Planning Commission
Regular Meeting
December 3, 2024 - 6:30 PM
City Hall Council Chambers

AGENDA

PUBLIC PARTICIPATION

A. Public Participation Information

The City of Auburn Planning Commission Meeting scheduled for Tuesday, December 3, 2024, at 6:30 p.m., will be held in-person and virtually. To attend the meeting virtually, please follow the webinar instructions below:

Join from a PC, Mac, iPad, iPhone or Android device
Please click this URL to join. https://us06web.zoom.us/j/84764578149
Or One tap mobile:
+12532158782,,84764578149# US (Tacoma)
+12532050468,,84764578149# US
Or join by phone:
Dial(for higher quality, dial a number based on your current location):
US: +1 253 215 8782 or +1 253 205 0468 or +1 720 707 2699 or +1 346 248 7799 or +1 669 444 9171 or +1 719 359 4580 or +1 309 205 3325 or +1 312 626 6799 or +1 360 209 5623 or +1 386 347 5053 or +1 507 473 4847 or +1 564 217 2000 or +1 646 558 8656 or +1 646 931 3860 or +1 689 278 1000 or +1 301 715 8592 or +1 305 224 1968 or 888 475 4499 (Toll Free) or 877 853 5257 (Toll Free)
Webinar ID: 847 6457 8149
International numbers available: https://us06web.zoom.us/u/ku8bw5pXS

CALL TO ORDER

ROLL CALL

PLEDGE OF ALLEGIANCE

AGENDA MODIFICATIONS

AUDIENCE PARTICIPATION

A. Comment from the audience on any proposal for action by the Commission. If the comment is related to an action subsequently listed here as a public hearing, the comment should be provided at the time of the public hearing.

The public can participate in-person or submit written comments in advance.

Participants can submit written comments via mail, fax, or email. All written comments must be received prior to 5:00 p.m. on the day before the scheduled meeting and must be 350 words or less.

Please mail written comments to:
City of Auburn
Attn: Tammy Gallier, Administrative Specialist
25 W Main St
Auburn, WA 98001

Please fax written comments to:
Attn: Tammy Gallier, Administrative Specialist
Fax number: 253-804-3114

Email written comments to: tgallier@auburnwa.gov

If an individual requires accommodation to allow for remote oral comment because of a difficulty attending a meeting of the governing body, the City requests notice of the need for accommodation by 5:00 p.m. on the day before the scheduled meeting. Participants can request accommodation to be able to provide a remote oral comment by contacting the Community Development Department in person, by phone (253) 931-3090 or by email (tgallier@auburnwa.gov).

APPROVAL OF MINUTES

A. October 8, 2024 Draft Minutes from the Regular Planning Commission Meeting

B. October 23, 2024 Draft Minutes from the Special Planning Commission Meeting

INTRODUCTION

A. 2024 Comprehensive Plan - Planning Commission (Teague)
Brief overview of tonight's agenda items.

PUBLIC HEARING

A. Water Plan (Vondrak)
Planning Commission deliberation and action on the proposed changes to the Capital Facilities Element

OTHER BUSINESS

A. Capital Facilities Element (Tatro)
Planning Commission deliberation and action on the proposed changes to the Capital Facilities Element

B. Utilities Element (Tatro)
Planning Commission deliberation and action on the proposed changes to the Utilities Element

C. Land Use and Housing Element (Tatro)
Planning Commission deliberation and action on the proposed changes to the Housing and Land Use Element

D. 2024 Period Comprehensive Plan Update Package 2 (Teague)
Planning Commission deliberation and action on the elements contained in package 2: Transportation Plan, Sewer Plan, Stormwater Plan, Water System Plan, PROS Plan, Parks Element, Capital Facilities Element, Utilities Element, Transportation Element

COMMUNITY DEVELOPMENT REPORT

ADJOURNMENT

The City of Auburn Planning Commission is a seven member advisory body that provides recommendations to the Auburn City Council on the preparation of and amendments to land use plans and related codes such as zoning. Planning Commissioners are appointed by the Mayor and confirmed by the City Council.

Actions taken by the Planning Commission, other than approvals or amendments to the Planning Commission Rules of Procedure, are not final decisions; they are in the form of recommendations to the City Council which must ultimately make the final decision.

CITY OF AUBURN WASHINGTON

AGENDA BILL APPROVAL FORM

Agenda Subject:
October 8, 2024 Draft Minutes from the Regular Planning Commission Meeting

Meeting Date:
December 3, 2024

Department:
Community Development

Attachments:
10-08-2024 Minutes

Budget Impact:
Current Budget: $0
Proposed Revision: $0
Revised Budget: $0

Administrative Recommendation:

Background for Motion:

Background Summary:

Councilmember:

Staff: Jason Krum

Planning Commission Meeting
October 8, 2024 - 6:30 PM
City Hall Council Chambers
MINUTES

I. PUBLIC PARTICIPATION

A. Public Participation Information

The City of Auburn Planning Commission Meeting was held in person and virtually.

II. CALL TO ORDER

Chair Judi Roland called the meeting to order at 6:30 p.m. in the Council Chambers of Auburn City Hall, 25 West Main Street.

A. ROLL CALL/ESTABLISHMENT OF QUORUM

Commissioners present: Chair Judi Roland, Vice Chair Phillip Stephens, Julie Berry, Kent Sprague, William Stewart, Aaron Vanderpol and Lynn Walters.

Staff members present: Planning Services Manager Alexandria Teague, Deputy City Attorney Paul Byrne, Director of Community Development Jason Krum, Planner Alyssa Tatro, Development Review Engineer Shannon Howard, Parks Planning and Development Manager Thaniel Gouk, and Deputy City Clerk Hannah Scholl. City Attorney Jason Whalen and Assistant Director of Community Development Steven Sturza attended the meeting virtually via Zoom.

B. PLEDGE OF ALLEGIANCE

Chair Roland led those in attendance in the Pledge of Allegiance.

III. PUBLIC COMMENT

There was no public comment.

IV. APPROVAL OF MINUTES

A. August 20, 2024 Minutes from the Planning Commission Meeting

Commissioner Walters moved and Commissioner Sprague seconded to approve the August 20, 2024 Planning Commission Meeting Minutes.

MOTION CARRIED UNANIMOUSLY. 7-0

V. PUBLIC HEARINGS

A. Parks and Recreation PROS Plan (Gouk)

Planning Commission deliberation and action on the proposed changes to the PROS Plan.

Chair Roland opened the Public Hearing at 6:34 p.m.

Virtual/Written Comments:

No virtual or written comments were received.

Planner Gouk provided the Commission with a brief re-cap of the 2024 Parks, Recreation and Open Space (PROS) Plan.

In-Person Comments:

No one came forward to speak.

Commissioner Stewart moved and Vice Chair Stephens seconded to provide the 2024 PROS Plan recommendation to City Council.

MOTION CARRIED UNANIMOUSLY. 7-0

Chair Roland closed the Public Hearing at 6:37 p.m.

B. Proposed Amendments to Title 14 (Teague)

Staff to present key changes to Title 14 "Project Review". Planning Commission deliberation and action on the proposed changes to Title 14 Zoning to implement the Periodic Comprehensive Plan Update.

Chair Roland opened the Public Hearing at 6:38 p.m.

Virtual/Written Comments:

No virtual or written comments were received.

In-Person Comments:

No one came forward to speak.

Manager Teague provided the Commission with a presentation of Senate Bill (SB) 5290 Code Updates including review requirements per RCW 36.70B, permit decision timelines, permit types, and permit review timelines.

The Commissioners discussed permit review timelines, staffing within the Community Development Department, and permit checklists.

Director Krum discussed permit fee refunds, annual reporting to the

Department of Commerce, and the proposed additional project review measures including RCW 36.70B.160(g)(h)(j).

Manager Howard discussed the proposed Code updates to Title 14: Project Review, Title 17: Land Adjustments and Divisions, and Title 18: Zoning of the Auburn City Code (ACC).

The Commissioners discussed permit decision timelines, proposed Code updates, and fees.

Commissioner Sprague moved and Commissioner Walters seconded to provide the proposed Amendments to Title 14 as a recommendation to City Council.

MOTION CARRIED UNANIMOUSLY. 7-0

Chair Roland closed the Public Hearing at 7:22 p.m.

VI. OTHER BUSINESS

A. Proposed Amendments to Title 18 (Teague)

Staff to present key changes to Title 18 Zoning to implement the Periodic Comprehensive Plan Update.

Manager Teague provided the Commission with a presentation on the proposed updates to Title 18: Zoning of the ACC including key changes, new definitions, revised definitions, implementation, and next steps.

The Commissioners discussed density, major transit stops, residential zones, urban separators, middle housing, timelines, design standards, mixed use developments, and next steps.

The Commission will hold a Public Hearing regarding the Proposed Amendments to Title 18 on October 23, 2024.

VII. COMMUNITY DEVELOPMENT REPORT

There was no report.

VIII. ADJOURNMENT

There being no further business to come before the Council, the meeting was adjourned at 9:03 p.m.

APPROVED this 3rd day of December 2024.

_____ _____

JUDI ROLAND, CHAIR Hannah Scholl, Deputy City Clerk

The City of Auburn Planning Commission is a seven member advisory body that provides recommendations to the Auburn City Council on the preparation of and amendments to land use plans and related codes such as zoning. Planning Commissioners are appointed by the Mayor and confirmed by the City Council.

Actions taken by the Planning Commission, other than approvals or amendments to the Planning Commission Rules of Procedure, are not final decisions; they are in the form of recommendations to the city council which must ultimately make the final decision.

CITY OF AUBURN WASHINGTON

AGENDA BILL APPROVAL FORM

Agenda Subject:
October 23, 2024 Draft Minutes from the Special Planning Commission Meeting

Meeting Date:
December 3, 2024

Department:
Community Development

Attachments:
10-23-2024 Minutes

Budget Impact:
Current Budget: $0
Proposed Revision: $0
Revised Budget: $0

Administrative Recommendation:

Background for Motion:

Background Summary:

Councilmember:

Staff: Jason Krum

Planning Commission Meeting
October 23, 2024 - 6:30 PM
Special Meeting - City Hall Council Chambers
MINUTES

I. PUBLIC PARTICIPATION

A. Public Participation Information

The City of Auburn Planning Commission Meeting was held in person and virtually.

II. CALL TO ORDER

Chair Judi Roland called the meeting to order at 6:30 p.m. in the Council Chambers of Auburn City Hall, 25 West Main Street.

A. ROLL CALL/ESTABLISHMENT OF QUORUM

Commissioners present: Chair Judi Roland, Vice Chair Phillip Stephens, Julie Berry, Kent Sprague, William Stewart, and Lynn Walters. Aaron Vanderpol arrived at 6:32 p.m.

Staff members present: Planning Services Manager Alexandria Teague, Planner Gabriel Clark, Senior Planner Alyssa Tatro, Senior City Staff Attorney Taryn Jones, Deputy City Clerk Hannah Scholl, and Acting Deputy City Clerk Gerri Blackwell.

B. PLEDGE OF ALLEGIANCE

Chair Roland led those in attendance in the Pledge of Allegiance.

III. PUBLIC COMMENT

No one came forward to speak.

IV. APPROVAL OF MINUTES

A. September 17, 2024 Minutes from the Planning Commission Meeting

Vice Chair Stephens moved and Commissioner Walters seconded to approve the September 17, 2024 Planning Commission Meeting Minutes.

MOTION CARRIED UNANIMOUSLY. 7 - 0

V. PUBLIC HEARINGS

A. Annual Amendments (Clark)

Staff to present annual amendments to the Comprehensive Plan. Planning Commission deliberation and action on the annual amendments.

Chair Roland opened the Public Hearing at 6:34 p.m.

Planner Clark provided the Commission with a presentation on the 2024 Comprehensive Plan Annual Amendments including the purpose of the Plan and amendments, City initiated amendments, and private initiated amendments. He discussed the School Capital Facility Plans including the Auburn, Dieringer, Federal Way, and Kent School Districts, the City of Auburn Capital Facilities Plan Update including budget, and next steps.

In-Person Comments:

Jeffrey Gross, Auburn School District, Auburn WA

Jeffrey discussed the Capital Facilities Plan, Impact Fees, building new schools, amount of enrolled students, amount of space available, need for additional space, and the potential new middle school and location.

Commissioners discussed School District boundary lines.

Planner Clark provided the Commission with a presentation on the 2024 School Impact Fees including the four districts within City Limits, operations and projected growth for the Auburn, Dieringer, Federal Way, and Kent School Districts, Single Family fees, and Multi-Family fees.

Chair Roland closed the Public Hearing at 6:58 p.m.

Vice Chair Stephens moved and Commissioner Sprague seconded to recommend approval to the City Council of Staff recommendation Version 2 at the December 2, 2024 City Council Meeting.

MOTION CARRIED UNANIMOUSLY. 7-0

B. Proposed Amendments to Title 18 (Teague)

Planning Commission deliberation and action on the proposed changes to Title 18 Zoning, and Title 17 to implement the Periodic Comprehensive Plan Update.

Chair Roland opened the Public Hearing at 7:02 p.m.

Manager Teague provided a brief summary of the proposed Amendments to Title 18 including key changes, implementation process, residential zones, lot layouts, yield of lots and units.

No one came forward to speak.

Commissioners discussed mobile home communities, density zoning,

square footage of housing, middle housing, lot sizes, short plats, lot layouts, and subdivisions.

Vice Chair Stephens moved and Commissioner Sprague seconded to recommend seven dwellings per acre, option B, as outlined.

MOTION CARRIED 6-1. Commissioner Berry voted no.

Manager Teague discussed key changes to the Middle Housing Standards, Accessory Dwelling Units (ADUs) development standards, Downtown Urban Center (DUC) District maps, landscaping and screening zones, off-street parking and loading, new definitions in Auburn City Code (ACC) 17.04, unit lot subdivisions, and staff recommendations.

Commissioners discussed Middle Housing and ADU Grants, parking dimension requirements, definitions updates, manufactured homes, next steps, and the next meeting dates.

Chair Roland closed the Public Hearing at 7:53 p.m.

Commissioner Stewart moved and Commissioner Sprague seconded to accept staff recommendation Version Two as outlined.

MOTION CARRIED UNANIMOUSLY. 7-0

VI. **ADJOURNMENT**

There being no further business to come before the Planning Commission, the meeting was adjourned at 8:01 p.m.

APPROVED this 3rd day of December, 2024.

_____ _____

JUDI ROLAND, CHAIR Gerri Blackwell, Acting Deputy City Clerk

The City of Auburn Planning Commission is a seven member advisory body that provides recommendations to the Auburn City Council on the preparation of and amendments to land use plans and related codes such as zoning. Planning Commissioners are appointed by the Mayor and confirmed by the City Council.

Actions taken by the Planning Commission, other than approvals or amendments to the Planning Commission Rules of Procedure, are not final decisions; they are in the form of recommendations to the city council which must ultimately make the final decision.

CITY OF AUBURN WASHINGTON

AGENDA BILL APPROVAL FORM

Agenda Subject:
2024 Comprehensive Plan - Planning Commission (Teague)
Brief overview of tonight's agenda items.

Meeting Date:
December 3, 2024

Department:
Community Development

Attachments:
2024 Comp Plan PC Memo
Overview

Budget Impact:
Current Budget: $0
Proposed Revision: $0
Revised Budget: $0

Administrative Recommendation:

Background for Motion:

Background Summary:

Councilmember:

Staff: Jason Krum

Memorandum

To: Judi Roland, Chair, Planning Commission
Planning Commission Members

From: Alexandria Teague, Planning Services Manager, Comm. Dev. Dept
Alyssa Tatro, Senior Planner, Comm. Dev. Dept

Date: November 25, 2024

Re: **2024 Comprehensive Plan - Planning Commission**

Each city and county in Washington state is required to conduct a periodic update of its comprehensive plan and development regulations per RCW 36.70A.130 (the Growth Management Act or GMA). In general, the purpose is to ensure consistency with the Puget Sound Regional Council Vision 2050, the Countywide Planning Policies (for Auburn this means both Pierce and King County), any changes in state laws over the intervening time, and to respond to changing conditions within the local community.

Tonight, public hearing on the Water Plan will be conducted. A regular meeting to discuss the updated Water Plan was held on July 2nd. Staff requests that following the public hearing, that Planning Commission will deliberate and take action on a recommendation to City Council for adoption of the Water System Plan. These Plan is also included under “Package 2”.

Planning Commission will also deliberate and take action on a recommendation to City Council for adoption of the Capital Facilities and Utilities Elements. A regular meeting and public hearing were held for each of these elements earlier in the year. These Elements are also included under “Package 2”.

Staff will provide an update on the Land Use and Housing Elements. The update is to info Planning Commission of the changes made to address agency comments. Agency comments were received on the housing element from the Puget Sound Regional Council (PSRC), Department of Commerce, and King County. A total of six comments were received from PSRC, four comments received from the Dept. of Commerce, and six comments were received from King County. All required updates have been made to comply with the agency comments. A public hearing has been held on both the Land Use and Housing Element on April 16th. Staff requests that Planning Commission will deliberate and take action on a recommendation to City Council for adoption of the Land Use and Housing Elements.

Planning Commission is also requested deliberate and action on “Package 2”, is expected at this meeting.

This meeting is open to the public and has been advertised appropriately as a regular meeting. The table below illustrates current, past, and upcoming Planning Commission meetings for the Comprehensive Plan update, as well as subject.

Subject	Public Meeting	Public Hearing	PC Acceptance	Complete
Planning Commission - Package 1				
Land Use Element	April 2, 2024	April 16, 2024	April 16, 2024	Yes
Housing Element	April 2, 2024	April 16, 2024	April 16, 2024	Yes
Historic Preservation Element	April 16, 2024	April 30, 2024	April 30, 2024	Yes
Economic Development Element	April 16, 2024	April 30, 2024	April 30, 2024	Yes
Climate Element	April 30, 2024	May 7, 2024	May 7, 2024	Yes
Planning Commission - Package 2				
Sewer Plan	May 21, 2024	June 4, 2024	September 17, 2024	Yes
Stormwater Plan	June 4, 2024	June 18, 2024	June 18, 2024	Yes
Transportation Element	June 4, 2024	July 16, 2024	July 16, 2024	Yes
Capital Facilities Element	June 18, 2024	July 2, 2024	December 3, 2024	-
Water System Plan	July 2, 2024	December 3, 2024	December 3, 2024	
Utilities Element	July 2, 2024	July 16, 2024	December 3, 2024	-
Parks Element	April 30, 2024	May 7, 2024	May 7, 2024	Yes
Parks PROS Plan	September 17, 2024	October 8, 2024	October 8, 2024	Yes
Code Update	October 8, 2024	October 23, 2024	October 23, 2024	Yes
Planning Commission Action – Recommendation for Adoption to City Council				
Package 1 (Land Use, Housing, Historic Preservation, Economic Development, and Climate Elements)	-	-	July 16, 2024	Yes
Code Update	-	-	October 23, 2024	Yes
Package 2 (Capital Facilities Element, Utilities Element, Transportation Element, Parks Element, PROS Plan, Sewer Plan, Storm Plan, and Water Plan)			December 3, 2024	

For reference, the current adopted Comprehensive Plan Elements can be found here.

Feel free to contact Alexandria Teague, Planning Services Manager, at ateague@auburnwa.gov or 253-931-3003 with any questions.

Attachments:
ATTACHMENT 1 - Water Plan Update Presentation
ATTACHMENT 2 - Comprehensive Water System Plan
ATTACHMENT 3 - Capital Facilities Element Presentation

ATTACHMENT 4 - Capital Facilities Element Presentation
ATTACHMENT 5 - V4 Capital Facilities
ATTACHMENT 6 - Utilities Element Presentation
ATTACHMENT 7 - V4 Utilities Element
ATTACHMENT 8 - Land Use and Housing Elements Presentation
ATTACHMENT 9 - V6 Land Use Element - Council Study Session
ATTACHMENT 10 - V6 Housing Element - Council Study Session
ATTACHMENT 11 - Comprehensive Land Use Map
ATTACHMENT 12 - Comprehensive Zoning Map
ATTACHMENT 13 - Comprehensive Plan Staff Report Package 2
ATTACHMENT 14 - V4 Capital Facilities
ATTACHMENT 15 - V4 Utilities Element
ATTACHMENT 16 - V5 Transportation Element
ATTACHMENT 17 - V5 Parks Element
ATTACHMENT 18 - Appendix G - Comprehensive Transportation Plan
ATTACHMENT 19 - Appendix F - Parks PROS Plan
ATTACHMENT 20 - Comprehensive Water System Plan
ATTACHMENT 21 - Comprehensive Sewer Plan
ATTACHMENT 22 - Comprehensive Storm Drainage Plan

CITY OF AUBURN WASHINGTON

AGENDA BILL APPROVAL FORM

Agenda Subject:
Water Plan (Vondrak)
Planning Commission deliberation and action on the proposed changes to the Capital Facilities Element

Meeting Date:
December 3, 2024

Department:
Community Development

Attachments:
ATTACHMENT 1 - Water Plan Update Presentation,
ATTACHMENT 2 - Comprehensive Water System Plan

Budget Impact:
Current Budget: $0
Proposed Revision: $0
Revised Budget: $0

Administrative Recommendation:

Background for Motion:

Background Summary:

Councilmember:

Staff: Jason Krum

ENGINEERING SERVICES

2024 COMPREHENSIVE WATER PLAN UPDATE

SENAIT GEBREEYESUS
WATER UTILITY ENGINEER

PLANNING COMMISSION MEETING
DECEMBER 3, 2024

Public Works Department
Engineering Services • Airport Services • Maintenance & Operations Services

AUBURN VALUES

SERVICE
ENVIRONMENT
ECONOMY
CHARACTER
SUSTAINABILITY
WELLNESS
CELEBRATION

2024 COMPREHENSIVE WATER PLAN (RECAP)

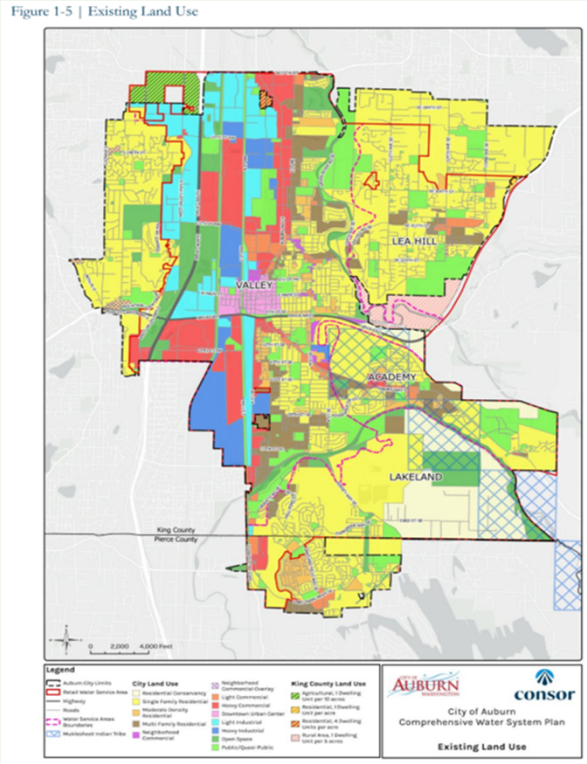
Comprehensive update addressing current system data, future projections, and regulatory compliance.

Four service areas: Academy, Lakeland Hills, Lea Hill, and Valley, totaling approximately 15,000 service connections.

Infrastructure: 306 miles of water mains, 8 reservoirs, 8 pump stations, 6 wells, 2 springs, and 2 interties with Tacoma Water.

Planning horizons for the next 10 and 20 years to meet growth and ensure financial sustainability.

CHAPTER 1: WATER SYSTEM DESCRIPTION
SERVICE AREA DETAILS



Total area:

16,193 acres.

Breakdown:

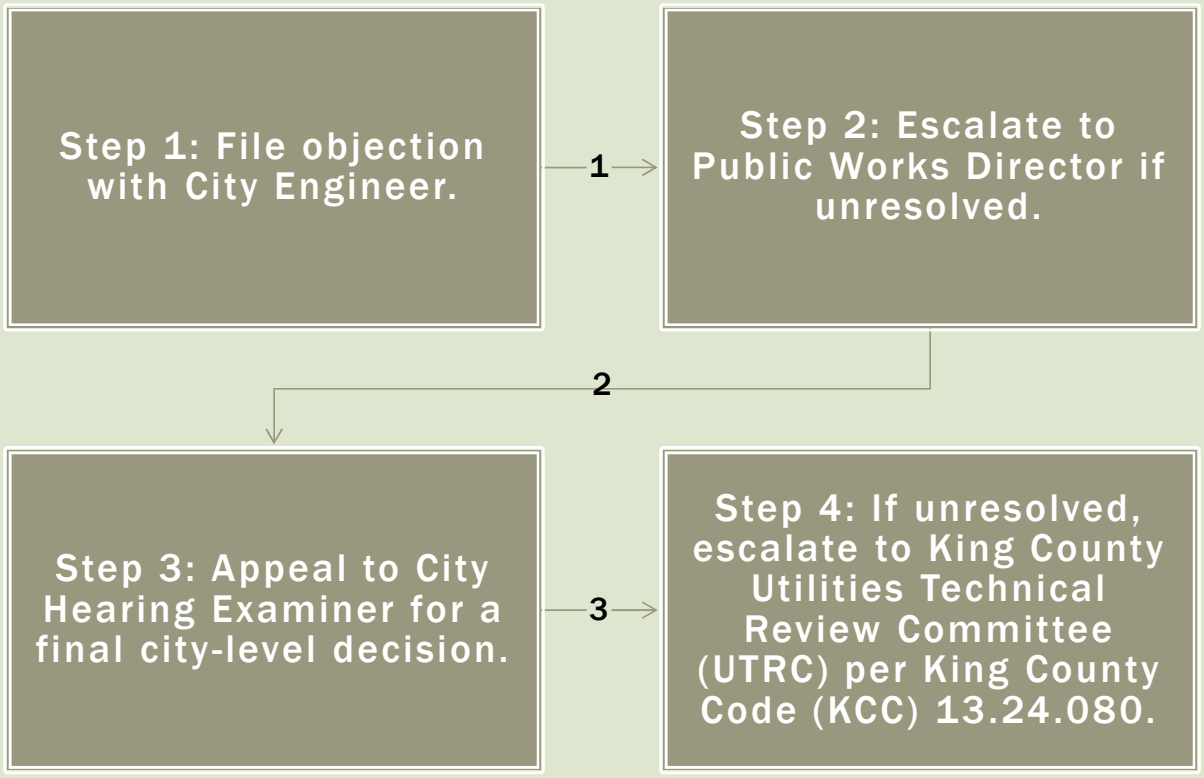
15,877 acres (King County)

316 acres (Pierce County)

700 acres (4.3%) in unincorporated King County.

Updated Figure 1-5 to identify land use in unincorporated King County.

CHAPTER 1: WATER SYSTEM DESCRIPTION APPEALS PROCESS (KING COUNTY)



CHAPTER 2: BASIC PLANNING DATA

Zoning District	Land Use	Definition	Fire Flow Requirement (gpm)
I INSTITUTIONAL USE DISTRICT	Public/Quasi-Public	Private schools, Green River College, large campus development	2,500
OS OPEN SPACE	Open Space	No change	-
DUC - DOWNTOWN URBAN CENTER 125	Downtown Urban Center	DUC with up to 125-ft tall buildings where permitted	2,500
DUC - DOWNTOWN URBAN CENTER 75	Downtown Urban Center	DUC with up to 75-ft tall buildings where permitted	2,500
DUC - DOWNTOWN URBAN CENTER 55	Downtown Urban Center	DUC with up to 55-ft tall buildings where permitted	2,500
DUC - NEIGHBORHOOD RESIDENTIAL	Downtown Urban Center	Mixed-use and R-15	2,500
DUC - HEALTH AND WELLNESS 125	Downtown Urban Center	R-OH-MultiCare Zone	2,500
DUC - FLEX RESIDENTIAL	Downtown Urban Center	RO with permitted specific industrial uses (craft workshops, breweries, coffee, etc.)	2,500
LAKELAND HILLS SOUTH SPECIAL PLAN AREA – PUD[1]	Neighborhood Residential Two		1,500-2,500
AIRPORT LANDING FIELD DISTRICT	Industrial		2,500
AUBURN GATEWAY DISTRICT	Mixed Use		2,500
DUC - I INSTITUTIONAL	Downtown Urban Center		2,500
DUC - M-1 LIGHT INDUSTRIAL	Downtown Urban Center		2,500
I INSTITUTIONAL	Public/Quasi-Public		2,500
PLANNED UNIT DEVELOPMENT DISTRICT[1]		Varies by location	1,500-2,500
TERRACE VIEW DISTRICT	Commercial		2,500
UNCLASSIFIED USE DISTRICT[1]		Varies by location	1,500-2,500
A-10	Agricultural	1 Dwelling Unit per 10 acres, located in unincorporated King County.	1,500
RA-5	Rural Area	1 Dwelling Unit per 5 acres, located in unincorporated King County.	1,500
R-1	Residential	1 Dwelling Unit per acre, located in unincorporated King County	1,500
R-4	Residential	4 Dwelling Units per acre, located in unincorporated King County	1,500

- Zoning and Fire Flow (King County):
  - Updated Table 2-13 to include zoning districts and fire flow requirements for unincorporated King County.
  - Added text describing future land use and zoning designations in unincorporated areas.

CHAPTER 3: SYSTEM ANALYSIS & ASSET MANAGEMENT

- Intertie Capacities (Tacoma Water):
  - Corrected Table 3-19 to reflect Tacoma Water intertie contractual limits: 5.12 MGD for both B Street and 132nd Street interties combined.
  - Added clarifications about temporary exceedances, provided the 24-hour average complies with the contract.

Table 3-19 | Supply Analysis with Largest Source Out of Service

Description	2024 Scenario	2034 Scenario	2044 Scenario
Required Supply (gpm)			
FSS Replenished in 72-hours	797	797	797
Maximum Day Demand[1], gpm	8,657	9,751	11,068
Average Day Demand[1], gpm	4,899	5,518	6,263
Available Supply (gpm)			
Largest Source (Q_L) – Tacoma Interties	3,555	3,555	3,555
Largest Active Source – Coal Creek Springs[2]	3,500	3,500	3,500
Total Sources (Q_T)[3,4]	15,610	15,610	15,610
DOH Criteria: MDD while replenishing FSS within 72-hrs (24-hr source pumping may be assumed)			
Surplus / (Deficit) of Supply, gpm	6,156	5,062	3,746
DOH Criteria: ADD with largest source out of service			
Surplus / (Deficit) of Supply, gpm	7,156	6,537	5,792
DOH Criteria: MDD in a pumping period of 20 hours or less of pumping			
Surplus / (Deficit) of Supply, gpm	4,352	3,257	1,941
City Criteria: MDD with largest active water supply source out of service			
Surplus / (Deficit) of Supply, gpm[2]	3,453	2,359	1,042

Notes:
1. Current analysis does NOT include a separate allocation for wholesale customers who have not purchased water from the City since 2019 or earlier (i.e., MIT or LMWD).
2. The City's largest active source is Coal Creek Springs since the City has not purchased water from Tacoma since 2016.
3. Total sources are: Well 1, 2, 4, 5, 5a, and 6 (7,955 gpm), Coal Creek Springs (3,500 gpm), West Hill Springs (600 gpm), and two Tacoma Interties (3,555 gpm).

CHAPTER 3: SYSTEM ANALYSIS & ASSET MANAGEMENT
CHAPTER 5: SOURCE WATER PROTECTION

- Water Rights (Ecology):
  - Added footnotes to Table 3-18 noting constraints for:
    - Braunwood Well (G1-25173C).
    - West Hill Springs (S1-049354CL).
  - Modifications to Appendix I

Water Right Self-Assessment Form for Water System Plan

Mouse-over any link for more information. Click on any link for more detailed instructions.

Water Right Permit, Certificate, or Claim # *If water right is interruptible, identify limitation in yellow section below	WFI Source # If a source has multiple water rights, list each water right on separate line	Existing Water Rights Qi= Instantaneous Flow Rate Allowed (GPM) Qa= Annual Volume Allowed (Acre-Feet/Year) This includes wholesale water sold				Current Source Production – Most Recent Calendar Year Qi = Max Instantaneous Flow Rate Withdrawn (GPM or CFS) Qa = Annual Volume Withdrawn (Acre-Feet/Year) This includes wholesale water sold				10-Year Forecasted Source Production (determined from WSP) This includes wholesale water sold				20-Year Forecasted Source Production (determined from WSP) This includes wholesale water sold			
		Primary Qi Maximum Rate Allowed	Non-Additive Qi Maximum Rate Allowed	Primary Qa Maximum Volume Allowed	Non-Additive Qa Maximum Volume Allowed	Total Qi Maximum Instantaneous Flow Rate Withdrawn	Current Excess or (Deficiency) Qi	Total Qa Maximum Annual Volume Withdrawn	Current Excess or (Deficiency) Qa	Total Qi Maximum Instantaneous Flow Rate in 10 Years	10-Year Forecasted Excess or (Deficiency) Qi	Total Qa Maximum Annual Volume in 10 Years	10-Year Forecasted Excess or (Deficiency) Qa	Total Qi Maximum Instantaneous Flow Rate in 20 Years	20-Year Forecasted Excess or (Deficiency) Qi	Total Qa Maximum Annual Volume in 20 Years	20-Year Forecasted Excess or (Deficiency) Qa
00857 S1*01304 C	Coal Creek Springs	6,732		9,410		4,383	2,349	3,758	5,652	5,715	1,017	8,097	1,313	6,685	47	8,781	629
03560 G1*04731C	Well 1, 6, & 7	2,200		1,120		2,100	100	786	334	2,200	0	1,120	0	2,200	0	1,120	0
G1-00277C	Well 2, 6, & 7	2,400		1,360	2,480	2,062	338	1,360	0	2,400	0	1,360	0	2,400	0	1,360	0
G1-23629C	Well 3A & 3B, 6, & 7	2,800		3,600		592	2,208	0	3,600	2,022	778	574	3,026	2,800	0	717	2,883
G1-20391C	Well 4, 6, and 7	2,800		3,600		2,388	412	681	2,919	2,800	0	3,038	562	2,800	0	3,409	191
G1-23633C	Wells 5, 5A, 5B, &5C	1,000		720		730	270	191	529	952	48	437	283	1,000	0	560	160
G1-25518	Well 5A	167		0	187	90	77	0	0	117	50	0	0	167	0	0	0
G1-22769 C	Algona Well	500		175		0	500	0	175	0	500	0	175	0	500	0	175
S1-049354CL	West Hill Springs	625		1,010		563	62	481	529	625	0	1,010	0	625	0	1,010	0
	TOTALS =	19,224		20,995		12,909	6,315	7,257	13,738	16,831	2,393	15,636	5,359	18,677	547	16,957	4,038
Column Identifiers for Calculations:		A		B		C	=A-C	D	=B-D	E	= A-E	F	=B-F	G	=A-G	H	=B-H

CHAPTER 8: CAPITAL IMPROVEMENTS PLAN

CIP ID	Name	CAP/Non-CAP	Total Estimated Cost 2024 USD	2024	10-Year										20-Year		
					2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035-38	2039-42	2043-44
S-16	Algona Well 1 Study – Phase 2	Non-CAP	$250,000													$250,000	
Storage																	
R-01	Reservoir Repair & Replacements	Non-CAP	$1,392,000	$192,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$240,000	$240,000	$120,000
R-02	Reservoir Painting (10-year Cycle)	Non-CAP	$3,500,000		$250,000	$1,500,000									$1,750,000		
R-03	Academy PRV Project	CAP	$470,000				$470,000										
R-04	Reservoir Capital Improvements	Non-CAP	$470,000				$470,000										
R-05	Braunwood Reservoir Improvements	Non-CAP	$250,000													$250,000	
R-06	Valley Service Area Reservoir No. 3	CAP	$11,745,000													$1,500,000	$10,245,000
Pump Station																	
PS-01	Intertie Pump Station/Lea Hill BPS Improvements	Non-CAP	$2,325,000	$75,000	$250,000	$2,000,000											
PS-02	Lea Hill Pump Station Replacement	Non-CAP	$6,365,000				$765,000	$3,000,000	$2,600,000								
PS-03	Braunwood Pump Station Mechanical Upgrades	Non-CAP	$250,000											$70,000	$180,000		
PS-04	Game Farm Park Pump Station Mechanical Upgrades	Non-CAP	$250,000											$70,000	$180,000		
Distribution																	
D-01	Annual Distribution System Improvements Program	CAP	$59,699,000		$400,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$3,572,636	$14,290,546	$14,290,546	$7,145,273
D-02	Street Utility Improvements	Non-CAP	$24,618,000		$601,000	$617,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$5,200,000	$5,200,000	$2,600,000
D-03	Water Repair & Replacements	Non-CAP	$11,950,000		$150,000	$450,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$650,000	$2,600,000	$2,600,000	$1,300,000
D-04	Water Trench Patches Program	Non-CAP	$3,360,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$640,000	$640,000	$320,000
D-05	West Hill Springs Transmission Main Replacement	Non-CAP	$1,401,000	$50,000		$200,000	$1,151,000										
D-06	Lea Hill 648 Zoning Adjustment	CAP	$104,000				$104,000										
General																	
G-01	Comprehensive Water System Plan Update - 2034	Non-CAP	$750,000										$375,000	$375,000			
G-01	Comprehensive Water System Plan Update - 2044	Non-CAP	$750,000														$750,000
Total Project Cost (March 2024 USD)			**$214,834,315**	**$15,368,740**	**$13,020,848**	**$12,897,298**	**$10,674,810**	**$11,364,810**	**$10,214,810**	**$8,937,250**	**$10,647,750**	**$11,544,961**	**$9,369,039**	**$10,367,636**	**$42,115,546**	**$25,460,546**	**$22,850,273**
Cost in Future USD with Inflation/Escalation				**$15,505,949**	**$13,438,366**	**$15,356,813**	**$13,346,021**	**$14,919,117**	**$14,079,931**	**$12,934,911**	**$16,181,050**	**$18,421,739**	**$15,697,211**	**$18,238,810**	**$84,303,230**	**$61,753,697**	**$64,192,441**

- **Cost Table Reconciliation:**
  - **Reconciled discrepancies in Tables 8-9, 8-10, and 9-3 by aligning timeframes and correcting errors.**
  - **Addressed differences in escalation rates: 5% in the Capital Improvement Plan vs. 3% in the Financial chapter.**

APPENDIX A: WATER SYSTEM POLICIES

- Appendix A: Policy 2.3 Duty to Serve
  - Policy 2.3 Duty to Serve

    "The City commits to providing reliable water service to all customers within its Retail Water Service Area (RWSA) in compliance with Washington Administrative Code (WAC) 246-290-106. The City also ensures adherence to King County Codes 13.24.138 and 13.24.140 where applicable for areas outside city limits in unincorporated King County. Revisions to the City's RWSA shall be made only by written agreement and in accordance with local, county and state regulations."

KEY TAKEAWAYS

Comprehensive updates improve compliance, accuracy, and transparency.

Strengthened collaboration with regulatory and regional partners.



NEXT STEPS



Council Adoption

City Council Presentation: December 2024.

Final Plan to Regulatory Agencies

WA Department of Health
King County
Pierce County


2024 WATER COMPREHENSIVE PLAN
Thank you for your time. Any Questions?
12

consor



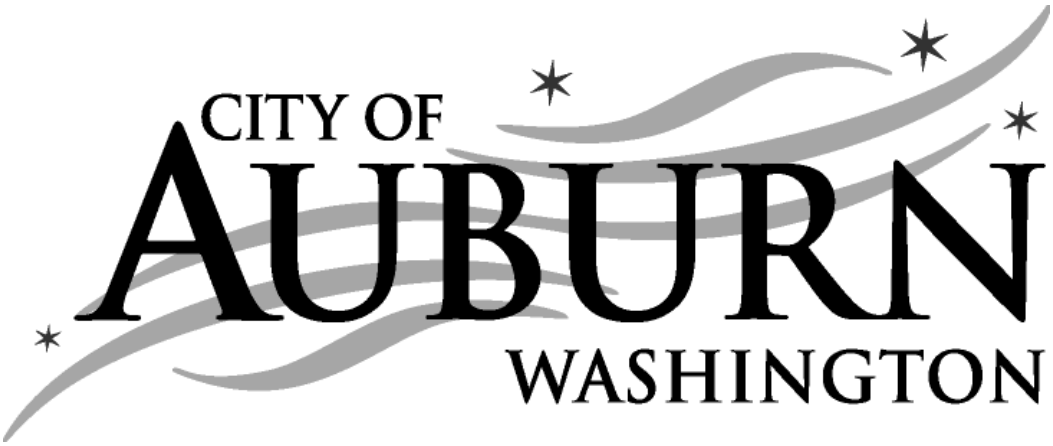
CITY OF AUBURN, WA

Water System Plan

October 2024

DRAFT

THIS PAGE LEFT INTENTIONALLY BLANK



2024
Water System Plan

City of Auburn, Washington

October 2024

DRAFT - FOR AGENCY REVIEW

PREPARED BY:
Consor
Point of Contact: Nichole Kruse
600 University Street, Suite #300
Seattle, WA 98101
P: 206-462-7030
E: Nichole.Kruse@consoreng.com

PREPARED FOR:
City of Auburn
Point of Contact: Ryan Vondrak
25 W Main Street
Auburn, WA 98001
P: 253-931-3086
E: Rvondrak@auburnwa.gov

THIS PAGE LEFT INTENTIONALLY BLANK

City of Auburn, WA
Water System Plan
October 2024

PREPARED BY:
Consor
Point of Contact: Nichole Kruse
600 University Street, Suite #300
Seattle, WA 98101
P: 206-462-7030
E: Nichole.Kruse@consoreng.com

PREPARED FOR:
City of Auburn
Point of Contact: Ryan Vondrak
25 W Main Street
Auburn, WA 98001
P: 253-931-3086
E: Rvondrak@auburnwa.gov

This Plan was prepared under the direction of the following registered professional engineers:



PRELIMINARY

Nichole Kruse, PE
Consor
Seattle, WA

Ryan Vondrak, PE
City of Auburn, Washington

THIS PAGE LEFT INTENTIONALLY BLANK

Table of Contents

Executive Summary

Introduction ES-1
ES.1 Description of Water System ES-1
Es.2 Basic Planning Data ES-5
Water Service Connections and Usage *ES-5*
Water Supply and Production *ES-5*
Future Population and Demand Projections *ES-5*
ES.3 System Analysis and Asset Management ES-7
Asset Management *ES-7*
Water Quality *ES-7*
Design Standards *ES-7*
Capacity Analysis *ES-8*
ES.4 Water Use Efficiency Program ES-9
Source and Service Metering *ES-9*
Distribution System Leakage *ES-10*
Water Use Efficiency Program *ES-10*
Climate Change Resiliency *ES-11*
ES.5 Source Water Protection ES-11
ES.6 Operations and Maintenance Program ES-12
ES.7 Distribution Facilities Design and Construction Standards ES-14
ES.8 Capital Improvement Program ES-14
ES.9 Financial Program ES-15

Chapter 1 Description of Water System

1.1 Objective 1-1
1.2 Plan Content 1-1
1.3 Ownership and Management 1-1
1.4 System History and Background 1-4
1.4.1 Geography *1-4*
1.4.2 Existing System Overview *1-5*

1.4.3 History *1-5*
1.5 Related Plans and Studies 1-13
1.6 Service Area, Maps, and Land Use 1-15
1.6.1 Wholesale Interties *1-16*
1.6.2 Emergency Interties *1-20*
1.7 System Policies 1-21
1.8 Duty of Service 1-22
1.9 Local Government Consistency 1-22
1.10 Watershed Plan Consistency 1-23

Chapter 2 Basic Planning Data

2.1 Water Service Area Population 2-1
2.2 Water Service Connection and Usage 2-2
2.2.1 Historical Accounts *2-2*
2.2.2 Historical Consumption *2-4*
2.2.3 Water Use Per Connection and Equivalent Residential Units *2-6*
2.2.4 Largest Water Users *2-7*
2.3 Water Supply and Production 2-10
2.3.1Historical Water Supply *2-10*
2.3.2 Average Day Demands and Maximum Day Demands *2-11*
2.3.3 Peak Hour Demand *2-12*
2.3.4 Seasonal Variations *2-13*
2.4 Distribution System Leakage 2-13
2.5 Water Supply Characteristics 2-14
2.6 Water Supply Reliability Evaluation 2-15
2.6.1 Use Impacts on Instream Flows *2-17*
2.6.2 Whole Interties *2-17*
2.6.3 Emergency Interties *2-18*
2.6.4 Potential Interties *2-18*
2.7 Future Population Projections and Land Use 2-18
2.7.1 Demographic Forecast *2-18*
2.7.2 Future Land Use and Zoning *2-19*
2.7.3 Projected Demographic Growth *2-23*
2.8 Future Water Demand 2-29

2.8.1 Projected Number of Connections *2-29*
2.8.2 Projected Water Demand *2-31*
2.8.3 Large User Demand Forecast *2-32*
2.8.4 Projected Retail ERUs *2-32*
2.8.5 Projected Retail Average Day and Maximum Day Demands *2-34*
2.8.6 Wholesale Demands *2-37*
2.8.7 Total Demands *2-38*

Chapter 3 System Analysis and Asset Management

3.1 Asset Management – Asset Inventory and Analysis 3-1
3.1.1 Distribution Facilities *3-6*
3.1.2 Water Source Facilities *3-14*
3.1.3 Water Treatment Facilities *3-17*
3.1.4 Storage Facilities *3-20*
3.1.5 Pump Station Facilities *3-22*
3.1.6 Facility Back-Up Power *3-23*
3.1.7 Facility Monitoring and Control *3-24*
3.1.8 2022 Sanitary Survey Findings *3-24*
3.2 Water Quality 3-25
3.2.1 Water Quality Treatment and Objectives *3-26*
3.2.2 Analysis of Source Water Quality *3-26*
3.2.3 Analysis of Distribution System Water Quality *3-28*
3.2.4 Recent Regulatory Changes *3-30*
3.3 Design Standards 3-31
3.4 Capacity Analysis 3-33
3.4.1 Water Rights *3-33*
3.4.2 Physical Capacity Analysis *3-35*
3.4.3 New Source of Supply Analysis *3-57*
3.5 Summary of System Deficiencies 3-57

Chapter 4 Water Use Efficiency Program

4.1 Source and Service Metering 4-2
4.1.1 Source Meters *4-2*
4.1.2 Service Meters *4-3*

4.2 Distribution System Leakage 4-4
4.2.1 Water Audits *4-5*
4.3 Water Use Efficiency Program 4-5
4.3.1 Program Requirements *4-6*
4.3.2 Mandatory Measures *4-7*
4.3.3 Program Goals *4-7*
4.3.4 2024-2034 Demand-Side Program Measures *4-8*
4.3.5 Reclaimed Water *4-10*
4.3.6 WUE Budget *4-10*
4.4 Water Use Efficiency Savings 4-10
4.5 Climate Change Resiliency 4-11
4.5.1 Expected Climate Changes for the City of Auburn *4-11*
4.5.2 Extreme Weather Events and Significant Challenges *4-12*
4.5.3 Assessment of Actions to Protect System *4-13*

Chapter 5 Source Water Protection

5.1 Sanitary Control Area 5-1
5.2 Wellhead Protection Program 5-1
5.2.1 Susceptibility Assessment *5-2*
5.2.2 Wellhead Protection Area Delineation *5-2*
5.2.3 Contaminant Source Inventory and Notification of Findings *5-4*
5.2.4 Contingency Plan *5-4*

Chapter 6 Operations and Maintenance Program

6.1 Water System Management and Personnel 6-1
6.1.1 Mission Statement *6-1*
6.1.2 Department Overview *6-1*
6.1.3 Internal and External Factors *6-1*
6.1.4 Water Utility Division Organization *6-2*
6.1.5 Communication System *6-4*
6.1.6 Operator Certification Program *6-5*
6.1.7 Education and Training Program *6-6*
6.2 Operations and Preventive Maintenance 6-6
6.2.1 Inspections, Preventive Maintenance, Repairs, and Replacement *6-7*

6.2.2 Reservoir Maintenance *6-9*
6.2.3 Pump Station Maintenance *6-9*
6.2.4 Treatment Facility Maintenance *6-10*
6.2.5 Pressure Reducing Valve Stations *6-10*
6.2.6 Utility Locating Service *6-10*
6.2.7 Fire Hydrant Inspection *6-10*
6.2.8 Dead-end Flushing *6-10*
6.2.9 Valve Exercising *6-11*
6.2.10 Unidirectional Flushing *6-11*
6.2.11 System Loss Program *6-12*
6.2.12 Distribution System Corrosion Inspection *6-13*
6.3 Comprehensive Water Quality Monitoring 6-14
6.4 Emergency Preparedness and Response 6-15
6.4.1 Vulnerability Assessment *6-16*
6.4.2 Wellhead Protection Program *6-16*
6.4.3 Water Shortage Contingency Plan *6-16*
6.5 Safety Procedures 6-16
6.6 Cross Connection Control Program 6-18
6.7 Sanitary Survey Findings 6-18
6.8 Customer Complaint Response Program 6-19
6.8.1 Customer Request Response Program *6-20*
6.9 Recordkeeping and Reporting 6-20
6.9.1 Cross Connection Control Program *6-21*
6.9.2 Water Meter Consumption *6-21*
6.9.3 Supervisory Control and Data Acquisition (SCADA) *6-21*
6.9.4 Water Meter Reading *6-21*
6.10 Summary of O&M Deficiencies and Recommended Improvements 6-22
6.10.1 Water Facilities Evaluation Study *6-22*
6.10.2 Recommended Improvements *6-22*

Chapter 7 Distribution Facilities Design and Construction Standards

7.1 Project Review Procedures 7-1
7.2 Policies and Requirements for Outside Parties 7-2

7.3 Design and Construction Standards 7-2
7.4 Construction Certification 7-4

Chapter 8 Capital Improvements Program

8.1 Prioritization 8-1
8.1.1 Project Identification 8-1
8.1.2 Prioritization Factors 8-2
8.1.3 Estimated Costs 8-2
8.2 Capital Improvement Program Summary and Schedule 8-4
8.2.1 Completed Projects 8-4
8.2.2 Active Projects 8-5
8.2.3 Capital Improvement Projects 8-8
8.3 CIP Summary and Schedule 8-18

Chapter 9 Financial Program

9.1 Introduction 9-1
9.2 Past Financial Performance 9-1
9.2.1 Comparative Financial Statements 9-1
9.3 Financial Plan 9-4
9.3.1 Capital Funding Plan 9-5
9.4 Available Funding Assistance and Financing Resources 9-6
9.4.1 City Resources 9-6
9.4.2 Outside Resources 9-8
9.4.3 Capital Financing Strategy 9-9
9.5 Financial Forecast 9-9
9.5.1 Current Financial Structure 9-10
9.6 Current and Projected Rates 9-14
9.6.1 Current Rates 9-14
9.6.2 Projected Rates 9-15
9.6.3 Conservation Based Rates 9-15
9.7 Affordability 9-15
9.8 Conclusion 9-16

List of Figures

ES-1 RWSA Vicinity Map ES-2

ES-2 Existing Facilities ES-3
ES-3 Hydraulic Profile ES-4
ES-4 Wellhead Protection Area Map ES-13
1-1 RWSA Vicinity Map 1-2
1-2 Water Utility – Organizational Chart 1-3
1-3 Existing Facilities 1-6
1-4 Adjacent Water Systems 1-17
1-5 Existing Land Use 1-18
1-6 Urban Growth Area 1-19
2-1 Comparison of Number of Connections to Annual Water Consumption per Customer Classification in 2022 2-5
2-2 Historical Annual Consumption of the Top 20 Largest Water Users in Million Gallons (MG) 2-9
2-3 Historical Water Production with Peaking Factor 2-12
2-4 Temperature Effects on Water Usage in 2022 2-13
2-5 Comprehensive Future Land Use and Zoning Map 2-20
2-6 Single Family Population Projections by Service Area 2-25
2-7 Multi-Family Population Projections by Service Area 2-26
2-8 Employment Projections by Service Area 2-27
2-9 Map of Projected Areas with Greatest Population Growth 2-28
2-10 Projected Retail Plus Firm Wholesale ADD and MDD 2-40
3-1 Map of Water System Assets and Pressure Zones 3-2
3-2 Hydraulic Profile 3-3
3-3 Hydraulic Profile - Detail A 3-4
3-4 Hydraulic Profile - Detail B 3-5
3-5 Water Main Leak and Break Repair Locations from 2014-2024 3-12
3-6 Low Pressure, Odor, and Discolored Water Complaints from 2014-2024 3-13
3-7 Illustration of Reservoir Storage Components 3-43
3-8 2024 PHD Scenario – Pressure and Velocity 3-49
3-9 2034 PHD Scenario – Pressure and Velocity 3-50
3-10 2044 PHD Scenario – Pressure and Velocity 3-51
3-11 MDD+FF Deficiency Locations for 2024, 2034 and 2044 Scenarios 3-53
3-12 Capital Improvement Projects Addressing Fire Flow Deficiencies 3-54
5-1 Wellhead Protection Area Map 5-3

6-1 Auburn Water Utility Organizational Chart 6-3

List of Tables

ES-1 ADD, MDD, and ERUs Summarized by Service Area with Wholesale Included ES-6
ES-2 Summary of Pump Station Capacity Results ES-8
ES-3 Summary Storage Capacity Analysis ES-9
ES-4 Source Susceptibility Assessment Ratings ES-11
ES-5 Water System Capital Improvement Program Budget 2024-2044 ..... ES-14
1-1 Water System Ownership Management 1-3
1-2 Water Facilities History 1-7
1-3 Emergency Interties 1-19
2-1 Historical Population 2-2
2-2 Historical Number of Connections per Customer Classification 2-3
2-3 Historical Consumption in Million Gallons (MG) by Customer Classification 2-4
2-4 Historical Annual Demand per ERU (gpd per ERU) 2-6
2-5 Historical Demand as Equivalent ERUs per Customer Classification 2-7
2-6 Historical Annual Consumption of the Top 20 Largest Water Users in Million Gallons (MG) 2-8
2-7 Historical Annual Water Supply by Source in Million Gallons (MG) 2-10
2-8 2022 Monthly Water Production by Source (MG) 2-10
2-9 Historical Annual ADD, MDD, Peak Day, and Peaking Factor 2-11
2-10 Historical Peak Hour Demand 2-12
2-11 Historical Distribution System Leakage 2-14
2-12 Summary of Source Water Pumping or Production Capacity Compared to 2022 Maximum Daily Production 2-16
2-13 Updated Zoning Districts and Fire Flow Requirements 2-21
2-14 Growth Rates by Customer Class and Service Area 2-23
2-15 Population and Employment Projections Calculated by Service Area 2-23
2-16 Connection Projections by Customer Classification and Service Area 2-29
2-17 Proposed Planning Values for Demand Projections 2-32
2-18 Large User Demand Projections 2-32
2-19 ERU Projections by Customer Class and Service Area 2-33
2-20 ADD Projections 2-34
2-21 MDD Projections 2-35
2-22 Wholesale Demand Projections 2-38

2-23 ADD, MDD, and ERUs Summarized by Service Area with Wholesale Included 2-39
3-1 Transmission and Distribution System Piping Inventory by Pipe Diameter 3-6
3-2 Transmission and Distribution System Piping Inventory by Material and Installation Decade .. 3-7
3-3 Pressure Reducing Valve (PRV) Inventory 3-8
3-4 Summary Customer Complaints 3-14
3-5 Source of Supply Well Pump Inventory 3-14
3-6 Water Treatment Facility Inventory 3-18
3-7 Inventory of Storage Reservoirs 3-21
3-8 Pump Station and Booster Pump Station Inventory 3-23
3-9 Back Up Power Inventory 3-23
3-10 Summary of 2022 Sanitary Survey Findings 3-24
3-11 Summary of Operator Certifications 3-26
3-12 EPA Primary Drinking Water Standards Results from 2015 through 2022 3-27
3-13 Total Chlorine Residuals Results from 2015 through 2022 3-29
3-14 Summary of Disinfection By-Product Rule Monitoring Results from 2015 through 2022 3-29
3-15 Summary of Lead and Copper Sampling Results from 2015 through 2022 3-30
3-16 PFAS State Action Levels and Monitoring Data 3-31
3-17 System Capacity Analysis Criteria 3-31
3-18 Summary of Existing Water Rights 3-33
3-19 Supply Analysis with Largest Source Out of Service 3-34
3-20 Buildings in Auburn with High Fire Flow Requirements 3-35
3-21 Pumps Station Capacity for Valley Service Area Open Pressure Zones 3-36
3-22 Pump Station Capacity for Lea Hill Service Area Open Pressure Zones 3-37
3-23 Pump Station Capacity for Lakeland Service Area Open Pressure Zones 3-38
3-24 Pump Station Capacity for Academy Service Area Open Pressure Zones 3-38
3-25 BPS Capacity for Lakeland Service Area Closed Pressure Zones 3-39
3-26 BPS Capacity for Academy Service Area Closed Pressure Zone 3-40
3-27 BPS Capacity for Lea Hill Service Area Closed Pressure Zone 3-40
3-28 BPS Capacity for Game Farm Park Closed Pressure Zone 3-41
3-29 System-Wide Storage Analysis for the 2024 Scenario 3-43
3-30 System-Wide Storage Analysis for the 2034 Scenario 3-44
3-31 System-Wide Storage Analysis for the 2044 Scenario 3-45
3-32 Final C-Factors for Piping Materials 3-47

3-33 Prioritized Pipeline Improvements to Address Fire Flow Deficiencies 3-55
3-34 System Capacity Analysis in ERU Basis 3-57
3-35 Summary of System Deficiencies 3-58
4-1 WUE Rule Requirements 4-1
4-2 Source Meter Details 4-3
4-3 Annual Average Day Demand (gpd) per Capita 4-7
4-4 Annual WUE Budget 4-10
4-5 Demand Forecast With and Without Projected WUE Savings 4-11
4-6 Predicted Increase in Demand from Baseline Due to Climate Change 4-12
5-1 Source Susceptibility Assessment Ratings Issued by DOH 5-2
5-2 State and Local Agencies Notified of CSI Findings 5-4
6-1 Water Operations and Distribution Staff and Certifications 6-5
6-2 Water Operations - Facility Inspection Schedule 6-8
6-3 Safety Policies and Procedures 6-17
6-4 Recommended Inspections 6-22
6-5 O&M Improvement Projects 6-23
7 1 Water Main Design and Construction Standards 7-3
8-1 Water Pipeline Construction Costs per Linear Foot 8-4
8-2 Reservoir Tank Construction Costs per Gallon 8-4
8-3 Prioritized Water Supply Improvement Projects 8-12
8-4 Storage Improvements Projects 8-14
8-5 Pump Station Improvement Projects 8-15
8-6 Water Repair & Replacements Cost Estimate 8-16
8-7 Distribution System Improvements Projects 8-17
8-8 General Water System Projects 8-18
8-9 Total CIP Cost by Project Category from 2024 through 2044 8-18
8-10 Capital Improvements Program Costs and Phasing 8-19
9-1 Summary of Historical Fund Resources and Uses Arising From Cash Transactions 9-2
9-2 Summary of Historical Comparative Statements of Net Position 9-3
9-3 10-Year and 20-Year CIPs 9-5
9-4 10-Year CIP (Escalated $) 9-6
9-5 10-Year and 20-Year Capital Financing Strategy 9-9
9-6 10-Year Financial Forecast 9-13

9-7 Ending Cash Balance Summary 9-14
9-8 Existing Schedule of Rates 9-14
9-9 Proposed Schedule of Rates 9-15
9-10 Community Affordability Test 9-16

Appendices

Appendix A Water System Policies and Criteria
Appendix B SEPA Checklist
Appendix C Local Government Consistency Determination Forms
Appendix D Public Meeting Documentation
Appendix E Ordinances and Approvals
Appendix F Local Government Consistency Review
Appendix G Water Service Area, Interlocal & Wholesale Water Agreements
Appendix H Water Facilities Inventory Form
Appendix I Water Rights Self-Assessment Form
Appendix J Water Rights Certifications
Appendix K Hydraulic Model Calibration Documentation
Appendix L Reclaimed Water Checklist
Appendix M Water Use Efficiency Reports
Appendix N Consumer Confidence Reports
Appendix O Water Quality Monitoring Plan
Appendix P Design and Construction Standards
Appendix Q Cross Connection Control Program
Appendix R Water Shortage Contingency Plan
Appendix S Conceptual Mitigation Plan for Water Right Application G1-28404
Appendix T Wellhead Protection Plan
Appendix U Natural Hazard Vulnerability Summary
Appendix V Worksheet 4-1 ERU Capacity Summary
Appendix W CIP Cost Information

THIS PAGE INTENTIONALLY LEFT BLANK

Acronyms & Abbreviations

A	
AACE	American Association of Cost Estimators
AC	Asbestos-Cement
ACC	Auburn City Code
ac-ft/year	Acre-Foot Per Year
ADD	Average Day Demand
ADU	Accessory Dwelling Unit
AFY	Acre Feet Per Year
Algona	City of Algona
AMC	Auburn Municipal Code
AMI	Advanced Metering Infrastructure
APWA	American Public Works Association
ASR	Aquifer Storage and Recovery
AWC	Association of Washington Cities
AWWA	American Water Works Association
B	
BCA	Bilaterial Compliance Agreement
Bonney Lake	City of Bonney Lake
BPS	Booster Pump Station
C	
Cascade	Cascade Water Alliance
ccf	Centum Cubic Feet
CCI	Construction Cost Index
CCPP	Calcium Carbonate Precipitation Potential
CCR	Consumer Confidence Report
CCT	Corrosion Control Treatment
CCTF	Corrosion Control Treatment Facility
CDBG	Community Development Block Grant
CDPW	Community Development & Public Works
CEMP	Comprehensive Emergency Management Plan
CERB	Community Economic Revitalization Board
CEU	Continuing Education Units
cfs	Cubic Feet Per Second
cfm	Cubic Feet Per Minute
CFP	Capital Facilities Plan
City	City of Auburn
CIP	Capital Improvement Plan
CMP	Coliform Monitoring Plan
CPR	Conservation Planning Requirements
CSCSL	Confirmed and Suspected Contaminate Sites

CWD	Covington Water District
CWSP	Coordinated Water System Plan
D	
D	Distribution Improvements
DBPR	Disinfectants and Disinfection Byproducts Rule
DBP	Disinfection Byproducts
DHS	Department of Homeland Security
DI	Ductile Iron
DNS	Determination of Non-Significance
DOE	Department of Ecology
DOH	Washington State Department of Health
DSL	Distribution System Leakage
DWSRF	Drinking Water State Revolving Fund
E	
EDCS	Engineering Design and Construction Standards
ENR	Engineering News Record
EOC	Emergency Operation Center
EPA	United States Environmental Protection Agency
EPS	Extended Period Simulation
ERU	Equivalent Residential Unit
EWE	Energy and Water Efficiency
F	
FEMA	Federal Emergency Management Agency
FF	Fire Flow
ft/s or fps	Feet Per Second
G	
G	General Improvements
gal/ERU	Gallons Per Equivalent Residential Unit
GIS	Geographic Information System
gpd	Gallons Per Day
gpm	Gallons Per Minute
GMA	Growth Management Act
G.O.	General Obligation
GWMP	Ground Water Management Plan
GWR	Groundwater Rule
GWUI	Groundwater Under the Influence of Surface Water
H	
HAA5	Haloacetic Acids
HGL	Hydraulic Grade Line
HPC	Heterotrophic Plate Count
HP	Horsepower
HWD	Highline Water District

I	
IA2	Interlocal Agreement 2
IA3	Interlocal Agreement 3
ICS	Incident Command System
IDSE	Initial Distribution System Evaluation
IGEA	Investment Grade Efficiency Audit
L	
LCRMR	Lead and Copper Rule Minor Revisions
LFC	Local Facilities Charge
LIDs	Local Improvement Projects
LMWD	Lake Meridian Water District
LRAAs	Locational Running Annual Averages
LR	Larson Ratio
LSI	Langelier
LWSD	Lakehaven Water and Sewer District
M	
MAG	Electromagnetic
Manual	Public Works Emergency Response Manual
MCL	Maximum Contaminant Level
MCLGs	Maximum Contaminant Level Goals
M/DBP	Microbial/Disinfection By-Product
MDD	Maximum Day Demand
MDRLs	Maximum Disinfectant Residual Level
MFR	Multifamily Residential
MG	Million Gallon
mgd	Million Gallons Per Day
MG/year	Million Gallons Per Year
MIT	Muckleshoot Indian Tribe
M&O	Maintenance and Operations
MRSC	Municipal Research and Services Center of Washington
MSDS	Material Safety Data Sheets
N	
NIMS	National Incident Management System
NOM	Natural Organic Matter
O	
O&M	Operations & Maintenance
OSHA	Occupational Safety and Health Administration
P	
PAA	Potential Annexation Areas
PGG	Pacific Groundwater Group
PHD	Peak Hour Demand
PHG	Public Health Goal

PIC	Forest Villa Manor
PI	Parcel Insight
Plan	Comprehensive Water Plan
PLC	Programmable Logic Controller
PNR	Public Notification Rule
PR	Pressure Reducing
Project ID	Identification Number
PRV	Pressure Reducing Valve
psi	Pounds Per Square Inch
PSRC	Puget Sound Regional Council
PS	Pump Stations
PUD	Planned Unit Development
PW	Public Works
PWB	Public Works Board
Q	
Qaw	White River Alluvium
Qd	Vashon Recessional Deltaic Deposits
Qom	Osceola Mudflow
Qua	Undifferentiated Alluvium
Qu	Undifferentiated Glacial and Interglacial Deposits
R	
R	Storage Improvement
R5	Residential 5 Du/Acre
RAA	Running Annual Average
RWSA	Retail Water Service Area
RWSS	Regional Water Supply System
S	
S	Supply Improvement
SCA	Sanitary Control Area
SCADA	Supervisory Control and Data Acquisition
SDC	Standard Development Charge
SDS	Safety Data Sheets
SDWA	Safe Drinking Water Act
SEATAC	Seattle-Tacoma International Airport
SEPA	State Environmental Policy Act
SFR	Single-Family Residential/Duplex
SMP	Standard Monitoring Program
SOC	Synthetic Organic Chemical
SOS	Save Our Streets
SSS	System-Specific Study
SWTR	Surface Water Treatment Rule

T	
Tacoma	City of Tacoma
TAZ	Transportation Analysis Zone
TCR	Total Coliform Rule
TPU	Tacoma Public Utility
TTHM	Total Trihalomethanes
U	
UCM	Unregulated Contaminant Monitoring
UDF	Unidirectional Flushing
UGA	Urban Growth Area
ULID	Utility Local Improvement District
USGS	United States Geological Survey
USEPA	United States Environmental Protectional Agency
UTC	Utilities And Transportation Commission
V	
VA	Vulnerability Assessment
VFD	Variable Frequency Drive
VOC	Volatile Organic Compound
W	
WAC	Washington Administrative Code
WCIA	Washington Cities Insurance Authority
WD#111	King County Water District #111
WETRC	Washington Environmental Training Resource Center
WFI	Water Facilities Inventory
WHP	Wellhead Protection
WHPA	Wellhead Protection Areas
WHPP	Wellhead Protection Plan
WISHA	Washington Industrial Safety and Health Act
WSP	Water System Plan
WSSIP	Water System Security Improvement Plan
WUE	Water Use Efficiency

THIS PAGE INTENTIONALLY LEFT BLANK

Executive Summary

Introduction

This Water System Plan (WSP) has been developed in accordance with Chapter 426-290 of the Washington Administrative Code (WAC), as presented in the Washington State Department of Health (DOH) regulations for Group A Public Water Systems. This WSP supersedes the City of Auburn's (City) 2015 WSP, approved by DOH on May 11, 2016, and the 2021 Limited WSP Update approved by DOH on December 16, 2021. The City's water system identification number is 03350V.

Th purpose of this WSP is to develop a long-term planning strategy for the City's Retail Water Service Area (RWSA). Updated every ten years per DOH, the WSP evaluates the existing system and its ability to meet the anticipated requirements for water source, treatment, transmission, storage, and distribution over a 20-year planning period. Historical data through the year 2022 were used for the analyses throughout the WSP. The ten-year planning period is 2024-2034. The long-term planning period is 2034-2044. Water system improvement projects have been developed to meet the changing demands of regulatory impacts, population growth, and necessary infrastructure repair and replacement. The WSP also identifies planning-level costs of the improvement projects and provides a financial plan for funding the projects.

ES.1 Description of Water System

The City limits are within both King County and Pierce County in the Puget Sound Region of Washington. Figure ES-1 shows the City's RWSA which encompasses approximately 30 square miles. Several water purveyors adjoin the City's RWSA, including the cities of Algona, Bonney Lake, Federal Way, Kent, Pacific, and Sumner. Also included are the Covington Water District (CWD), Lakehaven Water and Sewer District (LWSD), Lake Meridian Water District (LMWD) (formerly known as King County Water District #111), Highline Water District (HWD), and the Muckleshoot Indian Tribe (MIT). The City also provides internal staffing for the management, operations, and maintenance of the Braunwood Estates satellite system.

The City's water system consists of groundwater wells, springs, and interties with adjacent purveyors as water sources, chlorination and corrosion control treatment facilities, pump stations, pressure reducing valve stations, steel and concrete enclosed reservoirs for storage, and transmission and distribution pipelines to provide potable water to customers. The RWSA is further divided into four service areas (Valley, Lea Hill, Lakeland, and Academy) that include a total of 28 pressure zones. The City's four service areas and the location of key components of the water system are shown in Figure ES-2.

Interties provide a tool that water utilities use to move water between systems to meet supply needs, to increase reliability and respond to emergencies. The City maintains wholesale supply interties with three water systems: City of Tacoma (Tacoma), Algona, and LMWD. The City also has a supply contract with the MIT and the Indian Health Service, dating from 1972, for services along a pipeline at SE 368th PL extending from the City limits into the reservation. The City has emergency interties with seven water systems, Algona, Bonney Lake, Kent, Pacific, LWSD, LMWD and Tacoma.

A hydraulic profile of the City's water system is presented in Figure ES-3, showing all service areas, pressure zones, supplies, interties, reservoirs, and pump stations.

Figure ES-1 | RWSA Vicinity Map

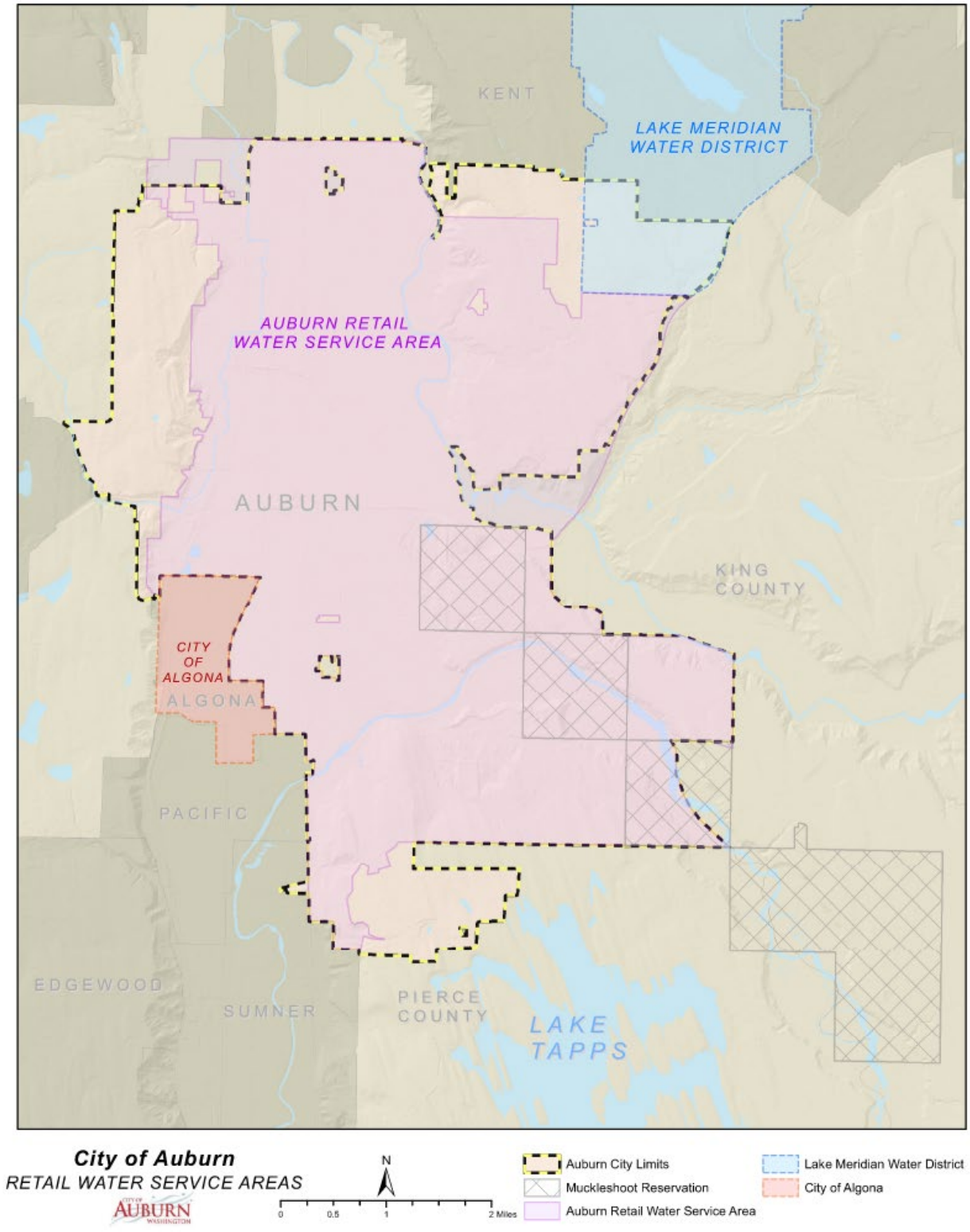


Figure ES-2 | Existing Facilities

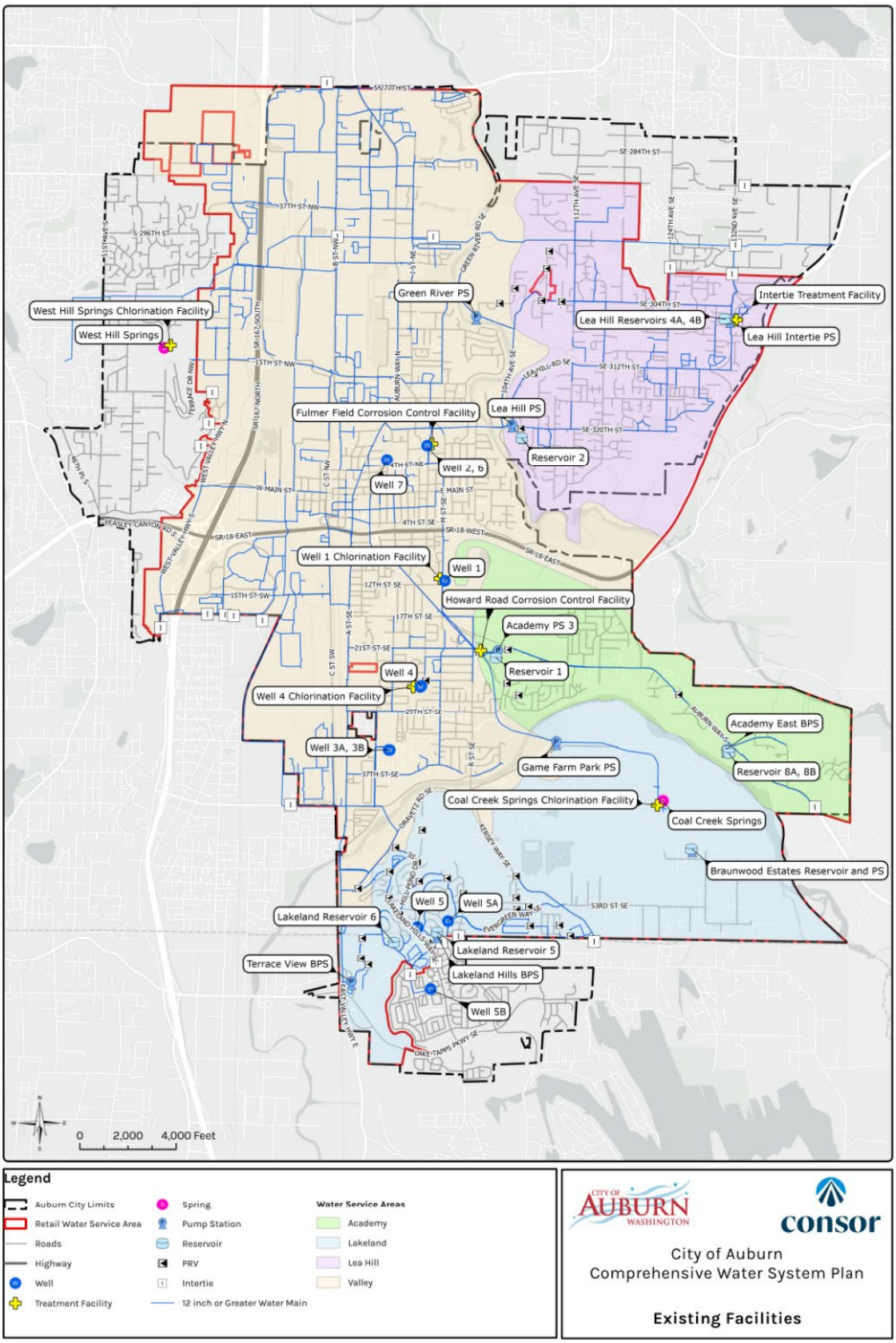
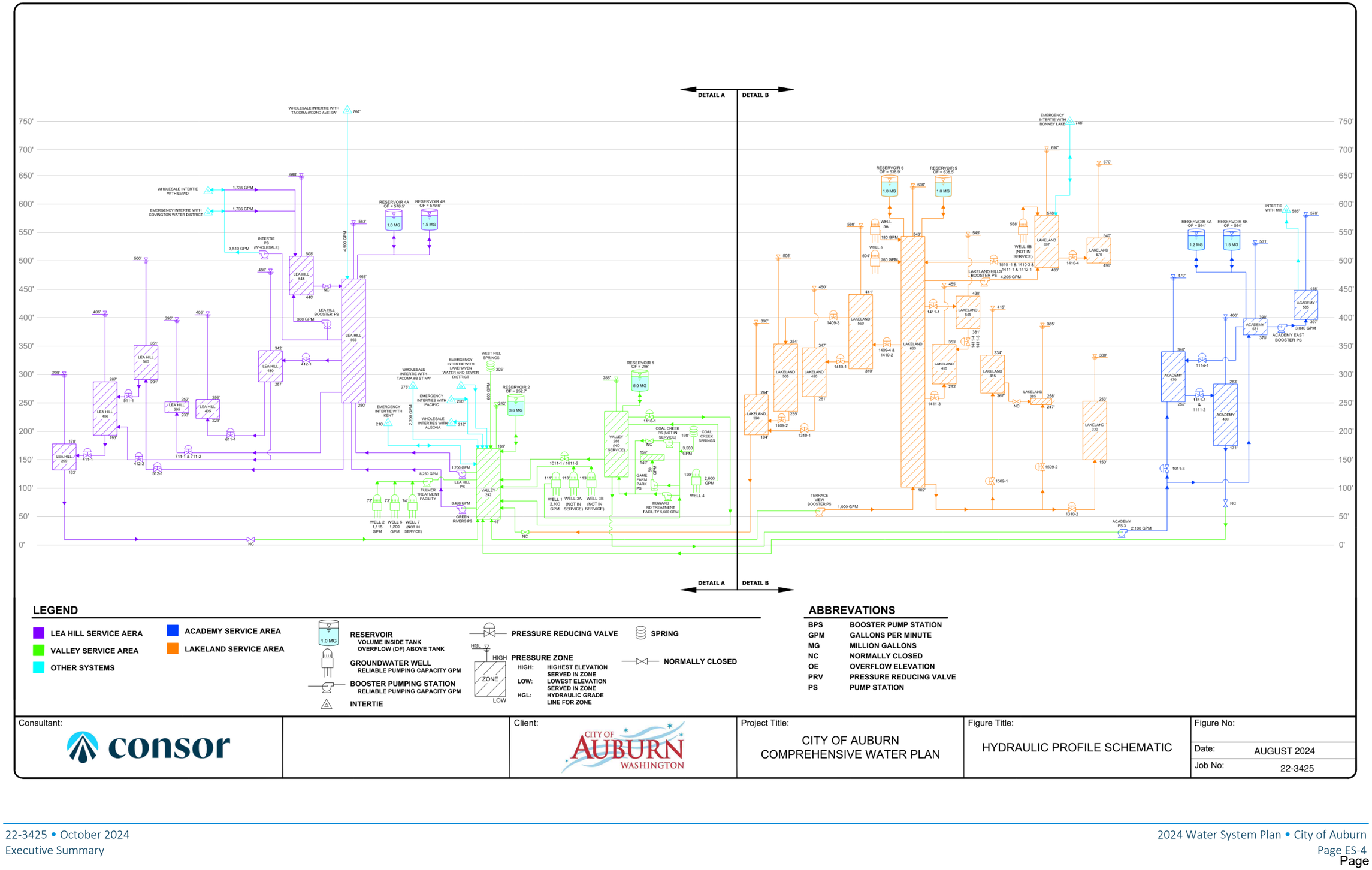


Figure ES-3 | Hydraulic Profile



ES.2 Basic Planning Data

Water Service Connections and Usage

The City's current and future water demand requirements were projected for each customer class (single-family residential/duplex, multifamily residential, commercial, manufacturing/industrial, schools, city accounts, irrigation, and wholesale). The water consumption, or demand, of each customer classification can be expressed in terms of equivalent residential units (ERUs) for forecasting and planning purposes. One ERU is defined as the average quantity of water used by one average, full-time, single-family residence per day. The quantity of water used by other customer classes, or by the entire system, can be expressed in terms of equivalent ERUs. The historical average and maximum water demands are important parameters when performing system and supply analyses. The Average Day Demand (ADD) is typically used in operational evaluations. The Maximum Day Demand (MDD) represents the single largest day water demand during the year and is a key parameter for infrastructure sizing.

The City provided water to approximately 63,450 customers through 15,046 connections as of the end of 2022. Between 2015 and 2022 the ADD ranged from 6.32 million gallons per day (mgd) on the low end in 2020 to 7.67 mgd on the high end in 2016. The MDD has ranged from 11.25 mgd in 2019 to 12.43 mgd in 2020. The total number of connections increased by approximately three percent between 2015 and 2022. The City has two active wholesale water agreements, one with the City of Algona and the other with LMWD that is interruptible.

Water Supply and Production

The City has a diverse water supply consisting of two springs, ten wells and an intertie with the City of Tacoma. Wells 1, 2, 3A, 3B, 4, 6, and 7 are in the lower alluvial aquifer in the Auburn Valley, referred to as the Valley Wellfield. Wells 3A, 3B and 7 are currently offline due to high manganese concentrations. Wells 5, 5A, and 5B are in the Upland Wellfield within the Lakeland Service Area. Once Well 5B came online, the City discovered that the aquifer was not recovering and Well 5B has been offline since 2006. The safe yield of Wells 5 and 5A have been decreased from their design capacity due to a drop in the aquifer's capacity. The City has sufficient water rights to meet current demands as well as 10- and 20-year demand projections, as shown in the Water Rights Self-Assessment Form provided in Appendix I. Additional information on the City meeting future demands is mentioned in the Capacity Analysis Section under ES.3 (System Analysis and Asset Management).

West Hill Springs draws from an unnamed confined aquifer. The spring source water flows by gravity into the Valley Service Area, although flows vary depending on aquifer conditions. Coal Creek Springs is the largest active water supply for the City and draws from a confined aquifer, however its flow varies depending on aquifer conditions. The City also owns two additional wells: the Algona Well 1, which is not operational and the Braunwood Well which serves the Braunwood satellite system.

Future Population and Demand Projections

Demographic projections are based on the Puget Sound Regional Council's (PSRC) 2044 forecasts for population and employment within the City's RWSA. Total population is projected to increase by 1.5 percent annually from 2021 to 2044 and total employment is projected to increase by 1.9 percent annually over the same period. Overall, the City is planning for an additional 24,987 residents and 20,525 employed people by 2044 within the RWSA. The Valley Service Area is projected to represent 64 percent of the system's population and 93 percent of the system's employment in 2044.

The projected ADD and MDD, along with wholesale demands, are summarized in **Table ES-1.** To be conservative, an ERU planning value higher than the average was used for demand forecasting. The 75th percentile of the historical ADD per ERU between 2015 and 2022 was used to select the planning ERU value of 182 gpd. The peak demands can be expressed as an MDD/ADD peaking factor, which is the relative magnitude of MDD compared to ADD. The City's MDD/ADD peaking factor was 1.77. Distribution system leakage and authorized unbilled consumption are accounted for in the projections.

Table ES-1 | ADD, MDD, and ERUs Summarized by Service Area with Wholesale Included

	2024	2034	2044
Lea Hill			
Average Day Demand (mgd)	1.00	1.04	1.09
Maximum Day Demand (mgd)	1.77	1.84	1.92
Equivalent Residential Units	5,506	5,729	5,966
Valley			
Average Day Demand (mgd)	5.11	5.84	6.72
Maximum Day Demand (mgd)	9.02	10.31	11.88
Equivalent Residential Units	28,034	32,037	36,920
Lakeland			
Average Day Demand (mgd)	0.51	0.59	0.67
Maximum Day Demand (mgd)	0.91	1.04	1.19
Equivalent Residential Units	2,815	3,217	3,684
Academy			
Average Day Demand (mgd)	0.43	0.48	0.54
Maximum Day Demand (mgd)	0.76	0.85	0.95
Equivalent Residential Units	2,375	2,642	2,946
Total Retail Customers			
Average Day Demand (mgd)	7.05	7.95	9.02
Maximum Day Demand (mgd)	12.47	14.04	15.94
Equivalent Residential Units	38,731	43,626	49,515
Algona (Firm Wholesale)			
Total Average Day Demand (mgd)	0.365	0.386	0.409
Total Equivalent Residential Units, ADD	2,005	2,120	2,246
Total Maximum Day Demand (mgd)	0.692	0.732	0.775
Total Equivalent Residential Units, MDD	3,800	4,018	4,256
Retail with Algona			
Total Average Day Demand (mgd)	7.42	8.33	9.43
Total Maximum Day Demand (mgd)	13.16	14.77	16.71
Retail with Firm Wholesale (Algona and MIT)			
Average Day Demand (mgd)	9.92	10.83	11.93
Maximum Day Demand (mgd)	14.66	16.27	18.21
Retail with Firm & Interruptible Wholesale (Algona, MIT, and LMWD)			
Average Day Demand (mgd)	12.42	13.33	14.43
Maximum Day Demand (mgd)	17.16	18.77	20.71

ES.3 System Analysis and Asset Management

Asset Management

The City actively assesses and plans for the maintenance, repair, and replacement of its assets while preventive maintenance practices keep assets in good condition, thereby extending their useful life. For asset management, the City utilizes CarteGraph in conjunction with the geographic information system (GIS). GIS is updated using as-builts as projects are completed and CarteGraph is auto-populated from this information. CarteGraph is used to track and schedule maintenance activities and track material and labor costs and project timelines.

An inventory of the City's existing water system assets including distribution system components, treatment, reservoirs, supply facilities, pump stations, backup power, and the telemetry system is presented in Chapter 3.

Water Quality

The DOH requires that source water be monitored for primary and secondary contaminants. Primary contaminant levels are not to be exceeded for health reasons and secondary contaminants should not be exceeded for aesthetic reasons. Distribution system water quality testing requirements include monitoring of many contaminants for which the DOH determines maximum contaminant levels.

Historically, the City has relied on groundwater supplies from wells and springs, which have been determined are not under the direct influence of surface waters. For these water sources, the City is required to meet the United States Environmental Protection Agency's (EPA's) Groundwater Rule. The treatment objectives of the City are to treat source water to contaminant concentrations below the maximum contaminant levels (MCLs) established by the EPA and WAC. All constituents are currently below their respective MCLs.

The required frequency of monitoring of inorganic chemical and physical parameters varies by source, however, the City typically monitors these constituents every 12 months. Within the study period, the maximum detected concentrations of these parameters did not exceed the MCLs published by the EPA.

All active sources are disinfected with chlorine prior to entering the distribution system except for Well 5. The City has a capital project discussed in Chapter 8 that will include the addition of a chlorination facility to Well 5. Corrosion control treatment is required on the water produced by Coal Creek Springs, Well 1, Well 2, Well 6, and Well 7 to limit the corrosion of lead and copper in the system. Since the corrosion control treatment facilities were constructed, the lead and copper levels in the City's system have been well below the action level. There were no water quality violations in the distribution system between 2015 and 2022.

Design Standards

The City's most recent Engineering Design and Construction Standards are available on the City's website and are provided as Appendix P.

The City's water quality design standards follow the design standards set forth by the EPA and the Washington DOH.

Capacity Analysis

The City's water supply (production) capacity compared with demand projections and DOH and City criteria indicate that the City has the supply facilities necessary to meet demand projections under current and future projections for all required criteria.

The City's Water Rights Self-Assessment Form is provided in **Appendix I** and was used to assess the City's water rights and includes supply that is available to the City through firm wholesale interties with Tacoma. The form includes a comparison of the available water rights to the existing, 10-year and 20-year demand projections for the "High Demand Scenario" provided in **Chapter 2**. The calculations presented in the Water Rights Self-Assessment Form conclude that the City's existing water rights are anticipated to be adequate to meet the current, 10-year, and 20-year projections for Qi and Qa.

The City does not currently have the infrastructure necessary to withdraw from all water rights (i.e., Wells 3A, 3B, 5B, and 7 are not currently operational). Additionally, some sources have underlying aquifer or infrastructure restrictions that limit the capacity of the source (i.e., Well 2, Well 6, and Coal Creek Springs). Several facility improvement projects are necessary for the City to maximize water production capacity to meet future demands, and planned supply related capital projects to meet this need are discussed further in **Chapter 8**.

Table ES-2 provides an overview of pump station supply analysis results expressed as either having a capacity surplus or deficit for open and closed zones. Open zones are pressure zones that are fed by gravity from a reservoir. Pressure zones that do not include a storage facility are analyzed as a closed zone. A closed zone in the Lea Hill Service Area and the Game Farm Park closed zone have a BPS capacity deficit identified in all planning scenarios. The City has planned a capital project to resolve the deficiency at the Intertie Pump Station/Lea Hill BPS. The Game Farm Park Pump Station only provides service to a recreational area with no residential or commercial property connections supplied by this facility. The City has reviewed the deficit with the Fire Marshal and the deficiency is not critical to address, therefore no actions are currently planned to resolve the deficiency at the Game Farm Park Pump Station. As further development progresses in and around the Game Farm Park Pump Station, modifications will be considered to address the deficiency.

Table ES-2 | Summary of Pump Station Capacity Results

	2024	2034	2044
Valley Open Zone Pump Station Capacity	Surplus	Surplus	Surplus
Lea Hill Open Zone Pump Station Capacity	Surplus	Surplus	Surplus
Lakeland Open Zone Pump Station Capacity	Surplus	Surplus	Surplus
Academy Open Zone Pump Station Capacity	Surplus	Surplus	Surplus
Lakeland Closed Zone BPS Capacity	Surplus	Surplus	Surplus
Academy Closed Zone BPS Capacity	Surplus	Surplus	Surplus
Lea Hill Closed Zone BPS Capacity	**Deficit**	**Deficit**	**Deficit**
Game Farm Park Closed Zone BPS Capacity	**Deficit**	**Deficit**	**Deficit**

The City's water storage facilities were analyzed to determine if they have sufficient capacity to meet the existing and future storage requirements. A summary of the results is provided in **Table ES-3**. New sources and pump stations allow for reliable and redundant operation of the system as an interconnected whole, rather than separate Service Areas. As such, excess storage in one service area can be used to

offset a deficit in another area of the system. The results of the storage analysis indicate that there is sufficient capacity to meet the projected 2024 and 2034 storage requirements, however additional storage is projected to be necessary in 2044. The City has a planned capital project to add a new reservoir in the Valley Service Area to address this deficiency.

Table ES-3 | Summary Storage Capacity Analysis

	Total Usable Storage	2024		2034		2044	
		Total Required Storage (MG)	Surplus/ (Deficit) (MG)	Total Required Storage (MG)	Surplus/ (Deficit) (MG)	Total Required Storage (MG)	Surplus/ (Deficit) (MG)
Academy	2.66	1.54	1.12	1.60	1.06	1.68	0.98
Lakeland	1.34	1.24	0.10	1.36	(0.02)	1.49	(0.15)
Lea Hill	2.12	2.29	(0.17)	2.34	(0.22)	2.40	(0.28)
Valley	7.96	7.72	0.24	8.68	(0.72)	9.86	(1.89)
RWSA	**14.08**	**12.79**	**1.29**	**13.98**	**0.10**	**15.42**	**(1.34)**

The City's existing distribution system was analyzed to determine if they have sufficient capacity to meet the existing and future demands and fire flow requirements using an updated and calibrated version of the City's hydraulic model. A low-pressure analysis was performed in the hydraulic model to confirm that pressures throughout the system were above 30 psi during under peak hour demand (PHD) conditions for 2024, 2034, and 2044. The results of this analysis indicated that all areas of existing and future system have pressures meeting this condition and were compliant with requirements.

An individual fire flow analysis was performed for each hydrant node in the hydraulic model to determine the available fire flow during MDD plus fire flow (FF) conditions, while maintaining a minimum residual pressure of 20 psi. The results of this analysis indicate that multiple pipeline improvement projects are necessary to address the distribution system deficiencies.

An analysis of the water system's overall physical capacity in terms of ERU using DOH Worksheet 4-1 is provided in Appendix V. The analysis indicates that the existing system has sufficient capacity to serve the current and projected water demands through 2034 (10-year planning horizon). Under 2024 and 2034 demand conditions, storage is the limiting system component for growth and development. In 2044 (20-year planning horizon) storage is deficient, which is consistent with the other analysis findings.

ES.4 Water Use Efficiency Program

Source and Service Metering

Each of the City's sources are metered to measure the amount of water produced. The meters are calibrated annually. If a meter cannot be calibrated properly, it is replaced with a new one. Propeller source meters are being replaced with electromagnetic (MAG) meters as part of on-going operation and maintenance (O&M) improvements.

Service meters are installed on every service line to measure the quantity of water used by a customer per WAC 246-290-496 and City Code Chapter 13.06.320. In 2015, the City began installing an Automated Metering Infrastructure (AMI) system, as a part of the Water Meter and Billing System Improvements project, which was completed in 2018. With the new AMI system, the City automatically receives meter reads via radio transmission and can integrate the data into the billing software.

Distribution System Leakage

Distribution System Leakage (DSL) represents the difference between production and documented water use (retail, wholesale, and authorized unmetered). The City's historical DSL performance complies with the DOH requirement that the three-year average DSL be under ten percent to minimize water waste. To further reduce DSL, the City has ongoing leak detection, meter calibration, and an active repair and replacement program for water system infrastructure.

Water Use Efficiency Program

The City's Water Use Efficiency (WUE) Program provides for efficient water use and supports stewardship of the City's resources. The selected program measures are interrelated and will help the City achieve its goals to both reduce average water use and peak water use per customer. Per the WUE requirements, the following measures implemented as part of the 2024-2034 WUE program:

- Install production (source) meters.
- Install consumption (service) meters.
- Perform meter calibration.
- Implement a water loss control action plan to control leakage if the three-year rolling average exceeds ten percent.
- Educate customers about water use efficiency practices.

Additionally, the following measures that must be evaluated are:

- Rates that encourage water demand efficiency (discussed in Chapter 9).
- Reclamation opportunities (discussed in detail in Chapter 4).

The DOH requires that the City estimate the amount of water saved through implementation of the system's WUE program over the last six years. Water use per-capita dropped from 112 gpd per capita in 2017 to 105 gpd per capita in 2022. The net water savings over this period equates to approximately 148 million gallons or 29.6 million gallons of savings per year.

The City has chosen to focus on implementing voluntary measures to decrease both the average and peak water usage. The City's goals are as follows:

- Decrease the planning ERU value (gpd/ERU) one percent annually from the current planning ERU value of 182 gpd/ERU,
- Decrease the planning peaking factor from the current 1.77 to 1.68, or less, and
- Maintain three-year average DSL under ten percent.

The City is committed to wastewater reuse and rainwater reclamation, as stated in its official water system policies summarized in Appendix A. Currently, there are no reclaimed water users in the City.

Climate Change Resiliency

To estimate the impact of climate change on the City's water demands, results from the Water Supply Forum's 2009 Regional Water Supply Outlook (WSF 2009 Outlook) were used. The impacts of climate change on sources that rely on groundwater are mostly unknown due to the variability between aquifers and site-specific effects. No changes to demand projections were made for the 20-year planning period to account for potential climate change due to the uncertain magnitude and timing of local effects. However, it is recognized that demand has the potential to increase in the future given these changes. In the event the City experiences such an increase, the City will use a model to compute firm yield from streamflow data, replacing historic inflows with projected inflows from three climate change scenarios as described by the WSF 2009 Outlook.

This WSP discusses short and long-term actions the City can take to improve the resiliency of the water system from the impacts of climate change. The short-term measures can improve resiliency within three to five years while the long-term measures may require decades to be fully implemented.

ES.5 Source Water Protection

Sanitary Control Areas (SCAs) have been established for each of the City's water sources per WAC 246-290-135(2). The standard SCA for wells has a minimum radius of 100 feet from the wellhead. The standard SCA for spring sources has a minimum radius of 200 feet from the spring head. All City water sources have SCAs that were established and approved by DOH, and are documented in the susceptibility forms provided in Appendix T.

The DOH has developed regulations that require Group A water systems using groundwater sources to develop and implement a Wellhead Protection Program (WHPP) in accordance with WAC 246-290-135. The City maintains its WHPP for 12 groundwater sources. A WHPP was prepared in 2014 for the City's 2015 WSP; this remains the current WHPP for the City.

Susceptibility Assessment Forms have been completed by the City and submitted to the DOH. The DOH's susceptibility assessment rating for each source is summarized in Table ES-4

Table ES-4 | Source Susceptibility Assessment Ratings

Source	DOH Issued Susceptibility Rating
Coal Creek Springs	High
West Hill Springs	High
Well 1	Moderate
Well 2	High
Well 3A	Low (Off-line)
Well 3B	Low (Off-line)
Well 4	Low
Well 5	Low
Well 5A	Low
Well 5B	Low (Off-line)
Well 6	High
Well 7	High (Off-line)

The Wellhead Protection Area (WHPA) defines the area around a groundwater source that has the potential to contaminate the source. This area is based on the source's capture zones, which are the zones of the source aquifer and ground surface that can contribute water to the source in six months, one year, five years, or ten years of time of travel. The established WHPAs are shown in Figure ES-4.

A summary of potential contaminant sources for the City's water sources was updated in July 2024 and is included in Appendix T.

ES.6 Operations and Maintenance Program

The Auburn Water Utility is operated as a utility enterprise under the direction of the Public Works (PW) Director. Specific water utility management responsibilities within the PW Department fall under either the Utilities-Water Section of Engineering Services or the Water Division of Maintenance and Operations Services. The Utilities-Water Section of Engineering Services is responsible for comprehensive water system planning, development of a Capital Improvement Program (CIP), as well as programming the design, construction, and inspection of projects related to the water system. The Water Division of Maintenance and Operations Services is responsible for operating and maintaining the water system, performing daily operation and inspection, water quality monitoring as required by DOH, and line management of the Water Utility.

The mission statement of the City's Water Utility is to provide for the efficient, environmentally sound, and safe management of the existing and future water system within the City's service area. Operations staff provide daily O&M of wells, corrosion control treatment facilities, pump stations, and reservoirs. They also implement the cross connection control program and provide locating services for all City utilities. Distribution staff maintains the complete distribution system including water mains, valves, hydrants, pressure reducing stations, and meters.

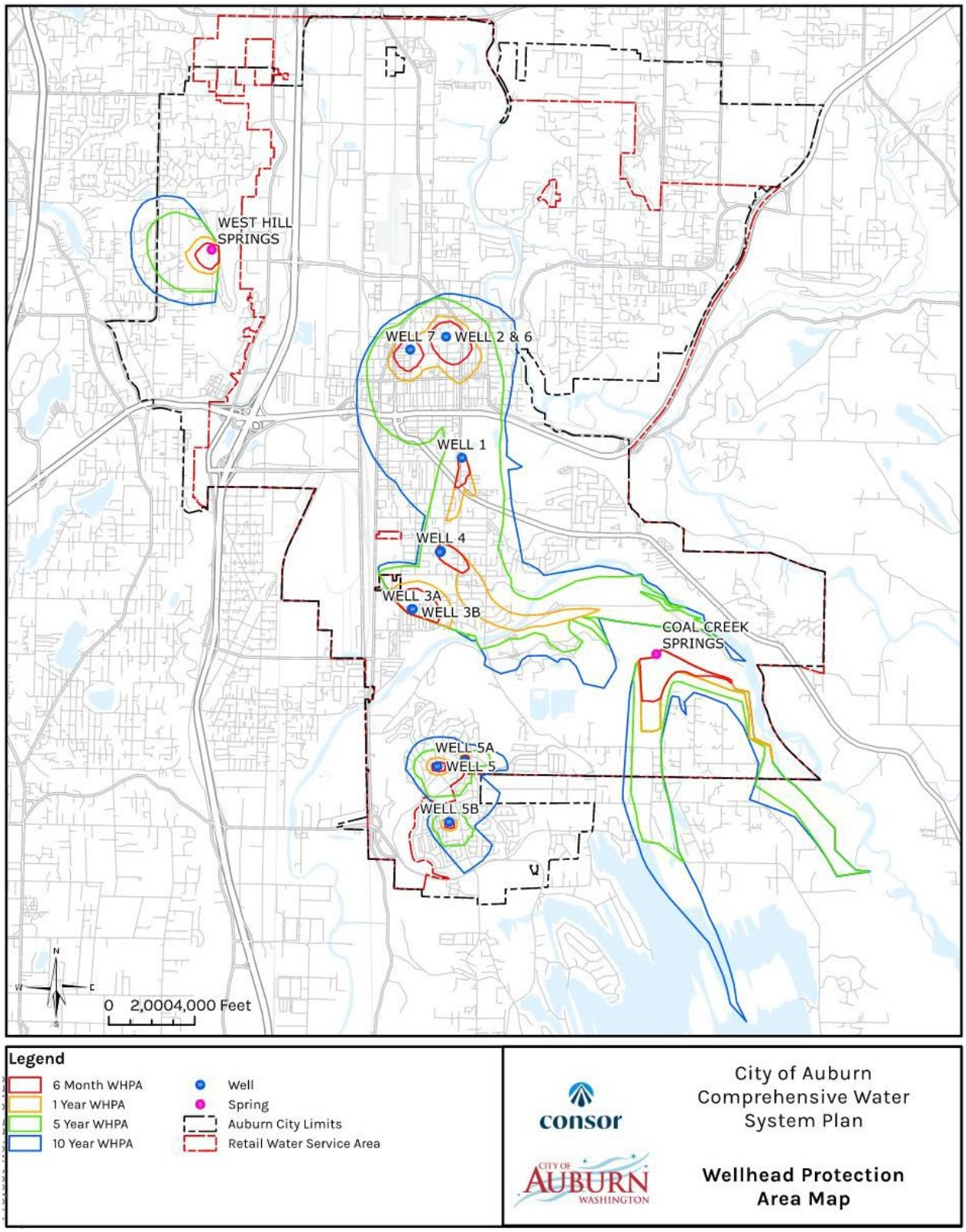
Primary operation of the water system is maintained via the Supervisory Control And Data Acquisition (SCADA) computerized control system. Wonderware software works in association with SCADA to provide real time graphical display of system data for staff interpretation and control.

The Water Operations staff maintains an active and ongoing program of water quality monitoring and reporting to ensure a safe, high quality water supply. Two staff members are responsible for water quality monitoring, sampling, control, and record keeping as outlined in the City's Water Quality Monitoring Plan provided in Appendix O.

The City has prepared an electronic Public Works Emergency Response Manual (Manual) as a guide for management of emergency situations, with the objective of protecting life and property and restoration of essential services, such as providing clean water, as quickly as possible. The Emergency Response Plan is updated annually at the first of the year. The master response program for the entire City is documented in the Comprehensive Emergency Management Plan (CEMP), which provides guidance to the Emergency Management Organization for mitigation, preparedness, responsibilities, recovery operations, training, and community education activities. The CEMP also describes the functions of local government and incorporation of essential non-governmental organizations into the Emergency Management Organization.

The City has a comprehensive safety program that meets Occupational Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Act (WISHA) regulations. The safety policies and procedures for the water department are documented in this WSP and cover the full range of hazards staff may experience while operating the water system.

Figure ES-4 | Wellhead Protection Area Map



The City's Cross Connection Control Program (provided in Appendix Q) protects the public water system from contamination via cross connection hazards. It describes minimum operating policies, provides guidelines for installation, testing, and maintenance of approved backflow prevention assemblies, permitting process, inspection, and survey requirements for existing and new water service connections. The findings of the 2022 Sanitary Survey are also summarized in this WSP, along with the actions completed or in progress to address the deficiencies. The next DOH sanitary survey is scheduled for 2027.

ES.7 Distribution Facilities Design and Construction Standards

The Engineering Design and Construction Standards (EDCS) encompass policies and procedures governing project review and approval. To ensure the highest level of water system reliability, integration of the EDCS into the broader City infrastructure is essential. The integration of the EDCS in this WSP empowers the City to employ an alternative review process for distribution main projects, through the submittal exception process, which permits the City to approve project reports and construction documents without written approval from the DOH.

The City's Utilities-Water Section of Engineering Services reviews plans, including calculations, reports, and AutoCAD files, to verify conformity with development requirements, City standards, City policies, as well as other federal, state, and local requirements. Compliance with Washington State Department of Transportation (WSDOT) "Standard Specifications for Road, Bridge, and Municipal Construction," and relevant City, State, and Federal regulations is also evaluated during the review process.

ES.8 Capital Improvement Program

The CIP was developed to identify system improvements needed to meet customer demands throughout the 20-year planning horizon. The capital projects identified are categorized as water supply (S), storage (R), pump stations (PS), distribution (D), and general improvements (G). Planning-level cost estimates were developed for each of the recommended projects for budgeting purposes.

The capital projects for the facilities improvements were prioritized based on existing capacity deficiencies, safety concerns, maintenance or capacity requirements, and regulatory requirements. A summary of the total planned CIP cost is provided in Table ES-5. All costs are presented as total project costs in March 2024 dollars. For future budgeting purposes, the latest Engineering News Record (ENR) Construction Cost Index (CCI) can be used to project current estimates to the year of implementation. The cost estimates for the Auburn area used the ENR Seattle CCI. The March 2024 CCI is 15,477. Overall, the City anticipates total projects costs of $214M over the next 20 years, with more than 50 percent of the cost being for distribution system improvements.

Table ES-5 | Water System Capital Improvement Program Budget 2024-2044

Capital Improvement Category	Total for 20-Year Period From 2024-2044 (2024 USD)
Distribution	$121,858,681
Supply	$60,416,013
Storage	$21,579,621
Pump Station	$9,230,000
General	$1,750,000
TOTAL	**$214,834,315**

ES.9 Financial Program

Chapter 9 was prepared by FCS GROUP to provide a financial program that allows the City to remain financially viable during the 20-year planning horizon. This viability analysis considers the financial condition of the utility of the past six-year period (2017-2022), current and identified future financial and policy obligations, O&M needs, and the financial impacts of the capital projects identified in Chapter 8. A review of the water utility's current rate structure with respect to rate adequacy and customer affordability is also included.

The City's water charges for services increased from $14.8M in 2017 to $16.5M in 2022, averaging an annual increase of approximately 2.2 percent per year. Operating expenditures increased by $1.7M across the six years with an average annual increase of 2.8 percent. Despite total operating expenses outpacing growth in operating revenues, operating income has been positive in all years observed.

The financial forecast indicates that at existing rate levels the utility will become deficient in 2025 as growth in expenses outpaces growth in revenues and the utility takes on additional debt obligations to fund capital infrastructure investments. The City has adopted a 7.50 percent increase for 2025 to resolve the remaining projected deficiency. Rates will need to potentially increase by 9.50 percent annually from 2026 through 2030, before decreasing to 3.00 percent annually through 2033. A detailed rate study is planned for completion in 2025. It is recommended that the City regularly review and update the key underlying assumptions that compose the multi-year financial plan to confirm that adequate revenues are collected to meet the City's total financial obligations.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 1

Description of the Water System

1.1 Objective

This Water System Plan (Plan) for the City of Auburn (City) has been prepared to serve as a guide for planning and designing future water system infrastructure and to assist the City in the efficient use of its water resources. The Plan identifies system improvements intended to meet the anticipated growth and changing needs of the City while maintaining reliable and quality water service to customers.

The Plan is designed to meet state, county, and local requirements. It complies with the requirements of the Washington State Department of Health (DOH) as set forth in the Washington Administrative Code (WAC) 246-290-100, Water System Plan. This Plan supersedes the City's 2015 Water System Plan, approved by DOH on May 11, 2016, and the 2021 Limited Water System Plan Update approved by DOH on December 16, 2021.

A 10-year approval period is desired for this Plan, and therefore the Plan analyzes the 10-year and 20-year planning periods. This Plan contains a framework for future funding decisions and capital projects. However, the timeframes are estimates and do not represent actual commitments by the City, which may depend on funding, resources availability, and/or other unidentified factors.

1.2 Plan Content

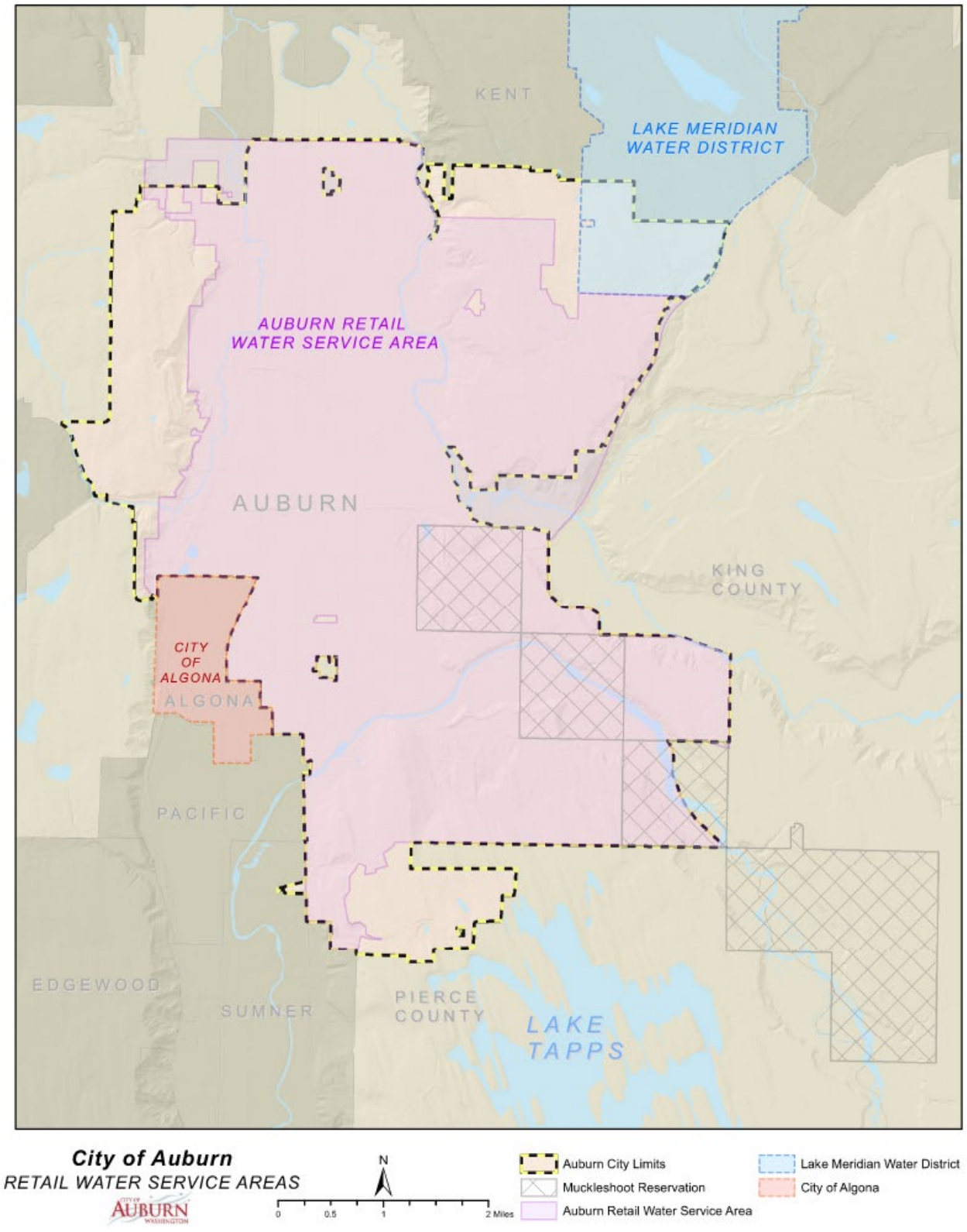
This chapter addresses the following topics:

1.3 Ownership and Management
1.4 System History and Background
1.5 Related Plans and Studies
1.6 Service Areas, Maps, and Land Uses
1.7 System Policies
1.8 Duty to Serve
1.9 Local Government Consistency
1.10 Watershed Consistency

1.3 Ownership and Management

The City owns and operates its water system and serves most of the City as delineated by the Retail Water Service Area (RWSA). The City also provides firm wholesale water supply to the City of Algona (Algona), and interruptible wholesale water supply to Lake Meridian Water District (LMWD) (formally known as King County Water District #111). The City RWSA boundary is further described in Section 1.4 and Figure 1-1 shows the City RWSA with wholesale customers.

Figure 1-1 | RWSA Vicinity Map



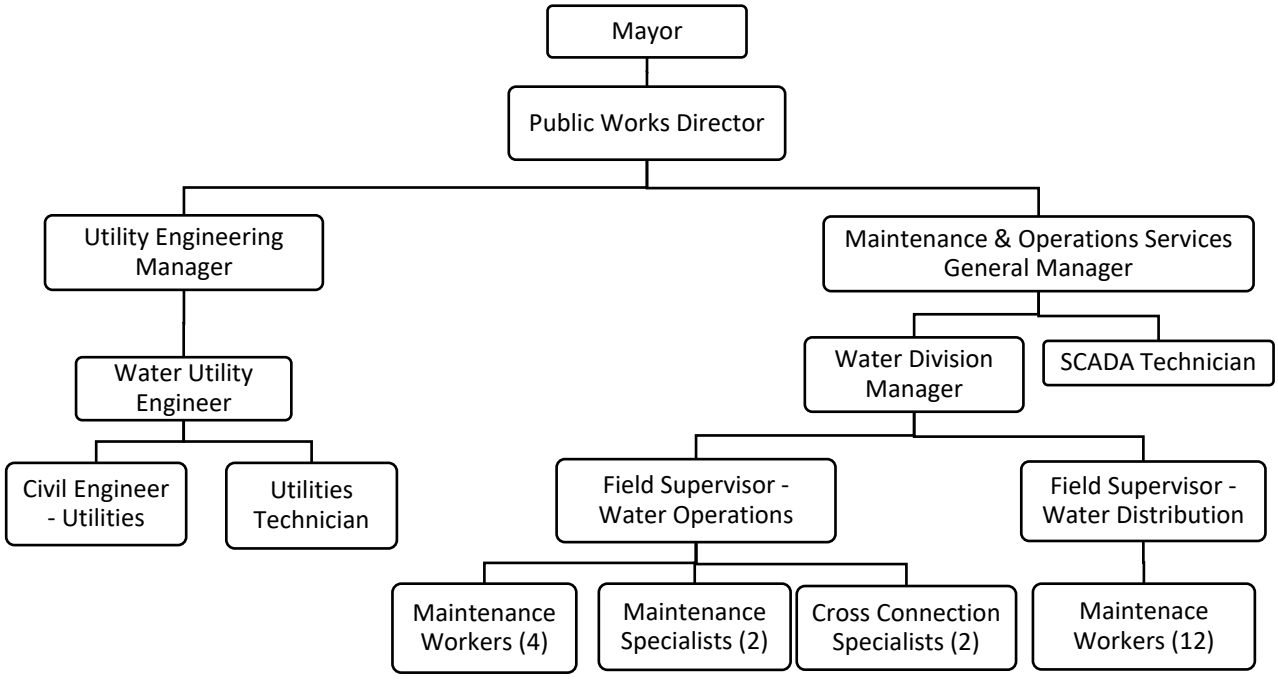
The City provides internal staffing for the management, operations, and maintenance of the water system and the Braunwood Estates satellite system. The DOH's data on these water systems, managed by the City, is presented in **Table 1-1**. The water management structure is presented in **Figure 1-2** and further elaborated in **Chapter 6**.

Chapter 3 provides details on the existing water facilities, while **Appendix H** includes a copy of the current Water Facility Inventory (WFI) form.

Table 1-1 | Water System Ownership Management

Information Type	Description
System Names	City of Auburn Braunwood Estates (Satellite System)
System Type	Group A - Community Public Water System
County	King County and Pierce County
City of Auburn System ID Number	03350V
Braunwood Estates System ID Number (Satellite System)	03336E
Address	25 W Main St Auburn, WA 98001
Primary Contact	Josh Flanders, Water Division Manager
Owner Contact	(253) 876-1998

Figure 1-2 | Water Utility – Organizational Chart



The City's water system is publicly owned, under the jurisdiction of the local government. As a result, it is exempt from regulation by the Washington Utilities and Transportation Commission (UTC), which is

responsible for overseeing some private water companies. There are no plans to bring the City's water utility service under UTC's regulatory authority during this planning period.

1.4 System History and Background

1.4.1 Geography

The City is centrally located between Seattle and Tacoma in both King and Pierce Counties, Washington. It encompasses approximately 30 square miles. Adjacent cities include Pacific, Algona, Bonney Lake, Federal Way, Kent, Sumner, and Covington.

1.4.1.1 Topography

The City's RWSA is dominated by a broad valley surrounded by uplifted plateaus. The Green River enters from the eastern City limit and then runs north cutting through the center of the City. Mill Creek, a tributary of the Green River, parallels the western corporate limits. The White River flows through the southern part of the City before turning south to join the Puyallup River. The topography of the service area is a result, in part, of the glaciation of the region.

Most of the City lies on a two to three-mile wide plain bound by Mill Creek on the west and the Green River on the east. Ground elevations in the area range between 50 to 100 feet and slope upward generally to the north. The terrain rises sharply to elevations of 400 to 500 feet on either side of the valley as well as in the southern portion of the City, south of the White River and between the White and Green Rivers.

The topographic features of the RWSA provide for a necessary divide of the water system into four major service areas serving the valley and the surrounding plateaus. The following are the major service areas and associated elevations:

- Valley Service Area (service elevation from 39 to 235 feet)
- Lea Hill Service Area (service elevation from 129 to 513 feet)
- Academy Service Area (service elevation from 171 to 444 feet)
- Lakeland Service Area (service elevation from 122 to 578 feet)

Each service area is further subdivided into smaller hydraulic operating areas based on topographic elevations, called pressure zones. Additional details on the City's major service areas are provided in Chapter 2.

1.4.1.2 Climate

The RWSA has a West Coast, marine-type climate caused by the influence of air masses coming from the Pacific Ocean. In late fall and winter, orographic lifting, and cooling cause moist air masses to create clouds and precipitation throughout the area. The average annual rainfall is approximately 40 inches, generally occurring between October and March. The average annual snowfall is 8.6 inches. The temperatures typically range from mid-70 degrees Fahrenheit in the summer to 38 degrees Fahrenheit during the winter, with an overall average of 54 degrees Fahrenheit.

Water consumption is notably impacted by climate conditions, as customers adjust their usage based on weather patterns. In periods of hot and dry weather, consumption rises, driven by activities such as lawn watering and outdoor water use. Conversely, consumption tends to decrease during wet weather.

1.4.1.3 Geology

The geology of the City is the result of glacial and interglacial processes acting over millions of years. During the periods when large continental glaciers, not rivers nor lakes, occupied the Puget Sound area, landslides created deposits and erosion through glacial and interglacial deposits. Generally, the uplands surrounding the City are composed of glacial and interglacial deposits and the valleys are filled with more recent deposits overlying older ones.

Five major geologic units lie within the White and Green River Valleys: White River Alluvium (Qaw), Osceola Mudflow (Qom), Undifferentiated Alluvium (Qua), Vashon Recessional Deltaic Deposits (Qd) and Undifferentiated Glacial and Interglacial Deposits (Qu). Bedrock is known to lie approximately 1,280 feet beneath the valley floors.

The Pacific Groundwater Group (PGG) completed an extensive geological and hydrogeological study within the City's RWSA, known as the Auburn Water Resources Program Study, and the results are documented in several volumes:

- 1996 Preliminary Hydrogeologic Characterization
- Summary of 1997 Hydrogeologic Investigations
- The 1997-1998 Test Well Drilling and Installation Program
- The 1999 Hydrogeologic Characterization Report and Appendices

The general groundwater flow system in the City's vicinity is characterized by recharge within uplands and discharge to the rivers in the lowland valleys. Precipitation and Lake Tapps are sources of groundwater recharge. Lake water flows from the lake bottom into the groundwater system. Contrary to recharge in other upland areas, recharge from Lake Tapps is not totally dependent upon precipitation because water is routed to the lake from outside the area. The main discharge zone for the City's area is the Green River Valley. Some groundwater discharges into the river in the City's vicinity and further downstream.

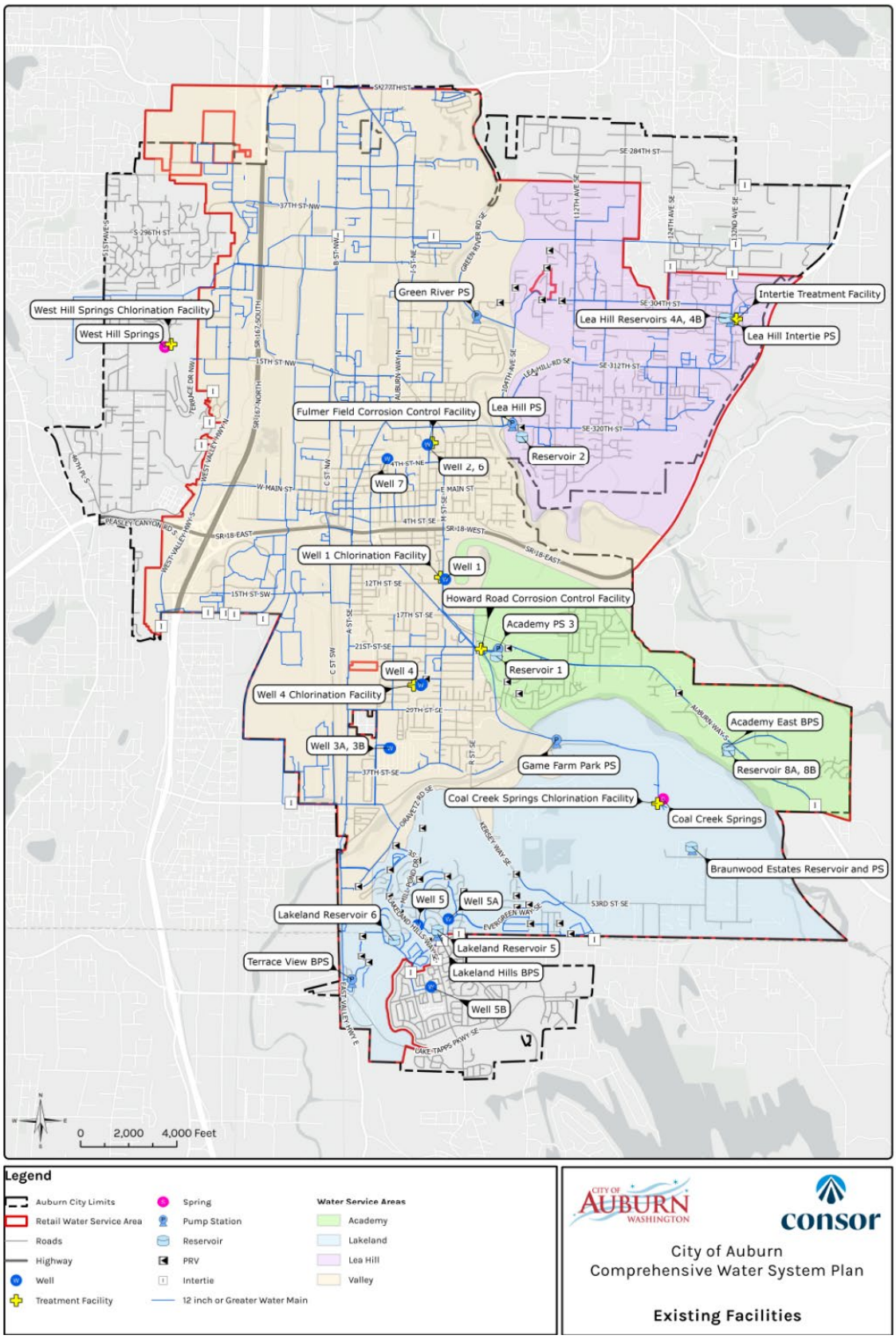
1.4.2 Existing System Overview

The City's water system consists of wells, springs and interties as water sources, chlorination stations and corrosion control facilities for water treatment, pump stations, pressure reducing stations, steel and concrete enclosed reservoirs for storage, and transmission and distribution pipelines to provide potable water to customers. Service is provided to four major service areas (Valley, Lea Hill, Lakeland, and Academy). Each major service area is further divided into pressure zones as required by local topography. The City's four major service areas and the location of key elements of the water system are shown in **Figure 1-3**. A more detailed inventory of assets and system hydraulic profile is presented in **Chapter 3**.

1.4.3 History

The earliest record of a potable water system for the City of Auburn traces back to 1884 with the establishment of the Peasley Canyon supply. Initially serving the City, then called Slaughter, a 4-inch wood-stave pipe connected Peasley Canyon Reservoir to deliver surface water. The year 1907 marked a pivotal moment as the City acquired West Hill Springs for $2,000, a source that continues to yield approximately 1 million gallons of water per day (600 gpm) and remains active.

Figure 1-3 | Existing Facilities



As the City's population grew to a few thousand by 1922, the demand for water prompted the introduction of groundwater wells alongside the existing West Hill Springs. These wells, strategically drilled in the downtown area, were complemented by pump stations, with one situated at the present site of City Hall. Despite their longstanding service, these early wells and pump stations have since been decommissioned.

The evolution of Auburn's water distribution system saw a transition from wooden pipes to the installation of the first recorded steel water main in 1924 - a 10-inch pipeline connecting West Hill Springs to the valley floor. The Coal Creek Springs water collection system, which included a 24-inch steel main under the White River was constructed in 1925, along with the construction of Reservoir 1 (later replaced in 1975), to meet the escalating water needs of the growing City.

By 1946, the population had increased, prompting construction of the Coal Creek Pump Station, to pump water from Coal Creek Springs to the distribution system.

In 1960, the City embarked on further enhancements by supplementing its two springs with a well system, beginning with Well 1 and then Well 2 in 1969.

In 1961, water system facilities were constructed in the Academy Service Area.

Expansion into the Lea Hill Service Area occurred between 1964 and 1965, coinciding with extensive modifications to the Coal Creek supply system and the implementation of a Supervisory Control and Data Acquisition (SCADA) system.

The early 1980s saw the extension of the water system into Lakeland Service Area.

A key development occurred in 1991 with the acceptance of Braunwood Estates (now called Hidden Valley) as a satellite water system operating independently outside the City's distribution network.

The late 1990s marked significant construction under the Interlocal Agreement 2 (IA2) project, a water supply project between LMWD, Covington Water District (CWD) and the City to provide LMWD and CWD with wholesale water supply, and as a result expanding the water system. Expansion into Pierce County and service agreement modifications characterized the late 1990s and early 2000s.

Table 1-2 summarizes key construction and enhancements related to the City's wells, springs, reservoirs, pump stations, treatment, water pipelines, and system upgrades. Notably, the water pipelines improvements focus on transmission mains, excluding distribution mains installation and replacements (due to the extensive list), with exceptions for distribution improvements mandated by environmental (water quality) regulations. The table provides a documented history of the water system, recognizing occasional gaps.

Table 1-2 | Water Facilities History

Springs	
West Hill Springs	• Before 1907: Established as a potable water supply for the City. • 1915: Construction of 210,000-gallon concrete reservoir to store water from West Hill Springs. • 1924: Installation of the first recorded steel water main (10" pipeline from West Hill Springs to the valley floor). • 1960: Ongoing use, with a replacement of collection boxes. • 1988: Removal of reservoir. West Hill Springs water flows continuously into the system.

	• 2000: Partial fencing of the watershed carried out according to the 2000 Water Comprehensive Plan. • 2017: Flow Control Improvements, including installation of an electromagnetic meter and flow control valve for automatic shutdown. • Current: The spring has a capacity of 600-gpm, with varying supply based on aquifer conditions. Equipped with chlorination station.
Coal Creek Springs	• 1925: Construction of Collection system. • 1925: Installation of 24" wood-stave supply pipeline connecting the Coal Creek Springs collection system to a booster pump station (present Howard Road site) and 14" transmission main to Reservoir 1, including installation of 24" steel pipe under the White River • 1964: Construction of south and middle collectors in the system. • 1964: Replacement of the 24" wood-stave supply pipeline connecting the Coal Creek Springs collection system to a booster pump station (present Howard Road site) with 24-inch concrete pipe. • 1998: Addition of the north collector for enhanced system performance. • 2023: Coal Creek Springs Transmission Main Replacement underway to install a new transmission main suspended from a utility/pedestrian bridge over the white river to replace a portion of the old main crossing the river. • Current: Flows by gravity to Howard Road Corrosion Control Treatment Facility (CCTF) and pumped into Reservoir 1, with typical production capacity of 3,000-gpm. Equipped with chlorination station.
Wells	
Well 1	• 1960: Construction of Well 1, within Valley Service Area. • 1998: Shutdown due to reduced well output and water levels. • 2010: The well was brought back into service temporarily to meet summer demands. • 2015: Phase 1 improvements to bring the facility back online. Construction of transmission main in M St SE, 17th St SE, R St SE & Howard Road SE to convey supplies from Well 1 to Howard Road CCTF. • 2016: Phase 2 improvements to bring the facility back online. Improvements included new well house, pumping system (2,200-gpm), disinfection with sodium hypochlorite, on-site emergency power, and upgraded electrical and SCADA controls. • Current: Operational and pumps to Howard Road CCTF, then boosted to Reservoir 1.
Well 2	• 1969: Construction of Well 2 (3,000-gpm capacity), within Valley Service Area. • 2000: Replacement with a new masonry building, pump (1,600-gpm) and associated equipment. • 2014: Installation of Variable-frequency Drive (VFD). • 2023: Rehabilitation and replacement of well pump and motor. • Current: Operational with the Fulmer Field CCTF, providing chlorination and emergency power.
Well 3A	• 1983: Construction of Well 3A (1,650-gpm) with automatic standby generator, pumps directly into Valley Service Area. • 1984: Installation of chlorination system. • Current: Inactive since mid-1990's (Est. 1995 – 1997) due to elevated manganese levels.
Well 3B	• 1984: Construction of Well 3B (1,650-gpm) adjacent to Well 3A, with chlorination system. • Current: Inactive since mid-1990's (Est. 1995 – 1997) due to elevated manganese levels.
Well 4	• 1985: Construction of Well 4 (2,600-gpm), to pump directly into Reservoir 1 and capable of feeding south end of Valley distribution system through pressure-reducing station. • 2016: Emergency Power Improvements project added a diesel-fueled generator and hypochlorite chlorination equipment.

	• 2018: Upgrade of Well soft starter. • 2023 (ongoing): Well 4 Facility Improvements project underway to replace aging mechanical equipment and electrical improvements. • Current: Pumps directly to Reservoir 1 and to south end of Valley Service Area through PRVs.
Well 5	• 1983: Construction of Well 5 (1,000-gpm) to serve the Lakeland Hills Development. • Current: Maximum production capacity of 650-gpm, not chlorinated and pumps directly into Lakeland Service Area and supplies Reservoirs 5 and 6.
Well 5A	• 1990: Construction of Well 5A (180-gpm) to supplement Well 5. • Current: Equipped with chlorination facilities and a manual transfer switch. Pumps directly into Lakeland Service Area and supplies Reservoirs 5 and 6.
Well 5B	• 2005: Construction of Well 5B (600-gpm) with hypochlorite generation and ATEC media filters, to remove iron and manganese prior to disinfection. • Current: Removed from service in 2006 due to irrecoverable aquifer.
Well 6	• 1998-2000: Construction of Well 6 (3,500-gpm) within Valley Service Area. • 2014: Replacement of pump bowl and installation of VFD. • 2000: Rehabilitation with a new masonry building, well pump (1,600-gpm), and associated equipment. • Current: Operational with the Fulmer Field CCTF, providing chlorination and emergency power.
Well 7	• 1997: Construction of Well 7 (3,500-gpm) within Valley Service Area. • Current: Inactive as of 2012, due to elevated manganese levels.
Reservoirs	
West Hill Springs Reservoir	• 1915: Construction of 210,000-gallon concrete reservoir to store water from West Hill Springs. • Current: Reservoir removal (1988). West Hill Springs water flows continuously into the system.
Academy Reservoir	• 1961: 500,000 gallons steel reservoir, supplied by Academy Pump Station. • Current: Reservoir removed (1978-1980) when Reservoir 8B was constructed.
Reservoir 1	• Est. 1925: Construction of 3.0 million gallons to store water from Coal Creek Springs. • 1975: Replacement of uncovered reservoir with covered 5-MG concrete reservoir. • 2019: Seismic isolation control valve installed on outlet piping. • Current: Primary storage for Coal Creek Springs and can also be filled with water from Well 4. Serves as water supply for the Academy Pump Station and Valley Service Area.
Reservoir 2	• 1975: Construction of a 3.6-MG pre-stressed concrete underground reservoir (dual-purpose facility with tennis court on top) in Lea Hill. • Current: Supplied with several City sources and Reservoir 1. Serves as water supply for Valley Service Area. Design for the addition of a seismic isolation control valve in 2024 with construction expected in 2025.
Reservoir 4A	• 1965: Construction of 1.0-MG steel reservoir in Lea Hill. • 1965: Installation of 12-inch ductile iron pipeline from Porter (8th St NE) Bridge to Reservoir 4A. • 1998: Replacement of exterior and interior protective coatings. • Current: Supplied by Valley Service Area through Lea Hill & Green River Pump Stations. Serves as water supply for Lea Hill Service Area. Addition of a seismic isolation control valve underway with construction anticipated in 2024.
Reservoir 4B	• 1983: Construction of 1.5-MG steel reservoir in Lea Hill. • 1998: Replacement of exterior protective coatings. • 2002-2003: Replacement of interior protective coatings

	• Current: Supplied by Valley Service Area through Lea Hill & Green River Pump Stations. Serves as water supply for Lea Hill Service Area. Addition of a seismic isolation control valve underway with construction anticipated in 2024.
Reservoir 5	• 1981: Construction of 1.0-MG steel reservoir for Lakeland Service Area. • 2015: Painting of the Interior and exterior, installation of seismic isolation control valve and addition of ladder. • Current: Supplied with wells 5, 5A and Terrace View Booster Pump Station. Serves as water supply for Lakeland Service Area.
Reservoir 6	• 2012: Construction of 1.0-MG reservoir in Lakeland Service Area (also provides storage for City of Algona). • Current: Supplied with wells 5, 5A and Terrace View Booster Pump Station. Serves as water supply for Lakeland Service Area and City of Algona.
Reservoir 8A	• 1973: Construction of 1.2-MG steel reservoir in Academy Service Area. • 2002-2003: Recoating of the reservoir's exterior and interior. • Current: Supplied with Reservoir 1 through the Academy Pump Station. Serves as water supply for Academy Service Area. Addition of a seismic isolation control valve underway with construction anticipated in 2024.
Reservoir 8B	• 1980: Construction of 1.5-MG steel reservoir in Academy Service Area. • 2002-2003: Recoating of the reservoir's exterior and interior. • Current: Supplied with Reservoir 1 through the Academy Pump Station. Serves as water supply for Academy Service Area. Addition of a seismic isolation control valve underway with construction anticipated in 2024.
Pump Stations	
Howard Road Site Pump Station	• 1925: Construction of Howard Road Site Pump Station with 5 hydraulic ram-type pumps to move water from coal creek springs to Reservoir 1 & distribution system. • Current: (1962) Operation of ram-type pumps ended.
Coal Creek Springs Pump Station	• 1946: Construction Coal Creek Springs Pump Station to pump water to Reservoir 1 and distribution system (consisted of pump house and an electric pump). • 1947-1952 (exact year unknown): Addition of second pump (2,000-gpm). • 1953: Addition of third pump (3,000-gpm) • 1964: Replacement of two pumps with new 1,500-gpm and 2,500-gpm pumps. • 1999: Replacement of Diesel fuel storage tanks for emergency generators with above-ground, double-walled fuel tanks (easier to inspect for fuel leakage). • Current: Pump station removed in 2003 to make way for Howard CCTF.
Academy Pump Station	• 1960: Construction of Academy Pump Station 1, housing Pumps 1 and 2 (300-gpm and 500-gpm capacity). • 1961: Installation of 2 miles 10" cast iron transmission main from Academy Pump station 1 to Academy reservoir. • 1980: Construction of Academy Pump Station 2, housing Pumps 3 and 4 (750-gpm capacity each), with emergency power generator. • 1980: Installation of 2 miles 14" ductile iron transmission main, connecting Academy Pump Station 2 to Reservoirs 8A & 8B. • 1999: Replacement of Diesel fuel storage tanks for emergency generators with above-ground, double-walled fuel tanks (easier to inspect for fuel leakage). • 2022: Academy Pump Stations 1 and 2 replaced with a single pump station, Academy Pump Station 3, that consists of 4 vertical turbines, variable speed drive pumps with firm pumping capacity of 2,100-gpm. • Current: Pumps water to the Academy Reservoirs (Reservoirs 8A & 8B)
Green River Pump Station	• 1999: Construction of the Green River Pump Station, equipped with 4 pumps (1,170-gpm capacity each), as part of the Interlocal Agreement 2 (IA2) to supply water to CWD & LMWD.

	• 2020: Facility improvements for emergency generator and associated electrical equipment. • Current: Pumps water to the Lea Hill Reservoirs (Reservoirs 4A & 4B).
Game Farm Park Pump Station	• 1988: Construction of the Game Farm Wilderness Park Pump station for water supply and fire protection of the park. • 1992: Installation of 60-gpm domestic pump. • 1993: Installation of 1,000-gpm fire pump. • Current: Pumps water to the Game Farm Wilderness Park from the Coal Creek gravity supply line.
(Lea Hill) Intertie/Booster Pump Station	• 1998-2000: Construction of Intertie Pump Station near Lea Hill Reservoirs, designed to operate in conjunction with Green River Pump Station to serve IA2 partners (using 4 pumps) and to also serve small area at the top of Lea Hill using a "package type" booster-pump station. • Current: Pumps water to small higher elevation service area in Lea Hill. Equipped with a hypochlorite chlorination system.
Lea Hill Pump Station	• 1965: Construction of Lea Hill Pump station with two 600-gpm and one 800-gpm pumps, to boost water from Valley Service Area to Lea Hill Service Area. • 1999: Replacement of Diesel fuel storage tanks for emergency generators with above-ground, double-walled fuel tanks (easier to inspect for fuel leakage). • Current: Pumps water to the Lea Hill Service Area.
Lakeland Hills Booster Pump Station	• 1990: Construction of Lakeland Hills Booster Pump Station, consisting of a three-pump pressure sustaining package system and two large-capacity fire pumps, to pump water from Lakeland Hills Reservoir to Lakeland Service Area. • 2013: Replaced for improved service to boosted Lakeland Service Area, using three low flow pumps (720-gpm capacity each) and two fire flow pumps (3,125-gpm capacity each). • Current: Pumps water to higher elevation service area in Lakeland.
Terrace View Booster Pump Station	• 2010: Construction of Terrace View Booster Pump Station with firm capacity of 1,100-gpm, to supply water from Valley 242 to Lakeland 630 pressure zone. • Current: Pumps Valley Service Area water to Lakeland Service Area. Equipped with hypochlorite feed pump.
Academy East Booster Pump Station	• 2014: Construction of the Academy East Booster Pump Station replaced the single pump Janssen's Addition Pump Station, equipped with three domestic pumps with firm capacity ranging from 750 to 1,250-gpm. • Current: Pumps water from Reservoirs 8A and 8B into Academy Service Area.
Treatment	
Howard Road Corrosion Control Treatment Facility (CCTF)	• 2004: Construction of the Howard Road CCTF (6,300-gpm capacity), to treat water from Coal Creek Springs and Well 1 and boost to Reservoir 1, using three 2,100-gpm booster pumps. • Current: Pumps water to Reservoir 1.
Fulmer Field CCTF	• 2004: Construction of the Fulmer Field CCTF (9,600-gpm capacity), to treat water from Well 2, 6 and 7 and boost to Reservoir 2 and distribution system, using four 3,200-gpm booster pumps. • 2013-2018: Evaluation of Fulmer Field CCTF (along with Wells 2, 6 and 7) to identify improvements to increase the supply and treatment capacity of the existing facilities and infrastructure. • Current: Pumps water to Reservoir 2 and the Valley Service Area.
Distribution Main Improvements (mandated by Environmental Regulations) & Interties	
Intertie with City of Algona	• After 1996: Construction of wholesale interties (combined 1.1-mgd capacity) at: ○ 1149 Industry Drive SW ○ Boundary Boulevard and Milwaukee Ave

	○ Iowa Drive and West Valley Highway ○ 1st Avenue • Emergency Interties at ○ Boundary Boulevard and Celery Ave ○ Boundary Boulevard and O Street
Intertie with City of Bonney Lake	• 2002: Construction of 8" emergency intertie at Evergreen Way, southwest of Lakeland Hills Way • After 2010: Construction of emergency interties at ○ Lakeland Hills Way & 59th Avenue ○ Evergreen Way and Nathan Avenue ○ Olive Avenue, south of Evergreen Loop
Intertie with City of Pacific	• After 2003: Construction of emergency interties at ○ Ellingson Road near Pacific Ave ○ A St SE, north of White River
Intertie with City of Kent	• After 2001: Construction of emergency intertie with 78th Avenue S and S 277th Street
Intertie with LMWD	• Est. 1996 – Construction of 12" wholesale intertie at 30502 132nd Avenue SE (5-mgd capacity) • 1996 – 2002: Construction of emergency interties in ○ 127th Place SE, south of SE 299th Place ○ 124th Avenue SE and SE 300th Way ○ SE 300th & 132nd Ave SE ○ 1998-2000 at SE 288th St & 132nd Ave SE
Intertie with Lakehaven Water & Sewer District (LWSD)	• Est. 1995: Construction of the Aaby Dr. emergency intertie with LWSD at R St. NW (named Intertie #2). • 2004: Transfer of Aaby Dr. pump station and service from City to LWSD. • 2006: Emergency intertie with LWSD at R St. NW (Intertie #2) was removed from service • After 2010: Installation of water meter and control valve vault for 6" emergency intertie at Aaby Dr. and Knickerbocker Dr. (reinstating Intertie #2)
Intertie with City of Tacoma	• Est. 2012: Construction of wholesale interties at: ○ 3240 B St NW (2,200-gpm max. instantaneous flow rate) ○ 29598 132nd Ave SE (4,500-gpm max. instantaneous flow rate) ○ Combined max. flow rate of 5.12 MGD (3,555 gpm) in a 24 hour period (the interties could flow at a higher rate for a portion of the day so long as the 24-hour average meets the contractual peak period flow)
Distribution Main Improvements (mandated by environmental (water quality) regulation)	• 2015: Replacement of 2,760 linear feet of Asbestos Cement (AC) water main with ductile iron main. • 2022: Removal and replacement of approximately 186 service lines with lead goosenecks and approximately 7,075 linear feet of distribution water main with ductile iron main.
System Upgrades	
Supervisory Control and Data Acquisition (SCADA) system	• 1975: Addition of SCADA/telemetry, to control all reservoirs, wells and pumps from the Maintenance and Operations building. • 2015: Extensive upgrade of the SCADA/telemetry system, to improve control of the water utility facilities and replace obsolete components. • 2024: Updated System Platform to AVEVA. Major components and new hardware were replaced to provide more reliable service.
Metering	• 2016: Installation of two master meters for Muckleshoot Indian Tribe (MIT) Casino, to facilitate City and MIT account administration.

	• 2017-2018: Installation of Advanced Metering Infrastructure (AMI) for all customers. The AMI allowed for more accurate meter reads, daily information for quicker detection of leaks, and improved efficiency of billing operations. • 2020 - 2022: Replacement of deduct meters used for irrigation purposes with separate water service tap on the city's main.

1.5 Related Plans and Studies

In preparing this Plan, related studies and plans were reviewed to ensure coordination with adopted documents that affect system planning and operations. The related plans are categorized into two groups for clarity: Internal Studies/Plans Specific to the City and External Plans Influencing City-Wide Water Management. A brief synopsis of these studies and plans are presented below.

Internal Studies/Plans Specific to the City:

Wellhead Protection Plan, City of Auburn, 2014: The City developed a Wellhead Protection Plan to identify and protect groundwater sources. The initial plan was created in 2000 by Pacific Groundwater Group (PGG) and subsequently updated by Robinson Noble in 2008 and 2014. The plan maintains existing wellhead protection areas (WHPAs) and contributes to hazard assessments within these zones. It aligns with county ordinances, impacting land use planning and reflecting in critical aquifer recharge areas as outlined in the King County Comprehensive Plan. Additionally, the plan developed a monitoring system for groundwater sampling, which enhanced operational readiness by providing early warnings of potential contaminations.

City of Auburn Water Resources Program, Pacific Groundwater Group, Inc., 1995-1999: Pacific Groundwater Group conducted a comprehensive groundwater study in response to recommendations of the 1995 Comprehensive Water Plan. The study was documented in a series of reports (listed below), collectively known as the Auburn Water Resources Program Study. The Auburn Water Resources Program assessed the long-term potential for the City's continued use of groundwater for its water supply. The study confirmed substantial quantities of groundwater underlying the valley area and provided the basis for the water supply conclusions for this Plan. This comprehensive program, spanning several years, strategically addresses water rights acquisition by delving into technical studies of the local groundwater system. Two key elements of the program were the installation of monitoring wells and river gauges, and the assessment of the existing City wells in the deep aquifer. The installation of monitoring wells and river gauges not only aids in system planning by understanding groundwater dynamics but also enhances operational efficiency through real-time data collection. The program also included the development of a regional ground-water model (MODFLOW), using the United States Geological Survey (USGS) model program. This provided a tool for analyzing potential withdrawal scenarios, offering valuable insights into optimizing water system operations.

- 1996 Existing Data Hydrogeologic Characterization
- 1996 Preliminary Hydrogeologic Characterization
- Summary of 1997 Hydrogeologic Investigations
- 1997-1998 Test Well Drilling and Installation Program
- 1999 Hydrogeologic Characterization Report and Appendices
- Regional Groundwater Model Report

Bilateral Compliance Agreement (BCA), 1996: This agreement, entered with the Department of Health (DOH) due to copper levels that exceeded the action levels in samples collected in 1993, outlined treatment options and schedules for corrosion control facilities. As a result, new corrosion facilities at the Howard Road/Coal Creek Springs Pump Station and Fulmer Field Park were completed in 2004. The completion of

these facilities in 2002 directly impacts operational efficiency, ensuring compliance with health standards and safeguarding water quality in the long term.

City of Auburn – Public Works Emergency Response Manual, 2022: This electronic manual is only one element of the City's overall Emergency Response Plan, which serves as a guide for management of emergency situations. It was first developed in 1999 in response to the potential impact of Y2K and it is updated annually at the first of the year. The manual is not all-inclusive for every type of disaster that could occur, but it is a valuable tool for dealing with many of the emergency situations that most water utilities could face.

City of Auburn Comprehensive Plan, 2015 and Amendments: This current plan, originally adopted in 2015 in accordance with the State Growth Management Act (GMA) is the City's comprehensive land use plan and policy document. It consists of goals, land use policies, and the Comprehensive Plan maps. The plan may be amended annually as needed. The update of the comprehensive plan is taking place concurrently with the revision of this water system plan.

City of Auburn 2015 Comprehensive Water Plan, City of Auburn Public Works, 2015: The previous Comprehensive Water Plan provided evaluation of needs and recommended improvements to the City system for 2015-2022. In 2021, DOH extended the approval period for the 2015 WSP until May 11, 2026. The plan adopted in 2015 constitutes the basis for this Plan.

Capital Facilities Plan (2023-2028), City of Auburn Finance Department, 2022: Adopted in 2022, this plan is instrumental in both planning and operations. It outlines goals, policies, and implementation programs mandated by the State GMA, providing a roadmap for capital improvements. This directly influences the operational landscape by defining necessary infrastructure enhancements and improvements, aligning with the city's capital improvements program.

Engineering Design and Construction Standards, City of Auburn, 2024: The City updates its Design and Construction Standards as needed, typically on an annual or bi-annual basis. These standards not only guide the planning of new infrastructure but also enhance day-to-day operations by ensuring adherence to the latest industry practices and regulations. The City of Auburn Design and Construction Standards are attached in Appendix P.

Water Shortage Contingency Plan, City of Auburn, 2024: The plan establishes actions and procedures for implementing Auburn City Code (ACC) 13.14 during impending or actual water shortages, to maintain levels of service essential for public health and safety, minimize adverse impacts on economic activity, and protect customer's lifestyle; refer to Appendix R.

Water Cost of Service Rate Update Study, City of Auburn, 2022: This study informs strategic decisions related to water rates and influences the operational budget.

System Development Charge Study, City of Auburn, 2014: Completed in 2014, this study examines system development charges, offering insights for future infrastructure development. Its findings directly influence the planning of new systems and infrastructure projects and provide a financial basis for expansion.

External Plans Influencing City-Wide Water Management:

King County 2016 Comprehensive Plan, King County Department of Local Services, 2016: The King County Comprehensive Plan establishes land use zoning for areas outside the City limits, but within the RWSA. Additionally, King County provides critical area ordinances and critical aquifer recharge areas that support

the City's wellhead protection efforts. The current King County Comprehensive Plan was first adopted on December 5, 2016, and was later amended in 2020.

Pierce County Comprehensive Plan, 2015 and Amendments: This is a comprehensive plan and policy document for Pierce County. The plan was developed in accordance with the GMA and is amended every two years. This plan influences planning by offering insights into regional policies.

Pierce County Coordinated Water System Plan, 2021: In 1983, all of Pierce County was declared a Critical Water Supply Service Area. In response to this declaration, Pierce County established the first Coordinated Water System Plan to coordinate planning and establish water service areas. The current Coordinated Water System Plan, adopted in 2021 through Ordinance 2018-39s2, influences both regional water planning and City's operational coordination with other systems in the county.

Pierce County White River Basin Plan, 2013: This plan provides a comprehensive guide to storm drainage and surface water management in portions of the White River Basin. Given that the City of Auburn utilizes this basin, the plan significantly influences operational considerations and emergency response strategies during storm events.

South King County Coordinated Water System Plan (CWSP), 1989: This plan, adopted in 1989, defined the initial service area boundaries for the water systems within the Critical Water Supply Area of South King County. The City of Auburn Comprehensive Water Plan, upon adoption, becomes an element of the CWSP.

South King County Ground Water Management Plan (GWMP), 2003: The GWMP was initiated by Ecology with the intent to develop methods to protect the quality and quantity of ground water, meet future resource needs while recognizing existing water rights and provide effective and coordinated management of ground-water resources. This plan is considered in planning for and operation of the City's water system.

Tribal Land Use Plan, Muckleshoot Indian Tribe, 1978: The adoption of the MIT's Zoning Ordinance in 1979, which influences land use within the Muckleshoot Indian Tribe, affects water-related considerations. This plan plays a crucial role in ensuring collaborative water management efforts that respect tribal land use.

USGS Hydrogeologic Framework, Groundwater Movement, and Water Budget in the Puyallup River Watershed and Vicinity, Pierce and King Counties, Washington: Scientific Investigations Report 2015-5068: A collaborative effort involving various entities (Cities of Auburn, Milton, Puyallup, Sumner, and Tacoma; Pierce Conservation District; DOH; Cascade Water Alliance; Lakehaven Utility District; Summit Water & Supply Company; Mt. View-Edgewood Water Company; and The Russell Family Foundation), this report contributes valuable insights into the hydrogeologic framework, groundwater movement, and water budget in the Puyallup River Watershed. It significantly influences both regional water planning and operational considerations, providing a scientific basis for understanding the water dynamics in the watershed.

Other Plans

In addition to the studies listed above, the current Water Comprehensive Plans from the following neighboring water systems (City of Algona, Bonney Lake, Kent, Pacific, CWD, LWSD, LMWD and Highline Water District (HWD)) were considered during the preparation of this Plan.

1.6 Service Area, Maps, and Land Use

The City's RWSA boundaries were initially defined and documented through the South King County CWSP in 1989. The boundaries of the RWSA have been adjusted since 1989. An area of Pierce County was incorporated into the RWSA through the Pierce County Coordinated Water System Planning process (1997) and interlocal agreements with Bonney Lake (1998 and 2016), LWSD (2004), Kent (2006), and LMWD (2006). Copies of the Water Service Area Agreements are provided in Appendix G. The RWSA covers a total area of 16,193 acres; 15,877 acres are in King County and the remaining 316 acres are in Pierce County within Auburn City Limits. A total of 700 acres (4.3 percent) of the RWSA is in unincorporated King County urban and rural areas.

Several water purveyors adjoin the City of Auburn RWSA, as shown in Figure 1-4. These include the cities of Algona, Bonney Lake, Kent, Pacific, and Sumner. Also included are the CWD, LWSD, LMWD, HWD, and MIT. Purveyors with wholesale water agreements and interties are discussed in Section 1.6.1.

Figure 1-5 reflects the City's current land use designations. The City includes a wide range of residential, commercial, institutional, and industrial land uses. Public and quasi-public land uses include parks, open space, and public recreation as well as institutional uses such as schools. Commercial and industrial uses occur primarily in the valley; however, large areas of residential land use and the Downtown Urban Center (DUC) also exist in the valley area.

The Academy and Lakeland Service Areas are primarily residential, although some commercial development is located along Auburn Way South (SR 164) in the Academy Service Area. The Lea Hill Service Area is also primarily residential although other uses include small amounts of commercial and open spaces, and Green River College.

Areas within the RWSA, but outside the City limits, are governed by unincorporated King County land uses which include agricultural, rural and residential land use types as shown in Figure 1-5. The unincorporated King County land uses shown in Figure 1-5 were obtained from King County's open data portal which reflects the current adopted land use designations established in the Comprehensive Plan. Those land use designations reflect the intended long-range use of land of the 20-year planning horizon of the plan.

Figure 1-6 reflects shows the Urban Growth Area (UGA), which is comprised of both the current City limits and potential annexation areas (PAA).

1.6.1 Wholesale Interties

Interties provide a tool that water utilities use to move water between systems to meet supply needs, to increase reliability and respond to emergencies. The City maintains wholesale supply interties with three water systems: City of Tacoma, Algona, and LMWD. The City also has a supply contract with the MIT and the Indian Health Service, dating from 1972, for services along a pipeline at SE 368th PL extending from the City limits into the reservation.

1.6.1.1 City of Tacoma

In 2012, Tacoma agreed to provide water to the City in the quantity of up to 1.0 mgd average day use, 1.8 mgd peak day use, and 1.62 mgd four-day peak use. Two interties were constructed to supply the City: located at 3200 B Street NW and 29600 132nd Avenue SE in Auburn. This agreement will remain in force as long as Tacoma (or its successors in interest of its water system) remains in the business of providing water, and as long as the City meets the terms and conditions of the agreement.

In 2014, Tacoma amended and restated the 2012 agreement with the City to provide a total of 3.5 mgd (2,430 gpm) of average use and 5.12 mgd (3,555 gpm) of peak use combined from the interties. The B Street NW Intertie is limited to a maximum flowrate of 2,200 gpm and the 132nd Avenue SE Intertie is limited to a maximum flowrate of 4,500 gpm. However, the combined use of the interties cannot exceed 5.12 mgd (3,555 gpm) in a 24 hour period.

Figure 1-4 | Adjacent Water Systems

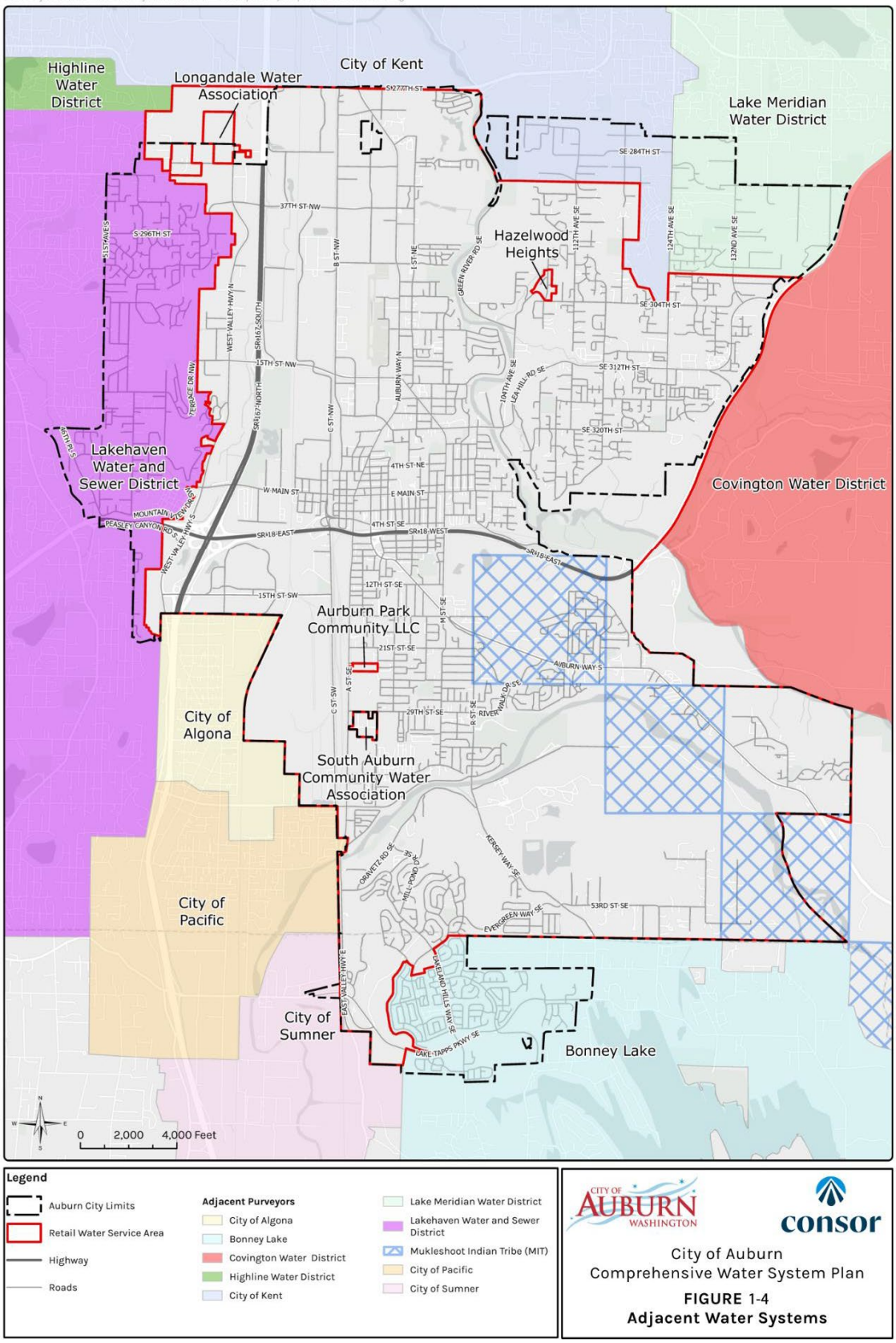


Figure 1-5 | Existing Land Use

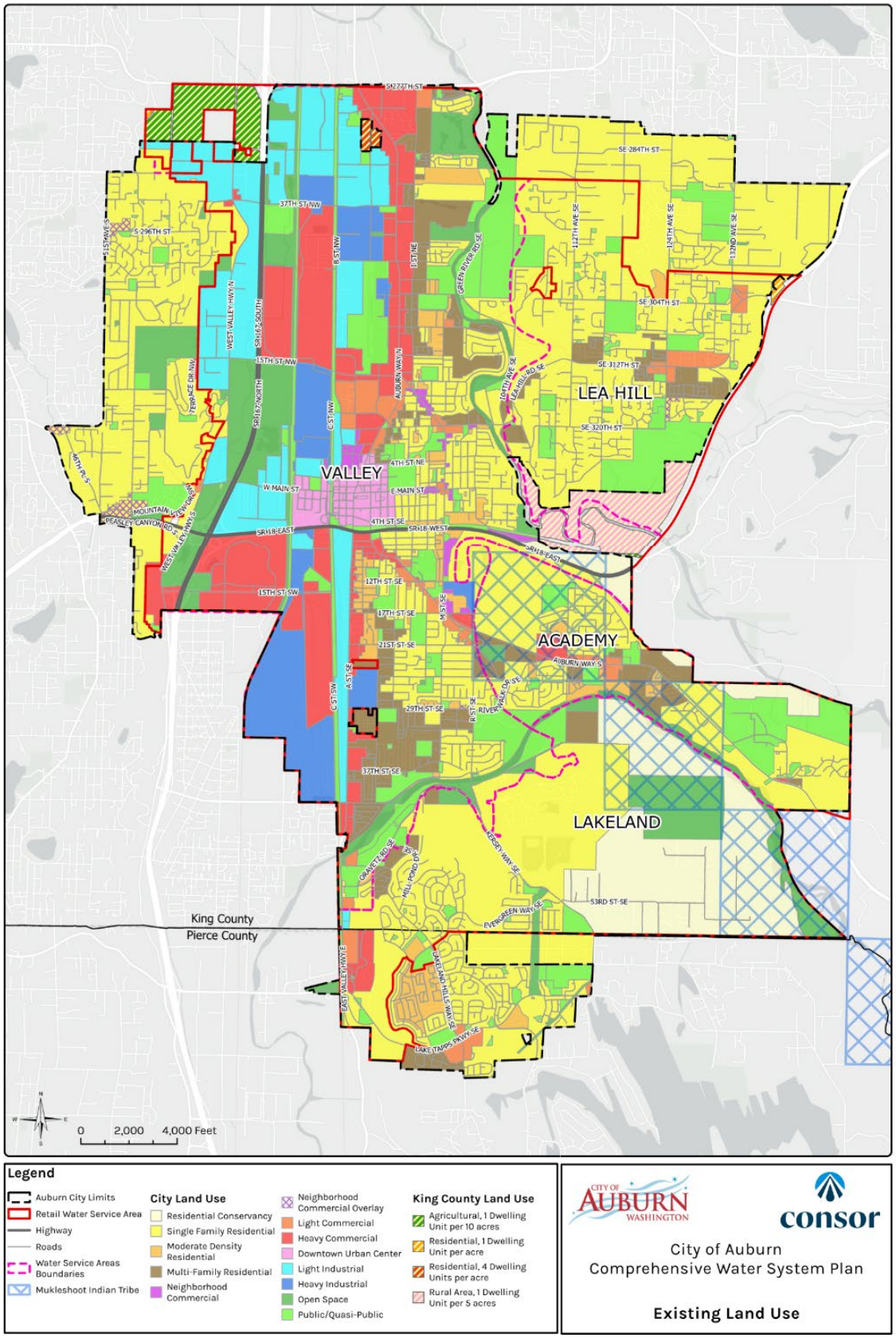
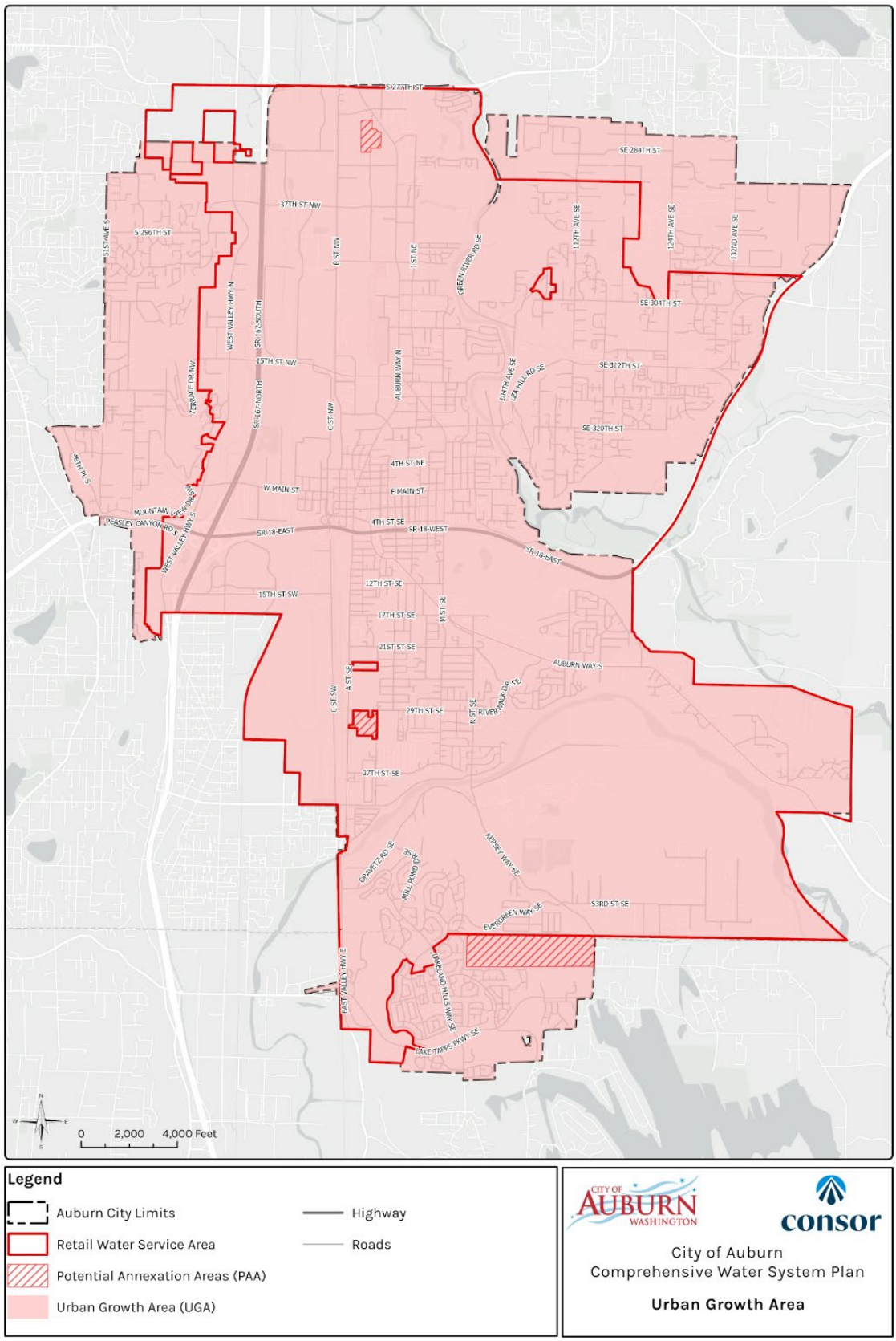


Figure 1-6 | Urban Growth Area



1.6.1.2 City of Algona (Algona)

In 1996, the City and Algona entered into a water supply interlocal agreement (IA3) for the City to provide wholesale water supply to Algona. In 2002, the agreement was superseded with Interlocal Agreement 3A (IA3A). IA3A called for the City to provide for a firm quantified (uninterruptible) wholesale water supply and Algona would provide the City its groundwater rights from the failed well located at the intersection of 3rd Avenue and Washington Boulevard. Per IA3A, Algona also agreed to maintain its 100,000 gallons of system storage and financially participate in an additional 180,000-gallon share of the City's Reservoir 6 storage capacity. Per request in 2016, Algona elected to increase its participation in Reservoir 6 by 100,000 gallons, which accounted for a total share of 280,000-gallon storage capacity. If the City experiences any failure or decreased capacity, the supply of water to Algona may be decreased by the same percentage that is experienced by the City.

Algona is served (per agreement IA3A) through 8-inch meter located at 1st Avenue and by two 8-inch intertie meter stations located at 1149 Industry Drive SW, and at Boundary Boulevard and Milwaukee Avenue. A fourth 8-inch master meter is located near Iowa Drive and West Valley Highway. All the interties are connected to the City's 242 zone.

1.6.1.3 Lake Meridian Water District (LMWD)

An intertie between the City and LMWD was constructed in 1996 as part of Interlocal Agreement 2 (IA2), to enable the District to purchase water from the City. The intertie also allows the City to provide an emergency supply to Kent's East Hill Service Area through LMWD. A provision of the IA2 agreement calls for the district to provide an emergency supply to the City when needed for the Lea Hill Service Area. As part of the IA2, the City agrees to provide up to 2.5 mgd of MDD to LMWD (total maximum day demand of 5.0 mgd).

Per the 2017 Amendment to the IA2, LMWD discontinued regular purchase of water from the City and instead switched their primary supply to CWD. The amendment maintained the intertie with LMWD but modified the conditions of service to interruptible.

1.6.2 Emergency Interties

The City has emergency interties with seven water systems as summarized in **Table 1-3.**

Table 1-3 | Emergency Interties

Water System	Receiver	Location	Auburn Pressure Zone	Mode of Operation	Meter Size	Operated by
City of Algona	City of Algona	Boundary Boulevard and Celery Ave	Valley 242	Manual	N/A	City of Auburn
City of Algona	City of Algona	Boundary Boulevard and O Street	Valley 242	Manual	8"	City of Auburn
City of Bonney Lake	City of Bonney Lake	Evergreen Way SE (southwest of Lakeland Hills Way)	Lakeland 697	Manual	8"	City of Bonney Lake
City of Bonney Lake	Two-way	Lakeland Hills Way & 59th Avenue	Lakeland 697	Manual	N/A	City of Auburn/ Bonney Lake
City of Bonney Lake	Two-way	Evergreen Way and Nathan Avenue	Lakeland 697	Manual	N/A	City of Auburn/ Bonney Lake
City of Bonney Lake	Two-way	Olive Avenue, south of Evergreen Loop	Lakeland 697	Manual	N/A	City of Auburn/ Bonney Lake

Water System	Receiver	Location	Auburn Pressure Zone	Mode of Operation	Meter Size	Operated by
City of Kent	Two-way	78th Avenue S and S 277th Street	Valley 242	Manual	6"	City of Auburn/ Kent
City of Pacific	City of Pacific	Ellingson Road near Pacific Ave	Valley 242	Manual	4"	City of Pacific
City of Pacific	City of Pacific	A St SE (north of White River)	Valley 242	Manual	N/A	City of Pacific
Lakehaven Water & Sewer District (LWSD)	City of Auburn	Aaby Drive and Knickerbocker Drive	Valley 242	Manual	6”	LWSD
LMWD	Two-way	127th Place SE, south of SE 299th Place	Lea Hill 648	Manual	N/A	City of Auburn
LMWD	Two-way	124th Avenue SE and SE 300th Way	Lea Hill 648	Manual	N/A	City of Auburn
LMWD	LMWD	SE 300th & 132nd Ave SE	Lea Hill 648	Manual	8”	City of Auburn
LMWD	LMWD	SE 288th St & 132nd Ave SE	Lea Hill 648	Manual	8”	City of Auburn

1.7 System Policies

The City manages the water utility in accordance with established water system policies that govern various facets of utility operations. The water system policies are established to support a vision or mission and to provide a framework for the design, operation, and ongoing wellbeing of the City’s water utility. The policies establish consistency and ensure that adequate levels of service are provided throughout the system. The policies also provide documentation to current water-system customers, as well as those considering service from the City.

The City’s Water Comprehensive Plan is based upon the following mission statement for the water utility:

“The City will provide for the efficient, environmentally sound and safe management of the existing and future water system within Auburn’s service area.”

For areas outside its municipal boundaries, the City maintains water franchises that allow for construction, operation, and maintenance of its facilities. Water system design and construction in the franchise areas are consistent with franchise requirements and the design and construction standards included in this Plan.

The City’s water system policies and criteria, provided in Appendix A, are grouped within goal statements that are headlined under seven categories: Business Practices, Service Area, Operations and Maintenance, Financial, Planning, Environmental Stewardship, and Design and Construction.

1.8 Duty to Serve

The City recognizes its duty to serve all new service connections within its RWSA when the following thresholds are met per WAC 246-290-106.

- The water system has sufficient capacity to serve water in a safe and reliable manner.
    - To ensure the water system's capacity for safe water delivery, hydraulic analysis is conducted. This involves assessment of peak demand patterns, pressure requirements, and potential system expansions. The goal is to establish and maintain a water supply infrastructure that can reliably and securely accommodate the needs of new connections.
- The service request is consistent with adopted local plans and development regulations.
    - Service requests undergo a comprehensive review to ascertain their alignment with local plans, including the City's Design and Construction Standards.
- The water system has sufficient water rights to provide service.
    - Assessment of water production data is performed for all sources to confirm the water system's capacity and compliance with available water rights.
- The water system can provide service in a timely and reasonable manner.
    - The assessment of the water system's capability to provide service promptly and reasonably encompasses evaluating infrastructure readiness, adherence to construction timelines, and minimizing disruption to existing customers.
    - If a customer or applicant is dissatisfied with a decision made by the City Engineer concerning water service, they may file a written objection with the Public Works Director within 15 working days of receiving the decision. The Director will respond within 15 working days. If the response is unsatisfactory, the appellant may request a hearing with the City's hearing examiner within 30 days.
    - The hearing examiner's decision is final, but can be appealed in superior court following RCW 34.05.510 through 34.05.598.
    - For customers in the city's RWSA located within unincorporated areas of King County, if all city-level appeals are exhausted and unresolved, the dispute may be escalated to the King County Utilities Technical Review Committee (UTRC) in accordance with King County Code (KCC) 13.24.080.

The City will plan to provide water service to all customers within its RWSA, in accordance with the WAC requirements and City Code. Revisions to the City's RWSA will be made only by written agreement and in accordance with local, county and state regulations.

1.9 Local Government Consistency

The City has submitted this plan to DOH, King and Pierce Counties, adjacent utilities, and local governments as part of the Agency Review process. Local government consistency review is completed in accordance

with WAC 246-290-100(7) and WAC 246-290-108 to confirm consistency between the water system plan and local comprehensive plans, development regulations, and other local codes.

The consistency review also supports planning and development, minimizing conflicts and legal entanglements. The completed and signed Local Government Consistency Determination forms (DOH 331-568) are provided in Appendix F.

1.10 Watershed Plan Consistency

The City is in the Duwamish-Green (WRIA 9) and Puyallup-White Watershed (WRIA 10). The City currently has no plans to expand water rights place of use to include any portion of the service area that was not previously within the place of use for the water right when documented in an approved planning or engineering document and as identified in this Plan.

If the City expands water rights place of use, the new area within the water rights place of use service area will be formed in compliance with the terms of WAC 246-290-107 and consistent with the Watershed Plan approved for WRIA 9 or WRIA 10, under RCW 90.54.040(1).

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 2

Basic Planning Data

This chapter's objective is to meet the requirements of WAC 246-290-100 (4)(b), incorporating basic planning data into this 2024 Water System Plan (WSP). It provides current population and water demand information; estimates future population and water demand; validates data; and compares future population and water demand estimates with locally adopted plans.

Projecting realistic future water requirements, or demand, is necessary for planning infrastructure projects and securing adequate water supply to meet future growth. Future water demands are a key component of the water system analyses presented in this WSP and in the City's Capital Improvement Program (CIP). Accurate demand projections require a thorough review of historical water use, predicting where and how much growth will occur, and estimating the future water use for existing and new customers.

The following topics are addressed in this chapter:

2.1 Water Service Area Population
2.2 Water Service Connections and Usage
2.3 Water Supply and Production
2.4 Distribution System Leakage
2.5 Water Supply Characteristics
2.6 Water Supply Reliability Evaluation
2.7 Future Population Projections and Land Use
2.8 Future Water Demand

2.1 Water Service Area Population

The City's current area within the RWSA boundary is smaller than its City limits, with adjacent purveyors serving the portion of the City's population that is outside its RWSA boundary, as shown in **Figure 1-1** presented in **Chapter 1**. As a result, historical City population data does not accurately represent the population served by the City's water system. To calculate the RWSA population, the Housing Unit Method was used, which is presented as an acceptable option for population determination in the Washington State Department of Health's (DOH) Water System Planning Guidebook 2020 Revision. The Housing Unit Method calculates the population based on the number of residential units and the area's average person's per household ratio.

The historical population data for the water system, as calculated using the Housing Unit Method, is presented in **Table 2-1**. These calculated populations are consistent with the numbers the City has reported on its Water Facilities Inventory (WFI), included in **Appendix H.**

Table 2-1 | Historical Population

	2015	2016	2017	2018	2019	2020	2021	2022
Persons per household[1]	2.73	2.75	2.76	2.77	2.79	2.80	2.81	2.82
Single-Family Residential Connections[2,3]	11,600	12,128	11,852	11,857	11,883	11,894	11,985	11,980
Multi-Family Residential Connections[2]	1,045	1,070	1,035	1,044	1,054	1,054	1,064	1,052
Calculated Multi-Family Units[4]	10,450	10,700	10,350	10,440	10,540	10,540	10,640	10,520
Calculated Population Served[5]	60,259	62,704	61,294	61,872	62,535	62,876	63,576	63,450
City Population[6]	78,210	80,362	82,058	84,352	86,353	87,256	88,080	88,750
City Employment (Non-Residential Population)[7]	37,298	39,466	29,487	40,855	41,985	39,092	37,871	N/A

Notes:

1. Persons per household per Washington State Office of Financial Management (OFM). 2021 and 2022 values are projected since OFM data is only available for the census period of 2010-2020.
2. Single and Multi-Family connections per City's water system billing records.
3. Single-Family Residential connections include duplexes per the City's design standards.
4. Assumed units per multi-family connection is 10 per the City's WFI, updated on 3/15/2022.
5. Calculated Population Served is calculated as the number of single-family connections plus the number of multi-family units multiplied by the persons per household.
6. City population per the Washington State OFM records.
7. Employment data is from the United States Census OnTheMap data source using a City-defined selection area.

Based on the calculated historical water system population presented in **Table 2-1**, the City's water system has seen growth in population between 2015 and 2022 averaging a one percent increase annually. The number of connections peaked in 2016 (along with the calculated population), however this was during the time when the City was transferring services to AMI metering, resulting in some apparent fluctuations of reported connections during the switchover that could not be easily rectified. The last row in **Table 2-1** provides the City population as reported by the Office of Financial Management (OFM). The City population has had a similar, steady growth to the calculated water system population, with an average annual growth rate of 1.8 percent annually. The City population as reported by the OFM is larger than the calculated water system population because the RWSA is smaller than the City limits as shown in the Water System Map (**Figure 1-3**). Additionally, growth in parts of the City beyond the RWSA has been greater than the rate of growth experienced within the RWSA. The OFM City population information is provided for reference; the calculated population served will be used for the purposes of this WSP.

2.2 Water Service Connections and Usage

Historical water use, or consumption, data was obtained from City records to characterize the demands of the City's customers. Annual water use data for the years 2015 to 2022 was used to develop historical demand patterns and parameters, which represent current and likely future water use. Two key demand parameters were generated from the data: typical water use per customer classification, and typical water use per equivalent residential unit. These parameters were used as the basis of future demand projections.

2.2.1 Historical Accounts

The City's water customers are divided into eight customer classifications, which are:

- Single-family Residential (SFR).
- Multi-family Residential (MFR).
- Commercial.

- Manufacturing and Industrial.
- Schools.
- Municipal (City Accounts).
- Irrigation.
- Wholesale.

The number of connections for each customer classification is summarized in Table 2-2. Unmetered, also referred to as non-revenue water, also accounts for a portion of the City's water use, however, this classification is not included in Table 2-2. Please note that per the City's standards, SRF connections include duplexes.

Table 2-2 | Historical Number of Connections per Customer Classification

	2015	2016	2017	2018	2019	2020	2021	2022
Single-Family Residential	11,600	12,128	11,852	11,857	11,883	11,894	11,985	11,980
Multi-Family Residential	1,045	1,070	1,035	1,044	1,054	1,054	1,064	1,052
Commercial	1,317	1,386	1,340	1,339	1,333	1,328	1,284	1,244
Manufacturing & Industrial	50	4	4	3	2	2	2	2
Schools	70	64	60	60	60	60	58	55
Municipal (City Accounts)	32	34	33	33	33	33	33	33
Irrigation	459	499	484	499	514	514	620	675
Wholesale	8	8	8	7	5	5	5	5
Number of Connections, Total	**14,581**	**15,193**	**14,816**	**14,842**	**14,884**	**14,890**	**15,051**	**15,046**

As summarized in Table 2-2, SFR connections make up approximately 80 percent of all accounts. The total number of connections has increased by approximately three percent between 2015 and 2022. Variation in the total number of water service connections in 2016 is linked to the rollout of AMI technology from 2016 to 2017. Throughout this transitional phase, there may have been instances of double counting meters in 2016, leading to an inflated number of connections. Subsequently, there was a notable decrease in 2017 as the number of connections were normalized.

A significant change in manufacturing and industrial accounts occurred between 2015 and 2016 due to some meters being reclassified as commercial connections. Manufacturing and industrial services are classified as businesses engaging in the manufacture of products, materials, equipment, machinery, and supplies with a meter size of two inches or larger and a monthly annual average water consumption equal to or greater than 30,000 cubic feet. There were several accounts that did not meet the criteria for this classification and were changed to Commercial classification rate following 2015. The total number of connections from 2016 to 2017 decreased due to low and high flow meters (two meters) being replaced with one meter; this impacted Commercial, Manufacturing and Industrial, and School connections.

The number of SFR, MFR, and commercial connections peaked in 2016, however, as mentioned in the opening paragraph, this is likely due to the fluctuations in the City's transition to AMI metering. Municipal connections remained constant over this period.

Wholesale connections were reduced in 2019 when Covington Water District (CWD) and Lake Meridian Water District (LMWD), formerly known as King County Water District # 111, discontinued regular purchase of water from the City.

2.2.2 Historical Consumption

The City's historical annual water consumption based on City billing data for each customer classification is presented in **Table 2-3** in million gallons (MG); the table does not include non-revenue (unmetered) water.

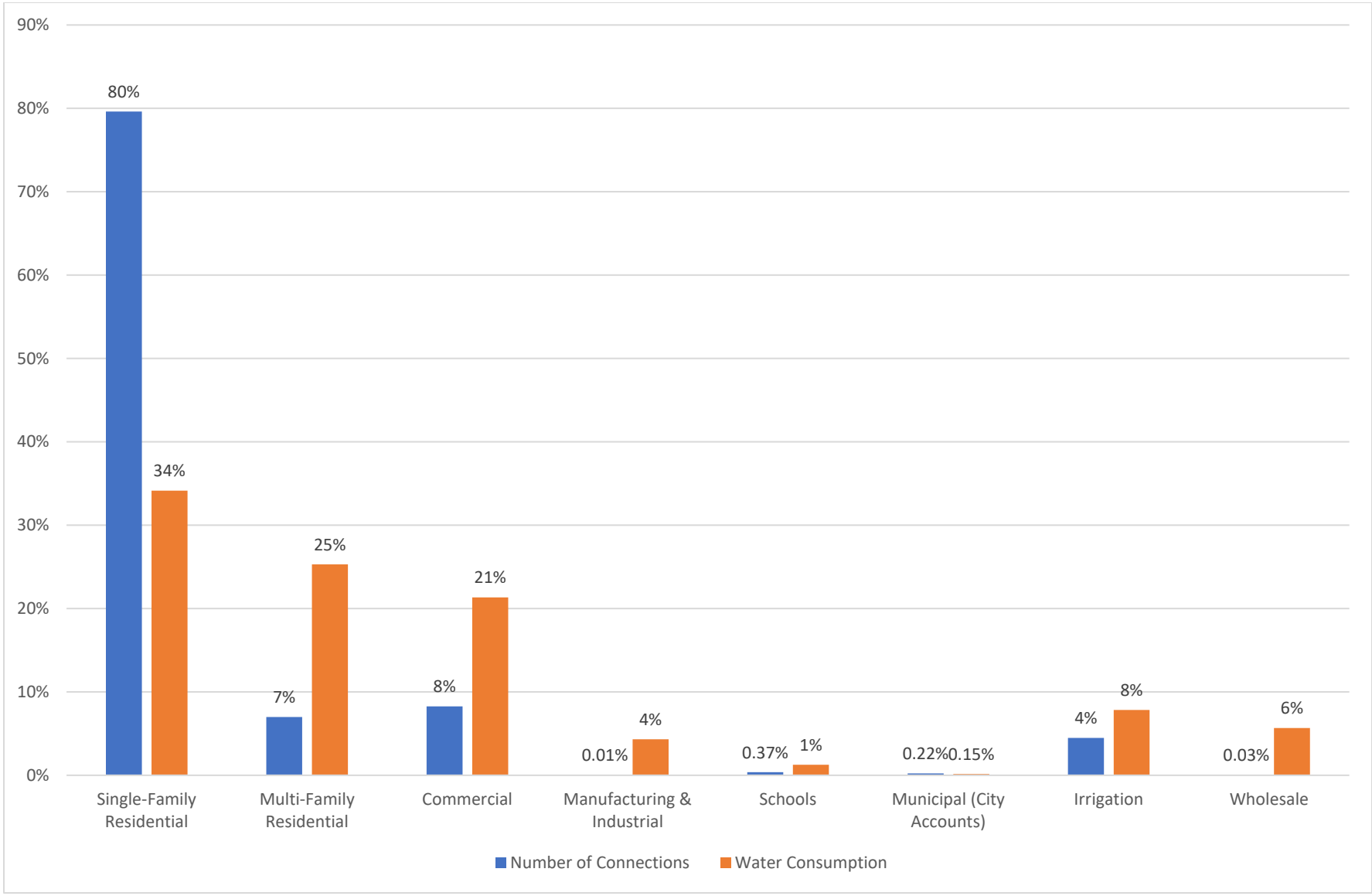
Table 2-3 | Historical Consumption in Million Gallons (MG) by Customer Classification

	2015	2016	2017	2018	2019	2020	2021	2022
Single-Family Residential	774	753	759	836	729	777	796	755
Multi-Family Residential	537	546	523	587	536	553	559	559
Commercial	501	581	595	594	585	461	470	472
Manufacturing & Industrial	170	153	123	124	121	101	94	96
Schools	41	49	56	49	42	30	33	28
Municipal (City Accounts)	5	4	5	5	5	4	4	3
Irrigation	163	162	160	102	102	118	173	173
Wholesale	425	428	153	137	130	131	128	125
Total Consumption, MG	**2,616**	**2,676**	**2,374**	**2,433**	**2,251**	**2,175**	**2,257**	**2,211**

Consumption has slightly declined over the period of record. While SFR and MFR consumption varied from year to year, it generally saw a slight increase during the study period which is correlated to the steady increase in the number of connections presented in **Table 2-2**. SFR and MFR consumption peaked in 2018, which is likely due to AMI meters implementation. Manufacturing and industrial demands decreased between 2015 and 2022 which is attributed to the reduced number of connections (reclassification) presented in **Table 2-2** as well as reduced consumption from Boeing which is the City's only current manufacturing and industrial customer. Commercial and school consumption decreased in 2020 through 2022 which is likely correlated with remote working and schooling that resulted during the COVID-19 pandemic. Wholesale demands also decreased over the planning period since LMWD and CWD discontinued purchase of water from the City. Additionally, no wholesale water was supplied to the Muckleshoot Indian Tribe (MIT) for the future fish hatchery; refer to **Section 2.8** for additional information.

Figure 2-1 presents the percentage of customer connections and annual billed water consumption by customer classification in 2022. Comparing the number of connections and water consumption illustrates the differences in water consumption between the different customer classifications. For example, SFR customers represent 80 percent of the connections, yet only 34 percent of the total consumption in 2022. Conversely, MFR customers represent seven percent of the connections, but 25 percent of the total consumption in 2022. Wholesale customers have six accounts in 2022 (0.04 percent of the total connections), but account for six percent of the total consumption in 2022. Similarly, manufacturing and industrial have two connections in 2022 (0.01 percent of the total connections), but account for four percent of the total consumption in 2022.

Figure 2-1 | Comparison of Number of Connections to Annual Water Consumption per Customer Classification in 2022



2.2.2.1 Historical Wholesale Consumption

Wholesale consumption decreased between 2015 and 2022. From 2015 to 2016 wholesale consumption represented 16 percent of the City's annual water consumption. In 2017 wholesale consumption decreased to six percent and remained relatively constant through 2022.

The City has two wholesale water agreements, one with the City of Algona and the other with LMWD. These agreements are described below, and copies of the agreements are included in **Appendix G**.

The City of Algona relies on the City of Auburn for water supply under the Water System Intertie Agreement, Algona/Auburn Intertie Agreement No. 3A (Agreement 3A). Agreement 3A was amended in 2002 to continue the agreement for the City of Auburn to provide a portion of the City of Algona's long-term water supply needs. Additionally, in 2016 the City of Algona purchased 100,000 gallons of additional storage in Lakeland Reservoir 6, bringing their total storage capacity to 280,000 gallons. Algona's consumption increased in 2018. Water consumption averaged 0.33 mgd between 2015 and 2017, and 0.36 mgd between 2018 and 2022. See **Table 2-6** for annual usage totals.

The City's Interlocal Agreement 2 (IA2) outlines the agreement with LMWD. The City's agreement with LMWD is on an interruptible basis and allows sales up to 2.5 mgd. This agreement was executed in October of 1996 and amended as Resolution 5332 in 2017. The agreement will remain in full force unless terminated by mutual agreement of the participants. LMWD did not purchase wholesale water during the planning period since they discontinued regular purchase of water from the City of Auburn in 2017 per the amendment to IA2. Instead, LMWD switched their primary supply to CWD, however, LMWD still maintains intertie with the City to use as a wholesale water supply on an as-needed basis.

The first amendment to IA2 also included the termination of CWD's wholesale agreement with the City; CWD did not purchase wholesale water during the planning period.

2.2.3 Water Use Per Connection and Equivalent Residential Units

The water use, or demand, of each customer classification can be expressed in terms of equivalent residential units (ERUs) for forecasting and planning purposes. One ERU is defined as the average quantity of water beneficially used by one average, full-time, SFR per day. The ERU calculation does not include non-revenue water or distribution leakage. **Table 2-4** summarizes the annual demand per ERU from 2015 to 2022 in gpd.

Table 2-4 | Historical Annual Demand per ERU (gpd per ERU)

	2015	2016	2017	2018	2019	2020	2021	2022
SFR Consumption (MG)[1]	774	753	759	836	729	777	796	755
Number of SFR Connections[2]	11,600	12,128	11,852	11,857	11,883	11,894	11,985	11,980
ERU_{ADD} (gpd)[3]	**183**	**170**	**176**	**193**	**168**	**179**	**182**	**173**

Notes:
1. Per annual residential consumption from **Table 2-3.**
2. Per residential connections from **Table 2-2.**
3. Calculated as annual consumption divided by number of connections.

To be conservative, an ERU planning value higher than the average was used by the City for demand forecasting. The 75th percentile of all the eight-year values was used to select the planning ERU value of 182 gpd. This methodology is consistent with the City's 2015 Plan. The ERU value of 182 gpd is seven percent lower than the 2015 Plan's ERU planning value of 195 gpd per ERU.

The conversion of total water consumption to ERUs provides a means to express water consumption by non-residential customers as an equivalent number of SFR accounts. The number of ERUs per account is obtained by dividing the water consumption per account by the water use per ERU (182 gpd for this planning period). Table 2-5 presents the number of ERUs per account for each customer classification based on the planning value of 182 gallons per ERU.

Table 2-5 | Historical Demand as Equivalent ERUs per Customer Classification

	2015	2016	2017	2018	2019	2020	2021	2022
Single-Family Residential(ERUs)[1]	11,600	12,128	11,852	11,857	11,883	11,894	11,985	11,980
Multi-Family Residential (ERUs)	8,078	8,194	7,864	8,832	8,067	8,295	8,403	8,411
Commercial (ERUs)	7,542	8,709	8,947	8,933	8,806	6,920	7,066	7,096
Manufacturing & Industrial (ERUs)	2,561	2,298	1,857	1,864	1,817	1,510	1,412	1,437
Schools (ERUs)	614	730	842	742	624	448	497	420
Municipal (City Accounts) (ERUs)	69	62	69	72	82	56	67	49
Irrigation (ERUs)	2,454	2,431	2,412	1,528	1,534	1,775	2,608	2,603
Wholesale (ERUs)	6,395	6,414	2,299	2,057	1,949	1,966	1,925	1,884
Annual Demand Equivalent (ERUs)	**39,314**	**40,967**	**36,141**	**35,884**	**34,762**	**32,863**	**33,963**	**33,881**

Note:

1. The number of Single-Family Residential ERUs is equivalent to the actual number of connections. For all other customer classifications, the planning value of one ERU is equivalent to 182 gpd.

2.2.4 Largest Water Users

The top 20 largest water users for the City's water system are summarized in Table 2-6 and Figure 2-2 with rank assignments based on 2022 consumption. Total consumption values are presented in MG. This list, in conjunction with the information above, provides information on where water is consumed in the system. It is important to note the type of customer classification, because the top 20 water users consume a significant percentage of the total consumption. As mentioned above, SFR connections make up most of the total connections and water consumption for the system, but no individual SFR connections are listed within the top 20 largest water users. Though the City of Algona is comprised of individual SFR's, the City of Algona is one of the top 20 largest water users because it is a wholesale customer supplied via a limited number of connections.

The top 20 water users in the City's water system accounted for approximately 24 percent of the total water system consumption in 2022. LMWD was the largest water user in 2015 and 2016, purchasing over 300 MG per year, but discontinued regular purchase of consumed water from the City in 2017. Copper Gate, Promenade Apartments, and Villas/Reserve are developments that were constructed after 2015, which pushed Tall Cedars and Leisure Manor multi-family users out of the top 20. Boeing and the City of Algona make up almost 50 percent of the top 20 water users' consumption.

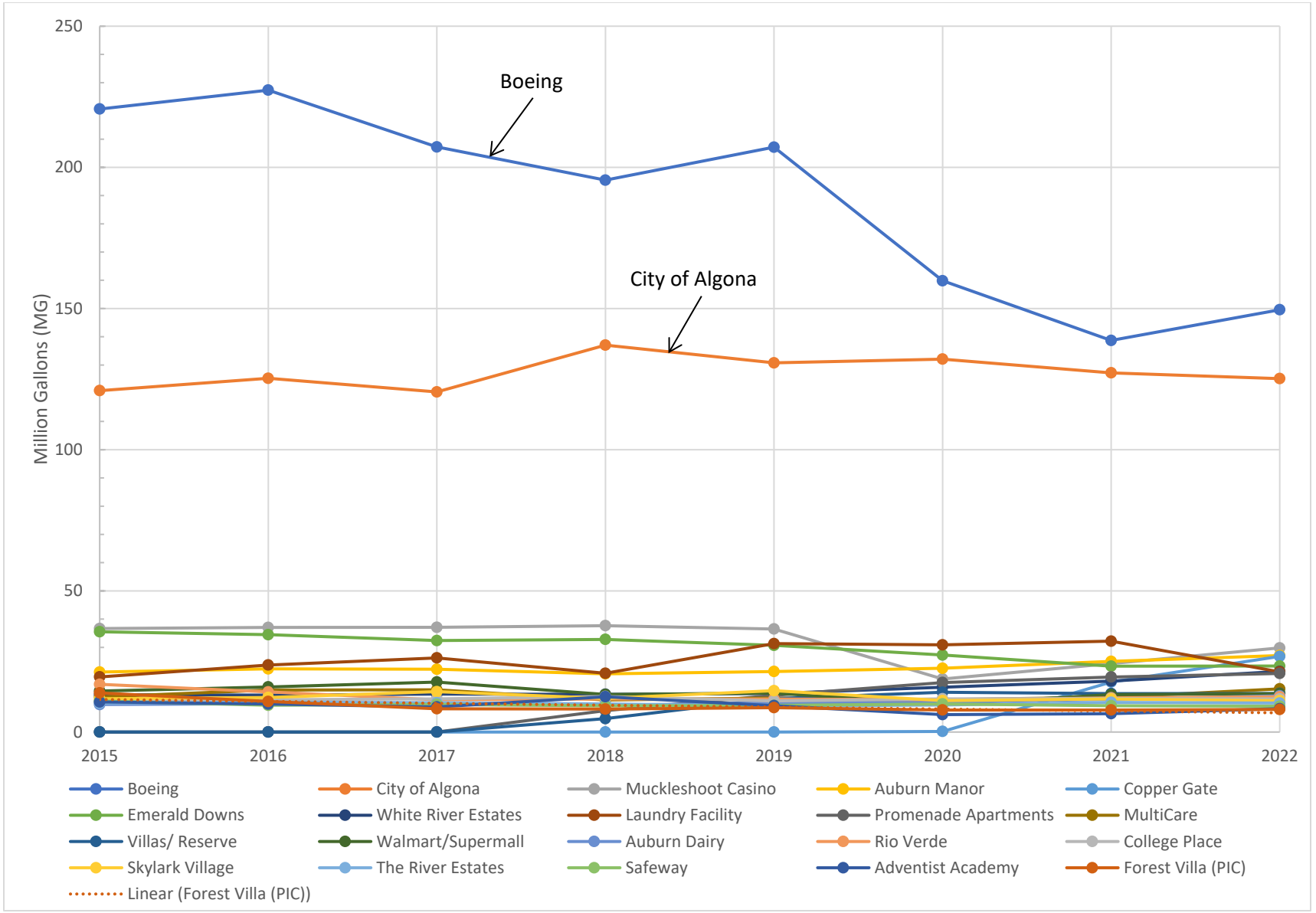
Table 2-6 | Historical Annual Consumption of the Top 20 Largest Water Users in Million Gallons (MG)

Rank[1]	Customer Name	Classification	Service Area	2015	2016	2017	2018	2019	2020	2021	2022
1	Boeing	Manufacturing/Commercial	Valley	220.67	227.34	207.23	195.48	207.15	159.83	138.70	149.57
2	City of Algona	Wholesale	Valley	120.93	125.29	120.46	137.04	130.75	132.07	127.22	125.18
3	Muckleshoot Casino	Commercial	Academy	36.65	37.04	37.08	37.66	36.49	18.79	24.24	29.79
4	Auburn Manor	Multi-Family	Valley	21.25	22.367	22.24	20.61	21.45	22.59	25.03	27.10
5	Copper Gate[2]	Irrigation/Multi-Family	Valley	-	-	-	-	-	0.22	17.70	26.80
6	Emerald Downs	Commercial/Irrigation	Valley	35.51	34.48	32.40	32.81	30.69	27.28	23.33	23.36
7	White River Estates	Multi-Family	Valley	13.24	13.09	13.42	13.36	13.66	15.87	18.06	21.47
8	Laundry Facility	Commercial	Valley	19.52	23.73	26.25	20.81	31.31	30.87	32.19	21.32
9	Promenade Apartments[2]	Commercial/Irrigation/Multi-Family	Lea Hill	-	-	-	7.58	13.00	17.53	19.48	20.74
10	MultiCare	Commercial/Irrigation	Valley	12.45	14.86	14.95	11.35	12.04	11.48	12.32	15.30
11	Villas/Reserve[2]	Commercial/Irrigation/Multi-Family	Valley	-	-	-	4.75	11.84	14.09	13.62	13.66
12	Wal-mart/Supermall	Commercial/Irrigation	Valley	14.54	15.98	17.70	13.31	13.78	9.79	13.26	13.58
13	Auburn Dairy	Commercial	Valley	9.73	10.03	9.73	9.49	10.38	10.63	11.58	12.82
14	Rio Verde	Multi-Family	Valley	16.91	14.21	11.41	11.72	11.72	11.46	12.12	12.48
15	College Place	Multi-Family	Lea Hill	10.81	11.46	11.75	12.59	10.99	11.77	11.89	11.74
16	Skylark Village	Multi-Family	Valley	11.80	12.23	14.30	11.93	14.65	11.13	11.73	11.11
17	The River Estates	Multi-Family	Valley	10.23	10.59	10.38	9.97	9.17	9.59	10.49	10.27
18	Safeway	Commercial	Valley	11.01	9.48	9.81	9.27	9.44	9.95	9.32	9.14
19	Adventist Academy	School/Multi-Family	Academy	10.66	9.92	8.89	12.49	9.33	6.17	6.50	8.26
20	Forest Villa (PIC)	Multi-Family	Academy	13.86	10.83	8.24	8.13	8.63	7.80	7.82	8.00
-	LMWD[3]	Wholesale	Lea Hill	302.89	303.02	29.40	-	-	-	-	-
		TOTAL CONSUMPTION (MG)[3]		**905.86**	**918.45**	**618.85**	**588.28**	**613.31**	**545.32**	**546.66**	**571.67**

Notes:

1. Rank assignments are based on 2022 consumption data.
2. Service location was constructed after 2015 WSP was published.
3. LMWD was the largest water user in 2015 and 2016 but discontinued purchase of water from the City in 2017. Included to contribute to the total consumption.
4. The annual total is the sum of the top 20 largest users from each year; Tall Cedars and Leisure Manor consumption data is not shown but is included in the total.

Figure 2-2 | Historical Annual Consumption of the Top 20 Largest Water Users in Million Gallons (MG)



2.3 Water Supply and Production

The historical average and maximum water demands are important parameters when performing system and supply analyses. The term "water demand" refers to all the water requirements of a system including metered customers, unmetered water use, and unaccounted for water loss such as leakage and theft. For this reason, the City's supply data, which accounts for all water demand, was used to calculate the Average Day Demand (ADD) and Maximum Day Demand (MDD) for each year.

2.3.1 Historical Water Supply

The City produces water through its springs, wells, and, when needed, wholesale water purchases. **Table 2-7** summarizes the amount of water produced and purchased by the City between 2015 and 2022 as MG. The City has not purchased water from the City of Tacoma since 2016.

Table 2-7 | Historical Annual Water Supply by Source in Million Gallons (MG)

	2015	2016	2017	2018	2019	2020	2021	2022
Lakeland Well 5	4.9	0.1	0.2	0.5	1.0	0.9	1.2	3.3
Lakeland Well 5A	54	45	64	76	68	65	72	59
Lakeland Well 5B	-	-	-	-	-	-	-	-
Valley Well 1	-	200	336	93	143	143	57	73
Valley Well 2	-	-	-	270	296	235	305	314
Valley Well 3A	-	-	-	-	-	-	-	-
Valley Well 3B	-	-	-	-	-	-	-	-
Valley Well 4	302	430	421	121	96	84	88	66
Valley Well 6	-	-	-	402	445	349	438	468
Valley Well 7	-	-	-	-	-	-	-	-
Coal Creek Springs	1,456	1,613	1,510	1,315	1,208	1,268	1,338	1,225
West Hill Springs	173	198	114	176	136	133	140	157
Algona Well 1	-	-	-	-	-	-	-	-
Total Production (MG)[1]	2,033	2,487	2,506	2,464	2,410	2,313	2,443	2,395
Total Purchased (MG)	732	321	-	-	-	-	-	-
Total Supply (MG)	**2,765**	**2,808**	**2,506**	**2,464**	**2,410**	**2,313**	**2,443**	**2,395**

Note:

1. Small differences exist between the total production value and the sum of individual production values by source. This is due to the use of raw unprocessed data for individual sources, which was subsequently processed to identify and remove outliers, correct data entry errors and account for anomalies that could distort the overall results. These adjustments ensure that the . Total Production values presented depict the most accurate information available.

Table 2-8 | 2022 Monthly Water Production by Source (MG)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Lakeland Well 5	0.4	0.2	0.2	0.2	0.2	0.2	0.9	0.6	0.1	0.1	0.1	0.1
Lakeland Well 5A	6	5	6	6	6	6	5	6	6	6	-	1
Lakeland Well 5B	-	-	-	-	-	-	-	-	-	-	-	-
Valley Well 1	3	1	-	1	-	3	19	41	5	-	-	-
Valley Well 2	27	25	29	28	29	25	30	29	24	23	21	24

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Valley Well 3A	-	-	-	-	-	-	-	-	-	-	-	-
Valley Well 3B	-	-	-	-	-	-	-	-	-	-	-	-
Valley Well 4	3	2	2	3	-	2	18	27	8	1	-	-
Valley Well 6	41	37	44	41	43	36	44	44	37	35	31	35
Valley Well 7	-	-	-	-	-	-	-	-	-	-	-	-
Coal Creek Springs	90	71	77	62	83	110	129	159	153	112	89	90
West Hill Springs	13	11	13	12	13	13	13	15	14	14	13	13
Algona Well 1	-	-	-	-	-	-	-	-	-	-	-	-

2.3.2 Average Day Demands and Maximum Day Demands

Table 2-9 summarizes the historical ADD and MDD based on production from 2015 through 2022.

To calculate the ADD, the total annual supply was divided by the number of days in the year.

Historical values of MDD are equivalent to the highest production and purchase in one day each year, usually during the summer when irrigation use is highest. The MDD is a key parameter used for supply capacity, pump station discharge rates, reservoir capacity, and pump sizes. The peaking factor is also a key parameter in developing the future MDD projections.

Table 2-9 | Historical Annual ADD, MDD, Peak Day, and Peaking Factor

	2015	2016	2017	2018	2019	2020	2021	2022
Annual Supply (MG)[1]	2,765	2,808	2,506	2,464	2,410	2,313	2,443	2,395
Average Day Demand (mgd)	7.57	7.67	6.87	6.75	6.60	6.32	6.69	6.56
Maximum Day Demand (mgd)	11.62	12.56	11.76	11.60	11.25	12.43	11.77	11.78
Max Day Date (month/day)	6/28	8/25	8/22	7/27	8/1	7/29	7/27	7/29
MDD/ADD Peaking Factor	1.53	1.64	1.71	1.72	1.70	1.97	1.76	1.80

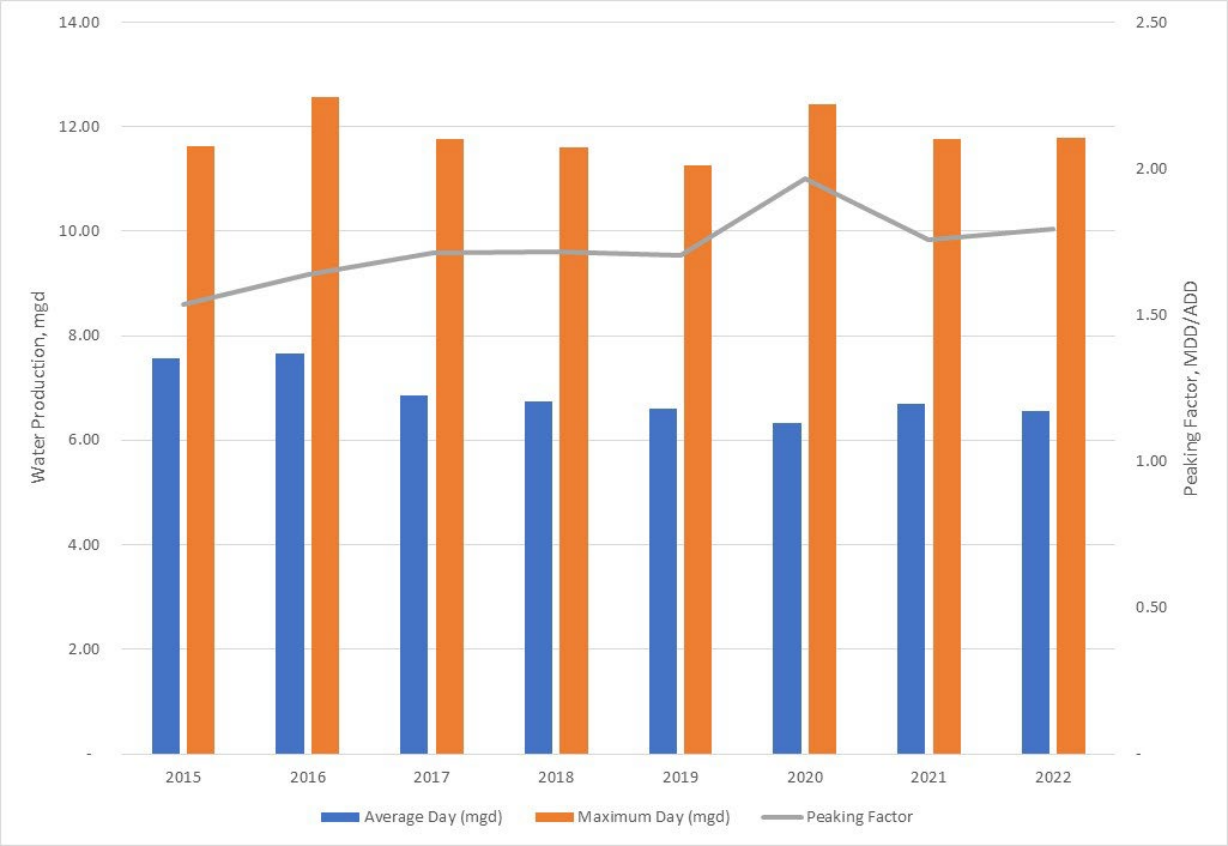
Note:
1. Value is from **Table 2-7.**

The last row of **Table 2-9** presents the historical MDD to ADD peaking factor, which normalizes the historical data to compare between years. The minimum MDD factor was 1.53 in 2015, and the maximum MDD was 1.97 in 2020.

Due to variability of the peaking factor, the City has chosen to use the 75th percentile of the historical peaking factors in demand projections, which is 1.77. This factor provides a better representation of the peaking factors observed historically for water supply predictions.

Figure 2-3 shows that from 2015 to 2022 the ADD has decreased, which is correlated with improved water use efficiency, but the MDD and MDD/ADD peaking factor have increased. This is likely due to warmer and drier summer months and a reduction in the ADD after CWD opted out of their original agreement with the City, terminating their purchase of water, and LMWD stopped regular purchase of consumed water from the City, switching to interruptible supply.

Figure 2-3 | Historical Water Production with Peaking Factor



2.3.3 Peak Hour Demand

Peak Hour Demand (PHD) is the amount of water used, excluding fire flow, during the largest use hour of the year. Because the City does not track hourly production data, PHD was estimated based on Equation 3-1 from the DOH Water Design Manual, which is as follows:

$PHD = (ERU_{MDD}/1440)\ [(C \times N) + F] + 18$

Where **PHD =** Peak Hourly Demand, total system (gpm)
C = Coefficient Associated with Ranges of ERUs (1.6 for systems with more than 500 ERUs)
N = Number of ERUs based on MDD
F = Factor Associated with Ranges of ERUs (225 for systems with more than 500 ERUs)
ERU_{MDD} = Maximum Day Demand per ERU (gpd)

The calculated annual PHD for the system is summarized in **Table 2-10**.

Table 2-10 | Historical Peak Hour Demand

	2015	2016	2017	2018	2019	2020	2021	2022
ERU_{MDD} (gpd)	279	298	312	313	310	358	320	327
Number of ERUs based on MDD	41,586	42,115	37,692	37,068	36,253	34,696	36,747	36,025
PHD (gpm)	12,973	14,019	13,135	12,950	12,567	13,881	13,140	13,159
PHD to MDD Factor	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61

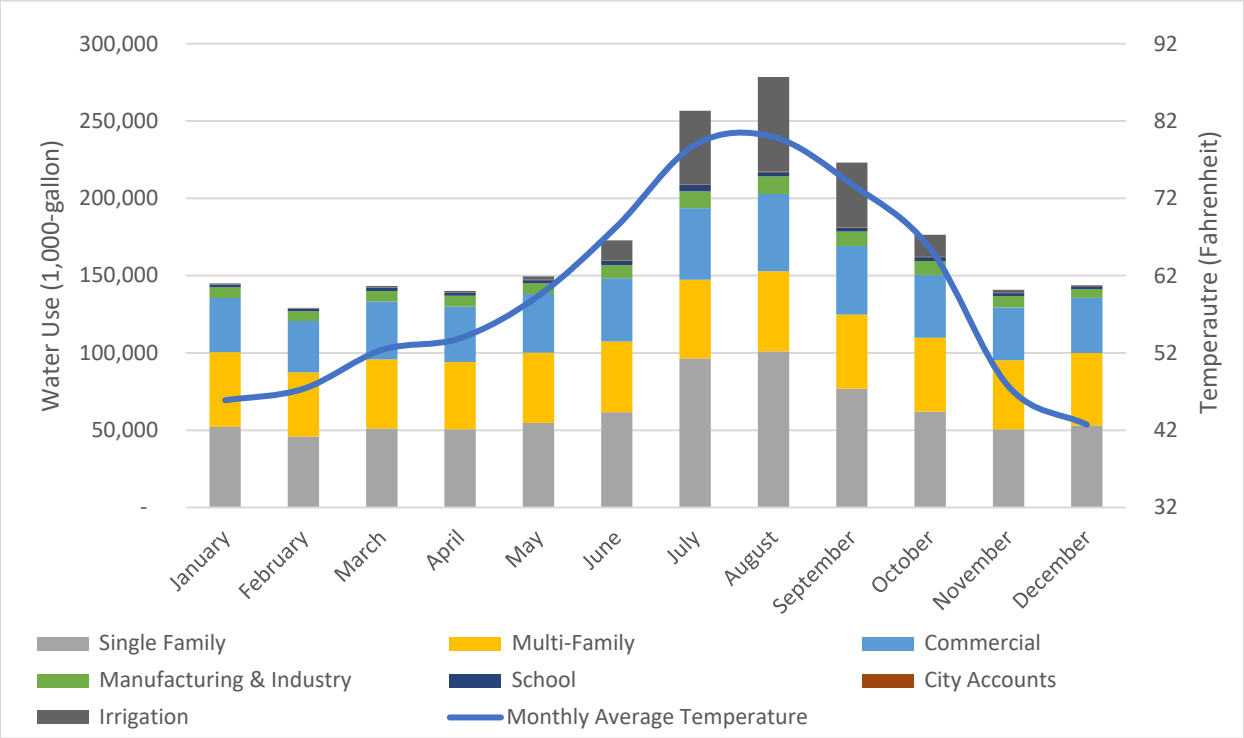
The last row of **Table 2-10** provides the calculated PHD to MDD factor, which normalizes the historical data to compare between years. The calculated PHD factor remained consistent at 1.61 between 2015-2022. Due to this consistency, the City has elected to use the PHD factor of 1.61 in future demand projections.

2.3.4 Seasonal Variations

The pattern of water consumption differs between the customer classifications. Water use increases significantly during the summer when daylight hours are longer, and lawn and landscape watering is prominent. Other outdoor uses, including car washing, pools, and recreation, are also at their highest during summer months.

Figure 2-4 presents the effect that temperature has on water usage by comparing 2022 monthly consumption data per customer classification to the average monthly temperature.

Figure 2-4 | Temperature Effects on Water Usage in 2022



As seen in **Figure 2-4**, SFR and irrigation customers show a significant peak in total consumption during the summer months. Other customer classifications show a smaller similar peak during these months. MFR customers do not show a significant peak during summer monthly because City's policy dictates the use of separate irrigation accounts for all non-SFR accounts. These monthly variations can be used to target water use efficiency efforts and/or to project future water-use patterns for planning purposes.

2.4 Distribution System Leakage

Distribution System Leakage (DSL) represents the difference between production and documented water use (retail, wholesale, and authorized unmetered). It may include inaccurate master and service connection meters, unaccounted-for non-revenue water use, pipeline leakage, and unauthorized use. DSL does not include authorized water usage such as water used for fire protection, flushing, construction, and other

maintenance and operations practices. However, to be credited, this must be accounted for by metering or estimating using credible means.

DSL is calculated as the difference between the total amount of water produced and the sum of water sold and authorized unbilled water usage. DOH requires the three-year average DSL to be under 10 percent to minimize water waste.

The City's estimated DSL for 2015 through 2022 is presented in **Table 2-11**. Revised DSL values have been provided to DOH for 2020, 2021 and 2022 that are lower than the values presented in **Table 2-11**. However, the revised values are not utilized for projections, as the revisions were made after the demand projections and system analysis were completed. Since the values used for demand projections and system analysis are slightly higher than the revised values, the projections are slightly more conservative than would have been necessary otherwise.

Table 2-11 | Historical Distribution System Leakage

	2015	2016	2017	2018	2019	2020	2021	2022
Total Water Supply[1] (MG)	2,765	2,808	2,506	2,464	2,410	2,313	2,443	2,395
Billed Consumption[2] (MG)	2,616	2,676	2,374	2,433	2,251	2,175	2,266	2,214
Authorized Non-Billed Consumption (MG)	7	4	6	13	7	4	5	5
Total Authorized Consumption (MG)	2,623	2,679	2,380	2,446	2,257	2,179	2,271	2,219
DSL (MG)	142	128	126	18	153	133	172	176
Annual Percent DSL	5.1%	4.6%	5.0%	0.7%	6.3%	5.8%	7.1%	7.4%
3-Year Rolling Average (Percent)	6.8%	5.1%	4.9%	3.4%	4.0%	4.3%	6.4%	6.7%
3-Year Rolling Average (MG)	183	139	132	91	99	101	153	161

Notes:
1. From **Table 2-7.**
2. From **Table 2-3.**

For the City's water system, the total three-year rolling average DSL ranged from 3.4 percent to 6.8 percent of the total production meeting DOH requirements and the City's goal. The City's annual average DSL over the period was 5.2 percent. During this period the City maintained a DSL below 10 percent on an annual basis, which is an improvement from the last planning period. Abnormally high authorized non-billed consumption was recorded in 2018 due to unidirectional flushing for the Valley Service Area. Starting in 2021, the billed consumption was updated to track hydrant water used during construction.

The City is committed to maintaining a 3-year rolling average DSL below 10 percent and actively works to identify and eliminate DSL throughout the system through its ongoing leak detection, meter calibration, and repair and replacement programs for water system infrastructure, as detailed in **Chapter 6 – Operations and Maintenance**. Additionally, the City has maintained efforts to reduce non-payment bills and water theft.

2.5 Water Supply Characteristics

The City has a diverse water supply consisting of two springs, ten wells and an emergency intertie with the City of Tacoma; refer to the Existing Facilities Figure provided in **Chapter 1** (**Figure 1-3**). The City's aquifer characteristics are described in several sources; this section draws mainly from the Conceptual Mitigation Plan (CMP) for Water Right Application G1-28404, provided in **Appendix S**.

Wells 1, 2, 3A, 3B, 4, 6, and 7 are in the lower alluvial aquifer in the Auburn Valley, referred to as the Valley Wellfield. This wellfield is mostly confined by the Osceola Mudflow, an important aquitard in the Auburn Valley depicted in Figure 4 of the CMP. Groundwater discharge from the upland aquifers is the primary source of recharge to the lower alluvial aquifer, which hosts all the City's wells. Groundwater generally moves upward in the valley aquifers and moves horizontally at approximately one to four feet per day. Alluvial groundwater from the White River also recharges the Green River alluvial aquifer. Groundwater in the vicinity of Wells 2, 6, and 7 discharges into the Puget Sound via the Green River and the Duwamish River valley. Wells 2, 6, and 7 are located northeast of downtown Auburn and collectively referred to as the Fulmer Wellfield. Wells 1, 3A, 3B, and 4 are in the White River Drainage Basin and Wells 2, 6, 7 and West Hill Springs are in the Green River Drainage Basin.

Wells 3A, 3B and 7 are not currently in use due to high manganese concentrations, however the City plans to install manganese treatment at each of these facilities to bring them back online. The City has a pending water right application for 13,443 acre-feet per year from the existing Wells 6 and 7 and a future Well 8. The City has sufficient water rights to meet current demands, 10-year, and 20-year demand projections, as shown in the Water Rights Self-Assessment Form provided in Appendix I. Mitigation obligations due to the proposed water right for Wells 6, 7, and 8 are listed below and are described in detail in the CMP:

- Mitigation of impacts to Green River,
- Mitigation of impacts to White River, and
- Mitigation of impacts to Mill Creek.

Wells 5, 5A, and 5B are in the Upland Wellfield and constructed within the Lakeland Service Area. The upland aquifers are recharged through precipitation and leakage from Lake Tapps and discharge into the White River system. Once Well 5B came online, the City discovered that the aquifer was not recovering. Well 5B has been offline since 2006. The safe yield of Wells 5 and 5A have been decreased from their design capacity due to a drop in the aquifer's capacity. Specific information on the individual wells and their associated water rights are provided in Section 3.4.1.

West Hill Springs draws from an unnamed confined aquifer. The spring source water flows by gravity into the Valley Service Area, although flows vary depending on aquifer conditions, and discharges into Mill Creek, which flows into the Green River.

Coal Creek Springs is the largest active water supply for the City and draws from a confined aquifer, however its flow varies depending on aquifer conditions. Coal Creek Springs collection system is located at the base of Lake Tapps Upland and is in the White River Drainage Basin. Further aquifer details are provided within the Wellhead Protection Program (WHPP) provided as Appendix T.

The City also owns two additional wells: the Algona Well 1 and the Braunwood Well. Algona Well 1 was acquired by the City in 1996 but has since been taken offline due to operational issues.

The City plans to use a groundwater flow model being developed by the USGS to predict potential impacts to surface water.

2.6 Water Supply Reliability Evaluation

The City's active water sources have maintained current production capacities and are deemed reliable, as they have back-up power sources available. The production of some water sources is limited by pump or intake capacity, as mentioned in Section 2.5, however all production is managed to be within available water rights and is managed by the physical capacity of each facility as summarized in Table 2-12.

Table 2-12 | Summary of Source Water Pumping or Production Capacity Compared to 2022 Maximum Daily Production

Source	Service Area	Pumping/Production Capacity (gpm)	Maximum Daily Production[1] (gpm)
Well 5	Lakeland	760	640
Well 5A	Lakeland	180	180
Well 5B	Lakeland	--[2]	--
Well 1	Valley	2,100	2,100
Well 2	Valley	1,600[4]	1,470
Well 3A	Valley	--[2]	--
Well 3B	Valley	--[2]	--
Well 4	Valley	2,600	1,796
Well 6	Valley	1,800	1,777
Well 7	Valley	--[2]	--
Coal Creek Springs	Valley	3,500[3]	4,383
West Hill Springs	Valley	600	563
Algona Well 1	--	--[2]	--
TOTAL		**13,140**	**12,909**

Notes:
1. Maximum daily production per source is the maximum production rate recorded in 2022.
2. The facility is currently offline. No production capacity is available without facility improvements.
3. Water rights for Coal Creek Springs allow for a Qi of 6,732 gpm. 3,500 gpm is the typical historical production capacity limitation experienced. The City is currently investigating the possible factors influencing the feasible withdrawal from this source.
4. The pump at Well 2 was replaced in 2023 and now has a capacity of 1,115 gpm.

Calculations presented in the Water Rights Self-Assessment Form (**Appendix I**) conclude that the City's existing water rights are anticipated to be adequate to meet the current, 10-year, and 20-year projections for maximum instantaneous flows (Qi) and total annual withdrawal (Qa).

However, the City does not have the infrastructure required to withdraw from all water sources, and some sources have underlying production restrictions that require further evaluation. Several facility improvement projects are required to maximize production and obtain the full water rights. Furthermore, potential demand from LMWD was not included in the assessment, as they have an interruptible wholesale agreement with the City which is a secondary priority to the City's demand. Currently, the City's interties with the City of Tacoma provide additional wholesale water for purchase if necessary to meet demands, however the City has not purchased water from Tacoma since 2016.

The City has established a policy of maintaining the capability to supply the MDD while the largest water source is out of service. The system analysis documented in **Chapter 3** confirms that with projected demands over the 20-year planning period, the City will maintain the capability to meet MDD if the largest pumping source is out of service. This evaluation includes the Tacoma interties as available sources to meet this need and excludes the capacity of facilities that are offline or not operational.

Of the twelve sources, only Wells 5 and 7 are currently without a standby power source. Standby power will be added to Wells 5 and 7 as part of CIP projects discussed in **Chapter 8.** The Fulmer Field Corrosion Control Treatment Facility has backup power.

The Game Farm Park Pump Station, Lea Hill BPS, and Intertie Pump Station are the only pump stations without a standby power source or connection. Backup power will be added to the Lea Hill BPS and the Intertie Pump Station as part of a capital projects discussed further in **Chapter 8**. The Game Farm Park Pump

Station is a small facility that serves a recreational area and does not serve residential or commercial properties, therefore back-up power is not a critical element.

2.6.1 Use Impacts on Instream Flows

New water right appropriations in the Green-Duwamish Basin are subject to instream flow (ISF) regulations as described in the CMP and WAC 173-509. These ISF are senior to the City's recent water rights application G1-28404. This requires mitigation for potential impacts to the Green River when instream flows are not met, such as predicting when streamflow will drop below ISFs as well as determining the lag time associated with impacts to instream flows from groundwater withdrawals. The CMP includes the following detailed description of the streamflow characteristics:

> "A review of historical streamflow data indicates that on average streamflow's are below the ISFs at the Auburn gauge approximately 20 percent of the time (Table 3). Streamflow's are generally more often below the minimum ISFs during the summer months, falling below the minimum ISFs 35 percent to 61 percent of the time between June and September. The flows are frequently above the minimum ISFs during the spring and winter months but can drop to below ISFs at any time of the year. For example, in April, streamflow falls below the minimum ISFs approximately 3 percent of the time (4.1.2)."

The City's current rights are senior to the instream rights and therefore not effected by the instream flow limitations, however as stewards of the watershed, the City has an aggressive water use efficiency program described in Chapter 4 meant to limit the volume of withdrawals, especially during the dry season. The City has a minor surplus of both annual volume withdrawn (Qa) and maximum instantaneous flow rate withdrawn (Qi) to meet MDD through the 20-year planning period. However, several facility improvements are required to make the withdrawals feasible.

2.6.2 Wholesale Interties

The City has three wholesale interties, described below and in further detail in Section 1.6.2.

City of Algona

The City has supplied water to Algona on a regular basis since 1996, when interlocal agreement IA3 was negotiated. A superseded agreement, IA3A, was negotiated in October 2002 which reflects the current status. The agreement will remain unless terminated by mutual agreement of the City and Algona. Currently, Algona is served through the metered Boeing Welded Duct Intertie and by two eight-inch, manually operated meter stations located at Boundary Boulevard and Industry Drive North, and at Boundary Boulevard and Milwaukee Avenue.

LMWD

An intertie between the City and LMWD was constructed in 1996 as part of IA2 to enable LMWD to purchase water from the City. The manually operated intertie also allows the City to provide an emergency supply to Kent's East Hill Service Area. The City agreed to provide up to 2.5 MGD average day and 5.0 MGD maximum day use. A provision of the agreement calls for LMWD to send an emergency supply of water to

the City when needed for the Lea Hill Service Area. The IA2 agreement also included several improvements to allow delivery of water:

- The Green River Pump Station and pipelines to deliver additional water into the Lea Hill Service Area
- The Intertie Pump Station and pipelines to deliver water from the Lea Hill Service Area to LMWD
- Construction of two additional wells (Wells 6 and 7).

LMWD discontinued regular purchase of water from the City in 2017 per the amendment to IA2, however LMWD still maintains the intertie with the City to use as a wholesale water supply on an as-needed basis. This interlocal agreement has a term of sixty years, commencing in 2017.

City of Tacoma

In 2012, Tacoma agreed to provide water to the City in the quantity of up to 1.0 MGD average day use, 1.8 MGD peak day use, and 1.62 MGD four-day peak use. Two interties were constructed to supply the City's Valley pressure zone: located at 3200 B Street NW and 29600 132nd Avenue SE in Auburn. In 2014, Tacoma amended and restated the 2012 agreement with the City to provide a total of 3.5 mgd (2,430 gpm) of average use and 5.12 mgd (3,555 gpm) of peak use from the interties. The B Street NW remotely operated intertie is limited to a maximum flowrate of 2,200 gpm and the 132nd Avenue SE Intertie is limited to a maximum flowrate of 4,500 gpm. However, the combined use of the interties cannot exceed 5.12 mgd (3,555 gpm) in a 24 hour period. This agreement will remain in force as long as the City of Tacoma remains in the business of providing water, however the City has not purchased water for consumption from the City of Tacoma since 2016.

2.6.3 Emergency Interties

Emergency interties are an important tool that helps water utilities increase reliability and respond to emergencies. The City has emergency interties with seven water systems, as described in Section 1.6.2 and summarized in Table 1-3.

2.6.4 Potential Interties

The City has an interest in acquiring additional interties that would enhance the reliability of water service in the City and among adjacent purveyors. Tacoma Public Utilities constructed the Second Supply Pipeline Project, which runs through the north end of the City's RWSA between 30th and 37th Streets NE. In addition to the B Street NW and 132nd Avenue SE interties, a third turnout was constructed as part of the pipeline project in the Valley Service Area. The City does not currently plan to develop this turnout but may do so in the future.

2.7 Future Population Projections and Land Use

2.7.1 Demographic Forecast

Demographic forecasts provide an estimate of future population and employment. The City is a member of the Puget Sound Regional Council (PSRC), which develops demographic analyses for the central Puget Sound region (King County, Kitsap County, Pierce County, and Snohomish County). The demographic projections are developed based on local planned development capacities and regional policies adopted by the PSRC Vision 2050. Vision 2050 established the region's strategy for accommodating population and employment growth to maintain the high quality of living, economic prosperity, and a healthy environment

through the year 2050. Through this planning process, the City is required to plan for a specific number of additional housing units and jobs.

Consistent with the Washington State Growth Management Act (GMA), the City uses the Vision 2050 growth values as the basis of the demographic projections.

Demographic projections are based on the PSRC's 2044 forecasts for housing, population, and employment for each Transportation Analysis Zone (TAZ) within the City's RWSA, as the City's policy is to serve all customers within its RWSA. Additional information on the City's existing land use, future zoning, demographic projections, and corresponding rates of growth are detailed in this Section.

2.7.2 Future Land Use and Zoning

Land use and zoning regulations provide important information in determining future water requirements. Land use and zoning determines the area available for various types of development including both SFR and MFR development, as well as commercial and other types of land use that provide the economic base necessary to support residential development. The housing, population and employment projections developed for the 2024 Periodic Comprehensive Plan are based on the employment and housing targets provided by King and Pierce counties that the City must accommodate over the 20-year planning horizon. This consistent approach is encouraged by the Washington State GMA and should result in predictable and stable land uses over longer planning periods.

Future land use and zoning designations for the City's RWSA are shown on the Comprehensive Zoning Map provided as Figure 2-5. Land uses in unincorporated King County which are part of the RWSA, but beyond City limits are anticipated to remain consistent with current designations, as the current land use designations reflect the intended long-range use of land for the 20-year planning horizon in the current Comprehensive Plan; additional data for future land use designation for unincorporated King County are not currently available. Zoning designations implement the land use identified in the City's Comprehensive Plan; therefore, the current land use reflects the City's historical zoning. House Bill 1337 and House Bill 1110, both effective as of July 2023, are geared at expanding housing options. As such, the City has adopted future zoning to allow for accessory dwelling units within areas previously dedicated to single-family detached housing. Table 2-13 summarizes the updating zoning designations and fire flow requirements. Note that the required fire flow in some zoning designations will be determined on a case-by-case basis pending development or re-development type. Fire flow requirements for portions of the RWSA located in unincorporated King County are also captured in Table 2-13.

Three of the updated residential zoning designations presented in Table 2-13 allow for Accessory Dwelling Units (ADUs). Policies related to ADU water service metering and connection fees are included in Appendix A. The demographic population projections are expected to be sufficient to account for growth that is realized by the additional ADUs within the service area. The demographic population projections are discussed in Section 2.7.3 and demand projections are discussed in Section 2.8.2. Required fire flow for ADUs will be determined on a case-by-case basis pending development or re-development type.

The City includes a wide range of residential, commercial, institutional, and industrial land uses. Public and quasi-public land uses include parks, open space, and public recreation as well as institutional uses such as schools. Commercial and industrial uses occur primarily in the Valley Service Area; however, large areas of residential land use and the Downtown Urban Center (DUC) also exist in the Valley Service Area.

The Academy and Lakeland Service Areas are primarily residential, although some commercial zoning is located along Auburn Way South (SR 164) in the Academy Service Area. The Lea Hill Service Area is also

primarily residential although other uses include small amounts of commercial and open space, and Green River College.

Areas within the RWSA, but outside the City limits, are governed by King County zoning. Land use was assumed to be consistent with zoning in these areas. The area in the northwest corner of the RWSA, west of SR167 and north of S 287th Street is zoned for Agriculture. A second area is located near Auburn Narrows State Park, which is north and west of SR18. This area includes Rural Residential, as well as Park and Greenbelt zoning. The City does not currently provide service in this area; however, it is willing to provide service to customers meeting the Service Area Policies. There are two additional unincorporated "pockets" of urban residential zoning within the RWSA that the City currently serves, where the southern area also contains a single parcel of Industrial zoning. The King County zoning was used in the demographic analyses.

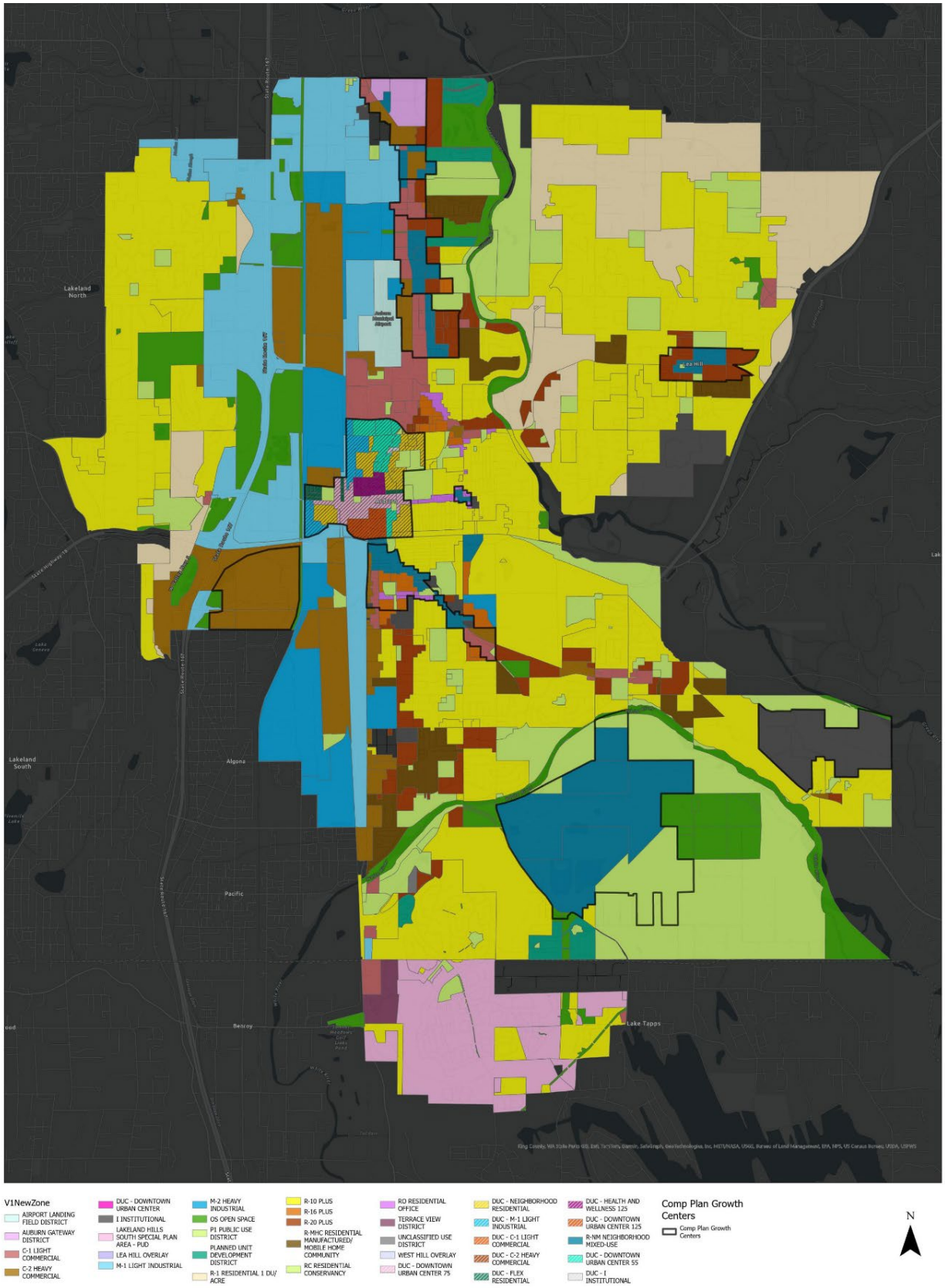
Table 2-13 | Updated Zoning Districts and Fire Flow Requirements

Zoning District	Land Use	Definition	Fire Flow Requirement (gpm)
RC RESIDENTIAL CONSERVANCY	Residential Conservancy	No change	1,500
R-1 RESIDENTIAL 1 DU/ACRE	Neighborhood Residential One	No change	1,500
R-10 PLUS[1]	Neighborhood Residential Two	Single family, townhouse, duplex, triplex, fourplex, two-story stacked flats, cottage housing-4-6 units/lot ADUs	1,500 - 2,500
R-16 PLUS	Neighborhood Residential Two	R-10, plus five-plex, six-plex, 3 story stacked flats, courtyard apartments, apartment buildings and mixed use up to 20 units ADUs	2,500
R-20 PLUS	Neighborhood Residential Three	R-16 plus apartment buildings, and mixed use over 20 units ADUs	2,500
R-NM NEIGHBORHOOD MIXED-USE	Mixed Use	R-16 and C-1 Uses + Mixed-use (horizontal or vertical) encouraged	2,500
R-MHC RESIDENTIAL MANUFACTURED/MOBILE HOME COMMUNITY	Neighborhood Residential Three	No change	2,500
RO RESIDENTIAL OFFICE	Mixed Use	Smaller scale R-NM with emphasis on conversion of existing structure	2,500
C-1 LIGHT COMMERCIAL DISTRICT	Commercial	Generally the same as existing	2,500
C-2 HEAVY COMMERCIAL DISTRICT	Commercial	Generally the same as existing	2,500
AUBURN GATEWAY DISTRICT	Mixed Use	North Auburn Subarea Use	2,500
M-1 LIGHT INDUSTRIAL DISTRICT	Industrial	Generally the same as existing	2,500
M-2 HEAVY INDUSTRIAL DISTRICT	Industrial	Generally the same as existing	2,500
AIRPORT ZONE	Industrial	No change	2,500
P1 PUBLIC USE DISTRICT	Public/Quasi-Public	Public schools, recreational spaces, police stations, fire stations, cemeteries	2,500

Zoning District	Land Use	Definition	Fire Flow Requirement (gpm)
I INSTITUTIONAL USE DISTRICT	Public/Quasi-Public	Private schools, Green River College, large campus development	2,500
OS OPEN SPACE	Open Space	No change	-
DUC - DOWNTOWN URBAN CENTER 125	Downtown Urban Center	DUC with up to 125-ft tall buildings where permitted	2,500
DUC - DOWNTOWN URBAN CENTER 75	Downtown Urban Center	DUC with up to 75-ft tall buildings where permitted	2,500
DUC - DOWNTOWN URBAN CENTER 55	Downtown Urban Center	DUC with up to 55-ft tall buildings where permitted	2,500
DUC - NEIGHBORHOOD RESIDENTIAL	Downtown Urban Center	Mixed-use and R-15	2,500
DUC - HEALTH AND WELLNESS 125	Downtown Urban Center	R-OH-MultiCare Zone	2,500
DUC - FLEX RESIDENTIAL	Downtown Urban Center	RO with permitted specific industrial uses (craft workshops, breweries, coffee, etc.)	2,500
LAKELAND HILLS SOUTH SPECIAL PLAN AREA – PUD[1]	Neighborhood Residential Two		1,500-2,500
AIRPORT LANDING FIELD DISTRICT	Industrial		2,500
AUBURN GATEWAY DISTRICT	Mixed Use		2,500
DUC - I INSTITUTIONAL	Downtown Urban Center		2,500
DUC - M-1 LIGHT INDUSTRIAL	Downtown Urban Center		2,500
I INSTITUTIONAL	Public/Quasi-Public		2,500
PLANNED UNIT DEVELOPMENT DISTRICT[1]		Varies by location	1,500-2,500
TERRACE VIEW DISTRICT	Commercial		2,500
UNCLASSIFIED USE DISTRICT[1]		Varies by location	1,500-2,500
A-10	Agricultural	1 Dwelling Unit per 10 acres, located in unincorporated King County.	1,500
RA-5	Rural Area	1 Dwelling Unit per 5 acres, located in unincorporated King County.	1,500
R-1	Residential	1 Dwelling Unit per acre, located in unincorporated King County	1,500
R-4	Residential	4 Dwelling Units per acre, located in unincorporated King County	1,500

Note:
1. Required fire flow will be determined on a case-by-case basis pending development or re-development type.

Figure 2-5 | Comprehensive Future Land Use and Zoning Map



2.7.3 Projected Demographic Growth

Many factors influence population growth including the state of the economy, interest rates, annexation of adjacent areas, and up-zoning for new development. Growth management policies, along with coordination between local governments, should make development more predictable and growth projections more accurate than they have been historically. The City's Comprehensive Plan, as well as this Plan, are key documents to aid the City in preparing for the predicted growth. However, it is common for actual growth rates to vary from those predicted. In addition, growth rates will vary between various parts of the City based on the availability of services and the costs to develop for the zoned use.

Housing, population, and employment projections were used to calculate rates of growth. PSRC's Vision 2050 requires the City to plan for a given number of additional housing units and jobs. The demographic projections for population and employment were allocated based on water meter locations within the four Water Service Areas that comprise the RWSA. Population projections extending beyond the RWSA boundary were modified or eliminated and are not included in the projections.

2.7.3.1 Demographic Projections

Existing and future demographic projections consistent with the City's GMA goals were provided by the City for 2021 and 2044. City planning provided projections of housing, population, and employment growth based on TAZ data. The intermediate 10-year planning horizon (2034) was interpolated assuming consistent compounding growth across the planning period.

The projections were further delineated by Service Area, as growth is expected to vary due to zoning, availability of vacant or re-developable land, existing and proposed infrastructure, etc. Demographic growth rates, rather than total number of people or employed people, were used to develop demand projections. The resulting demographic growth rates as a compounding annual percentage are presented in **Table 2-14.** Total population is projected to annually increase by 1.5 percent from 2021 to 2044 and total employment is projected to increase by 1.9 percent annually over the same period. Overall, the City is planning for an additional 24,987 people and 20,525 employed people by 2044 within the RWSA.

Table 2-14 | Growth Rates by Customer Class and Service Area

	Total Growth from 2021 to 2044 (Housing Units/Population)	Total Growth from 2021 to 2044 (%)	Annual Average Compounding Growth (%)
Single-Family Unit Projections			
Lea Hill	201	5.9%	0.248%
Valley	275	5.3%	0.223%
Lakeland	534	27.0%	1.043%
Academy	436	36.3%	1.355%
Multi-Family Unit Projections			
Lea Hill	254	12.6%	0.518%
Valley	7,862	77.1%	2.515%
Lakeland	1,003	55.7%	1.943%
Academy	124	10.4%	0.433%
Population Projections			
Lea Hill	1,245	8.2%	0.343%
Valley	18,009	44.1%	1.602%

	Total Growth from 2021 to 2044 (Housing Units/Population)	Total Growth from 2021 to 2044 (%)	Annual Average Compounding Growth (%)
Lakeland	4,113	39.4%	1.456%
Academy	1,621	24.6%	0.962%
Employment Projections			
Lea Hill	484	30.6%	1.168%
Valley	18,692	43.8%	1.586%
Lakeland	171	31.1%	1.172%
Academy	1,178	77.8%	0.316%

Table 2-15 summarizes the calculated demographic projections for population or employment projections by Service Area for each category when applying the growth rates from **Table 2-14.**

Table 2-15 | Population and Employment Projections Calculated by Service Area

	2024	2034	2044
Single-Family Population			
Lea Hill	10,498	10,864	11,243
Valley	19,889	23,315	27,330
Lakeland	4,394	5,077	5,866
Academy	5,009	5,512	6,066
Subtotal	**39,789**	**44,767**	**50,505**
Multi-Family Population			
Lea Hill	5,341	5,527	5,719
Valley	25,203	29,544	34,633
Lakeland	3,454	3,991	4,612
Academy	1,535	1,689	1,859
Subtotal	**35,533**	**40,752**	**46,824**
Total Population			
Lea Hill	15,839	16,391	16,962
Valley	45,092	52,859	61,964
Lakeland	7,848	9,068	10,478
Academy	6,544	7,201	7,925
Subtotal	**75,323**	**85,519**	**97,328**
Employment			
Lea Hill	1,720	1,932	2,170
Valley	46,946	54,948	64,313
Lakeland	596	669	752
Academy	1,605	1,656	1,709
Subtotal	**50,867**	**59,205**	**68,944**

The demographic growth for each Service Area is shown in **Figure 2-6, Figure 2-7**, and **Figure 2-8**, where single family population, multi-family population, and employment population growth are each presented in a different graph. The figures show the anticipated variability in growth between the Service Areas. For example, employment growth rate (percentage) is projected to be greater in the Valley Service Area than the other Services Areas between 2024 and 2044. Since the Valley Service Area has a much greater magnitude of population and employment than the other Service Areas, minor differences in growth projection percentages results in larger increases in total population and employment numbers. The Valley

Service Area is projected to represent 64 percent of the system's population and 93 percent of the system's employment in 2044.

Figure 2-6 | Single Family Population Projections by Service Area

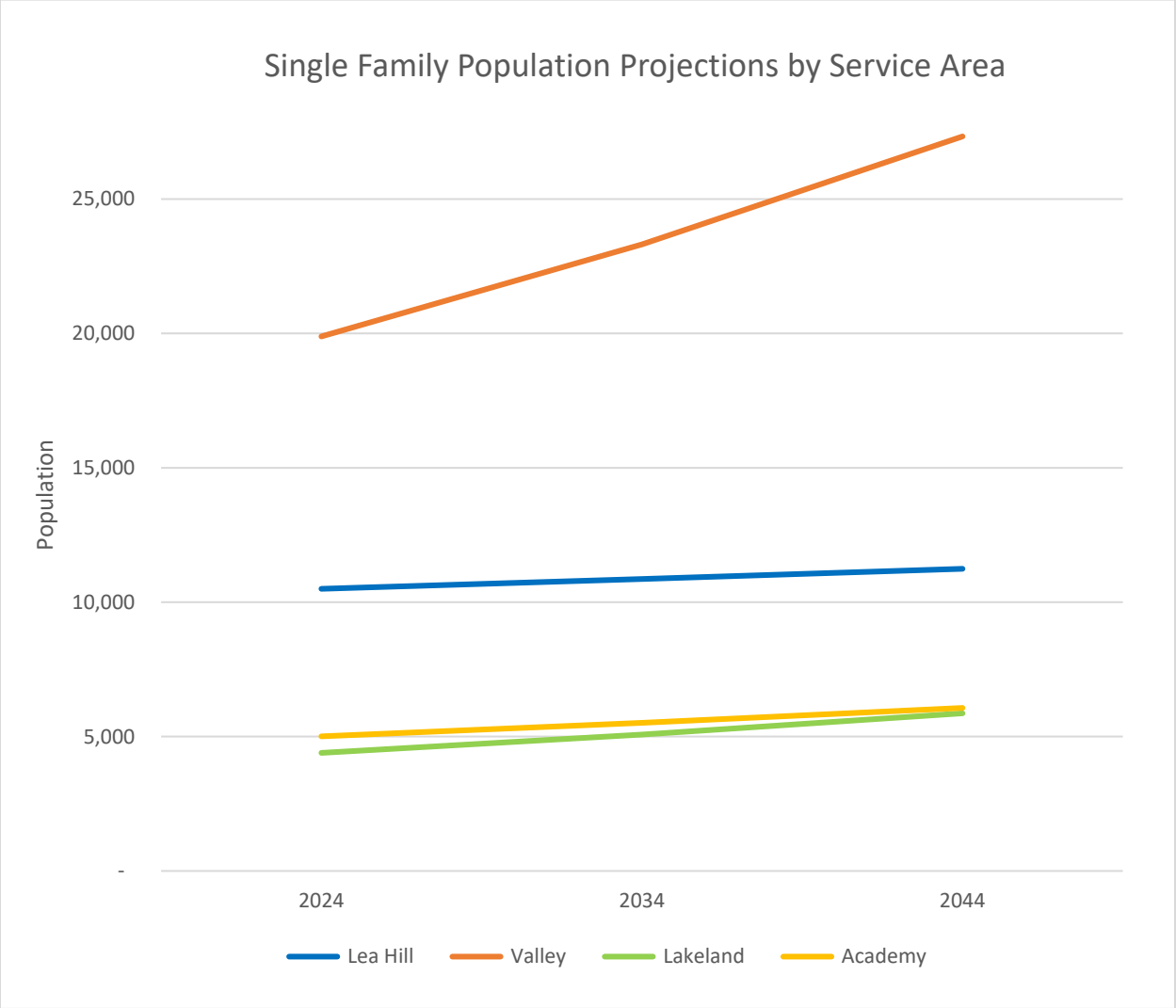


Figure 2-7 | Multi-Family Population Projections by Service Area

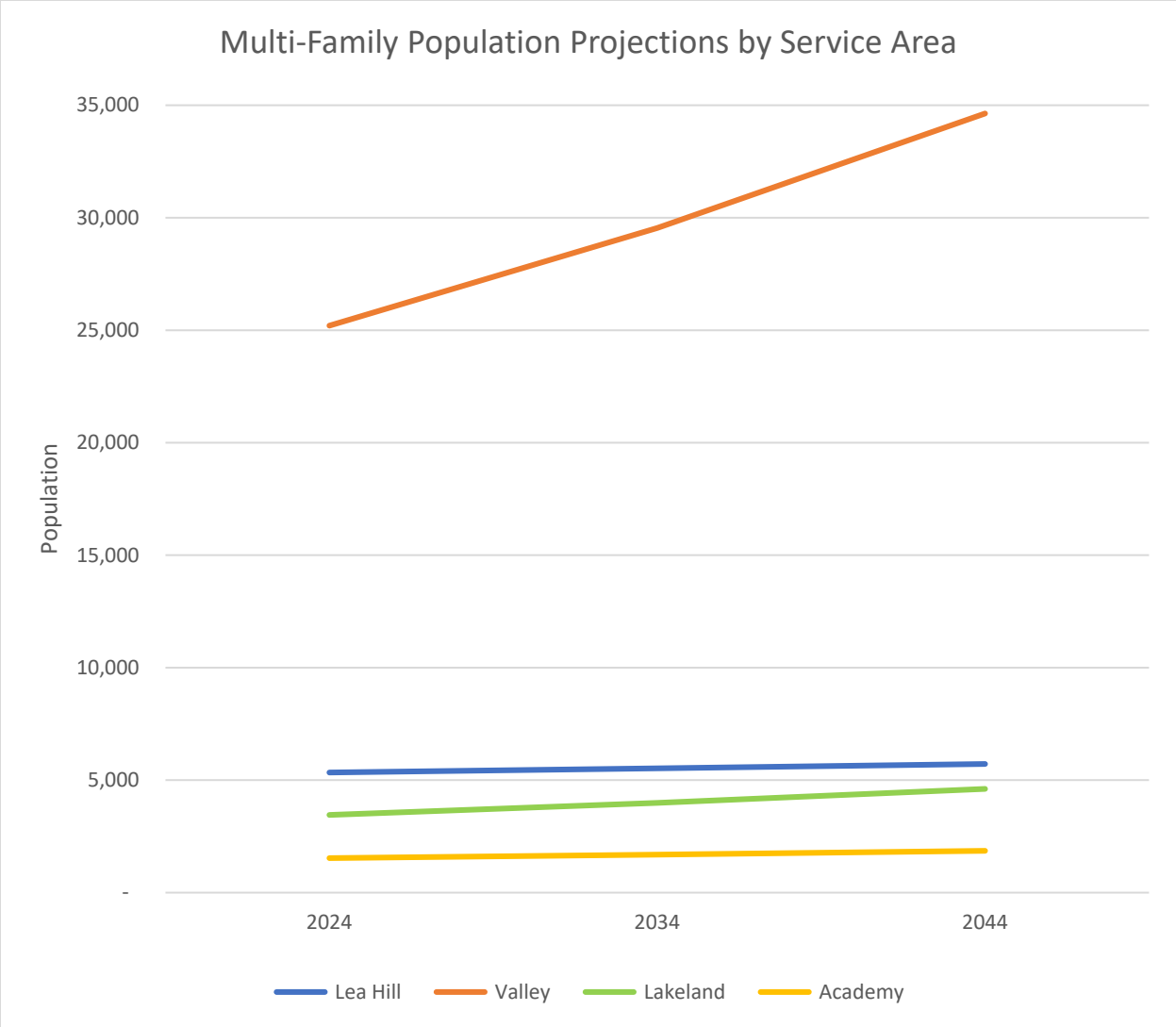
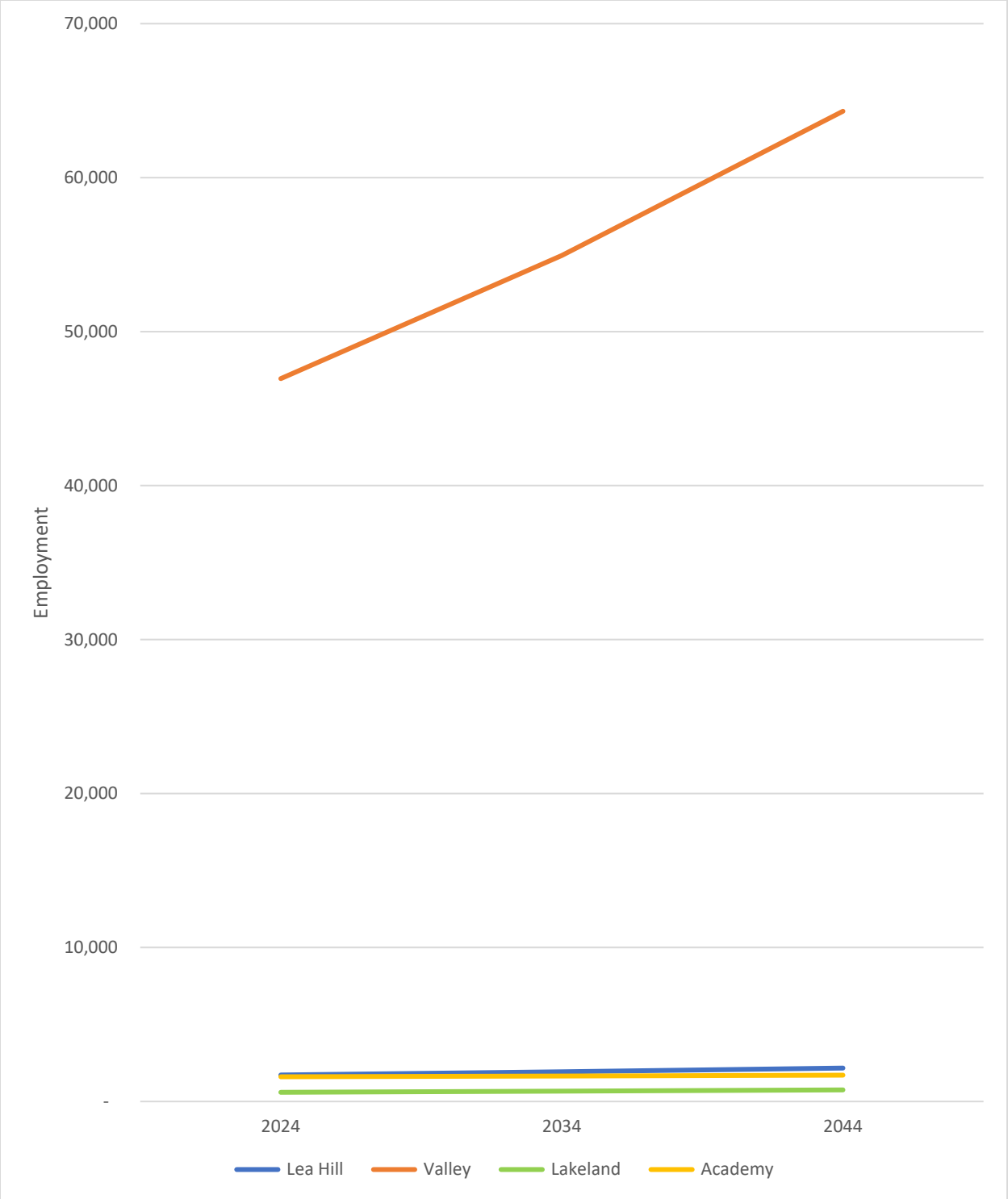
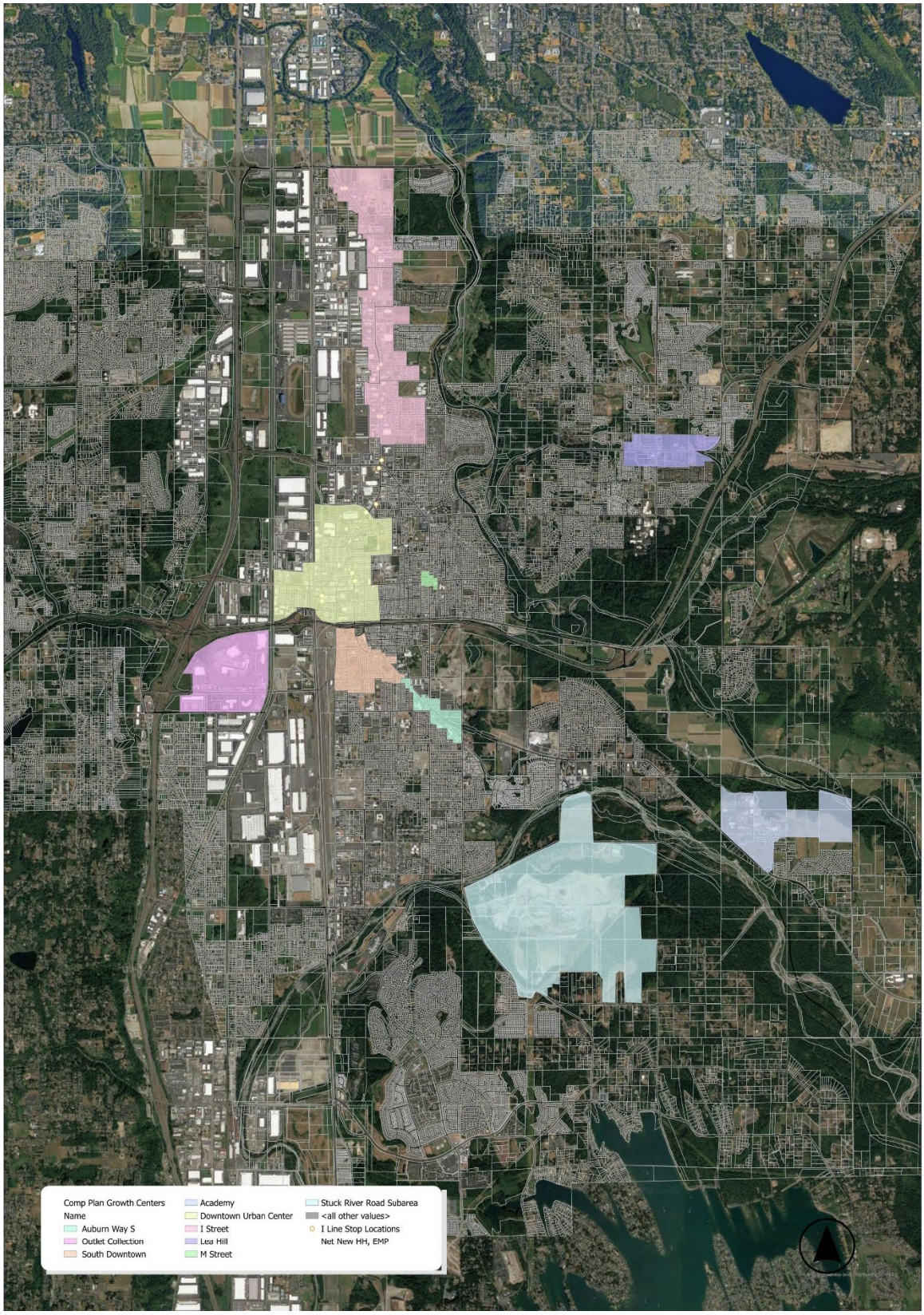


Figure 2-8 | Employment Projections by Service Area



Areas anticipated to have higher than average population and employment growth through 2044, termed "Growth Centers" identified in the City's Comprehensive Plan, are presented in **Figure 2-9.** Demand in each Service Area was modified during the system analysis to reflect focus growth in the areas identified in **Figure 2-9**, matching the population and employment growth projection data.

Figure 2-9 | Map of Projected Areas with Greatest Population Growth



2.8 Future Water Demand

2.8.1 Projected Number of Connections

The number of water connections was used in determining the ERU, ADD, and MDD projections. The number of water connections in the future was projected using the demographic growth rates presented in **Table 2-14** and the number of existing water accounts presented in **Table 2-2**. The projected future connections by both Service Area and customer classification are presented in **Table 2-16.**

- The respective housing unit growth rates for each Service Area were used to calculate projected SFR and MFR connections.
- The School connections were projected by multiplying the percentage of the City population aged 5-19 (22%) by population growth rates for each Service Area.
- The projected employment growth rates were used to calculate future Commercial, Municipal (City Accounts), and Irrigation connections.
- The City's largest user (Boeing) is not included in **Table 2-16**, their projections are based on individual demand and are presented separately. Boeing also accounts for the only Manufacturing and Industrial connections within the City.
- Wholesale customers are not included in **Table 2-16**, their projections are based on individual demand and are presented separately.

Table 2-16 | Connection Projections by Customer Classification and Service Area

	2024	2034	2044
Lea Hill			
Single-Family Residential	3,265	3,347	3,431
Multi-Family Residential	167	176	186
Commercial	22	24	27
Manufacturing/Industrial	-	-	-
Schools	11	11	11
Municipal (City Accounts)	1	1	1
Irrigation	61	69	78
Valley			
Single-Family Residential	5,954	6,088	6,226
Multi-Family Residential	807	1,035	1,327
Commercial	1,272	1,489	1,743
Manufacturing/Industrial	-	-	-
Schools	37	38	40
Municipal (City Accounts)	32	38	45
Irrigation	532	622	729
Lakeland			
Single-Family Residential	1,354	1,502	1,666
Multi-Family Residential	109	132	161
Commercial	34	39	43
Manufacturing/Industrial	-	-	-
Schools	9	9	9

	2024	2034	2044
Municipal (City Accounts)	-	-	-
Irrigation	21	23	26
Academy			
Single-Family Residential	1,581	1,808	2,069
Multi-Family Residential	47	49	51
Commercial	14	14	15
Manufacturing/Industrial	-	-	-
Schools	2	2	2
Municipal (City Accounts)	1	1	1
Irrigation	34	35	36
Total			
Single-Family Residential	12,153	12,745	13,391
Multi-Family Residential	1,131	1,393	1,725
Commercial	1,342	1,566	1,828
Manufacturing/Industrial	-	-	-
Schools	59	60	62
Municipal (City Accounts)	35	40	47
Irrigation	648	750	868

2.8.1.1 Lea Hill Service Area

The Lea Hill Service Area is located east of the Auburn-Kent Valley and the Green River. The area is mostly residential with supportive neighborhood businesses. Green River College is in the Lea Hill Service Area and has a concentration of multi-family residential units in the vicinity of the college.

The Lea Hill service area is projected to have the lowest growth rate in population with a 0.3 percent per year average increase from 2021 to 2044. This Service Area is projected to have a moderate growth in employment with a 1.2 percent growth per year from 2021 to 2044.

2.8.1.2 Valley Service Area

The Valley Service Area contains a significant amount of developable land designated as multi-family and commercial, including the Downtown Urban Center. The Service Area is projected to have the highest growth rate in population at 1.6 percent per year from 2021 to 2044. The multi-family connections in this area are projected to grow 2.5 percent per year from 2021 to 2044 and employment is projected to grow 1.6 percent per year. These growth projections are based on the City's anticipation of growth trends and the redevelopment of Auburn's Downtown Urban Center, as well as commercial developments in locations with available space throughout the Service Area.

2.8.1.3 Lakeland Service Area

The Lakeland Service Area includes the entire City south of the White River. A sizable portion of this Service Area is designated residential conservancy land use, which is anticipated to be developed within the planning horizon related to the anticipated closure of the Segale Gravel Pit. The area includes proposed special planning areas for Stuck River Road and Mount Rainier Vista anticipated to be developed with a moderate population growth rate of 1.5 percent per year. This Service Area is projected to have a moderate growth in employment with a 1.2 percent growth per year from 2021 to 2044.

2.8.1.4 Academy Service Area

The Academy Service Area is a well-developed portion of the City. It is expected to have a population growth of 1.0 percent per year from 2021 to 2044. This Service Area is projected to have minimal growth in employment with a 0.3 percent per year increase from 2021 to 2044.

2.8.2 Projected Water Demand

Projecting future water demand is one of the key elements of the water system planning process. Identification of system improvements such as supply, pumping, storage, and piping requirements are all related to demand projections. This section summarizes the ERU, ADD, and MDD projections, as well as the potential range in future demands associated with various factors, such as water use per ERU, DSL, and demographic growth rate.

2.8.2.1 Potential Range in Future Water Demand

Several factors and assumptions affect the accuracy of projected future water demands. Recognizing that certain assumptions built into the demand projections will vary in the future, the projections were developed for medium and high demand scenarios to provide a range in demands that may be experienced in the future. The medium projection will be used for the system analysis in **Chapter 3**, while the high projection will be used for the water right evaluation in **Chapter 5**. The system analysis determines future pumping, storage, and distribution system deficiencies and identifies potential improvements to achieve the City's established capacity criteria. The water right evaluation looks at both water rights and overall supply capacity. Only the medium projections are presented within this Chapter. The variables considered in developing the range of demand projections are summarized in **Table 2-17** and are discussed below.

- Future Water Connections: The future water connections are presented in **Table 2-16** and were used for both demand scenarios.
- Water Use Per ERU_{ADD}: Water use per ERU for the average demand day projections are based on the 75th percentile of the historical data, which is the medium demand scenario, presented in **Table 2-4**. This value equals 182 gpd per ERU. The high demand scenario used the highest annual value from the data set presented in **Table 2-4**, which equals 193 gpd per ERU.
- ERUs per Account: The historical ERU per account by customer classification presented in **Table 2-4** was used to develop demand projections. The ERU per Account values are based on the 75th percentile of the historical data and a water use per ERU value of 182 gpd per ERU. These values are used in both projections.
- Distribution System Leakage: Historical annual DSL varied between 0.7 and 7.4 percent of the City's total City production between 2015 and 2022. The average three-year rolling average of historical DSL values of 5.2 percent is utilized in the medium demand scenario and the maximum three-year rolling average of 6.8 percent was used for the high demand scenario.
- Authorized Unbilled Consumption: Historical annual authorized unbilled consumption varied between 0.14 and 0.54 percent of the City's total billed consumption between 2015 and 2022. The 75^{th} percentile value of 0.27 percent is utilized in the medium demand scenario and the maximum values of 0.54 percent is used for the high demand scenario.
- Water Use Per ERU_{MDD}: Water use per ERU for the maximum demand day projections are based on 75th percentile of the historical data, which is the medium demand scenario, presented in **Table**

2-10. This value equals 322 gpd per ERU. The high demand scenario used the highest annual value from the data set presented in Table 2-10, which is 358 gpd per ERU.

- MDD/ADD Peaking Factor: The 75th percentile of historical annual peaking factors of 1.77 is utilized in the medium demand scenario. The highest value in the historical annual peaking factor data set was used for the high demand scenario, which is 1.97.

The City's largest user (Boeing) and wholesale customers are not included in Table 2-17, their projections are based on individual demand and are presented separately.

Table 2-17 | Proposed Planning Values for Demand Projections

Assumptions	Medium Demand Scenario	High Demand Scenario
Water Demand per ERU_{ADD} (gpd)	182	193
DSL	5.2%	6.8%
Authorized Unbilled	0.27%	0.54%
Water Demand per ERU_{MDD} (gpd)	322	358
MDD/ADD Peaking Factor	1.77	1.97

2.8.3 Large User Demand Forecast

The large user term is used to identify customers consuming the greatest volume of water on an annual basis as presented in Table 2-6. Projections for the City's single largest user (Boeing) is separated from the demand forecasts to aid in accurate forecasting and in the system analyses. The forecasts were based on historical water use data from 2015 through 2022 and is presented in Table 2-18. The projected demand will use the 75th percentile of water use from the historical period of record. Boeing's consumption has trended down over the historical period of record, therefore, the projected demand is conservative and actual consumption is anticipated to be less than the value presented in Table 2-18.

Wholesale connections are also projected separately in Table 2-22. The remaining largest users are not presented separately in demand forecasts; their projected consumption is built into the overall Service Area projections by customer classification.

Table 2-18 | Large User Demand Projections

Large User	Customer Class	Service Area	Representative Historical Water Use Statistic[1]	Representative Annual Water Use (MG)[2]	Projected ERUs in 2044
Boeing	Manufacturing Commercial	Valley	75th percentile	210.6	3,168

Notes:
1. Historical water use data from 2015 through 2022
2. Based on representative historical water use statistic.

2.8.4 Projected Retail ERUs

Future water system demands are based on projected ERUs, which in turn are based on the projected water consumption by customer classification and the projected number of accounts discussed earlier in this chapter. Table 2-19 shows the projected ERUs for the City's individual service areas over the planning period. The projected number of ERUs for each Service Area was calculated by multiplying the projected number of accounts, provided in Table 2-16, by the number of ERUs per account, as summarized in Table

2-3, for each customer class. Wholesale customer demand in terms of ERUs is not included in the demand projections below and must be added separately as summarized in Table 2-23.

Table 2-19 | ERU Projections by Customer Class and Service Area

	2024 ERU	2034 ERU	2044 ERU
Lea Hill			
Single-Family Residential	3,265	3,347	3,431
Multi-Family Residential	1,379	1,452	1,529
Commercial	128	143	161
Manufacturing/Industrial	-	-	-
Schools	127	128	129
Municipal (City Accounts)	2	3	3
Irrigation	319	358	402
Authorized Unbilled	14	15	15
DSL	272	283	295
Valley			
Single-Family Residential	5,954	6,088	6,226
Multi-Family Residential	6,652	8,528	10,933
Commercial	7,554	8,841	10,348
Manufacturing/Industrial	-	-	-
Schools	435	451	467
Municipal (City Accounts)	70	82	96
Irrigation	2,758	3,228	3,778
Boeing (Largest User)	3,170	3,170	3,170
Authorized Unbilled	56	66	78
DSL	1,386	1,584	1,825
Lakeland			
Single-Family Residential	1,354	1,502	1,666
Multi-Family Residential	900	1,091	1,323
Commercial	204	230	258
Manufacturing/Industrial	-	-	-
Schools	102	106	109
Municipal (City Accounts)	-	-	-
Irrigation	108	121	136
Authorized Unbilled	7	8	9
DSL	139	159	182
Academy			
Single-Family Residential	1,581	1,808	2,069
Multi-Family Residential	388	405	423
Commercial	81	84	86
Manufacturing/Industrial	-	-	-
Schools	25	26	27
Municipal (City Accounts)	2	2	2
Irrigation	174	179	185
Authorized Unbilled	6	7	8
DSL	117	131	146
Total			
Single-Family Residential	12,153	12,745	13,391
Multi-Family Residential	9,320	11,477	14,209

	2024 ERU	2034 ERU	2044 ERU
Commercial	7,967	9,298	10,853
Manufacturing/Industrial	-	-	-
Schools	690	711	732
Municipal (City Accounts)	74	87	101
Irrigation	3,359	3,887	4,502
Boeing (Largest User)	3,170	3,170	3,170
Authorized Unbilled	83	96	110
DSL	1,914	2,156	2,447
City of Algona (Wholesale)	Refer to Table 2-22.		

2.8.5 Projected Retail Average Day and Maximum Day Demands

The ADD projections include the projected customer demands by customer classification, authorized unbilled consumption, and DSL by service area. The resulting ADD projections are summarized in **Table 2-20**.

- Customer demands by classification were calculated by multiplying the projected ERUs summarized in **Table 2-19** by the average ERU water use (182 gpd/ERU).
- Authorized unbilled consumption projections were calculated by multiplying the sum of all customer classification use by the medium demand scenario percentage presented in **Table 2-17**.
- DSL consumption projections were calculated by multiplying the sum of all customer classification use and authorized unbilled use by the medium demand scenario percentage presented in **Table 2-17** for DSL.

Table 2-20 | ADD Projections

	2024 (mgd)	2034 (mgd)	2044 (mgd)
Lea Hill			
Single-Family Residential	0.595	0.610	0.625
Multi-Family Residential	0.251	0.265	0.279
Commercial	0.023	0.026	0.029
Manufacturing/Industrial	-	-	-
Schools	0.023	0.023	0.023
Municipal (City Accounts)	-	-	0.001
Irrigation	0.058	0.065	0.073
Authorized Unbilled	0.003	0.003	0.003
DSL	0.050	0.052	0.054
Valley			
Single-Family Residential	1.084	1.109	1.134
Multi-Family Residential	1.212	1.553	1.991
Commercial	1.376	1.610	1.885
Manufacturing/Industrial	-	-	-
Schools	0.079	0.082	0.085
Municipal (City Accounts)	0.013	0.015	0.017
Irrigation	0.502	0.588	0.688
Boeing (Largest User)	0.577	0.577	0.577

	2024 (mgd)	2034 (mgd)	2044 (mgd)
Authorized Unbilled	0.010	0.012	0.014
DSL	0.252	0.288	0.332
Lakeland			
Single-Family Residential	0.247	0.274	0.303
Multi-Family Residential	0.164	0.199	0.241
Commercial	0.037	0.042	0.047
Manufacturing/Industrial	-	-	-
Schools	0.019	0.019	0.020
Municipal (City Accounts)	-	-	-
Irrigation	0.020	0.022	0.025
Authorized Unbilled	0.001	0.002	0.002
DSL	0.025	0.029	0.033
Academy			
Single-Family Residential	0.288	0.329	0.377
Multi-Family Residential	0.071	0.074	0.077
Commercial	0.015	0.015	0.016
Manufacturing/Industrial	-	-	-
Schools	0.005	0.005	0.005
Municipal (City Accounts)	-	-	-
Irrigation	0.032	0.033	0.034
Authorized Unbilled	0.001	0.001	0.001
DSL	0.021	0.024	0.027
Total			
Single-Family Residential	2.214	2.321	2.439
Multi-Family Residential	1.698	2.091	2.588
Commercial	1.451	1.694	1.977
Manufacturing/Industrial	-	-	-
Schools	0.126	0.129	0.133
Municipal (City Accounts)	0.014	0.016	0.018
Irrigation	0.612	0.708	0.820
Boeing (Largest User)	0.577	0.577	0.577
Authorized Unbilled	0.015	0.017	0.020
DSL	0.349	0.393	0.4546

The MDD projections include the projected customer demands by customer classification, authorized unbilled consumption, and DSL by service area and are summarized in **Table 2-21**.

- Customer demands by classification, authorized unbilled consumption projections, and DSL projections were calculated by multiplying the ADD projections as summarized in **Table 2-20** by the MDD/ADD Peaking Factor presented in **Table 2-17.**

Table 2-21 | MDD Projections

	2024 (mgd)	2034 (mgd)	2044 (mgd)
Lea Hill			
Single-Family Residential	1.051	1.077	1.104
Multi-Family Residential	0.444	0.468	0.492
Commercial	0.041	0.046	0.052
Manufacturing/Industrial	-	-	-

	2024 (mgd)	2034 (mgd)	2044 (mgd)
Schools	0.041	0.041	0.041
Municipal (City Accounts)	0.001	0.001	0.001
Irrigation	0.103	0.115	0.129
Authorized Unbilled	0.005	0.005	0.005
DSL	0.088	0.091	0.095
Valley			
Single-Family Residential	1.916	1.960	2.004
Multi-Family Residential	2.141	2.745	3.519
Commercial	2.431	2.846	3.331
Manufacturing/Industrial	-	-	-
Schools	0.140	0.145	0.150
Municipal (City Accounts)	0.022	0.026	0.031
Irrigation	0.888	1.039	1.216
Boeing (Largest User)	1.020	1.020	1.020
Authorized Unbilled	0.018	0.021	0.025
DSL	0.446	0.510	0.587
Lakeland			
Single-Family Residential	0.436	0.483	0.536
Multi-Family Residential	0.290	0.351	0.426
Commercial	0.066	0.074	0.083
Manufacturing/Industrial	-	-	-
Schools	0.033	0.034	0.035
Municipal (City Accounts)	-	-	-
Irrigation	0.035	0.039	0.044
Authorized Unbilled	0.002	0.003	0.003
DSL	0.045	0.051	0.059
Academy			
Single-Family Residential	0.509	0.582	0.666
Multi-Family Residential	0.125	0.130	0.136
Commercial	0.026	0.027	0.028
Manufacturing/Industrial	-	-	-
Schools	0.008	0.008	0.009
Municipal (City Accounts)	0.001	0.001	0.001
Irrigation	0.056	0.058	0.060
Authorized Unbilled	0.002	0.002	0.002
DSL	0.038	0.042	0.047
Total			
Single-Family Residential	3.912	4.102	4.310
Multi-Family Residential	3.000	3.694	4.573
Commercial	2.564	2.993	3.493
Manufacturing/Industrial	-	-	-
Schools	0.222	0.229	0.236
Municipal (City Accounts)	0.024	0.028	0.032
Irrigation	1.081	1.251	1.449
Boeing (Largest User)	1.020	1.020	1.020
Authorized Unbilled	0.027	0.031	0.036
DSL	0.616	0.694	0.788

2.8.6 Wholesale Demands

The City currently has a wholesale water contract with the City of Algona. The City is also planning to supply wholesale water for the MIT's future fish hatchery. As stated in the Retail Water Service Policy, "the City will plan for and provide water service to all retail customers and wholesale customers with firm contracts. As supply permits, the City may provide water to wholesale customers without firm contracts unilaterally or as part of a capital improvement partnership agreement." The wholesale demands for the City are summarized in Table 2-22.

Algona's current agreement allows for the sale of up to 525,000 gallons per day on a firm basis for the ADD and up to 1,114,00 gallons per day on a firm basis for the MDD. In 2022, Algona purchased an average of 342,953 gallons per day of water from the City. Algona's 2022 Water System Plan (WSP) projects 2042 ADD to be 404,278 gallons per day and 2042 MDD to be 766,137 gallons per day. Algona's WSP demand projections were used for projecting the wholesale water purchases by Algona, rather than the contractual amount, as presented in Table 2-22.

MIT plans to develop a fish hatchery on the White River. An agreement dated from 1986 (included in Appendix G) requires that the City provide the tribe with an average annual demand of 3.9 cubic feet per second (cfs) (2.52 mgd) from Coal Creek Springs for MIT's future fishery enhancement purposes. The agreement does not specify an MDD but rather states:

"The Tribe and the City agree to work in harmony toward a mutually satisfactory allocation of the Coal Creek waters. In furtherance of this goal, the City understands that the water requirements for fishery enhancement purposes are greatest in the winter and spring months. Accordingly, the City agrees to increase the amount of water above 3.9 cfs as needed for fishery purposes. The Tribe understands that the City's requirement for water for domestic use is greatest in the summer and fall months. Accordingly, the Tribe agrees to decrease its use of water below 3.9 cfs, as needed for domestic water purposes…It is further understood that the tribe requires a minimum of 3 cfs at all times for fishery enhancement purposes".

The intent of this agreement indicates that the MIT demand will be at a minimum when the City's demands are at their maximum. Based on this understanding, the planned MDD for the MIT is 1.5 mgd and the ADD was 2.5 mgd. For planning purposes, the MIT demand was added to the Algona demand and included in the "Retail + firm wholesale" group of demands.

LMWD has an interruptible wholesale contract that can be terminated at any time and is therefore represented separately. As discussed in the Historical Wholesale Consumption section, LMWD discontinued regular purchase of water from the City in 2017 per the amendment to IA2 but maintains an intertie with the City to use wholesale water supply on an as-needed basis. LMWD may purchase up to 2.5 mgd of wholesale water per IA2. The contract does not have an expiration date and therefore 2.5 mgd of interruptible wholesale demand is projected through 2044.

Table 2-22 | Wholesale Demand Projections

Wholesale Customer	Service Area	Contractual Delivery[1]	2024 (mgd)	2034 (mgd)	2044 (mgd)[2]
ADD					
Algona	Valley	Firm	0.37	0.39	0.41
MIT Fish Hatchery	Valley	Firm	2.5	2.5	2.5
LMWD	Lea Hill	Interruptible	2.5	2.5	2.5
MDD					
Algona	Valley	Firm	0.69	0.73	0.78
MIT Fish Hatchery	Valley	Firm	1.5	1.5	1.5
LMWD	Lea Hill	Interruptible	2.5	2.5	2.5

Notes:

1. The City will plan for and provide water services to all retail customers and wholesale customers with firm contracts. As supply permits, the City may provide water to wholesale customers without firm contracts unilaterally or as part of a CIP agreement.
2. Algona's projections are provided through 2042; their projected rate increase was used to project consumption to 2044.

2.8.7 Total Demands

The total projected demands are tabulated for retail customers, firm wholesale, and interruptible wholesale in **Table 2-23.** The demands are presented separately to show the level of obligation to the City's customers. Projected retail ADD, MDD, and ERUs are presented by Service Area for the medium demand scenario. Additionally, the ADD and MDD are presented as the total of the projected retail demand and firm wholesale. The retail with firm wholesale represents the projected demand that is used as the basis for the system analysis and are shown in **Figure 2-10**. The difference between the historical and projected wholesale demands is due to the projected allocation of the supply to the proposed MIT Fish Hatchery, per the 1986 Stipulation Settlement Agreement. Additionally, both CWD and LMWD discontinued regular purchase of water from the City in 2017.

The 2044 retail ADD demand is projected to 9.02 mgd, which represents a 28 percent increase from 2024. Throughout the planning period, approximately 40 percent of the City's demand may be from wholesale purchases when both firm and interruptible supply are considered. The MDD is projected to increase by 24 percent from 2024 to 2044 for the sum of firm wholesale customers and retail customers.

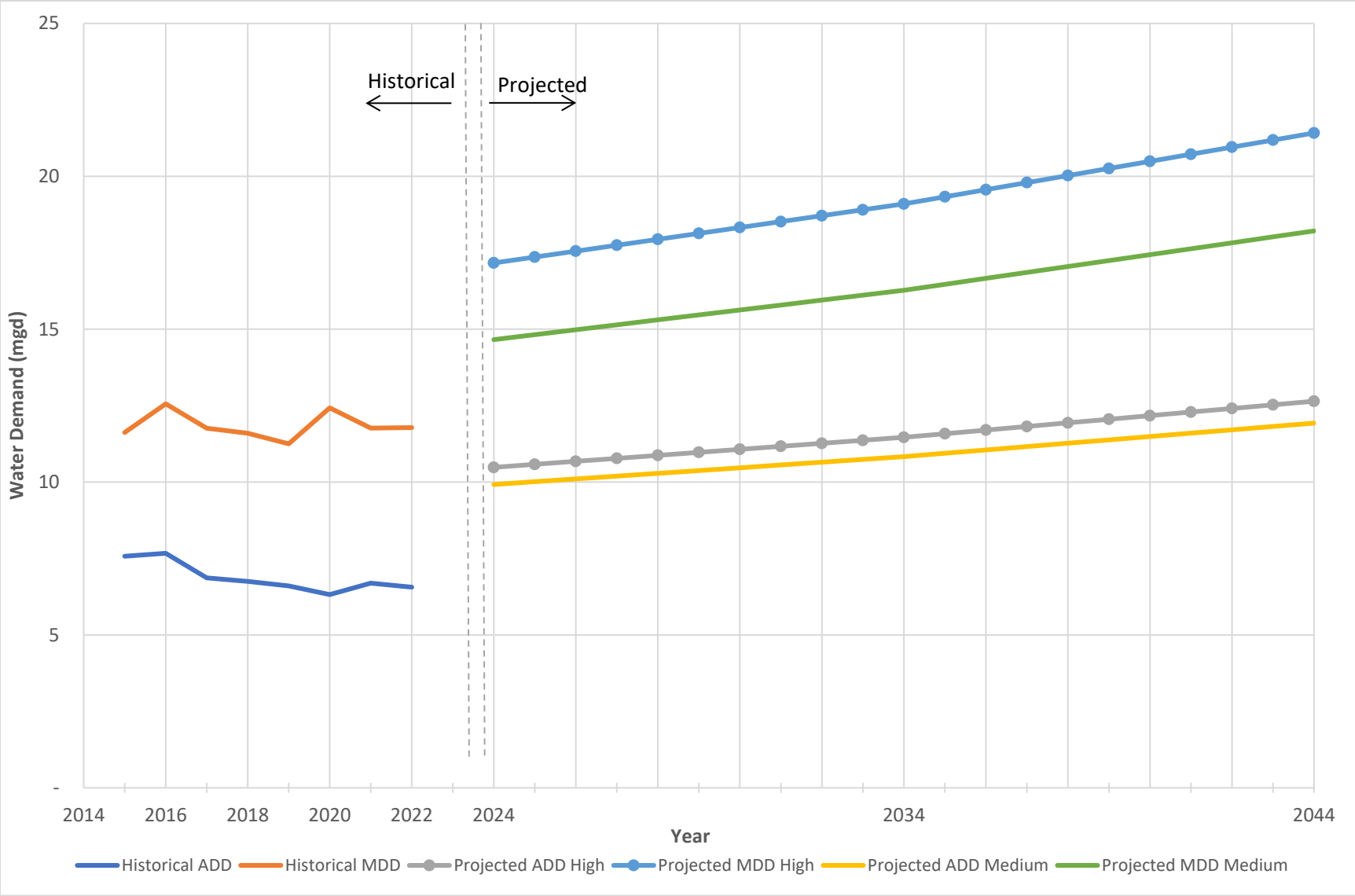
Table 2-23 | ADD, MDD, and ERUs Summarized by Service Area with Wholesale Included

	2024	2034	2044
Lea Hill			
Average Day Demand (mgd)	1.00	1.04	1.09
Maximum Day Demand (mgd)	1.77	1.84	1.92
Equivalent Residential Units	5,506	5,729	5,966
Valley			
Average Day Demand (mgd)	5.11	5.84	6.72
Maximum Day Demand (mgd)	9.02	10.31	11.88
Equivalent Residential Units	28,034	32,037	36,920
Lakeland			
Average Day Demand (mgd)	0.51	0.59	0.67
Maximum Day Demand (mgd)	0.91	1.04	1.19
Equivalent Residential Units	2,815	3,217	3,684
Academy			
Average Day Demand (mgd)	0.43	0.48	0.54
Maximum Day Demand (mgd)	0.76	0.85	0.95
Equivalent Residential Units	2,375	2,642	2,946
Total Retail Customers			
Total Average Day Demand (mgd)	7.05	7.95	9.02
Total Maximum Day Demand (mgd)	12.47	14.04	15.94
Total Equivalent Residential Units	38,731	43,626	49,515
Algona (Firm Wholesale)			
Total Average Day Demand (mgd)	0.365	0.386	0.409
Total Equivalent Residential Units, ADD[1]	2,005	2,120	2,246
Total Maximum Day Demand (mgd)	0.692	0.732	0.775
Total Equivalent Residential Units, MDD[1]	2,150	2,274	2,409
Retail Customer Demand with Algona (Firm Wholesale)			
Total Average Day Demand (mgd)	7.42	8.33	9.43
Total Maximum Day Demand (mgd)	13.16	14.77	16.71
Retail with Firm Wholesale (Algona and MIT Fish Hatchery)			
Total Average Day Demand (mgd)	9.92	10.83	11.93
Total Maximum Day Demand (mgd)	14.66	16.27	18.21
Retail with Firm & Interruptible Wholesale (Algona, MIT Fish Hatchery, and LMWD)			
Average Day Demand (mgd)	12.42	13.33	14.43
Maximum Day Demand (mgd)	17.16	18.77	20.71

Note:

1. The Algona ERU values were calculated using the City of Algona's projected demand and the City of Auburn's ERU_{ADD} and ERU_{MDD} factors.

Figure 2-10 | Projected Retail Plus Firm Wholesale ADD and MDD



CHAPTER 3

System Analysis and Asset Management

This chapter's objective is to identify existing facilities and determine their capacity to reliably satisfy current and projected water demands with safe drinking water. The cost of addressing identified infrastructure deficiencies and operational and maintenance improvements is addressed in priority order in Chapter 8.

This chapter addresses the following topics:

3.1 Asset Management – Asset Inventory and Analysis
3.2 Water Quality
3.3 Design Standards
3.4 Capacity Analysis
3.5 Summary of System Deficiencies

3.1 Asset Management – Asset Inventory and Analysis

This section establishes a date-based inventory of all system-owned water assets and satisfies the requirements of WAC 246-290-100(4)e(iii). The City actively assesses and plans for the maintenance, repair, and replacement of its major assets while preventive maintenance practices keep assets in good condition, thereby extending their useful life.

The City utilizes Cartegraph, an asset management software program, in conjunction with ESRI ArcGIS, a geographic information system (GIS) software program to manage its water assets. GIS is updated using record drawings as projects are completed and Cartegraph is linked to automatically update with new GIS information. Cartegraph is used to track and schedule maintenance activities, as well as materials, labor hours, costs and project timelines. Capital costs for the replacement of assets are assessed on a case-by-case basis.

The City's water system is comprised of groundwater wells, springs, interties with other water systems, treatment facilities, pump stations, storage facilities, pressure reducing stations, and water transmission and distribution pipelines. The City's water system includes 28 pressure zones in four different service areas: Lea Hill, Valley, Academy, and Lakeland. The location of major assets and pressure zones are shown in Figure 3-1. The hydraulic profile of the City's water system is presented in Figure 3-2, with enlargements provided as Figure 3-3 and Figure 3-4.

Water system vulnerabilities relating to risks from natural hazards, such as power outage, flooding, and earthquake are detailed in the Natural Hazard Vulnerability Summary, which is provided in Appendix U.

Figure 3-1 | Map of Water System Assets and Pressure Zones

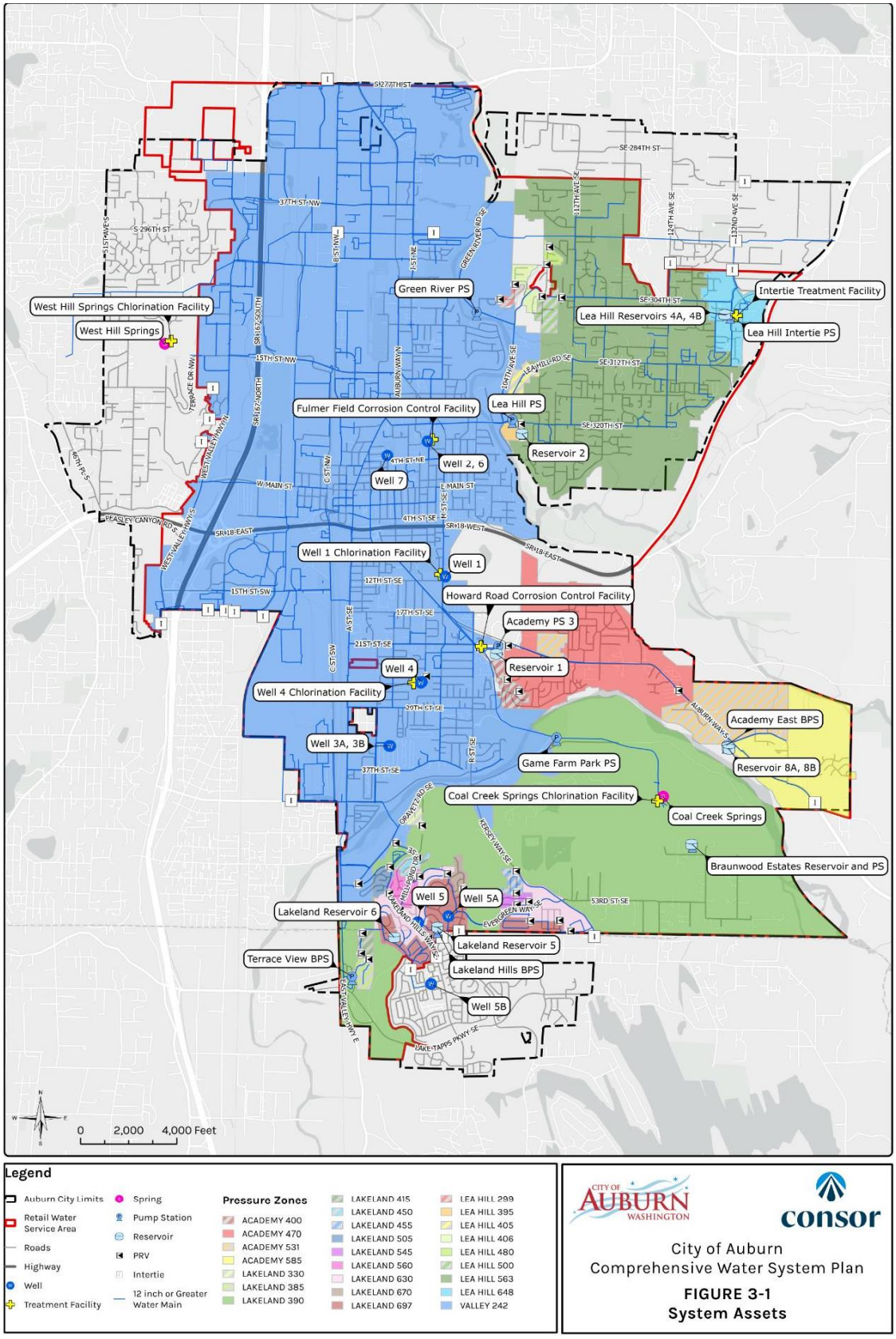
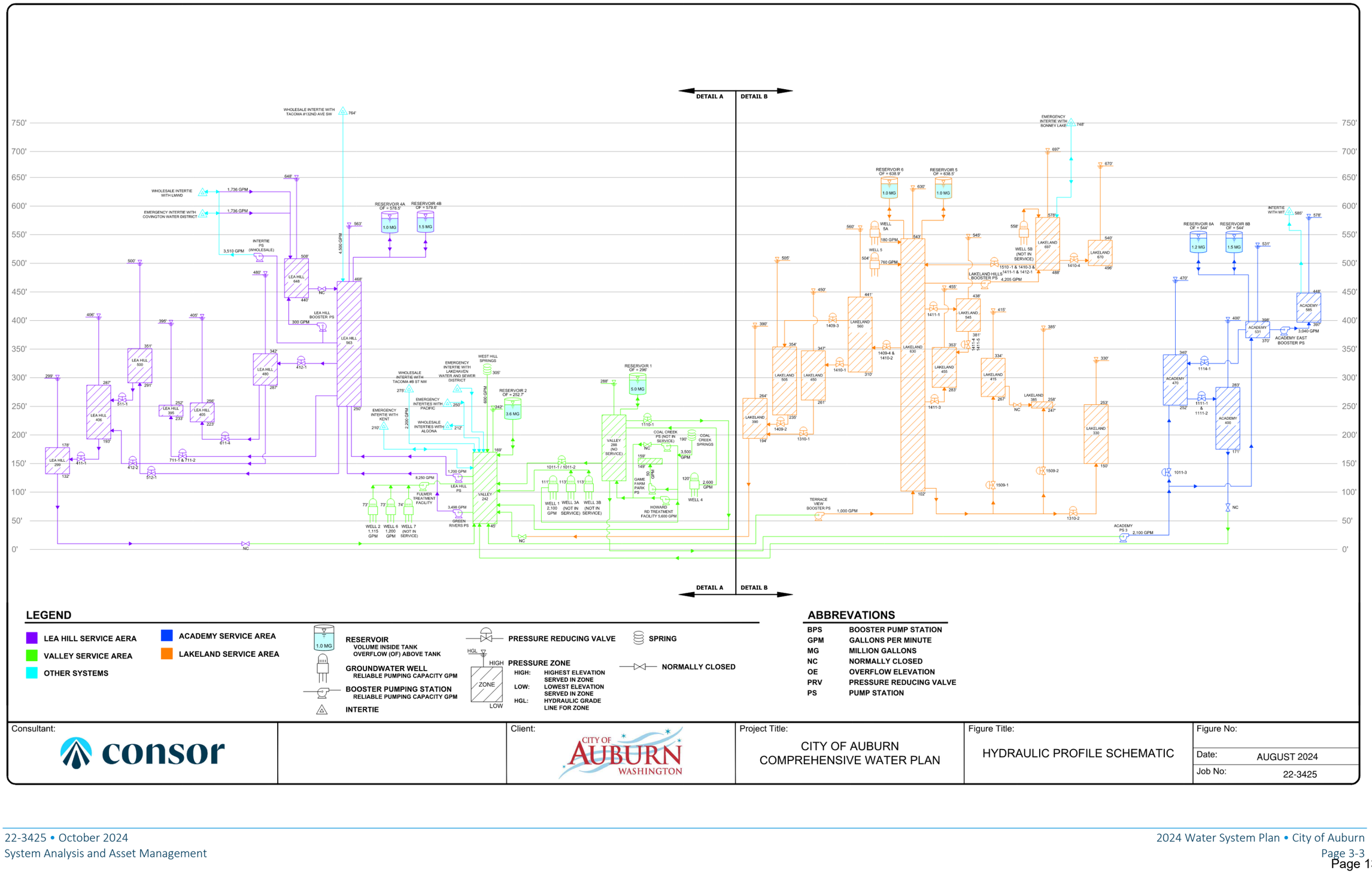


Figure 3-2 | Hydraulic Profile



LEGEND

- LEA HILL SERVICE AERA
- VALLEY SERVICE AREA
- OTHER SYSTEMS
- ACADEMY SERVICE AREA
- LAKELAND SERVICE AREA

RESERVOIR — VOLUME INSIDE TANK, OVERFLOW (OF) ABOVE TANK

GROUNDWATER WELL — RELIABLE PUMPING CAPACITY GPM

BOOSTER PUMPING STATION — RELIABLE PUMPING CAPACITY GPM

INTERTIE

PRESSURE REDUCING VALVE

PRESSURE ZONE
- HIGH: HIGHEST ELEVATION SERVED IN ZONE
- LOW: LOWEST ELEVATION SERVED IN ZONE
- HGL: HYDRAULIC GRADE LINE FOR ZONE

SPRING

NORMALLY CLOSED

ABBREVIATIONS

BPS	BOOSTER PUMP STATION
GPM	GALLONS PER MINUTE
MG	MILLION GALLONS
NC	NORMALLY CLOSED
OE	OVERFLOW ELEVATION
PRV	PRESSURE REDUCING VALVE
PS	PUMP STATION

Consultant: consor		Client: CITY OF AUBURN WASHINGTON	Project Title: CITY OF AUBURN COMPREHENSIVE WATER PLAN	Figure Title: HYDRAULIC PROFILE SCHEMATIC	Figure No:
					Date: AUGUST 2024
					Job No: 22-3425

Figure 3-3 | Hydraulic Profile - Detail A

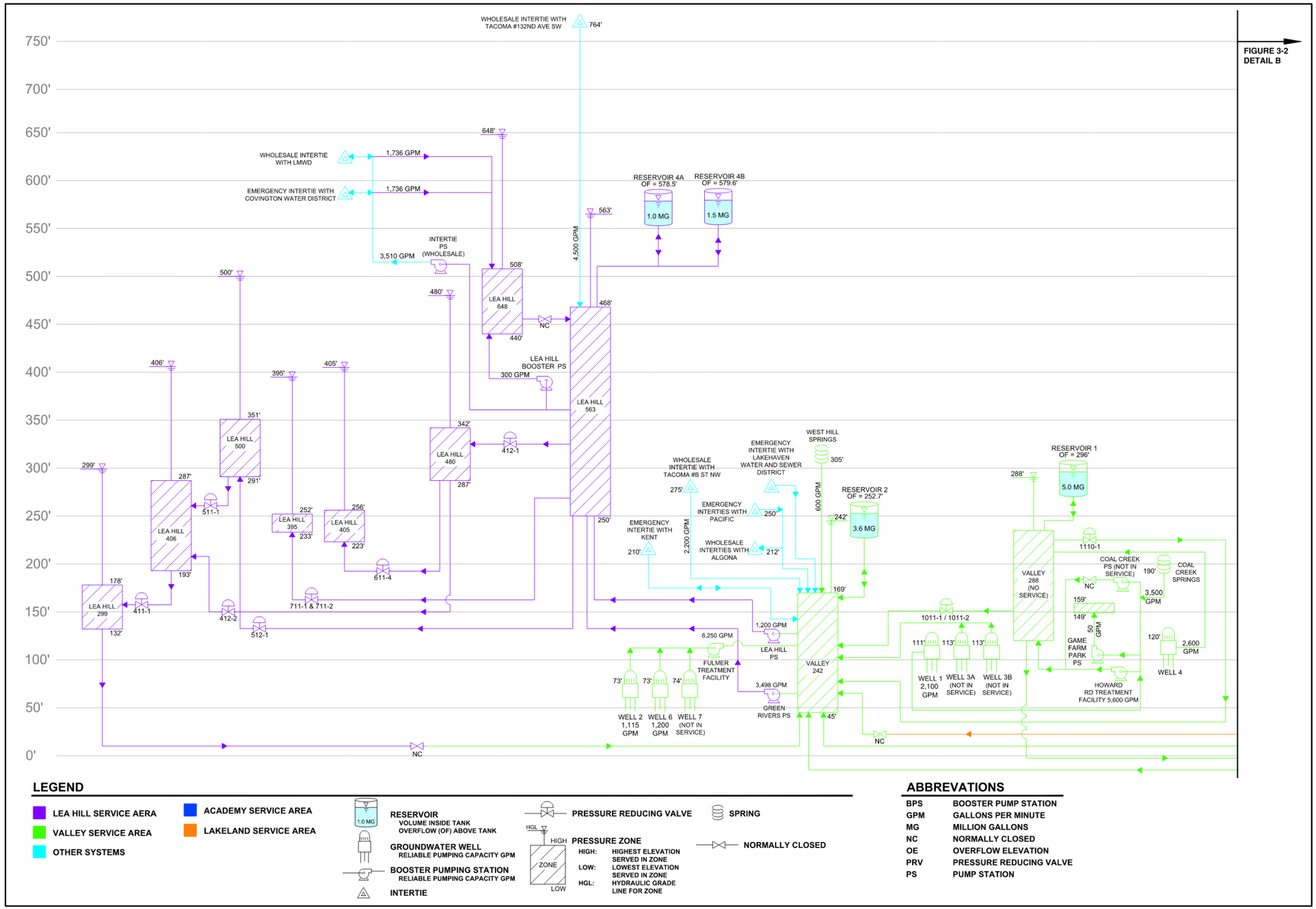
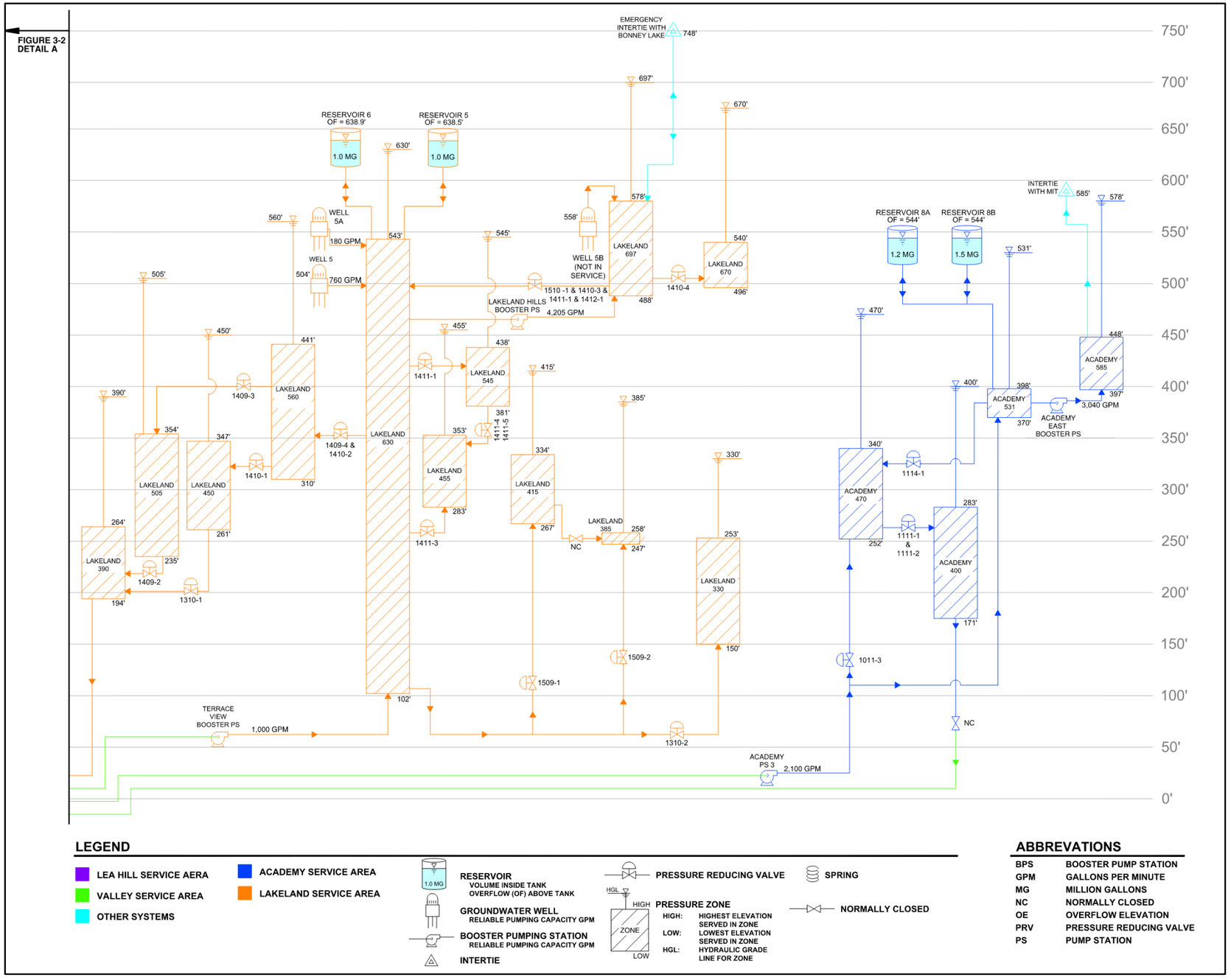


Figure 3-4 | Hydraulic Profile - Detail B



3.1.1 Distribution Facilities

The City' water distribution system includes approximately 300 miles of piping. **Table 3-1** summarizes the water piping inventory by size (diameter). The criticality ratings for the system's pipes are presented in **Table 3-1**, as criticality of the pipelines is assessed based on size. Water main and transmission pipelines vary in diameter from 4 to 36 inches, with a predominance of 8 and 12 inches, and range in age with the oldest piping dating back to 1925. Approximately 78 percent of the distribution system is ductile iron pipe.

Table 3-1 | Transmission and Distribution System Piping Inventory by Pipe Diameter

Distribution System Piping Diameter (inches)	Length (linear feet)	Design Life (years)	Criticality Rating (Bigger # = Less Critical)[1]
≤ 6	189,574	100	4
8-10	681,601		4
12-15	532,953		3
16-20	119,997		3
24-30	15,582		2
36-42	35		2
Unknown	1,380		--

Note:
1. Criticality was assessed based on pipe diameter. Larger diameter pipes were identified as being more critical than smaller diameter pipes.

Table 3-2 organizes water system piping by material and age and identifies the anticipated pipe condition. Pipe condition was assessed based on pipe age and remining useful life. Cast iron pipe that was installed after the 1930's, which constitutes over 48 miles of water mains or 16 percent of the total length of water mains in the City's system, was designated to have a significantly reduced design life of 50 years due to known pipe integrity issues. As such, the City is prioritizing replacement of cast iron pipe and regularly partners with other City projects to replace this piping efficiently and has capital programs to fund replacements as discussed further in **Chapter 8**. Piping that has an unknown material and unknown installation date will be updated in the City's GIS system and Cartegraph as more records research is completed.

In 2014, the City conducted leak detection testing and condition assessment of approximately 2.8 miles of 14 to 24-inch ductile iron and concrete composite pipe. The results indicated that the 20-inch and 16-inch ductile iron mains in the Lea Hill Service Area range from moderate to good condition. The Coal Creek Springs concrete composite main was identified as being in good condition. The 14-inch ductile iron main located in the Academy Service Area was suspected of being in poor condition, however this was later thought to be in decent condition as more information regarding the pipe material was obtained. A portion of the 14-inch piping was replaced as part of a roundabout project within Auburn Way S.

In 2020 the City conducted additional leak detection testing and condition assessment of approximately 13,500 feet of 10 to 16-inch cast iron main. With a focus on four specific sites: Auburn Way South, C Street Southwest, West Hill Springs, and Lea Hill Road. All the pipe on Auburn Way South and Lea Hill Road are in moderate condition. The pipe on C Street Southwest and at West Hill Springs are in poor to moderate condition. The C Street Southwest piping is currently being replaced by the City's "C St SW Preservation" capital project that will begin construction in in 2024.The West Hill Springs piping will be replaced in a forthcoming capital project titled "West Hill Springs Transmission Main Replacement" that is identified in **Chapter 8**.

Table 3-2 | Transmission and Distribution System Piping Inventory by Material and Installation Decade

Piping Material	Total Length (linear feet)	Install Decade (10-Year Period)	Length (linear feet)	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)[1]
Cast Iron	253,919	1920	11,877	100	-4	7
		1930	10,602		6	6
		1940	3,079	50	-34	10
		1950	5,937		-24	10
		1960	147,764		-14	9
		Unknown	74,660		--	--
Concrete[2]	11,284	1960	11,284	100	36	3
Ductile Iron	1,198,958	1960	48,235	100	36	4
		1970	115,184		46	4
		1980	283,977		56	4
		1990	299,293		66	4
		2000	230,295		76	3
		2010	156,307		86	2
		2020	50,594		96	1
		Unknown	15,072		--	--
HDPE	409	2010	409	100	86	1
PVC[2]	19,498	1960	1,630	100	36	4
		1970	2,598		46	4
		1980	1,251		56	4
		1990	1,784		66	4
		2000	2,647		76	3
		2010	2,588		86	2
		2020	1,117		96	1
		Unknown	5,884		--	--
RCP	1,014	1970	884	100	46	3
		2020	130		96	1
Steel	1,030	1920	870	100	-4	6
		1970	160		46	4
Unknown - Anticipated to be Cast Iron based on install date	4,022	1960	4,022	50	-14	4
Unknown – Anticipated to be Ductile Iron based	28,564	1970	4,001	100	46	4
		1980	3,822		56	4

Piping Material	Total Length (linear feet)	Install Decade (10-Year Period)	Length (linear feet)	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)[1]
on install date		1990	12,465		66	4
		2000	4,165		76	3
		2010	4,112		86	2
Unknown	23,089	Unknown	23,089	50	--	--

Note:
1. Condition was assessed based on remaining useful life of the pipe.
2. The City is investigating pipe materials in 2024 to verify pipe materials in the City's database that may be mislabeled.

The distribution system piping is delineated into pressure zones using Pressure Reducing Valves (PRVs). An inventory of the City's PRVs, as well as their size, remaining useful life, condition, and criticality are summarized in **Table 3-3**. As PRVs approach their anticipated design life, the City's Maintenance and Operations (M&O) staff remove and rebuild the valve to extend the useful life of the asset, when feasible.

Table 3-3 | Pressure Reducing Valve (PRV) Inventory

Valve ID #	PRV Location Description	Valve Size (inches)	Install Date (year)	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
Lea Hill Service Area							
411-10 - Primary Valve	Cobble Creek Upper at 30216 104th Ave SE	8	2024	40	40	1	3
411-11 - Secondary Valve		2					4
411-12 - Relief Valve		1.5					4
411-20 - Primary Valve	104th Ave SE/SE 302nd St. Cobble Creek Lower	6	1994		10	4	3
411-21 - Secondary Valve		2					4
411-22 - Relief Valve		1.5					4
412-10 - Primary Valve	298th Pl SE & 109th Ave SE	6	2011		27	2	3
412-11 - Secondary Valve		2					4
412-12 - Secondary Valve		2					4
412-20 - Primary Valve	300 Block SE & 108th Ave SE	6	2005		21	1	3
412-21 - Secondary Valve		2					4
412-22 - Secondary Valve		2					4
511-10 - Primary Valve	SE 304th St. & 108th Ave. SE	6	2016	40	32	1	3
511-11 - Secondary Valve		2					4
511-20 – Primary Valve	Cobble Creek Lower at 10230 304th Pl SE	6	1994		10	1	3
511-21 – Secondary Valve		2					4
511-22 – Relief Valve		1.5					4

Valve ID #	PRV Location Description	Valve Size (inches)	Install Date (year)	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
512-10 – Primary Valve	SE 304th St & 110th Pl SE	6	2018		34	1	3
512-11 – Secondary Valve		2					4
512-12 – Secondary Valve		2					4
611-30 - Primary Valve	Carriage Square	8	2018		34	1	3
611-31 - Secondary Valve		3					4
611-32 - Secondary Valve		3					4
711-10 - Primary Valve	Amberview North	8	1986		2	5	3
711-11 – Secondary Valve		2					4
711-20 - Primary Valve	Amberview South	8	1986		2	5	3
Valley Service Area							
1110-10 - Primary Valve	25th St SE & K St SE	10	1987	40	3	6	3
1110-20 - Secondary Valve		4					4
Lakeland Service Area							
1309-10 - Primary Valve	Mill Pond Dr SE & Oravetz Rd SE	10	1980	40	-4	6	3
1309-11 - Secondary Valve		3					4
1309-12 - Secondary Valve		3					4
1309-13- Secondary Valve		1					4
1310-10 - Primary Valve	Mill Pond Dr SE & Mill Pond Loop SE	10	1980		-4	6	3
1310-11 - Secondary Valve		3					4
1310-12 - Secondary Valve		2		40			4
1310-13 - Secondary Valve		1					4
1409-10 - Primary Valve	Oravetz Rd SE & Lakeland Hills Way SE	8	1990		6	5	3
1409-11 - Secondary Valve		4					4
1409-12 - Secondary Valve		2					4
1409-13 - Secondary Valve		2					4
1409-20 - Primary Valve	47th St SE & Lakeland Hills Way SE	8	1992		8	5	3
1409-21 - Secondary Valve		4					4
1409-22 - Secondary Valve		2					4
1409-23 - Secondary Valve		2					4
1409-30 - Primary Valve	Lakeland Hills Way SE & 51st St SE	10	2004		20	3	3
1409-31 - Secondary Valve		3					4
1409-32 - Secondary Valve		2					4
1409-40 - Primary Valve	Mill Pond Dr SE & Lakeland	10	1988		4	5	3

Valve ID #	PRV Location Description	Valve Size (inches)	Install Date (year)	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
1409-41 - Secondary Valve	Hills Way SE	3					4
1409-42 - Secondary Valve		3					4
1409-43 - Secondary Valve		1					4
1410-10 - Primary Valve	5018 Mill Pond Dr SE	10	1980		-4	6	3
1410-11 - Secondary Valve		3					4
1410-12 - Secondary Valve		2					4
1410-20 - Primary Valve	52nd St SE & East of Mill Pond Dr SE	8	1992		8	5	3
1410-21- Secondary Valve		4					4
1410-22- Secondary Valve		2					4
1410-23- Secondary Valve		2					4
1410-30 - Primary Valve	Nathan Ave SE & Highland Dr SE	8	1992		8	5	3
1410-31- Secondary Valve		4					4
1410-32- Secondary Valve		2					4
1410-33- Secondary Valve		2					4
1410-40 - Primary Valve	5203 Quincy Ave SE	8	1995	40	11	4	3
1410-41- Secondary Valve		4					4
1410-42- Secondary Valve		2					4
1410-43- Secondary Valve		2					4
1509-10 - Primary Valve	Terrace View Lower	10	2007		23	3	3
1509-11- Secondary Valve		3					4
1509-12- Secondary Valve		3					4
1509-20 - Primary Valve	Terrace View Middle	10	2007		23	3	3
1509-21- Secondary Valve		3					4
1509-22- Secondary Valve		3					4
1509-30 - Primary Valve	Terrace View Upper	10	2007		23	3	3
1509-31- Secondary Valve		3					4
1509-32- Secondary Valve		3					4
1509-40 - Primary Valve	Terrace View Dr SE & Alexander Pl SE	10	2007		23	3	3
1509-41- Secondary Valve		3					4
1509-42- Secondary Valve		3					4
1510-10 - Primary Valve	Lakeland Hills Way SE & Evergreen Way SE	8	1994		10	4	3
1510-11- Secondary Valve		4					4
1510-12- Secondary Valve		2					4

Valve ID #	PRV Location Description	Valve Size (inches)	Install Date (year)	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
1510-13- Secondary Valve		2					4
1411-10 - Primary Valve	56th St SE at Bennett Ave SE	6	2011		27	2	3
1411-11- Secondary Valve		2					4
1411-12- Secondary Valve		2					4
1411-20 - Primary Valve	5310 Bennett Ave SE	6	2010		26	2	3
1411-21- Secondary Valve		2					4
1411-22- Secondary Valve		2					4
1411-30 - Primary Valve	Kersey Way SE & 50th St SE	8	2015		31	2	3
1411-31- Secondary Valve		2					4
1411-32- Secondary Valve		2		40			4
1411-40 - Primary Valve	2305 54th St SE	10	2015		31	2	3
1411-41- Secondary Valve		3					4
1411-42- Secondary Valve		3					4
1411-50 - Primary Valve	5253 Wesley Ave SE	6	2015		31	2	3
1411-51- Secondary Valve		2					4
1411-52- Secondary Valve		2					4
1412-10 - Primary Valve	5539 Franklin Ave SE	6	2012		28	2	3
1412-11- Secondary Valve		2					4
1412-12- Secondary Valve		2					4
Academy Service Area							
1011-30 - Primary Valve	2003 Auburn Way S	8	2006		22	3	3
1011-31 - Secondary Valve		3					4
1011-32 - Secondary Valve		3					4
1111-10 - Primary Valve	Riverwalk Dr SE & Howard Rd SE	6	2006		22	3	3
1111-11 - Secondary Valve		2					4
1111-12 - Secondary Valve		2					4
1111-20 - Primary Valve	2204 27th St SE	6	1997		13	3	3
1111-21 - Secondary Valve		2					4
1111-22 - Secondary Valve		2					4
1114-10 - Primary Valve	4500 Auburn Way South	8	2006		22	3	3
1114-11 - Secondary Valve		3					4
1114-12 - Secondary Valve		3					4

Figure 3-5 shows the locations of water main breaks and leaks that have required repair since 2014. A total of 93 repairs have been completed during this timeframe and include water main break and leak repairs, water main appurtenance repairs, service lines repairs, and repairs due to damage caused by construction contractors.

Figure 3-5 | Water Main Leak and Break Repair Locations from 2014-2024

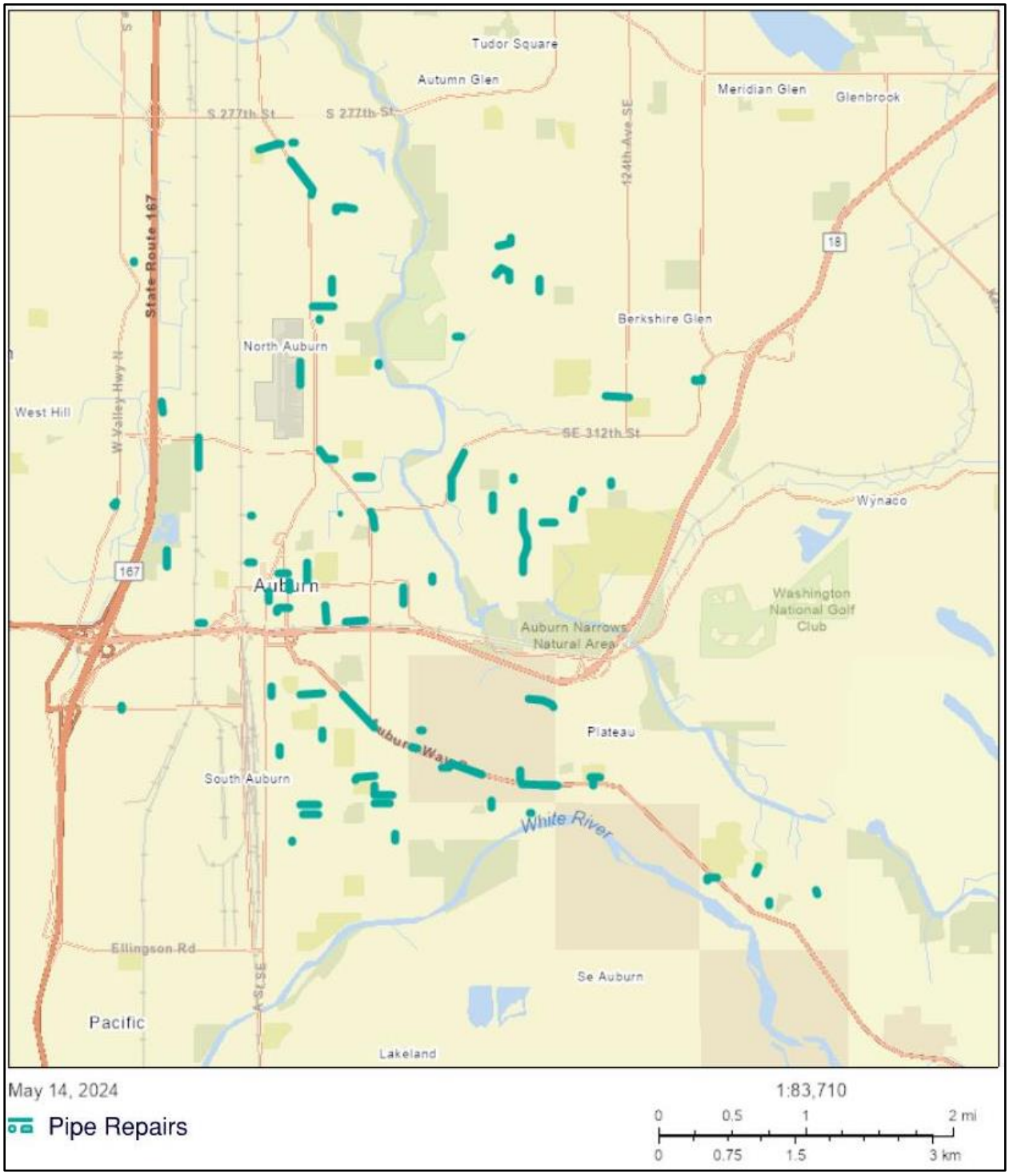
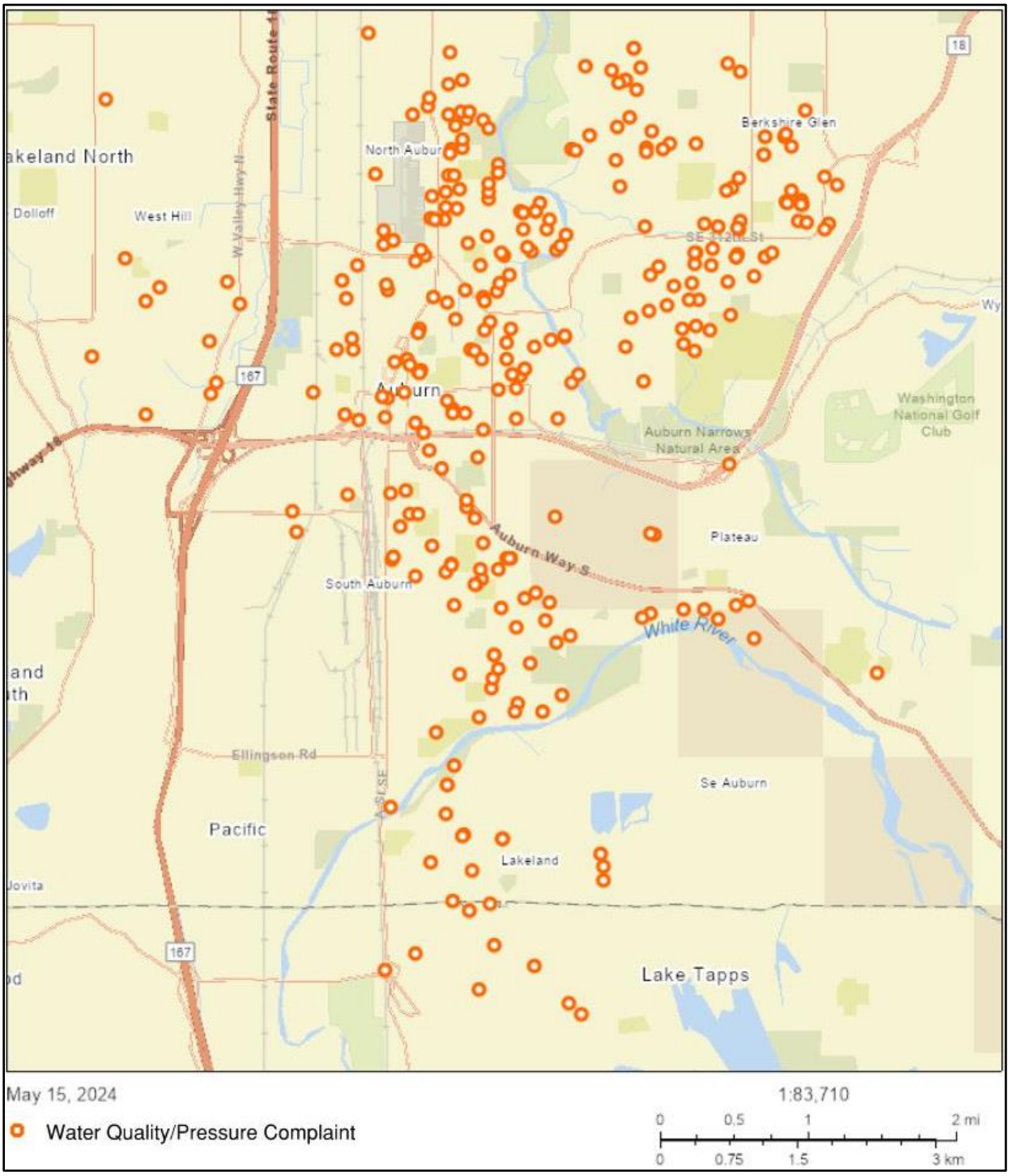


Figure 3-6 shows the locations of low pressure and water quality (odor and discolored water) complaints received since 2014.

Figure 3-6 | Low Pressure, Odor, and Discolored Water Complaints from 2014-2024



A summary of the customer complaints by category is presented in **Table 3-4**. Overall, there has been only one odor complaint within the last ten years. Pressure complaints and water quality complaints have remained fairly consistent, with the fewest number of complaints being made in 2023.

Table 3-4 | Summary Customer Complaints

Category	2014[1]	2015	2016	2017	2018	2019	2020	2021	2022	2023
Water Quality (Appearance)	0	40	47	23	14	55	48	47	27	9
Odor	3	1	0	0	0	0	0	0	0	0
Pressure	6	9	16	19	12	8	4	11	8	10
Total	**9**	**50**	**63**	**42**	**26**	**63**	**52**	**58**	**35**	**19**

Note:
1. Data in 2014 is incomplete due to the City transitioning to Cartegraph Asset Management.

3.1.2 Water Source Facilities

The City uses a combination of groundwater wells and springs as supply sources for the water system. The pumping capacity, remaining useful life, condition and criticality of the City's groundwater wells are summarized in **Table 3-5**. The City's two spring sources, Coal Creek Springs and West Hill Springs, are not included in **Table 3-5** since both these sources operate by gravity and have no on-site pumping equipment. Condition ratings are assigned based on the 2013 Water Facilities Evaluation Study.

A detailed description of each water source facility, including both springs and groundwater wells, and planned improvements is provided following **Table 3-5**. A summary of the pumping or production capacity of each source, including the springs, is included in **Section 2.6** of **Chapter 2**. Discussion of the City's current water rights for each water source is provided in **Section 3.4.1**.

Table 3-5 | Source of Supply Well Pump Inventory

Facility Name	Capacity (MGD)	No. of Pumps	Pump Type	Install Year	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
Valley Service Area								
Well 1	3.02	1	Vertical Turbine	2016	40	32	2	2
Well 2	1.61	1	Centrifugal	2023		39	3	1
Well 3A	Not in Service							
Well 3B	Not in Service							
Well 4	3.74	1	Centrifugal	1985	40	30	1	3
Well 6	1.73	1	Vertical Turbine	1999		15	4	1
Well 7	Not in Service							
Lakeland Service Area								
Well 5	0.94	1	Submersible	1983	40	-1	7	3
Well 5A	0.26	1	Submersible	1990		6	7	2
Well 5B	Not in Service							

3.1.2.1 Coal Creek Springs

Coal Creek Springs is a primary water supply for the City due to its production capacity. This source is more economical to operate than other sources as it can provide a large volume of water and does not require pumping for extraction. Much of the spring's collector system, including the south and middle collectors, was constructed in 1964. A third collector (the north collector) was added in 1998 to enhance system performance and to provide increased reliability. Currently, the flow from this collector is by gravity, however a buried manhole structure was installed in the line to provide space for a future pump station that could increase production.

Each collector is connected to an overflow structure before connection to a 24-inch transmission line that conveys flow to the Howard Road Corrosion Control Treatment (CCT) Facility where the water is treated for corrosion and is then pumped to Reservoir 1. Between the Coal Creek Springs headworks and the Howard Road CCT Facility is a single connection that supplies potable water to Game Farm Wilderness Park. This transmission main is in good condition, however a suspected leak on the 24-inch steel transmission main crossing the White River was identified in a facility evaluation study completed in 2014. It was later identified that there was not a leak, but the evaluation results were caused by river turbulence due to portions of the pipe being exposed along the riverbed. The City is currently constructing a project that replaces the river crossing with new transmission piping suspended from a utility and pedestrian bridge; the project will be completed in 2024 and is identified in Chapter 8.

In recent years, the production capacity of Coal Creek Springs has been reduced. A maximum instantaneous production rate up to 4,500 gpm is currently feasible, however a more consistent functional production capacity of 3,500 gpm is currently achieved (approximately 52 percent of the water right capacity). The City is currently investigating the cause of reduced production and potential solutions. A capital project is planned to rehabilitate Coal Creek Springs once a solution is identified; the project is discussed further in Chapter 8.

3.1.2.2 West Hill Springs

Although the use of West Hill Springs as a potable water supply dates to before 1907, most of the current facilities and equipment were constructed after 1960. More recent improvements include replacement of the collection boxes, as recommended in the 1995 Comprehensive Water Plan, and partial fencing of the watershed, as recommended by the 2000 Water Comprehensive Plan. The spring's existing transmission main is constructed of 10-inch diameter cast iron piping and has experienced two breaks. The City plans to replace approximately 1,250 linear feet of the transmission main with 12-inch diameter ductile iron pipe in an upcoming capital project identified in Chapter 8.

3.1.2.3 Well 1

Well 1 was constructed in 1960 and underwent substantial renovation in 2016, significantly improving the overall facility condition. Renovations included transmission piping to Howard Road CCT Facility, site improvements, a new well house, new pumping system, disinfection with sodium hypochlorite, on-site emergency power, and upgraded electrical and supervisory control and data acquisition (SCADA) controls. The new well pumping system is a two-stage, vertical turbine pump with a capacity of 2,100 gpm, driven by a 100-HP motor and controlled by a variable frequency drive (VFD). Supply from Well 1 will be routed along the recently constructed 16-inch transmission main and conveyed to the Howard Road CCT Facility.

3.1.2.4 Wells 2 & 6

Well 2 was constructed in 1970 and the well and well house were replaced in 2000 with a new masonry building and pumping equipment as part of the City's corrosion control strategy. The facility built in 2000 also houses Well 6, which was built in 1999. Within the facility is a two-stage 1,115 gpm centrifugal pump powered by a 125-HP motor, installed in 2023 (Well 2), and a two-stage, vertical-turbine pump driven by a 200-HP motor (Well 6). The pumping capacity of Well 6 has been reduced in recent years to a typical production rate of 1,200 gpm due to fouling of the well screen that requires occasional cleaning. The wells discharge to a 14-inch transmission main to Fulmer Field CCT Facility for treatment prior to distribution.

Since the Fulmer Field CCT Facility is required to re-pump the water from Wells 2 and 6 into the Valley Service Area and to Reservoir 2, Wells 2 and 6 are functional only with operation of the Fulmer Field CCT Facility. Chlorination and emergency power for both Wells 2 and 6 are housed in the Fulmer Field CCT Facility.

In 2023 the City completed an interim replacement of the pump at Well 2. Full replacement of Well 2 is planned as a capital project discussed further in Chapter 8. Additionally, rehabilitation work completed in 2013 and 2014 indicated that it would be beneficial to clean and rehab both wells on a regular basis. As such, the City initiated a program for regular cleaning of the wells established on a 3-year cycle which is discussed further in Chapter 8.

3.1.2.5 Wells 3A & 3B

Wells 3A and 3B are located at the same site, off 37th Street SE on the extension of E Street SE. The wells are approximately 50 feet apart and were constructed in 1983 and 1984 respectively. Each well is equipped with a four-stage, centrifugal pump driven by a 125-HP motor, each with a maximum pumping capacity of 1,650 gpm when operated individually. A standby generator capable of running one pump at a time is available on site. The system is equipped with an automatic transfer switch.

Currently, Wells 3A and Well 3B are not operated because they produce water that contains high concentrations of manganese. Since the wells were taken offline, the chlorination facilities have been removed. If operated, the wells pump directly into the Valley Service area distribution system. The City plans to construct treatment for these wells as part of the "Wells 3A/3B Treatment" project discussed further in Chapter 8.

3.1.2.6 Well 4

Well 4 was originally constructed in 1985, was rebuilt in 2012, and is currently undergoing significant upgrades to mechanical and electrical equipment, including well pump piping, valve replacement, and control panel replacement. Once the upgrades are complete this source will be considered in excellent condition. The well is equipped with a 2,600-gpm, four-stage, centrifugal, turbine pump driven by a 300-HP motor. Well 4 pumps directly to a 16-inch transmission main that can either convey water to Reservoir 1 or to distribution through a PRV. Well 4 is an important supply for the southern end of the City's Retail Water Service Area (RWSA). Operation of the well is normally controlled by the water level in Reservoir 1.

3.1.2.7 Well 5

Well 5 is one of three City wells that were constructed to serve the Lakeland Hills Development within the City's Lakeland Service Area. Well 5 pumps directly into the Lakeland Service Area distribution system. The well was constructed in 1983 and is equipped with a seven-stage submersible turbine pump, driven by a

125-HP motor. The well facility was assessed to be in poor condition in the 2013 Water Facilities Evaluation Study. The City plans to upgrade the facility as part of the Well 5/5A Upgrades project discussed in Chapter 8.

3.1.2.8 Well 5A

Well 5A is the second well serving the Lakeland Service Area and was constructed in 1990 to supplement Well 5. The well pumps directly into the Lakeland Service Area distribution system. The well is equipped with a ten-stage submersible turbine pump, driven by a 60-HP motor and has on-site chlorination facilities. A manual transfer switch is provided to allow operation of Well 5A using a portable emergency generator. The well facility was assessed to be in poor condition in the 2013 Water Facilities Evaluation Study. The City plans to upgrade the facility as part of the Well 5/5A Upgrades project discussed in Chapter 8.

3.1.2.9 Well 5B

Well 5B was constructed in 2005 with a 600 gpm pump. Once this source came on-line, the City discovered the aquifer was not recovering, so the well was taken out of service in 2006 and has not been operated since. The City has no plans to operate this well within the planning horizon.

3.1.2.10 Well 7

Well 7 was constructed in 1997 and was originally equipped with a 3,500-gpm variable-stage, vertical-turbine pump driven by a 500-HP motor. Well 7 is configured to pump directly to the Fulmer Field CCT Facility through a 16-inch transmission main. The treated water is then re-pumped into the Valley Service Area. If necessary, Well 7 can pump untreated water directly to the Valley Service Area through a PRV. The well was taken out-of-service in 2012 due to high manganese concentrations. The City has planned capital projects to expand the treatment capacity and treat manganese at Fulmer Field CCT Facility to accommodate flows from Well 7 so operation of this facility can be reinstated. The projects to provide treatment and back-up power for Well 7 are discussed in Chapter 8.

3.1.2.11 Algona Well 1

In 1996, the City acquired the water rights for Algona Well 1 as a condition of the wholesale agreement with the City of Algona (Algona). Due to pump operational problems, Algona Well 1 was removed from service. The 500-gpm pump and associated piping have been removed from the well house and the building has been demolished, but the well casing is still intact, and the well is plugged. The City has a capital project identified in Chapter 8 to study the well and options for potential use or relocation.

3.1.3 Water Treatment Facilities

The City's water treatment facilities provide chlorination and corrosion control. An inventory of the water system's treatment facilities, including the treatment type, capacity, remaining useful life, condition, and criticality is provided in Table 3-6. Condition ratings are assigned based on the 2013 Water Facilities Evaluation Study. A detailed description of each water treatment facility and planned improvements is provided following Table 3-6.

Table 3-6 | Water Treatment Facility Inventory

Facility Name	Treatment Type	Treatment/ Dosing Capacity	Install Date	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
Coal Creek Springs	Gas Chlorination	0.75-0.80 mg/L	1976	35	-13	3	2
West Hill Springs	Gas Chlorination	0.75-0.80 mg/L	1992		15	5	3
Fulmer Field CCT Facility	Hypochlorite	0.95 mg/L	2002	35	13	5	2
	Corrosion/Air-Stripping	11.88 MGD					1
Howard Road CCT Facility	Corrosion/Air-Stripping	8.06 MGD	2004		15	5	1
Terrace View Booster Pump Station	Re-chlorination	0.75 mg/L	2010		21	3	2
Well 1	Hypochlorite	0.75-0.80 mg/L	2016		27	2	2
Well 4	Hypochlorite	0.75-0.80 mg/L	2016		27	2	3
Well 5A	Hypochlorite	0.75-0.80 mg/L	1990		1	3	2

3.1.3.1 Chlorination Facilities

3.1.3.1.1 Coal Creek Springs Chlorination

The Coal Creek Springs chlorination station was built in 1976 and achieves 4-log treatment of the supply. The chlorination station is housed in a masonry building approximately 300 feet north of the collectors and is in fair condition. As a major source of water for the system, Coal Creek Springs is used to maintain chlorine residuals in the Academy Service Area and south end of the Valley Service Area.

This chlorination station is equipped with two chlorinators. Gaseous chlorine is stored on site in a separate room. Alarms from the chlorination equipment are transmitted back to the Water Control Center at the M&O Facility. A chlorine residual analyzer provides high and low alarms to the M&O Facility. Chlorine is dosed into the water at a range of 0.75-0.80 milligrams per liter (mg/L) and is adjusted based on the chlorine residual measured in the Academy and the south end of the Valley Service Area.

The City has a capital project planned to replace the chlorination building and upgrade the chlorination equipment from chlorine gas to hypochlorite disinfection. This project is discussed further in **Chapter 8**.

3.1.3.1.2 West Hill Springs Chlorination

The West Hill Springs Chlorination Facility was constructed in 1992. Water produced at West Hill Springs continuously flows from the collection boxes to the on-site chlorination station, housed in a wood building, where gas chlorine is metered continuously to treat the water. Chlorine dosage typically ranges from 0.75 – 0.80 mg/L and is adjusted based on the measured chlorine residual in the north end of the Valley Service Area. From the chlorination station, the water flows by gravity into the Valley Service Area.

3.1.3.1.3 Well 1

Liquid sodium hypochlorite treatment was installed at Well 1 in 2016. The chlorine dosage typically ranges from 0.75 - 0.80 mg/L. A residual monitoring system is tied into the City's existing SCADA system. The City plans to replace the liquid hypochlorite system with an on-site chlorine generation system (OSEC) to better accommodate seasonal changes to chemical demands and reduce chemical waste. This project is discussed further in Chapter 8.

3.1.3.1.4 Wells 2 and 6

Water produced at Wells 2 and 6 is treated and chlorinated at the Fulmer Field CCT Facility prior to distribution.

3.1.3.1.5 Well 4

Well 4 was equipped with a liquid sodium hypochlorite chlorination system in 2016. The chlorine dosage typically ranges from 0.75 – 0.80 mg/L. The City plans to replace the liquid hypochlorite system with an on-site chlorine generation system (OSEC) to better accommodate seasonal changes to chemical demands and reduce chemical waste. This project is discussed further in Chapter 8.

3.1.3.1.6 Well 5

There is currently no chlorination provided for water produced at Well 5. This City has a capital project discussed in Chapter 8 that will include the addition of a chlorination facility to Well 5.

3.1.3.1.7 Well 5A

Well 5A was equipped with a liquid sodium hypochlorite chlorination station in 1990. The chlorine dosage typically ranges from 0.75 – 0.80 mg/L and is adjusted based on the chlorine residual measured in the Lakeland Service Area.

3.1.3.1.8 Fulmer Field CCT Facility

The Fulmer Field CCT Facility was constructed in 2004. Chlorination at Fulmer Field CCT, along with B Street Intertie, is a major source of chlorine residual in the north end of the Valley Service Area and in the Lea Hill Service Area and is achieved using an on-site chlorine generation system. The existing on-site chlorine generation cell was replaced in 2012, but the system was identified as being in poor condition and sourcing replacement parts for repairs has become increasingly more difficult. A capital project to replace the entire on-site generation system is planned and discussed further in Chapter 8.

The Fulmer Field CCT Facility treats the water from Wells 2, 6, and 7 (when operational). Chlorine is introduced into the system prior to the air-stripping towers at a dose of approximately 0.95 mg/L. The chlorine is adjusted based on measured chlorine residual at the station analyzer. The treated water is then stored in the clearwell and boosted into the distribution system and Reservoir 2. If needed, the chlorine can be manually introduced into the clearwell rather than prior to the towers.

3.1.3.1.9 Terrace View Booster Pump Station (BPS)

The Terrace View BPS was equipped with a liquid sodium hypochlorite chlorination system in 2010, adding 6 percent solution to the discharge piping of the station at an approximate dose of 0.75 mg/L.

3.1.3.1.10 Intertie Pump Station

Through the First Amendment to Interlocal Agreement No. 2 for the Lea Hill Intertie project executed in 2017, Covington Water District (CWD) terminated its rights or obligations to Interlocal Agreement No. 2 or the First Amendment and Lake Meridian Water District (LMWD) continues to receive wholesale water from the City, as needed, on an interruptible basis. The chlorination equipment was removed from the Intertie Pump Station since the intertie is not used on regular basis.

3.1.3.2 CCT Facilities

To limit the corrosion of lead and copper in the system, the City treats major supplies. The treatment process increases the pH of the water, which reduces the solubility of lead and copper, allowing the water to comply with the Lead and Copper Rule. The goal of the CCT facilities is to adjust the water leaving the facility to a pH of approximately 7.5.

3.1.3.2.1 Fulmer Field CCT Facility

The Fulmer Field CCT Facility also adjusts the pH of the water from its sources to approximately 8.0 by air-stripping in three 33,000 gallon air-stripping towers to provide corrosion control treatment. Three 10,000 cubic feet per minute (CFM) blowers provide air. As the carbon dioxide is stripped from the water, the treated water is stored in the clearwell and boosted through four booster pumps back into the distribution system and Reservoir 2. The firm capacity of the facility is 11.88 MGD.

3.1.3.2.2 Howard Road CCT Facility

The Howard Road CCT Facility was constructed in 2004. It has a life expectancy of an additional 15 years and is generally in fair condition. This facility is housed in a masonry building and treats the water from Coal Creek Springs and Well 1. The pH of the water from Coal Creek Springs and Well 1 is then adjusted to approximately 7.8 by air-stripping in two 33,000 gallon air-stripping towers. Two 9,300 CFM blowers provide air. The treated water is then stored in the clearwell at the facility and re-boosted through three booster pumps to Reservoir 1 and the Valley Service Area. The firm capacity of the facility is 8.06 MGD.

3.1.4 Storage Facilities

The City currently maintains a total of 15.7 million gallons (MG) of water storage in eight water reservoirs located throughout the system. Storage reservoirs are present in each of the City's Service Areas. The location of each storage reservoir is shown in **Figure 3-1**. A summary of the City's storage reservoirs, as well as the type of storage tank, installation date, remaining useful life, condition and criticality is provided in **Table 3-7**. Condition ratings are assigned based on the 2013 Water Facilities Evaluation Study. The storage volumes provided in **Table 3-7** represent the maximum tank volume; however, the City commonly operates the reservoirs at below the maximum levels. A detailed description of reservoir and planned improvements is provided following **Table 3-7**.

Table 3-7 | Inventory of Storage Reservoirs

Reservoir Name	Storage Volume (MG)	Type	Install Date	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
Valley Service Area							
Reservoir 1	5.0	Prestressed Concrete	1975	100	45	5	2
Reservoir 2	3.6	Prestressed Concrete	1975		45	3	2
Lea Hill Service Area							
Reservoir 4A	1.0	Steel Standpipe	1965	70	11	3	2
Reservoir 4B	1.5	Steel Standpipe	1983		29	4	2
Lakeland Service Area							
Reservoir 5	1.0	Steel Standpipe	1981	70	27	2	3
Reservoir 6	1.0	Steel Standpipe	2012		58	2	3
Academy Service Area							
Reservoir 8A	1.2	Steel Standpipe	1973	70	19	3	3
Reservoir 8B	1.5	Steel Standpipe	1980		26	3	3

3.1.4.1 Reservoir 1

Reservoir 1 is located at the southeast end of the Valley Service Area and is the primary storage location for water produced at Coal Creek Springs and pumped from the Howard Road CCT Facility. Reservoir 1 can also be filled by water produced at Well 4. The reservoir was constructed in 1975 and is a covered, pre-stressed concrete tank with a capacity of 5 MG. Reservoir 1 is 184.5 feet in diameter and has an overflow elevation of 269 feet. Academy Pump Station 3 draws water from Reservoir 1 to feed the Academy Service Area. Reservoir 1 also serves the Valley Service Area through Control Valve 1. Control Valve 1 is essential to limit flow and maintain adequate supply to the Valley Service Area.

Reservoir 1 was last inspected and cleaned on March 15, 2023. Recommended improvements identified in 2013 Water Facilities Evaluation Study are planned to be completed as part of the "Reservoir Capital Improvements" project discussed further in **Chapter 8**.

3.1.4.2 Reservoir 2

Reservoir 2 is located on the northeast side of the City's Water Service Area and serves the Valley Service Area. The reservoir was constructed in 1975 and is a buried, pre-stressed concrete tank with public tennis courts on the concrete roof. The reservoir has a maximum storage capacity of 3.6 MG, has a diameter of 143 feet and an overflow elevation of 252.7 feet. Reservoir 2 is filled by the water sources located in the Valley Service Area and is also filled from Reservoir 1 through Control Valve 1.

Reservoir 2 was last inspected and cleaned on March 13, 2023. A capital project is planned to replace the fill and drain valves associated with the reservoir; the project is discussed further in **Chapter 8**. This project will also resolve improvements identified in the 2022 sanitary survey.

3.1.4.3 Reservoirs 4A and 4B

Storage in the Lea Hill Service Area is provided in two steel standpipe reservoirs located in the northeast corner of the City's RWSA, Reservoir 4A and Reservoir 4B. The reservoirs have capacities of 1.0 MG and 1.5 MG respectively. Reservoir 4A was constructed in 1965 with a diameter of 46 feet and an overflow elevation of 578.5 feet. Reservoir 4B was constructed in 1983 with a diameter of 58 feet and an overflow elevation of 579.6 feet. Water is supplied to the Lea Hill reservoirs from the City's Valley Service Area through the Green River Pump Station and Lea Hill Pump Station.

The reservoirs were last inspected and cleaned in June and April of 2018. A capital project is currently installing seismic control valves on the outlet piping from both reservoirs to prevent catastrophic flow during a seismic pipe failure; the project is discussed further in **Chapter 8**. Additionally, required improvements identified in the 2022 Sanitary Survey will be completed as part of the Reservoir Repair and Replacements Program also discussed in **Chapter 8**.

3.1.4.4 Reservoir 5

Reservoir 5 is one of two reservoirs providing storage for the Lakeland Service Area. The reservoir was constructed in 1981 and has a total capacity of 1.0 MG. The reservoir is filled by Well 5, Well 5A, and the Terrace View BPS. Reservoir 5 is steel standpipe with a 53.25-foot diameter and an overflow elevation of 638.5 feet. The reservoir was last cleaned and inspected in 2019 and the interior and exterior were last painted in 2016 as part of routine maintenance.

3.1.4.5 Reservoir 6

Reservoir 6 is in the Lakeland Service Area within the boundary of the Lakeland 697 pressure zone but is connected to distribution piping for the Lakeland 630 pressure zone. Reservoir 6 is a steel standpipe constructed in 2012 and has a total capacity of 1.0 MG. This reservoir has a diameter of 63.4 feet and an overflow elevation of 638.9 feet. The reservoir is filled by Well 5, Well 5A, and the Terrace View BPS. The reservoir was last cleaned and inspected in 2019.

3.1.4.6 Reservoir 8A and 8B

Reservoirs 8A and 8B are steel standpipes that provide storage for the Academy Service Area. The reservoirs are normally operated in parallel, functioning as one large reservoir. Reservoir 8A has a diameter of 52.75 feet and a total storage volume of 1.2 MG and was constructed in 1973. Academy Reservoir 8B has a diameter of 60 feet and a total storage volume of 1.5 MG and was constructed in 1980. Both reservoirs have an overflow elevation of 544 feet. Academy Pump Station 3 fills the reservoirs.

The reservoirs were last cleaned and inspected in October 2019. A capital project is currently installing seismic control valves on the outlet piping from both reservoirs to prevent catastrophic flow during a seismic pipe failure; the project is discussed further in **Chapter 8**. Additionally, required improvements identified in the 2022 Sanitary Survey will be completed as part of the Reservoir Repair and Replacements Program also discussed in **Chapter 8**.

3.1.5 Pump Station Facilities

The City operates and maintains several pump stations to move water throughout the distribution system and to provide water at the required service pressures. An inventory of the City's pump stations is provided in **Table 3-8** and locations are shown in **Figure 3-1**. Condition ratings provided in **Table 3-8** are assigned based on findings from the 2013 Water Facilities Evaluation Study.

Table 3-8 | Pump Station and Booster Pump Station Inventory

Facility Name	Firm Capacity (gpm)	Firm Capacity (MGD)	Install Date	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
Lea Hill Service Area							
Intertie Pump Station (Wholesale)	3,510	5.05	1999	40	15	3	4
Lea Hill BPS	300	0.432	1999		15	3	3
Lea Hill Pump Station	1,200	1.73	1965		-19	6	3
Green River Pump Station	3,498	5.04	1999		15	3	2
Valley Service Area							
Game Farm Park Pump Station	50	0.07	1988	40	4	7	4
Lakeland Service Area							
Lakeland Hills BPS	4,205	6.06	2012	40	28	2	2
Terrace View BPS	1,000	1.44	2010		26	2	2
Fulmer Field CCT Facility	8,250	11.88	2004		20	3	1
Howard Road CCT Facility	5,600	8.06	2004		20	4	1
Academy Service Area							
Academy Pump Station 3	2,100	3.02	2023	40	39	1	1
Academy East BPS	3,040	4.38	2014		30	2	2

3.1.6 Facility Back-Up Power

An inventory of the City's existing facilities with backup power accommodation is provided in **Table 3-9**. Of the City's twelve water sources, only Wells 5 and 7 are currently without a standby power source. Standby power will be added to both wells as part of capital projects discussed in **Chapter 8**. Back-up power for Wells 2 and 6 is housed at the Fulmer Field CCT Facility.

The Game Farm Park Pump Station, Lea Hill BPS, and Intertie Pump Station are the only pump stations without a standby power source or connection. Backup power will be added to the Lea Hill BPS as part of a capital project discussed further in **Chapter 8**. The Game Farm Park Pump Station is a small facility that serves a recreational area and does not serve residential or commercial properties, therefore back-up power is not a critical element.

Table 3-9 | Back Up Power Inventory

Generator Location	Generator Type and Size	Install or Purchase Date	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
Fulmer Field CCT Facility	On-site, 1000 kW	2001	25	2	4	3
Howard Road CCT Facility	On-site, 600 kW	2004		5	3	3
Academy East BPS	On-site, 600 kW	2010		11	2	3

Generator Location	Generator Type and Size	Install or Purchase Date	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
Academy Pump Station 3	On-site, 450 kW	2023		24	1	3
Green River Pump Station	On-site, 515 kW	2004		5	2	3
Lakeland Hills BPS	On-site, 300 kW	2012		13	2	3
Lea Hill Pump Station	On-site, 250 kW	1964		-35	6	3
Terrace View BPS	On-site, 250 kW	2010		11	2	3
Well 1	Portable, 230 kW	2014		15	2	3
Well 3A/3B	On-site, 210 kW	1983		-16	5	3
Well 4	On-site, 450 kW	2016		17	2	3
Well 5A	Portable, 230 kW	1992		-7	4	3
Well 5B	On-site, 400 kW	2005		6	3	4
Coal Creek Springs	On-site, 20 kW	1964		-35	6	3

3.1.7 Facility Monitoring and Control

Primary monitoring and operation of the City's water system and facilities is conducted via a SCADA computerized control system. A software program called "AVEVA" works in association with SCADA to provide real time graphical display of system data, set points, and alarms for staff monitoring and control. The City's SCADA system controls are centralized at the Public Works M&O Facility. Major upgrades of the City's SCADA system were complete in 2015 and again in 2024, and the system regularly undergoes updates as facility upgrades or improvements are completed.

3.1.8 2022 Sanitary Survey Findings

The City has already taken corrective actions and will continue to resolve all deficiencies identified in the 2022 Sanitary Survey, as summarized in **Table 3-10**.

Table 3-10 | Summary of 2022 Sanitary Survey Findings

Issues/Recommended Improvements		Required Action
Sources and Treatment		
Well 3A	Offline due to manganese issues	--
Well 3B	Offline due to manganese issues	--
Well 5	Water supply lines to chlorine solution tanks must be provided with either air gaps or reduced pressure backflow assemblies to eliminate potential cross connections.	This deficiency was mislabeled by DOH, This should have been for Well 4. A letter from the DOH acknowledging the error was received on October 17, 2022.
	Pump to waste line should terminate above grade.	Will be addressed in Well 5/5A Upgrades project included in CIP; refer to **Chapter 8**.
Well 5A	Water supply lines to chlorine solution tanks must be provided with either air gaps or reduced pressure backflow assemblies to eliminate potential cross connections.	Completed. On September 21, 2022, a reduced pressure backflow assembly was installed at Well 5A, on the water supply line to the chlorine tank.
	Raise casing to terminate above grade or provision of sump pump or alarms that activate when water accumulates in vault. In the meantime, the vault	City implemented an inspection program in October 2022.

	Issues/Recommended Improvements	Required Action
	should be inspected weekly and immediately following significant storm events.	Will be addressed further in Well 5/5A Upgrades project included in CIP; refer to **Chapter 8**.
Well 7	Offline due to manganese issues	--
Storage		
Reservoir 2	Reservoir overflow should not be connected directly to any drain, sanitary sewer, or storm sewer.	Will be addressed in Reservoir 2 improvements project included in CIP; refer to **Chapter 8**.
Reservoir 4A	Reservoir vents should open downward to prevent windblown debris from entering tank.	Will be completed as part of City's annual Reservoir Repair and Replacement program or Reservoirs 4 and 8 Seismic Rehabilitation project; refer to **Chapter 8**.
	Reservoir overflow should not be connected directly to any drain, sanitary sewer, or storm sewer.	Will be completed as part of City's annual Reservoir Repair and Replacement program or Reservoirs 4 and 8 Seismic Rehabilitation project; refer to **Chapter 8**.
Reservoir 4B	Reservoir overflow should not be connected directly to any drain, sanitary sewer, or storm sewer.	Will be completed as part of City's annual Reservoir Repair and Replacement program or Reservoirs 4 and 8 Seismic Rehabilitation project; refer to **Chapter 8**.
Reservoir 8A	Reservoir overflow screen must be repaired	Completed. On September 13, 2022, the overflow screen at Reservoir 8A was repaired.
	Reservoir vents should open downward to prevent windblown debris from entering tank.	Will be completed as part of City's annual Reservoir Repair and Replacement program or Reservoirs 4 and 8 Seismic Rehabilitation project; refer to **Chapter 8**.
Reservoir 8B	Reservoir overflow screen must be repaired	Completed. On September 13, 2022, the overflow screen at Reservoir 8B was repaired.
	Reservoir vents should open downward to prevent windblown debris from entering tank.	Will be completed as part of City's annual Reservoir Repair and Replacement program or Reservoirs 4 and 8 Seismic Rehabilitation project; refer to **Chapter 8**.

3.2 Water Quality

The quality of drinking water in the United States is regulated by the EPA. Under provisions of the Safe Drinking Water Act (SDWA) established in 1974, the EPA is allowed to delegate primary enforcement responsibility for water quality control to each state. In the State of Washington, DOH is the agency responsible for implementing and enforcing the drinking water regulations. For the State to maintain the authority to implement requirements under the SDWA, it must adopt drinking water regulations that are at least as stringent as federal regulations. In meeting these requirements, the State has published drinking water regulations that are contained in Chapter 246-290 of the WAC.

As a Group A system, the City is responsible for monitoring and complying with all applicable SDWA and WAC regulations pertaining to source water and distribution system water quality. The purpose of this section is to document the water system's water quality compared to the above drinking water standards, satisfying the requirements of WAC 246-290-100(4)(e)(ii).

The City also owns and operates the Braunwood satellite system located in southeast Auburn in the Braunwood development, also known as the Hidden Valley Acres development. This system is classified as a Group A - Community Water System by DOH. This system is not discussed further in this chapter since it is a small satellite system that is regularly monitored by the City as required and has not had water quality issues as documented in the City's annual water quality reports for the system.

This section includes the following:

- Water quality and treatment objectives
- Analysis of source water quality
- Analysis of distribution system water quality
- Recent regulatory changes

3.2.1 Water Quality Treatment and Objectives

The treatment objectives of the City are to treat source water to contaminant concentrations below the MCLs established by the EPA and WAC.

Historically, the City has relied on groundwater supplied from wells and springs, which have been determined to be not under the direct influence of surface waters (DOH 2004 for Coal Creek Springs). For these water sources, the City is required to meet the EPA's Groundwater Rule (GWR). The City treats water from all groundwater and spring sources, except for Well 5. The City's water treatment facilities provide chlorination and corrosion control. A summary of the required operator certifications for each type of facility is provided in Table 3-11.

Table 3-11 | Summary of Operator Certifications

Treatment Facility	Required Operator Certifications
Corrosion Control Treatment (CCT) Facilities	Water Distribution Manager 4 (WDM-4) and Water Treatment Plant Operator (WTPO)
Chlorination Facilities	WDM-4

The City began using surface water in 2012 through the B-St Wholesale Intertie with the City of Tacoma (Tacoma). This supply, referred to as the Regional Water Supply, originates from the Green River and the Howard Hansen Dam. Since the City receives treated water as a wholesale purchaser, it is not required to meet the Surface Water Treatment Rule. Tacoma maintains compliance with the Interim Enhanced Surface Water Rule, Long Term 1 and Long Term 2 Enhanced Surface Water Treatment Rules; and the Filter Backwash Recycling Rule. The City has not purchased water for consumption from Tacoma since 2016.

3.2.2 Analysis of Source Water Quality

3.2.2.1 Raw Water Quality

The City only samples post-treatment water except for Well 5, which does not currently have treatment or chlorination. Water quality data for Well 5 is provided in Table 3-12.

3.2.2.2 Finished Water Quality

Monitoring of inorganic chemical and physical parameters varies by source but is typically required once per 36-month compliance period, however, the City typically monitors these constituents every 12 months (annually) in July. Samples are collected from each source following treatment. A summary of the maximum detected concentrations for monitoring data from 2015 through 2022 is provided in **Table 3-12**. During this time, none of the MCLs published by the EPA were exceeded; all samples were below required limits.

Asbestos sampling is usually required once per 36-month compliance period. However, the City has a waiver that requires sampling once every nine years at three distribution system sample sites. No data was collected during the study period. The City is expected to sample again in 2028. Annual VOC sampling is required for Wells 2 and 6, which are both currently represented by the Fulmer Field CCT Facility. All active sources are disinfected with chlorine prior to entering the distribution system except for Well 5, which serves the Lakeland Service Area.

Monitoring data for 2015 through 2022 for inorganic constituents, physical parameters, SOCs, and VOCs were reviewed and is summarized in **Table 3-12**. All values are post-treatment, except for Well 5 since water from this source is not treated. Wells 3A, 3B, 5B, and 7 were not used during this period and were therefore not sampled.

Table 3-12 | EPA Primary Drinking Water Standards Results from 2015 through 2022

Constituent	MCL	Units	Maximum Detected Concentration From 2015 Through 2022[1] (mg/L)						
			Coal Creek Springs	West Hill Springs	Well 1	Well 4	Well 5	Well 5A	Fulmer Field CCT Facility[2]
EPA Primary Drinking Water Standards									
Arsenic	0.01	mg/L	0.001	0.001	0.001	0.001	0.001	0.002	0.002
Barium	2	mg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cadmium	0.005	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Chromium	0.1	mg/L	0.007	0.007	0.007	0.007	0.007	0.007	0.007
Mercury	0.002	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Selenium	0.05	mg/L	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Beryllium	0.004	mg/L	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
Nickel[3]	-	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Antimony	0.006	mg/L	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Thallium	0.002	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cyanide	0.2	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Fluoride	4.0	mg/L	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nitrite-N	1	mg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Nitrate-N	10	mg/L	1.7	3.6	2.4	1.4	1.9	0.4	1.7
Total Nitrate/Nitrite[4]	10	mg/L	1.7	3.6	2.4	1.4	1.9	0.5	1.7
EPA Secondary Drinking Water Standards[5]									
Iron	0.3	mg/L	0.1	0.1	0.1	0.62[6]	0.16	0.1	0.1
Manganese	0.05	mg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.032
Silver	0.1	mg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Chloride	250	mg/L	5	8	5	4	6	3	9
Sulfate	250	mg/L	9	15	12	12	11	6	14
Zinc	5	mg/L	0.2	0.2	0.2	0.2	0.2	0.2	0.2
State Regulated Characteristics									
Sodium	20	mg/L	6	8	7	7	10	6	12
Conductivity	700	µmhos/cm	150	254	184	152	275	133	224

Constituent	MCL	Units	Maximum Detected Concentration From 2015 Through 2022[1] (mg/L)						
			Coal Creek Springs	West Hill Springs	Well 1	Well 4	Well 5	Well 5A	Fulmer Field CCT Facility[2]
Turbidity	1	NTU	0.4	1.5	9.6	5.8	1.2	0.4	3.1
Color	15	Color Units	5	5	10	5	5	5	5
Total Dissolved Solids (TDS)[7]	600	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	N/A
State Unregulated									
Lead[8]	0.015	mg/L	0.001	0.001	0.001	0.018	0.001	0.001	0.001
Copper	1.3	mg/L	0.02	0.3	0.02	0.2	0.02	0.02	0.02
Hardness[9]	-	mg/L	66	122	83	100	130	62	100

Notes:

1. Based on monitoring conducted between 2015 and 2022. Wells 3A, 3B, and 5B were not in use during this time period and no monitoring was conducted.
2. The Fulmer Field CCT Facility was monitored in 2015, 2018,2020, 2021, and 2022, it replaces monitoring of Wells 2, 6, and 7.
3. There is no state or federal MCL, but Washington state has a detection reporting limit of 0.005 mg/L.
4. EPA has set a treatment goal of Total Nitrate at 10 mg/L.
5. EPA does not enforce these "secondary maximum contaminant levels" (SMCLs). They are established as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color, and odor. These contaminants are not considered to present a risk to human health at the SMCL.
6. Iron levels in Well 4 exceeded the Secondary Drinking Water Standards in 2015 but have since all been below the MCL.
7. N/A - not applicable, no testing conducted; testing for total dissolved solids is only required if the specific conductivity is greater than 700 micomhos per centimeter (umhos/cm).
8. On November 30, 2023, the EPA announced the proposed Lead and Copper Rule Improvements, which would lower the Lead Action Level from 0.015 mg/L to 0.010 mg/L if finalized in October 2024.
9. No MCL, as hardness is not a regulated characteristic.

3.2.2.3 Water Quality and Treatment Technique Violations

There were no water quality treatment violations from 2015 through 2022.

3.2.3 Analysis of Distribution System Water Quality

3.2.3.1 Seasonal Water Quality Changes

Water quality within the distribution system is relatively consistent throughout the year. The Valley Service Area distribution water experiences low pH during the winter, however no changes are implemented to offset seasonal variations.

3.2.3.2 Distribution Water Quality Objectives

The City collects 100 samples at 70 dedicated sampling sites for total and fecal coliform monitoring. Sampling is conducted at one quarter of the routine sample locations each week during the first four weeks of a month. The City also monitors weekly for total and fecal coliform at Coal Creek Springs and West Hill Springs at their respective collector vaults, as well as after treatment, and at several additional sites to support operations on a weekly basis. The City uses two types of disinfectant for treatment, chlorine gas and liquid sodium hypochlorite, which both produce free chlorine residuals in the distribution system. Average chlorine residuals throughout the distribution system ranged from 0.57 to 0.71 mg/L from 2015 through 2022, as summarized in Table 3-13. Although the range of chlorine residual varies throughout the year, the range of chlorine residual is relatively consistent from year to year. Planned improvements to chlorination facilities at Well 1 and Well 4 are expected to help maintain a more consistent chlorine residual level within the water system.

Table 3-13 | Total Chlorine Residuals Results from 2015 through 2022

Year	Sample Results (mg/L)	
	Average	Range
2015	0.71	0.40 - 1.09
2016	0.64	0.37 – 0.89
2017	0.58	0.32 – 0.79
2018	0.57	0.30 – 0.78
2019	0.59	0.33 – 0.77
2020	0.57	0.33 – 0.80
2021	0.58	0.36 – 0.78
2022	0.59	0.40 – 0.77

The Stage 1 Disinfection By-Product Rule (DBPR) monitoring was superseded in 2012 with Stage 2 DBPR monitoring because the City's population exceeded 50,000 people. The City conducts monthly sampling within the distribution system to determine the concentration of fluoride. This sampling is in addition to the inorganic source monitoring required by DOH. The City does not add fluoride to their water. The City of Tacoma does fluoridate their water and is wholesale supplier to the City, but the City has not purchased water for consumption from Tacoma since 2016. Sampling is conducted for informational purposes only and to answer customer questions regarding natural fluoride in the City's water. Should the City purchase water from Tacoma, this information would also be used to monitor the blending of different water sources within the distribution system.

The City conducted both Stage 1 and Stage 2 DBPR monitoring since the last water system plan (WSP). **Table 3-14** provides a summary of the sample results from 2015 through 2022. The City's Total Trihalomethanes (TTHMs) and Haloacetic Acid 5 (HAA5) monitoring has been conducted once per year during the month with the warmest water temperature (i.e., July or August). All samples were well below the concentrations that DOH uses to determine whether a water system qualifies for reduced monitoring (0.080 mg/L for TTHMs and 0.060 mg/L for HAA5).

Table 3-14 | Summary of Disinfection By-Product Rule Monitoring Results from 2015 through 2022

Year	TTHM Concentration (µg/L)[2]		HAA5 Concentration (µg/L)[2]	
	Range for LRAA[1]	Compliance	Range for LRAA[1]	Compliance
2015	2.6 – 19.0	< 80	Not Detected – 4.8	< 60
2016	2.2 – 23.1	< 80	Not Detected – 6.0	< 60
2017	1.7 – 15.0	< 80	1.1 – 6.9	< 60
2018	6.7 – 15.1	< 80	Not Detected – 6.9	< 60
2019	ND	< 80	0.2 – 0.3	< 60
2020	7.5 – 11.95	< 80	Not Detected – 3.66	< 60
2021	6.45 – 17.62	< 80	1.25 – 12.41	< 60
2022	9.03 – 10.41	< 80	Not Detected	< 60

Notes:
1. Local running annual average.
2. Microgram per liter (µg/L).

Corrosion control treatment (CCT) is required for the water produced at Coal Creek Springs, Well 1, Well 2, Well 6, and Well 7. Per the Lead and Copper Rule (LCR), the City is required to collect at least 30 water samples per 36-month compliance period in alignment with reduced lead and copper monitoring

requirements of WAC 246-290. Sample results from 2015 through 2022 are presented in **Table 3-15**. Since the CCT facilities were constructed, the lead and copper levels have been well below the action level.

Table 3-15 | Summary of Lead and Copper Sampling Results from 2015 through 2022

Constituent	Range of Results from 2015 through 2022
Copper Concentrations (mg/L)	
Copper Concentration Range	<0.02 – 0.3
Copper 90th Percentile	0.091
Lead Concentrations (mg/L)	
Lead Concentration Range	<0.001-0.018
Lead 90th Percentile	<0.001

3.2.3.3 Water Quality and Treatment Technique Violations

There were no water quality violations in the distribution system from 2015 through 2022.

3.2.4 Recent Regulatory Changes

The EPA established a health advisory for drinking water of 70 parts per trillion (ppt) for perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA), two commonly found Perfluorinated compounds (PFAS). When both compounds are found in the water, the combined health advisory is also 70 ppt. The Washington State Board of Health (Board) adopted rule changes to chapter 246-290 WAC, Group A Public Water Supplies and WAC 246-390, Drinking Water Laboratory Certification and Data Reporting. The newly adopted rules became effective on January 1, 2022.

The rule establishes the administrative processes for setting drinking water quality standards as State Action Levels (SAL) and state MCLs. The rule establishes SALs for five PFAS contaminants: PFOA, PFOS, perfluorohexane sulfonic acid (PFHxS), perfluorononanoic acid (PFNA), and perfluorobutane sulfonic acid (PFBS). The rule requires Group A community and non-transient noncommunity public water systems to test for PFAS. For those Group A water systems that have detections of PFAS, but do not exceed the SAL, the rule requires additional ongoing monitoring, with the frequency of monitoring based upon the detected level in comparison to the SAL. It also establishes reporting, recordkeeping, and consumer confidence report requirements. For those Group A water systems that exceed the SAL, the rule requires follow-up actions such as monitoring, public notification, additional recordkeeping, and reporting requirements. SALs for regulated PFAS compounds are shown in

Table 3-16 with results from the City's latest samples. Most results indicated that the PFAS compounds were not detected (ND), being they were below detectable limits. PFBS was detected at Well 1, Coal Creek Springs, and West Hill Springs, however the levels are far below regulated levels. In more recent results received in May 2024, all samples were below detection limits for all facilities and the City was approved for a 3-year testing schedule.

Table 3-16 | PFAS State Action Levels and Monitoring Data

PFAS Compound	SAL (ng/L)[1]	Maximum Detected Concentration (ng/L)[1]									
		Well 1	Fulmer Field CCT Facility	Well 3A	Well 3B	Well 4	Well 5	Well 5A	Well 5B	Coal Creek Springs	West Hill Springs
PFOA	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PFOS	15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PFHxS	65	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PFNA	9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PFBS	345	2.8	ND	ND	ND	ND	ND	ND	ND	3.1	3.0

Notes:
1. Nanograms per liter (ng/L).
2. Not detected (ND).

3.3 Design Standards

The City's most recent Engineering Design Standards are available on the City's website and are provided as **Appendix P**. **Table 3-17** highlights keys standards that are used to evaluate the capacity of the City's water system, summarizing both DOH criteria and City criteria. The City's water quality design standards follow the design standards set forth by the EPA and DOH, as discussed in **Section 3.2**.

Table 3-17 | System Capacity Analysis Criteria

Evaluation Type		Evaluation Criteria	Agency's Standard
Water Reliability Recommendations	Multiple Source	2 or more supply sources are available	DOH
	Backup Power	Source of supply pump stations have power connections to two independent primary public power sources, have in-place auxiliary power available, and/or maintain adequate gravity standby storage	DOH
	Surface Water Reliability	Firm watershed yield for surface water provides 98% reliability to meet normal, anticipated system demands.	DOH
	Groundwater Reliability	Factor of safety is applied to well pumping test safe yield determination.	DOH
Water Source	Source Capacity	MDD while replenishing Fire Suppression Storage (FSS) within 72-hrs (24-hr source pumping may be assumed).	DOH
		ADD with largest source out of service.	DOH
		MDD in a pumping period of 20 hours or less of pumping.	DOH
		MDD with the largest active water source out of service.	City
Pump Stations	Capacity - Open System (sufficient storage in zone)	ADD with largest pump out of service.	DOH
		MDD with all pumps in service.	
		MDD with largest pump out of service.	City
		Fire Flow is met from storage reservoir.	
	Capacity - Closed System (no/insufficient storage in zone)	PHD with largest pump out of service.	DOH
		MDD + Fire Flow at a pressure of at least 20 psi at all points throughout the distribution system.	
		PHD + Fire Flow with largest pump out of service.	City
		Standby power with capacity to run with any single pump out of service.	

Evaluation Type		Evaluation Criteria	Agency's Standard
Storage Facilities	Total Storage Capacity	Sum of operational, equalization, standby, fire suppression, and dead storage.	DOH
	Operating Storage (OS)	The volume of water before sources turn on.	DOH
		(pump off elev. – pump on elev.) x gal/ft	
	Equalizing Storage (ES)	(PHD – maximum supply capacity) x 150 min	DOH
		Min. pressure of 30 psi.	
		Must be provided when source pumping capacity cannot meet the peak hourly demand.	
	Standby Storage (SB)	Min. standby storage of 200 gallons per ERU.	DOH
		Min. pressure of 20 psi.	
		Standby storage volume equal to one day of MDD for the pressure zone(s) served.	
	Fire Suppression Storage (FSS)	(required fire flow rate) x (duration in minutes)	DOH
		Min. pressure of 20 psi.	
		Nested storage (same storage for Standby and Fire Suppression Storge) requires written consent of fire protection authority.	
	Dead Storage (DS)	Volume that cannot provide minimum design pressure (20 psi) to all customers.	DOH
		Volume below the outlet pipe and cannot be used because of hydraulic limitations.	City
Distribution System	Minimum Pressures	PHD at no less than 30 psi.	DOH
		MDD + Fire Flow at no less than 20 psi.	
	Maximum Pressures	Add individual PRVs for ADD pressures more than 80 psi.	DOH
		Max. target pressure of 80 psi in water distribution system.	City
	Maximum Velocity	No more than 8 feet per second (fps) under PHD conditions.	DOH
		No more than 8 fps in distribution mains and 5 fps in transmission mains under PHD conditions. No more than 18 fps under MDD+FF conditions.	City
	Minimum Pipe Size	6-inch diameter in residential areas and 8-inch diameter in commercial areas, unless a hydraulic analysis justifies another size.	DOH
		Single-Family Residential minimum 8-inch diameter and Industrial/Commercial/Multi-Family minimum 12-inch diameter.	City
	Telemetry	Each parcel receiving water service shall have its own meter	City
		Meters shall be located as close to the water main from which the service is taken as possible, distance not to exceed 50 feet.	
		Meters shall be placed in landscape strips, behind the sidewalk, or at the right-of-way limits in that order of availability.	
		Meters in landscaped or unimproved areas shall be set 2 inches above the finished grade.	
	Maximum Valve Spacing	Maximum 400-foot spacing and at the intersection of lateral lines in all zones.	City
	Hydrant Spacing	Single-Family Residential maximum 600-foot spacing.	City
		Industrial/Commercial/Multi-Family maximum 300-foot spacing.	
Fire Flow & Duration	Residential	Minimum 1,500 gpm at 2 hours.	City
	Multi-Family Residential	Minimum 2,500 gpm at 3 hours.	
	Commercial		
	Industrial		

3.4 Capacity Analysis

This section provides an analysis of legal and physical capacity of the water system based on the system's available water rights, sources, treatment, storage, and distribution components.

3.4.1 Water Rights

A summary of the City's current water rights is presented in **Table 3-18**. The maximum instantaneous allowable flow for each source (Qi) is in units of gpm. The total annual withdrawal for each source (Qa) is in units of acre-feet per year. The City does not have any interruptible water rights.

Table 3-18 | Summary of Existing Water Rights

Water Right	Primary Qi (gpm)	Primary Qa (acre-feet/year)
Coal Creek Springs	6,732	9,410
Well 1, 6, & 7	2,200	1,120
Well 2, 6, & 7	2,400	1,360
Well 3A & 3B, 6, & 7	2,800	3,600
Well 4, 6, and 7	2,800	3,600
Wells 5, 5A, 5B, &5C	1,000	720
Well 5A	167	0
Algona Well	500	175
Braunwood Well[1]	20	6.5
West Hill Springs[2]	625	1,010
TOTAL	**19,244**	**21,002**

Notes:

1. Water from the Braunwood well is administered through water right certificate G1-25173C, originally issued for a small domestic water system to serve up to 13 connections. Braunwood is a standalone non-municipal satellite water system that currently serves 12 connections.
2. Water from West Hill Springs operates through water right claim S1-049354CL. A claim is an assertion that a water right was created pre-code (1917 for surface water and 1945 for groundwater).

In addition to the water rights presented above, the City also has a wholesale agreement with the City of Tacoma and can purchase water through two interties as discussed in **Chapter 1, Section 1.6.1**. These two interties are also considered to be supply facilities. The City also has several emergency interties with adjacent purveyors.

3.4.1.1 Analysis Criteria

Supply facilities must be reliable and provide sufficient water at pressures that meet the requirements of WAC 246-290-230. The capacity of supply facilities in a pressure zone with adequate storage must be sufficient to provide water at a rate that is equal to or greater than the MDD of the zone being served. This approach assumes that demands greater than the MDD will be supplied using equalizing storage.

According to Section 3.10.5 and Section 5.4 of the 2020 DOH Water System Design Manual, water system sources must be capable of supplying MDD and replenishing depleted within 72-hours (assuming continuous pumping), provide MDD in a pumping period of 20 hours or less, and provide ADD with the

largest source out of order. The City's standards have a more stringent requirement to provide MDD with the largest active source out of service.

3.4.1.2 Analysis Results

The City's water supply (production) capacity compared with demand projections and DOH and City criteria are summarized in **Table 3-19**. It is worth noting that the water supply (production) capacity is not synonymous with the supply water rights. The MDD and ADD values are based on the demand projections included in **Chapter 2** and include wholesale supply projections for the City of Algona. Demand allocation for the Muckleshoot Indian Tribe (MIT) Fish Hatchery and LMWD are not included. LMWD is not included since they do not rely on the City as their main source of water and have an interruptible wholesale agreement. Demand from the MIT Fish Hatchery is also not included since it is unknown when this facility will be constructed, however the analysis presented in **Table 3-19** shows that the City has sufficient surplus supply to support this demand when it comes to fruition. The FSS flow rate is calculated as the sum of the FSS for each service area presented in **Section 3.4.2.3.2**, which totals 797 gpm, divided over a 72-hour period.

The results presented in **Table 3-19** demonstrate that the City has the supply facilities necessary to meet demand projections under current and future projections for all required criteria.

Table 3-19 | Supply Analysis with Largest Source Out of Service

Description	2024 Scenario	2034 Scenario	2044 Scenario
Required Supply (gpm)			
FSS Replenished in 72-hours	797	797	797
Maximum Day Demand[1], gpm	8,657	9,751	11,068
Average Day Demand[1], gpm	4,899	5,518	6,263
Available Supply (gpm)			
Largest Source (Q_L) – Tacoma Interties	3,555	3,555	3,555
Largest Active Source – Coal Creek Springs[2]	3,500	3,500	3,500
Total Sources (Q_t)[3,4]	15,610	15,610	15,610
DOH Criteria: MDD while replenishing FSS within 72-hrs (24-hr source pumping may be assumed)			
Surplus / (Deficit) of Supply, gpm	6,156	5,062	3,746
DOH Criteria: ADD with largest source out of service			
Surplus / (Deficit) of Supply, gpm	7,156	6,537	5,792
DOH Criteria: MDD in a pumping period of 20 hours or less of pumping			
Surplus / (Deficit) of Supply, gpm	4,352	3,257	1,941
City Criteria: MDD with largest active water supply source out of service			
Surplus / (Deficit) of Supply, gpm[2]	3,453	2,359	1,042

Notes:

1. Current analysis does NOT include a separate allocation for wholesale customers who have not purchased water from the City since 2019 or earlier (i.e., MIT or LMWD).
2. The City's largest active source is Coal Creek Springs since the City has not purchased water from Tacoma since 2016.
3. Total sources are: Well 1, 2, 4, 5, 5a, and 6 (7,955 gpm), Coal Creek Springs (3,500 gpm), West Hill Springs (600 gpm), and two Tacoma Interties (3,555 gpm).
4. Supplies do NOT include emergency interties with CWD (1,736gpm) or LMWD (1,736 gpm).

The City's Water Rights Self-Assessment Form is provided in **Appendix I** and was used to assess the City's water rights water rights and includes supply that is available to the City through firm wholesale interties with Tacoma. The form includes a comparison of the available water rights to the existing, 10-year and 20-year demand projections for the "High Demand Scenario" presented in **Chapter 2**. The calculations

presented in the Water Rights Self-Assessment Form conclude that the City's existing water rights are anticipated to be adequate to meet the current, 10-year, and 20-year demand projections.

The City does not have all the infrastructure required to withdraw from all water rights (i.e., Wells 3A, 3B, 5B, and 7 are not currently operational). Additionally, some sources have underlying aquifer or infrastructure restrictions that limit the capacity of the source (i.e., Well 2, Well 6, and Coal Creek Springs). Several facility improvement projects are necessary for the City to maximize water production capacity to meet future demands, and planned supply related capital projects to meet this need are discussed further in Chapter 8.

3.4.2 Physical Capacity Analysis

This section includes an analysis of the physical capacity of the City's distribution system. The specific components analyzed include:

- Pump Station Capacity Analysis
  - Open Pressure Zones: Zones with storage reservoirs
  - Closed Pressure Zones: Zones without storage
- Storage Capacity Analysis
- Hydraulic Analysis of the Distribution System
- System Analysis based on ERUs

To complete the physical capacity analysis, the projected demands calculated in Chapter 2 were utilized for the 2024 scenario (existing conditions), 2034 scenario (10-year projections) and 2044 scenario (20-year projections). When evaluating facilities under fire flow conditions, the largest fire flow demand was utilized in each Service Area. The fire flow required for single family residential customers is 1,500 gpm for two hours and all other customer types have a requirement of 2,500 gpm for two hours. There are select buildings throughout the system that require fire flow capacity in the water system that exceeds 2,500 gpm for two hours as determined by the Fire Marshal; these individual locations and their fire flow requirements are summarized in Table 3-20.

Table 3-20 | Buildings in Auburn with High Fire Flow Requirements

ID #	Location Description	Address	Service Area	Flow Required (gpm)
1	RPS Distribution Center	3702 C St. NE	Valley	4,000
2	Emerald Downs	2300 Emerald Downs Drive	Valley	3,000
3	Panattoni Warehouse	816 44th ST NW	Valley	4,000
4	Span Alaska Transportation Inc.	3815 W Valley Highway N	Valley	3,125
5	AMB Valley Distribution Center	2202 Perimeter Road SW	Valley	4,000
6	Grace Community Church	1106 12th Street SE	Valley	3,750
7	Riverside High School	501 Oravetz Road SE	Valley	3,000
8	Wesley Homes Senior Housing	10805 SE 320th Street	Lea Hill	4,000
9	Auburn Elementary School at Lakeland	1020 Evergreen Way SE	Lakeland	3,125
10	Academy Campus	5000 Auburn Way South	Academy	4,000
11	MIT Casino Expansion	2402 Auburn Way South	Academy	2,625

3.4.2.1 Pump Station Analysis: Open Pressure Zones

This section evaluates the pumping capacity of the water system on a zone-by-zone basis with consideration for pump stations between zones and supply wells pumping directly into the pressure zones that contain a storage reservoir. All reduced pressure zones are included in the open zone analysis, as they are ultimately fed by gravity from a reservoir. Pressure zones that do not include a storage facility are analyzed as a closed zone.

3.4.2.1.1 Valley Service Area

The Valley Service Area is the largest service area in the water system and consists of two pressure zones: Valley 288 and Valley 242. The Valley 288 pressure zone is a transmission zone that does not directly serve any customers. Valley 242 is the largest pressure zone in the RWSA and is draws supply from the following facilities:

- Wells 2 and 6 via the Fulmer Field CCT Facility
- Coal Creek Springs and Well 1 via the Howard Road CCT Facility with transmission through Valley 288
- Well 4 with transmission through Valley 288
- West Hill Springs

Table 3-21 provides an overview of the total pump station capacity into the Valley Service Area compared with demand projections and DOH and City criteria. The results presented in **Table 3-21** demonstrate that the City has adequate pumping capacity within the open pressure zones of the Valley Service Area to meet current and future demand projections for all required criteria.

Table 3-21 | Pumps Station Capacity for Valley Service Area Open Pressure Zones

Description	Valley 2024 Scenario	Valley 2034 Scenario	Valley 2044 Scenario
Required Capacity (gpm)			
FSS Replenished in 72-hours	222	222	222
Maximum Day Demand, gpm	6,266	7,161	8,252
Average Day Demand, gpm	3,546	4,052	4,670
Available Capacity (gpm)			
Largest Pump (Q_L), gpm	2,800	2,800	2,800
Total Pumping Capacity (Q_t), gpm	19,400	19,400	19,400
DOH Criteria: Reliable Capacity (ADD + largest pump out of service)			
Surplus / (Deficit), gpm	15,854	15,348	14,730
DOH Criteria: Total Capacity (MDD + replenish FSS in 72-hours)			
Surplus / (Deficit), gpm	13,134	12,239	11,148
City Criteria: MDD + largest pump out of service			
Surplus / (Deficit), gpm	10,334	9,439	8,348

3.4.2.1.2 Lea Hill Service Area

Water supply for the Lea Hill Service Area is provided by the Lea Hill Pump Station and the Green River Pump Station. In 2014, the City added wholesale water supply from Tacoma through the 132nd Ave SW intertie, however the City has not purchased water for consumption from Tacoma since 2016. The intertie and pump stations feed the Lea Hill 563 pressure zone, which includes Reservoirs 4A and 4B. Therefore, the Lea Hill and Green River Pump Stations were evaluated based on the open zone criteria. **Table 3-22** provides a summary of the pump station capacity into the Lea Hill Service Area compared with demand projections and DOH and City criteria. The results presented in **Table 3-22** demonstrate that the City has adequate pumping capacity within the open pressure zones of the Lea Hill Service Area to meet current and future demand projections for all required criteria.

Table 3-22 | Pump Station Capacity for Lea Hill Service Area Open Pressure Zones

Description	Lea Hill 2024 Scenario	Lea Hill 2034 Scenario	Lea Hill 2044 Scenario
Required Capacity (gpm)			
FSS Replenished in 72-hours	222	222	222
Maximum Day Demand, gpm	1,231	1,281	1,333
Average Day Demand, gpm	696	725	755
Available Capacity (gpm)			
Largest Pump (Q_L), gpm	1,166	1,166	1,166
Total Pumping Capacity (Q_t), gpm	6,664	6,664	6,664
DOH Criteria: Reliable Capacity (ADD + largest pump out of service)			
Surplus / (Deficit), gpm	5,968	5,939	5,909
DOH Criteria: Total Capacity (MDD + replenish FSS in 72-hours)			
Surplus / (Deficit), gpm	5,433	5,383	5,331
City Criteria: MDD + largest pump out of service			
Surplus / (Deficit), gpm	4,267	4,217	4,165

3.4.2.1.3 Lakeland Service Area

The Lakeland Service Area is supplied from the Upland Well Field (Wells 5 and 5A) and by sources in the Valley Service Area using the Terrace View BPS. The Terrace View BPS supplies the Lakeland 630 pressure zone from the Valley Service Area, which is then distributed through the Service Area. Since the Lakeland 630 pressure zone contains two reservoirs (Reservoirs 5 and 6), the Terrace View BPS was evaluated based on the open zone criteria. **Table 3-23** provides a summary of the pump station capacity into the Lakeland Service Area compared with demand projections and DOH and City criteria. The results presented in **Table 3-23** demonstrate that the City has adequate pumping capacity within the open pressure zones of the Lakeland Service Area to meet current and future demand projections for all required criteria.

Table 3-23 | Pump Station Capacity for Lakeland Service Area Open Pressure Zones

Description	Lakeland 2024 Scenario	Lakeland 2034 Scenario	Lakeland 2044 Scenario
Required Capacity (gpm)			
FSS Replenished in 72-hours	130	130	130
Maximum Day Demand, gpm	629	719	823
Average Day Demand, gpm	356	407	466
Available Capacity (gpm)			
Largest Pump (Q_L), gpm	500	500	500
Total Pumping Capacity (Q_t), gpm	1,500	1,500	1,500
DOH Criteria: Reliable Capacity (ADD + largest pump out of service)			
Surplus / (Deficit), gpm	1,144	1,093	1,034
DOH Criteria: Total Capacity (MDD + replenish FSS in 72-hours)			
Surplus / (Deficit), gpm	871	781	677
City Criteria: MDD + largest pump out of service			
Surplus / (Deficit), gpm	371	281	177

3.4.2.1.4 Academy Service Area

The Academy Service Area is supplied from the Valley Service Area using Academy Pump Station 3. The pump station operates based on levels in Reservoirs 8A and 8B located in the Academy 531 pressure zone. **Table 3-24** provides a summary of the pump station capacity into the Academy Service Area compared with demand projections and DOH and City criteria. The results presented in **Table 3-24** demonstrate that the City has adequate pumping capacity within the open pressure zones of the Academy Service Area to meet current and future demand projections for all required criteria.

Table 3-24 | Pump Station Capacity for Academy Service Area Open Pressure Zones

Description	Academy 2024 Scenario	Academy 2034 Scenario	Academy 2044 Scenario
Required Capacity (gpm)			
FSS Replenished in 72-hours	222	222	222
Maximum Day Demand, gpm	531	591	658
Average Day Demand, gpm	300	334	373
Available Capacity (gpm)			
Largest Pump (Q_L), gpm	700	700	700
Total Pumping Capacity (Q_t), gpm	2,800	2,800	2,800
DOH Criteria: Reliable Capacity (ADD + largest pump out of service)			
Surplus / (Deficit), gpm	2,500	2,466	2,427
DOH Criteria: Total Capacity (MDD + replenish FSS in 72-hours)			
Surplus / (Deficit), gpm	2,269	2,209	2,142
City Criteria: MDD + largest pump out of service			
Surplus / (Deficit), gpm	1,569	1,509	1,442

3.4.2.2 Booster Pump Station Analysis: Closed Pressure Zones

The City operates a closed zone in each of its Service Areas. Closed zones do not have a storage reservoir directly serving the zone and are required to supply the peak hour demand (PHD) and fire flow via a BPS. The BPS serving each closed pressure zone was evaluated using the closed zone criteria as defined by DOH.

3.4.2.2.1 Lakeland Hills BPS

The Lakeland Service Area has two closed pressure zones served by the Lakeland Hills BPS: Lakeland 697 and Lakeland 670.

Table 3-25 provides a summary of the BPS capacity into the Lakeland closed pressure zones compared with demand projections and DOH and City criteria. The results presented in

Table 3-25 demonstrate that the City has adequate pumping capacity within the closed pressure zones of the Lakeland Service Area to meet current and future demand projections for all required criteria.

Table 3-25 | BPS Capacity for Lakeland Service Area Closed Pressure Zones

Description	Lakeland 670 & 697 2024 Scenario	Lakeland 670 & 697 2034 Scenario	Lakeland 670 & 697 2044 Scenario
Required Capacity (gpm)			
Fire Flow Required, gpm	3,125	3,125	3,125
Maximum Day Demand, gpm	231	261	296
Peak Hour Demand, gpm	372	419	476
Available Capacity (gpm)			
Largest Pump (Q_L), gpm	3,125	3,125	3,125
Total Pumping Capacity (Q_t), gpm	7,330	7,330	7,330
DOH Criteria: Firm Capacity (no storage; PHD + largest pump out of service)			
Surplus / (Deficit), gpm	3,833	3,786	3,729
DOH Criteria: Reliable Capacity (no storage; MDD + FSS + largest pump out of service)			
Surplus / (Deficit), gpm	3,974	3,944	3,909
City Criteria: PHD+ FSS + largest pump out of service			
Surplus / (Deficit), gpm	708	661	604

3.4.2.2.2 Academy East BPS

The Academy Service Area has one closed zone served by the Academy East BPS: Academy 585. Table 3-26 provides a summary of the BPS capacity into the Academy closed pressure zone compared with demand projections and DOH and City criteria. The results presented in Table 3-26 demonstrate that the City has adequate pumping capacity within the closed pressure zones of the Academy Service Area to meet current and future demand projections for all required criteria.

Table 3-26 | BPS Capacity for Academy Service Area Closed Pressure Zone

Description	Academy 585 2024 Scenario	2 Academy 585 2034 Scenario	Academy 585 2044 Scenario
Required Capacity (gpm)			
Fire Flow Required, gpm	2,500	2,500	2,500
Maximum Day Demand, gpm	87	98	111
Peak Hour Demand, gpm	140	158	179
Available Capacity (gpm)			
Largest Pump (Q_L), gpm	1,250	1,250	1,250
Total Pumping Capacity (Q_t), gpm	4,290	4,290	4,290
DOH Criteria: Firm Capacity (no storage; PHD + largest pump out of service)			
Surplus / (Deficit) of Supply, gpm	2,900	2,882	2,861
DOH Criteria: Reliable Capacity (no storage; MDD + FSS + largest pump out of service)			
Surplus / (Deficit), gpm	1,703	1,692	1,679
City Criteria: PHD+ FSS + largest pump out of service			
Surplus / (Deficit), gpm	400	382	361

3.4.2.2.3 Lea Hill BPS

The Lea Hill Service Area has one closed zone served by the Lea Hill BPS: Lea Hill 648. **Table 3-27** provides a summary of the BPS capacity into the Lea Hill closed pressure zone compared with demand projections and DOH and City criteria. The results presented in **Table 3-27** indicate that the Lea Hill BPS is currently deficient and cannot meet the required criteria for existing or future demands.

Table 3-27 | BPS Capacity for Lea Hill Service Area Closed Pressure Zone

Description	Lea Hill 648 2024 Scenario	Lea Hill 648 2034 Scenario	Lea Hill 648 2044 Scenario
Required Capacity (gpm)			
Fire Flow Required, gpm	2,500	2,500	2,500
Maximum Day Demand, gpm	110	124	141
Peak Hour Demand, gpm	178	200	227
Available Capacity (gpm)			
Largest Pump (Q_L), gpm	1,500	1,500	1,500
Total Pumping Capacity (Q_t), gpm	1,800	1,800	1,800
DOH Criteria: Firm Capacity (no storage; PHD + largest pump out of service)			
Surplus / (Deficit), gpm	122	100	73
DOH Criteria: Reliable Capacity (no storage; MDD + FSS + largest pump out of service)			
Surplus / (Deficit), gpm	(810)	(824)	(841)
City Criteria: PHD+ FSS + largest pump out of service			
Surplus / (Deficit), gpm	(2,378)	(2,400)	(2,427)

The Intertie Pump Station shares a building with the Lea Hill BPS and contains pumps which were originally purposed to serve the intertie for wholesale supply to CWD and LMWD. Since CWD and LMWD no longer rely on the City as their primary water source, the City plans to complete facility modifications so the pumps

at the Intertie Pump Station can serve the Lea Hill 648 pressure zone. This project is discussed further in Chapter 8 and will resolve the deficiencies identified in Table 3-27.

3.4.2.2.4 Game Farm Park Pump Station

The Valley Service Area has one closed zone served by the Game Farm Park Pump Station: Game Farm Park (no assigned pressure zone name). Table 3-28 provides a summary of the BPS capacity into the Valley closed pressure zone compared with demand projections and DOH and City criteria. The results presented in Table 3-28 indicate that the Game Farm Park Pump Station is currently deficient and cannot meet the required criteria for existing or future demands.

The Game Farm Park Pump Station provides service to a park restroom facility, two fire hydrants, and individual RV campsites. As this is a small BPS with the single purpose of providing service to a recreational area, and there are no residential or commercial property connections supplied by this facility, no actions are planned to resolve this deficiency. The DOH and City criteria are geared towards providing reliable service for residents and businesses and are not applicable for this minor facility. The City has reviewed this condition with the Fire Marshal, and no exceptions were taken. As further development progresses in and around the Game Farm Park Pump Station, modifications will be considered to address the deficiency.

Table 3-28 | BPS Capacity for Game Farm Park Closed Pressure Zone

Description	2024 Game Farm	2034 Game Farm	2044 Game Farm
Required Capacity (gpm)			
Fire Flow Required, gpm	1,500	1,500	1,500
Maximum Day Demand, gpm	0.4	0.4	0.4
Peak Hour Demand, gpm	0.6	0.6	0.7
Available Capacity (gpm)			
Largest Pump (Q_L), gpm	1,000	1,000	1,000
Total Pumping Capacity (Q_t), gpm	1,050	1,050	1,050
DOH Criteria: Firm Capacity (no storage; PHD + largest pump out of service)			
Surplus / (Deficit), gpm	49	49	49
DOH Criteria: Reliable Capacity (no storage; MDD + FSS + largest pump out of service)			
Surplus / (Deficit), gpm	(450)	(450)	(451)
City Criteria: PHD+ FSS + largest pump out of service			
Surplus / (Deficit), gpm	(1,451)	(1,451)	(1,451)

3.4.2.3 Storage Analysis

This section evaluates the City's existing water storage facilities to determine if there is sufficient capacity to meet existing and future storage requirements of the system.

3.4.2.3.1 Components of Storage

The City currently maintains a total of 15.7 MG of water storage in eight reservoirs located throughout the service area. Each Service Area has two reservoirs, providing redundancy for cleaning and maintenance. Historically, the City has evaluated each Service Area independently. However, new sources, pump stations, and PRV facilities now allow for reliable and redundant operation of the system as an interconnected whole, rather than as separate Service Areas. The storage analysis reflects the new operational ability by allowing sharing of emergency storage between the Service Areas. The existing infrastructure and customer expectations still require that other storage components, such as FSS, be stored in individual Service Areas.

Water storage requirements are typically defined by the following components: operational storage, equalizing storage, standby storage, fire suppression storage, and dead storage. A description of each storage component and the criteria used to evaluate the capacity of the City's reservoirs is as follows:

- Operational Storage: Operational storage is used to supply the water system under normal demand conditions and provides pump protection to avoid frequent starting and stopping of pumps for pump stations that are used to fill reservoirs. The operational storage is calculated per the DOH Design Manual as the pump supply firm capacity (in gpm) times 2.5-minutes.

- Equalizing Storage: When the source pumping capacity cannot meet the periodic daily (or longer) peak demands placed on the water system, equalizing storage must be provided as a part of the total storage for the system and must be available at 30 psi to all service connections. The criteria for determining the equalizing storage requirements for the City's system is based on the equalizing calculation in the DOH Design Manual (refer to equation 7-1).

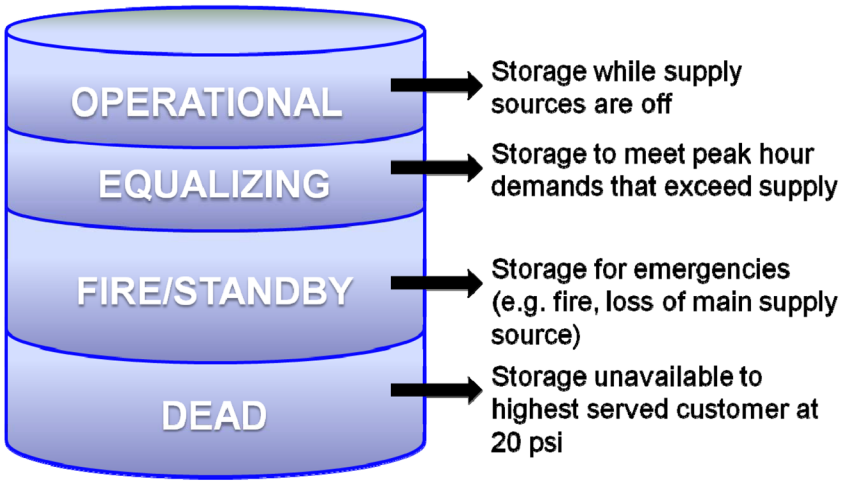
- Standby Storage: Standby storage is the portion of the reservoir used to supply the water system when supply facilities are out of service. DOH allows water systems with multiple sources to require that standby volume be supplied with the largest supply source out of service but recommends a minimum standby storage of 200 gallons per ERU in the system. The City calculates standby storage as the maximum volume required to supply all ERUs at least 240 gallons (based on the DOH minimum times a 20 percent factor of safety).

- Fire Suppression Storage (FSS): FSS is the portion of the reservoir with sufficient volume to supply water to the system at the maximum rate and duration required to extinguish a fire at the building with the highest fire flow requirement. The required volume of the FSS is the product of the fire flow rate and duration of the system's maximum fire flow requirement.

- Dead Storage: Dead storage is the bottom portion of the reservoir that cannot be used because water is stored at an elevation that is too low to provide sufficient system pressure (below 20 psi at the highest elevation served by the reservoir). This unusable storage occupies the lower portion of many ground-level standpipe-type reservoirs. When the highest service elevation is not the limiting factor, the City defines dead storage as being 1-foot above the reservoir inlet elevation for operational reasons.

The City's reservoir storage requirements depend on the water system's configuration, seasonal and daily variation in water-use patterns, and the reliability of various water system components. This section describes the five components of storage, summarizes the existing system's capacity to meet the storage needs of each Service Area, and makes recommendations to address identified storage deficits.

Figure 3-7 | Illustration of Reservoir Storage Components



3.4.2.3.2 Storage Analysis Results

The storage available in the four Service Areas was evaluated to confirm each is provided with the required usable Operational, Equalizing, Fire Suppression, and Emergency Storage volumes. Reflecting the interconnectedness of the system, excess storage in higher Service Areas (i.e., Lea Hill, Lakeland and Academy) can be used in the Valley Service Area and vice versa through use of the system pump stations. The storage analysis compares the required storage, based on the criteria in Table 3-17, and the available storage. The FSS for each region was calculated using 4,000 gpm for four hours except for Lakeland, which used 3,125 gpm for three hours based on buildings with the highest fire flow requirement in each Service Area (see Table 3-20).

Table 3-29 summarizes the existing 2024 storage analysis and results. The results indicate a deficit in the Lea Hill Service Area, however, this deficit is offset by surplus storage available in other Service Areas.

Table 3-29 | System-Wide Storage Analysis for the 2024 Scenario

Description	RWSA 2024	Academy 2024	Lakeland 2024	Lea Hill 2024	Valley 2024
Usable Storage (MG)					
Maximum Storage Capacity	15.86	2.72	2.06	2.48	8.60
Algona Reserve Storage Capacity[1]	0.28	--	0.28	--	--
Dead Storage	1.50	0.06	0.44	0.36	0.64
Total Usable Storage	14.08	2.66	1.34	2.12	7.96
Required Storage (MG)					
Operational Storage	0.05	0.01	0.00	0.01	0.03
Equalizing Storage	0.00	0.00	0.00	0.00	0.00
Standby Storage (Emergency)	9.30	0.57	0.68	1.32	6.73
FSS (Emergency)	3.44	0.96	0.56	0.96	0.96
Total Required Storage	12.79	1.54	1.24	2.29	7.72
Surplus/ (Deficit) Storage	**1.29**	**1.12**	**0.10**	**(0.17)**	**0.24**

Note:

1. The water supply interlocal agreement (IA3) between the City of Algona and the City of Auburn was updated in 2016. Through this updated agreement, Algona elected to financially participate in Lakeland Reservoir 6 to obtain a total share of 280,000-gallons of storage capacity. The agreement stipulates that if the City experiences any failure or decreased capacity, the supply of water to Algona may be decreased by the same percentage that is experienced by the City.

Table 3-30 summarizes the 2034 storage analysis and results (10-year projections). The results indicate a deficit in the Lea Hill, Lakeland, and Valley Service Areas, however, this deficit is offset by surplus storage available in other Service Areas. Additionally, the deficit in the Lakeland Service Area may not be realized based on the City's terms and conditions of the IA3 agreement with Algona.

Table 3-30 | System-Wide Storage Analysis for the 2034 Scenario

Description	RWSA 2034	Academy 2034	Lakeland 2034	Lea Hill 2034	Valley 2034
Usable Storage (MG)					
Maximum Storage Capacity	15.86	2.72	2.06	2.48	8.60
Algona Reserve Storage Capacity[1]	0.28	--	0.28	--	--
Dead Storage	1.50	0.06	0.44	0.36	0.64
Total Usable Storage	14.08	2.66	1.34	2.12	7.96
Required Storage (MG)					
Operational Storage	0.05	0.01	0.00	0.01	0.03
Equalizing Storage	0.02	0.00	0.02	0.00	0.00
Standby Storage (Emergency)	10.47	0.63	0.77	1.38	7.69
FSS (Emergency)	3.44	0.96	0.56	0.96	0.96
Total Required Storage	13.98	1.60	1.36	2.34	8.68
Surplus/ (Deficit) Storage	**0.10**	**1.06**	**(0.02)**	**(0.22)**	**(0.72)**

Note:

1. The water supply interlocal agreement (IA3) between the City of Algona and the City of Auburn was updated in 2016. Through this updated agreement, Algona elected to financially participate in Lakeland Reservoir 6 to obtain a total share of 280,000-gallons of storage capacity. The agreement stipulates that if the City experiences any failure or decreased capacity, the supply of water to Algona may be decreased by the same percentage that is experienced by the City.

The 2044 storage analysis was performed to determine the ability of the proposed storage facilities to meet the future storage requirements in 2044, based on projected demands. The analysis results indicate that the existing storage facilities do not have sufficient capacity to meet the future demands of the system based on the demand projections presented in Chapter 2. The City is currently planning a new reservoir in the Valley Service area to address these future deficiencies in the 20-year time frame. Table 3-31 summarizes the buildout 2044 storage analysis.

Table 3-31 summarizes the 2044 storage analysis and results (20-year projections). The results indicate an overall deficit in the RWSA, spurred largely by the projected growth within the Valley Service Area in the 20-year horizon.

Table 3-31 | System-Wide Storage Analysis for the 2044 Scenario

Description	RWSA 2044	Academy 2044	Lakeland 2044	Lea Hill 2044	Valley 2044
Usable Storage (MG)					
Maximum Storage Capacity	15.86	2.72	2.06	2.48	8.60
Algona Reserve Storage Capacity[1]	0.28	--	0.28	--	--
Dead Storage	1.50	0.06	0.44	0.36	0.64
Total Usable Storage	14.08	2.66	1.34	2.12	7.96
Required Storage (MG)					
Operational Storage	0.05	0.01	0.00	0.01	0.03
Equalizing Storage	0.05	0.00	0.05	0.00	0.00
Standby Storage (Emergency)	11.88	0.71	0.88	1.43	8.86

FSS Storage (Emergency)	3.44	0.96	0.56	0.96	0.96
Total Required Storage	15.42	1.68	1.49	2.40	9.86
Surplus/ (Deficit) Storage	**(1.34)**	**0.98**	**(0.15)**	**(0.28)**	**(1.89)**

Note:

1. The water supply interlocal agreement (IA3) between the City of Algona and the City of Auburn was updated in 2016. Through this updated agreement, Algona elected to financially participate in Lakeland Reservoir 6 to obtain a total share of 280,000-gallons of storage capacity. The agreement stipulates that if the City experiences any failure or decreased capacity, the supply of water to Algona may be decreased by the same percentage that is experienced by the City.

Since most of the future storage deficiency is in the Valley Service Area, a new storage reservoir is planned in the northeastern portion of the Service Area (Valley 242 pressure zone). The reservoir is a planned capital project to be completed in the 20-year horizon and is discussed further in **Chapter 8**.

The Lea Hill PS has sufficient capacity to transfer standby storage from Valley to Lea Hill. In addition, there are multiple PRVs which can be used to transfer water from the Academy and Lakeland Service Areas back to Valley to utilize excess standby storage in those areas. No other projects are necessary to resolve this deficiency.

3.4.2.4 Distribution and Transmission Capacity Analysis

This section evaluates the City's existing distribution and transmission mains to determine if the water pipelines are sized and looped adequately to provide the required flow and pressures to meet existing and future system conditions. The evaluation used an updated version of the City's computerized hydraulic water system model and InfoWater Pro, a GIS-based modeling software developed by Autodesk (formerly Innovyze). The model was updated to accurately reflect the City's existing water system and verified against field hydrant test data. Results from the model were used to evaluate the existing system and identify deficiencies.

3.4.2.4.1 Model Update

The following updates were made to the City's hydraulic model prior to conducting the capacity analyses:

- Facility updates
- Pipeline network updates
- Elevation updates
- Demand updates

Each update is described in further detail below.

Facility Updates

Existing facilities within the hydraulic model were reviewed and updated based on information provided by the City. The facilities reviewed included groundwater wells, springs, interties with adjacent water systems, potable water reservoirs, pump stations, treatment facilities, flow control valves, and PRVs. The following documents were used to confirm the accuracy of the facility information within the hydraulic model:

- Interlocal agreements
- Record drawings
- PRV calibration records
- Pump curves
- SCADA data
- Operations and maintenance data

Pipeline Network Updates

The existing pipeline network within the hydraulic model was compared to the City's existing GIS data to locate areas where pipelines may have been missing in the model. In addition, the pipeline material type was added to the model to match data available from GIS to more accurately reflect the existing distribution system.

Elevation Updates

Node elevations within the model were updated using United States Geological Survey (USGS) Digital Elevation Model (DEM). The DEM is a tile of the 3-Dimenional Elevation Program (3DEP) with data that is updated regularly and distributed in geographic coordinates in units conforming with the North American Datum of 1983 (NAD 83). All elevation values are in meters and, over the contiguous United States, are referenced to the North American Vertical Datum of 1988 (NAVD 88). The assigned elevations were converted to feet when applied to the model.

In addition to the general elevation update of the model nodes, the record drawings of the water reservoirs were used to verify the bottom and overflow elevations of the reservoirs within the model. Where necessary based on date, the as-built elevations were corrected to NAVD88 values, as some of the reservoirs were constructed using National Geodetic Vertical Datum of 1929 (NGVD 29). A conversion of 3.51 feet was used to update elevations from NGVD 29 to NAVD 88.

Demand Updates

Demands in the model were updated using the City's customer billing database. The meters were geolocated based on the customer's address and assigned to the closest model junction. No demands were allocated to transmission pipelines or facility nodes (i.e., pump station, reservoirs, etc.). Approximately 10 percent of the demand was unable to be allocated using this method. The remaining demand and non-billed usage, like DSL and construction meters, was distributed uniformly throughout the model by applying a scaling factor to match the 2022 production data. The demand sets in the model sought to distribute the demand projections provided in Chapter 2. A scaling factor was then applied to all demand nodes to equal the demand projection in years 2024.

As discussed in Chapter 2, TAZ data was used to determine growth projections and the future water demand. Based on the TAZ data, each Service Area was split between focused growth areas and non-growth areas. Future demands were allocated equally across all current demand nodes within the focused growth and non-growth areas of each Service Area. Demand peaking factors from Chapter 2 were used to adjust demands to MDD for the fire flow analyses and PHD for the pressure analysis.

3.4.2.4.2 Model Calibration

To verify and calibrate the hydraulic model, the City collected field hydrant testing data. A map of the hydrant testing locations and testing plan is included in Appendix K. The City also collected static pressure at the test locations to verify the hydraulic grade line (HGL) of specific areas of the water system.

In addition to the hydrant tests results, the boundary conditions of the water system facilities at the time of each test were provided. The boundary conditions were used to calculate the demand observed during each test. The boundary conditions were also entered into the model for each hydrant test to accurately simulate the system conditions during the hydrant test. At most locations, hydrants were operated to stress the system to identify required changes to the boundary conditions and pipe roughness factors (C-factors) within the hydraulic model.

A fire flow calibration scenario was set up within the hydraulic model and each of the hydrant test locations was simulated. Appendix K provides the field flow data compared to the flow data input into the model and a comparison of the static pressures and pressure drops observed at each hydrant test. Table 3-32 summarizes the final Hazen Williams C-factors used during the calibration based on piping material.

Table 3-32 | Final C-Factors for Piping Materials

Material	C-Factor
Cast Iron	90-120
Concrete	120
Ductile Iron	120
HDPE	130
PVC	130
RCP	120
Steel	120
Unknown	115

Valley Service Area

A total of 16 hydrant tests were conducted in the Valley Service Area, however the results from one test were excluded as the static pressure was not recorded. The static pressure and pressure drop in the calibrated model is now within 5 psi, or less, of the observed data for each of the hydrant tests.

Lea Hill Service Area

A total of nine hydrant tests were conducted in the Lea Hill Service Area. The static pressure and pressure drop in the calibrated model is now within 5 psi, or less, of the observed data for each of the hydrant tests.

The HGL from the hydrant testing was higher than the reported HGL in the hydraulic model for the Lea Hill 462 pressure zone. The PRV setpoints were referenced to confirm the higher HGL observed during the hydrant testing. As such, the naming for the pressure zone was updated to Lea Hill 480. The update and supporting calculations are included in Appendix K.

Academy Service Area

A total of five hydrant tests were conducted in the Academy Service Area. The static pressure and pressure drop in the calibrated model is now within 5 psi, or less, of the observed data for each of the hydrant tests.

The HGL from the hydrant testing was higher than the reported HGL in the hydraulic model for the Academy 350 and Academy 445 pressure zones. The PRV setpoints were referenced to confirm the higher HGL observed during the hydrant testing. As such, the naming for each pressure zone was updated to Academy 400 and Academy 470 respectively. The updates and supporting calculations are included in Appendix K.

Lakeland Service Area

A total of ten hydrant tests were conducted in the Lakeland Service Area, however the results from one test were excluded as the recorded static pressure was determined to be incorrect. The static pressure and pressure drop in the calibrated model is now within 5 psi, or less, of the observed data for each of the hydrant tests.

The HGL from the hydrant testing varied from the reported HGL in the hydraulic model for the Lakeland 440, Lakeland 441, Lakeland 446, and Lakeland 485 pressure zones. The PRV setpoints were referenced to

confirm the HGLs observed during the hydrant tests. As such, the naming for each pressure zone was updated as follows:

- Lakeland 440 pressure zone was split into two pressure zones: Lakeland 450 and Lakeland 405.
- Lakeland 441 pressure zone was updated to Lakeland 385
- Lakeland 446 pressure zone was updated to Lakeland 415
- Lakeland 485 pressure zone was updated to Lakeland 455.

The hydrant test for Lakeland 575 was not simulated in the model as observed in the field since a static pressure of 101 psi was recorded during the hydrant test. According to the PRV setpoints, the HGL on the test date was anticipated to be an error. The City re-checked the hydrant on February 8, 2024, and a static pressure of 69 psi was recorded. It was concluded that the original hydrant test data was inaccurate, and the test was voided. The Lakeland 575 pressure zone was updated to Lakeland 560 instead based on the PRV setpoints and static pressure reading completed in February 2024. The updates and supporting calculations are included in Appendix K.

3.4.2.4.3 Hydraulic Analysis

PHD Analysis

During PHD conditions, the water system must maintain a minimum pressure of 30 psi at all service nodes, a maximum velocity of 8 fps in wall water mains, and a maximum velocity of 5 fps in all transmission mains in accordance with DOH and City standards. The hydraulic model was set up to evaluate pressures and velocities throughout the system under PHD conditions for the 2024 (existing conditions), 2034 (10-year), and 2044 (20-year) scenarios. The results of this analysis are shown in Figure 3-8, Figure 3-9, and Figure 3-10 respectively. The results of this analysis indicate that all areas of the water system meet these requirements under existing and future conditions.

Figure 3-8 | 2024 PHD Scenario – Pressure and Velocity

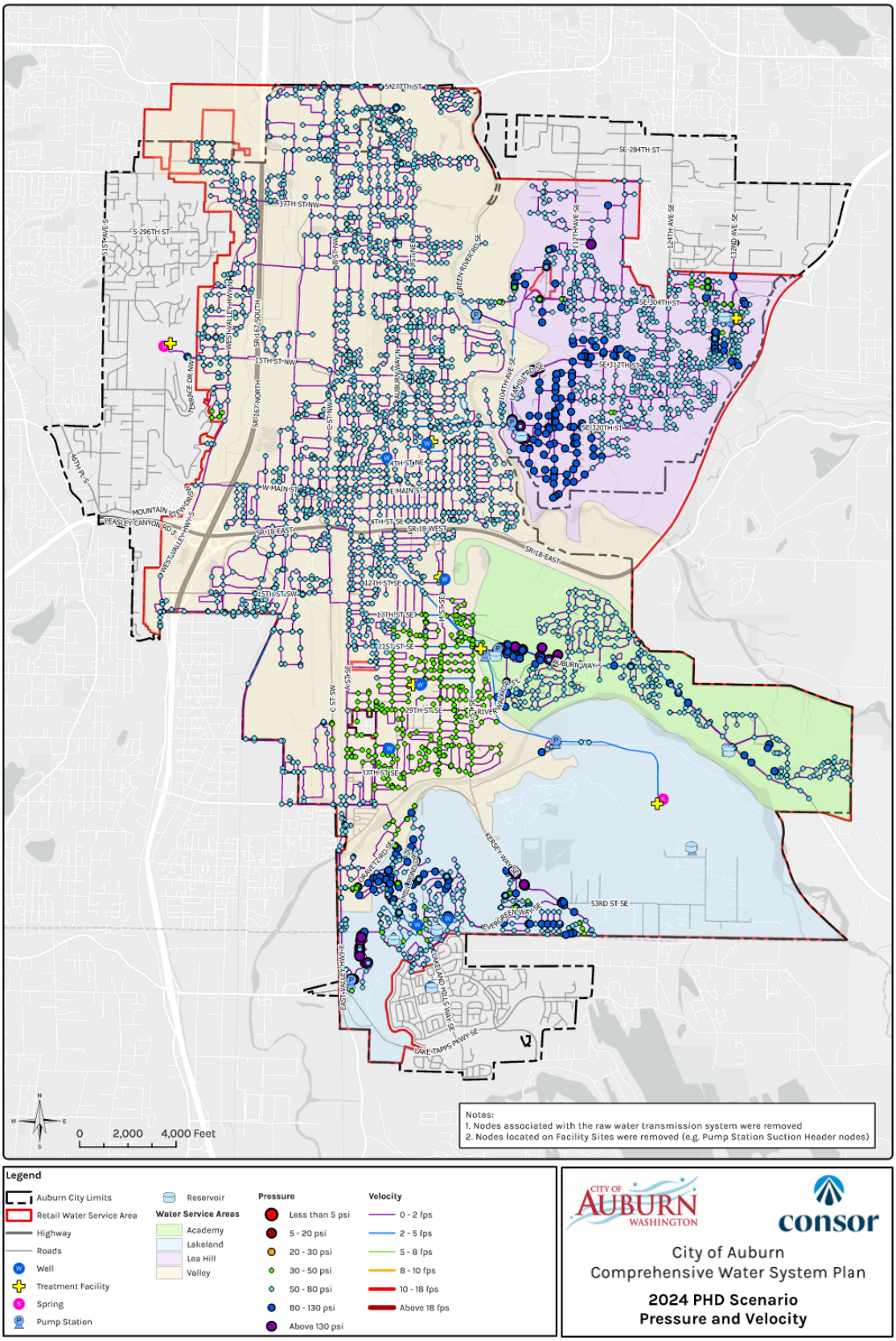


Figure 3-9 | 2034 PHD Scenario – Pressure and Velocity

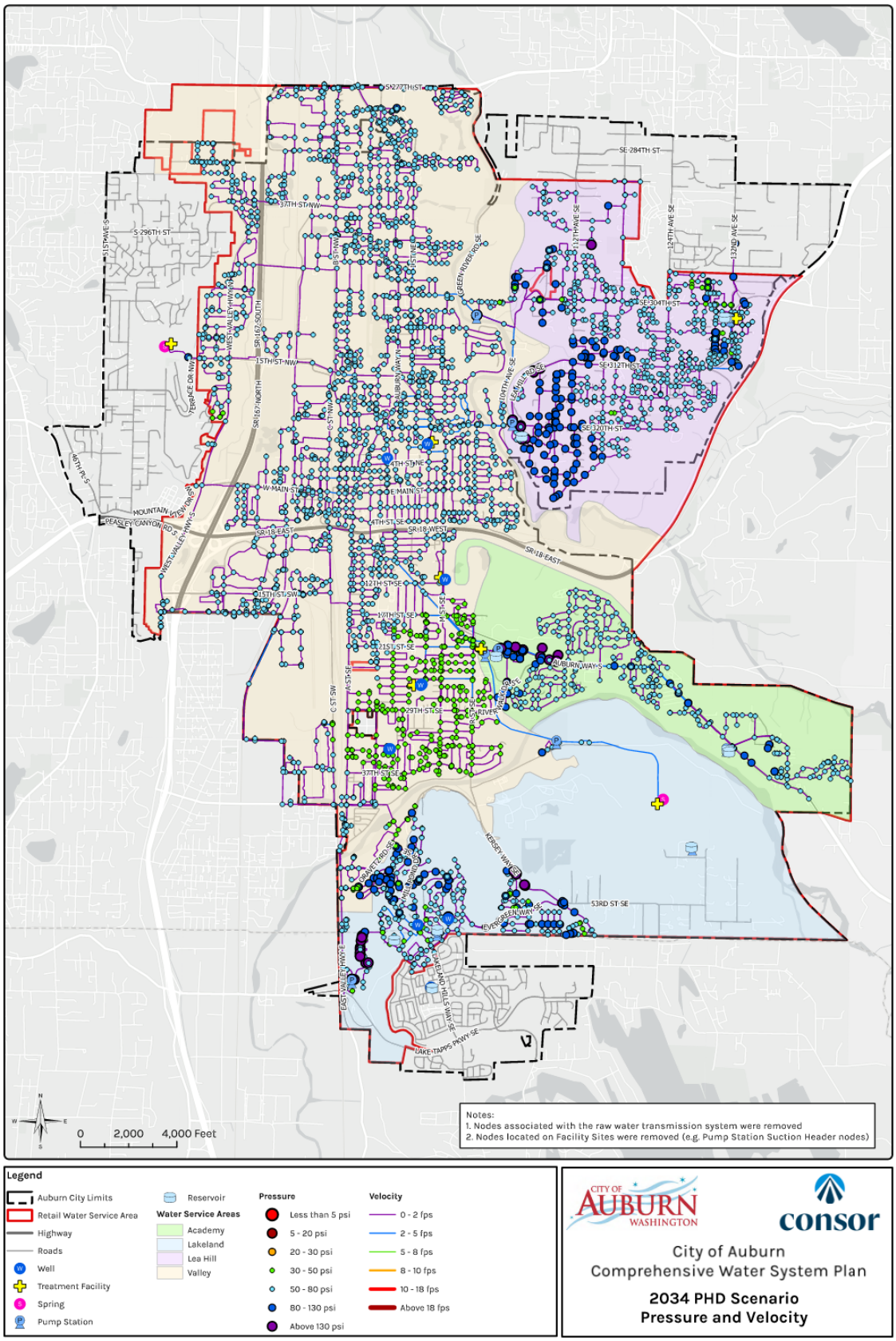
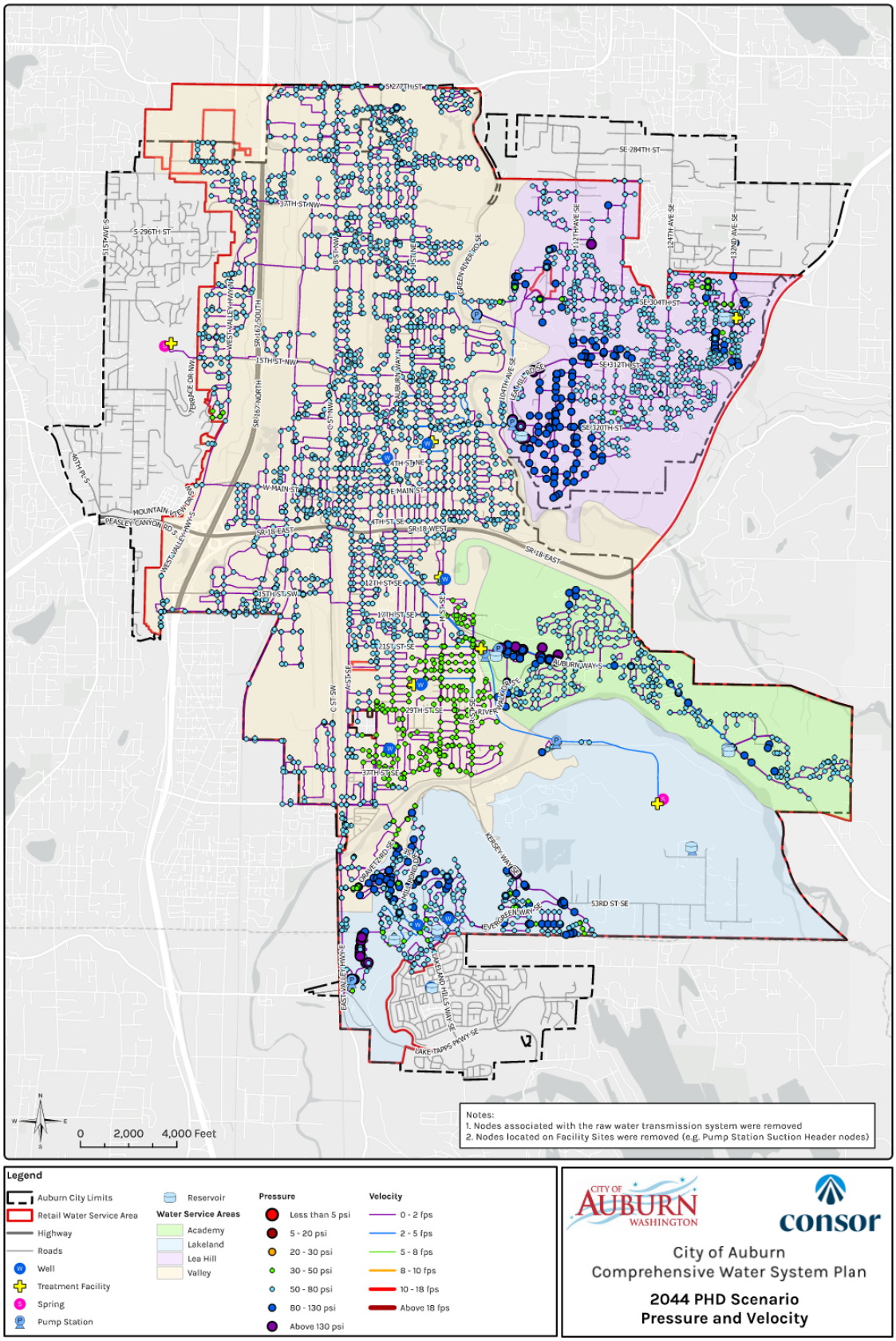


Figure 3-10 | 2044 PHD Scenario – Pressure and Velocity



Fire Flow Analysis

The fire flow analysis assesses each hydrant node in the hydraulic model to determine the available fire flow while maintaining a minimum residual pressure of 20 psi throughout the respective pressure zone. To complete the analysis, the water elevation in each reservoir was set to top of dead storage (below operational, equalizing and standby storage) per DOH recommendations. In addition, the system demands were set to MDD for each scenario (2024, 2034 and 2044). For each node, the modeled available fire flow was compared to its target fire flow requirement as follows:

- Single Family Residential Meters: 1,500 gpm of fire flow required.
- All Other Meters (i.e., multi-family, commercial, etc.): 2,500 gpm of fire flow required.
- Specific Buildings with Higher Fire Flow Requirements: Assessed individually per **Table 3-20**.

Fire flow requirements were assigned to the model nodes based on account classifications of the assigned water meters. Where multiple meters with different account classifications were assigned to the same node, the highest fire flow requirement was assigned to the node. The hydrant locations provided in the City's GIS system do not correspond to the exact location of the hydrant node in the model. Therefore, the nodes that were predicted to have fire flow below what is required were checked based on their proximity to the nearest hydrant to verify whether the appropriate hydrant could provide the required fire. As shown in **Figure 3-11** the results of this analysis indicated that multiple areas of the system under current and future demand conditions have fire flow deficiencies. A summary of the proposed pipeline improvements to resolve the deficiencies is shown in **Figure 3-12** and summarized in **Table 3-33**. **Figure 3-12** also includes on-going projects currently being completed by the City or developers.

Valley Service Area

Multiple deficiencies are identified in the Valley Service Area. The highest priority project assists with raising the HGL of the highest critical node on the west side of the RWSA. This project will increase the available fire flow at most of the western failure locations. The remaining improvements assist with specific failure locations by upsizing water mains experiencing significant headloss.

Additionally, a new PRV facility is proposed to rezone a portion of the Valley 242 pressure zone to the Academy 350 pressure zone to resolve deficiencies in the area. This PRV facility will also allow storage transfer from the Academy Service Area where this is surplus storage to the Valley Service Area to resolve the 2034 storage deficit projections. This project is discussed further in **Chapter 8**.

Lakeland Service Area

There were no failure locations identified within the Lakeland Service Area for the existing and future demand conditions.

Lea Hill Service Area

Multiple deficiencies are identified in the Lea Hill Service Area. The highest priority project in this area is to rezone a portion of Lea Hill 563 pressure zone to the Lea Hill 648 pressure zone. In addition, deficiencies were noted in the northern part of Lea Hill 563, in the vicinity of 112th Avenue, 290th Street, 295th Street, and 293rd Street. These pipelines were replaced recently and provide an available fire flow of approximately 1,350 gpm after the rezoning of the Lea Hill 563 pressure zone is completed. Therefore, a project was not proposed in this area and was confirmed with the Fire Marshal. The remaining improvements assist with specific failure locations by upsizing water mains experiencing significant headloss.

Figure 3-11 | MDD+FF Deficiency Locations for 2024, 2034 and 2044 Scenarios

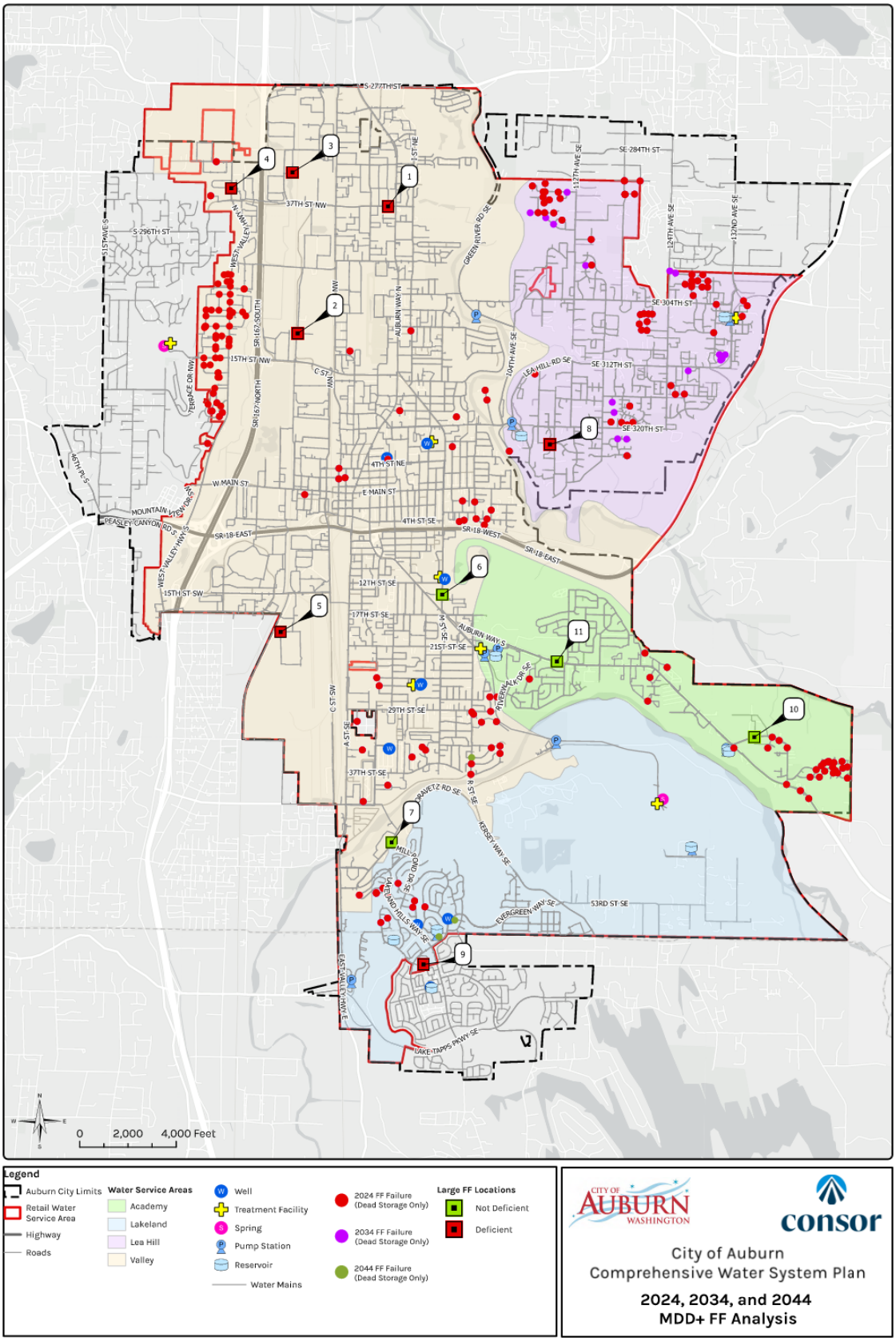
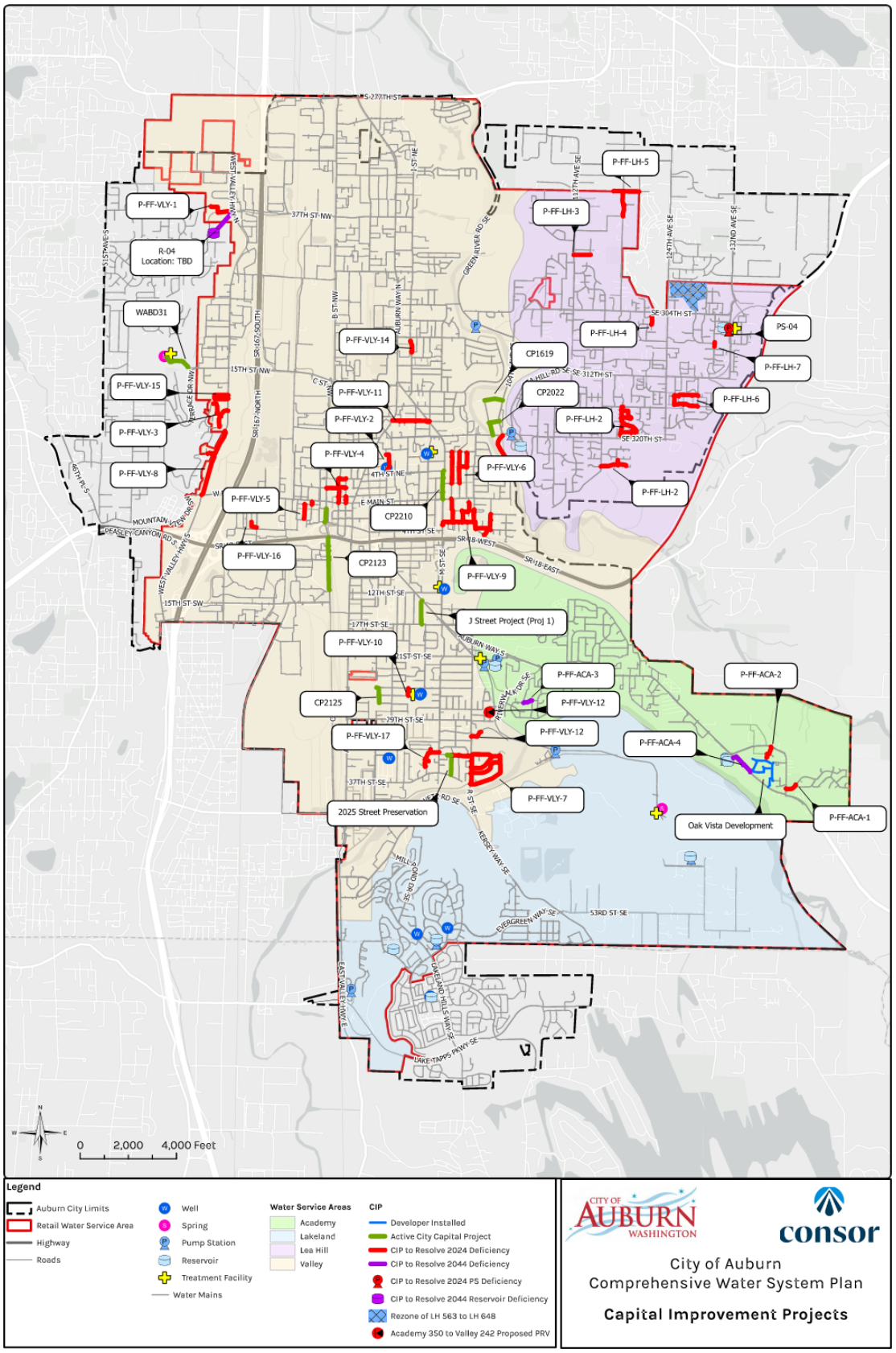


Figure 3-12 | Capital Improvement Projects Addressing Fire Flow Deficiencies



Academy Service Area

Multiple deficiencies are identified in the Academy Service Area. The planned Oak Vista Development provides a significant increase in available fire flow in Academy 585 pressure zone. The remaining improvements assist with specific failure locations by upsizing pipelines with high predicted headloss.

Table 3-33 | Prioritized Pipeline Improvements to Address Fire Flow Deficiencies

Project Priority	Service Area	Project ID	Summary of Deficiency	Summary of Improvements
1	Valley	P-FF-VLY-8	2024 Scenario: Hydrants less than 500 gpm	Replace existing with 3,200 LF of 16-inch diameter piping.
2	Lea Hill	P-FF-LH-3	2024 Scenario: Hydrants less than 1,000 gpm	Replace existing with 690 LF of 12-inch diameter piping.
3	Lea Hill	P-FF-LH-7	2024 Scenario: Hydrants less than 1,000 gpm.	Replace existing with 180 LF of 8-inch diameter piping. Move hydrant connection to higher zone.
4	Lea Hill	P-FF-LH-5	2024 Scenario: Hydrants less than 1,000 gpm	Replace existing with 1,080 LF of 12-inch diameter piping and 1,170 LF of 16-inch diameter piping.
5	Valley	P-FF-VLY-15	2024 Scenario: Hydrants less than 1,000 gpm	Replace existing with 1,320 LF of 12-inch diameter piping.
6	Valley	P-FF-VLY-6	2024 Scenario: Hydrants less than 1,000 gpm	Replace existing with 3,590 LF of 8-inch diameter piping.
7	Valley	P-FF-VLY-7	2024 Scenario: Hydrants less than 1,500 gpm	Replace existing with 7,9840 LF of 8-inch diameter piping and 4,380 LF of 12-inch piping.
8	Valley	P-FF-VLY-13	2024 Scenario: Hydrants less than 1,000 gpm	Replace existing with 1,290 LF of 12-inch diameter piping.
9	Valley	P-FF-VLY-12	2024 Scenario: Hydrants less than 1,000 gpm	Replace existing with 1,440 LF of 8-inch diameter piping and 550 LF of 12-inch piping.
10	Lea Hill	P-FF-LH-1	2024 Scenario: Hydrants less than 1,500 gpm	Replace existing with 4,540 LF of 8-inch diameter piping.
11	Lea Hill	P-FF-LH-2	2024 Scenario: Hydrants less than 1,500 gpm	Replace existing with 1,300 LF of 8-inch diameter piping.
12	Lea Hill	P-FF-LH-6	2024 Scenario: Hydrants less than 1,500 gpm	Replace existing with 2,470 LF of 12-inch diameter piping.
13	Academy	P-FF-ACA-2	2024 Scenario: Hydrants less than 1,500 gpm.	Replace existing with 590 LF of 8-inch diameter piping.
14	Academy	P-FF-ACA-1	2024 Scenario: Hydrants less than 1,500 gpm.	Replace existing with 500 LF of 12-inch diameter piping.
15	Lea Hill	P-FF-LH-4	2024 Scenario: Hydrants less than 1,500 gpm	Replace existing with 340 LF of 8-inch diameter piping.
16	Valley	P-FF-VLY-9	2024 Scenario: Multiple hydrants less than 1,500 gpm	Replace existing with 190 LF of 8-inch diameter piping and 5,765 LF of 12-inch piping.
17	Valley	P-FF-VLY-14	2024 Scenario: Hydrants less than 2,500 gpm	Replace existing with 510 LF of 12-inch diameter piping.
18	Valley	P-FF-VLY-2	2024 Scenario: Hydrants less than 2,500 gpm	Replace existing with 910 LF of 12-inch diameter piping.

Project Priority	Service Area	Project ID	Summary of Deficiency	Summary of Improvements
19	Valley	P-FF-VLY-17	2024 Scenario: Hydrants less than 2,500 gpm	Replace existing with 170 LF of 8-inch diameter piping and 1,270 LF of 12-inch piping.
20	Valley	P-FF-VLY-4	2024 Scenario: Hydrants less than 2,500 gpm	Replace existing with 2,610 LF of 12-inch diameter piping.
21	Valley	P-FF-VLY-10	2024 Scenario: 4-inch Cast Iron near 1,500 gpm dead end	Replace existing with 320 LF of 12-inch diameter piping.
22	Valley	P-FF-VLY-3	2024 Scenario: Hydrant less than 1,500 gpm available.	Replace existing with 1,010 LF of 8-inch diameter piping and 660 LF of 12-inch piping. Complete P-FF-VLY-8 has higher priority for initial improvement in this area.
23	Valley	P-FF-VLY-1	2024 Scenario: Hydrants less than 2,500 gpm	Replace existing with 960 LF of 12-inch diameter piping.
24	Valley	P-FF-VLY-11	2024 Scenario: Hydrants less than 2,500 gpm	Replace existing with 1,630 LF of 12-inch diameter piping.
25	Valley	P-FF-VLY-16	2024 Scenario: Hydrants less than 2,500 gpm	Replace existing with 390 LF of 12-inch diameter piping.
26	Valley	P-FF-VLY-5	2024 Scenario: Hydrants less than 2,500 gpm	Replace existing with 750 LF of 12-inch diameter piping.
27	Academy	P-FF-ACA-3	2044 Scenario: Hydrants less than 2,500 gpm	Replace existing with 380 LF of 12-inch diameter piping.
28	Academy	P-FF-ACA-4	2044 Scenario: Hydrants less than 2,500 gpm	Replace existing with 1,040 LF of 16-inch diameter piping.

3.4.2.5 System Capacity Analysis Results

Chapter 2 of this WSP calculated the ADD ERU planning value to be at 182 gallons per day per Equivalent Residential Units (gpd/ERU) and an MDD ERU planning value of 322 gpd/ERU. An analysis of the water system's overall physical capacity in terms of ERU using DOH Worksheet 4-1 is provided in Appendix V. Demand projection values include retail customer demands, distribution system losses, authorized unbilled consumption, and wholesale demand from Algona. Projections for the MIT Fish Hatchery and LMWD are not included. LMWD is not included since they do not rely on the City as their main source of water and have an interruptible wholesale agreement. Demand from the MIT Fish Hatchery is also not included since it is unknown when this facility will be constructed or what the actual demands will be.

The results of the ERU analysis included in Appendix V are summarized in Error! Not a valid bookmark self-reference.. The analysis indicates that the existing system has sufficient capacity to serve the current and projected water demands through 2034 (10-year planning horizon). Under 2024 and 2034 demand conditions, storage is the limiting system component for growth and development. In 2044 (20-year planning horizon) storage is deficient, which is consistent with the analysis findings summarized in Section 3.4.2.3 and is planned to be resolved with a new reservoir project included in Chapter 8.

Table 3-34 | System Capacity Analysis in ERU Basis

Description of Capacity Parameter	2024	2034	2044
Demands per ERU Basis			
Average Day Demand, gpd/ERU	182	182	182
Maximum Day Demand, gpd/ERU	322	322	322
Peak Hour Demand, gpd/ERU	518	518	518
Projected Retail Customer Demand, ERUs	**38,731**	**43,626**	**49,515**
Algona (Firm Wholesale) Projected ADD, ERUs	2,005	2,120	2,246
Algona (Firm Wholesale) Projected MDD, ERUs	2,150	2,274	2,409
Total ERUs Required for Qa Analysis (ADD), ERUs	**40,736**	**45,746**	**51,761**
Total ERUs Required for Qi and Qs Analysis (MDD), ERUs	**40,881**	**45,900**	**51,924**
Source Capacity (Qi)			
Total Supply Capacity, Qi (20 hours of pumping), gpd	23,092,800	23,092,800	23,092,800
Maximum Day Demand, gpd/ERU	322	322	322
Maximum Supply Capacity, ERUs	**71,744**	**71,744**	**71,744**
Projected MDD Demand, ERUs	40,881	45,900	51,924
Remaining Qi Capacity Surplus/(Deficit), ERUs	**30,863**	**25,845**	**19,820**
Water Rights (Qa)			
Supply Capacity, Qa (Total), gpd	18,749,377	18,749,377	18,749,377
Average Day Demand, gpd/ERU	182	182	182
Maximum Supply Capacity, ERUs	**102,938**	**102,938**	**102,938**
Projected ADD Demand, ERUs	40,736	45,746	51,761
Remaining Qa Capacity Surplus/(Deficit), ERUs	**62,202**	**57,192**	**51,177**
Pumping Capacity (Qs)			
Total Pumping Capacity, Qs (20 hours of pumping), gpd	22,506,000	22,506,000	22,506,000
Maximum Day Demand, gpd/ERU	322	322	322
Maximum Supply Capacity, ERUs	**69,921**	**69,921**	**69,921**
Projected MDD Demand, ERUs	40,881	45,900	51,924
Remaining Pumping Capacity Surplus/(Deficit), ERUs	**29,040**	**24,022**	**17,997**
Storage Capacity			
Maximum Usable Storage Capacity, MG	14.07	14.07	14.07
Available Standby and Equalization Storage Capacity, MG	10.58	10.58	10.58
Standby Storage Requirement, gal/ERU	240	240	240
Equalizing Storage Requirement, gal/ERU	-	-	-
Maximum Storage Capacity, ERUs	**44,071**	**44,071**	**44,071**
Projected Retail System ERUs	38,731	43,626	49,515
Remaining Storage Capacity Surplus/(Deficit), ERUs	**5,340**	**445**	**(5,445)**
System Capacity Analysis Summary			
Limiting Component of System Capacity Surplus/ (Deficit), ERUs	**5,340**	**445**	**(5,445)**

3.4.3 New Source of Supply Analysis

The City has a pending water right application for 13,443 acre-feet from the existing Wells 6 and 7 and a future Well 8. The location of the future Well 8 has not been determined but is expected to be located near Wells 6 and 7. Flows from future Well 8 would be treated at the Fulmer Field CCT Facility. It is anticipated that water quality from Well 8 would be similar to Wells 6 and 7 and may require manganese treatment.

Calculations presented in the Water Rights Self-Assessment Form (**Appendix I**) conclude that the City's existing water rights are anticipated to be adequate to meet the current, 10-year, and 20-year demand projections for maximum instantaneous flows (Qi) and total annual withdrawal (Qa).

The City has established a policy of maintaining the capability to supply the MDD while the largest water source is out of service. The system analysis documented in this chapter confirms that, with projected demands over the 20-year planning period, the City will maintain the capability to meet MDD with the largest pumping source is out of service with the use of the Tacoma interties as an available source.

Mitigation obligations due to the proposed water right for Wells 6, 7, and 8 are listed below and are described in detail in the Conceptual Mitigation Plan (**Appendix S**):

- Mitigation of impacts to Green River,
- Mitigation of impacts to White River, and
- Mitigation of impacts to Mill Creek.

Water Use Efficiency measures described in **Chapter 4** will be applied to the expanded supplies from Wells 6 and 7 and the new supply from Well 8 if the pending water right is approved.

Aside from the pending water right application, the City has several projects planned over the 20-year horizon to improve supply production or fully utilize their existing water rights, as discussed in **Section 3.1.2**.

3.5 Summary of System Deficiencies

Table 3-35 provides a summary of the system deficiencies described in this chapter. Proposed improvements include pump station improvements, storage improvements, and distribution system improvements. Total project costs and the anticipated source of funding for each project are provided in **Chapter 8**.

Table 3-35 | Summary of System Deficiencies

CIP Improvement	Classification of Deficiency	Description of Project Solution	Location in WSP Where Deficiency is Identified	Location in WSP Where Analysis Demonstrates Deficiency will be Addressed by Project
Supply Improvements	Reliability, Resiliency	• Coal Creek Springs Rehabilitation • Well 2 Replacement • Well 2 and Well 6 Cleaning Program • Wells 5/5A Upgrades • Well 7 Back-up Power • Algona Well 1 Study	Section 3.1.2	Section 3.1.2 and Chapter 8

CIP Improvement	Classification of Deficiency	Description of Project Solution	Location in WSP Where Deficiency is Identified	Location in WSP Where Analysis Demonstrates Deficiency will be Addressed by Project
Treatment Improvements	Reliability	• Wells 3A/3B Treatment • Well 5 Chlorination • Well 7 Treatment • Coal Creek Springs Chlorination Building Replacement • Wells 1 and 4 On-site Chlorination Improvements • Fulmer Field CCT Facility Chlorination Improvements	Section 3.1.3	Section 3.1.3and Chapter 8
Storage Improvements	Growth, Fire Flow, Reliability, Resiliency	• Reservoir 2 Valve Improvements • Reservoirs 4 and 8 Seismic Rehabilitation • Additional storage in the Valley Service Area	Section 3.1.4 and Section 3.4.6	Section 3.1.4, Section 3.4.6, and Chapter 8
Pump Station Improvements	Reliability, Fire Flow	• Modifications to Lea Hill BPS/Intertie PS	Section 3.4.5	Section 3.4.5 and Chapter 8
Distribution Improvements	Growth, Fire Flow	• Coal Creek Springs Transmission Improvements • West Hill Springs Transmission Improvements • Replacing and upsizing pipelines where needed	Section 3.1.2 and Section 3.4.7	Section 3.1.2, Section 3.4.7, and Chapter 8

CHAPTER 4

Water Use Efficiency Program

The purpose of this chapter is to describe the water system's program to improve water use efficiency (WUE). WUE contributes to the long-term water supply reliability and promotes good stewardship of the state's water resources.

This chapter addresses the following topics.

4.1 Source and Service Metering
4.2 Distribution System Leakage
4.3 Water Use Efficiency Program
4.4 Water Use Efficiency Savings
4.5 Climate Change Resiliency

Table 4-1 lists the requirements of the WUE Rules from the DOH 2020 Water Use Efficiency Guidebook and reflects the City's level of compliance with these requirements.

Table 4-1 | WUE Rule Requirements

Category	Requirement	City of Auburn Compliance Status
Meters		
	Meter all sources.	Yes, all sources are metered.
	Meter all service connections.	Yes, all services are metered.
Data Collection		
	Provide annual consumption by customer class.	Yes, provided in Section 2.2.2.
	Provide "seasonal variations" consumption by customer class.	Yes, provided in Section 2.5.
	Evaluate reclaimed water opportunities.	Yes, provided in Section 4.3.5.
	Consider water use efficiency rate structure.	Yes, the City has an inverted block rate structure to promote conservation.
	Provide monthly and annual production for each source.	Yes, provided in Section 2.3.1.
Distribution System Leakage		
	Calculate annual volume and percent using formula defined in WUE Rules.	Yes, distribution leakage is calculated and reported in Section 4.2.
	Report annually: annual leakage volume, annual leakage percent, and for systems not fully metered, meter installation progress and leak minimization activities.	Yes, distribution leakage is reported to DOH on an annual basis.
	Develop water loss control action plan (if leakage is over 10% for 3-year average).	N/A, system has a 3-year average water loss of less than 10%.
Goals		
	Establish measurable (in terms of water production or usage) conservation goals and re-establish every 6 years. Provide schedule for achieving goals.	Yes, measurable goals were established via a public process. See Section 4.3.3.
	Use a public process to establish goals.	

Category	Requirement	City of Auburn Compliance Status
	Report annually on progress.	Yes, report submitted annually to DOH.
WUE Program		
	Describe existing conservation plan.	Yes, see Section 4.3.
	Estimate water saved over last 6 years due to conservation program.	Yes, see Section 4.3.1.
	Describe conservation goals.	Yes, see Section 4.3.3.
	Implement or evaluate 1-12 measures, depending on size. Nine measures for City of Auburn.	Yes, see Section 4.3.4.
	Describe conservation programs for next 6 years including schedule, budget, and funding mechanism.	Yes, see Section 4.3.6.
	Describe how customers will be educated on efficiency practices.	Yes, see Section 4.3.4.
	Estimate projected water savings from selected measures.	Yes, see Section 4.4.
	Describe how efficiency program will be evaluated for effectiveness.	Yes, see Section 4.3.1.
	Estimate leakage from transmission lines (if not included in distribution system leakage).	N/A, transmission line leakage included in distribution system leakage as system does not have true transmission lines.
Demand Forecast		
	Provide demand forecast reflecting no additional conservation.	Yes, provided in Section 4.4.
	Provide demand forecast reflecting all "cost effective" evaluated measures.	
Performance Reports		
	Develop annual report including goals and progress towards meeting them, total annual production, annual leakage volume and percent and, for systems not fully metered, status of meter installation and actions taken to minimize leakage.	Yes, reports will be submitted annually to DOH.
	Submit annually by July 1 to DOH and customers and make available to the public.	

4.1 Source and Service Metering

4.1.1 Source Meters

Source meters, also known as production meters, measure the amount of water emitted from the City's springs and wells. Each of the City's sources are metered to measure the amount of water produced. The meters are calibrated annually by an outside contractor under the direction of the Water Operations Supervisor to ensure an accurate accounting of water produced. If a meter cannot be calibrated properly, it is replaced with a new one. Propeller source meters are being replaced with electromagnetic (MAG) meters in conjunction with planned capital improvements projects, or as the budget allows.

Table 4-2 | Source Meter Details

Source Meter ID	Manufacturer	Meter Type	Meter Size	Years in Service	Date of Last Calibration
Coal Creek Springs	Siemens	Magnetic	24-inch	26	August 2023
West Hill Springs	Siemens	Magnetic	10-inch	10	Unknown
Algona Well 1	N/A	N/A	Not in use	Not in use	Not in use
Valley Well 1	Siemens	Magnetic	12-inch	14	August 2023
Valley Well 2	Siemens	Magnetic	10-inch	24	August 2022
Valley Well 3A	Sparling	Turbine	Not in use	Not in use	Not in use
Valley Well 3B	Sparling	Turbine	Not in use	Not in use	Not in use
Valley Well 4	Siemens	Magnetic	12-inch	39[1]	August 2023
Lakeland Well 5	Sparling	Turbine	8-inch	41[1]	August 2023
Lakeland Well 5A	Siemens	Magnetic	4-inch	34	August 2023
Lakeland Well 5B	Siemens	Magnetic	Not in use	Not in use	Not in use
Valley Well 6	Siemens	Magnetic	12-inch	24[1]	August 2023
Valley Well 7	Sparling	Turbine	Not in use	Not in use	Not in use

Note:
1. Years in service assumed to be from source's original construction date.

4.1.2 Service Meters

Water meters are installed on every service line to measure the quantity of water used by a customer per WAC 246-290-496 and City Code Chapter 13.06.320. All new direct service connections must be metered at the time-of-service activation per WAC 246-290-496(2)(d). All meters shall remain the property of the City and shall not be removed except by the City. In all cases where meters are lost, damaged or broken by carelessness, negligence, or willful actions of owners/operators of premises, they shall be replaced or repaired by or under the direction of the City. The actual cost of repairs or replacement of meters will be charged against the owners/operators. In case of nonpayment of fees, fines, charges, or penalties, the water shall be shut off and will not be turned on until all charges are paid.

In 2015, the City began installing an Automated Metering Infrastructure (AMI) system, as a part of the Water Meter and Billing System Improvements project, which was completed in 2018. With the new AMI system, the City automatically receives meter reads via radio transmission and can integrate the data into the billing software. The benefits of an AMI system include increased accuracy and efficiency, early leak detection, and improved customer service. The AMI system is anticipated to have a 20-year life, including the system components and batteries in the radios.

In conjunction with the AMI system installation, the City also completed a meter changeout in 2018. Since 2015, the City has installed 15,156 meters, ranging in size from ¾ inch to ten inches. Meter replacement will be on a 20-year program to coincide with the AMI system. Large source meters and three-inch and larger commercial meters will be tested and calibrated annually. Small meters (less than three inches) are not calibrated.

All new service connections under three inches, in addition to repairs, retrofits or replacements of existing services, are typically conducted by Water Distribution Staff unless unusual circumstances arise. Meter

services consist of meters, meter vaults, meter boxes, service lines, valves, setters, re-setters, and other associated equipment.

- Small Meters (3/4 to two inch)
    - Replacement Cost: $700 - $1,620
    - New Installation Cost: $550 - $1,500
- Large Meters (three to eight inch)
    - Replacement Cost: $3,300 - $12,000
    - New Installation Cost: $2,800 - $11,500

The City uses master meters when beneficial to the City and its customers. Master meters are used at certain locations such as mobile home parks, the Auburn Business Park (formerly the Federal General Services Administration Property), and Muckleshoot Indian Tribe (MIT) commercial properties.

4.1.2.1 Large Meters

Large meters are used to measure water consumption by customers with significant demand requirements. They are usually employed by the following customer classes.

- Commercial
- Farms or Parks – Irrigation
- Schools
- Multifamily Complexes
- Industrial / Manufacturing Businesses
- Wholesale Customers
- Municipal Buildings

Large meters are defined as water meters three inches or larger and new meters are installed by contractors rather than City maintenance staff. There are a total of 127 large meters in the City's system. All large meters are calibrated for accuracy each year, usually between the months of April and June, as part of the City's System Loss Program. Calibration of large meters is conducted by an outside contractor, but two maintenance staff members under the direction of the Water Distribution Supervisor assist in the process. If a meter cannot be calibrated, it is replaced with a new one by City maintenance staff.

4.2 Distribution System Leakage

Distribution System Leakage (DSL) represents the difference between production and documented water use (retail, wholesale, and authorized unmetered). It may include inaccurate master and service connection meters, unaccounted-for non-revenue water use, pipeline leakage, and unauthorized use. DSL does not include authorized water usage such as water used for fire protection, flushing, construction, and other maintenance and operations practices. However, to be credited, this must be accounted for by metering or estimating using credible means.

The DSL is calculated as the difference between the total amount of water produced and the sum of water sold plus any authorized unmetered water usage. The City's estimated DSL for 2015 through 2022 is presented in Chapter 2, Table 2-11. For the City's water system, the 2022 three-year rolling average DSL was 6.7 percent of total production (corrected value submitted by the City to DOH in 2024). This falls below the DOH requirement that the three-year average DSL be under ten percent to minimize water waste.

The City is committed to maintaining DSL below the required ten percent and is actively working to identify and minimize DSL. To minimize DSL, the City has ongoing leak detection, meter calibration, and an active repair and replacement program for water system infrastructure, as detailed in Chapter 6 – Operations and Maintenance. The City completes a leak detection study of 25 percent of the water distribution system every year to detect and fix leaks. Additionally, the City has recently increased its efforts to reduce non-payment of bills and water theft. The City recently completed a major SCADA system upgrade in 2024. These investments should significantly increase the City's ability to measure DSL both temporally and geographically. The resulting information may allow the City to better target its WUE activities to reduce DSL.

4.2.1 Water Audits

The City has implemented AMI throughout the system, completing installations between 2015 and 2018. AMI is a tool that improves the effectiveness of the WUE Program measures, providing detailed water use data for each customer that allows the City to better understand water use patterns and target WUE Program measures to specific customers. Data can be sent in real-time or stored for several weeks or months. Potential AMI capabilities vary depending on the chosen hardware and software however, most systems can aid in the WUE Program. Below is a summary of how the City can use the AMI data.

- Advanced algorithms and metering data will allow the City to identify customer leaks.
- Advanced metering will provide cost savings in the Leak Detection and Repair and Service Meter Replacements programs.
- Advanced metering will aid in the City's efforts to reduce non-payment of bills and water theft.
- By comparing production and customer water use, DSL can be evaluated in greater temporal and geographic detail. For example, DSL may be calculated by month or for a given service area.
- Advanced metering data will help the City identify groups of customers to target for WUE measures and can be used to track the effectiveness of the measures for the same customers.
- Advanced metering data will allow additional reporting options to educate customers, such as their peak water use.

The City reports DSL annually; refer to Appendix M for the previous three annual WUE reports. The newly installed AMI system will provide substantial benefits for the WUE Program and improve savings, further outlined in Section 4.4 of this chapter.

4.3 Water Use Efficiency Program

In 2003, the Washington State Legislature passed the 2003 Municipal Water Law (MWL) which added a requirement that water purveyors use water efficiently. This law was expanded in January 2007 with the WUE Rule and has since been updated. WUE requirements are listed under WAC 246-290 and include:

- Publicly establishing a water savings goal.
- Evaluating water use efficiency opportunities specific to each community.
- Developing a WUE planning program.
- Meter installation on all customer connections by January 22, 2017.
- Achieve a standard of no more than ten percent water loss, on a three-year rolling annual average.
- Annual reporting on WUE progress.

The City's WUE Program provides for efficient water use and supports continued growth. This program fulfills all the necessary requirements of DOH. The selected program measures will allow the City to meet its WUE goals, resulting in decreased water demand. Measures are interrelated and will help the City achieve its goals to both reduce average water use and peak water use per customer. Public education measures (showing water use in bills, workshops, school outreach, fairs/trade shows, etc.) will continue to be a focus of the WUE Program to increase customer awareness and knowledge of WUE opportunities. Public education is needed to support the City's other WUE measures and to support reductions in both average and peak water use. Continued appliance rebates and shower head giveaways help customers implement what is learned in the public education campaign. With the implementation of AMI, it is expected that the City and customers will be able to identify more water loss reduction opportunities than previously possible. Therefore, customer and City leak detection, water audits, and meter repair and replacement may have a prominent role in the 2024-2034 WUE Program. The program will also continue to provide financial disincentives for excessive water use through metering and WUE pricing. This aspect of the program is likely to help reduce peak water usage further. These measures will result in the City being able to achieve its WUE goals, which includes reduced demand.

The 2024-2034 WUE Program will be a continuation of the City's successful existing WUE Program. The program has also been updated to leverage the City's investments in improved SCADA, leak detection, and AMI. The 2024 Plan complies with regulations as set forth in WAC 246-290-830 and DOH's 2020 Water Use Efficiency Guidebook. This section summarizes the program's goals, demand and supply side measures, reclaimed water, and DSL. The projected demand with the conservation goals, program budget, and cost savings are also presented.

4.3.1 Program Requirements

The WUE requirements emphasize the importance of measuring water usage and evaluating the effectiveness of the City's program. There are three fundamental requirements of a WUE Program that the City follows.

- **Planning Requirements** – Municipal water suppliers are required to:
  - Collect data.
  - Forecast demand.
  - Evaluate WUE measures.
  - Calculate DSL.
  - Implement a WUE Program to meet their goals.
- **Distribution Leakage Standard** – Municipal water suppliers are required to meet a distribution system leakage standard to minimize water loss from their distribution system.
- **Goal setting and performance reporting** – Municipal water suppliers are required to set WUE goals through a public process and report annually to their customers and DOH.

The DOH requires that the City estimate the amount of water saved through implementation of the system's WUE program over the last six years. **Table 4-3** shows the average day demand per-capita from 2017 to 2022. Water use per-capita dropped from 112 gpd per capita in 2017 to 103 gpd per capita in 2022. The net water savings over this period equates to approximately 195.2 million gallons or 39.0 million gallons per year. This was calculated by multiplying the population for each individual year (over the six-year period) by the difference in calculated savings in gpd per capita year after year. The result was then multiplied by the total days in each year. Annual totals were summed for the entire six-year period.

Table 4-3 | Annual Average Day Demand (gpd) per Capita[1]

2017	2018	2019	2020	2021	2022
112	109	106	100	105	103

Note:
1. Average day demand per capita was calculated by dividing the Average Day Demand from Table 2-9 by the population served from Table 2-1 and converting to gpd.

4.3.2 Mandatory Measures

The WUE Program includes supply side measures that the City implements to understand and control leakage including new meters, leak detection surveys, and water audits. Per the WUE requirements, the following measures shall be continued for the 2024-2034 WUE program.

- Install production (source) meters.
- Install consumption (service) meters.
- Perform meter calibration.
- Implement a water loss control action plan to control leakage if the three-year rolling average exceeds ten percent.
- Educate customers about water use efficiency practices.

Additionally, the following measures that must be evaluated are:

- Rates that encourage water demand efficiency (discussed in **Chapter 9**)
- Reclamation opportunities (discussed below)

The City has complied with these requirements in the past and will continue to comply with these regulations.

4.3.3 Program Goals

Per the WAC 246-290-830(4)(a), all water purveyors with 1,000 or more connections were required to set efficiency goals through a public process. The City has chosen to focus on implementing voluntary measures to decrease both the average and peak water usage. The 2024 program has established the following goals.

- Water Use per ERU Goal: Decrease the planning ERU value (gpd/ERU) one percent annually from the current planning ERU value of 182 gpd/ERU, which is the 75th percentile of eight years of historical data (2015 – 2022). Revaluate goal when the planning ERU value reaches less than 172 gpd/ERU.
    - To be conservative, an ERU planning value higher than the average was used by the City for demand forecasting. The 75th percentile of the eight-years of data was used to select the planning ERU value of 182 gpd. This methodology is consistent with the City's 2015 Plan. The ERU value of 182 gpd is seven percent lower than the 2015 Plan's ERU planning value of 195 gpd per ERU.
- MDD/ADD Peaking Factor: Decrease the planning peaking factor from the current 1.77, which is equal to the 75th percentile of eight years of historical data (2015-2022), to a planning peaking factor of less than 1.68, the average peaking factor from 2015-2022.

- Distribution System Leakage: Maintain three-year average DSL under ten percent to minimize water waste.

- Customer Support: Provide the service and support necessary to those water customers expressing a desire to conserve water as a part of their environmental ethic and as a means of minimizing water bills.

The WUE Program measures, as summarized below, are designed to help meet these established goals.

4.3.4 2024-2034 Demand-Side Program Measures

To encourage WUE and support customers, the City has incorporated program measures that target demand reductions. Under the WUE requirements, a program measure may include water efficient devices, actions, business practices, or policies that promote efficient water use. With 14 measures as part of the 2024 Program, the City exceeds the minimum DOH requirement of nine measures. WUE measures can target specific customer classes or a combination of customer classes. The City's demand-side program measures are summarized below.

1. School Outreach: The City will continue to participate in programs arranged to educate students on efficient water usage as requested by schools.

2. Speakers' Bureau: The City will seek speaking opportunities to discuss efficient water use with a wide audience spectrum. Topics could include water efficient fixtures and appliances, curbing seasonal peak demands, lawn watering practices, etc.

3. Program Promotion: The City will seek opportunities for social media, television, and/or radio public service announcements for WUE and submit news articles to local papers and Auburn Magazine on efficient water usage especially during the spring and summer months.

4. Theme Shows/Fairs: The City hosts an annual Kids Day fair. The fair includes a wide range of activities for all ages of kids. As part of the fair, the City has fun, water-related activities and provides water efficiency brochures and other materials. The City will conduct outreach at other Theme Shows/Fairs if requested. Water saving device kits are distributed to interested single-family and multiple-family residential customers.

5. Water Audits: The City will conduct a water audit upon the request of a customer, including industrial, commercial, and institutional customers. The audits will review items such as: recirculation of cooling water, reuse of cooling and process water, reuse of treated wastewater, efficient landscape irrigation, low water using fixtures, fixing leaks, and process modifications.

6. Customer Leak Detection: The City identifies potential leaks through investigation of the water meter upon request of customers. The City runs multiple reports in the AMI system to analyze data and investigate water meters to identify leaks.

7. Bills Showing Consumption History: The City will continue to provide customer bills showing the previous year's water usage. The City provides water usage information from AMI on the customers e-portal.

8. Water Saving Device Kits: The City will participate in distribution of water use efficiency kits through education events such as speakers' bureaus, theme shows, fairs, and through bill insert request forms.

9. WUE Pricing: The City has an inverted block rate structure for single-family residential customers to encourage WUE. The City will consider WUE in future cost of service/rate studies. Studies should determine the most appropriate water structures and rate levels to achieve the City's WUE goals, while generating sufficient revenues for utility operations. It is recommended that the studies consider uniform rates by class, inverted block rates, seasonal rates, and excess use rates.

10. Water Efficient Toilet Rebate Program: The City will continue to provide rebates to customers that replace old toilets with new high-efficiency toilets through their Environmental Protection Agency (EPA) WaterSense Toilet Rebate program.

11. Low-Flow Shower Heads Giveaways: The City gives away free low-flow shower heads at the Utility Billing Counter.

12. School Outdoor Water Use Reduction: The City will target schools to reduce their outdoor water consumption. Water audits and education on the benefits of replacing inefficient irrigation systems or landscaping (including turf) will be conducted.

13. City Water Use Reduction: The City will audit the water use of City accounts to identify both indoor and outdoor water saving opportunities. The Water Utility staff will help educate City account holders on WUE; however, no water budget has been allocated to implement water saving devices at City facilities.

14. Rainwater Harvesting: The City will evaluate implementation of a rainwater harvesting (rainwater reclamation) promotion program as a means to reduce irrigation water usage by commercial, public, and residential customers. The City's Stormwater Utility's requirements to use Low Impact Development (LID) measures, where feasible, strives to keep rainwater on the property, further reducing irrigation demands.

It is important to note that in addition to the water cost savings for the WUE measures, other benefits result, both to the utility and to its customers, from WUE activities. Such additional benefits could include:

- Significant customer energy savings because water heaters are the second largest energy users in the home. Hot water use can be reduced by almost one-third by cost-effective WUE measures, such as water efficient fixtures and appliances. Significant energy savings can also occur for industrial processes requiring water heating and other power uses.

- Efficient landscaping and irrigation techniques save on maintenance costs.

- Reductions in water production decrease energy required by utilities to treat and distribute water and to collect and treat wastewater. Chemical costs are also reduced in water and wastewater operations.

- System measures could provide substantial benefits in addition to water production cost savings including:

    - Identification of non-revenue water could result in recovery of unbilled revenue (inaccurate meters) and reduced unauthorized water usage (theft).

    - Leak detection helps prevent major main breaks, which could result in significant repair costs to the utility.

- Leak detection reduces a utility's liability due to prevention of potential property damage.
- Repair and/or replacement of service and source meters allows a utility to recover unbilled water revenues.

4.3.5 Reclaimed Water

According to WAC 246-290-100 and the WUE requirements, water systems with over 1,000 connections must collect and evaluate information on reclaimed water opportunities. The City is committed to wastewater reuse and rainwater reclamation, as stated in its official water system policies summarized in Appendix A. The City participates in the King County reclaimed water program, which completed a Reclaimed Water Comprehensive Plan in 2012. Additionally, the City has completed the King County Water Reclamation Evaluation Checklist, included as Appendix L. Currently, there are no reclaimed water users in the City. The City considers the most likely candidates for use of reclaimed water to be the irrigation customer class. Since the City conveys all sewage to King County's regional sewerage system, there is not an opportunity for the City to sell reclaimed water without significant capital investments to develop a reclaimed water distribution system, and there is not currently an alternative reclaimed water source in the area.

The City will implement reclaimed water as a conservation measure and include these savings in the demand projections when specific opportunities arise. The City, in conjunction with King County, may develop projects or consider participation in water reuse projects and programs developed by adjacent purveyors and others as appropriate. The efforts may include demonstration or pilot projects developed in accordance with applicable federal, state, and local laws and regulations.

4.3.6 WUE Budget

The City has established a budget for each program measure from 2023 to 2029, as required per WAC 246-290-810 4.e, shown in Table 4-4. WUE measures are funded through rates.

Table 4-4 | Annual WUE Budget

Measure	2023	2024	2025	2026	2027	2028	2029
School Education (NPDES & Water)	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000
Conservation Public Education/ WQ Report	$6,350	$6,350	$6,350	$6,350	$6,350	$6,350	$6,350
Toilet Rebates & Low-flow Shower Heads	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000
Large Meter Test/Repair/Replace	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000
WSP Update (WUE)	$22,000	-	-	-	-	-	-
Total	**$89,350**	**$67,350**	**$67,350**	**$67,350**	**$67,350**	**$67,350**	**$67,350**

4.4 Water Use Efficiency Savings

The WUE Program primarily provides cost savings in two ways, reducing demand and reducing DSL. Reducing demand may reduce or delay capital projects for additional supply and expanded distribution infrastructure. Reducing DSL can provide additional revenue, as well as increase the efficiency of supplying existing water uses. Additionally, advanced metering will provide cost savings in the Leak Detection and Repair and Service Meter Replacements programs.

The City has completed a cost analysis of their proposed WUE Program using historical data and projected annual water savings. Table 4-5 shows projected demands with and without annual water savings. This analysis maintains the target water use efficiency goal of one percent reduction per year in the planning ERU value. This goal will be reached through implementation of the proposed program measures. These reductions in demand can be translated into tangible benefits once realized, such as more time before new sources must be developed, increased ERUs that can be served by the existing water infrastructure, and cost savings in power and water treatment.

Table 4-5 | Demand Forecast With and Without Projected WUE Savings

Year	ADD (mgd)				MDD (mgd)			
	Without WUE	With WUE	Savings	% Savings	Without WUE	With WUE	Savings	% Savings
2024	7.05	6.98	0.07	1%	12.47	12.34	0.12	1%
2025	7.14	6.99	0.14	2%	12.61	12.36	0.25	2%
2026	7.22	7.00	0.22	3%	12.76	12.38	0.38	3%
2027	7.31	7.01	0.29	4%	12.91	12.39	0.52	4%
2028	7.39	7.02	0.37	5%	13.06	12.41	0.65	5%
2029	7.48	7.03	0.45	6%	13.22	12.43	0.79	6%
2030	7.57	7.04	0.53	7%	13.38	12.44	0.94	7%
2031	7.66	7.05	0.61	8%	13.54	12.46	1.08	8%
2032	7.75	7.06	0.70	9%	13.70	12.47	1.23	9%
2033	7.85	7.06	0.78	10%	13.87	12.48	1.39	10%
2034	7.95	7.07	0.87	11%	14.04	12.50	1.54	11%

4.5 Climate Change Resiliency

In 2023, the Washington State Legislature passed House Bill 1181, which requires all group A community public water systems serving 1,000 or more connections to include a climate resilience element in water system plans initiated after June 30, 2025. Though this requirement is not yet in effect, the following section is included to initiate discussion and planning for climate resilience and to supplement the Climate Element being incorporated into the City's 2024 Comprehensive Plan update.

4.5.1 Expected Climate Changes for the City of Auburn

Climate is a key factor driving water use as temperature, precipitation, and other climate-driven weather patterns affect irrigation, and commercial and industrial cooling. Auburn's maritime climate is characterized by wet cool winters and dry warm summers. The City's temperate climate is largely protected from continental weather by the Cascade Mountains to the east.

According to the publication Climate Change Impacts and Adaptation in Washington State, Washington State is projected to experience decreases in snowpack, increases in stream temperatures, and widespread changes in streamflow timing, flooding, and summer minimum flows. Climate change is expected to cause more frequent summer water shortages, especially in fully allocated watersheds with little management

flexibility. The average spring snowpack in Washington is projected to decline by 38 percent to 46 percent by the 2040s[1].

To estimate the impact of this change in climate on the City's water demands, results from the Water Supply Forum's 2009 Regional Water Supply Outlook (WSF 2009 Outlook) were used. The impacts of climate change on sources that rely on groundwater are mostly unknown due to the variability between aquifers and site-specific effects, such as recharge rates.

Continued increases in average annual and seasonal air temperatures in the Puget Sound are projected due to climate change, as well as increases in extreme heat. Projected changes in annual precipitation are generally minor, although summer precipitation is projected to decrease and heavy rainfall events are projected to become more severe[2].

No changes to demand projections were made for the 20-year planning period to account for potential climate change due to the uncertain magnitude and timing of local effects. However, it is recognized that demands have the potential to increase in the future given these changes. In the event the City experiences an increase in demand, to understand the scale of the impact, the City will run a model of the City water system that would compute firm yield from inputted streamflow data, replacing historic inflows with projected inflows from three climate change scenarios as described by the WSF 2009 Outlook. Those climate change scenarios for King County are provided in Table 4-6.

Table 4-6 | Predicted Increase in Demand from Baseline Due to Climate Change[1]

Climate Change Scenario	2005	2020	2030	2040
Baseline	0.0%	0.0%	0.0%	0.0%
Warm	3.5%	4.4%	4.9%	5.4%
Warmer	4.6%	4.9%	5.8%	7.4%
Warmest	4.8%	6.2%	7.6%	9.5%

4.5.2 Extreme Weather Events and Significant Challenges

To meet the requirements for risk and resilience assessments in America's Water Infrastructure Act (AWIA) of 2018, the City completed a Risk and Resilience Analysis (RRA) in December 2020 using the EPA's Vulnerability Self-Assessment Tool (VSAT). VSAT was developed to serve as an all-hazards assessment tool for water and wastewater utilities of all sizes and addresses malevolent acts, dependency/proximity threats, and natural hazards. Through this effort, the City has identified the following assets as the most vulnerable to flood hazards.

- Coal Creek Springs aquifer
- Coal Creek Springs and West Hill Springs piping
- Valley Aquifer (Wells 1, 2, 3A, 3B, 4, 6, 7)
- Green River and Lea Hill pump stations
- Distribution System

Climate change exacerbates existing challenges with flooding, landslides, droughts, wildfire, and other natural hazards by potentially changing the frequency, intensity, and duration of these events. Heavier

[1] Climate Change Impacts and Adaptation in Washington State: Technical Summaries for Decision Makers (uw.edu)
[2] *2009RegionalWaterSupplyOutlook.pdf (amazonaws.com)

rainfall increases the threat of flooding. In addition to immediate flood threats, flood waters can damage and contaminate wells and water treatment plants resulting in short-term outages and increased risk of waterborne diseases in drinking water. Higher levels of pathogens in runoff from areas around drinking water wells and surface water intakes from flooding of the wells themselves.

In October 2018, the Intergovernmental Panel on Climate Change (IPCC) released the Special Report on Global Warming of 1.5 degrees Celsius (^{O}C). Warming of 1.5^{O}C is projected to decrease summer streamflow in the Puget Sound by 23 percent. Average temperatures in 2015 were 2.7^{O}C warmer than pre-industrial era temperatures which resulted in low summer streamflow and warmer waters[3]. According to the King County Climate Change GIS map "Summer Runoff: Change, 2040s", summer (July-September) runoff in the City of Auburn is expected to decrease by 2.4 percent by the 2040s from historical conditions (1970-1999)[4]. The WSF 2009 Outlook believes the region is reasonably well prepared for drought, however further actions could improve drought preparation. During droughts, water supplies may fall short of meeting demands, especially in summer months. In the past, water utilities in the Puget Sound have adapted to fluctuations in water supplies from droughts through reservoir management and system adaptations such as long-term conservation programs and short-term demand curtailments[1].

Warming of 1.5^{O}C is also expected to bring larger and more frequent wildfires, which could disrupt regional water supplies. Significant water quality impairments from a wildfire include increased turbidity and introduction of radionuclides, metals, and fire-retardant chemicals[5], although impacts to the City's water quality is not likely as there are not surface water sources. The City can maintain existing emergency interties to mitigate wildfires that affect adjacent systems more severely than the City's. While the City contains land that is considered Wildland-Urban Interface, the United States Forest Service has classified the City as either Very Low or Non-burnable in its Potential Wildfire Hazard GIS map (2020)[6].

4.5.3 Assessment of Actions to Protect System

In the face of continued warming, there are actions the City can take to improve the resiliency of the water system from the impacts of climate change. Below are possible short-term and long-term actions for the City to consider. The short-term measures can improve resiliency within three to five years while the long-term measures may require decades to be fully implemented[5].

4.5.3.1 Short-Term Actions

Source Inventory: Identify sources that will remain online in the event of a 100-year or 500-year flood. Utilize GIS or other mapping tools to create a map to visualize which sources are at risk of inundation in such events. Develop protocols for isolating these sources. Determine how sources could be used for critical health and safety following an extreme weather event and how these sources relate to emergency shelters and critical facilities, such as hospitals.

Groundwater Supplies: Develop new groundwater supplies or augment existing groundwater supplies to improve drought resiliency and offset challenges posed by the wetter winters and drier summers expected with warming temperatures. Establish models to understand the effects of drier summers and increased

[3] NoTimeToWaste_CIG_Feb2019.pdf (uw.edu)
[4] https://climate-kingcounty.opendata.arcgis.com/maps/bab86832a962416cbdbb35644dacb11b
[5] Phase2SummaryReport20180731FINAL.pdf (amazonaws.com)
[6] https://hub.arcgis.com/datasets/usfs::wildfire-hazard-potential-version-2020-classified-image-service/explore?location=47.307822%2C-121.937736%2C10.98

risk of drought on groundwater supplies. Evaluate impacts of lower snowpack levels in the Cascade Mountains on aquifer recharge.

Wildfire Mitigation: Evaluate fire-fighting capacity for open space areas such as Game Farm Park and Wilderness Area.

Interaction with Research Community: Build and sustain routine interactions with the research community on the subject of climate change and water supply. Consider opportunities to fund water-industry research with direct application to water supplies in western Washington. Explore opportunities to have imbedded persons, such as employing a scientist with climate change expertise.

Rate Factors: Implement less frequently used rate factors, such as a rate for drought periods, to encourage lower demands.

Floodproofing: Build flood barriers such as levees and dikes to protect critical infrastructure. Elevate critical equipment or place it within waterproof containers or foundation systems.

Power Supplies: Extreme weather events can cause power outages. Consider alternative or on-site power supplies to provide resiliency during such events.

4.5.3.2 Long-Term Actions

Monitor Aquifer Conditions: Establish a program of long-range monitoring of aquifer recharge and water levels as affected by climate change. Assess risk of saltwater intrusion. Establish models to assess source redundancy in extreme drought events.

Green Infrastructure: Apply green infrastructure strategies to collect and manage stormwater. Regional or water-shed scale plans for stormwater management can be more cost effective than individual plans.

Water Use Efficiency: Continue to invest in and evaluate WUE programs to reduce water consumption and improve efficiency. Consider partnering with King County to assess reclamation and reuse programs to augment non-potable water demands.

Water Rights: Invest in permanent or mobile infrastructure to ensure access to all available water rights to maximize available sources.

CHAPTER 5

Source Water Protection

The City relies on groundwater sources to meet current water supply demands. This chapter's objective is to update the City of Auburn's (City's) program to protect and improve source water used by the City. As the City's sources only include groundwater wells and springs which are not under the influence of surface water, a Watershed Control Program is not required.

This chapter addresses the following topics:

5.1 Sanitary Control Area
5.2 Wellhead Protection Program

5.1 Sanitary Control Area

Sanitary Control Areas (SCAs) have been established for each of the City's water sources per WAC 246-290-135(2). An SCA is the front-line protection against contamination of the water source. The standard SCA for wells has a minimum radius of 100 feet from the wellhead. The standard SCA for spring sources has a minimum radius of 200 feet from the spring head. All City water sources have SCAs that were established and approved by DOH, and are documented in the susceptibility forms provided in Appendix T. All properties within the SCA for each water source are under the City's ownership and control.

5.2 Wellhead Protection Program

DOH has developed regulations that require Group A water systems using groundwater sources to develop and implement a Wellhead Protection Program (WHPP) in accordance with WAC 246-290-135. The basic elements required of a WHPP are:

- Assessment of initial groundwater susceptibility (physical susceptibility to contamination) for each water supply source,
- Delineation of the wellhead protection area (WHPA) that directly contributes groundwater to each water supply well,
- Identification of potential sources of contamination within each WHPA,
- Documentation of notification to owner/operators of known or potential hazards, and
- Development of spill prevention plans and water contingency plans that minimize or eliminate the possibility of contamination to the groundwater supply and development of options for maintaining water supply in the event the aquifer contributing to a source is contaminated.

The City maintains its WHPP for 12 groundwater sources. A WHPP was prepared in 2014 for the City's 2015 WSP; this remains the current WHPP for the City. The purpose of the WHPP is to help prevent the City's water supply from becoming contaminated and to develop contingency and emergency response procedures in case one or more sources are lost due to contamination. This is accomplished by providing

WHPAs around public groundwater sources, identifying existing groundwater contamination sources, and managing potential groundwater contamination sources prior to their entry into the drinking water system.

The WHPP provides tasks for the City to implement wellhead protection and the City prioritizes those tasks by criteria such as available staff, time to complete, cost, and urgency due to limited available resources. The City maintains an annual operating budget for implementing tasks related to the wellhead protection program, as well as identifying and monitoring potential new hazards. The City allocates budget annually for the Water Resources Protection Program, as discussed in **Chapter 8.**

5.2.1 Susceptibility Assessment

Susceptibility Assessment Forms have been completed by the City and submitted to the DOH. The forms are provided in **Appendix T**. The DOH's susceptibility assessment rating for each source is summarized in **Table 5-1.**

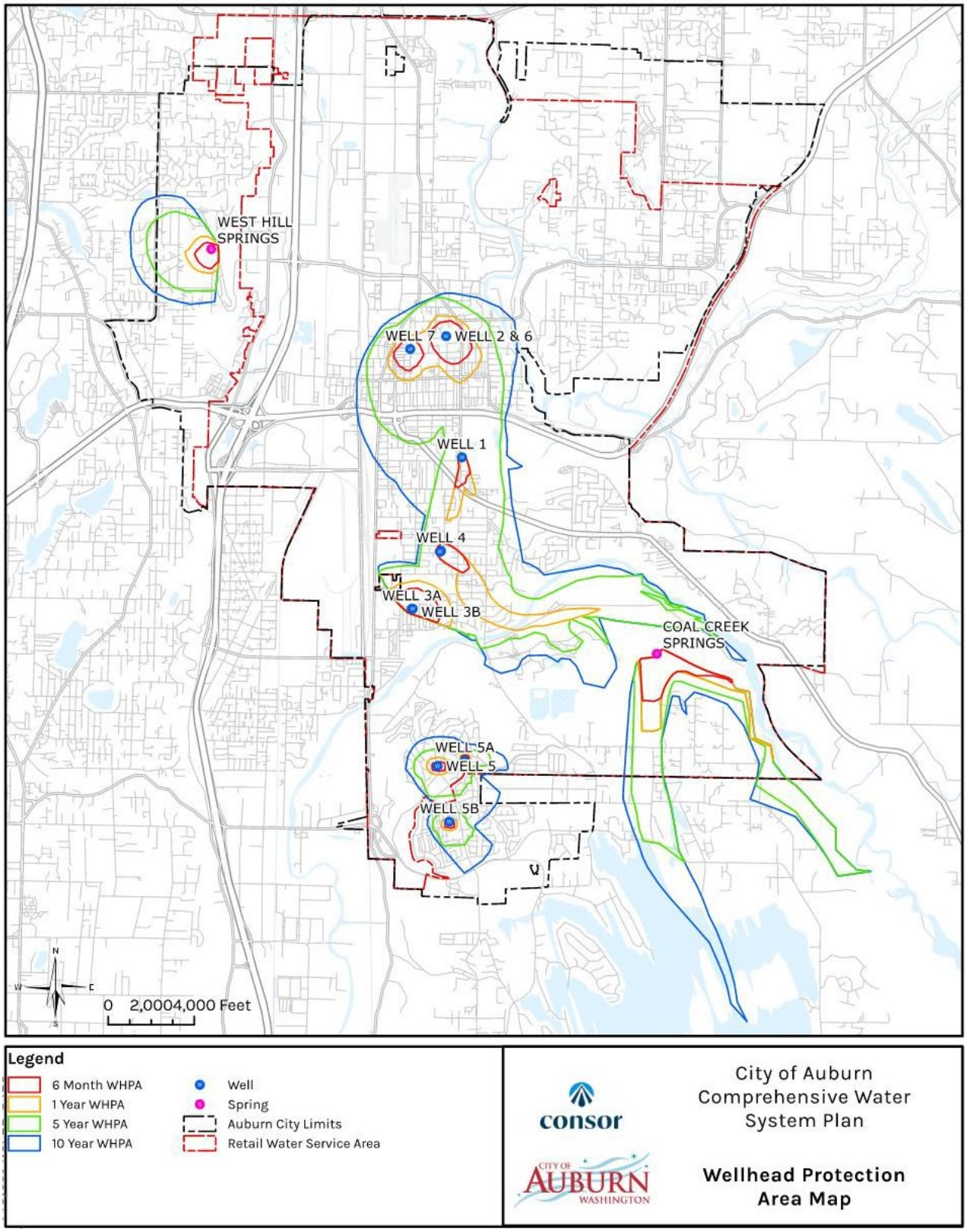
Table 5-1 | Source Susceptibility Assessment Ratings Issued by DOH

Source	Susceptibility Rating
Coal Creek Springs	High
West Hill Springs	High
Well 1	Moderate
Well 2	High
Well 3A	Low (Off-line)
Well 3B	Low (Off-line)
Well 4	Low
Well 5	Low
Well 5A	Low
Well 5B	Low (Off-line)
Well 6	High
Well 7	High (Off-line)

5.2.2 Wellhead Protection Area Delineation

The WHPA defines the area around a groundwater source that has the potential to contaminate the source. This area is based on the source's capture zones, which are the zones of the source aquifer and ground surface that can contribute water to the source in six months, one year, five years, or ten years. The City's 2014 WHPP largely replaced the initial plan created in 2000. The study area, physiographic settings, and WHPAs were defined in the 2000 WHPP and remain valid. Capture zones were delineated using a three-dimensional particle-tracking program with a steady-state head distribution created by a numerical model. The established WHPAs are shown in **Figure 5-1.**

Figure 5-1 | Wellhead Protection Area Map



5.2.3 Contaminant Source Inventory and Notification of Findings

A summary of potential contaminant sources for the City's water sources was updated in April 2024. The Contaminant Source Inventory (CSI) was updated utilizing Ecology's Facility/Site ID database. The contaminant sources are organized by water source and time travel zones, and are included in **Appendix T**.

DOH requires notifications be sent to landowners with potential contaminant sources, as well as state and local agencies, of the CSI findings. Letters and WHPA maps were mailed to landowners in June 2024; copies of the notification letter template and maps that were sent to landowners are included in **Appendix T.**

State and local agencies use the CSI findings and WHPAs to help prioritize local and state pollution control outreach, to provide incentives to landowners for risk reduction, and to support local land-use planning decisions. DOH requires that state and local emergency responders be notified of the WHPAs, results of the susceptibility assessment, CSI findings, and the contingency plan. Copies of the notifications sent to emergency responders and regulatory agencies, as well as the WHPA maps, are included in **Appendix T**. A list of state and local agencies that were sent notifications letters, along with the date of the notification is summarized in **Table 5-2**.

Table 5-2 | State and Local Agencies Notified of CSI Findings

Agency	Notification Date
Washington Department of Ecology	June 2024
Washington State Department of Health Southwest Regional Office	June 2024
King County Public Health	June 2024
Auburn Police Department	June 2024
East Pierce Fire and Rescue	June 2024
King County Fire Protection District 31	June 2024
Mountain View Fire and Rescue	June 2024
South King Fire and Rescue	June 2024
Valley Regional Fire Authority	June 2024

5.2.4 Contingency Plan

The City developed a Water Source Loss Mitigation Plan (City of Auburn Standard Operating Procedure 5.2.1) to address how the water system will provide consumers with adequate supply of potable water in the event one or more sources become temporarily or permanently unavailable; this plan is included in **Appendix T**. Should one water source be unavailable, the City has sufficient capacity across the remaining sources and interties to supply potable drinking water to its customers; water supply availability is evaluated in greater detail in **Chapter 3**.

CHAPTER 6

Operations and Maintenance Program

This chapter provides an overview of the City of Auburn's (City) Water Utility organization, operations and maintenance (O&M). The purpose of the chapter is to document existing procedures and to identify areas where improvements or changes could enhance system operation.

The following topics are addressed in this chapter:

6.1 Water System Management and Personnel
6.2 Operations and Preventive Maintenance
6.3 Comprehensive Water Quality Monitoring
6.4 Emergency Preparedness and Response
6.5 Safety Procedures
6.6 Cross Connection Control Program
6.7 Sanitary Survey Findings
6.8 Customer Complaint Response Program
6.9 Recordkeeping and Reporting
6.10 Summary of O&M Deficiencies and Recommended Improvements

6.1 Water System Management and Personnel

6.1.1 Mission Statement

The mission statement of the City's Water Utility is to provide for the efficient, environmentally sound, and safe management of the existing and future water system within the City's service area.

6.1.2 Department Overview

The Water Utility is responsible for providing potable water to the City's customers that meets or exceeds the recognized standards of today and the future by efficiently administering, operating, and maintaining the water supply. The Water Utility will also continue to enhance its customer service through public education and information. A primary responsibility of the Water Utility is implementing the Comprehensive Water Plan (Plan).

6.1.3 Internal and External Factors

The objective of the Water Utility is based on compliance with internal and external factors. An internal Work Plan Overview is generated at the beginning of each work year with a review process at the end of the year. The Work Plan Overview describes budget goals, performance measures, engineering tasks,

capital projects, and maintenance and operations tasks. External factors include adoption of goals, recommendations, and standards established by the following regulatory or professional practice agencies:

- Washington State Department of Health (DOH)
- Washington State Department of Ecology (Ecology)
- American Public Works Association (APWA)
- Association of Washington Cities (AWC)
- Department of Homeland Security (DHS)
- American Water Works Association (AWWA)
- Washington Cities Insurance Authority (WCIA)
- Municipal Research and Services Center of Washington (MRSC)
- United States Environmental Protection Agency (USEPA)

6.1.4 Water Utility Division Organization

The Auburn Water Utility is operated as a utility enterprise under the direction of the Public Works (PW) Director. Specific Water Utility Management Responsibilities within the PW Department fall under either the Utilities-Water Section of Engineering Services or the Water Division of Maintenance and Operations Services.

The Utilities-Water Section of Engineering Services is responsible for comprehensive water system planning, development of a Capital Improvement Program (CIP), as well as programming the design, construction, and inspection of projects related to the water system.

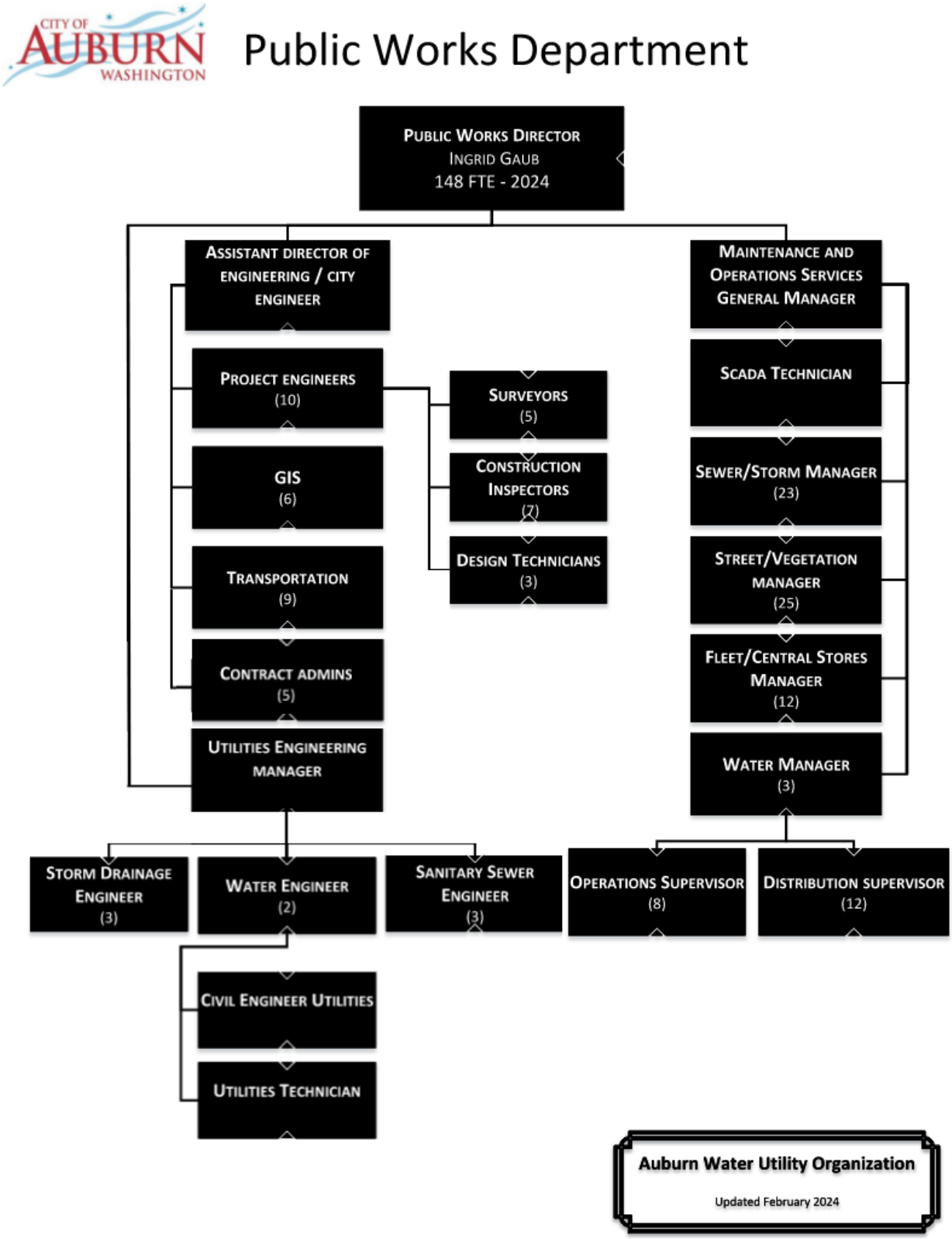
The Water Division of Maintenance and Operations Services is responsible for operating and maintaining the water system, performing daily operation and inspection, water quality monitoring as required by DOH, and line management of the Water Utility.

The organization of the Water Utility is shown within the Public Works Organizational chart in Figure 6-1. The responsibilities of each staff within the Utilities-Water Section of Engineering Services, including professional and technical support staff from within Engineering Services that are not specifically within the Water Utility are summarized below.

- Utilities Engineering Manager and Water Utility Engineer: Primarily responsible for development of the comprehensive water plans, water capital facility plan, annual project budgeting, technical design, and construction standards, "as-built" drawings, and designs, utilized in the construction of the water systems facilities. They also provide technical computations, water modeling and other analysis required to support system operation. Additional responsibilities include engineering, consultant contracts, capital projects planning, and customer assistance with City code, drawings, and permits.

- Water Quality Programs Coordinator: Assist with the Water Quality and Water Conservation Programs and is responsible for compiling DOH sampling data and verifying DOH sampling was conducted per the sampling schedule.

Figure 6-1 | Auburn Water Utility Organizational Chart



- City Engineer: Responsible for issuance of the City's Design and Construction Standards. Responsible for the management and the design and construction of capital projects managed by Project Engineers, including consultant-designed projects and construction contractors. Under the direction of the City Engineer, GIS Specialists are responsible for the transfer of data from "as-built" drawings to the GIS database. GIS is a mapping software that records and locates infrastructure related to the water system. GIS Specialists are also responsible for provision of maps and statistics to staff within the PW Department.

- Utilities Technician: Assist with certain permit-related activities involving the water system. The Technician is also responsible for customer inquiries, assistance with applications, tracking water system usage for reporting, and updating and updating water system records.

- Utilities Civil Engineer: Review City capital improvements and development projects pertaining to water system improvements and provides customer assistance regarding projects and permit activities.

Personnel lists for Engineering and Maintenance and Operation (M&O) staff that are responsible for daily operations are summarized in Table 6-1 and Table 6-2. Operations staff provide daily O&M of wells, corrosion control treatment facilities, pump stations, and reservoirs. They also implement the cross connection control program and provide locating services for all City utilities. Distribution staff maintains the complete distribution system including water mains, valves, hydrants, pressure reducing stations, and meters.

The City has a mayor-council form of government; therefore, the PW Director reports to the Mayor. The City Council provides oversight of the Water Utility regarding policy, planning, and management of the water system.

6.1.5 Communication System

The City maintains a robust communication system to contact Water Utility personnel during normal work hours and after hours. This system is necessary to respond to customer requests, routine maintenance, or emergency situations. Maintenance staff vehicles and other rolling stock are all equipped with radios and personnel carry cellular phones. The Water Utility also has access to an inventory of portable emergency use radio units, should they be required.

A Standby Call-Out Program was initiated in 2006 to ensure that coverage for after-hours response was guaranteed. One staff member in Operations and one staff member in Distribution always carry a dedicated cell phone during their off hours. Standby duration runs for one week before responsibility is rotated to the next staff member on the roster.

Water problems involving service leaks, quality issues, main breaks, broken hydrants, etc., that occur outside normal working hours, are reported through the City's 911 emergency response system. An "Emergency Call-Out List" is provided to the emergency operators who will attempt to contact the designated standby Water Distribution or Water Operations employee, based on the type of service required. If contact cannot be made, the operator will contact the designated Standby Public Works Maintenance and Operation Manager.

Table 6-1 | Water Operations and Distribution Staff and Certifications

Position	Primary Function(s)	Certification(s)[1]
Water Manager	Management	Water Distribution Manager 4
Water Operations Field Supervisor	Management (Operations)	Water Distribution Manager 4, Water Treatment Plant Operator 1, Cross Connection Specialist
Water Distribution Field Supervisor	Management (Distribution)	Water Distribution Manager 3
Maintenance Lead (Distribution)	Management (Distribution)	Water Distribution Manager 2
Cross Connection Control Specialist	Cross Connection Control & Backflow Assembly Tester	Water Distribution Manager 1, Cross Connection Specialist, Backflow Assembly Tester
Distribution Specialist	Distribution Operations Maintenance	Water Distribution Manager 1
Maintenance Worker II / Locator	Operations & Distribution Maintenance	N/A
Maintenance Worker I	Operations & Distribution Maintenance	N/A

There are 12 staff members on the On-Call Manager Standby List and one of them has call-out responsibility for an entire week until it rotates to the next staff member. The 12 staff positions on the Standby List are:

- Water Manager
- Water Distribution Supervisor
- Water Operation Supervisors
- Sanitary Sewer and Storm Drainage Manager
- Sanitary Sewer Supervisor
- Storm Drainage Supervisor
- Streets and Vegetation Manager
- Street Supervisor
- Vegetation Supervisor
- Fleet/General Service Manager
- Maintenance & Operations (M&O) Support Supervisor
- M&O Services General Manager

There are also three other maintenance staff members on standby that can be called out as needed. The staff members are employed by Sanitary Sewer Division, Storm Drainage Division, and Street Division. The 911 operator also has phone access to the other Public Works staff, if the situation warrants it.

Telemetry alarms that occur after hours are handled by an automated Supervisory Control and Data Acquisition (SCADA) alarm and an automated dialer for notification called WIN911. The SCADA alarm calls standby staff from the WIN911 list. If no one responds within 15 minutes, then WIN911 calls the Water Operations standby staff on the call out list. The system will continue to cycle through the roster of seven employees until contact is made.

6.1.6 Operator Certification Program

The Washington Administrative Code (WAC) 246-292, requires minimum standards for the certification status of water operators. Also, the City has recognized the value of having a knowledgeable and well-trained staff operating the Water Utility and encourages employees to obtain the highest level of certification available. The City currently serves a population of greater than 50,000, which classifies their

distribution system into a group 4 according to WAC 246-292-040. Certifications required per staff role are summarized in Table 6-1.

The City pays for annual certification fees, provides time and tuition for certification training courses, and allows time for certification examinations. In addition, the City provides opportunities for staff to obtain continuing education units (CEUs) to maintain certification. Professional growth requirements for certification CEUs are monitored and maintained by the Washington Certification Services.

6.1.7 Education and Training Program

Continuing educational opportunities are fundamental for staff in the Water Utility. The Water Utility training budget is funded to support staff in maintaining their technical awareness and skill sets. Seminars, conferences, and college coursework: 1) broaden their knowledge and 2) allow them to network with other professionals involved in Water Utility work. Subjects include cross connection control, pumps, motors, pressure reducing valves, hydrants, chlorination, generators, forklift training, confined space, first aid, CPR, electrics, and other essential topics.

Most staff are tasked with specific job functions during their normal work shift and the consistent nature of the work allows them to complete their jobs in a very professional and efficient manner. However, all staff are rotated through an active cross training program to cope with employee absences such as vacation, sickness, retirement, and termination.

6.2 Operations and Preventive Maintenance

The City's water system is comprised of pump stations, chlorination stations, corrosion control facilities, reservoirs, springs, and wells. Figure 1-3 presented in Chapter 1 provides an overview map of the major existing system facilities. These components all work together to ensure that water is available to meet customer demands. Primary operation of the water system is maintained via the SCADA computerized control system. AVEVA software works in association with SCADA to provide real time graphical display of system data for staff interpretation and control. The SCADA system is often referred to as the Telemetry system based on one of the definitions of Telemetry (the science and technology of the transmission and measurement of data from a distant source). The City's SCADA system is monitored in the Public Works M&O Building, 1305 C Street SW, and responsibility for the system related to the Water Utility falls under the Water Manager and associated staff.

Some of the functions that SCADA monitors, records, and controls include:

- Reservoir levels
- Source meter production
- Pumps
- Motors
- Valves
- Chlorination
- Pressures: Low, High, Discharge, Suction
- Alarms: Intrusion, Fire, Generator Run, Low Fuel, Overflows, Failures, Turbidity

Status reports are continuously received via radio and information regarding system demand is used to determine system activation. The SCADA system includes logic programming which automates the process; however, Operations staff can manually override most computer decisions, if necessary. The alarm infrastructure is linked to WIN911 for after-hour call-out and response.

All data monitored by the SCADA system is electronically recorded by a computer server maintained by the Innovation & Technology (IT) Department. A back-up copy is made each evening to ensure that records are retrievable should hardware or software failures occur. SCADA records are available to all PW staff via the City's computer server. Access and control of the system is relegated to two dedicated computer terminals at the M&O Building. The computer terminal that houses SCADA is password protected and entry into the building is keycard access controlled.

The SCADA software and historical data is maintained on the City's Wide Area Network (WAN). Staff have access to the system via workstations connected to the WAN or remote network applications. A telephone connection provides the auto-dialer for the WIN911 notification to phones or pagers. An Ethernet radio connected to the computer system at the M&O Building sends and receives radio signals to/from the Programmable Logic Controllers (PLCs) at the water facilities. PLCs at the facilities are also able to communicate directly with each other via radio signal.

The City recently completed a SCADA Upgrade Project, completed in 2024, which updated the system platform to the most current version, modernizing the City's SCADA system from its last major upgrade in 2015. Major components were also replaced throughout the system to provide more reliable communication. The new hardware, in conjunction with software upgrades, provides additional control of the city's facilities.

6.2.1 Inspections, Preventive Maintenance, Repairs, and Replacement

Systematic inspection of Water Utility facilities is conducted on a daily or weekly basis by Distribution Specialists under direction of the Water Operations Supervisor as summarized in Table 6-2. The inspection process serves the following purposes:

- System Confirmation - proper operation of automated control and monitoring equipment
- Sound Check - listen for unusual noises
- Well Levels - static and dynamic
- Equipment Check - pumps, motors, valves, chlorination, heaters, vents, generators, etc.
- Security Verification - intrusion, vents, hatches, locks, gates, graffiti, etc.

A portion of the maintenance tasks handled by the Operations staff are associated with a Preventive Maintenance Program and some of those activities are arranged to coincide with the Facility Inspection Schedule shown in Table 6-2. The maintenance activities are based on equipment manufacturer recommendations and maintenance staff observations for infrastructure located within and outside the facility. Preventive maintenance tasks are essential for reliable operations and preservation of investment so adherence to the program is stressed. Additional maintenance activities handled by Water Operations staff include repairs, replacement, small improvement projects, and response to customer requests.

The Distribution staff is involved in the same activities as Water Operations staff regarding inspection, preventive maintenance, repairs, replacement, and response to customer requests. Water Distribution staff activities are usually in response to damage or leaks involving mainlines, service laterals, meters, meter boxes, and hydrants. Other Distribution tasks include fire flow testing, system flushing, meter installation, and miscellaneous small improvement projects.

Most customer requests are associated with water quality concerns and water pressure issues. Those requests are handled by the Distribution staff and/or Cross Connection Specialists, on a case-by-case basis.

Table 6-2 | Water Operations - Facility Inspection Schedule

Type of Facility	Facility Name	Daily Inspection 5 Day Workweek	Weekly Inspection
Booster Pump Station	Academy Pump Station 3	X	
	Academy East Booster Pump Station	X	
	Green River Pump Station	X	
	Lea Hill Pump Station	X	
	Lea Hill Booster Pump Station		X
	Lea Hill Intertie Booster Pump Station	X	
	Terrace View Booster Pump Station	X	
	Lakeland Hills Booster Pump Station	X	
	Game Farm Park Pump Station		X
	Braunwood Booster Pump Station	X	
Chlorination Facility	Lea Hill Intertie Pump Station (Re-chlorination)	X	
	Terrace View Booster Pump Station (Re-chlorination)	X	
	Coal Creek Springs – Chlorine Gas	X	
	West Hill Springs - Chlorine Gas	X	
	Well 1 – Hypochlorite	X	
	Well 3A – Chlorine Gas (when well is in operation)		Off-line
	Well 3B – Chlorine Gas (when well is in operation)		Off-line
	Well 4 - Hypochlorite	X	
	Fulmer Field Corrosion Control Facility – Onsite Generated Hypochlorite (Treats Well 2, 6, and 7 sources)	X	
	Well 5A - Hypochlorite	X	
	Braunwood Well - Hypochlorite	X	
Corrosion Control Facility	Howard Road Corrosion Control Treatment Facility (Treats Coal Creek Springs source)	X	
	Fulmer Field Corrosion Control Treatment Facility (Treats Well 2, 6 and 7 sources)	X	
Metals Removal Facility	Well 5B (Treats iron and manganese)		Off-line
Reservoir	Reservoir 1 – Valley Service Area	X	
	Reservoir 2 – Valley Service Area	X	
	Reservoir 4A – Lea Hill Service Area	X	
	Reservoir 4B – Lea Hill Service Area	X	
	Reservoir 5 – Lakeland Service Area	X	
	Reservoir 6 – Lakeland Service Area	X	
	Reservoir 8A - Academy Service Area	X	
	Reservoir 8B - Academy Service Area	X	
	Braunwood Reservoir	X	
Spring Source	Coal Creek Springs	X	
	West Hill Springs	X	

Type of Facility	Facility Name	Daily Inspection 5 Day Workweek	Weekly Inspection
Well Source	Well 1	X	
	Well 2	X	
	Well 3A (Off-line)		Off-line
	Well 3B (Off-line)		Off-line
	Well 4	X	
	Well 5	X	
	Well 5A	X	
	Well 5B (Off-line)		Off-line
	Well 6	X (when on)	X (when off)
	Well 7 (Off-line)		Off-line
	Braunwood Satellite Well	X	
Intertie Supply	Tacoma B Street Intertie		X
	Tacoma 132nd Avenue Intertie		X

6.2.2 Reservoir Maintenance

Reservoirs are a fundamental part of the water distribution system. They act as storage and regulating devices for water flow and maintaining them in prime physical condition is an essential activity. The Water Utility began a rigorous reservoir maintenance program in 1997 and it has evolved into an annual routine function. Each year, two of the reservoirs have their interiors thoroughly inspected by a contractor experienced in reservoir maintenance. The annual inspection process is based on a rotational schedule to ensure inspection of each reservoir on a 5-year timetable.

Since the reservoirs are usually filled with water, a diver must conduct the inspection. The diver is equipped with lights and an audio/video device to record the process. Issues of concern include corrosion, cracks, and condition of coating on the walls, valve, fasteners, etc. The diver is also equipped with a vacuum unit to remove sedimentation. The contractor also performs a visual inspection of the exterior of the reservoir for the same elements noted for the interior. The recording is reviewed by the contractor, a report is generated based on the interior and exterior inspection and a copy of the report and recording are given to the Water Manager and Water Utility Engineer for review.

If the report and recording indicate that a reservoir needs major repair, relining, or repainting, another contractor is acquired for a recommended course of action. If interior work is required, the reservoir must be drained of water. In those situations, a carefully orchestrated timetable and shifting of water resources is necessary to balance maintenance with the needs of the City's customers.

6.2.3 Pump Station Maintenance

Pump Stations are inspected daily or weekly depending on the station by Water Operations staff. The inspection checklist includes confirming that proper operation of the automated controls and monitoring equipment align with the standard operating procedures for the equipment, sound checks for unusual noises, static and dynamic well level checks, equipment checks (pumps, motors, valves, chlorination, heaters, vents, generators, etc.), security checks through visual inspection of the facility grounds for

intrusion, graffiti, or issues with vents, hatches, locks, gates, and anything else that may seem unusual or misaligned.

6.2.4 Treatment Facility Maintenance

Treatment Facilities are inspected daily by Water Operations staff. The inspection checklist includes confirming that proper operation of the automated controls and monitoring equipment align with the standard operating procedures for the equipment, sound checks for unusual noises, equipment checks (pumps, motors, valves, chlorination, heaters, vents, generators, aeration towers, etc.), security checks through visual inspection of the facility grounds for intrusion, graffiti, or issues with vents, hatches, locks, gates, and anything else that may seem unusual or misaligned.

6.2.5 Pressure Reducing Valve Stations

Pressure Reducing Valve (PRV) Stations are inspected every month by Water Operations staff. The inspection checklist includes condition of the vault, valves, inlet pressure, outlet pressure, and pilot controls. Staff inspections are supplemented by a more thorough inspection and calibration process conducted annually by a contractor that specializes in PRVs. Repair or replacement maintenance, unless minor, is usually performed by the contractor. The City plans to implement an in-house repair maintenance program.

Rebuilds of PRVs are typically done every three to five years based on the rebuild schedule.

6.2.6 Utility Locating Service

Two Water Utility staff are designated as the Utility Locators for all City utilities and roadway infrastructure (Water, Storm Drainage, Sanitary Sewer, and Street lights and traffic signals) and additional staff may also be present to provide flagging when safety issues arise. The number of location requests varies daily but averages out to a full-time commitment. The Utility Locators report to the Water Operation Supervisor, but location requests may be made indirectly by the Water Distribution, Sanitary Sewer, or Storm Drainage Supervisors.

6.2.7 Fire Hydrant Inspection

In 1999, a fire hydrant inspection goal was initiated. The intent was to inspect, repair, and test at least one third of the utility owned fire hydrants in the system each year. The importance of this program cannot be understated since fire hydrants are the first defense against loss of life or property due to fire. The inspections also improve water quality due to the stagnant water that is purged from the hydrant stubs. A water de-chlorination program, in response to Ecology guidelines, was initiated in 2001 to treat water purged from hydrant stubs. The Water Distribution Supervisor has made public hydrant inspection a year-round routine task of Water Utility operations. Secondary maintenance of public hydrants such as rust removal, painting, street reflector replacement, clearing obstructions, etc., is handled by seasonal part time staff when time permits. Property owners with private hydrants are solely responsible for obtaining annual, satisfactory inspections of their private hydrants from a qualified inspector.

6.2.8 Dead-end Flushing

A key component of water quality control is dead-end line flushing. The City has approximately 548 dead-end mains throughout the distribution system. The water in dead-end mains tends to stagnate due to lack of turnover which can have an impact on water quality for customers in the immediate vicinity. Flushing dead-ends is the only effective way to purge the lines of stagnant water and associated particulate matter.

In 2000, an engineering consulting firm was hired to assist the City with the development of a Dead-end Flushing Program. They examined the City's distribution system via GIS data and supplemented the study with field inspections. A comprehensive operating procedure detailing separate flushing instructions for each dead-end was developed and continues to be used today.

Maintenance staff, under the direction of the Water Distribution Supervisor, follow the program instructions and record their activities. This program has been incorporated into the Unidirectional Flushing program, see Section 6.3.8.

6.2.9 Valve Exercising

The AWWA technical manual *M44 Distribution Valves: Selection, Installation, Field Testing, and Maintenance*, suggests that valve exercising should be conducted each year and more frequently for valves 16 inches and larger.

The Water Utility has a Valve Exercising Program, which is in concert with the Unidirectional and Dead-end Flushing programs. Historically, distribution valves have only been exercised on a limited and sporadic basis. Through the Valve Exercising Program, the City's goal is to exercise 25 percent of the distribution valves each year. Hydrant foot valves are not included in the valve exercising program and instead, are exercised as part of the hydrant inspection process.

Opening and closing valves by hand is a repetitive, ergonomically unsafe, and time-consuming task. The City has purchased a portable valve exercising machine and vacuum device to speed up removal of debris that collects in the bottom of valve boxes. Valves requiring repair or replacement are documented and corrected by City Staff or contractors.

Additionally, Distribution staff work with GIS staff to correct inaccurate valve information in the City's GIS data.

6.2.10 Unidirectional Flushing

In 2013, the City implemented a comprehensive Unidirectional Flushing (UDF) program to flush its water system. The program's goals include:

- Improving cleaning of accumulated deposits on pipes,
- Reducing water use, as compared with conventional flushing, and
- Reducing the impact on customers.

The Water Distribution Supervisor is responsible for the UDF program to maintain Water Quality.

The UDF process concentrates flow within a pipe by closing valves and using specific hydrants to isolate each pipeline and create flow in a single direction. The concentrated flows increase velocities within the pipe that results in scouring of accumulated deposits on pipes. UDF may remove sand, gravel, plastic, biofilms, and other accumulated materials that are not removed by conventional flushing. The cleaned mains may have improved water clarity or color, reduced turbidity, and improved chlorine residual.

Flushing times of a half hour or less are typical, which can equate to substantial water savings. Therefore, UDF is a key component of the City's Water Use Efficiency (WUE) program. The reduced flushing time also limits the impact on the Water Utility's customers.

As previously mentioned, the City has incorporated the valve exercising and dead-end flushing programs into the UDF program. Valves not used as part of a flushing sequence along each pipe length are exercised by distribution system staff to complete the Valve Exercising Program. While the UDF program flushes dead-end mains, more frequent dead-end main flushing may be required for water quality reasons. The UDF program also provides static pressure measurements.

The City's goal is to conduct UDF of approximately 20 percent of the system each year.

6.2.11 System Loss Program

The City has committed to an active System Loss Program to maintain water loss under 10 percent. The achievement is documented each year in the Distribution System Leakage Report. Elements of the Program include Leak Detection, Source Meter Calibration, Large Meter Testing, and Meter Replacement. Each of these is discussed in detail below.

6.2.11.1 Leak Detection

The City is committed to a tight, non-leaking water distribution system. As of 2016, the city implemented an in-house Leak Detection program, with a goal to inspect 90 miles of water main every year.

6.2.11.2 Source Meters

Source meters, also known as production meters, measure the amount of water emitted from the City's springs and wells. They are calibrated by an outside contractor under the direction of the Water Operations Supervisor and if a meter cannot be calibrated properly, it is replaced with a new one.

6.2.11.3 Meter Replacement Program

Between 2017 and 2018, the City replaced all service meters with an Automated Metering Infrastructure (AMI) system, under the Water Meter and Billing System Improvements project. The system automatically receives meter reads via radio transmission and integrates the data into the City's billing software. The benefits of an AMI system include increased accuracy and efficiency; early leak detection; high usage, zero usage, and backflow detection; and improved customer service. This has saved staff time associated with regular meter reading, missed or incorrect reads, final reads for customer account close-out, and confirmation of high reads for potential leaks. An optional interactive customer portal allows customers to view their monthly, daily, and hourly usage to see exactly when they are using water and how much. This allows customers to better understand their water usage, encourages conservation, and potentially saves them money.

The AMI system is anticipated to have a 20-year life. That includes the system components and batteries in the radios. Meter replacement will be on a 20-year program to coincide with the AMI system.

6.2.11.4 Meter Services

Water Distribution staff are responsible for all new service connections under three inches and contractors are usually secured for installation of sizes three inches and larger. Repairs, retrofits, or replacements of existing services are typically conducted by Water Distribution Staff unless unusual circumstances arise. Meter services consist of meters, meter vaults, meter boxes, service lines, valves, setters, and other associated equipment. The City uses master meters when beneficial to the City and its customers. Master meters are currently used at several mobile home parks, the Auburn Business Park, and Muckleshoot Indian Tribe (MIT) commercial properties.

6.2.11.5 Large Meter Testing

Large meters are devices that measure water consumed by customers with significant demand requirements. They are usually employed by the following customer classes:

- Commercial
- Farms or Parks – Irrigation
- Schools
- Multifamily Complexes
- Industrial / Manufacturing Businesses
- Wholesale Customers
- Municipal Buildings

Large meters are defined as water meters three inches or larger. The system contains a total of 151 large meters, all of which are calibrated annually, as part of the City's System Loss Program.

Calibration of large meters is conducted by an outside contractor, but one maintenance staff member under the direction of the Water Distribution Supervisor assists in the process. If a meter cannot be calibrated, it is replaced with a new one.

6.2.12 Distribution System Corrosion Inspection

One program that the Water Distribution Division would like to activate, if additional funds and labor resources are available, is a Distribution System Corrosion Inspection program. A significant percentage of the City's piping system is constructed of metal which is subject to corrosive deterioration. Corrosion is an electrochemical reaction whereby metal is eroded and reduced. It is not possible to stop corrosion of metal pipe, but it can be substantially reduced if proper anti-corrosive measures are taken.

The Distribution System Corrosion inspection will identify which pipes can benefit from corrosion resistance measures, resulting in a longer serviceable life. Popular measures taken to resist corrosion include coatings, poly-bagging, and anode packs, and they are described further below:

- Coatings are electrical insulator types of finishes applied to a surface and is the most common method of corrosion protection. Though coatings are common, they are subject to damage and decay. Damage from soil stress such as contraction and expansion can rip coatings from pipes. Pinholes in the insulation, also known as holidays, can allow seepage between the coating and pipe and accelerate corrosion. Penetration of the pipe occurs even more rapidly when pinholes are present than it would on a bare line.

- Anode packs are metal cylinders that are connected to a metal structure via electrically conductive wires and inserted into the ground adjacent to the structure. The ground is subject to stray electric currents and these currents are the electrical component of the electrochemical nature of corrosion. Anode packs become the sacrificial metal to corrode in lieu of the structure. This type of treatment, when initiated, provides benefits in two ways: 1) it could save substantial amounts of money by reducing unnecessary, early replacement of pipe and 2) it would reduce possible disruptive service to the City's customers that could occur if pipe replacement were necessary. Though anodes packs are effective and economical, their current capacity is limited and they typically have a short lifespan.

- Poly-bagging is the process of wrapping the exterior of buried water mains and appurtenances, typically under the influence of corrosive soils, with polyethylene, creating a protective layer around the mains and appurtenances. Poly-bagging is an effective method for corrosion protection of water mains and they are resistant to tearing or puncturing. Though economical, they are not as environmentally friendly and add another layer to maintenance activities.

6.3 Comprehensive Water Quality Monitoring

The Water Operations staff maintains an active and ongoing program of water quality monitoring and reporting to ensure a safe, high quality water supply. Two staff members are responsible for water quality monitoring, sampling, control, and record keeping. The Water Operations staff also receives assistance from the Engineering Services - Water Quality Program Coordinator. A detailed description of the City's water quality monitoring and results is presented in Appendix Q, which includes the following:

- Summary of the City's water quality monitoring programs.
- Summary of recent water quality testing results.
- Summary of the Wholesale Interties Blending Evaluation.

The City's Water Quality Monitoring Program is detailed in a manual entitled "City of Auburn Public Water System Water Quality Monitoring Plan" provided in Appendix O. The document includes plans associated with coliform, lead and copper, disinfection by-products and treatment specific monitoring, and the Water Quality Monitoring Schedule. These plans comply with DOH regulations for Group A public water systems. All sampling is conducted in accordance with the annual Water Quality Monitoring Schedule received from DOH. The City samples for inorganic and physical parameters, synthetic and volatile organic compounds, asbestos, nitrate and nitrite, radionuclides, coliforms, residual chlorine, disinfection byproducts, lead and copper, fluoride, and per and poly-fluoroalkyl substances (PFAS). A map of the sampling locations is included with the documents provided in Appendix O.

Additional sampling also occurs based on special requests by DOH or by customers concerned about water quality issues involving unusual taste, odor, or color.

The Water Manager maintains hard copies of the water quality analysis laboratory reports. These reports are kept at the M&O Building in files organized by years and analysis type. As specified by DOH regulations, chemical analysis reports are kept indefinitely, and bacteriological reports are maintained for a minimum of five years.

The City will comply with the Follow-Up Action Requirements of WAC 246-290-320 whenever water quality results exceed a prescribed level. The Water Utility also complies with the requirements of WAC 246-290 for public notification, as established by the Safe Drinking Water Act (SDWA) and DOH.

Forms for "Water Boil Notification" and "Drinking Water Problem Corrected Notification" have been developed and are available for immediate distribution, if necessary. A list of the appropriate print, TV, and radio media to contact for public notice is included in the electronic Emergency Response Manual. An additional procedure described in the Emergency Response Manual to address water quality issues involves an "Action Plan for Water System Contamination Via Threat Warning."

The City maintains equipment to perform some basic water quality monitoring functions. However, all testing required for water quality regulatory compliance is contracted to independent testing laboratories. The current primary laboratory used by the City is:

Water Management Laboratory
1515 80th Street East
Tacoma, Washington 98404
206-531-3121

If testing cannot be done on a timely basis, the City also uses the following laboratory:

Analytical Resources, Inc.
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200

6.4 Emergency Preparedness and Response

The City has prepared an electronic Public Works Emergency Response Manual (Manual) as a guide for management of emergency situations, with the objective of protecting life and property and restoration of essential services, such as providing clean water, as quickly as possible. The Manual is only one element of the City's overall Emergency Response Plan, which serves as a guide and was first developed in 1999 in response to the potential impact of Y2K. The Emergency Response Plan is updated annually at the first of the year. It is not all-inclusive for every type of disaster that could occur but is a valuable tool for dealing with many of the emergency situations that most utilities could face.

The Manual contains a detailed table of contents and is tabbed to allow quick access to information. Three copies of the Manual have been published. Copies are located at the M&O Building, in Engineering Services with the Public Works Director, and at the Valley Regional Fire Authority, Station 31. The Manual is also available in digital format on the City's computer server.

The master response program for the entire City is documented in the Comprehensive Emergency Management Plan (CEMP), which provides guidance to the Emergency Management Organization for mitigation, preparedness, responsibilities, recovery operations, training, and community education activities. The CEMP also describes the functions of local government and incorporation of essential non-governmental organizations into the Emergency Management Organization. Copies are in each City Department, the Public Works M&O Building, and the Valley Regional Fire Authority, Station 31. The CEMP is also available in digital format on the City's Emergency Operation Center (EOC) computer server.

An additional emergency response manual that is available for use is the Water Division Intertie Locations and Policy Manual. This manual contains contact names, addresses, and phone numbers for cities and water districts that have intertie connections with the City. Included are photos of the intertie vaults, valves, and meters, along with information for activating or deactivating an intertie. Three copies have been published and are located at the M&O Building, in Engineering Services with the Water Utility Engineer, and at the Valley Regional Fire Authority, Station 31.

The City has been involved with several tabletop exercises to prepare for emergencies and they are an ongoing feature of the City's Emergency Response Program. Staff, depending on their position, have also been trained for emergencies in accordance with the Federal Emergency Management Authority (FEMA)

under the auspices of Homeland Security. The training program, known as the National Incident Management System (NIMS), offers educational classes tailored for the Incident Command System (ICS).

The NIMS and ICS program is a solid blueprint for federal and local emergency command activities, but it does not provide the type of response details needed by PW maintenance staff and managers. Consequently, the PW Emergency Response Manual is the reference tool referred to on a more intimate scale.

6.4.1 Vulnerability Assessment

The City's Vulnerability Assessment (VA) was prepared in 2004 under the guidance of an engineering consultant firm and it was submitted to the USEPA on November 15, 2004. A Water System Security Improvement Plan (WSSIP) was also prepared in conjunction with the VA to prevent or significantly lessen the impact of intrusive activities.

Recommendations noted in the WSSIP have been adequately addressed by completing the SCADA system upgrades and physical security project. As further upgrades are completed at City facilities, the recommendations noted in the WSSIP are considered, as well as other considerations as technology continues to advance.

6.4.2 Wellhead Protection Program

The City's wellhead protection program is key to managing potential sources of groundwater contamination prior to their entry into the drinking water system. The wellhead protection plan (WHP) was updated as part of the Plan and summarized in Chapter 5.

Engineering Services staff are charged with implementation of the program. Staff track and follow up on construction projects, spills, and monitor possible contamination sources, as possible.

6.4.3 Water Shortage Contingency Plan

In Auburn City Code (ACC) 13.14 the Mayor may order water use restrictions and conservation measures, when necessary, to protect public health, safety, and welfare during a water shortage or emergency caused by drought conditions, city water utility damage or destruction, or any other cause which threatens to disrupt or diminish the City's water supply below its ability to meet normal demands.

The City has also updated its Water Shortage Contingency Plan, attached as Appendix R, which establishes actions and procedures during impending or actual water shortages. These actions and activities maintain levels of service essential for public health and safety, minimize adverse impacts on economic activity, and protect customers' lifestyles. The plan addresses both progressive situations, such as those that are weather-related, and more drastic and immediate situations such as facility emergencies (e.g., a pipeline break). Initial stages of the Water Shortage Contingency Plan may coincide with efforts in the WUE program; however, it is distinct as it is a response to a specific situation, and it may lead to mandatory restrictions and curtailment.

6.5 Safety Procedures

The City has a comprehensive safety program that meets Occupational Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Act (WISHA) regulations. The safety policies and procedures for the water department are documented in 25 policies that are summarized in Table 6-3. The

policies cover the full range of hazards staff may experience while operating the water system. These include, but are not limited to, operation of motor vehicles and equipment, chemicals, confined spaces, falls, traffic, and fires. Each policy includes a purpose, organization affected, references, the policy, definitions, procedures to implement the policy, and responsibilities for the implementation. Responsibilities are assigned to individual roles, such as employee, supervisor, or safety manager. The policies and procedures clearly identify contact information of the applicable regulating agencies in case of a serious incident. All policies are available on the City's intranet.

Table 6-3 | Safety Policies and Procedures

Number	Policy Name	Description
300-01	Workplace Health & Safety	Document workplace health and safety policy
300-03	Hearing Conservation	Implement program to protect employee hearing
300-04	Personal Protective Equipment	Establish policy that requires employees to always use personal protective equipment when performing certain tasks or when in an unsafe environment
300-05	Flagger Certification	Flagger certification requirements
300-06	First Aid	Employee first aid training, first aid supplies and emergency stations
300-07	Hazard Reporting	Procedure to report an obvious or potential safety or health hazard
300-08	Incident Reporting	Procedures for reporting non-vehicular incidents
300-09	On The Job Injury	Establish policy to monitor on-the-job injuries
300-10	Safety Inspection of City Owned Facilities	Procedure for inspection of all City-owned and operated facilities
300-11	Central Safety Committee	Establish function and structure of Central Safety Committee
300-13	Emergency Evacuations of City Buildings	Procedure for evacuation of City buildings in the event of an emergency
300-14	Safety Restraints & Seat Belts	Requires mandatory use of safety restraints/seat belts while driving or riding in the City vehicles
300-15	Excavation Trenching & Shoring	Establish policy for shoring and sloping all excavations or trenches over four (4) feet in depth
300-16	Safety Line Procedure All Cranes, Backhoes, & Hoists	Procedures for controlling moving loads being hoisted or swinging ground or truck using hoists, backhoes, cranes, or any mechanical device use in moving loads
300-17	Chemical Hazard Communication (Worker Right To Know)	Establish chemical and global hazard communication program to assure the health and safety of City employees
300-18	Welding, Brazing, & Cutting	Procedure for welding, cutting or brazing work or practices which may result in an injury or death
300-19	Lockout & Tagout	Requirements for the lockout or tagout of energy isolating devices
300-20	Bloodborne Pathogens	Procedure to prevent exposure to blood or other substances and materials that may carry bloodborne pathogens. Procedures for decontamination of equipment and evaluation and treatment of employees who experience exposure.
300-21	Reporting Vehicle Accidents	Procedure for reporting vehicle accidents
300-22	Heat Related Illness	Training for potential heat related illness

Number	Policy Name	Description
300-23	Confined Spaces	Procedures for entering a confined space
300-24	Green Housekeeping Guidelines	Procedures that sustain a "Green Cleaning" environment
300-25	Respiratory Protection Program	Procedures that will prevent employees from inhaling hazardous airborne chemicals
300-26	Fall Protection & Rooftop Safety	Procedures for rooftop safety and use of fall protection
300-27	Powered Industrial Trucks	Training, operation, and safety of powered industrial vehicles

In addition to the policies, all M&O staff receive safety training. The contents of the training are periodically reviewed and updated, if necessary, through departmental and city-wide safety committees. The Human Resources and Risk Management Department maintains information and schedules on safety training.

The City maintains appropriate safety equipment and information. Each vehicle and facility have a fire extinguisher and first aid kit. All staff use personal protective equipment, such as hard hats, safety glasses, safety vests, etc., appropriate to the task. Climbing equipment and lockout/tagout equipment is available and stored at the M&O Building and the Well 7 storage facility. Additionally, each site with chemicals has a Safety Data Sheets (SDS) book that contains the Material Safety Data Sheets (MSDS) for all chemicals on site. A master sheet of all chemicals used by the Water Utility is maintained at the M&O Building.

6.6 Cross Connection Control Program

The City's Cross Connection Control Program (provided in Appendix Q) protects the public water system as defined by WAC 246.290.010, WAC 246.290.490, and Auburn City Code (ACC) 13.12 from contamination via cross connection hazards. It describes minimum operating policies, provides guidelines for installation, testing, and maintenance of approved backflow prevention assemblies, permitting process, inspection, and survey requirements for existing and new water service connections. The program is maintained by two Cross Connection Specialists under the direction of the Water Operations Supervisor. The specialists are responsible for identification and elimination of potential and actual cross connections and contamination hazards within the public water system.

6.7 Sanitary Survey Findings

DOH completes periodic inspections of the City's water facilities, their operations, and facility records to identify potential health risks to the public. The sanitary survey, conducted by DOH on August 22, 2022, identified significant deficiencies such as air gaps or backflow assemblies that must be added to the water supply lines at Wells 5 and 5A. Additionally, repair needs were identified for the reservoir overflow screens at Reservoirs 8A and 8B.

DOH identified the need to terminate the pump to waste line at Well 5 above grade and either raise the casing at Well 5A or provide a sump pump or alarms to address potential water accumulation in the vault. Weekly vault inspections, especially after significant storms, were recommended until a permanent solution is implemented.

The survey noted that the reservoir vents at Reservoirs 4A, 4B, and 8A should open downward to prevent debris entry. It also identified a need for evaluation of the overflow piping at Reservoirs 2, 4A, and 4B, to ensure compliance with regulations.

The next DOH sanitary survey is scheduled for 2027.

The City has taken the following actions to address some of the deficiencies identified in the sanitary survey.

- A backflow assembly was installed at Well 5A.
- The reservoir overflow screen at Reservoirs 8A and 8B was repaired on September 13, 2022.
- The City implemented an inspection and maintenance program to conduct weekly inspections at Well 5A and immediately after a significant storm even.
- The direct connections of reservoir overflows (Reservoirs 4A and B to drains, sanitary sewer, and/or storm sewer) have been addressed.

The following deficiencies identified in the sanitary survey will be addressed with ongoing or planned Capital Improvement Projects identified in Chapter 8 and are captured in Section 6.13 as recommended improvements:

- Reservoir vents will be retrofitted or replaced as part of the ongoing Reservoirs 4A, 4B, 8A, and 8B Seismic Valves Retrofit capital project.
- The request for the pump to waste line at Well 5 to terminate above grade will be addressed with a capital improvement project.
- The direct connections of reservoir overflows (Reservoirs 2) to drains, sanitary sewer, and/or storm sewer, will be addressed with a capital improvement project.

6.8 Customer Complaint Response Program

One member of the Water Distribution staff is a Customer Service Representative. This individual is responsible for meter turn-on and turn-off, delinquency notices, meter rereads, new service reads, final service reads, leak adjustments, high consumption investigations, account documentation, and other duties, as assigned. The employee maintains a modified work schedule, which provides more flexibility in dealing with emergency service requests by customers.

Beginning in 2006, the Water Utility, along with the rest of PW transitioned to an asset management software system called CarteGraph. Some of the benefits include:

- Ability to assign and track citizen complaints and requests
- Produce work orders
- Monitor work and maintenance projects
- Track costs for labor, equipment, and material
- Enhanced inventory control
- Integration with GIS
- Benchmark analysis
- Generate reports
- Track infrastructure conditions – GASB 34

The City has a customer service program accessible by the public and City staff via the City's website. Customers fill out the online Citizen Report form and describe the services they are seeking. The submitted form downloads into the CarteGraph system for review and action by staff. In addition, customers can stay connected with the City on mobile devices with a SeeClickFix application. The SeeClickFix app allows customers to report graffiti, abandoned vehicles or potholes, water issues, etc.

6.8.1 Customer Request Response Program

As described above, the CarteGraph system can assign and track customer requests (or complaints) and produce work orders. The City maintains a list of requests and identifies the work done to respond to any requests from the public. The City categorizes the citizen reported issues into the following five categories:

- Water Appearance: contains all requests related to the color of the water (brown, discoloration, cloudy, etc.)
- Odor: contains all requests related to water smell (chemical, sulfur, chlorine smell, etc.)
- Pressure: contains all requests related to change in water pressure (pressure drop, high water pressure, fluctuation in pressure, etc.)
- Taste: contains all requests related to water taste (poor, bitter, strong chlorine taste, etc.)
- Water Quality: contains all requests related to a combination of odor, taste, and discoloration issues.

Customer requests are entered into the CarteGraph or SeeClickFix and a work order is generated. Typically, a Distribution staff member or team will investigate the issue and respond directly to the customer.

A table summarizing the number and type of requests or complaints is provided in Chapter 3.

6.9 Recordkeeping and Reporting

All recordkeeping and reporting practices follow DOH regulations as specified in WAC 246-290-480. The Water Manager maintains hard copies of the water quality analysis laboratory reports. These reports are kept at the M&O Building in files organized by year and analysis type.

Analytical laboratories submit reports directly to DOH. As specified by the regulations, chemical analysis reports are kept indefinitely, and bacteriological reports are maintained for a minimum of five years. Additionally, Construction Completion Reports are submitted to DOH, as required. Construction Completion Reports for distribution main projects are maintained on file at the City and are available upon request by DOH, in accordance with WAC 246-290-125.

Water production and purchase source meters are read daily (during the work week). Paper copies are scanned at the end of the month and digital copies in pdf format are maintained on the City computer server by month and year. Annual summary spreadsheets are also maintained on the computer server. This data is added to the monthly DOH reports. Records are maintained for a minimum of 10 years.

Chlorine residual samples are collected in the distribution system and analyzed on a weekly basis. Summary spreadsheets are maintained on the City computer server by year. Records are maintained for a minimum of three years.

Monthly reports containing water production and treatment data are submitted to DOH by the 10th day of the following month, using forms provided by DOH. Signed paper copies are scanned to produce a digital copy and are maintained on the City computer server, organized by year. Digital copies are maintained for a minimum of 10 years.

Most records that Water Utility collected in the past are based on hard copy paper forms. This includes forms that track maintenance and inspection records used for pumps, valves, meters, reservoirs, hydrants, operating equipment, etc. A portion of the integration process with CarteGraph involved the collection and collation of historical data into a form that can be downloaded into the software system. The City's goal is a near-paperless documentation system that can be accessed by staff in the office, field, or home on a 7-day, 24-hour basis. Existing electronic records include those described below.

6.9.1 Cross Connection Control Program

Cross Connection Control records are managed with Tokay software and Laserfiche. Test reports conducted are stored in Laserfiche and are kept for 5 years. Tokay is used for creating reports, identifying and updating when tests are required, and general data entry and management of cross connection devices per parcel.

6.9.2 Water Meter Consumption

Water meter consumption records are maintained by the Finance Department using the Springbrook Utility Billing System. These records include customer account data for classes of customers, billing, service, comments, and questions. The system also includes a tracking feature for water sold each month as well as annual total water sales. The tracking feature is useful because data on water consumption by customer type and season supports the City's WUE Program, per Chapter 4. The Finance Department also provides staff with monthly financial reports regarding Water Utility operations.

The City also uses AMI throughout the system as a tool for the WUE Program. Using AMI data, the City may be able to identify customer leaks and, as a result, provide cost savings in the Leak Detection, Repair, and Service Meter Replacements programs. Advanced metering also aids the City's efforts to reduce non-payment of bills and water theft.

6.9.3 Supervisory Control and Data Acquisition (SCADA)

The SCADA system monitors, records, and controls water system operations at various facilities. The electronic records are maintained by the IT Department and a back-up copy is made each evening to ensure that records are retrievable should hardware or software failure occur.

Please note that the SCADA system is discussed more thoroughly in Section 6.2 of this chapter.

6.9.4 Water Meter Reading

Effective January 1, 2019, the City transitioned to monthly consumption billing. The Utility Billing staff imports the water meter reads monthly into the City Utility Billing System. With the implementation of the AMI system, the City obtained a Cloud-Based Data Analytics Solution with meter data management capabilities called Sensus Analytics. Within Sensus Analytics, is a billing access application, which enables Utility Billing staff to generate and export a billing request file defined by a billing cycle and billing window. Subsequently, the file that contains meter numbers, account numbers, and current water meter reads are imported into the City Utility Billing System. The Utility Billing staff reviews abnormally high or low consumption levels compared to previous readings from the previous year, same period.

Water service meters are read monthly to document customers' water usage for billing purposes. The AMI system automatically stores and transmits the water use data for utility billing, without the need for personnel to collect the data on site.

6.10 Summary of O&M Deficiencies and Recommended Improvements

6.10.1 Water Facilities Evaluation Study

The City completed an extensive Water Facilities Evaluation Study in 2014. The study conducted a physical inspection and evaluation of 40 out of the City's 97 water supply facilities. Inspections included pump stations, treatment facilities, reservoirs, wells, transmission mains, and PRVs. Inspections considered general conditions, corrosion and rust, structural deficiencies, ability to meet current code, and operational constraints. In addition to the inspections, the remaining useful life of the facilities were developed in a desktop analysis for pump, motor, pipe, valve, general electrical equipment, and major electrical equipment.

Where notable deficiencies were identified in the inspections or assets exceeded their usable life, improvements were recommended. Many of the recommended improvements have been completed or are currently scheduled to be completed and identified in the Capital Improvement Plan. Remaining improvements less than or equal to $10,000 are considered capital maintenance projects, which the City staff or a small works contractor will address as part of the normal M&O budget and are not identified in the Capital Improvement Plan.

Based on the observed facilities, general maintenance improvements are recommended for each facility to create a schedule of improvements based on the facility's remaining useful life. Regular facility inspections are also recommended, as summarized Table 6-4. Additionally, maintenance plans were developed for each inspected water system facility. These plans included the improvement type, estimated project cost, and frequency the improvement is required.

Table 6-4 | Recommended Inspections

Asset Type	Recommended Inspection	Frequency (years)
Pump	Perform pump test	5
Motor	Check motor amp draw	5
Reservoir	Inspect coating thickness	5
Reservoir	Inspect reservoir interior	5
PRV Station	Inspect for corrosion and signs of flooding	1
Structure	Inspect for cracks in grout (where applicable)	1
Piping	Inspect for general coating conditions	3

6.10.2 Recommended Improvements

The City operates and maintains an efficient, environmentally sound, and safe water system. Recommended improvements include the outstanding projects identified from the 2014 Facility Evaluation Study, outstanding items to be corrected from the 2022 Sanitary Survey, and general continued repairs and maintenance activities that are conducted by M&O staff or contracted out. Table 6-5 provides a summary of the identified O&M projects and their costs.

Table 6-5 | O&M Improvement Projects

O&M Deficiency	Planned Year	Notes
The pump to waste line at Well 5 to terminate above grade will be addressed with a capital improvement project. (Identified in 2022 Sanitary Survey)	2026-2028	Included with the Well 5/Well 5A Upgrades Project
Raising the casing at Well 5A to terminate above grade or the provision of a sump pump or alarms to activate when water accumulates in the vault. (Identified in 2022 Sanitary Survey)	2026-2028	Included with the Well 5/Well 5A Upgrades Project
Reservoir vents will be retrofitted or replaced as part of the ongoing Reservoirs 4A, 4B, 8A, and 8B Seismic Valves Retrofit capital project. (Identified in 2022 Sanitary Survey)	2024-2025	Included in CP2219 – Reservoirs 4 and 8 Seismic Rehabilitation
The direct connections of reservoir overflows at Reservoirs 2 to drains, sanitary sewer, and/or storm sewer, will be addressed with a capital improvement project. (Identified in 2022 Sanitary Survey)	2024-2025	Included in Reservoir 2 Valves Project
Conduct inspections of facilities at frequency recommended in the Facilities Evaluation Study.	--	Refer to **Table 6-4**. To be completed via annual M&O operating budget.
Continue distribution system corrosion inspection.	TBD	To be completed via annual M&O operating budget as funds are available.
Develop a UDF Program for the Lakeland Service Areas.	TBD	To be completed via annual M&O operating budget as funds are available.
Replace source water supply meters with flow transmitters for improved electronic data transmission and record keeping.	TBD	To be completed via annual M&O operating budget as funds are available.
Continue PRV Vault Repairs	2024-2026	To be completed via annual M&O operating budget as funds are available.
Continue Pump and Equipment Repairs and Maintenance	2024-2026	To be completed via annual M&O operating budget as funds are available.
Continue Annual HVAC Maintenance and Repairs	2024-2026	To be completed via annual M&O operating budget as funds are available.
Continue Fencing Repairs at Water Facilities	2024-2026	To be completed via annual M&O operating budget as funds are available.
Continue Generator Maintenance and Repair	2024-2026	To be completed via annual M&O operating budget as funds are available.
Continue Large Meter Repair and Testing	2024-2026	To be completed via annual M&O operating budget as funds are available.
Continue Chlorine Feed and Analyzer Maintenance	2024-2026	To be completed via annual M&O operating budget as funds are available.

O&M Deficiency	Planned Year	Notes
Continue Vegetation Control and Maintenance at Water Facilities	2024-2026	To be completed via annual M&O operating budget as funds are available.

CHAPTER 7

Distribution Facilities Design and Construction Standards

This chapter outlines the Engineering Design and Construction Standards (EDCS) of the City of Auburn (City), concerning its water system. It encompasses policies and procedures governing project review and approval. To ensure the highest level of water system reliability, integration of the EDCS into the broader city infrastructure is essential. The City recognizes the interdependence of its water system with other municipal services. As such, there is an ongoing collaborative effort between the Water Division and other relevant City departments, such as Community Development and Finance, as well as non-City stakeholders, such as the Valley Regional Fire Authority (VRFA).

The integration of the EDCS in this Water System Plan empowers the City to employ an alternative review process for distribution main projects, through the submittal exception process, which permits the City to approve project reports and construction documents without written approval from the Department of Health (DOH). This submittal exception is granted provided the conditions specified in WAC 246-290-125(2) are met.

The submittal exception does not apply for source of supply, reservoir, pump station, and water treatment projects. For those projects, the City will seek approval from DOH through the submittal process outlined in WAC 246-290-110 and 246-290-120.

The following topics are addressed in this chapter:

7.1 Project Review Procedures
7.2 Policies and Requirements for Outside Parties
7.3 Design and Construction Standards
7.4 Construction Certification

7.1 Project Review Procedures

For all construction activities related to the City's water system, coordination must be done directly through the City's Water Department. The City's Water Department reviews plans, including calculations, reports, and AutoCAD files, to verify conformity with development requirements, City standards, City policies, as well as other federal, state, and local requirements. The plan sets are required to feature an overall utility plan illustrating public water facilities and private connections within the water service boundary, regardless of whether the project is inside or outside the City limits. City staff also review projects proposed by developers or other water purveyors to determine impacts to the City's water system facilities.

Development review processes are detailed in the Engineering Design Standards (EDS), available on the City's website. Compliance with Washington State Department of Transportation (WSDOT) "Standard Specifications for Road, Bridge, and Municipal Construction," and relevant City, State, and Federal regulations is also evaluated during the review process.

All water-related improvements projects, whether for capital improvement or development, undergo a thorough review process by the Water Division, including evaluation by the VRFA and City's Fire Authority for fire protection standards. Additionally, all plans involving main extensions, modifications, and fire service installations must be stamped by a Professional Engineer licensed in Washington State.

7.2 Policies and Requirements for Outside Parties

The City manages the water utility in accordance with established water- system policies that govern various facets of utility operations. City policies are established by the City to provide a vision or mission of the water utility and to provide a framework for the design, operation, and ongoing wellbeing of the City's water utility.

Policies are developed specifically for the City's multi-source municipal water system and seek to provide consistent treatment to all utility customers and to provide documentation to current water-system customers as well as those considering service from the City. What is included in these policies is limited to those things related to the water system and its design, maintenance, and operation. There are other policies and criteria that pertain to the water utility the City has in place regarding land use, development, and financial components that could still have an impact on the needs of the water system. These policies and criteria may include factors such as zoning regulations, building codes, infrastructure requirements, and financing options. These additional factors will be considered when planning for the water system, to meet the needs of the community in a sustainable and effective matter.

Policies set forth for development are described in the Water System Policies provided as Appendix A of this Plan.

7.3 Design and Construction Standards

Within the Retail Water Service Area (RWAS), the City has established specific standards governing the design and construction of water mains, detailed in the City's EDCS. The EDCS collectively contains the following:

- City of Auburn Engineering Design Standards (EDS).
- City of Auburn Engineering Construction Standards (ECS):
    - City of Auburn Engineering Construction Standards – Standard Details (STD DTL)
    - City of Auburn Engineering Construction Standards – General Special Provisions (GSP)
    - City of Auburn Engineering Construction Standards – Technical Special Provisions (TSP)

These standards undergo periodic updates, with the most recent revision in 2024. The City's 2024 design standards and construction specifications related to the water system are outlined in Appendix P. Additionally, this plan incorporates relevant sections of the City's current construction standards, including materials, methods, and standard details applicable to the construction of water system appurtenances.

For detailed information, the latest versions of the collective EDCS are accessible for view on the City's Public Works web page.

Table 7-1 lists sections of the EDCS sections for the specifications, drawing standards, and special conditions of water main installations, extensions, and replacements. Standards for supply sources, reservoirs, pump stations, and water treatment facilities are not presented due to the complex nature of these facilities. For

those projects, the City will seek approval from DOH through the submittal process outlined in WAC 246-290-110 and 246-290-120.

Table 7-1 | Water Main Design and Construction Standards

Specifications for:	
Pipe material and pipe class. ANSI/NSF Standard 61 certified materials required for all pipes.	EDS Section 7.01.02
Disinfection procedures (include de-chlorination or chlorinated water disposal specifications).	TSP – 7.09.3(24)
Pipe bedding and installed depth of bury.	EDS Section 9.05
Bacteriological testing.	TSP – 7.09.3(24)N
Pressure and leakage testing.	TSP – 7.09.3(23)
Separation from sewer mains, non-potable conveyance systems, and other buried utilities.	EDS Section 6.02
Valve spacing.	EDS Section 7.03
Construction Drawings Standards	
Plan and profile views drawn to a particular scale	EDS Sections 3.03, 3.04 & 3.04.07
Easement locations and dimensions	EDS Sections 2.02, 3.04 & 3.04.07.B, 6.01, 7.01.04, 7.01.05, 7.02.01, 7.03 and STD DTL W-06.3, W-22.2, W-23.3,
Appurtenant Design Standard Drawings	
Pipeline trench cross-section, including pipe bedding, backfill, compaction, and road restoration standard details	STD DTL T-01
Hydrants (for fire, flushing)	STD DTL W-07, W-08
Valves	STD DTL W-17, W-18, W-19
Service Meters	STD DTL W-15, W-16, W-16a
Service lines and service connection to main	STD DTL W-9, W-13, W-14
Air relief, vacuum relief, and combination air-vacuum relief valve and valve vault	STD DTL W-02
Pressure reducing valve stations	Submittal review (project specific)
Thrust blocking	STD DTL W-01
Backflow prevention assemblies	STD DTL W-21, W-22, W-23, W-24, W-25
Blow-offs	STD DTL W-03, W-04
Special Conditions	
Pipeline corrosion mitigation measures	TSP 7.09.03(25)
Potable/non-potable pipeline crossing construction details	EDS Section 6.02
Stream-crossing construction details	N/A
Individual service booster pumps	N/A
Temporary water service (i.e., employed during water main replacement or emergency repair)	N/A

7.4 Construction Certification

Construction work aimed at improving City roads and utilities, whether initiated by private developers or the City itself, must adhere to approved contract documents. City approval is mandatory for any modifications to approved plans before implementation, especially for work within the public right-of-way (ROW) or designated easements. Compliance with general WSDOT/APWA Standard Specifications, approved plans, and the City's EDCS is strictly enforced.

Prior to the start of construction, a pre-construction meeting must be held by the City and the developer, contractor, and/or designated representative. Pre-construction meetings establish the first touch point between the City and developer/contractor to discuss the schedule, certain unique aspects of the work, any special restrictions, and general coordination and communication protocols. Consistent presence of the approved set of plans with redline markups identified and requisite permits at the job site during construction is a shared responsibility of the City, the developer, and the construction contractor. The City exercises its authority to enforce standards through appointed project engineers, assistants, and inspectors, ensuring collective adherence to specified standards. Inspections, test measurements, and actions outlined in the City's Development Guidelines and Public Works Standards are pivotal. Post-construction, the submission of as-built drawings is mandated.

Non-compliance with approved project documents can lead to stop-work orders and potential removal of completed elements, subject to penalties established by ordinance. The project's conclusive status is granted only when the City issues a formal letter of acceptance to the responsible party.

Upon completion of construction activities related to the water system, including disinfection, flushing, and pressure testing for water mains, a construction completion report must be submitted. This document becomes part of the project records, and the release of water meters for any lot or building linked to a project is contingent upon final acceptance.

CHAPTER 8

Capital Improvements Program

This chapter's objective is to develop a cohesive Capital Improvement Program (CIP) for the City of Auburn (City) by summarizing and prioritizing all capital projects identified in the previous chapters. The CIP provides a comprehensive accounting of capital projects needed to continue consistent, efficient water supply to the City's Retail Water Service Area (RWSA) through the 20-year planning horizon. The recommended projects were developed in coordination with City staff.

Projects identified as part of the City's asset management program that are anticipated to cost greater than $50,000 were included as capital projects. The capital projects discussed in Section 8.2 include water supply and storage improvements, improvements to the distribution system, and upgrades or replacement of aging facilities and distribution piping as discussed in Chapter 3.

Projects were allocated to the 10-year (2025 to 2034) and 20-year (2035-2044) planning horizons. Planned projects coincide with the City's current Capital Facilities Plan (CFP) and have been placed into specific years for planned completion. These timeframes are intended to be a framework for future funding decisions that directs when future actions and decisions are intended to occur. However, these timeframes are estimates, and depending on factors involved in the processing of applications and project work, and availability of funding, the timing may change from the included timeframes. The framework does not represent actual commitments from the City, which may depend on funding and staffing resources available.

8.1 Prioritization

8.1.1 Project Identification

Capital projects are organized into two categories to help provide a better understanding of the primary project driver as follows:

- Capacity Projects (CAP): These projects are needed to expand infrastructure capacity to meet increased demands associated with current deficiencies or projected growth.
- Non-Capacity (Non-CAP): These projects are needed to address aged and/or obsolete equipment to maintain and/or improve the reliability of the infrastructures system. These projects are needed to improve existing infrastructure for reasons other than capacity.

The capital projects are also identified and grouped into categories based on the infrastructure they are focused on. Each project is assigned an identification number (Project ID) with the following ID prefixes:

- Supply (S): These projects are associated with the City's water supply sources and treatment facilities.

- Storage (R): These projects are associated with the City's storage reservoirs or allow modifications in the system impacting reservoir storage transfer throughout the RWSA.
- Pump Stations (PS): These projects are associated with the City's pump stations or booster pump stations (BPS).
- Distribution (D): These projects are associated with the City's transmission and distribution piping systems.
- General Improvements (G): General improvement projects do not fit into the other categories and may be broader, impacting multiple components of the City's water system.

8.1.2 Prioritization Factors

The capital projects for the facilities improvements were prioritized based on system deficiencies, safety concerns, maintenance or capacity requirements, and regulatory requirements.

The capital projects for the capacity driven distribution system improvements were prioritized based on the fire flow availability; projects resolving the largest deficits were prioritized higher, and as such are planned to be completed sooner than projects resolving smaller deficits. The capital projects for the condition driven distribution improvements were prioritized based on the existing pipe age, size, and material. More details are discussed in Chapter 3.

The priority order of these improvements is reflected in the schedule of improvements, which is presented in Section 8.3 and Appendix W.

8.1.3 Estimated Costs

"Active projects" are projects that are currently underway for completion. The project costs presented include total project costs for the current and future years and are presented in 2024 dollars.

For projects already included in the City's 2023 CFP, it was assumed that the project cost in 2024 dollars remains the same, unless the costs were identified as needing to be reassessed.

For planned capital projects identified in the 2015 WSP that have not been completed and are not included in the City's 2023 CFP, the project costs were escalated from 2014 dollars as presented in the 2015 WSP to 2024 dollars using the Engineering News Record (ENR) Construction Cost Index (CCI).

For all other projects that were newly identified, modified, or reassessed, planning-level project cost estimates were developed for the improvements using average costs from RSMeans, HeavyBid Construction Cost Data, recent City of Auburn project bid tabs, City input, industry experience, and local contractor and supplier costs. These project costs are planning-level estimates and are categorized as Class 5 estimates, as defined by the Association for the Advancement of Cost Engineering (AACE) International:

> *Class 5 estimates are generally prepared based on very limited information, and subsequently have wide accuracy ranges. As such, some companies and organizations have elected to determine that due to the inherent inaccuracies, such estimates cannot be classified in a conventional and systemic manner.*
>
> *Class 5 estimates are prepared for any number of strategic business planning purposes, such as but not limited to market studies, assessment of initial viability, evaluation of alternate schemes, project*

screening, project location studies, evaluation of resource needs and budgeting, long-range capital planning, etc.

Typical accuracy ranges for Class 5 estimates are -50 % to -20% on the low side and +30% to +100% on the high side, depending on the construction complexity of the project, appropriate reference information and other risks (after inclusion of an appropriate contingency determination). Ranges could exceed those shown if there are unusual risks.

All project descriptions and cost estimates in this WSP represent planning-level accuracy and opinions of costs (-50 percent to +100 percent).

During the pre-design phase of each project, the project definition, scope, and specific information (e.g., pipe length and diameter, roadway restoration requirements, permitting requirements) should be verified. The final cost of individual projects will vary depending on actual labor and material costs, site conditions, market conditions, regulatory requirements, project schedule and other factors. Because of these factors, project feasibility and risks must be carefully reviewed prior to making specific financial decisions or establishing project budgets to support proper project evaluation and adequate funding.

Total estimated project costs were developed through a progression of steps and multiple methodologies. The steps included development of component unit costs, construction costs and, finally, total project costs. The component unit cost includes the sum of materials, labor and equipment of a project's basic features. The construction cost is the sum of component costs and construction markups, which includes a 30 percent allowance for contingency and 10.2 percent for sales tax. The total project costs presented is the sum of construction costs with the following additional allowances:

- 15 percent for City management, survey, legal, and project administration.
- 15 percent engineering design.
- 15 percent construction management and inspection.

The following costs are not included, unless specifically noted:

- Land or right-of-way acquisition.
- Maintenance expenses.
- Operation expenses.

All cost estimates were developed as total project costs in March 2024 dollars. In Table 8-10, costs have been inflated and escalated using an annual increase rate from 2024 dollars to their planned implementation year. For projects that will be designed or constructed in 2024, an annual increase of eight percent was used. For projects that will be designed or constructed after 2024, an annual increase of five percent was used. For future budgeting purposes, the latest engineering news record (ENR) Construction Cost Index (CCI) can be used to project current estimates to the year of implementation. The cost estimates for the Auburn area used the ENR CCI in Seattle of 15,477 (March 2024).

8.1.3.1 Pipeline Component Unit Costs

The pipelines unit costs were developed using recent City construction bid tabs assuming the use of ductile iron pipe and a typical cover depth of four feet. The estimated unit cost is provided by pipe diameter per linear foot of pipe in Table 8-1, which includes the cost for the pipe, trench, roadway restoration, appurtenances, installation, and direct construction markups. As the diameter of pipe and the trench width increase, the costs also increase.

Table 8-1 | Water Pipeline Construction Costs per Linear Foot

Pipe Diameter (inch)	Unit Construction Cost ($/linear foot)
8	$490
10	$510
12	$520
14	$570
16	$630
18	$730
20	$780
24	$880

8.1.3.2 Reservoir Component Unit Costs

Reservoir (storage tank) unit costs were determined based on the tank volume in gallons. Conceptual costs for tanks vary based on the material of storage: prestressed concrete and welded steel being the most common options. Unit costs for the different reservoir options are presented in Table 8-2 in terms of cost per gallon of storage. The unit costs do not include site piping, site improvements, land acquisition, repair, or recoating. Storage reservoir costs are sensitive to site-specific geotechnical and seismic considerations. A tank siting study is necessary whenever a new tank project is initiated to obtain the information required to inform the design.

Table 8-2 | Reservoir Tank Construction Costs per Gallon

Tank Material	Unit Construction Cost ($/gallon)
Prestressed Concrete	$1.50
Welded Steel	$1.25

8.2 Capital Improvement Program Summary and Schedule

8.2.1 Completed Projects

The following projects have been completed since 2015 WSP was completed:

- S-01: Onsite Improvements Projects, completed in 2016.
- S-02: Emergency Power Improvements Project, completed in 2016.
- S-17: West Hill Springs Flow Control Improvements, completed in 2017.
- S-19: Fulmer Field Improvements Project, completed in 2018.
- R-01: Lakeland Hills Reservoir 5 Improvements, completed in 2016.
- D-03: SCADA Upgrades, completed in 2015.
- D-10: Pipeline Asset Management Study, completed in 2020.
- D-13: Lea Hill PRV Station Improvements, completed in 2018.
- D-14: Valley AC Main Replacement, completed in 2015.
- PS-03: Green River Pump Station Emergency Power, completed in 2020.
- PS-07: Academy Pump Station No.1 Improvements, completed in 2023.
- G-06: Muckleshoot Indian Tribe (MIT) Casino Master Meters, completed in 2016.
- G-09: Water Meter & Billing System Improvements, completed in 2018

The following projects have been eliminated since 2015 WSP was prepared:

- G-05 - Utilities Field Operations Center: This project was replaced with a more comprehensive upgrade to the City's Operations and Maintenance Facilities as reported in the 2021 Limited Comprehensive Plan Update.

- D-12 - Academy Transmission Replacement: This project was eliminated, after further investigation found no issues with the existing pipeline.

- D-15: Braunwood Transmission: This project was split from Reservoir Seismic Rehabilitation (R-06) identified in the 2015 WSP. This project was originally planned to incorporate the Braunwood Satellite System, however after further evaluation, there is not a business case to support this project. Instead, it is replaced in this WSP with a mechanical upgrades project for the Braunwood Pump Station to maintain operation. The potential for incorporation of the Braunwood Satellite System may be more viable in the future pending potential development in the southern portion of the City's RWSA.

- D-16 - Game Farm Park Transmission: This project was originally planned to allow for the decommissioning and removal of the Game Farm Park Pump Station, however after further evaluation, there is not a business case to support this project. Instead, it is replaced in this WSP with a mechanical upgrades project to maintain operation of the Game Farm Park Pump Station. Elimination of the Game Farm Park Pump Station may be more viable in the future pending potential development in the southern portion of the City's RWSA.

- S-12 - West Hill Springs Water Quality Improvements: The City had planned to replace the aging West Hill Springs chlorination building and equipment with a new liquid chlorination system. However, since this project is not required to meet regulatory requirements and after further review of the City's Financial Program, this project was eliminated to prioritize projects required to resolve deficiencies. This project will be completed later, likely beyond the planning horizon for this WSP.

- S-14 - Algona Well 1 Redevelopment: This project was eliminated until the Algona Well 1 Study is completed. A new capital project may be developed in the 10 to 20-year planning horizon pending the outcome of the study.

8.2.2 Active Projects

The following projects are currently underway for completion by the City and are referred to as "Active Projects" that have remaining costs to be spent in the near term:

- CP2021 - Well 4 Facility Improvements: This project was split from the Well 4 Pump Improvements project (S-22) identified in the 2015 WSP. This project includes upgrades to much of the mechanical systems at the facility.

- CP2043 - Well 4 Electrical Improvements: This project was split from the Well 4 Pump Improvements project (S-22) identified in the 2015 WSP to accommodate beneficial electrical improvements outside the original scope of the project. The well facility is over 40 years old and much of the electrical equipment is original. Upgrades to the electrical system will improve the overall efficiency of the facility.

- CP2219 - Reservoir 4 and 8 Seismic Rehabilitation: This project was split from Reservoir Seismic Rehabilitation (R-06) identified in the 2015 WSP. The City plans to install seismic control valves on outlet piping of the Lea Hill Reservoirs (4A & 4B) and Academy Reservoirs (8A & 8B). A seismic control valve isolates the reservoir to prevent catastrophic flows from the reservoir during a seismic pipe failure. This project will also address outstanding deficiencies identified in the 2022 Sanitary Survey, including vent modifications, overflow connection modifications and overflow screen repairs.

- CP2134 - Comprehensive Water System Plan Update: This project was split from identified in the 2015 WSP (G-08), which originally included updates for both 2024 and 2034. This project will be carried forward in the CIP with further WSP updates being required in 2034 and 2044.

- CP1603 - Coal Creek Springs Transmission Main Replacement: This project was identified in the 2015 WSP as project (D-11) will be completed in 2024. The project will replace the existing 24-inch diameter steel transmission main crossing the White River with a new transmission main suspended from a utility and pedestrian bridge to cross the White River.

- CP2204 - Coal Creek Springs Rehabilitation (Phase 1): The Coal Creek Springs Rehabilitation project aims to investigate the cause of low yield and identify potential upgrades to improve water production. The updates will be completed in Phase 2 of the project.

- CP2413 - Reservoir 2 Valves: This project was split from Reservoir Seismic Rehabilitation (R-06) identified in the 2015 WSP. This project will replace the existing 20-inch supply valve with a seismic control valve and replace the 12-inch drain valve at Reservoir 2. Both valves will be installed in a vault. This project was identified as a maintenance issue due to limited access to the valves. The addition of a seismic control valve will improve the resiliency of the distribution system. This project will address the outstanding deficiency identified in the 2022 Sanitary Survey by modifying the overflow connection.

- CP1914 - Cascade Water Alliance Water Purchase: This project was identified in the 2015 WSP as project (S-04) and finances System Development Charges for the right to purchase water from Tacoma Public Utilities (TPU) through the Second Supply Pipeline to meet future projected demand, based on agreements with Cascade Water Alliance. Council approved the agreements for permanent and reserve wholesale supply in September 2013, and a new agreement was executed in 2014. Budget reflects purchase of permanent supply; payments will continue through 2029.

- S-08 - Water Resources Protection Program (Wellhead Protection): This program provides annual funding for implementing strategies identified in the Wellhead Protection Plan. Although some tasks will be performed as part of the water operations budget, other tasks will require consultants with expertise in review and investigation of contaminant sites and other environmental databases, development of spill response plans, and leaking underground storage tanks. This program will continue through the 20-year planning horizon.

- R-03 - Reservoir Repair and Replacements: This is an annual program that provides budget for general reservoir maintenance and minor repairs. This program will continue through the 20-year planning horizon.

- R-05 - Reservoir Painting: This is a program that operates on a 10-year cycle to complete reservoir coatings. This program will continue through the 20-year planning horizon with the next anticipated painting project planned in 2025.

The following projects include distribution improvements identified in the 2015 WSP to be completed as part of either the Annual Distribution System Improvements Program (D-02), Water Repair and Replacement Program (D-09) or are in partnership with other City utilities and are funded by budget available in the Street Utility Improvements annual program (D-06). All three programs have been updated and will continue through the 20-year planning horizon. In total the following active projects will replace approximately 9,000 linear feet of water main in the City's system. The locations of all active distribution system improvement projects are identified in Figure 3-12 in Chapter 3.

- CP1619 - 104th Park Development (104th to 102nd Water Main Loop)
- CP2301 - 104th Avenue SE PRV Replacement
- CP2123 - C St SW Preservation
- CP2125 - D St SE and 23rd Street SE Storm Improvements
- CP2410 - 112th Pl SE Water Main Replacement
- CP1622 - Auburn Way South - Hemlock St SE to Poplar St SE
- CP2022 - Garden Avenue Realignment
- CP2210 - M Street NE Widening
- CP2116 - R Street SE Widening
- CP2308 - R St SE and 21st St SE Roundabout
- CP2315 - R St SE Preservation - 33rd St SE to 37th St SE
- CP2319 - Lea Hill Road/104th Ave SE Roundabout
- CP2404 - 12th St SE and Auburn Way South Water R&R
- CP2412 - 2025 Local Street Preservation
- 2026 Local Street Preservation

The following active projects were not identified in the 2015 WSP:

- CP2405 - Fulmer Treatment Facility VFD Replacements: The variable frequency drive (VFD) for pumps 1 and 2 at Fulmer Corrosion Control Treatment Facility (CCTF) were installed in 2002. They are at the end of their useful life and require replacement as repair parts are no longer available.

- CP2329 - Coal Creek Springs Flowmeter Replacement: The project will replace existing source meters on the Coal Creek Springs collectors to improve the accuracy and frequency of production readings.

- Algona Well 1 Study – Phase 1: The project will conduct a preliminary assessment of options to utilize the existing water right.

- Valley Service Area Reservoir No. 3 Siting Analysis: The project will conduct a siting analysis to identify and evaluate possible locations for the new reservoir.

- Braunwood Pump Station Assessment: The project will identify process mechanical upgrades necessary to continued operation. The project will also evaluate roofing replacement material options and costs.

- Coal Creek Springs Rehabilitation – Phase 1: The project will investigate the cause of reduced production from Coal Creek Springs and recommend improvements to increase production capacity.

8.2.3 Capital Improvement Projects

The following projects identified in the 2015 WSP have not been completed since the WSP was prepared, but have been revisited and are discussed in detail in the following sections for completion during this planning period. The timing of most projects has been adjusted based on the City's financial analysis and project prioritization updates.

- S-03 - Well 7 Back-Up Power: Delayed to 2032 since Well 7 has been offline due to high levels of Manganese. The timing of this project will be aligned with the completion of the Well 7 Treatment Phase 1 project (S-15) that will allow the Well to resume operation.
- S-06 - Well 5/5A Upgrades: Delayed from 2022 to 2026.
- S-07 - Well Inspection and Redevelopment Program: Delayed from 2015-2033 to 2026.
- S-09 - Coal Creek Springs Rehabilitation: Delayed from 2018 to 2027 based on awaiting results of ongoing investigations to identify the cause and possible solutions to improve production from Coal Creek Springs. The timing of this project may be adjusted pending results of the on-going investigation.
- S-11 - Wells 3A/3B Treatment: Delayed from 2035 to 2036.
- S-13 - Algona Well 1 Study: Delayed from 2015 to 2039.
- S-15 - Well 7 Treatment Phase 1: Delayed from 2022 to 2030 based on City financial analysis and updated project prioritization.
- S-16 - Well 7 Treatment Phase 2: Moved forward from 2035 to 2033.
- S-18 - Howard Road CCTF Expansion: Delayed from 2025 to 2032. The timing of this project must be aligned with the completion of the Coal Creek Springs Rehabilitation project, as its purpose is to provide increased treatment capacity to accommodate increased flows from Coal Creek Springs.
- S-20 - Well 2 Replacement: Moved forward from 2035 to 2030.
- S-21 - Coal Creek Springs Chlorination Building Replacement: Moved forward from 2035 to 2030.
- R-04 - Valley Service Area Reservoir No. 3: Delayed from 2025 to 2041.
- R-07 - Reservoir Capital Improvements: Delayed from 2025 to 2027 to avoid timing conflicts with other current projects at Reservoirs 4A, 4B, and 8A.
- R-07 - Braunwood Reservoir Improvements: Separated from "Reservoir Capital Improvements" project and delayed from 2025 to 2039.
- PS-04 - Intertie Booster Pump Station Improvements: Delayed from 2021 to 2024.
- PS-09 - Game Farm Park Pump Station Mechanical Upgrades: Replaces original project 'Game Farm Park Pump Station/Distribution System Improvements. Delayed from 2025 to 2034.
- PS-10 - Lea Hill Pump Station Replacement: Delayed from 2025 to 2027 to avoid conflicts with concurrent work in area being completed as part of a separate project.

- G-08 - Comprehensive Water System Plan Update: This project was split into two separate completion years for future updates (2034 and 2044).

Based on the information provided by the City, information included in the 2023 CFP, asset management program input, and results of the system capacity analysis provided in **Chapter 3**, the following new projects were identified that are included in the CIP and are discussed in further detail below:

- Rehabilitate & Clean Wells 2 and 6 (3-year Cycle).
- On-Site Chlorine Generation Systems (OSEC) at Wells 1 and 4.
- Academy PRV Project.
- Braunwood Pump Station Mechanical Upgrades.
- Water Trench Patches Program.
- West Hill Springs Transmission Main Replacement.
- Lea Hill 648 Zoning Adjustment.

8.2.3.1 Water Supply

The City's water supply strategy details both project sizing and timing. A summary of the 0 to 10-year and 10 to 20-year capital projects recommended for securing adequate supply to meet the system's future demands are presented in **Table 8-3**. Project IDs have been revised to reflect the updated prioritization and planned timing of projects presented in this WSP. Previous project IDs from the 2015 WSP as presented above will be discontinued for clarity purposes. Active projects identified above are not discussed in detail as they are already well defined and in progress.

8.2.3.1.1 Cascade Water Alliance Water Purchase (S-01)

Financing to purchase water from Tacoma Public Utilities (Tacoma) to meet water demands is based on an agreement with Cascade Water Alliance (Cascade), which had purchased water supply from Tacoma. The Council approved the agreement for permanent wholesale supply in September 2013. The agreement provides an additional 3.32 mgd of supply during the peak day and 1.5 mgd of average day supply. The City's permanent and reserve agreement requires System Development Charges (SDC) payments of $21,073,743 between 2017 and 2029. A total of $934,810 of payments will continue from 2023 through 2029. The SDC costs will decrease if less than the full reserve amount is purchased. The project ID was previously S-04 in the 2015 WSP.

8.2.3.1.2 Water Resources Protection Program (Wellhead Protection) (S-02)

Annual funding for implementing strategies identified in the Wellhead Protection Plan. Although some tasks will be performed as part of the water operations budget, other tasks will require consultants with expertise in review and investigation of contaminant sites and other environmental databases, development of spill response plans, and leaking underground storage tanks. The project ID was previously S-08 in the 2015 WSP.

8.2.3.1.3 Rehabilitate & Clean Wells 2 and 6 (3-year Cycle) (S-3)

Rehabilitation work completed in 2013-2014 indicated it would be beneficial to clean and rehabilitate both wells on a regular basis to improve production capacity and pumping efficiencies. Cleaning was completed in 2020 and again in late 2023/early 2024. This program was originally established as a 5-year cycle, however based on more recent evidence, more frequent cleaning is required. Cleaning and rehabilitation for Wells 2 and 6 will be performed over a 3-year cycle. This program was not identified in the 2015 WSP.

8.2.3.1.4 Well Inspection and Redevelopment Program (S-04)

The City allocates annual funding for investigations and redevelopment of supply wells and springs necessary to support production at maximum capacity for efficient utilization. This program is to be used for production wells and spring collectors, and is not intended to finance the replacement of pumps, motors, buildings, etc. The project ID was previously S-07 in the 2015 WSP.

8.2.3.1.5 On-Site Chlorine Generation Systems (OSEC) at Wells 1 and 4 (S-05)

The existing liquid chlorine (sodium hypochlorite) used at Wells 1 and 4 degrades during low winter demand periods when the volume used is much lower and product turnover is decreased. This results in more chemical consumption to achieve the same chlorine dose which is not cost effective. The hypochlorite systems will be replaced with on-site chlorine generation systems sized to meet peak summer demands while providing flexibility during winter months. This project was not identified in the 2015 WSP.

8.2.3.1.6 Fulmer CCTF Replace On-Site Chlorine Generation System (OSEC) (S-06)

The existing on-site chlorine generating equipment was installed in 2002. The generation cell was replaced in 2012. Sourcing parts for equipment repairs has become increasingly difficult due to the equipment age. An analysis performed in 2018 comparing chlorine alternatives indicated that on-site generation has the lowest overall cost. This project will replace the entire generation system. The chlorination system will be sized to accommodate future production from Well 7.

8.2.3.1.7 Well 5/5A Upgrades (S-07)

Well 5 needs significant improvements including a new building, a backup generator, chlorination, and a hydrologic investigation to evaluate observed decreased production. Due to the small size of the existing site, the acquisition of an adjacent parcel may be required. Additionally, the project will address the recommended Capital Improvements identified in the 2014 Facility Evaluation Study (CIP Project G-01), including a new pump at Well 5 and new pump and motor at Well 5A. Additional upgrades may be identified in the hydrologic investigation; therefore, the cost of this CIP item should be revisited upon completion of the study. This project will also include improvements to address outstanding deficiencies identified in the 2022 Sanitary Survey, including modifications to the pump waste line for Well 5 and addressing water accumulation in the vault at Well 5A. The project ID was previously S-06 in the 2015 WSP.

8.2.3.1.8 Coal Creek Springs Rehabilitation – Phase 2 (S-08)

Complete rehabilitation of the Coal Creek Springs collectors to improve production capacity resulting in greater utilization of the water right. Improvements are to be defined by the outcomes of the 2023/2024 hydrogeologic study currently being completed as Phase 1 (S-04). Additional upgrades may be identified in the hydrologic investigation; therefore, the cost of this CIP item should be revisited upon completion of the study.

8.2.3.1.9 Coal Creek Springs Chlorination Building Replacement (S-09)

Coal Creek Springs chlorination building was identified as requiring replacement in the 2013 Facility Evaluation Study. Additionally, the project will upgrade the source treatment from chlorine gas to a liquid sodium hypochlorite disinfection system. Sizing of the new equipment will be dependent upon capacity improvements completed as part of the Coal Creek Springs Rehabilitation Project. A new building will be constructed to house the equipment. The project ID was previously S-21 in the 2015 WSP.

8.2.3.1.10 Well 7 Treatment Phase 1 (S-10)

Well 7 is not operational due to high manganese levels. Manganese treatment is required to allow operation of this facility to be restored and to utilize the full water right for this well. Due to space limitations at the Well 7 site, the treatment facilities will be added at the Fulmer Field CCT Facility. The treatment facility will be installed in two phases. The first phase will provide 2.5 mgd of capacity. Additionally, phase 1 of the project will address the recommended improvements to the Fulmer Field CCT Facility identified in the 2013 Facility Evaluation Study, including a new pump and motor. The project ID was previously S-15 in the 2015 WSP.

8.2.3.1.11 Well 2 Replacement (S-11)

The Fulmer Well Field Improvement project found that Well 2 can continue to serve the City but would need to be replaced to resolve ongoing operational challenges. This project includes installation of a new large diameter well. It is assumed that the well will remain on its existing site, or other City-owned property. The project ID was previously S-20 in the 2015 WSP.

8.2.3.1.12 Howard Road CCTF Expansion (S-12)

The inflow to the Howard Road CCTF will increase with the completion of the Well 1 Improvements project in 2016 and planning production improvements for Coal Creek Springs Collector Improvements. The existing facility will be expanded to its full capacity to provide additional treatment capacity and redundant pump capacity to match increased flows. Additionally, the project will address the recommended improvements to Howard Road CCTF identified in the 2013 Facility Evaluation Study, including a new pump and motor. The expansion will include an additional aeration tower and a pump to match existing. The project ID was previously S-18 in the 2015 WSP.

8.2.3.1.13 Well 7 Back-up Power (S-13)

Well 7 is currently out of service, but the City has plans to bring the facility back online once manganese treatment is provided as part of the Well 7 Treatment Phase 1 Project. Without back-up power to its pumps, Well 7 is not considered a reliable source of supply for the Valley Service Area. The City has limited land available at the Well 7 site, therefore, backup power will be installed at the Fulmer Field CCT Facility. The project also includes installing underground electrical transmission capability between Well 7 and the Fulmer Field CCT Facility. The project ID was previously S-03 in the 2015 WSP.

8.2.3.1.14 Well 7 Treatment Phase 2 (S-14)

Well 7 Treatment Phase 2 will complete the manganese treatment facilities at the Fulmer Field CCT Facility to allow year-round use of Well 7. Phase 2 will add 2.5 mgd of treatment for a total capacity of 5.0 mgd. The project ID was previously S-16 in the 2015 WSP.

8.2.3.1.15 Wells 3A/3B Treatment (S-15)

Wells 3A and 3B are not operated due to high manganese levels. Manganese treatment is required to allow these wells to be used, which would add 4.03 mgd of instantaneous flow capacity to the City's supply capabilities. The project includes manganese treatment, a new well and treatment building, well pumps, and onsite backup-power. Additionally, a new sodium hypochlorite system for chlorination will be installed. The project ID was previously S-11 in the 2015 WSP.

Table 8-3 | Prioritized Water Supply Improvement Projects

Project Name	Project ID	Project Timing	Added Qi Capacity (mgd)	Estimated Cost 2024 USD	Brief Project Description
0 to 10-Year Planning Horizon					
Cascade Water Alliance Water Purchase	S-01	2024-2029	3.32	$5,608,860	The agreement provides an additional 3.32 mgd of supply during the peak day and 1.5 mgd of average day supply.
Water Resources Protection Program (Wellhead Protection)	S-02	2024-2044 (Annual)		$1,287,700	Annual funding for Wellhead Protection activities.
Rehabilitate & Clean Wells 2 and 6 (3-year Cycle)	S-03	2025-2044		$1,750,000	3-year cycle program to clean and rehab Wells 2 and 6.
Well Inspection and Redevelopment Program	S-04	2026-2027		$420,000	Annual funding allocation for investigations and redevelopment of wells and springs to maximize production capacity.
On-Site Chlorine Generation Systems (OSEC) at Wells 1 and 4	S-05	2026-2027		$275,000	Replace liquid hypochlorite systems with on-site generation systems.
Fulmer CCTF Replace On-Site Chlorine Generation System (OSEC)	S-06	2026-2027		$500,000	Replace aged on-site chlorine generation equipment.
Well 5/5A Upgrades	S-07	2026-2028		$2,715,000	New building, back-up generator, chlorination, and a hydrologic investigation to evaluate the reasons for decreased production.
Coal Creek Springs Rehabilitation – Phase 2	S-08	2027-2030	4.32	$5,337,000	Rehabilitation of the Coal Creek Springs collectors to improve production.
Coal Creek Springs Chlorination Building Replacement	S-09	2030-2031		$2,081,000	Replace chlorination system and building at Coal Creek Springs Facility with hypochlorite disinfection system.
Well 7 Treatment Phase 1	S-10	2030-2032	2.5	$10,097,000	Requires manganese treatment facilities
Well 2 Replacement	S-11	2030-2031	3.46	$1,960,000	Replace Well 2 to resolve ongoing operational challenges.
Howard Road CCTF Expansion	S-12	2032-2033		$1,450,000	Expand the facility to its full capacity (including an additional aeration tower and pumps).
Well 7 Back-Up Power	S-13	2032-2033		$2,075,000	Provide back-up power for this source.
Well 7 Treatment Phase 2	S-14	2033-2035	2.5	$8,054,000	Requires completion of manganese treatment facilities.
10 to 20-Year Planning Horizon					
Wells 3A/3B Treatment	S-15	2036-2038	4.03	$13,945,000	Provide manganese treatment for well operation
Algona Well 1 Study – Phase 2	S-16	2039		$250,000	Evaluate possible uses of water right.
Subtotal				**$57,805,560**	

8.2.3.1.16 Algona Well 1 Study – Phase 2 (S-16)

Algona Well 1 has been abandoned and all related facilities removed. This project will study possible options to utilize the existing water right. One option may be to redevelop the well on-site at its previous location. Another alternative may be to pursue an alternative well location or how to use the water right at another existing facility. The project does not include the development of design, permitting or construction of well infrastructure. The project ID was previously S-13 in the 2015 WSP.

8.2.3.2 Storage

Table 8-4 provides a summary of the planned reservoir projects. Project IDs have been revised to reflect the updated prioritization and planned timing of projects presented in this WSP. Previous project IDs from the 2015 WSP as presented above will be discontinued for clarity purposes. Active projects identified above are not discussed in detail as they are already well defined and in progress.

8.2.3.2.1 Reservoir Repair & Replacements (R-01)

The City has allocated an annual capital expenditure for general reservoir maintenance and minor improvements. Projects are identified by the City on an as-needed basis. The project ID was previously R-03 in the 2015 WSP.

8.2.3.2.2 Reservoir Painting (10-year Cycle) (R-02)

The City plans to paint the welded steel reservoirs to extend their useful life. This program finances the painting of two reservoirs every 10 years. The project ID was previously R-05 in the 2015 WSP.

8.2.3.2.3 Academy PRV Project (R-03)

A new PRV facility will be located to rezone a portion of the Valley 242 pressure zone to the Academy 350 pressure zone to resolve fire flow deficiencies in the area. This PRV facility will also allow storage transfer from the Academy Service Area where this is surplus storage to the Valley Service Area to resolve 2034 storage deficit projections, allowing for more system flexibility. The PRV facility location is assumed to be in a cul-de-sac where U St SE meets 28th St SE but will be confirmed during design. The PRV vault is assumed to house a 2-inch PRV for low flows (normal operation) and a 6-inch PRV for fire flows. This project was not identified in the 2015 WSP.

8.2.3.2.4 Reservoir Capital Improvements (R-04)

The 2013 Facility Evaluation Study identified improvements to reservoir facilities based on the condition and remaining useful life of the assets within the facilities. Improvements were identified at Reservoir 1, Reservoir 4A & 4B, and Reservoir 8A & 8B. The project ID was previously R-07 in the 2015 WSP.

8.2.3.2.5 Braunwood Reservoir Improvements (R-05)

The 2013 Facility Evaluation Study identified improvements to reservoir facilities based on the condition and remaining useful life of the assets within the facilities. Improvements were identified at the Braunwood Reservoir and were previously included in Reservoir Capital Improvements project (R-07) in the 2015 WSP.

8.2.3.2.6 Valley Service Area Reservoir No. 3 (R-06)

To meet future storage requirements in the Valley Service Area, it is recommended that a new, 2-MG storage reservoir. A siting study should be conducted to identify the preferred reservoir location and other details; it is assumed that the reservoir will be in the northeast portion of the Valley 242 pressure zone.

Property acquisition is expected to be required and an allowance of $1M is included in the project budget. The project ID was previously R-04 in the 2015 WSP. It was assumed that the new reservoir will be a prestressed concrete tank, however this should be confirmed during the siting study.

Table 8-4 | Storage Improvements Projects

Project Name	Project ID	Project Timing	Added Storage (MG)	Estimated Cost 2024 USD	Brief Project Description
0 to 10-Year Planning Horizon					
Reservoir Repair & Replacements	R-01	2024-2044 (Annual)		$1,392,000	Annual program for reservoir maintenance and minor improvements.
Reservoir Painting (10-year Cycle)	R-02	2025-2044		$3,500,000	Required for maintenance and reservoir longevity in both Academy and Lea Hill service areas.
Academy PRV Project	R-03	2027		$470,000	PRV for storage transfer and rezoning to meet fire flow demands.
Reservoir Capital Improvements	R-04	2027		$470,000	Improvements to Reservoir 1, Reservoir 4A&4B, Reservoir 8A&8B based on the condition and remaining useful life.
10 to 20-Year Planning Horizon					
Braunwood Reservoir Improvements	R-05	2039-2040		$250,000	Improvements based on condition and remaining useful life.
Valley Service Area Reservoir No. 3	R-06	2041-2044	2.0	$11,745,000	Required to meet future storage requirements in the Valley service area.
Subtotal				**$17,827,000**	

8.2.3.3 Pump Stations

Table 8-5 provides a summary of the planned pump station projects. Project IDs have been revised to reflect the updated prioritization and planned timing of projects presented in this WSP. Previous project IDs from the 2015 WSP as presented above will be discontinued for clarity purposes. Active projects identified above are not discussed in detail as they are already well defined and in progress.

8.2.3.3.1 Intertie Pump Station/Lea Hill BPS Improvements (PS-01)

The Lea Hill BPS serves the closed 648 Pressure Zone and does not have sufficient capacity to meet fire flow requirements under current or future demand projections. To meet fire flow requirements, an additional 2,500 gpm of firm capacity is required. The Lea Hill BPS and that Intertie Pump Station share a building. To increase capacity of the Lea Hill PS, the project will provide additional piping and modify the existing Intertie Pump Station/Lea Hill BPS building to utilize the existing Intertie Pump Station pumps to serve the Lea Hill 648 pressure zone. The project will also add pressure reducing valves and control valves at Lea Hill reservoirs, and system valves to provide efficient operation of the 132nd Ave Tacoma Intertie. On-site back-up power improvements for the Lea Hill BPS are also included to improve facility reliability.

In the 2015 WSP, this project also included distribution system improvements to rezone a portion of the Lea Hill Service Area; this work has been shifted to a separate project titled the Lea Hill 648 Zoning Adjustment project. This project ID was previously PS-04 in the 2015 WSP.

8.2.3.3.2 Lea Hill Pump Station Replacement (PS-02)

The Lea Hill Pump Station will be reconstructed to provide redundant pumped supply to the Lea Hill area. If the Green River Pump Station is out of service for maintenance, a redundant pump station would avoid the need to purchase more expensive regional surface water through the 132nd Intertie. The pump station needs to be relocated from its current location on the shoulder of Lea Hill Road at the base of a steep hill for safety and reliability considerations. Two separate active projects (Garden Avenue Realignment and Lea Hill Roundabout) will construct approximately 900 feet and 835 feet of 12-inch diameter transmission main respectively, that is required for the future pump station. The project ID was previously PS-10 in the 2015 WSP.

8.2.3.3.3 Braunwood Pump Station Mechanical Upgrades (PS-03)

The Braunwood Pump Station is an aging facility that serves the Braunwood Satellite System. The project will include minor mechanical or electrical improvements to rehabilitate the facility for continued use. This project ID was previously PS-09 in the 2015 WSP. This project was not identified in the 2015 WSP.

8.2.3.3.4 Game Farm Park Pump Station Mechanical Upgrades Project (PS-04)

The Game Farm Wilderness Park Pump Station is an aging facility that serves the Game Farm Wilderness and recreational area. The 2013 Facility Evaluation Study identified improvements to allow continued use of the station including pump replacement and building repairs. Additional minor mechanical or electrical improvements may be warranted to rehabilitate the facility for continued use. This project ID was previously PS-09 in the 2015 WSP.

Table 8-5 | Pump Station Improvement Projects

Project Name	Project ID	Project Timing	Added Firm/Reliable Capacity (gpm)	Estimated Cost 2024 USD	Brief Project Description
0 to 10-Year Planning Horizon					
Intertie Pump Station/Lea Hill BPS Improvements	PS-01	2024-2026	2,500 gpm	$2,325,000	Expand the fire flow capacity of the Lea Hill BPS by connecting to the Intertie PS pumps.
Lea Hill Pump Station Replacement	PS-02	2027-2029		$6,365,000	Decommission and replace the pump station at the end of its usable life.
10 to 20-Year Planning Horizon					
Braunwood Pump Station Mechanical Upgrades	PS-03	2034-2035		$250,000	Rehabilitate Pump Station to allow continued use.
Game Farm Park Pump Station Mechanical Upgrades	PS-04	2034-2035		$250,000	Rehabilitate Pump Station to allow continued use.
Subtotal				**$9,190,000**	

8.2.3.4 Distribution System

The City's water distribution system will require many improvements to address fire flow deficiencies identified by the system analysis presented in **Chapter 3**. Additionally, the City has undersized, and aging piping within the water system that needs to be replaced to reduce the risk of breaks and leaks. The identified distribution system improvements programs are described below and summarized in **Table 8-7**.

Project IDs have been revised to reflect the updated prioritization and planned timing of projects presented in this WSP. Previous project IDs from the 2015 WSP as presented above will be discontinued for clarity purposes. Active projects identified above are not discussed in detail as they are already well defined and in progress.

8.2.3.4.1 Annual Distribution System Improvements Program (D-01)

The Annual Distribution System Improvements Program is focused on capacity related improvements to the City's water distribution system as identified in **Figure 3-12** and **Table 3-33** of **Chapter 3**. These improvements address deficiencies during fire flow demand scenarios. A comprehensive list of the projects and their individual estimated costs are provided in **Appendix W**. The total of all project costs is distributed across the 20-year planning horizon and will be prioritized to address the areas with the greatest deficiency first. This project ID was previously D-02 in the 2015 WSP.

8.2.3.4.2 Street Utility Improvements (D-02)

The City Street Utility program provides an annual budget to perform water main improvements in coordination with the Street Preservation programs and general arterial street improvements. By replacing water infrastructure concurrent with other utility or street improvement projects, the City can reduce overall project costs. Identified projects are anticipated to occur annually throughout the planning period. This project ID was previously D-06 in the 2015 WSP.

8.2.3.4.3 Water Repair & Replacements (D-03)

Previous WSPs identified pipelines for the City's Water Repair & Replacement program focus on replacement of old cast iron pipes, pipes under 6-inches that serve fire hydrants, dead-end mains in non-residential areas, and decommissioned duplicate pipes. The budget for this project has been re-evaluated and is revised to focus on the replacement of undersized cast iron pipe. The budget was developed focusing specifically on 4-inch diameter cast iron pipe, however the City may also allocate this budget to replace other undersized cast iron pipe within the system. **Table 8-6** summarizes the basis of the program budget using the same unit cost assumptions and allowances established in **Section 8.1.3**. The City's pipeline water repair and replacement program will be accomplished through the combination of the Street Utility Improvements (D-02) and this program. Ideally, Water Repair and Replacement and Street Utility projects will be constructed on alternating years to maintain consistent levels of capital expenditures. This project ID was previously D-09 in the 2015 WSP.

Table 8-6 | Water Repair & Replacements Cost Estimate

Length (LF)	Existing Size (inch)	New Size (inch)	Unit Cost	Component Cost	Construction Cost	Project Cost
11,740	4	8	$490/LF	$5,752,500	$8,241,000	$11,950,000

8.2.3.4.4 Water Trench Patches Program (D-04)

This program provides annual funding for roadway restoration of trench patches from water main leak repairs and water service installation that are beyond the scope of work done by City maintenance staff. This project was not identified in the 2015 WSP.

8.2.3.4.5 West Hill Springs Transmission Main Replacement (D-05)

The 2020 pipeline assessment indicated the existing cast iron transmission main is in poor condition. The main has experienced two breaks in the past. The project will replace approximately 1,250 LF of 10-inch

diameter cast iron pipe with 12-inch diameter ductile iron pipe. The project includes preliminary geotechnical investigations prior to design and construction. This project was not identified in the 2015 WSP.

8.2.3.4.6 Lea Hill 648 Zoning Adjustment (D-06)

The system capacity analysis identified deficiencies in the upper portion of the Lea Hill 563 pressure zone where the highest service elevations of the zone are located. This project includes system piping and valving modifications to rezone a portion of the Lea Hill 563 pressure zone to the Lea Hill 648 pressure zone. GIS and site verification, as well as minimal system modeling are required to verify necessary modifications.

Table 8-7 | Distribution System Improvements Projects

Project Name	Project ID	Project Timing	Estimated Cost 2024 USD	Brief Project Description
0 to 20-Year Planning Horizon				
Annual Distribution System Improvements Program	D-01	2025-2044 (Annual)	$59,699,000	Pipe improvement projects required to address system capacity deficits.
Street Utility Improvements	D-02	2025-2044 (Annual)	$24,618,000	Water main improvements concurrent with street improvements.
Water Repair & Replacements	D-03	2025-2044 (Annual)	$11,950,000	Pipe improvements to replace aging and undersized pipes.
Water Trench Patches Program	D-04	2024-2044 (Annual)	$3,360,000	Annual program for restoration following water and service leaks.
West Hill Springs Transmission Main Replacement	D-05	2024, 2026-2027	$1,401,000	Transmission piping replacement.
Lea Hill 648 Zoning Adjustment	D-06	2027	$104,000	Pressure zone modifications to address fire flow capacity deficit.
Subtotal			**$101,132,000**	

8.2.3.5 General Utility Projects

The general water system projects and their estimated costs are provided in **Table 8-8**. Project IDs have been revised to reflect the updated prioritization and planned timing of projects presented in this WSP. Previous project IDs from the 2015 WSP as presented above will be discontinued for clarity purposes.

8.2.3.5.1 Water System Plan Updates (G-01, G-02)

DOH requires Water System Plans to be updated every ten years. The City has allocated budget to complete Water System Plan Updates in 2034 and 2044. The project ID for both updates was previously G-08 in the 2015 WSP.

Table 8-8 | General Water System Projects

Project Name	Project ID	Project Timing	Estimated Cost 2024 USD	Brief Project Description
0 to 10-Year Planning Horizon				
Water System Plan Update - 2034	G-01	2033-2034	$750,000	Mandated by Washington Department of Health.
10 to 20-Year Planning Horizon				
Water System Plan Update - 2044	G-02	2043-2044	$750,000	Mandated by Washington Department of Health.
Subtotal			**$1,500,000**	

8.3 CIP Summary and Schedule

Table 8-9 summarizes the total CIP cost by project categories for the 20-year planning horizon. All costs shown are in 2024 dollars. Distribution system improvements comprise more than 50 percent of the allocated costs for the CIP.

Table 8-9 | Total CIP Cost by Project Category from 2024 through 2044

Category	Total CIP Cost Summary 2024 – 2044 (2024 USD)
Supply	$60,416,013
Storage	$21,579,621
Pump Stations	$9,230,000
Distribution	$121,858,681
General	$1,750,000
TOTAL	**$214,834,315**

The results of prioritizing the improvements were used to establish an implementation schedule that can be used by the City for preparing its 20-year CIP and 6-year CFP. The implementation schedule for the active projects and planned CIP projects is summarized in **Table 8-10**. More details are included in **Appendix W**. The City uses this information to develop rates and SDC charges.

The City will schedule the water main projects in the Annual Distribution Improvements Program and Water Repair and Replacements during the annual budget process. This provides the City with the flexibility to coordinate these projects with roadway or other projects within the same area.

Table 8-10 | Capital Improvements Program Costs and Phasing

CIP ID	Name	CAP/Non-CAP	Total Estimated Cost 2024 USD	2024	10-Year										20-Year		
					2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035-38	2039-42	2043-44
Active Projects																	
CP1619	104th Park Development (104th to 102nd Water Main Loop)	Non-CAP	$350,000	$350,000													
CP2301	104th Avenue SE PRV Replacement	Non-CAP	$390,475	$390,475													
CP2123	C St SW Preservation	Non-CAP	$1,802,075	$901,038	$901,038												
CP1603	Coal Creek Springs Transmission Main Replacement	Non-CAP	$4,450,422	$4,450,422													
CP2125	D St SE and 23rd Street SE Storm Improvements	Non-CAP	$2,285,677	$2,285,677													
CP2021	Well 4 Facility Improvements	Non-CAP	$884,822	$884,822													
CP2403	Well 4 Electrical Improvements	Non-CAP	$1,050,000	$200,000	$850,000												
CP2410	112th Pl SE Water Main Replacement	Non-CAP	$2,100,000	$255,000	$1,845,000												
CP1622	Auburn Way South - Hemlock St SE to Poplar St SE	Non-CAP	$2,398,000		$2,398,000												
CP2022	Garden Avenue Realignment	Non-CAP	$699,797	$699,797													
CP2210	M Street NE Widening	Non-CAP	$357,000	$37,000		$320,000											
CP2116	R Street SE Widening	Non-CAP	$1,762,488		$100,000	$1,662,488											
CP2308	R St SE and 21st St SE Roundabout	Non-CAP	$544,897	$61,897	$483,000												
CP2315	R St SE Preservation - 33rd St SE to 37th St SE	Non-CAP	$301,850	$301,850													
CP2319	Lea Hill Road/104th Ave SE Roundabout	Non-CAP	$850,000	$100,000		$150,000	$600,000										
CP2405	Fulmer Treatment Facility VFD Replacements	Non-CAP	$175,000	$175,000													
CP2219	Reservoirs 4 and 8 Seismic Rehabilitation	Non-CAP	$1,433,871	$1,433,871													
CP2404	12th St SE and Auburn Way South Water R&R	Non-CAP	$636,000	$318,000	$318,000												
CP2412	2025 Local Street Preservation	Non-CAP	$725,000	$65,000	$660,000												
	2026 Local Street Preservation	Non-CAP	$1,073,000	$50,000	$150,000	$873,000											
CP2329	Coal Creek Springs Flowmeter Replacement	Non-CAP	$375,017	$375,017													

CIP ID	Name	CAP/Non-CAP	Total Estimated Cost 2024 USD	2024	10-Year										20-Year		
					2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035-38	2039-42	2043-44
CP2134	Comprehensive Water System Plan Update - 2024	Non-CAP	$250,000	$250,000													
CP2209	Coal Creek Springs Rehabilitation - Phase 1	Non-CAP	$75,614	$75,614													
CP2413	Reservoir 2 Valves	Non-CAP	$2,268,750	$68,750	$2,200,000												
	Algona Well 1 Study – Phase 1	Non-CAP	$50,000	$50,000													
	Valley Service Area Reservoir No. 3 Siting Analysis	Non-CAP	$50,000	$50,000													
	Braunwood Pump Station Assessment	Non-CAP	$40,000	$40,000													
Supply																	
S-01	Cascade Water Alliance Water Purchase	CAP	$5,608,860	$934,810	$934,810	$934,810	$934,810	$934,810	$934,810								
S-02	Water Resources Protection Program (Wellhead Protection)	Non-CAP	$1,287,700	$87,700	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$240,000	$240,000	$120,000
S-03	Rehabilitate & Clean Wells 2 and 6 (3-year Cycle)	Non-CAP	$1,750,000		$250,000			$250,000			$250,000			$250,000	$250,000	$250,000	$250,000
S-04	Well Inspection and Redevelopment Program	Non-CAP	$420,000			$210,000	$210,000										
S-05	On-Site Chlorine Generation Systems (OSEC) at Wells 1 and 4	Non-CAP	$275,000			$100,000	$175,000										
S-06	Fulmer CCTF Replace On-Site Chlorine Generation System (OSEC)	Non-CAP	$500,000			$150,000	$350,000										
S-07	Well 5/5A Upgrades	CAP	$2,715,000			$950,000	$265,000	$1,500,000									
S-08	Coal Creek Springs Rehabilitation – Phase 2	CAP	$5,337,000				$500,000	$1,000,000	$2,000,000	$1,837,000							
S-09	Coal Creek Springs Chlorination Building Replacement	Non-CAP	$2,081,000							$520,250	$1,560,750						
S-10	Well 7 Treatment Phase 1	CAP	$10,097,000							$1,500,000	$2,597,000	$6,000,000					
S-11	Well 2 Replacement	CAP	$1,960,000							$400,000	$1,560,000						
S-12	Howard Road CCTF Expansion	CAP	$1,450,000									$450,000	$1,000,000				
S-13	Well 7 Back-Up Power	Non-CAP	$2,075,000									$414,961	$1,660,039				
S-14	Well 7 Treatment Phase 2	CAP	$8,054,000										$1,654,000	$3,800,000	$2,600,000		
S-15	Wells 3A/3B Treatment	CAP	$13,945,000												$13,945,000		

CIP ID	Name	CAP/Non-CAP	Total Estimated Cost 2024 USD	2024	10-Year										20-Year		
					2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035-38	2039-42	2043-44
S-16	Algona Well 1 Study – Phase 2	Non-CAP	$250,000													$250,000	
Storage																	
R-01	Reservoir Repair & Replacements	Non-CAP	$1,392,000	$192,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$240,000	$240,000	$120,000
R-02	Reservoir Painting (10-year Cycle)	Non-CAP	$3,500,000		$250,000	$1,500,000									$1,750,000		
R-03	Academy PRV Project	CAP	$470,000				$470,000										
R-04	Reservoir Capital Improvements	Non-CAP	$470,000				$470,000										
R-05	Braunwood Reservoir Improvements	Non-CAP	$250,000													$250,000	
R-06	Valley Service Area Reservoir No. 3	CAP	$11,745,000													$1,500,000	$10,245,000
Pump Station																	
PS-01	Intertie Pump Station/Lea Hill BPS Improvements	Non-CAP	$2,325,000	$75,000	$250,000	$2,000,000											
PS-02	Lea Hill Pump Station Replacement	Non-CAP	$6,365,000				$765,000	$3,000,000	$2,600,000								
PS-03	Braunwood Pump Station Mechanical Upgrades	Non-CAP	$250,000											$70,000	$180,000		
PS-04	Game Farm Park Pump Station Mechanical Upgrades	Non-CAP	$250,000											$70,000	$180,000		
Distribution																	
D-01	Annual Distribution System Improvements Program	CAP	$59,699,000		$400,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$3,572,636	$14,290,546	$14,290,546	$7,145,273
D-02	Street Utility Improvements	Non-CAP	$24,618,000		$601,000	$617,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$5,200,000	$5,200,000	$2,600,000
D-03	Water Repair & Replacements	Non-CAP	$11,950,000		$150,000	$450,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$650,000	$2,600,000	$2,600,000	$1,300,000
D-04	Water Trench Patches Program	Non-CAP	$3,360,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$640,000	$640,000	$320,000
D-05	West Hill Springs Transmission Main Replacement	Non-CAP	$1,401,000	$50,000		$200,000	$1,151,000										
D-06	Lea Hill 648 Zoning Adjustment	CAP	$104,000				$104,000										
General																	
G-01	Comprehensive Water System Plan Update - 2034	Non-CAP	$750,000										$375,000	$375,000			
G-01	Comprehensive Water System Plan Update - 2044	Non-CAP	$750,000														$750,000
Total Project Cost (March 2024 USD)			**$214,834,315**	**$15,368,740**	**$13,020,848**	**$12,897,298**	**$10,674,810**	**$11,364,810**	**$10,214,810**	**$8,937,250**	**$10,647,750**	**$11,544,961**	**$9,369,039**	**$10,367,636**	**$42,115,546**	**$25,460,546**	**$22,850,273**
Cost in Future USD with Inflation/Escalation				**$15,505,949**	**$13,438,366**	**$15,356,813**	**$13,346,021**	**$14,919,117**	**$14,079,931**	**$12,934,911**	**$16,181,050**	**$18,421,739**	**$15,697,211**	**$18,238,810**	**$84,303,230**	**$61,753,697**	**$64,192,441**

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 9

Financial Program

9.1 Introduction

This chapter was prepared by FCS GROUP to provide a financial program that allows the City of Auburn (City) water utility to remain financially viable during the planning period. This financial viability analysis considers the historical financial condition, current and identified future financial and policy obligations, operation and maintenance (O&M) needs, and the financial impacts of the capital projects identified in this Water System Plan (WSP). Furthermore, this chapter provides a review of the water utility's current rate structure with respect to rate adequacy and customer affordability.

9.2 Past Financial Performance

This section includes a historical summary of financial performance as reported by the City, including fund resources and uses arising from cash transactions.

9.2.1 Comparative Financial Statements

The City legally owns and operates a water utility. Table 9-1 shows a summary of water fund resources and uses arising from cash transactions for the previous 6 years (2017 through 2022). 2023 financial statements were not available at the time the chapter was developed. Table 9-2 shows a summary of assets and liabilities, with the difference between the two reported as "net position." Increases and decreases in net position are useful indicators of the financial position of the City's utility. Noteworthy findings and trends for the historical performance and condition of the City's water utility are then discussed.

9.2.1.1 Findings and Trends

- The City's water charges for services increased from $14.8M in 2017 to $16.5M in 2022. The average annual increase was approximately 2.2 percent per year, with a total increase of 11.4 percent from 2017 to 2022. Charges for services increase each year, except for 2019 and 2020 where revenues fell by 1.5 percent and 1.4 percent respectively. Operating Expenditures increased by $1.7M across the six years with an average annual increase of 2.8 percent. Similar to observations made in revenues, expenditures dropped in 2020 but to a greater extent, decreasing by 2.0 percent. Despite total operating expenses slightly outpacing growth in operating revenues, operating income has been positive in all years observed. 2019 and 2020 had slightly less operating income than other years, observed at $2.7M, with the remainder of the years averaging $3.1M.

- The O&M coverage ratio (total operating revenues divided by total operating expenses) was 126.3 percent in 2017. With expenses slightly outpacing revenues this metric decreased and ended 2022 at 122.8 percent. A ratio of 100.0 percent or greater shows that operating revenue will successfully cover operating expenses, and the utility has remained above this ratio for all years observed.

Table 9-1 | Summary of Historical Fund Resources and Uses Arising From Cash Transactions

	2017	2018	2019	2020	2021	2022
OPERATING REVENUES						
Charges for Service	$ 14,781,310	$ 15,293,485	$ 15,057,517	$ 14,846,679	$ 15,879,799	$ 16,459,868
Other Operating Revenue	-	600	835	835	-	-
Total Operating Revenues	$ 14,781,310	$ 15,294,085	$ 15,058,352	$ 14,847,514	$ 15,879,799	$ 16,459,868
OPERATING EXPENSES						
Operations and Maintenance	$ 3,753,573	$ 3,692,419	$ 3,789,093	$ 3,727,553	$ 3,912,937	$ 3,840,391
Administration	4,672,569	4,702,259	4,727,971	4,615,503	5,221,782	6,028,393
Depreciation and Amortization	3,269,581	3,407,933	3,848,016	3,774,956	3,826,387	3,533,926
Other Operating Expenses	8,964	-	-	-	-	-
Total Operating Expenses	$ 11,704,687	$ 11,802,611	$ 12,365,080	$ 12,118,012	$ 12,961,106	$ 13,402,710
Operating Income (Loss)	$ 3,076,623	$ 3,491,474	$ 2,693,272	$ 2,729,502	$ 2,918,693	$ 3,057,158
NONOPERATING REVENUES (EXPENSES)						
Interest Revenue	$ 104,564	$ 178,271	$ 261,654	$ 49,808	$ 22,790	$ 278,430
Other Non-Operating Revenue	269,264	324,228	589,809	148,433	26,542	86,333
Gain (Loss) on Sale of Capital Assets	-	-	-	-	-	-
Interest Expense	(703,321)	(697,363)	(658,808)	(910,452)	(663,857)	(601,400)
Other Non-Operating Expense	-	-	-	(225,230)	-	(90,443)
Total Non-Operating Revenues (Expenses)	$ (329,493)	$ (194,864)	$ 192,655	$ (937,441)	$ (614,525)	$ (327,080)
Income (Loss) Before Contributions and Transfers	$ 2,747,130	$ 3,296,610	$ 2,885,927	$ 1,792,061	$ 2,304,168	$ 2,730,078
Capital Contributions	$ 1,176,756	$ 1,271,234	$ 3,246,853	$ 2,170,407	$ 5,382,110	$ 1,772,439
Transfers In	2,500,000	2,686,332	39,258	6,536,029	-	-
Transfers Out	(2,693,946)	(2,800,400)	(147,002)	(6,643,340)	(119,472)	(96,339)
Change in Net Position	$ 3,729,940	$ 4,453,776	$ 6,025,036	$ 3,855,157	$ 7,566,806	$ 4,406,178
Net Position, January 1	75,751,705	79,481,645	83,935,421	89,960,457	93,815,614	101,382,420
Net Position, December 31	$ 79,481,645	$ 83,935,421	$ 89,960,457	$ 93,815,614	$ 101,382,420	$ 105,788,598
O&M Coverage Ratio	126.3%	129.6%	121.8%	122.5%	122.5%	122.8%
Net Operating Income as a % of Operating Revenue	20.8%	22.8%	17.9%	18.4%	18.4%	18.6%
Debt Service Coverage Ratio	3.83	4.16	3.93	3.63	3.17	2.85

Table 9-2 | Summary of Historical Comparative Statements of Net Position

	2017	2018	2019	2020	2021	2022
CURRENT ASSETS						
Cash and Cash Equivalents	$ 5,765,412	$ 7,294,288	$ 9,568,609	$ 11,417,193	$ 14,719,905	$ 13,826,776
Investments	-	-	-	-	-	-
Restricted Cash:						
Bond Payments	1,690,316	1,687,994	1,672,123	2,334,270	2,246,000	2,183,144
Customer Deposits	43,892	31,541	40,062	64,792	91,672	104,070
Other (Reserve for Bonds and Rate Stabilization)	1,630,313	1,630,314	1,627,520	11,586,722	5,987,879	2,448,053
Customer Accounts	1,363,945	1,837,533	1,912,797	2,090,429	2,007,050	2,203,858
Other Receivables	-	-	-	-	-	-
Due From Other Governmental Units	17,968	14,338	-	-	10,000	-
Inventories	135,450	183,252	189,071	233,015	242,192	313,273
Total Current Assets	$ 10,647,296	$ 12,679,260	$ 15,010,182	$ 27,726,421	$ 25,304,698	$ 21,079,174
NONCURRENT ASSETS						
Net Pension Asset	$ -	$ -	$ -	$ -	$ 2,266,854	$ 920,143
Capital Assets Not Being Depreciated:						
Land	897,971	897,971	897,971	1,283,524	1,283,524	1,283,524
Intangible - Water Rights	5,449,186	5,701,772	5,954,358	6,889,163	7,823,968	8,758,773
Construction In Progress	8,374,328	620,533	3,488,784	4,443,772	6,918,228	6,283,865
Capital Assets:						
Buildings and Equipment	2,509,599	2,509,599	2,509,599	2,509,599	2,509,599	2,509,599
Improvements Other Than Buildings	131,463,582	142,480,531	145,175,810	151,038,789	159,207,726	167,888,532
Less Accumulated Depreciation	(54,538,817)	(57,946,751)	(61,794,767)	(65,569,723)	(69,396,109)	(72,930,035)
Total Noncurrent Assets Net of Accumulated Depreciation	$ 94,155,849	$ 94,263,655	$ 96,231,755	$ 100,595,124	$ 110,613,790	$ 114,714,401
TOTAL ASSETS	$ 104,803,145	$ 106,942,915	$ 111,241,937	$ 128,321,545	$ 135,918,488	$ 135,793,575
DEFFERED OUTFLOWS OF RESOURCES						
Deferred Outflow from Bond Refunding	$ -	$ -	$ -	$ 78,146	$ 78,146	$ 78,146
Deferred Outflow related to Pensions	312,206	274,590	296,941	334,033	309,166	866,866
Total Deferred Outflows of Resources	312,206	274,590	296,941	412,179	387,312	$ 945,012
CURRENT LIABILITIES						
Current Payables	$ 1,354,856	$ 831,153	$ 971,724	$ 1,015,566	$ 1,627,369	$ 700,718
Claims Payable	-	-	-	-	-	-
Loans Payable - Current	634,328	652,107	467,646	478,000	250,914	224,800
Employee Leave Benefits - Current	125,285	122,115	128,188	122,116	172,872	172,114
Leases Payable - Current	-	-	-	-	-	-
Revenue Bonds Payable - Current	871,737	902,092	935,347	1,215,345	1,268,753	1,327,964
Payable From Restricted Assets:						
Accrued Interest	828,486	794,779	754,158	1,126,592	1,065,376	998,923
Deposits	43,892	31,541	40,062	64,792	91,672	104,070
Other Liabilities Payable	600	-	-	-	-	-
Total Current Liabilities	$ 3,859,184	$ 3,333,787	$ 3,297,125	$ 4,022,411	$ 4,476,956	$ 3,528,589
NONCURRENT LIABILITIES						
Employee Leave Benefits	$ 37,836	$ 44,177	$ 34,069	$ 44,176	$ 74,823	$ 66,026
Loans Payable	3,689,390	3,123,514	2,697,219	2,359,332	2,108,418	1,883,620
Leases Payable	-	-	-	-	-	-
Revenue Bonds Payable	14,899,559	13,952,693	12,972,571	26,189,156	24,596,375	22,944,382
Net Pension Liability	2,775,633	2,245,967	1,937,559	1,917,936	1,216,710	1,478,887
Total Non Current Liabilities	$ 21,402,418	$ 19,366,351	$ 17,641,418	$ 30,510,600	$ 27,996,326	$ 26,372,915
TOTAL LIABILITIES	$ 25,261,602	$ 22,700,138	$ 20,938,543	$ 34,533,011	$ 32,473,282	$ 29,901,504
DEFERRED INFLOWS OF RESOURCES						
Deferred Inflow Related to Leases	$ -	$ -	$ -	$ -	$ -	$ -
Deferred Inflow Related to Pensions	372,104	581,946	639,878	385,099	2,450,098	1,048,485
Total Deferred Inflows of Resources	$ 372,104	$ 581,946	$ 639,878	$ 385,099	$ 2,450,098	$ 1,048,485
NET POSITION						
Net Investment in Capital Assets	$ 75,751,151	$ 77,321,243	$ 80,831,095	$ 72,687,561	$ 86,632,404	$ 87,779,897
Restricted For:						
Debt Service	801,827	835,535	873,362	10,460,130	658,575	3,265,869
Rate Stabilization	-	-	-	-	-	-
Pension Asset	-	-	-	-	-	920,143
Unrestricted	2,928,667	5,778,643	8,256,000	10,667,923	14,091,441	13,822,689
TOTAL NET POSITION	$ 79,481,645	$ 83,935,421	$ 89,960,457	$ 93,815,614	$ 101,382,420	$ 105,788,598
Current Ratio	2.8	3.8	4.6	6.9	5.7	6.0
Debt to Net Position Ratio	0.26	0.23	0.20	0.33	0.29	0.26
Debt to Noncurrent Capital Assets Ratio	0.22	0.21	0.19	0.31	0.26	0.24

- Net operating income as a percentage of operating revenue was 20.8 percent in 2017, decreasing to a low of 17.9 percent in 2019, before ending 2022 at 18.6 percent. Similar to the O&M coverage ratio, these trends show how successfully operating revenue actually covered operating expenses, with higher positive numbers being the best and negative numbers showing a need for improvement. In addition, these trends demonstrate the ability of the utility to invest in capital, whether through direct cash transfers or the issuance and servicing of debt.

- The debt service coverage ratio measures the amount of cash flow available to meet principal and interest payments. Typically, revenue bond debt service coverage requires a minimum factor of 1.25 during the life of the loans. This ratio is calculated by dividing cash or net operating income (operating revenues less operating expenses) by annual revenue bond debt service. The debt service coverage ratio for all outstanding revenue bond debt ended 2017 at 3.83, decreasing to 2.85 by 2022, as the City took on more debt liabilities. The fact that this ratio has sustained levels higher than the minimum target of 1.25 indicates a stable capacity for new debt and will likely result in favorable terms when entering the bond market.

9.2.1.2 Findings and Trends

- The current ratio is calculated by dividing unrestricted current assets by current liabilities and measures an entity's ability to pay short-term obligations. This ratio ranges from a low of 2.8 in 2017 to a high of 6.9 in 2020, ending at 6.0 in 2022. Anything above 2.0 for this liquidity ratio is good.

- The Debt to Net Position Ratio compares total debt to total net position, which is the difference between total assets and liabilities. This ratio ranged from a high of 0.33 or 33 percent in 2020 to a low of 0.20 or 20 percent in 2019. For utilities, a ratio of 40 to 60 percent helps to moderate rate impacts by spreading costs over a longer period of time. Based on these results, the City may consider utilizing debt service for future capital investments, especially if it benefits system expansion.

- The Debt to Noncurrent Capital Asset Ratio compares total debt to noncurrent capital assets, which are also known as property, plant and equipment. This ratio begins at 0.22 or 22 percent debt to 78 percent noncurrent assets in 2017. Noncurrent capital assets increase by $20.6 million throughout the six-year history while debt increased by $6.2 million, and the ratio increases to 24 percent by 2022. Similar to the debt to net position ratio, these results indicate the utility has ample borrowing capacity and may consider utilizing debt service for future capital investments, especially if it benefits system expansion. A ratio of 40 percent debt to 60 percent equity or below is a general industry target.

9.3 Financial Plan

The water utility is responsible for generating sufficient revenue to meet all of its costs. The primary source of funding is derived from ongoing monthly service charges, with additional revenue coming from late penalties and interest earnings. The City controls the level of user charges and, with City Council approval, can adjust user charges as needed to meet financial objectives.

The financial plan can only confirm financial feasibility if it considers the total system costs of providing water services, both operating and capital. To meet these objectives, the following elements have been completed.

1. **Capital Funding Plan.** Identifies the total capital improvement plan (CIP) obligations of the planning period. The plan defines a strategy for funding the CIP, including an analysis of available resources from rate revenues, existing reserves, connection charge revenues, debt financing, and any special resources that may be readily available (e.g., grants, developer contributions, etc.). The capital funding plan impacts the financial plan through the use of debt financing (resulting in annual debt service) and the assumed rate revenue made available for capital funding.

2. **Financial Forecast.** Identifies future annual non-capital costs associated with the operation, maintenance, and administration of the water system. Included in the financial plan is a reserve analysis that forecasts cash flow and fund balance activity, along with testing for satisfaction of actual or recommended minimum fund balance policies. The financial plan ultimately evaluates the sufficiency of utility revenues in meeting all obligations, including cash uses such as operating expenses, debt service, capital outlays, and reserve contributions, as well as any coverage requirements associated with long-term debt. The plan also identifies the future adjustments required to fully fund all utility obligations in the planning period.

9.3.1 Capital Funding Plan

To properly evaluate future capital funding needs, capital costs were escalated by 3.00 percent annually to the year of planned spending. The CIP developed for this WSP identifies $129.4M in escalated project costs over the 10-year planning horizon from 2024-2033. The 20-year period, through 2043, includes $262.6M in total escalated project costs.

A summary of the 10-year and 20-year CIPs are shown in **Table 9-3**. As shown, each year has varied capital cost obligations depending on construction schedules and infrastructure planning needs.

Table 9-3 | 10-Year and 20-Year CIPs

Year	Unescalated $	Escalated $
2024	$ 15,368,740	$ 15,368,740
2025	13,020,848	13,411,473
2026	12,897,298	13,682,743
2027	10,674,810	11,664,653
2028	11,364,810	12,791,194
2029	10,214,810	11,841,764
2030	8,937,250	10,671,544
2031	10,647,750	13,095,389
2032	11,544,961	14,624,811
2033	9,369,039	12,224,471
10-Year Total	**$ 114,040,315**	**$ 129,376,782**
2034 - 2043	87,371,364	133,200,307
20-Year Total	**$ 201,411,679**	**$ 262,577,089**

Table 9-4 provides more detail for the 10-year CIP.

Table 9-4 | 10-Year CIP (Escalated $)

Project	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Active Projects (In Design or Construction)										
104th Park Development (104th to 102nd Water Main Loop)	$ 350,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
104th Avenue SE PRV Replacement	390,475									
C St SW Preservation	901,038	928,069								
Coal Creek Springs Transmission Main Replacement	4,450,422									
D St SE and 23rd Street SE Storm Improvements	2,285,677									
Well 4 Facility Improvements	884,822									
Well 4 Electrical Improvements	200,000	875,500								
112th Pl SE Water Main Replacement	255,000	1,900,350								
Auburn Way South - Hemlock St SE to Poplar St SE		2,469,940								
Garden Avenue Realignment	699,797									
M Street NE Widening	37,000		339,488							
R Street SE Widening		103,000	1,763,734							
R St SE and 21st St SE Roundabout	61,897	497,490								
R St SE Preservation - 33rd St SE to 37th St SE	301,850									
Lea Hill Road/104th Ave SE Roundabout	100,000		159,135	655,636						
Fulmer Treatment Facility VFD Replacements	175,000									
Reservoirs 4 and 8 Seismic Rehabilitation	1,433,871									
12th St SE and Auburn Way South Water R&R	318,000	327,540								
2025 Local Street Preservation	65,000	679,800								
2026 Local Street Preservation	50,000	154,500	926,166							
Coal Creek Springs Flowmeter Replacement	375,017									
Comprehensive Water System Plan Update - 2024	250,000									
Reservoir 2 Valves	68,750	2,266,000								
Supply										
Cascade Water Alliance Water Purchase	934,810	962,854	991,740	1,021,492	1,052,137	1,083,701				
Water Resources Protection Program	87,700	61,800	63,654	65,564	67,531	69,556	71,643	73,792	76,006	78,286
Rehabilitate & Clean Wells 2 and 6 (3-year Cycle)		257,500			281,377			307,468		
Well Inspection and Redevelopment Program			222,789	229,473						
Coal Creek Springs Rehabilitation	75,614			546,364	1,125,509	2,318,548	2,193,474			
Coal Creek Springs Chlorination Building Replacement							621,206	1,919,526		
Howard Road CCTF Expansion									570,047	1,304,773
On-Site Chlorine Generation Systems (OSEC) at Wells 1 and 4			106,090	191,227						
Fulmer CCTF Replace On-Site Chlorine Generation System (OSEC)			159,135	382,454						
Well 5/5A Upgrades			1,007,855	289,573	1,688,263					
Well 7 Treatment Phase 1							1,791,078	3,193,982	7,600,620	
Well 7 Back-Up Power									525,660	2,165,974
Well 7 Treatment Phase 2										2,158,095
Well 2 Replacement							477,621	1,918,603		
Algona Well 1 Study	50,000									
Storage										
Reservoir Repair and Replacements	192,000	61,800	63,654	65,564	67,531	69,556	71,643	73,792	76,006	78,286
Reservoir Painting (10-year Cycle)		257,500	1,591,350							
Academy PRV Project				513,582						
Reservoir Capital Improvements				513,582						
Valley Service Area Reservoir No. 3	50,000									
Pump Stations										
Intertie Booster Pump Station Improvements	75,000	257,500	2,121,800							
Lea Hill Pump Station Replacement				835,936	3,376,526	3,014,112				
Braunwood Pump Station Mechanical Upgrades	40,000									
Distribution System										
Annual Distribution System Improvements Program		412,000	2,652,250	2,731,818	2,813,772	2,898,185	2,985,131	3,074,685	3,166,925	3,261,933
Street Utility Improvements		619,030	654,575	1,420,545	1,463,161	1,507,056	1,552,268	1,598,836	1,646,801	1,696,205
Water Repair & Replacements		154,500	477,405	655,636	675,305	695,564	716,431	737,924	760,062	782,864
Water Trench Patches Program	160,000	164,800	169,744	174,836	180,081	185,484	191,048	196,780	202,683	208,764
West Hill Springs Transmission Main Replacement	50,000		212,180	1,257,729						
Lea Hill 648 Zoning Adjustment				113,644						
General										
Comprehensive Water System Plan Update - 2034										489,290
	$15,368,740	$13,411,473	$13,682,743	$11,664,653	$12,791,194	$11,841,764	$10,671,544	$13,095,389	$14,624,811	$12,224,471

9.4 Available Funding Assistance and Financing Resources

9.4.1 City Resources

Resources appropriate for funding capital needs include accumulated cash in the capital fund, rate revenues designated for capital spending purposes, developer contributions, and capital-related charges

such as system development charges. The first two resources will be discussed in the **Fiscal Policies** section of the **Financial Forecast**. Capital-related charges are discussed below.

9.4.1.1 System Development Charges

A connection charge such as the City's system development charge (SDC) refers to a one-time charge imposed on new customers as a condition of connecting to the water system. The purpose of the SDC is two-fold: 1) to promote equity between new and existing customers; and 2) to provide a source of revenue to fund capital projects necessary for meeting growth. This revenue can only be used to fund utility capital projects or to pay debt service incurred to finance those projects. In the absence of a connection charge, growth-related capital costs would be borne in large part by existing customers. In 2024, the City charged all new customers an SDC of $9,553 per meter capacity equivalent (MCE). MCEs are defined by the American Water Works Association and represent the maximum safe operating flow capacity in gallons per minute, relative to the base meter size.

9.4.1.2 Local Facilities Charges

While a connection charge is the manner in which new customers pay their share of system investment costs, local facilities charge funding is used to pay the costs of local facilities that connect each property to the system's infrastructure. Local facilities funding is often overlooked in rate forecasting because it is funded upfront by either connecting customers and developers, or through an assessment to properties, but never from rates.

A number of mechanisms can be considered toward funding local facilities. One of the following scenarios typically occurs: (a) the utility charges a connection fee based on the cost of the local facilities (under the same authority as the facilities assessment fee); (b) a developer funds an extension of the system to its development and turns those facilities over to the utility (contributed capital); or (c) a local assessment is set up called a Utility Local Improvement District (ULID/LID) or a Local Utility District (LUD), which collects tax revenue from benefited properties.

A local facilities charge (LFC) is a variation of the connection charge. It is a city-imposed charge to recover the cost related to service extension to local properties. Often called a front-footage charge and imposed on the basis of footage of the main "fronting" a particular property, it is usually implemented as a reimbursement mechanism to a city for the cost of a local facility that directly serves a property. It is a form of a connection charge and thus can accumulate up to 10 years of interest. It typically applies in instances when no developer-installed facilities are needed through developer extension due to the prior existence of available mains already serving the developing property.

The developer extension is a requirement that a developer install on-site and sometimes off-site improvements as a condition of extending service. These are in addition to the connection charge required and must be built to City standards. Part of the agreement between the City and the developer planning to extend service might include a latecomer agreement (also called payback agreements), resulting in a latecomer charge to new connections for the developer extension.

Latecomer charges are a variation of developer extensions, whereby new customers connecting to a developer-installed improvement make a payment to the City based on their share of the developer's cost. The City passes this charge on to the developer who installed the facilities. As part of the developer extension process, this defines the allocation of costs and records latecomer obligations on the title of affected properties. No interest is allowed, and the reimbursement agreement cannot exceed 20 years in duration.

ULID/LID is another mechanism for funding infrastructure that assesses benefited properties based on the special benefit received by the construction of specific facilities. Most often used for local facilities, some ULIDs also recover related general facilities costs. Substantial legal and procedural requirements can make this a relatively expensive process, and there are mechanisms by which a ULID can be rejected.

9.4.2 Outside Resources

This section outlines various grant, loan, and bond opportunities available to the City through federal and state agencies to fund the CIP identified in the WSP.

9.4.2.1 Grants and Low-Cost Loans

Historically, federal and state grant programs were available to local utilities for capital funding assistance. However, these assistance programs have been mostly eliminated, substantially reduced in scope and amount, or replaced by loan programs. Remaining grant programs are generally lightly funded and heavily subscribed. Nonetheless, the benefit of low-interest loans makes the effort of applying worthwhile.

The State of Washington's Department of Commerce maintains a document currently entitled "*Funding Programs for Drinking Water and Wastewater Projects; Updated 3-5-2024*", which contains details on government programs, eligibility requirements, and contact information, should the City wish to inquire about program offerings and eligibility requirements.

9.4.2.2 Bond Financing

General Obligation Bonds – General obligation (G.O.) bonds are bonds secured by the full faith and credit of the issuing agency, committing all available tax and revenue resources to debt repayment. With this high level of commitment, G.O. bonds have relatively low interest rates and few financial restrictions. However, the authority to issue G.O. bonds is restricted in terms of the amount and use of the funds, as defined by the Washington constitution and statute. Specifically, the amount of debt that can be issued is linked to assessed valuation.

Revised Code of Washington (RCW) 39.36.020 states:

> (2)(a)(ii) Counties, cities, and towns are limited to an indebtedness amount not exceeding one and one half percent of the value of the taxable property in such counties, cities, or towns without the assent of three-fifths of the voters therein voting at an election held for that purpose.
>
> (b) In cases requiring such assent counties, cities, towns, and public hospital districts are limited to a total indebtedness of two and one-half percent of the value of the taxable property therein.

While bonding capacity can limit the availability of G.O. bonds for utility purposes, these can sometimes play a valuable role in project financing. A utility rate savings may be realized through two avenues: the lower interest rate and related bond costs, and the extension of repayment obligation to all tax-paying properties (not just developed properties) through the authorization of an ad valorem property tax levy.

Revenue Bonds – Revenue bonds are commonly used to fund utility capital improvements. The debt is secured by the revenues of the issuing utility. With this limited commitment, revenue bonds typically bear higher interest rates than G.O. bonds and require security conditions related to the maintenance of

dedicated reserves (a bond reserve) and financial performance (added bond debt service coverage). The City agrees to satisfy these requirements by resolution as a condition of bond sale.

Revenue bonds can be issued in Washington without a public vote. There is no bonding limit, except perhaps the practical limit of the utility's ability to generate sufficient revenue to repay the debt and provide coverage. In some cases, poor credit might make issuing revenue bonds problematic.

9.4.3 Capital Financing Strategy

An ideal capital financing strategy would include the use of grants and low-cost loans when debt issuance is required. However, these resources are very limited and competitive in nature and do not provide a reliable source of funding for planning purposes. It is recommended that the City pursue these funding avenues but assume revenue bond financing to meet the needs which can't be met by available cash resources. The capital financing strategy developed to fund the CIP identified in this WSP assumes the following funding resources:

- Accumulated cash reserves,
- Transfers of excess cash (over minimum balance targets) from the Operating Fund,
- System development charge revenue,
- Interest earned on Capital Fund balances,
- Grant proceeds, and
- Revenue bond financing.

The cash resources described above are anticipated to fund 47.1 percent of the 10-year CIP and 56.4 percent of the 20-year CIP. The remaining funding is assumed to be from new debt obligations of $69.1M in the next 10-year planning period and an additional $45.3M between 2034-2043. Table 9-5 presents the 10-year and 20-year capital financing strategy.

Table 9-5 | 10-Year and 20-Year Capital Financing Strategy

Year	Capital Expenditures Escalated	System Development Charge Revenue	Grant Funding	Revenue Bond Proceeds	Cash / Reserve Funding	Total Financial Resources
2024	**$ 15,368,740**	$ 325,000	$ 2,717,531		$ 12,326,209	**$ 15,368,740**
2025	**13,411,473**	452,813		12,958,660	-	**13,411,473**
2026	**13,682,743**	468,497		3,541,340	9,672,907	**13,682,743**
2027	**11,664,653**	484,723		11,179,930	-	**11,664,653**
2028	**12,791,194**	501,511		6,320,070	5,969,613	**12,791,194**
2029	**11,841,764**	518,881		10,400,000	922,883	**11,841,764**
2030	**10,671,544**	536,853		-	10,134,691	**10,671,544**
2031	**13,095,389**	555,446		12,539,943	-	**13,095,389**
2032	**14,624,811**	574,684		2,260,057	11,790,070	**14,624,811**
2033	**12,224,471**	594,589		9,305,411	2,324,471	**12,224,471**
Subtotal	**$ 129,376,782**	**$ 5,012,997**	**$ 2,717,531**	**$ 68,505,411**	**$ 53,140,843**	**$ 129,376,782**
2034 - 2043	**133,200,307**	7,204,781		45,894,589	80,100,937	**133,200,307**
Total	**$ 262,577,089**	**$ 12,217,778**	**$ 2,717,531**	**$ 114,400,000**	**$ 133,241,780**	**$ 262,577,089**

9.5 Financial Forecast

The financial forecast, or revenue requirement analysis, forecasts the amount of annual revenue that needs to be generated by user rates. The analysis incorporates operating revenues, O&M expenses, debt service

payments, rate-funded capital needs, and any other identified revenues or expenses related to operations. The objective of the financial forecast is to evaluate the sufficiency of the current level of rates. In addition to annual operating costs, the revenue needs also include debt covenant requirements and specific fiscal policies and financial goals of the City.

For this analysis, two revenue sufficiency tests have been developed to reflect the financial goals and constraints of the City: cash needs must be met; and debt coverage requirements must be realized. In order to operate successfully with respect to these goals, both tests of revenue sufficiency must be met.

Cash Test – The cash flow test identifies all known cash requirements for the City in each year of the planning period. Typically, these include O&M expenses, debt service payments, rate-funded system reinvestment funding or directly funded capital outlays, and any additions to specified reserve balances. The total annual cash needs of the City are then compared to projected cash revenues using the current rate structure. Any projected revenue shortfalls are identified, and the rate increases necessary to make up the shortfalls are established.

Coverage Test – The coverage test is based on a commitment made by the City when issuing revenue bonds and some other forms of long-term debt. For the purposes of this analysis, revenue bond debt is assumed for any needed debt issuance. As a security condition of issuance, the City would be required per covenant to agree that the revenue bond debt would have a higher priority for payment (a senior lien) compared to most other expenditures; the only outlays with a higher lien are O&M expenses. Debt service coverage is expressed as a multiplier of the annual revenue bond debt service payment. For example, a 1.00 coverage factor would imply that no additional cushion is required. A 1.25 coverage factor means revenue must be sufficient to pay O&M expenses, annual revenue bond debt service payments, and an additional 25.0 percent of annual revenue bond debt service payments. The excess cash flow derived from the added coverage, if any, can be used for any purpose, including funding capital projects. Targeting a higher coverage factor can help the City achieve a better credit rating and provide lower interest rates for future debt issues.

9.5.1 Current Financial Structure

The City maintains a fund structure and implements financial policies that target management of a financially viable and fiscally responsible water system.

9.5.1.1 Fiscal Policies

A summary of the key financial policies employed by the City, as well as those recommended and incorporated in the financial program, are discussed below.

Operating Reserve – Operating reserves are designed to provide a liquidity cushion to ensure that adequate cash working capital will be maintained to deal with significant cash balance fluctuations, such as seasonal fluctuations in billings and receipts, unanticipated cash expenses, or lower than expected revenue collections. Like other types of reserves, operating reserves also serve another purpose: they help smooth rate increases over time. Target funding levels for an operating reserve are generally expressed as a certain number of days of O&M expenses, with the minimum requirement varying with the expected revenue volatility. Industry practice for utility operating reserves ranges from 30 days (8.0 percent) to 120 days (33.0 percent) of O&M expenses, with the lower end more appropriate for utilities with stable revenue streams and the higher end more appropriate for utilities with significant seasonal or consumption-based fluctuations. The City's current goal is to maintain a minimum balance in the Operating Fund equal to 90 days of O&M expenses for working capital.

Capital Reserve – A capital contingency reserve is an amount of cash set aside in case of an emergency should a piece of equipment or a portion of the utility's infrastructure fail unexpectedly. The reserve also could be used for other unanticipated capital needs, including capital project cost overruns. Industry practices range from maintaining a balance equal to 1.0 to 2.0 percent of fixed assets, an amount equal to a 5-year rolling average of CIP costs, or an amount determined sufficient to fund equipment failure (other than catastrophic failure). The final target level should balance industry practices with the risk level of the City.

This financial plan targets a minimum balance in the water utility capital fund equal to 1.0 percent of fixed assets.

System Reinvestment – System reinvestment funding promotes system integrity through ongoing repair and replacement of system infrastructure. Ideally, a detailed asset management plan would guide the level of rate funded system reinvestment, however, in absence of this level of effort, annual depreciation expense is commonly used as a measure of the decline in asset value associated with routine use of the system. Particularly for utilities that do not already have an explicit system reinvestment policy in place, implementing a funding level based on full depreciation expense could significantly impact rates. An alternative benchmark is annual depreciation expense net of debt principal payments on outstanding debt. This approach recognizes that customers are still paying for certain assets through the debt component of their rate and intends to avoid simultaneously charging customers for an asset and its future replacement. The specific benchmark used to set system reinvestment funding targets is a matter of policy that must balance various objectives, including managing rate impacts, keeping long-term costs down, and promoting "generational equity" (i.e., not excessively burdening current customers with paying for facilities that will serve a larger group of customers in the future).

The City is currently phasing in system reinvestment funding, aiming to reach 100 percent of annual depreciation levels by 2030. With this phase-in strategy in place, the City is forecast to fund an average of $3.8 million in capital costs annually through dedicated rate revenues within the 10-year forecast period.

Debt Management – It is prudent to consider policies related to debt management as part of a broader utility financial policy structure. Debt management policies should be evaluated and formalized, including the level of acceptable outstanding debt, debt repayment, bond coverage, and total debt coverage targets. The City has three outstanding water revenue bonds, a Public Works Trust fund loan, and two other low interest loans. This forecast meets or exceeds the required revenue bond debt service coverage of 1.25.

9.5.1.2 Financial Forecast

The financial forecast is primarily based upon the City's budget through 2024 and takes into consideration other key factors and assumptions needed to develop a complete portrait of the City's annual water utility financial obligations. The following is a list of the key revenue and expense factors and assumptions used to develop the financial forecast.

- Growth – Rate revenue is escalated utilizing a 0.45 percent growth rate developed based on actual historical trends at the City.

- Revenue – The City has two general revenue sources: 1) water service charges (rate revenue); and 2) miscellaneous (non-rate) revenue. In the event of a forecasted annual shortfall, rate revenue can be increased to meet the annual revenue requirement. For the purpose of this financial forecast, rate revenues are forecasted to increase with customer growth. Non-rate revenues are

held constant throughout the forecast period, with the exception of interest earnings which are calculated based on projected balances and assumed investment rates.

- System Development Charge Revenue – the existing system development charges are applied to the projected new connections to forecast revenue. Connection charges are forecast to generate an average of $501,000 annually from 2024-2033. This equates to an average of 46 new MCEs per year. Connection charge revenue is directed towards annual capital needs.

- Expenses – O&M expense projections are based on the City's budget through 2024 with general cost inflation increases of 3.0 percent, labor cost inflation of 5.0 percent for 2025 and 2026, decreasing to 3.0 percent thereafter and benefit cost inflation increases of 12.50 percent for 2025 and 2026, decreasing to 5.5 percent per year thereafter. Budget figures were used for taxes in 2024. Future taxes are calculated based on forecasted revenues and prevailing tax rates.

    - Facilities GO Bond - In order to construct a new facility for Maintenance and Operations for the City, the water utility will fund part of a General Obligation Bond totaling approximately $39.1 million. Beginning in 2025, the water utility's proportionate share of the bond is forecasted at $333,000 annually for the remainder of the twenty-year forecast.

- Existing Debt – The water utility has six (6) outstanding debt issues: three (3) revenue bonds, one (1) Public Works Trust Fund (PWTF) loan and two (2) Drinking Water State Revolving Fund (DWSRF) loans. Total annual existing debt service obligations begin 2024 at $2.7 million, decreasing to $1.1 million by 2033 as four (4) of the six (6) loans are fully repaid.

- Future Debt – The capital financial strategy developed for this WSP forecasts the need for $69.1M in new debt proceeds in five (5) separate instances throughout the ten-year forecast. The analysis performed assumes all new debt is through revenue bond financing. Annual new debt service obligations are forecasted to begin in 2025 at $1.5 million increasing to $6.1 million by 2033.

- Transfers to Capital - Operating fund balance above the minimum requirement is assumed to be available to fund capital projects and projected to be transferred to the Capital Fund each year, if needed. In total, the utility is forecast to fund $16.7 million in capital projects from excess operating fund cash within the 10-year forecast period.

Although the financial plan is completed through 2043, the rate strategy focuses on the shorter-term planning period of 2024 through 2033. It is recommended that the City revisit the proposed rates every 3 to 4 years to ensure that the rate projections developed remain adequate. Any significant changes should be incorporated into the financial plan and future rates should be adjusted as needed.

Table 9-6, following, summarizes the annual revenue requirements based on the forecast of revenues, expenditures, fund balances, and fiscal policies.

Table 9-6 | 10-Year Financial Forecast

Revenue Requirement	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Revenues										
Rate Revenues Under Existing Rates	$ 18,398,987	$ 18,480,409	$ 18,562,210	$ 18,644,392	$ 18,726,956	$ 18,809,906	$ 18,893,241	$ 18,976,964	$ 19,061,078	$ 19,145,583
Non-Rate Revenues	711,618	995,023	921,087	742,167	760,542	763,594	775,863	779,012	795,263	798,519
Total Revenues	**$ 19,110,605**	**$ 19,475,432**	**$ 19,483,297**	**$ 19,386,559**	**$ 19,487,499**	**$ 19,573,500**	**$ 19,669,104**	**$ 19,755,976**	**$ 19,856,341**	**$ 19,944,102**
Expenses										
Cash Operating Expenses	$ 14,490,240	$ 15,195,624	$ 15,775,495	$ 16,147,464	$ 16,560,290	$ 16,986,418	$ 17,429,740	$ 17,888,499	$ 18,366,342	$ 18,860,547
Existing Debt Service	2,674,248	2,671,361	2,665,106	2,615,447	2,611,734	2,601,528	2,598,336	1,759,410	1,759,292	1,090,490
New Debt Service	-	1,455,336	1,455,336	2,998,874	2,998,874	3,916,177	3,916,177	5,221,569	5,221,569	6,094,771
Rate Funded System Reinvestment	1,738,857	1,037,921	2,016,114	1,877,607	3,393,539	4,213,598	5,626,454	5,888,362	6,180,858	6,425,348
Total Expenses	**$ 18,903,345**	**$ 20,360,242**	**$ 21,912,050**	**$ 23,639,392**	**$ 25,564,438**	**$ 27,717,721**	**$ 29,570,707**	**$ 30,757,840**	**$ 31,528,062**	**$ 32,471,155**
Total Surplus (Deficiency)	**$ 207,259**	**$ (884,810)**	**$ (2,428,754)**	**$ (4,252,833)**	**$ (6,076,939)**	**$ (8,144,221)**	**$ (9,901,603)**	**$ (11,001,863)**	**$ (11,671,720)**	**$ (12,527,053)**
Annual Rate Adjustment	**0.00%**	**7.50%**	**9.50%**	**9.50%**	**9.50%**	**9.50%**	**9.50%**	**3.00%**	**3.00%**	**3.00%**
Cumulative Annual Rate Adjustment	**0.00%**	**7.50%**	**17.71%**	**28.90%**	**41.14%**	**54.55%**	**69.23%**	**74.31%**	**79.54%**	**84.92%**
Rate Revenues After Rate Increase	$ 18,398,987	$ 19,866,440	$ 21,850,041	$ 24,031,724	$ 26,431,269	$ 29,070,437	$ 31,973,157	$ 33,078,288	$ 34,221,651	$ 35,404,570
Additional Taxes from Rate Increase	-	229,097	543,446	890,472	1,273,446	1,695,963	2,161,979	2,330,808	2,505,891	2,687,448
Net Cash Flow After Rate Increase	**$ 207,259**	**$ 272,124**	**$ 315,632**	**$ 244,027**	**$ 353,928**	**$ 420,347**	**$ 1,016,334**	**$ 768,653**	**$ 982,962**	**$ 1,044,486**
Coverage After Rate Increases	3.00	2.10	2.40	1.91	2.24	2.19	2.52	2.41	2.50	2.43

The financial forecast indicates that at existing rate levels the utility will become deficient in 2025 as growth in expenses outpaces growth in revenues and the utility takes on additional debt obligations to fund capital infrastructure investment. The City has adopted a 7.50 percent increase for 2025, to resolve the remaining projected deficiency, rates will need to increase by 9.50 percent annually from 2026 through 2030, before decreasing to 3.00 percent annually through 2033.

9.5.1.3 City Funds and Reserves

Table 9-7 shows a summary of the projected Operating Fund and Capital Fund ending balances through 2033 based on the rate forecasts presented above. The Operating Fund is maintained above 90 days of O&M expenses. The Capital Fund balance meets or exceeds the minimum target of 1 percent of fixed assets in most years of the study timeframe with the exception of 2026, 2028 and 2030 where balances fall below target. Fund balances are rebuilt and meet or exceed target balances by the end of the ten-year timeframe.

Table 9-7 | Ending Cash Balance Summary

Ending Fund Balance	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Operating Fund	$ 8,988,743	$ 9,260,867	$ 3,943,874	$ 4,036,866	$ 4,140,073	$ 4,246,604	$ 4,357,435	$ 4,472,125	$ 4,591,586	$ 4,715,137
Capital Fund	2,019,201	6,659,039	1,226,711	9,587,690	1,038,144	4,653,056	1,096,853	9,910,203	3,003,538	8,649,973
Total	**$11,007,944**	**$15,919,905**	**$ 5,170,585**	**$13,624,556**	**$ 5,178,217**	**$ 8,899,660**	**$ 5,454,288**	**$14,382,328**	**$ 7,595,123**	**$13,365,110**

9.6 Current and Projected Rates

9.6.1 Current Rates

The existing water rates are composed of a fixed monthly charge that varies by meter size and a variable consumption charge per hundred cubic feet (CCF) for all water usage. While fixed charges are consistent across customer classes for all meter sizes except one inch, usage charges are different for each customer class. Consumption for the single family class is divided into three escalating pricing tiers that are applied year-round. This type of inclining tier structure is designed to discourage discretionary usage of water and encourage conservation. All other customers are charged a uniform rate for all consumption used. Table 9-8 shows the existing City of Auburn water system rate schedule.

Table 9-8 | Existing Schedule of Rates

Description	2024 Existing
Monthly Fixed Charges (All Classes)	
3/4"	$ 21.08
1" - Single Family	21.08
1" - All Other Classes	23.66
1 1/2"	25.76
2"	29.69
3"	57.11
4"	71.66
6"	91.57
8"	118.30
10"	167.97
Volume Charges per CCF	
Single Family	
0-7 CCF	$ 4.18
7-15 CCF	5.11
Greater Than 15 CCF	5.81
Multi-Family	$ 5.00
Commercial	5.27
Manufacturing / Industrial	5.15
Schools	5.61
Municipal	5.19
Irrigation	6.94

9.6.2 Projected Rates

The financial forecast discussed above indicates the need for annual rate adjustments to satisfy all forecasted financial obligations. The city has adopted a 7.50 percent increase for 2025, with annual 9.50 percent increases forecasted from 2026 through 2030, and 3.00 percent increases from 2031 to 2033. Table 9-9 shows the projected rates with increases applied uniformly to the water fixed and volume components for all classes. A more detailed rate study that will analyze the projected increases beyond the current adopted rates will be conducted in 2025.

Table 9-9 | Proposed Schedule of Rates

Description	Existing	Proposed								
	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Monthly Fixed Charges (All Classes)										
3/4"	$ 21.08	$ 22.66	$ 24.81	$ 27.17	$ 29.75	$ 32.58	$ 35.68	$ 36.75	$ 37.85	$ 38.99
1" - Single Family	21.08	22.66	24.81	27.17	29.75	32.58	35.68	36.75	37.85	38.99
1" - All Other Classes	23.66	25.43	27.85	30.50	33.40	36.57	40.04	41.24	42.48	43.75
1 1/2"	25.76	27.69	30.32	33.20	36.35	39.80	43.58	44.89	46.24	47.63
2"	29.69	31.92	34.95	38.27	41.91	45.89	50.25	51.76	53.31	54.91
3"	57.11	61.39	67.22	73.61	80.60	88.26	96.64	99.54	102.53	105.61
4"	71.66	77.03	84.35	92.36	101.13	110.74	121.26	124.90	128.65	132.51
6"	91.57	98.44	107.79	118.03	129.24	141.52	154.96	159.61	164.40	169.33
8"	118.30	127.17	139.25	152.48	166.97	182.83	200.20	206.21	212.40	218.77
10"	167.97	180.57	197.72	216.50	237.07	259.59	284.25	292.78	301.56	310.61
Volume Charges per CCF										
Single Family										
0-7 CCF	$ 4.18	$ 4.49	$ 4.92	$ 5.39	$ 5.90	$ 6.46	$ 7.07	$ 7.28	$ 7.50	$ 7.73
7-15 CCF	5.11	5.49	6.01	6.58	7.21	7.89	8.64	8.90	9.17	9.45
Greater Than 15 CCF	5.81	6.25	6.84	7.49	8.20	8.98	9.83	10.12	10.42	10.73
Multi-Family	$ 5.00	$ 5.38	$ 5.89	$ 6.45	$ 7.06	$ 7.73	$ 8.46	$ 8.71	$ 8.97	$ 9.24
Commercial	5.27	5.67	6.21	6.80	7.45	8.16	8.94	9.21	9.49	9.77
Manufacturing / Industrial	5.15	5.54	6.07	6.65	7.28	7.97	8.73	8.99	9.26	9.54
Schools	5.61	6.03	6.60	7.23	7.92	8.67	9.49	9.77	10.06	10.36
Municipal	5.19	5.58	6.11	6.69	7.33	8.03	8.79	9.05	9.32	9.60
Irrigation	6.94	7.46	8.17	8.95	9.80	10.73	11.75	12.10	12.46	12.83

9.6.3 Conservation Based Rates

In 2003 the Washington State Legislature passed the Municipal Water Supply Efficiency Requirements Act. The Water Use Efficiency rules went into effect on January 22, 2007 and typically apply to Water System Plans that each jurisdiction is required to develop every six to ten years. The Revised Code of Washington (RCW) outlines the rules of this act, under RCW 70.119.180. In section 4(B), the RCW states that jurisdictions must perform an "evaluation of the feasibility of adopting and implementing water delivery rate structures that encourage water conservation." The City of Auburn currently charges their single family residential customers based on an inclining block rate structure to incentivize water use conservation, therefore no additional evaluation was performed.

9.7 Affordability

The Washington State Department of Health and the Department of Commerce Public Works Board use an affordability index to prioritize low-cost loan awards depending on whether rates exceed 2.5 percent of the median household income for the service area. The average median household income for the City was $87,406 between 2018 and 2022, expressed in 2022 dollars, according to the U.S. Census Bureau. The 2022 value is escalated based on the actual rate of inflation in 2023 of 4.31 percent and the 3.00 percent inflation rate used in the financial forecast to project the median household income in future years. Table 9-10

presents the City's monthly water bill, projected to 2033 and tested against the 2.5 precent monthly affordability threshold.

Table 9-10 | Community Affordability Test

Year	Inflation	Median HH Income	2.5% Monthly Threshold	Projected Monthly Bill	% of Median HH Income
2022		$ 87,406			
2023	4.31%	91,173			
2024	3.00%	93,908	$ 195.64	$ 50.34	0.64%
2025	3.00%	96,726	201.51	54.09	0.67%
2026	3.00%	99,627	207.56	59.25	0.71%
2027	3.00%	102,616	213.78	64.90	0.76%
2028	3.00%	105,695	220.20	71.05	0.81%
2029	3.00%	108,866	226.80	77.80	0.86%
2030	3.00%	112,132	233.61	85.17	0.91%
2031	3.00%	115,495	240.62	87.71	0.91%
2032	3.00%	118,960	247.83	90.35	0.91%
2033	3.00%	122,529	255.27	93.10	0.91%

Applying the 2.5 percent monthly affordability test, the City's rates are forecasted to remain within the indicated affordability range through 2033.

9.8 Conclusion

The results of this analysis indicate that at existing rate levels the utility will be deficient beginning in 2025. To keep pace with expenses and prepare for new debt obligations needed to fund system infrastructure needs, the City has adopted a 7.50 percent rate increase in 2025. Forecasting into the future a 9.5 percent annual rate increase will be required from 2026 through 2030, followed by 3.00 percent increases through 2033. It is recommended that the City regularly review and update the key underlying assumptions that compose the multi-year financial plan to ensure that adequate revenues are collected to meet the City's total financial obligations.

CITY OF AUBURN WASHINGTON

AGENDA BILL APPROVAL FORM

Agenda Subject:
Capital Facilities Element (Tatro)
Planning Commission deliberation and action on the proposed changes to the Capital Facilities Element

Meeting Date:
December 3, 2024

Department:
Community Development

Attachments:
ATTACHMENT 3- Capital Facilities Element Presentation - PC 12-3, ATTACHMENT 4 - Capital Facilities Element Presentation - PC 12-3, ATTACHMENT 5 - V4 Capital Facilities

Budget Impact:
Current Budget: $0
Proposed Revision: $0
Revised Budget: $0

Administrative Recommendation:

Background for Motion:

Background Summary:

Councilmember:

Staff: Jason Krum

CITY DEPARTMENTS

2024 COMPREHENSIVE PLAN – CAPITAL FACILITIES ELEMENT

ALYSSA TATRO, SENIOR PLANNER
PLANNING COMMISSION

DECEMBER 3, 2024

Department of Community Development
Planning • Building • Development Engineering • Permit Center
Economic Development • Community Services • Code Enforcement

AUBURN VALUES

SERVICE
ENVIRONMENT
ECONOMY
CHARACTER
SUSTAINABILITY
WELLNESS
CELEBRATION

2024 PERIODIC COMPREHENSIVE PLAN – CAPITAL FACILITIES ELEMENT

Core Changes to Capital Facilities Element

Regulatory Requirements (RCW 36.70A.070)

(3) A capital facilities plan element consisting of:

(a) An inventory of existing capital facilities owned by public entities, including green infrastructure, showing the locations and capacities of the capital facilities;

(b) Forecast of the future needs for such capital facilities;

(c) Proposed locations and capacities of expanded or new capital facilities;

(d) At least a six-year plan that will finance such capital facilities within projected funding capacities and clearly identifies sources of public money for such purposes; and

(e) Requirement to reassess the land use element if probable funding falls short of meeting existing needs and to ensure that the land use element, capital facilities plan element, and financing plan within the capital facilities plan element are coordinated and consistent. Park and recreation facilities shall be included in the capital facilities plan element.

2024 PERIODIC COMPREHENSIVE PLAN – CAPITAL FACILITIES ELEMENT

Core Changes to Capital Facilities Element

Element Update Framework

- Pull in policy and non-financial text from Capital Facilities Plan
- Incorporate information from Utilities Element as appropriate
- Include inventories for capital facilities
  - Reference goals, policies, and technical information from other Elements as appropriate to avoid duplication
- Overall formatting and refinements for readability
- Note: Solid Waste polices have moved from CFE to Utilities Element

2024 PERIODIC COMPREHENSIVE PLAN – CAPITAL FACILITIES ELEMENT

Core Changes to Capital Facilities Element

Element Update Framework

- **Capital Facilities Inventory** – list of facilities and attributes (condition, age, size, etc.)
- **Level of Service** – Adopted Level of Service standards that apply to facilities for identification of future needs.
- **Known Capacity Issues** – Deficiencies identified by Level of Service analysis and/or capacity issues identified in other documents (systems plans, etc.)
- **Future Plans** – Summary of identified future projects or reference to other documents where information is found (systems plans, etc.)

2024 PERIODIC COMPREHENSIVE PLAN – CAPITAL FACILITIES ELEMENT

Next Steps

- **Acceptance of the Capital Facilities Element as a part of Package 2 of the Comprehensive Plan Update**

CITY DEPARTMENTS

2024 COMPREHENSIVE PLAN – CAPITAL FACILITIES ELEMENT

ALYSSA TATRO, SENIOR PLANNER
PLANNING COMMISSION

DECEMBER 3, 2024

Department of Community Development

Planning • Building • Development Engineering • Permit Center
Economic Development • Community Services • Code Enforcement

AUBURN VALUES

SERVICE

ENVIRONMENT

ECONOMY

CHARACTER

SUSTAINABILITY

WELLNESS

CELEBRATION

2024 PERIODIC COMPREHENSIVE PLAN – CAPITAL FACILITIES ELEMENT

Core Changes to Capital Facilities Element

Regulatory Requirements (RCW 36.70A.070)

(3) A capital facilities plan element consisting of:

(a) An inventory of existing capital facilities owned by public entities, including green infrastructure, showing the locations and capacities of the capital facilities;

(b) Forecast of the future needs for such capital facilities;

(c) Proposed locations and capacities of expanded or new capital facilities;

(d) At least a six-year plan that will finance such capital facilities within projected funding capacities and clearly identifies sources of public money for such purposes; and

(e) Requirement to reassess the land use element if probable funding falls short of meeting existing needs and to ensure that the land use element, capital facilities plan element, and financing plan within the capital facilities plan element are coordinated and consistent. Park and recreation facilities shall be included in the capital facilities plan element.

2024 PERIODIC COMPREHENSIVE PLAN – CAPITAL FACILITIES ELEMENT

Core Changes to Capital Facilities Element

Element Update Framework

- Pull in policy and non-financial text from Capital Facilities Plan
- Incorporate information from Utilities Element as appropriate
- Include inventories for capital facilities
  - Reference goals, policies, and technical information from other Elements as appropriate to avoid duplication
- Overall formatting and refinements for readability
- Note: Solid Waste polices have moved from CFE to Utilities Element

2024 PERIODIC COMPREHENSIVE PLAN – CAPITAL FACILITIES ELEMENT

Core Changes to Capital Facilities Element

Element Update Framework

- Capital Facilities Inventory – list of facilities and attributes (condition, age, size, etc.)
- Level of Service – Adopted Level of Service standards that apply to facilities for identification of future needs.
- Known Capacity Issues – Deficiencies identified by Level of Service analysis and/or capacity issues identified in other documents (systems plans, etc.)
- Future Plans – Summary of identified future projects or reference to other documents where information is found (systems plans, etc.)

2024 PERIODIC COMPREHENSIVE PLAN – CAPITAL FACILITIES ELEMENT

Next Steps

- Acceptance of the Capital Facilities Element as a part of Package 2 of the Comprehensive Plan Update

City of Auburn

Capital Facilities Element

Table of Contents

Introduction 1
Vision 1
Conditions and Trends 1
Planning Approach 2
Values 2
Concurrency and Levels of Service 3
  Levels of Service 3
  Concurrency 3
Capital Facilities and Services 5
  Municipal Facilities 5
  Parks and Recreation 10
  Transportation 11
  Public Utilities 14
  Public Education Facilities 22
Goals and Policies 24

Introduction

This volume provides overall policy direction for the different capital facility plans and programs provided by the City. Capital facilities belonging to privately owned utilities (electricity, natural gas lines, etc.) and those that are city-operated (water, sewer, stormwater, etc.) are covered in the Utilities Element (Volume 4). Certain City plans and programs are further refined in other sections of this volume, such as Parks, Recreation, and Open Space, and Transportation. Overall, however, this volume acts as a reference for all of the City's various capital facility plans except for those found in other Elements, including the City of Auburn Six-Year Capital Facilities Plan (a key component of and adopted with this plan), comprehensive plans, capital improvement and investment programs, inventories, and studies that together represent the planning and financing mechanisms required to serve the capital facility needs of Auburn. For more details on a particular capital facility or the City's overall capital facility plan, see the most recently adopted version of the following:

- City of Auburn Airport Master Plan
- City of Auburn Capital Facilities Plan
- City of Auburn Comprehensive Water Plan
- City of Auburn Comprehensive Sewer Plan
- City of Auburn Comprehensive Stormwater Plan
- City of Auburn Parks and Recreation Master Plan
- City of Auburn Comprehensive Transportation Plan
- Auburn School District Capital Facilities Plan
- Kent School District Capital Facilities Plan
- Dieringer School District Capital Facilities Plan
- Federal Way School District Capital Facilities Plan
- Valley Regional Fire Authority (VRFA) Capital Facilities Plan

Vision

Capital facilities in Auburn are planned, designed, and constructed in a manner that adequately supports the future growth scenarios in the City's Land Use Element and that meets the needs of residents, visitors, and businesses. Sustainability is a principle that guides decisions about where facilities are placed, how they are constructed, how they are operated and maintained, and how all aspects of design, construction, and operation are funded.

Conditions and Trends

Growth: The provision and sizing of public facilities such as streets or waterlines and sewer lines can influence the rate or timing of development and is an important means of managing growth. Timed provision of facilities also ensures that new development can be assimilated into the existing community without serious disruptions or adverse impacts. This Plan establishes policies to allow development when and where all public facilities are adequate or can be made adequate, but only if such development can be adequately served by public facilities and services consistent with the adopted level-of-service standards.

A key provision of the Growth Management Act is concurrency. In general, concurrency seeks to ensure that development is permitted only if adequate public facilities are, or can be guaranteed to be, available to support new development. Concurrency requires that facilities needed to maintain a locally adopted level of service be provided "concurrently" with development. Concurrency places the finance function of local government in a much more prominent role in the land use development process. While the concept of concurrency is new to many jurisdictions, it has been used in Auburn since the adoption of its 1986 Comprehensive Plan.

The Act requires concurrency only for transportation facilities, though if a jurisdiction desires, concurrency can be applied to other public facilities as well. With respect to transportation facilities, concurrent is defined within the Act as being provided at the time of or within 6 years of development (this is done to coincide with the six-year time frame of most capital facilities plans). If the facility is not available at the time of development, the funding to construct the facility must be included in the six-year capital facilities plan.

Regardless of whether a local jurisdiction applies concurrency to public facilities beyond those for transportation, new development must be coordinated with the provision of capital facilities. This ensures that all relevant public facilities and services are planned and available to serve the demands of new growth.

Planning Approach

The Capital Facilities planning approach is to manage growth in a manner that enhances from community quality and values by actively coordinating land use type and intensity with City facility and service development and provision.

Values

Character: Public buildings and spaces incorporate high-quality building and landscape design so that they positively impact the surrounding built environment.

Wellness: Public spaces that are purchased and developed for capital facilities also incorporate features and infrastructure that provide more complete nonmotorized connections.

Service: City utilities and buildings are of high quality and complete, reliable, and available to residents and business owners.

Economy: City utilities are available or planned to be available to serve allowed commercial, recreational, and residential uses.

Celebration: Capital facility spaces will be available, designed, and programmed in a manner that promotes public gathering.

Environment: Development of capital facilities will place a premium on environmental preservation and protection.

Sustainability: Our philosophy of designing, constructing, and maintaining utilities and buildings embraces a long-term investment horizon rather than concepts that only provide short-term benefits and outcomes.

Concurrency and Levels of Service

Levels of Service

Level of Service (LOS) is a common measure used to determine the efficiency or effectiveness of services. For the City of Auburn, LOS targets serve as a means to assess the adequacy of public facilities in meeting the needs of the population for which it serves. The GMA requires that LOS be established for certain transportation facilities for the purposes of applying concurrency to development proposals. The State GMA guidelines recommend the adoption of LOS standards for other capital facilities to measure the provision of adequate public facilities.

Typically, measures of level of service are expressed as ratios of facility capacity to demand (i.e., actual or potential users). For example, in the case of park space, when there is an increase in population without a corresponding increase in park acreage, the LOS unit of measure (acres per 1,000 population) will decline, indicating a potential need to increase the total amount of park acreage to keep pace with population growth. On the other hand, a slight increase in population, coupled with a large increase in facilities, will result in an increased LOS. For example, facilities such as buildings or burial plots may be constructed or expanded to keep pace with anticipated population growth. While this will have the effect of increasing LOS in the short-term, in the longer-term, the LOS will gradually decline to the targeted level based on forecasted population. The impact of population growth to the LOS for facilities will vary depending on the type of facility and long-range planning by the City.

Concurrency

The GMA requires that jurisdictions have certain capital facilities in place or available within a specified time frame when development occurs. This concept is called concurrency. Under the GMA, concurrency is required for transportation

facilities and is recommended by the State for certain other public facilities, namely potable water and sanitary sewer.

Concurrency has a direct relationship to level of service. The importance of concurrency to capital facilities planning is that development may be denied if it reduces the level of service for a capital facility below the locally adopted minimum. The level of service is unique for each type of facility and is presented in the subsequent sections. Concurrency has a direct relationship to level of service. The importance of concurrency to capital facilities planning is that development may be denied if it reduces the level of service for a capital facility below the locally adopted minimum. The level of service is unique for each type of facility and is presented in the subsequent sections.

The need for capital facilities is largely determined by a community's adopted LOS standards and whether or not the community has formally designated capital facilities, other than transportation, as necessary for development to meet the concurrency test. The CFP itself is therefore largely influenced by the selection of the level of service standards. Level of service standards are measures of the quality of life in the City. The standards should be based on the City's vision of its future and its values.

Level of Service Standards and Needs

Based on the proposed six-year capital projects and the projected population increase of 4,585 (5.1%) between 2023 and 2028, the LOS for the following City-owned public facilities will change as follows:

The LOS for the following facilities will be increased as a result of population projections described in the Capital Facilities Plan (CFP), comparing the 2023 LOS to the projected 2028 LOS.

Capital Facility	LOS Units	2023 LOS	2028 LOS (Projected)
Cemetery	Burial Plots per 1,000 population	29.00	56.00
Community Parks	Acres per 1,000 population	2.62	2.95
Linear Parks	Acres per 1,000 population	0.18	0.21
Neighborhood Parks	Acres per 1,000 population	0.72	0.78

The LOS for the following facilities will be maintained as a result of the CFP.

Capital Facility	LOS Units	2023 LOS	2028 LOS (Projected)
Transportation	See Comprehensive Transportation Plan		
Airport	% of Air Operations Support	100%	100%
Storm Drainage	N/A	N/A	N/A
Water	Residential GPCPD[1]	182.00	181.00

1 – GPCPD = Gallons per Customer per Day, or the equivalent of water used by a single-family residential unit per day.

The LOS for the following facilities will be decreased as a result of the CFP, comparing the 2023 LOS to the projected 2028 LOS.

Capital Facility	LOS Units	2023 LOS	2028 LOS (Projected)
General Municipal Buildings	Square Feet per 1,000 population	3,290.44	3,173.11
Open Space	Acres per 1,000 population	4.25	4.10
Senior Center	Square Feet per 1,000 population	135.70	129.12
Special Use Areas	Acres per 1,000 population	2.83	2.69

Other Level of Service metrics and thresholds related to specific capital facilities are located in the sections below.

Capital Facilities and Services

Municipal Facilities

The current inventory of City government administration and operations facilities include 207,629 square feet for general government operations, 66,469 square feet for police services, and 21,726 square feet for fire protection, for a total of 295,824 square feet. The table below lists the facilities along with their current capacity and location.

Community Facilities

Facilities Inventory

Facility Name	Location	Size
Community Center	910 9th St SE	19,804 sq ft
Senior Center	808 9th St SE	11,667 sq ft
Cemetery	2020 Mountain View Dr	4,011 sq ft (out buildings not included)
Golf Course	29630 Green River Rd	14,114 sq ft (out buildings not included)
Postmark Center for the Arts	20 Auburn Ave	8,744 sq ft
GSA	2905 C St SW	11,837 sq ft
4910 A Street	4910 A Street	5,920 sq ft
City Hall	25 W Main St	57, 316 sq ft
City Hall Annex	1 E Main St	47,000 sq ft
Justice Center	340 E Main St	36,000 sq ft
Maintenance & Operations	1305 C St SW	18,232 sq ft (out buildings not included)

Parks Maintenance	1403 C St SW	6,094 sq ft (out buildings not included)
Les Gove MPP Building	1040 Deal's Way	1,262 sq ft (out buildings not included)
R Street Building	2840 Riverwalk Drive SE	4,798 sq ft (out buildings not included)
Warren Building	411 E Street NE	1,813 sq ft (out buildings not included)
Herr Storage	1140 Auburn Way S	3,600 sq ft
Auburn Ave Theatre (scheduled for demolition)	10 Auburn Ave	7,590 sq ft
Auburn valley Humane Society	4910 A Street SE	5,920 sq ft

Level of Service

The current LOS of 3,290 square feet per 1,000 population is based on the existing inventory divided by the 2023 citywide population of 89,904. The proposed LOS of 3,173 square feet per 1,000 population is based on the projected inventory divided by the 2028-projected citywide population of 94,489.

Future Plans

As of 2024, the City is in the process of designing and constructing a replacement for the Auburn Ave Theatre, which was damaged when the adjacent historic mixed-use building on E Main Stret was damaged beyond repair due to fire. The new theatre is anticipated to be an activity anchor in downtown with its central location.

Public Library Facilities

The City of Auburn is served by the King County Library System in 15,000 square foot Auburn Library building at 1102 Auburn Way S. The library opened in 2000 after moving first from the Carnegie Library building in downtown (constructed in 1914), then from another facility in Les Gove Park (constructed in 1964). The current building has continued to be renovated and expanded over the past 25 years, with the last construction completed in 2012. Detailed information regarding the King County Library System is available at www.kcls.org.

Police

Facility Inventory

Name	Location	Size
Auburn Justice Center (Police)	340 E Main St	16,000 sq ft
Evidence Building	340 E Main St	4,400 sq ft

The Auburn Police Department has a staff of the Chief, Assistant Chief, 5 Commanders, 13 Sergeants, 57 Patrol Officers, 20 Detectives, 5 Traffic Officers, and multiple supervisors, specialists, technicians, and other staff as of 2023.

Police services are centered around the Auburn Justice Center that serves the entire City and supports the required staff, the majority of who are assigned to the patrol division. In 2004, the police department took occupancy of a portion of the Justice Center, primarily in the basement, with the Court located on the primary level. The police portion occupies just over 16,000 square feet. Currently the police facility houses 118 sworn police officers in addition to 22 civilian staff. Police headquarters provides both designated and temporary workspace, meeting rooms, common areas, locker rooms, storage space, utility space, electrical and utility space, and records storage space. A separate evidence building at the same site houses evidence storage, general equipment storage, and records archives. Additionally, the department maintains temporary evidence storage in the basement of city hall, utilizing approximately 200 square feet of space.

A facility needs assessment was completed in 2020 and was incorporated in the 2020 Facilities Master Plan.

Known Capacity Issues

Police facilities lack adequate space to support current staff and operations, and future growth.

- Suboptimal climate control, especially on ground floor as HVAC zone configuration does not align with current space configuration due to renovations.
- Facility too small to accommodate both Court and Police in long-term.
- Severely space-constrained, especially for Police, which grew 40% between 2004 and 2019.
- Undersized public lobby and soft interview space.
- Limited meeting/briefing space for all meeting types, including large groups, confidential discussions, and interviews.

Police office space is primarily in basement areas that have limited natural light.

- Defensive tactics and classroom training occur in a room with irregular column placement which impedes sightlines, creates barriers for physical training, and complicates furniture/mat reconfiguration.
- Evidence building is at capacity.
- Undersized parking; unsecured parking for marked vehicles.

Future Plans

A property located near the intersection of Auburn Way Sout & 12th Street Southeast has been acquired by the City. 2023-2024 budget allocated funding for facility planning at new location. Other than planning, there is no funding allocated for this project.

Fire Protection

The Valley Regional Fire Authority (VRFA) provides critical fire and life safety services to the approximately 97,000 citizens residing in the 37 square miles of Algona, Auburn, and Pacific. Oversight of the VRFA is provided by a nine-member Governance Board consisting of the Mayor and two council members from each participating city. Twenty personnel respond from five fire stations. These stations are staffed 24 hours a day, seven days a week, by four shifts. A battalion chief oversees each shift, and a deputy chief manages the entire division.

The Auburn Fire Department was formed over a century ago as a result of a devastating fire in August of 1890. The fire destroyed an entire city block of businesses in what was then known as the town of Slaughter. The original department, consisting of volunteer firefighters and a hand-drawn hose cart, was first named the Auburn Bucket Brigade. The name changed to the Auburn Volunteer Fire Department in 1908. On January 1, 2007, as a result of a voter-approved measure, the Auburn Fire Department combined with the Pacific Fire Department and the City of Algona to form the Valley Regional Fire Authority, which provides fire and EMS services to all three cities.

In an emergency, every second counts. The VRFA has established a Total Response Time (TRT) benchmark of seven minutes and 34 seconds (7:34) for EMS Calls and seven minutes and 49 seconds (7:49) for fire calls. TRT is the time it takes a unit to arrive at a scene once the call is received at the Fire Alarm Center. In 2022, we achieved those benchmarks 51% of the time for fire response and 57% for EMS response.

The VRFA's Capital Facilities Plan (CFP), which was adopted by the Board of Governance in 2021, made four recommendations:

- Priority 1: build an additional station in the northern part of VRFA's service area
- Priority 2: relocate and rebuild Station 38 in Pacific
- Priority 3: remodel or replace Station 31
- Priority 4: find a permanent location for Support Services

In 2022, the VRFA took several significant steps to implement the CFP, including:

- Purchasing property on 30th and I Street Northeast for a new north end fire station. Evaluating property on the Ellingson corridor in Pacific in order to relocate Station 38.
- Contracting with the leading architectural firm TCA to consult on land acquisition and complete preliminary design concepts on each element of the CFP.
- Initiating a discussion on the best way to fund these critical projects.

In 2022, 45% of revenue was from Property Taxes, 34% from Fire Benefit Charges, and 21% from other sources such as grants and permit fees. Expenditures in 2022

include 52% for wages, 15% for capital projects, 19% for benefits and 14% for other services and supplies.

Valley Regional Fire Authority Capital Facility Plans, Annual Reports, and other documents can be found at www.vrfa.org.

Level of Service

The current LOS of 0.20 fire apparatus per 1,000 population is based on the existing inventory (18 fire apparatus) divided by the 2023 citywide population estimate of 89,904. The proposed LOS of 0.20 fire apparatus per 1,000 is based on the 2028-planned inventory (19 fire apparatus) divided by the 2028-projected citywide population of 94,489.

Parking

Facilities Inventory

Facility Name	Location	Capacity	Condition
Kiss-n-Ride Parking Lot	Parcel #7815700172	21 Non-Handicap spaces; 1 accessible space	Fair
11 A Street NW Parking Lot	11 A Street NW	47 Non-Handicap spaces; 2 accessible spaces	Poor
B Street Parking Lot	137 E Main Street	60 Non-Handicap spaces; 13 accessible spaces	Fair
Safeway Parking Lot	Parcel #7331400135	122 Non-Handicap spaces; 4 accessible spaces	Poor
D Street Parking Lot	350 E Main St	20 Non-Handicap spaces; 0 accessible spaces	Very Poor
JC Employee Parking Lot	20 D Street SE	55 Non-Handicap spaces; 1 accessible spaces	Fair

Future Plans

On April 1, 2024, the City of Auburn relinquished possession and use of 113 off-site parking stalls to Sound Transit. The 113 parking stalls were code required parking stalls tied to two office-condominiums owned by the City and utilized as office space by City employees. The City will need to replace these 113 parking stalls within the code required 1,000/ft radius of the office condominiums with which they serve. Funding for the parking replacement will come in whole or in part from the monetary amount awarded to the City by the arbitrator who presided over the arbitration hearing.

Replacement of the 113 parking stalls relinquished to Sound Transit will likely need to be accomplished by constructing a multi-story parking garage.

Cemeteries

The City owns two cemeteries. The Mountain View Cemetery is a fully developed facility (60 acres and five buildings) that provides burial services and related merchandise for the community. The Pioneer Cemetery is a historic cemetery that is no longer used for burial purposes.

Level of Service

The current LOS of 29 burial plots/niches and cremation in ground plots per 1,000 population is based on the existing inventory divided by the estimated 2023 citywide population. The proposed LOS of 56 burial and plots/niches and cremation in ground plots per 1,000 population is based on the projected inventory divided by the 2028-projected citywide population.

Parks and Recreation

The Parks, Recreation, and Open Space (PROS) Plan is needed to meet legal requirements and secure funding for the City's parks and recreation areas for the next six to ten years. Developed with public involvement, city staff, and several city commissions, this plan provides a summary of the city's parks, recreation programs, and open spaces, and gathers information on the community's recreational needs through surveys, outreach, and online tools. This Plan establishes a vision, goals, and assesses the current level of service provided by city parks and open spaces. The Capital Improvement Plan (CIP) and its formal approval adoption completes the PROS Plan suggesting a series of recommended improvements to better serve the citizens of Auburn for the next six years and beyond, each tied to potential grant funding sources, serving to guide the City's response and priorities to the desired quality of life envisioned from its citizens.

Facilities Inventory

Currently, the City manages a diverse range of parks and recreation assets, including 23 neighborhood, or local, parks, 14 community parks, 7 parcels of dedicated open space including a golf course, trail systems, and 16 special use facilities. More information on parks and recreation assets can be found in Appendix F – PROS Plan of the Comprehensive Plan

Facility Type	Quantity	Location	Existing Inventory (Total Acres)	LOS (2015) Acres/1,000 Res.	LOS (2024)	Future Facilities	Future Capital Projects
Community Parks	14	City-Wide	283.3	4.5	3.5	Jacobsen Tree Farm & 104th Ave SE Property	Jacobsen Master Plan, Ph. 1, Ph. 2 Sunset Park Ph. 2, Ph. 3 Game Farm Rec. Courts & Field Imps. Brannan Field Conversions
Neighbor Parks	10	City-Wide	51.23	1.32	1	Auburndale 2	

Open Spaces	6	City-Wide	321.42	As Acquired	4	Lakeland Nature Area	Lakeland Nature Area Parking & Access Imps., Interpretive Trail
Special Use Areas	14	City-Wide	307.69	As Identified	N/A		Golf Course Maint. Building & Les Gove Pavilion
Tot Lots	13	City-Wide	16.71	N/A	.25		
Trails	N/A	City-Wide	26.87 Miles	0.21	.25 miles		White River Trail Reconstruction

Level of Service (LOS)

A 10-minute walk is considered an important park access metric for several reasons. A 10-minute walk (approximately 1/2 mile on level ground) as a park access metric is important because it promotes physical activity, equity, sustainability, social interaction, and overall community well-being. It aligns with various health, environmental, and social goals the City has and should encourage staff and policymakers to prioritize accessible green spaces as a fundamental part of Auburn's development and the community's desired quality of life.

Future Plans

A Needs Analysis and Capital Improvement Program (CIP) project list can be found in Appendix F – PROS Plan of the Comprehensive Plan.

Transportation

Roadways: The City's street system consists of a network of approximately 249 miles of arterials, collectors, local streets and alleys. Existing nonmotorized facilities include a mix of trails, sidewalks, and both dedicated and shared bicycle facilities.

Signals and ITS: The City's transportation system also includes 95 traffic signals, a Traffic Control Center employing Intelligent Transportation Systems (ITS), which centrally directs the signals, 89 traffic cameras, and various traffic beacons all communicating on a network of copper wire and fiber optic cable. The City also has three roundabouts.

Transit: King County Metro Transit, Sound Transit and Pierce Transit serve the Auburn area. Auburn is currently served by six Metro, two Sound Transit, and one Pierce Transit bus route. In addition, Sound Transit "Sounder" commuter trains provide peak hour and midday service at the Auburn Station. The Sounder also provides special event service to selected sporting events. Park and Ride facilities and the Auburn Station support bus and rail service.

Facilities Inventory

Quantity	Description
249	Miles of Streets
17	Bridges
11,000	Street Signs
13,389	Feet of Guardrail
96	Traffic Signals
31	Rapid Rectangular Flashing Beacons
3.684	Street Lights - City Owned
2,261	Street Lights - PSE Owned
53	School Zone Flashing Beacons
19	Speed Radar Feedback Signs
89	Traffic Cameras
12	Speed Photo Enforcement Locations (School Zones)
4	Dynamic Message Signs
43.86	Miles of Fiber Optic Systems
2	Community Banner Locations
22.62	Miles of Class I Bikeways
1.29	Miles of Class II Bikeway with Buffer (Both Sides of Roadway)
15.95	Miles of Class II Bikeway (Both Sides of Roadway)
4.21	Miles of Class II Bikeway (Intermittent or 1 Side of Roadway)
2.60	Miles of Class III Bikeway with Pavement Markings
298.21	Miles of City Sidewalk

Level of Service

The City's Comprehensive Transportation Plan (CTP) establishes multimodal level of service standards for City streets, active transportation facilities, and access to transit service, and freight movement to provide guidance to evaluate the multimodal facilities, identify deficiencies, and prioritize projects to eventually reach a complete multimodal network that can support and promote mode shift, reducing the vehicle capacity demand on the roadways. The following policies relate to vehicle level of service which the City primarily utilizes to evaluate transportation system capacity. Other level of service standards are utilized for concurrency and planning but generally focus on the existing or absence of facilities and services and the quality of those facilities and services rather than their capacity.

- Policy TR6-1-1: The City adopts the following Vehicle Level of Service (LOS) Standards for the AM and PM peak periods per the Highway Capacity Manual:

- Signalized: The LOS standard for signalized intersections is “D”, with the following exceptions: for signalized intersections of two principal arterial roads the LOS standard is “E”.
- Stop Controlled: The LOS standard stop controlled intersections is “D”.
- Roundabout: The LOS standard for roundabout controlled intersections is “D” with a V/C ratio for each lane group of less than 0.90.
- Queuing: The LOS standard for intersection queuing is the 95th percentile queue shall not extend across an adjacent driveway, alley, or street intersection, except if the driveway, alley, or street intersection is within the functional intersection boundary of the queue in which case the queue may extend to the limit of the functional intersection boundary. Additionally, queuing for a designated turn lane shall not exceed turn lane storage area and cause a blockage of through lane(s).

Known Capacity Issues

The City utilizes the vehicle intersection delay level of service standard to evaluate general transportation system capacity for concurrency. Of the 157 intersections evaluated with the CTP, the following 11 (or 8%) were operating below the City’s adopted level of service standard under existing conditions:

- Auburn Way North & 45th Street NE
- 116th Avenue SE & SE 304th Street
- 46th Place S/44th Avenue S & S 321st Street/51st Avenue S
- 51st Avenue S & 316th Avenue
- Henry Road NE/Pike Street NE & 8th Street NE
- C Street SW & 3rd Street NW
- M Street SE & Auburn Way South
- Auburn Way South & 17th Street SE
- A Street SE & 44th Street SE
- Lakeland Hills Way SE & Oravetz Road SE
- R Street SE & 33rd Street SE

Initial modeling of future conditions (2044) added another 10 intersections to the list of intersections that would be operating below the City’s adopted level of service standard:

- Auburn Way N & 42nd Street NE
- I Street NE & 37th Street NE
- 30th Street NE & I Street NE
- 112th Avenue SE & SE 304th Street
- SE 304th Street & 118th Avenue SE
- 56th Avenue S & S 316th Avenue
- 15th Street NE & M Street NW

- A Street SE & 12th Street SE
- A Street SE & 21st Street SE
- A Street SE & Ellingson Road/41st Street SE

Transportation Project List

The Comprehensive Transportation Plan (CTP) includes projects and programs to address the vehicle level of service issues at intersections identified in the existing and future conditions. Those projects include new traffic signals, new roundabouts, modified lane configurations, new roadways, and other measures intended to reduce intersection vehicle delays. The CTP also includes projects, programs, and other actions intended to address to address level of service issues related to active transportation (bicycle and pedestrian), transit, and freight movement. Please refer to the CTP for lists and summaries of the projects, programs, and actions.

Public Utilities

The City of Auburn manages sanitary sewer, water, and storm drainage utilities as well as solid waste collection. The sanitary sewer and water utilities serve the City and several areas outside the City limits. The efficient provision of these services can play a significant role in managing the growth of the City as well as affecting the quality of life for residents of Auburn and the surrounding areas. Public utilities can serve the following goals:

- To protect the public health and safety by providing efficient and cost-effective water, sanitary sewer, storm drainage, and solid waste services to the community.
- Ensure that development will only occur if the urban services necessary to support such development will be available when it is developed.

Water

The City provided water service to over 15,000 service connections as of 2024. The City's water sources include the Coal Creek Springs and West Hill Springs watersheds and are supplemented by a system of ten wells (6 active) and two connections to the regional water system operated by Tacoma Public Utilities. Storage facilities are found on the Enumclaw plateau, at Lakeland Hills, and at Lea Hill. For more background information, see the Comprehensive Water Plan.

Facilities Inventory

- Approximately 306 miles of Water Main
- Over 15,000 Service Connections
- 8 Pump Stations
- 8 Reservoirs
- 1 Satellite Water System
- 6 Active Wells
- 2 Springs

Levels of Service Standards

The System Policies included in Appendix A of the Comprehensive Water Plan and provide direction for City Staff in the management of the utility. The City of Auburn (City) manages the water utility in accordance with established water system policies that govern various facets of utility operations. City policies are established by the City to provide a vision or mission of the water utility and to provide a framework for the design, operation, and ongoing wellbeing of the City's water utility.

The policies included in Appendix A of the Comprehensive Water Plan are developed specifically for the City's multi-source municipal water system and seek to provide consistent treatment to all utility customers and to provide documentation to current water-system customers as well as those considering service from the City.

The City's Comprehensive Water Plan is based upon the following mission statement for the water utility:

"The City will provide for the efficient, environmentally sound and safe management of the existing and future water system within Auburn's service area."

The City's Water utility policies are grouped within goal statements that are headlined under the following categories:

- Business Practices
- Service Area
- Operations and Maintenance
- Financial
- Planning
- Environmental Stewardship
- Design and Construction

A few examples of policies related to level of service standards provided by the water system include:

- Policy 5.3 - System-Wide Reliability
  The City shall invest the resources necessary to construct, maintain, and renew water-system infrastructure and equipment to ensure that customers are provided consistent, reliable service in accordance with WAC 246-290-420 Reliability and Emergency Response. Wherever possible, the City should anticipate system interruptions and design and operate the system to minimize the impact of such interruptions to customers.

- Policy 5.8 - Water Supply Planning

The City's objective is to ensure a continuous, safe water supply to meet firm customer demands. Provision of water service must be consistent with the goals, objectives, and policies of the City of Auburn Comprehensive Water Plan. Effects of past water conservation will be considered when projecting future water needs. Future water demands will be estimated using existing water usage patterns and projected future populations developed by the City's comprehensive Plan and consistent with the Puget Sound Regional Council data.

- Policy 5.10 - Service Pressure
  The City should provide potable water to customers in sufficient quantity to meet maximum day demands at a pressure that meets or exceeds all minimum applicable regulations, except during emergency conditions. Property owners may install private booster pumps to achieve higher pressures under supervision of the City and in accordance with WAC 246-290-230 Distribution Systems.

Known Capacity Issues (based on Level of Service or other standards)

The preparation of the Comprehensive Water Plan included hydraulic modeling for existing and future conditions. Issues derived from the modeling with respect to pipeline improvements needed to meet fire flow conditions were ranked, with those locations ranked higher given more priority to be completed. The projects are anticipated to be completed under the Repair and Replacement program identified in Chapter 7 of the Comprehensive Water Plan. In addition, other known capacity issues with respect to water facilities and sources, include:

- Lea Hill Intertie Booster Pump Station - the Intertie Booster Pump Station (serves the Lea Hill 648 pressure zone) has a pumping capacity deficit, and the Pump Station lacks emergency power, impacting water supply during power outages.
- Lea Hill Service Area Storage - There is a reservoir/storage capacity shortage of 0.54 MG for the Lea Hill service area.
- Valley Service Area Storage - There is a reservoir/storage capacity shortage of 1.28 MG in the Valley service area.
- Wells 3A/3B - are offline due to high manganese levels.
- Wells 7 - is offline due to high manganese levels.
- Coal Creek Springs - is underutilizing its water right, leading to inefficiency.
- Well 5 - needs upgrades and property acquisition for expansion.
- Well 4 - requires facility and electrical improvements for efficient operation.
- Well 1 and Well 4 - Liquid chlorine degradation at the facilities affect water treatment during low winter demand periods.
- West Hill Springs - Aging chlorination building.
- Lea Hill Pump Station – pump station lacks redundancy.

- Game Farm Wilderness Park - pumps need replacement and building repairs.
- Reservoir 2 - Limited maintenance access to Reservoir 2 valves and lack of earthquake resiliency.
- Coal Creek Springs Transmission Main- 100+ year old pipe that needs to be replaced and is susceptible to leaks.
- West Hill Springs - Poor condition of existing cast iron transmission main.
- Howard Road Corrosion Control Treatment Facility (CCTF) - will exceed capacity after Coal Creek Springs Rehabilitation project completion.
- Howard Road Corrosion Control Treatment Facility (CCTF) - Existing liquid chlorine generating equipment reaching the end of its useful life at Fulmer CCTF.

Stormwater

The System consists of a combination of open ditches, closed conveyance pipes, water quality facilities, and pump stations. For more details, see the Comprehensive Storm Drainage Plan.

Facilities Inventory

- Over 240 miles of storm drainage pipe
- Over 40 miles of open channels and ditches
- Over 13,900 junction structures (catch basins, manholes)
- 167 detention ponds
- 7 pump stations.

Levels of Service Standards

The System Policies included in Chapter 3 of the Comprehensive Storm Drainage Plan provide direction for City Staff in the management of the utility. The following policies are specifically related to designed capacity level of service provided by the sewer conveyance system:

- Policy 1.1 -The City shall seek to manage stormwater runoff within the public Right of Way (ROW):
    - to provide access to and functionality of critical services.
    - to preserve mobility on major transportation routes (i.e., arterial roads) and residential roads.
    - to protect real property structures (e.g., residences and businesses.)
- Policy 1.2 - The City shall seek to provide pump redundancy and backup power generators or dual power feeds at City- owned and -operated drainage pump stations.
- Policy 1.3 - The City shall routinely assess the performance of pumped systems with a focus on capacity and vulnerability. This review aims to

ensure that these systems operate efficiently, meet their intended capacity, and remain resilient against potential risks.

Known Capacity Issues

The preparation of the Comprehensive Storm Drainage Plan included hydraulic modeling focused on updating models within locations of proposed capital projects. In addition, existing drainage problems have been observed by the staff and are known to cause flooding of roadways at the following locations:

- Auburn Way South/ SR 18 Underpass - minor roadway flooding causes disruptions to traffic during periods of certain intense rainfall events.
- I St NE between 33rd St NE and 35th St NE – minor flooding has been observed when the Green River flows are high, and the gravity discharge is impacted.
- There are areas within the city not served by the public storm system, such as paved alleys or residential streets where minor flooding is observed.

Future Plans

The 6-year capital improvements are discussed in detail in Chapter 7 and the implementation schedule presented in Chapter 8 of the Comprehensive Storm Drainage Plan.

Sewer

The system is primarily a collection system with treatment provided by Metro. The system includes approximately 205 miles of sewers and force mains and 17 sewer pump stations. Significant portions of the City's service area are currently on septic systems, although plans for future expansion of sewer service into these areas is included in the Comprehensive Sewer Plan. For more details, see the Comprehensive Sewer Plan.

Facilities Inventory

Sewer facilities in the City currently consist of:

- 205 miles of gravity sanitary sewer main
- 17 sewer pump stations
- 5 miles of force main associated with pump stations
- 3 siphons (1 single pipe, and one double pipe under the Green River
- 2,700 sewer service connections

Level of Service Standards

The System Policies included in Chapter 2 of the Comprehensive Sewer Plan provide direction for City Staff in the management of the utility. The following policies are specifically related to designed capacity level of service provided by the sewer conveyance system:

Policy 3.3 - Require the transport of sewage by gravity whenever feasible in order to increase reliability, sustainability, and long-term cost effectiveness.

Policy 4.5 - Size the sewer collection system for peak wet weather flow rates that include I/I flows. Gravity sewers will be sized to convey the once-per-20-year peak hour flow without surcharging.

Policy 4.6 - Size pump stations and force mains for peak wet weather flow rates that include I/I flows. Pump stations will be sized to convey the once per 5-year flow with one pump out of service and convey the once per 20-year flow with all pumps in service.

Known Capacity Issues

The preparation of the Comprehensive Sewer Plan included hydraulic modeling for three scenarios. The first used existing system wastewater flows and applied the expected additional flow during a design storm (with a 20-year recurrence). The second was to escalate wastewater base flows based on population and employment projections for the year 2044, and the last was to increase the intensity and duration of the design storm based on anticipated rainfall changes associated with climate change.

- The existing system is shown to have few deficient pipes, none of which cause overflows.
- For future scenarios (2044-both including and not including climate change effects) show the following deficiencies:
    - The Rainier Ridge Pump Station's capacity is anticipated to be under capacity; however, a project is currently underway to replace that station in 2025.
    - The Dogwood Pump Station is anticipated to be under capacity in 2044.
    - Approximately 4,000 feet of gravity sewer in Roegner Park is expected to be under capacity in 2044.
    - Individual pipe segments upstream of each of the Green River crossings are expected to be under capacity at various times throughout the 20-year planning period. The precise timing is dependent on the rate and distribution of population and employment growth.

Future Plans

Conceptual plans for future sewer extensions and facilities are shown on Figure 5.5 of the Comprehensive Sewer Plan. Those extensions are to be funded by the property owners of the parcels served by them, so the timing of their construction is unknown. The Capital Improvement Plan is described in detail in Chapter 7 of the Comprehensive Sewer Plan. The Plan includes projects related to system capacity, repair and replacement, and system evaluation.

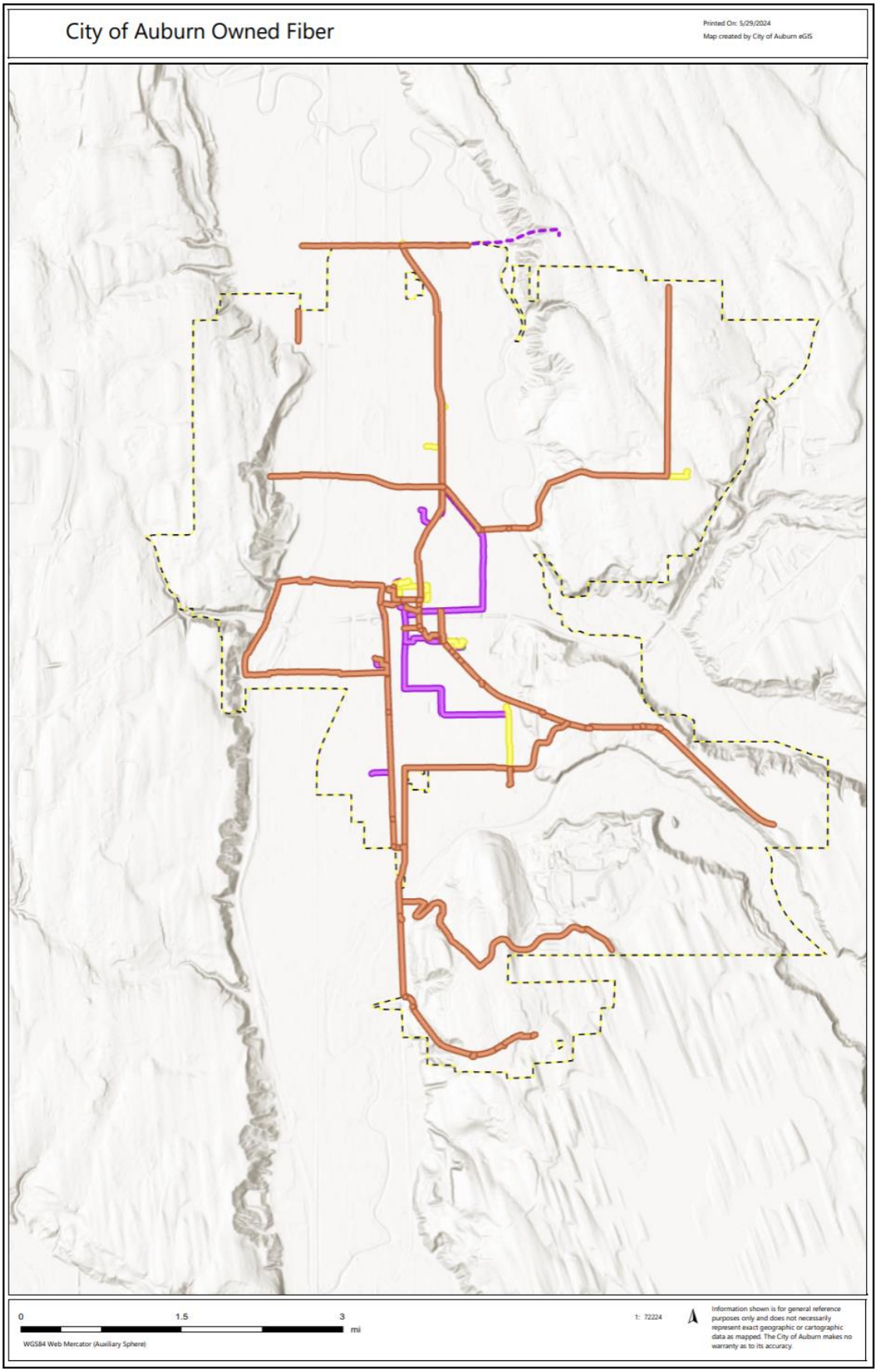
Solid Waste

The City of Auburn contracts with Waste Management (WM) for collection of municipal garbage, recycling, and yard waste. Waste Management disposes of Auburn's garbage at a King County Solid Waste transfer station. Recycling is processed at WM's material recycling facility in Tacoma, WA. WM takes the yard and food waste to either DTG in Tacoma, WA or Cedar Grove in Maple Valley, WA to be converted into compost. There is a small area of Auburn that was recently annexed. This area is serviced by Republic Services. Republic Services takes the garbage to a King County Solid Waste transfer station, the recycling is processed at their material recycling center in Seattle, WA, and yard and food waste is taken to Cedar Grove in Maple Valley, WA.

Telecommunications

The City of Auburn owns and maintains a robust fiber optic Metropolitan Area Network (MAN) that connects most City owned building facilities and traffic signals throughout the Auburn area. This infrastructure delivers secure, high-speed broadband capabilities essential for supporting various government functions, including public safety, public works, planning, permitting, and tourism.

Additionally, our fiber optic network enhances city operations by facilitating interconnections with regional partners and service providers such as City of Algona, City of Pacific, King County, The Community Connectivity Consortium, University of Washington, Valley Communications and Microsoft.


City of Auburn Owned Fiber
Printed On: 5/29/2024
Map created by City of Auburn eGIS
0
1.5
3
mi
WGS84 Web Mercator (Auxiliary Sphere)
1: 72224
Information shown is for general reference purposes only and does not necessarily represent exact geographic or cartographic data as mapped. The City of Auburn makes no warranty as to its accuracy.

Public Education Facilities

Auburn's residential areas are served by a combination of Auburn School District, Dieringer School District, Federal Way Public Schools, and Kent School District. Detailed inventories of school district capital facilities and levels-of-service are contained in the Capital Facilities Plan (CFP) of each school district. The CFPs of the four school districts serving Auburn residential areas and the associated school impact fees are adopted annually as part of the Annual Comprehensive Plan amendment process. Locations of schools and school districts within the City of Auburn which are illustrated in the map below.

Future Plans

To accommodate projected growth, the school districts have noted the following projects in their 2023 Capital Facilities Plans:

Auburn School District

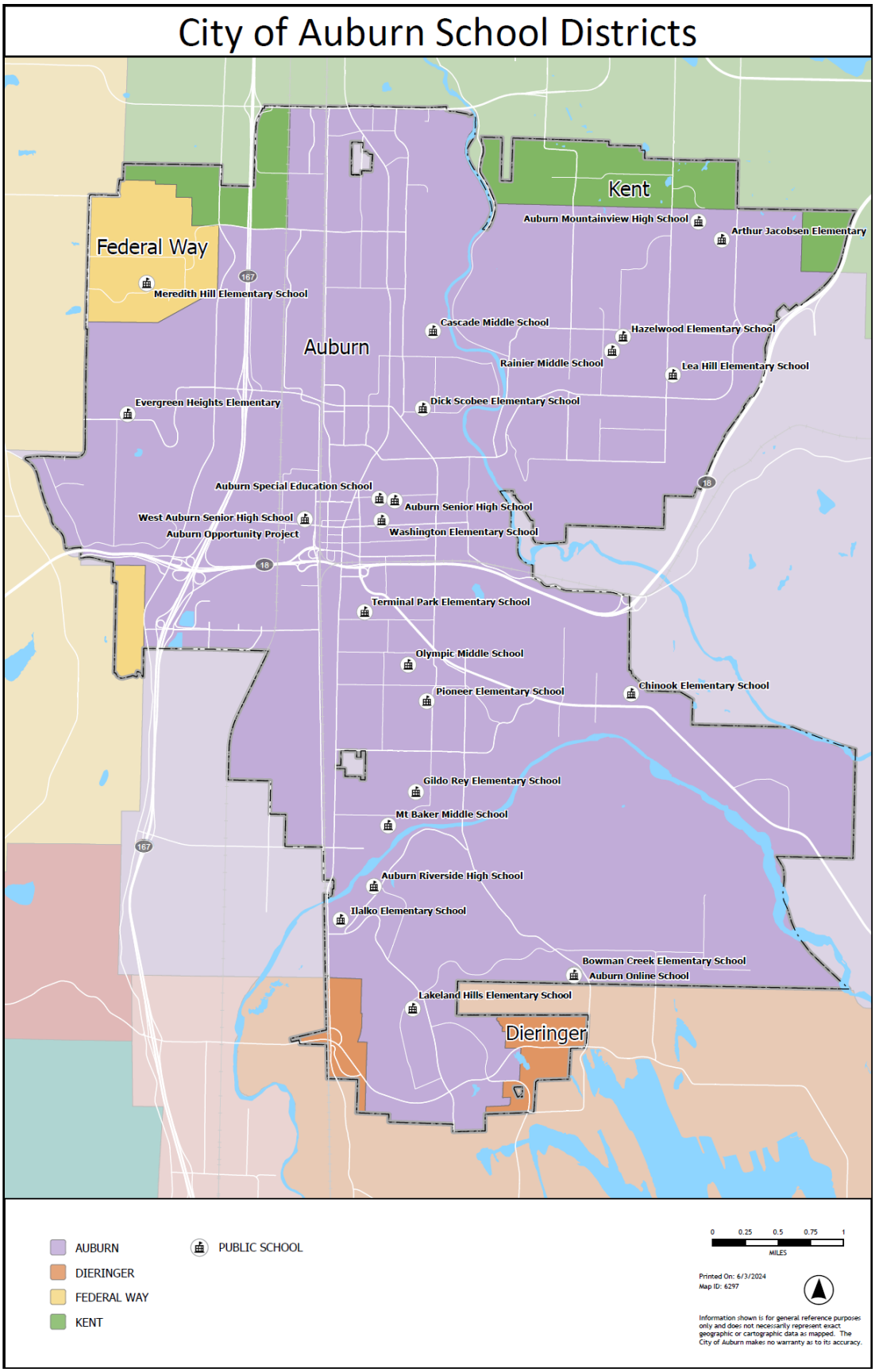
- Portable Relocation – Opens 2023-2024
- Middle School #5 – Opens 2027-2028

Dieringer School District

- Elementary School #3 – Opens 2027
- North Tapps Middle School Classroom Addition – Opens 2027

Federal Way Public Schools

- Illahee Middle School Modernization and Expansion – Opens 2024
- Former DeVry/ES 24 Site Acquisition – Opens 2028
- Portables Expansion – Through 2030


City of Auburn School Districts
Kent
Federal Way
Auburn
Dieringer
Auburn Mountainview High School
Arthur Jacobsen Elementary
Meredith Hill Elementary School
Cascade Middle School
Hazelwood Elementary School
Rainier Middle School
Lea Hill Elementary School
Evergreen Heights Elementary
Dick Scobee Elementary School
Auburn Special Education School
Auburn Senior High School
West Auburn Senior High School
Auburn Opportunity Project
Washington Elementary School
Terminal Park Elementary School
Olympic Middle School
Pioneer Elementary School
Chinook Elementary School
Gildo Rey Elementary School
Mt Baker Middle School
Auburn Riverside High School
Ilalko Elementary School
Bowman Creek Elementary School
Auburn Online School
Lakeland Hills Elementary School
AUBURN
DIERINGER
FEDERAL WAY
KENT
PUBLIC SCHOOL
0 0.25 0.5 0.75 1
MILES
Printed On: 6/3/2024
Map ID: 6297
Information shown is for general reference purposes only and does not necessarily represent exact geographic or cartographic data as mapped. The City of Auburn makes no warranty as to its accuracy.

Goals and Policies

Goal # 1 - Keeping Pace with Growth

Ensure that new development does not outpace the City's ability to provide and maintain adequate public facilities and services, by allowing new development to occur only when and where adequate facilities exist or will be provided, and by encouraging development types and locations that can support the public services they require.

Policies:

CF-1. Lands designated for urban growth by this Plan shall have public facilities (streets, sewer, water, storm drainage, and parks) that meet City standards prior to or concurrent with development.

CF-2. Encourage development where new public facilities can be provided in an efficient manner.

CF-3. If adequate facilities are currently unavailable and public funds are not committed to provide such facilities, developers must provide such facilities at their own expense to develop their proposed projects.

CF-4. The City shall encourage and approve development only where adequate public services including police protection, fire and emergency medical services, education, parks and other recreational facilities, solid waste collection, drinking water, storm drainage, roadway and nonmotorized and other governmental services are available or will be made available at acceptable levels of service prior to project occupancy or use.

CF-5. Provide additional public facility capacity when existing facilities are used to their maximum level of efficiency (consistent with adopted standards for level of service).

CF-6. Encourage development where new public facilities can be provided in an efficient manner.

CF-7. Public facilities shall be provided in accord with the guidance of the Capital Facilities Plan or, as may be appropriate a system plan for each type of facility designed to serve at an adequate level of service the locations and intensities of uses specified in this Comprehensive Plan.

CF-8. New development shall not be approved that is not supported by a minimum of facilities to support the development and that does not provide for its proportionate share of related system needs.

CF-9. The city will perform its activities and make capital budget decisions in conformity with the comprehensive plan. The Land Use Element of the

comprehensive plan shall be reassessed if probable funding falls short of meeting existing needs.

CF-10. Establish land use patterns that optimize the use of public facilities.

CF-11. Exempt the following from the concurrency management program:

- Development vested by RCW 19.27.095, 58.17.033 or 58.17.170.
- Development that creates no added impact on public facilities.
- Expansions of existing development that were disclosed and tested for concurrency as part of the original application.

Goal # 2 – Public Facilities and Funding

Provide needed public facilities that are within the ability of the City to fund or within the City's authority to require others to provide.

Policies:

CF-12. Establish level of service standards that are achievable with the financing plan of this Capital Facilities Plan.

CF-13. Base the financing plan for public facilities on realistic estimates of current local revenues and external revenues that are reasonably anticipated to be received by the City.

CF-14. Match revenue sources to capital projects based on sound fiscal policies.

- The City shall continue to fund utility costs through utility enterprise funds, based on user fees and grants. Public facilities included in utilities are sewer, solid waste, storm drainage, and water.
- Where feasible pursue joint venture facility construction, construction timing, and other facility coordination measures for City provided facilities, as well as with school districts and other potential partners in developing public facilities.
- The City shall continue to assist through direct participation, LIDs and payback agreements, where appropriate and financially feasible. Where funding is available, the City may participate in developer-initiated facility extensions or improvements, but only to the extent that the improvements benefit the broader public interest and are consistent with the policies of this Capital Facilities Plan.

CF-15. If the projected funding is inadequate to finance needed public facilities and utilities based on adopted level of service standards and forecasted growth, the City will do one or more of the following to achieve a balance between available revenue and needed public facilities:

- Lower the level of service standards;
- Increase the amount of revenue from existing sources;
- Adopt new sources of revenue;

- Require developers to provide such facilities at their own expense; and/or
- Amend the Land Use Element to reduce the need for additional public facilities.

CF-16. Both existing and future development will pay for the costs of needed capital improvements.

- Ensure that existing development pays for capital improvements that reduce or eliminate existing deficiencies and pays for some or all of the cost to replace obsolete or worn-out facilities. Existing development may also pay a portion of the cost of capital improvements needed by future development. Existing development's payments may take the form of user fees, charges for services, special assessments, and taxes.
- Ensure that future development pays a proportionate share of the cost of new facilities that it requires. Future development may also pay a portion of the cost to replace obsolete or worn-out facilities. Future development's payments may take the form of voluntary contributions for the benefit of any public facility, impact fees, mitigation payments, capacity fees, dedications of land, provision of public facilities, and future payments of user's fees, charges for services, special assessments, and taxes.

CF-17. The City will determine the priority of public facility capital improvements using the following criteria as general guidelines. Any revenue source that cannot be used for the highest priority will be used beginning with the highest priority for which the revenue can legally be expended.

- Projects that eliminate hazardous conditions.
- Refurbishment of existing facilities that contribute to achieving or maintaining standards for adopted level of service.
- New or expanded facilities that reduce or eliminate deficiencies in level of service for existing demand.
- New or expanded facilities that provide the adopted level of service for new development and redevelopment during the next six fiscal years.
- Capital improvements that significantly reduce the operating cost of providing a service or facility, or otherwise mitigate impacts of public facilities on future operating budgets.
- Capital improvements that contribute to stabilizing and developing the economy of the City.
- Project priorities may also involve additional criteria that are unique to each type of public facility, as described in other elements of this Comprehensive Plan.

CF-18. Ensure that the ongoing operating and maintenance costs of a capital facility are financially feasible prior to constructing the facility.

Goal # 3 – Public and Environmental Health

Protect public health, environmental quality, and neighborhood stability and viability through the appropriate design and installation of public facilities.

Policies:

CF-19. Promote conservation of energy, water and other natural resources in the location and design of public facilities.

CF-20. Require the separation of sanitary and storm sewer facilities wherever combined sewers may be discovered.

CF-21. Practice efficient and environmentally responsible maintenance and operating procedures.

CF-22. The siting, design, construction and improvement of all public buildings shall be done in full compliance with the Americans with Disabilities Act (ADA).

CF-23. Promote economic and community stability and growth through strategic investments in public facilities and public/private partnerships.

Goal # 4 – Community Benefits of Public Facilities

Provide public facilities that provide a sense of community that is inclusive of diverse populations.

Policies:

CF-24. Contribute to community pride and foster a sense of community through provision of public facilities that create a community-gathering place for neighbors, family and friends.

CF-25. Through provision of public facilities, offer a broad range of activities promoting social interactions especially with new residents.

CF-26. Provide maximum flexibility and multiple uses through design of public facilities that are adaptable to changing interests.

CF-27. Provide a community center facility that is financially feasible, affordable for participants, and can generate revenue to offset a portion of the operating costs.

Goal # 5 – Consistency with Other Adopted Plans

Make the Capital Facilities Plan consistent with other elements of the comprehensive plan, and with other city, county, regional and state adopted plans.

Policies:

CF-28. Ensure that the growth and development assumptions used in the Capital Facilities Plan are consistent with similar assumptions in other elements of the comprehensive plan.

CF-29. Coordinate with non-city providers of public facilities on a joint program for maintaining applicable level of service standards, concurrency requirements, funding, and construction of public facilities.

Goal #6 - Public and Institutional Buildings

To site public and institutional buildings in accord with their service function and the needs of the members of the public served by the facility.

Policies:

CF-30. All “people-oriented” City facilities should be located near high-amenity sites. Les Grove Park and downtown are particularly appropriate sites for senior services, community centers, libraries, museums, etc.

CF-31. City park buildings should be developed in accordance with the Parks, Recreation, and Open Space Element.

CF-32. Public and institutional facilities should incorporate practices that reduce energy consumption, reduce the emission of greenhouse gases, conserve water, provide electric vehicle infrastructure, and preserve native vegetation.

CF-33. Public and institutional facilities that attract a large number of visitors (City Hall, museums, libraries, educational facilities, permit and license offices, health and similar facilities, etc.) should be sited in areas that are accessible (within 1/4 mile) by transit.

CF-34. The City shall encourage other agencies to follow these siting principles in considering new sites for public buildings.

CF-35. The location of religious institutions, private schools, community centers, parks and similar public or institutional facilities shall be related to the size of the facility and the area served. Citywide facilities should be sited in visible and accessible locations.

CF-36. Small public or institutional facilities intended to serve one or two residential neighborhoods may be located within a neighborhood. Larger public or institutional facilities intended to serve mainly Auburn residents or businesses shall be located along major arterial roads within the community-serving area of Auburn; however, elementary schools should be given flexibility to locate along smaller roads. Buffering from adjacent land uses may be required.

CF-37. The location of utility facilities is often dependent upon the physical requirements of the utility system. Sewage lift stations, pump stations, water

reservoirs, and other similar facilities should be sited, designed, and buffered (through extensive screening and/or landscaping) to fit in harmoniously with their surroundings. When sited within or adjacent to residential areas, special attention should be given to minimizing noise, light, and glare impacts.

CF-38. Public facilities of an industrial or heavy commercial character should be confined to the region-serving area of Auburn, unless no other reasonable siting opportunity exists, in which case siting still must comply with applicable zoning standards. Examples of such facilities are the City maintenance and operations facility, state and regional solid waste facilities, and the Auburn School District bus barn.

CF-39. The siting and relocation of City maintenance and operation facilities shall be responsive to growing demands for utility, transportation, and fleet services, and shall also account for the City's role in emergency preparedness and response.

Goal # 7 - Essential Public Facilities

Essential public facilities include those facilities that are typically difficult to site such as airports, state education facilities, state or regional transportation facilities as defined in RCW 47.06.140, state and local correctional facilities, solid waste handling facilities, and in-patient facilities including substance abuse facilities, mental health facilities, group homes, and secure community transition facilities as defined in RCW 71.09.020."

More generally, essential public facilities are facilities, conveyances, or sites that meet the following definition: (1) the facility, conveyance or site is used to provide services to the public; (2) these services are delivered by government agencies, or private or nonprofit organizations that are under contract to or with substantial funding from government agencies, or by private firms or organizations subject to public service obligations; and (3) the facility or use of the site is necessary to adequately provide a public service.

The Growth Management Act requires that a local comprehensive plan include a process for siting essential public facilities. The Growth Management Act includes these provisions because siting certain public facilities has become difficult due to the impacts many of these facilities have on the adjacent community. Many factors contribute to this problem, including increased demand for facilities to serve a growing population, increased competition for land as the state becomes more urbanized, problems with siting processes, and judicial decisions that compel jurisdictions to provide certain facilities. By including a process for siting essential facilities in the Comprehensive Plan, deficiencies in the siting process can be minimized.

This section contains Auburn's process for siting essential public facilities. This is an interim process until development regulations are incorporated into city code.

When that process is developed, Auburn may modify these procedures to reflect the Council's recommendation.

Policies:

CF-40. Essential Public Facility Siting Process.

1. The City will review proposals through the process outlined in Policies 3 through 8 below, if the essential public facility largely serves a regional, countywide, statewide, or national need, and is included in a policy sense within an adopted state or regional plan that meets both of the following criteria:

a. The state or regional plan was developed through an appropriate public process (including at least one local public hearing) and has undergone a NEPA and/or SEPA review.

b. A clear policy statement supporting the type of facility proposed must be included. The plan should also include, in a policy sense, a set of siting guidelines to be used for such a facility. Such criteria may include but are not limited to the type and sufficiency of transportation access, colocation requirements, preferred adjacent land uses, on- or off-site security and/or mitigation, and required public facilities and services.

2. If the essential public facility largely serves a regional, countywide, statewide or national need and is not part of an adopted state or regional plan, the proponent will be required to request that the appropriate state or regional plan be amended to include the proposal meeting the criteria contained in Part 1 above. The proposal will also be reviewed following the process outlined in Parts 3 through 8.

Essential Public Facilities of a regional, countywide, statewide, or national nature:

3. Essential public facilities of a regional, countywide, statewide or national nature will be reviewed by the City through the special area plan process. The boundaries of the special area plan will be set at a scale directly related to the size and magnitude of the proposal. For facilities of regional, state, and national need, an alternative analysis will be performed, but will not be limited to, the guidelines described in Part 1 above. Auburn staff shall participate in the review process of Part 1 above, and use the data, analysis, and environmental documents prepared in that process to aid the City's special area plan review, if Auburn determines that those documents are adequate. If the facility requires other development permits, those approvals also shall be considered within the review process.

4. Impacts of the proposed essential public facility must be identified and an appropriate mitigation plan developed. Unless otherwise governed by state law, the financing strategy for the mitigation plan shall be structured so that the costs of the plan shall be allocated proportionally on a benefit basis using nonlocal sources of funding, although local sources of funding may also be used.

5. The special area plan process to be used for essential public facilities of a regional, countywide, statewide or national nature shall follow the City's Comprehensive Plan amendment process that includes multiple opportunities for public involvement.

6. An analysis of the facility's impact on City finances shall be undertaken. If the study shows that locating a facility in a community would result in a disproportionate financial burden on the City of Auburn, an agreement with the project's proponents must be executed to mitigate the adverse financial impact or the approval shall be denied.

Essential Public Facilities of primarily local nature:

7. If the essential public facility meets largely local needs (for example, in-patient facilities, including substance abuse facilities, mental health facilities and group homes), the facility shall be considered based upon Section 8 below.

All Essential Public Facilities:

8. The following criteria shall be used to evaluate all applications to site essential public facilities:

a. Whether there is a public need for the facility

b. The impact of the facility on the surrounding uses and environment, the City and the region

c. Whether the design of the facility or the operation of the facility can be conditioned, or the impacts mitigated, in a manner similar to those used in traditional private development, in order to make the facility compatible with the affected area and the environment

d. Whether a package of mitigating measures can be developed that would make siting the facility within the community more acceptable.

e. Whether the factors that make the facility difficult to site can be modified to increase the range of available sites or to minimize impacts on affected areas and the environment.

f. Whether the proposed essential public facility is consistent with the Auburn Comprehensive Plan.

g. Essential public facilities shall comply with any applicable state siting and permitting requirements (e.g., hazardous waste facilities).

h. Whether the State proves by clear, cogent, and convincing evidence that (1) a sufficient and reasonable number of alternative sites have been fully, fairly, and competently considered, and (2) such sites were found to be unsuitable for an SCTF for reasons other than the cost of property.

i. Whether careful analysis has been completed to show that siting of the facility will have no undue impact on any one racial, cultural, or socioeconomic group, and that there will not be a resulting concentration of similar facilities in a particular neighborhood, community, jurisdiction or region.

CF-41. The Planning Director or designee shall determine whether a development application will result in a significant change of use or a significant change in the intensity of use of an existing essential public facility. If the Planning Director or designee determines that the proposed changes are significant, the proposal will be subject to the essential public facility siting process as defined in Goal #4, Policy CF-10. If the Planning Director or designee determines that the proposed changes are insignificant, the application shall be reviewed through the City's standard development review procedures. The Planning Director or designee's determination shall be based upon:

a. The proposal's impacts on the surrounding area.

b. The likelihood that there will be future additions, expansions, or further activity related to or connected with the proposal.

CF-42. One of the difficulties of siting essential public facilities is that they are allowed in some but not all appropriate areas. To help address this problem, Auburn shall allow essential public facilities in all zones where they would be compatible. The types of facilities that are compatible will vary with the impacts likely from the facility and the zoning district. Essential public facilities are likely most compatible in the M-2 Heavy Industrial Zoning District. Uses within the zone may generate more externalities to the surrounding area.

CF-43. Essential public facilities shall be allowed in those zoning districts in which they would be compatible, and impacts can be mitigated. In situations where specific development standards cannot be met, but it is determined that the facility can be made compatible, the City Council can waive those specific standards with the requirement that appropriate mitigation is provided. The M-2 Zoning District should include broad use categories that allow all essential public facilities that are difficult to site as permitted or conditional uses as appropriate.

CF-44. Essential public facilities should be equitably located throughout the City, county and state. No jurisdiction should absorb a disproportionate share.

CF-45. Essential public facilities of a regional, countywide, statewide, or national nature should be restricted to the region-serving area of Auburn. Such facilities should be located in relationship to transportation facilities in a manner appropriate to their transportation needs. Extensive buffering from adjacent uses may be required. Facilities that generate a significant amount of truck traffic should be located such that they are served by existing truck routes or mitigation provided to address impacts on the street network.

CF-46. Infrastructure investments should consider equity and plan for any potential displacement impacts.

CITY OF AUBURN WASHINGTON

AGENDA BILL APPROVAL FORM

Agenda Subject:
Utilities Element (Tatro)
Planning Commission deliberation and action on the proposed changes to the Utilities Element

Meeting Date:
December 3, 2024

Department:
Community Development

Attachments:
ATTACHMENT 6 - Utilities Element Presentation ,
ATTACHMENT 7 - V4 Utilities Element

Budget Impact:

Administrative Recommendation:

Background for Motion:

Background Summary:

Councilmember:

Staff:

CITY DEPARTMENTS

2024 COMPREHENSIVE PLAN – UTILITIES ELEMENT

ALYSSA TATRO, SENIOR PLANNER
PLANNING COMMISSION

DECEMBER 3, 2024

Department of Community Development
Planning • Building • Development Engineering • Permit Center
Economic Development • Community Services • Code Enforcement

AUBURN VALUES

SERVICE
ENVIRONMENT
ECONOMY
CHARACTER
SUSTAINABILITY
WELLNESS
CELEBRATION

2024 PERIODIC COMPREHENSIVE PLAN – UTILITIES FACILITIES ELEMENT

Core Changes to Utilities Use Element

- Regulatory Requirements (RCW 36.70A.070)

(3) A Utilities Element consisting of:

(a) General location, proposed location, and capacity of all existing and proposed utilities including, but not limited to, electrical, telecommunications, and natural gas systems. Forecast of the future needs for such capital facilities;

(b) Identify all public entities that own utility systems and endeavor in good faith to work with other public entities, such as special purpose districts.

2024 PERIODIC COMPREHENSIVE PLAN – UTILITIES ELEMENT

Core Changes to Utilities Element

- **Element Update Framework**

  - Consolidate Private Utilities and City-owned utilities policies and information into one Element
  - Incorporate information from Systems Plan and Reference
  - Overall formatting and refinements for readability

2024 PERIODIC COMPREHENSIVE PLAN – UTILITIES ELEMENT

Core Changes to Utilities Element

- Policy Updates

- **Water, Sewer, Stormwater policies in individual System Plans adopted by reference**
- **Utility Element policies focus on private utility services, but do not include specific policies developed by service providers. Addressed at a high level.**
- **No updates to private utility goals and policies.**

2024 PERIODIC COMPREHENSIVE PLAN – UTILITIES ELEMENT

Next Steps

- Acceptance of the Utilities Element as a part of Package 2 of the Comprehensive Plan Update

City of Auburn

Utilities Element

Table of Contents

Intent of the Utilities Element 1
Values 1
City-Owned and Operated Utilities 1
Introduction 2
Conditions and Trends 2
Utility Services 2
Sewer Systems 5
Private Utilities 8
Introduction 8
Vision 8
Electricity and Natural Gas 8
Telecommunications 9
Solid Waste 10
Goals and Policies 10

Intent of the Utilities Element

The Utilities Element required by the Department of Commerce per RCW 36.70A.070, and consists of the general location, proposed location, and capacity of all existing and proposed utilities including electrical, telecommunications, and natural gas systems. This Element generally describes these "privately-owned" services, and solid waste services, provided within the city, however Auburn does not own or operate these services and relies on outside service providers such as Puget Sound Energy and Waste Management to provide these services.

This Element includes descriptions those "privately-owned" utilities note above as well as summaries of city-owned and operated utilities such as water, sewer, and stormwater. Detailed information for both privately-owned and city-owned utilities can primarily found in the Water, Sewer, and Stormwater Systems Plans adopted by the City and that are incorporated by reference in the Comprehensive Plan, and by contacting privately-owned utility providers.

Values

Character: Private utilities will provide a positive contribution to the quality, aesthetics, and functionality of the community.

Wellness: Utility infrastructure and systems support the delivery of safe and efficient electricity, gas, and telecommunications.

Service: Utility infrastructure and systems support the City's goals of providing accessible and transparent government services and processes.

Economy: Businesses are served by utility infrastructure meeting or exceeding the needs for market entry and future growth.

Celebration: Telecommunication systems are fully utilized to reach a broader cross-section of the community in a way that brings people together for civic activities, cultural events, and social awareness.

Environment: Siting, installation, and maintenance of utilities will ensure protection, preservation, and respect of the wildlife habitat, water quality, and environmentally sensitive features.

Sustainability: When designing, constructing, and maintaining utilities, a long-term investment horizon is favored over concepts that only provide short-term benefits and outcomes.

City-Owned and Operated Utilities

Introduction

This section provides overall policy direction for the different utility services provided by the city, including water, sewer, and stormwater facilities. A key provision of the Growth Management Act is concurrency. In general, concurrency seeks to ensure that development is permitted only if adequate public facilities are, or can be guaranteed to be, available to support new development. Concurrency requires that facilities needed to maintain a locally adopted level of service be provided "concurrently" with development. Concurrency places the finance function of local government in a much more prominent role in the land use development process. While the concept of concurrency is new to many jurisdictions, it has been used in Auburn since the adoption of its 1986 Comprehensive Plan.

Conditions and Trends

Accommodating Growth

The provision and sizing of public facilities such as streets or waterlines and sewer lines can influence the rate or timing of development and is an important means of managing growth. Timed provision of facilities also ensures that new development can be assimilated into the existing community without serious disruptions or adverse impacts. This Plan establishes policies to allow development when and where all public facilities are adequate or can be made adequate, but only if such development can be adequately served by public facilities and services consistent with the adopted level-of-service standards.

Utility Services

The following services are owned and operated by the City of Auburn.

Water System

The City of Auburn (City) manages the water utility in accordance with established water- system policies that govern various facets of utility operations. City policies are established by the City in order to provide a vision or mission of the water utility and to provide a framework for the design, operation, and ongoing wellbeing of the City's water utility.

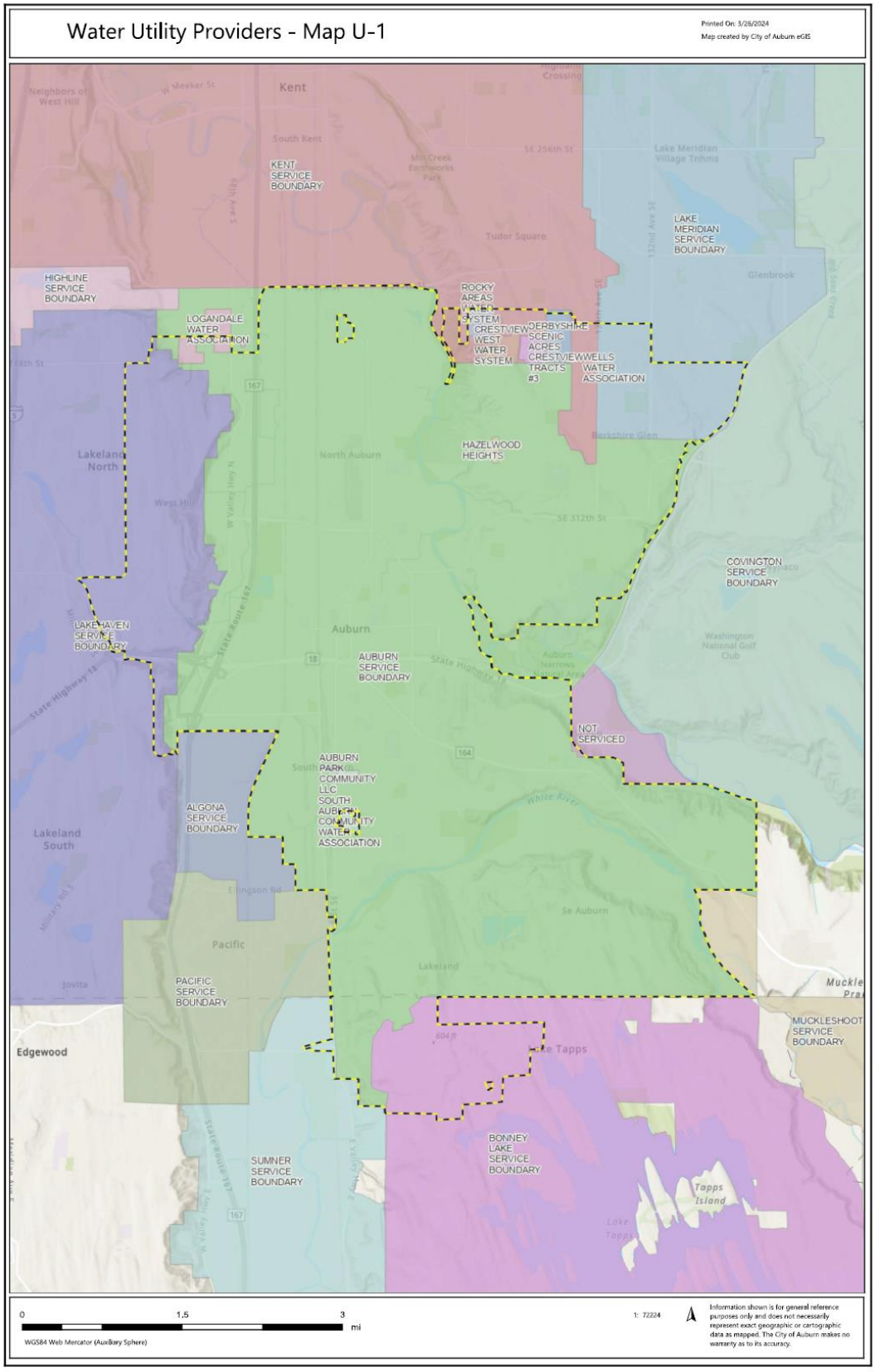
The policies included in this Water Comprehensive Plan are developed specifically for the City's multi-source municipal water system and seek to provide consistent treatment to all utility customers and to provide documentation to current water-system customers as well as those considering service from the City. It should be noted that what is included in these policies is limited to those things related to the water system and its design, maintenance, and operation. There are other policies and criteria that pertain to the water utility the City has in place regarding land use, development, and financial components, which are not directly addressed in this plan, that could still have an impact on the needs of the water system. These

policies and criteria may include factors such as zoning regulations, building codes, infrastructure requirements, and financing options. These additional factors will be considered when planning for the water system, to meet the needs of the community in a sustainable and effective matter.

The City's Water Comprehensive Plan is based upon the following mission statement for the water utility: "The City will provide for the efficient, environmentally sound and safe management of the existing and future water system within Auburn's service area."

- The City's Water utility policies are grouped within goal statements that are headlined under the following categories:
- Business Practices
- Service Area
- Operations and Maintenance
- Financial
- Planning
- Environmental Stewardship
- Design and Construction

Map U-1 – Water Utility Providers



Stormwater Systems

This chapter describes a set of overarching goals for the City's Storm Drainage Utility and policies for complying with these goals.

UE-83 City Comprehensive Plan Consistency

The City Comprehensive Plan is the City's growth management plan and contains policies for protecting critical areas and natural resource lands, designating urban growth areas, preparing comprehensive utility plans, and implementing them through capital investments and development regulations. Therefore, the City Comprehensive Plan provides a framework of policies for development, expansion, and maintenance of the Storm Drainage Utility reflected in this Storm Drainage Comprehensive Plan.

UE-84 Storm Drainage Comprehensive Plan Policy Goals

The City's Storm Drainage Utility policies are grouped within goal statements that are headlined under the following categories:

- System Planning
- Operations and Maintenance
- Fiscal Responsibility
- Environment and Regional Coordination

Taken together with the City Comprehensive Plan and Auburn City Code (ACC) these goals define how the Storm Drainage Utility shall be operated and maintained. Several policies have been developed within each goal, many of which are also based on the Washington Department of Ecology Stormwater Management Manual (SWMMWW) and the City's Phase II National Pollutant Discharge Elimination Stormwater Permit (NPDES).

Sewer Systems

The City desires to employ recognized best business practices that result in an efficient and cost-effective operation of the Sanitary Sewer Utility. The City shall identify the key business functions within the Sanitary Sewer Utility (e.g., billing, permitting, asset management, and planning) and develop supporting best business practices for each.

The City understands that defining and implementing best business practices is a long-term effort and will require a stepwise approach. Given that the Sanitary Sewer Utility is made up largely of physical assets that have the greatest value and deserve the greatest commitment to operate and maintain, the City shall continue to prioritize the business practice of asset management.

Asset management is a systematic approach to maintaining assets in good working order to minimize future costs of maintaining and replacing them, especially to avoid costly deferred maintenance. The best practices for asset management involve systematically basing choices on an understanding of asset condition and performance, risks, and costs in the long term. Asset best practices include:

- Having extensive knowledge about assets and their costs for maintenance and replacement (i.e., detailed inventories);
- Maintaining Levels of Service;
- Taking a life-cycle approach to asset management planning; and
- Implementing the planned solutions to provide a reliable, cost-effective service.

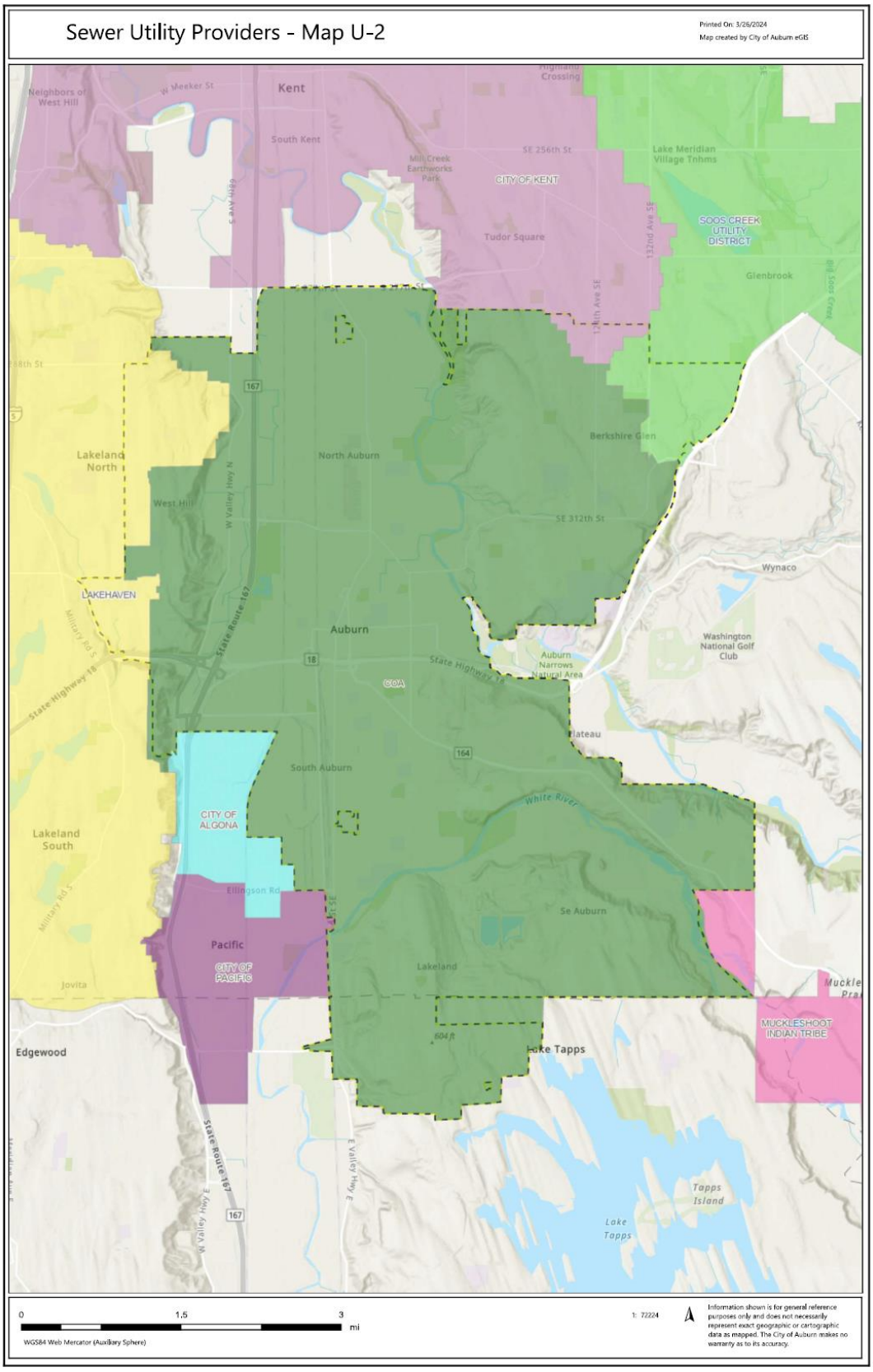
Since the adoption of the 2016 Comprehensive Sewer Plan, the Sanitary Sewer Utility has compiled an inventory of assets and their conditions for approximate 70% of its currents assets. The Sanitary Sewer Utility shall continue implementing the above best practices during the next planning period.

Sewer Comprehensive Plan Policies, Standards, and Guidelines

This Plan presents policies and standards related to system development, maintenance, funding, and generally how the Sanitary Sewer Utility should operate. These policies define limits and outline how the wastewater collection system should be operated and maintained and are grouped within goal statements that are headlined under the following categories:

- Service Area
- System Planning
- Operations and Maintenance
- Environmental Stewardship
- System Performance and Reliability
- Fiscal Responsibility

Map U-2 – Sewer Utility Providers



Private Utilities

Introduction

The Growth Management Act requires the City of Auburn to include a Private Utilities Element within its Comprehensive Plan. The element should pro- vide a framework for the efficient and predictable provision and siting of utility facilities and ser- vices within the City, consistent with each serving utility's public service obligations. This element covers private utilities (those not provided by the City of Auburn), and includes electricity, telecommunications, and natural gas. City-owned water, sewer, and stormwater utilities are described within the Capital Facilities Element (Chapter 3) of this Comprehensive Plan.

Investor-owned utilities in the state of Washington are regulated by the Washington Utilities and Transportation Commission. State law regulates the rates, charges, services facilities, and practices of utilities. Any changes in policies of these aspects of utility provision require WUTC approval.

The primary responsibility for the planning of private utilities rests with utility providers. Clearly, however, planning cannot take place without open lines of communication between the City and utility providers. The City acknowledges that some private utility providers are not willing to provide capacity or future construction plans, as some of this information may affect their competitiveness or be considered proprietary. Private utilities, however, must recognize that not pro- viding relevant information may hinder the City's ability to assist them in their projects.

Vision

Private utilities in Auburn are planned, designed, and constructed in a manner that adequately supports the future growth scenarios predicted in the City's Land Use Element and that meets the needs of residents, visitors, and businesses. Sustainability is a principle that guides decisions for where utilities are placed, how they are constructed, how they are operated and maintained, and how all aspects of design, construction, and operation are funded.

Electricity and Natural Gas

Puget Sound Energy provides electrical and natural gas service to the City of Auburn and its potential annexation area. PSE is an investor-owned private utility that provides service to approximately 1.2 million customers in a service area that covers 6,000 square miles.

Electricity

PSE builds, operates, and maintains an electrical system consisting of generation, transmission, and distribution facilities. Facility technology for electricity transmission may change in the future in order to respond to the need for more

efficient facilities, address various electromagnetic field and health concerns, and diversify resources. Utility policies should be updated in the future to consider changes in technology, facilities, and services.

Natural Gas

The Northwest Pipeline Corporation and Enumclaw Natural Gas also have gas lines in the southeastern portion of the City. Northwest

Pipeline Corporation's only customer in Auburn is Enumclaw Natural Gas. Enumclaw Natural Gas serves Auburn residential customers in the area of the Auburn Adventist Academy.

Telecommunications

Telecommunications includes a wide range of services including conventional telephone, cellular telephone, and cable television. Telecommunications technology continues to change rapidly. The City of Auburn owns and maintains a robust fiber optic Metropolitan Area Network (MAN) that connects most City owned building facilities and traffic signals throughout the Auburn area.

Conventional Telephone

Conventional local telephone service to the City is provided by CenturyLink. CenturyLink is a global provider of telecommunications services.

Calls are switched at facilities called central offices. Typically, four main lines leave each central office – one in each direction. Auburn's central office is located in downtown Auburn.

Several carriers provide long distance service to the area. These providers have underground fiber-optic cables passing through the City of Auburn.

Cellular Telephone

Cellular telecommunications provide mobile telephone communications via radios that send and receive signals from a network of receivers mounted on utility poles, towers, buildings, or other structures on private property or within a right-of-way. Cellular communication companies offer digital voice, messaging, and high-speed wireless data services to customers.

Cellular telephone service within the City, its potential annexation areas, and the Puget Sound region overall is provided by multiple private companies. Cellular providers are regulated by the Federal Communications Commission. Technology and business practices in the area of telecommunications continue to change rapidly.

Cable Television

Cable television service is provided by Comcast through a combination of aerial and underground cables. The locations of existing and planned cable lines are shown on Map 6.4.

Solid Waste

The City of Auburn contracts with WM for collection of municipal garbage, recycling, and yard waste. Waste Management disposes of Auburn's garbage at a King County Solid Waste transfer station. Recycling is processed at WM's material recycling facility in Tacoma, WA. WM takes the yard and food waste to either DTG in Tacoma, WA or Cedar Grove in Maple Valley, WA to be converted into compost. There is a small area of Auburn that was recently annexed. This area is serviced by Republic Services. Republic Services takes the garbage to a King County Solid Waste transfer station, the recycling is processed at their material recycling center in Seattle, WA, and yard and food waste is taken to Cedar Grove in Maple Valley, WA. There are approximately 20,200 Waste Management accounts as of 2024.

Goals and Policies

Goal # 1 – Service Area

Allow the development of private utilities to meet the needs of the existing community and provide for its planned growth consistent with serving utilities' public service obligations.

Policies:

U-1. Private utility providers will utilize the City's Comprehensive Plan Map for guidance regarding future land uses and intensities in order to determine and plan for future service. Private utility facilities and systems should be consistent with the uses and densities allowed by the Comprehensive Plan and Zoning Code. The City will make this information easily available to utility providers. The City will also coordinate with utility providers on pending development proposals (both public and private). In return, the City expects a cooperative posture toward coordinated and timely expansion of infrastructure.

U-2. Private utility companies should strive to provide utility services to all segments of the Auburn population and areas of the community in an equitable manner that prioritizes easy access and that offers pricing structures that strive to reduce barriers that otherwise exclude portions of the community.

U-3. Construction of facilities and provision of services by private utility providers within the City of Auburn shall be in compliance with all of the goals and policies of this Comprehensive Plan.

Goal # 2 – Compatibility in the Community

Prioritize visual quality of private utility facilities consistent with the serving utilities' public service obligations.

U-4. The City shall require that new private utility distribution, service, and telecommunication lines be located underground within all new developments. The City will also work with utility companies to relocate existing distribution, service, and telecommunication lines underground as a part of new development whenever it is technologically feasible, and as part of City capital roadway projects whenever it is economically and technologically feasible. Expansions and upgrades completed by private utilities will be required to be underground unless they meet appropriate exemptions.

U-5. To reduce visual clutter, antennas, relay mechanisms, and similar structures should be located on existing poles, structures, or buildings whenever possible. When deemed feasible and necessary to minimize impacts on adjacent uses or views by the City, visual screening may be required.

U-6. The location of utility facilities is often dependent upon the physical requirements of the utility system. All utility facilities should be sited, designed, and buffered (through extensive screening and/or landscaping) to fit in with their surroundings harmoniously and safely. When sited within or adjacent to residential areas, special attention should be given to minimizing noise, light, and glare impacts.

U-7. Utility service boxes and cabinets should be designed, oriented and/or treated with in a manner intended to reduce the likelihood of graffiti tagging, contribute to Auburn's arts and culture programming, and to enhance the overall appearance of the community.

U-8. Generator and back up generators that are located within residential areas should be visually screened and incorporate techniques that mitigate noise impacts consistent with local and state requirements.

U-9. Substations and maintenance buildings within residential areas should be screened, landscaped and/or designed in a manner that provides visual compatibility.

Goal # 3 – Safety and Efficiency

Prioritize the safe and efficient installation, maintenance and operation of private utility facilities consistent with the serving utilities' public service obligations.

Policies:

U-10. Common utility trenches should be encouraged and coordinated by both private and public providers whenever possible.

U-11. Decisions regarding private utility facilities within Auburn should consider the safe, adequate, and efficient availability of these utilities to other jurisdictions.

Goals # 4 – Sustainability and Equity

Prioritize equitable access to the services offered by private utility facilities and ensure that the location, installation and maintenance of private utilities is carried our in an environmentally sensitive manner.

Policies:

U-12. The City shall consider the environmental impacts of proposed utility facilities as a part of its environmental review process. When requested by the City, the utility provider shall furnish documentation of current research results and/or provide additional information related to determination of the potential environmental impacts, if any, from the proposed facilities.

U-13. Private utility companies are recognized as providers of important services necessary for maintaining current and future lifestyles as well as contributing to equitable community outcomes.

U-14. Private utilities that are permitted to operate within Auburn offer various technological means for accessing information, education, services, and assistance. Because Auburn believes that all residents should be afforded equal access to education, information and services private utility providers should seek to recognize and reduce access barriers.

Table 1 - List of Utility Providers

Provider	Contact Info	Map #
City of Auburn Water	Customer Service Center 1 East Main Street 2nd Floor Auburn, WA 98002 253-931-3010	U-1
Lakehaven Water and Sewer	31627A 1st Ave S P.O. Box 4249 Federal Way, WA 98063 253-941-1516	U-1
Lake Meridian Water	27224 144th Ave SE Kent, WA 98042 253-631-3770 Office	U-1
City of Kent Water	Kent City Hall 220 4th Ave S, Kent, WA 98032 253-859-3373	U-1
Bonney Lake Water	Public Services Center 21719 96th ST E Buckley, WA 98321 253-447-4319	U-1
Logandale Water Assoc.	PO Box 1254 Auburn, WA 98071	U-1
Hazelwood Heights Water Assoc.	30224 108TH Ave SE Auburn, WA 98092	U-1

Rocky Acres Water System	28120 105TH Ave SE Auburn, WA, 98092-4075	U-1
Crestview West Water System	PO Box 194 Kent, WA 98035-0194	U-1
Crestview Tracts Water System	11237 SE 286th St Auburn, WA 98092	U-1
Derbyshire Scenic Acres Water System	11628 SE 282ND ST Auburn, WA 98092-4051	U-1
Wells Water Assoc.	28804 124th Ave SE Auburn, WA 98092	U-1
Auburn Park Community Assoc.		U-1
South Auburn Community Assoc.	3005 C ST SE Auburn, WA 98002-8829	U-1
City of Auburn Sewer	Customer Service Center 1 East Main Street 2nd Floor Auburn, WA 98002 253-931-3010	U-2
Lakehaven Water and Sewer	31627A 1st Ave S P.O. Box 4249 Federal Way, WA 98063 253-941-1516	U-2
City of Kent Sewer	Kent City Hall 220 4th Ave S, Kent, WA 98032 253-859-3373	U-2
Soos Creek Water and Sewer District	14616 SE 192nd St Renton, WA 98058 253-630-9900	U-2
City of Auburn Stormwater	Customer Service Center 1 East Main Street 2nd Floor Auburn, WA 98002 253-931-3010	N/A – Consistent with City boundary
Puget Sound Energy – Electricity and Gas	www.pse.com 1-888-321-7779	N/A – Consistent with City boundary
Comcast	www. business.comcast.com 1-855-237-7896	N/A – Consistent with City boundary

Goal # 4 - Solid Waste

To provide area residents and businesses with a universal and compulsory system for collection and disposal of all solid waste, including ample waste reduction and recycling opportunities intended to maximize diversion of the City's waste stream away from costly landfills, incineration, or other solid waste disposal facilities, and to conserve exhaustible resources.

Policies:

U-15. The King County Solid Waste Management Plan and Solid Waste Interlocal Forum, except as modified by City of Auburn Ordinance No. 4413 and this Plan shall form the basis for solid waste management activities within the City.

U-16. The City shall continue to fund solid waste collection, disposal and waste reduction and recycling programs and services through the existing solid waste utility, with supplemental funding provided through available grants.

U-17. The City shall implement solid waste management programs and services that provide ample opportunities and incentives to maximize the community's participation in local and regional waste reduction and recycling efforts.

U-18. The City's solid waste management programs shall be developed to make waste reduction and recycling efficient, reliable, cost-effective, and convenient for all residents and businesses.

U-19. The City encourages and should promote the use of products manufactured from recycled materials, and the use of materials that can be recycled. City Departments and contractors shall use recycled and recyclable products whenever and wherever feasible.

U-20. The City shall implement solid waste reduction and recycling programs that have the cumulative effect maintaining the 50 percent waste reduction and recycling goal (recycling tons/total solid waste stream).

U-21. The City shall periodically monitor and evaluate the effectiveness of Auburn's waste reduction and recycling programs to ensure that local and state goals and policies are being met.

U-22. The City shall promote the recycling of solid waste materials by providing opportunities for convenient recycling and by developing educational materials on recycling, composting and other waste reduction methods.

CITY OF AUBURN WASHINGTON

AGENDA BILL APPROVAL FORM

Agenda Subject:
Land Use and Housing Element (Tatro)
Planning Commission deliberation and action on the proposed changes to the Housing and Land Use Element

Meeting Date:
December 3, 2024

Department:
Community Development

Attachments:
ATTACHMENT 8 - Land Use and Housing Elements Presentation, ATTACHMENT 9 - V6 Land Use Element - Council Study Session, ATTACHMENT 10 - V6 Housing Element - Council Study Session , ATTACHMENT 11 - Comprehensive Land Use Map, ATTACHMENT 12 - Comprehensive Zoning Map

Budget Impact:
Current Budget: $0
Proposed Revision: $0
Revised Budget: $0

Administrative Recommendation:

Background for Motion:

Background Summary:

Councilmember:

Staff: Jason Krum

CITY DEPARTMENTS

2024 COMPREHENSIVE PLAN – LAND USE AND HOUSING ELEMENT UPDATES

ALYSSA TATRO, SENIOR PLANNER
PLANNING COMMISSION

DECEMBER 3, 2024

Department of Community Development

Planning • Building • Development Engineering • Permit Center
Economic Development • Community Services • Code Enforcement

AUBURN VALUES

SERVICE

ENVIRONMENT

ECONOMY

CHARACTER

SUSTAINABILITY

WELLNESS

CELEBRATION

2024 PERIODIC COMPREHENSIVE PLAN – LAND USE AND HOUSING ELEMENT UPDATES

Changes to the Housing Element

Puget Sound Regional Council (PSRC)

- **PSRC4: "The city should clarify the affordable housing need consistent with King and Pierce counties. A table could be used to show total housing need and the policy on meeting Auburn's share of affordable housing should be updated to be consistent with current CPPs. Existing housing stock by AMI should also be included in the plan for the King County portion of the city."**

- **Staff response: Existing housing stock by AMI graph added to HE-3, Housing Element. Tables in HNCA and HE updated with total housing need by county. Added references to appropriate housing policies.**

- **Section of update: HE-3, Housing Element**

2024 PERIODIC COMPREHENSIVE PLAN – LAND USE AND HOUSING ELEMENT UPDATES

Changes to the Housing Element

Puget Sound Regional Council (PSRC)

- **PSRC5: "The plan should document the city's existing housing tools and incentives and discuss regulatory and financial barriers to affordable housing. Commerce's Adequate Provision checklist can help document this work."**

- **Staff response: Included text to address comment. Information regarding existing partnerships and strategies was included. Gaps are identified throughout the Housing Element and the Housing Needs Assessment**

- **Section of update: HE-3 and HE-4, Housing Element**

2024 PERIODIC COMPREHENSIVE PLAN – LAND USE AND HOUSING ELEMENT UPDATES

Changes to the Housing Element

Puget Sound Regional Council (PSRC)

- PSRC6: "The draft plan indicates the city currently lacks sufficient capacity for its housing targets. The plan seeks to increase capacity to remedy this gap – following through to provide sufficient capacity for housing will be important in finalizing the plan update. The city should clarify the capacity for housing to meet various income levels, specifically, looking at capacity by county, housing serving 0-30% AMI and capacity for emergency housing units. Currently, the plan shows ADUs as covering 0-30% AMI and language around "developable acres" could be clarified."

- Staff response: This is found in Table 2, HE-13 in the Housing Element.. Table has been updated to include AMI and capacity/need by County. ADUs have been reallocated to >80% AMI only.

- Section of update: HE-13, Housing Element

Changes to the Housing Element

Puget Sound Regional Council (PSRC)

- PSRC7: "The city should include additional data and information on local policies and regulations that result in racially disparate impacts and strategies to address this. Commerce's Racially Disparate Impact Guidance provides additional information on how to do this and UW's mapping provides a resource on racially restrictive covenants in Auburn."

- Staff response: Added section on Historically Restrictive Housing. Also complies with comment KC4.

- Section of update: HE-9, Housing Element

2024 PERIODIC COMPREHENSIVE PLAN – LAND USE AND HOUSING ELEMENT UPDATES

Changes to the Housing Element

Puget Sound Regional Council (PSRC)

- **PSRC8: "The city should consider pointing to where inclusionary and incentive zoning are used and increase focus on affordability to support the creation of more affordable units."**
- **Staff response: Added acknowledgement of incentive zoning and reference to city code.**
- **Section of update: LUE-5, Land Use Element**

Changes to the Housing Element

Puget Sound Regional Council (PSRC)

- PSRC9: "The city uses displacement risk mapping tools from both Commerce and PSRC in different areas of the plan. While using both tools may be helpful, clarifying why they are each used or using only one tool could clarify displacement risk and the city's approach to mitigation."

- Staff response: Replaced Housing Element map with PSRC one in the Housing Needs and Characteristics Assessment.

- Section of update: HE-7, Housing Element

Changes to the Housing Element

Department of Commerce

- COM3: "While the draft housing element (HE) appears to include policies demonstrating consideration of Accessory Dwelling Units (ADUs), we encourage Auburn to review sections related to ADUs in Housing Element Book 2 (ADU narrative guidance, pages 68-69 and ADU capacity, Step 1.6, pages 27-28) to adjust capacity calculations in HE Table 1 (Residential Capacity by Zone). Generally, ADUs do not serve households below 50% Area Median Income (AMI). Commerce recommends jurisdictions assume ADU rents are on par with apartment rents unless there is better data available at the local/place level."
- Staff response: ADUs have been reallocated to only <80% AMI
- Section of update: HE-16, Housing Element, HNCA

2024 PERIODIC COMPREHENSIVE PLAN – LAND USE AND HOUSING ELEMENT UPDATES

Changes to the Housing Element

Department of Commerce

- COM4: "RCW 36.70A.070(2)(c) requires housing elements to identify sufficient capacity of land for housing, including emergency housing. Auburn's draft HE does not appear to include emergency housing in its land capacity analysis. Please include emergency housing in the land capacity analysis and the findings in the Housing Element."

- Staff response: Addressed as "other" in Table 2 of Housing Element.

- Section of update: HE-15, Housing Element and LU-38, LUE-19, Land Use Element

2024 PERIODIC COMPREHENSIVE PLAN – LAND USE AND HOUSING ELEMENT UPDATES

Changes to the Housing Element

Department of Commerce

- COM5: "c. Commerce recommends including a list of barriers to affordable housing needs, including barriers to emergency housing and permanent supportive housing. On draft HE pg. 11 there is a short discussion related to addressing identified barriers; please expand on this statement. Commerce recommends including a list of barriers (e.g. gaps in local funding, development regulations) and specific actions needed to remove these barriers. Consider factors that may negatively impact production for each type of housing allowed in your community."

- Staff response: Updated text to include additional barriers and clarify strategies.

- Section of update: HE-14, Housing Element

2024 PERIODIC COMPREHENSIVE PLAN – LAND USE AND HOUSING ELEMENT UPDATES

Changes to the Housing Element

Department of Commerce

- COM6: "d. RCW 36.70A.070(2)(e) requires housing elements to identify local policies and regulations that result in racially disparate impacts, displacement, and exclusion in housing. While there is a statement in the draft Housing Needs & Characteristics Assessment Update on page 40 indicating where racially disparate impacts are anticipated, Commerce recommends expanding analysis of specific policies and regulations that have resulted in the identified racially disparate impacts and how policies were reviewed (Housing Element Book 3: see pages 33-36; this specific evaluation framework is not required)."

- Staff response: Housing Element and HNCA have been updated to include additional information on historic restrictive housing.

- Section of update: HE-9, Housing Element, HNA-40

2024 PERIODIC COMPREHENSIVE PLAN – LAND USE AND HOUSING ELEMENT UPDATES

Changes to the Housing Element

King County

- KC1: "Recommendation 1: To align with CPP H-1, Auburn should adopt a policy stating their intent to plan for and accommodate its allocated share of countywide future housing needs for moderate-, low-, very low-, and extremely low-income households as well as emergency housing and permanent supportive housing."

- Staff response: Revised policy text

- Section of update: Policy H-32, Housing Element

2024 PERIODIC COMPREHENSIVE PLAN – LAND USE AND HOUSING ELEMENT UPDATES

Changes to the Housing Element

King County

- KC2: "Auburn should include all inventory and analysis components as required by H-3 in the comprehensive plan and summarize the findings in the Housing Element. This additional analysis should inform additional comprehensive plan policy responses and strategies."

- Staff response: Added age distribution to Housing Element. Added housing capacity within 1/2 mile of major transit stop analysis. More context was given to the existing partnerships and strategies. See KC3 response.

- Section of update: 2d - HNCA page 59; 2e - HNCA page 27; 2g - HE, page 5; 2i - HE-4, Housing Element

2024 PERIODIC COMPREHENSIVE PLAN – LAND USE AND HOUSING ELEMENT UPDATES

Changes to the Housing Element

King County

- KC3: "To align with CPPs H-3(k), H-4, H-12, and H-20, Auburn should list existing partnerships and strategies and identify gaps in existing partnerships, policies, and dedicated resources for meeting housing needs and eliminating disparities."

- Staff response: Information regarding existing partnerships and strategies was included. Gaps are identified throughout the Housing Element and the Housing Needs Assessment

- Section of update: HE-3, HE-4, HE-14 Housing Element

Changes to the Housing Element

King County

- KC4: "To align with CPP H-5, Auburn should document the history of racially exclusive and discriminatory land use and housing practices within their jurisdiction and explain the extent to which the history is still reflected in current development patterns, housing conditions, tenure, and access to opportunity. See "Resources for Documenting the Local History of Racially Exclusive and Discriminatory Land Use and Housing Practices" document for assistance. To align with CPP H-9, Auburn should adopt or clarify how proposed actions are targeted to repair harms identified in their Racially Disparate Impacts analysis."

- Staff response: Included research on Restrictive Housing

- Section of update: HE-6, Housing Element; Housing Needs and Characteristics Assessment

2024 PERIODIC COMPREHENSIVE PLAN – LAND USE AND HOUSING ELEMENT UPDATES

Changes to the Housing Element

King County

- KC5: "Recommendation 5: To align with CPP H-8, Auburn should disaggregate input from community engagement and clarify how the plan prioritizes the needs of populations disproportionately impacted by housing cost burden."

- Staff response: Demographics for community input efforts was not collected. It is not possible to disaggregate data as requested by KC. Demonstrating how the Plan prioritizes need of various populations is discussed at length in the Housing Element and Housing Needs and Characteristics Assessment.

- Section of update: N/A. No updates were made to address this comment

Changes to the Housing Element

King County

- KC6: "Recommendation 6: To align with CPP H-11, Auburn should update their land capacity analysis to either: assume ADUs provide capacity for households above 80 percent of AMI, in alignment with Exhibit 13 in the Department of Commerce's land capacity analysis guidance, or provide evidence in a detailed market analysis that ADUs are affordable to low-income households, or propose subsidies or development incentives that set a reasonable expectation that ADUs would be affordable to low-income households. This update should inform and be consistent throughout Auburn's Housing Needs & Characteristics Assessment and Housing and Land Use elements."

- Staff response: Addressed in Land Use Element

- Section of update: LUE-5, Land Use Element

2024 PERIODIC COMPREHENSIVE PLAN – LAND USE AND HOUSING ELEMENT UPDATES

Changes to the Land Use Element

Puget Sound Regional Council (PSRC)

- **PSRC10: "PSRC recommends the city discuss capacity within each county to demonstrate consistency with countywide growth targets."**
- **Staff response: Updated and addressed in Table 3 of Housing Element**
- **Section of update: Table 3, HE-14, Housing Element (also in HNCA)**

2024 PERIODIC COMPREHENSIVE PLAN – LAND USE AND HOUSING ELEMENT UPDATES

Changes to the Land Use Element

Puget Sound Regional Council (PSRC)

- **PSRC11: "Growth targets for population and housing should be included in the process of updating the Auburn Downtown Plan consistent with regional center guidelines. If timing is appropriate, these targets should be incorporated into the comprehensive plan as well."**

- **Staff response: Growth targets for Centers will be developed in 2025 along with other items such as centers performance standards. Population, housing, and employment targets for downtown will be included in Downtown Plan.**

- **Section of update: No changes made**

Changes to the Land Use Element

Department of Commerce

- **COM1: "a. There are multiple references to Appendix A throughout the draft land use element and, while not required, it would be helpful if those references specify which chapter(s), and/or section(s) provide analyses noted."**

- **Staff response: References for Appendix A include document title.**

- **Section of update: LUE-4, Land Use Element**

2024 PERIODIC COMPREHENSIVE PLAN – LAND USE AND HOUSING ELEMENT UPDATES

Changes to the Land Use Element

Department of Commerce

- COM2: "b. While there are references to the protection of groundwater and public water sources in the Open Space Designation and Residential Conservancy Designation, the draft land use element does not appear to include specific policy for protection of the quality and quantity of groundwater used for public water supplies. RCW 36.70A.070(1) expressly states, "The land use element shall provide for protection of the quality and quantity of groundwater used for public water supplies". Commerce recommends strengthening the draft land use element by adding such provisions, as required by the Growth Management Act (GMA), and which are consistent with water protection policies provided in the draft utilities element."

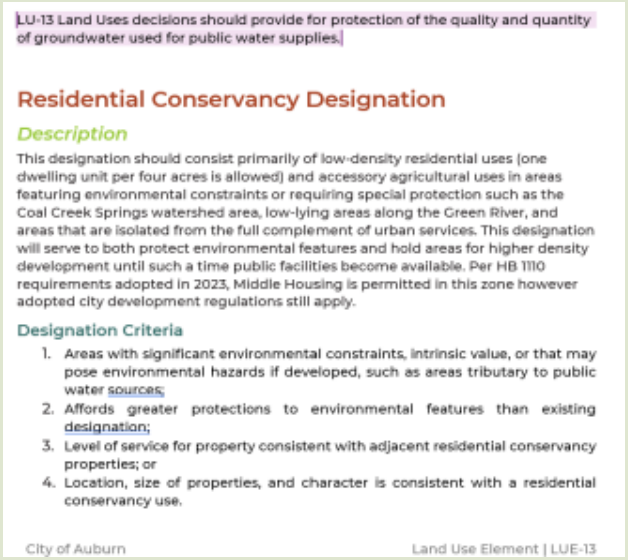
- Staff response: Added new policy consistent with the quoted comment language.
- Section of update: LU-13, LUE-13, Land Use Element

2024 PERIODIC COMPREHENSIVE PLAN – LAND USE AND HOUSING ELEMENT UPDATES

Changes to the Land Use Element

New policy to address comment COM2:

"LU-13 Land Uses decisions should provide for protection of the quality and quantity of groundwater used for public water supplies."



LU-13 Land Uses decisions should provide for protection of the quality and quantity of groundwater used for public water supplies.

Residential Conservancy Designation

Description

This designation should consist primarily of low-density residential uses (one dwelling unit per four acres is allowed) and accessory agricultural uses in areas featuring environmental constraints or requiring special protection such as the Coal Creek Springs watershed area, low-lying areas along the Green River, and areas that are isolated from the full complement of urban services. This designation will serve to both protect environmental features and hold areas for higher density development until such a time public facilities become available. Per HB 1110 requirements adopted in 2023, Middle Housing is permitted in this zone however adopted city development regulations still apply.

Designation Criteria

1. Areas with significant environmental constraints, intrinsic value, or that may pose environmental hazards if developed, such as areas tributary to public water sources;
2. Affords greater protections to environmental features than existing designation;
3. Level of service for property consistent with adjacent residential conservancy properties; or
4. Location, size of properties, and character is consistent with a residential conservancy use.

City of Auburn Land Use Element | LUE-13

2024 PERIODIC COMPREHENSIVE PLAN – LAND USE AND HOUSING ELEMENT UPDATES

Next Steps

- **December 9th Council Study Session on Package 1 and 2 of the Comprehensive Plan Update**

City of Auburn

Land Use Element

Table of Contents

Land Use Element 1
Introduction 1
Planning Framework 2
Land Use Patterns 2
Future Land Use 3
Residential and Employment Zoned Capacity 4
Housing Affordability by Average Median Income (AMI) 6
Goals, Policies, and Land Use Characteristics 11
Residential Land Use Designations 11
Residential Conservancy Designation 13
Neighborhood Residential One Designation 14
Neighborhood Residential Two Designation 15
Neighborhood Residential Three Designation 17
Mixed-Use Designation 18
Commercial Land Use Designation 20
Downtown Urban Center Designation 22
Industrial Land Use Designation 25
Public/Quasi-Public Designation 29
Open Space Designation 31
Overlays, Urban Growth Area, and Special Planning Land Use Designations 32

Maps and Figures

Map 1.1 – 2044 Population Estimates by Area 9
Map 1.2 – 2044 Net New Housing Units by Area 10
Map 1.3 - City of Auburn Comprehensive Land Use Map 51
Map 1.4 - City of Auburn Comprehensive Growth Centers 52
Map 1.5 - City of Auburn Districts Map 53
Map 1.6 - City of Auburn Designated Areas 54
Map 1.7 - City of Auburn Adopted Areas 55
Map 1.8 - City of Auburn Impression Corridors 56
Map 1.9 - City of Auburn Gateways 57

Land Use Element

Introduction

All land within the City of Auburn is assigned a land use designation and implementing zoning district, which builds from previously adopted Comprehensive Plan Maps, the existing land use pattern, adopted subarea plans, topography, natural features, and targeted goals for shifting the character of specified areas. This chapter provides a description for each designation, general criteria for how to assign the designation, and a series of goals and policies that govern land use within each designation.

The Comprehensive Plan Land Use Map shows the location and boundaries for each designation. This map should be consulted together with the written policies of this Plan when decisions about zoning designations, land use activities, and development of public infrastructure are considered.

The Land Use Element explains the reasoning and intention behind the land use designations. This should be useful in:

- Developing and implementing tools (such as zoning provisions)
- Interpreting the Land Use Map as it applies to specific regulatory decisions or development proposals
- Adjusting or amending the Land Use Map when changing conditions or land use markets warrant
- Planning for public services and infrastructure

Finally, this Element sets forth special policies intended to address the unique challenges and opportunities of specific locations within Auburn. These specific policies supplement the general goals, objectives and policies found in other Elements of the comprehensive plan.

Vision

The Auburn community is both physically and socially connected. We take pride in the quality of our built environment as well as the beauty and function of our natural environment. Land use patterns are supported by a complete and efficient transportation and utility infrastructure system. Neighborhoods, commercial centers, and parks are attractive, interesting, accessible, and well maintained. Natural riverine and forested corridors are interspersed throughout the city, offering sanctuaries where fish and wildlife reside, and providing opportunities for people to observe and learn about the environment. Residents have a strong association with their neighborhoods, are engaged and involved in the decisions that steer Auburn into the future.

Planning Framework

The Growth Management Act (GMA), codified as RCW 36.70A, is the enabling legislation that renders this Comprehensive Plan a legally recognized document by the State of Washington. This plan is a policy document only; the policies are required by GMA to be implemented through the use of such regulatory tools as zoning and subdivision ordinances, as well as other innovative techniques. The implementing regulations must be developed and maintained in accordance with the goals and policies of this Comprehensive Plan, and as set forth in the Growth Management Act, as amended, and consistent with King and Pierce County, Countywide Planning Policies (CPP).

In 1991, the State Legislature amended the GMA to require that counties adopt CPP's in cooperation with their municipalities. The purpose of these policies is to establish a coordinated, countywide framework within which to develop comprehensive plans. The CPP must guide the subsequent adoption of comprehensive plans without overly constraining with excessive detail. The Countywide Planning Policies shall, at a minimum, address the following:

1. Policies to implement RCW 36.70A.110;
2. Policies for promotion of contiguous and orderly development and provision of urban services to such development;
3. Policies for siting public capital facilities of a countywide or statewide nature, including transportation facilities of statewide significance as defined in RCW 47.06.140;
4. Policies for countywide transportation facilities and strategies;
5. Policies that consider the need for affordable housing, such as housing for all economic segments of the population and parameters for its distribution;
6. Policies for joint county and municipality planning within urban growth areas;
7. Policies for countywide economic development and employment, which must include consideration of the future development of commercial and industrial facilities; and
8. An analysis of the fiscal impact.
9. Policies that address the protection of tribal cultural resources in collaboration with federally recognized Indian tribes that are invited pursuant to subsection (4) of this section, provided that a tribe, or more than one tribe, chooses to participate in the process.

Land Use Patterns

For the first 100 years of Auburn's existence, the land use pattern developed in a relatively logical manner. Auburn was fully contained to the valley floor with a

traditional downtown urban center, several north/south heavy commercial and industrial corridors paralleling Highway 167, and a surrounding housing stock that was built primarily between 1910 and 1960. In the last 30 years, the land use pattern of Auburn has changed, primarily from incorporation of areas to the south, east, and west. Each newly incorporated area has its own identity and land use pattern.

Because a significant portion of today's Auburn was settled prior to incorporation, the basic land use patterns and infrastructure have already been established. Furthermore, much of today's Auburn land use pattern was established in either Auburn, the Muckleshoot Reservation, or prior to incorporation in King County or Pierce County. Given the mix of jurisdictional oversight, myriad land use policies, regulations, infrastructure standards, and investments have been applied in these areas. This has resulted in a relatively uncoordinated and random land use pattern. It also means that the various communities lack connectivity to each other, have a mix of identities, and are experiencing a change in their character from rural to more urban.

Auburn has a strong mix of housing and industry. Auburn's residential land use pattern includes a variety of densities, ages, and housing type. Auburn's nonresidential land use pattern includes a mix of local and regional retail, entertainment, services, manufacturing, warehousing, and distribution centers. This mix of land use is a strength because it exemplifies social, economic, and cultural diversity.

Auburn's natural resources include the Green River and its tributaries, the White River and its tributaries, a robust inventory of wetlands, floodplains, steep slopes, and mature open spaces. With a strong base to work from, the city and its partners can be strategic about how to better connect and preserve natural areas so that the overall system is enhanced for future generations to enjoy.

Future Land Use

The City of Auburn conducted a process to determine the preferred alternative for Auburn's future land use. Alternatives are different options to achieve the project's purpose and needs, and they serve as the basis for analyses related to environmental elements. The alternatives considered provide a range of capacities to accommodate growth for housing and employment, housing types, and citywide infrastructure investments. The Preferred Alternative, which is adopted as the future Zoning and Land Use maps, incorporate feedback from the community regarding where household and growth should occur as well as modelling to determine how growth may affect local infrastructure such as transportation and utilities. The Land Use and Zoning maps and assumptions described in the Land Use Element are assumed in each of the Comprehensive Plan Element and related systems plans. Future land use and zoning decisions were based on modelling results and calculations to demonstrate that there is adequate zoned capacity to accommodate the city's required future housing and employment targets.

Future Land Use Housing and Employment Capacity

A residential land capacity analysis evaluates whether jurisdictions have sufficient land capacity available to allow for the types and amount of new housing needed to meet identified housing needs is required as part of HB 1220 requirements. The 2021 Housing Element updates amended RCW 36.70A.070(2)(c) of the Growth Management Act to require the Housing Element to include explicit consideration of capacity for the following household needs and building types:

- Moderate, low, very low, and extremely low-income households;
- Permanent supportive housing;
- Emergency housing and emergency shelters; and
- Duplexes, triplexes and townhomes (within an urban growth area boundary

The intent of this analysis is to assess the City of Auburn's current capacity to accommodate different housing income brackets and whether that capacity is sufficient to meet Auburn's housing targets established by King and Pierce counties. In addition, this analysis considers implementing a preferred land use alternative through zoning changes and provides updated capacity calculations to ensure sufficient capacity of suitable land to meet growth targets.

Full analysis of housing and employment capacities and future need is described in *Appendix A - Housing Needs and Characteristics Assessment*.

Preferred Alternative Implementation

To address an anticipated deficit of zoned capacity to accommodate future growth targets of 12,112 new housing units and 19,520 new jobs based on current zoning, Auburn is consolidated zoning districts, developing dedicated Growth Centers, increasing densities, and permitting additional housing types. The changes in zoning are based on a preferred alternative completed as part of the land use scenario process where select centers and nodes were identified for increased density. This preferred alternative is reflected in the Comprehensive Plan Land Use and Comprehensive Plan Zoning maps. Results of the zoning changes pertaining to housing unit and employment growth are summarized below. The full zoning analysis is described in *Appendix A - Housing Needs and Characteristics Assessment*.

Residential and Employment Zoned Capacity

Residential and employment capacity by zone is based primarily on the assumptions outlined Buildable Lands Report process in 2021, updates to reflect

changes to zoning and density assumptions since that time. Downtown Urban Center mixed-use development assumes a distribution of 75% residential and 25% commercial, whereas the R-NM Neighborhood Mixed Use assumes a 50-50% split for mixed uses both vertically and horizontally. The residential capacity estimates accommodating 47,9226,070 housing units at max buildable capacity and 35,5073,655 net new housing units, exceeding the 12,112 net new housing unit target. This increase is due largely to Middle Housing policies consistent with HB 1110 which allows for Middle Housing in all residentially zoned areas. Four middle housing units per lot are permitted in moving forward, with up to two additional units permitted if within ¼ mile of a major transit stop or of those units are dedicated to affordable housing. Specific information on middle housing development regulations and requirements are found in city code. The R2 – Residential Low zone is found widely throughout the city.

Table 1. Residential Capacity by Zone

Residential & Mixed-Use Zoning Districts	Zone category	Developable Acres	Net zoning changes (acres)	Assumed Density - DU/Acres	Residential Capacity (units)	Net New (Units)
King County						
Residential Conservancy (RC)	Low Density	745	0	1	745	-
R-1 Residential	Low Density	275	0	4	1,4711,101	-
R2 – Residential Low	Moderate Density	294	1158	25	37,78935,799	28,950441
R3 – Residential Moderate	Moderate Density	0	22	30	660	660
R4 – Residential High	High Density	79	-1	50	3,890	-50
Neighborhood Mixed-Use (R-NM)	High Density Mixed-Use	0	89	30	2,670	2,670
Manufacture Home/Community (R-MHC)	Low Density	27	0	10	273	
DUC Downtown Urban Center - 125	High Density Mixed-Use	0	5	100	125	500
DUC Downtown Urban Center - 75	High Density Mixed-Use	0	5	95	119	475
DUC Downtown Urban Center - 55	High Density Mixed-Use	0	4	90	90	360
~~Total~~		~~1,420~~	~~1,285~~	-	~~45,561~~	~~33,146~~
DUC Neighborhood Residential	High Density Mixed-Use	0	3	30	90	90
Total		1,420	1,285	-	47.422	35,310
Pierce County						

R2 – Residential Low	Moderate Density	20	20	**25**	5009	5009
Total		20	20	-	5009	5009
			Total New (2044) Housing Capacity		~~44~~7,9226,~~070~~	35,8103,~~655~~

Table 2. Adjusted Employment Development Capacity by Zone

Non-Residential Districts	Developable Acres	Net zoning changes (acres)	Assumed Density – DU/Acres	Employment Capacity (units)
Light Commercial (C-1)	32	-13	845,391	2,254
Heavy Commercial District (C-2)	8	-8	-	-
Auburn Gateway District (C-AG)	0	15	653,400	653
Light Industrial (M-1)	132	-41	3,945,338	3,945
Heavy Industrial (M-2)	81	-9	3,122,925	3,123
Airport Landing Field (AF)	5	0	233,038	233
Mixed-Use Districts	**Developable Acres**	**Net zoning changes (acres)**	**Assumed Density – DU/Acres**	**Employment Capacity (units)**
DUC Downtown Urban Center – 125	0	5	163,350	408
DUC Downtown Urban Center – 75	0	5	163,350	408
DUC Downtown Urban Center – 55	0	4	130,680	327
DUC Neighborhood Residential	0	3	98,010	245
DUC Health and Wellness – 125	0	2	87,120	218
DUC C-1	0	13	566,280	1,510
DUC C-2	0	12	522,720	1,394
DUC M-1	0	39	1,698,840	1,699
Neighborhood Mixed-Use (R-NM)	0	89	1,938,420	5,169
		Total New (2044) Jobs Capacity		**21,587**

The employment capacity estimates accommodating 20,701 new jobs at max buildable capacity by 2044, exceeding the city's target of 19,520. Growth is located in the Downtown Urban Center (DUC) and in Growth Centers, whose core is primarily R-NM Neighborhood Mixed-Use. Additional growth in commercial space is anticipated, following a recent trend in industry job growth in Auburn.

Housing Affordability by Average Median Income (AMI)

Income Level (% AMI)	Zone Categories Servicing these Needs	Housing Needs	Capacity prior to Zoning Adjustment	Post-Rezone Capacity	Capacity surplus or deficit
King County					
0-30% PSH	High Density-Mixed Use	2,389	566	3,004	**615**
0-30% Other					
>30-50%	High-Density, ADU	962	1,532	4,823	**3,861**
>50-80%					
>80-100%	Moderate Density, ADU	2,458	5,058	37,3795,889	**35,333,431**
>100-120%					
>120%	Low-Density, ADU	6,303	348	2,2171,846	***(4,086457)***
Pierce County					
>80-100%	Moderate Density, ADU	112	100	5009	***38897***
Aggregated Total	-	**12,112**	**7,504**	***46,0706,070***	***353,810958***

In addition to meeting the residential and employment capacity targets through zoning and policy decisions, the city meets the aggregate King and Pierce County housing needs for income level groups. The only exception is the >120% Average Median Income (AMI) category, which includes primarily low-density housing in the R-1 and RC zones. However, this AMI category is not required to be met under HB 1220 requirements as high-income earners are represented in this group and can also purchase moderate density housing options as well.

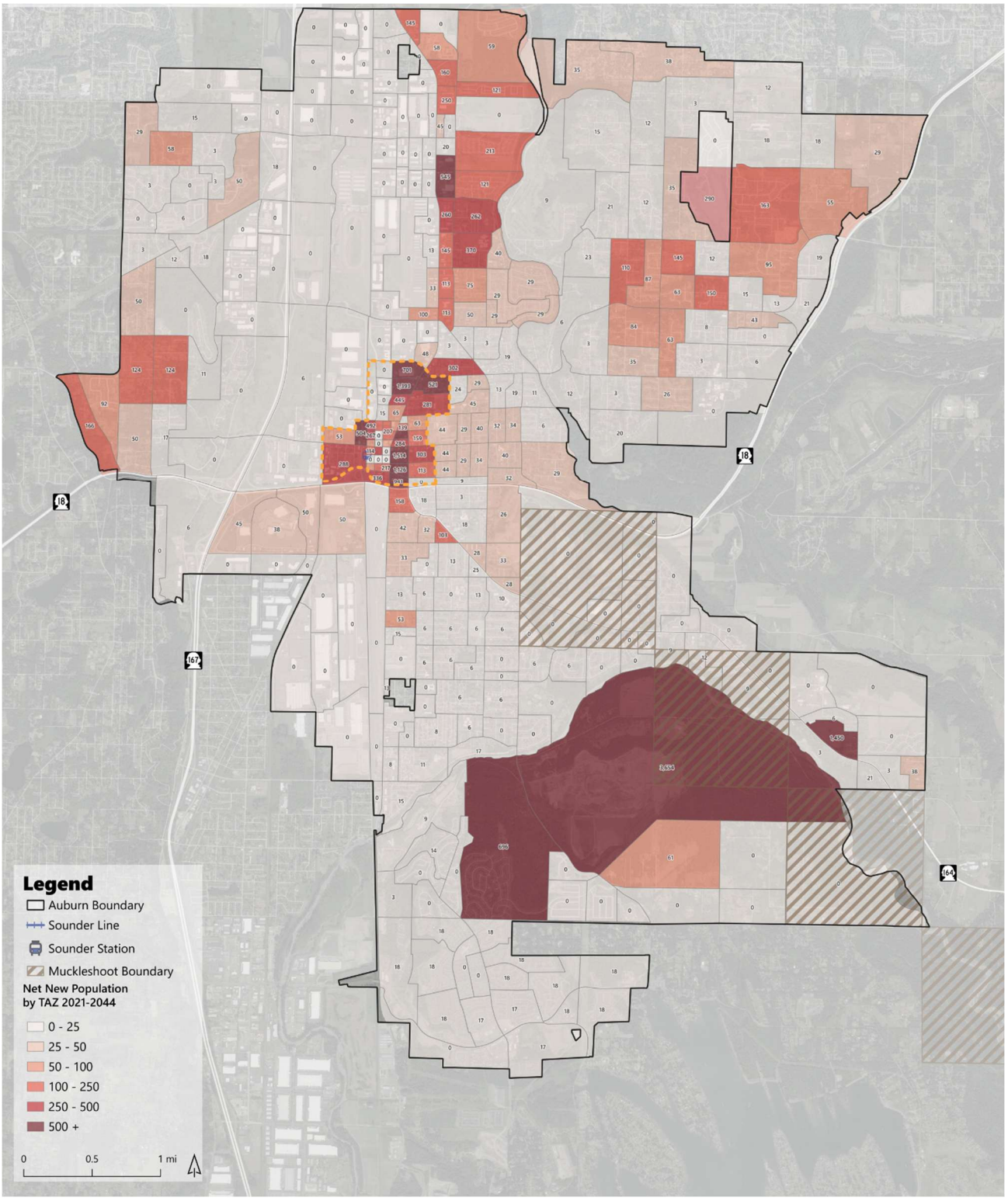
In Pierce County, the City's primary residential zone is R-2 Residential Moderate which for purposes of this capacity analysis aligns with the 80-120% AMI range. This zone can adequately accommodate the total housing need of 112, however AMI below 80% is not accounted for in this analysis. As indicated earlier, the housing target for the Pierce County portion of Auburn is only 112 housing units and as a result the city does not intend to rezone small areas of land in order to satisfy AMI requirements since actual development is unpredictable. The R-2 Residential Moderate zone can accommodate middle housing, single unit detached housing, and ADUs that can realistically serve a range of incomes, and the city will continue to provide flexibility in the development types allowed in this part of the city to best accommodate the full range of AMI levels.

An estimated 1,852 new Accessory Dwelling Units (ADUs) are accounted for prior to rezoning, as these developments are currently allowed in various zones are expected to occur naturally over the next 20-years. In total, ~~10% of new ADUs are planned for in the 50-80% AMI range,~~ 80% of new ADUs are planned for in the 80-120% AMI range, and 2~~1~~0% in the greater than 120% AMI range. ADUs are expected

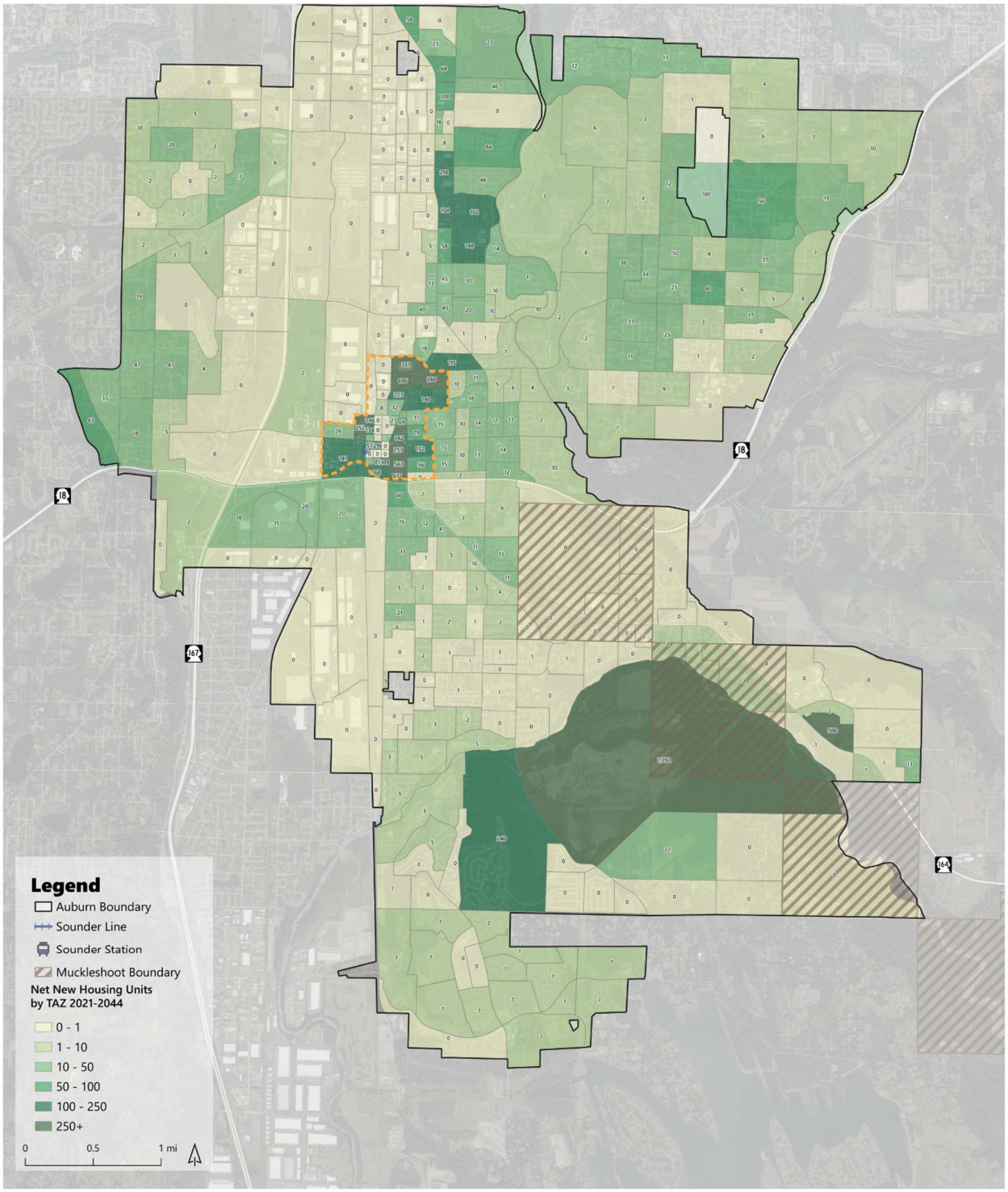
primarily in the ~~The high~~low-density and moderate-density land uses ~~where ADUs are primarily expected are~~ found in throughout the city.

Map 1.1 below shows where future new population is anticipated based on new households. It is anticipated that Auburn will have a population of 100,000 by 2029 and approaching 130,000 by 2044.

Map 1.2 shows the allocation of net new housing units by 2044 throughout the city. The net new housing units are consistent with King County and Pierce County Countywide Planning Policies required household units for 2044. Many of the new housing units are allocated in the Downtown Urban Center and in designated Growth Corridors.



Map 1.1 – 2044 Population Estimates by Area



Map 1.2 – 2044 Net New Housing Units by Area

Goals, Policies, and Land Use Characteristics

Residential Land Use Designations

Character

Residential uses will comprise a diverse arrangement of multiple densities and housing types. The pattern of one single density in a zone or neighborhood will evolve into increased and mixed densities in exchange for amenities that enhance quality of life. There will be greater connectivity and stronger spatial relationships between neighborhoods through strategic locations of roadway, trail, park, and neighborhood-serving businesses. These amenities will help create localized identity while also linking one area to another. The design and build quality of the new construction and infill will be held to a high standard. The city will encourage projects to be unique, innovative, and provide the residents of Auburn with true choice.

Values

- *Character:* Residential neighborhoods will include amenities, features, and layouts that promote interaction amongst residents.
- *Wellness:* The design of residential neighborhoods will emphasize safety and nonmotorized connectivity.
- *Service:* Through outreach and engagement, individual residents and homeowners' associations are connected to and aware of municipal services, events, and activities.
- *Economy:* Neighborhoods have a physical and personal connection to Auburn's commercial centers and attractions. People want to move to Auburn because of the commercial and recreational opportunities it has to offer.
- *Celebration:* Districts and neighborhoods are identified, promoted, and celebrated.
- *Environment:* The built environment will fit into the natural landscape in a way that protects and respects ecosystem function and that preserves native vegetation and soils.
- *Sustainability:* Natural resources, economic prosperity, and cultural vibrancy are balanced in a way that builds and maintains a thriving and long-lasting community.

Policies

LU-1 Regulations for new developments and infill should address the following elements:

a. Connectivity by multiple means to adjacent subdivisions, nearby commercial hubs, and parks and recreation facilities.

b. Relationship to nearby existing or future transit service.

c. Usable community amenities and spaces.

d. Environmental protection and preservation of natural features.

e. Preservation of areas that can support low-impact development techniques.

f. Promote the use of energy and water conservation measures

g. Efficient and effective delivery of utility service.

h. Innovative design.

i. Crime prevention through environmental design.

j. Long-term maintenance considerations.

LU-2 As denser development continues to occur; standards should be developed to maximize density while preserving open space and critical areas.

LU-3 Programs should continue to be implemented to improve the quality of low-income neighborhoods and encourage rehabilitation of deteriorating structures and facilities.

LU-4 Public/Quasi-Public uses may be permitted as a conditional use if de signed in a manner that enhances the residential character of the area. Special care shall be given to ensuring appropriate levels of parking, landscaping, and traffic circulation to avoid conflict with residential uses.

LU-5 New residential development shall contribute to the creation, enhancement, and improvement of the transportation system, health and human services, emergency services, school system, and park system. This may be accomplished through the development of level-of-service standards, mitigation fees, impact fees, and/or construction contributions.

LU-6 Cluster development is the preferred form of residential development in all residential designations with the goal of preserving natural areas, critical areas, and areas that support low-impact development. Where clustering accomplishes these objectives, it should not come at the expense of lost development potential. Variances to lot size, lot dimensions, building height, and other bulk or dimensional standards should be utilized in order to create incentives that promote preservation.

LU-7 Ensure that new development in Growth Centers meets minimum development intensity thresholds to ensure that employment and housing growth will help achieve the desired levels of jobs and housing units.

LU-8 Designated Growth Centers and Downtown Urban Center shall promote physical activity and reduce per capita vehicle miles traveled within the jurisdiction, but without increasing greenhouse gas emissions elsewhere in the state.

LU-9 Consider land use patterns and development regulations to promote development that addresses potential environmental health disparities in coordination with the Climate Element.

LU-10 Identify and implement strategies to mitigate the risk to lives and property posed by wildfires. Risk identification and strategies should be aligned with Climate Element workplan through 2029.

LU-11 Coordinate land use choices with neighboring jurisdictions, agencies, and the Muckleshoot Indian Tribe to encourage consistency and predictability for regional planning and environmental considerations.

LU-12 Encourage inclusive engagement on land use decisions to ensure decisions do not negatively impact historically marginalized communities.

LU-13 Land Uses decisions should provide for protection of the quality and quantity of groundwater used for public water supplies.

Residential Conservancy Designation

Description

This designation should consist primarily of low-density residential uses (one dwelling unit per four acres is allowed) and accessory agricultural uses in areas featuring environmental constraints or requiring special protection such as the Coal Creek Springs watershed area, low-lying areas along the Green River, and areas that are isolated from the full complement of urban services. This designation will serve to both protect environmental features and hold areas for higher density development until such a time public facilities become available. Per HB 1110 requirements adopted in 2023, Middle Housing is permitted in this zone however adopted city development regulations still apply.

Designation Criteria

1. Areas with significant environmental constraints, intrinsic value, or that may pose environmental hazards if developed, such as areas tributary to public water sources;
2. Affords greater protections to environmental features than existing designation;
3. Level of service for property consistent with adjacent residential conservancy properties; or
4. Location, size of properties, and character is consistent with a residential conservancy use.

Implementation Zoning Designation

A. RC Residential Conservancy

Policies

LU-143 Densities and activities shall be of a very low intensity and shall not compromise environmental and watershed resources.

LU-154 In addition to single-family homes, these larger properties can also be developed with garages, accessory dwelling units, barns, and other accessory outbuildings. Home occupations, agricultural uses, and other allowed nonresidential activities may operate out of any type of permitted building, subject to intensity and use limitations.

LU-165 Until these areas are served by public utilities (water, sewer, storm services), existing and new development is not expected to be served by public infrastructure, such as urban streets, curbs, gutters, sidewalks, street lighting, and landscaping.

LU-176 As the market and utility availability enable denser development to occur, standards should be developed to maximize density while preserving open space and critical areas.

LU-187 Small-scale agricultural uses are allowed and encouraged. Commercial activities that are directly related to and support agricultural uses may also be allowed. The procedural standards may vary depending upon the type and scale of agricultural uses and supporting commercial activities. Small-scale agricultural uses are allowed and encouraged.

LU-198 Land use standards should adequately limit and control excessive accumulation of de bris. Where a permitted activity does allow outdoor storage, it should be adequately screened from adjacent properties and roads, as well as ensuring adequate soil and environmental protection.

LU-2019 Public/Quasi-Public and resource extractive uses that are low-intensity and preserve the environment may be considered conditional uses.

Neighborhood Residential One Designation[1]

Description

Low density land use for detached single-unit detached housing with a density of one unit per acre. Neighborhood Residential One includes all properties zoned R1 -

[1] This designation was previously called “Single Family” prior to the 2024 Periodic Comprehensive Plan Update. However, the implementing zones may have changed.

Residential 1 du/acre including areas within the Urban Separator Overlay, as designated in King County Countywide Planning Policies. Per HB 1110 requirements adopted in 2023, Middle Housing is permitted in this zone however adopted city development regulations still apply.

Designation Criteria

1. Low density residential areas located within the Urban Separator Overlay that are also constrained by the presence of critical areas

Implementing Zoning Designations

A. R1 - Residential Zone (One Dwelling Unit Per Acre): All properties located within the Urban Separator Overlay are zoned R-1, as consistent with King County Countywide Planning Policies.

Policies

LU-210 Accessory dwelling units should play an integral part of promoting infill development and affordable housing and are therefore encouraged within this land use category.

LU-221 Home occupations, bed-and-breakfasts, day cares, and other appropriate uses should be encouraged as viable accessory uses.

LU-232 Manufactured homes shall be permitted on single-family lots provided they are sited and constructed in a manner that would blend with adjacent homes.

LU-243 Encourage the development of a variety of housing typologies to suit the needs of various potential residents.

LU-254 Density bonuses outside of the Urban Separator Overlay should be approved based on innovations in transportation, stormwater management, and public amenities proposed for the development or adjacent neighborhoods associated with the request. The onus is on the developer to justify density above baseline. Examples of amenities and concepts that justify density bonuses include park space, art, enhanced landscaping, trails that connect to adjacent properties, neighborhood commercial property set asides, use of low-impact development techniques beyond the minimum code requirements, incorporation of Crime Prevention Through Environmental Design (CPTED) (Public Comment, LU 2) concepts, and variation of architecture and housing typology.

Neighborhood Residential Two Designation[2]

[2] This designation was previously called “Moderate Density Residential” prior to the 2024 Periodic Comprehensive Plan Update. However, the implementing zones may have changed.

Description

Neighborhood Residential Two designated areas are planned to accommodate a variety of residential dwelling types. Varying intensities may be permitted to provide a transition between Neighborhood Residential One and other more intensive uses or activities (such as arterial streets) based on adjacent density, intensity, and/or character. Appropriate densities in these areas range from 25-30 dwelling units per acre, with between 4 and 6 Middle Housing units per lot permitted. Dwelling types generally range from single-unit detached dwellings to Middle Housing, and moderately sized mixed-use and apartment buildings that fit the size and character of traditional single-family neighborhoods. Low-impact, neighborhood scale business such as small-scale food stores, coffee shops, and cultural or recreational services in pre-existing structures, either separate from or as part of a mixed-use building, are allowed in Neighborhood Residential Two.

Designation Criteria

1. Previously developed Neighborhood Residential Two areas; or

2. Areas that provide a transition between Neighborhood Residential One and Neighborhood Residential Three, Neighborhood Residential One and nonresidential, Neighborhood Residential Three and nonresidential zones or development that are adjacent and meet the development parameters of the Neighborhood Residential Two designation.

Implementing Zoning Designations

A. R2 – Residential Low
B. R3 – Residential Moderate

Policies

LU-265 ~~5~~ Density bonuses and flexible development standards should be considered an incentive for innovative neighborhood design.

LU-276 ~~6~~ Carefully developed low-intensity commercial uses (such as day care centers, food and beverage establishments) can be compatible.

LU-287 ~~7~~ Middle Housing and accessory dwelling units should play an integral part of promoting infill development and affordable housing and are therefore encouraged within this land use category.

Neighborhood Residential Three Designation[3]

Description

Neighborhood Residential Three encourages a mix of Middle Housing residential, apartment buildings and mixed-use development at a greater density compared to Neighborhood Residential Two. These communities are served by nearby high-capacity transit, have nonmotorized connections to surrounding amenities (parks, libraries, community centers, etc.) and services, or have access to on-site amenities. Small, local commercial development is allowed consistent with Neighborhood Resident Two.

Land use density standards are based on dwelling units per lot for all Middle Housing types, while base density of units per acre continues to apply for detached single-unit housing. This use includes Residential Manufactured Home communities, for which the City will be coordinating with the Department of Commerce for exception to compliance with middle housing requirements.

Designation Criteria

1. Previously developed high-density residential or manufactured/mobile home parks; or
2. Properties that are connected to Neighborhood Residential One and nonresidential designations by the Neighborhood Residential Two designation or are connected to a Mixed-Use District.

Implementing Zoning Designations

A. R4 - Residential High
B. R-MHC Residential Manufactured/Mobile Home Community

Policies (cont.)

LU-298 Development regulations should include density bonuses and flexible development standards that create incentives for innovative site and building design, incorporation of open space and public art, nonmotorized connectivity to parks and commercial areas, proximity to transit services, supplemental natural resource protection, supplemental use of Crime Prevention Through Environmental Design (CPTED) (Public Comment, LU 2), and supplemental use of low-impact development techniques.

LU-3029 Home occupations and shared housing should be allowed in this designation; however, given their high densities, it is appropriate to establish

[3] This designation was previously called “Multiple-Family” prior to the 2024 Periodic Comprehensive Plan Update. However, the implementing zones may have changed.

additional restrictions, procedures, and requirements in order to ensure that they are compatible with their surroundings and do not adversely affect the community.

LU-310 Live–work units are encouraged in Neighborhood Residential Two and Neighborhood Residential Three designations.

LU-321 Improve the quality of low-income neighborhoods and implement programs that encourage rehabilitation of deteriorating structures and facilities the downtown area, areas between lower-density residential uses and more intense nonresidential activities, and areas with high levels of transit service and available high-quality services.

LU-332 Parking requirements for Middle Housing types of development shall be reduced within ½ mile walk of a major transit stop, consistent with state requirements.

LU-343 Middle Housing types are eligible for bonus of two dwelling units depending on proximity to a major transit stop or when two dwelling units are developed as affordable housing. Affordable housing bonus dwelling units shall remain affordable for a 50-year period and recorded on the covenant, per RCW 36.70A.030.

Mixed-Use Designation

Description

The Mixed-Use Designation permits a complementary mix of residential and commercial uses in a single land use designation. This designation encourages vertical mixed-use, horizontal-mixed use, conversion of existing residential to commercial, middle housing, and pedestrian and non-motorized travel, while allowing flexibility for how uses are combined within this area. Mixed-Use Districts align with areas where moderate and high-density development is served by transit, bicycle facilities and sidewalks, and amenities that create healthy and livable neighborhoods.

Designation Criteria

1. Mixed-Use Districts are primarily located within designated Growth Centers or other areas where it can be demonstrated that the Mixed-Use District provides local neighborhood benefits consistent with the description and intent of the Mixed-Use District and where orientation to walkable communities is desired.
2. Residential and commercial uses are encouraged to be integrated as a component in all development projects.
3. A variety of housing options and development types is encouraged within this designation.

4. Mixed-Use District is not intended for automobile oriented or businesses that rely on outdoor storage, or any other type of storage facility. Such uses will be not permitted.
5. Development within a Growth Center designation along major roadways between Mixed-Use zones should provide additional building setback from the street right of way and include areas for landscaping, open space, and pedestrian activity.

Implementing Zoning Designations

A. R-NM Neighborhood Mixed-Use
B. RO Residential Office District
C. Auburn Gateway District

LU-354 Apartment development should be subject to building and site design standards. These standards should address the appearance of buildings, compatibility with nearby uses, exterior lighting, connectivity with surrounding properties and uses, the relationship of ground floor spaces and entryways with the streetscape, and connectivity to nearby nonresidential hubs (shopping centers and schools). Protected bicycle parking should be provided.

LU-365 Provide a variety of housing typologies to suit the needs of various potential residents.

LU-376 Establish intensity limitations such as floor area ratios, density, building height, coverage ratios, setbacks, and other standards.

LU-387 Access to nearby amenities and health and human services should be considered when reviewing senior housing and STEP (shelters, transitional housing, emergency housing, and permanent supportive housing) developments.

LU-398 Encourage development of permanent supportive housing to address the homeless population and those with special needs.

LU-4039 Encourage adaptive reuse, particularly of historic properties.

LU-410 Mixed-Use Districts should supportcreate cohesive, diverse, neighborhood mixed-use centers that allow vertical and horizontal mixed-use flexibility, as well as flexibility in uses, that provide for local housing, shopping, and employment options that also allows each center to foster it's own identity. (Public Comment, LU 2),

LU-421 Encourage sustainable transportation options by creating viable options for people to get to destinations by alternatives to personal vehicles in Mixed-Use Districts, Neighborhood Residential Three, and Neighborhood Residential Two designations.

LU-432 Support development of small-scale, local neighborhood serving commercial such as food and drink establishments and local services in Residential Two and Three designations.

LU-443 The residential uses permitted must be carefully regulated in regard to performance criteria to ensure alignment with the City's responsibility to accommodate required share of regional growth.

Commercial Land Use Designation

Character

Commercial uses will be wide ranging in terms of scale and type. A mix of businesses – local, regional, and national – will be among the businesses in the various designations and will be carefully located to create balance and maintain appropriateness based on adjacent uses. These commercial areas will be economically vibrant, unique, and active outside of traditional work hours. They will be accessible by foot, bike, car, and public transport.

Values

Character – Active gathering spaces, such as parks, plazas, cafes, concert venues, festivals and markets, will be distributed throughout the City; these spaces will be engaging and filled with people interacting, irrespective of culture, age, or income level.

Wellness: A variety of healthy food options will be physically and economically accessible to all members of the Auburn community.

Service: The City's resources and services are available and utilized by the business community. The business community finds the City approachable, empathetic, and responsive. An open and collaborative dialogue exists to help identify problems and find solutions.

Economy: A wide complement of retail, service, and dining options will cater to local needs, attract visitors, and encourage consistent patronage of local businesses.

Celebration: Auburn will have a thriving and expanding arts and culture community. There will be events, amenities, and attractions that draw people to congregate and socialize.

Environment: Local businesses benefit from Auburn's collection of natural resources and amenities because residents and visitors are choosing Auburn as their home or destination.

Sustainability: Local businesses benefit from, and contribute to, a sustainable economy because Auburn is an easy location to start up, maintains opportunity for growth, and has a business-friendly economic climate.

Policies

LU-454 The commercial uses permitted must be carefully regulated in regard to performance criteria and design to ensure alignment with the City's responsibility to accommodate required share of regional growth.

LU-465 Permitted uses in Residential designations would consist of local-serving and community-serving retail trade, offices, personal services, and eating establishments.

LU-476 Encourage uses that provide health and human services to the adjacent community.

LU-487 Encourage adaptive reuse, particularly of historic properties.

LU-498 Promote the use of energy and water conservation measures

LU-5049 Ensure that legally established existing uses that may not conform with the underlying zone, but that are compatible with their surrounding uses, and are allowed to continue to evolve and operate without being classified as "nonconforming" uses.

LU-510 Consider commercial displacement when evaluating new development proposals and determine strategies to mitigate impacts when possible.

Description

Commercial land use designations are predominantly a mix of retail, office, service, hospitality, entertainment, and eating/drinking establishments. Some districts have a greater non-motorized emphasis where buildings and site features are scaled to a pedestrian level while other districts are more auto-centric. Extra design emphasis is placed on architecture, lighting, landscaping, accessory uses, landscaping, hours of operation, site layout, and transitions to adjacent uses.

Designation Criteria

1. Previously developed light commercial areas buffered from more intense commercial or industrial designations by landscaping or environmental features; or
2. Previously developed heavy commercial areas; or
3. Located along arterial or collector streets;
4. Properties that are buffered from the single-family designation by landscaping, or environmental features,; and
5. Meets the development parameters of the Light and Heavy Commercial designations.

Implementing Zoning Designations

A. C-1 Light Commercial
B. C-2 Heavy Commercial

Downtown Urban Center Designation

Description

The Downtown Urban Center (DUC) land use designation should be applied exclusively in the Downtown Auburn Subarea and Regional Growth center as identified in the Comprehensive Plan and 2024 Auburn Downtown Plan. As a Regional Growth Center, the DUC must maintain a planned target density of 45 activity units per acre minimum, per Puget Sound Regional Center Requirements. The Land Use Element assumes this target when considering future land use and zoning changes in the DUC. DUC zoning and land use in the Land Use Element and map are consistent with those in the draft 2024 Auburn Downtown Plan, which is under development with an anticipated 2025 adoption date. The DUC is implemented by zoning districts specific to Downtown Urban Center and the Downtown Design Guidelines. The ambiance of the downtown should encourage leisure shopping, provide amenities that attract regional visitors and shoppers, and provide housing and services to local residents and area employees.

Designation Criteria

1. Located within the Urban Center boundaries established by the King County Countywide planning policies or within the PSRC Regional Growth Center boundaries.

Implementing Zoning Designations

DUC Subarea-Specific Zoning classifications consisting of:

A. DUC Downtown Urban Center - 125’ District
B. DUC Downtown Urban Center - 75’ District
C. DUC Downtown Urban Center – 55’ District
D. DUC Downtown Urban Center – Health and Wellness District
E. DUC Downtown Urban Center - C1 Light Commercial District
F. DUC Downtown Urban Center - C2 Heavy Commercial District
G. DUC Downtown Urban Center - M1 Light Industrial District
H. DUC Downtown Urban Center - Flex-Residential District
I. DUC Downtown Urban Center - Neighborhood Residential District

Policies

LU-521 ~~1~~ Vertical mixed-use should be encouraged; the location of retail sales and services should predominately be on the ground floor with residential or more retail or services above. However, small freestanding commercial spaces may be established as an accessory use to a larger vertical mixed-use development.

LU-532 ~~2~~ Deviations of height, density or intensity limitations should be allowed when supplemental amenities are incorporated into site and building design. Examples of amenities include use of low-impact development, use of sustainable site and building techniques, public space and art, transit-oriented development

(TOD), landscaping and lighting, and bike shelters as well as the inclusion of affordable housing.

LU-5~~43~~ Encourage a broad mix of uses within the downtown area. A wide range of consumer-oriented goods and services are compatible within this designation since creating an attractive shopping environment is a primary emphasis. Permitted uses include retail trade, offices, personal services, eating and drinking establishments, financial institutions, governmental offices, and similar uses. Legally established existing uses that do not fit within the range of desired new uses continue to be a valuable part of the downtown economy and character and should be allowed to evolve and operate in a manner that resembles listed permitted uses.

LU-5~~54~~ Encourage residential dwellings within the upper stories of buildings and provide flexibility with how those spaces are organized and utilized.

LU-5~~65~~ Drive-in windows shall not be permitted to maintain the area's pedestrian environment.

LU-5~~76~~ Parking standards within the downtown should reflect the pedestrian orientation of the area, but also consider parking's impact for economic development.

LU-5~~87~~ Discourage uses that rely on direct access by vehicles or involve heavy truck traffic (other than for merchandise delivery).

LU-5~~98~~ Unsightly outdoor storage and similar activities should be prohibited.

LU-60~~59~~ The downtown should capitalize on opportunities for multimodal transportation.

LU-6~~10~~ Encourage adaptive reuse of existing buildings, particularly of historic properties.

LU-6~~21~~ As a designated VISION 20 50 Regional Growth Center that contains a transit station, land use policies and regulations should encourage population and employment growth.

LU-6~~32~~ The commercial uses permitted must be carefully regulated in regards to performance criteria and design. Architectural style, building height and size, lighting, and signage should be consistent with the surrounding residential properties.

LU-6~~43~~ Permitted uses would consist of community and regional-serving retail trade, offices, personal services, and non-drive through eating establishments.

LU-6~~54~~ Special emphasis will be directed at those accessory activities that can alter the character of these areas into heavier commercial areas. Examples include outdoor storage, location, and screening of trash receptacles, loading and unloading zones, and parking lots. Regulations and permit conditions will employ

techniques that mitigate light and noise impacts associated with surrounding residential properties.

LU-665 Commercial uses will have an orientation that is directed toward adjacent public streets while also providing pedestrian and bike-oriented access.

LU-676 Upzone requests to the next zone will be considered for approval based on the innovations in transportation and stormwater management and public amenities proposed for the development associated with the request.

LU-687 Encourage occupancy of storefront and other ground floor public-facing spaces to create a active environment downtown.

LU-698 Explore opportunities to increase the amount of public green space in downtown that provide spaces for recreation and activation.

LU-7069 A wide range of consumer-oriented goods and services are compatible within this designation since creating an attractive shopping environment is a primary emphasis. Permitted uses would consist of local-serving and community-serving retail trade, offices, personal services, eating establishments, financial institutions, governmental offices, and similar uses.

LU-710 Parking lots must be located and designed in a manner that softens their appearance from adjacent public roads. This is accomplished through landscaping, pedestrian spaces, and the location of buildings on the property. Where practicable, low-impact development techniques and landscaping should be used to promote on site stormwater infiltration and shading of hard surfaces. Minimum and maximum parking ratios must be established for each type of permitted use.

LU-721 Development incentives should be established that encourage the creation of electric car charging stations, use of sustainable building and/or operational practices, development of nonmotorized infrastructure, and proximity and connection to public transit.

LU-732 Multiple family dwellings are only allowed as part of mixed-use developments where they do not interfere with the shopping character of the area, such as within the upper stories of buildings.

LU-743 Drive in windows should only be allowed accessory to a permitted use, and only when carefully sited under the administrative use process, in order to ensure that an area's pedestrian environment is not compromised

LU-754 Large-scale regional retail uses and uses that rely on direct access by vehicles or involve heavy truck traffic (other than for merchandise delivery) are not appropriate in this category.

LU-765 Unsightly outdoor storage and similar activities should be prohibited.

LU-776 Encourage adaptive reuse, particularly of historic properties.

LU-787 Upzone requests to the next zone should be approved based on the innovations in transportation and stormwater management and public amenities proposed for the development associated with the request.

LU-798 A wide variety of commercial-oriented services are appropriate within this category. This includes but is not limited to regional-scale retail and entertainment uses, commercial uses with outdoor sales areas, drive-in restaurant or other drive-in commercial businesses, and commercial services with outdoor storage as an accessory use.

LU-8079 Parking lots must be located and designed in a manner that softens their appearance from adjacent public roads. This is accomplished through landscaping, pedestrian spaces, and the location of buildings on the property. Where practicable, low-impact development techniques and landscaping should be used to promote on site stormwater infiltration and shading of hard surfaces. Minimum and maximum parking ratios must be established for each type of permitted use.

LU-810 Development incentives should be established that encourage the creation of electric car charging stations, use of sustainable building and/or operational practices, development of nonmotorized infrastructure, and proximity and connection to public transit.

Industrial Land Use Designation

Character

Industrial uses will become a more integrated part of the physical and social life of the city. Since so many people work in these areas and these companies contribute so much to the financial life of the city, it is important that they are connected through paths, roads and by public transportation. Locations that have access to rail and highways that also encourage intelligent growth patterns will be prioritized. Innovation will be a key requirement of new and infill projects as the city looks to mitigate impacts of production and limit damage to the environment.

Values

Character: Buildings, landscaping, and outdoor spaces will be attractive, interesting, well designed, and well maintained.

Wellness: Risk to life and property from all hazards will be minimized. Properties and businesses are connected to nonmotorized corridors that offers alternative means to commute.

Service: The city works closely with individuals and organizations to fully understand the demands, needs, and concerns of the industrial community so that the city can sponsor initiatives that help aid in their success.

Economy: Cornerstone institutions will strategically expand in regional prominence. As industry grows, land use policy will support efforts to grow within Auburn.

Celebration: The Community will be made aware of and celebrate the accomplishments of our local, regional and international leaders in manufacturing, warehousing, and distribution.

Environment: The built environment will fit into the natural landscape in a way that protects and respects ecosystem function. Natural resource protection will be supported and celebrated by City leadership and the community.

Sustainability: Industrial uses are contributing to, and supportive of, efforts to build and maintain a transportation system that ensures the people and goods move safely throughout the city and beyond.

Description

Industrial lands allow for a mix of manufacturing, logistics, and warehousing along with the space needed to store materials and vehicles. These areas have a heavy reliance upon the transportation of goods by rail or truck which necessitates loading docks/bays, ample area for truck movement, and convenient access to robust rail and road infrastructure. These areas can also accommodate uses such as breweries and distilleries and their associated tasting rooms, restaurants and banquet halls, warehouse style retail outlets, and a modest level of integrated housing.

Designation Criteria

1. Previously developed light or heavy industrial areas; or
2. Light Industrial provides buffering for heavy industrial areas or is buffered from the single-family designation by landscaping, environmental features, and buffered from all other Residential designations;
3. Meets the development parameters of the Light and Heavy Industrial zoning districts.

1. Heavy Industrial districts should not located along high-visibility corridors serving non-industrial uses;
2. Properties identified as LF Airport Landing Field on the zoning map in the Airport Master Plan, and properties identified for future acquisition.

Implementing Zoning Designations

A. M-1 Light Industrial
B. M-2 Heavy Industrial
C. Airport Landing Field District

LU-821 ~~1~~ A wide range of industrial uses may be permitted, subject to performance standards.

LU-832 Outside storage shall be permitted subject to performance criteria addressing its quantity and location.

LU-843 Development incentives should be established that encourage the creation of electric car charging stations, use of sustainable building and/or operational practices, development of nonmotorized infrastructure, and proximity and connection to public transit.

LU-854 Promote the use of energy and water conservation measures.

LU-865 A wide range of industrial uses may be permitted, subject to performance standards. Heavy commercial uses that serve the needs of workers in light industries are also appropriate. These uses include indoor manufacturing, processing, and assembling of materials from previously prepared or raw materials and ancillary and necessary warehousing and distribution of finished goods associated with manufacturing and industrial uses.

LU-876 Parking lots must be located and designed in a manner that softens their appearance from adjacent public roads. This is accomplished through landscaping, pedestrian spaces, and the location of buildings on the property. Where practicable, low-im pact development techniques and landscaping should be used to promote on site stormwater infiltration and shading of hard surfaces. Minimum and maximum parking ratios must be established for each type of permitted use.

LU-887 Landscaping, sidewalks, and bike paths will be integral parts of site design if a development is located on an impression corridor or located within or adjacent to an identified nonmotorized corridor.

LU-898 Outside storage shall be permitted subject to performance criteria addressing its quantity and location. This is to ensure compatibility with adjacent uses, so that such storage would not detract from the potential use of the area for light industry. In all cases, such storage shall be extensively screened.

LU-9089 Where an Industrial use is located adjacent to a property with a less intense zoning designation, the light industrial use bears the burden of incorporating techniques that mitigate the visual, noise, dust, and odor impacts.

LU-910 Uses involving substantial storage or processing of hazardous materials, as well as substantial emissions, should not be permitted in these areas.

LU-921 A wide range of commercial activities may be allowed to provide increased opportunities for sales tax revenue.

LU-932 The Burlington Northern Santa Fe Railroad Auburn Yard located within the Railroad Special Plan Area is considered a compatible use at its current level of usage. It is not bound by the policies concerning outside storage under the existing light industrial designation as it was an existing use prior to the development of this policy. Should BNSF decide to reactivate its applications to upgrade the yard to

an intermodal facility, the proposal will be subject to the essential public facility siting process as defined in the Capital Facilities Element.

LU-943 Upzone requests to the next zone should be approved based on the innovations in transportation and stormwater management and public amenities proposed for the development associated with the request.

LU-954 While this zone should be reserved primarily for the heavier forms of industrial activities, a wide range of industrial activities may be permitted. These heavier forms of industrial activities may include outdoor or semi-enclosed manufacturing, processing, or assembling activities, significant outdoor storage, and uses involving substantial storage or processing of hazardous materials. Heavy commercial uses that serve the needs of workers in heavy industries are also appropriate.

LU-965 Landscaping, sidewalks, and bike paths will be integral parts of site design if a development is located on an impression corridor or located within or adjacent to an identified nonmotorized corridor.

LU-976 For the LF Airport Landing Field District, the Airport Master Plan (AMP) establishes the vision, policies, and implementation strategies that govern uses, management principles, and future planning efforts. The AMP is incorporated by reference in the Auburn Comprehensive Plan as an appendix.

LU-987 Auburn Municipal Airport is included in the federal airport system the National Plan of Integrated Airport Systems (NPIAS). Participation in the NPIAS is limited to public use airports that meet specific FAA criteria. NPIAS airports are eligible for federal funding of improvements through FAA programs. To maintain eligibility for funding through FAA programs, the Airport Master Plan should be periodically updated as conditions change.

LU-998 Uses, activities, and operations within the LF Airport Landing Field District must be coordinated and consistent with the Airport Master Plan.

LU-100 99Future expansions of the LF Airport Landing Field District, for the purpose of airport uses, activities, and operations, should be coordinated and consistent with the Airport Master Plan.

LU-1010 While the industrially designated area east of the Airport is highly suited for airport related activities, other industrial type uses are now located here. Therefore, the City will encourage use in this area to take advantage of its proximity to the Airport.

LU-1021 New commercial land uses in proximity to the airport should be air related and/ or complementary to the airport.

LU-1032 To protect the viability of the Auburn Municipal Airport the City shall create an airport overlay that is consistent with FAA regulations and WSDOT guidance.

LU-1043 The City's zoning ordinance and other appropriate regulatory measures shall enforce the airport overlay and the FAR Part 77 surfaces.

LU-1054 The airport overlay shall protect the operations of the Auburn Municipal Airport by establishing controls on incompatible land uses and development.

LU-1065 The airport overlay should be implemented to manage land uses and development around the airport to ensure compatibility into the future and prevent incompatible future uses. The regulations applied to properties surrounding the airport should encourage land uses that are related to, and benefit from, proximity to the airport but not restricted exclusively to only these.

LU-1076 The impact of development on air safety shall be assessed through the City zoning ordinance, FAA regulations, SEPA review, input from the Auburn Municipal Airport, and relevant technical guidance. Appropriate mitigation measures shall be required by the City.

LU-1087 Uses in proximity to the airport that may create potential operational (e.g. height or noise) conflicts shall be reviewed for their consistency to airport operations and conformance with the FAA regulations.

LU-1098 The airport should be protected from nonconforming uses and structures that pose a safety concern to airport operations.

LU-11009 The City shall determine whether nonconforming uses and structures affect airport operations and require their minimization or elimination, at cost to owner, based on individualized study of proposals, City regulations, input from the Auburn Municipal Airport, and relevant technical guidance.

Public/Quasi-Public Designation

Character

This category includes those areas that are reserved for public or quasi-public uses. It is intended to include those of a significant extent, and not those smaller public uses that are consistent with and may be included in another designation. These public uses include public schools, developed parks, and uses of quasi-public character such as large churches and private schools. Public uses of an industrial character are included in the industrial designation, and small-scale religious institutions of a residential character are included in the residential designation. Streets, utilities, and other separate uses are not intended to be mapped separately as Public/Quasi-Public.

Values

Character: Community facilities and programs bring people together and connect residents and visitors to our natural resources.

Wellness: Multiple recreation options, and nearby trails, parks, activities, and events will be readily accessible to the entire community.

Service: Land use policy supports the provision of community, health and human services to all residents.

Economy: Residents and visitors seek Auburn as a residence or destination because of its natural resources, community events, and community pride.

Celebration: We utilize our open spaces and public facilities to promote who we are, our diversity, and our community pride.

Environment: Residents and visitors will enjoy open spaces and environmentally sensitive areas, while encouraging the appreciation of their importance and beauty. Impacts of new development on natural resources are considerate of their sensitivity and importance.

Sustainability: Public and private funds are used to make investments in land preservation, restoration and protection. Public investments in land and facilities are considered for their perpetual or generational value versus short-term motivations.

Policies

LU-1110 The primary purpose of this designation is to address public needs while taking advantage of synergies with the adjacent areas where they are sited.

LU-1121 Appropriate uses for this designation include facilities that serve the needs of the larger community such as public schools, active parks, city operated municipal facilities, police stations, and fire stations.

LU-1132 Innovative strategies to integrate the uses and sites into the areas where they are sited is encouraged. These strategies should maximize use of the site while minimizing fiscal impacts and impacts to adjacent areas.

LU-1143 Increase visibility of resources through public information campaigns.

LU-1154 Appropriate uses include low-intensity recreational uses, passive use open areas, protected environmental habitat, stormwater detention facilities, and similar low-intensity uses.

LU-1165 Promote the use of energy and water conservation measures.

LU-1176 A responsible management entity and the purpose for Institutional districts should be identified for each property interest within this designation. Management policies and plans are appropriate for all lands in this designation.

LU-1187 This designation permits a wide array of uses that tend to be located in the midst of other dissimilar uses. For this reason, special emphasis should be directed at the following:

a. The appropriateness of new requests for this designation and the impacts that it may have on the surrounding community.

b. Site-specific conditions that should be attached to the granting of new requests for this designation that are designed to mitigate impacts on the surrounding community.

c. Site-specific conditions that should be attached to development proposals that are designed to mitigate impacts on the surrounding community.

LU-1198 Coordination with other Institutional entities is essential in the implementation of the Public/Quasi-Public land use designation.

LU-12019 Industrial and commercial uses that are affiliated with and managed by educational institutions for vocational educational purposes may be classified as a Publican Public/Quasi-Public use and permitted on a conditional basis.

Designation Criteria

1. Previously developed institutional uses; or
2. Meets the development parameters of the Public/Quasi-Public designation.

Implementing Zoning Designations

A. *I Institutional*

B. P-1 Public Use District

Open Space Designation

Description

Open space lands are in public ownership or an otherwise permanently protected state that provide enhanced protection of floodplains, aquatic and/or wildlife corridors, wetlands, hazardous slopes, or that protect groundwater supplies. Open Space lands may be made available for public access and education which includes ancillary supportive uses such as bathrooms, trails, boardwalks, interpretive signs, parking, and picnic areas.

Designation Criteria

1. Passive parks or undeveloped Parks Department property;
2. Any site containing a significant developmental hazard; or
3. Any site containing open space value suitable for public protection without unduly encroaching on private property rights.
4. Sites that are permanently protected as a result of the terms of acquisition or a recorded instrument.

Implementing Zoning Designations

A. OS Open Space

Policies

LU-1210 Active parks that provide sports field, activity and community centers, cemeteries, and public buildings should not be designated as open space.

LU-1221 Open space lands are primarily designated to provide wildlife and aquatic habitat, flood detention, vegetation and soil preservation, and view shed protection. Land designated as open space may be used for public access to trails, interpretive centers, education opportunities, and other uses and facilities that support the purpose of their designation.

LU-1232 Increase distribution of open space and increase access to open space amenities throughout Auburn.

LU-1243 Enhance restoration, preservation and protection of natural resources and critical areas.

LU-1254 Seek out opportunities to develop recreation and education opportunities on public lands or through public–private partnerships.

LU-1265 Increase visibility of resources through public information campaigns. Continue to work with regional partners to develop and maintain trail systems that connect Auburn with regional destinations.

LU-1276 Build on partnerships with school districts to expand public use of school facilities for recreation and exercise, and to improve public access to facilities for this purpose, as appropriate.

Overlays, Urban Growth Area, and Special Planning Land Use Designations

Character

These areas help control growth, protect the environment, and prevent urban sprawl conditions in our City. For a variety of reasons, specific areas exist within the City that require further specificity or focus of land use planning, policy, regulation, or investment. Overlays, urban growth areas, and special planning areas may be designated that help further enumerate a purpose. These areas are to be designated through the Comprehensive Plan and treated as a component of the Land Use Element of the Plan.

Values

Each area designated as an overlay, urban growth area, or special planning area shall reflect the values identified in the Core Comprehensive Plan.

General Policies

LU-1287 These land use designations must be consistent with the Growth Management Act, Puget Sound Regional Council, and countywide planning policies.

LU-1298 Any proposed changes to these designations must be pursued in coordination with applicable State, Regional and County agencies.

Urban Separator Designation

Description

Urban separators are areas designated for low-density uses in the King County Countywide planning policies. They are intended to "protect Resource Lands, the Rural Area, and environmentally sensitive areas, and create open space and wildlife corridors within and between communities while also providing public health, environmental, visual, and recreational benefits." There are two primary areas of urban separators, one on Lea Hill and one on West Hill.

Designation Criteria

Areas designated through the process of annexation.

Implementing Zoning Designations

A. Lea Hill Overlay
B. West Hill Overlay
C. Bridges Overlay
D. Urban Separator Overlay

Policies

LU-13029 The City is obligated to maintain (and not redesignate) the Urban Separator designation until at least the year 2022, pursuant to countywide planning policies and an annexation agreement with King County. The City will coordinate with King County on redesignation of Urban Separators in 2025.

LU-1310 Urban separators are deemed to be both a regional as well as local concern and no modifications to development regulations governing their use may be made without King County review and concurrence. Therefore, the areas designated as "urban separator" on the Comprehensive Land Use map, will be zoned for densities not to exceed one dwelling unit per acre, with lot clustering being required if a subdivision of land is proposed.

Urban Growth Area and Potential Annexation Area Designation

Description

Urban growth areas and potential annexation areas are areas located outside of the municipal city limits of Auburn. They are areas that are anticipated to be incorporated into the City within 10 years of their designation.

Designation Criteria

Potential annexation areas are jointly developed by cities and the County in which they are located. They are based upon countywide growth projections that are divided among all urban growth areas within each respective County. Urban growth areas and potential annexation areas are distinguished from each other by whether they have been assigned to a city or not. Urban growth areas have been identified but have not been assigned to a city. Potential annexation areas are urban growth areas that have been assigned to a specific city.

Implementing Zoning Designations

A. Urban Growth Area Potential Annexation Area

Policies

LU-1321 Work with King and Pierce County, as well as nearby cities, to redesignate urban growth areas into potential annexation areas.

LU-1332 Auburn's Potential Annexation Area is shown on the Comprehensive Plan Land Use Map (Map 1.1). Map 1.1 also depicts Growth Impact Areas. These Growth Impact Areas are generally adjacent to cities or unincorporated County lands in which development that occurs potentially impacts the city of Auburn.

LU-1343 The Auburn City Council may revise the boundaries of the Potential Annexation Area in the future, in response to:

a. Amendments to King and Pierce County Urban Growth Areas as specified in the King and Pierce County countywide policies
b. Discussions between Auburn and adjacent jurisdictions regarding potential annexation area boundaries
c. Discussions with Pierce County concerning the designation of potential annexation area boundaries
d. Changed circumstances relating to population and employment growth and projections, urban service feasibility, or similar factors.

LU-1354 Develop strategies and agreements for the review of development and provision of utilities within potential annexation areas that have yet to be annexed.

LU-1365 Prior to annexation, develop strategies and agreements that address the orderly transition of areas into the city such as transfer of permit authority, infrastructure financing, financing of fire and police services, and interim development regulations.

Critical Area Overlay Land Use

Description

Under the Growth Management Act cities and counties are required to identify, designate and protect critical areas. Critical areas include (a) wetlands, (b) aquifer recharge areas (including areas with a critical recharging effect on aquifers used for potable water), (c) fish and wildlife habitat conservation areas, (d) frequently flooded areas, and (e) geologically hazardous areas.

Designation Criteria

Designation of critical areas includes both criteria that should be applied to the specific type of critical area as well as buffers and/or setbacks that are necessary for the protection of the critical area and/or life and property. Designation of critical areas is based on best available science as it applies to local conditions.

Implementing Zoning Designations

A. Wetlands
B. Aquifer Recharge Areas
C. Fish and Wildlife Habitat Conservation Areas
D. Frequently Flooded Areas
E. Geologically Hazardous Area

Policies

LU-1376 Best available science will be utilized for the specific designation criteria and the associated adopted protection standards and development regulations.

LU-1387 Reasonable use provisions will be included within the critical area regulations that ensure a property owner is not denied use of a preexisting parcel, lot or tract.

LU-1398 Exemptions to the critical areas ordinance should be provided for very limited and justified circumstances such as maintenance of existing land uses, work within some types of human-made features, limited types of site investigation work, emergency activities, and certain types of invasive vegetation control.

LU-14039 Critical area regulations will identify the process and standards for alteration of a critical area and criteria related to mitigation, performance, and monitoring.

Special Planning Area Designation

Description

“Special Planning Areas” consist of Districts, subareas, Impression Corridors, and Gateways within Auburn that warrant additional emphasis in planning, investments, and policy development. Each may be recognized separately within

the Comprehensive Plan, as an Element of the Comprehensive Plan, or as an subarea plan (discussed below). There are a variety of reasons for designating and distinguishing a special planning area, and once designated, a variety of potential outcomes. Reasons for designating a special planning area include:

- Growth Centers are areas of the city identified though the Comprehensive Planning process where a large share of growth is allocated. These areas provide a combination of Mixed-use, higher density residential, and higher density commercial uses which serve the local area. There will be a special focus on the performance of these Centers, including housing units and jobs created, to ensure the City accommodates the required share of regional growth by 2044. Growth Centers are shown in Map 1.4 and reflected in development regulations found in city code.
- Areas of high visibility and traffic. These areas create an impression or image of Auburn. It is therefore particularly important to ensure that they are attractive and well maintained. Examples include Auburn Way South and associated major highway on- and off-ramps.
- Land use activities that warrant joint planning between the city and owner/operator. In addition to developing approaches and strategies for the land use activity, there may be additional emphasis on ensuring compatibility with surrounding land uses. Examples include Green River College, the Auburn Municipal Airport, and Emerald Downs Thoroughbred Horse Racetrack.
- Neighborhoods in which a resident and merchant live and conduct daily business and leisure. Neighborhoods may also be distinguished by physical setting, physical separations, and similarity over an area. Examples include downtown, Lea Hill, and Lakeland.
- Areas with a focused desire to create greater physical and economic cohesiveness. These may be large, planned developments or clusters. Examples include the Auburn North Business Area and Mt. Rainier Vista.
- Areas with an existing built environment or an existing regulatory framework that does not, in itself, meet the expectations of the seven values that underscore the Comprehensive Plan. Examples include the need for multimodal connections between West Hill and Lea Hill to north and downtown Auburn.

Designation Criteria

1. **Districts:** The geographic limit of districts and areas that make up this category of Special Planning Areas extends beyond an alignment with any particular street, trail, river, stream, or other linear corridor. Districts may contain other smaller Special Planning Areas, such as subareas. Additionally, districts are generally consistent with the geography of one of the eight

"neighborhoods" identified in the 2014 City of Auburn Community Vision Report. Generally speaking, districts are identified for the purpose of creating identity. This means that the land use designations and overarching policies and implementing regulations are not going to change from one district to the next. Instead, Districts are important for event planning, establishing park and open space level-of-service standards, and promoting community identity.

Districts (see Map 1.4)

- West Hill
- North Auburn
- Lea Hill
- Downtown
- South Auburn
- Plateau
- Lakeland
- Southeast Auburn

2. **Subareas:** Subareas are smaller in geography than a district. Though relatively large, multiple subareas may be located within a single district. Subareas allow for the refinement and recognition of existing unique characteristics within a district. Subareas are intended to anticipate, support, and guide long-term growth and redevelopment through planned development and a unique vision for how that area should look and function in the future. It can also be used to provide flexibility when there is uncertainty regarding how an area may be most appropriately developed in the future.
3. Twenty-eight (28) subareas currently exist. These subareas are categorized into five different types of subareas:

- Identified Areas;
- Designated Areas;
- Economic Development Strategy Areas (a Designated Areas sub-category);
- Areas of Concern (another Designated Areas sub-category); and
- Adopted Areas.

Uses, intensities, and infrastructure development determined for each subarea or planned area through individual planning processes. Connectivity throughout the planned area, and connections to multimodal transportation opportunities outside

of the planned area are also emphasized through the individual planning process. The result of each individual planning process is the adoption of Comprehensive Plan element or subarea plan for the particular subarea by the City Council. Each Plan element must be consistent with the general goals, objectives, and policies of the Comprehensive Plan, and once adopted, subarea plans are intended to guide the future development of each respectively adopted subarea.

2a. **Identified Areas:** Identified areas are identified as a subarea within the Comprehensive Plan, but have not been established on the Comprehensive Plan Map. Therefore, the specific and detailed boundaries of an identified subarea have not been defined. Identification of a subarea within the Comprehensive Plan occurs by official action of the City Council.

Identified Areas

- Auburn Golf Course
- GSA/Boeing
- Green River College
- Mary Olsen Farm
- Les Gove Campus
- Emerald Downs
- Auburn High School

2b. **Designated Areas**: Designated Areas have been designated on the Comprehensive Plan Map, which defines the specific and detailed boundaries of the area. Designation of an area on the Comprehensive Plan Map occurs by official action of the Auburn City Council. It is intended that future development of these areas will be guided by individual Plan element or subarea plan of the Comprehensive Plan. The future subarea plan will either supplement existing goals, policies, and implement strategies, or replace existing Comprehensive Plan designations and policies for the area within the specific and detailed boundary.

Designated Areas (see Map 1.6):

- Auburn Municipal Airport
- BNSF Rail Yard
- Stuck River Road
- Mount Rainier Vista
- Lakeview

2b(1). Designated Areas - Areas of Concern: Areas of Concern are a specific type (or subcategory) of the designated area. Areas of Concern are established because

they represent an area that features a lack in the infrastructure and services (e.g. municipal water and sewer service, urban roads, traffic demand, and storm water management) necessary to support increase in density or other development. These areas require a close assessment of and an emphasis on infrastructure development and planning to support further development. While this Plan may not fully represent the intensity of uses that could ultimately be supported in these areas (in part due to the current weakness of the City's infrastructure to support future growth). Development intensification within the Area of Concern needs to be coordinated with the necessary infrastructure and services to support growth.

Designated Areas - Areas of Concern (see Map 1.6):

- AWS/Auburn Black Diamond Rd.
- Pike Street NE
- 8th Street NE

2b (2). Designated Areas - Economic Development Strategy Areas: The Economic Development Strategy Areas are a specific type (or subcategory) of designated area. In 2005, City Council adopted six Economic Development Strategy Areas under Resolution No. 3944. These areas, initially identified by a focus group of diverse business and community interests, are targeted for population and employment growth within the planning horizon of the City's 20-year growth target (204431). By 2012, the City Council added three additional economic development strategy areas, bringing the total to nine (9) strategy areas.

During the City's 2015 update of the Comprehensive Plan the list of economic development strategy areas reflects current conditions and status of these areas. As such, two of the original six economic development strategy areas were removed from the list. The Urban Center, one of the original six development strategy areas, was removed as it is no longer a designated area. The Urban Center, also known as "Downtown Auburn" or the "Downtown Urban Center" is an adopted area (since 2001) and features its own subarea plan. The Auburn Environmental Park (AEP)/Green Zone has also been removed as an economic development strategy area. The AEP/Green Zone economic development strategy area was previously zoned EP, Environmental Park Zone. The intent of this zone was to encourage economic development in the form of medical, biotech and "green" technologies including energy conservation, engineering, water quality and similar uses. Through Ordinance No. 6660 City Council rezoned the AEP/Green Zone from EP, Environmental Park Zone to M-1, Light Industrial, hereby effectively removing the need to designate the AEP/Green Zone as a specific economic development strategy area.

The current economic development strategy areas are included below. The boundaries of the economic development strategy areas are incorporated as

designated sub-areas "Designated Areas – Special Planning Areas" map of the Land Use Element.

Designated Areas -Economic Development Strategy Areas (see Map 1.6)

- A St SE (corridor)
- Auburn Way South (AWS) Corridor
- Auburn Way North (AWN) Corridor
- M St SE (between AWN and AWS)
- SE 312th/124th Ave
- NW Manufacturing Village
- 15th St SW/West Valley Hwy N

2c. Adopted Areas: Adopted Areas include an Adopted Subarea Plan incorporated into the Comprehensive Plan that establishes the purpose of its designation, goals and policies, and implementation strategies. Adoption of a subarea plan occurs by official action of the City Council. As an adopted document of the Comprehensive Plan, the subarea Plans are subject to a review, and if necessary, revision to address changes in conditions, issues, or even characteristics of the planned areas. The review and revision of the Subarea Plan will also include the review and, if necessary, a revision of zoning regulations and architectural design standards.

Adopted Areas (see Map 1.7)

- Downtown (Ordinance No. 5549)
- Auburn Adventist Academy (Resolution No. 2254)
- Auburn North Business Area (Resolution No. 2283)
- Lakeland Hills (Resolution No. 1851)
- Lake Hills South (County H.E. Case Z15/UP70)
- Northeast Auburn (Ordinance N. 6183)

3. Impression Corridors: Impression corridors are aligned with a particular street, trail, river, stream, or specific linear corridor. Some corridors may be part of a subarea, in which case the Impression Corridor policies are additive to a subarea plan. Impression corridors enhance the areas in which residents, businesses, and visitors move throughout the city. The benefit of an impression corridor is two-fold: residents know that the city is invested in the aesthetic of main thoroughfares and businesses can build off of the design and aesthetic provided by the impression corridor. Improvements or modification to impression corridors consist of aesthetic signage, landscaping, and monument features, and the rehabilitation or removal of existing buildings and property. Impression Corridor boundaries and

policies are formally designated by adoption of the Comprehensive Plan. Priority is given to the impression corridors that are a part of a subarea. Priority impression corridors are the thoroughfares in which residents, businesses, visitors move throughout a specific subarea. The priority impression corridors are italicized below.

Impression Corridors (see Map 1.8)

- *Auburn Way North*
- *Auburn Way South*
- *Auburn Black Diamond Road*
- *A Street SE/Auburn Avenue*
- *C Street SW*
- *Division Street*
- *M Street/Harvey Road*
- *Main Street*
- *8th Street NE*
- *15th Street SW*
- *West Valley Highway*
- *15th Street NW/NE*
- 132nd Ave SE
- SE 320th Street
- SE 312th Street
- SE 304th Street
- R Street
- Lake Tapps Pkwy SE
- Green River Road
- 37th Street NW
- S 277th Street
- Interurban Trail

- Green River
- White River
- Mill Creek

4. Gateways: Gateways are specific places, intersections, or blocks within the city. These essential locations are established because they constitute the first impression into of Auburn. Gateways are intended to create a "welcome" into distinct areas of the city or into the city itself. They are therefore highly important to plan, construct, maintain, and enhance their appearance and function. Gateway locations and policies are formally designated by adoption of the Comprehensive Plan. Priority is given to those gateways that are along a priority impression corridor. Priority gateways function as an entrance to an impression corridor. The priority gateways are italicized below.

Gateways (see Map 1.9)

- *Auburn Way North and Auburn Avenue (where the roads converge)*
- *East Main Street and M Street NE/ SE (at the intersection)*
- *Auburn Way South and 4th Street SE*
- *Auburn Way S and 6th Street SE*
- *West Main Street between C Street NW and B Street NW*
- All roads with an entry into the city
- Hwy 167 Off Ramps
- SR 18 Off Ramps

Implementing Zoning Designations

A. Planned Unit Development (PUD) Master Plans

Special Plan Area Policies

District Policies.

LU-1410 Through regulation, capital investment, and community planning, identify, promote and market district identity.

Subarea Policies.

LU-1421 Each subarea will contain its own vision, goals, policies and strategies.

LU-1432 BNSF Rail Yard - This approximately 150-acre Special Planning Area is located in the south-central portion of the city and surrounded by SR-18 to the North, Ellingson Road to the South, C Street SW to the west and A Street SE to the East. The Special Planning Area should consider both sides of C Street and A Street. Consideration should be given to:

- The needs of Burlington Northern.
- Providing pedestrian, bicycle and vehicular access across the site to connect the southeast and southwest sides of the city.
- Providing a more visually appealing "entry corridor" into the city from the south along A and C Streets.
- Allowing for a mix of uses including single and multifamily development and commercial and industrial uses where appropriate.

LU-1443 Stuck River Road - A portion of the Stuck River Road Special Planning Area is currently the site of a large sand and gravel mining operation. This area and other adjacent land comprising a total of approximately 664 acres has been designated as a long-term resource area (mineral resource area), so development of the Special Area Plan for this area should be a low priority as mining is expected to continue on this site for as long as 30 years. The land uses for the Stuck River Road Special Planning Area will be determined through the subarea planning process and the City Council's adoption of the subarea plan. Potential land uses applied through the subarea planning process could include single-family residential, multi-family residential, commercial, institutional, and recreational. Some light industrial uses may be appropriate for consideration and designation through the subarea planning process if the uses are "industrial or business park" in character, conducted entirely within an enclosed building, and exhibit a high degree of performance standards and are non-nuisance in nature and if appropriately limited in extent and location. A mix of housing types ranging from single family residential to multi-family residential is appropriate for this planning area. The subarea plan should be adopted taking into consideration the period during which mining is expected and the intent of the ultimate development of the area. An active permit has been processed by the city with respect to the mining activity on a portion (approximately 664 acres) of the mineral extraction operation. The permit process should continue, however, any permit for mining in the mineral resource area should be granted for the life of the resource, with reviews conducted periodically (every five years) to determine whether changes in the originally proposed mineral extraction operation have arisen and give rise to the need for additional or revised permit conditions to address the new impacts (if any) of any such changes. Any permit applications for additional acreage within the mineral resource area shall be processed by the City.

Development of this area should not occur until adequate public facilities are available to support the development consistent with City concurrency policy.

The City recognizes the potential for expanding the Stuck River Road Special Planning Area to include additional land east of Kersey Way and north of the Covington-Chehalis power line easement and will consider a proposal by all affected property owners. If the area is expanded, the number of non-multiple family, non-manufactured home park dwellings units may be increased proportionate to the increase in acreage. Any such proposal shall specifically apportion the types and quantities of development to occur within each separate ownership.

LU-1454 Lakeview - The Lakeview subarea is currently the site of two independent sand and gravel mining operations. While mining activity continues in the eastern operation, indications in 1995 are that the western operation has ceased. Activity in the western portion is now limited to a concrete batch plant and future site reclamation. Following reclamation, the area should be developed as a primarily single-family residential neighborhood of low to moderate urban density. A planned development would be particularly appropriate for this approximately 235-acre site. The permitted development density of the site will depend heavily upon the ability of the transportation system near the site to handle the new uses. Consideration shall be given to the environmental, recreational and amenity value of White Lake, the historical and cultural significance, as well as tribal ownership and jurisdiction of the Muckleshoot Tribe in the development of the Lakeview Plan element. Permit applications have been accepted and are currently being processed by the city with respect to the mining activity in the eastern portion of the area. The permit process should continue, however, any permit for continued mining in this portion of the area should be limited to 10 years to encourage completion of the mining, and subsequent reclamation by the property owner in preparation for development. The Lakeview Plan element should be adopted prior to the City's acceptance or processing of any other permit applications for the mining operation in the Lakeview Special Planning Area. The environmental information and analysis included in the Final Environmental Impact Statement for Lakeview (November 1980), shall be considered in the development of the Lakeview Plan element. While heavy commercial or industrial uses would not be appropriate as permanent uses of this area, conversion of the area now zoned for heavy industry to office commercial (or similar) uses would be appropriate.

LU-1465 Mt. Rainier Vista - This 145-acre subarea is located south of Coal Creek Springs Watershed. Overall development of the Mt. Rainier Vista subarea plan shall be consistent with the following conditions:

1. Primary consideration in the use and development of the property shall be given to protection of Coal Creek Springs' water quality. Development types, patterns and standards determined to pose a substantial risk to the public water source shall not be allowed.

2. The maximum number of dwelling units will be determined as part of any sub-area plan process. Dwelling units shall be located within portions of the property where development poses the least risk of contamination for Coal Creek Springs. Lands upon which any level of development would have a high risk for contaminating the water supply shall not be developed, but would be retained as open space. The development pattern shall provide for a logical transition

between areas designated for rural uses and those designated for single family residential use. All dwelling units shall be served by municipal water and sanitary sewer service, and urban roads. If 53rd Street S.E. is the major access to serve the Special Planning Area, the developer will be responsible for developing the street to urban standards, from the property owners' eastern property line that abuts 53rd Street, west to the intersection of 53rd and Kersey Way.

3. Percolation type storm sewer disposal systems shall not be permitted. All surface water drainage shall be conveyed consistent with the City's current storm drainage standards. Treatment of stormwater shall occur prior to its discharge to any surface water body, consistent with standard public works or other requirements in general effect at the time of development.

4. The site shall be zoned temporarily, at one unit per four acres, until the sub-area plan is completed, and the long-term urban zoning determined.

5. The Mt. Rainier Vista special planning area boundary may be modified through the development of the subarea plan.

6. The Mt. Rainier Vista and Stuck River Road Special Planning Areas shall be coordinated subarea plans.

Designated Areas - Areas of Concern Policies

LU-1476 AWS/Auburn Black Diamond Rd – The area between Auburn-Black Diamond Road and the Burlington Northern Railroad currently lacks urban facilities necessary to support urban development. Major development proposals shall be carefully assessed under SEPA to ensure that the development can be supported by the available facilities. Once property owners are able to demonstrate to the City that they can provide urban services (municipal water and sewer service, urban roads and storm water management) necessary to support the intensity of development proposed within the entire area, the Plan designation and zoning for this area should be changed to an urban residential or commercial classification. The appropriate classification(s) shall be determined after a review of the development proposal and the pertinent Comprehensive Plan policies.

LU-1487 Pike Street NE – The area located north of 8th NE, east of Harvey Road, and south of 22nd NE is inadequately served by residential arterials. No increase in density or other development which would increase traffic demand in this area should be approved.

LU-1498 8th Street NE – The areas paralleling 8th Street NE located between Auburn Way and M Street are designated for multiple family residential while 8th Street NE is designated as a minor arterial. However, the road is not currently constructed to this standard and is not able to support current traffic demand adequately. The Plan designation would greatly increase traffic volumes. Implementation of the Plan designations should not occur until 8th Street NE is constructed to the adequate arterial standard and water service is upgraded. Up zones should not be granted from current zoning until these stems are upgraded or guaranteed.

Designated Areas - Economic Development Strategy Areas Policies

LU-15049 The City should adopt a formal subarea plan for each of the seven economic development strategy areas (listed below) as an element of the Comprehensive Plan. Each economic development strategy area subarea plan should identify the uses, intensities, and infrastructure development necessary to support the types of business and activities that are most consistent with community aspirations. Each subarea plan should address and include policies regarding the expected level of housing density (or residential growth targets) and employment growth targets.

- Auburn Way South Corridor
- Auburn Way North Corridor
- NW Auburn Manufacturing Village
- 15th St. SW/C St. SW/W Valley Hwy. N
- A St. SE
- SE 312th St. /124th Ave SE
- M St. SE between Auburn Way N and Auburn Way S

Adopted Areas Policies

LU-1510 Adoption or revision of a subarea plan will be treated as a comprehensive plan amendment and will comply with the Growth Management Act, Countywide planning policies, Vision 20 50, and the Core Comprehensive Plan.

LU-1521 Adventist Academy - Adopted under Resolution No. 2254 on November 14, 1991. The Auburn Adventist Academy is Special Planning Area (Adopted Area) is a multi-use campus operated by the Western Washington Conference of Seventh-Day Adventists. The Campus plays a large role in the Western Washington Conference of Seventh- Day Adventists' private elementary and secondary education system in Washington and hosts many community events as well as an annual regional camp meeting for Adventists from Washington and around the world. The Campus previously housed Harris Pine Mill, a furniture manufacturer, for many years. The Mill provided financial benefit to the Academy's budget and provided employment opportunities, learning experiences, and vocational education for Academy students. The Academy continues to include in its plan industrial uses that support the mission of the school financially. The reuse of existing mill buildings and redevelopment of buildings lost to a fire in 1989 are the focal points of the current industrial development. In addition to institutional and industrial uses, the Academy also operates a landing strip and associated aircraft hangars for student aviation and flight training. A single-family subdivision is located to the south of the airstrip. In addition to these uses, the Academy wishes to allow development of uses such a multi-family and senior housing and assisted living and memory care which will generate perpetual revenue through a long-term land lease on a portion of the Campus lying generally north of Auburn Way South and south of 32nd Street S.E. that will directly aid its mission. The financial

benefit from these uses will allow funding an endowment, subsidize student tuition, provide financial aid for students needing tuition assistance, for new educational programs, for additional faculty, facility maintenance and upgrades, and other needs. The plan focuses on provides predictability to planning, zoning, subdivision, and development decisions within the Special Planning Area (Adopted Area) made by the city.

LU-1532 Auburn North Business Area - Adopted under Resolution No. 2283 on March 2, 1992. The Auburn North Business Area Special Planning Area Plan was the result of a comprehensive planning study due to increased development pressure north of the Central Business District. Since the Central Business District, which contains Downtown, the core of Auburn, is adjacent to these areas, future development in this area is crucial. A comprehensive and cohesive direction was also needed based on increased development proposals and rezone requests. In addition to development concerns, many of the considerable undeveloped parcels contain wetlands. All of these factors made development controls beyond zoning and development regulations advisable.

LU-1543 Lakeland Hills - Adopted under Resolution No. 1851 on April 18, 1988. Lakeland Hills area lies between the Stuck River and the southern City limits of Auburn in the most southwestern part of the city. The area consists of planned residential and commercial subdivisions, and is predominately residential in nature, offering a range of housing types, including single family and multi-family dwellings. The Lakeland Hills Plan was intended to provide long-term predictability to both the city and potential developers. As a planned community, development and design must be consistent with the policy guidance of the Lakeland Hills Plan.

LU-1554 Lakeland Hills South - Approved under Pierce County Hearing Examiner Case Z15/UP70.Lakeland Hills South lies south of the Lakeland Hills special plan area and is the most southwestern part of the city. The area is predominately residential, allowing for a range of housing types, with commercial uses, including Lakeland Town Center, in the center. Nonresidential uses, including civic, religious, and municipal services are allowed throughout the area through an Administrative Use Permit. Unlike Lakeland Hills, Lakeland Hills South was accepted into Auburn was a Planned Unit Development (PUD). The Lakeland Hills PUD, originally the Lakeland Hills South Planned Development District (PDD), was approved under Pierce County Hearing Examiner Case no Z15-UP70 in 1990. Lakeland Hills South PUD is intended to provide enhanced flexibility to develop a site through innovative and alternative development standards. As a PUD, specific development and design standards are prescribed.

LU-1565 Auburn Downtown Plan (Downtown Urban Center) – Adopted under Ordinance No. 5549 on May 21, 2001. Downtown Auburn is the business, governmental, and cultural hub of Auburn, its physical and cultural heart. Many stores, restaurants, service providers, and small offices are well-represented throughout this district. Downtown hosts many community events and activities, such as the weekly Auburn International Farmers Market in the summer,

Soundbites! Concert Series (in the City Hall Plaza) and the Veterans Day Parade. Downtown features public art that includes temporary installations such as Pianos on Parade and a permanent outdoor Downtown Sculpture Gallery with rotating pieces. This dynamism is possible because the district is a collection of uses that coexist in close proximity to one another. Due to the value, importance, and complexity of this district, The Auburn Downtown Plan identified four general needs to be addressed by the plan:

- Update of the existing plan in order to continue Downtown revitalization
- Concern over the reopening of Stampede Pass
- Multiple large projects proposed for Downtown
- Scarce private investment

In conjunction with project-based items, a regulatory element that emerged from the goals of the Auburn Downtown Plan was the Downtown Urban Center (DUC) zoning district, which was established in 2007. While the DUC zoning district is intended specifically to address the needs of downtown, though the implementation of policies identified by the Downtown Auburn Plan, many challenges related to public and private investment, development, and strategic planning have yet to be addressed as downtown has evolved.

The Auburn Downtown Plan is in the process of being updated and is expected to be considered for adoption in 2025, after this Periodic Comprehensive Plan update is adopted in 2024. The DUC zoning districts and DUC boundaries found in the Comprehensive Plan Land Use Map, related Zoning Map, and Implementing Zones is consistent with direction in the updated Auburn Downtown Plan.

LU-1576 Northeast Auburn Special Plan Area – Adopted under Ordinance No. 6183 on June 5, 2008. The Plan was prepared in fulfillment of the policies included in the Comprehensive Plan for the area between Auburn Way North and the Green River, south of 277th Street (52nd Street NE) and north of approximately 37th Street NE in the City of Auburn (Map No. 14.2). The planning area was narrowed to an area covering approximately 120 acres, north of 45th Street NW and between Auburn Way North and the existing I Street NE right-of-way. The Northeast Auburn/ Robertson Properties Special Area Plan focuses on proposed develop of the Auburn Gateway project area, a 60-acre group of properties owned or under consideration for purchase by Robertson Properties Group, owners of the Valley 6 Drive-In Theater. The plan calls for a mix of office, retail, and multifamily development under a new zoning designation (C-AG Auburn Gateway) for the central portion of this planning area, created to accommodate mixed use development. The plan calls for phased development in coordination with the provision of new roads, stormwater and other utilities, and flood management measures.

Impression Corridor Policies.

LU-1587 Create specific plans for each identified corridor, outlining development policies and regulations, necessary capital improvements, and implementation strategies. In the absence of any specific corridor plans, this section contains general policies that are to be applied within designated impression corridors.

LU-1598 Coordinate corridor planning, design, construction, and maintenance with other agencies, such as BNSF, the Muckleshoot Indian Reservation, and the Washington State Department of Transportation. Where one agency may more effectively manage the corridor, management or ownership consolidation is appropriate.

LU-16059 Promote the elimination or renovation of existing derelict or unmaintained structures, signs, fences, and properties along impression corridors through regulatory or enforcement mechanisms.

LU-1610 Work with private and public property owners to educate, create incentives, and enforce regulations that are intended to improve the overall appearance of identified corridors.

LU-1621 Emphasize the design, orientation, construction materials, landscaping, and site layout for development proposals of new and existing buildings along impression corridors. New construction and the renovation of existing buildings create important opportunities for enhancing the appearance of impression corridors.

LU-1632 Establish regulations that ensure coordinated, attractive commercial signage is of an appropriate size and quantity. Signage regulations along these corridors may be different than those in other areas.

LU-1643 Take advantage of opportunities to provide informational signs, wayfinding signs, and traffic control signs that are attractive, useful, and integrated into a larger citywide signage plan or policy.

LU-1654 Outdoor storage of materials, inventory, and other goods and off-street surface parking should be located at the rear of the property. If outdoor storage cannot be located in the rear of the property, then it should be screened from view from adjacent rights-of-way.

LU-1665 Design, construct, and enhance impression corridors to accommodate multimodal uses.

LU-1676 Design and construct vehicular access points in a manner that consolidates access points serving multiple uses.

LU-1687 Signage, landscaping, and monument features should be used to establish prominent access points.

LU-1698 Discourage aerial utilities.

LU-17069 Invest in impression corridors by acquiring rights-of-way, constructing and widening sidewalks, installing landscaping, building center medians, constructing parklets, providing street furniture, and constructing other improvements.

Gateway Policies

LU-1710 Prioritize by ranking all gateways and develop potential opportunities and designs for each location.

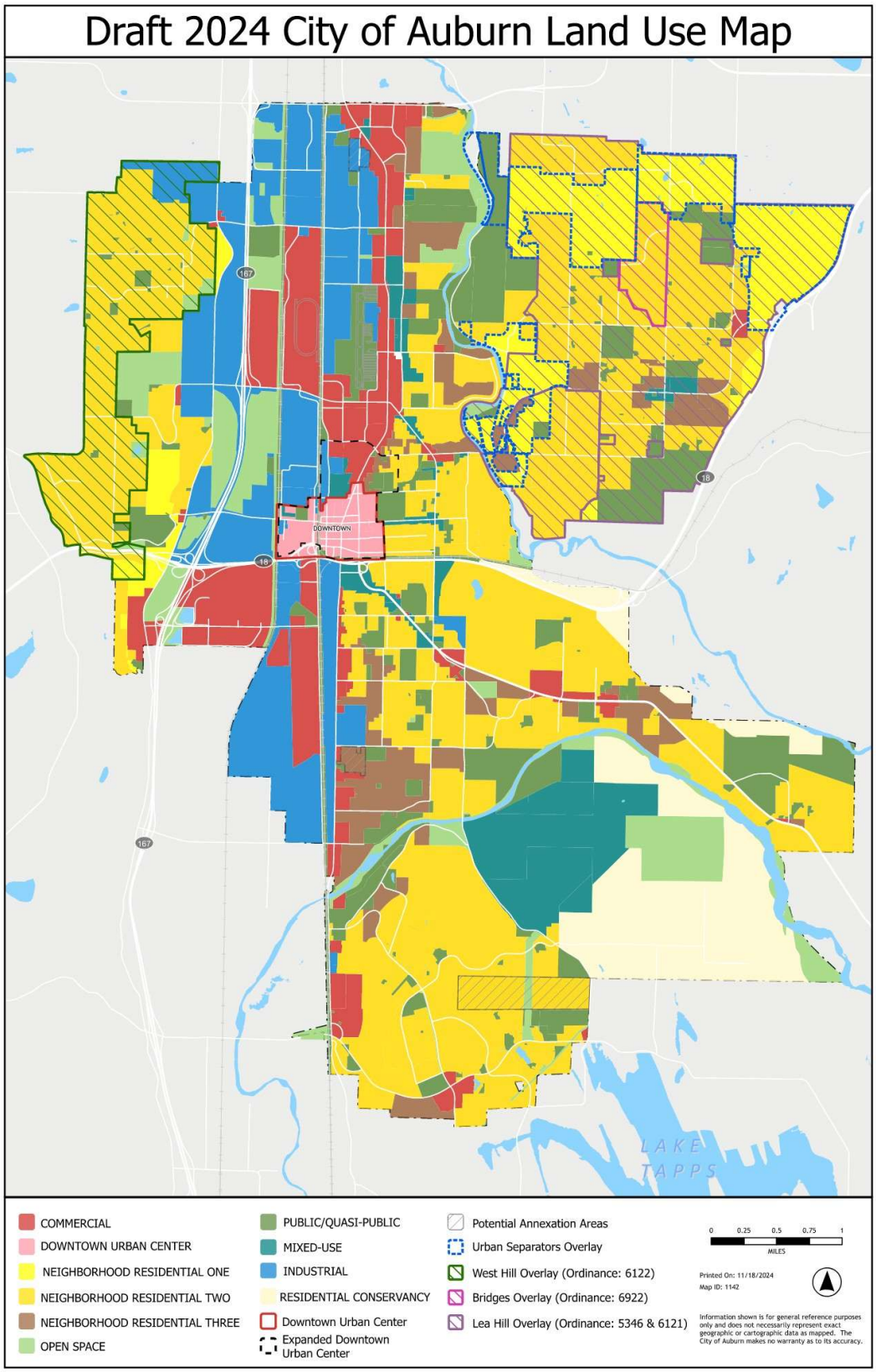
LU-1721 Develop land use regulations that incorporate gateway priorities and concepts into private development proposals that are located at identified gateways.

LU-1732 Coordinate with the Washington State Department of Transportation to understand options and implement actions at gateway location. Many of the gateway locations are within the WSDOT right-of-way.

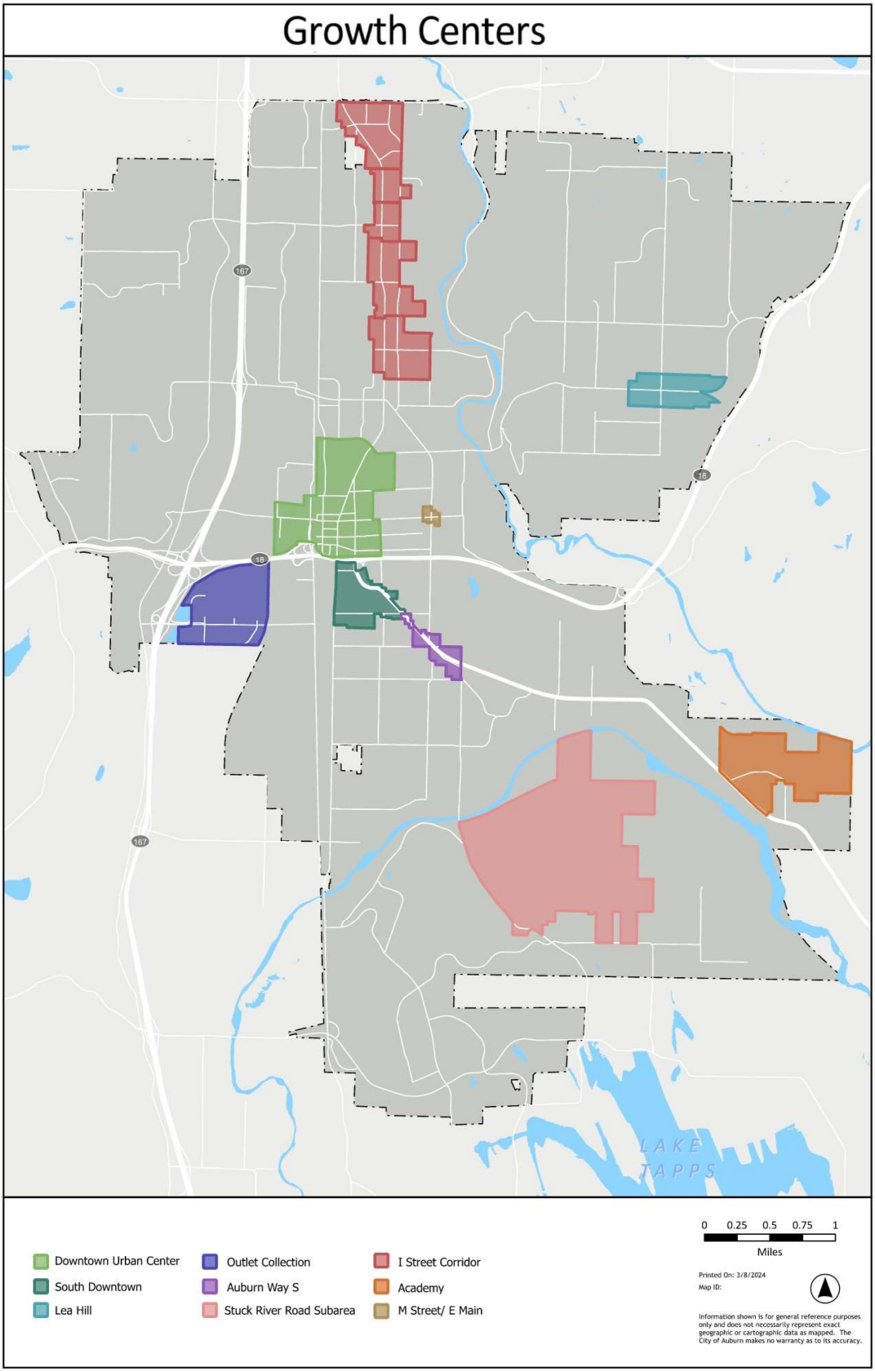
LU-1743 Develop design layouts for gateway locations. Designs will identify key areas that greet residents and visitors as they enter the city or downtown center, opportunities for signage and monument features, and landscaping.

LU-1754 Maintain established gateways.

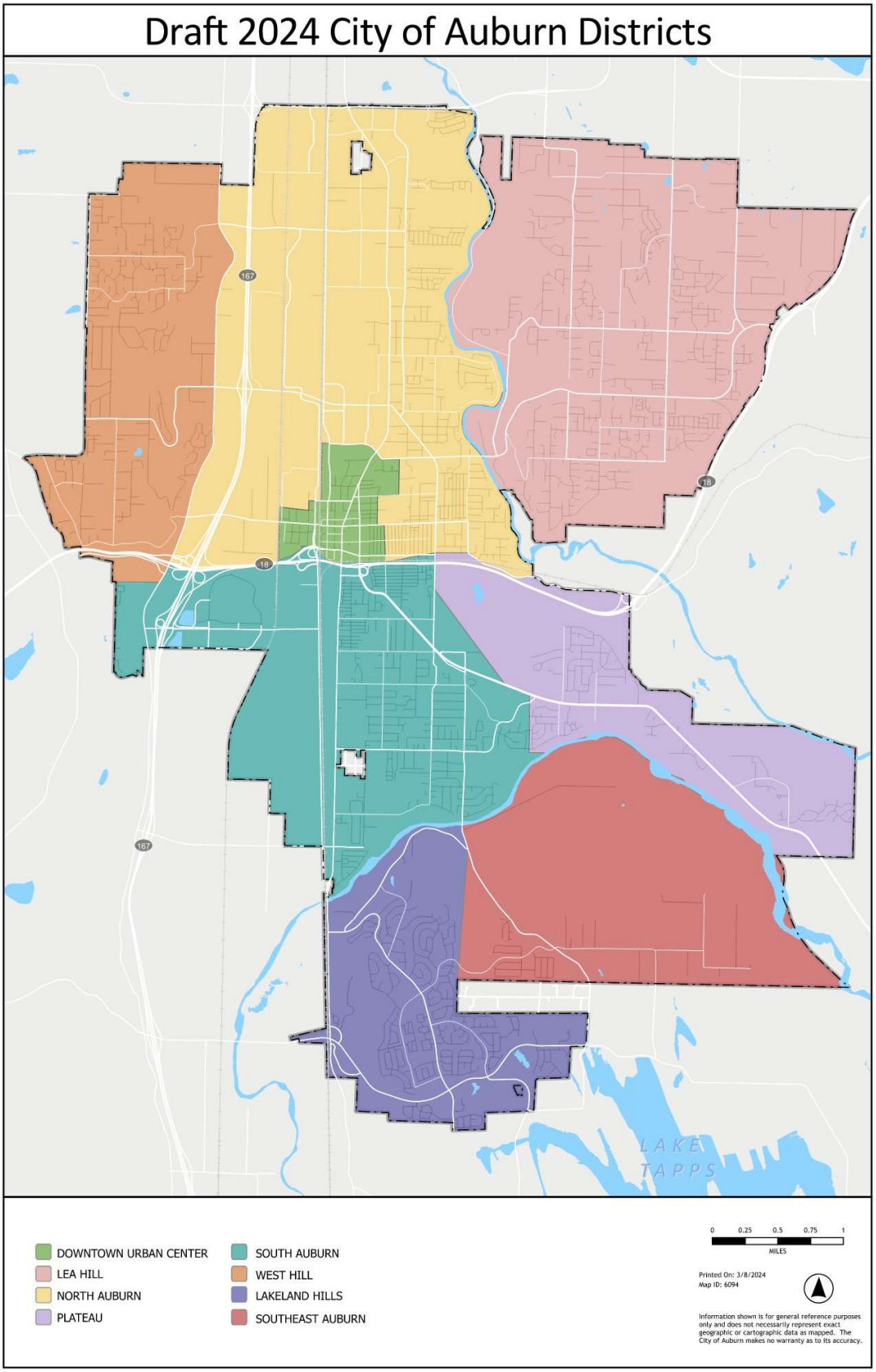
Map 1.3 - City of Auburn Comprehensive Land Use Map



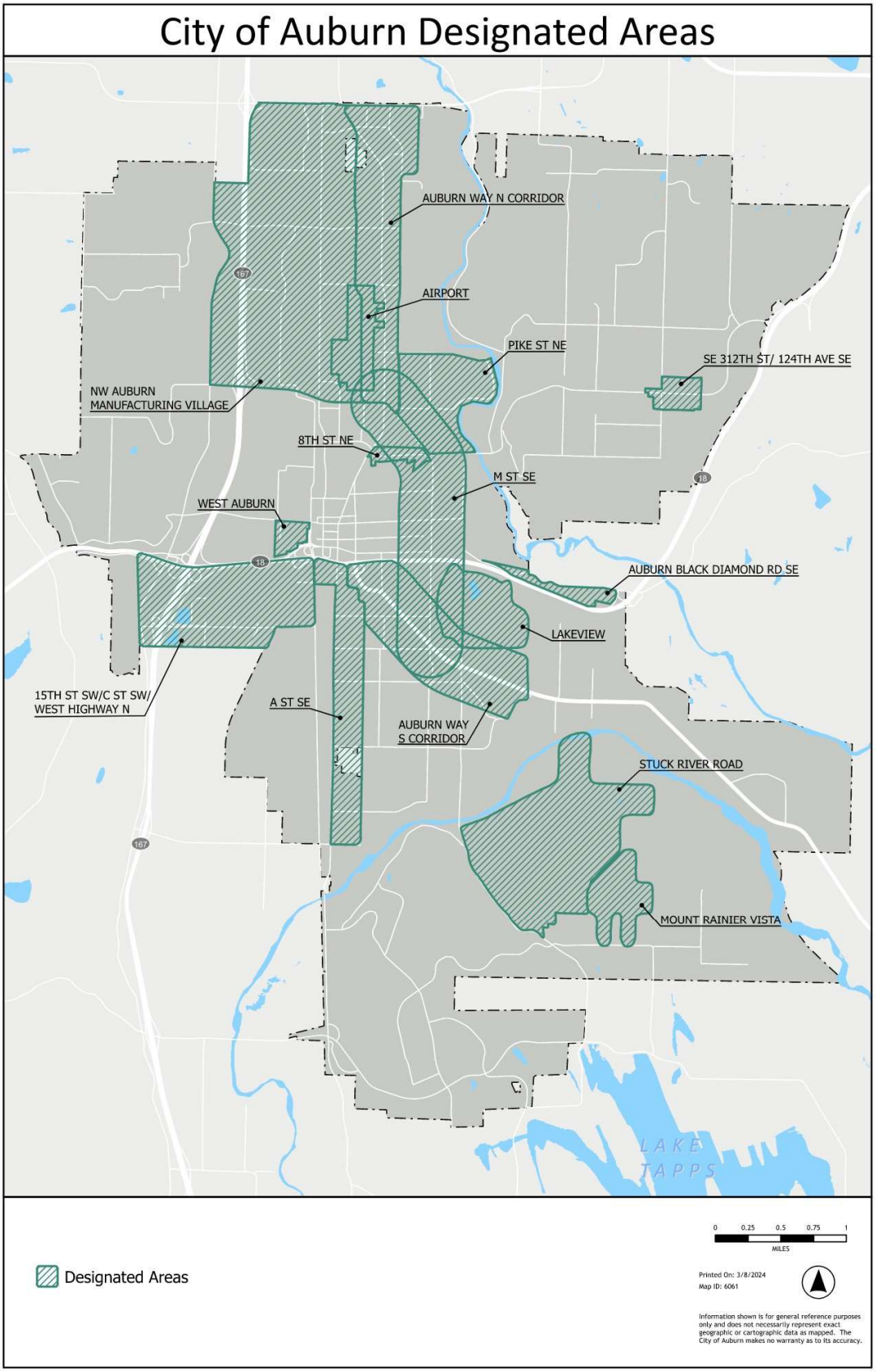
Map 1.4 - City of Auburn Comprehensive Growth Centers



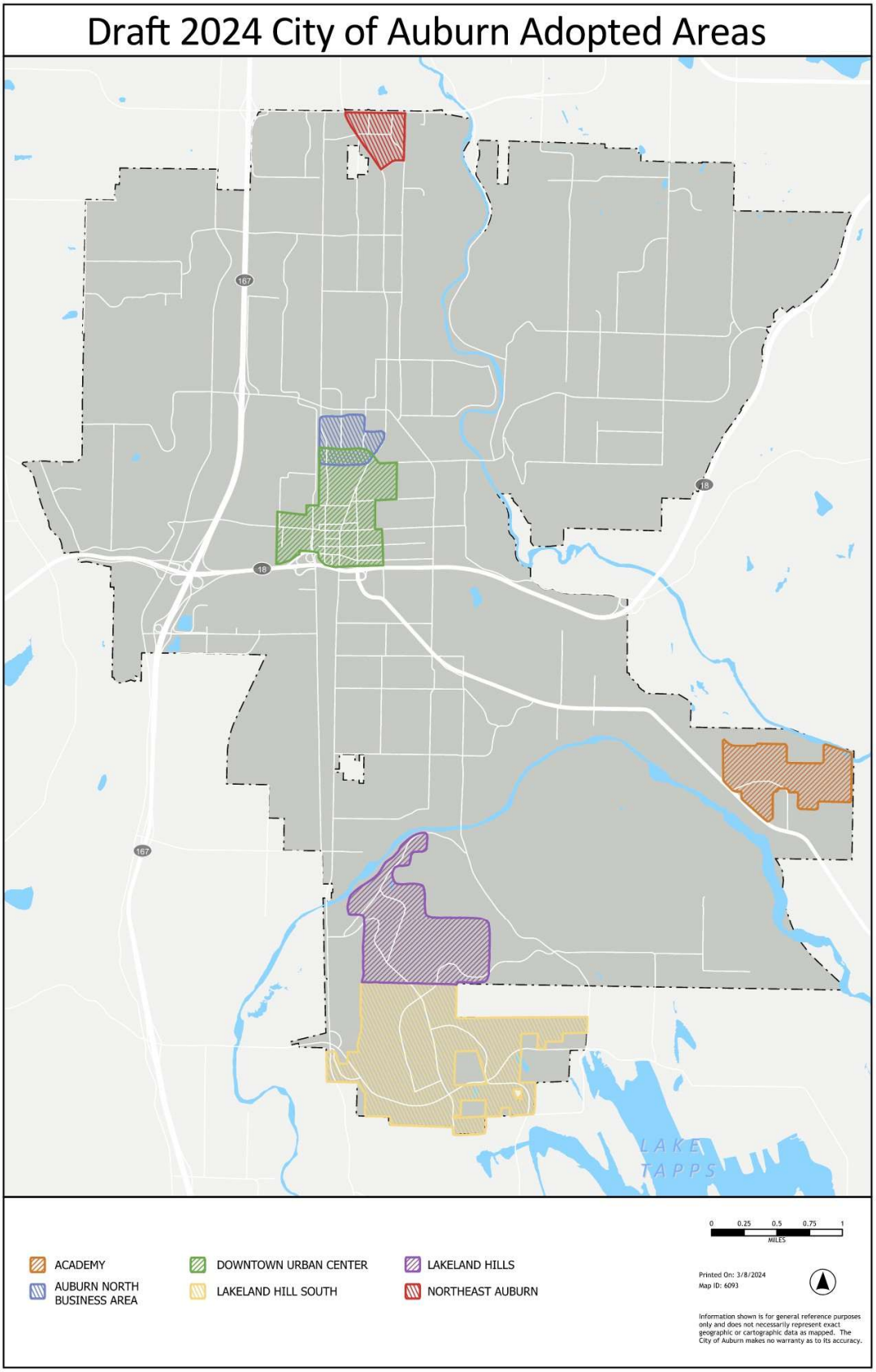
Map 1.5 - City of Auburn Districts Map



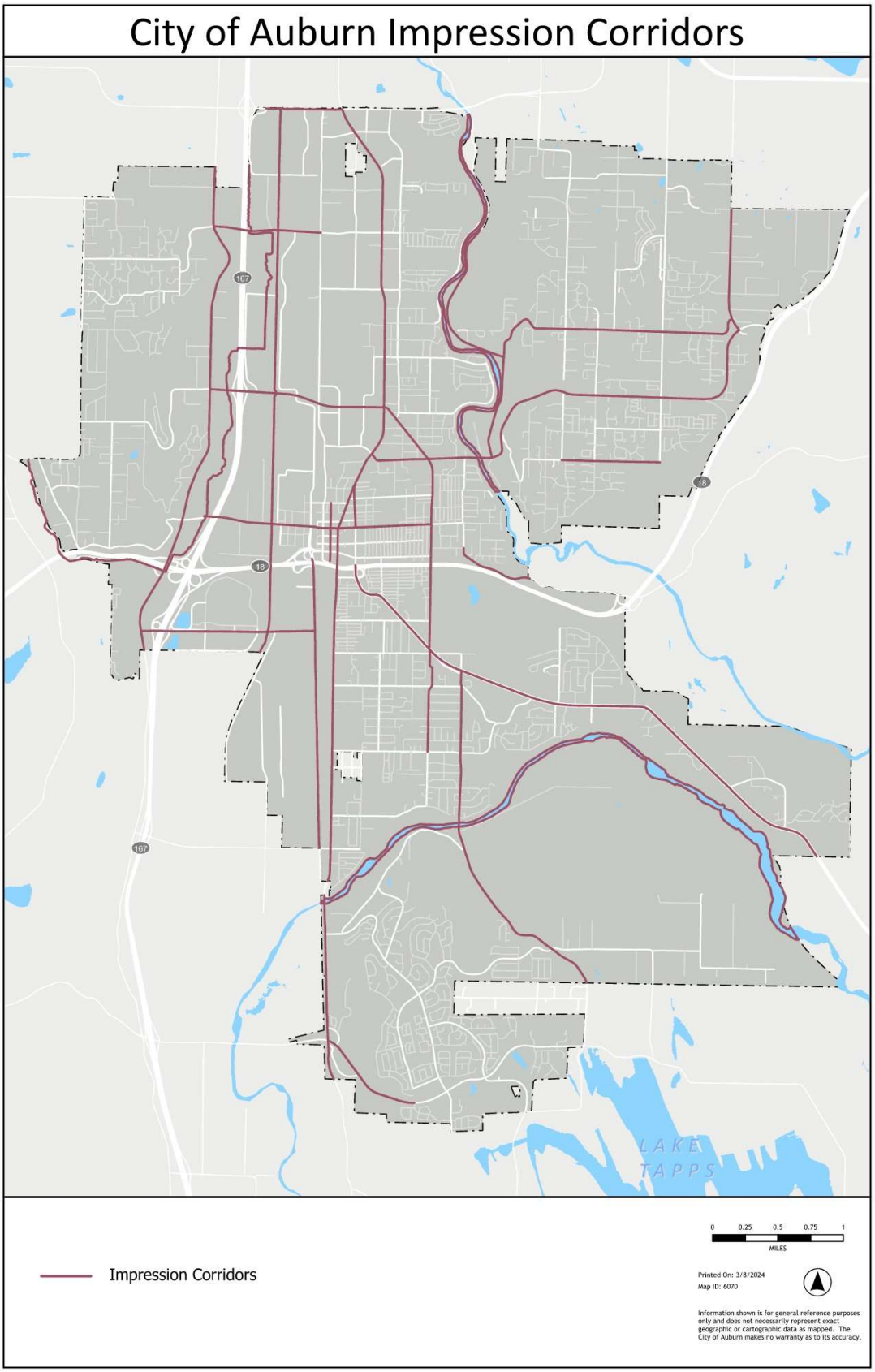
Map 1.6 - City of Auburn Designated Areas



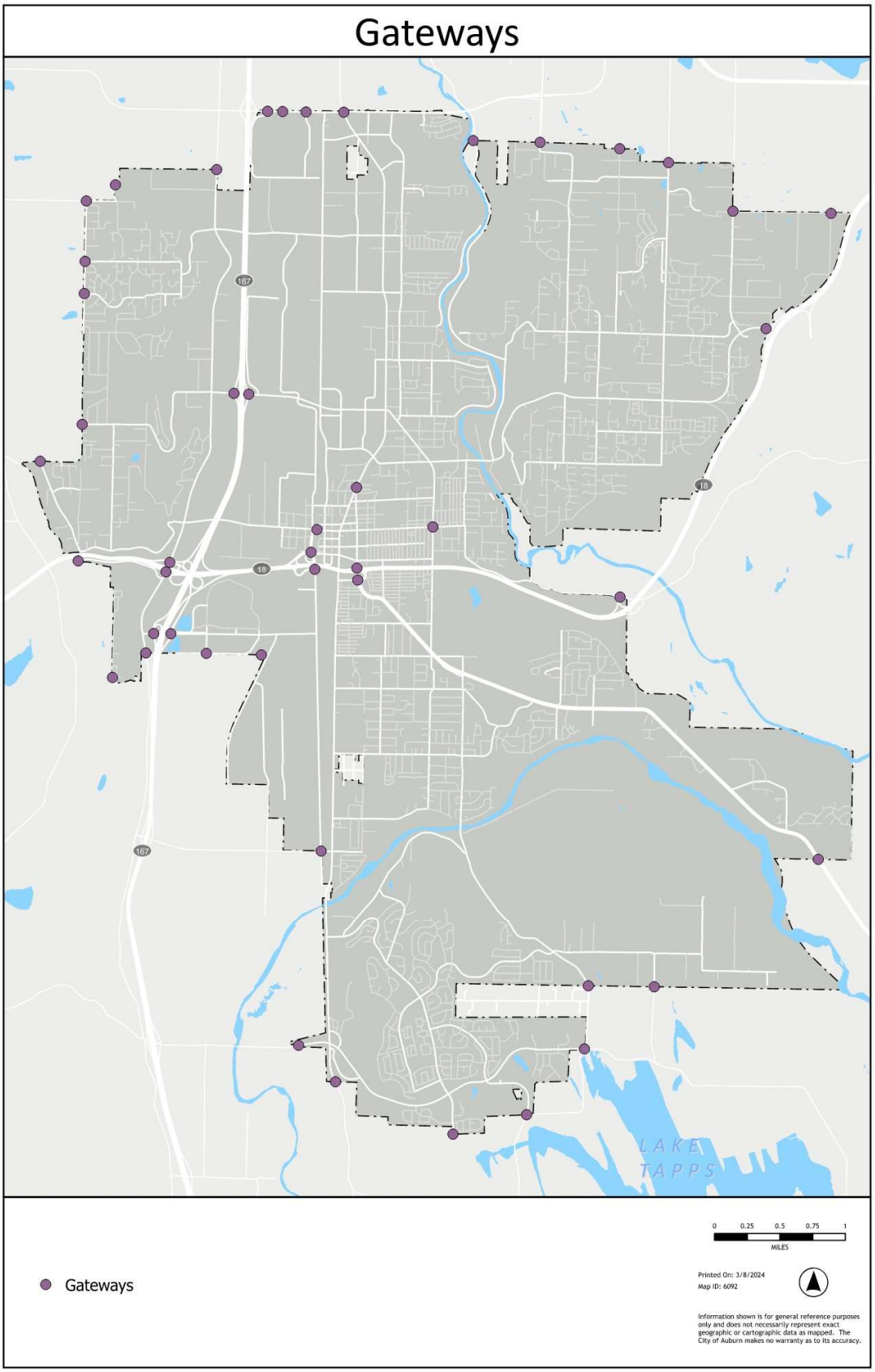
Map 1.7 - City of Auburn Adopted Areas



Map 1.8 - City of Auburn Impression Corridors



Map 1.9 - City of Auburn Gateways



City of Auburn

Housing Element

Table of Contents

Why is Housing Important to Auburn's Future? 1
Vision 1
Conditions and Trends 2
Affordability 2
Household Size 2
Housing Stock 3
Diversity ..... 6~~5~~
Trends ..... 7~~5~~
Racially Disparate Impacts ..... 8~~6~~
Displacement Risk ..... 8~~7~~
Planning Approach ..... 10~~9~~
Housing Choices for All ..... 11~~9~~
Housing and Employment Targets ..... 12~~9~~
Housing Need by Income Level ..... 13~~10~~
Housing Capacity in Future Land Use ..... 16~~12~~
Goals and Policies ..... 17~~13~~

Maps and Figures

Figure 1 - Housing Stock by Year Built ..... 5~~4~~
Figure 2. Race and Ethnicity in Auburn (2021) ..... 7~~5~~
Figure 3. Housing Objectives and Tools ..... 24~~20~~
~~Figure 1 - Housing Stock by Year Built ..... 4~~
~~Figure 2. Race and Ethnicity in Auburn (2021) ..... 5~~
~~Figure 3. Housing Objectives and Tools ..... 20~~
~~Figure 1 - Housing Stock by Year Built ..... 4~~
~~Figure 2. Race and Ethnicity in Auburn (2021) ..... 5~~
~~Figure 3. Housing Objectives and Tools ..... 20~~

Why is Housing Important to Auburn's Future?

The Housing Element can serve as a useful management tool to meet changing community needs for housing and address land use, economic development, transportation, environmental, and other concerns.

- A variety of housing choices can meet the needs of Auburn's current and future residents across all ages and affordability levels, help residents maintain and retain their homes, and promote services and amenities that improve neighborhood livability.
- Well-planned housing can support Auburn's economic goals by making it attractive and possible for residents to live near their jobs and by serving as a source of customers to support commercial districts.
- Housing in proximity to transit or mixed-use projects can help reduce the need for costly infrastructure such as roads and sewers, and reduce environmental impacts related to transportation. In addition, housing in proximity to a variety of transportation modes can increase a household's disposable income and savings by reducing household transportation costs.
- Well-designed and located housing can reduce energy and water consumption, and it can promote healthy lifestyles.

For these reasons, as well as others discussed or referenced in this Housing Element, an emphasis on encouraging Middle Housing, Mixed-Use, Transit-Oriented Development is core to planning for housing both in the near-term and by 2044.

Vision

Auburn is a place that those in our diverse community are proud to call home for a lifetime. Auburn provides opportunities for attainable housing in a variety of styles to meet the needs of all ages, abilities, cultures, and incomes. Our neighborhoods are safe and attractive, offer gathering places to meet friends and family, are connected by trails, streets, and transit, and are well kept. Our households are aware of the opportunities and services offered by governmental, educational, employment, health, and service providers that can enhance their quality of life. Volunteerism to improve our parks, schools, streets, and homes makes our neighborhoods and families stronger. Our quality housing and neighborhoods support our local economy.

Conditions and Trends

This section summarizes key findings of the Housing Needs and Characteristic Assessment (HNCA), which was updated in 2023. The HNCA provides a comprehensive picture of Auburn's housing conditions, needs, and regional context.

Analysis and data to support required analysis, policy choices, and to help illustrate the housing picture in Auburn was collected from a variety of sources. In 2021, the City of Auburn prepared and adopted a Housing Action Plan (HAP), funded by a state grant (authorized by HB 1923) for the purpose of identifying city strategies and recommendations to increase residential capacity. Findings in the HAP may vary slightly from those completed for the HNCA due to differences in horizon years. Both of these data sources, as well as others from the Washington State Department of Commerce, Puget Sound Regional Council, King and Pierce Counties, as well as other sources are referenced in the HNCA and this Housing Element. The Housing Needs and Characteristics Assessment can be found in Appendix X of the Comprehensive Plan.

The conditions and trends inform Housing Element goals and policies to address projected housing need in Auburn.

Affordability

The cost of housing in Auburn has substantially increased from 2010 to 2020. Between 2010 and 2020, the average monthly rent in Auburn increased by 49 percent ($459 per month). In this same period, the median sales price for a home increased by 88 percent ($195,550) based on 2017-2021 American Community Survey Data.

Of the approximate 15,507 renter households in Auburn, more than half (53 percent) are cost-burdened, and more than one-quarter (27 percent) are severely cost-burdened. About a quarter of households are considered unaffordable for renters and homeowners in Auburn according to state and federal affordability thresholds. While Auburn is more affordable than other cities in King County, housing is unaffordable for most households.

Household Size

Trends in household size indicate that Auburn will need to ensure the availability of a variety of housing types to match the needs of both small and large households. Auburn has both a larger household size (2.7) and a larger share of family households compared to King and Pierce Counties overall. Data on household composition indicates however, that 38% of the City's households are made up of single-person and two-person households without children, and Auburn also has a higher-than-average percentage (7%) of single-parent households compared to King and Pierce County (4% and 6%, respectively). Overall, 24% of Auburn

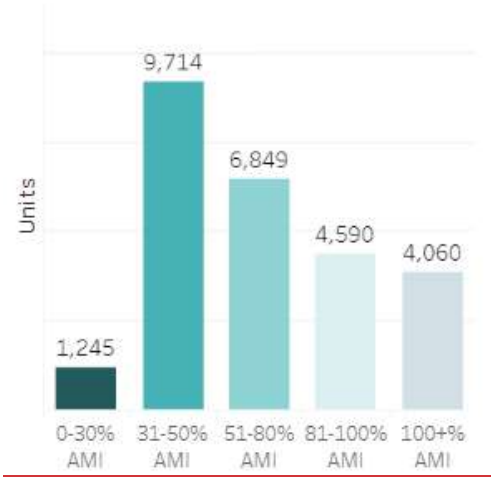
households are married with children, compared to 21% in King and Pierce Counties. The types of homes needed for smaller households may be different than those needed for larger households, putting an emphasis on planning for a variety of housing types and sizes in the future.

Housing Stock

Auburn's housing stock is older than average, and much of its rental housing stock is in fair or poor condition. Though housing is affordable in Auburn, the City could lose some of its most affordable rental housing as structures approach the end of their useful lives. About half of Auburn's housing stock is 2-3-bedroom units, accounting for 56.7% of housing units.

Most of the existing housing stock in Auburn accommodates the 31-50% AMI affordability levels, as shown in Figure 2. Preservation of this housing stock is discussed in policy H-23 and accommodating the city's share of housing growth at a range of affordability levels is addressed in policy H-32.

Figure 12. Total Existing Housing Units



Source: King County, CHAS 2015-2019

The city aims to preserve housing stock and create more opportunities for the creation of new homes through coordinated collaboration with regional organization such as South King County Housing and Homelessness Partners (SKHHP), Auburn's Housing Repair Program, and various Community Block Grant programs. Polices for the preservation and creation of homes is addressed in policies in this Element.

Existing Partnerships and Strategies for Housing Needs

To align with countywide goals and polices for meeting housing needs and eliminating disparities Auburn is a member of the South King Housing and Homeless Partners (SKHHP). SKHHP is a joint board formed by an interlocal agreement between the jurisdictions of Auburn, Burien, Covington, Des Moines, Federal Way, Kent, Maple Valley, Normandy Park, Renton, SeaTac, Tukwila, and King County. Through SKHHP, South King County jurisdictions can take a coordinated and comprehensive approach to increasing housing stability and producing and preserving quality affordable housing in South King County. Auburn pools SHB 1406 funds with SKHHP for the development and preservation of affordable housing in South King County.

In addition, the City of Auburn administers the Housing Repair Program within the Building Division of the Department of Community Development. This program provides eligible homeowners grants up to $9,999 for emergency minor home repairs. Leaky roofs, unsafe stairs, floor repair, access for individuals with disabilities, and heating system repairs are examples of work funded with Minor Housing Repair grants. The Housing Repair program helps Auburn's low-income homeowners preserve and stay in safe and affordable housing.

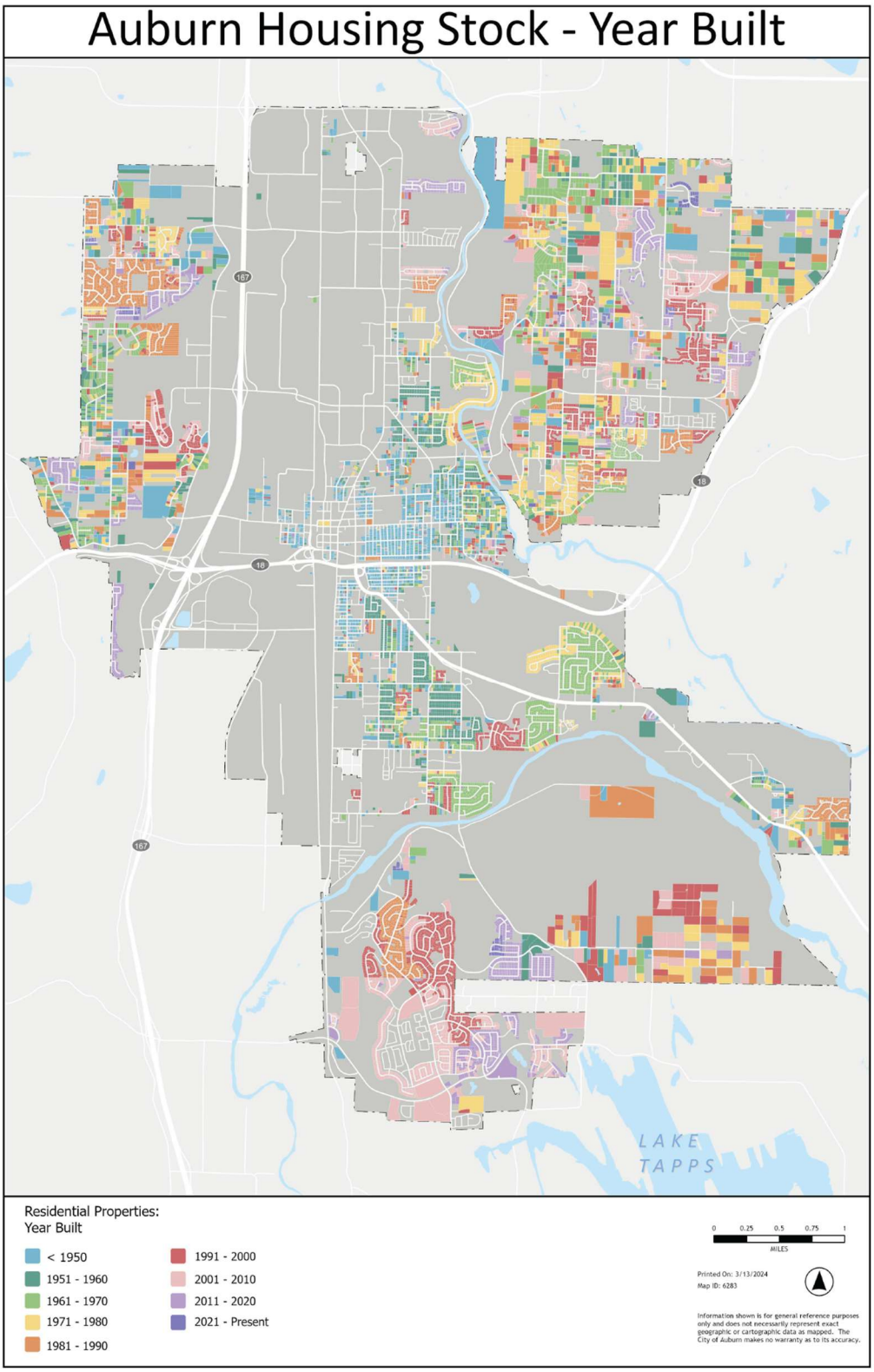


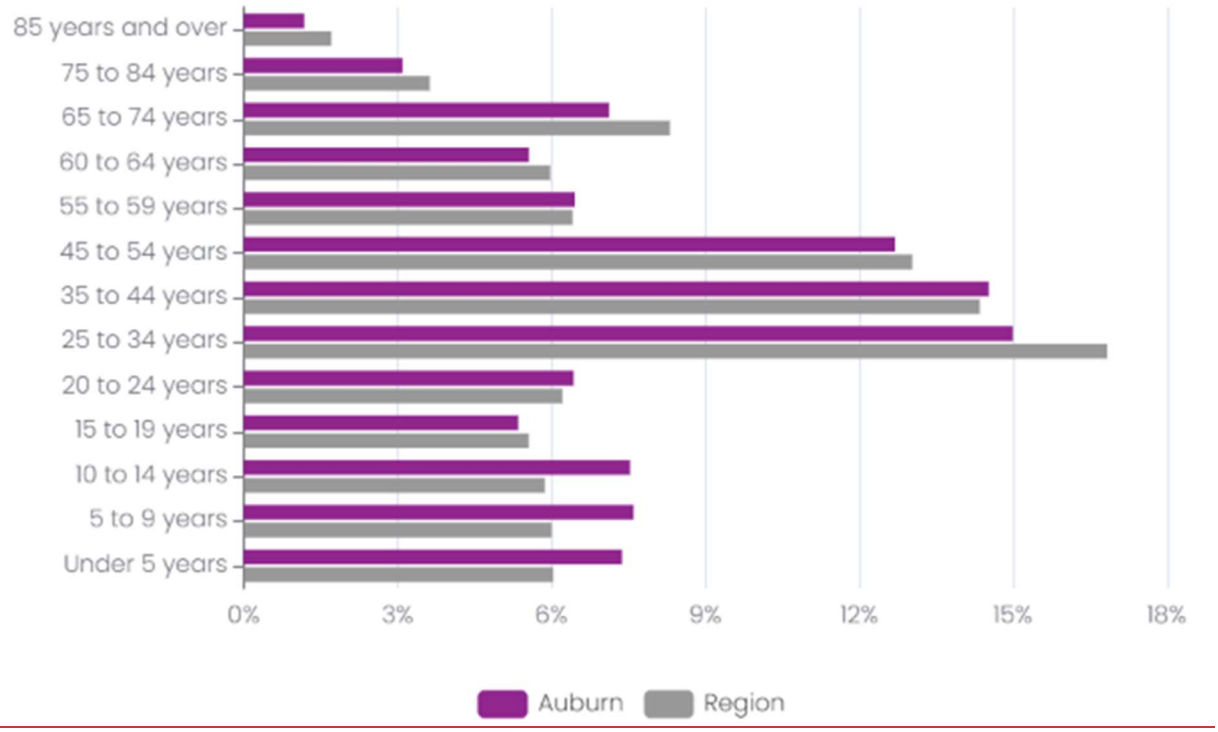
Figure 21 - Housing Stock by Year Built

Diversity

Auburn is diverse. Approximately 25% of Auburn residents speak a language other than English. Auburn's population generally follows regional trends for age distribution. Most of the city's population is between 25-54 years of age. Auburn's racial and ethnic makeup is more diverse than that of King County and Washington as a whole, with 48% of residents identifying as Black, Indigenous, or People of Color (BIPOC), compared with 42% in King County and 34% statewide.

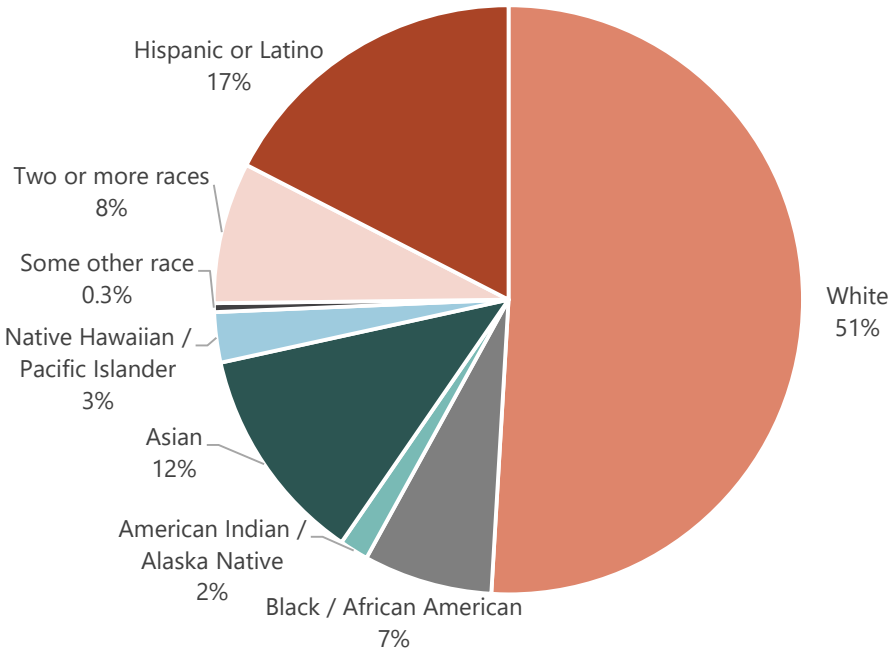
Auburn's diverse communities may have different housing, neighborhood amenities, and service needs. For example, outreach conducted with the Hispanic community has shown that most would recommend Auburn as a place to live for family and friends, and though residents wanted their children to grow up and remain in Auburn, they desired improved security and traffic calming. Outreach participants were interested in helping to improve their neighborhood and in volunteering.

Figure 32. Population by Age in Auburn and Region



Source: 2016-2020 ACS Data

Figure ~~4~~2. Race and Ethnicity in Auburn (2021)



Source: 2020 ACS 5-Year Estimates, Table DP05

Trends

Overall, Auburn's housing market is characterized by strong growth in both the homeownership and multifamily rental markets. These trends are important to consider as the City works to encourage development to reach the 10,429 units needed by 2040. Key findings include the following:

- Multifamily rents in Auburn increased 47 percent from $1.14 per square foot in 2010 to $1.68 in 2020 Q3. Auburn did not see a dip in rents in 2011-2013 like many of its peer cities. In addition, thus far through 2020, multifamily rents are continuing to grow in Auburn, approaching levels in Kent and Tukwila which have started to level off.
- Auburn's rental vacancy rates are low, indicating continued demand for housing. Multifamily vacancy rates in Auburn increased by 2.7 percentage points from 8.3 percent in 2008 to 11.0 percent in 2020 Q3, spurred by the recent Copper Gate affordable apartment complex, which added 500 units to Auburn's housing market in late 2020. Although this increase in vacancy is reflected by an influx of new multifamily units that have yet to be rented, the mostly positive net absorption in the City from 2008 to 2019 indicates demand for multifamily housing is strong.
- About 60 percent of the new units developed in Auburn between 2010 and 2018 are for homeownership, while only about 40 percent are intended as

rentals. These ownership trends, coupled with strong price growth, indicate strength in the market.

- Auburn has not been producing enough housing to meet its demand from household formation (net in-migration and people forming new households, such as moving out of a family home). Over the 2010-2019 time period, only 7.8 housing units (of all types and sizes) were constructed for every 10 new households that formed. This translates into housing underproduction and is a contributor to Auburn's rent and price increases.
- An additional 12,112 housing units are needed in Auburn citywide by 2044 to accommodate growth.

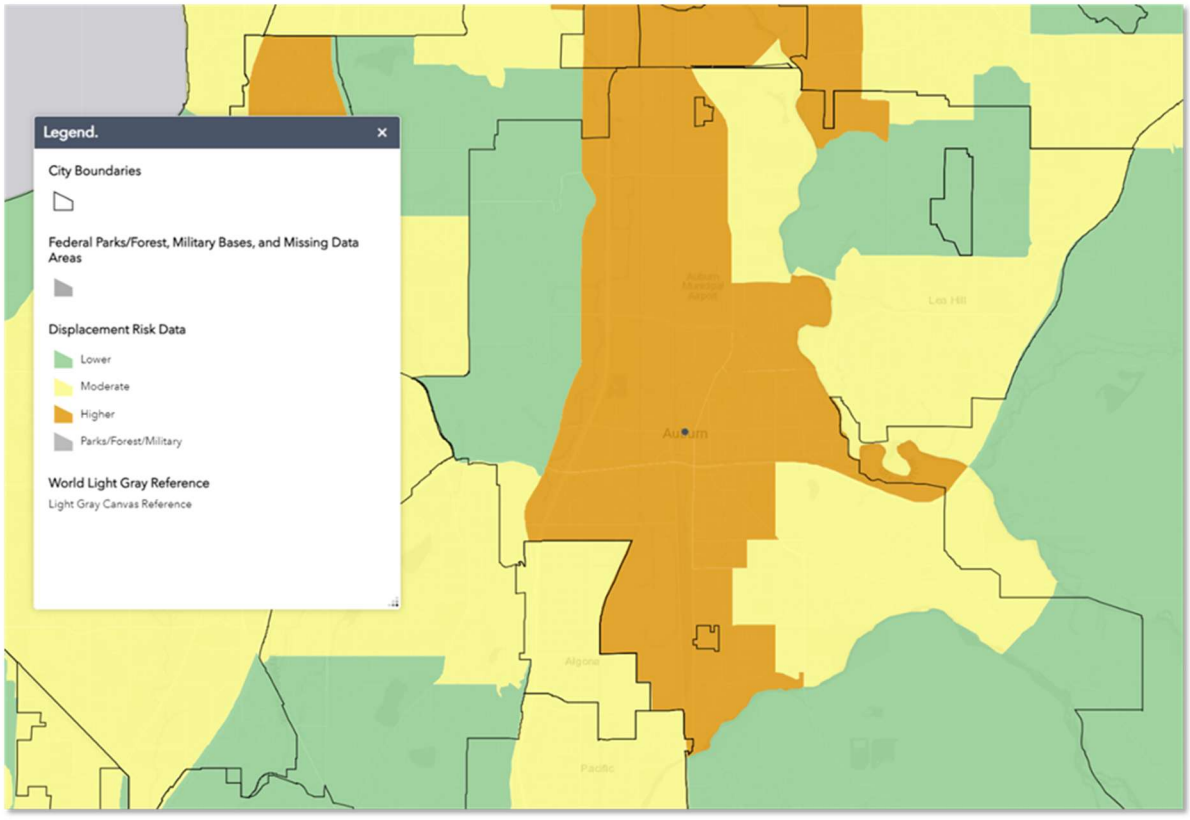
Racially Disparate Impacts

The Housing Element and Housing Needs and Characteristics Assessment (Appendix A) identifies data and strategies to undo local policies and regulations that result in racially disparate impacts. ~~As described in Appendix A - Housing Needs and Characteristics Assessment and earlier in this Element,~~ Racially Disparate Impacts were identified in Auburn such as potential for displacement due to the percentage of residents, especially renters, who are cost burdened and at high risk of displacement if market forces shift and historical records of restrictive housing covenants.

Considerations for displacement are also addressed in the Land Use Element when developing future land use goals. Where appropriate, goals, policies, actions, and overall strategies have been created or revised to address these issues as a first step towards undoing racially disparate impacts. This includes refinements to goals and policies to preserve existing housing stock, create opportunities for increased capacity for the development of multi-family, mixed-use, and middle housing throughout the city to accommodate a range of affordability levels, and regional coordination to address housing issues.

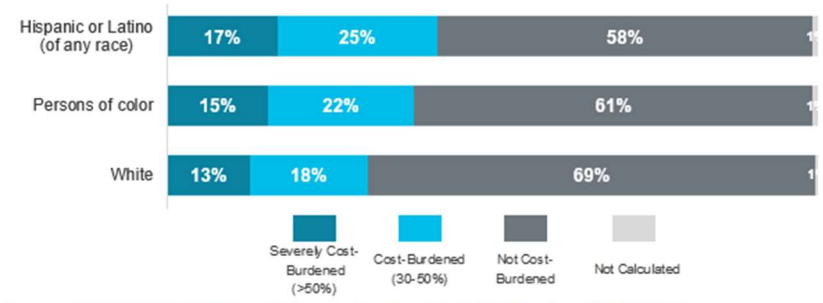
Displacement Risk

The highest displacement risk in Auburn is the few housing units located in southwest Auburn where mostly industrial and commercial is located. In particular, a mobile home park located in this block group is particularly vulnerable to displacement. Downtown Auburn is also susceptible to moderate to high displacement risk. The downtown area currently contains 426 subsidized affordable units in several developments, slightly more than a quarter of the housing units in the area. A full analysis is located in the Housing Needs and Characteristics Assessment.

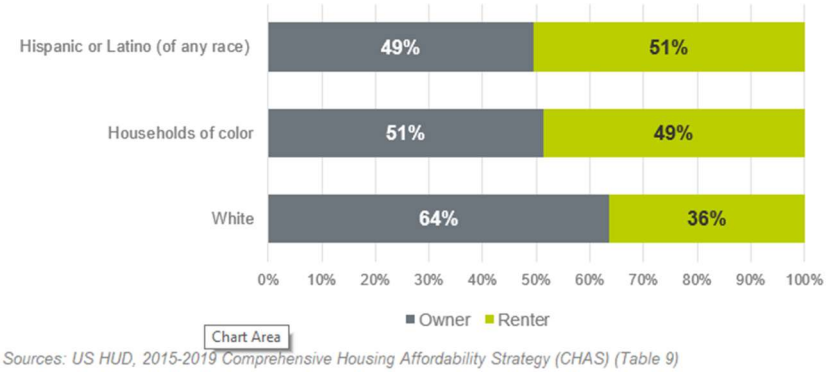


Source: ~~Washington State Department of Commerce Displacement Risk Map~~Puget Sound

As part of an evaluation of racially disparate impacts, the city identifies housing costs and cost-burdened households as especially vulnerable to displacement. In Auburn, 42 percent of the community identifying as Hispanic or Latino (of any race) is either cost-burdened or severely cost-burdened (<50% AMI) and persons of color are 37 percent cost-burdened or severely cost-burdened, compared to 31 percent identifying as white. These communities are about 50 percent renters and 50 percent homeowners, while those identifying as white are 64 percent homeowners in Auburn. The gap in homeownership is addressed through thoughtful and effective policy including increasing affordable ownership opportunities by encouraging diverse housing stock.

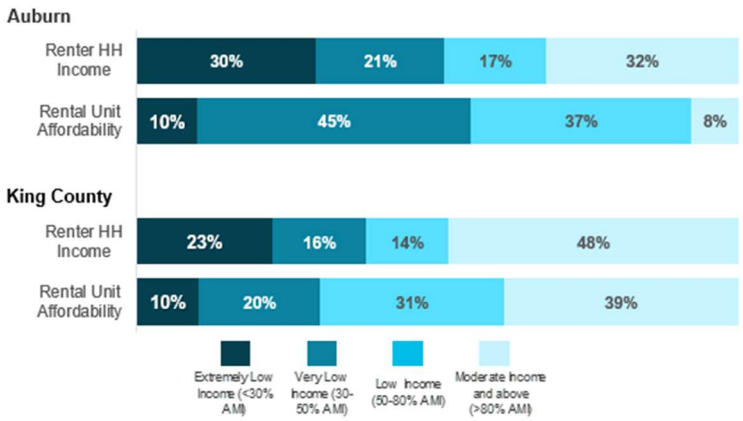


Source: US HUD, 2015-2019 Comprehensive Housing Affordability Strategy (CHAS) (Table 9); Washington Department of Commerce, 2023



Sources: US HUD, 2015-2019 Comprehensive Housing Affordability Strategy (CHAS) (Table 9)

Overall, the Auburn community spends a greater amount of income on rental housing costs compared to King County, with 51 percent of renters in the very low or extremely low-income bands (<50% AMI) in Auburn and 39 percent in King County. While Auburn has a naturally occurring affordable housing stock of 55 percent serving very-low and extremely-low incomes, this means there is only 11 percent additional capacity available to serve extremely-low and very low-incomes. If housing cost trends in King County continue, and Auburn housing prices in Auburn continue to rise, the amount of naturally affordable housing is expected to decrease. Again, preservation strategies and housing policies supporting a range of development types is key while encouraging housing growth.



Sources: US HUD, 2015-2019 Comprehensive Housing Affordability Strategy (CHAS) (Table 8)

Historically Restrictive Housing

The lands of Auburn have been historically utilized by many different groups of people. Year 1920 census records showed that Japanese farmers operated 25,320 acres and 699 farms. This number dropped to 7,030 acres and 246 farms in 1925 after the Alien Land Law of 1921 restricted "non-citizen aliens from sharecropping, leasing or renting land." (It is important to note due to a series of Congress legislation (Naturalization Act of 1870, Chinese Exclusion Act of 1882, and The Immigrant Act of 1924) citizenship was a closed door for persons of Asian descent.

When considering historic and restrictive land use in Auburn, it is important to consider the official record keeping is very slim regarding restrictions as it wasn't until 1920 when Auburn's population rose above 2,500 (3,163) and was more detailed in its recording of population ratios in the census. (census 1920 vol 3 table 11, page 1092). 3096 persons of this population were recorded as white (Native white, foreign or mixed parentage, or foreign-born), with 67 persons being classified as non-white. As Auburn has grown certain covenants have been placed on plat maps and deeds within the county, with 759 recorded parcels containing/that have contained this restrictive language. These have been recorded on Auburn parcels from 1900 up to 1959, with many plat maps still containing the language. These restrictions were largely put in place by the developers, with many of them (464 or 61.1%) being placed by the Hillman Investment company, or Clarence Dayton Hillman.

These covenants were developed to only allow "members of the Caucasian race" the ability to purchase and use the land. There are different variations and verbiage depending on the plat or deed, but they all come to the same end, only white persons were eligible to own these properties. These restrictions shaped the sections of the city to where they are today, the growth in culture and development was stunted. The policies in this Housing Element create housing opportunities for all members of the community in an effort to undo historically documented racially disparate impacts and look forward to a more equitable Auburn.

Planning Approach

Auburn's preferred Comprehensive Plan Land Use Map sufficiently addresses housing needs for all economic segments of the Auburn community. The Comprehensive Land Use map considers adequate capacity for housing and employment targets and housing needs by income level through a Centers approach. Centers in Auburn are high-intensity and density cores characterized as primarily as mixed-use areas served by Middle Housing and commercial development. Most new housing is planned to be built in the neighborhood centers and downtown. More information on the Comprehensive Land Use Map and future land uses can be found in the Land Use Element, Chapter 1 of the Comprehensive Plan.

Housing Choices for All

Central to planning for future housing is providing a range of housing types to choose from which facilitates home ownership across a wide range of households and affordability levels. Consideration "Middle Housing" is key to increasing housing types in Auburn. Middle Housing, typically attached to one-another, provide options to increase residential density in existing residential neighborhoods and are designed at the scale and overall aesthetic of these areas. In 2023, the Washington State Legislature passed HB 1110 which requires

jurisdictions to incorporate Middle Housing into Comprehensive Plans and related development regulations. This Housing Element, and updated city code, fully complies with HB 1110 requirements by allowing for townhomes, duplexes, triplexes, fourplexes, fiveplexes, sixplexes, stacked flats, cottage housing, courtyard housing in residential zones throughout the city. In addition, the City also acknowledges Accessory Dwelling Units (or ADUs) as an important piece of Middle Housing , complying with HB 1337 legislation allowing ADUs in residential zones throughout the City. Middle Housing, in combination with Mixed-Use Development, are critical development types that enable the City to meet future housing needs and provide a variety of housing options for current and future residents.

Housing and Employment Targets

Based on legislative changes, communities must plan for housing and employment targets allocated by Countywide Planning Policies (CPP). These growth targets are consistent with PSRC Vision 2025 requirements and originate at the state level. King County CPP, and the related 2021 King County Urban Growth Capacity Report, identifies targets of 12,000 net new residential units and 19,520 net new jobs between 2019-2044. Pierce County CPP identifies 112 net new residential units and 0 net new jobs targets by 2044. The Comprehensive Plan Land Use and Zoning Maps and policies adopted in the Comprehensive Plan demonstrate



adequate capacity and strategies in order to accommodate these housing and employment targets.

Housing Need by Income Level

The Housing Needs and Characteristics Assessment projects housing need by income level using Area Median Income (AMI) bands. This assessment, as required by the Department of Commerce in coordination with counties, identifies the number of units necessary to serve varying AMI levels and for Emergency Housing. These figures were provided by both King and Pierce Counties using their own methodologies. The full methodology for the projections is provided in the assessment. As shown in Table 1~~FIGURE X~~, Auburn has a need for housing primarily at the 80% or greater AMI and for less than 30% AMI. Policies in this Element describe how Auburn plans to address these housing needs.

Table 1. Housing Need by Income and County

Middle Housing: Example of a Duplex from Auburn Housing Action Plan Implementation project, 2023

County		Total	0-30%		>30% to 50%	>50% to 80%	>80% to 100%	>100% to 120%	>120%	Net New Emergency Housing Needs
			Non-PSH	PSH						
King	Supply (2019)	28,049	1,076	237	8,029	8,075	4,427	3,302	2,903	58
	Net New Need (2044)	12,000	1,543	812	309	616	1,146	1,299	6,275	2,293
Pierce	Supply (2019)	3,963	0	33	134	493	1,141	680	1,482	8
	Net New Need (2044)	112	14	20	21	16	7	6	27	7
Total	Net New Need (2044)	12,112	1,557	892	330	632	1,153	1,235	6,302	2,300

Source: King County Ordinance 19660, Countywide Planning Policies; Pierce County Ordinance 2023-22s, Countywide Planning Policies

	Jurisdictional Net New Permanent Housing Units Needed, 2019-2044								Jurisdictional Net New Emergency Housing Needs
	Total	0 to ≤30%		>30 to ≤50%	>50 to ≤80%	>80 to ≤100%	>100 to ≤120%	>120%	
		Non-PSH	PSH						
Auburn	12,000	1,543	812	309	616	1,146	1,299	6,275	2,293

~~*Source: King County Ordinance 19660, Countywide Planning Policies*~~

		Total	Permanent Housing Needs by Income Level (% of Area Median Income)							Emergency Housing Needs (Beds)
			0-30% Non-PSH	0-30% PSH *	>30-50%	>50-80%	>80-100%	>100-120%	>120%	
Unincorporated Pierce County	Est. Supply (2020)	152,322	2,134	292	17,603	42,774	32,502	21,957	35,060	0
	Allocation (2020-2044)	32,048	4,140	5,594	5,943	4,697	2,022	1,833	7,817	1,961
Auburn	Est. Supply (2020)	3,963	0	33	134	493	1,141	680	1,482	8
	Allocation (2020-2044)	112	14	20	21	16	7	6	27	7

~~*Source: Pierce County Ordinance 2023-22s, Countywide Planning Policies*~~

The overall housing need by 2044 in Auburn is 9,722 additional permanent units between 30% and greater than 125% AMI range, and 2,300 additional temporary/emergency housing beds totaling 12,112 new housing units.

Barriers that limit the development of affordable housing~~, including emergency housing,~~ such as gaps in local funding and incompatible development regulations have been addressed in this Element and in Auburn City Code as part of the comprehensive plan update. Strategies to overcome these barriers include allowing appropriate housing types to serve various income levels, permitting a range of development serving all income levels in various zones, and development-related bonuses related to inclusion of affordable housing~~ are included in this Element and in Auburn City Code.~~ The Housing Needs by Average Median Income (AMI) analysis discussed in the next section describes how the city is ensuring adequate zoned capacity and development types to accommodate a range of affordable housing.

~~*Supportive and Emergency Housing*~~*STEP Housing*

~~Supportive housing is defined by Washington State in RCW 35.70A.30 as either Permanent Supportive Housing (PSH) or Non-Permanent Supportive Housing(non-PSH~~STEP housing (previously "supportive housing", as defined HB 1220, includes emergency shelters, transitional housing, emergency housing, and permanent supportive housing~~)~~. Households earning below 30% of the AMI are considered extremely low income and severely cost-burdened. In Auburn by 2044 the city needs an additional 2,389 supportive housing units for households earning below 30% AMI.

Permanent supportive housing includes supportive services such as health care and housing assistance. Auburn needs 812 additional permanent supportive housing units by 2044 in King County (King County CPPs) and another 20 in Pierce County (Pierce County CPPs).

Non-permanent supportive housing is to provide temporary or transitional shelter and supportive services to those struggling to stay housed. Auburn needs 1,543 additional non-permanent supportive housing units by 2044 in King County (King County CPPs) and 14 in Pierce County (Pierce County CPPs). Auburn also has a severe shortage of emergency housing beds compared to the projected need in

2044. As of 2020, there are 66 emergency/temporary housing beds citywide and 2,300 are needed by 2044 (King and Pierce CPPs). An additional 115 beds a year will need to be built between 2024-2044.

Housing Needs by AMI Capacity Analysis

In addition to meeting the residential and employment capacity targets through zoning and policy decisions, the city meets the aggregate King and Pierce County housing needs for income level groups. The only exception is the >120% Average Median Income (AMI) category, which includes primarily low-density housing in the R-1 and RC zones. However, this AMI category is not required to be met under HB 1220 requirements as high-income earners are represented in this group and can also purchase moderate density housing options as well.

Table 221. Housing Capacity by Income Level Future Surplus or Deficit

Income Level (% AMI)	Zone Categories Servicing these Needs	Aggregated Housing Needs	Capacity prior to Zoning Adjustment	Post-Rezone Capacity	Capacity surplus or deficit
King County					
0-30% PSH 0-30% Other	High Density-Mixed Use	2,389	566	3,004	**615**
>30-50% >50-80%	High-Density, ADU	962	1,532	4,823	**3,861**
>80-100% >100-120%	Moderate Density, ADU	2,458	5,058	36,39837,379	**33,94035,033**
>120%	Low-Density, ADU	6,303	3487,504	2,2171,846	***(4,086457)***
Pierce County					
>80-100%	Moderate Density, ADU	112	100	500	***388***
Aggregated Total	-	12,112	7,504	46,070	*35,810*

~~In addition to meeting the residential and employment capacity targets through zoning and policy decisions, the city meets the aggregate King and Pierce County housing needs for income level groups. The only exception is the >120% Average Median Income (AMI) category, which includes primarily low-density housing in the R-1 and RC zones. However, this AMI category is not required to be met under HB 1220 requirements as high-income earners are represented in this group and can also purchase moderate density housing options as well.~~ In Pierce County, the City's primary residential zone is R-2 Residential Moderate which for purposes of this capacity analysis aligns with the 80-120% AMI range. This zone can adequately accommodate the total housing need of 112, however AMI below 80% is not

accounted for in this analysis. As indicated earlier, the housing target for the Pierce County portion of Auburn is only 112 housing units and as a result the city does not intend to rezone small areas of land in order to satisfy AMI requirements since actual development is unpredictable. The R-2 Residential Moderate zone can accommodate middle housing, single unit detached housing, and ADUs that can realistically serve a range of incomes, and the city will continue to provide flexibility in the development types allowed in this part of the city to best accommodate the full range of AMI levels.

An estimated 1,852 new Accessory Dwelling Units (ADUs) are accounted for prior to rezoning, as these developments are currently allowed in various zones are expected to occur naturally over the next 20-years. In total, 80% of new ADUs are planned for in the 80-120% AMI range, and 20% in the greater than 120% AMI range. ADUs are expected primarily in the low-density and moderate-density land uses found in throughout the city.

Housing Capacity in Future Land Use

Total Housing Capacity

Residential capacity by zone is based primarily on the assumptions outlined Buildable Lands Report process in 2021, updates to reflect changes to zoning and density assumptions since that time. Downtown Urban Center mixed-use development assumes a distribution of 75% residential and 25% commercial, whereas the R-NM Neighborhood Mixed Use assumes a 50-50% split for mixed uses both vertically and horizontally. The residential capacity estimates accommodating 476,922070 ~~new~~ housing units at max buildable capacity and 35,507 net new housing units, exceeding the 12,112 net new housing unit target. This increase is due largely to Middle Housing policies consistent with HB 1110 which allow for Middle Housing in all residentially zoned areas. The R2 – Residential Low zone is found widely throughout the city. It is assumed that 32,889 housing units at max buildable capacity are located within a ½ mile walkshed of a major transit stop, including both Auburn Station and future (2025) RapidRide I-Line stops. This aligns with the comprehensive plan vision for encouraging dense residential development near transit facilities.

Table 332. Residential Capacity by Zone

Residential & Mixed-Use Zoning Districts	Zone category	Developable Acres	Net zoning changes (acres)	Assumed Density - DU/Acres	Residential Capacity (units)	Net New (Units)
King County						
Residential Conservancy (RC)	Low Density	745	0	1	745	-
R-1 ~~One DU per Acre~~Residential	Low Density	275	0	4	1,471~~101~~	-

R2 – Residential Low	Moderate Density	294	1158	25	37,7896,308	28,950
R3 – Residential Moderate	Moderate Density	0	22	30	660	660
R4 – Residential High	High Density	79	-1	50	3,890	-50
Neighborhood Mixed-Use (R-NM)	High Density Mixed-Use	0	89	30	2,670	2,670
Manufacture Home/Community (R-MHC)	Low Density	27	0	10	273	
DUC Downtown Urban Center - 125	High Density Mixed-Use	0	5	100	125	500
DUC Downtown Urban Center - 75	High Density Mixed-Use	0	5	95	119	475
DUC Downtown Urban Center - 55	High Density Mixed-Use	0	4	90	90	360
DUC Neighborhood Residential	High Density Mixed-Use	0	3	30	90	90
Total		1,420	1,285	-	47,422	35,310
Pierce County						
R2 – Residential Low	Moderate Density	20	20	25	500	500
Total		20	20	-	500	500
			Total New (2044) Housing Capacity		47,9226,070	35,810

Goals and Policies

Goal 1: Healthy Homes and Neighborhoods

H-1 Recognize the important role of public improvements, facilities, and programs in providing a healthy home environment within the community.

H-2 Through integrated planning for land use, parks and recreation, transportation, housing, and jobs, support active living and healthy eating opportunities.

H-3 Promote safe and connected neighborhoods.

a. Continue to implement crime prevention programs such as neighborhood block watches.
b. Through the land use and building permit process, implement principles of crime prevention through environmental design.
c. Promote community volunteerism to increase the well-being and safety of residents.

d. Invest in transportation improvements that will create safe neighborhoods for walking, biking, and connecting to transit.

H-4 Promote housing that meets the needs of Auburn's workforce, is located near and designed to take advantage of affordable multimodal transportation options and contributes to a regional jobs–housing balance.

H-5 Improve streetscapes in developed neighborhoods. Continue to repair and/or replace deteriorated sidewalks and remove barriers to pedestrian traffic.

H-6 Seek and provide assistance for the reduction of lead-based paint hazards and measures to remove mold, improve energy conservation and provide for healthy indoor air quality.

H-7 Promote the City's neighborhood program. Connect residents to volunteer activities.

H-8 When evaluating proposed developments, apply site and building design standards, require quality streetscape, landscape, on-site recreational and open space, and low-impact development measures that will improve community character and environmental quality.

H-9 As neighborhoods change, work to eliminate the displacement of those who are under-served or under-represented.

H-10 Promote housing stability for the most vulnerable residents.

How can Auburn plan for Active Living and Healthy Eating?

- *Provide for a complete community with a variety of work, shopping, recreation, health and education, and home environments.*
- *Implement a connected nonmotorized trail and park system with neighborhood gathering spaces. Work with transit providers to connect neighborhoods to commercial and social services.*
- *Facilitate access to regional transportation and job centers in and near Auburn.*
- *Support art projects and cultural events to provide opportunities to build a sense of community investment, improve aesthetics, bring people together cross-culturally, and involve neighborhood youth. Support community gardens to improve access to healthy food and to build community relationships.*

Goal 2: Support Housing Growth

H-11 Provide a land use plan and zoning that offers opportunities to achieve a variety of housing styles and densities for private and nonprofit housing providers.

H-12 Support development of a variety of housing choices by allowing Middle Housing types in residential zones including townhomes, duplexes, triplexes, fourplexes, fiveplexes, sixplexes, cottage housing, courtyard apartments, and accessory dwelling units.

H-13 Provide dense housing choices downtown and other areas identified in the Comprehensive Plan where infrastructure is more available or can be improved with regional and local funds.

H-14 Encourage residential development downtown, particularly housing that is integrated with commercial development.

H-15 Allow accessory dwelling units as an affordable housing strategy and Middle Housing option.

H-16 Promote greater opportunities for home ownership for all incomes and ethnicities in the community through development of middle housing options and fee-simple development.

H-17 Implement incentives for developing underutilized parcels into new uses that allow them to function as pedestrian-oriented mixed-use neighborhoods. Existing uses that are complementary, economical, and physically viable shall integrate into the form and function of the neighborhood.

H-18 Use innovative zoning provisions to encourage infill development of underutilized parcels in zones that have been identified in the Comprehensive Plan as areas where infill residential development should be encouraged. Certain development requirements for infill development may be relaxed, while requiring adherence to specific design requirements to ensure compatibility with the character of nearby existing residential structures.

H-19 Allow appropriately designed manufactured housing within Neighborhood Residential areas, consistent with state law and city code.~~.~~

H-20 Allow manufactured housing parks, transitional housing, supportive housing, and multiplex housing in appropriately zoned areas.

H-21 Adopt incentives, strategies, actions and regulations to create and sustain neighborhoods that provide equitable access to parks and open space, safe pedestrian and bicycle networks, clean air, soil and water, healthy foods, high-quality education, affordable and high-quality transit options and jobs.

H-22 Prioritize affordable housing when surplusing publicly owned land or property to provide opportunities for increased affordable housing.

Goal 3: Maintenance and Preservation

H-23 Conserve Auburn's existing housing stock because it is the most affordable form of housing.

H-24 Inventory and map dilapidated properties.

H-25 Organize, educate and assist property managers and owners in the creation and preservation of safe neighborhoods.

a. Offer an owner–landlord training program to better market, manage and maintain residential rental property.
b. Encourage retention of professional management assistance.
c. Recognize and publicize well-maintained apartment properties, such as by awarding a "multifamily property of the year."

d. Advise landlords with problem buildings about the benefits of donating their property or selling it below market cost to a specially designated nonprofit organization.

H-26 Promote housing improvements by property owners and building managers. Seek available assistance for housing rehabilitation. Assistance will include the development of residential infrastructure and the rehabilitation of individual properties.

a. Find public and private sources of capital and offer low-interest loans for rehabilitation.
b. Continue to participate in the Emergency Home Repair Program and consider partnering with nongovernmental organizations to maximize funds.
c. Encourage green lending for improved energy conservation, indoor air quality, and other measures.
d. Help identify professional volunteers at educational or professional associations to plan redesign or architectural upgrades of the properties.
e. Support additional healthy housing and preservation strategies, such as property tax exemptions to preserve affordable housing opportunities and utilizing community health workers to offer property owners and residents the education and resources needed to maintain housing.

H-27 Evaluate and update codes applicable to housing and provide effective and appropriate enforcement.

a. Enforce city ordinances regarding abandoned properties.
b. Consider a multifamily inspection program.
c. Consider public identification of landlords who are found to be out of compliance for extended time periods and unwilling to take steps to ameliorate substandard conditions.
d. Consider a landlord compliance program where code enforcement penalties can be reduced if attending landlord training programs.
e. Work with park owners, managers, and park tenants to develop policies and regulations to preserve manufactured home parks and the affordable housing they offer.
f. Consider an Auburn Housing Authority.

H-28 Ensure that rental housing units comply with life and fire safety standards and provide a safe place for tenants to live, including renters with disabilities.

H-29 Promote the maintenance, energy efficiency, and weatherization of existing affordable housing stock.

Goal 4: Housing Attainability and Affordability

H-30 Promote affordable housing that meets changing demographic needs.

H-31 Promote housing stability for the most vulnerable residents.

H-32 Work in partnership with King and Pierce Counties and other cities ~~to~~ to plan for and accommodate its allocated share of countywide future housing needs for moderate-, low-, very low-, and extremely low-income households as well as emergency housing and permanent supportive housing~~address countywide needs for affordable housing to households with moderate, low, very low, and extremely low incomes~~, including those with special needs and our veterans.

~~a. The King County need for housing, countywide, by percentage of area median income is:~~

~~. 80%-120% of AMI (moderate) – 26% of total housing need~~

~~. 50%-80% of AMI (low) – 14% of total housing need~~

~~. 30%-50% of AMI (very low) – 11% of total housing need~~

~~. 30% and below AMI (extremely low) – 13% of total housing need~~

~~f.Address the King County need for housing affordable to households at less than 30% AMI (extremely low income) and for moderate and market rate income (greater than 80% AMI) in Auburn, through all jurisdictions working individually and collectively.~~

~~g. The Pierce County need for housing, countywide, by percentage of area median income is less than 1% for all AMI groups because the target is 112.~~

~~h.~~a. Focus Auburn's efforts toward the countywide and community need for low- and moderate-income housing on preserving existing affordable housing with robust maintenance and repair programs, minimizing displacement impacts, and ensuring long-term affordability of existing housing.

~~i.~~b. Act as a County leader in the exploration and implementation of new funding mechanisms and strategies to develop housing affordable at 30% AMI and below across King County and throughout South King County.

H-33 Encourage and assist in the renovation of surplus public and commercial buildings and land into affordable housing. Additionally, explore opportunities to dedicate revenues from sales of publicly owned properties, including tax title sales, to affordable housing projects.

H-34 Seek, encourage, and assist nonprofit organizations in acquiring depreciated apartment units for the purpose of maintaining and ensuring their long-term affordability.

H-35 Review and streamline development standards and regulations to advance their public benefit, provide flexibility, and minimize additional costs to housing.

H-36 Promote compliance with federal and state fair housing laws. Support fair housing opportunities for all regardless race, color, national origin, religion, sex, familial status, or disability.

H-37 Explore the use of density bonuses, parking reductions, multifamily tax exemptions (MFTE), fee waivers and exemptions, and permit expediting to encourage the development of housing affordable at below-market rate.

H-38 Where practical, ensure that housing created or preserved using local public resources or by regulation benefits low-income households and retains its affordability over time.

H-39 Partner with Affordable Housing Providers – partner with local affordable housing providers and services who have additional knowledge and resources that are not available to the city.

H-40 Support existing programs that provide emergency rental assistance for families facing homelessness due to temporary economic hardship.

H-41 Engage with communities disproportionately impacted by housing challenges in developing, implementing and monitoring policies that reduce and undo harm to these communities. Prioritize the needs and solutions expressed by these disproportionately impacted communities for implementation.

H-42 Support the long-term preservation of income-restricted affordable housing with expiring affordability covenants through acquisition by acting as a facilitator between affordable housing groups interested in purchasing the property and property owners.

H-43 Explore opportunities to implement a Community Preference policy or a first right to return policy that prioritizes members of the community in new affordable housing developments.

Goal 5: Supportive Services

H-44 Encourage and support human and health service organizations that offer programs and facilities for people with special needs. Support programs in particular that help people to remain within the community, including those that are veterans, disabled, seniors, single-parent households, and the homeless.

H-45 Assist low-income people, who are displaced as a result of redevelopment, find affordable housing in accordance with state and federal laws and regulations.

H-46 Develop strategies that seek to preserve naturally occurring affordable housing at-risk of redevelopment and/or in deteriorating physical condition.

H-47 Continue to ensure that funding becomes available to support youth, veterans, and social services in Auburn.

H-48 Support seniors who wish to age in place in their homes, such as with home rehabilitation services, adult day health and Senior Center activities.

H-49 Provide opportunities for transitional housing assisted living and retirement communities.

H-50 Promote universal design principles to ensure housing is designed to be compatible with surrounding neighborhoods.

H-51 usable by all people regardless of age or abilities.

H-52 Provide empowering training for residents who want to participate in civic activities and who would like to improve their knowledge and skills around community leadership.

H-53 Provide information in multiple languages to Auburn's diverse communities regarding services offered by local and regional governmental, educational, employment, health, and other providers to improve residents' quality of life and to promote resident engagement and household economic independence.

H-54 Offer financial and homebuyer education to encourage household saving and budgeting to consider home ownership.

H-55 Provide information and resources that educate and guide low-income persons toward affordable housing opportunities. Develop materials in multiple languages.

H-56 Review proposals to site facilities providing new or expanded human services within the City to determine their potential impacts and whether they meet the needs of the Auburn community. Important caveats in the City's consideration will include the following:

a. While Auburn will willingly accept its regional share of facilities that provide residential services, or influence residential location decisions, Auburn will expect other communities to accept their share as well.
b. The funding of human service centers sited in Auburn that serve an area larger than Auburn would rely on an equitable regional source of funding.
c. The siting of all facilities shall be based on sound land use planning principles and should establish working relationships with affected neighborhoods.

Goal 6: Implementation and Monitoring

H-57 Partner with South King County jurisdictions in ongoing efforts to coordinate the human, educational, and housing needs of our diverse cultural communities, such as through the Road Map Project, interjurisdictional housing and human services forums, and other efforts.

H-58 Pursue partnerships with non-profits, housing authorities, SKHHP, and other organizations to preserve existing unregulated and naturally occurring affordable housing including through acquisition.

H-59 Work with other jurisdictions and health and social service organizations to implement a coordinated, regional approach to homelessness.

H-60 Support national, state and especially regional efforts to address the housing and human service needs of the region and the City.

H-61 Explore all available federal, state and local programs and private options for financing affordable housing, removing or reducing risk factors, and preserving safe neighborhoods.

H-62 Work in partnership with public and private housing providers, businesses, and other agencies in the provision of housing assistance to Auburn residents and business employees.

H-63 Support nonprofit organizations during all stages of siting and project planning and when applying for county, state, and federal funding.

H-64 Through the building permit process, inventory and track affordable housing opportunities within Auburn. Distribute affordable housing information to nonprofit agencies serving the homeless and low-income people.

H-65 Monitor housing supply, affordability, and diversity in Auburn and its contribution to the countywide and regional housing need.

H-66 Explore options to identify and monitor unregulated affordable housing for the purpose of long-term preservation particularly in urban centers, near transit, and/or where most redevelopment pressure is anticipated.

H-67 Review and amend, a minimum every 5 years, local housing policies and strategies.

H-68 Consider opportunities to evaluate potential displacement risk for naturally occurring affordable housing and vulnerable communities, especially those with historical and cultural ties to the community in daily work, and mitigate or review actions that significantly increase this risk.

Housing Objectives and Implementation

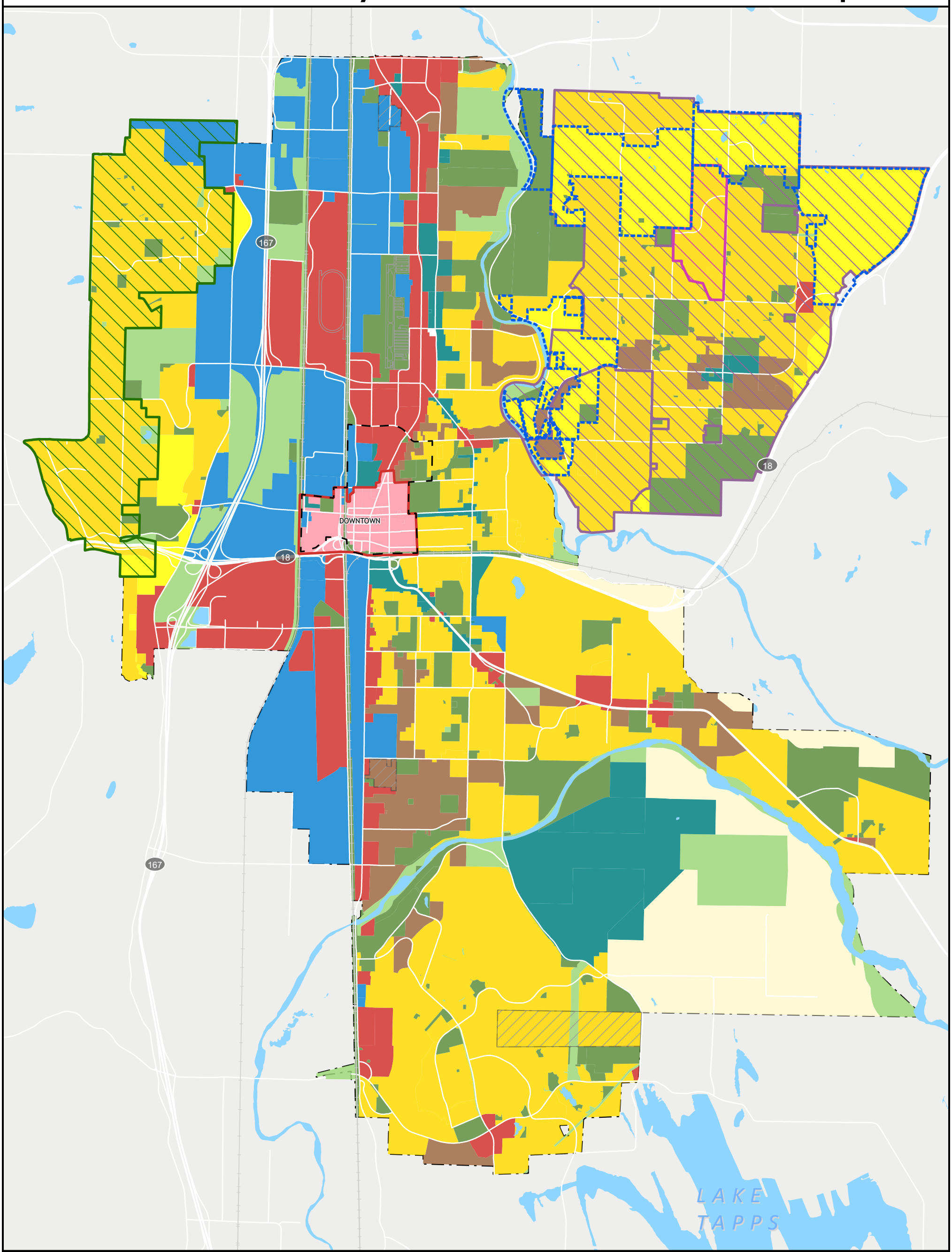
The City has developed housing objective implementation strategies addressing housing diversity, condition, attainability, and programs to serve special needs. The City will monitor the objectives over time.

Figure 53. Housing Objectives and Tools

Outcomes	Indicators	Example Tools
Improve housing quality	Increased quality of rental housing	• Housing rehabilitation and repair loans • Loans for energy conservation and healthy indoor air quality • City-sponsored and nonprofit property manager programs • Housing inspection program Code enforcement • Community volunteer program

Meet demand for new housing units	Land capacity to meet or exceed housing target	• Land use plan and zoning • Variety of housing options
Promote housing ownership	Maintain or increase homeownership rates	• Accessory dwelling units • Middle Housing • Unit-Lot Subdivision
Allow for a variety of housing types to meet size, age, and cultural trends	Increased numbers of middle housing units and apartment units with neighborhood recreation and service amenities Retention of housing stock with larger units	• Middle Housing on small and infill lots • Accessory dwelling units • Mixed-use zoning • Incentivize infill development
Increase opportunities for housing to extremely-low, very-low, low-, and moderate-income households	Increased numbers of ownership dwellings available to moderate incomes Increased mixed-use development for all incomes Increased preservation and improvement of rental housing with long-term affordability commitments	• Accessory dwelling units Downtown and Growth Center incentives for apartment and mixed-use • Infill incentives • Permit and impact fee waivers • See also “improve housing quality” above • Expansion of MFTE program outside of Downtown
Improved opportunities for special needs housing and services	Greater match of housing to special needs including housing for all ages and abilities as well as the homeless	• Community services programs • Partnerships with nonprofit housing providers and nongovernmental organizations
Monitor housing supply, affordability, and diversity	Address achievement of indicators above	• Monitor in conjunction with regular and annual Comprehensive Plan updates and new countywide planning policy housing targets

Draft 2024 City of Auburn Land Use Map



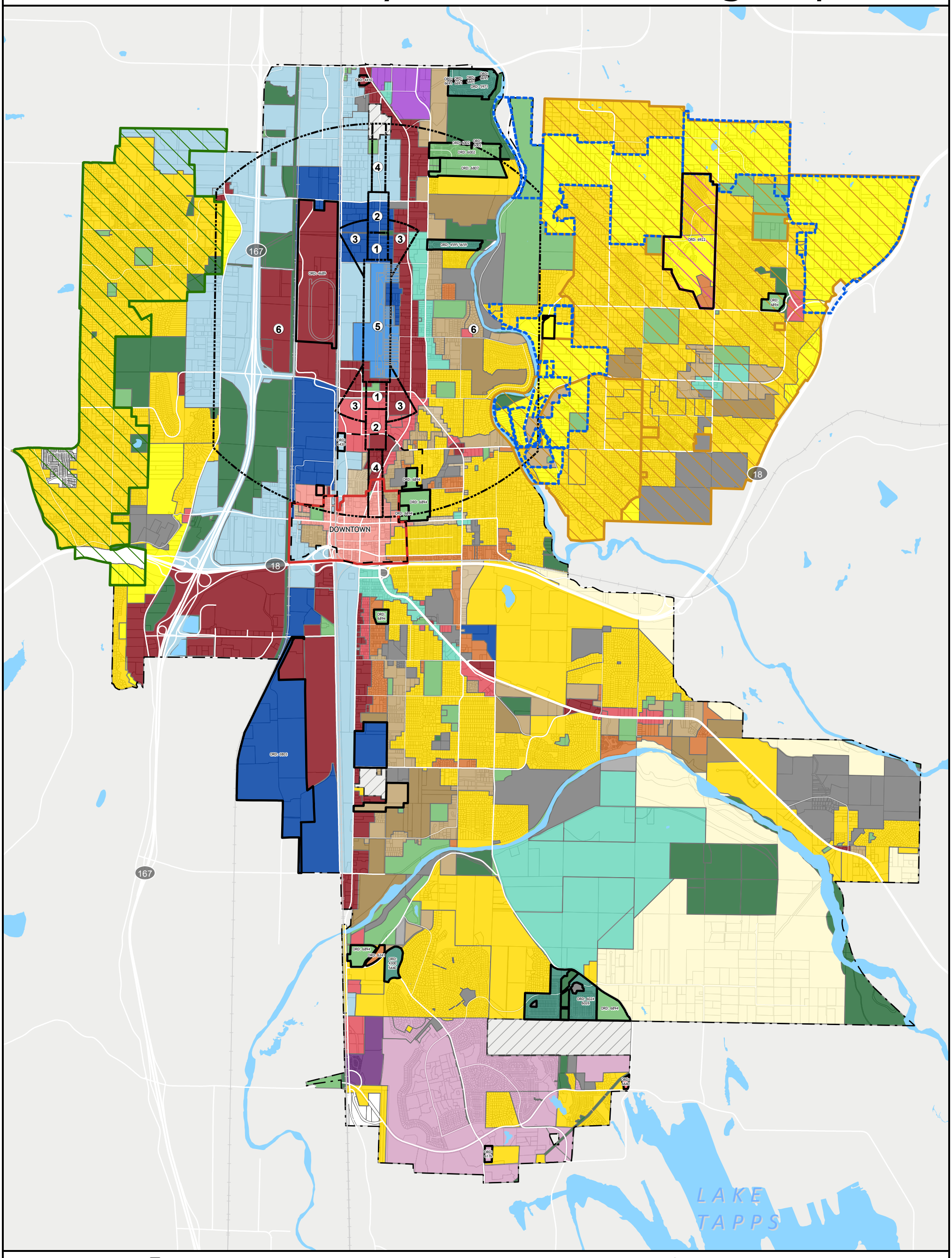
- COMMERCIAL
- DOWNTOWN URBAN CENTER
- NEIGHBORHOOD RESIDENTIAL ONE
- NEIGHBORHOOD RESIDENTIAL TWO
- NEIGHBORHOOD RESIDENTIAL THREE
- OPEN SPACE
- PUBLIC/QUASI-PUBLIC
- MIXED-USE
- INDUSTRIAL
- RESIDENTIAL CONSERVANCY
- Downtown Urban Center
- Expanded Downtown Urban Center
- Potential Annexation Areas
- Urban Separators Overlay
- West Hill Overlay (Ordinance: 6122)
- Bridges Overlay (Ordinance: 6922)
- Lea Hill Overlay (Ordinance: 5346 & 6121)

0 0.25 0.5 0.75 1
MILES

Printed On: 11/18/2024
Map ID: 1142

Information shown is for general reference purposes only and does not necessarily represent exact geographic or cartographic data as mapped. The City of Auburn makes no warranty as to its accuracy.

Draft 2024 City of Auburn Zoning Map



Zoning

- DOWNTOWN URBAN CENTER
- C-AG - AUBURN GATEWAY
- C-1 LIGHT COMMERCIAL
- C-2 HEAVY COMMERCIAL
- I - INSTITUTIONAL
- M-1 LIGHT INDUSTRIAL
- M-2 HEAVY INDUSTRIAL
- LF - Airport Landing Field
- OS - OPEN SPACE
- P-1 PUBLIC USE
- PLANNED UNIT DEVELOPMENT DISTRICT
- R1 RESIDENTIAL 1 DU/ACRE
- R2 - Residential Low
- R3 - Residential Moderate
- R4 - Residential High
- Lakeland Hills PUD
- R-MHC RESIDENTIAL MANUFACTURED/MOBILE HOME COMMUNITY
- R-NM NEIGHBORHOOD MIXED-USE
- RC RESIDENTIAL CONSERVANCY
- RF - Residential-Flex
- TERRACE VIEW DISTRICT
- UNCLASSIFIED USE DISTRICT

Special Zoning Ordinances & Resolution

- Downtown Urban Center
- Expanded Downtown Urban Center
- Potential Annexation Areas
- Urban Separators Overlay
- Lea Hill Overlay (Ordinance: 5346 & 6121)
- Bridges Overlay (Ordinance: 6922)
- West Hill Overlay (Ordinance: 6122)

Airport Overlays

- Runway Overlay Zone 1
- Inner Safety Zone 2
- Inner Turning Zone 3
- Outer Safety Zone 4
- Sideline Safety Zone 5
- Airport Operations Zone 6

0 0.25 0.5 0.75 1
MILES

Printed On: 11/18/2024

Map ID: 1016

Information shown is for general reference purposes only and does not necessarily represent exact geographic or cartographic data as mapped. The City of Auburn makes no warranty as to its accuracy.

CITY OF AUBURN WASHINGTON

AGENDA BILL APPROVAL FORM

Agenda Subject:
2024 Period Comprehensive Plan Update Package 2 (Teague)
Planning Commission deliberation and action on the elements contained in package 2: Transportation Plan, Sewer Plan, Stormwater Plan, Water System Plan, PROS Plan, Parks Element, Capital Facilities Element, Utilities Element, Transportation Element

Meeting Date:
December 3, 2024

Department:
Community Development

Attachments:
ATTACHMENT 13 - Comprehensive Plan Staff Report Package 2, ATTACHMENT 14 - V4 Capital Facilities, ATTACHMENT 15 - V4 Utilities Element , ATTACHMENT 16 - V5 Transportation Element , ATTACHMENT 17 - V5 Parks Element , ATTACHMENT 18 - Appendix G - Comprehensive Transportation Plan , ATTACHMENT 19 - Appendix F - Parks PROS Plan, ATTACHMENT 20 - Comprehensive Water System Plan, ATTACHMENT 21 - Comprehensive Sewer Plan, ATTACHMENT 22 - Comprehensive Storm Drainage Plan

Budget Impact:
Current Budget: $0
Proposed Revision: $0
Revised Budget: $0

Administrative Recommendation:

Background for Motion:

Background Summary:

Councilmember:

Staff: Jason Krum

STAFF REPORT
PLANNING COMMISSION

Agenda Subject/Title:
PRJ24-0008
2024 Periodic Comprehensive Plan Update

Date:
November 19, 2024

Department:
Community Development

Staff Recommendation: Planning Commission to deliberate and take action to recommend to City Council approval of Package 2 of the 2024 Comprehensive Plan Update which includes the Capital Facilities, Utilities, Transportation, and Parks and Open Space Elements. Package 2 also includes the Parks PROS Plan and the systems plan for Sewer, Water, and Stormwater.

Background Summary: Between April and July 2024 staff transmitted to Planning Commission Draft 2024 Comprehensive Plan Elements for presentation, public hearing, and deliberation a package of 5 Elements developed by the Community Development Department. The dates of those presentations and actions are as follows:

Document	Planning Commission Presentation	Planning Commission Hearing	Planning Commission Acceptance
Land Use Element	April 2, 2024	April 16, 2024	April 16, 2024
Housing Element	April 2, 2024	April 16, 2024	April 16, 2024
Economic Development Element	April 16, 2024	April 30, 2024	April 30, 2024
Historic Preservation Element	April 16, 2024	April 30, 2024	April 30, 2024
Climate Element	April 30, 2024	May 7, 2024	May 7, 2024
Transportation Element	June 4, 2024	July 16, 2024	July 16, 2024
Parks and Open Space Element	April 30, 2024	May 7, 2024	May 7, 2024
Parks PROS Plan	September 17, 2024	October 8, 2024	October 8, 2024
Capital Facilities Element	June 18, 2024	July 2, 2024	December 3, 2024
Utilities Element	July 2, 2024	July 16, 2024	October 23, 2024
Sewer System Plan	May 21, 2024	June 4, 2024	September 17, 2024
Water System Plan	July 2, 2024	December 3, 2024	December 3, 2024

Stormwater System Plan	June 4, 2024	June 18, 2024	June 18, 2024

On July 16, 2024, the Planning Commission deliberated on the draft documents, staff's suggested modifications, and public comments that had been received; and a vote was made for recommendation to be transmitted to City Council for consideration for adoption of:

Updated Chapters of the Comprehensive Plan

- Volume 1 – Land Use Element
- Volume 2 – Housing Element
- Volume 6 – Economic Development Element
- Volume 8 – Historic Preservation Element
- Volume 9 – Climate Element.
- Appendix A – Housing Needs Assessment Update

A second action is scheduled for December 3, 2024, for a recommendation to City Council on the adoption of the remaining four Elements and four related plans consisting of:

Updated Chapters of the Comprehensive Plan

- Attachment 10 - Volume 3 – Capital Facilities Element
- Attachment 11 - Volume 4 – Utilities Element
- Attachment 12 - Volume 5 – Transportation Element
- Attachment 13 - Volume 7 – Parks and Recreation Element
- Attachment 15 - Appendix F – Parks, Arts, Recreation and Open Space Plan (PROS)
- Attachment 14 - Appendix G – Comprehensive Transportation Plan

Updated Additional Documents of the Comprehensive Plan, That Are Incorporated by Reference.

- Attachment 16 - Comprehensive Water System Plan
- Attachment 17 - Comprehensive Sewer Plan
- Attachment 18 - Comprehensive Storm Drainage Plan

Findings of Fact:

1. RCW 36.70A.70 (Washington State Growth Management Act (GMA)) describes required and optional Elements of the Comprehensive Plan. The Plan shall be an internally consistent document and all elements shall be consistent with a future land use map.

2. RCW 36.70A.140 (Washington State Growth Management Act (GMA)) indicates that a comprehensive plan shall be adopted and amended with public participation. Auburn City

Code (ACC) 14.22.030 required early and continuous public participation in the comprehensive plan process.

3. Auburn City Code (ACC) 14.22.010 provides a description of the purpose of the comprehensive plan. The city of Auburn comprehensive plan establishes the principles, goals, objectives and policies guiding future development of the city in compliance with Chapter 36.70A RCW, the Washington State Growth Management Act. The purpose of this chapter is to establish procedures and review criteria for amending the comprehensive plan and to provide provisions for public participation in the planning process.

4. Environmental review under the State Environmental Policy Act (SEPA) for the comprehensive plan resulted in a Determination of Significance (DS) and Request for Comments on Scope of Environmental Impact Statement (EIS) issued on October 23, 2023 (City File No. SEP24-0004). This notice was published in the Seattle Times on October 23, 2023. The comment period ended November 13, 2023 with no comments received.

5. Per Chapter 36.70A RCW, the Draft Environmental Impact Statement (DEIS) was transmitted to the Washington State Department of Commerce on May 20, 2024; Agencies, affected tribes, and members of the public were invited to comment on the proposed contents of the DEIS. Comments were accepted up to the 60-day notice period on 5:00 p.m. PST on June 19, 2024. Comments related to the Elements indicated above were received from Puget Sound Regional Council, Washington State Department of Commerce, Department of Wildlife, Department of Ecology, and King County.

6. Per Chapter 36.70A RCW, the Final Environmental Impact Statement (FEIS) was transmitted to the Department of Commerce on October 18, 2024. The City did not act upon the FEIS until November 8, 2024.

7. ACC 14.22.100 outlines the public hearing requirements by planning commission. Amendments to the Periodic Comprehensive Plan generally comply with “area-wide” requirements.

    A. The planning commission shall hold at least one public hearing on all proposed amendments to the comprehensive plan. Notice of such public hearing shall be given pursuant to Chapter 1.27 ACC and, at a minimum, include the following:
        1. For site-specific plan map amendments:
            a. Notice shall be published once in the official newspaper of the city not less than 10 calendar days prior to the date of public hearing;
            b. Notice shall be mailed by first class mail to all property owners of record within a radius of 300 feet of the proposed map amendment request, not less than 10 calendar days prior to the public hearing;
        2. For area-wide plan map amendments:
            a. Notice shall be published once in the official newspaper of the city not less than 10 calendar days prior to the date of public hearing;
            b. Notice shall be mailed by first class mail to all property owners of record within the area subject to the proposed amendment;

c. Notice shall be posted in at least two conspicuous locations in the area subject to the proposed amendment not less than 10 calendar days prior to the date of the public hearing.

B. Notwithstanding the above, the director may expand the minimum noticing provisions noted above as deemed necessary.

C. Planning Commission Recommendation. The planning commission shall conduct a public hearing on all potential comprehensive plan amendments and shall make and forward a recommendation on each to the city council. The planning commission shall adopt written findings and make a recommendation consistent with those findings to the city council.

D. The city council, if it elects to amend the comprehensive plan, shall adopt written findings and adopt said amendments by ordinance.

E. State Review. All comprehensive plan amendments considered by the planning commission shall be forwarded for state agency review consistent with RCW 36.70A.106.

F. Any appeal of an amendment to the comprehensive plan shall be made in accordance with Chapter 36.70A RCW."

8. As provided in the City code, the Comprehensive Plan amendments are initially reviewed during a public hearing process before the City of Auburn Planning Commission, who then provides a recommendation to the City Council for final action, which is expected in December 2024 to meet requirements to adopt the comprehensive plan by December 31, 2024.

9. Pursuant to RCW 36.70A.106, the proposed comprehensive plan amendments outlined in this agenda bill were sent to the Washington State Department of Commerce and other state agencies for the required state review. The Washington State Department of Commerce acknowledged receipt on April 9, 2024, by Submittal ID: #2024-S-6992.

10. Text and/or map updates to address agency comments will be included in the final draft of the Comprehensive Plan for City Council adoption. Where possible, updates to Elements referenced above have been incorporated into the Element versions attached to this staff report.

11. A Notice of Public Hearing announcing the schedule for Public Meetings and Public Hearings for all comprehensive plan elements and related plans was published on March 12, 2024 in the Seattle Times Newspaper and on the city website which is at least 10 days prior to Planning Commission public hearings. A Re-Issuance/Correction of Notice of Public Hearing that includes updates to public meeting and/or public hearing dates and/or times was issued on May 3, 2024, June 8, 2024, July 6, 2024, September 24, 2024, and November 18, 2024.

ATTACHMENTS:

Updated Chapters of the Comprehensive Plan

- Volume 3 – Capital Facilities Element

- Volume 4 – Utilities Element
- Volume 5 – Transportation Element
- Volume 7 – Parks and Recreation Element
- Appendix F – Parks, Arts, Recreation and Open Space Plan (PROS)
- Appendix G – Comprehensive Transportation Plan

Updated Additional Documents of the Comprehensive Plan, That Are Incorporated by Reference.

- Comprehensive Water System Plan
- Comprehensive Sewer Plan
- Comprehensive Storm Drainage Plan Update

City of Auburn

Capital Facilities Element

Table of Contents

Introduction 1
Vision 1
Conditions and Trends 1
Planning Approach 2
Values 2
Concurrency and Levels of Service 3
  Levels of Service 3
  Concurrency 3
Capital Facilities and Services 5
  Municipal Facilities 5
  Parks and Recreation 10
  Transportation 11
  Public Utilities 14
  Public Education Facilities 22
Goals and Policies 24

Introduction

This volume provides overall policy direction for the different capital facility plans and programs provided by the City. Capital facilities belonging to privately owned utilities (electricity, natural gas lines, etc.) and those that are city-operated (water, sewer, stormwater, etc.) are covered in the Utilities Element (Volume 4). Certain City plans and programs are further refined in other sections of this volume, such as Parks, Recreation, and Open Space, and Transportation. Overall, however, this volume acts as a reference for all of the City's various capital facility plans except for those found in other Elements, including the City of Auburn Six-Year Capital Facilities Plan (a key component of and adopted with this plan), comprehensive plans, capital improvement and investment programs, inventories, and studies that together represent the planning and financing mechanisms required to serve the capital facility needs of Auburn. For more details on a particular capital facility or the City's overall capital facility plan, see the most recently adopted version of the following:

- City of Auburn Airport Master Plan
- City of Auburn Capital Facilities Plan
- City of Auburn Comprehensive Water Plan
- City of Auburn Comprehensive Sewer Plan
- City of Auburn Comprehensive Stormwater Plan
- City of Auburn Parks and Recreation Master Plan
- City of Auburn Comprehensive Transportation Plan
- Auburn School District Capital Facilities Plan
- Kent School District Capital Facilities Plan
- Dieringer School District Capital Facilities Plan
- Federal Way School District Capital Facilities Plan
- Valley Regional Fire Authority (VRFA) Capital Facilities Plan

Vision

Capital facilities in Auburn are planned, designed, and constructed in a manner that adequately supports the future growth scenarios in the City's Land Use Element and that meets the needs of residents, visitors, and businesses. Sustainability is a principle that guides decisions about where facilities are placed, how they are constructed, how they are operated and maintained, and how all aspects of design, construction, and operation are funded.

Conditions and Trends

Growth: The provision and sizing of public facilities such as streets or waterlines and sewer lines can influence the rate or timing of development and is an important means of managing growth. Timed provision of facilities also ensures that new development can be assimilated into the existing community without serious disruptions or adverse impacts. This Plan establishes policies to allow development when and where all public facilities are adequate or can be made adequate, but only if such development can be adequately served by public facilities and services consistent with the adopted level-of-service standards.

A key provision of the Growth Management Act is concurrency. In general, concurrency seeks to ensure that development is permitted only if adequate public facilities are, or can be guaranteed to be, available to support new development. Concurrency requires that facilities needed to maintain a locally adopted level of service be provided "concurrently" with development. Concurrency places the finance function of local government in a much more prominent role in the land use development process. While the concept of concurrency is new to many jurisdictions, it has been used in Auburn since the adoption of its 1986 Comprehensive Plan.

The Act requires concurrency only for transportation facilities, though if a jurisdiction desires, concurrency can be applied to other public facilities as well. With respect to transportation facilities, concurrent is defined within the Act as being provided at the time of or within 6 years of development (this is done to coincide with the six-year time frame of most capital facilities plans). If the facility is not available at the time of development, the funding to construct the facility must be included in the six-year capital facilities plan.

Regardless of whether a local jurisdiction applies concurrency to public facilities beyond those for transportation, new development must be coordinated with the provision of capital facilities. This ensures that all relevant public facilities and services are planned and available to serve the demands of new growth.

Planning Approach

The Capital Facilities planning approach is to manage growth in a manner that enhances from community quality and values by actively coordinating land use type and intensity with City facility and service development and provision.

Values

Character: Public buildings and spaces incorporate high-quality building and landscape design so that they positively impact the surrounding built environment.

Wellness: Public spaces that are purchased and developed for capital facilities also incorporate features and infrastructure that provide more complete nonmotorized connections.

Service: City utilities and buildings are of high quality and complete, reliable, and available to residents and business owners.

Economy: City utilities are available or planned to be available to serve allowed commercial, recreational, and residential uses.

Celebration: Capital facility spaces will be available, designed, and programmed in a manner that promotes public gathering.

Environment: Development of capital facilities will place a premium on environmental preservation and protection.

Sustainability: Our philosophy of designing, constructing, and maintaining utilities and buildings embraces a long-term investment horizon rather than concepts that only provide short-term benefits and outcomes.

Concurrency and Levels of Service

Levels of Service

Level of Service (LOS) is a common measure used to determine the efficiency or effectiveness of services. For the City of Auburn, LOS targets serve as a means to assess the adequacy of public facilities in meeting the needs of the population for which it serves. The GMA requires that LOS be established for certain transportation facilities for the purposes of applying concurrency to development proposals. The State GMA guidelines recommend the adoption of LOS standards for other capital facilities to measure the provision of adequate public facilities.

Typically, measures of level of service are expressed as ratios of facility capacity to demand (i.e., actual or potential users). For example, in the case of park space, when there is an increase in population without a corresponding increase in park acreage, the LOS unit of measure (acres per 1,000 population) will decline, indicating a potential need to increase the total amount of park acreage to keep pace with population growth. On the other hand, a slight increase in population, coupled with a large increase in facilities, will result in an increased LOS. For example, facilities such as buildings or burial plots may be constructed or expanded to keep pace with anticipated population growth. While this will have the effect of increasing LOS in the short-term, in the longer-term, the LOS will gradually decline to the targeted level based on forecasted population. The impact of population growth to the LOS for facilities will vary depending on the type of facility and long-range planning by the City.

Concurrency

The GMA requires that jurisdictions have certain capital facilities in place or available within a specified time frame when development occurs. This concept is called concurrency. Under the GMA, concurrency is required for transportation

facilities and is recommended by the State for certain other public facilities, namely potable water and sanitary sewer.

Concurrency has a direct relationship to level of service. The importance of concurrency to capital facilities planning is that development may be denied if it reduces the level of service for a capital facility below the locally adopted minimum. The level of service is unique for each type of facility and is presented in the subsequent sections. Concurrency has a direct relationship to level of service. The importance of concurrency to capital facilities planning is that development may be denied if it reduces the level of service for a capital facility below the locally adopted minimum. The level of service is unique for each type of facility and is presented in the subsequent sections.

The need for capital facilities is largely determined by a community's adopted LOS standards and whether or not the community has formally designated capital facilities, other than transportation, as necessary for development to meet the concurrency test. The CFP itself is therefore largely influenced by the selection of the level of service standards. Level of service standards are measures of the quality of life in the City. The standards should be based on the City's vision of its future and its values.

Level of Service Standards and Needs

Based on the proposed six-year capital projects and the projected population increase of 4,585 (5.1%) between 2023 and 2028, the LOS for the following City-owned public facilities will change as follows:

The LOS for the following facilities will be increased as a result of population projections described in the Capital Facilities Plan (CFP), comparing the 2023 LOS to the projected 2028 LOS.

Capital Facility	LOS Units	2023 LOS	2028 LOS (Projected)
Cemetery	Burial Plots per 1,000 population	29.00	56.00
Community Parks	Acres per 1,000 population	2.62	2.95
Linear Parks	Acres per 1,000 population	0.18	0.21
Neighborhood Parks	Acres per 1,000 population	0.72	0.78

The LOS for the following facilities will be maintained as a result of the CFP.

Capital Facility	LOS Units	2023 LOS	2028 LOS (Projected)
Transportation	See Comprehensive Transportation Plan		
Airport	% of Air Operations Support	100%	100%
Storm Drainage	N/A	N/A	N/A
Water	Residential GPCPD[1]	182.00	181.00

1 – GPCPD = Gallons per Customer per Day, or the equivalent of water used by a single-family residential unit per day.

The LOS for the following facilities will be decreased as a result of the CFP, comparing the 2023 LOS to the projected 2028 LOS.

Capital Facility	LOS Units	2023 LOS	2028 LOS (Projected)
General Municipal Buildings	Square Feet per 1,000 population	3,290.44	3,173.11
Open Space	Acres per 1,000 population	4.25	4.10
Senior Center	Square Feet per 1,000 population	135.70	129.12
Special Use Areas	Acres per 1,000 population	2.83	2.69

Other Level of Service metrics and thresholds related to specific capital facilities are located in the sections below.

Capital Facilities and Services

Municipal Facilities

The current inventory of City government administration and operations facilities include 207,629 square feet for general government operations, 66,469 square feet for police services, and 21,726 square feet for fire protection, for a total of 295,824 square feet. The table below lists the facilities along with their current capacity and location.

Community Facilities

Facilities Inventory

Facility Name	Location	Size
Community Center	910 9th St SE	19,804 sq ft
Senior Center	808 9th St SE	11,667 sq ft
Cemetery	2020 Mountain View Dr	4,011 sq ft (out buildings not included)
Golf Course	29630 Green River Rd	14,114 sq ft (out buildings not included)
Postmark Center for the Arts	20 Auburn Ave	8,744 sq ft
GSA	2905 C St SW	11,837 sq ft
4910 A Street	4910 A Street	5,920 sq ft
City Hall	25 W Main St	57, 316 sq ft
City Hall Annex	1 E Main St	47,000 sq ft
Justice Center	340 E Main St	36,000 sq ft
Maintenance & Operations	1305 C St SW	18,232 sq ft (out buildings not included)

Parks Maintenance	1403 C St SW	6,094 sq ft (out buildings not included)
Les Gove MPP Building	1040 Deal's Way	1,262 sq ft (out buildings not included)
R Street Building	2840 Riverwalk Drive SE	4,798 sq ft (out buildings not included)
Warren Building	411 E Street NE	1,813 sq ft (out buildings not included)
Herr Storage	1140 Auburn Way S	3,600 sq ft
Auburn Ave Theatre (scheduled for demolition)	10 Auburn Ave	7,590 sq ft
Auburn valley Humane Society	4910 A Street SE	5,920 sq ft

Level of Service

The current LOS of 3,290 square feet per 1,000 population is based on the existing inventory divided by the 2023 citywide population of 89,904. The proposed LOS of 3,173 square feet per 1,000 population is based on the projected inventory divided by the 2028-projected citywide population of 94,489.

Future Plans

As of 2024, the City is in the process of designing and constructing a replacement for the Auburn Ave Theatre, which was damaged when the adjacent historic mixed-use building on E Main Stret was damaged beyond repair due to fire. The new theatre is anticipated to be an activity anchor in downtown with its central location.

Public Library Facilities

The City of Auburn is served by the King County Library System in 15,000 square foot Auburn Library building at 1102 Auburn Way S. The library opened in 2000 after moving first from the Carnegie Library building in downtown (constructed in 1914), then from another facility in Les Gove Park (constructed in 1964). The current building has continued to be renovated and expanded over the past 25 years, with the last construction completed in 2012. Detailed information regarding the King County Library System is available at www.kcls.org.

Police

Facility Inventory

Name	Location	Size
Auburn Justice Center (Police)	340 E Main St	16,000 sq ft
Evidence Building	340 E Main St	4,400 sq ft

The Auburn Police Department has a staff of the Chief, Assistant Chief, 5 Commanders, 13 Sergeants, 57 Patrol Officers, 20 Detectives, 5 Traffic Officers, and multiple supervisors, specialists, technicians, and other staff as of 2023.

Police services are centered around the Auburn Justice Center that serves the entire City and supports the required staff, the majority of who are assigned to the patrol division. In 2004, the police department took occupancy of a portion of the Justice Center, primarily in the basement, with the Court located on the primary level. The police portion occupies just over 16,000 square feet. Currently the police facility houses 118 sworn police officers in addition to 22 civilian staff. Police headquarters provides both designated and temporary workspace, meeting rooms, common areas, locker rooms, storage space, utility space, electrical and utility space, and records storage space. A separate evidence building at the same site houses evidence storage, general equipment storage, and records archives. Additionally, the department maintains temporary evidence storage in the basement of city hall, utilizing approximately 200 square feet of space.

A facility needs assessment was completed in 2020 and was incorporated in the 2020 Facilities Master Plan.

Known Capacity Issues

Police facilities lack adequate space to support current staff and operations, and future growth.

- Suboptimal climate control, especially on ground floor as HVAC zone configuration does not align with current space configuration due to renovations.
- Facility too small to accommodate both Court and Police in long-term.
- Severely space-constrained, especially for Police, which grew 40% between 2004 and 2019.
- Undersized public lobby and soft interview space.
- Limited meeting/briefing space for all meeting types, including large groups, confidential discussions, and interviews.

Police office space is primarily in basement areas that have limited natural light.

- Defensive tactics and classroom training occur in a room with irregular column placement which impedes sightlines, creates barriers for physical training, and complicates furniture/mat reconfiguration.
- Evidence building is at capacity.
- Undersized parking; unsecured parking for marked vehicles.

Future Plans

A property located near the intersection of Auburn Way Sout & 12th Street Southeast has been acquired by the City. 2023-2024 budget allocated funding for facility planning at new location. Other than planning, there is no funding allocated for this project.

Fire Protection

The Valley Regional Fire Authority (VRFA) provides critical fire and life safety services to the approximately 97,000 citizens residing in the 37 square miles of Algona, Auburn, and Pacific. Oversight of the VRFA is provided by a nine-member Governance Board consisting of the Mayor and two council members from each participating city. Twenty personnel respond from five fire stations. These stations are staffed 24 hours a day, seven days a week, by four shifts. A battalion chief oversees each shift, and a deputy chief manages the entire division.

The Auburn Fire Department was formed over a century ago as a result of a devastating fire in August of 1890. The fire destroyed an entire city block of businesses in what was then known as the town of Slaughter. The original department, consisting of volunteer firefighters and a hand-drawn hose cart, was first named the Auburn Bucket Brigade. The name changed to the Auburn Volunteer Fire Department in 1908. On January 1, 2007, as a result of a voter-approved measure, the Auburn Fire Department combined with the Pacific Fire Department and the City of Algona to form the Valley Regional Fire Authority, which provides fire and EMS services to all three cities.

In an emergency, every second counts. The VRFA has established a Total Response Time (TRT) benchmark of seven minutes and 34 seconds (7:34) for EMS Calls and seven minutes and 49 seconds (7:49) for fire calls. TRT is the time it takes a unit to arrive at a scene once the call is received at the Fire Alarm Center. In 2022, we achieved those benchmarks 51% of the time for fire response and 57% for EMS response.

The VRFA's Capital Facilities Plan (CFP), which was adopted by the Board of Governance in 2021, made four recommendations:

- Priority 1: build an additional station in the northern part of VRFA's service area
- Priority 2: relocate and rebuild Station 38 in Pacific
- Priority 3: remodel or replace Station 31
- Priority 4: find a permanent location for Support Services

In 2022, the VRFA took several significant steps to implement the CFP, including:

- Purchasing property on 30th and I Street Northeast for a new north end fire station. Evaluating property on the Ellingson corridor in Pacific in order to relocate Station 38.
- Contracting with the leading architectural firm TCA to consult on land acquisition and complete preliminary design concepts on each element of the CFP.
- Initiating a discussion on the best way to fund these critical projects.

In 2022, 45% of revenue was from Property Taxes, 34% from Fire Benefit Charges, and 21% from other sources such as grants and permit fees. Expenditures in 2022

include 52% for wages, 15% for capital projects, 19% for benefits and 14% for other services and supplies.

Valley Regional Fire Authority Capital Facility Plans, Annual Reports, and other documents can be found at www.vrfa.org.

Level of Service

The current LOS of 0.20 fire apparatus per 1,000 population is based on the existing inventory (18 fire apparatus) divided by the 2023 citywide population estimate of 89,904. The proposed LOS of 0.20 fire apparatus per 1,000 is based on the 2028-planned inventory (19 fire apparatus) divided by the 2028-projected citywide population of 94,489.

Parking

Facilities Inventory

Facility Name	Location	Capacity	Condition
Kiss-n-Ride Parking Lot	Parcel #7815700172	21 Non-Handicap spaces; 1 accessible space	Fair
11 A Street NW Parking Lot	11 A Street NW	47 Non-Handicap spaces; 2 accessible spaces	Poor
B Street Parking Lot	137 E Main Street	60 Non-Handicap spaces; 13 accessible spaces	Fair
Safeway Parking Lot	Parcel #7331400135	122 Non-Handicap spaces; 4 accessible spaces	Poor
D Street Parking Lot	350 E Main St	20 Non-Handicap spaces; 0 accessible spaces	Very Poor
JC Employee Parking Lot	20 D Street SE	55 Non-Handicap spaces; 1 accessible spaces	Fair

Future Plans

On April 1, 2024, the City of Auburn relinquished possession and use of 113 off-site parking stalls to Sound Transit. The 113 parking stalls were code required parking stalls tied to two office-condominiums owned by the City and utilized as office space by City employees. The City will need to replace these 113 parking stalls within the code required 1,000/ft radius of the office condominiums with which they serve. Funding for the parking replacement will come in whole or in part from the monetary amount awarded to the City by the arbitrator who presided over the arbitration hearing.

Replacement of the 113 parking stalls relinquished to Sound Transit will likely need to be accomplished by constructing a multi-story parking garage.

Cemeteries

The City owns two cemeteries. The Mountain View Cemetery is a fully developed facility (60 acres and five buildings) that provides burial services and related merchandise for the community. The Pioneer Cemetery is a historic cemetery that is no longer used for burial purposes.

Level of Service

The current LOS of 29 burial plots/niches and cremation in ground plots per 1,000 population is based on the existing inventory divided by the estimated 2023 citywide population. The proposed LOS of 56 burial and plots/niches and cremation in ground plots per 1,000 population is based on the projected inventory divided by the 2028-projected citywide population.

Parks and Recreation

The Parks, Recreation, and Open Space (PROS) Plan is needed to meet legal requirements and secure funding for the City's parks and recreation areas for the next six to ten years. Developed with public involvement, city staff, and several city commissions, this plan provides a summary of the city's parks, recreation programs, and open spaces, and gathers information on the community's recreational needs through surveys, outreach, and online tools. This Plan establishes a vision, goals, and assesses the current level of service provided by city parks and open spaces. The Capital Improvement Plan (CIP) and its formal approval adoption completes the PROS Plan suggesting a series of recommended improvements to better serve the citizens of Auburn for the next six years and beyond, each tied to potential grant funding sources, serving to guide the City's response and priorities to the desired quality of life envisioned from its citizens.

Facilities Inventory

Currently, the City manages a diverse range of parks and recreation assets, including 23 neighborhood, or local, parks, 14 community parks, 7 parcels of dedicated open space including a golf course, trail systems, and 16 special use facilities. More information on parks and recreation assets can be found in Appendix F – PROS Plan of the Comprehensive Plan

Facility Type	Quantity	Location	Existing Inventory (Total Acres)	LOS (2015) Acres/1,000 Res.	LOS (2024)	Future Facilities	Future Capital Projects
Community Parks	14	City-Wide	283.3	4.5	3.5	Jacobsen Tree Farm & 104th Ave SE Property	Jacobsen Master Plan, Ph. 1, Ph. 2 Sunset Park Ph. 2, Ph. 3 Game Farm Rec. Courts & Field Imps. Brannan Field Conversions
Neighbor Parks	10	City-Wide	51.23	1.32	1	Auburndale 2	

Open Spaces	6	City-Wide	321.42	As Acquired	4	Lakeland Nature Area	Lakeland Nature Area Parking & Access Imps., Interpretive Trail
Special Use Areas	14	City-Wide	307.69	As Identified	N/A		Golf Course Maint. Building & Les Gove Pavilion
Tot Lots	13	City-Wide	16.71	N/A	.25		
Trails	N/A	City-Wide	26.87 Miles	0.21	.25 miles		White River Trail Reconstruction

Level of Service (LOS)

A 10-minute walk is considered an important park access metric for several reasons. A 10-minute walk (approximately 1/2 mile on level ground) as a park access metric is important because it promotes physical activity, equity, sustainability, social interaction, and overall community well-being. It aligns with various health, environmental, and social goals the City has and should encourage staff and policymakers to prioritize accessible green spaces as a fundamental part of Auburn's development and the community's desired quality of life.

Future Plans

A Needs Analysis and Capital Improvement Program (CIP) project list can be found in Appendix F – PROS Plan of the Comprehensive Plan.

Transportation

Roadways: The City's street system consists of a network of approximately 249 miles of arterials, collectors, local streets and alleys. Existing nonmotorized facilities include a mix of trails, sidewalks, and both dedicated and shared bicycle facilities.

Signals and ITS: The City's transportation system also includes 95 traffic signals, a Traffic Control Center employing Intelligent Transportation Systems (ITS), which centrally directs the signals, 89 traffic cameras, and various traffic beacons all communicating on a network of copper wire and fiber optic cable. The City also has three roundabouts.

Transit: King County Metro Transit, Sound Transit and Pierce Transit serve the Auburn area. Auburn is currently served by six Metro, two Sound Transit, and one Pierce Transit bus route. In addition, Sound Transit "Sounder" commuter trains provide peak hour and midday service at the Auburn Station. The Sounder also provides special event service to selected sporting events. Park and Ride facilities and the Auburn Station support bus and rail service.

Facilities Inventory

Quantity	Description
249	Miles of Streets
17	Bridges
11,000	Street Signs
13,389	Feet of Guardrail
96	Traffic Signals
31	Rapid Rectangular Flashing Beacons
3.684	Street Lights - City Owned
2,261	Street Lights - PSE Owned
53	School Zone Flashing Beacons
19	Speed Radar Feedback Signs
89	Traffic Cameras
12	Speed Photo Enforcement Locations (School Zones)
4	Dynamic Message Signs
43.86	Miles of Fiber Optic Systems
2	Community Banner Locations
22.62	Miles of Class I Bikeways
1.29	Miles of Class II Bikeway with Buffer (Both Sides of Roadway)
15.95	Miles of Class II Bikeway (Both Sides of Roadway)
4.21	Miles of Class II Bikeway (Intermittent or 1 Side of Roadway)
2.60	Miles of Class III Bikeway with Pavement Markings
298.21	Miles of City Sidewalk

Level of Service

The City's Comprehensive Transportation Plan (CTP) establishes multimodal level of service standards for City streets, active transportation facilities, and access to transit service, and freight movement to provide guidance to evaluate the multimodal facilities, identify deficiencies, and prioritize projects to eventually reach a complete multimodal network that can support and promote mode shift, reducing the vehicle capacity demand on the roadways. The following policies relate to vehicle level of service which the City primarily utilizes to evaluate transportation system capacity. Other level of service standards are utilized for concurrency and planning but generally focus on the existing or absence of facilities and services and the quality of those facilities and services rather than their capacity.

- Policy TR6-1-1: The City adopts the following Vehicle Level of Service (LOS) Standards for the AM and PM peak periods per the Highway Capacity Manual:

- Signalized: The LOS standard for signalized intersections is “D”, with the following exceptions: for signalized intersections of two principal arterial roads the LOS standard is “E”.
- Stop Controlled: The LOS standard stop controlled intersections is “D”.
- Roundabout: The LOS standard for roundabout controlled intersections is “D” with a V/C ratio for each lane group of less than 0.90.
- Queuing: The LOS standard for intersection queuing is the 95th percentile queue shall not extend across an adjacent driveway, alley, or street intersection, except if the driveway, alley, or street intersection is within the functional intersection boundary of the queue in which case the queue may extend to the limit of the functional intersection boundary. Additionally, queuing for a designated turn lane shall not exceed turn lane storage area and cause a blockage of through lane(s).

Known Capacity Issues

The City utilizes the vehicle intersection delay level of service standard to evaluate general transportation system capacity for concurrency. Of the 157 intersections evaluated with the CTP, the following 11 (or 8%) were operating below the City’s adopted level of service standard under existing conditions:

- Auburn Way North & 45th Street NE
- 116th Avenue SE & SE 304th Street
- 46th Place S/44th Avenue S & S 321st Street/51st Avenue S
- 51st Avenue S & 316th Avenue
- Henry Road NE/Pike Street NE & 8th Street NE
- C Street SW & 3rd Street NW
- M Street SE & Auburn Way South
- Auburn Way South & 17th Street SE
- A Street SE & 44th Street SE
- Lakeland Hills Way SE & Oravetz Road SE
- R Street SE & 33rd Street SE

Initial modeling of future conditions (2044) added another 10 intersections to the list of intersections that would be operating below the City’s adopted level of service standard:

- Auburn Way N & 42nd Street NE
- I Street NE & 37th Street NE
- 30th Street NE & I Street NE
- 112th Avenue SE & SE 304th Street
- SE 304th Street & 118th Avenue SE
- 56th Avenue S & S 316th Avenue
- 15th Street NE & M Street NW

- A Street SE & 12th Street SE
- A Street SE & 21st Street SE
- A Street SE & Ellingson Road/41st Street SE

Transportation Project List

The Comprehensive Transportation Plan (CTP) includes projects and programs to address the vehicle level of service issues at intersections identified in the existing and future conditions. Those projects include new traffic signals, new roundabouts, modified lane configurations, new roadways, and other measures intended to reduce intersection vehicle delays. The CTP also includes projects, programs, and other actions intended to address to address level of service issues related to active transportation (bicycle and pedestrian), transit, and freight movement. Please refer to the CTP for lists and summaries of the projects, programs, and actions.

Public Utilities

The City of Auburn manages sanitary sewer, water, and storm drainage utilities as well as solid waste collection. The sanitary sewer and water utilities serve the City and several areas outside the City limits. The efficient provision of these services can play a significant role in managing the growth of the City as well as affecting the quality of life for residents of Auburn and the surrounding areas. Public utilities can serve the following goals:

- To protect the public health and safety by providing efficient and cost-effective water, sanitary sewer, storm drainage, and solid waste services to the community.
- Ensure that development will only occur if the urban services necessary to support such development will be available when it is developed.

Water

The City provided water service to over 15,000 service connections as of 2024. The City's water sources include the Coal Creek Springs and West Hill Springs watersheds and are supplemented by a system of ten wells (6 active) and two connections to the regional water system operated by Tacoma Public Utilities. Storage facilities are found on the Enumclaw plateau, at Lakeland Hills, and at Lea Hill. For more background information, see the Comprehensive Water Plan.

Facilities Inventory

- Approximately 306 miles of Water Main
- Over 15,000 Service Connections
- 8 Pump Stations
- 8 Reservoirs
- 1 Satellite Water System
- 6 Active Wells
- 2 Springs

Levels of Service Standards

The System Policies included in Appendix A of the Comprehensive Water Plan and provide direction for City Staff in the management of the utility. The City of Auburn (City) manages the water utility in accordance with established water system policies that govern various facets of utility operations. City policies are established by the City to provide a vision or mission of the water utility and to provide a framework for the design, operation, and ongoing wellbeing of the City's water utility.

The policies included in Appendix A of the Comprehensive Water Plan are developed specifically for the City's multi-source municipal water system and seek to provide consistent treatment to all utility customers and to provide documentation to current water-system customers as well as those considering service from the City.

The City's Comprehensive Water Plan is based upon the following mission statement for the water utility:

"The City will provide for the efficient, environmentally sound and safe management of the existing and future water system within Auburn's service area."

The City's Water utility policies are grouped within goal statements that are headlined under the following categories:

- Business Practices
- Service Area
- Operations and Maintenance
- Financial
- Planning
- Environmental Stewardship
- Design and Construction

A few examples of policies related to level of service standards provided by the water system include:

- Policy 5.3 - System-Wide Reliability
  The City shall invest the resources necessary to construct, maintain, and renew water-system infrastructure and equipment to ensure that customers are provided consistent, reliable service in accordance with WAC 246-290-420 Reliability and Emergency Response. Wherever possible, the City should anticipate system interruptions and design and operate the system to minimize the impact of such interruptions to customers.

- Policy 5.8 - Water Supply Planning

The City's objective is to ensure a continuous, safe water supply to meet firm customer demands. Provision of water service must be consistent with the goals, objectives, and policies of the City of Auburn Comprehensive Water Plan. Effects of past water conservation will be considered when projecting future water needs. Future water demands will be estimated using existing water usage patterns and projected future populations developed by the City's comprehensive Plan and consistent with the Puget Sound Regional Council data.

- Policy 5.10 - Service Pressure
  The City should provide potable water to customers in sufficient quantity to meet maximum day demands at a pressure that meets or exceeds all minimum applicable regulations, except during emergency conditions. Property owners may install private booster pumps to achieve higher pressures under supervision of the City and in accordance with WAC 246-290-230 Distribution Systems.

Known Capacity Issues (based on Level of Service or other standards)

The preparation of the Comprehensive Water Plan included hydraulic modeling for existing and future conditions. Issues derived from the modeling with respect to pipeline improvements needed to meet fire flow conditions were ranked, with those locations ranked higher given more priority to be completed. The projects are anticipated to be completed under the Repair and Replacement program identified in Chapter 7 of the Comprehensive Water Plan. In addition, other known capacity issues with respect to water facilities and sources, include:

- Lea Hill Intertie Booster Pump Station - the Intertie Booster Pump Station (serves the Lea Hill 648 pressure zone) has a pumping capacity deficit, and the Pump Station lacks emergency power, impacting water supply during power outages.
- Lea Hill Service Area Storage - There is a reservoir/storage capacity shortage of 0.54 MG for the Lea Hill service area.
- Valley Service Area Storage - There is a reservoir/storage capacity shortage of 1.28 MG in the Valley service area.
- Wells 3A/3B - are offline due to high manganese levels.
- Wells 7 - is offline due to high manganese levels.
- Coal Creek Springs - is underutilizing its water right, leading to inefficiency.
- Well 5 - needs upgrades and property acquisition for expansion.
- Well 4 - requires facility and electrical improvements for efficient operation.
- Well 1 and Well 4 - Liquid chlorine degradation at the facilities affect water treatment during low winter demand periods.
- West Hill Springs - Aging chlorination building.
- Lea Hill Pump Station – pump station lacks redundancy.

- Game Farm Wilderness Park - pumps need replacement and building repairs.
- Reservoir 2 - Limited maintenance access to Reservoir 2 valves and lack of earthquake resiliency.
- Coal Creek Springs Transmission Main- 100+ year old pipe that needs to be replaced and is susceptible to leaks.
- West Hill Springs - Poor condition of existing cast iron transmission main.
- Howard Road Corrosion Control Treatment Facility (CCTF) - will exceed capacity after Coal Creek Springs Rehabilitation project completion.
- Howard Road Corrosion Control Treatment Facility (CCTF) - Existing liquid chlorine generating equipment reaching the end of its useful life at Fulmer CCTF.

Stormwater

The System consists of a combination of open ditches, closed conveyance pipes, water quality facilities, and pump stations. For more details, see the Comprehensive Storm Drainage Plan.

Facilities Inventory

- Over 240 miles of storm drainage pipe
- Over 40 miles of open channels and ditches
- Over 13,900 junction structures (catch basins, manholes)
- 167 detention ponds
- 7 pump stations.

Levels of Service Standards

The System Policies included in Chapter 3 of the Comprehensive Storm Drainage Plan provide direction for City Staff in the management of the utility. The following policies are specifically related to designed capacity level of service provided by the sewer conveyance system:

- Policy 1.1 -The City shall seek to manage stormwater runoff within the public Right of Way (ROW):
    - to provide access to and functionality of critical services.
    - to preserve mobility on major transportation routes (i.e., arterial roads) and residential roads.
    - to protect real property structures (e.g., residences and businesses.)
- Policy 1.2 - The City shall seek to provide pump redundancy and backup power generators or dual power feeds at City- owned and -operated drainage pump stations.
- Policy 1.3 - The City shall routinely assess the performance of pumped systems with a focus on capacity and vulnerability. This review aims to

ensure that these systems operate efficiently, meet their intended capacity, and remain resilient against potential risks.

Known Capacity Issues

The preparation of the Comprehensive Storm Drainage Plan included hydraulic modeling focused on updating models within locations of proposed capital projects. In addition, existing drainage problems have been observed by the staff and are known to cause flooding of roadways at the following locations:

- Auburn Way South/ SR 18 Underpass - minor roadway flooding causes disruptions to traffic during periods of certain intense rainfall events.
- I St NE between 33rd St NE and 35th St NE – minor flooding has been observed when the Green River flows are high, and the gravity discharge is impacted.
- There are areas within the city not served by the public storm system, such as paved alleys or residential streets where minor flooding is observed.

Future Plans

The 6-year capital improvements are discussed in detail in Chapter 7 and the implementation schedule presented in Chapter 8 of the Comprehensive Storm Drainage Plan.

Sewer

The system is primarily a collection system with treatment provided by Metro. The system includes approximately 205 miles of sewers and force mains and 17 sewer pump stations. Significant portions of the City's service area are currently on septic systems, although plans for future expansion of sewer service into these areas is included in the Comprehensive Sewer Plan. For more details, see the Comprehensive Sewer Plan.

Facilities Inventory

Sewer facilities in the City currently consist of:

- 205 miles of gravity sanitary sewer main
- 17 sewer pump stations
- 5 miles of force main associated with pump stations
- 3 siphons (1 single pipe, and one double pipe under the Green River
- 2,700 sewer service connections

Level of Service Standards

The System Policies included in Chapter 2 of the Comprehensive Sewer Plan provide direction for City Staff in the management of the utility. The following policies are specifically related to designed capacity level of service provided by the sewer conveyance system:

Policy 3.3 - Require the transport of sewage by gravity whenever feasible in order to increase reliability, sustainability, and long-term cost effectiveness.

Policy 4.5 - Size the sewer collection system for peak wet weather flow rates that include I/I flows. Gravity sewers will be sized to convey the once-per-20-year peak hour flow without surcharging.

Policy 4.6 - Size pump stations and force mains for peak wet weather flow rates that include I/I flows. Pump stations will be sized to convey the once per 5-year flow with one pump out of service and convey the once per 20-year flow with all pumps in service.

Known Capacity Issues

The preparation of the Comprehensive Sewer Plan included hydraulic modeling for three scenarios. The first used existing system wastewater flows and applied the expected additional flow during a design storm (with a 20-year recurrence). The second was to escalate wastewater base flows based on population and employment projections for the year 2044, and the last was to increase the intensity and duration of the design storm based on anticipated rainfall changes associated with climate change.

- The existing system is shown to have few deficient pipes, none of which cause overflows.
- For future scenarios (2044-both including and not including climate change effects) show the following deficiencies:
    - The Rainier Ridge Pump Station's capacity is anticipated to be under capacity; however, a project is currently underway to replace that station in 2025.
    - The Dogwood Pump Station is anticipated to be under capacity in 2044.
    - Approximately 4,000 feet of gravity sewer in Roegner Park is expected to be under capacity in 2044.
    - Individual pipe segments upstream of each of the Green River crossings are expected to be under capacity at various times throughout the 20-year planning period. The precise timing is dependent on the rate and distribution of population and employment growth.

Future Plans

Conceptual plans for future sewer extensions and facilities are shown on Figure 5.5 of the Comprehensive Sewer Plan. Those extensions are to be funded by the property owners of the parcels served by them, so the timing of their construction is unknown. The Capital Improvement Plan is described in detail in Chapter 7 of the Comprehensive Sewer Plan. The Plan includes projects related to system capacity, repair and replacement, and system evaluation.

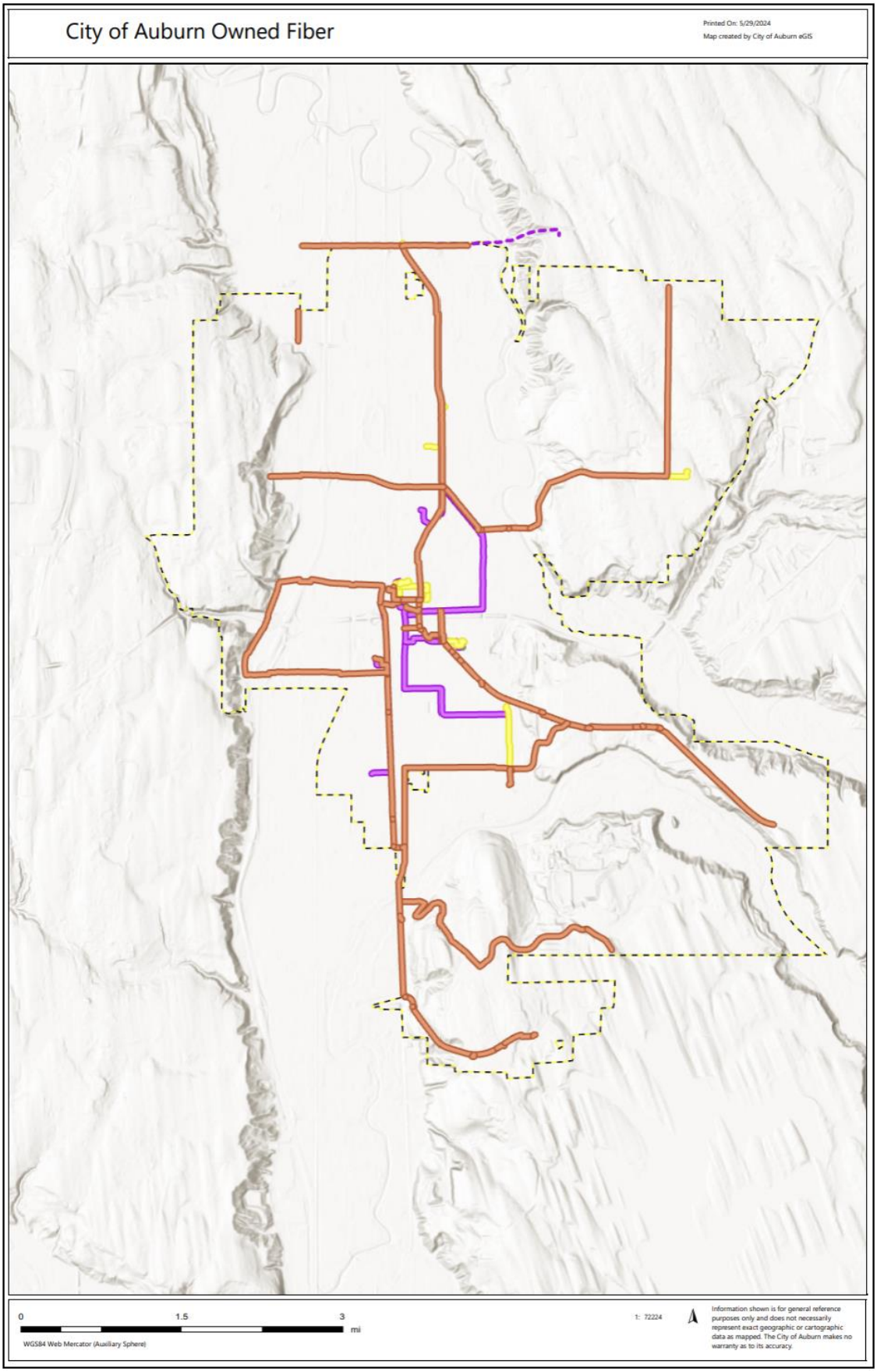
Solid Waste

The City of Auburn contracts with Waste Management (WM) for collection of municipal garbage, recycling, and yard waste. Waste Management disposes of Auburn's garbage at a King County Solid Waste transfer station. Recycling is processed at WM's material recycling facility in Tacoma, WA. WM takes the yard and food waste to either DTG in Tacoma, WA or Cedar Grove in Maple Valley, WA to be converted into compost. There is a small area of Auburn that was recently annexed. This area is serviced by Republic Services. Republic Services takes the garbage to a King County Solid Waste transfer station, the recycling is processed at their material recycling center in Seattle, WA, and yard and food waste is taken to Cedar Grove in Maple Valley, WA.

Telecommunications

The City of Auburn owns and maintains a robust fiber optic Metropolitan Area Network (MAN) that connects most City owned building facilities and traffic signals throughout the Auburn area. This infrastructure delivers secure, high-speed broadband capabilities essential for supporting various government functions, including public safety, public works, planning, permitting, and tourism.

Additionally, our fiber optic network enhances city operations by facilitating interconnections with regional partners and service providers such as City of Algona, City of Pacific, King County, The Community Connectivity Consortium, University of Washington, Valley Communications and Microsoft.


City of Auburn Owned Fiber
Printed On: 5/29/2024
Map created by City of Auburn eGIS
0
1.5
3
mi
WGS84 Web Mercator (Auxiliary Sphere)
1: 72224
Information shown is for general reference purposes only and does not necessarily represent exact geographic or cartographic data as mapped. The City of Auburn makes no warranty as to its accuracy.

Public Education Facilities

Auburn's residential areas are served by a combination of Auburn School District, Dieringer School District, Federal Way Public Schools, and Kent School District. Detailed inventories of school district capital facilities and levels-of-service are contained in the Capital Facilities Plan (CFP) of each school district. The CFPs of the four school districts serving Auburn residential areas and the associated school impact fees are adopted annually as part of the Annual Comprehensive Plan amendment process. Locations of schools and school districts within the City of Auburn which are illustrated in the map below.

Future Plans

To accommodate projected growth, the school districts have noted the following projects in their 2023 Capital Facilities Plans:

Auburn School District

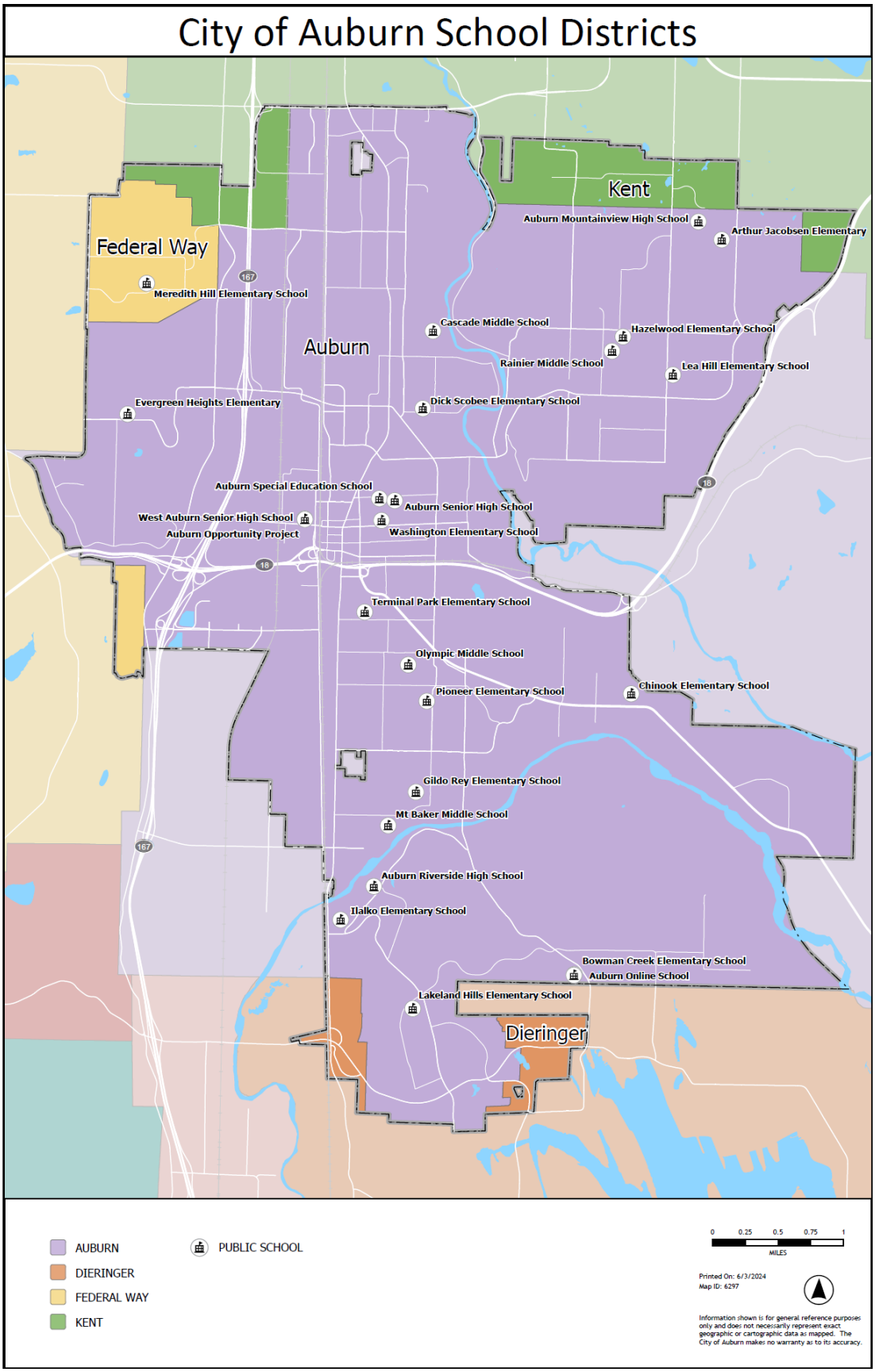
- Portable Relocation – Opens 2023-2024
- Middle School #5 – Opens 2027-2028

Dieringer School District

- Elementary School #3 – Opens 2027
- North Tapps Middle School Classroom Addition – Opens 2027

Federal Way Public Schools

- Illahee Middle School Modernization and Expansion – Opens 2024
- Former DeVry/ES 24 Site Acquisition – Opens 2028
- Portables Expansion – Through 2030


City of Auburn School Districts
Kent
Federal Way
Auburn
Dieringer
Auburn Mountainview High School
Arthur Jacobsen Elementary
Meredith Hill Elementary School
Cascade Middle School
Hazelwood Elementary School
Rainier Middle School
Lea Hill Elementary School
Evergreen Heights Elementary
Dick Scobee Elementary School
Auburn Special Education School
Auburn Senior High School
West Auburn Senior High School
Auburn Opportunity Project
Washington Elementary School
Terminal Park Elementary School
Olympic Middle School
Pioneer Elementary School
Chinook Elementary School
Gildo Rey Elementary School
Mt Baker Middle School
Auburn Riverside High School
Ilalko Elementary School
Bowman Creek Elementary School
Auburn Online School
Lakeland Hills Elementary School
AUBURN
DIERINGER
FEDERAL WAY
KENT
PUBLIC SCHOOL
0 0.25 0.5 0.75 1
MILES
Printed On: 6/3/2024
Map ID: 6297
Information shown is for general reference purposes only and does not necessarily represent exact geographic or cartographic data as mapped. The City of Auburn makes no warranty as to its accuracy.

Goals and Policies

Goal # 1 - Keeping Pace with Growth

Ensure that new development does not outpace the City's ability to provide and maintain adequate public facilities and services, by allowing new development to occur only when and where adequate facilities exist or will be provided, and by encouraging development types and locations that can support the public services they require.

Policies:

CF-1. Lands designated for urban growth by this Plan shall have public facilities (streets, sewer, water, storm drainage, and parks) that meet City standards prior to or concurrent with development.

CF-2. Encourage development where new public facilities can be provided in an efficient manner.

CF-3. If adequate facilities are currently unavailable and public funds are not committed to provide such facilities, developers must provide such facilities at their own expense to develop their proposed projects.

CF-4. The City shall encourage and approve development only where adequate public services including police protection, fire and emergency medical services, education, parks and other recreational facilities, solid waste collection, drinking water, storm drainage, roadway and nonmotorized and other governmental services are available or will be made available at acceptable levels of service prior to project occupancy or use.

CF-5. Provide additional public facility capacity when existing facilities are used to their maximum level of efficiency (consistent with adopted standards for level of service).

CF-6. Encourage development where new public facilities can be provided in an efficient manner.

CF-7. Public facilities shall be provided in accord with the guidance of the Capital Facilities Plan or, as may be appropriate a system plan for each type of facility designed to serve at an adequate level of service the locations and intensities of uses specified in this Comprehensive Plan.

CF-8. New development shall not be approved that is not supported by a minimum of facilities to support the development and that does not provide for its proportionate share of related system needs.

CF-9. The city will perform its activities and make capital budget decisions in conformity with the comprehensive plan. The Land Use Element of the

comprehensive plan shall be reassessed if probable funding falls short of meeting existing needs.

CF-10. Establish land use patterns that optimize the use of public facilities.

CF-11. Exempt the following from the concurrency management program:

- Development vested by RCW 19.27.095, 58.17.033 or 58.17.170.
- Development that creates no added impact on public facilities.
- Expansions of existing development that were disclosed and tested for concurrency as part of the original application.

Goal # 2 – Public Facilities and Funding

Provide needed public facilities that are within the ability of the City to fund or within the City's authority to require others to provide.

Policies:

CF-12. Establish level of service standards that are achievable with the financing plan of this Capital Facilities Plan.

CF-13. Base the financing plan for public facilities on realistic estimates of current local revenues and external revenues that are reasonably anticipated to be received by the City.

CF-14. Match revenue sources to capital projects based on sound fiscal policies.

- The City shall continue to fund utility costs through utility enterprise funds, based on user fees and grants. Public facilities included in utilities are sewer, solid waste, storm drainage, and water.
- Where feasible pursue joint venture facility construction, construction timing, and other facility coordination measures for City provided facilities, as well as with school districts and other potential partners in developing public facilities.
- The City shall continue to assist through direct participation, LIDs and payback agreements, where appropriate and financially feasible. Where funding is available, the City may participate in developer-initiated facility extensions or improvements, but only to the extent that the improvements benefit the broader public interest and are consistent with the policies of this Capital Facilities Plan.

CF-15. If the projected funding is inadequate to finance needed public facilities and utilities based on adopted level of service standards and forecasted growth, the City will do one or more of the following to achieve a balance between available revenue and needed public facilities:

- Lower the level of service standards;
- Increase the amount of revenue from existing sources;
- Adopt new sources of revenue;

- Require developers to provide such facilities at their own expense; and/or
- Amend the Land Use Element to reduce the need for additional public facilities.

CF-16. Both existing and future development will pay for the costs of needed capital improvements.

- Ensure that existing development pays for capital improvements that reduce or eliminate existing deficiencies and pays for some or all of the cost to replace obsolete or worn-out facilities. Existing development may also pay a portion of the cost of capital improvements needed by future development. Existing development's payments may take the form of user fees, charges for services, special assessments, and taxes.
- Ensure that future development pays a proportionate share of the cost of new facilities that it requires. Future development may also pay a portion of the cost to replace obsolete or worn-out facilities. Future development's payments may take the form of voluntary contributions for the benefit of any public facility, impact fees, mitigation payments, capacity fees, dedications of land, provision of public facilities, and future payments of user's fees, charges for services, special assessments, and taxes.

CF-17. The City will determine the priority of public facility capital improvements using the following criteria as general guidelines. Any revenue source that cannot be used for the highest priority will be used beginning with the highest priority for which the revenue can legally be expended.

- Projects that eliminate hazardous conditions.
- Refurbishment of existing facilities that contribute to achieving or maintaining standards for adopted level of service.
- New or expanded facilities that reduce or eliminate deficiencies in level of service for existing demand.
- New or expanded facilities that provide the adopted level of service for new development and redevelopment during the next six fiscal years.
- Capital improvements that significantly reduce the operating cost of providing a service or facility, or otherwise mitigate impacts of public facilities on future operating budgets.
- Capital improvements that contribute to stabilizing and developing the economy of the City.
- Project priorities may also involve additional criteria that are unique to each type of public facility, as described in other elements of this Comprehensive Plan.

CF-18. Ensure that the ongoing operating and maintenance costs of a capital facility are financially feasible prior to constructing the facility.

Goal # 3 – Public and Environmental Health

Protect public health, environmental quality, and neighborhood stability and viability through the appropriate design and installation of public facilities.

Policies:

CF-19. Promote conservation of energy, water and other natural resources in the location and design of public facilities.

CF-20. Require the separation of sanitary and storm sewer facilities wherever combined sewers may be discovered.

CF-21. Practice efficient and environmentally responsible maintenance and operating procedures.

CF-22. The siting, design, construction and improvement of all public buildings shall be done in full compliance with the Americans with Disabilities Act (ADA).

CF-23. Promote economic and community stability and growth through strategic investments in public facilities and public/private partnerships.

Goal # 4 – Community Benefits of Public Facilities

Provide public facilities that provide a sense of community that is inclusive of diverse populations.

Policies:

CF-24. Contribute to community pride and foster a sense of community through provision of public facilities that create a community-gathering place for neighbors, family and friends.

CF-25. Through provision of public facilities, offer a broad range of activities promoting social interactions especially with new residents.

CF-26. Provide maximum flexibility and multiple uses through design of public facilities that are adaptable to changing interests.

CF-27. Provide a community center facility that is financially feasible, affordable for participants, and can generate revenue to offset a portion of the operating costs.

Goal # 5 – Consistency with Other Adopted Plans

Make the Capital Facilities Plan consistent with other elements of the comprehensive plan, and with other city, county, regional and state adopted plans.

Policies:

CF-28. Ensure that the growth and development assumptions used in the Capital Facilities Plan are consistent with similar assumptions in other elements of the comprehensive plan.

CF-29. Coordinate with non-city providers of public facilities on a joint program for maintaining applicable level of service standards, concurrency requirements, funding, and construction of public facilities.

Goal #6 - Public and Institutional Buildings

To site public and institutional buildings in accord with their service function and the needs of the members of the public served by the facility.

Policies:

CF-30. All “people-oriented” City facilities should be located near high-amenity sites. Les Grove Park and downtown are particularly appropriate sites for senior services, community centers, libraries, museums, etc.

CF-31. City park buildings should be developed in accordance with the Parks, Recreation, and Open Space Element.

CF-32. Public and institutional facilities should incorporate practices that reduce energy consumption, reduce the emission of greenhouse gases, conserve water, provide electric vehicle infrastructure, and preserve native vegetation.

CF-33. Public and institutional facilities that attract a large number of visitors (City Hall, museums, libraries, educational facilities, permit and license offices, health and similar facilities, etc.) should be sited in areas that are accessible (within 1/4 mile) by transit.

CF-34. The City shall encourage other agencies to follow these siting principles in considering new sites for public buildings.

CF-35. The location of religious institutions, private schools, community centers, parks and similar public or institutional facilities shall be related to the size of the facility and the area served. Citywide facilities should be sited in visible and accessible locations.

CF-36. Small public or institutional facilities intended to serve one or two residential neighborhoods may be located within a neighborhood. Larger public or institutional facilities intended to serve mainly Auburn residents or businesses shall be located along major arterial roads within the community-serving area of Auburn; however, elementary schools should be given flexibility to locate along smaller roads. Buffering from adjacent land uses may be required.

CF-37. The location of utility facilities is often dependent upon the physical requirements of the utility system. Sewage lift stations, pump stations, water

reservoirs, and other similar facilities should be sited, designed, and buffered (through extensive screening and/or landscaping) to fit in harmoniously with their surroundings. When sited within or adjacent to residential areas, special attention should be given to minimizing noise, light, and glare impacts.

CF-38. Public facilities of an industrial or heavy commercial character should be confined to the region-serving area of Auburn, unless no other reasonable siting opportunity exists, in which case siting still must comply with applicable zoning standards. Examples of such facilities are the City maintenance and operations facility, state and regional solid waste facilities, and the Auburn School District bus barn.

CF-39. The siting and relocation of City maintenance and operation facilities shall be responsive to growing demands for utility, transportation, and fleet services, and shall also account for the City's role in emergency preparedness and response.

Goal # 7 - Essential Public Facilities

Essential public facilities include those facilities that are typically difficult to site such as airports, state education facilities, state or regional transportation facilities as defined in RCW 47.06.140, state and local correctional facilities, solid waste handling facilities, and in-patient facilities including substance abuse facilities, mental health facilities, group homes, and secure community transition facilities as defined in RCW 71.09.020."

More generally, essential public facilities are facilities, conveyances, or sites that meet the following definition: (1) the facility, conveyance or site is used to provide services to the public; (2) these services are delivered by government agencies, or private or nonprofit organizations that are under contract to or with substantial funding from government agencies, or by private firms or organizations subject to public service obligations; and (3) the facility or use of the site is necessary to adequately provide a public service.

The Growth Management Act requires that a local comprehensive plan include a process for siting essential public facilities. The Growth Management Act includes these provisions because siting certain public facilities has become difficult due to the impacts many of these facilities have on the adjacent community. Many factors contribute to this problem, including increased demand for facilities to serve a growing population, increased competition for land as the state becomes more urbanized, problems with siting processes, and judicial decisions that compel jurisdictions to provide certain facilities. By including a process for siting essential facilities in the Comprehensive Plan, deficiencies in the siting process can be minimized.

This section contains Auburn's process for siting essential public facilities. This is an interim process until development regulations are incorporated into city code.

When that process is developed, Auburn may modify these procedures to reflect the Council's recommendation.

Policies:

CF-40. Essential Public Facility Siting Process.

1. The City will review proposals through the process outlined in Policies 3 through 8 below, if the essential public facility largely serves a regional, countywide, statewide, or national need, and is included in a policy sense within an adopted state or regional plan that meets both of the following criteria:

a. The state or regional plan was developed through an appropriate public process (including at least one local public hearing) and has undergone a NEPA and/or SEPA review.

b. A clear policy statement supporting the type of facility proposed must be included. The plan should also include, in a policy sense, a set of siting guidelines to be used for such a facility. Such criteria may include but are not limited to the type and sufficiency of transportation access, colocation requirements, preferred adjacent land uses, on- or off-site security and/or mitigation, and required public facilities and services.

2. If the essential public facility largely serves a regional, countywide, statewide or national need and is not part of an adopted state or regional plan, the proponent will be required to request that the appropriate state or regional plan be amended to include the proposal meeting the criteria contained in Part 1 above. The proposal will also be reviewed following the process outlined in Parts 3 through 8.

Essential Public Facilities of a regional, countywide, statewide, or national nature:

3. Essential public facilities of a regional, countywide, statewide or national nature will be reviewed by the City through the special area plan process. The boundaries of the special area plan will be set at a scale directly related to the size and magnitude of the proposal. For facilities of regional, state, and national need, an alternative analysis will be performed, but will not be limited to, the guidelines described in Part 1 above. Auburn staff shall participate in the review process of Part 1 above, and use the data, analysis, and environmental documents prepared in that process to aid the City's special area plan review, if Auburn determines that those documents are adequate. If the facility requires other development permits, those approvals also shall be considered within the review process.

4. Impacts of the proposed essential public facility must be identified and an appropriate mitigation plan developed. Unless otherwise governed by state law, the financing strategy for the mitigation plan shall be structured so that the costs of the plan shall be allocated proportionally on a benefit basis using nonlocal sources of funding, although local sources of funding may also be used.

5. The special area plan process to be used for essential public facilities of a regional, countywide, statewide or national nature shall follow the City's Comprehensive Plan amendment process that includes multiple opportunities for public involvement.

6. An analysis of the facility's impact on City finances shall be undertaken. If the study shows that locating a facility in a community would result in a disproportionate financial burden on the City of Auburn, an agreement with the project's proponents must be executed to mitigate the adverse financial impact or the approval shall be denied.

Essential Public Facilities of primarily local nature:

7. If the essential public facility meets largely local needs (for example, in-patient facilities, including substance abuse facilities, mental health facilities and group homes), the facility shall be considered based upon Section 8 below.

All Essential Public Facilities:

8. The following criteria shall be used to evaluate all applications to site essential public facilities:

a. Whether there is a public need for the facility

b. The impact of the facility on the surrounding uses and environment, the City and the region

c. Whether the design of the facility or the operation of the facility can be conditioned, or the impacts mitigated, in a manner similar to those used in traditional private development, in order to make the facility compatible with the affected area and the environment

d. Whether a package of mitigating measures can be developed that would make siting the facility within the community more acceptable.

e. Whether the factors that make the facility difficult to site can be modified to increase the range of available sites or to minimize impacts on affected areas and the environment.

f. Whether the proposed essential public facility is consistent with the Auburn Comprehensive Plan.

g. Essential public facilities shall comply with any applicable state siting and permitting requirements (e.g., hazardous waste facilities).

h. Whether the State proves by clear, cogent, and convincing evidence that (1) a sufficient and reasonable number of alternative sites have been fully, fairly, and competently considered, and (2) such sites were found to be unsuitable for an SCTF for reasons other than the cost of property.

i. Whether careful analysis has been completed to show that siting of the facility will have no undue impact on any one racial, cultural, or socioeconomic group, and that there will not be a resulting concentration of similar facilities in a particular neighborhood, community, jurisdiction or region.

CF-41. The Planning Director or designee shall determine whether a development application will result in a significant change of use or a significant change in the intensity of use of an existing essential public facility. If the Planning Director or designee determines that the proposed changes are significant, the proposal will be subject to the essential public facility siting process as defined in Goal #4, Policy CF-10. If the Planning Director or designee determines that the proposed changes are insignificant, the application shall be reviewed through the City's standard development review procedures. The Planning Director or designee's determination shall be based upon:

a. The proposal's impacts on the surrounding area.

b. The likelihood that there will be future additions, expansions, or further activity related to or connected with the proposal.

CF-42. One of the difficulties of siting essential public facilities is that they are allowed in some but not all appropriate areas. To help address this problem, Auburn shall allow essential public facilities in all zones where they would be compatible. The types of facilities that are compatible will vary with the impacts likely from the facility and the zoning district. Essential public facilities are likely most compatible in the M-2 Heavy Industrial Zoning District. Uses within the zone may generate more externalities to the surrounding area.

CF-43. Essential public facilities shall be allowed in those zoning districts in which they would be compatible, and impacts can be mitigated. In situations where specific development standards cannot be met, but it is determined that the facility can be made compatible, the City Council can waive those specific standards with the requirement that appropriate mitigation is provided. The M-2 Zoning District should include broad use categories that allow all essential public facilities that are difficult to site as permitted or conditional uses as appropriate.

CF-44. Essential public facilities should be equitably located throughout the City, county and state. No jurisdiction should absorb a disproportionate share.

CF-45. Essential public facilities of a regional, countywide, statewide, or national nature should be restricted to the region-serving area of Auburn. Such facilities should be located in relationship to transportation facilities in a manner appropriate to their transportation needs. Extensive buffering from adjacent uses may be required. Facilities that generate a significant amount of truck traffic should be located such that they are served by existing truck routes or mitigation provided to address impacts on the street network.

CF-46. Infrastructure investments should consider equity and plan for any potential displacement impacts.

City of Auburn

Utilities Element

Table of Contents

Intent of the Utilities Element 1
Values 1
City-Owned and Operated Utilities 1
Introduction 2
Conditions and Trends 2
Utility Services 2
Sewer Systems 6
Private Utilities 10
Introduction 10
Vision 10
Electricity and Natural Gas 10
Telecommunications 11
Solid Waste 12
Goals and Policies 12

Intent of the Utilities Element

The Utilities Element required by the Department of Commerce per RCW 36.70A.070, and consists of the general location, proposed location, and capacity of all existing and proposed utilities including electrical, telecommunications, and natural gas systems. This Element generally describes these "privately-owned" services, and solid waste services, provided within the city, however Auburn does not own or operate these services and relies on outside service providers such as Puget Sound Energy and Waste Management to provide these services.

This Element includes descriptions those "privately-owned" utilities note above as well as summaries of city-owned and operated utilities such as water, sewer, and stormwater. Detailed information for both privately-owned and city-owned utilities can primarily found in the Water, Sewer, and Stormwater Systems Plans adopted by the City and that are incorporated by reference in the Comprehensive Plan, and by contacting privately-owned utility providers.

Values

Character: Private utilities will provide a positive contribution to the quality, aesthetics, and functionality of the community.

Wellness: Utility infrastructure and systems support the delivery of safe and efficient electricity, gas, and telecommunications.

Service: Utility infrastructure and systems support the City's goals of providing accessible and transparent government services and processes.

Economy: Businesses are served by utility infrastructure meeting or exceeding the needs for market entry and future growth.

Celebration: Telecommunication systems are fully utilized to reach a broader cross-section of the community in a way that brings people together for civic activities, cultural events, and social awareness.

Environment: Siting, installation, and maintenance of utilities will ensure protection, preservation, and respect of the wildlife habitat, water quality, and environmentally sensitive features.

Sustainability: When designing, constructing, and maintaining utilities, a long-term investment horizon is favored over concepts that only provide short-term benefits and outcomes.

City-Owned and Operated Utilities

Introduction

This section provides overall policy direction for the different utility services provided by the city, including water, sewer, and stormwater facilities. A key provision of the Growth Management Act is concurrency. In general, concurrency seeks to ensure that development is permitted only if adequate public facilities are, or can be guaranteed to be, available to support new development. Concurrency requires that facilities needed to maintain a locally adopted level of service be provided "concurrently" with development. Concurrency places the finance function of local government in a much more prominent role in the land use development process. While the concept of concurrency is new to many jurisdictions, it has been used in Auburn since the adoption of its 1986 Comprehensive Plan.

Conditions and Trends

Accommodating Growth

The provision and sizing of public facilities such as streets or waterlines and sewer lines can influence the rate or timing of development and is an important means of managing growth. Timed provision of facilities also ensures that new development can be assimilated into the existing community without serious disruptions or adverse impacts. This Plan establishes policies to allow development when and where all public facilities are adequate or can be made adequate, but only if such development can be adequately served by public facilities and services consistent with the adopted level-of-service standards.

Utility Services

The following services are owned and operated by the City of Auburn.

Water System

The City of Auburn (City) manages the water utility in accordance with established water- system policies that govern various facets of utility operations. City policies are established by the City in order to provide a vision or mission of the water utility and to provide a framework for the design, operation, and ongoing wellbeing of the City's water utility.

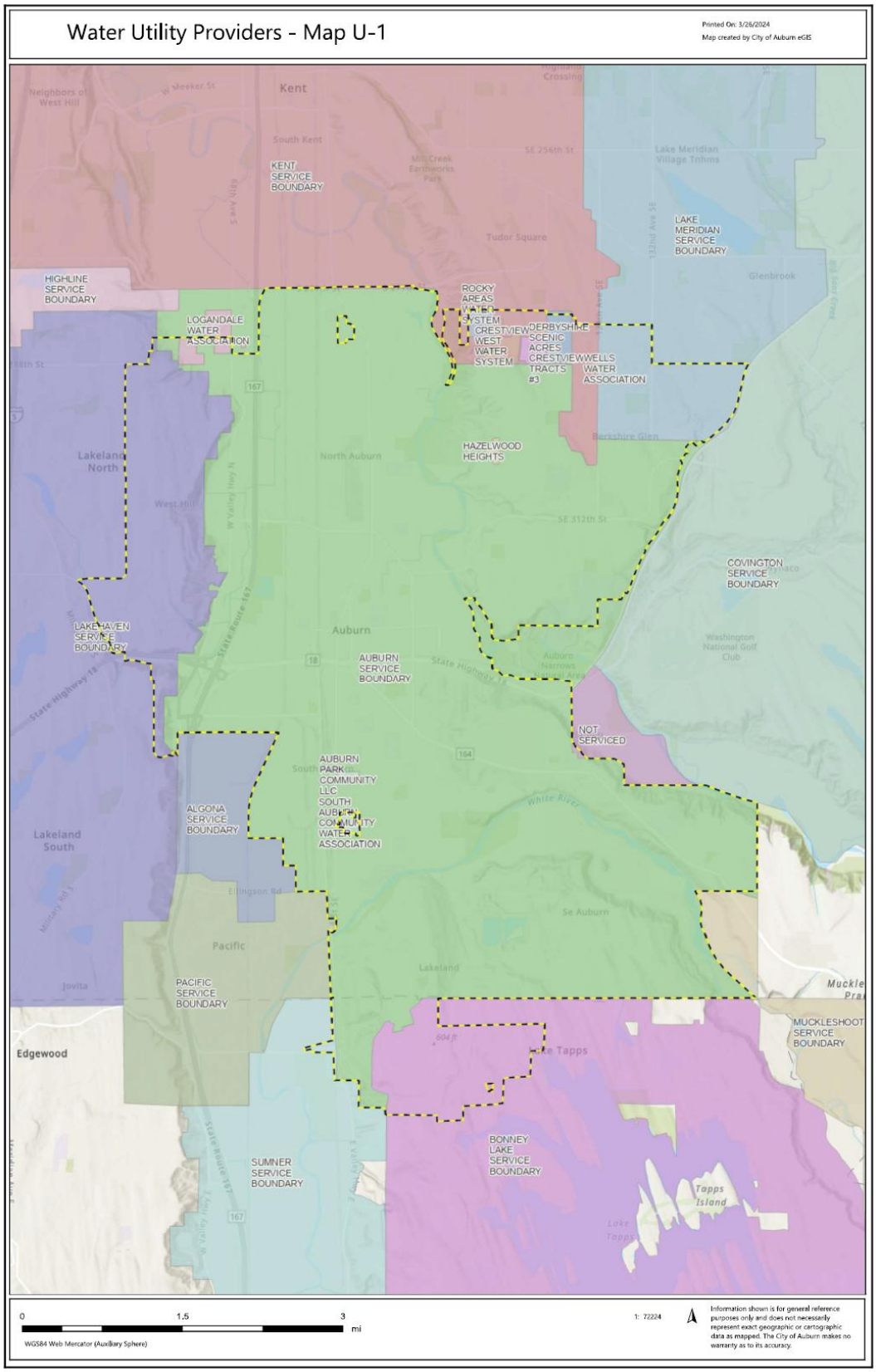
The policies included in this Water Comprehensive Plan are developed specifically for the City's multi-source municipal water system and seek to provide consistent treatment to all utility customers and to provide documentation to current water-system customers as well as those considering service from the City. It should be noted that what is included in these policies is limited to those things related to the water system and its design, maintenance, and operation. There are other policies and criteria that pertain to the water utility the City has in place regarding land use, development, and financial components, which are not directly addressed in this

plan, that could still have an impact on the needs of the water system. These policies and criteria may include factors such as zoning regulations, building codes, infrastructure requirements, and financing options. These additional factors will be considered when planning for the water system, to meet the needs of the community in a sustainable and effective matter.

The City's Water Comprehensive Plan is based upon the following mission statement for the water utility: "The City will provide for the efficient, environmentally sound and safe management of the existing and future water system within Auburn's service area."

- The City's Water utility policies are grouped within goal statements that are headlined under the following categories:
- Business Practices
- Service Area
- Operations and Maintenance
- Financial
- Planning
- Environmental Stewardship
- Design and Construction

Map U-1 – Water Utility Providers


Water Utility Providers - Map U-1
Printed On: 3/26/2024
Map created by City of Auburn eGIS
Kent
KENT SERVICE BOUNDARY
HIGHLINE SERVICE BOUNDARY
LOGANDALE WATER ASSOCIATION
ROCKY AREAS WATER SYSTEM
CRESTVIEW WEST WATER SYSTEM
DERBYSHIRE SCENIC ACRES CRESTVIEW TRACTS #3
WELLS WATER ASSOCIATION
LAKE MERIDIAN SERVICE BOUNDARY
HAZELWOOD HEIGHTS
COVINGTON SERVICE BOUNDARY
LAKE HAVEN SERVICE BOUNDARY
AUBURN SERVICE BOUNDARY
NOT SERVICED
AUBURN PARK COMMUNITY LLC
SOUTH AUBURN COMMUNITY WATER ASSOCIATION
ALGONA SERVICE BOUNDARY
PACIFIC SERVICE BOUNDARY
MUCKLESHOOT SERVICE BOUNDARY
BONNEY LAKE SERVICE BOUNDARY
SUMNER SERVICE BOUNDARY
Auburn
Lakeland North
Lakeland South
Pacific
Edgewood
Tapps Island
0
1.5
3
mi
WGS84 Web Mercator (Auxiliary Sphere)
1: 72224
Information shown is for general reference purposes only and does not necessarily represent exact geographic or cartographic data as mapped. The City of Auburn makes no warranty as to its accuracy.

Stormwater Systems

This chapter describes a set of overarching goals for the City's Storm Drainage Utility and policies for complying with these goals.

UE-83 City Comprehensive Plan Consistency

The City Comprehensive Plan is the City's growth management plan and contains policies for protecting critical areas and natural resource lands, designating urban growth areas, preparing comprehensive utility plans, and implementing them through capital investments and development regulations. Therefore, the City Comprehensive Plan provides a framework of policies for development, expansion, and maintenance of the Storm Drainage Utility reflected in this Storm Drainage Comprehensive Plan.

UE-84 Storm Drainage Comprehensive Plan Policy Goals

The City's Storm Drainage Utility policies are grouped within goal statements that are headlined under the following categories:

- System Planning
- Operations and Maintenance
- Fiscal Responsibility
- Environment and Regional Coordination

Taken together with the City Comprehensive Plan and Auburn City Code (ACC) these goals define how the Storm Drainage Utility shall be operated and maintained. Several policies have been developed within each goal, many of which are also based on the Washington Department of Ecology Stormwater Management Manual (SWMMWW) and the City's Phase II National Pollutant Discharge Elimination Stormwater Permit (NPDES).

Sewer Systems

The City desires to employ recognized best business practices that result in an efficient and cost-effective operation of the Sanitary Sewer Utility. The City shall identify the key business functions within the Sanitary Sewer Utility (e.g., billing, permitting, asset management, and planning) and develop supporting best business practices for each.

The City understands that defining and implementing best business practices is a long-term effort and will require a stepwise approach. Given that the Sanitary Sewer Utility is made up largely of physical assets that have the greatest value and deserve the greatest commitment to operate and maintain, the City shall continue to prioritize the business practice of asset management.

Asset management is a systematic approach to maintaining assets in good working order to minimize future costs of maintaining and replacing them, especially to avoid costly deferred maintenance. The best practices for asset management involve systematically basing choices on an understanding of asset condition and performance, risks, and costs in the long term. Asset best practices include:

- Having extensive knowledge about assets and their costs for maintenance and replacement (i.e., detailed inventories);
- Maintaining Levels of Service;
- Taking a life-cycle approach to asset management planning; and
- Implementing the planned solutions to provide a reliable, cost-effective service.

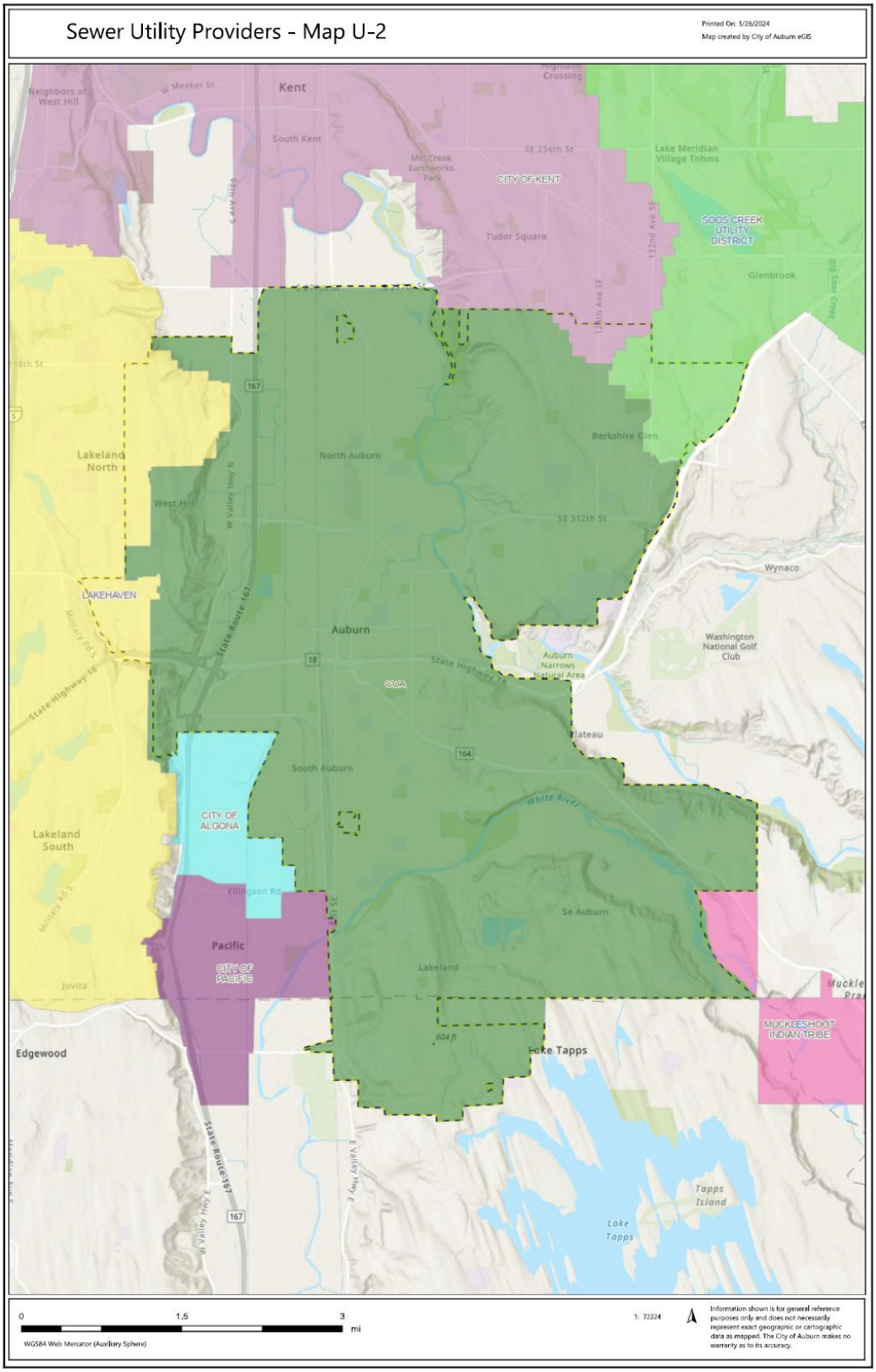
Since the adoption of the 2016 Comprehensive Sewer Plan, the Sanitary Sewer Utility has compiled an inventory of assets and their conditions for approximate 70% of its currents assets. The Sanitary Sewer Utility shall continue implementing the above best practices during the next planning period.

Sewer Comprehensive Plan Policies, Standards, and Guidelines

This Plan presents policies and standards related to system development, maintenance, funding, and generally how the Sanitary Sewer Utility should operate. These policies define limits and outline how the wastewater collection system should be operated and maintained and are grouped within goal statements that are headlined under the following categories:

- Service Area
- System Planning
- Operations and Maintenance
- Environmental Stewardship
- System Performance and Reliability
- Fiscal Responsibility

Map U-2 – Sewer Utility Providers


Sewer Utility Providers - Map U-2
Printed On: 3/26/2024
Map created by City of Auburn eGIS
Kent
South Kent
CITY OF KENT
SOOS CREEK UTILITY DISTRICT
Tudor Square
Glenbrook
Lake Meridian Village Tnhms
Mill Creek Earthworks Park
Neighbors of West Hill
Highland Crossing
SE 256th St
132nd Ave SE
Lakeland North
North Auburn
Berkshire Glen
West Hill
W Valley Hwy N
SE 312th St
LAKEHAVEN
Auburn
State Route 167
State Highway 18
Military Rd S
Wynaco
Washington National Golf Club
Auburn Narrows Natural Area
COA
Plateau
South Auburn
CITY OF ALGONA
White River
Lakeland South
Ellingson Rd
Se Auburn
Pacific
CITY OF PACIFIC
Lakeland
Jovita
Edgewood
Lake Tapps
MUCKLESHOOT INDIAN TRIBE
Tapps Island
Lake Tapps
E Valley Hwy E
0
1.5
3
mi
WGS84 Web Mercator (Auxiliary Sphere)
1: 72224
Information shown is for general reference purposes only and does not necessarily represent exact geographic or cartographic data as mapped. The City of Auburn makes no warranty as to its accuracy.

Private Utilities

Introduction

The Growth Management Act requires the City of Auburn to include a Private Utilities Element within its Comprehensive Plan. The element should pro- vide a framework for the efficient and predictable provision and siting of utility facilities and ser- vices within the City, consistent with each serving utility's public service obligations. This element covers private utilities (those not provided by the City of Auburn), and includes electricity, telecommunications, and natural gas. City-owned water, sewer, and stormwater utilities are described within the Capital Facilities Element (Chapter 3) of this Comprehensive Plan.

Investor-owned utilities in the state of Washington are regulated by the Washington Utilities and Transportation Commission. State law regulates the rates, charges, services facilities, and practices of utilities. Any changes in policies of these aspects of utility provision require WUTC approval.

The primary responsibility for the planning of private utilities rests with utility providers. Clearly, however, planning cannot take place without open lines of communication between the City and utility providers. The City acknowledges that some private utility providers are not willing to provide capacity or future construction plans, as some of this information may affect their competitiveness or be considered proprietary. Private utilities, however, must recognize that not pro- viding relevant information may hinder the City's ability to assist them in their projects.

Vision

Private utilities in Auburn are planned, designed, and constructed in a manner that adequately supports the future growth scenarios predicted in the City's Land Use Element and that meets the needs of residents, visitors, and businesses. Sustainability is a principle that guides decisions for where utilities are placed, how they are constructed, how they are operated and maintained, and how all aspects of design, construction, and operation are funded.

Electricity and Natural Gas

Puget Sound Energy provides electrical and natural gas service to the City of Auburn and its potential annexation area. PSE is an investor-owned private utility that provides service to approximately 1.2 million customers in a service area that covers 6,000 square miles.

Electricity

PSE builds, operates, and maintains an electrical system consisting of generation, transmission, and distribution facilities. Facility technology for electricity

transmission may change in the future in order to respond to the need for more efficient facilities, address various electromagnetic field and health concerns, and diversify resources. Utility policies should be updated in the future to consider changes in technology, facilities, and services.

Natural Gas

The Northwest Pipeline Corporation and Enumclaw Natural Gas also have gas lines in the southeastern portion of the City. Northwest

Pipeline Corporation's only customer in Auburn is Enumclaw Natural Gas. Enumclaw Natural Gas serves Auburn residential customers in the area of the Auburn Adventist Academy.

Telecommunications

Telecommunications includes a wide range of services including conventional telephone, cellular telephone, and cable television. Telecommunications technology continues to change rapidly. The City of Auburn owns and maintains a robust fiber optic Metropolitan Area Network (MAN) that connects most City owned building facilities and traffic signals throughout the Auburn area.

Conventional Telephone

Conventional local telephone service to the City is provided by CenturyLink. CenturyLink is a global provider of telecommunications services.

Calls are switched at facilities called central offices. Typically, four main lines leave each central office – one in each direction. Auburn's central office is located in downtown Auburn.

Several carriers provide long distance service to the area. These providers have underground fiber-optic cables passing through the City of Auburn.

Cellular Telephone

Cellular telecommunications provide mobile telephone communications via radios that send and receive signals from a network of receivers mounted on utility poles, towers, buildings, or other structures on private property or within a right-of-way. Cellular communication companies offer digital voice, messaging, and high-speed wireless data services to customers.

Cellular telephone service within the City, its potential annexation areas, and the Puget Sound region overall is provided by multiple private companies. Cellular providers are regulated by the Federal Communications Commission. Technology and business practices in the area of telecommunications continue to change rapidly.

Cable Television

Cable television service is provided by Comcast through a combination of aerial and underground cables. The locations of existing and planned cable lines are shown on Map 6.4.

Solid Waste

The City of Auburn contracts with WM for collection of municipal garbage, recycling, and yard waste. Waste Management disposes of Auburn's garbage at a King County Solid Waste transfer station. Recycling is processed at WM's material recycling facility in Tacoma, WA. WM takes the yard and food waste to either DTG in Tacoma, WA or Cedar Grove in Maple Valley, WA to be converted into compost. There is a small area of Auburn that was recently annexed. This area is serviced by Republic Services. Republic Services takes the garbage to a King County Solid Waste transfer station, the recycling is processed at their material recycling center in Seattle, WA, and yard and food waste is taken to Cedar Grove in Maple Valley, WA. There are approximately 20,200 Waste Management accounts as of 2024.

Goals and Policies

Goal # 1 – Service Area

Allow the development of private utilities to meet the needs of the existing community and provide for its planned growth consistent with serving utilities' public service obligations.

Policies:

U-1. Private utility providers will utilize the City's Comprehensive Plan Map for guidance regarding future land uses and intensities in order to determine and plan for future service. Private utility facilities and systems should be consistent with the uses and densities allowed by the Comprehensive Plan and Zoning Code. The City will make this information easily available to utility providers. The City will also coordinate with utility providers on pending development proposals (both public and private). In return, the City expects a cooperative posture toward coordinated and timely expansion of infrastructure.

U-2. Private utility companies should strive to provide utility services to all segments of the Auburn population and areas of the community in an equitable manner that prioritizes easy access and that offers pricing structures that strive to reduce barriers that otherwise exclude portions of the community.

U-3. Construction of facilities and provision of services by private utility providers within the City of Auburn shall be in compliance with all of the goals and policies of this Comprehensive Plan.

Goal # 2 – Compatibility in the Community

Prioritize visual quality of private utility facilities consistent with the serving utilities' public service obligations.

U-4. The City shall require that new private utility distribution, service, and telecommunication lines be located underground within all new developments. The City will also work with utility companies to relocate existing distribution, service, and telecommunication lines underground as a part of new development whenever it is technologically feasible, and as part of City capital roadway projects whenever it is economically and technologically feasible. Expansions and upgrades completed by private utilities will be required to be underground unless they meet appropriate exemptions.

U-5. To reduce visual clutter, antennas, relay mechanisms, and similar structures should be located on existing poles, structures, or buildings whenever possible. When deemed feasible and necessary to minimize impacts on adjacent uses or views by the City, visual screening may be required.

U-6. The location of utility facilities is often dependent upon the physical requirements of the utility system. All utility facilities should be sited, designed, and buffered (through extensive screening and/or landscaping) to fit in with their surroundings harmoniously and safely. When sited within or adjacent to residential areas, special attention should be given to minimizing noise, light, and glare impacts.

U-7. Utility service boxes and cabinets should be designed, oriented and/or treated with in a manner intended to reduce the likelihood of graffiti tagging, contribute to Auburn's arts and culture programming, and to enhance the overall appearance of the community.

U-8. Generator and back up generators that are located within residential areas should be visually screened and incorporate techniques that mitigate noise impacts consistent with local and state requirements.

U-9. Substations and maintenance buildings within residential areas should be screened, landscaped and/or designed in a manner that provides visual compatibility.

Goal # 3 – Safety and Efficiency

Prioritize the safe and efficient installation, maintenance and operation of private utility facilities consistent with the serving utilities' public service obligations.

Policies:

U-10. Common utility trenches should be encouraged and coordinated by both private and public providers whenever possible.

U-11. Decisions regarding private utility facilities within Auburn should consider the safe, adequate, and efficient availability of these utilities to other jurisdictions.

Goals # 4 – Sustainability and Equity

Prioritize equitable access to the services offered by private utility facilities and ensure that the location, installation and maintenance of private utilities is carried our in an environmentally sensitive manner.

Policies:

U-12. The City shall consider the environmental impacts of proposed utility facilities as a part of its environmental review process. When requested by the City, the utility provider shall furnish documentation of current research results and/or provide additional information related to determination of the potential environmental impacts, if any, from the proposed facilities.

U-13. Private utility companies are recognized as providers of important services necessary for maintaining current and future lifestyles as well as contributing to equitable community outcomes.

U-14. Private utilities that are permitted to operate within Auburn offer various technological means for accessing information, education, services, and assistance. Because Auburn believes that all residents should be afforded equal access to education, information and services private utility providers should seek to recognize and reduce access barriers.

Table 1 - List of Utility Providers

Provider	Contact Info	Map #
City of Auburn Water	Customer Service Center 1 East Main Street 2nd Floor Auburn, WA 98002 253-931-3010	U-1
Lakehaven Water and Sewer	31627A 1st Ave S P.O. Box 4249 Federal Way, WA 98063 253-941-1516	U-1
Lake Meridian Water	27224 144th Ave SE Kent, WA 98042 253-631-3770 Office	U-1
City of Kent Water	Kent City Hall 220 4th Ave S, Kent, WA 98032 253-859-3373	U-1
Bonney Lake Water	Public Services Center 21719 96th ST E Buckley, WA 98321 253-447-4319	U-1
Logandale Water Assoc.	PO Box 1254 Auburn, WA 98071	U-1
Hazelwood Heights Water Assoc.	30224 108TH Ave SE	U-1

	Auburn, WA 98092	
Rocky Acres Water System	28120 105TH Ave SE Auburn, WA, 98092-4075	U-1
Crestview West Water System	PO Box 194 Kent, WA 98035-0194	U-1
Crestview Tracts Water System	11237 SE 286th St Auburn, WA 98092	U-1
Derbyshire Scenic Acres Water System	11628 SE 282ND ST Auburn, WA 98092-4051	U-1
Wells Water Assoc.	28804 124th Ave SE Auburn, WA 98092	U-1
Auburn Park Community Assoc.		U-1
South Auburn Community Assoc.	3005 C ST SE Auburn, WA 98002-8829	U-1
City of Auburn Sewer	Customer Service Center 1 East Main Street 2nd Floor Auburn, WA 98002 253-931-3010	U-2
Lakehaven Water and Sewer	31627A 1st Ave S P.O. Box 4249 Federal Way, WA 98063 253-941-1516	U-2
City of Kent Sewer	Kent City Hall 220 4th Ave S, Kent, WA 98032 253-859-3373	U-2
Soos Creek Water and Sewer District	14616 SE 192nd St Renton, WA 98058 253-630-9900	U-2
City of Auburn Stormwater	Customer Service Center 1 East Main Street 2nd Floor Auburn, WA 98002 253-931-3010	N/A – Consistent with City boundary
Puget Sound Energy – Electricity and Gas	www.pse.com 1-888-321-7779	N/A – Consistent with City boundary
Comcast	www. business.comcast.com 1-855-237-7896	N/A – Consistent with City boundary

Goal # 4 - Solid Waste

To provide area residents and businesses with a universal and compulsory system for collection and disposal of all solid waste, including ample waste reduction and recycling opportunities intended to maximize diversion of the City's waste stream away from costly landfills, incineration, or other solid waste disposal facilities, and to conserve exhaustible resources.

Policies:

U-15. The King County Solid Waste Management Plan and Solid Waste Interlocal Forum, except as modified by City of Auburn Ordinance No. 4413 and this Plan shall form the basis for solid waste management activities within the City.

U-16. The City shall continue to fund solid waste collection, disposal and waste reduction and recycling programs and services through the existing solid waste utility, with supplemental funding provided through available grants.

U-17. The City shall implement solid waste management programs and services that provide ample opportunities and incentives to maximize the community's participation in local and regional waste reduction and recycling efforts.

U-18. The City's solid waste management programs shall be developed to make waste reduction and recycling efficient, reliable, cost-effective, and convenient for all residents and businesses.

U-19. The City encourages and should promote the use of products manufactured from recycled materials, and the use of materials that can be recycled. City Departments and contractors shall use recycled and recyclable products whenever and wherever feasible.

U-20. The City shall implement solid waste reduction and recycling programs that have the cumulative effect maintaining the 50 percent waste reduction and recycling goal (recycling tons/total solid waste stream).

U-21. The City shall periodically monitor and evaluate the effectiveness of Auburn's waste reduction and recycling programs to ensure that local and state goals and policies are being met.

U-22. The City shall promote the recycling of solid waste materials by providing opportunities for convenient recycling and by developing educational materials on recycling, composting and other waste reduction methods.

City of Auburn

Transportation Element

Table of Contents

Introduction....1
Vision....1
Planning Framework....1
Growth Management Act (GMA) and Puget Sound Regional Council (PSRC) Requirements....1
How the City Uses the Plan....2
Land Use Characteristics and Transportation Systems....4
Goals and Policies....6

Introduction

The transportation system is a vital component of Auburn's social, economic, and physical structure. The primary purposes of the transportation system is to support the movement of people and goods within the City and connect the City to the broader region. The transportation system influences patterns of growth, development, and economic activity by providing access to adjacent land uses. Planning for the development and maintenance of the transportation system is a critical activity promoting the efficient movement of people and goods, ensuring emergency access, and optimizing the role transportation plays in attaining other community objectives.

This chapter provides only a brief overview of the City's ***Comprehensive Transportation Plan***, located in Appendix G of the 2024 Periodic Comprehensive Plan.

Vision

The Comprehensive Transportation Plan reflects the current and future needs of the Auburn community and, in doing so, seeks to:

- Enhance the quality of life for all Auburn residents;
- Encourage healthy community principles through nonmotorized travel;
- Promote a transportation system that supports local businesses and enhances economic development opportunities;
- Create a transportation system that is efficient, uncomplicated, and welcoming to visitors; and
- Provide a balanced, multimodal transportation system that addresses both local and regional needs.

Planning Framework

The Comprehensive Transportation Plan (CTP) is the framework for transportation planning in Auburn. It functions as the overarching guide for changes to the transportation system. The CTP evaluates the existing system by identifying key assets and improvement needs. These findings are then incorporated into a needs assessment, which guides the future of the transportation system.

This CTP is multimodal, addressing multiple forms of transportation in Auburn including the street network, nonmotorized travel, and transit. Evaluating all modes enables the City to address its future transportation needs in a comprehensive and balanced manner.

Growth Management Act (GMA) and Puget Sound Regional Council (PSRC) Requirements

Washington State's 1990 Growth Management Act (GMA) requires that transportation planning be directly tied to the City's land use decisions and fiscal planning. This is traditionally accomplished through the adoption of the Transportation Element of the Comprehensive Plan. The City of Auburn is a member of the Puget Sound Regional Council (PSRC), the regions Metropolitan Planning Organization (MPO). As the MPO, PSRC is responsible for developing a long-range regional transportation plan and near-term regional transportation improvement program. PSRC establishes policies, procedures, and programs for award of Federal Highway Administration (FHWA) funding. PSRC has established requirements for agency comprehensive transportation plans that must be met to maintain eligibility for PSRC managed grant funding.

Transportation modelling and planning is consistent with the Land Use Element, including 2044 household and employment targets for both King and Pierce Counties.

How the City Uses the Plan

The Comprehensive Transportation Plan provides policy and technical direction for development of the City's transportation system through the year 2044. It updates and expands the 2015 Comprehensive Transportation Plan by recognizing network changes since the last plan, evaluating current needs, and identifying standards for future development and various infrastructure improvement scenarios.

Needs Assessment

A system-wide, multimodal needs assessment was conducted throughout plan development to ascertain which aspects of Auburn's existing transportation system work well and which ones need improvement. An evaluation of potential solutions and investment priorities was also conducted as part of this process. The end result is that Auburn has a more thorough understanding of system deficiencies, how best to address these deficiencies, and direction for expanding the system in a sustainable manner.

Multimodal Level of Service Standards

Prior to the 2024 Plan, as with comprehensive transportation plans for most other agencies in Washington, the City of Auburn's Comprehensive Transportation Plan only included LOS standards for motorized vehicles (vehicle LOS). Without adopted multimodal LOS standards (MMLOS), there were no metrics by which the effectiveness of the active transportation and transit systems could be measured and evaluated. With MMLOS, the City of Auburn can ensure that transportation system improvements are planned, funded, and implemented to develop a comprehensive, connected, and versatile transportation system. One of the main goals of MMLOS is to realize a transportation system that doesn't rely on adding more vehicular capacity alone to address growing needs to move people and goods. The MMLOS approach supports providing other transportation modes including walking, bicycling, and transit to address these needs. The City of

Auburn's MMLOS have been developed with the strategic and focused intent of maximizing potential mode shifts from driving cars to walking, biking, and riding transit. The standards work towards this by setting higher level of service standards for walking and biking in areas where doing so will best support existing and planned transit service.

These principles, many of which can be promoted by thoughtful transportation systems planning, encourage healthier communities by increasing physical activity and decreasing air pollution caused by vehicle emissions. Auburn has historically planned for a transportation system that incorporates many healthy community principles, such as transit facility planning and regional trail planning. In addition, the Downtown Plan calls for a mixed-use, high density, pedestrian-oriented downtown. In the future, Auburn shall continue to promote these principles through long-range planning efforts, capital facility improvements, development review, and community activities involving active lifestyle elements.

Capital Faciltites Plan and Transportation Improvement Program

The City uses the Transportation Improvement Program (TIP) and Capital Facilities Plan (CFP) to develop a financial plan for capital improvements in Auburn, thus enabling the City to fulfill the GMA requirement of having a multiyear financing plan based on the identified transportation needs. The TIP, is a financial planning tool used to implement the list of transportation improvement projects identified in the Transportation Plan. It is a six-year plan which is reviewed and updated annually by the City Council to reflect changes to project priorities and funding circumstances. The first three years of the plan are fiscally constrained. Traffic impact fees on new development are determined by the cost of the capacity projects included in the TIP. The Capital Facilities Plan is also an annually adopted six-year financing plan. However, it is fiscally constrained for all six years. Unlike the TIP, the CFP is an adopted element of the City’s Comprehensive Plan.

Agency Coordination

In addition to being influenced by factors within the City's jurisdiction, Auburn’s transportation system is influenced by what happens outside its jurisdiction and/or boundaries: growth in neighboring communities, infrastructure maintenance by regional agencies, the lack of funding for road maintenance, new capacity projects, and competing demands for transit service. The Plan calls for effective inter-jurisdictional actions to address cross-border issues and to mitigate the impact of new development. The Plan also recognizes that other jurisdictions, particularly state agencies and transit providers, are responsible for a major share of the transportation facilities serving Auburn. These jurisdictions include:

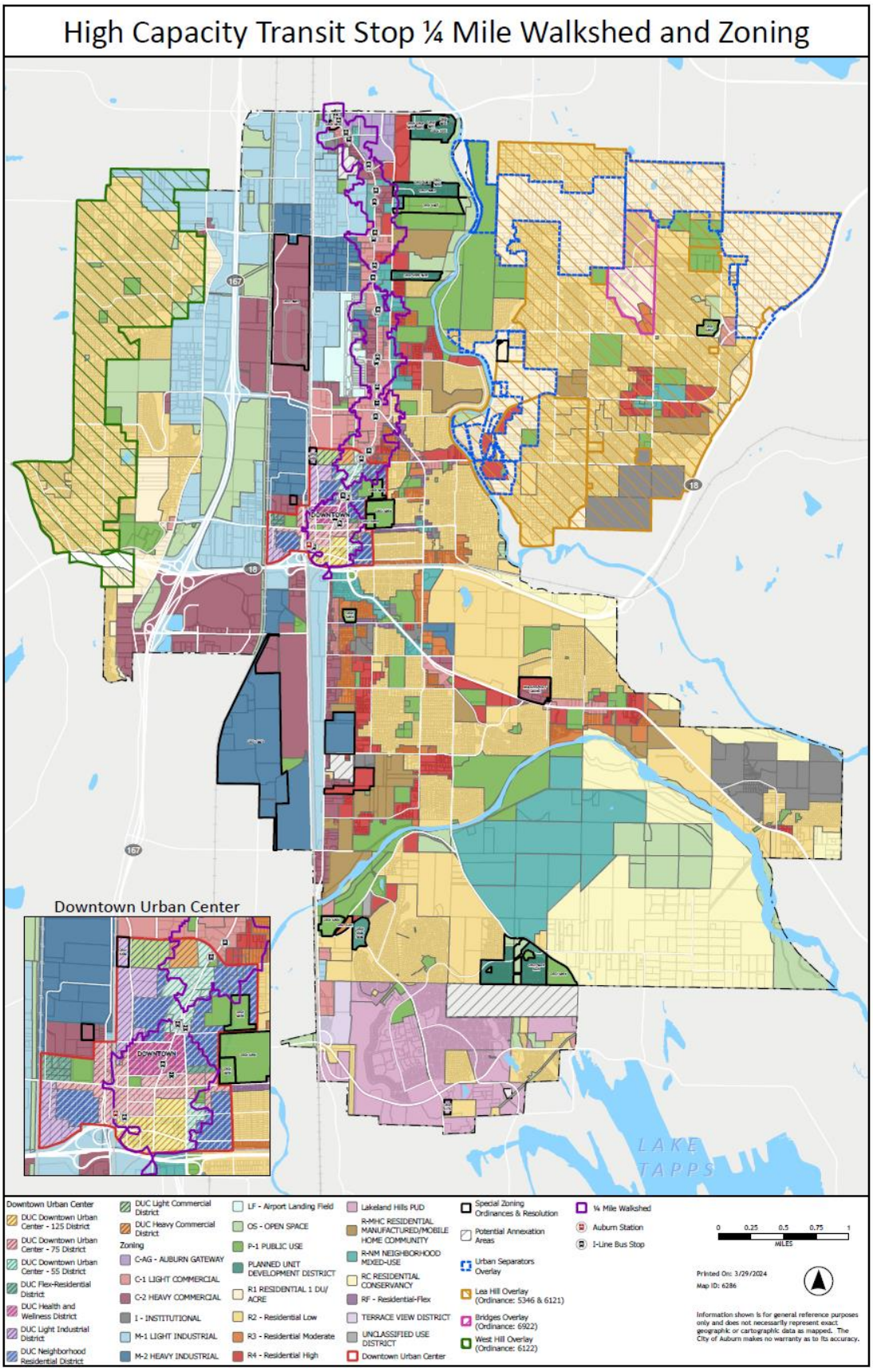
- Muckleshoot Indian Tribe (MIT)
- WSDOT
- Sound Transit
- King County Metro

- Pierce Transit
- King County
- Pierce County
- Puget Sound Regional Council (PSRC)
- Cities of Kent, Federal Way, Sumner, Pacific, Algona, and Bonney Lake

Land Use Characteristics and Transportation Systems

Based on the available land capacity as zoned in 2023, Auburn showed a deficit of capacity for both the 2044 housing unit and jobs targets. The future land use map developed with the 2024 Comprehensive Plan was developed to accommodate the 2044 housing and jobs targets through new zoning and land uses in various corridors and nodes throughout Auburn, and in the Downtown area in particular. Development of the future land use map involved evaluating alternative land use scenarios and testing them against various factors. Further information regarding this process is included in the Comprehensive Plan. This Comprehensive Transportation Plan is based on the Draft Preferred Land Use Alternative documented in the Comprehensive Plan. This land use alternative was a combination of two alternatives that each focused on centralizing housing and employment growth with either corridors or centers approach. Both alternatives included intense housing and employment growth focused in the Downtown area by expanding and increasing development density and intensity. The combined alternative targets employment and housing along the Auburn Way North and I Street NE corridors where frequent transit is planned to start operating in 2026. Focused growth in employment and housing was also identified at locations of known future development plans. These areas include the Outlet Collection Mall area along 15th Street SW, the Icon Materials mining operations and adjacent lands along the east side of Kersey Way (known as the Segale development area), and at vacant or underdeveloped land areas on Lea Hill and West Hill.

To comply with recent HB 1110 state legislation, middle housing is permitted in all residential zones in Auburn, which is incorporated into the Comprehensive Plan zoning map. Density increases in high-capacity transit station areas have also been assumed in the zoning map, which is implemented primarily by designated Growth Centers. Density has also been increased near future planned RapidRide high-capacity transit locations in Lea Hill and near the Outlet Collection. In addition, up to 6 middle housing units per lot will be permitted within ¼ mile of a high-capacity transit stop, which in Auburn includes future RapidRide I-Line stop locations as well as Auburn Station. The map below shows the area where the density bonus will be applied. Parking for middle housing is not required within ½ mile of these same stop locations. Middle housing considerations for density and parking is being addressed through updates to city code.


High Capacity Transit Stop ¼ Mile Walkshed and Zoning
Downtown Urban Center
DOWNTOWN
LAKE TAPPS
Downtown Urban Center
DUC Downtown Urban Center - 125 District
DUC Downtown Urban Center - 75 District
DUC Downtown Urban Center - 55 District
DUC Flex-Residential District
DUC Health and Wellness District
DUC Light Industrial District
DUC Neighborhood Residential District
DUC Light Commercial District
DUC Heavy Commercial District
Zoning
C-AG - AUBURN GATEWAY
C-1 LIGHT COMMERCIAL
C-2 HEAVY COMMERCIAL
I - INSTITUTIONAL
M-1 LIGHT INDUSTRIAL
M-2 HEAVY INDUSTRIAL
LF - Airport Landing Field
OS - OPEN SPACE
P-1 PUBLIC USE
PLANNED UNIT DEVELOPMENT DISTRICT
R1 RESIDENTIAL 1 DU/ ACRE
R2 - Residential Low
R3 - Residential Moderate
R4 - Residential High
Lakeland Hills PUD
R-MHC RESIDENTIAL MANUFACTURED/MOBILE HOME COMMUNITY
R-NM NEIGHBORHOOD MIXED-USE
RC RESIDENTIAL CONSERVANCY
RF - Residential-Flex
TERRACE VIEW DISTRICT
UNCLASSIFIED USE DISTRICT
Downtown Urban Center
Special Zoning Ordinances & Resolution
Potential Annexation Areas
Urban Separators Overlay
Lea Hill Overlay (Ordinance: 5346 & 6121)
Bridges Overlay (Ordinance: 6922)
West Hill Overlay (Ordinance: 6122)
¼ Mile Walkshed
Auburn Station
I-Line Bus Stop
0 0.25 0.5 0.75 1
MILES
Printed On: 3/29/2024
Map ID: 6286
Information shown is for general reference purposes only and does not necessarily represent exact geographic or cartographic data as mapped. The City of Auburn makes no warranty as to its accuracy.

Goals and Policies

The City creates policies to state preferences for preservation of the existing system and development of the future transportation system. Policies can be qualitative in nature, but often they are quantitative and prescribe a specific standard.

Policies are also important for communicating the City's values and needs to neighboring jurisdictions and regional and state agencies. Having established policies in place enables the City to more effectively influence change in keeping with its needs and objectives.

Goals and Policies are housed in the ***Comprehensive Transportation Plan***, located in Appendix G of the 2024 Periodic Comprehensive Plan.

City of Auburn

Parks and Recreation Element

Table of Contents

Introduction....1
Vision....1
Goals and Policies....1

Introduction

Adequate parks and recreation facilities are an essential amenity to maintain a suitable quality of life in the community. As the population of Auburn grows, the demand for its parks and recreational programs will increase. To maintain Auburn's quality of life, the supply of these parks and programs must keep pace with the demand placed on them by a growing population.

Open space also plays a key role in the quality of life in an area. While many understand the concept of the attraction of the western United States and its "open spaces," the concept of open space becomes less clear when it comes to open space and its appropriateness to a city such as Auburn. The policies below provide a definition of open space as applied to Auburn and its surroundings and provide a framework for the identification and preservation of these areas.

Vision

A diverse mix of park and recreation amenities, open spaces, and trails are distributed throughout the city and accessible to the majority of the population. Nonmotorized trails and paths connect residential neighborhoods, commercial centers, and other attractions. People are visiting Auburn because of the robust inventory and quality of park spaces and associated event programming. Community facilities are accessible and are serving the needs of our seniors, youth, and the rest of the community.

Goals and Policies

The mission of the Auburn Parks, Arts and Recreation Department is to "Protect the City of Auburn's natural beauty through a vibrant system of parks, open space, and trails while enhancing the quality of life for our residents by providing outstanding recreational and cultural opportunities."

The goals and policies outlined in this chapter were developed from the following resources:

- 2015 City of Auburn Park, Arts and Recreation Open Space Plan
- 2023 City of Auburn Parks, Recreation and Open Space Survey
- 2023 Washington State Statewide Comprehensive Outdoor Recreation Plan (SCORP)
- Park and Recreation staff meetings
- Participation rates and interests
- Evaluation of existing park conditions.

Goal 1: Serve all residents and provide a broad range of programs and facilities in order to serve all residents regardless of age or ability.

The Auburn Parks, Arts, and Recreation Department is committed to offering leisure and recreational programs and facilities that are accessible to all residents in our community. We recognize the unique needs of certain groups within our population and are dedicated to continually improving our facilities and programs to cater to these needs. This includes increasing awareness of our facilities and programs by incorporating both innovative and traditional methods to engage our citizens.

Policies

PR-1. Incorporate diverse activities: Offer a range of recreational facilities and programs that cater to different age groups, interests, and fitness levels to improve the physical and mental well-being of community members.

PR-2. Promote accessibility: Develop a comprehensive system of neighborhood and community parks ensuring that every resident lives within a half-mile walking distance to a developed park.

PR-3. Adapt to trends: Regularly survey community members to understand changing recreational trends and develop multi-use facilities that can be adapted to meet these evolving needs.

PR-4. Identify and serve: Continually identify under-served segments of the population and develop targeted programs to satisfy their unmet needs.

PR-5. Expand reach: Utilize both traditional and digital marketing strategies to ensure the widest possible distribution of information concerning park facilities and recreation programs.

PR-6. Affordability: Strive to provide programs and facilities that are affordable to local residents, considering tiered pricing structures or discounts for certain groups where appropriate.

PR-7. Expand financial aid: Continue to improve and expand the Fee Waiver and Scholarship Programs, exploring partnerships with local businesses or grants to allow more low-income youth and seniors to participate at reduced rates.

PR-8. Improve accessibility: Continue to improve access for the disabled and seniors by providing wheelchair ramps and other appropriate facilities in parks where they do not currently exist and consider adding more sensory-friendly spaces.

PR-9. Encourage participation: Maintain an open decision-making process that allows for resident input, perhaps through regular town hall meetings or an online suggestion portal.

PR-10. Staffing and resources: Ensure that staffing levels are sufficient to maintain and improve existing cultural and recreation programs. As programs expand or additional parks are developed, evaluate the impact on current staff levels and the need for additional staff.

PR-11. The City shall evaluate the impacts of new development on parks and recreational resources through the SEPA environmental review process and shall take appropriate steps to mitigate significant adverse impacts.

PR-12. New developments shall contribute to the development of new parks at a level commensurate with their share of new facility needs as established by the PROS Plan. If the City determines that the development does not contain an acceptable park site, the City shall require the payment of cash in lieu of land. The funds shall be used to acquire land and/ or develop recreational facilities at a location deemed appropriate by the City. Criteria for site acceptability and appropriateness shall be environmental limitations, accessibility, maintenance costs, consistency with the PROS Plan and the ability to meet more of the Community's recreational needs by the coordinated development of parks located elsewhere

PR-13. The City shall explore all means of funding the purchase of park land including, but not limited to, bond issuance, the collection of cash in lieu of land and federal, state, or county grants.

PR-14. Park impact fees will be established that help fund the future development of new parks, park facilities, trails, and acquisition of open space that meet the needs of an increasing population.

Goal 2: Provide a balanced mix of passive and active recreation opportunities to promote healthy and balanced activities.

Historically, the Auburn Parks and Recreation Department placed an emphasis on sports and active recreation. While the Department and park facilities continue to be oriented towards active recreation, recent developments have included the addition of walking trails and appealing natural environments. These additions are more conducive to a quieter, more relaxed experience in our parks.

Policies

PR-15. Cultivate a comprehensive park system: Develop a park system that caters to a variety of needs by providing facilities for social gatherings, cultural events, and physical activities.

PR-16. Promote passive recreation: We aim to provide park areas that offer opportunities for passive recreation, such as picnicking, birdwatching, and walking, allowing residents to relax and enjoy nature.

PR-17. Facilitate active recreation: Our objective is to provide park areas equipped with facilities for active muscle-powered recreation, including ball fields, skate parks, spray parks, and sports courts, to promote physical fitness and community engagement.

PR-18. Adapt to changing trends: Annually review our recreation programs and compare them to evolving, state, and national trends. Respond with appropriate programs and facilities that meet these changing needs, within the constraints of available funding and budgets, and in line with the service expectations of Auburn's residents.

PR-19. Encourage healthy eating: Provide access to healthy foods by continuing to operate the Auburn Farmer's Market and Community Gardens, promoting local produce and encouraging sustainable living.

Goal 3: Establish a system of high-quality parks that are not only well-maintained but also aesthetically pleasing.

Ensure that Auburn's parks, open spaces, and trails, as one of the most prominent public features in a city, contribute positively to the community's perception. We are committed to the long-term maintenance, thoughtful design, and use of high-quality, durable materials in our parks. This commitment aims to create inviting, safe, and enjoyable spaces that appeal enduringly to all community members. Our overarching objective is to enhance the quality of life in our community through well-maintained and aesthetically pleasing parks.

Policies

PR-20. Develop Level of Service Standards: Establish standards that assure residents' expectations are met. This could involve surveys or public forums to understand community needs and expectations.

PR-21. Intentional design: Design parks to require low maintenance, and low water and energy consumption. Reserve higher maintenance features like fountains or annual beds for high visibility locations.

PR-22. Sustainable materials: Select materials that are not only durable and aesthetically pleasing, but also environmentally friendly.

PR-23. Maintenance and appearance: Ensure parks exhibit a "cared for" appearance through close attention to maintenance, including regular cleaning, landscape updates, and prompt facility repair.

PR-24. Staff evaluation: Regularly evaluate maintenance staff levels, especially when new parkland or facilities are added, to ensure parks remain in a safe and attractive condition.

PR-25. Renovation and redesign: Identify deteriorating features and conditions that require redesign or construction of new facilities. Schedule and budget necessary changes in the City's Capital Facilities Plan.

PR-26. Regular inspections: Conduct regularly scheduled inspections to identify necessary repairs and upgrades, ensuring safe conditions in all park facilities.

Goal 4: Provide a park system that not only enhances the quality of life for our residents but also contributes positively to the city's image.

Strive to develop recreational spaces in Auburn that are well-maintained, accessible, and diverse. These spaces should reflect Auburn's dedication to the well-being of its community, environmental sustainability, and aesthetic appeal. Through thoughtful park design, aim to improve Auburn's image and identity, thereby contributing to a positive perception of the city by creating a visually pleasing environment.

PR-27. Enhance park visibility: Select new park sites that are highly visible. Position at least one side of larger parks along arterial streets, making them more accessible, both physically and visually, and known to the broader community.

PR-28. Boost aesthetics and environment: Increase the quantity of trees, shrubs, and ground covers in parks. Enhance the ambiance of our parks and public spaces that improves the overall aesthetics of the city.

PR-29. Promote urban forestry: Continue to work towards Tree City USA goals for improved urban forestry design and tree preservation.

PR-30. Revitalize the downtown core: Create green spaces in the downtown core that serve as focal points for community activities and stimulate economic growth.

PR-31. Incorporate artwork: Incorporate artwork as part of new park developments or when upgrading existing parks or other public facilities.

Goal 5: Identify, acquire, and effectively manage significant open spaces within the City of Auburn, preserving these areas for their environmental, recreational, and aesthetic value to the community.

Undeveloped open spaces are invaluable assets to the City of Auburn, contributing significantly to the well-being of our community. These spaces serve as protective

buffers against urban encroachment, preserving the natural charm of our city while enhancing the quality of life for Auburn's residents.

Policies

PR-32. Preserve Natural Buffers: Maintain and protect a system of forested corridors and buffers to provide a natural separation between urban land uses and natural areas.

PR-33. Target Open Spaces: Prioritize significant open space areas in the city for planning and acquisition. These target areas include lands along the Green and White Rivers, steep hillsides, the Mill Creek Corridor, and the West Hill Watershed.

PR-34. Secure Funding: Explore all possible funding mechanisms to enable regular acquisition of open space, allowing for the identification and purchase of properties as they become available.

PR-35. Ensure Accessibility: Make city-owned open space lands accessible to the public wherever possible and appropriate, promoting community engagement with nature.

PR-36. Manage and Maintain Spaces: Provide adequate management and maintenance of public open spaces, ensuring their ability to provide environmental benefits and serve as wildlife habitats.

PR-37. Engage the Community: Involve the community in habitat restoration activities through the city's annual Clean Sweep event, community service days, and the adopt-a-park program.

PR-38. Evaluate Ecosystem Services: Determine the ecosystem service value of each open space and park space, ensuring that these areas continue to address climate resiliency goals.

Goal 6: Develop an inclusive network of trails designed for all, accommodating pedestrians, cyclists, and individuals of all mobility levels.

To develop an inclusive network of trails, we will prioritize the needs of all residents. We will create a comprehensive multi-use trail system that facilitates movement throughout the city and region without the need for a car. This approach is not only environmentally friendly, reducing pollution and traffic congestion, but also promotes a healthier lifestyle. The objectives that follow are designed to enhance our trail system, transforming it into a truly multi-modal environment that caters to pedestrians, cyclists, and individuals of all mobility levels.

Policies

PR-39. Expand the trail network: Develop and extend a network of trails to provide comprehensive coverage for both commuting and recreational cyclists, while creating stronger East/West connections throughout the city.

PR-40. Prioritize the Green River Trail: Continue prioritizing the acquisition of land for the proposed Green River Trail.

PR-41. Leverage natural locations: Design and layout trails to take advantage of unique natural locations, providing access to a variety of landscapes and habitats.

PR-42. Regional collaboration: Actively participate in planning activities for regional trails in South King County and North Pierce County.

PR-43. Explore New Connections: Investigate possibilities for new trail connections between Auburn and neighboring communities.

PR-44. Ensure Accessibility: Develop and maintain trails in compliance with the Americans with Disabilities Act, ensuring accessibility for all.

PR-45. Promote Safety: Foster a safe trail system by discouraging crime through environmental design concepts.

PR-46. Standardize Wayfinding: Continue to implement an interpretive and way-finding program for use throughout our trail system.

PR-47. Secure funding: Identify and secure funding to maintain existing trail systems.

Goal 7: Enhance our existing park portfolio by addressing areas where service standards are currently not met, prioritizing improvements, particularly in the West Hill and Lea Hill regions of the city.

Provide unique opportunities for the community to shape the city in ways that benefit everyone, especially the underserved areas.

Policies

PR-48. Prioritize community parks: Prioritize the development of community parks and linear parks with trail systems over small neighborhood parks when possible and appropriate.

PR-49. Secure funding: Apply for grants from King County Conservation Futures and the Recreation & Conservation Office, among other available funding sources, to acquire and preserve parkland and natural areas.

PR-50. Acquire community amenities: Emphasize the acquisition of community amenities, such as shoreline property, to preserve these special places and provide public access.

PR-51. Minimize land use conflicts: Minimize conflicts between parks and other land uses, and employ sensitive design measures when locating parks in residential neighborhoods.

PR-52. Ensure quality design: Establish criteria for new park development to ensure consistent high-quality design that meets the needs of the community.

PR-53. Develop master plans: Develop Master Plans for undeveloped park properties and incorporate future park development costs into the Capital Facilities Plan as appropriate.

PR-54. Engage the community: Schedule public meetings as part of the Master Planning process to ensure residents' voices are heard and their needs are met when developing new parks.

PR-55. Create public gathering spaces: Develop public gathering spaces in the downtown core to foster community interaction and engagement.

CITY OF AUBURN WASHINGTON

2024

Comprehensive Transportation Plan



Table of Contents

CHAPTER 1 Introduction 1
1.1. Purpose 3
1.2. Goals, Policies, and Actions 3
1.3. Public Involvement 4
1.4. Regulatory Compliance 4
1.5. Agency Coordination 5
1.6. Land use/Transportation Relationship 7

CHAPTER 2 Multimodal Network 9
2.1. Multimodal Level of Service Standards 11
2.2. Streets System 13
2.3. Active Transportation 26
2.4. Transit 31
2.5. Freight 40
2.6. Airport 44

CHAPTER 3 Safety 45

CHAPTER 4 Policies 47
4.1. Goals 49

CHAPTER 5 System Management, Maintenance, and Operations 75
5.1. Staffing 77
5.2. Equipment/Fleet 79
5.3. Facilities 80
5.4. Asset Management 81

CHAPTER 6 Funding 85
6.1. Financial Summary 87
6.2. Financial Planning & Programming 88
6.3. Funding Sources 89
6.4. Revenue Shortfall Contingency 94
6.5. Funding Strategies, Project Prioritization 94

CHAPTER 7 Monitoring & Evaluation 95
7.1. Annual Updates 97
7.2. Multi-Year Updates 98
7.3. Accomplishments Since the Last Plan Update (2019) 98

APPENDIX A Maps & Interactive Links 99
Map 1. 2024 Adjacent Cities and Counties 100
Map 2. 2024 Bike Route Network 101
Map 3. 2024 Existing Bike Facilities 102
Map 4. 2024 Existing Sidewalks 103
Map 5. 2024 Transit Bus Routes/Stops 104
Map 6. 2024 Level of Transit Service 105
Map 7. 2024 Roadway Classifications 106
Map 8. 2024 Intelligent Transportation Systems (ITS) 107
Map 9. 2024 Federal Functional Classifications 108
Map 10. 2024 Freight Network 109

APPENDIX B Project Summaries 111
Planned Projects & Programs 112
List of Bike Improvements to Encourage Mode Shift 146
APPENDIX C Plan Checklists 149
GMA Requirements Checklist 150
PSRC Requirements Checklist 152
APPENDIX D Outreach 157
Public Outreach 158
APPENDIX E Roadway Classification Changes 185
Roadway Classification Changes 186

LIST OF FIGURES

Figure 1. Vehicle LOS - Illustration of Roadway Delay 16
Figure 2. TDM Strategies 18
Figure 3. Regional Center Mode Split Goals 18
Figure 4. Existing Intersection Level of Service 20
Figure 5. Changes in Trip Generation 23
Figure 6. Intersection Level of Service in the 2044 Future Preferred Land Use Alternative 24
Figure 7. Existing Bike Facility Statistics as of January 2024 27
Figure 8. Level of Traffic Stress (LTS) 28
Figure 9. Bikeway Standards 29
Figure 10. Bikeway Network Assessment Statistics as of January 2024 30
Figure 11. Types of Transit Services in Auburn 32
Figure 12. Auburn Neighborhoods with Transit Needs and Gaps 38
Figure 13. FGTS Truck Route Classification 41
Figure 14. Local Residential Street Before and After SOS Rebuild 81
Figure 15. Plan Website Homepage 158
Figure 16. Online Survey - Location Specific Feedback 159
Figure 17. Open House Photos 165
Figure 18. Other Outreach Event Photos 166

LIST OF TABLES

Table 1. State Highways 15
Table 2. Vehicle Intersection Delay LOS Table 16
Table 3. Intersections Operating Below the LOS Standard per 2022 Traffic Counts 19
Table 4. Improvement Projects in the Initial 2044 Preferred Land Use Future Model 21
Table 5. Intersections Operating Below the LOS Standard 23
Table 6. Pedestrian Facility LTS Table 28
Table 7. Bicycle Facility LTS Table 30
Table 8. Transit LOS Table 37
Table 9. Freight LOS Standards 43
Table 10. Transportation System Elements 77
Table 11. Equipment Assigned to Street Division or Traffic Signal Division 79
Table 12. Additional Equipment Available for all M&O Teams 79
Table 13. 2024 to 2044 Expense and Revenue Forecast 87
Table 14. Capital Project and Program Cost Summary and Revenue Forecast 89
Table 15. Potential Grant Program for Consideration 91
Table 16. 2024-2044 Forecast 92

Plan Overview

CH.1

Introduction

Overall purpose, goals, policies, and actions of the Comprehensive Transportation Plan. Summary of other Plan elements, including public outreach efforts and agency coordination, regulatory compliance, and the relationship between land use and transportation.

CH.2

Multimodal Network

Multimodal level of service (LOS) standards. Streets system and functional classification of City streets. Existing and future LOS conditions. Transportation demand management strategies.

CH.3

Safety

Where to find additional safety information, with reference to the City's Comprehensive Safety Action Plan.

CH.4

Policies

Goals, policies, and actions to establish the framework for Auburn's transportation system vision.

CH.5

System Management, Maintenance, and Operations

Overview of existing and needed staffing and resources to manage, maintain, and operate Auburn's transportation system.



CH.6

Funding

Planning tools and funding mechanisms available to the City to finance the maintenance and improvement of Auburn's transportation system.

CH.7

Monitoring & Evaluation

Strategy to regularly re-evaluate and update the Comprehensive Transportation Plan to incorporate changes and ensure consistency with other plans.



CHAPTER 1

Introduction



IN THIS CHAPTER

- Plan Purpose, Goals, Policies, and Actions
- Public Involvement
- Regulatory Compliance
- Agency Coordination
- Land Use/Transportation Relationship



The transportation system is a vital component of Auburn's social, economic, and physical structure. The primary purposes of the transportation system is to support the movement of people and goods within the City and connect the City to the broader region. The transportation system influences patterns of growth, development, and economic activity by providing access to adjacent land uses. Planning for the development and maintenance of the transportation system is a critical activity promoting the efficient movement of people and goods, ensuring emergency access, and optimizing the role transportation plays in attaining other community objectives.

1.1. PURPOSE

Auburn's Comprehensive Transportation Plan ("the Plan or CTP") evaluates the transportation system by identifying key assets and improvement needs, which guides the future of the transportation system.

This Plan is multimodal, addressing multiple forms of transportation in Auburn including streets, active transportation, transit, and freight. Evaluating all modes enables the City to address its future transportation needs in a comprehensive and balanced manner.

The Plan provides policy and technical direction for development of the City's transportation system through the year 2044. Major updates are required every 10 years, with an implementation report required every five years.

1.2. GOALS, POLICIES, AND ACTIONS

Transportation goals, policies, and actions establish the framework for realizing the City's vision of its transportation system. Policies provide guidance for the City, other governmental entities, and private developers, enabling the City to achieve its goals in accordance with the Plan. Adopted goals, policies and actions to support them are included in Chapter 4. The policies presented in the Plan will be followed by the City in its evaluation of individual projects, programs, and other actions to address its transportation infrastructure needs. The goals, policies, and actions make reference to the City of Auburn Engineering Design Standards (EDS) that provide specific guidelines and standards for design of the City's transportation system.

The Plan reflects the current and future needs of the Auburn community and, in doing so, seeks to:

- Enhance the quality of life for all Auburn residents
- Encourage a healthy, sustainable, and equitable community through active transportation
- Promote a transportation system that supports local businesses and enhances economic development opportunities
- Create a transportation system that is efficient, uncomplicated, and welcoming to visitors
- Provide a balanced, multimodal transportation system that addresses both local and regional needs





1.3. PUBLIC INVOLVEMENT

Public outreach is a critical component of the comprehensive planning process. Throughout years 2023 and 2024, City staff attended several public events and provided a webpage with a survey for public participation. The information provided on the webpage was available is English, Spanish, Ukrainian, Russian, and Tagalog, which are prevalent languages in Auburn.

As part of the adoption process, the Plan is also reviewed by the Transportation Advisory Board and the Planning Commission. Detailed description of the public involvement and comments received is in Appendix D.

1.4. REGULATORY COMPLIANCE

1.4.1. GMA and PSRC Requirements

Washington State's 1990 Growth Management Act (GMA) requires that transportation planning be directly tied to the City's land use decisions and financial planning. This is traditionally accomplished through the adoption of the Transportation Element of the Comprehensive Plan.

The City of Auburn is a member of the Puget Sound Regional Council (PSRC), the regions Metropolitan Planning Organization (MPO). PSRC is responsible for developing a long-range regional transportation plan and near-term regional transportation improvement program. PSRC establishes policies, procedures, and programs for award of Federal Highway Administration (FHWA) and other federal funding. PSRC has established requirements for agency comprehensive transportation plans that must be met to maintain eligibility for PSRC managed grant funding.

Auburn fulfills this mandate by adopting the Comprehensive Transportation Plan as the Transportation Element of the City's Comprehensive Plan.

Appendix C includes a list of GMA and PSRC

requirements and provides page/policy references where the requirement is satisfied in the Plan, the goals, policies, and or actions.

1.4.2. ADA Compliance

The Americans With Disabilities Act (ADA) went into effect on January 26, 1992. ADA requires that all facilities constructed after this date are readily accessible and usable by persons with disabilities. The City is committed to providing public infrastructure without barriers to those with disabilities and achieving compliance with ADA.

In 2020, the City adopted its first ADA Transition Plan for facilities in the public right-of-way. This document guides the process to reach full compliance with the ADA requirements for facilities in the public right-of-way. It addresses pedestrian pathways such as sidewalks, trails, curb ramps, and cross walks and traffic control devices such as pedestrian pushbuttons and pedestrian signals.

The ADA Transition Plan includes the following elements:

·Overview and Background

·Self-Evaluation

·Policies and Procedures

The ADA transition plan will be updated regularly to reflect new data and the progress towards full ADA compliance. Public comments are accepted and will be considered during the updates.

The City will make all reasonable modifications to policies and programs to ensure that people with disabilities have an equal opportunity to enjoy all its programs, services, and activities.

The City's current ADA Transition Plan is available here and included as part of this Plan by reference.

1.4.3. Title VI Compliance

In accordance with Title VI of the Civil Rights Act of 1964 (Title VI), the City assures that no person shall, on the grounds of race, color, national origin, or sex be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity funded directly or indirectly with federal funds. The City further assures every effort will be made to ensure non-discrimination in all its programs and activities, whether those programs and activities are federally funded or not.

The City works closely with the Washington State Department of Transportation (WSDOT) Office of Equal Opportunity to provide required Title VI assurances, plan, and annual reporting.

The City's Title VI information and reports are available here.

1.5. AGENCY COORDINATION

Auburn's transportation system is influenced by what happens outside its jurisdiction and/or boundaries: growth in neighboring communities, infrastructure maintenance by regional agencies, new capacity projects, and competing needs for transit service.

The Plan calls for effective inter-jurisdictional collaboration to address shared transportation issues. The Plan also recognizes that other jurisdictions, particularly state agencies and transit providers, are responsible for a major share of the transportation facilities serving Auburn.

1.5.1. Tribe

The **Muckleshoot Indian Tribe (MIT)** is situated in the southeastern portion of the City and in unincorporated King County, generally to the east of Auburn Way South (SR 164) and south of SR 18. MIT owns significant attractions in or near Auburn including the Emerald Downs Racetrack, Muckleshoot Bingo, the Muckleshoot Casino Hotel and Resort, and the White River Amphitheatre. These activity centers generate a relatively large number of vehicle trips. Residential, industrial, and commercial development on tribal lands is expected to increase in the future and must be evaluated during transportation planning efforts.

The City and MIT coordinate on a variety of transportation planning issues to accommodate the capacity needs derived from traffic generated by tribal land uses and to ensure the tribe has a functioning transportation system for its members. The City and the MIT have established a Memorandum of Understanding (MOU) to partner on pedestrian improvement projects along the Auburn Way South corridor. The partnership has provided for pedestrian access and safety improvements on, and along, the Auburn Way South corridor.

During July 2015, the State Legislature passed a

transportation package which included $15 million for the SR 164 East Auburn Access project along SR 164 between SR 18 and the Auburn plateau area, which was intended to create and develop an affordable, long-term improvement to congestion and safety issues, while also planning to accommodate future growth in the area. MIT is the lead agency on the project and the City has been involved in the alternatives development and evaluation process. The current status of the project is unknown and the City's traffic modeling does not include project improvements. The City's traffic modeling and planning approaches will be updated, as needed, to address progress on this project by MIT.

1.5.2. State

The **Washington State Department of Transportation (WSDOT)** has jurisdiction over three major routes connecting Auburn to the region: SR 167, SR 18, and SR 164 (Auburn Way South). SR 164 is considered a City of Auburn street and a state route and is subject to the City Streets as Part of State Highways Guidelines agreement. SR 164 is also designated by the State as a Highway of State Significance, which has implications regarding applicable level of service standards and concurrency. **Chapter 2** includes additional information regarding SR 164 and other State transportation facilities in Auburn. Auburn coordinates with WSDOT to study these corridors and implement roadway improvements. WSDOT also serves an important role as administrator of federal and state transportation funds.

1.5.3. Transit Agencies

Sound Transit provides a variety of regional transit services for King, Snohomish, and Pierce counties. In Auburn, Sound Transit provides commuter rail, parking, and express bus service. Auburn Station also serves as a hub and transfer station for local transit service provided by **King County Metro Transit** and **Pierce Transit.**

The transit chapter provides more detail on current Sound Transit services, remaining needs for regional transit service, and the role Auburn plays in coordinating with the agency.

King County Metro Transit (KC Metro) provides local bus, Metro Flex, vanpool, and paratransit services for the Auburn area. Planned service for the City of Auburn is described in the Metro Strategic Plan for Public Transportation 2021-2026, and in Metro Connects Long Range Public Transportation Plan, which was adopted by the King County Council in 2021. The City has developed an employee Commute Trip Reduction (CTR) program in cooperation with WSDOT. Details of the CTR program are summarized in the Active Transportation and Transit chapters of this plan.

Pierce Transit operates the 497 Lakeland Hills Express route which provides AM and PM direct service between Lakeland Hills and Auburn Station. This is a partnership route with the City, KC Metro, and Pierce Transit providing funding through an inter-local agreement.

1.5.4. Counties

King County Road Services Division is responsible for maintaining and regulating the roadway network in King County, including the Totem and Klump portions of King County, which are islands of unincorporated King County within the greater jurisdictional boundary of Auburn. King County Road Services has a number of programs and plans in place that regulate development and other activities affecting their roadway network.

Under the GMA, King and Pierce Counties have adopted Countywide Planning Policies to guide development in both incorporated and unincorporated areas of their jurisdictions. The policies support county and regional goals to provide a variety of mobility options and establish LOS standards that emphasize the efficient movement of people and not just vehicles. The Countywide Planning Policies are also important because they provide direction for planning and development of potential annexation areas.

1.5.5. Regional Government

The **Puget Sound Regional Council (PSRC)** sets policy for King, Pierce, Kitsap, and Snohomish Counties through its long-range planning document, Vision 2050, and its regional transportation plan, Transportation 2040. Auburn's transportation plan is required to be consistent with PSRC's regional planning documents and policies. PSRC encourages future growth to be concentrated in regional growth centers. Regional growth centers are locations with significant business, governmental, and cultural facilities, and serve as focal points

for planned growth, economic development, and transportation infrastructure investments.[1] The PRSC Planning documents seek to provide a multimodal transportation system that serves all travel modes, creating opportunities for the use of alternatives to single occupant vehicles. Other important PRSC policy themes are a focus on maximizing the efficiency of the transportation system through transportation demand management (TDM) and transportation system management (TSM) strategies, as well as completing critical links in the network.

1.5.6. Neighboring Cities

The **City of Kent** shares Auburn's northern border and several regional transportation corridors including S 277th Street, SR 167, Auburn Way North/Central, and West Valley Highway. Most recently, Auburn has completed coordination with Kent on the annexation of S 277th Street from Auburn Way North to the Green River into the City of Auburn to allow the widening of S 277th Street between Auburn Way N and L Street NE.

The **City of Federal Way** is located west of Auburn. Several roadways, most notably SR 18, connect Auburn and Federal Way. Auburn and Federal Way regularly coordinate on both vehicular and active transportation improvements affecting both jurisdictions.

The City partners with its southern neighbors in many respects, including street system planning, transit planning, and regional trail planning. Auburn is also working with **Sumner**, **Pacific**, and **Algona** on roadway improvement projects, including the financial support of the Sumner and Pacific projects to widen Stewart Road. The City coordinates primarily with **Bonney Lake** for provision of water service in the Pierce County portion of the City. However, efforts to coordinate transportation systems and services will likely occur in the future. Partnerships with neighboring cities will continue to be an important factor in successful transportation planning.

1.6. LAND USE/TRANSPORTATION RELATIONSHIP

Land use and the transportation system are intertwined, each influencing the needs and development of the other. Therefore, it is necessary to evaluate how existing transportation systems can be improved to best support both existing and proposed land uses.

It is equally important to consider potential transportation system needs when developing future land use plans. This 2024 Comprehensive Transportation Plan was developed concurrently with the City's Comprehensive Plan that included reviewing, evaluating, and revising projected land use throughout the City.

1.6.1. Land Use Characteristics and Transportation Systems

A broad overview of Auburn's existing land use designations shows industrial (light and heavy) designations in the west side of the valley floor portion of the City, extensive commercial development (light and heavy) located along Auburn Way N, Auburn Way S, and A Street SE, and sizable heavy commercial designated areas near the SR 18 and 15th Street SW interchange and between 15th Street NW and 37th Street NW (Emerald Downs). Residential development generally exists along the east side of the valley floor and the surrounding hillsides of West Hill, Lea Hill, and Lakeland Hills. A major land use activity in Lea Hill to the east includes the Green River College located on SE 320th Street.

The existing land use element identifies Industrial as the City's second most predominant zoning designation (Residential being first). Consequently, the City's land use plan establishes a development pattern that has traffic generated by these industrial uses directed towards the State Highway System.

Another key feature in the land use element is a Heavy Commercial designation at 15th Street SW, adjacent to SR 167 and SR 18. This commercial designation is the site of The Outlet Collection. The Outlet Collection generates high volumes of local and regional traffic that utilize State highways and City streets. Auburn's "Auto Row", along Auburn Way N, to the north of downtown also generates large volumes of local and regional traffic.

1 PSRC, https://www.psrc.org/our-work/centers

Downtown Auburn is near the geographic center of the City, located generally east of the Interurban Trail, north of SR 18, west of F Street SE/NE, and south of 3rd Street NW/NE and 4th Street NE. Downtown Auburn is designated as a Regional Growth Center by the PSRC as part of Vision 2050. Designated regional growth centers are identified for housing and employment growth, as well as being eligible for regional transportation funding. Downtown Auburn contains a mix of land uses including residential, commercial, and industrial uses. Commercial uses in Downtown are focused along Main Street, Auburn Way, and A Street SE. Historically, this commercial development has served predominantly local needs. However, the presence of Auburn Station, MultiCare, City Hall, and new development projects, combined with regulations and policies that encourage transit-oriented developments (TODs), downtown commercial development will serve a broader range of needs in the future. Downtown Auburn also has the City's most robust active transportation infrastructure, including both extensive pedestrian and bicycle facilities. This provides the opportunity for both residents and employees to rely on proximate transit services at Auburn Station, combined with a robust active transportation system for a portion of their transportation needs.

The City's Comprehensive Plan land use map focuses residential development in the eastern portion of the valley and in the West Hill, Lea Hill, and the Lakeland Hills area. Access to the State Highway System in Lea Hill is limited to SR 18 at SE 304th Street. Future impacts on the State Highway System in the Lea Hill area will primarily be commuter traffic due to the predominance of residential comprehensive plan designations in that area, and continued growth of Green River College. The development of Lakeland Hills will also principally result in increased commuter traffic.

1.6.2. **Future Land Use**

The Washington Office of Financial Management (OFM) produces population and employment forecasts for each county which are then allocated to cities through the Countywide Planning Policies. Cities must plan to accommodate the required levels of housing and employment growth allocated through this process. King and Pierce Counties have allocated Auburn a combined target of 12,096 new housing units (12,000 in King County and 96 in Pierce County) and 19,520 new jobs (all in King County) between the baseline of 2019 and 2044.

Based on the available land capacity as zoned in 2023, Auburn showed a deficit of capacity for both the 2044 housing unit and jobs targets. The future land use map developed with the 2024 Comprehensive Plan was developed to accommodate the 2044 housing and jobs targets through new zoning and land uses in various corridors and nodes throughout Auburn, and in the Downtown area in particular. Development of the future land use map involved evaluating alternative land use scenarios and testing them against various factors. Further information regarding this process is included in the Comprehensive Plan.



This Comprehensive Transportation Plan is based on the Preferred Land Use Alternative documented in the Comprehensive Plan. This land use alternative was a combination of two alternatives that each focused on centralizing housing and employment growth with either corridors or centers approach. Both alternatives included intense housing and employment growth focused in the Downtown area by expanding and increasing development density and intensity. The combined alternative targets employment and housing along the Auburn Way North and I Street NE corridors where frequent transit is planned to start operating in 2026. Focused growth in employment and housing was also identified at locations of known future development plans. These areas include the Outlet Collection Mall area along 15th Street SW, the Icon Materials mining operations and adjacent lands along the east side of Kersey Way (known as the Segale development area), and at vacant or underdeveloped land areas on Lea Hill and West Hill.

CHAPTER 2

Multimodal Network



IN THIS CHAPTER

- Multimodal Level of Service Standards
- Streets System
- Active Transportation
- Transit
- Freight
- Airport



The transportation network includes facilities for several modes of transportation, which must integrate well together, and support or complement each other, to provide the best possible mobility options throughout the city. While it is important to limit vehicle congestion and traffic delays, it is equally important to provide alternative transportation options, which can encourage active transportation and reduce the need to increase vehicle capacity on the roadways.

The availability of transit service, bike facilities, and sidewalks will become more important to achieve a comprehensive multimodal transportation network, which is composed of the vehicular traffic network (roads) which serves cars, trucks, and buses, and the active transportation network, which includes bike and pedestrian facilities. Some roads are more heavily used by trucks, and are identified in the freight network. Transit routes are also identified. Based on the primary function of the roads, special considerations are made to carefully prioritize specific modes, and protect other modes where there are overlaps, such as freight corridors along bikes routes.

2.1. MULTIMODAL LEVEL OF SERVICE STANDARDS

Transportation level of service (LOS) standards are metrics that indicate how well transportation facilities are moving people and goods.

Prior to this Plan, as with comprehensive transportation plans for most other agencies in Washington, the City of Auburn's Comprehensive Transportation Plan only included LOS standards for motorized vehicles (vehicle LOS). Without adopted multimodal LOS standards (MMLOS), there were no metrics by which the effectiveness of the active transportation and transit systems could be measured and evaluated. With MMLOS, the City of Auburn can ensure that transportation system improvements are planned, funded, and implemented to develop a comprehensive, connected, and versatile transportation system. One of the main goals of MMLOS is to realize a transportation system that doesn't rely on adding more vehicular capacity alone to address growing needs to move people and goods. The MMLOS approach supports providing other transportation modes including walking, bicycling, and transit to address these needs. The City of Auburn's MMLOS have been developed with the strategic and focused intent of maximizing potential mode shifts from driving cars to walking, biking, and riding transit. The standards work towards this by setting higher level of service standards for walking and biking in areas where doing so will best support existing and planned transit service.

These principles, many of which can be promoted by thoughtful transportation systems planning, encourage healthier communities by increasing physical activity and decreasing air pollution caused

In 2023, Washington enacted House Bill (HB) 1181 which required agencies to develop MMLOS. MMLOS expand the transportation system metrics to include other travel modes such as transit, walking, and biking.

Auburn's multimodal transportation network primarily includes the **modes of travel highlighted below**, which are explained and assessed in more detail throughout the Plan.

Separate sections have been included in the Plan that address the following elements for each mode:

- General description and overview
- Existing facilities and/or services
- LOS standards
- Existing LOS evaluation and existing deficiencies
- Future LOS evaluation and future deficiencies
- Strategies, projects, and programs to address existing and future deficiencies

The City of Auburn envisions a transportation system that will help promote healthy community principles by coordinating land use, the active transportation system, and transit in a manner that encourages walking and bicycling. PSRC has identified several elements that contribute to the desirability of walking, bicycling, and transit use in their Vision 2050 "Update Paper on Health":

- **Concentrating complementary uses** such as restaurants, retail, and grocery stores proximate to residences and employment.
- **Linking neighborhoods** by connecting streets, sidewalks, and trails.
- **Designing for safe and welcoming pedestrian and bicycle facilities.**
- **Enhancing transit opportunities and active transportation connections** to transit facilities.
- **Reducing and mitigating the effects of parking.**



Motorized vehicles moving people on streets



Pedestrians and bicyclists



Buses and trains moving people



Trucks and trains moving goods

by vehicle emissions. Auburn has historically planned for a transportation system that incorporates many healthy community principles, such as transit facility planning and regional trail planning. In addition, the Downtown Plan calls for a mixed-use, high density, pedestrian-oriented downtown. Improving the active transportation system also helps address the findings of the citywide Health Impact Assessment process, which recommended that the City improve sidewalk connectivity; improve the pedestrian environment; eliminate natural and man-made mobility barriers for pedestrians and bicyclists; improve access to transit; and improve vehicle safety, and pedestrian safety.

In the future, Auburn shall continue to promote these principles through long-range planning efforts, capital facility improvements, development review, and community activities involving active lifestyle elements.

MMLOS is vital to providing an equitable, effective, sustainable, and environmentally balanced transportation system. MMLOS allows a more strategic approach towards moving people and goods as compared to the historic approach of only using vehicle LOS standards. Products of the historic approach are visible all around us where we see wide multi-lane roadways with narrow or missing sidewalks, neighborhoods and commercial areas with little to no transit services, and an incomplete, often sporadic bicycle network. These deficiencies in the transportation system are understandable given that LOS standards are used to identify where the transportation system is not adequately functioning and, subsequently, used to plan and prioritize improvements to address those issues. If vehicle LOS is the only standard in place, the resulting transportation investments are focused on moving goods and people with motorized vehicles while other modes receive little funding relative to vehicle capacity.



2.2. STREETS SYSTEM

The City has 249 centerline miles of public roadways. The City's planned arterial street network is mostly established with existing roadways with only a few new arterials that have yet to be constructed. Many of the City's arterial and other streets were not built to current City design standards as the network itself is a product of almost a century of evolving standards and design approaches. Many older roads, including those inherited through several annexations, do not include robust pavement sections and do not accommodate active transportation users. The annexed county road networks present a challenge as they were originally set to provide access to rural areas and not to accommodate existing and future planned higher density housing and commercial areas. The network challenges are most prevalent on the City's West Hill and Lea Hill areas where connectivity is mostly provided by two-lane county roadways that don't form a fully connected network. Constructing new roadways or re-aligning existing roads to improve the network connectivity is heavily constrained by topography, environmentally sensitive areas, existing development, and jurisdictional boundaries.

Almost 400,000 vehicle trips use Auburn's streets everyday. Most of the City's arterial and collector roadways have adequate vehicle capacity on sections of roadways without intersections. Where capacity issues do occur, they are mostly at controlled intersections of arterial and/or collector streets.

An inventory of the City's street system is maintained using the City's asset management software and geographic information systems (GIS). The inventory includes spatially referenced roadway segments generally delineated between roadway centerline intersections. Each roadway segment includes a set of data associated with it such as roadway width, number of lanes, classification, posted speed, pavement condition index, and initial construction, maintenance/repair, and replacement history. This data is used to generate the maps included in Appendix A.

2.2.1. Functional Classification of City Streets

The street system functions as a network. Functional classification is the hierarchy by which streets and highways are defined according to the service they provide. There are three main classes of streets in Auburn: **arterials**, **collectors**, and **local streets**.



Map 7. 2024 Roadway Classifications in Appendix A provides the currently adopted classification of Auburn's existing and planned streets. Streets are classified using the Federal Functional Classification system guidelines, as shown in Map 9. 2024 Federal Functional Classifications in Appendix A.

The Auburn EDS establishes typical roadway cross sections for each City street classification. Some City streets have specific cross sections and other design elements that have been established through specific studies and/or design efforts. The following City studies or standards are included in this Plan by reference and establish roadway cross sections and other design elements for the studied roadways:

- R Street SE Corridor Study
- Lea Hill Road Corridor Study
- BNSF Railway and A Street SE Crossing Study
- Downtown Division Street Promenade Project
- Downtown Urban Standards as Presented in the EDS
- Other studies that have, or will be prepared and approved, by the City Engineer with consultation and input provided by the Transportation Advisory Board (TAB) and the City Council

Designation of functional classifications allows for the preservation of the right-of-way for future transportation corridors, whether the corridor provides access to car, transit, bike, or pedestrian use. Functional classification helps establish corridors that will provide for the future movement of people and goods, as well as emergency vehicle access. Proper designation is crucial to the planning effort; as development occurs, accommodation for the appropriate transportation corridors should be incorporated into development plans.

The following describes the different classifications used by the City, in order from highest classification to lowest:

Principal Arterials are designed to move traffic between locations within the region and connect with the freeway system. Design emphasis is placed on providing movement for both inter- and intra-City traffic. As such, these facilities typically carry the highest traffic volumes and are designed to accommodate longer-distance trips, provide the highest level of mobility, and have the highest speed limits of all City streets. Principal arterials will generally carry moderate to high level of large truck traffic. Direct access to adjacent land uses is permitted, although these streets are most likely to have limited or managed access in an effort to enhance safety and preserve capacity. Active modes also use these streets, but rely on sidewalks and other dedicated facilities to safely navigate vehicle traffic.

Principal arterials are the framework street system for the City and usually extend beyond the City limits, connecting with neighboring jurisdictions. Principal arterials are heavily utilized as bus routes, carrying both local and regional service.

Minor Arterials connect collector and local industrial streets to principal arterials and freeways. They serve moderate length trips, provide slightly less mobility than principal arterials, and distribute traffic to smaller geographic areas. Minor arterials may serve secondary traffic generators such as business centers, neighborhood shopping centers, major parks, multifamily residential areas, medical centers, larger religious institutions, and community activity centers.

Minor arterials will generally carry moderate to low levels of large truck traffic. Direct access to adjacent land use is permitted but may sometimes require limited or managed access in an effort to enhance safety and corridor capacity. Active modes also use these streets, and often rely on sidewalks and other dedicated facilities to safely navigate vehicle traffic.

Collectors and Rustic Collectors carry traffic originating from local streets, neighborhoods, and recreational areas to minor and principal arterials. Collectors typically serve only local truck trips and are not typically intended for use by large trucks. Collectors are intended to have a residential neighborhood feel and encourage active transportation. Collectors may accommodate some local transit routes.

Rustic collectors are located in areas with less intensive land uses associated with the Residential Conservancy land-use designation and along environmentally sensitive corridors such as Green River Road. Rustic collectors are intended to have a less urban feel and generally don't have separate bike or pedestrian facilities. Rustic collectors do not typically carry fixed route transit services.

Local, Local Industrial, and Local Rustic primarily provide direct access to adjacent land uses and connect with other local streets to eventually connect to collectors and arterials. Local streets are not intended to connect traffic between collector and arterial streets, also known as cut-through traffic. Local street networks generally consist of shorter roadway segments between intersections with collectors and arterials and often have cul-de-sacs and looping configurations. Local streets generally do not serve fixed route transit. Local streets are the most common streets in the City and are intended to have a residential neighborhood feel with relaxed and comfortable driving, biking, and walking experiences. Local streets are not intended to serve large truck traffic.

Rustic residential streets are a type of local street that serve areas associated with the Residential Conservancy zoning designation. Rustic residential streets are intended to have a less urban feel and typically do not have separate walking and biking facilities.

Local industrial streets serve primarily industrial and manufacturing land uses. They are intended to accommodate large trucks and provide a more urban or industrial setting.

Alleys are the lowest classification of City street and provide vehicular access to abutting properties generally from the rear or side. Alleys also provide access for garbage collection and emergency vehicles and serve as corridors for city and non-city utilities. Alleys can also serve additional purposes including access management and the alleviation of traffic operations issues on streets with higher classifications (not related to level of service issues). Alleys generally connect to local streets and are short in length without separate walking or biking facilities.

2.2.2. City Street Classification Changes

In preparing the Plan, the roadway classifications and street network were reviewed to evaluate if revisions were needed to reflect current and future needs. Previously, the City classified its local and collector streets as being either residential, non-residential, or rustic. There was some ambiguity and inconsistency in the non-residential designation as the name implied that the classification was intended for all commercial, industrial, and non-rustic streets. However, the typical roadway cross sections in the EDS for non-residential streets included wide vehicle travel lanes to accommodate large trucks. The EDS also specified a pavement section for non-residential roads that was very robust, again, intended to serve large trucks. Throughout the City, roads previously classified as non-residential included roads serving

multi-family housing, commercial areas, multi-use areas, and industrial areas. Except some heavy commercial and industrial areas, the wide lanes and robust pavement section specified in the EDS were generally not desirable for these roadways. To address this issue, the decision was made to discontinue the use of the non-residential collector classification. Streets previously classified as non-residential collectors were updated to be reflect the new classification approach. The local street classifications were updated to be either local, local industrial, or local rustic. Streets previously classified as local non-residential streets that serve industrial areas and large volumes of truck traffic were updated to be local industrial streets. Streets that were not local rustic or local industrial were classified as local streets. In addition to the change in roadway classification categories, the assigned classification to various City streets were updated to reflect current and future land-use, traffic volumes, and other factors. A summary of these changes is provided in Appendix E.

2.2.3. State Highways

State highways include **SR 18**, **SR 167**, and **SR 164**. A description of each highway is provided in **Table 1**.

2.2.4. Private Streets and Shared Driveways

Private Streets can be appropriate for local access in very limited usage. They provide direct access to City streets and are not intended to connect between two or more public streets immediately adjacent properties.

Shared Driveways, sometimes referred to as access tracts provide public right-of-way access for one or more properties. A driveway serving only one property but utilizing an access easement or tract across another property for access to the public right-of-way is also considered a shared driveway. They are most common in panhandle lots or rear lots that do not have street or alley access. Shared driveways have become very common in subdivision projects that are trying to meet density requirements while also working around critical areas and other constraints. Access tracts are privately owned and maintained.

2.2.5. City Streets LOS

Streets are based on the amount of delay experienced by drivers at intersections and how the queue of vehicles waiting at those intersections may block other intersections, driveways, and travel lanes. Previously, the City also included corridor delay as a vehicle LOS standard. Corridor LOS is no longer considered because intersections generally control how well the roadway network functions. If a roadway corridor is congested, most often it is the result of delays and queuing at the intersections along the corridor. The City's established policies and actions related to providing an efficient and effective multimodal network include provisions to support efficient, effective, and resilient roadway corridors. Previously the City vehicle LOS standards

Table 1. State Highways

ROUTE	
18	• Connects I-5 to I-90 through Auburn • Within the City limits, has interchanges with SR 167, West Valley Highway, C Street SW, SR 164/Auburn Way S, Auburn Black Diamond Road, and SE 304th Street providing access to downtown Auburn and Lea Hill • Classified as both a Highway of Statewide Significance (HSS) and a National Highway System (NHS) route for the entire corridor segment • A full control limited access highway, allowing access only at interchanges within the City limits
167	• Also known as the Valley Freeway • Serves as an alternative to I-5, connecting south King and north Pierce Counties to the I-405 corridor to the north • Designated as both HSS and NHS • Within the City limits, SR 167 has interchanges with SR 18, S 277th Street, 15th Street NW, and 15th Street SW • A full control limited access highway, allowing access only at interchanges within the City limits
164	• Also known as Auburn Way South • A 15-mile roadway corridor beginning at the SR 18 interchange with Auburn Way S • The corridor is aligned southeast through the City, connecting through the Muckleshoot Indian Tribe lands and unincorporated King County before terminating in the City of Enumclaw at its junction with SR 410 • A City street which is part of a state highway • Functionally classified as an urban other arterial by WSDOT, and also a Highway of State Significance (HSS) • Subject to WSDOT Complete Streets requirements

also included reference to other factors like pavement degradation, safety impacts, and general roadway geometry. Since those factors don't have a metric or rating that can be used to determine how well a facility is functioning, they are no longer included as a vehicle LOS standard. Instead, those are addressed with other goals and policies throughout the Plan and provided for with standards established in the EDS.

The vehicle LOS methodology used in the City of Auburn for intersection delay is based on the current edition of the Highway Capacity Manual (HCM) which assigns intersections with a letter designation from 'A' through 'F' based on control delay. Control delay is the total elapsed time from a vehicle joining the intersection queue until its departure from the stopped position at the head of the queue. This includes the time required to decelerate into the queue and accelerate back to free-flow. **Table 2** shows the LOS ratings for intersections based on the type of intersection control and maximum expected delay times. The Plan policies establish LOS "D" as

Figure 1. Vehicle LOS - Illustration of Roadway Delay

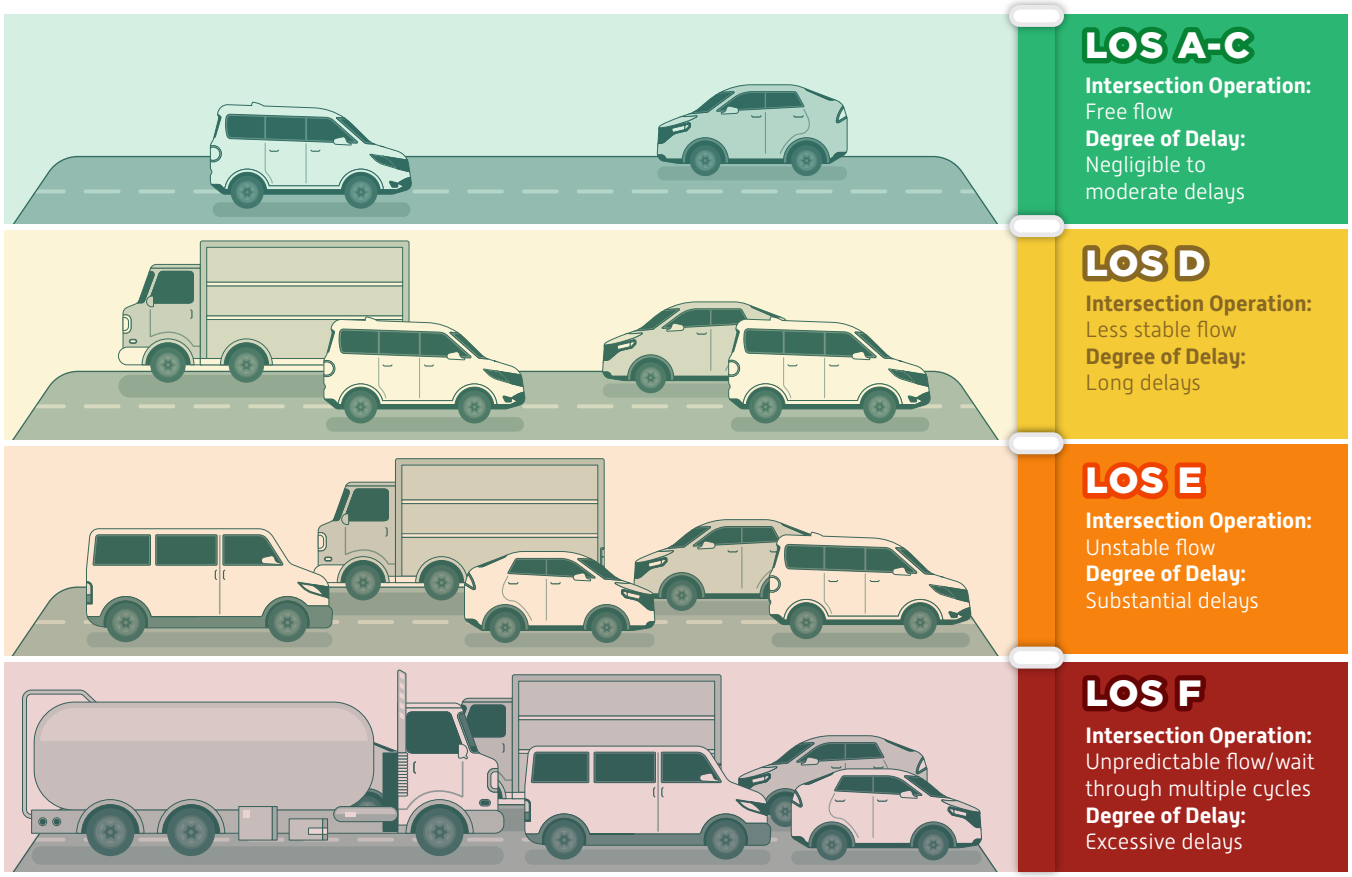


Table 2. Vehicle Intersection Delay LOS Table

INTERSECTION TYPE	LEVEL OF SERVICE					
	A	B	C	D	E	F
	AVERAGE CONTROL DELAY (SECONDS PER VEHICLE)					
Stop Control*	0 – 10	>10 – 15	>15 – 25	>25 – 35	>35 – 50	> 50
Traffic Signal or Roundabout Control**	0 – 10	>10 – 20	>20 – 35	>35 – 55	>55 – 80	>80

* LOS for stop-controlled intersections with one or more uncontrolled approaches is evaluated based on the movement with the highest delay.
** Intersections with roundabouts are also evaluated using V/C ratio.
Source: Highway Capacity Manual, 6th Edition

the minimum standard for most intersections with the exception being signalized intersections of two or more principal arterial roadways which have a LOS "E" minimum standard. Intersections with roundabout control are evaluated using both the letter designation "A" through "F" grade for control delay and the volume/capacity ratio (V/C ratio). The City has adopted WSDOT's Measures of Effectiveness (MOE) approach for roundabouts and established 0.90 as the maximum allowed V/C for each lane group.

Another metric used for Vehicle LOS standards in Auburn is based on the length of the queue of vehicles backed up at an intersection. This is a pass/fail metric based on whether or not all intersection approaches fit within the available queue storage under projected 95th percentile queue lengths. If any approach does not fit within the available storage, the intersection queuing LOS standard is "failed." If all approaches fit within available storage, the intersection queuing LOS standard is "pass." As outlined in the Plan policies, the queuing standard is that the 95th percentile queue shall not extend across an adjacent driveway, alley, or street intersection, except if the driveway, alley, or street intersection is within the functional intersection boundary of the queue in which case the queue may extend to the limit of the functional intersection boundary. Additionally, queuing for a designated turn lane shall not exceed the turn-lane storage area and cause a blockage of adjacent lane(s).

2.2.6. Vehicle LOS Standards - State Highways

Amendments to the GMA in 1998 added new requirements for local jurisdictions to address state-owned transportation facilities, as well as local transportation system needs in their comprehensive plans (RCW 47.06.140). House Bill 1487, adopted by the Washington State Legislature in 1998, requires that the transportation element of local comprehensive plans include the LOS standards for HSS. HB 1487 clarified that the concurrency requirement of the GMA does not apply to HSS or other transportation facilities and services of statewide significance. HB 1487 also requires local jurisdictions to estimate traffic impacts to state-owned facilities resulting from land use assumptions in the Comprehensive Plan.

WSDOT has identified a LOS D standard for all urban HSS, according to the State Highway System Plan (HSP). All state highways within the City of Auburn, including SR 18, SR 167, and SR 164, are classified as urban HSS, and therefore have a LOS D standard.

2.2.7. Transportation Demand Management (TDM)

In 1991, the State of Washington adopted its Commute Trip Reduction (CTR) law. The law's intent is to reduce traffic congestion and air pollution by shifting drive-alone commutes to other modes. Today, more than 1,000 worksites take part in the CTR program statewide and the program is well known nationally as an example of impactful TDM.

The law requires local jurisdictions to adopt ordinances detailing requirements for employers to implement employee commute trip reduction programs that encourage the reduction of the number of trips and miles people drive alone to work. In 2010, City of Auburn adopted Ordinance 6218, codified by Auburn City Code Chapter 10.02, which provides these requirements for employers within the City limits.

Reducing congestion includes strategies to reduce demands on the transportation system. The State of Washington emphasized the importance of TDM by adopting a CTR law. That law requires all major employers, with over 100 employees at a single site and arriving between the hours of 6:00 and 9:00 AM, to develop programs and strategies to reduce the number of commuter automobile trips made by their employees. Transportation demand management reduces demand on the street system. While TDM and TSM employ different strategies, they share many of the same benefits. Both reduce the peak vehicle demand, increase the efficiency of the transportation system, reduce the need for costly capacity expansions, help improve LOS, and contribute to an enhanced quality of life for those who use and benefit from the transportation system.

TDM strategies include those shown in **Figure 2** on the next page.

The City of Auburn will continue to encourage drivers of single occupancy vehicles to consider alternate modes of travel such as carpools, vanpools, transit, active transportation travel, and alternative work schedules, and has identified mode split goals for the Regional Growth Center. The goals were developed in consideration of the current mode splits for the Auburn Regional Growth Center, the current mode splits for all designated Regional Growth Centers, and the 2040 mode split targets identified by PSRC for all designated Regional Growth Centers. The existing and 2035 mode split goals for the Auburn Regional Growth Center are summarized in **Figure 3** on the next page.

The mode split goals for the Regional Growth Center reflect the desire to significantly reduce automobile travel as a share of work trips, with the most significant increase in transit trips. The reduction in the vehicle mode split will be the result of the right

mix of land use changes, transportation investments, and roadway pricing tools. Additionally, factors such as shifting demographic trends, preferences, and technology may contribute to mode shifts above and beyond the identified goals.

Figure 2. TDM Strategies

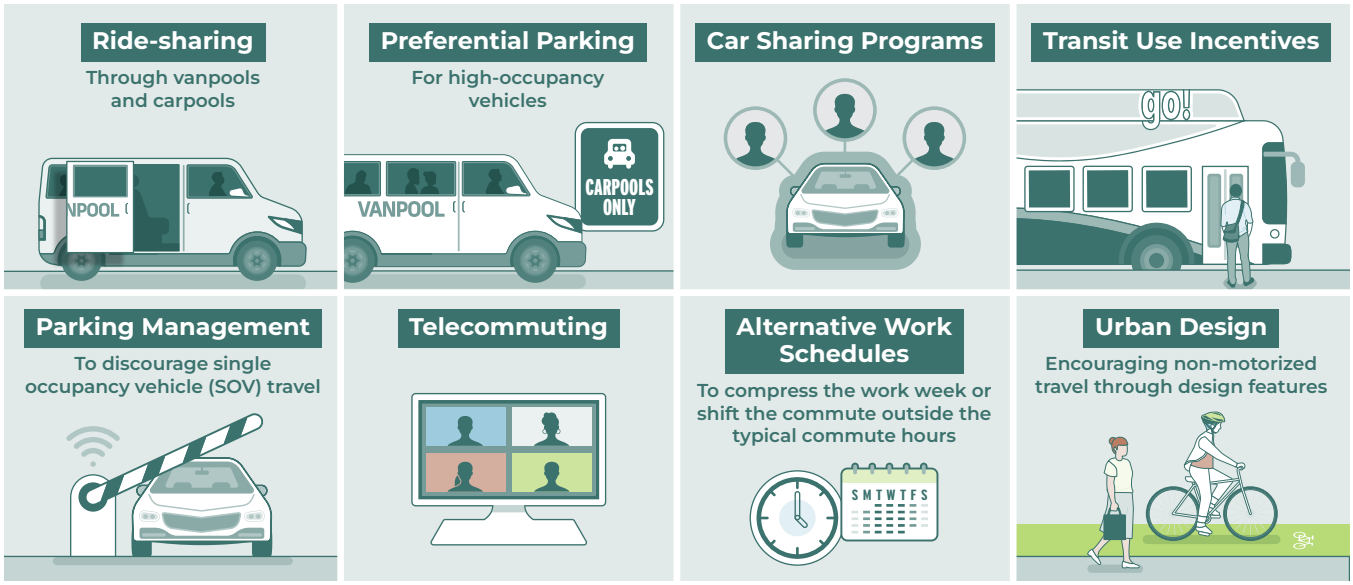
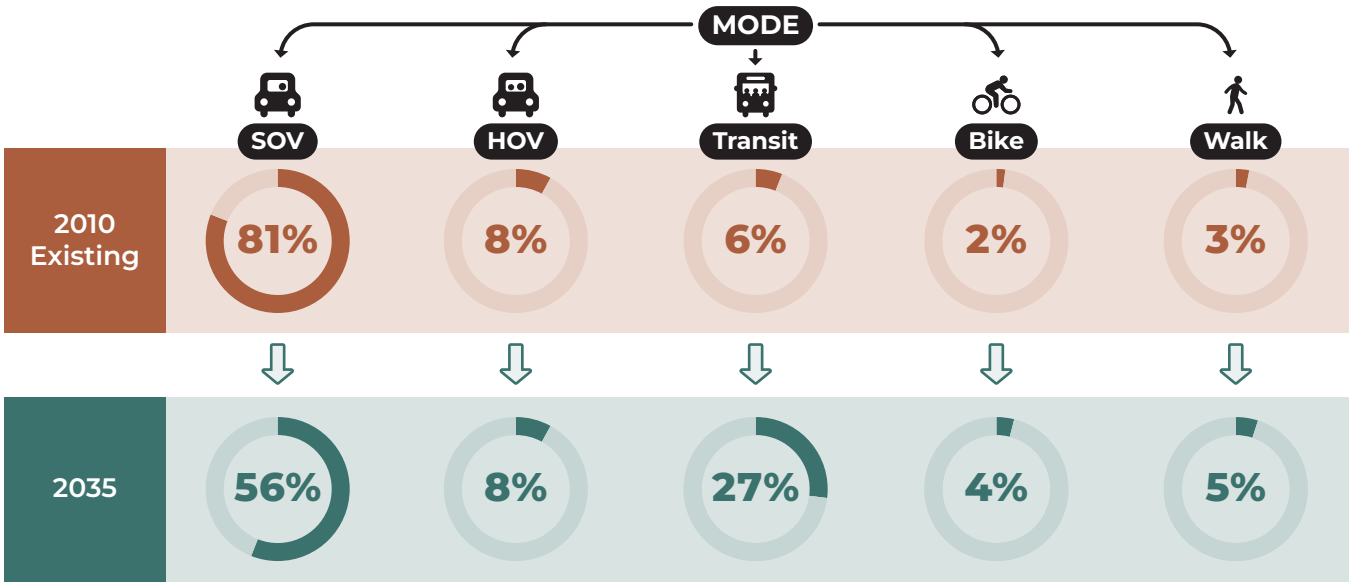


Figure 3. Regional Center Mode Split Goals



2.2.8. Existing and Future Vehicle LOS Conditions

Existing Conditions

In 2022, the City collected average daily traffic counts from arterial and collector streets and peak hour turning movement counts at 157 intersections in Auburn. These observations formed the basis for the existing conditions analysis of traffic operations in Auburn. Existing turning movement counts were analyzed using Synchro traffic operations software to calculate the LOS at each study intersection for the busiest hour during the weekday AM (7:00 - 9:00 am) and PM (4:00 - 6:00 pm) peak periods. Wherever possible, HCM 6th edition analysis was used. In some cases, due to incompatible intersection channelization and/or phasing settings, HCM 2000 was applied. Of the 157 intersections evaluated, the 11 (or 8%) shown in **Table 3** are currently operating below the City's adopted LOS standard. **Figure 4** displays the existing LOS standard of evaluated intersections and numbered intersections currently operating below the LOS standard.

The majority of intersections operating below adopted level of service standards or failing intersections have two-way stop-control; of the 13 failed intersections, three are signalized, one has all-way stop-control, and eight have two-way stop-control. The PM peak hour period is also when the network is under most strain: seven intersections are failing only during the PM peak hour, while only four intersections are failing only during the AM peak hour, and two intersections are failing during both AM and PM peak hours. In addition to current failures, five intersections are operating near the threshold of failure in the AM and three are approaching the City's standard in the PM, indicating that future growth could cause the level of service to drop below standards.

Many of the intersections with existing level of service issues are on Lea Hill or West Hill. Multiple intersections along Auburn Way South (SR 164), M Street SE, and A Street SE carry heavy volumes of both local and regional traffic and are close to or failing City and/or state LOS standards.

Table 3. Intersections Operating Below the LOS Standard per 2022 Traffic Counts

	INTERSECTION
1	116th Ave SE & SE 304th St
2	46th PL S / 44th Ave S & S 321st St / 51st Ave S
3	51st Ave S & 316th Ave
4	A St SE & 44th St SE
5	Auburn Way North & 45th St NE
6	Auburn Way South & 17th St SE
7	C St SW & 3rd St NW
8	Henry Rd NE / Pike St NE & 8th St NE
9	Lakeland Hills Way SE & Oravetz Rd SE
10	M St SE & 12th St SE
11	M St SE & AWS
12	R St SE & 33rd St SE
13	Howard Rd / 21st St SE

EXISTING LOS	NUMBER OF INTERSECTIONS
OK	111
Approaching Standard	27
At Standard	6
Failed	13

Future Conditions (2044 Preferred)

To forecast what travel patterns might be in 2044, the City's VISUM-based travel demand model was applied. Developing these forecasts required validation of the model to confirm it could replicate existing traffic volumes (with model inputs reflecting 2022 roadway and land use conditions throughout Auburn). Then, the model was updated to reflect land use and transportation conditions expected under the 2044 preferred land use scenario from the City's Comprehensive Plan Land Use Element. **Table 4** lists the projects included in the Initial 2044 Preferred Land Use Future model. The table also indicates what the current project status is and what are the next steps planned for the project. The next steps indicate whether or not the project will be retained or removed from the Plan project list included in Appendix B.

Figure 4. Existing Intersection Level of Service

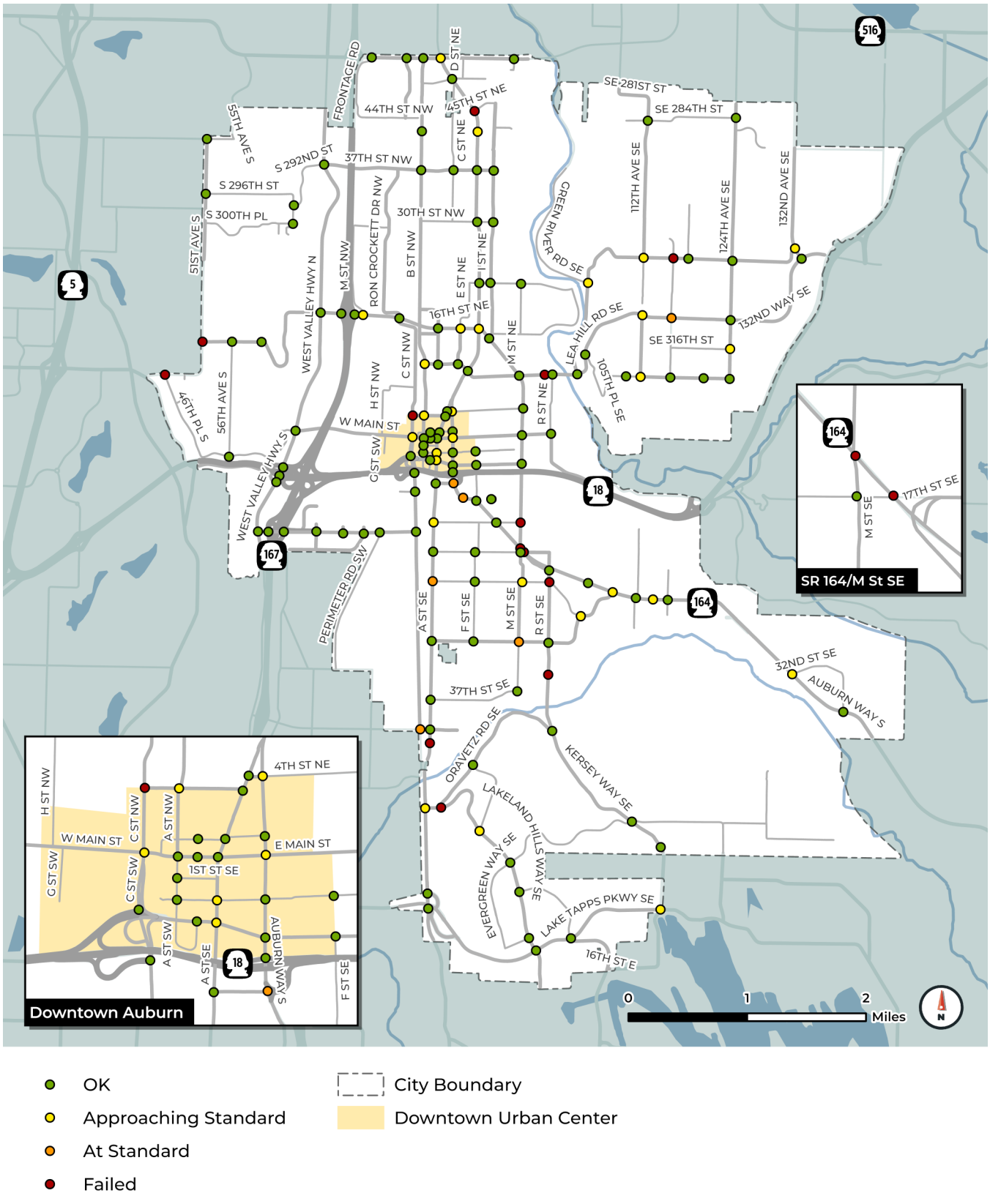


Table 4. Improvement Projects in the Initial 2044 Preferred Land Use Future Model

2024-2029 TIP ID	IMPROVEMENT PROJECT	PROJECT STATUS	NEXT STEPS
I-6	Lea Hill Road SE & 112th Avenue SE Roundabout	Design Programmed for 2027, Construction Not Yet funded.	Retain in 2024 CTP Project List
I-10	R Street SE & 21st Street SE Road Roundabout	Design Underway, Construction Programmed for 2025	Retain in 2024 CTP Project List
I-11	SR 164 & 6th Street SE Improvement	Design Programmed for 2025, Construction Not Yet Funded	Effectiveness of Project in Mitigating LOS questionable. Remove project from TIP and CTP.
I-12	Lea Hill Road SE & 104th Avenue SE Roundabout	Design Underway, Construction Not Yet Funded	Seek Construction Funding. Retain in 2024 CTP List.
I-15	10th Street NW & A Street NW Signal	Design Underway, Construction Programmed for 2024	Project to be substantially complete by end of 2024. Remove from 2024 CTP list.
I-16	SR 167 NB Ramps & 15th Street NW Improvement	Removed from TIP. Design and Construction Not Funded	Alternate Project Developed to Address LOS issue. Remove from 2024 CTP List.
R-2	Stewart Road Widening (City of Sumner)	Design Underway, Construction Programmed for 2025	Project By Others and Outside City of Auburn. Remove from 2024 CTP Project List.
R-4	A Street Loop	Construction underway	Project to be substantially complete by end of 2024. Remove from 2024 CTP list.
R-5	A Street NW & 3rd Street NW Improvement	Design and Construction Not Yet Funded	Retain in 2024 CTP Project List
R-6	Auburn Way S Widening (Hemlock Street to Poplar St)	Design Underway, Construction Programmed for 2024	Project will still be in construction by end of 2024. Retain in 2024 CTP Project List.
R-7	M Street NE Widening (Main Street to 4th Street NE)	Design Underway, Construction Programmed for 2025	Retain project in 2024 CTP Project List.
R-13	R Street SE Widening (22nd to 33rd)	Design Underway, Construction Not Yet Funded	Retain project in 2024 CTP Project List.

(Continued on next page)

2024-2029 TIP ID	IMPROVEMENT PROJECT	PROJECT STATUS	NEXT STEPS
R-16	RGC Access Improvements	Design Underway, Construction Programmed for 2024	Project to be substantially complete by end of 2024. Remove from 2024 CTP Project List.
R-26	E Valley Highway Widening	Design Underway, Construction Not Yet Funded	Seek construction funding. Retain in 2024 CTP Project List.
R-27	Garden Avenue Realignment	Design Underway, Construction Programmed for 2024	Project to be substantially complete by end of 2024. Remove from 2024 CTP Project List.
P-3	10th Street NE Improvements	Design and Construction Not Yet Funded	Retain in 2024 CTP Project List
2019 COMP PLAN ID	**IMPROVEMENT PROJECT**	**PROJECT STATUS**	**NEXT STEPS**
2	I Street NE Extension (45th Street NE to S 277th St)	Complete	Remove from 2024 CTP Project List
11	116th Avenue SE & SE 320th Street Roundabout	Not funded	Retain in 2024 CTP Project List
16	M Street SE Widening (8th Street SE to Auburn Way S)	Not funded	Combine with M/12th signal project in 2024 CTP Project List
19	116th Avenue SE & SE 312th Street Roundabout	Not funded	Retain in 2024 CTP Project List
22	M Street SE & 12th Street SE Signal	Not funded	Combine with M Street SE Widening
23	M Street SE & 29th Street SE Roundabout	Not funded	Retain in 2024 CTP Project List
30	R Street Bypass (M Street SE to SR 18)	Not funded	Retain in 2024 CTP Project List
WSDOT	**IMPROVEMENT PROJECT**	**PROJECT STATUS**	**NEXT STEPS**
n/a	SR 167 HOV Widening (15th Street SW to SR 410)	Construction Programmed for 2025	Project by Others. Remove from 2024 CTP Project List.

The initial 2044 Preferred Land Use Future Model was used to generate future travel demand volumes and turning movement counts at 162 study intersections[2] throughout the city during the busiest hour of the weekday AM (7:00 - 9:00 am) and PM (4:00 - 6:00 pm) peak periods.

Figure 5 shows the forecast 32% increase in households and 44% increase in jobs in the City of Auburn between 2022 and 2044. AM peak hour trips are forecast to increase by 28% (from 22,900 trips today to 29,300 trips in 2044). PM peak hour trips are forecast to increase by 37% (from 30,700 trips today to 42,200 trips in 2044).

Forecast volumes from the preferred land use alternative model were then applied to study intersections using Synchro software to test future LOS.

In the preferred land use alternative, 162 intersections were analyzed. Of these, 22 intersections are forecast to operate below City or state LOS standards in 2044. These intersections are listed in **Table 5**. Of the intersections forecast to fail, 10 currently do not meet the adopted LOS standards. These 10 intersections are highlighted in pink in **Table 5**. **Figure 6** shows a map of intersection LOS across the City.

Figure 5. Changes in Trip Generation Between 2022 Existing Condition and the Preferred Land Use 2044 Alternative

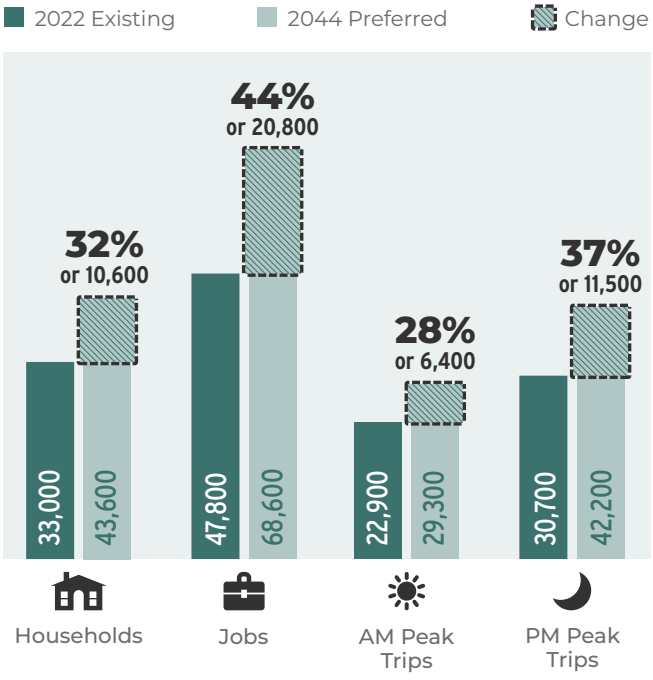


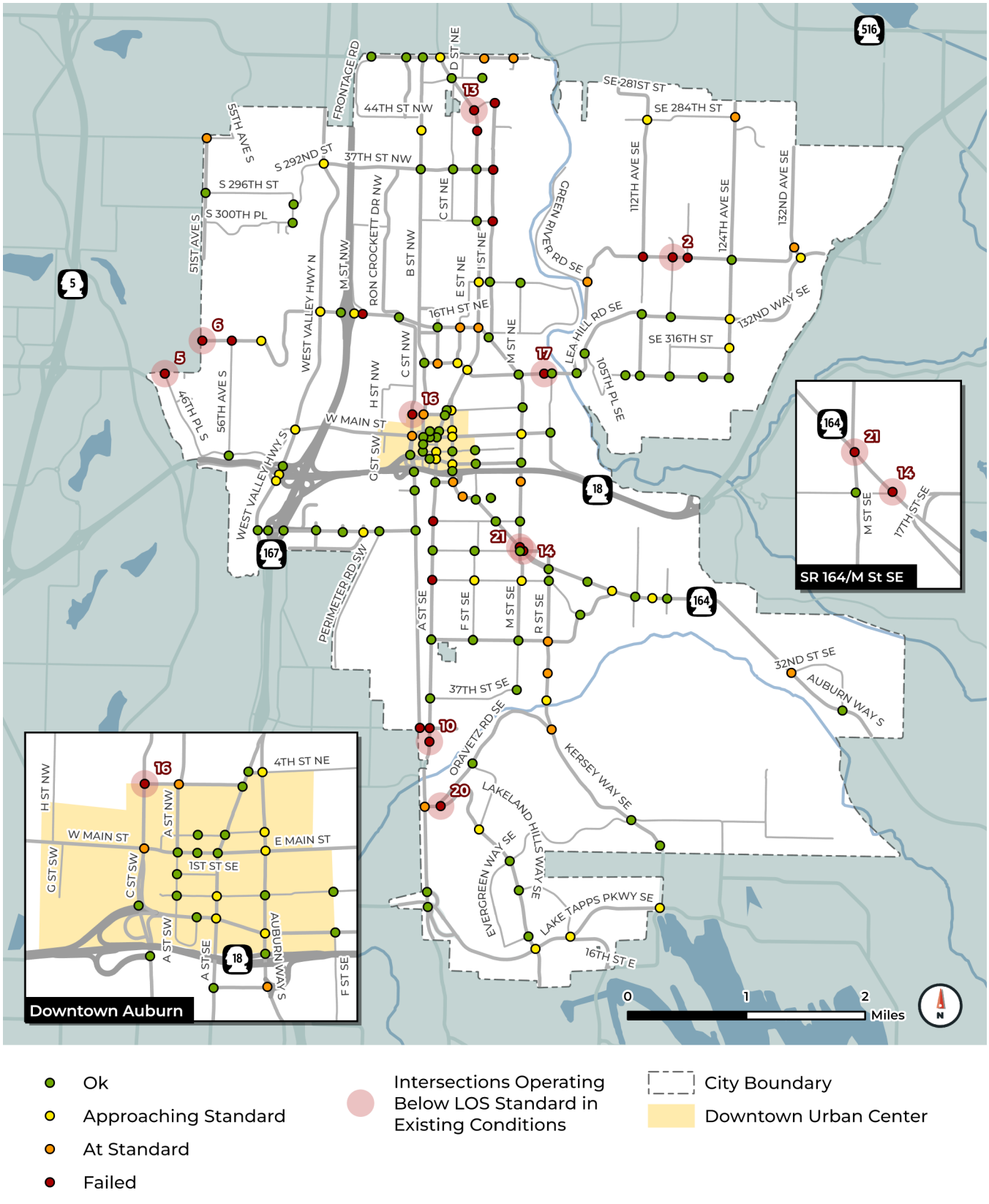
Table 5. Intersections Operating Below the LOS Standard

	INTERSECTION
1	112th Ave SE & SE 304th St
2	116th Ave SE & SE 304th St
3	15th St NE & M St NE
4	30th St NE
5	46th PL S / 44th Ave S & S 321st St / 51st Ave S
6	51st Ave S & 316th Ave
7	56th Ave S & S 316th Ave
8	A St SE & 12th St SE
9	A St SE & 21st St SE
10	A St SE & 44th St SE
11	A St SE & Ellingson Rd / 41st St SE
12	Auburn Way North & 42nd St NE
13	Auburn Way North & 45th St NE
14	Auburn Way South & 17th St SE
15	C St SE & Ellingson Rd
16	C St SW & 3rd St NW
17	Henry Rd NE / Pike St NE & 8th St NE
18	I St NE & 37th St NE
19	I St NE & 45th St NE
20	Lakeland Hills Way SE & Oravetz Rd SE
21	M St SE & AWS
22	SE 304th St & 118th Ave SE

FUTURE LOS	NUMBER OF INTERSECTIONS
OK	88
Approaching Standard	33
At Standard	19
Failed	22

2 Note that the future scenario includes five intersections that do not exist today.

Figure 6. Intersection Level of Service in the 2044 Future Preferred Land Use Alternative



Of the intersections forecast to operate below LOS standards by 2044, the vast majority have two-way stop-control; only three failing intersections are signalized, four have all-way stop-control, and 14 have two-way stop-control. More of the intersections are impacted during the PM peak hour than in the morning, similar to existing conditions. In addition to the 21 intersections that are expected to fail city or state standards by 2044, 14 intersections are forecast to operate at the City's LOS standard, two in both the AM and PM, three in the AM and nine in the PM peak hour, signaling that increased growth could test the capacity on more of the road network in Auburn.

With some exceptions, Vehicle LOS issues associated with the preferred land use alternative are concentrated along five corridors, where multiple intersections will fail to meet City or state LOS standards:

- **East:** SE 304th Street corridor on Lea Hill
- **North:** I St corridor and Auburn Way N
- **West:**51st Ave S / S 321st Street Corridor on West Hill
- **South:** A Street SE corridor

2.2.9. Addressing Vehicle LOS Deficiencies

Projects to Address Existing and Forecast LOS Issues

Where the future analysis indicated that an intersection would not meet adopted LOS standards in 2044, measures to address the deficiency were identified, evaluated, and costed. City transportation policies, goals, site characteristics, and and adjacent planned or underway projects were considered to identify effective and desirable improvements. The types of improvements considered included roundabouts, re-channelization of intersections, access management, turning restrictions, and signalization. Where a signalized intersection was deemed a desirable solution, MUTCD 11th Edition signal warrants were applied to determine if forecast volumes would warrant signalization of the intersection. In instances where a failing intersection would not meet MUTCD signal warrants, non-signalized mitigation measures, such as channelization and access management, were considered. All improvements were analyzed using Synchro traffic operations software to ensure the recommended measure would facilitate the intersection meeting the adopted level of service standards in the 2044 preferred land use alternative. Projects to implement these improvements are included in the project list in Appendix B.

Trip Reductions

The Preferred scenario includes reductions to vehicle trip generation rates to reflect shifts to other travel models due to increased density and mixed-use development projects, focused land use growth and increased access to additional active transportation facilities, transit service, increased vehicular travel costs, and demographic changes. The reduction percentages were determined based on results from PSRC's regional travel demand for travel behavior changes in the City of Auburn. Reductions were applied across the City based on the Transit LOS rating. This metric is based on walking proximity to transit. Reductions were only applied in areas with level of transit service 1 and 2, the highest quality transit options in the City: within the walkshed of Auburn Station and frequent transit routes (BRT and routes with less than 30 minute headways). The reductions in vehicle trip rates ranged from 1.5 to 8.0 percent based on trip type (commute vs. non-commute) and transit area type.

Regional Capacity Projects

In addition to projects that provide additional vehicle capacity to meet City vehicle LOS standards, a set of projects have been identified that would provide regional system-wide capacity benefit. These projects are included in the Regional Transportation Plan (RTP), by the Puget Sound Regional Council (PSRC) and are listed below:

- **Auburn Way South - Hemlock to Poplar** (currently in construction)
- **Auburn Way South: 32nd St to City Limit** (candidate project)
- **Auburn Way South - Poplar to 32nd St** (candidate project)
- **E Valley Highway Widening** (currently in design w/planned construction start in 2028)
- **M Street NE Widening, E Main St to 4th St NE**, (currently in design w/planned construction start in 2025/2026)
- **M Street SE Corridor Improvements** (8th St SE to Auburn Way S)

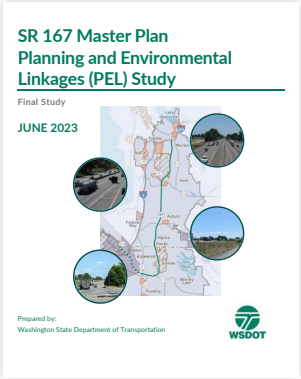
See Project Comp-20 in Appendix B. For more information regarding these projects, please refer to the **PSRC Regional Transportation Plan** available at https://www.psrc.org/planning-2050/regional-transportation-plan.

SR 167 Master Plan

The SR 167 Master Plan update includes recommendations to address the significant congestion and impact on local roadways from regional traffic flowing through the SR 167 corridor.

The plan calls for an additional express toll lane in each direction and interchange improvements on SR 167 at 15th Street NW, SR 18, and 15th Street SW to reduce bottlenecking and queuing issues. These changes are complemented by a suite of transit improvements and active mode access improvements in the surrounding area. Additionally, the master plan also includes support for reconstructing the BNSF freight railway over Ellingson Road to reduce bottleneck and impacts to traffic.

For further review of the SR 167 master plan, visit the WSDOT project website.



SR 167 PEL Study

2.3. ACTIVE TRANSPORTATION

Active transportation is an integral component of Auburn's transportation system. Active transportation includes walking, bicycling, and rolling. The City seeks to enhance the active transportation travel environment both for recreational travel and trips that might otherwise be taken via a car to improve mobility and environmental health.



The City recognizes that the past development of the transportation system has prioritized the automobile as the primary travel mode. A side effect of this has been conditions less conducive to active transportation travel. The City seeks to redress the balance by enhancing conditions in which active transportation modes are a realistic and attractive travel option.

Over the last 15 years, there have been significant improvements to active transportation facilities in Auburn's Regional Growth Center (Downtown Auburn). Sidewalk, ADA, and lighting improvements have been made to Main Street, S Division Street Promenade, City Hall Plaza and Plaza Park, and behind the shops on East Main Street. Growth in the downtown core has resulted in the development of multi-story residential and office buildings and senior housing, helping renew the pedestrian infrastructure and creating a need for continued effort to maintain and improve the sidewalk system. In addition, the Sounder Auburn Station and transit hub at West Main Street and C Street SW provide pedestrians more options for connecting to regional destinations.

These improvements contribute to a more hospitable environment for pedestrians. Despite the progress that has been made over the past several years, there are still many areas of need and gaps in active transportation systems in Downtown Auburn and in other areas throughout the city.

Commercial development outside the downtown exists primarily along arterials and is dominated by strip development and auto-oriented businesses. Although sidewalks are provided on most arterials, pedestrians may feel exposed to the traffic. Surface parking lots border the sidewalks, and driveways interrupt the continuity of the sidewalk system. The high volumes of vehicular traffic and wide streets along arterials, such as Auburn Way, pose a barrier for pedestrians crossing the roadway.

Residential areas, such as southwest Lea Hill, were built under King County's jurisdiction and sidewalk construction was not required. Breaks in the sidewalk network require pedestrians to maneuver around parked cars, into private yards, or into the street. In newer neighborhoods such as Lakeland Hills,

sidewalks built to the city standards applicable at the time of their construction are provided on both sides of the street.

The Lea Hill and West Hill neighborhoods have a sporadic and often disconnected sidewalk system. Most newer residential developments have sidewalks, but many of the older residential areas and arterial streets are missing large segments of sidewalk, resulting in an inconsistent pedestrian environment.

The Auburn Valley is flat and conducive to cycling for a range of skill levels and has a good network of existing or planned north-south biking routes and trails. Areas along the Green and White Rivers provide opportunities for multi-use trails that accommodate bicyclists and pedestrians. The Interurban Trail is part of a major north-south regional trail system. The Green River trail is also an extension of a north-south regional trail. Conversely, there are few existing east-west connections between the West Hill and Lea Hill areas of Auburn which are more challenging due to steep topography. Many bicycle lanes existing throughout the City but often have gaps before forming a fully connected network or connection to transit and trails.

Planning and developing a strong active transportation network supports several state and national acts including Washington's GMA, CTR Act, the federal Clean Air Act, the ADA, and the Move Ahead for Progress in the 21st Century Act (MAP-21) and its successors. Supporting the active transportation system helps ensure compliance with these initiatives and the healthy community principles espoused by PSRC through Vision 2050. It also increases funding opportunities for City projects. Improving the active transportation system also helps address the findings of the citywide Health Impact Assessment, which recommended that the City improve sidewalk connectivity; improve the pedestrian environment; eliminate natural and man-made mobility barriers for pedestrian and bicyclists; improve transit access; and improve traffic safety, and pedestrian safety.

As a regional growth center, the City encourages transportation planning that emerges from a clear land use plan based on a community vision and the values expressed in Imagine Auburn. In this vision, Auburn supports higher density housing in the downtown; neighborhood commercial districts; and landscaped, pedestrian-oriented street and sidewalk design. This pattern of development reinforces a positive walking and biking environment.

Auburn's developing trail network provides local and regional connections for both recreational use and commuting. The regional trails that have been developed include the Interurban Trail and portions of the Green River and White River Trails. The Lakeland Hills Trail network provides connections to neighborhood parks, community center, and to the Sumner Link Trail via a tunnel under the BNSF railway. Map 2. 2024 Bike Route Network in Appendix A illustrates the existing and proposed trail network within the City.

Figure 7. Existing Bike Facility Statistics as of January 2024



TOTAL: 46.67 mi

In 2024, the City's existing bike facilities were mapped using aerial photography and field verification. All roads in the City of Auburn are considered Class III Bikeways. However, only bike facilities of Class III Bikeways with Pavement Markings level and higher were included in the inventory. The inventory is depicted in Map 3. 2024 Existing Bike Facilities in Appendix A and yielded the statistics shown in **Figure 7**.

A citywide sidewalk inventory was completed in 2022. This initial inventory collected the following information for city sidewalks:

- Location
- Surface type (concrete, asphalt, brick)
- Width
- Length
- Surface area

The inventory was collected prior to the development of the Pedestrian Level of Traffic Stress (LTS) standards and for many sidewalks, doesn't include all information needed to determine the Pedestrian LTS. An ongoing effort is underway to collect this additional information that will then be used to evaluate and document where existing sidewalks meet or don't meet pedestrian LOS standards.

The total length of City sidewalks inventoried in 2022 was **298 Miles**.

2.3.1. Active Transportation Level of Service Standards

The Plan policies establish active transportation LOS standards based on the LTS, shown in **Figure 8**. This approach is consistent with Washington State, Pierce County, and King County policies and standards. LTS describes how comfortable a pedestrian or bicycle route feels to its users based on a variety of variables including posted speed limit, traffic volumes, whether or not the roadway is a truck route, and the type of active transportation facility provided. Active transportation facilities in, or along, roadways with higher vehicle speeds and volumes generally have higher LTS scores because the vehicle traffic makes it less comfortable for bicyclists and pedestrians to use those facilities. Facilities that provide more separation between active transportation modes and adjacent roadway vehicular traffic and/or on lower speed roadways are more comfortable for bikes and pedestrians and therefore have a lower LTS. The City rates the LTS of its bicycle and pedestrian facilities on a scale of "1" to "4" with "1" being the most comfortable facilities and are the most likely to be used by people with a wide range of ages and abilities and "4" is the least comfortable and are likely to be used by only a select group of people and may present a barrier to the general walking and biking community.

2.3.2. Walking LOS Standards

The City's pedestrian network consists mostly of sidewalks and roadway shoulders. Trails and alleys also provide pedestrian connectivity in some areas. The City utilizes the Pedestrian Facility LTS Table shown in **Table 6** to identify the LTS scores for pedestrian facilities. The Plan policies establish an LTS of "2" as the minimum standard for new and upgraded pedestrian facilities. The Plan policies also establish that new and upgraded pedestrian facilities will meet current ADA requirements. The Plan policies support actions to identify, prioritize, and plan improvements to existing pedestrian facilities to meet current LTS standards and ADA requirements.

Figure 8. Level of Traffic Stress (LTS)

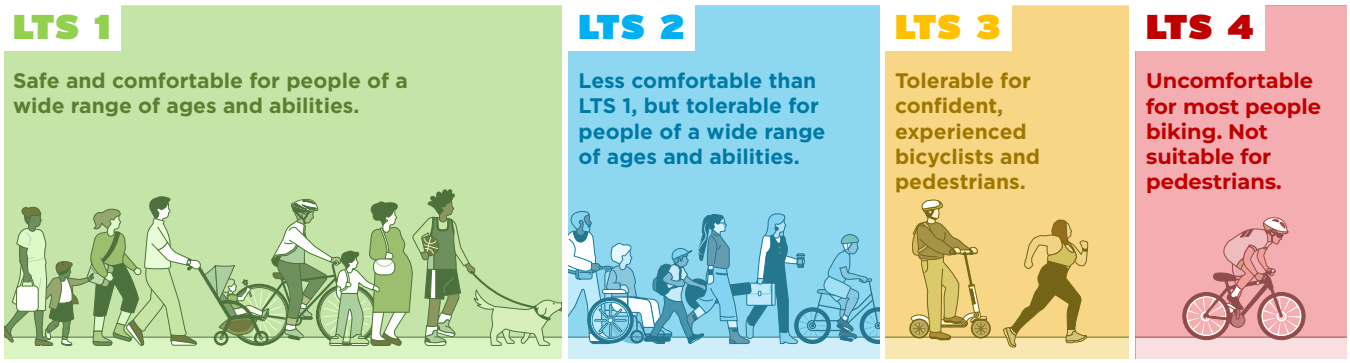


Table 6. Pedestrian Facility LTS Table

ROADWAY CLASS	NO SEPARATE PEDESTRIAN FACILITY	5' SHOULDER	5' SHOULDER WITH PHYSICAL BARRIER	5' SIDEWALK	5' SIDEWALK WITH 5' SEPARATION	10' SIDEWALK
Alley	2	1	1	1	1	1
Local Rustic	2	1	1	1	1	1
Rustic Collector	3	2	1	1	1	1
Local	3	3	2	2	1	1
Collector	4	3	2	2	1	1
Local Industrial	4	4	3	3	2	1
Minor Arterial	4	4	4	3	2	1
Principal Arterial	4	4	4	3	2	1

2.3.3. Biking LOS Standards

The planned and existing routes making up the City's bicycle transportation network have been classified as either Regional, Priority, or Auxiliary Routes and are shown on Map 2. 2024 Bike Route Network in Appendix A. These classified bicycle routes, both existing and planned, support general movement of cyclists throughout the City and have been identified to provide connectivity between neighborhoods and commercial areas to transit stops, regional trail connections, and the downtown urban center. Streets and trails not identified as Regional, Priority, or Auxiliary routes provide important connections between local destinations, recreational use, and access to the bicycle transportation network.

- **Regional routes** provide connectivity through the City to areas outside the City
- **Priority routes** provide connectivity from Auxiliary Routes to Regional Routes, frequent transit stops, and Auburn Station
- **Auxiliary routes** provide connectivity to Priority Routes from neighborhoods, commercial areas, schools, services, and non-frequent transit stops

The Plan policies establish standards that require Regional Routes to have the lowest LTS of "1", Priority Routes to have a slightly higher LTS of "2" or less, and Auxiliary Routes to have an LTS of no more than "3". Bicycle facilities not identified as being Regional, Priority, or Auxiliary do not have assigned LTS standards d are designed in accordance with the standard roadway cross sections by street classification in the EDS.

The City utilizes the Bicycle Facility LTS Table shown in **Table 7** to identify the LTS scores for bicycle facilities. The table represents a simplified approach towards evaluating bicycle level of traffic stress. In some cases, factors not shown in the table may need to be considered and could necessitate the use of a more robust bike facility than is shown on the table to achieve the level of traffic stress standard. Standards for Class I, II, and III Bikeways are included in the EDS, shown in **Figure 9**.

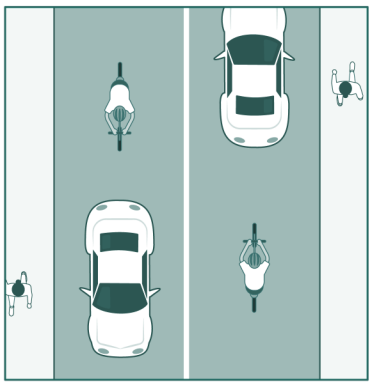
The EDS will be periodically updated to reflect current and emerging approaches towards achieving LTS standards with differing treatments and approaches.

Although a bike network route is not identified on SR 164, this state route is subject to WSDOT complete streets requirements. Per these standards, SR 164 would require a minimum of a separated trail (Class I Bike Facility) to meet WSDOT level of traffic stress requirements. The City will look for opportunities to improve SR 164 to include these facilities where feasible with capital and development project improvements and in partnership with the Muckleshoot Indian Tribe.

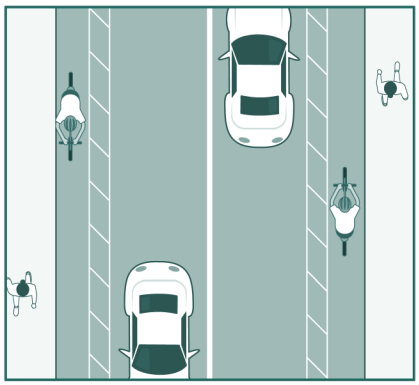
2.3.4. Sidewalk Facility Gap Analysis

The inventory of existing sidewalks was used to identify gaps in the City's sidewalk network. Improvements to address gaps and to address safety, accessibility, and level of traffic stress deficiencies have been, or will be, identified and included projects in this plan or addressed with future projects and programs.

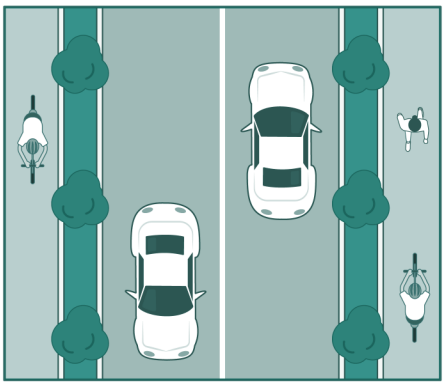
Figure 9. Bikeway Standards



Class III bikeways typically has the bicyclists and vehicles sharing travel lanes.



Class II bikeways are generally bicycle lanes in the roadway but separated from vehicular traffic.



Class I bikeways are bicycle facilities that are outside the roadway and are usually separated from roadway traffic by curbing, landscaping, buffer hardscaping, or physical barriers.

Table 7. Bicycle Facility LTS Table

POSTED SPEED LIMIT (MPH)	ARTERIAL TRAFFIC VOLUME/ FREIGHT CLASS	CLASS III BIKEWAY	CLASS III BIKEWAY W/ PAVEMENT MARKINGS	CLASS II BIKEWAY	CLASS II BIKEWAY W/BUFFER	CLASS I BIKEWAY
25/Not Posted	<3k	1	1	1	1	1
	3-7k	3	2	2	2	1
	≥7k	3	3	2	2	1
30	<15k	4	3	2	2	1
	≥15k	4	4	3	2	1
35	<25k	4	4	3	3	1
	≥25k	4	4	4	3	1
40+	Any Volume	4	4	4	4	1
Any	T-2* or Greater	4	4	4	4	1

2.3.5. Bike Facility Gap Analysis

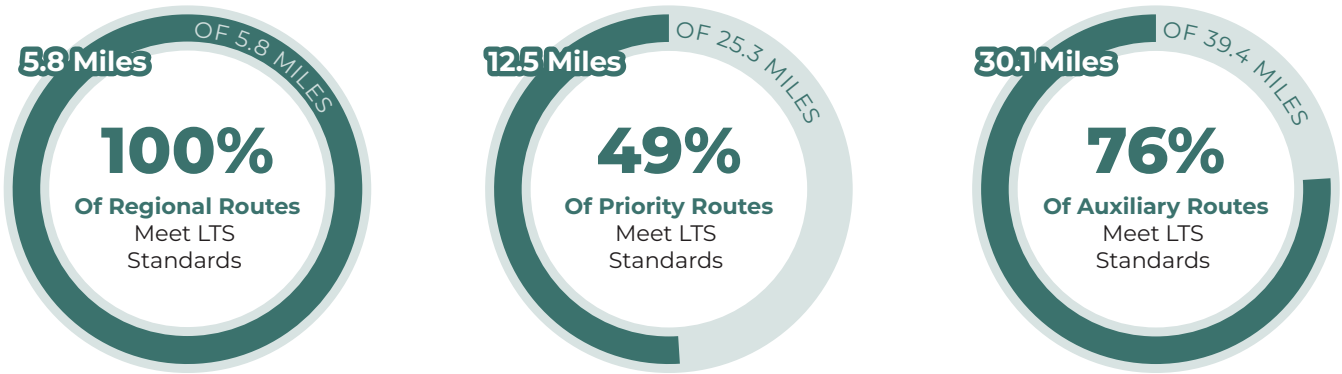
The inventory of existing bike facilities was evaluated using the LTS Table to determine the LTS for existing facilities.

The existing bike facilities LTS data was compared to the Map 2. 2024 Bike Route Network in Appendix A of regional, priority, and auxiliary routes to identify gaps in the planned bike network and existing bike facilities that do not currently meet the LTS standards. The comparison yielded the following statistics shown in **Figure 10**.

Bike facilities not located on the City's bike network do not have an LTS standard and were therefore not assessed for a gap between the provided LTS and the LTS standard.

Completing gaps in the bike network and upgrading bike facilities to meet or exceed LTS standards in areas closer to transit services and where those transit services are more frequent and convenient (level of transit service "1" or "2", see Section 2.4.2. Transit LOS Standards) is more likely to encourage a mode shift from cars to bikes and transit. These projects would help relieve vehicle congestion and reduce needs for increased vehicle capacity and are therefore eligible to be funded with a per person trip transportation impact fee program. These projects are listed in Appendix B.

Figure 10. Bikeway Network Assessment Statistics as of January 2024



2.4. TRANSIT

2.4.1. Existing Transit Services

Figure 11 provides a brief summary of the public transportation services offered in Auburn. Existing transit service for the Auburn area is identified in Map 5. 2024 Transit Bus Routes/Stops in Appendix A. The service levels outlined in this section are for normal operations as of January 2024.

Auburn Station

Transit service is a key component of Auburn's transportation system, providing mobility within the City and access to and from the City. Unlike the street and active transportation systems, Auburn does not directly administer transit service. Rather, the City works with local and regional transit agencies to coordinate service. The transit agencies are publicly funded and are responsible for providing transit service within their individual service boundaries.

Today, Auburn is served by local and regional bus service and commuter rail.

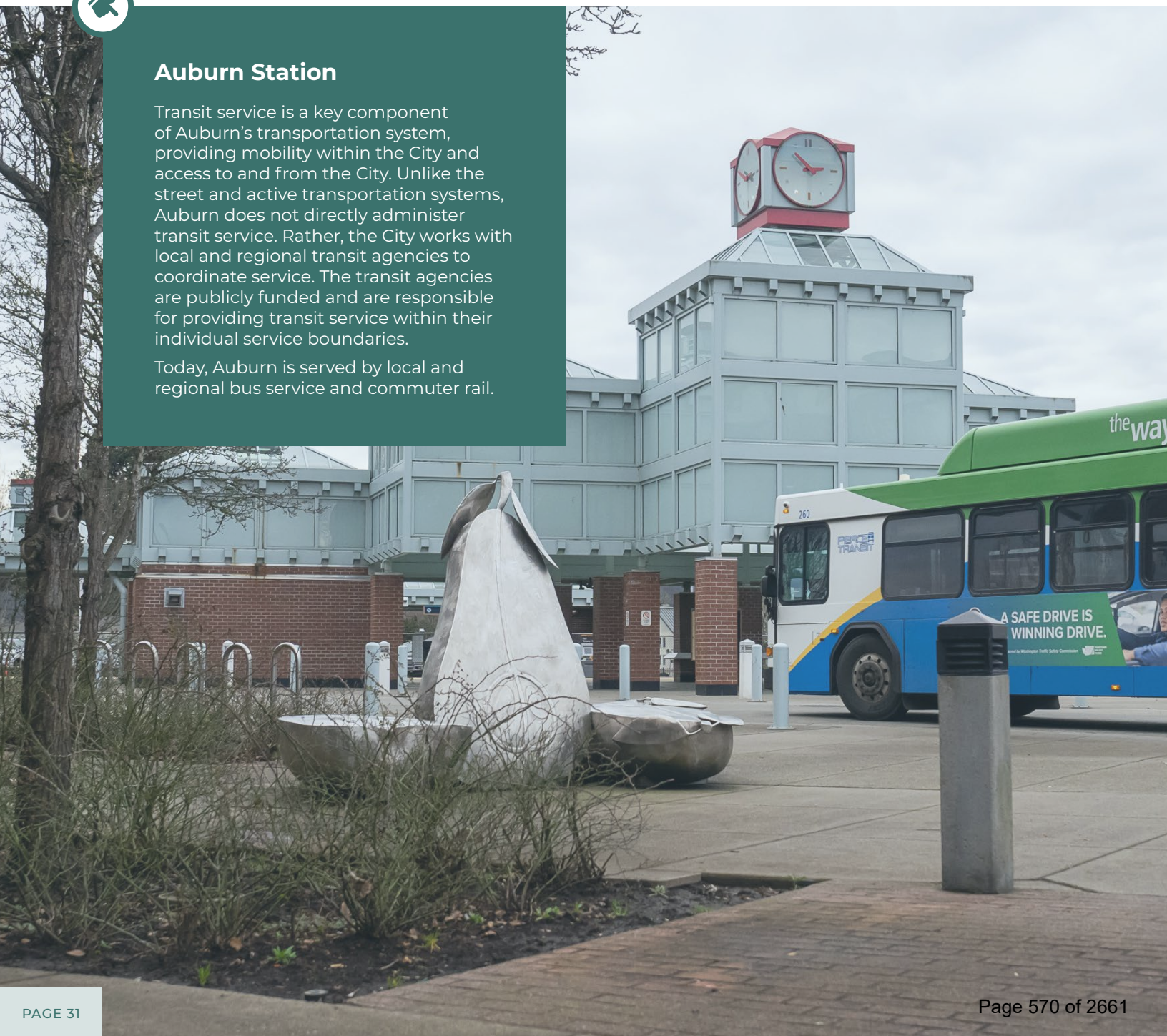
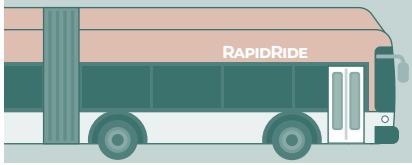
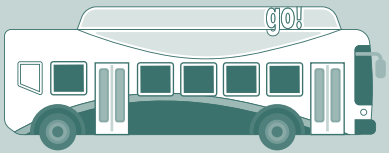
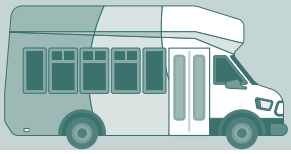


Figure 11. Types of Transit Services in Auburn

AUBURN STATION (MANY TRANSIT OPTIONS AVAILABLE)

- Sound Transit Sounder commuter rail service
- Sound Transit express bus service
- KC Metro frequent route service
- KC Metro and Muckleshoot Tribal Transit local route service
- KC Metro DART service
- Pierce Transit express route service

	Level of Service	Service/ Frequency	Distance Between Stops
Frequent Routes BRT – Bus Rapid Transit (RapidRide) 	**HIGHEST** service frequency/ hours	**< 15 MINS OR LESS** headways during service hours Minimum 4 buses/hour during peak times (currently route 160)	**STOPS EVERY 1/2 MILE**
Local Routes 	**MEDIUM** service frequency/ hours	**≤ 30 MINS** headways during peak hours **≤ 60 MINS** during service hours outside of peak hours (currently routes 181, 184, Muckleshoot Tribal Transit)	**STOPS EVERY 1/4 MILE**
DART & Express Routes 	**LIMITED** service frequency/ hours	**Service with few stops between destinations, intended to take riders quickly to the key destinations.** • Express routes are currently routes 497, 566, and 578 • Dial-A-Ride Transit Service (DART) routes are currently routes 915 and 917	**STOPS EVERY 1/4 MILE**

King County Metro Transit (KC Metro)

KC Metro offers a network of bus service in Auburn, connecting the city to the region. KC Metro adopted and implemented changes to its network in September 2020, via the Renton-Kent-Auburn Area Mobility Plan (RKAAMP), and some routes were affected. These changes were in part to accommodate the planned RapidRide I Line, which would replace a portion of Route 160, and provide frequent, reliable, and extended (early mornings to late night) service from Auburn Station, along the Auburn Way N corridor, connecting Auburn, Kent, and Renton transit stations.

Route 160 provides connection between Auburn Station, Kent Station, and the Renton Transit Center with very limited stops in between. It provides a maximum of 15-minute service during peak hours and 30-minute service during off-peak, and operates from 4 am to 3 am on weekdays and from 5 am to 3 am on weekends. This route will become the RapidRide I Line in 2026 and will provide service every 10 to 15 minutes.

Route 165 provides regional service between Kent, Auburn, and Green River College. It connects with Route 181 at Green River College. This route provides 20-minute service during peak hours and 30- to 60-minute service during off-peak, operating from 5 am to 12 am on weekdays and 6 am to 12am on weekends.

KC Metro provides frequent, local, and DART bus services linking destinations within the community and providing regional connections to the Auburn Station.

Route 181 provides daily service between the Twin Lakes Park-and-Ride, Federal Way Commons Mall, Federal Way Transit Center, the Outlet Collection, Auburn Station, and Green River College. It provides 15- to 30-minute service during peak hours and 30- to 60-minute service during off-peak, operating from 5 am to 11:30 pm on weekdays and 6:45 am to 11:30 pm on weekends.

Route 184 provides daily service from Auburn Station to south Auburn. It provides 20- to 30-minute service during the day, and 30- to 60-minute service during nights and weekends, and operates from 4:30 am to 1:30 am on weekdays and 5:30 am to 2 am on weekends.

Route 915 provides weekday and Saturday service between Auburn Station and Enumclaw via Auburn Way South. The route also includes a small portion of DART service with limited, variable routing in response to rider requests in downtown Enumclaw and the northern part of the Auburn Downtown Urban Center around the MultiCare Auburn Medical Center. This route provides 40- to 60-minute service, operating from 4:30 am to 7:45 pm, during weekdays, and 90-minute service, operating from 10 am to 6:30pm, on weekends.



Route 917 provides weekday and Saturday service between A St SE, 41st St SE, Algona, the Outlet Collection, and Auburn Station. The route offers DART service (limited variable route) in portions of Pacific. This route provides 25- to 40-minute service on weekdays, and 60-minute service on weekends. It operates from 5 am to 7 pm on weekdays and from 8:30 am to 5:45 pm on weekends.

Metro Flex

Metro Flex is an on-demand neighborhood ride share service, allowing transit users to ride anywhere within its service area at the same cost as a KC Metro bus trip. Metro Flex provides service in places that are not near frequent bus or rail service, helping to fill transit gaps in the areas that it serves. While Auburn is not currently within a Metro Flex service area, it is on the short list for expansion of the program.

ACCESS

ACCESS Transportation is a KC Metro paratransit service, providing door-to-door, shared-ride van transportation within most of King County. The ADA requires door-to-door paratransit service for persons whose disabilities prevent use of accessible fixed-route bus service.

Vanpool Services

KC Metro sponsors vanpool services that serve residents and employees in Auburn. Vanpool is a shared-ride service that provides group transport for commuters with proximate origins and destinations. Vanpool is a popular and flexible service that provides commuters with an alternative to driving alone and fixed-route transit service. Vanpool will continue to be an important strategy for mitigating peak period congestion throughout Auburn and the region.

Metro Transit Facilities

KC Metro owns and operates the Auburn 15th Street NW Park-and-Ride with approximately 150 surface parking stalls. KC Metro also operates into Auburn Station, which is managed by Sound Transit.



Pierce Transit

Route 497 is operated by Pierce Transit in partnership with the City of Auburn and KC Metro. It operates peak hour weekday service between Lakeland Hills and Auburn Station. As a morning and evening service meeting Sounder commuter rail schedule, Route 497 is a commuter-oriented route, but is open to all riders. Route 497 primarily serves Sounder passengers and significantly reduces the demand for commuter parking at the Auburn Station parking garage managed by Sound Transit.

Vanpool Services are provided by Pierce Transit similar to those offered by KC Metro.

Sound Transit

Sound Transit is the regional transit provider for the many parts of the Puget Sound region. It provides limited-stop transit services linking Auburn to major regional destinations in King and Pierce Counties. The agency offers Sounder commuter rail and regional express bus services in Auburn.

Sounder Commuter Rail

Sound Transit operates the Sounder commuter rail service on the Lakewood to Tacoma to Seattle route (S Line) via the BNSF Railway. The S Line provides weekday peak hour trips northbound to Seattle in the morning and southbound from Seattle to Tacoma to Lakewood in the afternoon. Limited reverse direction trips are also provided in each peak hour, as well as limited midday service. Some connections are available between S Line Sounder trains, which terminate in Seattle, and N Line Sounder trains from Everett to Seattle. Additional special event service to and from Seattle for Mariners, Seahawks, and Sounders games on some weekends.

Currently, nine trains operate northbound to Seattle in the morning peak, and ten trains return southbound during the evening peak. Three trains operate southbound to Tacoma/Lakewood in the morning and northbound to Seattle in the evening. There is currently one midday train running northbound to Seattle.

Due to shifts in ridership since the COVID-19 pandemic and changes in many commuters' work schedules, particularly the increase in telework, Sound Transit is re-examining the priorities from the 2020 Sounder South Strategic Plan. Prior to the pandemic, near capacity ridership growth was expected during peak periods, resulting in the plan prioritizing longer trains (from seven cars to ten cars) during the peak periods. However, since the pandemic, peak ridership has lowered, leading Sound Transit to consider prioritizing new trips, including more trips during off-peak hours, over longer trains.



Any new trips, however, will require approval from BNSF Railway, which owns most of the tracks the Sounder runs on.

As part of its re-examination of its priorities, Sound Transit conducted public engagement around the question of longer trains during peak hours versus more trips. The survey results showed that approximately 90% of respondents preferred adding new trips over longer trains. Sound Transit will use the feedback from its public engagement, along with other research, to inform Sound Transit Board discussions regarding its Sounder S-Line priorities.

Regional Express Bus Service

Route 566/567 offers daily weekday, limited-stop service between Auburn Station, Kent Station, Renton Transit Center, Bellevue Transit Center, and Overlake Transit Center. It provides 20- to 30-minute service northbound during the morning peak from 5:30 am to 11 am, and 20- to 30-minute service southbound during the evening peak from 1:40 pm to 8 pm.

Route 577/578 offers daily limited-stop service between Puyallup, Sumner, Auburn, Federal Way, and Seattle. Route 577 provides service between the Federal Way Transit Center and Seattle during the peak periods when the Sounder train is in operation. The 578 provides service between Puyallup and Seattle during the off-peak hours when train service is not currently provided. Route 578 provides 30- to 60-minute service on weekdays. On weekends, Route 578 provides hourly service.

Auburn Station

Sound Transit owns and operates Auburn Station located in downtown Auburn. This full-service multimodal facility provides parking for a total of 633 vehicles in a six-story parking garage and a surface parking lot. A new parking garage is expected to be available for transit users in 2027, offering an additional 525 parking stalls. A number of parking stalls are reserved for carpool/vanpool, and a number of stalls are reserved for paying single-occupant vehicles.

The facility currently handles approximately 470 daily bus trips. Approximately 3,000 passengers ride bus service to/from the station on a daily basis. Boardings at Auburn on the Sounder commuter rail are approximately 1,300 per day.

Muckleshoot Tribal Transit

MIT currently operates the Muckleshoot Tribal Transit (MTT) services that offers two publicly available transit routes. The Reservation Hot Lap provides local service between SE 384th Street and SE 416th Street with 30- to 60-minute service from 7 am to 8 pm on weekdays. The Reservation Route serves the SR 164 corridor generally between SE 416th Street, Downtown Auburn, and the Outlet Collection with 30-minute service from 5:30 am to 8:30 pm on weekdays, and 30-minute service from 10 am to 4:30 pm on Saturdays and holidays. MTT shares many stop locations with KC Metro and is a valuable resource to the community as the service is free to all passengers.



2.4.2. Transit LOS Standards

Different agencies take different approaches towards transit LOS standards. Unlike facilities and services for other transportation modes, the City of Auburn does not own or operate transit facilities and does not directly provide transit services. It follows that the City evaluates and utilizes transit LOS standards differently than transit service providers (KC Metro, Pierce Transit, Muckleshoot Indian Tribe, and Sound Transit). Agencies that provide transit service typically utilize transit LOS standards to identify deficiencies in transit services and plan for expanded or improved transit services and facilities.

The City of Auburn's approach utilizes transit LOS standards to identify and prioritize investments in other transportation modes that would best encourage people to use transit services instead of driving.

This approach utilizes transit LOS as a gauge to evaluate the likelihood that people would choose transit over driving. The variables used to evaluate transit LOS by the City are proximity to transit services and the type of transit services available to the area. People in areas that are within closer walking and biking distances to transit services are more likely to use those services and therefore those areas have a higher transit LOS than areas further from transit services. Similarly, people are more likely to use transit services that offer more frequent and connected services and therefore areas served by more frequent and connected services have a higher transit LOS than areas with less frequent, less connected services.

Using the transit LOS in **Table 8**, a transit LOS rating ranging from "1" to "4" can be assigned for any location in the City using a combination of the walking distance from the location to transit service and the type of transit service available. A transit LOS rating of "1" is the highest rating which indicates an area is within a comfortable walking or biking distance to the most frequent and convenient transit services (frequent transit and/or transit hubs like Auburn Station). A transit LOS rating of "4" is the lowest rating and indicates an area is not within a short walking or biking distance to even the most basic transit services.

Map 6. 2024 Level of Transit Service in Appendix A shows level of transit service ratings throughout the City. Transit LOS is estimated using the walkshed distance to current and near-term planned transit stops based on the existing street network and does not account for whether or not those streets have active transportation facilities that meet current LOS pedestrian and bike standards. The City utilizes transit LOS to help prioritize investments in active transportation facilities intended to reduce the transportation system's need for vehicular capacity. Placing a new sidewalk, bike lane, or trail in a location with a transit LOS of "1" is more likely to encourage mode shift from vehicle to transit than placing the new facility in a location with a transit LOS of "4". Additionally, mitigation of potential vehicular LOS impacts caused by development is more likely realized with active transportation improvements in areas with higher transit LOS ratings. Map 6. 2024 Level of Transit Service in Appendix A is also used by the City in its coordination efforts with transit agencies to help identify service needs and gaps. It is the City's intention to improve overall transit LOS in the City by coordinating with transit agencies to encourage and support improved services, planning growth in the City near areas served by transit, and prioritizing investments in active transportation facilities that provide connectivity to transit services.

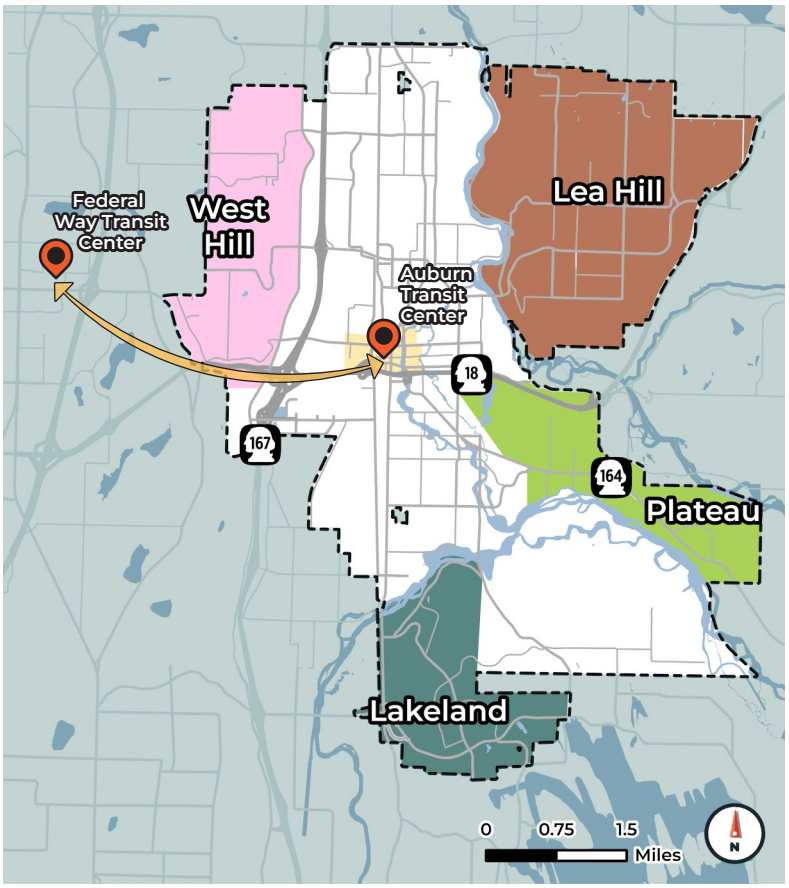
Table 8. Transit LOS Table

TYPE OF TRANSIT SERVICE	>1 MILE WALKSHED	1 MILE WALKSHED	¾ MILE WALKSHED	½ MILE WALKSHED	¼ MILE WALKSHED
Auburn Station	4	3	2	1	1
Frequent	4	3	2	1	1
Local	4	4	3	2	2
Express and Dart	4	4	4	3	2

2.4.3. Transit Needs and Gaps

The City serves as a community voice and advocate to transit providers to maintain and expand transit services to meet community needs. However, the City is not in full control of these services, therefore, the City's approach towards addressing transit level of service issues in order to improve that level of service where the City has control is to focus on providing access to existing and planned transit services. Those efforts are centered on improving sidewalk and bicycle facilities to provide connections to transit services and are described in the active transportation sections of this plan. This section summarizes the gaps and needs in the existing transit services in Auburn and provides recommendations on how those gaps and needs may be filled. The City will continue to communicate and coordinate with transit agencies to advocate for these needs.

Figure 12. Auburn Neighborhoods with Transit Needs and Gaps



West Hill

The West Hill of Auburn is generally the area bound on the west by 56th Ave S, Peasley Canyon Rd, 51st Ave S and 46th Place S (City limits), on the east by West Valley Highway, on the south by the S 348th St alignment (City limits), and on the north by the S 284th St alignment (the City limits approximately ½ mile south of S 277th St). Auburn's West Hill is not directly served by any transit services making its 7,500 residents the least transit served people in Auburn. Auburn's West Hill is also unique in that it sits between the Auburn Station and the Federal Way Transit Center. This presents an opportunity to provide transit connections from West Hill to the Federal Way Transit Center, Auburn Station, or both. These connections could come in the form of new routes or by modifying existing routes. KC Metro Route 183 could be modified to expand into portions of the West Hill to provide connection to the Federal Way Transit Center. KC Metro Route 181 could be modified to pass through a portion of West Hill to provide access to both the Federal Way Transit Center and Auburn Station. Another recommended solution would be to provide Metro Flex services to the West Hill and other parts of Auburn that lack transit services.

Connection Between Auburn Station and Federal Way Transit Center

With the Link Light Rail expanding south to Federal Way with an expected opening in 2026, there is an opportunity and need to improve Auburn's overall access to regional transit systems by providing frequent and efficient transit services between the Federal Way Link Station and Auburn Station. When the Link Light Rail is complete to the Federal Way Transit Center, the demand for this route is likely to increase significantly. The City of Auburn strongly supports and advocates for the expansion to frequent services and/or conversion of the existing Route 181 to a RapidRide line to enhance the connection between Auburn Station and the Federal Way Transit Center.

Lea Hill

The Lea Hill area of Auburn is bound on the west and south by the Green River, on the east by SR 18, and on the north by the City limits along S 282nd St and S 288th St. Lea Hill, a predominantly residential community, has two transit routes that predominantly serve Green River College, leaving a large portion of the residents unable to walk or bike to a transit route. In 2014, a license plate survey of the Auburn Station garage indicated that a substantial

number of Lea Hill residents utilize transit service at Auburn Station. This suggests that a commuter-oriented shuttle serving Lea Hill, similar to the Route 497 shuttle implemented in Lakeland Hills, could be successful. Another recommended solution would be to provide Metro Flex services to the Lea Hill and other parts of Auburn that lack transit services.

Plateau

The area along Auburn Way South (SR 164) between Riverwalk Drive, east to the City limits is referred to as the Plateau and is currently served by KC Metro Route 915 and Muckleshoot Tribal Transit. With both of these routes running, headway time ranges from 30 to 60 minutes. The City will continue to encourage partnership between KC Metro and Muckleshoot Tribal Transit to improve transit services to/from the

Other Transit Needs and Suggested Improvements



Residential areas of east Auburn, east of M St NE and south of 8th St NE, and parts of northeast Auburn, east of I St NE, are located more than 1/4 mile from fixed-route bus service. It is difficult for these areas to access transit, both for local and regional trips.



The design of KC Metro's local bus routes in Auburn should be reviewed in relation to future changes in Sound Transit's Sounder commuter rail and regional express bus services to identify opportunities and priorities for productive improvements to transit coverage, frequency, and hours of operation.



To maximize the investment in public transit service in Auburn, it is recommended that both Sound Transit and KC Metro conduct an evaluation of their schedules with a focus on improving service to major employers in the Auburn area.



Sounder Commuter Rail operates bi-directionally in the peak periods. Most of the trips are operated in the peak direction: northbound during the weekday AM peak and southbound during the weekday PM peak. No midday, evening, or weekend regular service is currently provided, except for the special events times. These services are needed, as is additional capacity on some of the currently most popular runs. The City encourages Sound Transit to institute midday Sounder service to and from Tacoma/Lakewood and Seattle, and plan for evening and weekend service in the near future.



The City will continue to work with Sound Transit as it designs and builds the second parking garage for the Auburn Station.



The City will utilize the CTR commuter surveys and employer program reports and continue to develop partnerships with CTR businesses to better understand the transit needs and gaps with the major employers in Auburn.



The City will continue to work with transit providers to ensure that transit stops are clean, secure, and meet safety requirements.



Auburn encourages Amtrak to consider implementing more intercity rail stations in the high density and traffic congested areas of Puget Sound, such as at Auburn Station. A new Auburn stop would have great ridership benefits since it is at a station with available overnight parking and is in close proximity to hundreds of thousands of potential new customers.

plateau to shorten headways along Auburn Way South. Another recommended solution would be to provide Metro Flex services to the Plateau and other parts of Auburn that lack transit services.

Lakeland Hills

Lakeland Hills, a planned residential community with approximately 3,800 homes, has peak-hour service to downtown Auburn, but lacks all-day service. The City of will continue to work with Pierce Transit, KC Metro, and Sound Transit to preserve Route 497 and add service to the route to meet all existing and future Sounder trains. In its Destination 2040 Long Range Plan, Pierce Transit lists an unfunded project that would expand Route 497 to become Route 498 that would run between Auburn and Fife. The City will continue to coordinate with Pierce Transit when, or if, this route expansion project starts to move forward. Another recommended solution would be to provide Metro Flex services and/or Pierce Transit Runner services to Lakeland Hills.

Additionally, during the public outreach efforts for development of this Plan, the City heard a suggestion from multiple people to expand KC Metro Route 184 into Lakeland to replace or augment Route 497. The City will discuss and potentially advocate for this, or similar concepts, with KC Metro and Pierce Transit.

2.5. FREIGHT

The efficient movement of freight, through and within the City, is critical to local and regional economic stability. Both rail and truck freight, originating largely in the Ports of Tacoma and Seattle, pass through Auburn regularly.

Within Auburn, freight, or the movement of goods, occurs mostly with trucks on state routes and City streets or on railroad facilities. These facilities benefit the City as they provide regional connectivity and access. The state routes present challenges as they create barriers to other roadways and active transportation facilities. Multiple railroad corridors pass through Auburn and provide regional benefit as they provide freight movement and, in the case of the BNSF Railway north-south corridor, also local benefit as it provides commuter rail line service. However, like the state routes, in many areas throughout the valley area of the City, the railroads obstruct neighborhood access and transportation network connectivity. A strength of the railroad network is that 11 of the 21 mainline rail crossings of City trails and roadways are grade separated. All non-grade separated mainline rail crossings have gates and warning lights. An opportunity to greatly improve neighborhood access and overall transportation network connectivity exists in working to create more grade separated crossings for active transportation modes. A significant amount of freight also moves throughout the City on City streets. Based on actual truck usage data, there are currently 49 centerline miles of T-1, T-2, and T-3 truck routes in Auburn.



2.5.1. **Truck**

The City has designated truck routes for through freight movement in an effort to maximize the efficiency of and protect the roadway infrastructure. Current City of Auburn truck routes are shown in Map 10. 2024 Freight Network in Appendix A. Truck routes, established by City ordinance, are designated for roadways that incorporate special design considerations such as street grades, continuity, turning radii, street and lane widths, pavement strength, and overhead obstruction heights.

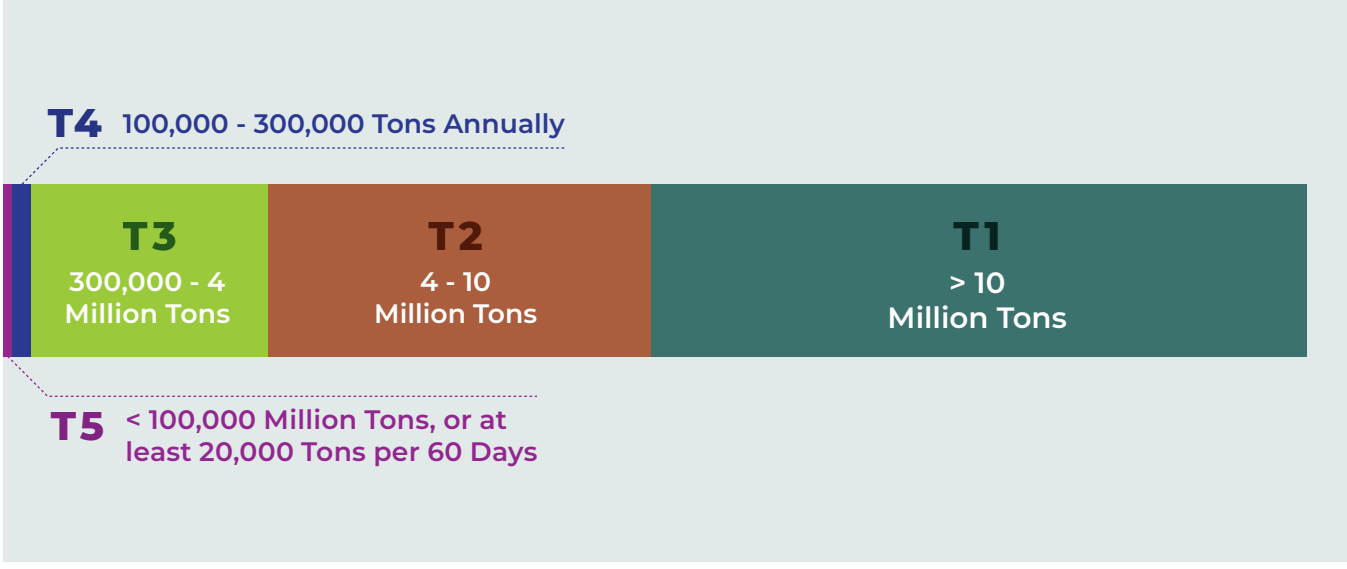
In addition, the Washington State Freight and Goods Transportation System (FGTS) is used to classify roadways, freight railroads, and waterways according to the annual freight tonnage they carry as directed by RCW 47.05.021. Map 10. 2024 Freight Network in Appendix A shows the 2023 classifications of City streets. The FGTS is primarily used to establish funding eligibility for Freight Mobility Strategic Investment Board (FMSIB) grants, fulfill federal reporting requirements, support transportation planning process, and plan for pavement needs and upgrades. The FGTS classifies roadways using the categories shown in **Figure 13**.

Truck freight tonnage values are derived from actual or estimated truck traffic counts and converted into average weights by truck type.

The City expects that the majority of regional truck trips will take place on state highways. However, recognizing that trips through the City are sometimes necessary, Auburn has designated a network of north-south and east-west corridors as truck routes, which are built to truck standards. In addition, the City has designated future truck routes, which will be designed and constructed to accommodate truck traffic, as opportunities arise. FMSIB has expressed an interest in these first and last mile connectors which provide access between these classified freight facilities and port, rail yard, distribution centers, and truck terminals.

Auburn has significant industrial and commercial development throughout the City. The City encourages local delivery trucks to use the designated truck network as much as possible, but recognizes that trips on non-truck routes are necessary. The City is committed to supporting local industry and recognizes that the ability to ship and receive freight is essential to the success of many businesses. To implement this policy, the City will collaborate with local businesses to improve freight access, while maintaining the roadway infrastructure whenever possible. This may include adopting City Code and updating the Auburn Engineering Design and Construction Standards in a manner that favors these priorities. However, in a limited number of key locations, trucks may be prohibited due to existing design elements which do not support trucks, protecting sensitive areas such as downtown and residential neighborhoods, and to extend pavement life.

Figure 13. FGTS Truck Route Classification



2.5.2. **Rail**

The Union Pacific Railroad (UP) and Burlington Northern Santa Fe Railway (BNSF) have rail lines running through Auburn. The UP line runs north-south, to the east of the Interurban Trail. BNSF has a triple-track, federally designated, high-speed railroad line running north-south. The BNSF Stampede Pass line runs east-west through downtown Auburn, entering Auburn at the east end of town near Auburn-Black Diamond Road, and merges with the north-south line just south of Auburn Station.

In addition, BNSF operates a rail yard between A Street SE and C Street SW, south of SR 18. In the future, this area may develop as a multimodal rail yard, prompting the need to mitigate increased truck traffic through capacity improvements. BNSF also has plans to increase traffic on the Stampede Pass line, the east-west rail line running through Auburn. To accommodate this increase, the City completed the grade separation of M Street SE. Both the BNSF north-south line and the Stampede Pass line are handling an increase in rail freight traffic. BNSF handles a number of unit (solid) coal trains traveling to terminals in northwest Washington state, as well as unit oil trains carrying crude oil to northwest Washington state refineries. While loaded coal and oil trains are usually handled on the north-south line, some of these empty trains return east to Wyoming or North Dakota via the Stampede Pass line.

At-grade railroad crossings create conflict points between vehicles and active transportation road users and rail traffic. Auburn has several at-grade railroad crossings: the Union Pacific tracks cross 44th St NW, 37th Street NW, 29th Street NW, West Main Street, and 15th Street SW. The BNSF tracks cross 37th Street NW, 29th Street NW, 3rd Street NW, W Main Street, and Auburn-Black Diamond Road. There are also at-grade crossings of spur tracks at various locations throughout the City.

With as many as 75 trains passing through the City each day, the City has many at-grade crossings, each with unique safety implications. The City coordinates with railroad operators and the State to upgrade the crossings whenever possible. For instance, the project to grade separate M Street SE at the BNSF Stampede Pass tracks by lowering M Street SE under the railroad overpass was completed during 2013.

Upgrades include the construction of a pre-signal where 37th Street NW crosses the BNSF tracks, to stop westbound vehicles on 37th Street NW to the west of the grade crossing in advance of the traffic signal at B Street NE. The pre-signal will prevent vehicles from stopping on the crossing.

BNSF recently constructed a third rail mainline between Seattle and Auburn to improve service and reliability for passenger rail. The new mainline is located on the west-side of the existing tracks. The third mainline reduces vehicle storage for westbound vehicles on W Main Street and 3rd Street NW



between the tracks and traffic signals with C Street NW.

Vehicle delays and queuing at the remaining at-grade crossings are anticipated to worsen in the future due to increased vehicle demands at the crossings, combined with increased rail and longer trains, resulting in more frequent, and longer duration, closures.

2.5.3. Freight LOS Standards

Within Auburn, freight, or the movement of goods, occurs mostly with trucks on state routes and City streets or on railroad facilities. The City of Auburn's freight LOS standards focus on elements of the freight network that the City owns, operates, or has regulatory authority to control such as City streets and intersections. The standards are intended to provide a network of roadways to carry freight traffic to/from freight oriented land use within the City to/from state highways and other regional truck routes. The standards are also intended to facilitate local deliveries using truck routes in the City. Unlike other LOS standards, freight LOS standards do not apply to all City streets. Instead, the standards are applied to truck routes in the City as designated in the Plan policies and shown on Map 10. 2024 Freight Network in Appendix A. Generally, truck routes include T-1, T-2, or T-3 routes, except as designated otherwise by the City Code or as posted by the City Engineer. In addition, the City recognizes local industrial roads, which are other key connections between truck routes and industrial properties. The freight LOS standards are established in the Plan policies and are summarized in **Table 9**.

Table 9. Freight LOS Standards

	LOS STANDARD
1	Freight LOS standards for intersection delay and queuing on truck routes match vehicle LOS standards.
2	Intersections of truck routes shall be designed to accommodate turning trucks such that the trucks do not interfere or obstruct with other travel modes or cause damage to adjacent property and facilities.
3	Roadway pavement on truck routes shall be designed with a minimum 20-year service life with truck loading.
4	Driveways serving trucks and lane widths on the adjacent truck routes shall be designed such that trucks accessing the driveways do not enter into opposing roadway or driveway lanes. Driveways with excessive width may be required to provide mitigation treatments for bicyclists and pedestrians crossing the driveway.
5	Truck oriented land-uses shall provide on-site parking area for truck loading and unloading and shall accommodate truck access and on-site turn-around. Development anticipating regular truck deliveries or services shall provide a delivery plan that identifies the trucks size, frequency, and delivery or service duration and demonstrates how, when, and where the trucks will make deliveries or services without causing impacts to vehicles, bicycles, and pedestrians in the roadway corridor.



2.6. **AIRPORT**

The Auburn Municipal Airport was founded in 1969. It is a division within the Public Works Department, is operated by three full-time City staff and is supported by other City of Auburn departments. The Airport is guided by seven volunteers on the Airport Advisory Board who advise the City Council regarding operations, master planning, facilities improvements, leasing, rental fees, and other aviation concerns. The airport is comprised of 113 acres. This includes 1,330,436 total square feet of pavement which is maintained by staff. The Airport has 254 hangar units (145 are City-owned), and 140 tie downs. In 2021, the City undertook an update to the City's Zoning regulations to address the need to discourage incompatible uses near the airport. The revised Auburn City Code Chapter 18.39, LF Airport Landing Field District, Overlay, and FAR Part 77 Surfaces, provides zone regulations specific to development near the airport that include restrictions, performance standards and requirements of development within the overlay areas Airport planning is specifically addressed in a separate document, Auburn Municipal Airport – Airport Master Plan.



Auburn Municipal Airport – Airport Master Plan

CHAPTER 3

Safety

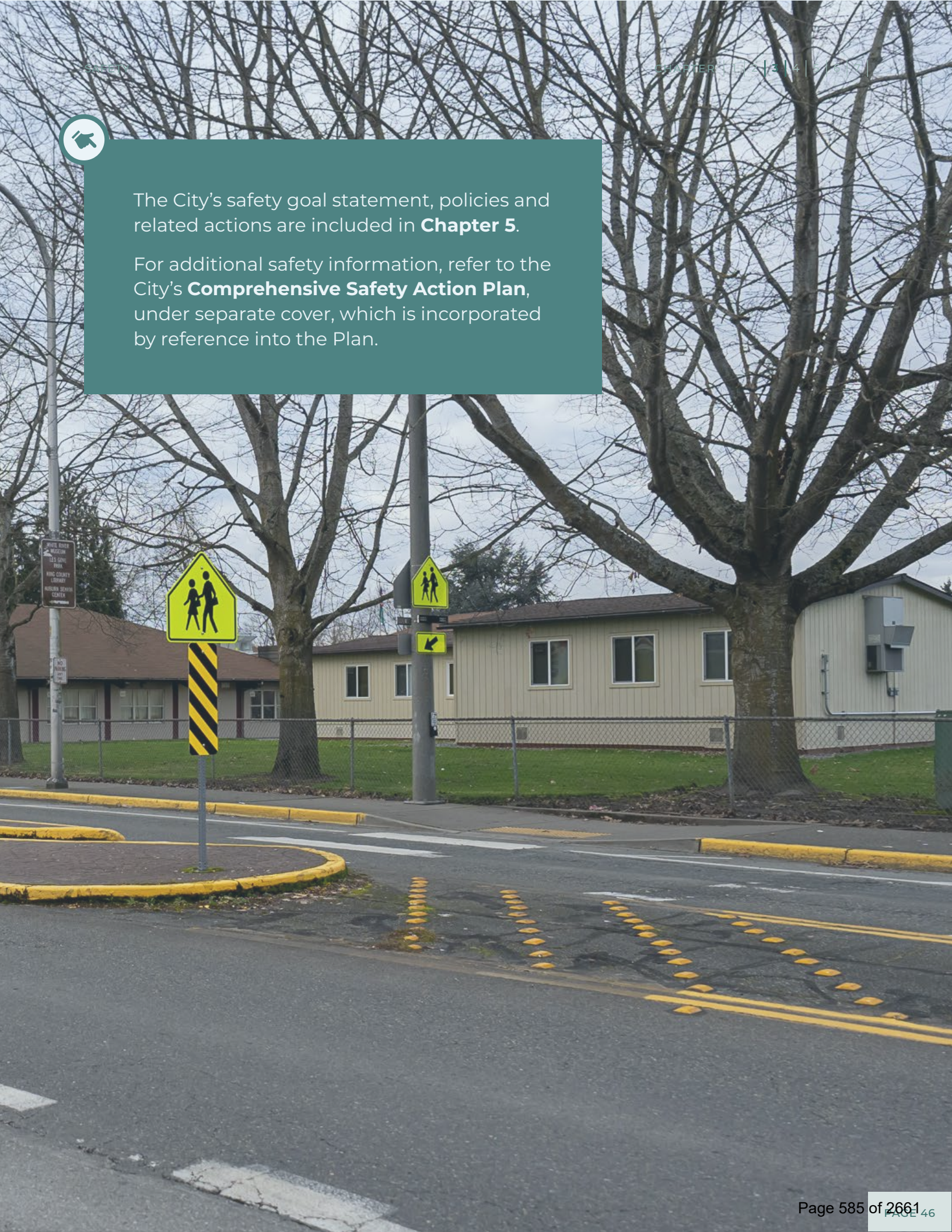
IN THIS CHAPTER

Where to Find Additional Safety Information



The City's safety goal statement, policies and related actions are included in **Chapter 5**.

For additional safety information, refer to the City's **Comprehensive Safety Action Plan**, under separate cover, which is incorporated by reference into the Plan.



CHAPTER 4

Policies

IN THIS CHAPTER

Goals, Policies and Actions



CITY OF AUBURN

Transportation goals, policies, and actions establish the framework for realizing the City's vision of its transportation system. Policies provide guidance for the City, other governmental entities, and private developers, enabling the City to achieve its goals in accordance with the Plan. The policy framework presented in this chapter is a guideline, which the City will use to evaluate individual projects, programs, actions, and other actions to address its infrastructure needs. The goals, policies, and actions make reference to the City of Auburn Engineering Design Standards (EDS) that provide specific guidelines and standards for design of the City's transportation system.



4.1. GOALS

GOAL 1



Planning: Plan, expand, and improve the transportation system.

GOAL 2



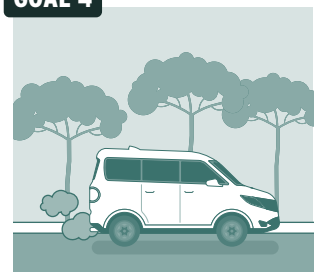
Equity: Plan and implement the City's transportation system to support system wide equity.

GOAL 3



Safety: Significantly reduce or eliminate traffic fatalities and serious injuries through a safe systems approach.

GOAL 4



Environmental: Comply with environmental laws and regulations.

GOAL 5



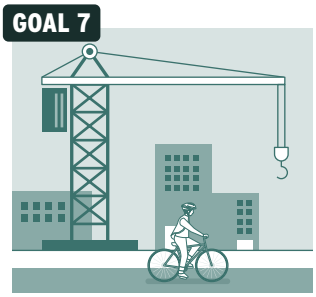
Multimodal Accessible Network: Ensure Auburn's transportation system is designed to be comprehensive, integrated, accessible for all.

GOAL 6



Multimodal Level of Service: Establish multimodal level of service (MMLOS) for all City streets, active transportation facilities, and access to transit.

GOAL 7



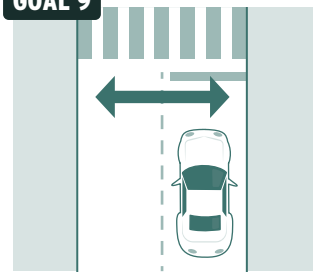
Multimodal Concurrency: Ensure transportation systems and facilities are adequate to serve development.

GOAL 8



Demand & System Management: Transportation Demand Management (TDM) and Transportation System Management (TSM) strategies.

GOAL 9



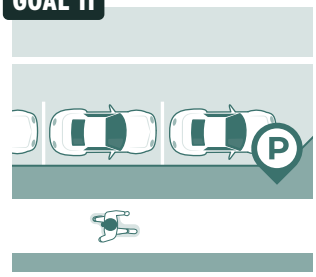
Right-of-Way: Retain and preserve existing Right-of-Way (ROW) and identify and acquire new ROW as needed.

GOAL 10



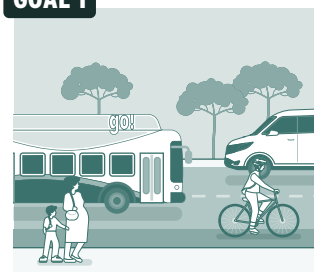
Asset Management: Design, construct, preserve, and maintain the City's transportation system in the most cost-effective manner.

GOAL 11



Parking: Ensure a balance between on-street and off-street parking.

GOAL 1



Planning

Plan, expand, and improve the transportation system in cooperation and coordination with adjacent and regional jurisdictions to ensure concurrency compliance with the Growth Management Act, and to improve the safety and efficiency of the multimodal system to meet the community needs, facilitate the land use plan, and reduce vehicle miles traveled and greenhouse gas emissions.

Planning Policies

The City's long range planning tool for its transportation systems shall be the Comprehensive Transportation Plan that will comply with State Law (RCW 36.70A.070).

TR1-1. The City's short range (6-year) planning tool for transportation system capital projects and programs, shall be the Transportation Improvement Program (TIP) that will comply with State Law (RCW 35.770.010).

TR1-2. The TIP shall be financially constrained to align planned project and programs expenditures with anticipated available funding.

TR1-3. The City shall identify transportation facilities or services that are below established multimodal level of service standards and develop projects and programs and engage in coordination activities that support improving those facilities or services to meet level of service standards.

TR1-4. City transportation planning will focus system improvements to connect centers and support existing and planned development as allocated by the Regional Growth Strategy.

SUPPORTING ACTIONS

- Evaluate and amend the Comprehensive Transportation Plan regularly to ensure it is technically accurate, consistent with state, regional, and other local plans, and in keeping with the City's vision of the future transportation system.
- Prepare a 5-year Comprehensive Transportation Plan intermediate progress report in 2029.
- Prepare a periodic update to the Comprehensive Transportation Plan to be adopted by Council in 2034 or date required by the State, whichever is earlier.
- Coordinate transportation planning and improvements with other transportation authorities and governmental entities (cities, counties, tribes, state, federal) to address transportation issues and to ensure that Auburn and its adjacent jurisdictions do not unreasonably preclude each other from implementing their planned improvements.
- Prepare, amend, and update a 6-year Transportation Improvement Program that is reviewed and adopted by the City Council in accordance with RCW 35.77.010. The TIP will include the following elements:
  - *Proposed road and bridge construction work and other transportation facilities and programs deemed appropriate.*
  - *Any new or enhanced bicycle or pedestrian facilities identified pursuant other applicable changes that promote nonmotorized transit.*
  - *Identify projects of regional significance for inclusion in the regional TIP.*
  - *Revise the TIP before July 1st of each year to encompass the ensuing six calendar years to update the included projects, programs, and associated funding to reflect transportation system priorities and available funding.*
- Coordinate transportation improvements with City utilities to provide efficiency and cost-effective solutions for both planned transportation improvements and planned utility improvements.
- Identify and fund capital projects and programs that address existing and emerging system needs to meet MMLOS standards and to support safety goals.

GOAL 2



Equity

Plan and implement the City's transportation system to support system wide equity.

Equity Policies

TR2-1. Transportation system improvements shall be planned such that they minimize and mitigate potential impacts, as well as past impacts, to historically under-represented and under-served communities.

TR2-2. The transportation system will be planned, built, and operated to provide equitable levels of access to transportation systems based on the needs of the populations being served, particularly populations that are traditionally underserved.

TR2-3. Encourage the involvement of residents, business and property owners in the planning process, including the participation of vulnerable populations and overburdened communities, and ensure coordination with other agencies to reconcile conflicts.

TR2-4. In the development of projects, the city shall identify opportunities to remove barriers created by past transportation programs or improvements.

SUPPORTING ACTIONS

- Develop and implement a process during project/program planning to review demographic information and identify potential impacts to historically under-represented and under-served communities and identify potential mitigation measures.
- Develop and implement equity tools to assist in transportation system planning, construction, and operations.
- For the communities adjacent to the project locations, or served by the projects and programs, research how to best engage with them, and develop outreach and information tools.



GOAL 3



Safety

Significantly reduce or eliminate traffic fatalities and serious injuries through a safe systems approach.

Safety Policies (General)

TR3-1-1. The City shall apply the Safe System Approach for pursuing its transportation safety goal through the different elements associated with the safety of the City's transportation system which the City has the ability to influence including: roadways, roadway users, speeds, vehicles, and post crash care.

TR3-1-2. The City shall study, plan, and implement safety improvements prioritized by the occurrence of fatal and serious injury crashes and/or the presence of systemic characteristics indicative of serious or fatal crash risk.

TR3-1-3. The City will seek internal and external funding to both implement safety strategies and on-going maintenance of improvements.

SUPPORTING ACTIONS (GENERAL)

- Implement, maintain, and regularly update the Local Road Safety Plan (LRSP) and Comprehensive Safety Action Plan (CSAP).
- The LRSP/CSAP will include documentation of the progress towards actions and performance metrics identified in the plans.
- Establish a transportation program in the Transportation Improvement Plan and funding that provides for safety data collection, study, planning, and implementation.
- Identify, evaluate, and pursue grant funding and other outside funding sources for safety programs and improvements.

What is the Safe Systems Approach?

Founded on the belief that death and serious injuries on city streets are preventable, the Safe System Approach considers how the transportation system as a whole can be improved to avoid serious and fatal crashes. It is organized into five categories: Safe Roads, Safe Speeds, Safe Vehicles, Safe Road Users, and Post Crash Care.

To learn more, please visit
highways.dot.gov/safety/zero-deaths



Source: Federal Highway Administration (https://highways.dot.gov/safety/zero-deaths)

Safety Policies (Roadways)

TR3-2-1. The City will integrate the Safe System Approach into roadway design standards and related policies, and project development processes and be consistent with industry best practice.

TR3-2-2. Roadway design shall consider safety and multi-modal level of service standards to meet both transportation level of service goals and safety goals to the greatest extent feasible. However, safety of active transportation users shall be prioritized over vehicle level of service standards.

TR3-2-3. In making changes to existing roadways, including horizontal or vertical re-alignment, re-channelization, additional lanes, new or modified intersections, and new or modified driveways, design speeds for safety related design elements shall not be less than the 85th percentile speeds of existing vehicle traffic except where roadway changes include traffic calming measures that will reduce vehicle speeds.

TR3-2-4. The City shall fund and implement the neighborhood traffic safety program that will take a pro-active, area wide approach towards traffic calming through studying streets in residential areas to identify safety concerns. The program will identify and implement physical measures per the EDS and as funding allows address identified concerns.

TR3-2-5. Safety countermeasures will be incorporated into roadways as recommended by the Federal Highway Administration and as appropriate to City roadways as funding allows to potentially reduce roadway fatalities and serious injuries.

SUPPORTING ACTIONS (ROADWAYS)

- Periodically review and update City EDS to integrate current and emerging Safe System Approaches and safety countermeasures.
- In identifying projects for inclusion in the Plan and TIP, develop and implement approaches to consider all travel modes and to specifically address risk factors identified in the CSAP in the project scope.
- At locations with a high number of risk factors identified in the CSAP, identify potential safety countermeasures to reduce the potential for fatality and serious injury crashes. Seek funding to implement countermeasures and implement as funding is available.
- Establish standards for physical improvements implemented with the neighborhood traffic calming program, including, but not limited to, speed cushions, traffic circles, raised crosswalks, and tabletop intersections.

Safety Policies (Road Users)

TR3-3-1. Seek and utilize opportunities to provide the community with information to educate and encourage safe driving, biking, and walking practices.

TR3-3-2. Implement and operate, as appropriate and funding allows, systems to provide information to roadway users that could help improve safety.

SUPPORTING ACTIONS (ROAD USERS)

- Establish and implement approaches towards education, outreach, and other measures as appropriate to encourage safe behaviors.
- Regularly communicate rules of the road and other safer travel strategies to the general public via various mediums such as signage, social media, public service announcements, flyers, articles, and mailers.

(Continued on next page)

Safety Policies (Road Users)

TR3-3-3. City employees are responsible for operating City vehicles responsibly and safely, according to all state and local laws and City administrative policies.

TR3-3-4. Support equitable, unbiased enforcement to enhance overall public safety.

SUPPORTING ACTIONS (ROAD USERS)

- Coordinate with appropriate partners such as local, county, and state law enforcement, local and regional hospitals, school districts, and large employers to create and distribute safety messages and materials.
- Regularly coordinate with law enforcement regarding the road user behaviors and/or street locations being targeted for enforcement to encourage equitable, unbiased enforcement that uses practices to enhance overall public safety, including use of automated enforcement technologies.
- Explore, identify, evaluate, and as appropriate and funding allows, implement systems such as dynamic message signs that provide roadway conditions and other information to drivers.

Safety Policies (Speeds)

TR3-4-1. Posted and design speeds of new roadways shall consider context, including adjacent land use, presence and proximity of active transportation, traffic volumes, and geometric design constraints.

TR3-4-2. The 85th percentile speed of vehicular traffic shall be used to evaluate speed compliance and to determine appropriate traffic calming measures as established by thresholds and considerations in the EDS. Traffic calming measures will be prioritized and implemented as funding is available.

TR3-4-3. The City will implement automated speed enforcement that encourages speed compliance as allowed by state law.

SUPPORTING ACTIONS (SPEEDS)

- Establish criteria in the EDS for when physical traffic calming measures may be appropriate to encourage safer speeds.
- Implement automated school speed zone enforcement. Modify and/or expand program as needed to address compliance issues and other concerns. Provide annual reporting as required by law.
- Identify, evaluate, and implement automated speed enforcement in non-school zone areas as allowed by law and as determined to be appropriate to address speed compliance concerns.
- As issues and concerns arise, as part of specific speed studies, and/or as part of public improvement project designs, the City will review roadways to identify existing and desired posted speeds based on classification, land use context, types of road users, and degree of separation or conflict management between vehicles and active transportation users. The review will identify changes needed to posted speeds, if any, and any new or modified roadway features needed to align desired speeds and posted speeds.

Safety Policies (Vehicles)

TR3-5-1. The City shall advocate for vehicle and device safety enhancements that make traveling in Auburn safer.

TR3-5-2. Seek opportunities to provide the community with information to educate and encourage vehicle safety practices.

TR3-5-3. City shall continue to implement vehicle safety practices on its fleet.

TR3-5-4. New or modified vehicle types and emerging vehicle technology shall be evaluated and measures may be taken to promote, prohibit, or restrict their use in the City transportation network as appropriate to support adopted goals and policies.

SUPPORTING ACTIONS (VEHICLES)

- Coordinate with other local, regional and state agencies to advocate for vehicle safety enhancements for commercial motor vehicles as well as technologies used in private automobile industry, and vehicle inspections.
- Review, update, and maintain local ordinances regarding the appropriate use of new or modified vehicle types and emerging vehicle technology.
- Ensure City vehicles are regularly inspected and maintained, and include regulatory required appropriate safety enhancing technologies, and are equipped with appropriate emergency equipment and tools.

Safety Policies (Post Crash Care)

TR3-6-1. Maintain the transportation system to support entities providing emergency response services to crashes.

TR3-6-2. Prioritize emergency vehicle routes and access to hospitals and trauma care centers.

TR3-6-3. Actions will be taken, as applicable, after crashes involving serious injury or fatality, to reduce or eliminate the possibility of repeat crashes at the location due to malfunctioning or failing traffic control devices.

SUPPORTING ACTIONS (POST CRASH CARE)

- Coordinate with entities providing emergency response services to crashes with the purpose of maintaining appropriately managed routes, access and facilitate wayfinding to hospitals and trauma care facilities.
- Continue to maintain emergency vehicle pre-emption technology at traffic signals throughout the City prioritizing emergency vehicle routes and access to hospitals and trauma care centers, and emergency response to crashes.
- When notified by Police, City Public Works staff perform post crash investigations where a serious injury or fatality crash occurs at a traffic signal or stop controlled intersection, in a marked and/or enhanced cross walk, involves a pedestrian during non-daylight hours where street lighting is present, or other situations that warrant verification that transportation systems are functioning as intended.



GOAL 4



Environmental

Comply with environmental laws and regulations.

Environmental Policies

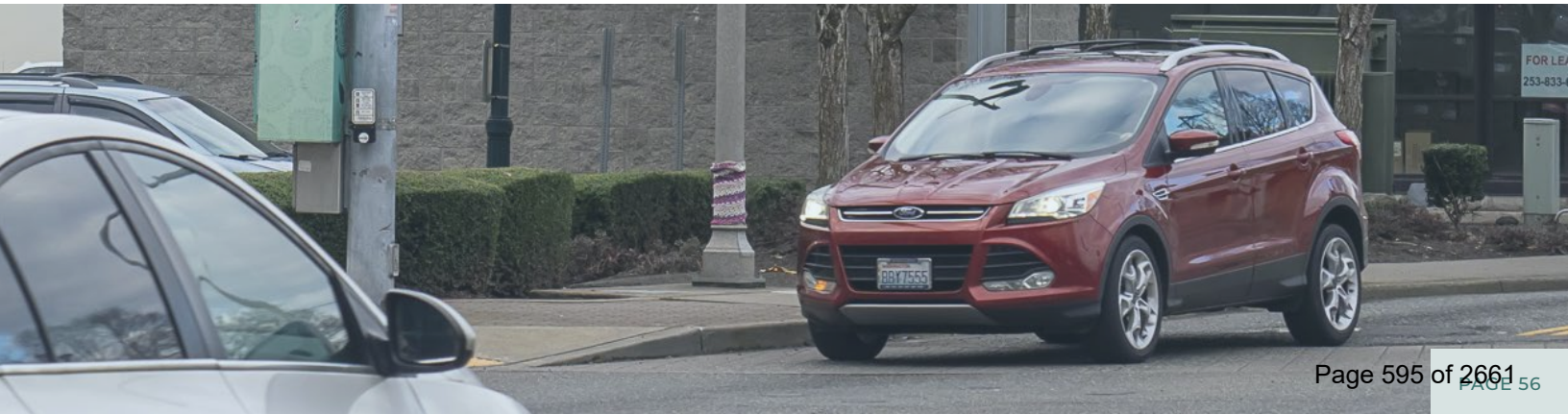
TR4-1. The impacts of transportation projects shall be evaluated, and the appropriate mitigation measures identified in accordance with the applicable environmental laws and regulations.

TR4-2. The multimodal transportation systems shall be designed efficiently and support reductions in greenhouse gas emissions and per capita miles traveled, protect and enhance environmental, economic, and human health and safety, and advance environmental justice, and are based on regional priorities and coordinated with other comprehensive plans.

TR4-3. In planning transportation facilities and programs, the City will seek to reduce stormwater pollution from transportation facilities and improve fish passage.

SUPPORTING ACTIONS

- Incorporate environmental factors into transportation decision-making, including attention to human health and safety.
- Review and implement guidance from the Department of Commerce pertaining to measures that cities may implement to reduce greenhouse gas emissions. These guidelines will prioritize measures that benefit overburdened communities that have experienced disproportionate harm due to air pollution and be consistent with environmental justice assessment pursuant to RCW 70A.02.060.



GOAL 5



Multimodal Accessible Network

Ensure Auburn's transportation system is designed to be comprehensive, integrated, accessible for users of all abilities, and facilitates different types of traffic flows, including pedestrians, bicyclists, motorists, transit riders and operators, truck operators and aviation users.

Multimodal Accessible Network Policies (General)

TR5-1-1. The network of sidewalks, bicycle facilities and roadways shall be interconnected to encourage active transportation between neighborhoods, activity centers, community resources, and transit.

TR5-1-2. Ensure that the city's standards and development requirements align with the complete streets policies.

TR5-1-3. Context and flexibility in balancing user needs for all travel modes shall be considered in the planning and design of all projects and, if necessary, a deviation from the EDS may be considered to ensure the Complete Streets Goal and supporting policies are achieved.

TR5-1-4. The development of the multimodal transportation system shall balance safety and convenience to accommodate all users of the transportation system to safely, reliably, and efficiently provide access and mobility to people and goods.

SUPPORTING ACTIONS (GENERAL)

- Plan for and develop a balanced transportation system, which provides safer access and connectivity to transportation facilities for users of all ages and abilities, including pedestrians, bicyclists, motorists, transit users and operators, and truck operators.
- Plan for, design, and construct all transportation projects, whether City led or development driven, to provide appropriate accommodation for bicyclists, pedestrians, and transit users in a manner consistent with the Comprehensive Plan, except in situations where the establishment of such facilities would be contrary to public health and safety or the cost would be excessively disproportionate to the need
- Ensure the transportation system meets the requirements outlined in the ADA and the ADA Transition Plan for Facilities in the Public Right-of-Way and its policies.
- Ensure the EDS requirements support the policies and guidance for complete streets, bicycle LTS, and pedestrian facilities.



Multimodal Accessible Network Policies (Streets)

TR5-2-1. City streets shall be classified as arterial, collector, local, or alley to support the goals and policies of the Plan. The EDS may establish more detailed classifications as needed to serve the needs of the transportation system.

TR5-2-2. The City Functional Roadway Classifications Map shall serve as the adopted standard for identifying classified streets in the City of Auburn.

TR5-2-3. The City shall pursue federal classification of all eligible streets and prioritize federal classification as funding needs and regulatory requirements are identified.

TR5-2-4. Street standards in the EDS shall reflect the street classification system and function.

TR5-2-5. The design and management of the street network shall seek to improve the appearance of existing street corridors. The EDS shall include provisions for streetscaping to enhance the appearance of City street corridors, where appropriate.

TR5-2-6. The classification standards adopted in the EDS are considered the City's minimum standards for new streets. The standards do not limit or prevent developers or the City from providing facilities that exceed the City's standards.

TR5-2-7. The standards for residential streets may be modified in cross section to provide better relationships between the different components of the street including, but not limited to, on-street parking, the landscape strip, and the sidewalk. Among other objectives, this may be done to balance the need to provide adequate parking and buffer pedestrians from traffic.

TR5-2-8. The city shall designate new arterials and collectors to serve developing areas concurrent with approval of such development. These new roadways shall be spaced in compliance with transportation network planning principles and support the importance of overall system circulation.

SUPPORTING ACTIONS (STREETS)

- The EDS will include cross section standards for the various city roadway classifications and established more detailed sub-classifications as appropriate.

- To achieve access control to meet city policy, the City:
  - *Adopts and supports the State's controlled access policy on all state highway facilities;*
  - *May acquire access rights along some arterials and collectors;*
  - *Adopts design standards that identify access standards for each type of functional street classification;*
  - *Encourages consolidation of access in developing commercial and high-density residential areas through shared use of driveways and local access streets; and*
  - *Will establish standards for access management, develop a planning process to work with the community, and implement access management solutions on arterial corridors.*

(Continued on next page)



Multimodal Accessible Network Policies (Streets)

TR5-2-9. The City will seek consolidation of access points to state highways, arterials, and collectors as appropriate to benefit the highway and city street system, reduce interference with traffic flows on arterials, and discourage through traffic on local streets.

TR5-2-10. ROW access shall be provided in a manner that minimizes operational impacts to the City street system, reduces or eliminates safety impacts to the ROW, and provides for access needs of the property. Shared driveways in access tracts or easements may be allowed as specified in the EDS to reduce access points to the ROW.

TR5-2-11. Intersections controlled with roundabouts are preferred over signalized intersections. Where necessary to meet level of service standards, roundabout control shall be implemented over signalization or all-way stop-control, unless determined to be infeasible.

TR5-2-12. Conversion of an intersection to all-way stop-control as mitigation for existing intersection level of service deficiencies shall only be allowed as a temporary measure where permanent measures such as a traffic signal or roundabout are planned.

TR5-2-13. New all-way stop-control intersections shall be discouraged. In evaluating improvements to existing intersections, roundabout or signalization are preferred over all-way stop-control.

TR5-2-14. The local street network shall be developed to maximize the efficiency of the transportation network in residential areas and minimize through traffic in neighborhoods.

TR5-2-15. The street network should be developed and maintained to increase resiliency and support security and emergency management.

TR5-2-16. Private streets are discouraged, but may be permitted on a discretionary basis, as regulated by City code and the EDS. Private streets are not intended to connect between two public streets and shall be built to public street standards. The properties benefiting from the private street are responsible for its maintenance.

SUPPORTING ACTIONS (STREETS)

- To maximize the efficiency of the transportation network in residential areas and minimize through traffic in neighborhoods, the EDS will incorporate requirements such that:
  - *The internal local residential street network for a neighborhood discourages regional through traffic and non-residential traffic from penetrating the neighborhood or adjacent neighborhoods.*
  - *Streets shall be planned, designed, and constructed to connect to future development as appropriate to support the goals and policies of the Plan.*
  - *Residential developments should be planned in a manner that minimizes the number of local street access points to arterials and collectors.*
  - *To promote efficient connectivity between areas of the community, existing stub end streets shall be linked to other streets in new development whenever the opportunity arises and the resulting traffic volumes are not likely to exceed acceptable volumes per the street classification as identified in the EDS.*
- Design criteria for roundabouts, including feasibility criteria, will be incorporated into the EDS.
- The City will coordinate with the WSDOT, counties, and adjacent cities to facilitate the movement of traffic through the City, to construct improvements needed to the state and county arterial and freeway systems, and to develop through routes that minimize the impact of through traffic on Auburn's residential neighborhoods.

Multimodal Accessible Network Policies (Active Transportation)

TR5-3-1. The City's active transportation facilities include bicycle and pedestrian networks and shall be planned and built in accordance with the active transportation level of service standards.

TR5-3-2. City investment in active transportation facilities will prioritize facilities that: 1) Encourage mode shifts from vehicle to active transportation and transit; 2) Provide access to key destinations, such as schools, parks, community services, transit stops, commercial areas, and the Downtown Urban Center; 3) Encourage and support bicycle and pedestrian safety; and 4) Serve disadvantaged and historically underserved communities.

TR5-3-3. City bicycle routes shall be classified as Regional, Priority, or Auxiliary to support the goals and policies of the Plan.

TR5-3-4. The City shall seek external funding and prioritize investments to develop the bicycle network identified in the bicycle priority map, and to build the associated projects listed in Comprehensive Transportation Plan.

TR5-3-5. Active transportation facilities shall be designed to reduce modal conflicts, with greater separation from vehicle traffic along roadways with higher classification, expecting higher vehicle volume and speed.

TR5-3-6. Bicycle and pedestrian crossings of vehicular travel ways shall be placed to align with desired crossing lines and in accordance with the EDS.

TR5-3-7. Pedestrian facilities shall be designed consistent with ADA guidelines and the existing infrastructure shall be updated per the city's ADA Transition Plan for facilities in the Public Right-of-way, to accommodate users of all ages and abilities.

TR5-3-8. Wayfinding elements may be constructed to guide travelers along major active transportation routes.

SUPPORTING ACTIONS (ACTIVE TRANSPORTATION)

- The City shall schedule, plan, and co-sponsor events that support recreational walking and bicycling. These events should emphasize their recreational and health values and introduce people to the transportation capabilities of bicycling and walking.
- Develop programs and publications, and work with local employers to encourage citywide bicycle commuting.
- Work with the Community Development Department to establish guidelines and building code requirements to require convenient and secure bicycle storage facilities in all large public and private developments.
- The City will develop, and periodically update, a Bicycle Route Map that defines the bicycle network in Auburn and classifies bicycle routes throughout the City as either Regional, Priority, or Auxiliary. The network of classified bicycle routes will focus on connectivity from non-classified routes in neighborhoods and commercial areas to auxiliary, priority, and regional routes.
- Develop and maintain an official Auburn Bicycling Guide Map.
- Evaluate transportation projects and identify opportunities to include sidewalk and bicycle facilities based on the identified priority locations.
- Seek ways to provide pedestrian amenities such as streetlights, trees (within the downtown and on local residential streets), signage, and public art along appropriate pedestrian travel routes.
- Encourage the formation of Local Improvement Districts to develop pedestrian pathways and other active transportation amenities throughout the City. Partner with the local school districts to improve Safe Walking Routes to School.
- Actively seek to acquire land along corridors for planned bike routes as identified in the Bicycle Route Map and for pedestrian facilities needing more property to meet LOS standards.

(Continued on next page)

Multimodal Accessible Network Policies (Active Transportation)

TR5-3-9. Active transportation routes shall be constructed to accommodate emergency vehicle access and be amenable to law enforcement.

TR5-3-10. When applicable, active transportation paths shall be provided at the end of dead end streets to shorten walking distances to an adjacent arterial or public facility including, but not limited to, schools and parks.

Multimodal Accessible Network Policies (Transit)

TR5-4-1. Active transportation improvements shall be prioritized based on transit level of service with higher priority placed on improvements in areas with higher transit level of service.

TR5-4-2. Improvements that optimize intersections and corridors to facilitate speed and reliability of transit service will be encouraged and supported as appropriate and will be balanced with the needs of the other travel modes.

TR5-4-3. The City shall cultivate partnerships with transit agencies and WSDOT to help with, or support the development of a robust transit network, to serve trip generators such as colleges, commercial areas, and community resources, to expand transit service within the underserved areas of Auburn, and to achieve a transit network that is convenient and provides a viable alternative to driving.

TR5-4-4. The City shall advocate for adequate off-street parking supply to accommodate demand associated with transit facilities in Auburn, where no alternative options are provided by transit agencies to access transit service that meet the needs of the transit riders.

TR5-4-5. The City shall encourage development projects to provide access improvements to transit stops located within priority transit walksheds.

TR5-4-6. The City shall establish parking restrictions in areas where transit parking impacts nearby residential areas to mitigate the impact of overflow transit parking.

TR5-4-7. The City shall seek partnership opportunities with transit agencies for grant applications and cost sharing to improve access to transit for active transportation facilities, supporting safety, equity, and sustainability.

SUPPORTING ACTIONS (TRANSIT)

- Evaluate intersections and identify opportunities to improve speed and reliability of transit service.
- Partner with transit agencies to support transit service in the City.
- Work proactively with Sound Transit, KC Metro, and Pierce Transit to ensure the adequate supply of transit parking capacity in Auburn.
- Expand the areas included in the Restricted Parking Zones and other parking restrictions as needed to mitigate impacts from transit parking.

Multimodal Accessible Network Policies (Freight)

TR5-5-1. City transportation planning efforts will seek to facilitate the movement of freight and goods through Auburn with minimal adverse traffic and environmental impacts.

TR5-5-2. The movement of freight and goods that serve largely national, state, or regional needs should take place in such a way so that the impacts on the local transportation system are minimized. These movements should take place primarily on state highways, interstates, or on rail corridors with grade separated roadway crossings to minimize the local impacts.

TR5-5-3. All through truck trips and the majority of local trips shall take place on designated truck routes. This policy shall not apply to developments and uses operating under existing ROW use permits, traffic mitigation agreements, or equivalent agreements directly related to the regulation of permitted haul routes.

TR5-5-4. Prioritize improvements that facilitate truck movements along and connecting to future and existing truck routes to accommodate truck traffic and minimize impacts to infrastructure.

TR5-5-5. Development shall be required to mitigate the impacts of development project generated truck traffic on the City's transportation system, based on the City's vehicle LOS standard.

TR5-5-6. Temporary haul routes for overweight or oversized vehicles shall be permitted under circumstances acceptable to the City and with appropriate mitigation. A temporary haul permit must be obtained prior to the hauling of oversized or overweight freight.

TR5-5-7. Truck traffic in residential neighborhoods shall be prohibited, except for local deliveries within said neighborhood, unless no other possible route is available, in which case mitigation may be required.

SUPPORTING ACTIONS (FREIGHT)

- Evaluate intersections and identify opportunities to reduce delays along freight corridors.
- Seek public and private partners to leverage funds for freight improvement projects and associated mitigation.
- Work with local and regional groups to ensure regional freight needs are met and local impacts are mitigated.
- The City will coordinate and communicate with railroad purveyors in Auburn (United Pacific Railroad and Burlington Northern Santa Fe Railway) regarding safety and operational concerns at railroad crossings, along railroad corridors, and near rail yards.

(Continued on next page)

Multimodal Accessible Network Policies (Freight)

TR5-5-8. As roadway reconstruction projects are identified, opportunities to reconstruct roadways adapted to heavy truck traffic shall be evaluated along T-1 and T-2 freight corridors, to prevent accelerated damage to these facilities.

TR5-5-9. Grade separation of roadway and active transportation facilities from railroad tracks and T-1 Truck Routes (such as SR 167 and SR 18) is preferred over at-grade crossings. The City shall plan its multimodal networks to utilize existing grade separated crossings and identify where future grade separation improvements are desired.

TR5-5-10. The City shall maintain its transportation systems to be compliant with Washington Utilities and Transportation Commission requirements regarding railroad crossings and shall work diligently to address any identified deficiencies.

Multimodal Accessible Network Policies (Air Transportation)

TR5-6-1. Continue to develop the Auburn Municipal Airport in accordance with the Airport Master Plan as adopted or amended.

TR5-6-2. The airport shall be managed as a general aviation facility. General aviation includes all civilian flying except scheduled passenger airline service.

TR5-6-3. When siting new or revised facilities or operations at the airport, the impacts on neighborhoods such as increased noise generated from the use of those facilities shall be considered.

TR5-6-4. Use of the airport by non-conventional aircraft, such as ultra lights, is discouraged.

TR5-6-5. Minimize or eliminate the potentially adverse effects of light, glare, and obstructions on the operation of the Auburn Airport.

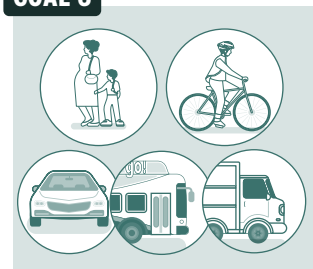
TR5-6-6. Insure that uses surrounding the Airport are compatible with the operations of the Airport as development occurs.



SUPPORTING ACTIONS (AIR TRANSPORTATION)

- Review existing and planned uses near Auburn Municipal Airport through development actions and review ACC18.38 regulations periodically to continue to discourage incompatible uses neat the airport.
- Coordinate planning efforts to optimize the effectiveness of the aviation system while minimizing health, air quality, and noise impacts to surrounding communities, including historically marginalized communities.

GOAL 6



Multimodal Level of Service (MMLOS) Standards

Establish multimodal level of service standards for all City streets, active transportation facilities, and access to transit service to serve as a gauge to judge performance of the system and success in helping achieve the comprehensive plan goals consistent with environmental justice.

The MMLOS policies under Goal 6 for bicycle and pedestrian facilities, including access to transit, are intended to provide guidance to evaluate the multimodal facilities, identify deficiencies, and prioritize projects to eventually reach a complete multimodal network that can support and promote mode shift, reducing the vehicle capacity demand on the roadways.

MMLOS Standards Policies (Vehicles)

TR6-1-1. The City adopts the following vehicle LOS standards for the AM and PM peak periods per the Highway Capacity Manual:

- **Signalized:** The LOS standard for signalized intersections is "D", with the following exceptions: for signalized intersections of two principal arterial roads the LOS standard is "E."
- **Stop Controlled:** The LOS standard for stop controlled intersections is "D."
- **Roundabout:** The LOS standard for roundabout controlled intersections is "D" and a V/C ratio for each lane group of less than 0.90.
- **Queuing:** The LOS standard for intersection queuing is the 95th percentile queue shall not extend across an adjacent driveway, alley, or street intersection, except if the driveway, alley, or street intersection is within the functional intersection boundary of the queue in which case the queue may extend to the limit of the functional intersection boundary. Additionally, queuing for a designated turn lane shall not exceed the turn lane storage area and cause a blockage of through lane(s).

SUPPORTING ACTIONS

- Regularly conduct traffic counts, observations, and modeling to evaluate current and future Vehicle LOS and identify projects to address deficiencies.

MMLOS Standards Policies (Active Transportation)

TR6-2-1. The City adopts the following bicycle LOS standards:

- **Bicycle LOS shall be based on Bicycle Level of Traffic Stress (LTS) ranging from "1" to "4" as follows:** "1" – minimal traffic stress and high comfort facilities that accommodate bicyclists of all ages and skill levels; "2" – some traffic stress and moderate comfort facilities that accommodate average bicyclists; "3" – moderate to high traffic stress and moderate to low comfort facilities that accommodate mostly experienced bicyclists; "4" – high traffic stress and low comfort facilities that accommodate mostly bicycle enthusiasts with advanced experience and skill levels.
- The **Bicycle LTS standard** for Auxiliary bicycle routes is "3."
- The **Bicycle LTS standard** for Priority bicycle routes is "2."

SUPPORTING ACTIONS (ACTIVE TRANSPORTATION)

- The EDS will be updated to include standards for various types of bicycle facilities intended to meet level of service standards as defined in the Plan.
- Standards will be developed and incorporated within the EDS to establish typical cross sections by roadway classification to meet the pedestrian LTS standards.

(Continued on next page)

MMLOS Standards Policies (Active Transportation)

- The **Bicycle LTS standard** for Regional bicycle routes is "1."
- **Minimum Bicycle LTS standards** for City streets without Regional, Priority, or Auxiliary bicycle routes shall be per the standard roadway cross sections by street classification in the EDS.
- **Streets may be designed with Bicycle LTS higher than the minimum standard** to accommodate local needs such as parks, schools, and other uses.

TR6-2-2. The City adopts the following pedestrian LOS standards:

- **Pedestrian LOS** shall be based on Pedestrian Level of Traffic Stress (LTS) ranging from "1" to "4" as follows: "1" – minimal traffic stress and high comfort facilities; "2" – some traffic stress and moderate comfort facilities; "3" – moderate to high traffic stress and moderate to low comfort facilities; "4" – high traffic stress and low comfort facilities.
- The **pedestrian LTS standard for City streets** is "1" except streets classified as "rustic" or alleys have a Pedestrian LTS standard of "2."
- **Streets may be designed with pedestrian LTS higher than the minimum standard** to accommodate local needs such as parks, schools, and other uses.

SUPPORTING ACTIONS (ACTIVE TRANSPORTATION)

- The Street cross sections included in the EDS will be updated to include active transportation facilities that provide at least minimum level of service requirements.

MMLOS Standards Policies (Transit)

TR6-3-1. Transit LOS is defined as the accessibility, frequency, comfort, reliability, and connectivity of available transit services using active transportation modes. A Transit LOS score ranging from "1" to "4" can be estimated for any location in the City using a combination of the walking shed distance from the location to transit services and the type of available transit service as defined in the Plan.

TR6-3-2. Active transportation improvements shall be prioritized based on transit level of service with higher priority placed on improvements in areas with higher transit level of service.

SUPPORTING ACTIONS (TRANSIT)

- Coordinate regularly with transit operators to understand service plans.
- Maintain a map that reports transit service levels citywide based on transit service plans and walksheds.
- Prioritize eliminating gaps in active transportation routes and improving sub standard active transportation facilities in areas of transit levels of service "1" and "2".
- Develop tools to assess current and future planned transit level of service throughout the City and identify active transportation gaps and substandard active transportation facilities.
- Advocate for, and support, transit speed and reliability improvements.

MMLOS Standards Policies (Freight)

TR6-4-1. The City adopts the following Freight LOS standards:

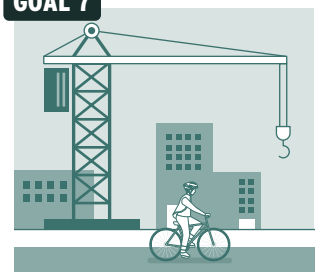
- **LOS for freight movement** follows the vehicle LOS standards.
- **Principal Arterial, Minor Arterial, Non-Residential, and other streets** identified as T-1, T-2, or T-3 routes are considered truck routes except as designated otherwise by the City Code or as posted by the City Engineer.
- **Intersections of truck routes** shall be designed to accommodate turning trucks such that the trucks do not interfere or obstruct with other travel modes or cause damage to adjacent property and facilities.
- **Roadway pavement on truck routes** shall be designed with a minimum 20-year service life with truck loading.
- **Driveways serving trucks and lane widths on the adjacent truck routes** shall be designed such that trucks accessing the driveways do not enter into opposing roadway or driveway lanes. Driveways with excessive width may be required to provide mitigation treatments for bicyclists and pedestrians crossing the driveway.
- **Truck dependent land-uses** shall provide on-site parking area for truck loading and unloading and shall accommodate truck access and on-site turn-around.
- **Development anticipating regular truck deliveries or services** shall provide a delivery plan that identifies the trucks size, frequency, and delivery or service duration and demonstrates how, when, and where the trucks will make deliveries or services without causing impacts to vehicles, bicycles, and pedestrians in the right-of-way.

SUPPORTING ACTIONS (FREIGHT)

- Maintain a map of Auburn streets that overlap with the WSDOT Freight and Goods Movement Transportation System and ensure that transportation projects that overlap with T-1, T-2, and T-3 routes include adequate space for large vehicle turns.
- Update the EDS to ensure they adequately consider the needs of freight vehicles in terms of intersection turning movements, mid-block turning movements into driveways, loading docks, and alleys, and entrance to, navigation of, and exit from traffic circles and roundabouts.
- Identify truck routes that do not meet current freight level LOS standards and prioritize investments to address deficiencies based on level of impact and available funding.



GOAL 7



Multimodal Concurrency

Ensure that those transportation system facilities and services necessary to support development shall be adequate to serve the development at the time the development is available for occupancy without decreasing current service levels below established minimum standards.

Concurrency Policies

TR7-1. The City will not approve development activity if the development causes the vehicle level of service on a transportation facility to decline below level of service standards or if the development negatively impacts a transportation facility currently operating below vehicle level of service standards (any increase in intersection delay where intersection delay standard is already exceeded or any increase to queue length of an existing queue length that does not meet standards). Strategies that may allow a development to proceed, include, but are not limited to, one or more of the following:

- Concurrent with the development, Developer constructs **street improvements** to address the vehicular level of service impacts of the development.
- Concurrent with the development, Developer provides **active transportation** facility improvements, increased or enhanced **public transportation** service, **ride-sharing** programs, **demand management**, and other transportation systems management strategies that demonstrate a mode shift from vehicle to active transportation and/or transit modes such that the development vehicular level of service impacts are mitigated.
- If the City's Transportation Improvement Program includes a **project that is not fully funded (for instance, the funding includes unsecured grants)** that will mitigate the impacts of the development and is scheduled to be complete concurrent to the development, the City may allow the developer to provide funds to fully fund the project so that it may proceed concurrent to the development.
- If the City's Transportation Improvement Program or Comprehensive Transportation Plan includes a project that would **mitigate the impacts** of the development, the City may allow the developer to fund (all or in-part) and build the project concurrent to the development.
- Development project scope is **reduced**.

SUPPORTING ACTIONS

- Include standards in the EDS that require development projects to conduct a traffic impact analysis (TIA) when certain thresholds are met. Thresholds will be intended to require a TIA when it is likely that a development could cause transportation facilities to operate below level of service standards or when then development is likely to have negative impact on transportation facilities already operating below level of service standards. The TIA scope will be scalable based on the development project and its potential impacts on the transportation system. The TIA will identify impacts and associated mitigation actions proposed to address the impacts.
- The City will review transportation impact analyses for developments outside the City through SEPA to identify if there may be potential impacts to City systems.
- The City will provide transportation impacts analyses for developments within the City that may impact other agencies so that those agencies may identify if there are potential impacts to their facilities.
- The City will update the per-person trip traffic impact rate for the following calendar year based on the traffic impact fee funding need identified in the TIP and revise the fee schedule based on this per-person trip rate for adoption as part of the City's overall fee schedule.

(Continued on next page)

- Development project is **phased or delayed**.
- Establish a **lower vehicle level of service standard** via the City Council adoption of an amended Comprehensive Transportation Plan. The denial of a development in order to maintain concurrency may be grounds for the City declaring an emergency for the purpose of amending the Comprehensive Transportation Plan outside of the annual amendment cycle.

For the purposes of this policy **"concurrent with the development"** means that improvements or strategies are in place at the time of development, or that a financial commitment is in place to complete the improvements or strategies within six years.

TR7-2. The City may afford a developer that funds and/or constructs improvements that provide mitigation beyond the impacts of the development activity a credit against the traffic impact fees due for the project.

TR7-3. Development activity generating people trips shall pay a transportation impact fee that is used by the City to make system wide capital improvements and programs that provide vehicular capacity and encourage a mode shift from vehicles to active transportation and/or transit.

TR7-4. Development activity shall make improvements along project right-of-way frontages to provide for vehicle, pedestrian, bicyclist, transit, and freight trips to/from the project. Improvements shall be in accordance with multimodal level of service standards and the EDS.

TR7-5. The City may enter into latecomer (payback) agreements where transportation investments are made by one party that legitimately should be reimbursed by others, agreements will be at the discretion of the City Council. Latecomer or payback agreements do not apply to situations in which a property owner is required to construct improvements per an existing city code provision, such as in the case of half-street and other required improvements.

TR7-6. The City may make transportation improvements that would be required for an undeveloped or underdeveloped private property to develop or redevelop with a City funded capital project and re-coup the costs of those improvements assessed through a payback requirement on the private property.

TR7-7. Conversion of an intersection to all-way stop-control as mitigation for intersection level of service deficiencies shall only be allowed as a temporary measure where permanent measures such as a traffic signal or roundabout will be constructed concurrent to the development activity triggering the mitigation requirement.

SUPPORTING ACTIONS

- On an annual basis, the City will develop a per person transportation impact fee based on the number of people trips anticipated over the next six-year period of the TIP and the impact fee funding needed to implement projects to accommodate those trips. Projects include those that increase vehicular capacity or provide mode shift from vehicle to active transportation and transit, thereby reducing the need for vehicle capacity.
- In planning expenditure of transportation impact fees, the City will seek to support development concurrency by prioritizing projects that address vehicular level of service issues related to recent and anticipated development activity.
- The EDS will define frontage improvements (half-street improvements) required to be provided by development activities.
- The City will seek grant, loan, and partnership funding for system capacity and mode shift projects that would help reduce traffic impact fee rates required to maintain concurrency.

GOAL 8



Demand and System Management

Use Transportation Demand Management (TDM) and Transportation System Management (TSM) strategies to reduce capacity demand on the transportation system.

Demand and System Management Policies

TR8-1. TSM strategies shall be utilized to efficiently operate the existing transportation system, thereby maximizing resources, and reducing the need for physical system capacity expansion.

TR8-2. TDM strategies, such as the Commute Trip Reduction (CTR) program or other strategies that reduce single occupant vehicle travel shall be utilized, when possible, to lessen the impact on transportation system capacity.

TR8-3. Reduce the need for new capital improvements through investments in operations, pricing programs, demand management strategies, and system management activities that improve the efficiency of the current system.

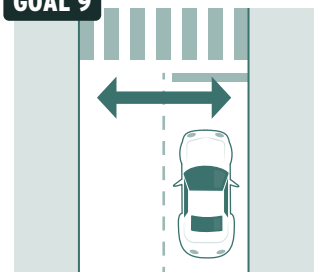
TR8-4. Emphasize transportation investments that provide alternatives to single occupancy vehicle travel, increase travel options, especially to and within centers, and support compact, pedestrian- and transit-oriented densities and development.

SUPPORTING ACTIONS

- Identify and map prioritized intelligent transportation system (ITS) improvements, based on available funding and existing infrastructure.
- Coordinate with transit agencies to enhance CTR programs for CTR employers in Auburn.
- Improve the CTR Program for City employees.



GOAL 9



Right-of-Way (ROW)

Retain and preserve existing right-of-way and identify and acquire new right-of-way as needed to provide for the existing and planned transportation system.

ROW Policies

TR9-1. Seek opportunities to obtain right-of-way along roadways and at intersections in accordance with adopted standards and comprehensive planning.

TR9-2. The City may acquire right-of-way, development rights, easements, and other property rights in accordance with the uniform act and other local, state, and federal law.

TR9-3. Private property shall not be taken for public use without just compensation having been made. The property rights of landowners shall be protected from arbitrary and discriminatory actions.

TR9-4. Right-of-way that has the potential for future transportation system needs shall be retained and right-of-way that has no potential future transportation system needs shall be considered for vacation.

TR9-5. When triggered by City code, require the dedication of right-of-way to accommodate the build-out of half street improvements based on the roadway classification and active transportation facilities identified in this Plan.

TR9-6. Permanent use or encroachment of right-of-way for non-City transportation system purposes shall be prohibited, restricted, or regulated to preserve the City's existing and planned use of the right-of-way for City transportation system purposes.

SUPPORTING ACTIONS

- Preserve and protect existing right-of-way through the issuance of permits such as Construction Permits, right-of-way Use Permits and franchise agreements.
- Monitor and address right-of-way encroachments.
- Acquire additional right-of-way as necessary to implement the Comprehensive Plan.
- As budgeted funds allow, purchase property when it is available on the market as a voluntary protective purchase rather than under threat of use of eminent domain.



GOAL 10



Asset Management

Design, construct, preserve, and maintain the City's transportation system in the most cost-effective manner.

Asset Management Policies

TR10-1. The target average Pavement Condition Index (PCI) for all streets is 70.

TR10-2. The minimum design service life for new and re-built roadways is 20 years.

TR10-3. The City shall take and require actions by others that minimize and mitigate impacts to the roadway surfaces by utility work and other construction activities.

TR10-4. Pursue and secure other funding sources, such as grants, partnerships, and revenue mechanisms to fund pavement preservation projects.

TR10-5. To the extent allowed by available preservation funding, the City shall prioritize the preservation of streets prior to the existing pavement degrading to the point where reconstruction of the roadway becomes the appropriate treatment.

TR10-6. Non-residential roadways requiring full pavement replacement shall be prioritized based on vehicle volumes and classifications with higher volumes of vehicles, heavy trucks, and transit routes being higher priorities than those with less.

TR10-7. Local Street Preservation program shall focus on preserving and re-building roadways classified as local residential, local industrial or rustic residential.

TR10-8. The Arterial Street Preservation program shall focus on preserving and re-building roadway systems classified as arterials or collectors.

SUPPORTING ACTIONS

- EDS prohibit trenching or cutting into newly constructed pavement surfaces (within five years) or require additional pavement replacement area where trenching or cutting in newly constructed pavement surfaces cannot be avoided.
- Notify and coordinate with private and public utilities when planning to complete pavement overlays or reconstruction.
- Identify City streets that are nearing a deterioration level that would require complete roadway re-build for inclusion in the pavement preservation program.
- Require roadways to be built per the requirements in the adopted EDS.
- Evaluate options to meet funding gaps that may include revenue mechanisms available through the Transportation Benefit District for consideration and potential implementation.
- Maintain a Computerized maintenance management system (CMMS) to record response to customer service calls.

(Continued on next page)

TR10-9. Prioritize the maintenance and replacement of pedestrian facilities to address deficiencies and to meet ADA requirements.

TR10-10. Prioritize maintenance of bicycle facilities to keep them visible with signage and markings, and clear of encroachments and debris.

TR10-11. Prioritize maintenance, repairs, and replacement of traffic control systems (signals, dynamic message signs, rapid rectangular flashing beacons) at a level consistent with optimizing system reliability, asset economic life, and system performance .

TR10-12. Ensure adequate resources to maintain, per USDOT, MUTCD, and other regulatory requirements and best practices, other elements of the street system such as signage, street lighting, and roadway markings.

TR10-13. Bridge inspection and maintenance shall follow State, Federal, and other applicable regulatory requirements.

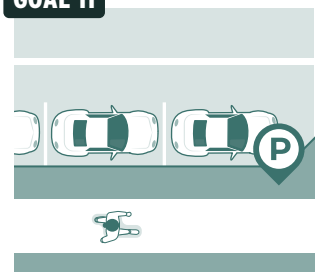
TR10-14. Intelligent Transportation Systems (ITS) will be managed and maintained to be secure, reliable, and effective.

TR10-15. Prepare for changes in transportation technologies and mobility patterns.

SUPPORTING ACTIONS

- Assign industry standard design lives for control systems. Seek to repair or replace system assets before they exceed their economic life and minimize the number of high-criticality assets beyond their economic life.
- Take measures to ensure system security for traffic control systems.
- Incorporate repair and replacement of sidewalks and other street assets into pavement preservation projects as appropriate and as resources allow.

GOAL 11



Parking

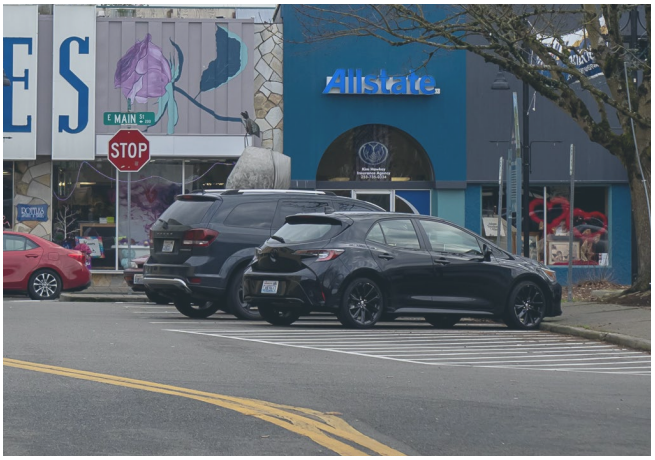
Ensure a balance between on-street and off-street parking provided to meet the needs of existing land use, development, and other community needs and as allowed by law.

Parking Policies

TR11-1. On-street parking should be allowed only when consistent with the classification and intended function of the street.

TR11-2. New developments shall provide adequate off-street parking to meet the needs of their development unless otherwise precluded by law.

TR11-3. Within high density areas, such as Regional Growth Center, evaluate and address the need for passenger and/or commercial loading zones.



SUPPORTING ACTIONS

- Take an active approach to managing on- and off-street parking in commercial and high-density residential areas to minimize land dedicated to parking and ensure right-of-way balancing parking with other community needs.
- Explore the feasibility of parking management programs, shared parking strategies, and/or subsidized ORCA cards programming as new low-income housing units are being developed; addressing the transportation needs as development occurs.
- Encourage new development to incorporate appropriate design features such as: Preferential parking for carpools and vanpools; Special loading and unloading facilities for carpools and vanpools; Transit passenger facilities, including comfortable bus stops and waiting areas that may be integrated in the building design; and secure and covered bicycle parking, showers, lockers, and related facilities to support bicycle commuters. Where applicable, encourage convenient short-term bicycle parking for customers or other visitors.
- Develop guidance for the creation of parking facilities for bicycles, scooters, and other active transportation vehicles that help promote mode shift away from motorized vehicles.


IT'S A
GOOD
DAY

CHAPTER 5

System Management, Maintenance, and Operations



IN THIS CHAPTER

- Staffing
- Equipment/Fleet
- Facilities
- Asset Management



Efficient and effective management, maintenance, and operations of the City's transportation systems relies on strategic planning and implementation. These efforts require identification of current and future assets and the financial, equipment, facilities, and personnel resources required to maintain and operate them. This chapter summarizes current and anticipated future staffing, equipment, and facilities needs and describes management of key transportation systems and elements such as pavement, street signal, sidewalks, and signage.

5.1. STAFFING

The staffing for the City's transportation system is broken down into four areas: Transportation Engineering and Planning, Traffic Signal Operation and Maintenance, Street Maintenance and Vegetation Maintenance.

5.1.1. Transportation Engineering and Planning

This area is responsible for the development, management, and administration of the Plan, Transportation Improvement Plan, Traffic Impact Fee program, street payback agreements, development review and permitting related to transportation requirements on all types of developments, traffic studies, citywide traffic count program, citywide channelization and pavement marking program, franchises, right-of-way use permits, community banner program, adopt a street program, right-of-way vacations, Americans with disabilities transition plan for right-of-way, commute trip reduction program for all large employers within Auburn, pavement preservation, capital project grants, neighborhood traffic calming program, on-street parking management, photo enforcement program, and regional coordination on transportation issues. There are currently five full-time equivalent (FTE) employees to manage these responsibilities.

5.1.2. Traffic Signal Operations and Maintenance

This area is responsible for the operation and maintenance of the City's traffic signals including programing and signal timing, electronic traffic control and warning devices, dynamic message signs, traffic cameras, school zone flashing beacons, and the ITS including fiber optic cable. There are currently five FTE's to manage these responsibilities.

5.1.3. Street Maintenance

This area is responsible for the maintenance of the roadway system including signage, street lighting, guardrails, walls, pavement, sidewalks, curbing, and delineators. There are currently 10.5 FTE's to complete this work.

Litter management is contained within the Solid Waste program through contracted services.

5.1.4. Vegetation Maintenance

This area is responsible for maintenance of roadside and pond vegetation, hardscape medians located along the roadways of the city, and provides street sweeping services on all roadways. The Parks Department maintains the landscaped medians within the roadway corridors of the City. There are currently 11.5 FTE's to complete this work, however, 5.1 FTE's are funded by the Storm Drainage Utility and provide for the vegetation maintenance of the Storm properties and facilities and therefore only 6.4 FTE's are dedicated to the street vegetation maintenance functions.

The City's transportation system elements are shown in **Table 10**.

Table 10. Transportation System Elements

QTY	DESCRIPTION
248.69	Miles of Streets
17	Bridges
11,000	Street Signs
13,389	Feet of Guardrail
96	Traffic Signals
31	Rapid Rectangular Flashing Beacons
3.684	Street Lights - City Owned
2,261	Street Lights - PSE Owned
53	School Zone Flashing Beacons
19	Speed Radar Feedback Signs
89	Traffic Cameras
12	Speed Photo Enforcement Locations (School Zones)
4	Dynamic Message Signs
43.86	Miles of Fiber Optic Systems
2	Community Banner Locations

As the City's transportation systems grow and new regulatory requirements are enacted, the resources needed to complete necessary maintenance and operations must be evaluated and adjusted to ensure adequate resources to meet the growing needs of the system and continue to maintain the system in a state of good repair. Unfortunately, because not all agencies provide the same services and functions, there are no reliable national standards to look at to determine level of staffing needed for a transportation system with the exception of signal maintenance.

The Federal Highway Administration and Institute of Transportation Engineers recommends a ration of between 25-50 traffic signal/field devices per technician. The City of Auburn has three signal technicians and one supervisor which results in a ratio of 76:1 and is therefore under resourced for the current number of systems that they are responsible for. This plan has identified a need for potentially ten to 12 new traffic signals and several RRFB's associated with projects and programs to improve pedestrian access and safety. In addition, there is the potential for future expansion of the photo enforcement program which should also be considered when determining future staff resources needed.



5.2. EQUIPMENT/FLEET

The City currently has the equipment resources for use in the maintenance of transportation systems shown in **Table 11** and **Table 12**.

Similar to the staff resource discussion above, there are no national statistics on the amount of equipment needed for the size of a transportation system because there are too many differences between agency responsibilities and levels of service. The current resources allow for adequate maintenance of the City's systems and as staffing resources grow, equipment resources will be need to increase accordingly.

In addition, in 2024 the City will be implementing an all electric street sweeper which was made possible through a grant from the Department of Ecology. In order to reduce the cities greenhouse gas emissions, replacement of fleet equipment and purchase of new equipment will consider the ability for electric vehicles, hybrid vehicles, or alternative fuels to be used as these technologies develop and improve.

Table 11. Equipment Assigned to Street Division or Traffic Signal Division

QTY	EQUIPMENT DESIGNATION	TYPE
4	6402E, 6403F, 6404B, 6412E	1 Ton Truck
1	6415C	F 350 Light Truck
1	6418D	Sign Truck
2	6113D, 6114D	Signal Transit Van
1	6116D	Signal Bucket Truck
1	6116D	Engineering SUV
4	6413D, 6414C, 6114C, 6113D	Staff Vehicles
2	6450A, 6450B	Bucket Trucks
1	6426D	Patching Truck
3	6411C, 6425C, 6425D	International Dump Truck
6	A402A, A402B, A901A, A408A, A404A, A501D	Plow Attachments
3	A403A, A405A, A401A	Sander Attachments
2	A904A, A407A	Deicer Attachments
1	A411A	1650 Gallon Tank
1	6423D	NorAm Grader
1	6420C	Johne Deere Loader
1	6432D	CAT Roller
1	6436A	Wacker Roller
1	6934A	Trverus Sidewalk Cleaner
1	N/A	ACCUBRINE Brine Maker

Table 12. Additional Equipment Available for all M&O Teams

QTY	EQUIPMENT DESIGNATION	TYPE
1	6940C	Case Skid Steer
1	A428E	30'' Cold Grinder
1	N/A	84" Angle Broom attachment-seria
1	6523C	Backhoe/ Extendahoe
1	6900	Backhoe
2	6635A, 6930A	Yanmar Excavator
1	6601A	John Deere Excavator
3	6911B, 6910C, 6505B	International Dump Truck
4	A904A, A905A, A406A, (6910D)	Plow
4	A903A, A902A, A502A, (6910D)	Sander
1	6910D	Kenworth Dump Truck
1	6911A	Mack Dump Truck
1	6420C	Johne Deere Loader
1	6432D	CAT Roller
1	6436A	Wacker Roller
1	6934A	Trverus Sidewalk Cleaner
1	N/A	ACCUBRINE Brine Maker

5.3. FACILITIES

Management, maintenance, and operations of the City's transportation systems are provided from two locations:

- **1 East Main Street** – City Hall Annex, Transportation Engineering Services
- **1305 C Street SW** – Maintenance and Operations Shops, Street Division, Vegetation Division, Traffic Signals Division

Other facilities also used for the Transportation system include the following

- **Sand and salt storage** – five locations citywide
- **Vegetation sorting facility** – Jacobson Tree Farm
- **Storage** – City's GSA Property on C Street SW

In 2020, the City undertook a study, the Facility Master Plan, to determine the space needs for the Public Works, Parks and Police departments. The recommendation of that study as it relates to the transportation system was to continue to provide maintenance and operations services from the 1305 C Street SW location but to expand the facilities with the construction of approximately 13,100 SF crew building, expansion of the fleet shops, relocation of the employee parking, completion of a driveway connection to 15th Street SW, and construction of covered parking for high valued fleet. This plan and its recommendations were adopted by the City Council in 2021 with Resolution 5595.

In 2024 construction is anticipated in the first phase of the Facility Master Plan for Public Works which is the expansion of the fleet shop facilities. As part of this work in the first phase, the City is improving the electrical service to the property to accommodate future charging stations for the electric street sweeper and future electric and/or hybrid fleet vehicles. In 2024/2025 it is anticipated that planning work will be done in the second phase of the identified improvements which for Public Works includes improvements at the Maintenance and Operations Shops to address the need for more crew space and warehousing space.

In 2024/2025 the City will be increasing the ability for the City to handle inclement weather events in the future by adding an additional sand and salt storage location. Planning efforts are also underway to relocate the vegetation sorting facility, which allows debris from operations to be separated and dried before disposal thereby reducing the costs of disposal is completed, from the Jacobson Tree Farm Property. This is due to the future plans of the City to build a Community Park on the tree farm site.

In 2024, the City is also completing a remodel at the City Hall Annex facility to provide the necessary office space for the future growth of the Public Works, Community Development and Finance departments located on the second floor and will provide necessary space for the transportation staff located there.



5.4. ASSET MANAGEMENT

Asset management involves the balancing of costs, opportunities and risks against the desired performance of assets to achieve objectives of the transportation system. The City currently uses an asset management system for its transportation and utility infrastructure and integrates this information with its GIS. This system allows the City to track requests for services both internally and from the community, assign specific tasks both reactionary and preventative to the maintenance of our facilities, and track information on specific assets defined within the system. The City has been implementing this system since 2007 and continues to improve the asset data sets and mapping to provide resources for our planning of system improvements as well as the day to day work of maintaining the systems.

5.4.1. Street Pavement

The City's Streets Division completes temporary and permanent pavement patching as needed in response to requests and complaints on all roadway corridors up to 6' x 10' in size. Areas that require more extensive patching or full pavement replacement are incorporated into the pavement preservation programs and implemented as capital projects managed by the Public Works Engineering services.

As of December 2022, City streets have an overall average pavement condition index of "67" on a scale of "0" to "100" where "0" is a completely deteriorated roadway surface and "100" is a new roadway surface. The City's goal is to achieve and maintain an average 70 pavement condition index which reflects a "good" surface condition.

An annual report is published to document the pavement rating throughout the City.

In November 2004, Auburn residents approved Proposition 1, Save Our Street Program, which created a dedicated local street fund. This money was set aside for repair and maintenance of local roadways which can sometimes also include sidewalk repair and rebuild. In 2013, the City Council modified the funding source for this program to be from construction sales tax revenues and no longer from property taxes. In 2018, the City Council modified the funds for this program, to be temporarily provided by real estate excise tax (REET) Revenues until a permanent and sustainable source could be established. Beginning in 2023, the City Council reallocated the existing 1% tax on utilities previously used to fund the arterial street preservation program to the fund the local street preservation program (formerly known as the Save Our Streets Program).

Figure 14. Local Residential Street Before and After SOS Rebuild



This re-allocating established $2 million annually to the local streets preservation program, which is the funding level estimated (in 2022 dollars) needed to achieve and maintain the City's average pavement condition index (PCI) goal of 70.

In 2008, the City created a similar program to fund the repair and maintenance of arterials and collector streets. Through 2022, this program was funded with a 1% utility tax, which was supplemented by grant funds, which provided an average of approximately $3.3 million per year. Analysis shows that approximately $5 million per year (in 2022 dollars) is needed to improve our arterial and collector streets to the PCI average target of 70 within the next 10-15 years, and then maintain them at that level.

Besides preserving, repairing, and replacing pavement surfaces, the street preservation programs also address non-ADA compliant curb ramps on-streets being re-paved or re-built when required per the criteria established in the City's ADA Transition Plan. The programs also address damaged or lifted sidewalks that may present an ADA obstruction or concern on streets it is re-paving or re-building.

In 2022, the City Council took actions to work towards reaching and sustaining the needed funding for both programs. Starting in 2023 the 1% utility tax revenue was moved to the local streets preservation program and a 1.5% tax on City Utilities was enacted to provide funding for the arterial streets preservation program. Additionally, as the City's Transportation Benefit District, the City Council enacted a 0.1% sales tax to provide funding for the arterial street preservation program. These new revenue streams, combined with grants, and fund balance are projected to get the City closer to the $5 million needed per year for the arterial street preservation program. The analysis in 2022 also identified that the City may need to consider the implementation of a $20 car tab fee through the Transportation Benefit District depending on future grant revenues. Current grant programs provide funding opportunities based on eligibility and scoring that exclude many City streets and the number of streets that are eligible and score well for the grants that have not already been repaired and preserved is diminishing. Therefore, the future level of grant revenues for pavement preservation is uncertain.

5.4.2. Active Transportation Facilities

Sidewalk Repair and Accessibility Program

The City of Auburn has an Annual Citywide Sidewalk Repair and Accessibility Program to repair damaged sidewalks, install/replace curb ramps that do not meet ADA standards, and to complete missing links in the sidewalk network.

These funds are essential for promoting active transportation travel and can be used to leverage other funding sources, such as state and federal grants or other city capital projects.

Auburn has identified three principal areas in which sidewalk improvements should be prioritized: corridors that provide access to and within the downtown, school zones, and parks, with a focus on addressing areas of known concern and complaints. Additional criteria for priority access improvement could include, but are not limited to, areas with high concentrations of senior citizens or disabled citizens, areas with high volumes of pedestrian-transit interaction, areas where private improvements such as trees have damaged the public infrastructure,



and areas where property owners are willing to financially participate in the construction of sidewalk improvements through payment into the City's sidewalk repair program. This program may also include the completion of sidewalk improvements using Community Development Block Grant funding to address areas that are within a qualified census tract as defined by HUD.

5.4.3. Street Lights

In 2021, the City completed the conversion of all of its City-owned standard Cobrahead style street lights from sodium halide to LED lighting and implemented a control system that provides information on the use of the system and can provide notifications when lights are not working. Beginning in 2021, the City created a Street Lighting Improvement program to complete the conversion of PSE-owned lights within the City to LED and to provide funds to add street lights where lighting does not meet the City's current design standards. More significant lighting projects are included in the transportation improvement plan as funding allows.

5.4.4. Traffic Signal Systems

The City completes annual preventative maintenance on its traffic signal systems. Every eight to ten years, the City also completes the re-lamping of signal heads. Each capital project that may impact an existing traffic signal is also reviewed for improvements and/or equipment replacements that may be needed for signal operations. In addition, as a traffic signal system reaches the end of its useful service life, it is included in the transportation improvement plan for replacement as funding allows. Often, development or capital projects re-build all, or portions, of existing traffic signal systems. Generally, to keep up with the general useful service lifetime of the City's traffic signals, a complete signal system must be replaced every three to four years.

5.4.5. Street Landscaping/Vegetation

The City's street standards require landscape strips along some roads classified as local residential or collector. City code establishes that the landscape strips are the responsibility of the adjacent property owner to maintain. Medians that include landscape treatments are maintained by the City's Parks Department through a contract with a landscape maintenance company. Roadside vegetation is maintained by the City's Vegetation Division where formal landscape strips do not exist and where vegetation within the right-of-way may create potential hazards or sight distance concerns.

5.4.6. Transportation System Management (TSM) and ITS

TSM techniques, which make more efficient use of the existing transportation facilities, can reduce the need for costly system capacity expansion projects. These techniques can also be used to improve reduce congestion and delays at intersections and along corridors to help meet City LOS standards TSM techniques used by the City include:

- Re-channelization/restriping, adding turn lanes, adding
- Signal interconnect and optimization
- Turn movement restrictions
- Access Management
- ITS, including Dynamic Message Signs (DMS)
- Traffic monitoring with PTZ cameras
- Signal battery backups on all major intersections



The City will continue to use these TSM techniques to maximize the efficiency of the existing street network. Of the various TSM strategies available, the City continues to invest in and expand its ITS infrastructure as a cost-effective means of increasing system capacity. The ITS system enables the City to change traffic signals in phasing and timing real-time, thereby accommodating unexpected increases in traffic or traffic obstacles such as event related traffic and crashes. For example, ITS has proven to be a useful tool in helping to manage the impact of event traffic traveling south on Auburn Way South, often during the PM peak, to the White River Amphitheatre. The City will continue to roll out ITS capabilities on corridors around the City, as referenced in Map 8. 2024 Intelligent Transportation Systems (ITS) in Appendix A.

In addition to TSM strategies, the City strives to provide viable alternatives for travelers to encourage mode shifts away from single occupancy vehicles to transit, biking, and walking,

5.4.7. Signage and Channelization

The City maintains street signage per the Manual of Uniform Traffic Control Devices (MUTCD) as adopted by WSDOT. This includes the replacement of signage as necessary due to knock downs or when reflectivity is below standards. Reflectivity requirements are established in the MUTCD.

The City re-paints roadway and curb striping on an annual basis. A database of the locations of all thermoplastic roadway markings is currently being created to facilitate a programmatic approach to the refreshing of these markings on a one to five-year basis. In addition, this data set will include the locations of raised pavement markers (RPMs) as new regulatory requirements within the MUTCD call for these RPM's to be updated/replaced on streets without street lighting and meeting other criteria.

5.4.8. Bridges

The City completes bridge inspections as required by the FHWA on an annual or bi-annual basis as determined in the prior inspection report. Inspection reports identify if there are maintenance, repairs, rehabilitation or replacement that is needed for the bridges within the City. The City Bridge program provides for minor cost repairs that are identified in the annual inspections on an annual or bi-annual basis depending on the work identified within each bridge inspection report. When larger items of work are identified, the City includes specific projects within the Transportation Improvement Plan as funding allows. The City also typically applies for grants through WSDOT's Local Bridge Grant Program and has secured funding for bridge maintenance and repairs.



CHAPTER 6

Funding

IN THIS CHAPTER

- Financial Summary
- Financial Planning & Programming
- Funding Sources
- Revenue Shortfall Contingency
- Funding Strategies, Project Prioritization





The ability to finance the maintenance and enhancement of the transportation system is critical to the implementation of this plan and the success of the future transportation system. This chapter details the financial planning tools and funding mechanisms available to accomplish these goals.

6.1. FINANCIAL SUMMARY

The summary below provides an overview of the 20-year financial outlook for the City's transportation systems. Forecasts are based on current funding levels for City funds and based on past trends for grants and partnerships. All amounts shown are shown in current dollars (2024) without discount rate adjustments to current value.

Table 13. 2024 to 2044 Expense and Revenue Forecast

OPERATIONS		
Labor, Materials, Facilities Operations, Equipment Maintenance	$	(336.6 Million)
Facilities Expansion, Additional Equipment	$	(20 Million)
Motor Vehicle Excise Tax Revenue	$	18.9 Million
General Fund	$	337.7 Million
OPERATIONS FUNDING REMAINDER/(SHORTFALL)	$	0
CAPITAL		
Plan Projects/Programs Expense	$	(320 Million)
Traffic Impact Fees Revenue	$	25.86 Million
Transportation Benefit District Revenue		
0.1% Sales Tax	$	47.5 Million
$20 Car Tabs*	$	11.7 Million
Utility Taxes Dedicated to Transportation		
1.0% on Non-City Utilities	$	40.98 Million
2.5% on City Utilities	$	26.61 Million
Motor Vehicle Excise Tax Revenue	$	10.6 Million
Multimodal Transportation	$	2.5 Million
Interest Earning and Investment Income	$	2.73 Million
Utility Revenues for Local Street Impacts	$	3 Million
Other (Developer and/or Other Contributions/Payments)	$	12.6 Million
Grants, Loans, and Partnerships Revenue**	$	106 Million
Real Estate Excise Tax Revenue	$	29.7 Million
OVERALL FUNDING CONTINGENCY/(SHORTFALL)	$	0.22 Million

* Assumes 13 years of collection at $900k collected per year.
** Based on historic average of $4.25 million awarded per year + $20 million grant for BNSF/A Street Access Project.

6.2. FINANCIAL PLANNING & PROGRAMMING

The City uses the Transportation Improvement Program (TIP) and Capital Facilities Plan (CFP) to develop a financial plan for capital improvements in Auburn, thus enabling the City to fulfill the GMA requirement of having a multi-year financing plan based on the identified transportation needs.

6.2.1. Transportation Improvement Program

The TIP is a six-year fiscally constrained plan which lists programmed transportation improvements in the following categories: roadway improvement projects, intersection improvement projects, active transportation and transit projects, preliminary engineering and miscellaneous projects, and preservation projects. Transportation needs are identified by examining the latest information concerning safety and crash history, growth trends, the traffic model, traffic studies, and the projects identified in the Plan. The City adopts an updated TIP annually, including a revenue forecast and analysis of available funding. Projects are then prioritized according to a number of factors including safety, capacity needs, access needs, and the likelihood of securing funding. The first three years of the TIP must be financially constrained, however, the City utilizes financial constraint on the full TIP period so project programming is often limited due to anticipated funding limitations.

The TIP is an important tool for identifying funding and developing a financial plan for project implementation. This planning document is incorporated into the CFP and used to influence the City's adopted budget.

6.2.2. Capital Facilities Plan

The CFP is the Comprehensive Plan element which identifies the financial plan for implementing all capital improvements in Auburn. Transportation improvements are included in the CFP, which is amended with each Biennial Budget. The CFP enables the City to fulfill the GMA requirement of having a multi-year financing plan based on identified transportation needs. It also enables the City to make informed decisions about its investment of public dollars and make timely decisions about maintaining LOS's in accordance with the Comprehensive Plan standards. The 2024-2044 Plan capital projects and program costs are summarized in **Table 14** on the next page.



Table 14. Capital Project and Program Cost Summary and Revenue Forecast

DESCRIPTION	SUMMARY			2024 – 2044 TOTAL
Comprehensive Plan Projects (Comp-X) from Appendix B	See Appendix B		$	**123 Million**
Asset Preservation, Repair, Replacement Projects/Programs	Traffic Signals Maintenance	$200,000 / Year	$	**162 Million**
	Traffic Signal Replacements	$150,000 / Year		
	Sidewalk Repair and Replacement Program	$250,000 / Year		
	Arterial Street Preservation	$5 Million / Year		
	Local Street Preservation	$2 Million / Year		
	Bridge Repair & Maintenance	$100,000 / Year		
	Channelization and Pavement Markings	$400,000 / Year		
Active Transportation Projects/Programs	Active Transportation Mode Shift Projects	$1 Million / Year	$	**20 Million**
Safety Projects/ Programs	Street Lighting	$50,000 / Year	$	**11 Million**
	Traffic Safety Programs	$500,000 / Year		
Other	Transit Partnership Routes	$200,000 / Year	$	**4 Million**
		TOTAL	$	**320 Million**

6.3. FUNDING SOURCES

The City uses a combination of public and private funding sources to implement transportation improvements in Auburn, both for maintenance activities and capital improvements.

6.3.1. General Tax Revenues

The City receives tax revenues from a variety of state, regional, and local sources including the Real Estate Excise Tax, sales tax, property tax, and the motor vehicle fuel tax (MVFT).

In addition, the City has implemented a utility tax on all utilities within the City and allocated a portion of these revenues specifically to the City's transportation system for improvements. This includes a 1% tax on all non-City utilities such as gas, power, telecommunications, and cable and a 2.5% tax on City utilities including water, sanitary sewer, storm drainage, and solid waste.

In 2023, the City began operation of a school zone photo enforcement program that may provide revenues for future transportation related projects.

6.3.2. Transportation Benefit District

Chapter 36.73 of the Revised Code of Washington provides for the establishment of Transportation Benefit District (TBD) by cities and counties to levy

and impose various taxes and fees to generate revenues to support transportation improvements within the district. A TBD is a quasi-municipal corporation and independent taxing district created for the sole purpose of acquiring, constructing, improving, providing, and funding transportation improvements within the district. The State Legislature provided local governments with the tools of the TBD because inflation has eroded the local share of gas tax and a series of statewide ballot initiatives passed over the last 12 years have eliminated other traditional sources of funding for local transportation needs.

In 2011, the City of Auburn implemented a TBD to provide adequate levels of funding for transportation improvements that are consistent with existing state, regional, and local transportation plans, and are necessitated by existing or reasonably foreseeable congestion levels.

The geographic boundaries of the Auburn TBD is the municipal limits of the City of Auburn as they currently exist. The Auburn TBD geographic boundaries would expand with any future annexations.

In December 13, 2016, there was an approval to implement an annual vehicle license fee of $20.00 for qualifying vehicles in the district. However, in September 19, 2017, the action was rescinded and therefore, no vehicle license fees were put into effect and no fees have been collected.

In 2022, the City Council completed a review of the needs for the preservation of the City's streets and determined that $5 Million was needed annually to preserve the City's arterial and collector streets and $2 Million was needed annually for local streets. As a result of that the Council developed three recommendations to provide funding for preservation of the City's roads. Two of the recommendations utilize the authorities granted to the TBD by the State Legislature. The first one was approved by the City Council on October 3, 2022, with the adoption of Ordinance No. 6881 which added a new section to the Auburn City Code (Chapter 3.23) imposing a Transportation Benefit District 0.1% Sales and Use Tax as authorized by RCW 84.55 and RCW 36.73. This tax became effective on January 1, 2023 and may be used for transportation improvements with a focus on preservation of the City's arterial and collector roadways. The second TBD consideration is a future implementation of a $20 Car Tabs at such time as the City is unable to obtain the grant funding to supplement the revenues for arterial and collector street preservation to meet the annual budget need of $5 Million. Based on the projected need of this Plan, it is anticipated that the $20 Car Tab's may be required to be implemented between 2031 and 2032. In addition, the 0.1% Sales and Use tax is enacted for a 10 year period and the City will need to consider continuing that tax every 10 years to continue to receive the revenues forecast in this plan.

The TBD is provided the authority to:

- Establish and implement district policies, programs and procedures
- Borrow money and incur indebtedness
- Provide for investment of district funds
- Create advisory committees (limited to seven City residents)
- Other powers consistent with state law

6.3.3. Grants

The City has an active grant program and continually seeks grants, both private and public, to improve Auburn's transportation system. The following is a list of some of the grants the City has historically applied for and will likely apply for again in the future.

Federal Legislation

In 2021, the Federal Legislature approved the new Surface Transportation reauthorization bill called the Infrastructure Investment and Jobs Act (IIJA). This is the largest long-term investment in infrastructure and provides $550 billion over fiscal years 2022 through 2026 in new federal funding. This is also know as the Bipartisan Infrastructure Law (BIL).

State Legislation

In 2015 and 2022, the Washington State Legislature passed two separate transportation funding packages called Connecting Washington and Move Ahead Washington. These programs also increased potential funding available to existing grant programs within the State and each identified specific regional projects to be funded by the programs.

Freight Mobility Strategic Investment Board (FMSIB)

The mission of the FMSIB is to create a comprehensive and coordinated state program to facilitate freight movement between and among local, national, and international markets which enhances trade opportunities. FMSIB is also charged with finding solutions that lessen the impact of the movement of freight on local communities.

FMSIB obtains funding directly from legislative appropriations and has contributed funds to the 3rd Street SW Grade Separation, the S 277th Street Grade Separation, M Street NE Widening 8th to 4th, and the M Street Underpass projects.

Potential Grant Programs for Consideration

From these state and federal actions, there are a number of grant programs available to local agencies related to transportation infrastructure improvements, as shown in **Table 15**.

There are a multitude of other potential federal grant programs through the IIJA that are evaluated as calls for projects are issued. PSRC has published a summary of the numerous grant programs available at https://www.psrc.org/media/7292.

Table 15. Potential Grant Program for Consideration

PROGRAM	DESCRIPTION
Transportation Alternatives Program (TAP)	TAP funds projects designed to strengthen the cultural, aesthetic, and environmental aspects of the inter-modal transportation system. The program provides for the implementation of a variety of non-traditional projects, including the restoration of historic transportation facilities, the construction of bicycle and pedestrian facilities, landscaping and scenic beautification, and the mitigation of water pollution from highway runoff.
Surface Transportation Program (STP)	STP provides flexible funding that may be used by states and localities for projects on any federally classified public road, active transportation improvements, bridge, and transit capital project.
Safety Program	A federal program targeted at reducing crash rates at intersections and along corridors, particularly at those locations with higher than average fatality and injury rates. Funds come from the Highway Safety Improvement (HSIP) Program . HSIP requires that states program and spend safety funds according to their Local Road Safety Plan. Washington State's plan is called Target Zero.
Congestion Mitigation and Air Quality (CMAQ)	A federally funded program administered through PSRC. CMAQ funds projects and programs in air quality non-attainment and maintenance areas, which reduce transportation related emissions.
Safe Routes to Schools Program	A state and federally funded program that aims to protect children from traffic related deaths and injuries and promotes a healthy lifestyle by encouraging bicycling and walking to school.
Pedestrian and Bicycle Safety Grant	A state funded program that funds active transportation safety improvements.
Transportation Improvement Board (TIB)	TIB administers annual grant programs that fund roadway and active transportation projects that improve safety, mobility, capacity, and promote economic development. The TIB offers several programs, each of which emphasizes different funding criteria. In addition, they offer a Complete Streets program.

(Continued on next page)

PROGRAM	DESCRIPTION
Community Economic Revitalization Board (CERB)	A state funded program that provides low-cost financing for public facility improvements. Public entities are eligible to apply for and receive loans and grants for public facilities linked to economic development outcomes such as private business investment and job creation. CERB also finances site-specific studies and plans.
Regional Mobility Grant Program	A State managed program to improve connectivity between counties and regional population centers and reduce transportation delay. There are four project types: vehicle and equipment purchases, capital construction, operations, and transportation demand management.
Local Bridge Grant Program	A State managed program to preserve and improve the condition of bridges that are physically deteriorated or structurally deficient through replacement, rehabilitation and systematic preventative maintenance.
Rebuilding American Infrastructure with Sustainability and Equity (RAISE)	A discretionary program funding to complete critical freight and passenger transportation projects.
Safe Streets and Roads For All (SS4A)	A discretionary program funding regional, local, and Tribal initiatives to prevent roadway deaths and serious injuries.
Reconnecting Communities and Neighborhoods (RCN)	RCN provides funding to prioritizing disadvantaged communities, aiming to improve access to daily needs such as jobs, education, healthcare, food, and recreation, fosters equitable development and restoration, and reconnects communities by removing, retrofitting, or mitigating highways or other transportation facilities that create barriers to community connectivity, including to mobility, access, or economic development.

6.3.4. Loans

Low-interest loans are also available to municipalities. For example, the Washington State Department of Commerce Public Works Board offers low-interest loans (PWTF) for local governments to finance public infrastructure construction and rehabilitation. Eligible projects must improve public health and safety, respond to environmental issues, promote economic development, or upgrade system performance. Roads, streets, and bridges are eligible for these loans. The loans can be strategically employed to leverage grant funding by providing a local match, enabling the City to compete for funding for public infrastructure projects. In addition, the City has the option of issuing bonds for public infrastructure projects. The City may also pursue financing airport improvements through the Community Aviation Revitalization Board (CARB) loan program.

Table 16. 2024-2044 Forecast

CURRENT LOANS & INDEBTEDNESS			
Harvey Road/8th Street NE Intersection Improvements	Remaining Debt Payments 2024 – 2028	**$**	**407,933**
M Street SE Undercrossing Improvements	Remaining Debt Payments 2024-2041	**$**	**2,155,891**
Auburn Way South Widening (Hemlock St SE to Poplar St SE)	Anticipated Payback Period 2025-2045	**$**	**3,000,000 + Interest**

6.3.5. Transportation Impact Fees

The City has an established traffic impact fee system based on the Institute of Traffic Engineers (ITE) guidelines, as amended by the City Council. The fee system estimates the amount of traffic each development is anticipated to create, based on the land use type and size. Traffic impact fees compensate the City for the capacity improvements needed to accommodate the new trips generated by new development. In turn, the City uses the revenues to expand the street network through the capacity projects included in the TIP. The fees are based on the costs of the capacity project included in the TIP and forecast growth throughout the City. The fees are updated annually following the adoption of the TIP by City Council. Payment of the impact fee does not relieve developers of their codified obligation to construct half-street improvements, nor the need to mitigate project impacts identified through the SEPA process, which may include the construction of an identified TIP project (and a credit for the impact fee contribution towards that project).

The City also charges a truck impact fee for certain land-use types which are associated with significant truck traffic generation, such as commercial and industrial uses. These fees are used to address impacts on the City's truck routes and other truck-related infrastructure.

With the adoption of this plan, the City will be updating its transportation impact fee schedule to be based on a per person trip approach. The impact fees generated from this revised approach will be used for both vehicle capacity projects and active transportation projects that support mode shift away from vehicles (and therefore reduce need for vehicle capacity).

6.3.6. Funding Partnerships

The City has successfully formed several funding partnerships, which have enabled it to leverage its resources in implementing transportation improvements.

The Muckleshoot Indian Tribe (MIT) has graciously provided easements, funding, and other support to the City for several transportation projects and programs. In 2020, the City and MIT entered into a Memorandum of Understanding (MOU) where both parties agreed to work together to identify needs and provide solutions to gaps in active transportation facilities on, and along, SR 164/Auburn Way South. Subsequently, the MIT and City have entered into funding agreements for specific projects where MIT has provided funding for projects implemented by the City.

The City anticipates continuing to partner with WSDOT on funding projects involving the state routes through the City.

Local Improvement Districts (LIDs) enable City investment in a specified area by leveraging City funds, when available, with contributions from property owners in the district. LIDs are a means of using limited city resources to improve neighborhood quality through improvement of streets, sidewalks, and other features of the roadway. Historically, LIDs were often implemented to construct public improvements associated with new commercial and residential neighborhoods. It has been over 15 years since the City has last implemented an LID. This is presumably due to the high costs that LIDs would require the benefited property owners to pay. Additionally, most new residential and commercial developments trigger the requirement for public improvements such as streets, sidewalks, and street lighting to be built by the development at the time of the development rather than being built through LID. For these reasons, the City has not included any LID constructed improvements or funding in its future projections.

In 2022, the City implemented a new Sidewalk Repair Program to address situations where adjacent property owners are financially responsible for the correction of damaged sidewalks within the City. This program allows for a property owner to pay the City a pre-determined fee to complete the work on their behalf in the next regularly scheduled sidewalk improvement project.

Street Deferral agreements or Fee In Lieu payments are allowed per Auburn City Code 12.64A where property owners responsible for the construction of frontage improvements along their properties can pay the City for the completion of the work where a planned improvement project has been identified in the City's Transportation Improvement Plan and/or adopted budget.

6.4. REVENUE SHORTFALL CONTINGENCY

Revenue forecasts for City funds are considered to be relatively secured. Other revenue such as grants and partnership funding can be slightly more unpredictable. While all the revenue currently forecast is anticipated to fully fund the transportation plan, if shortfalls arise the City will have to take one or more of the following actions to maintain compliance with GMA concurrency requirements:

- Supplant the projected budget shortfall with other existing City funds.
- Enact new sources of revenue.
- Revise the Land Use Plan to reduce development capacity and resultant need for additional transportation improvements.
- Lower the LOS Standard sufficiently to reduce the need for additional transportation improvements.
- Impose restriction (moratorium) on further development with impacts to areas not meeting LOS standards until the current LOS standard is met.

6.5. FUNDING STRATEGIES, PROJECT PRIORITIZATION

The City uses a variety of criteria to prioritize transportation projects, including safety, mobility, and overall community benefit. In addition, the City also considers the availability of funding and the ability to leverage City dollars to raise addition funds. For example, grants are often available for specific types of capital investments, whereas they are more limited for maintenance/preservation. Hence, the City often needs to budget for maintenance/preservation through tax revenues. Capital improvements may be financially secured through a combination of public and private investment. Hence, project prioritization for capital improvements is often partially dependent on the ability to secure outside funding. Likewise, maintenance and preservation are highly dependent on the limited tax revenues available to the City. In the future, the City will need to continue lobbying for its share of federal, state, and county tax revenues, seek creative avenues for securing private investment dollars and grant funds, and potentially implement new funding strategies such as car tabs or additional tax implementation when allowed.



CHAPTER 7

Monitoring & Evaluation

IN THIS CHAPTER

Annual Updates

Multi-Year Updates

Accomplishments Since the Last Plan Update (2019)





The Comprehensive Transportation Plan, a long-range plan with the horizon year 2044, predicts the needs and conditions of the future transportation system, enabling the City to anticipate its future needs. Nonetheless, the transportation network is dynamic, constantly evolving due to circumstances beyond the scope and influence of this plan. Hence, regular updates are necessary to ensure the Plan remains current and relevant.

7.1. ANNUAL UPDATES

The Plan can be amended annually as part of the City's regular Comprehensive Plan amendment cycle, which ensures proposed changes go through a public review process before the amended plan is adopted by the City Council at the end of the calendar year. In preparation for the annual amendment cycle, the City will review the plan and propose updates as needed. These proposed updates may be due to changes to City priorities, the availability of new information, or the relevance of certain plan components.

7.1.1. Re-Evaluation

The annual re-evaluation process provides an opportunity for the City to identify progress made in implementing the Plan, as well as identify new needs that have arisen since the previous update. The update will consider the street, active transportation, and transit systems, and assess whether the Plan adequately addresses the implementation strategies necessary to ensure the transportation infrastructure continues to grow in line with the City's objectives.

As part of this process, the City will review its future projects list and update the TIP and the CPF as appropriate. It will also review and update the Policies and Funding chapters in order to remain consistent with the City's vision and current with potential funding strategies.

7.1.2. Technical Information

The Plan contains a range of technical data, much of which informs other elements of the Plan. As part of the annual amendment cycle, technical information, such as traffic volumes, existing LOS, roadway classifications, and transit route and ridership information, will be updated as appropriate. Updated information will inform much of the evaluation process, enabling the City to quantify system changes over time and make appropriate decisions in planning the future system.

7.1.3. Model Updates

The City's traffic model shall be updated on a regular basis, every few years, as new land use, employment, and housing data becomes available. Model updates are important as they ensure the City has an accurate understanding of how land use patterns, employment, and other factors impact future transportation conditions, enabling the City Council to make informed policy decisions. The model also provides an understanding of the impacts associated with different projects, allowing the City to devise a revised list of future projects to improve capacity and safety, as well as achieve other priorities.

7.1.4. Comprehensive Plan Consistency

The annual evaluation process is an opportunity to ensure the Plan is consistent with other elements of the City's Comprehensive Plan, including the land use and economic development elements; Auburn Parks, Recreation and Open Space Plan, Transportation Improvement Program; and CFP. Hence, as part of the annual amendment cycle, the City will ensure these plan components are consistent with and supportive of each other.



7.2. MULTI-YEAR UPDATES

The City has the opportunity to perform annual updates to the Plan on an as-needed basis to account for significant changes which have occurred during the previous year. A more exhaustive process is periodically necessary; hence, a thorough rewrite of the Plan shall be conducted every five to eight years. This endeavor will include a broad public outreach effort with input from neighboring jurisdictions, state and regional agencies, and Auburn residents and businesses. Much like the process for the 2024 update, it will present an opportunity to holistically examine the current transportation system and lay the framework for development of the future system.

7.3. ACCOMPLISHMENTS SINCE THE LAST PLAN UPDATE (2019)

Since 2019, the City has completed numerous transportation improvements, with an emphasis on providing new road capacity, improving pedestrian and bicycle safety, preservation of existing infrastructure, and providing better access to regional transit services including commuter rail.

In addition to the completed planned capacity projects, additional projects were completed, such as the I Street extension to South 277th Street, the Auburn Way South sidewalk additions from Dogwood to Hemlock, Riverwalk Drive Sidewalks Expansion, and numerous pavement preservation projects.



APPENDIX A

Maps & Interactive Links



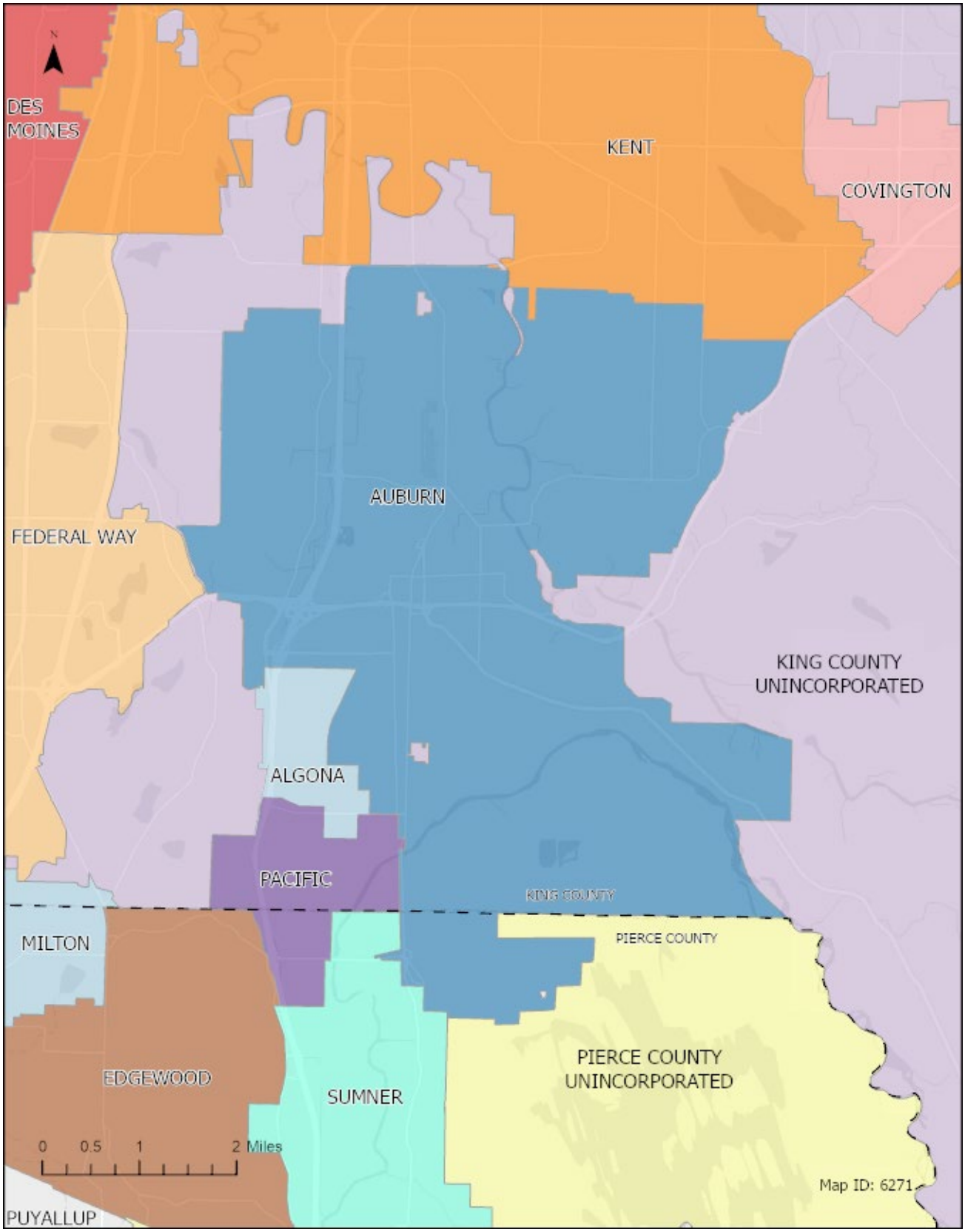
IN THIS APPENDIX

Map 1. 2024 Adjacent Cities and Counties
Map 2. 2024 Bike Route Network
Map 3. 2024 Existing Bike Facilities
Map 4. 2024 Existing Sidewalks
Map 5. 2024 Transit Bus Routes/Stops
Map 6. 2024 Level of Transit Service
Map 7. 2024 City of Roadway Classifications
Map 8. 2024 Intelligent Transportation Systems (ITS)
Map 9. 2024 Federal Functional Classifications
Map 10. 2024 Freight Network

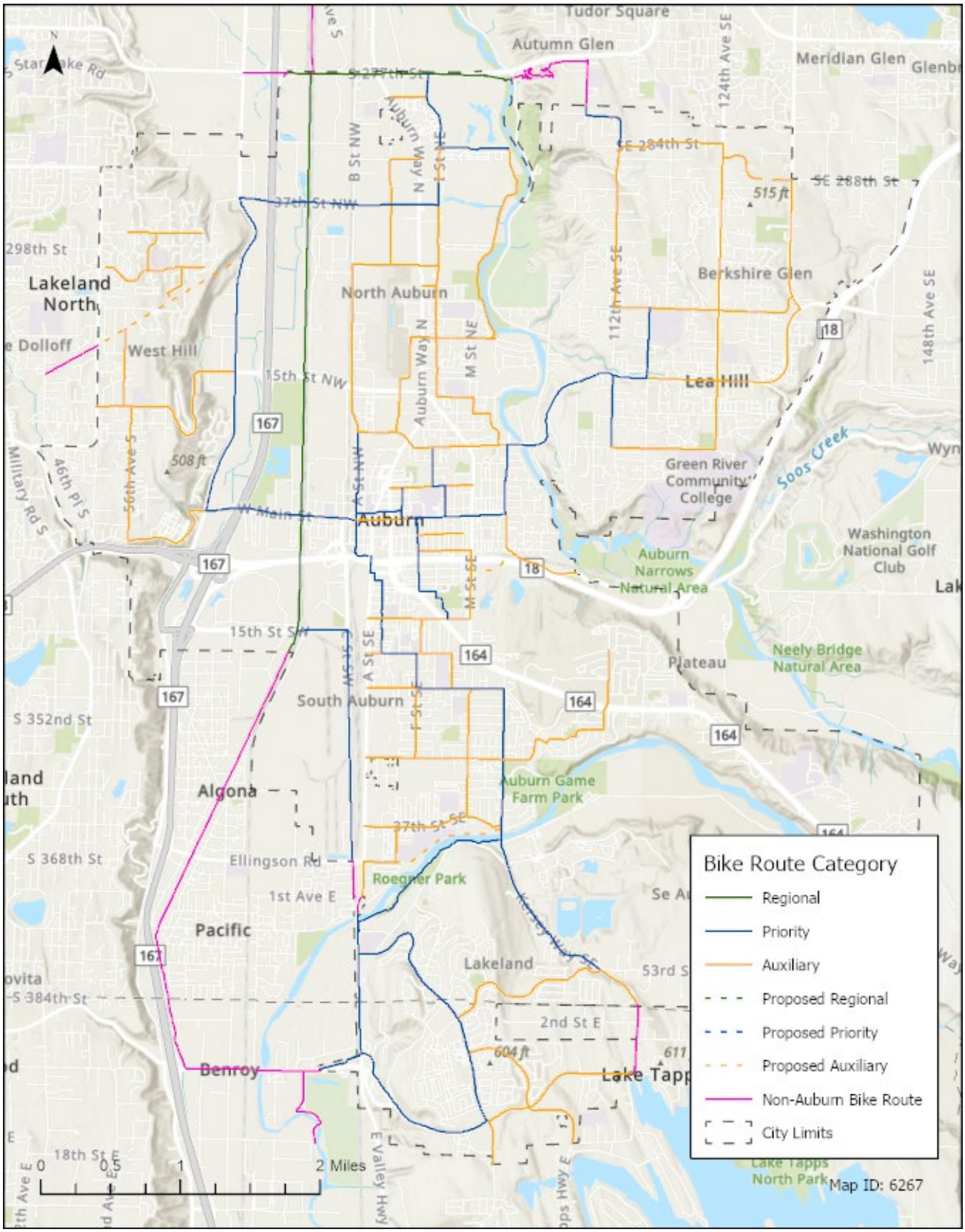
INTERACTIVE LINKS

Roadway Information
Vehicle LOS - Intersection Delays
Sidewalk Inventory and Transit Level of Service
Bike Network Assessment Map
Existing and Planned Bike Facilities Map
Conceptual Projects and Map

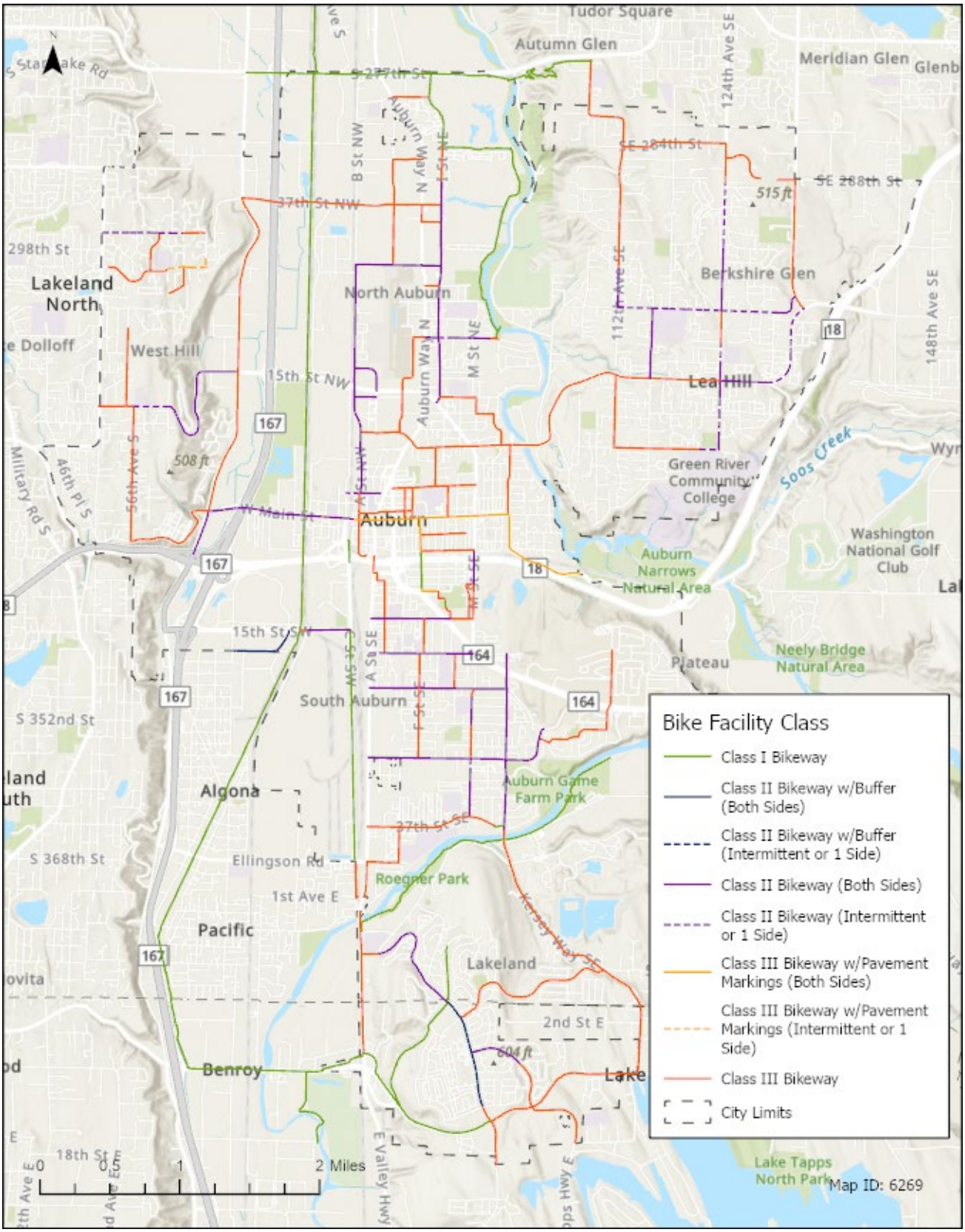
Map 1. 2024 Adjacent Cities and Counties



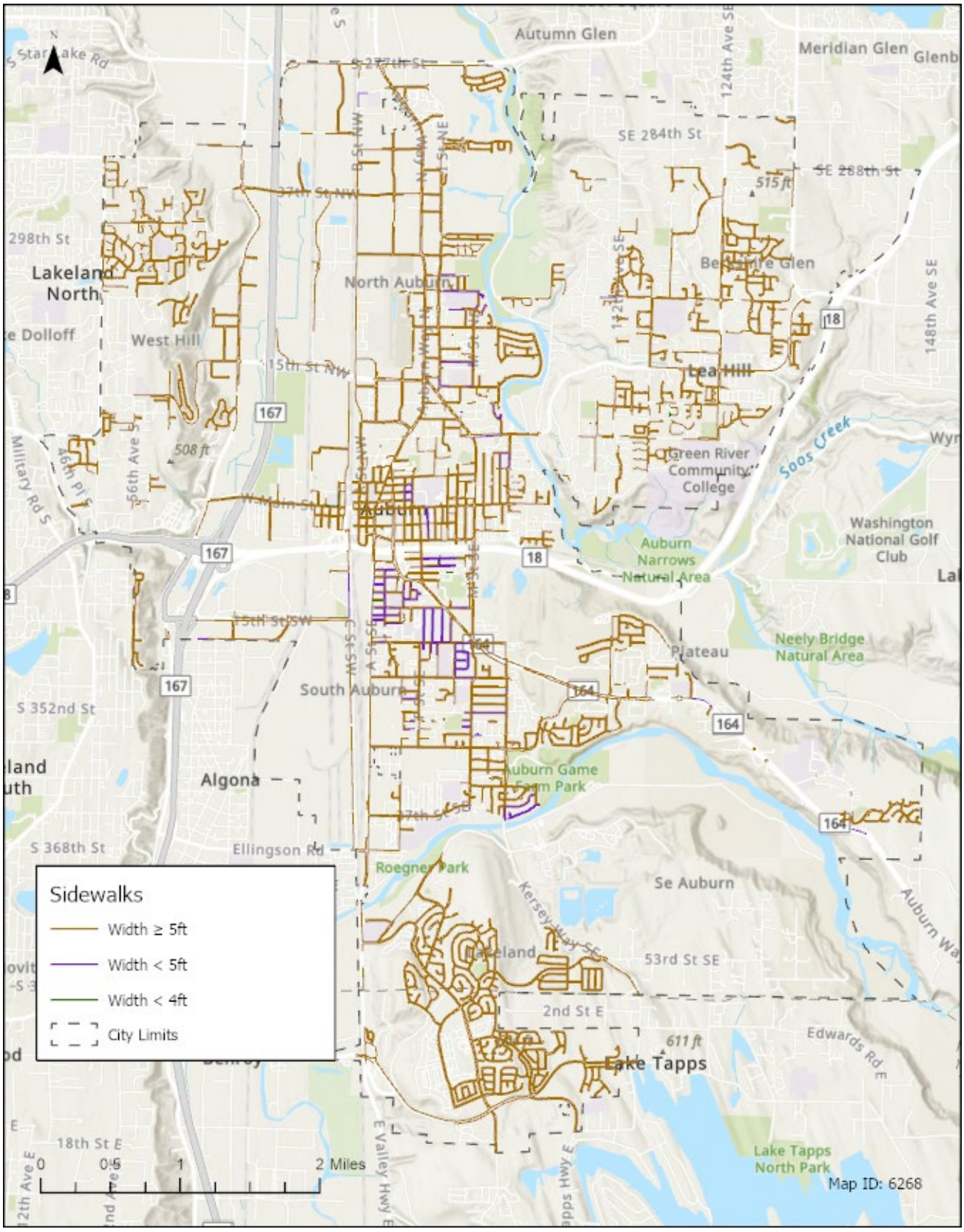
Map 2. 2024 Bike Route Network



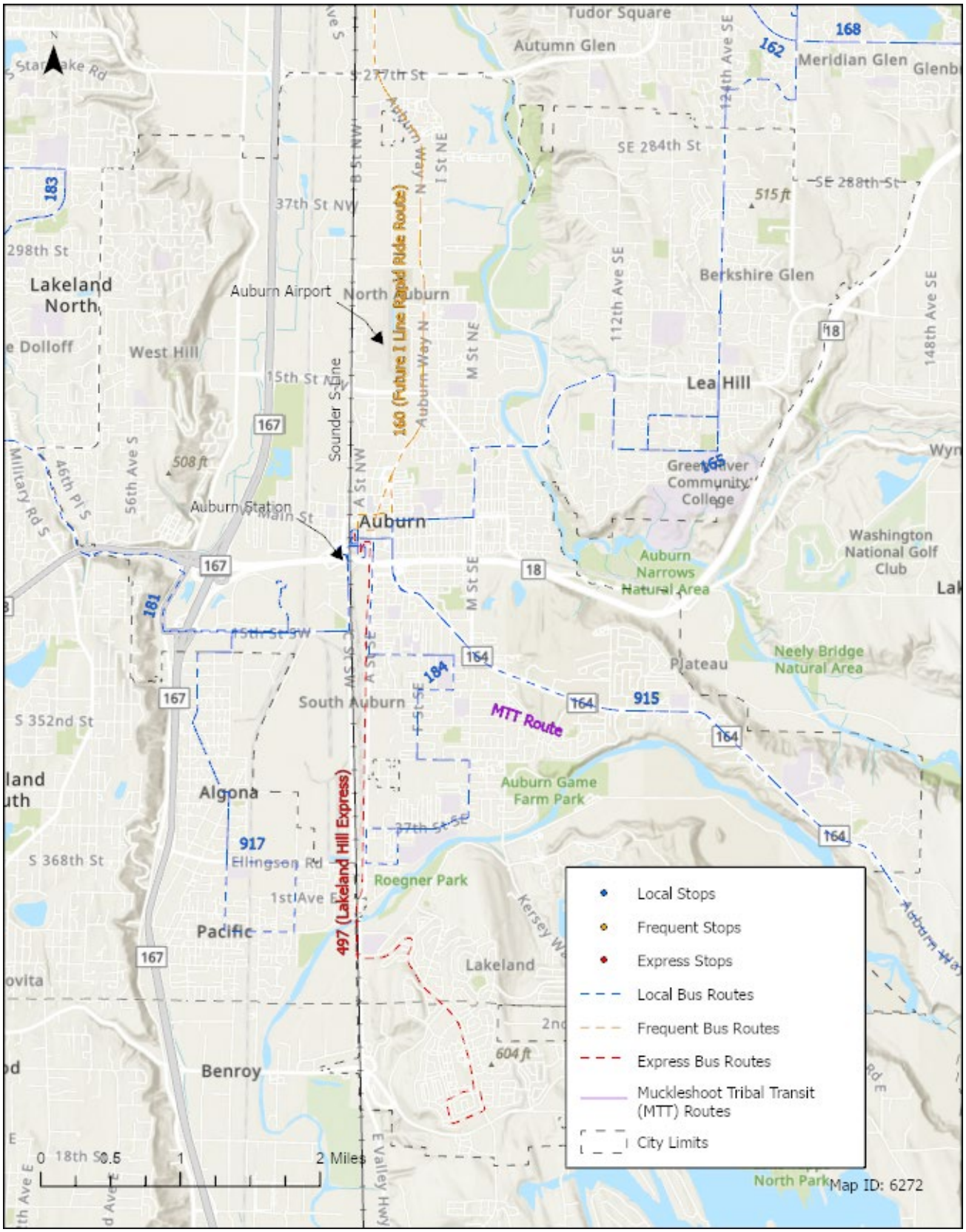
Map 3. 2024 Existing Bike Facilities



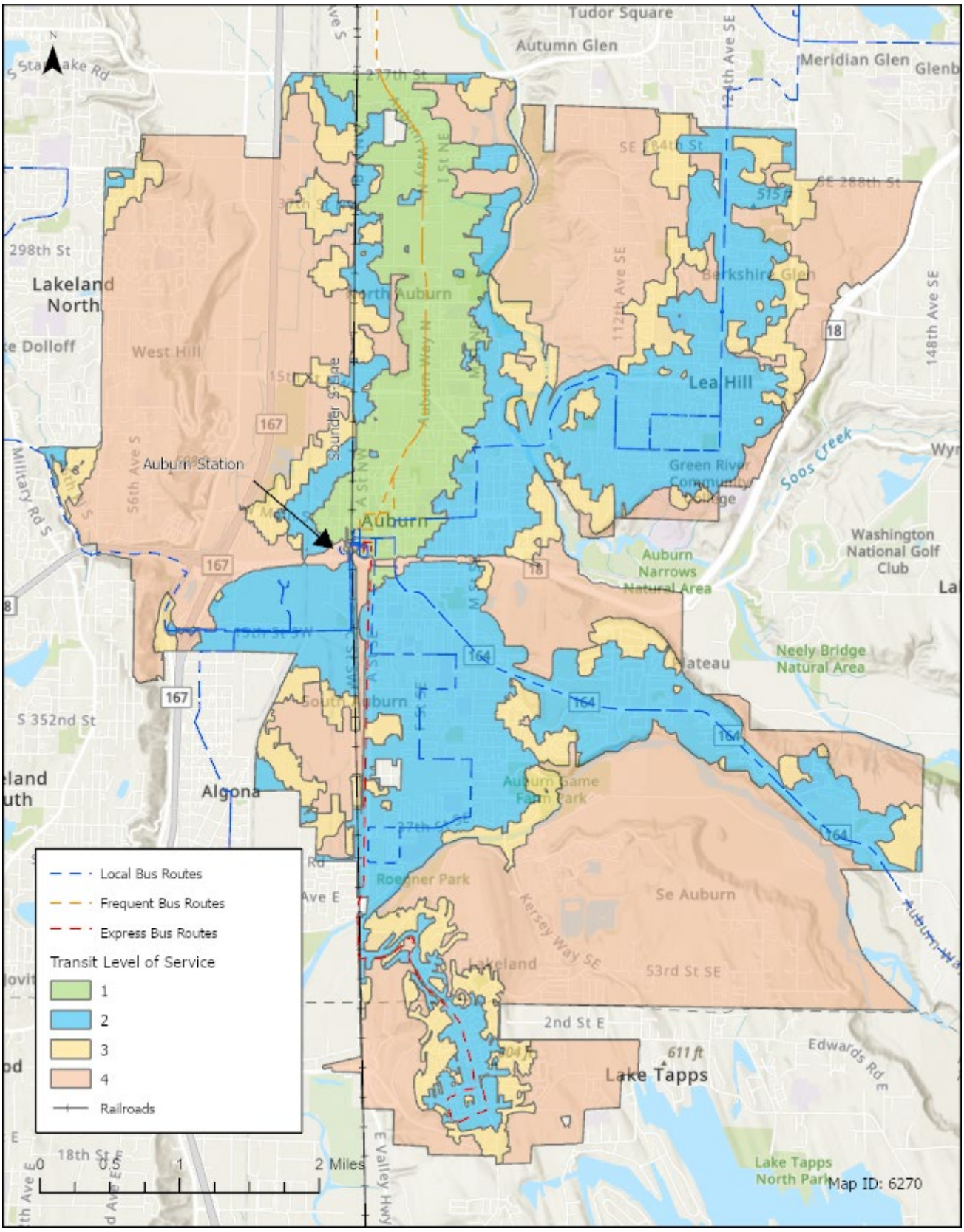
Map 4. 2024 Existing Sidewalks



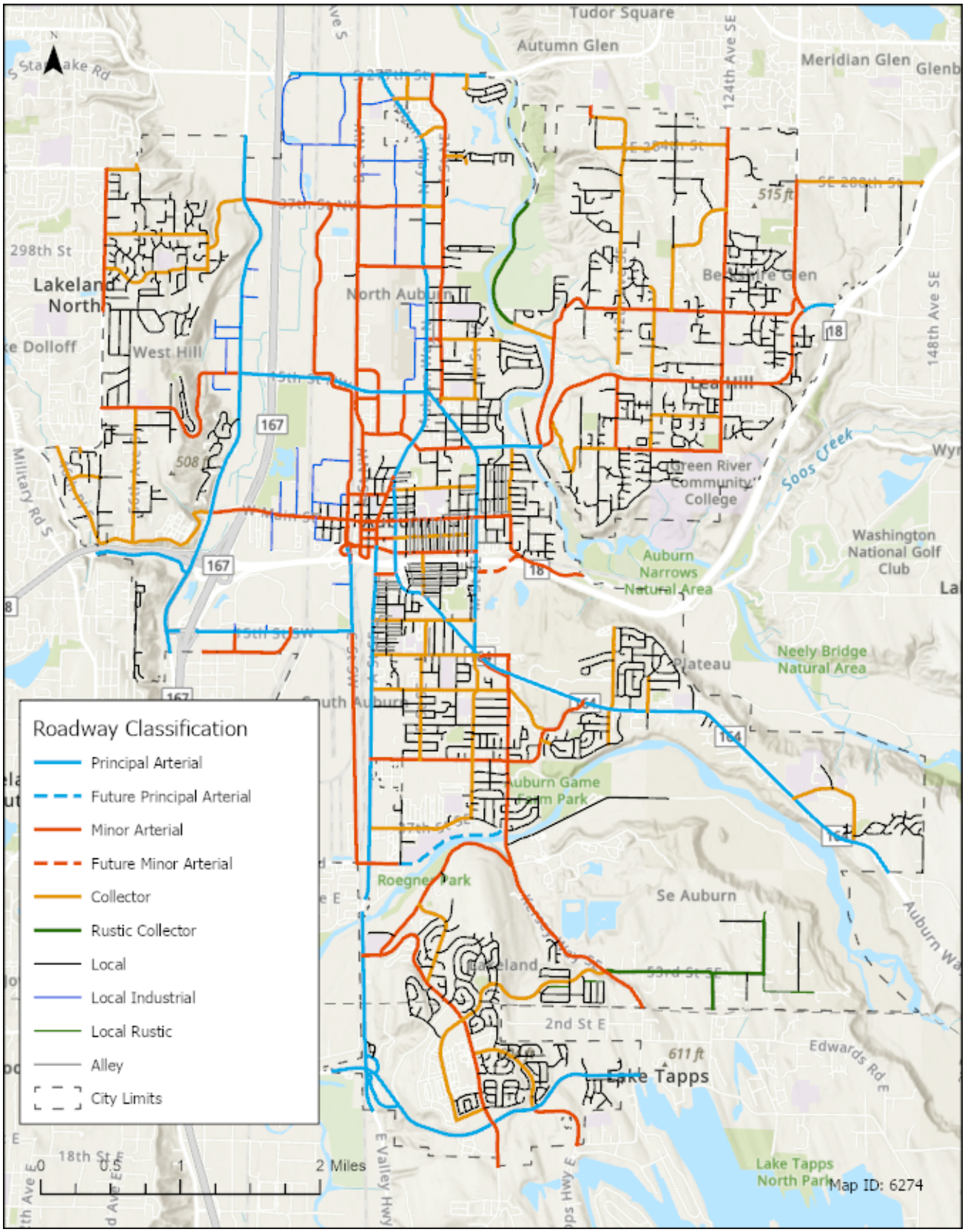
Map 5. 2024 Transit Bus Routes/Stops



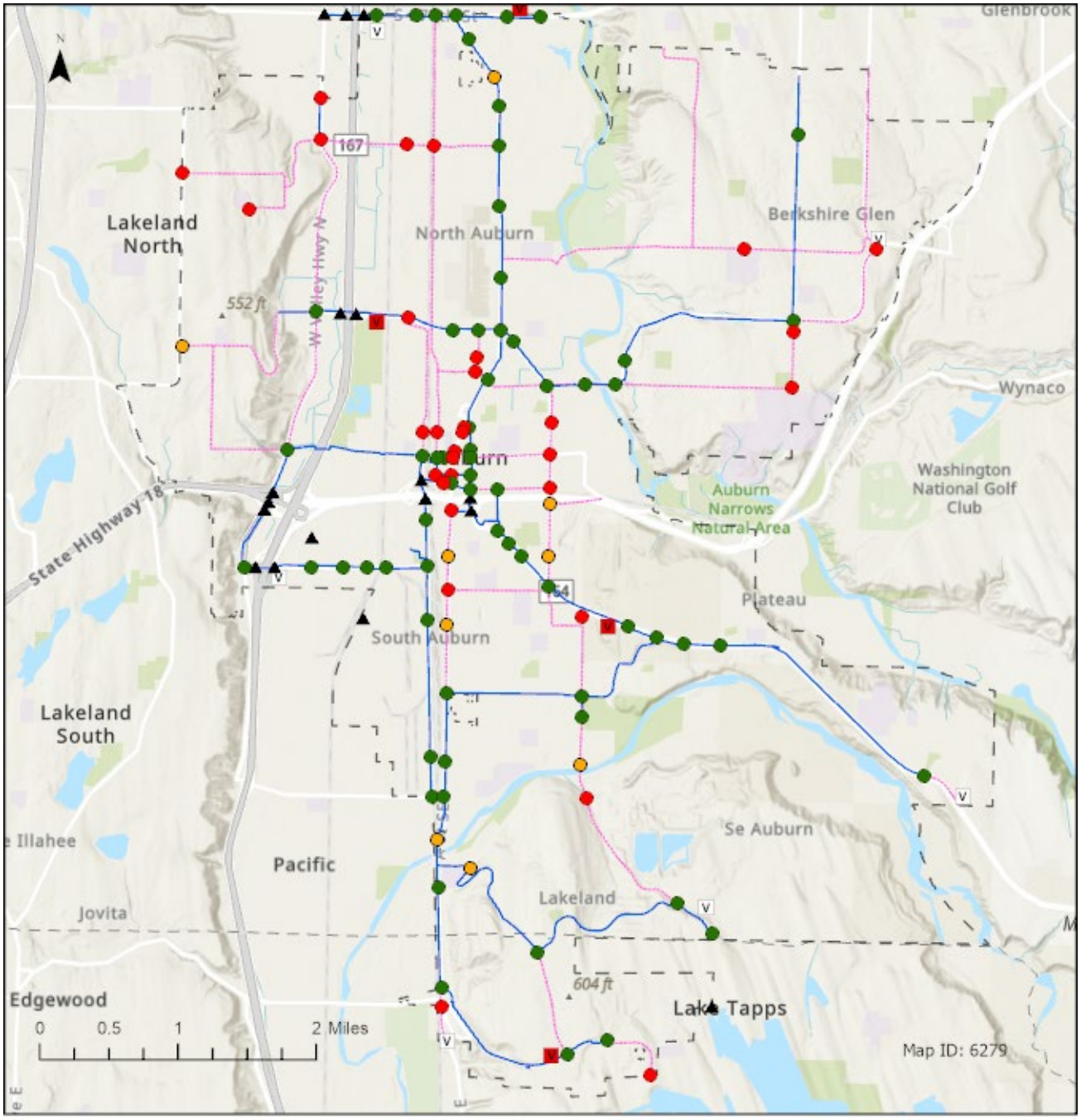
Map 6. 2024 Level of Transit Service



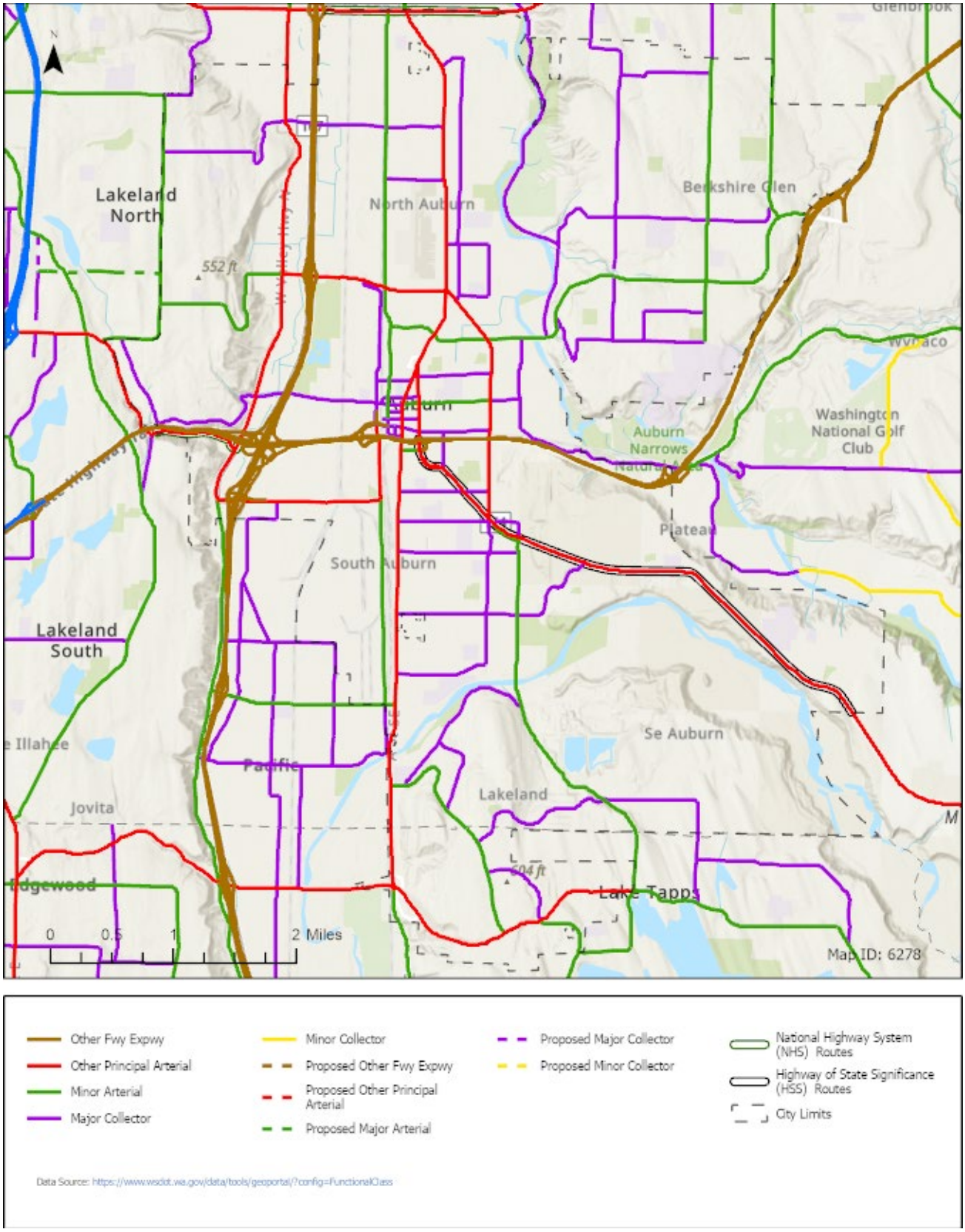
Map 7. 2024 Roadway Classifications



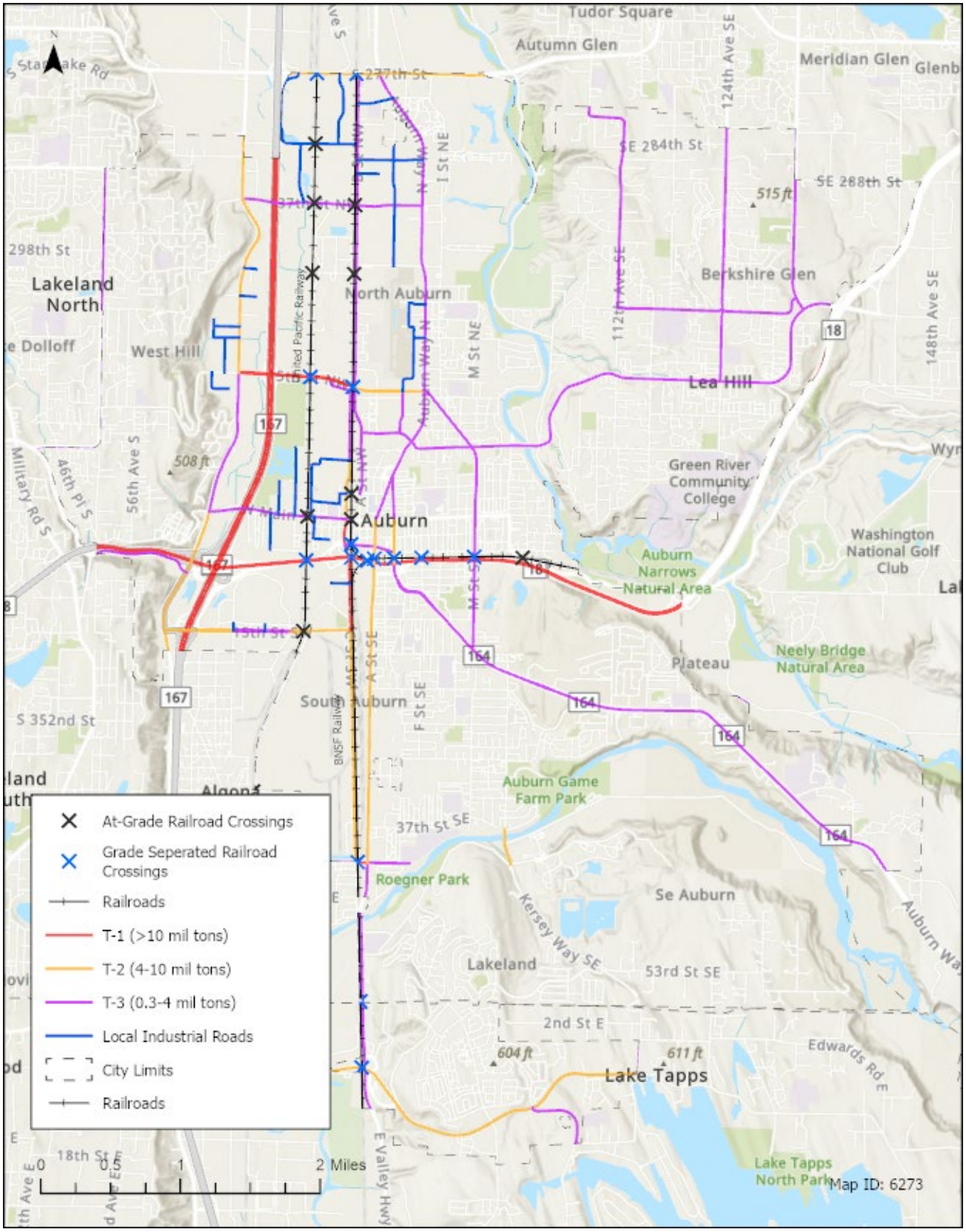
Map 8. 2024 Intelligent Transportation Systems (ITS)



Map 9. 2024 Federal Functional Classifications



Map 10. 2024 Freight Network



This page left intentionally blank

APPENDIX B

Project Summaries

IN THIS APPENDIX

- Summary Table of Planned Projects and Programs
- Project Summaries: Purpose, Concept, Planning Level Cost
- List of Bike Improvements to Encourage Mode Shift



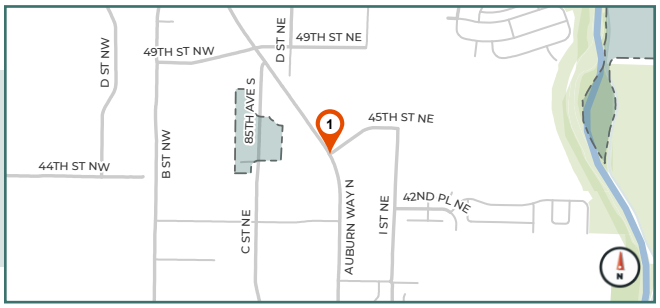
PLANNED PROJECTS & PROGRAMS

Interactive Map: https://storymaps.arcgis.com/stories/2d9fe1e0980044fbb4bf78c2056450eb

Click on a linked **COMP #** in the summary table below to view that specific project summary.

COMP #	PROJECT		COST ESTIMATE
1	Auburn Way N & 45th St NE Intersection Improvements	$	1,900,000
2	Auburn Way N & 42nd St NE Intersection Improvements	$	100,000
3	I St NE Improvements (37th St NE - 45th St NE)	$	6,700,000
4	I St NE & 37th St NE Intersection Improvements	$	2,300,000
5	I St NE & 30th St NE Intersection Improvements	$	3,250,000
6	SE 304th St & 112th Ave SE Intersection Improvements	$	800,000
7	SE 304th St & 118th Ave SE Intersection Improvements	$	950,000
8	SE 304th St & 116th Ave SE Intersection Improvements	$	3,725,000
9	Lea Hill Corridor Improvements	$	14,675,000
10	116th Ave SE & SE 312th St Intersection Improvements	$	5,600,000
11	116th Ave SE & SE 320th St Intersection Improvements	$	3,150,000
12	Pike St NE & 8th St NE Access Management	$	50,000
13	8th St NE Improvements (Auburn Way N - Harvey Rd/M St NE)	$	8,200,000
14	10th St NE Improvements (A St NW - Auburn Way N)	$	2,300,000
15	15th St NW & M St NW Access Management	$	50,000
16	S 316th St & 56th Ave S Intersection Improvements	$	3,225,000
17	S 316th St & 51st Ave S Intersection Improvements	$	2,150,000
18	S 321st St & 44th Ave S/46th Pl S Intersection Improvements	$	3,750,000
19	A St NW & 3rd St NW Improvements	$	3,025,000
20	C St NW & 3rd St NW Intersection Improvements	$	1,900,000
21	M St SE By-Pass Rd (M St SE - Black Diamond Rd)	$	17,250,000
22	Auburn Way S, M St SE, 17th St SE Intersection Improvements	$	2,300,000
23	M St SE & 12th St SE Intersection Improvements	$	4,650,000
24	M St SE & 29th St SE Intersection Improvements	$	2,925,000
25	A St Corridor Improvements - 37th to White River Bridge	$	21,965,000
26	A St SE & 12th St SE Intersection Improvements	$	1,425,000
27	A St SE & 21st St SE Intersection Improvements	$	1,925,000
28	Lakeland Hills Way SE & Oravetz Rd SE Corridor Improvements	$	2,610,000
		TOTAL $	**122,850,000**

COMP-1
AUBURN WAY N & 45TH ST NE INTERSECTION IMPROVEMENTS



Project Origin: New 2024 CTP Project

Primary Need: Vehicle Capacity

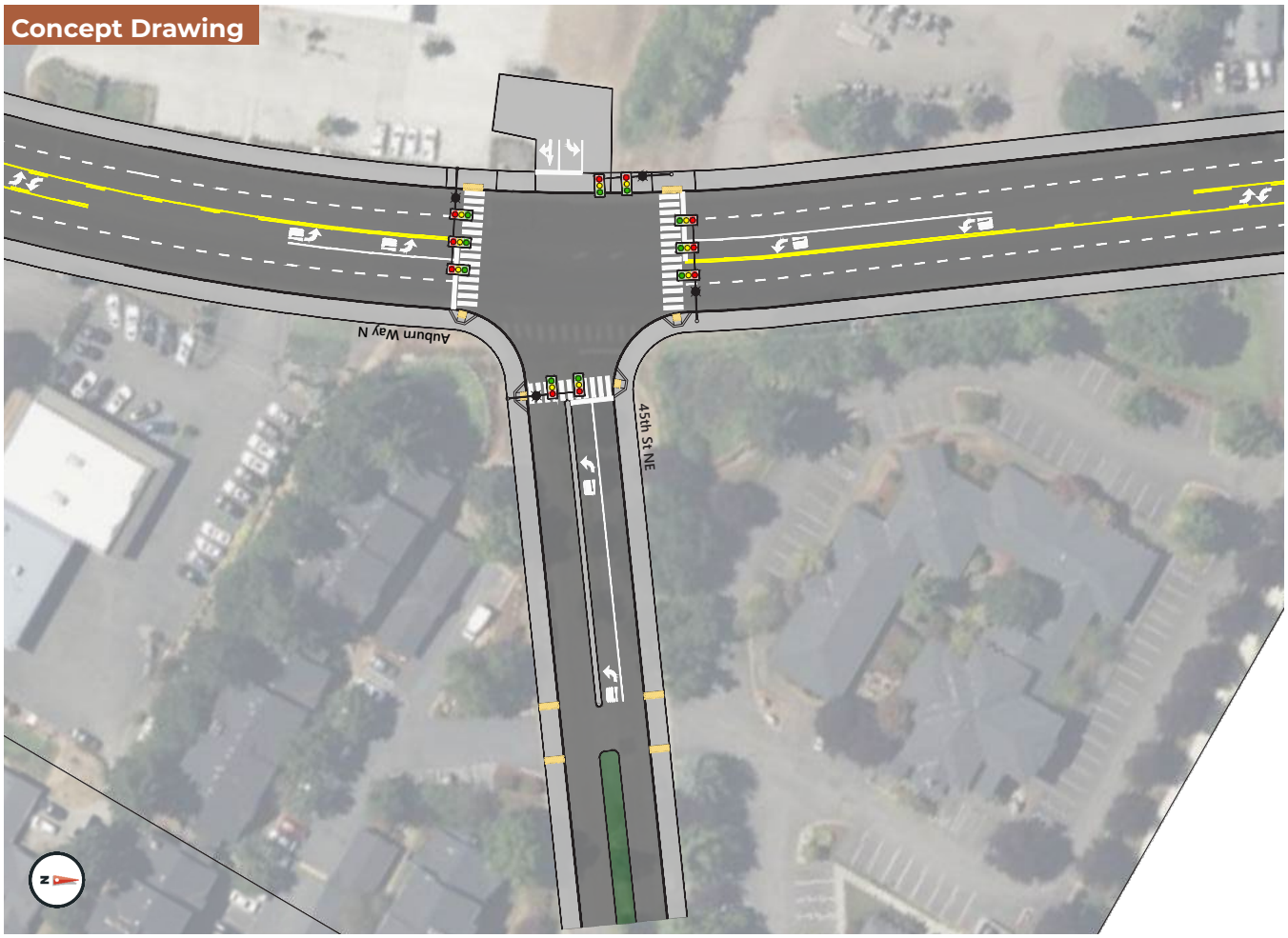
Description:

Intersection delays will be reduced through the replacement of the stop control with construction of a new traffic signal.

VEHICLE LOS WITHOUT PROJECT	AM	PM
2024 Existing	Meets	Fails
2044 Future	Fails	Fails

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 700,000
Right of Way	$ 0
Construction	$ 1,200,000
Total	$ 1,900,000

Concept Drawing



COMP-2
AUBURN WAY N & 42ND ST NE INTERSECTION IMPROVEMENTS



Project Origin: New 2024 CTP Project

Primary Need: Vehicle Capacity

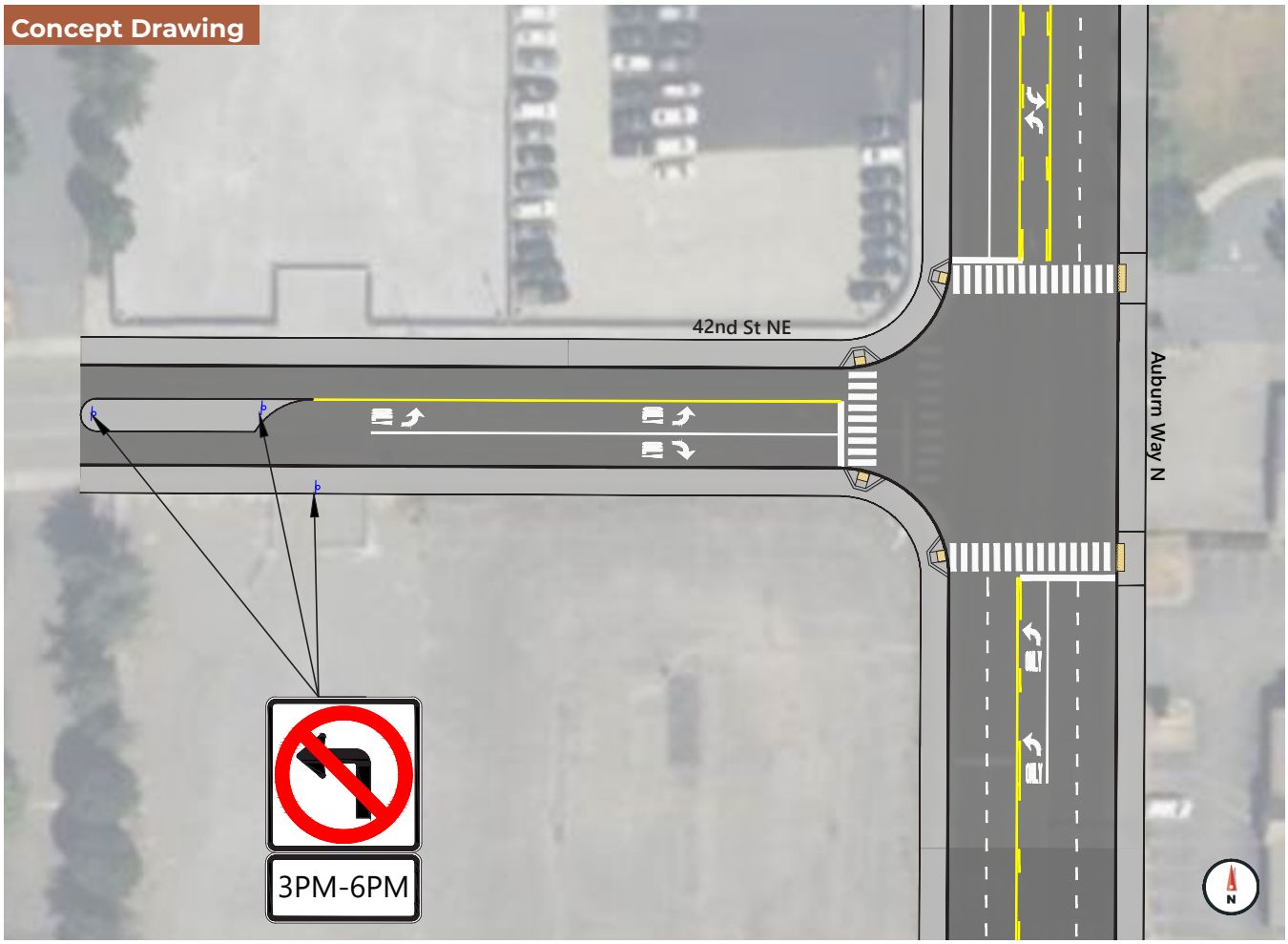
Description:

Intersection delays will be reduced through the restriction of left turns from 42nd St NE to Auburn Way N during PM peak hours with signage installed on a new raised median.

VEHICLE LOS WITHOUT PROJECT	AM	PM
2024 Existing	Meets	Meets
2044 Future	Meets	Fails

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 25,000
Right of Way	$ 0
Construction	$ 75,000
Total	$ 100,000

Concept Drawing



COMP-3
I ST NE IMPROVEMENTS
(37TH ST NE - 45TH ST NE)



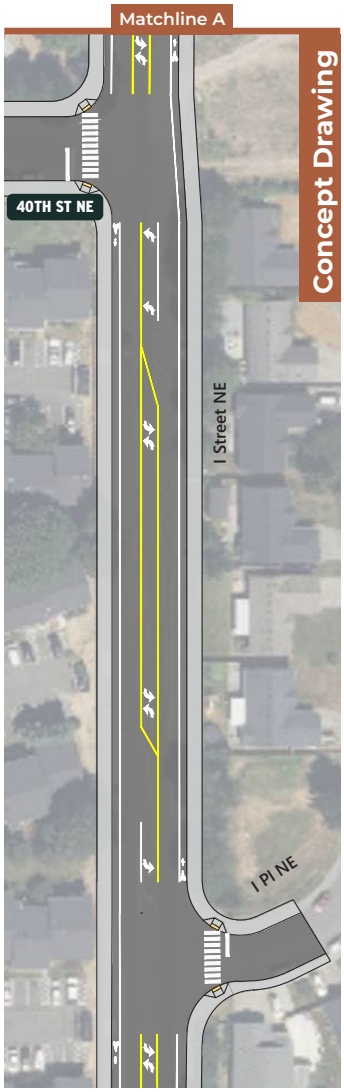
Project Origin: New 2024 CTP Project

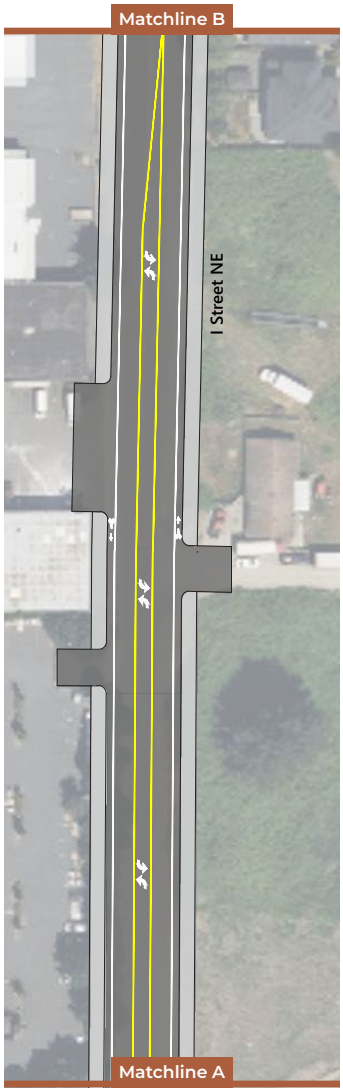
Primary Need: Safety/Active Transportation/ Mode Shift

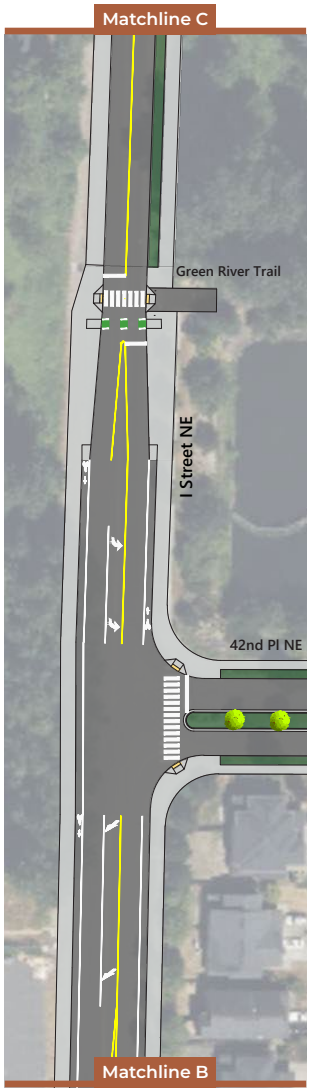
Description:

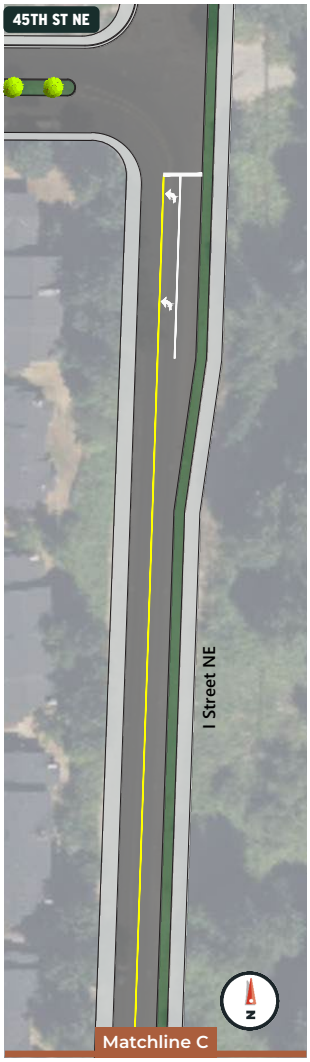
The I St NE Corridor provides access to several neighborhoods and commercial properties. To improve multi-model safety, and meet city roadway standards, bicycle and pedestrian improvements are proposed between 37th St NE and 45th St NE.

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 2,000,000
Right of Way	$ 1,000,000
Construction	$ 3,700,000
Total	$ 6,700,000

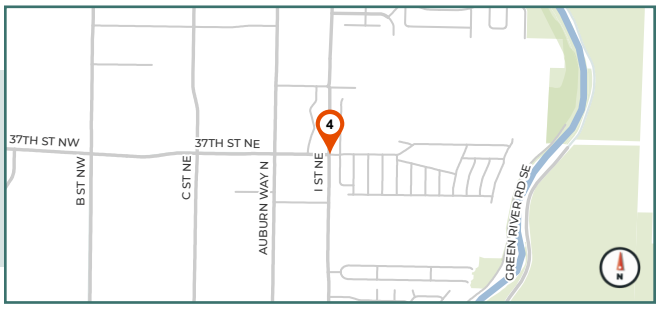








COMP-4
I ST NE & 37TH ST NE INTERSECTION IMPROVEMENTS



Project Origin: New 2024 CTP Project

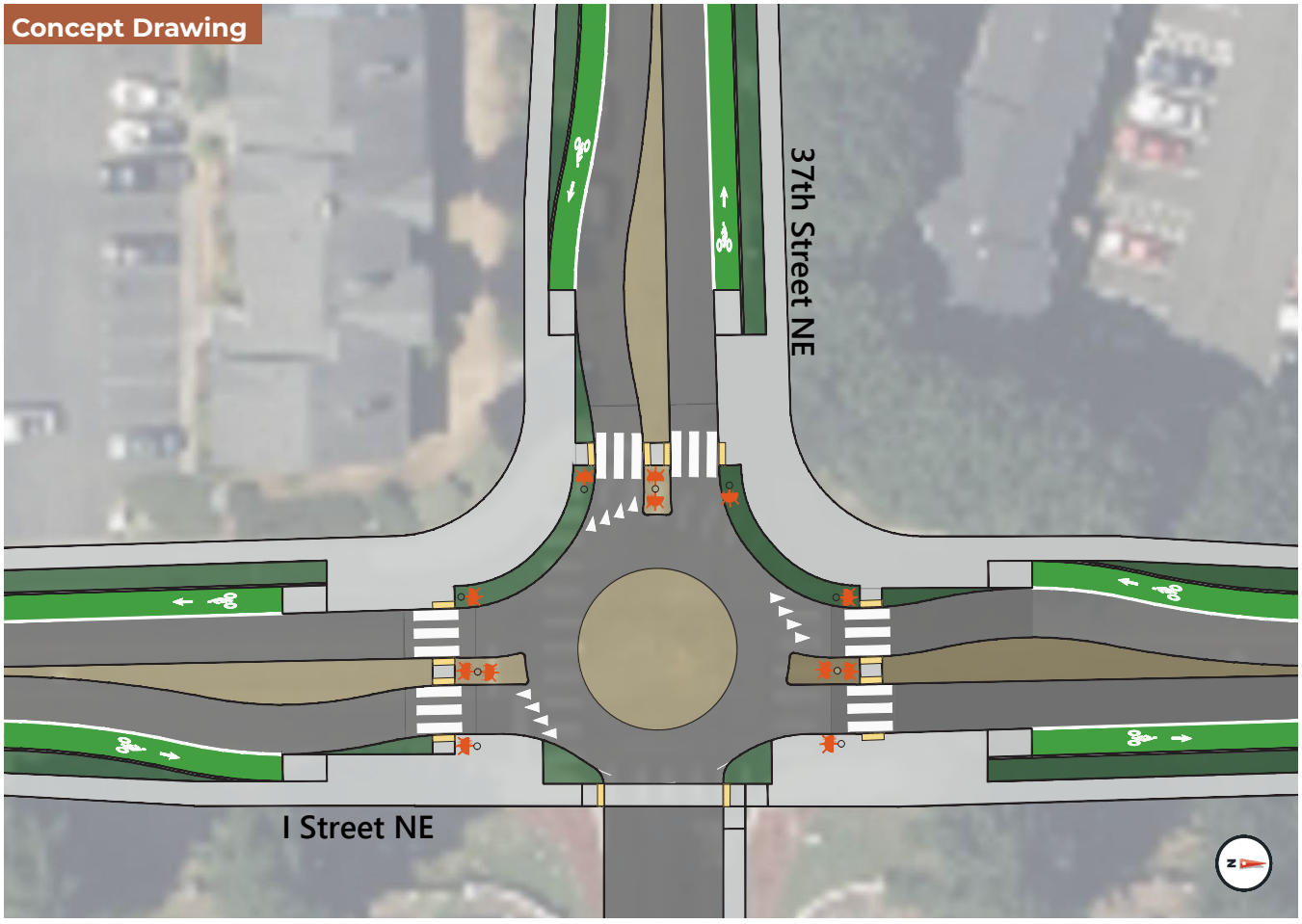
Primary Need: Vehicle Capacity

Description:

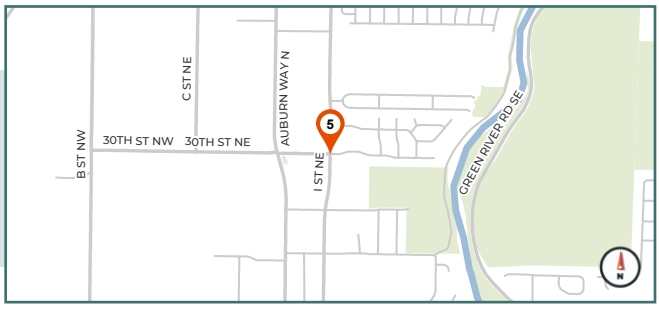
Intersection delays will be reduced through the construction of a single-lane roundabout.

VEHICLE LOS WITHOUT PROJECT	AM	PM
2024 Existing	Meets	Meets
2044 Future	Meets	Fails

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 800,000
Right of Way	$ 100,000
Construction	$ 1,400,000
Total	$ 2,300,000



COMP-5
I ST NE & 30TH ST NE INTERSECTION IMPROVEMENTS



Project Origin: New 2024 CTP Project

Primary Need: Vehicle Capacity

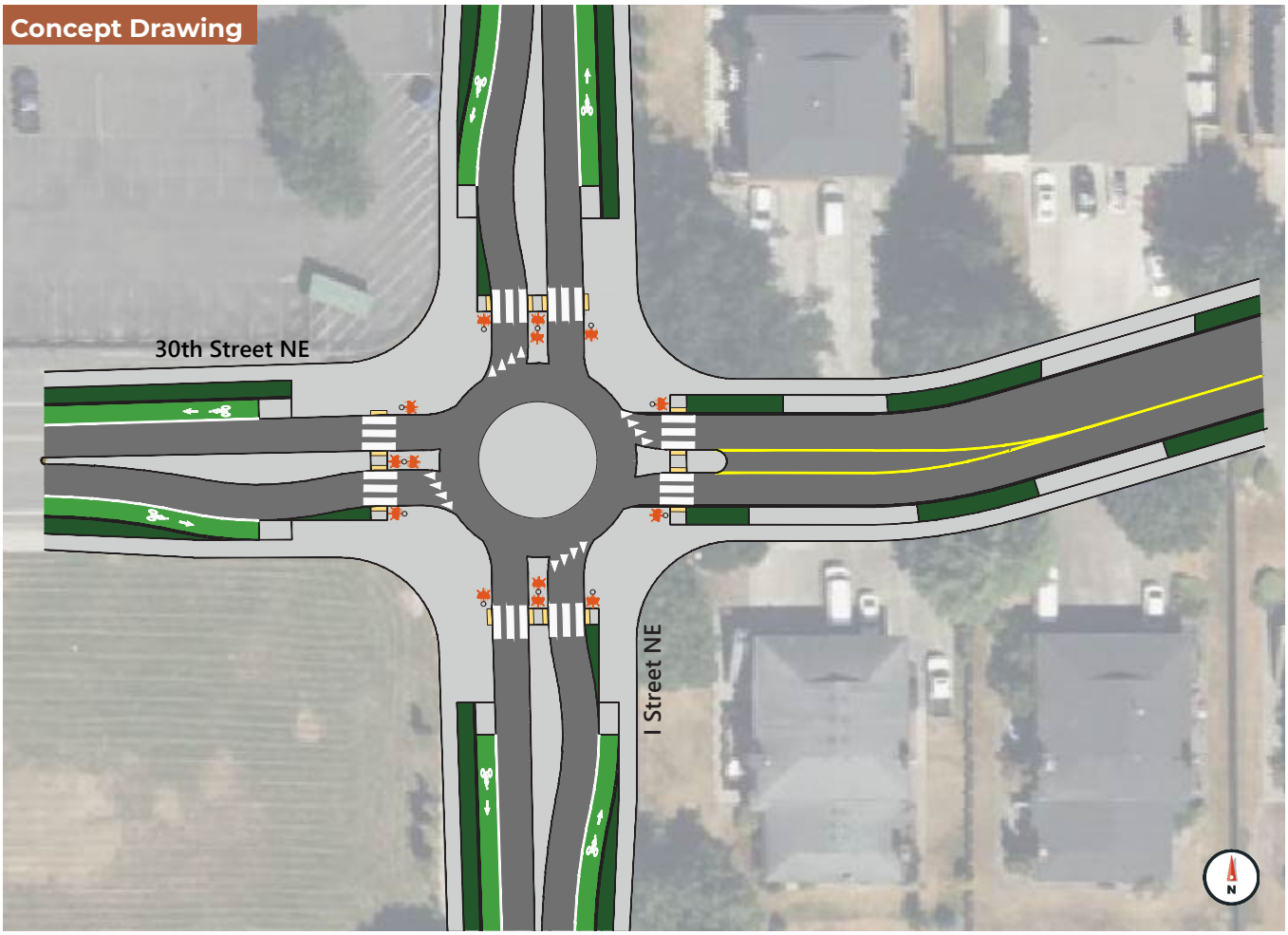
Description:

Intersection delays will be reduced through the construction of a single-lane roundabout.

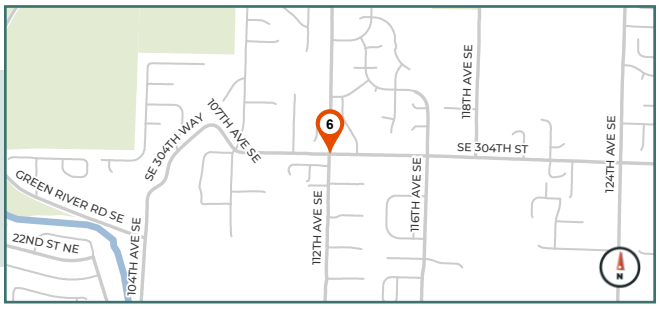
VEHICLE LOS WITHOUT PROJECT	AM	PM
2024 Existing	Meets	Meets
2044 Future	Meets	Fails

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 1,100,000
Right of Way	$ 50,000
Construction	$ 2,100,000
Total	$ 3,250,000

Concept Drawing



COMP-6
SE 304TH ST & 112TH AVE SE INTERSECTION IMPROVEMENTS



Project Origin: New 2024 CTP Project
Primary Need: Vehicle Capacity

Description:

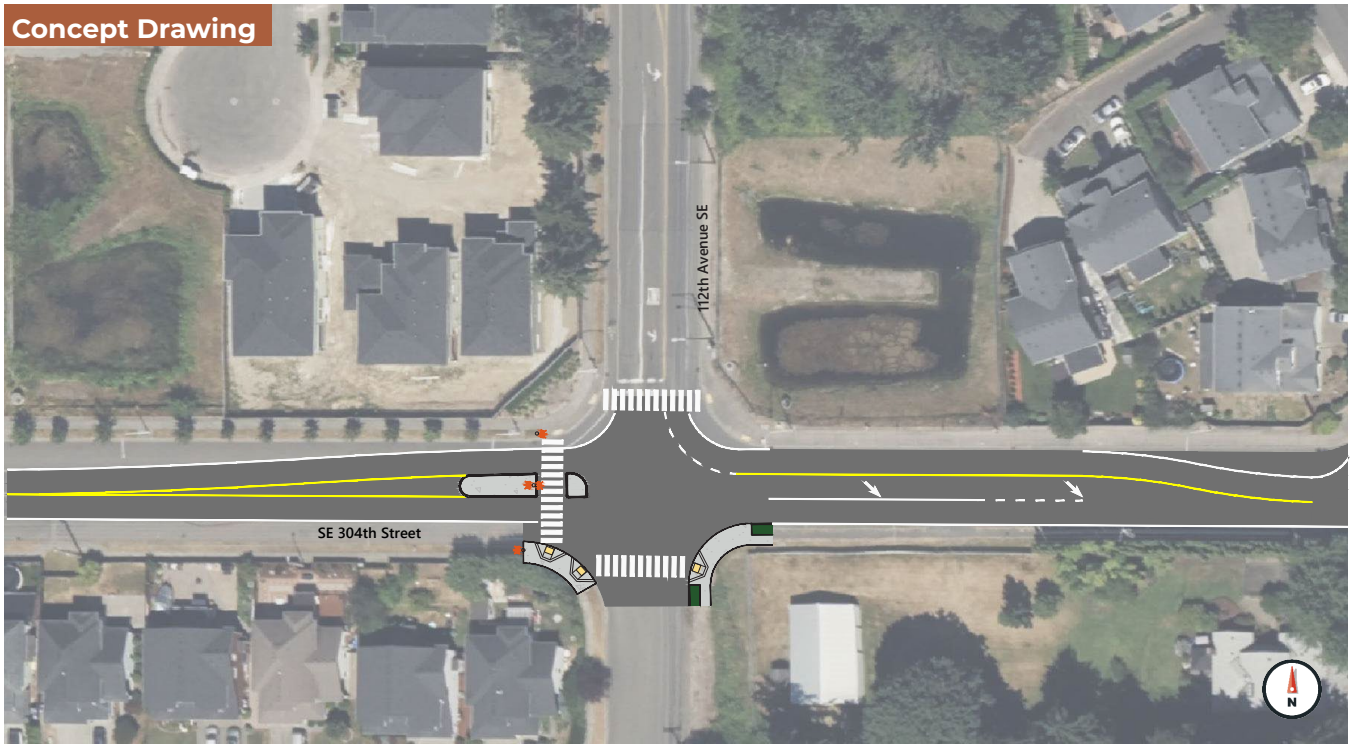
Intersection delays will be reduced through the construction of a new two-stage left turn lane on SE 304th St that will assist motorists turning from 112th Ave SE. A pedestrian refuge island and flashing beacons will be provided to enhance pedestrian crossing safety.

VEHICLE LOS WITHOUT PROJECT	AM	PM
2024 Existing	Meets	Meets
2044 Future	Meets	Fails

PROJECT PHASE	COST ESTIMATE*
Planning & Engineering/ Design	$ 300,000
Right of Way	$ 0
Construction	$ 500,000
Total	$ 800,000

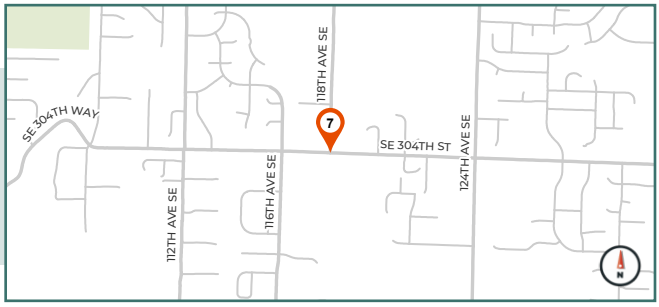
** Includes RRFB system*

Concept Drawing



COMP-7

SE 304TH ST & 118TH AVE SE INTERSECTION IMPROVEMENTS



Project Origin: New 2024 CTP Project

Primary Need: Vehicle Capacity

Description:

Intersection delays will be reduced through the construction of a raised median on SE 304th St that will restrict left turns from 118th Ave SE.

VEHICLE LOS WITHOUT PROJECT	AM	PM
2024 Existing	Meets	Meets
2044 Future	Fails	Fails

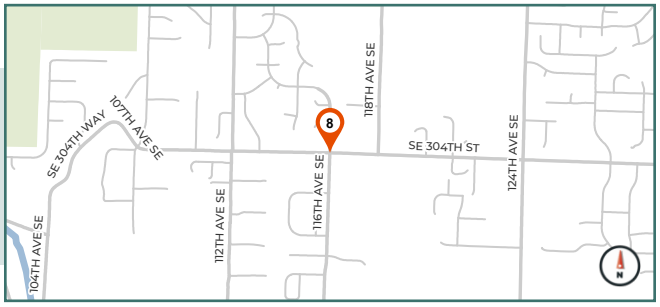
PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 300,000
Right of Way	$ 50,000
Construction	$ 600,000
Total	$ 950,000

Concept Drawing



COMP-8

SE 304TH ST & 116TH AVE SE INTERSECTION IMPROVEMENTS



Project Origin: New 2024 CTP Project

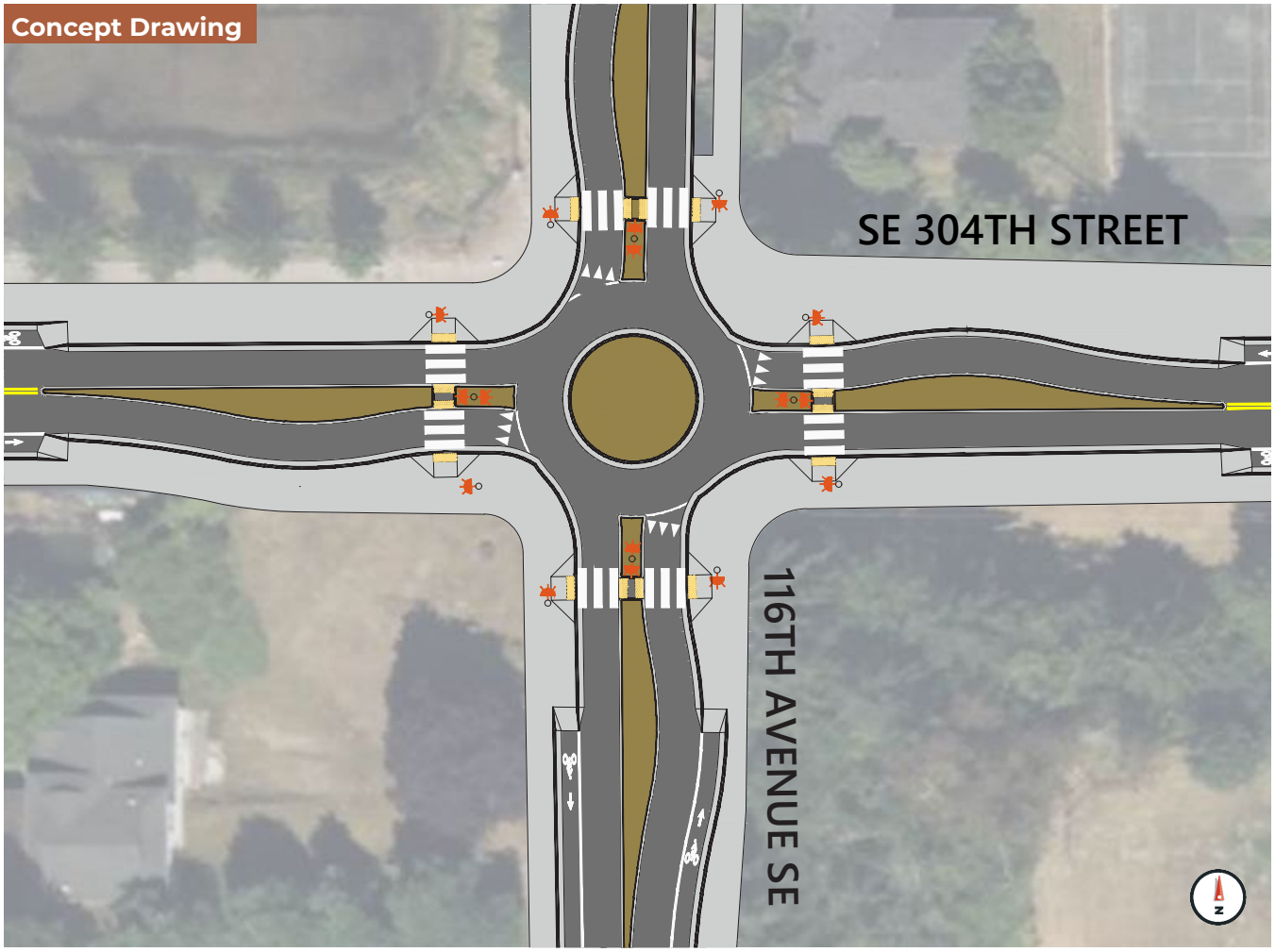
Primary Need: Vehicle Capacity

Description:

Intersection delays will be reduced through the construction of a single-lane roundabout.

VEHICLE LOS WITHOUT PROJECT	AM	PM
2024 Existing	Fails	Meets
2044 Future	Fails	Meets

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 1,200,000
Right of Way	$ 325,000
Construction	$ 2,200,000
Total	$ 3,725,000



COMP-9
LEA HILL CORRIDOR IMPROVEMENTS



Project Origin: Lea Hill Corridor Study (2020)

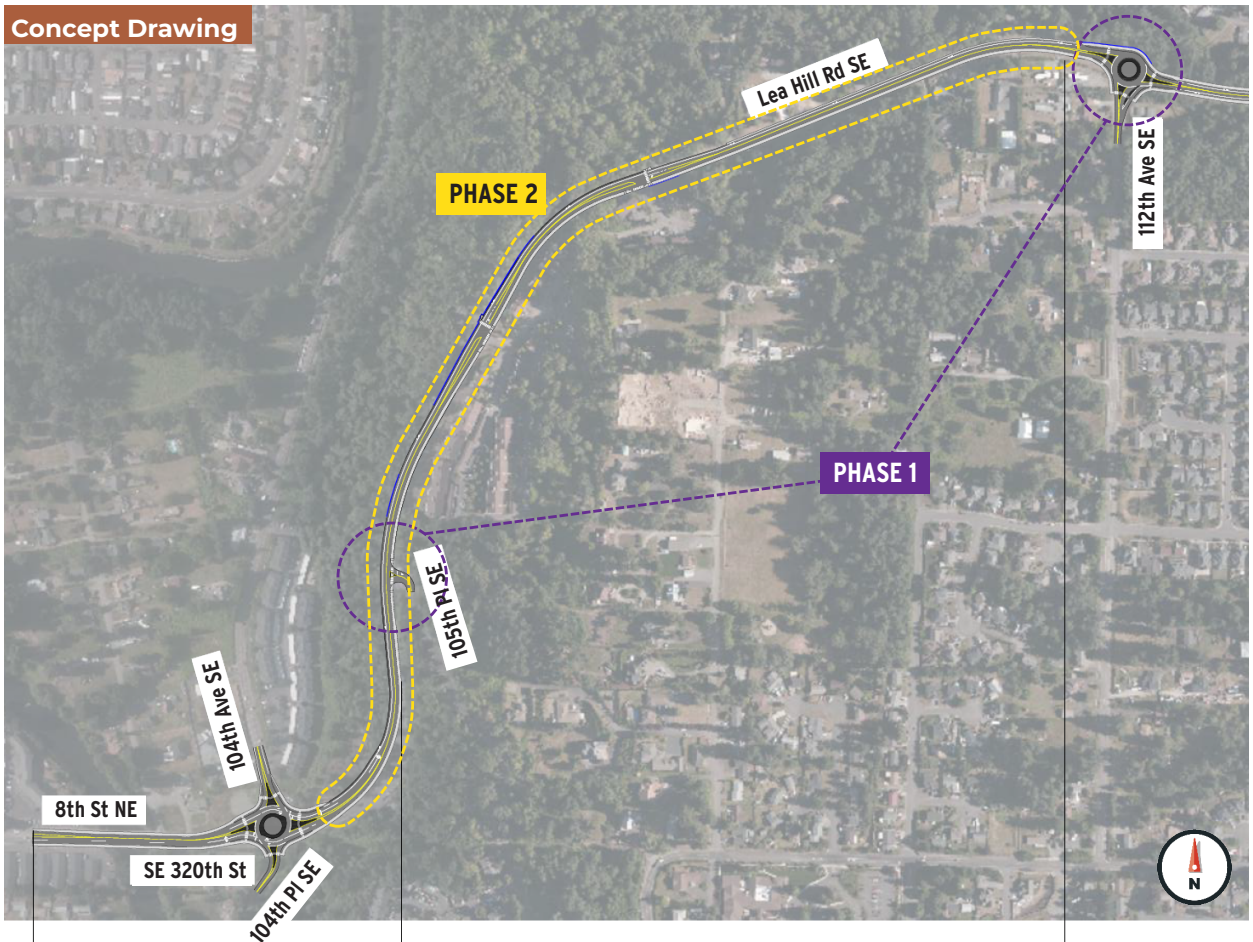
Primary Needs: Vehicle Capacity, Mode Shift, Active Transportation, Safety

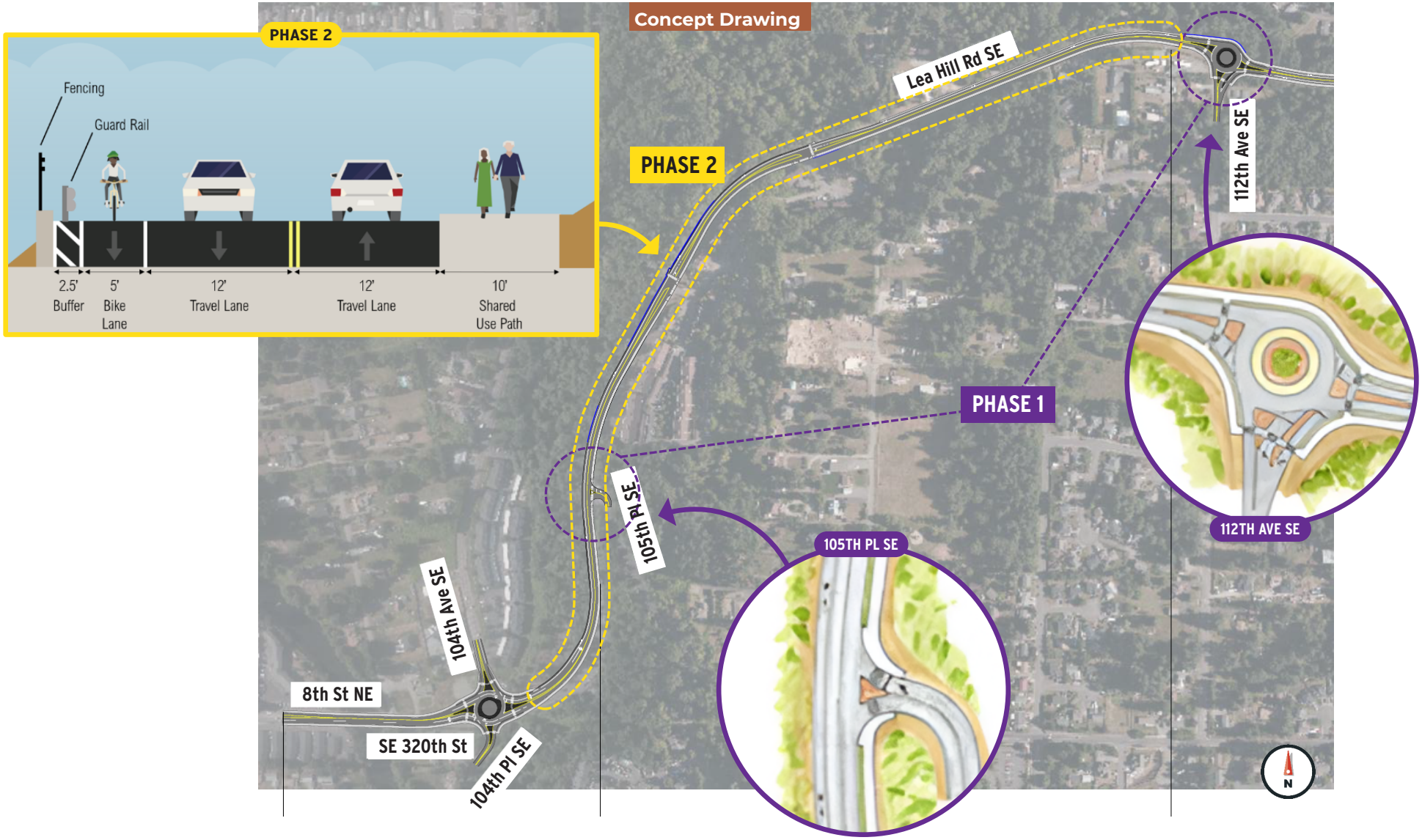
PROJECT PHASE	COST ESTIMATE
Phase 1: Lea Hill Corridor - 112th Ave SE & 105th Pl SE Intersections Improvements	$ 5,175,000
Phase 2: Lea Hill Rd Corridor - Non-Motorized Improvements from 104th Ave SE to SE 312th St	$ 9,500,000
Total	$14,675,000

Description:

This project will reduce intersection delays, improve vehicle and active transportation safety, and support mode shift through the construction of the following improvements that would likely be implemented as two separate phased projects:

- Phase 1 -
  New single lane roundabout at the intersection of Lea Hill Road and 112th Ave SE and removal of the existing traffic signal at the intersection of Lea Hill Road and 105th Ave SE. A raised media would restrict left turning movements at 105th Ave SE.
- Phase 2 -
  New multi-use shared path along east side (uphill) and bike lane along west side (downhill) of Lea Hill Road from the new roundabout at 104th Ave SE (previously constructed as a separate project), to the new roundabout at 112th Ave SE (constructed with Phase 1 of this project).




PHASE 2
Fencing
Guard Rail
2.5' Buffer
5' Bike Lane
12' Travel Lane
12' Travel Lane
10' Shared Use Path
Concept Drawing
PHASE 2
Lea Hill Rd SE
112th Ave SE
PHASE 1
112TH AVE SE
105th Pl SE
105TH PL SE
104th Ave SE
8th St NE
SE 320th St
104th Pl SE
N

COMP-10

116TH AVE SE & SE 312TH ST IMPROVEMENTS



Project Origin: Lea Hill Corridor Study (2020)

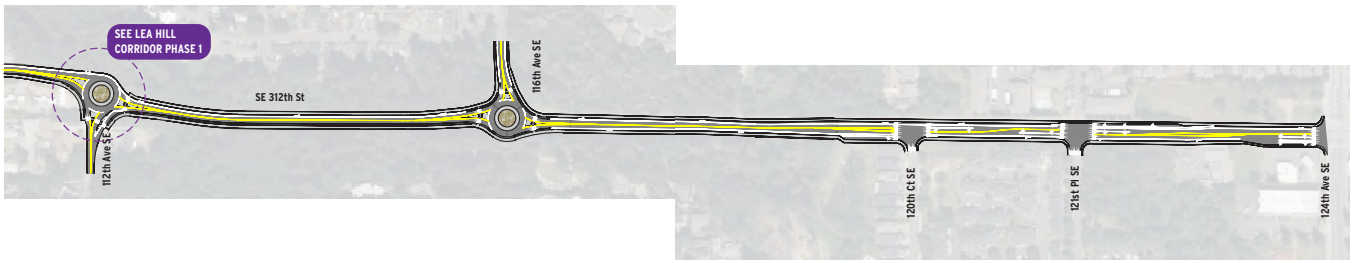
Primary Need: Vehicle Capacity

Description:

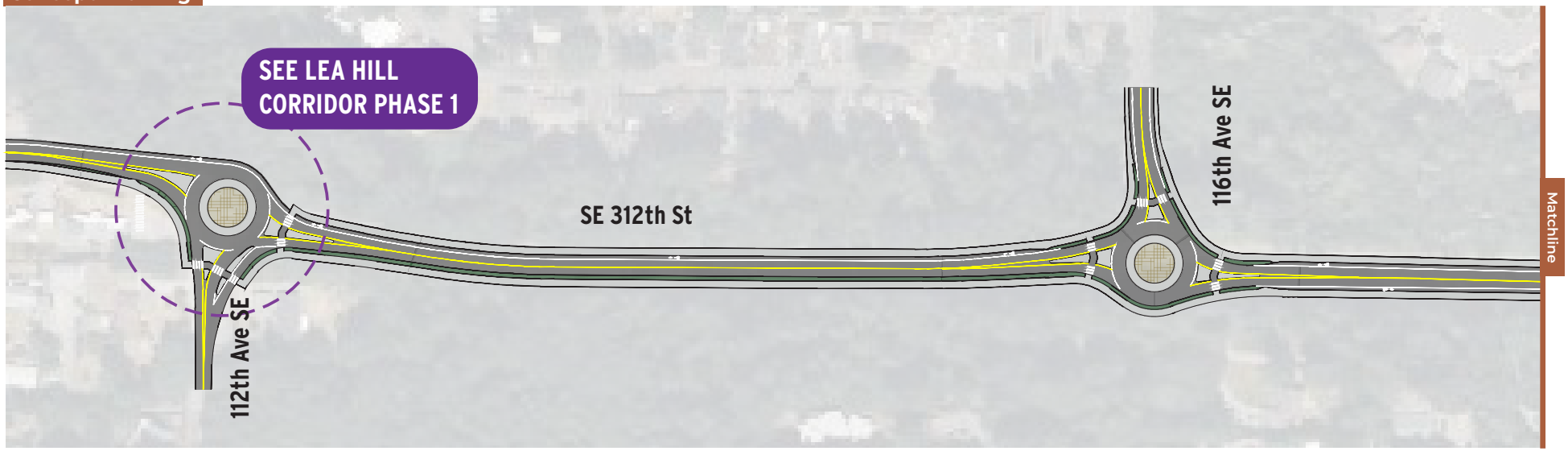
This project will reduce intersection delays, address bike and pedestrian LTS deficiencies, and provide overall safety improvements on Lea Hill Road/SE 312th Street from a new roundabout to be constructed with a separate project at the intersection of 112th Ave SE to the intersection of 124th Ave SE. Improvements include a new single lane roundabout at the intersection of 116th Ave SE, a bike lane along the north side of Lea Hill Road/SE 312th Street, a separated multi-use shared trail along the south side of Lea Hill Road/ SE 312th Street between 112th Ave SE and 116th Ave SE, and completing gaps in sidewalks and bike lanes on both sides of Lea Hill Road/SE 312th Street between 116th Ave SE and 124th Ave SE.

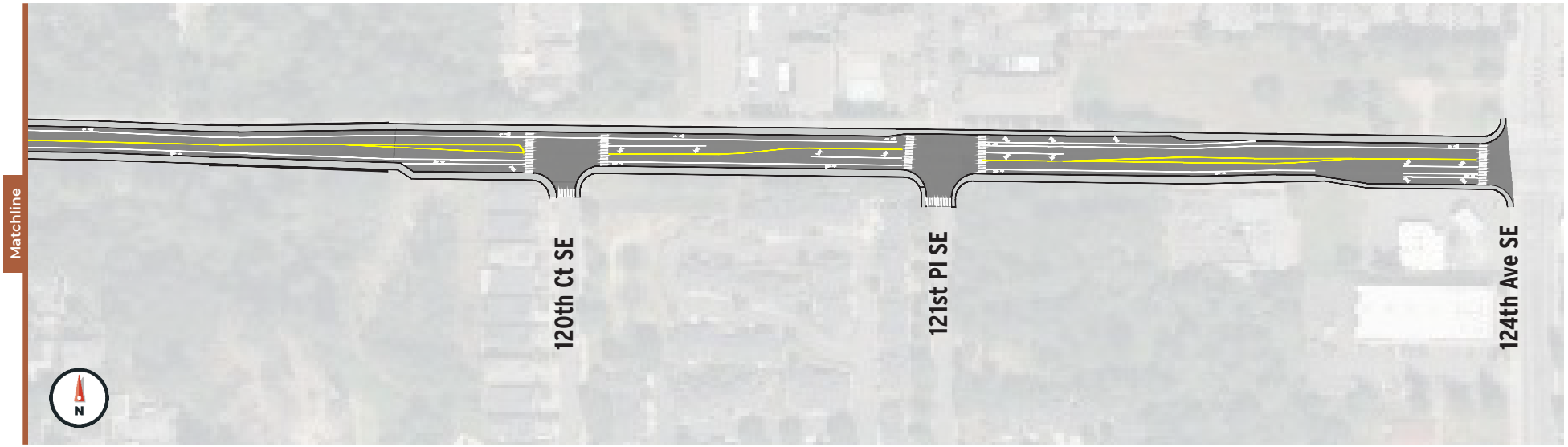
PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 550,000
Right of Way	$ 50,000
Construction	$ 5,000,000
Total	$ 5,600,000

Concept Drawing



Concept Drawing





COMP-11

116TH AVE SE & SE 320TH ST INTERSECTION IMPROVEMENTS



Project Origin: 2019 Comprehensive Transportation Plan

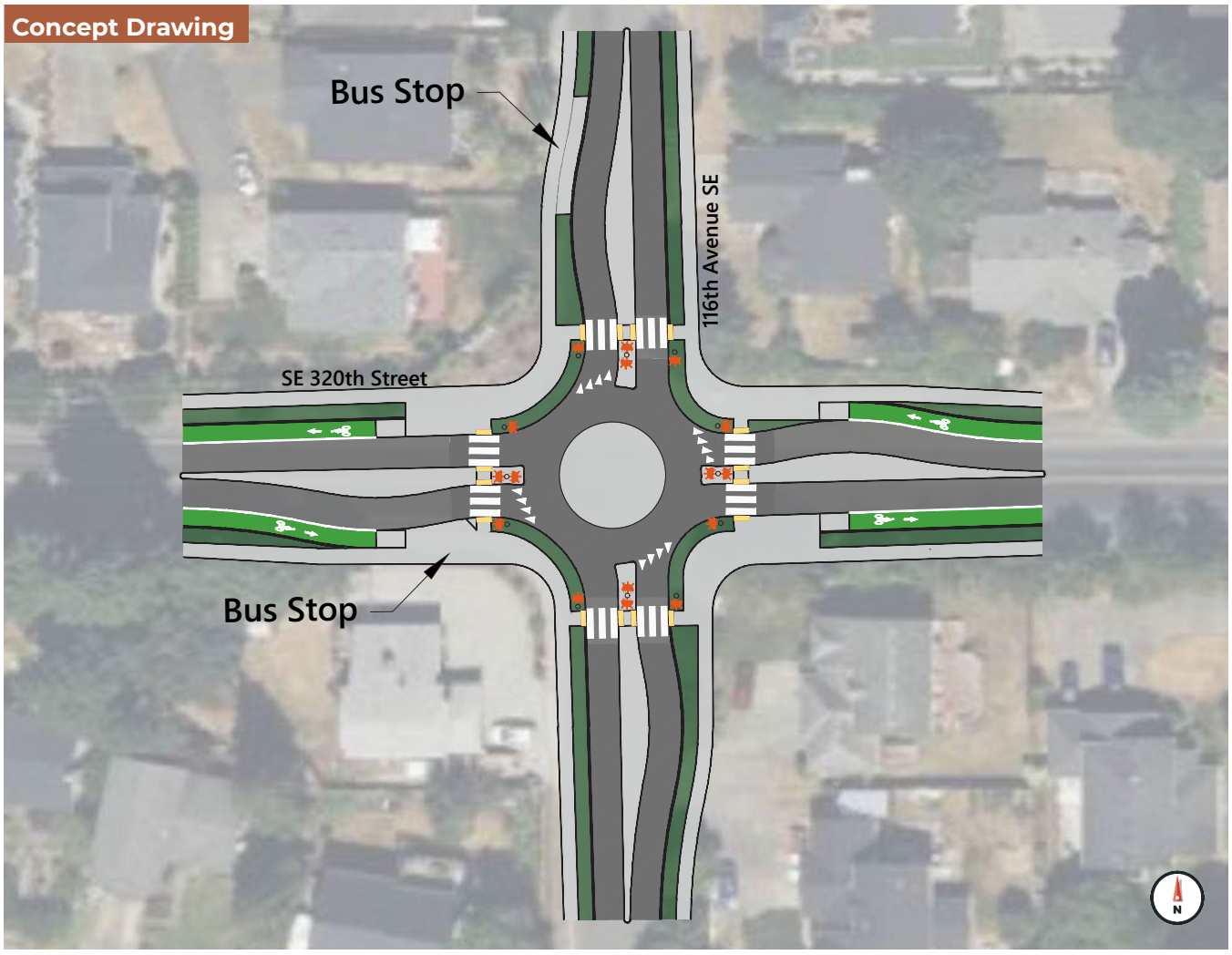
Primary Needs: Safety, Active Transportation

Description:

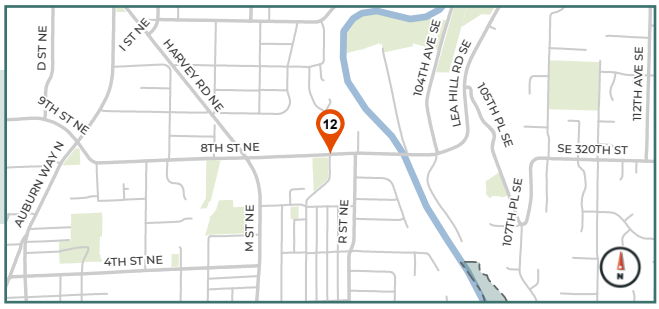
This project will improve vehicle and active transportation safety at the intersection with the construction of a single lane roundabout. This project may be expanded to complete gaps in sidewalks and bike lanes on SE 320th Street.

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 1,100,000
Right of Way	$ 50,000
Construction	$ 2,000,000
Total	$ 3,150,000

Concept Drawing



COMP-12
PIKE ST NE & 8TH ST NE ACCESS MANAGEMENT



Project Origin: New 2024 CTP Project

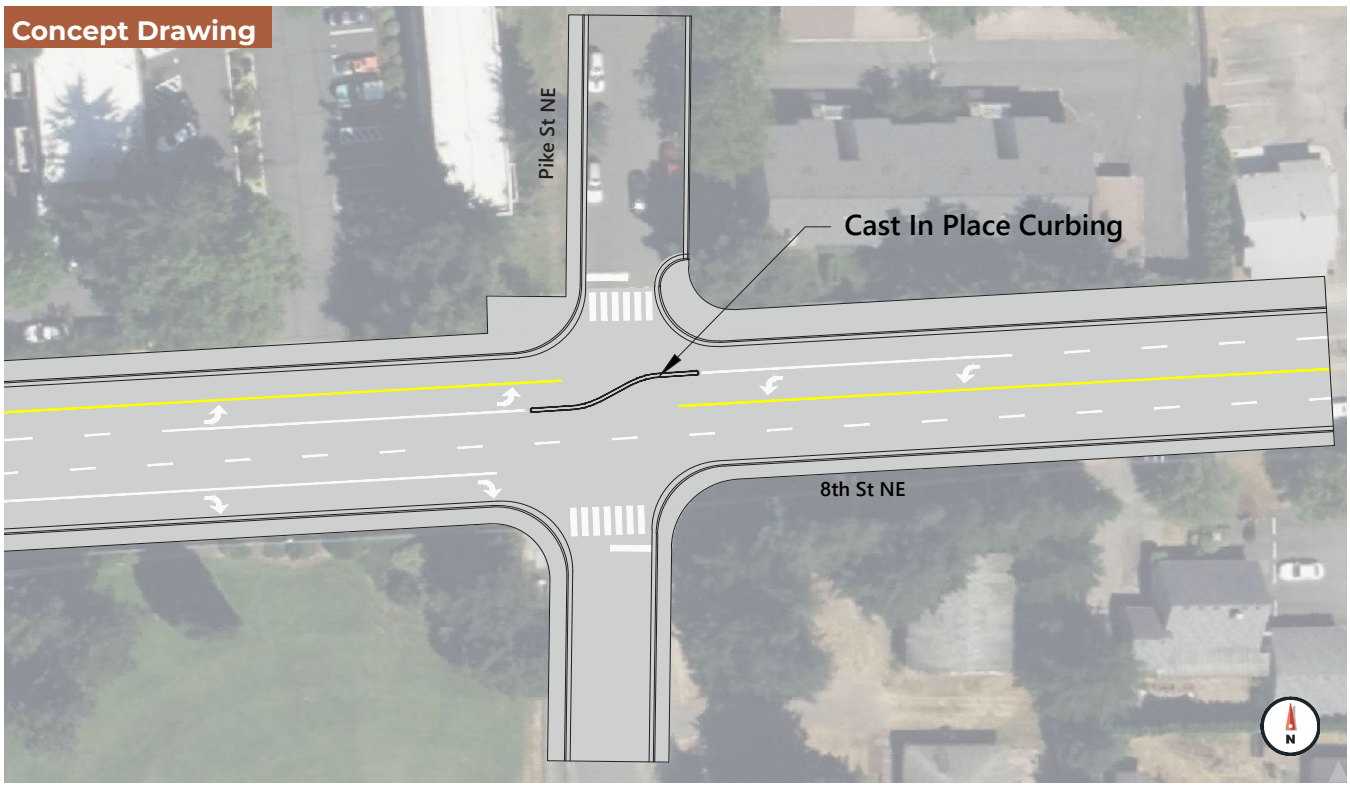
Primary Need: Vehicle Capacity

Description:

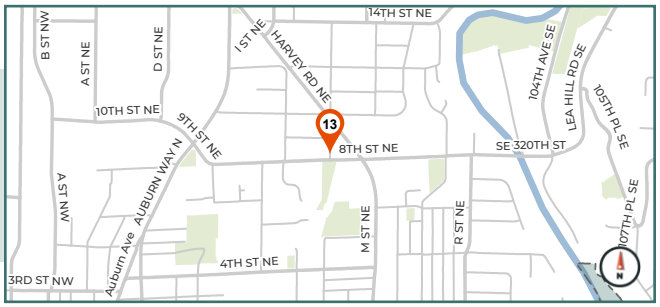
Intersection delays will be reduced by restricting left turns from both northbound and southbound Pike St NE on to 8th St NE.

VEHICLE LOS WITHOUT PROJECT	AM	PM
2024 Existing	Meets	Fails
2044 Future	Fails	Fails

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 15,000
Right of Way	$ 0
Construction	$ 35,000
Total	$ 50,000



COMP-13
8TH ST NE IMPROVEMENTS PROJECT
(AUBURN WAY N - HARVEY RD/M ST NE)



Project Origin: 2024 CTP New Project

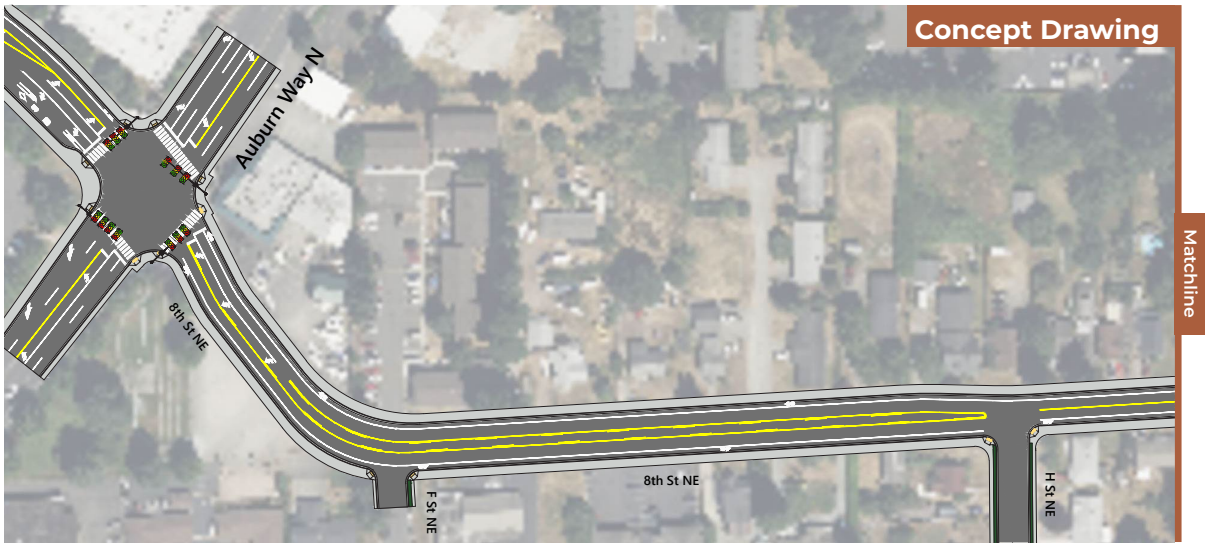
Primary Needs: Mode Shift/Active Transportation/Safety

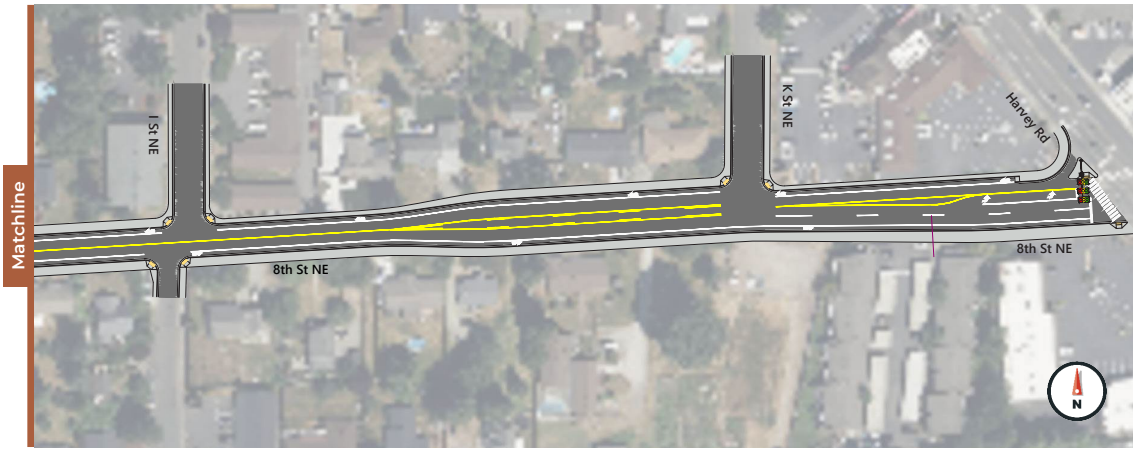
PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 2,300,000
Right of Way	$ 1,800,000*
Construction	$ 4,100,000
Total	$ 8,200,000

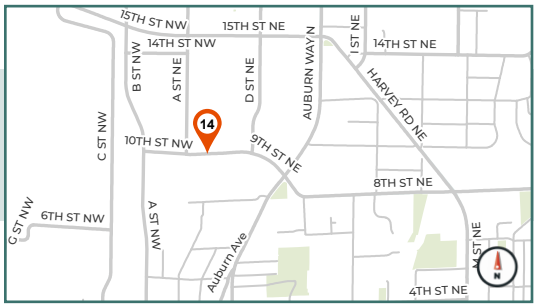
* ROW costs assume no relocation is required.

Description:

Residents from the neighborhoods along 8th Street NE currently must walk or ride along narrow shoulders to get to shopping, social services, recreation, and transit along Auburn Way North and M Street NE/Harvey Rd. This route is part of the City's designated bike route network (as shown in Map 2 - Bike Network) and is a critical connection to Downtown Auburn and regional transit and bike facilities. This project will improve the roadway to provide comfortable walking and biking facilities that meet or exceed the City's active transportation level of service standards. The project concept currently includes a center turn lane but whether or not the lane is included in the final project design will depend on detailed design considerations, including right of way needs.







COMP-14
10TH ST NE IMPROVEMENTS
(A ST NW - AUBURN WAY N)

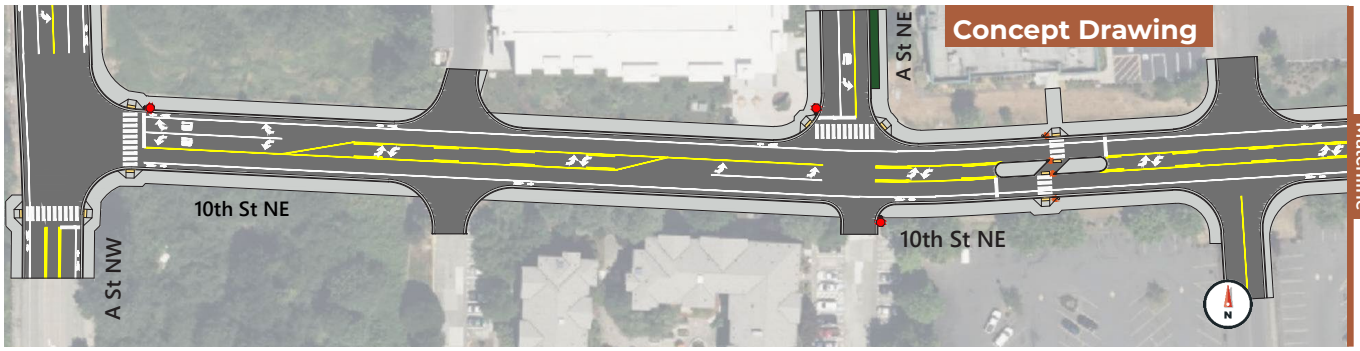
Project Origin: 2024 Comprehensive Transportation Plan

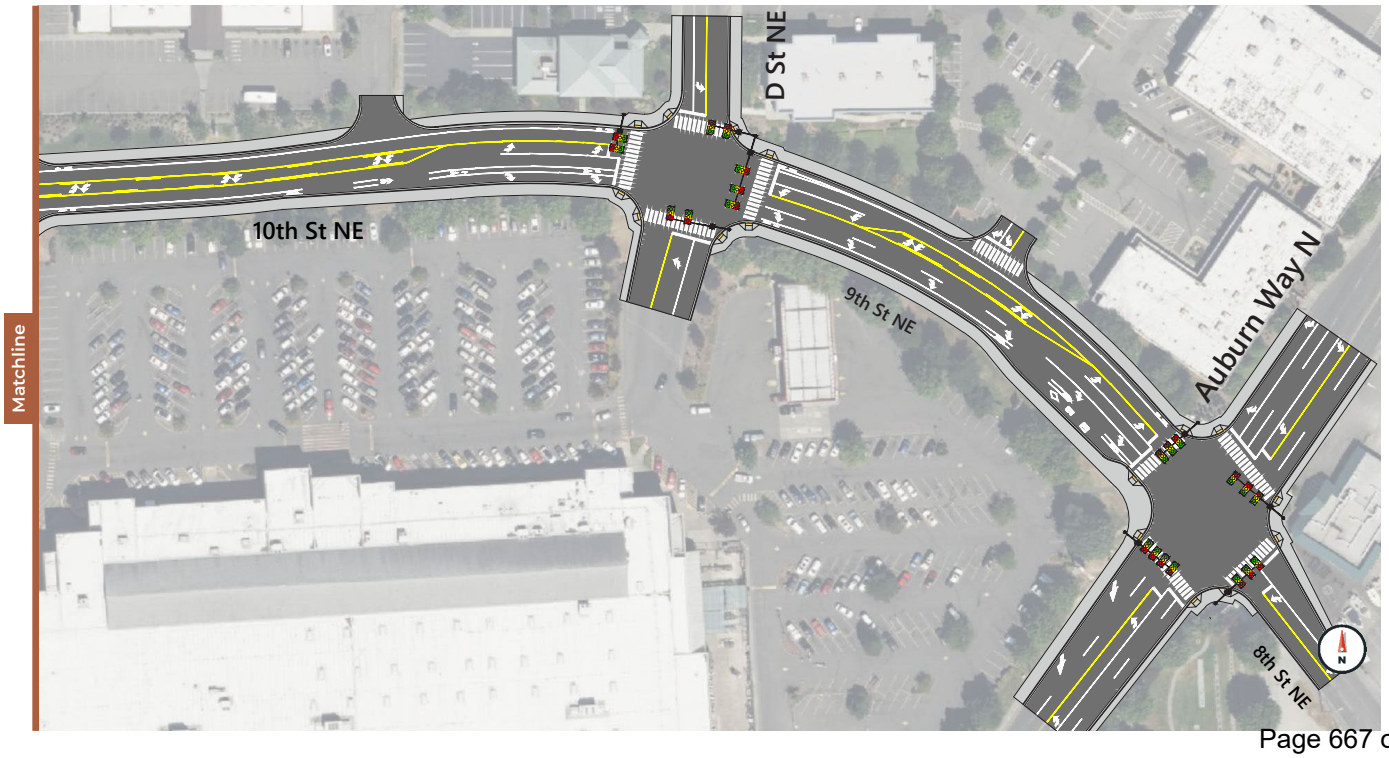
Primary Needs: Safety, Active Transportation, Mode Shift

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/Design	$ 800,000
Right of Way	$ 0
Construction	$ 1,500,000
Total	$ 2,300,000

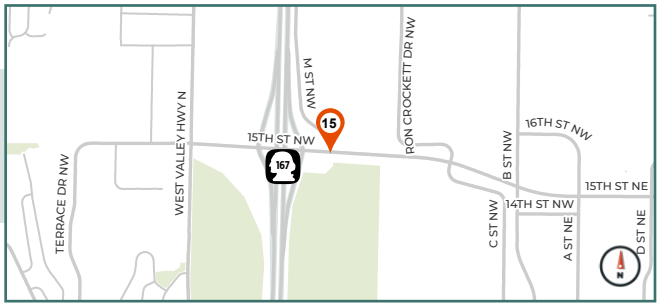
Description:

This project will provide bicycle facilities that meet or exceed City LTS Standards and improve vehicle and pedestrian safety measures on 10th Street NE between A Street NW and Auburn Way North. Improvements include addition of bike lanes, a road-diet to convert two lanes in each direction to one lane in each direction with a center turn lane, removal of stop-control at the intersection of A Street NE, and installation of an enhanced pedestrian crossing. The project provides active transportation facilities that connect housing and commercial areas to frequent transit on Auburn Way North.





COMP-15
15TH ST NW & M ST NW ACCESS MANAGEMENT



Project Origin: New 2024 CTP Project

Primary Need: Vehicle Capacity

Description:

Intersection delays will be reduced by restricting left turns from southbound M St NW to eastbound 15th St NW during peak travel demand periods.

VEHICLE LOS WITHOUT PROJECT	AM	PM
2024 Existing	Meets	Meets
2044 Future	Fails	Fails

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 10,000
Right of Way	$ 0
Construction	$ 40,000
Total	$ 50,000



COMP-16

S 316TH ST & 56TH AVE S INTERSECTION IMPROVEMENTS



Project Origin: New 2024 CTP Project

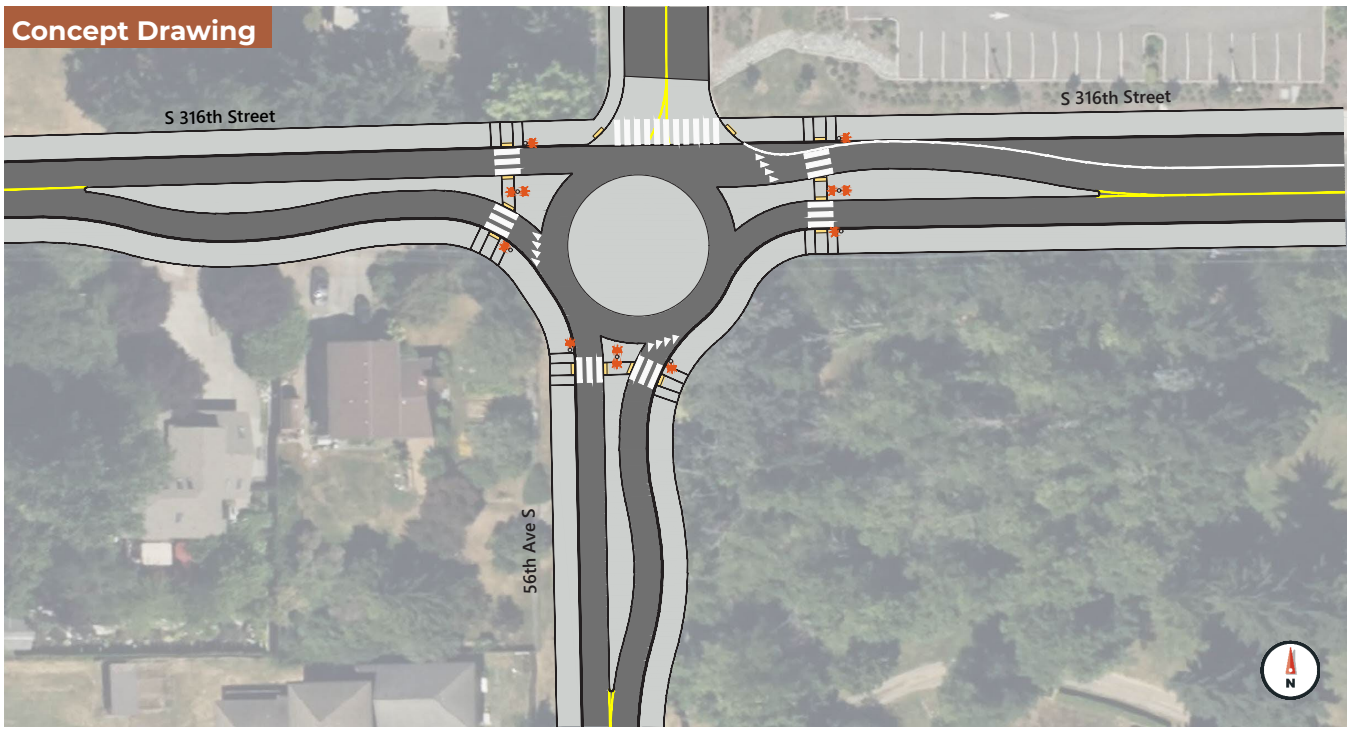
Primary Need: Vehicle Capacity

Description:

Intersection delays will be reduced through the construction of a single-lane roundabout.

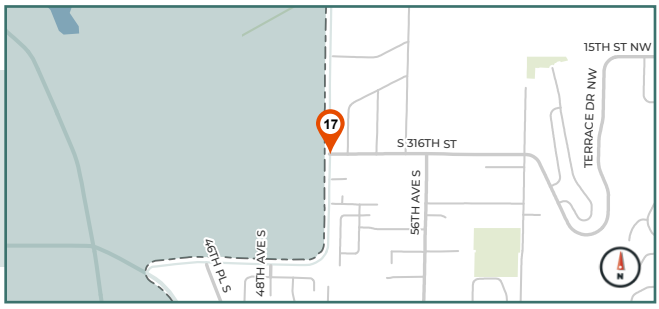
VEHICLE LOS WITHOUT PROJECT	AM	PM
2024 Existing	Meets	Meets
2044 Future	Meets	Fails

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 1,100,000
Right of Way	$ 125,000
Construction	$ 2,000,000
Total	$ 3,225,000



COMP-17

S 316TH ST & 51ST AVE S INTERSECTION IMPROVEMENTS



Project Origin: New 2024 CTP Project

Primary Need: Vehicle Capacity

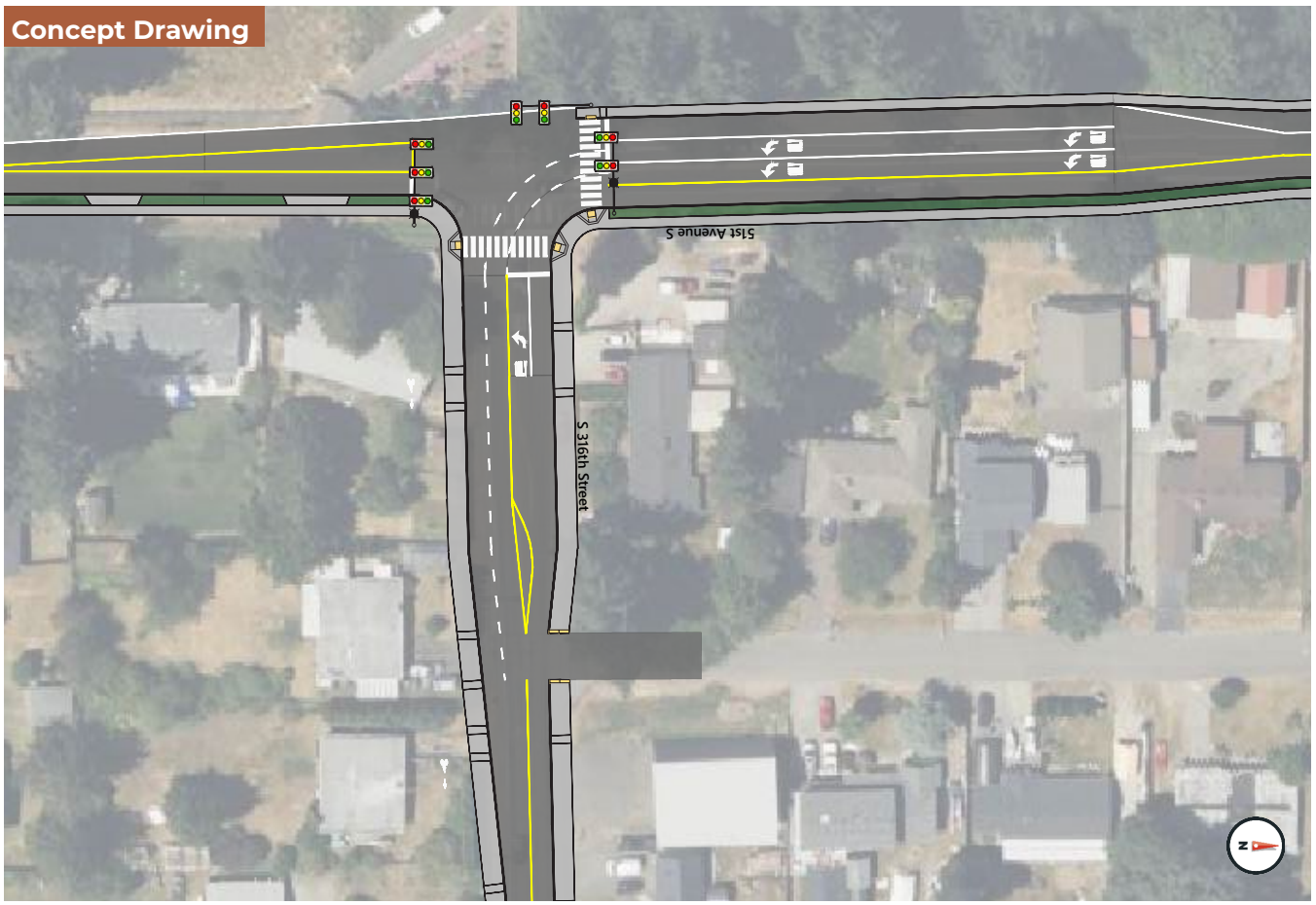
Description:

Intersection delays will be reduced through the replacement of the stop controls with construction of a new traffic signal. This intersection is outside City limits in King County. Coordination with King County will be required to fund and implement this project.

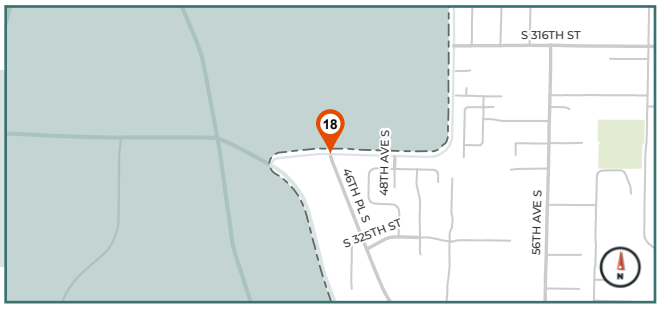
VEHICLE LOS WITHOUT PROJECT	AM	PM
2024 Existing	Meets	Fails
2044 Future	Meets	Fails

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 700,000
Right of Way	$ 150,000
Construction	$ 1,300,000
Total	$ 2,150,000

Concept Drawing



COMP-18
S 321ST ST & 44TH AVE S/ 46TH PL S INTERSECTION IMPROVEMENTS



Project Origin: New 2024 CTP Project

Primary Need: Vehicle Capacity

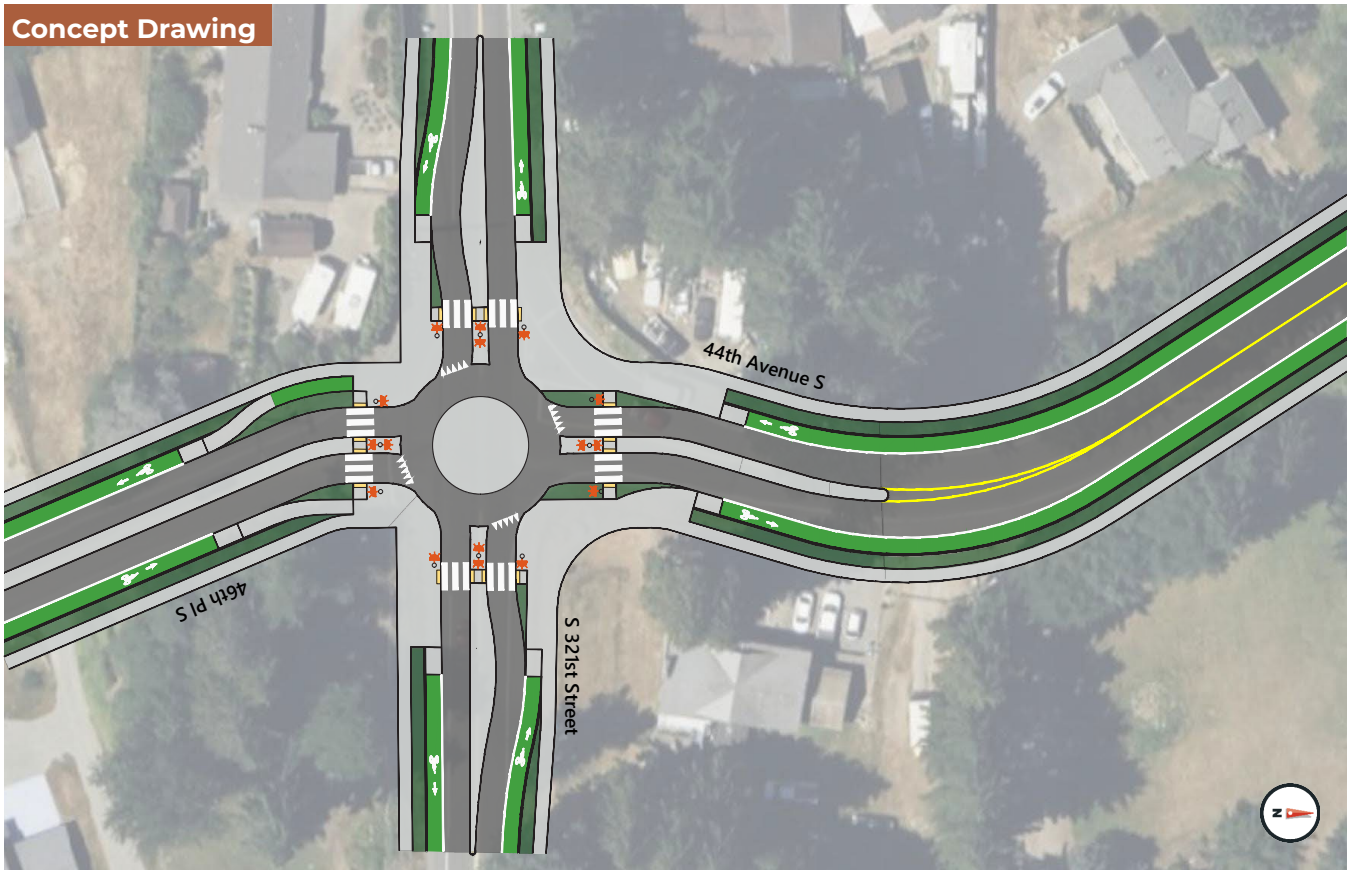
Description:

Intersection delays will be reduced through the construction of a single-lane roundabout. This intersection is outside City limits in King County. Coordination with King County will be required to fund and implement this project.Temporary mitigation measures to address existing LOS deficiency may require a traffic signal or other improvements until permanent project can be funded. Additional analysis is needed to determine if existing and/or future capacity needs can be met by improving the right-of-way east of 46th Place with roadway facilities instead of, or in addition to this roundabout.

VEHICLE LOS WITHOUT PROJECT	AM	PM
2024 Existing	Meets	Fails
2044 Future	Fails	Fails

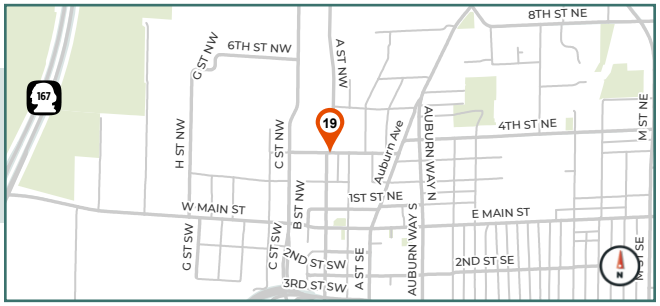
PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 1,200,000
Right of Way	$ 350,000
Construction	$ 2,200,000
Total	$ 3,750,000

Concept Drawing



COMP-19

A ST NW & 3RD ST NW IMPROVEMENTS



Project Origin: 2019 Comprehensive Transportation Plan

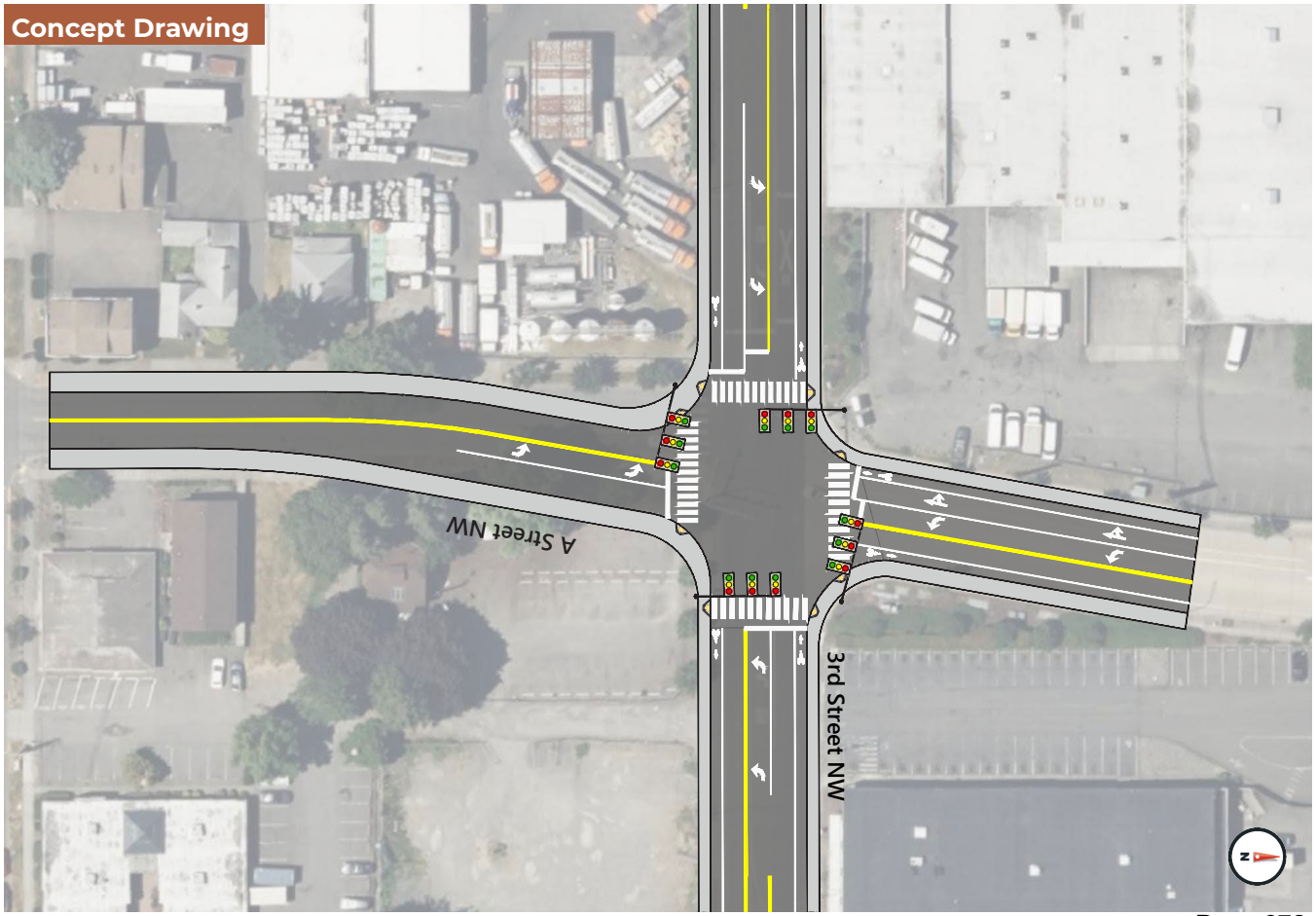
Primary Needs: Vehicle Capacity

Description:

This project will reduce intersection delays and improve overall vehicle, pedestrian, and bicycle operations through this intersection by re-constructing the south leg of the intersection to be re-aligned such that the split phase operations of the signal can be removed. Modeling indicates that despite this project, the southbound right turn lane queue would have a queue length that exceeds LOS standards. Therefore, additional refinement of this project would be required with, or prior to, implementation.

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 1,000,000
Right of Way	$ 225,000
Construction	$ 1,800,000
Total	$ 3,025,000

Concept Drawing



COMP-20
C ST NW & 3RD ST NW INTERSECTION IMPROVEMENTS



Project Origin: New 2024 CTP Project

Primary Need: Vehicle Capacity

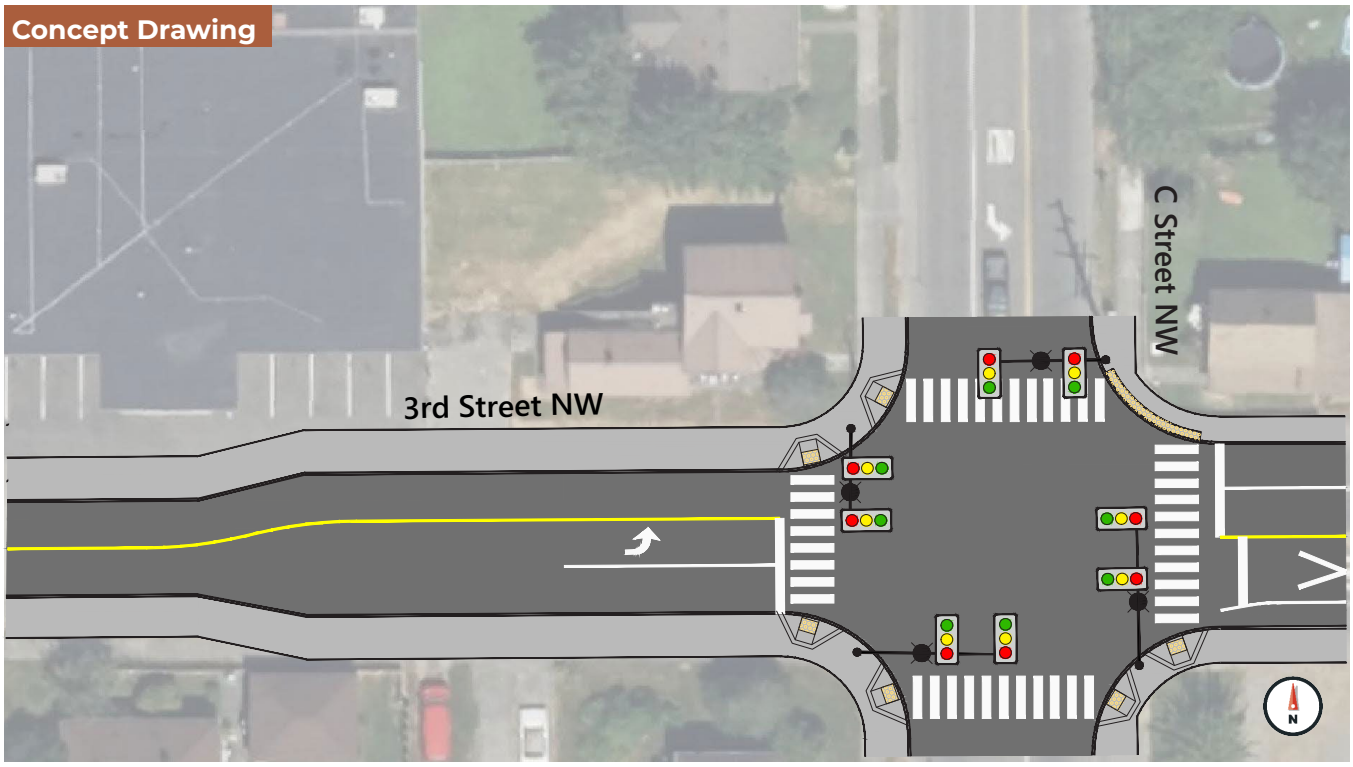
Description:

Intersection delays will be reduced through the addition of a dedicated eastbound left turn lane on 3rd Street NW and modifying the signal operations to allow for protected/ permissive left-turns on all approaches.

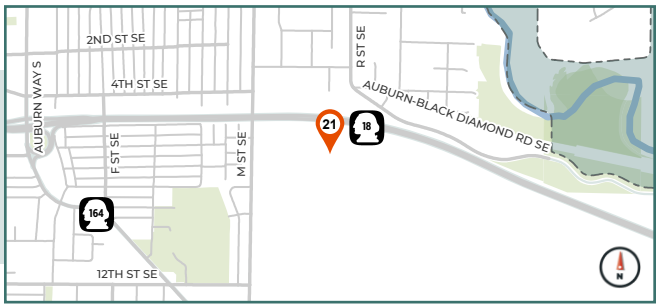
VEHICLE LOS WITHOUT PROJECT	AM	PM
2024 Existing	Meets	Fails
2044 Future	Meets	Fails

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 700,000
Right of Way	$ 0
Construction	$ 1,200,000
Total	$ 1,900,000

Concept Drawing



COMP-21
M ST SE BY-PASS RD
(M ST SE BY-PASS RD & SE AUBURN - BLACK DIAMOND RD)



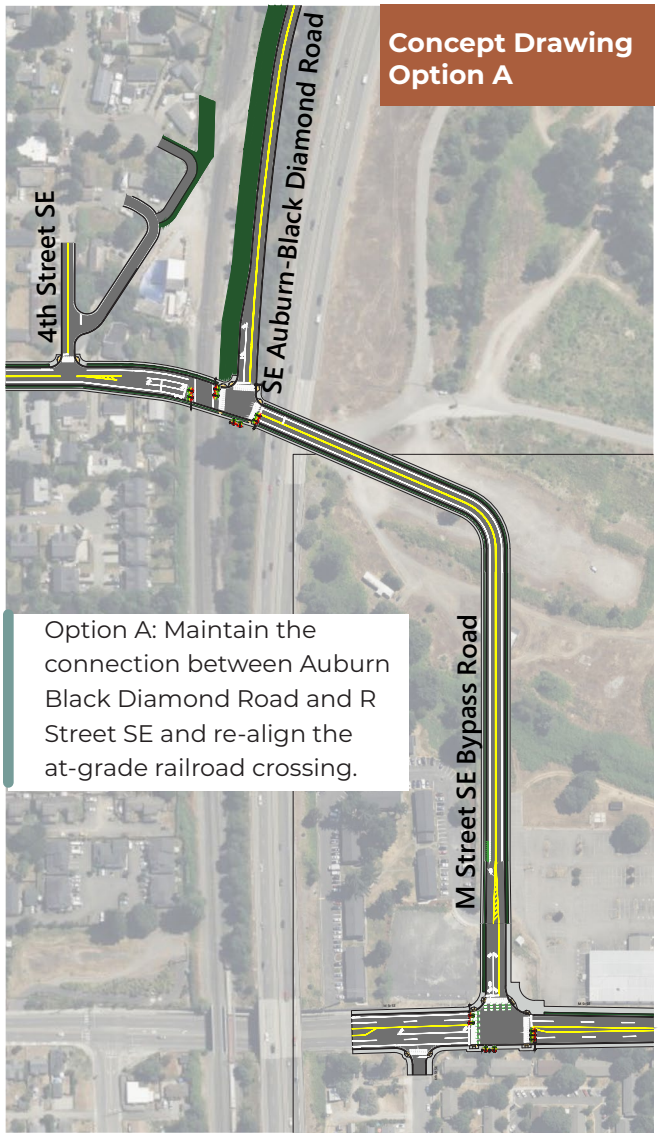
Project Origin: M Street Grade Separation Pre-Design Report (2009)

Primary Needs: Active Transportation/Safety/ System Resiliency

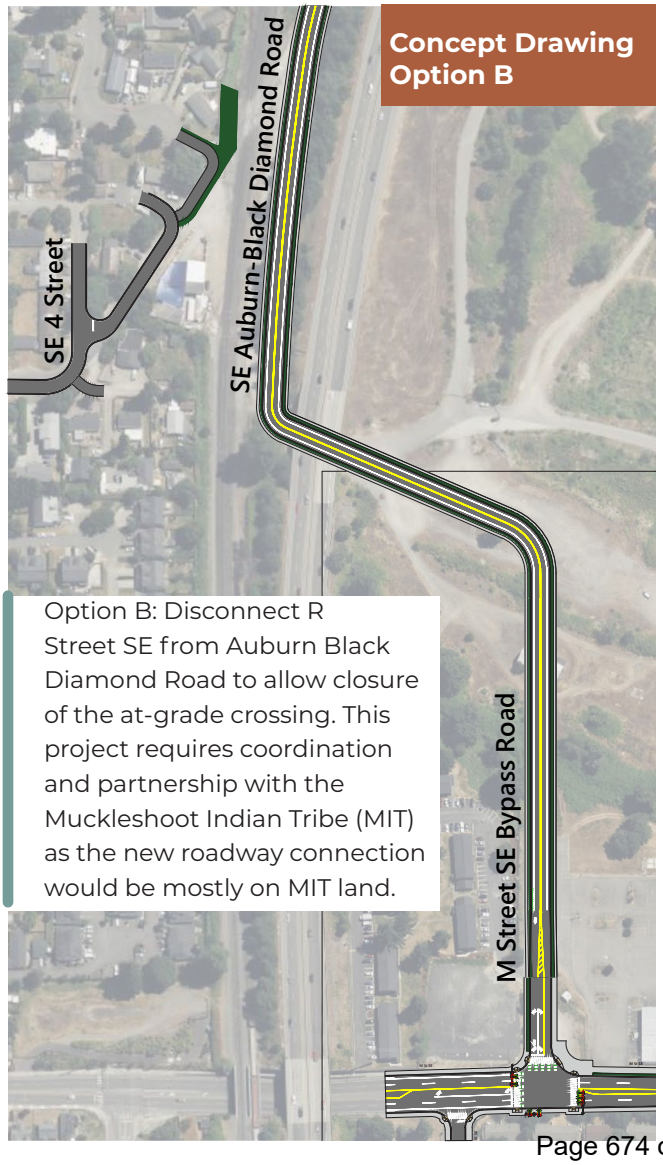
PROJECT PHASE	OPTION A	OPTION B
Planning & Engineering/Design	$ 3,500,000	$ 2,400,000
Right of Way	$ 6,250,000	$ 5,000,000
Construction	$ 7,500,000	$ 5,200,000
Total	$ 17,250,000	$ 12,600,000

Description:

This project will provide a new roadway connection between Auburn Black Diamond Road and M Street SE. The new connection will provide pedestrian, bicycle, and vehicle connectivity that allows by-pass of the at-grade railroad crossing at Black Diamond Road/R Street SE to the grade separated crossing at M Street SE. There are two alternatives for this project that will be considered further with preliminary project design:

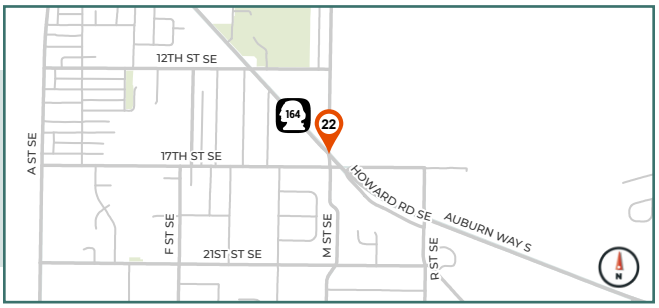


Option A: Maintain the connection between Auburn Black Diamond Road and R Street SE and re-align the at-grade railroad crossing.



Option B: Disconnect R Street SE from Auburn Black Diamond Road to allow closure of the at-grade crossing. This project requires coordination and partnership with the Muckleshoot Indian Tribe (MIT) as the new roadway connection would be mostly on MIT land.

COMP-22
AUBURN WAY S, M ST SE, 17TH ST SE INTERSECTION IMPROVEMENTS



Project Origin: New 2024 CTP Project

Primary Need: Vehicle Capacity

VEHICLE LOS WITHOUT PROJECT	AM	PM
2024 Existing	Fails	Fails
2044 Future	Fails	Fails

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 700,000
Right of Way	$ 300,000
Construction	$ 1,300,000
Total	$ 2,300,000

Description:

Intersection delays will be reduced with several improvements including:

Add a third eastbound lane on Auburn Way South through the intersection

Restrict left turns from eastbound Auburn Way South to northbound M Street SE. Vehicles would utilize 12th Street SE for access to M Street SE from eastbound Auburn Way South.

Restrict left turns from westbound Auburn Way South on the west intersection leg with curbing/median. Access to businesses on the south side of Auburn Way South would be made via a u-turn at the signalized intersection of 12th Street SE/Auburn Way South.

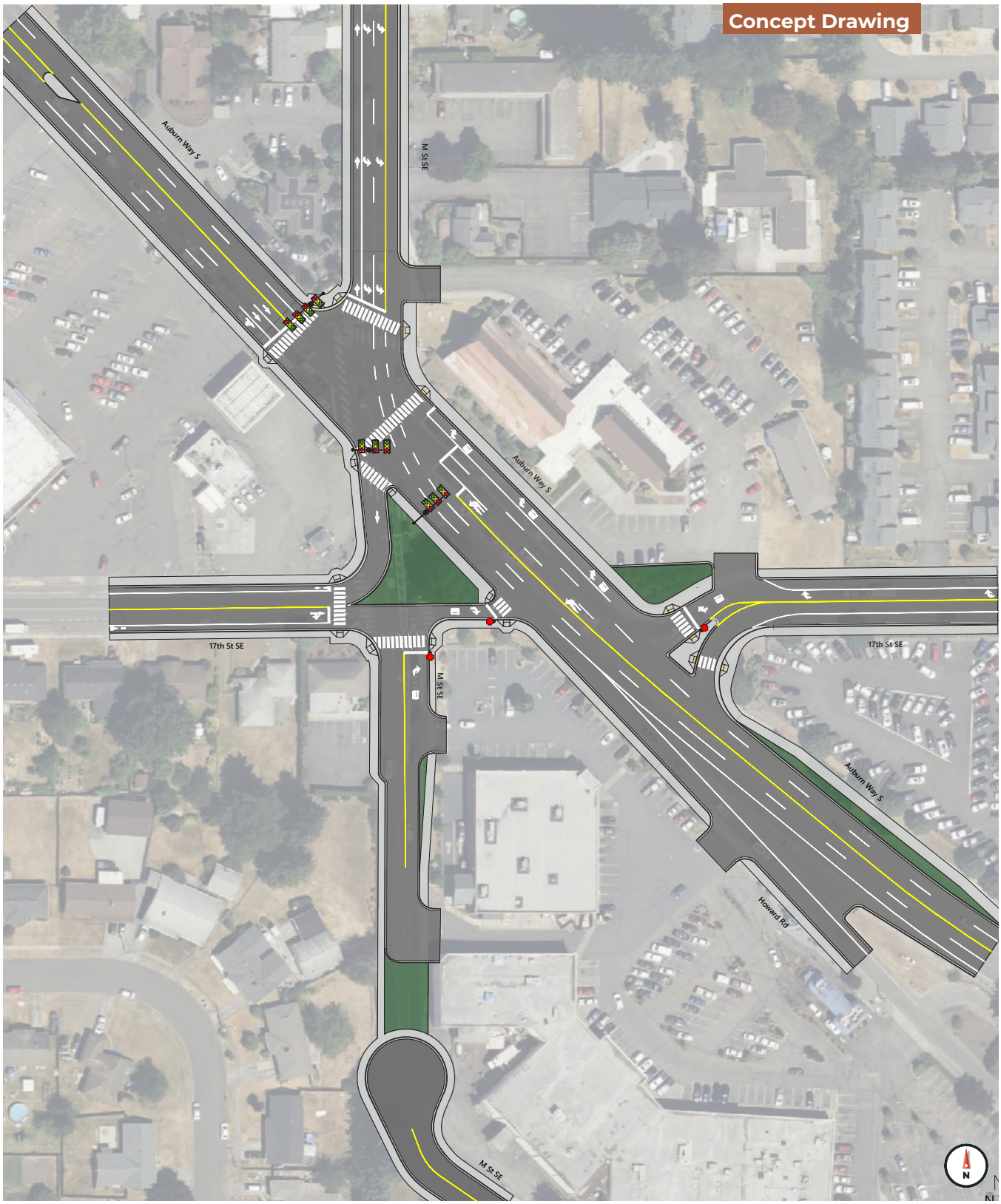
Left turns from southbound M Street SE to eastbound Auburn Way South would be allowed from the far west lane, creating three lanes available for this movement.

Eastbound 17th Street SE to eastbound Auburn Way South would be opened where it is currently blocked.

Northbound movements from M Street SE to Auburn Way South would be restricted and M Street SE would not provide connectivity between 21st Street SE and Auburn Way South.

Mark east crossing of Auburn Way South with a new crosswalk

Improvements on Auburn Way South will be subject to WSDOT complete streets requirements and will require coordination and approval from WSDOT.


Concept Drawing
Auburn Way S
M St SE
17th St SE
Howard Rd
N

COMP-23
M ST SE & 12TH ST SE INTERSECTION IMPROVEMENTS



Project Origin: 2024 CTP Project (Modified from Previous Comp. Plan)

Primary Need: Vehicle Capacity, Active Transportation

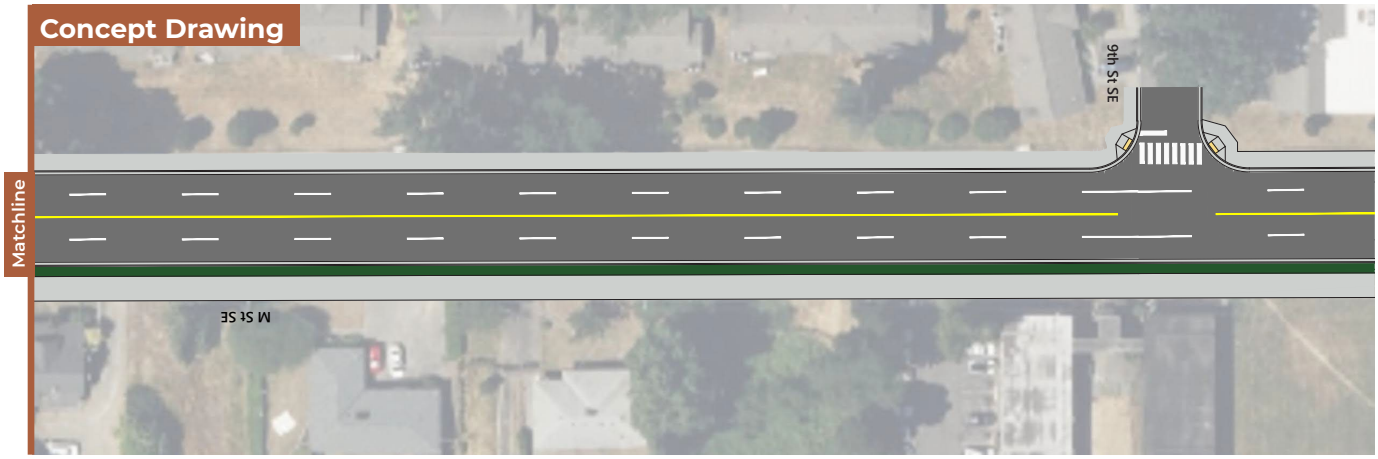
Description:

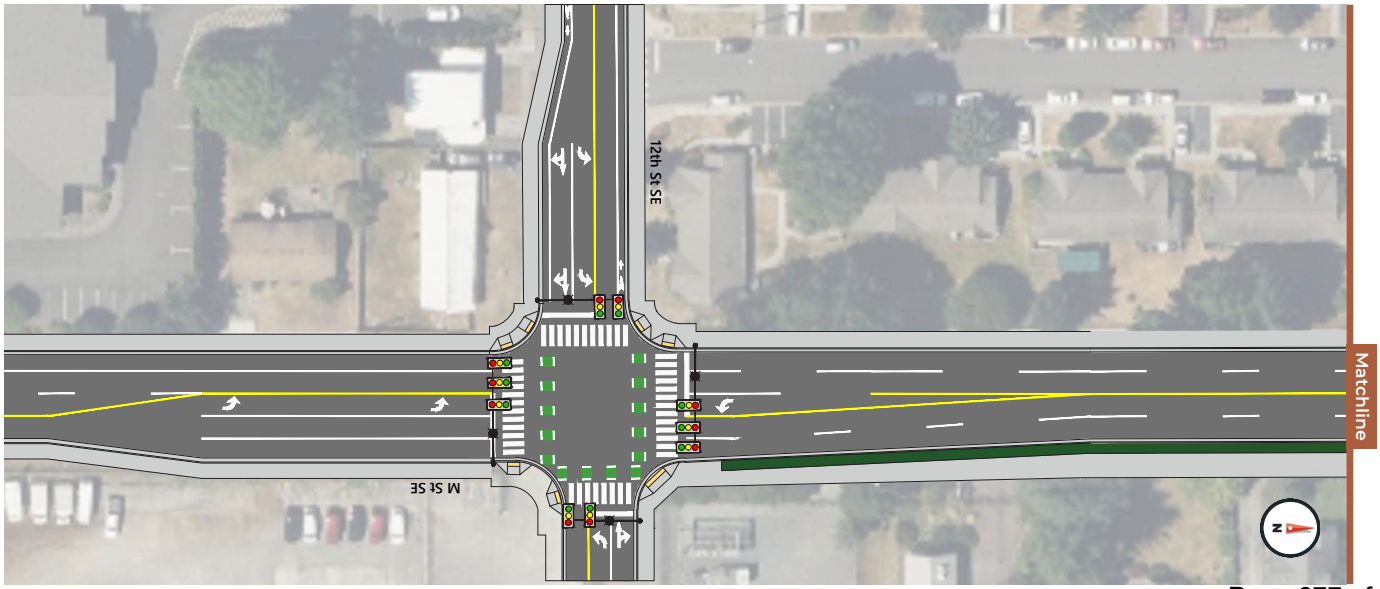
This project will reduce intersection delays with a new traffic signal. The project will also construct a separated trail along the east side of M Street SE between 12th Street SE and 8th Street SE to address active transportation level of service requirements.

VEHICLE LOS WITHOUT PROJECT	AM	PM
2024 Existing	Fails	Fails
2044 Future	Fails	Fails

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 1,200,000
Right of Way	$ 1,350,000
Construction	$ 2,100,000
Total	$ 4,650,000

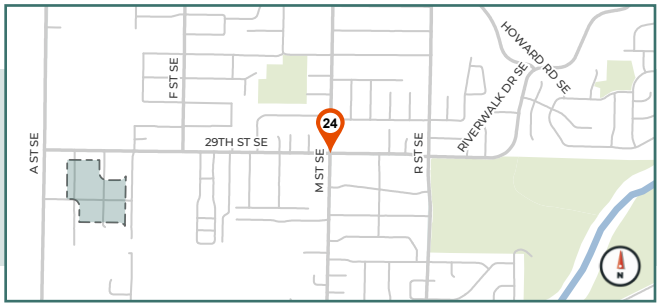
Concept Drawing





COMP-24

M ST SE & 29TH ST SE INTERSECTION IMPROVEMENTS



Project Origin: R St SE Corridor Study (2020)

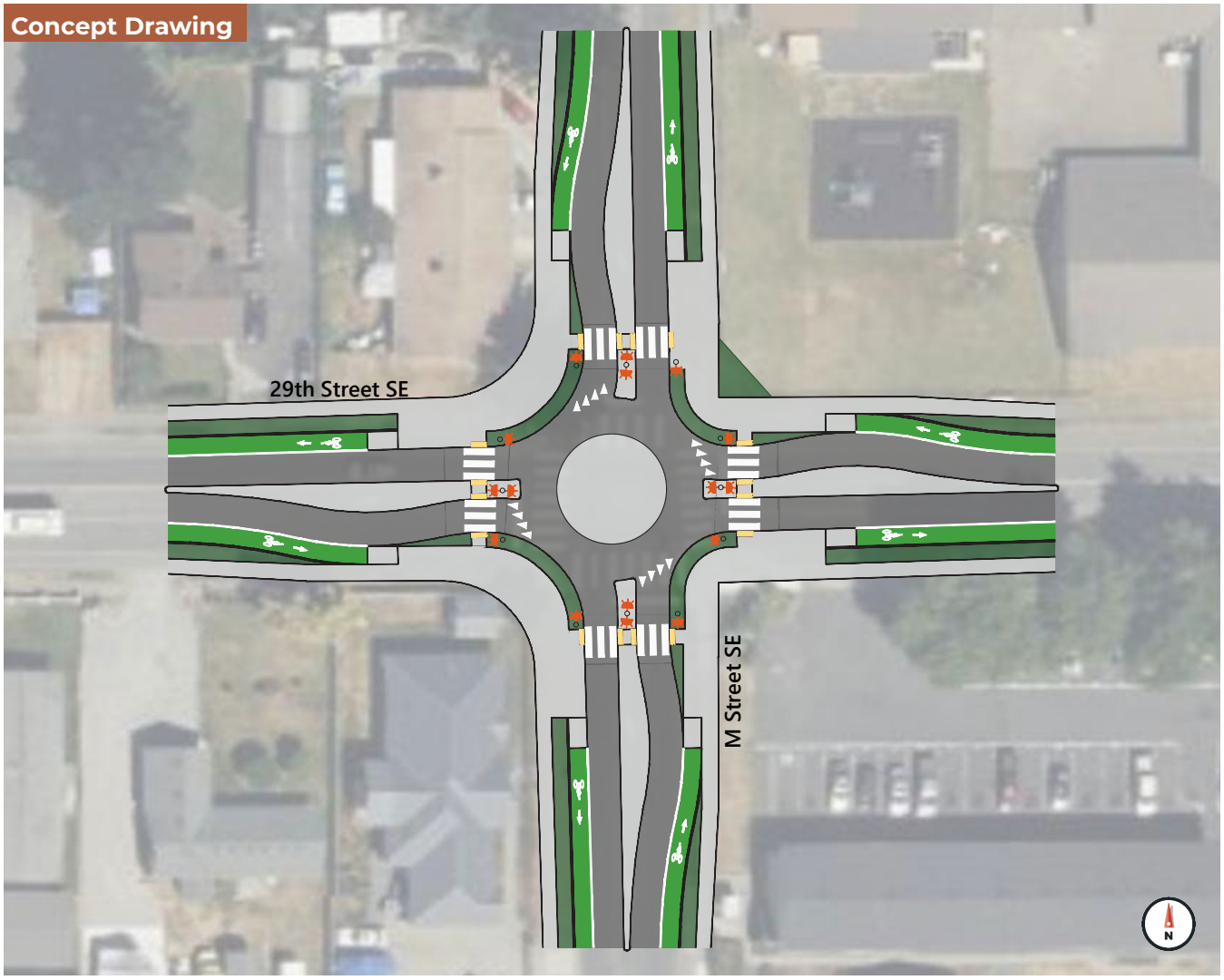
Primary Needs: Active Transportation/Safety/ Vehicle Capacity

Description:

This project will reduce vehicle delays, improve operations and safety, and provide improved access for bikes and pedestrians through the intersection through construction of a single lane roundabout to replace the current all-way stop control.

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 900,000
Right of Way	$ 125,000
Construction	$ 1,900,000
Total	$ 2,925,000

Concept Drawing



COMP-25
A ST SE CORRIDOR IMPROVEMENTS
(37TH ST SE - WHITE RIVER BRIDGE)



Project Origin: BNSF Railway and A Street SE Crossing Study (2015), 2024 CTP Project

Primary Needs: Vehicle LOS/Mode Shift/Active Transportation/Safety

	PROJECT PHASE	COST ESTIMATE
Phase 1	Planning & Engineering/Design	$ 2,940,000
	Right of Way	$ 1,750,000
	Construction	$ 15,250,000
	Phase 1 Total	$ 19,940,000
Phase 2	Planning & Engineering/Design	$ 600,000
	Right of Way	$ 225,000
	Construction	$ 1,200,000
	Phase 2 Total	$ 2,025,000
	Project Total	$ 21,965,000

Description:

This project will reduce intersection delays at the intersections of C St SW & Ellingson Rd/41st St SE, A St SE & Ellingson Rd/41st St SE, and at SE & 44th St SE (private road). The project will provide active transportation facilities that support mode shift and improved vehicle and active transportation safety. The improvements would likely be implemented with multiple projects implemented over time as funding is available.

Key project improvements and potential sequencing/phasing are:

Phase 1 (BNSF Railway and A Street SE Crossing)

1a New intersection with traffic signal and pedestrian and bike trail crossing on A Street SE just north of White River Bridge. White River Estates, and commercial properties along the east side of A Street SE between 41st Street SE and the new intersection will utilize this intersection for full access.

1b Construction of a pedestrian/bike tunnel under the BNSF Railway tracks that provides connectivity between the west side of A Street SE and Skinner Road. Extension of the separated trail on Skinner Road to connect to the tunnel crossing. Improvements between the White River Trail and the new intersection at the north end of the White River Bridge on the east side of A Street SE to created separated/buffered trail connection.

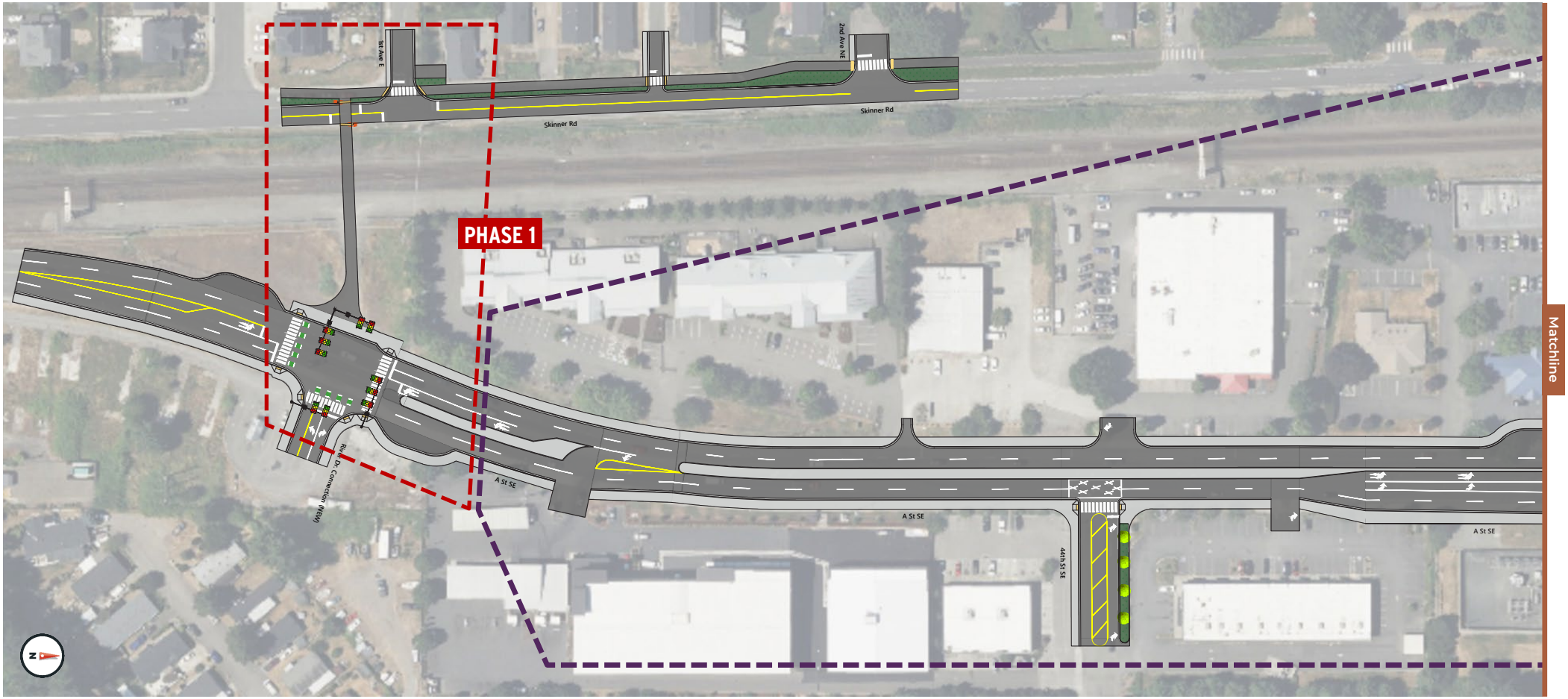
Phase 2 (Access Management & A Street SE Intersection Improvements at 41st Street SE and 37th Street SE)

2a Space for vehicle u-turns for both directions on A Street SE will be provided at all signalized intersections and medians will be installed to restrict left turns in/out of adjacent driveways and 44th Street SE.

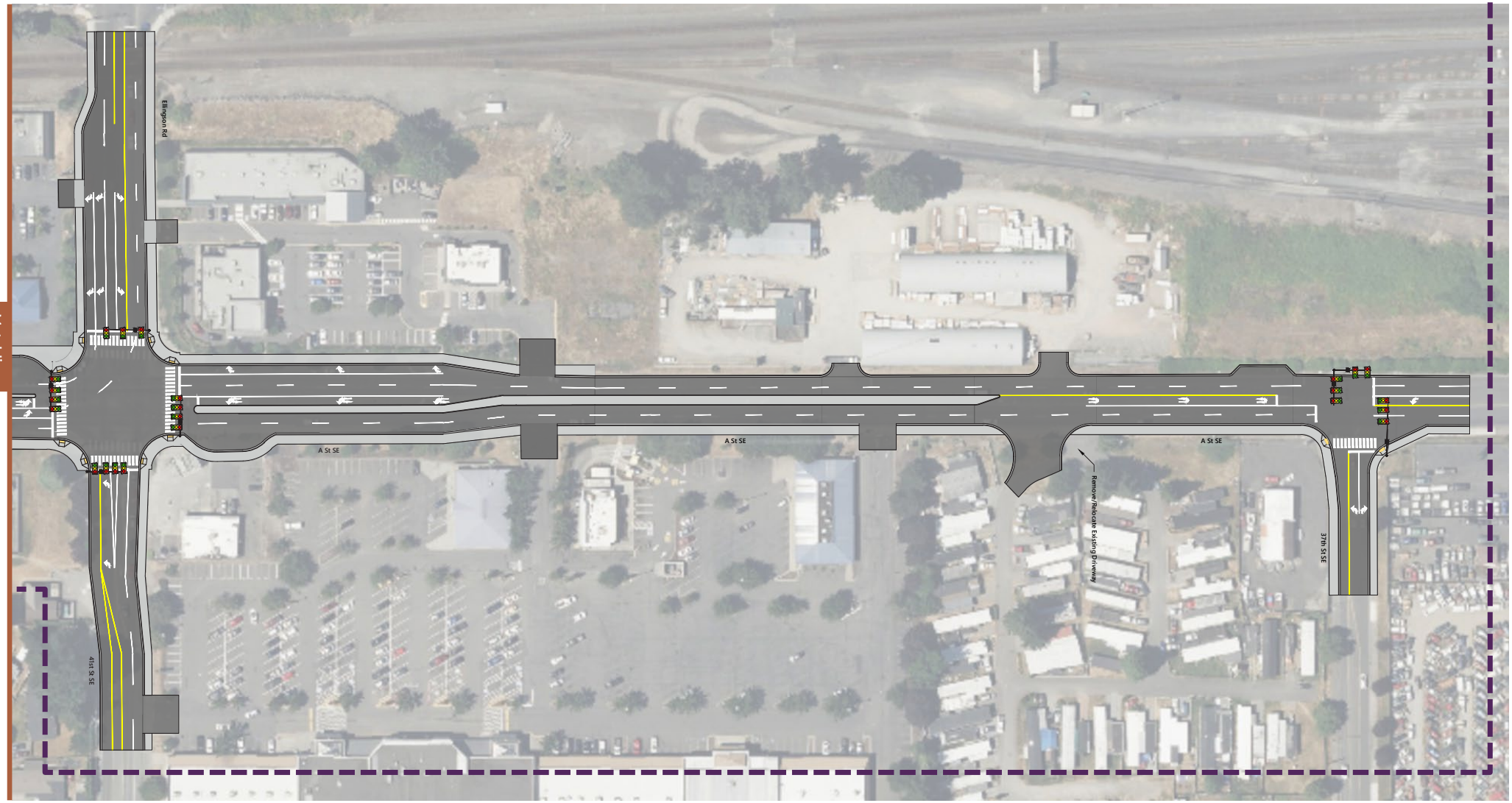
2b A second left turn lane from northbound A Street SE to westbound Ellingson Road/41st Street SE will be added.

2c A second dedicated right turn lane from eastbound Ellingson Road/41st Street SE will be added and there will be a separated dedicated eastbound through lane.

2d Smart signage will be installed on Ellingson Road/41st Street SE to allow two westbound movements through the intersection of C Street SW during some times and one westbound through and one right turn only (to northbound C Street SW) during other times. Re-build sidewalks on Ellingson Road/41st Street SE between C Street SW and A Street SE to provide maximum width possible as constrained by the BNSF bridge and mark the crosswalk/replace curb ramps on south leg of intersection of A Street SE and Ellingson Road/41st Street SE.

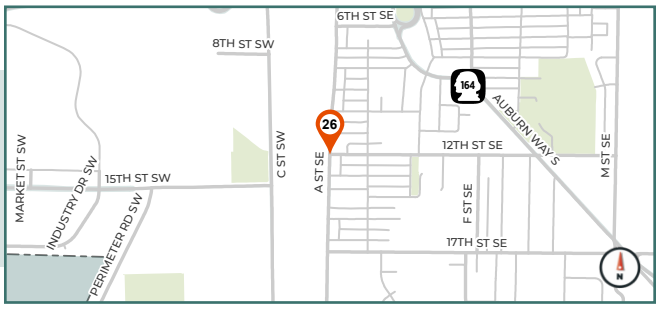

PHASE 1
Skinner Rd
Skinner Rd
A St SE
A St SE
A St SE
44th St SE
Matchline

PHASE 2



Matchline

COMP-26
A ST SE & 12TH ST SE INTERSECTION IMPROVEMENTS



Project Origin: New 2024 CTP Project

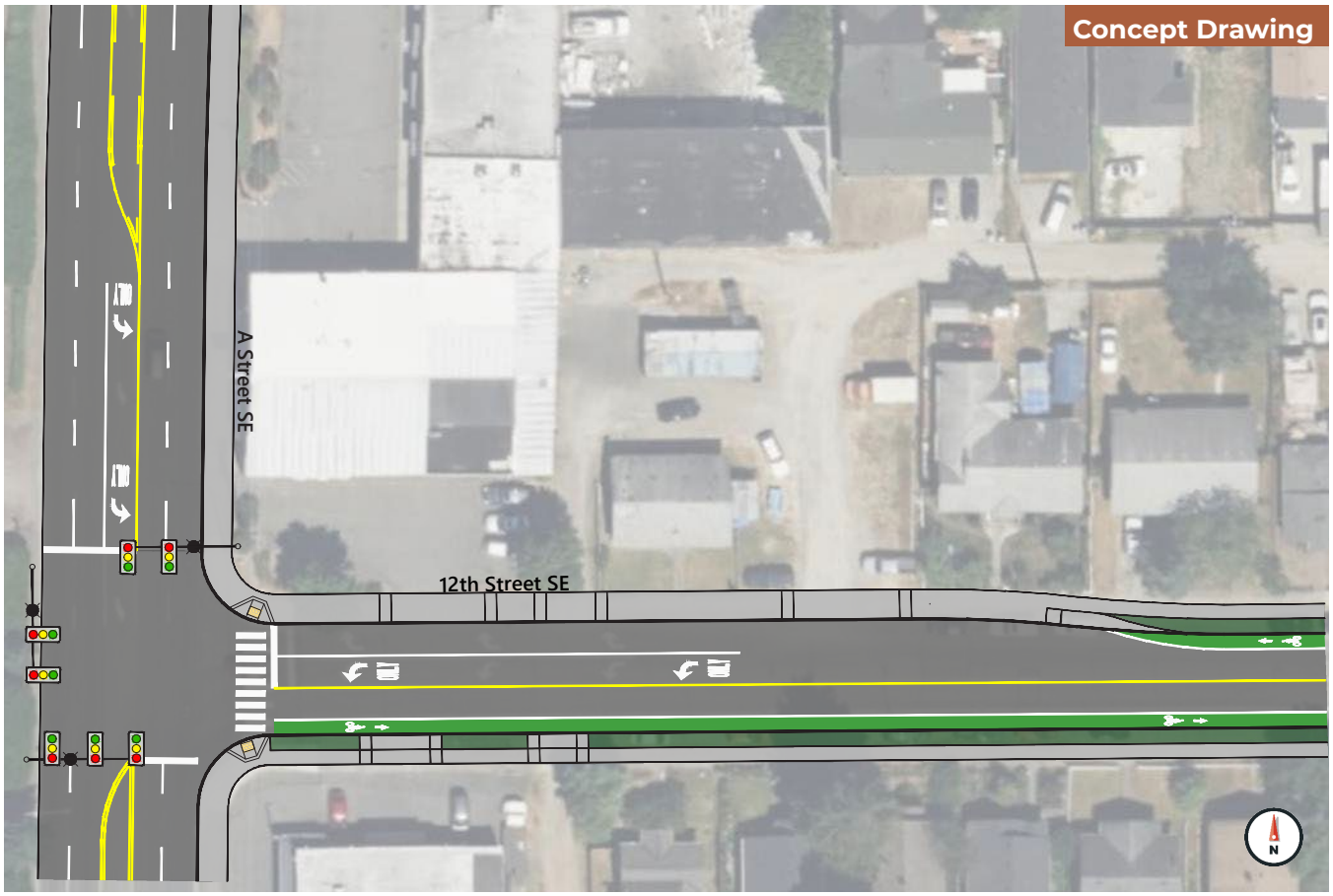
Primary Need: Vehicle Capacity

Description:

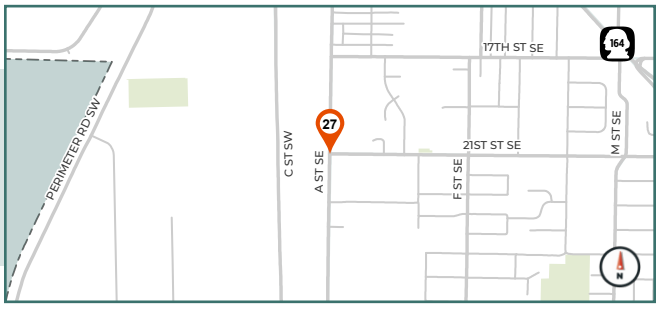
Intersection delays will be reduced through the replacement of the stop control with construction of a new traffic signal.

VEHICLE LOS WITHOUT PROJECT	AM	PM
2024 Existing	Meets	Meets
2044 Future	Fails	Fails

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 500,000
Right of Way	$ 25,000
Construction	$ 900,000
Total	$ 1,425,000



COMP-27
A ST SE & 21ST ST SE INTERSECTION IMPROVEMENTS



Project Origin: New 2024 CTP Project

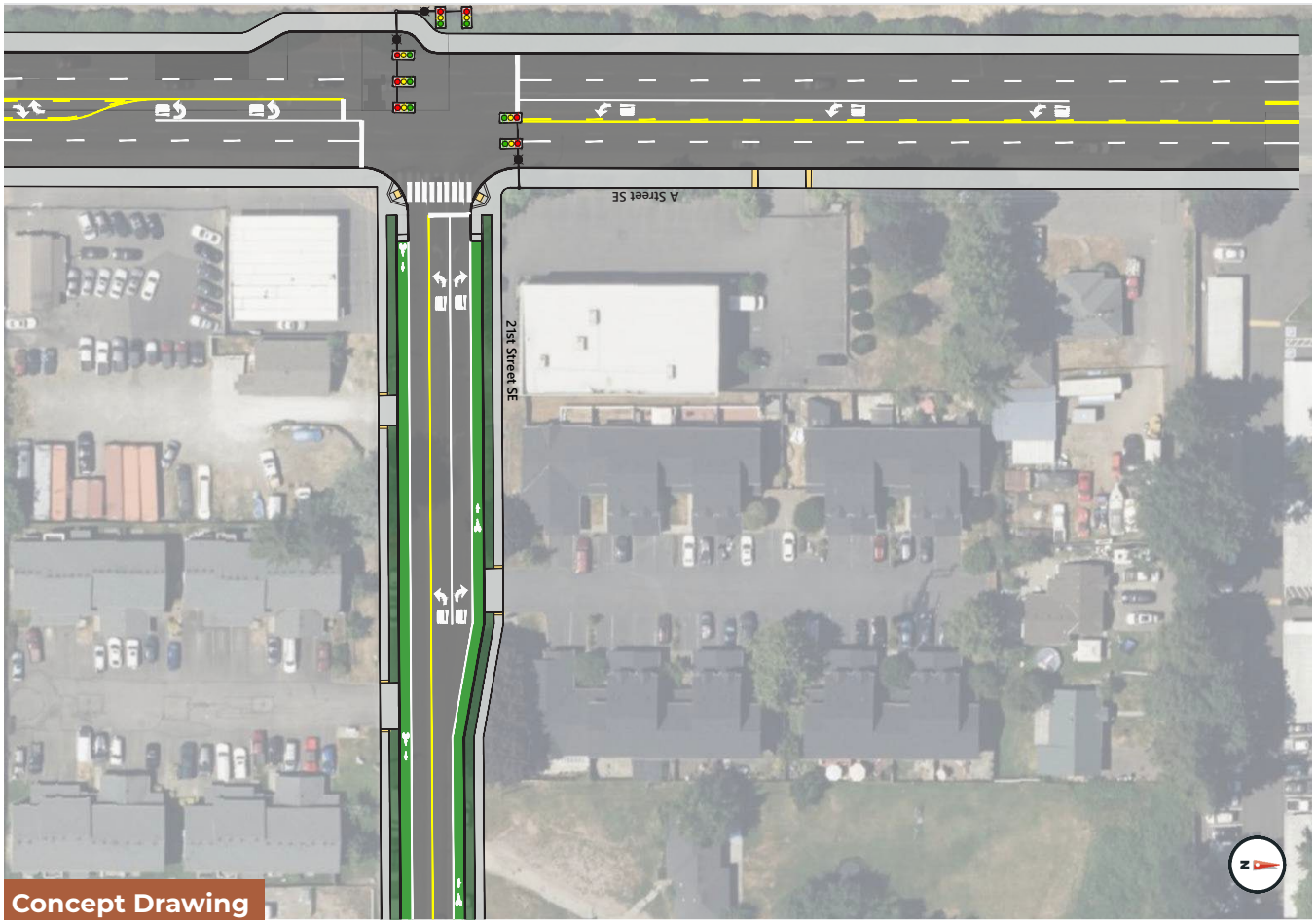
Primary Need: Vehicle Capacity

Description:

Intersection delays will be reduced through the replacement of the stop control with construction of a new traffic signal. Improvements may also include widening for a northbound u-turn to support access management along the corridor.

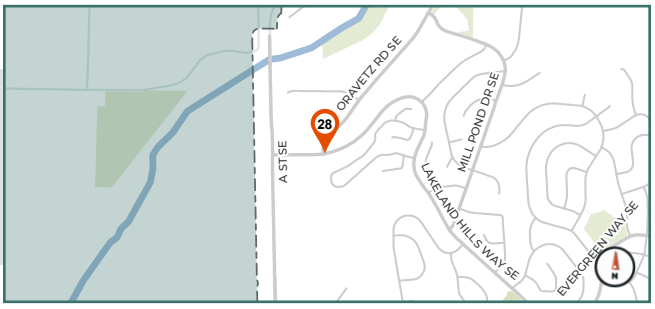
VEHICLE LOS WITHOUT PROJECT	AM	PM
2024 Existing	Meets	Meets
2044 Future	Fails	Fails

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 600,000
Right of Way	$ 125,000
Construction	$ 1,200,000
Total	$ 1,925,000



Concept Drawing

COMP-28
LAKELAND HILLS WAY SE & ORAVETZ RD SE CORRIDOR INTERSECTION IMPROVEMENTS



Project Origin: New 2024 CTP Project

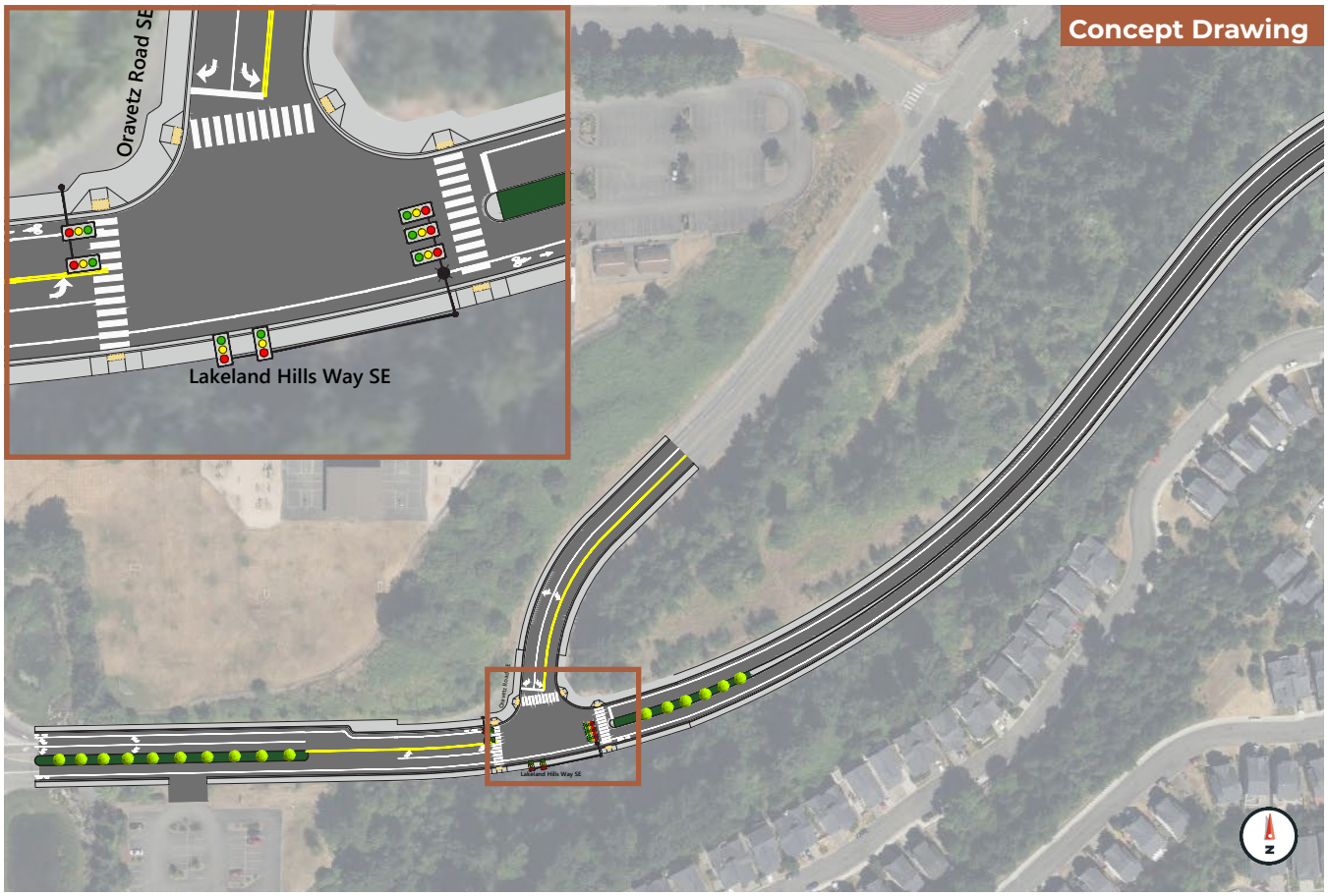
Primary Need: Vehicle Capacity

Description:

Intersection delays will be reduced through the replacement of the stop control with construction of a new traffic signal.

VEHICLE LOS WITHOUT PROJECT	AM	PM
2024 Existing	Fails	Meets
2044 Future	Fails	Meets

PROJECT PHASE	COST ESTIMATE
Planning & Engineering/ Design	$ 900,000
Right of Way	$ 10,000
Construction	$ 1,700,000
Total	$ 2,610,000



LIST OF BIKE IMPROVEMENTS TO ENCOURAGE MODE SHIFT

Existing and proposed bike facilities are mapped at https://auburn.maps.arcgis.com/apps/instant/sidebar/index.html?appid=0d4f2a3eee6d4a54bb284c3d09142b62

STREET	FROM	TO	EXISTING FACILITY	MINIMUM FACILITY REQUIRED TO MEET LTS STANDARD	APPROACH
Lakeland Hills Way	Lake Tapps Parkway	69th Street SE	Class III Bikeway	Class II Bikeway	Sign bike trail through Sunset Park.
I St NE	45th St NE	42nd Pl. NE	Class III Bikeway	Class I Bikeway	Build trail on East side, RRFB at trail crossing.
I St NE	42nd PL. NE	37th St NE	Class III Bikeway	Class II Bikeway	Change network class to auxiliary. Build out bike lanes.
C St NE	42nd St NE	30th St NE	Class III Bikeway	Class II Bikeway	North of 37th, remove TWFTL add bike lanes; south of 37th re-build pavement, add bike lanes.
37th St NE	I St NE	AWN	Class III Bikeway	Class III Bikeway w/ Pavement Marking	Re-stripe to include bike lanes and remove parking on north side.
37th St NE/NW	AWN	Between Emerald Downs Dr & I	Class III Bikeway	Class I Bikeway	Build separated trail on north side, re-strip to narrow lanes to 11 to 12 feet wide.
AWN	37th St NE	35th St NE	Class III Bikeway	Class II Bikeway	Remove bike network designation, remove bike lane designation on 35th between AWN and I Street.
8th St NE	Harvey Rd NE	R St NE	Class III Bikeway	Class II Bikeway	Re-channelize to include bike lanes. Potential widening at some locations.
8th St NE	R St NE	8th St Bridge	Class III Bikeway	Class I Bikeway	Construct separated trail along side of roadway.
8th St Bridge			Class III Bikeway	Class I Bikeway	Widen bridge or construct adjacent active transportation bridge. Construction separated trail.
SE 320th St	8th St Bridge	104th Ave SE	Class III Bikeway	Class I Bikeway	Re-channelize and widen to provide separated trail.
Lea Hill Rd SE	104th Ave SE	112th Ave SE	Class III Bikeway	Class I Bikeway	Trail along east side of road, bike lane along west side of road - See Lea Hill Corridor Study.
SE 312th St	112th Ave SE	116th Ave SE	Class III Bikeway	Class I Bikeway	Trail along east side of road, bike lane along west side of road - See Lea Hill Corridor Study.
SE 312th St	116th Ave SE	124th Ave SE	Class III Bikeway	Class II Bikeway	Re-Channelize and Widen to Provide bike lanes.
124th Ave SE	SE 284th St	SE 288th St	Class III Bikeway	Class II Bikeway	Widen to Minor Arterial Standards w/bike lanes.
124th Ave SE	SE 304th St	SE 307th Pl	Class III Bikeway	Class II Bikeway	Widen to Minor Arterial Standards w/bike lanes.
R St NE	8th St NE	E Main St	Class III Bikeway	Class II Bikeway	Re-Stripe to include bike lanes.

(Continued on next page)

STREET	FROM	TO	EXISTING FACILITY	MINIMUM FACILITY REQUIRED TO MEET LTS STANDARD	APPROACH
4th St NE	AWN	H St NE	Class III Bikeway	Class III Bikeway w/ Pavement Marking	Add bike lanes.
4th St NE	H St NE	J St NE	Class III Bikeway	Class II Bikeway	Add bike lanes.
4th St NE	J St NE	M St NE	Class III Bikeway	Class III Bikeway w/ Pavement Marking	Add bike lanes.
E Main St	E St NE	Pike St SE	Class III Bikeway w/ Pavement	Class II Bikeway	Bulb-outs/traffic calming/speed reduction to 25mph/sharrows signage (R to D).
4th St SE	F St SE	M St SE	Class III Bikeway	Class III Bikeway w/ Pavement Marking	Install sharrows/signage.
12th St SE	J St SE	L St SE	Class III Bikeway	Class III Bikeway w/ Pavement Marking	Bikes lanes on 12th from AWN to M Street SE.
15th St SW	C St SE	Perimeter Rd	Class II Bikeway (Both Sides)	Class I Bikeway	Construct separated trail along south side.
15th St SE	Perimeter Rd	Interurban Trail	Class III Bikeway	Class I Bikeway	Construct separated trail along south side.
17th St SE	B St SE	F St SE	Class II Bikeway (Both Sides)	Class I Bikeway	Bulb-outs/traffic calming/speed reduction to 30mph/sharrows signage (R to D).
21st St SE	F St SE	R St SE	Class II Bikeway (Both Sides)	Class I Bikeway	Bulb-outs/traffic calming/speed reduction to 30mph/sharrows signage (R to D).
R St SE	21st St SE	Between 22nd St SE & 23rd St S	Class II Bikeway (Both Sides)	Class I Bikeway	Separated trail along east side of roadway. CP2116.
37th St SE	A St SE	M St SE	Class III Bikeway	Class III Bikeway w/ Pavement Marking	Re-stripe to include bike lanes.
A St SE	41st St SE	44th St SE	Class III Bikeway	Class II Bikeway	Separated trail along east side of roadway.
A St SE	44th St SE	COA Boundary	Class III Bikeway	Class II Bikeway w/Buffer	Separated trail along east side of roadway.
A St SE	COA Boundary	South of Lakeland Hills Way SE	Class III Bikeway	Class I Bikeway	Separated trail along east side of roadway. CP2331.
Lakeland Hills Way	A St SE	Oravetz Pl SE	Class III Bikeway	Class II Bikeway	Re-stripe to include bike lanes.
R St SE	Between 25th St SE & 26th	White River Bridge	Class II Bikeway (Both Sides)	Class I Bikeway	Separated trail along east side of roadway. CP2116.
Lakeland Hills Way	Lake Tapps Parkway	Between Lake Tapps & 15th St	Class III Bikeway	Class III Bikeway w/ Pavement Marking	Install sharrows/signage.
Lake Tapps Pkwy SE	Lakeland Hills Way SE	Just east of Lakeland Hills	Class III Bikeway	Class I Bikeway	Construct separated trail along north side of roadway.

This page left intentionally blank

APPENDIX C

Plan Checklists

IN THIS APPENDIX

GMA Requirements Checklist

PSRC Requirements Checklist



GMA REQUIREMENTS CHECKLIST

To comply with the Growth Management Act requirements, the Comprehensive Transportation Plan will include the following elements:

GMA REQUIREMENT	PLAN ELEMENT(S)
1. An inventory of air, water, and ground transportation facilities and services, including transit alignments, state-owned transportation facilities, and general aviation airports.	· Chapter 2 · Appendix A
2. Adopted multimodal levels of service (LOS) standards for all arterials, transit routes and highways.	· Chapter 2
3. Identification of specific actions to bring locally-owned transportation facilities and services to established multimodal LOS.	· Chapter 2 · Appendix B
4. A forecast of traffic for at least 10 years including land use assumptions used in estimating travel.	· Chapter 2
5. A projection of state and local system needs to meet current and future demand.	· Chapter 2 · Appendix B
6. A pedestrian and bicycle component to include collaborative efforts to identify and designate planned improvements for pedestrian and bicycle facilities and corridors that address and encourage enhanced community access and promote healthy lifestyles.	· Chapter 2, Section 2.3
7. A description of any existing and planned transportation demand management (TDM) strategies, such as HOV lanes or subsidy programs, parking policies, etc.	· Chapter 4, Goal 8
8. An analysis of future funding capability to judge needs against probable funding resources.	· Chapter 6, Section 6.1
9. A multi-year financing plan based on needs identified in the comprehensive plan, the appropriate parts of which serve as the basis for the 6-year street, road or transit program.	· Chapter 6, Section 6.1
10. If probable funding falls short of meeting identified needs: a discussion of how additional funds will be raised, or how land use assumptions will be reassessed to ensure that LOS standards will be met.	· Chapter 6, Section 6.4

(Continued on next page)

GMA REQUIREMENT	PLAN ELEMENT(S)
11. A description of intergovernmental coordination efforts, including an assessment of the impacts of the transportation plan and land use assumptions on the transportation systems of adjacent jurisdictions and how it is consistent with the regional transportation plan.	• Chapter 1, Section 1.5
12. A plan for public participation in the comprehensive planning process.	• Chapter 1, Section 1.3 • Appendix D
13. A plan to monitor how well comprehensive plan policies, development regulations, and other implementation techniques are achieving the plan's goals and the goals of the GMA.	• Chapter 7
14. Considerations for preserving property rights with an evaluation of regulatory or administrative actions to ensure they do not result in unconstitutional taking of private property.	• Chapter 4, Goal 9, Policy TR9-3
15. Requirement that local governments permit development only if adequate multimodal transportation facilities exist, or can be guaranteed to be available within six years, to support new development. The GMA requires each local jurisdiction to identify facility and service needs based on LOS standards. Auburn ensures that future development will not cause the system's performance to fall below the adopted LOS standard by doing one or a combination of the following: limiting development, requiring appropriate mitigation, or changing the adopted standard.	• Chapter 4, Goal 7

PSRC REQUIREMENTS CHECKLIST

PSRC requires that the plan promotes a sustainable, equitable, affordable, safe, and efficient multimodal transportation system, with specific emphasis on an integrated regional transit network that supports the Regional Growth Strategy and promotes vitality of the economy, environment, and health.

PSRC REQUIREMENT	PLAN ELEMENT(S)
Implement the Regional Transportation Plan	
1. Promote the development of an efficient, multimodal transportation system that supports the Regional Growth Strategy in collaboration with other jurisdictions and agencies **(MPP-T-7)**	· Chapter 4, Goal 4, Policy TR4-2
2. Work to develop and operate a safe and convenient system for all users and the movement of freight and goods **(MPP-T-11)**	· Chapter 4, Goal 5, Policy TR5-1-4
3. Reduce the need for new capital improvements through investments in operations, pricing programs, demand management strategies, and system management activities that improve the efficiency of the current system **(RCW 36.70A.070(6)(a)(vi), MPP-T-3)**	· Chapter 4, Goal 8, Policy TR8-3
4. Emphasize transportation investments that provide alternatives to single occupancy vehicle travel, increase travel options, especially to and within centers, and support compact, pedestrian- and transit-oriented densities and development **(MPP-T-12-13, T-15)**	· Chapter 4, Goal 8, Policy TR8-4
5. Increase the resilience of the transportation system and support security and emergency management **(MPP-T-31)**	· Chapter 4, Goal 5, Policy TR5-2-15
6. Prepare for changes in transportation technologies and mobility patterns **(MPP-T-33-34)**	· Chapter 4, Goal 10, Policy TR10-15
Support the Regional Growth Strategy	
7. Focus system improvements to connect centers and support existing and planned development as allocated by the Regional Growth Strategy **(MPP-RC-7-9, T-7-8, T-15)**	· Chapter 4, Goal 1, Policy TR1-4
8. Prioritize multimodal investments in centers and high-capacity station areas **(MPP-RC-7-10, T-12-13,T-19)**	· Chapter 2, Section 2.4.1 · Chapter 4, Goal 1, 5, and 6, Policies TR1-3 and TR1-4; TR5-1-1; TR6-3-1 and TR6-3-2

(Continued on next page)

PSRC REQUIREMENT	PLAN ELEMENT(S)
Support the Regional Growth Strategy	
9. Promote the design of transportation facilities that support local and regional growth centers and high-capacity transit station areas and fit the community in which they are located **(MPP-T-19-21)**	· Chapter 2, Section 2.4 · Chapter 4, Goal 5, Multimodal Accessible Network Policies (Transit) · Chapter 4, Goal 6, MMLOS Standards Policies (Transit)
10. Support a safe and welcoming environment for walking and bicycling **(MPP-DP-15)**	· Chapter 4, Goal 5 (page 62-66)
11. Include a pedestrian and bicycle component and collaborative efforts to identify planned improvements for pedestrian and bicycle facilities and corridors **(RCW 36.70A.070(6)(a)(vii))**	· Chapter 2, Section 2.3
12. Improve local street patterns and design to promote walking and biking **(MPP-T-16-17)**	· Chapter 4, Goal 5
13. Support alternatives to driving alone, including walking, biking, and transit use, through design of local streets, land use development tools, and other practices **(MPP-T-16-18)**	· Chapter 4, Goal 8, Policy TR8-4
Support People	
14. Identify racial and social equity as a core objective when planning and implementing transportation improvements, programs, and services **(MPP-T-9)**	· Chapter 4, Goal 2
15. Ensure mobility choices for people with special needs **(MPP-T-10)**	· Chapter 4, Goal 2
Support the Economy	
16. Recognize the critical role of safe, reliable, and efficient movement of people and goods **(MPP-Ec-6,T-1, T-23)**	· Chapter 4, Goal 5, Policy TR5-1-4
17. Identify and support key facilities and improvements that connect the region to major transportation hubs such as ports, airports, and designated freight routes **(MPP-T-24-25)**	· Appendix A
18. Promote coordination with providers of major regional infrastructure, such as freight rail and commercial aviation **(MPP-Ec-4-5, T-27-28)**	· Chapter 4, Goal 5, Multimodal Accessible Network Policies and Supporting Actions (Freight, Air Transportation)

(Continued on next page)

PSRC REQUIREMENT	PLAN ELEMENT(S)
Protect the Environment	
19. Promote clean transportation programs and facilities, including actions to reduce air pollution and greenhouse gas emissions from transportation **(MPP-CC-3, CC-12, T-29-30)**	· Chapter 4, Goal 4, Policy TR4-2
20. Reduce stormwater pollution from transportation facilities and improve fish passage **(MPP-T-32)**	· Chapter 4, Goal 4, Policy TR4-3
21. Incorporate environmental factors into transportation decision-making, including attention to human health and safety **(MPP-DP-44, T-4-5, T-29-32)**	· Chapter 4, Goal 4, Supporting Actions
Provide Facilities inventories and identify Service Needs	
22. Include mapped inventories for each element of the transportation system, including roadways, transit, cycling, walking, freight, airports, and ferries **(RCW 36.70A.070, RCW 36.70A.108, MPP-T-7,T-15-17)**	· Appendix A
23. Include state facilities and reflect related (regional/ state) level-of-service standards **(RCW 36.70A.070, RCW 36.70A.108)**	· Chapter 2, Section 2.2
24. Develop a comprehensive concurrency program that addresses level-of-service standards for multimodal types of transportation and include implementation strategies **(RCW 36.70A.070, RCW 36.70A.108, MPP-DP-52-54)**	· Chapter 4, Goal 7
25. Provide travel demand forecasts and identify state and local system projects, programs, and management necessary to meet current and future demands and to improve safety and human health **(RCW 36.70A.070, MPP-T-4-5)**	· Chapter 2, Section 2.2.8
26. Identify maintenance and system preservation projects and programs necessary to maintain the ability of the transportation system to provide safe, efficient, and reliable movement of people, goods, and services **(RCW 36.70A.070, MPP-T-1-2, T-4)**	· Chapter 4, Goal 10 · Chapter 6

(Continued on next page)

PSRC REQUIREMENT	PLAN ELEMENT(S)
Finance Transportation Investments	
27. Identify stable and predictable funding sources for maintaining and preserving existing transportation facilities and services **(MPP-RC-11-12, T-6)**	· Chapter 6, Section 6.3
28. Pursue alternative transportation financing methods, such as user fees, tolls, and other pricing mechanisms **(MPP-T-6)**	· Chapter 6, Section 6.5
29. Include a 20-year financing plan, as well as an analysis of funding capability for all transportation modes **(RCW 36.70A.070(3), RCW 36.70A.070(6)(a)(iv), WAC 365-196-415, WAC 365-196-430, MPP-RC-11-12, T-6, T-15)**	· Chapter 6, Section 6.1
30. Include a reassessment strategy to address the event of a funding shortfall **(RCW 36.70A.070(3), RCW 36.70A.070(6)(a)(iv), WAC 365-196-415, WAC 365-196-430, MPP-RC-11-12,T-6)**	· Chapter 6, Section 6.4
Address Land Uses Adjacent to Airports	
31. Airport-adjacent communities: Identify and address any airports within or adjacent to the jurisdiction **(RCW 36.70.547, 36.70A.070(6)(a)(iii)(A), MPP-DP-48)**	· Chapter 2, Section 2.5
32. Describe existing and planned uses near the airport, as well as policies and regulations that discourage incompatible uses **(RCW 36.70.547, 36.70A.070(6)(a)(iii)(A), MPP-DP-48)**	· Existing and planned uses are not described. However, Chapter 4, Goal 5, lists an action under Actions to Support Multimodal Accessible Network Goal and Policies (Air Transportation) that calls the agency to do so
33. Promote coordinated planning and effective management to optimize the region's aviation system in a manner that minimizes health, air quality, and noise impacts to communities, including historically marginalized communities **(MPP-T-28)**	· Chapter 4, Goal 5, Multimodal Accessible Network Policies (Air Transportation)


shag
A St

APPENDIX D

Outreach

IN THIS APPENDIX

Public Outreach

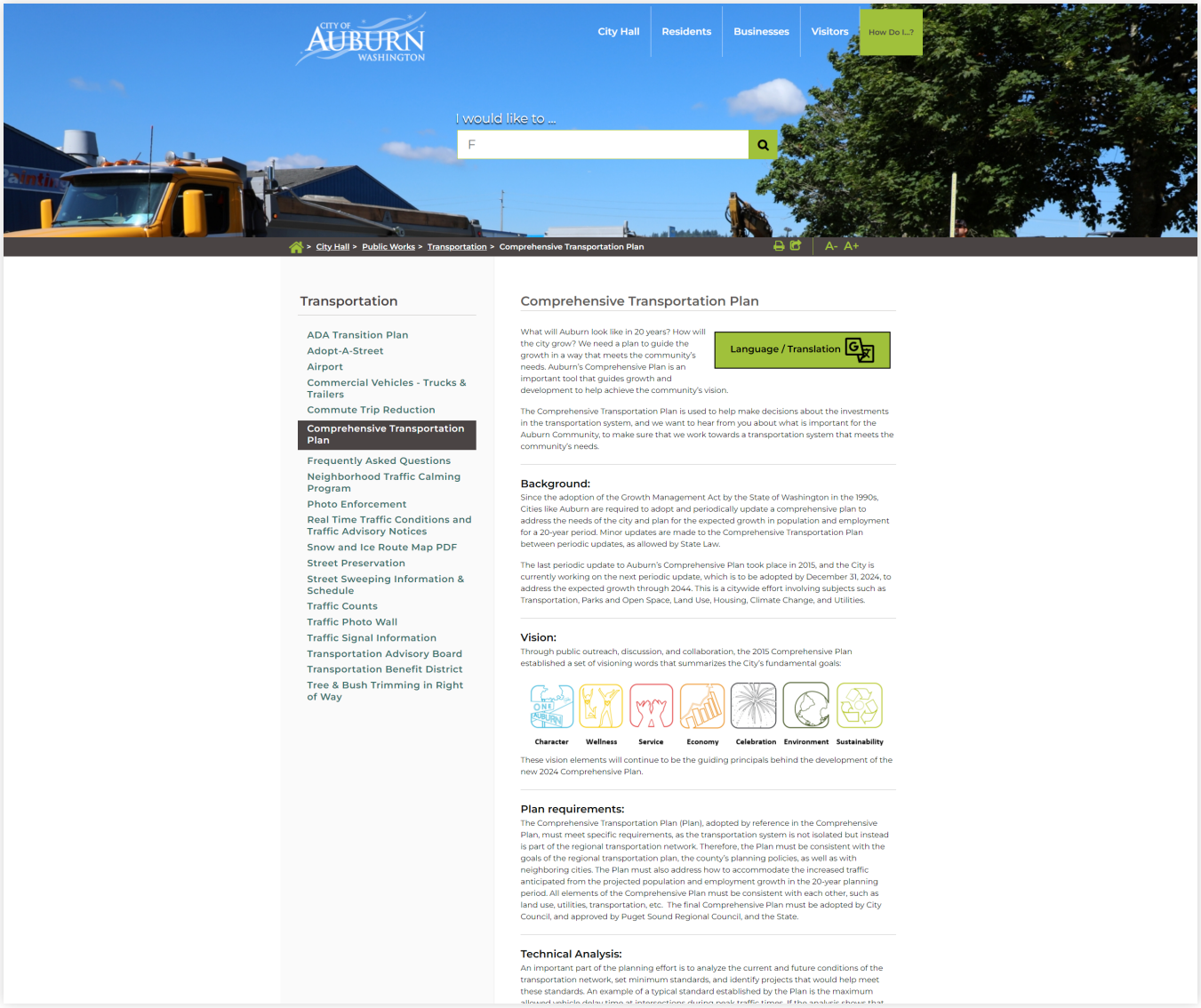
PUBLIC OUTREACH

For the 2024 update to the Comprehensive Transportation Plan (Plan), City staff engaged with the public in different ways, with the intent to encourage participation and receive input from the public to ensure that the needs of the community are addressed in the planning process.

Plan Webpage

A webpage was created with key information regarding the plan, and with a location specific survey where people could show on a map the type of concern they have, as well as three questions to help guide our planning process. The survey questions were translated into the four most used languages in Auburn, after English, which are, as of 2023, Spanish, Ukrainian, Russian, and Tagalog.

Figure 15. Plan Website Homepage



Visit the Comprehensive Transportation Plan Website

Figure 16. Online Survey - Location Specific Feedback

Public input:

We want to hear from you throughout this process, to understand your needs and ideas for Auburn's transportation systems.

Location Specific Feedback

Click on the map to drop a pin for the comment*

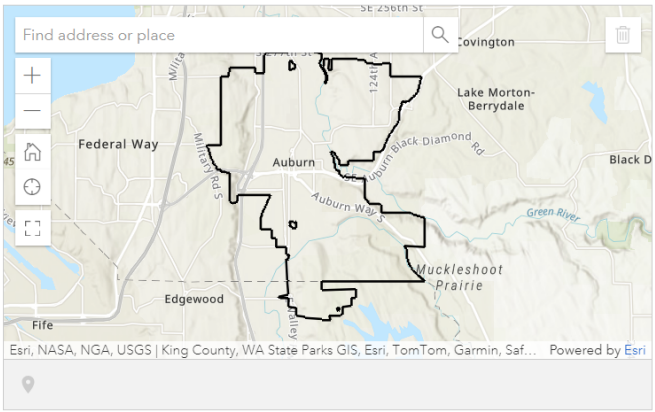
Please only click inside the box showing the Auburn City Limits. Only locations in Auburn will be considered.

Haga clic en el mapa para colocar un marcador para el comentario. Haga clic únicamente en el recuadro que muestra los límites de la ciudad de Auburn. Solo se considerarán las ubicaciones dentro de Auburn.

Клацніть на карті, щоб поставити мітку для коментарю. Клацайте лише в полі, що розташоване в межах міста Auburn City. Ураховуватимуться тільки зони в Auburn.

Щелкните карту, чтобы поставить метку для комментария. Щелкайте только в поле, находящемся в пределах города Auburn City. Будут учитываться только зоны в Auburn.

I-click ang map upang maglagay ng pin para sa mga komento. Pindutin lamang sa loob ng box na nagpapakita ng mga Limitasyon sa Lungsod ng Auburn. Ang mga lugar sa Auburn lamang ang isasaalang-alang.



Which category fits best? ¿Qué categoría se adapta mejor? Яка категорія підходить найкраще? Какая категория подходит лучше всего? Aling kategorya ang pinakaangkop?*

-Please select-

Please provide more details for your comment on the map:

Sírvase proporcionar más detalles para su comentario sobre el mapa:
Надайте більше інформації щодо свого коментарю на карті:
Предоставьте больше информации для своего комментария на карте:
Mangyaring magbigay ng higit pang mga detalye para sa iyong komento sa map:

1000

Submit Enviar Надіслати Отправить Isumite

Public Comments from the Website/Online Survey

Comments collected through the plan website/online survey are summarized in the table below:

GENERAL QUESTIONS ABOUT TRANSPORTATION IN AUBURN			
QUESTION	**RESPONDENT #1**	**RESPONDENT #2**	**RESPONDENT #3**
1. Do you have any suggestions on how we can encourage more people to walk, ride a bike, or take a bus instead of driving a car?	*I think the best thing to do is to expand the bicycle route network. The current network of bike lanes and trails do not take people to where they want to go. The best way to get people out of their cars is to make cycling an attractive option, and making dedicated space for them will allow for that. Ideally, bike lanes should be protected bike lanes; cyclists are not going to feel safe if there is nothing physically protecting them from being run over by cars! In terms of walking, many sidewalks are currently too narrow and/or do not provide enough protection from cars. We could also benefit from more protected pedestrian/ bicycle crossings (e.g., HAWK signals). Also consider making some streets (perhaps downtown) pedestrian-only; taking cars off of a street makes it a much more attractive place for people to gather and shop. For buses, increasing service frequencies and expanding service hours (e.g., adding off-peak service to the 497) is a good way to attract more riders.*	*Safety. Safety. Safety. Nonexistent or disconnected infrastructure makes pedestrians and bicyclists feel unsafe. Aggressive inattentive drivers are everywhere and street widths are designed for freeway speeds. My elementary school children are threatened by drivers and nearly run over by right and left turning drivers daily. No amount of victim blaming will fix that. Intersections near schools need pedestrian first design principles like raised crosswalks and intersections and narrow streets to force drivers to slow.*	*You need a mix of advertising options and upkeep for what you have. Moved down here going on 2 years and there are places that are not safe to walk due to crime, etc. Other places like between Les Groves and M tend to have lots of debris piled up. (For example under the overpass there's large piles of dirt and grass growing and it's clear there's very poor drainage and upkeep in the area). Businesses downtown occasionally block sidewalks with signage etc., making it difficult for strollers or mobility issues. Overall need a mix of upkeep so people can utilize/ access them and then making sure you are giving them places to go.*

(Continued on next page)

GENERAL QUESTIONS ABOUT TRANSPORTATION IN AUBURN

QUESTION	RESPONDENT #1	RESPONDENT #2	RESPONDENT #3
2. Do you have any suggestions on how we make sure we are providing transportation facilities in an equitable way and that we are considering the needs of the entire community, including typically underserved and disadvantaged groups?	*Expanding pedestrian, bicycle, and transit infrastructure to serve everyone's destinations is the best way to provide equitable transportation. Cars are expensive to purchase and maintain; living without one should be a feasible option.*	*Expanding pedestrian, bicycle, and transit infrastructure to serve everyone's destinations is the best way to provide equitable transportation. Cars are expensive to purchase and maintain; living without one should be a feasible option.*	*More education on existing options, maybe a more consistent booth at the farmers market and/or articles in the paper and making it clear where to flag needs or provide suggestions. Community Facebook groups in the area (and Nextdoor) seem fairly active so a social media education campaign could help spread the word more than just an add in the Auburn reporter (which by the way was misleading ad. I thought it was for city wide feedback but all these questions are transportation specific).*
3. Do you have suggestions on how we should prioritize limited funding for the wide range of transportation needs throughout the City?	*I think non-motorized projects should be prioritized over most projects that serve private cars. It's cheaper to add new bike lanes than it is to add new car lanes. And if we can get enough people out of their cars, we won't even need to expand road capacity!*	*All road repaving effort must add infrastructure for unrepresented road users like bicycles. Per a comprehensive plan for a connected network. Change zoning to create 15 minute neighborhoods.*	
4. Do you have any other comments about transportation in Auburn?		*All road repaving effort must add infrastructure for unrepresented road users like bicycles. Per a comprehensive plan for a connected network. Change zoning to create 15 minute neighborhoods.*	

This page left intentionally blank

Active Transportation (Non-motorized, Walking or Biking) General Traffic Issues Safety

COMMENTS ON THE INTERACTIVE MAP

COMMENT	CATEGORY	PIN/LOCATION
Perhaps a traffic light at A St SE & 21st St SE? This seems like a fairly busy intersection and I see a lot of people making somewhat dangerous turns.		A St SE & 21st St SE
Southbound C Street SW can get very congested at Ellingson Road during peak hours. Maybe consider adding an additional southbound left turn lane. Though, due to capacity constraints, this may require careful coordination of the C Street and A Street signals.		C St SE & Ellingson Rd
Consider bike lanes on Evergreen Way SE! The road lanes are too narrow to fit a bike and car simultaneously, and the sidewalk is too narrow to comfortably fit a bike and pedestrian simultaneously. I used to bike on this road frequently as part of my commute to school, and this caused problems for me.		Evergreen Way SE
On Kersey Way SE between Stuck River Dr and 50th St SE, there is a mismatch between the design speed of the road and the posted speed limit. Most of the vehicles on the road travel significantly faster than the posted speed limit of 35 mph, because the geometry and environment of the road puts the comfortable driving speed much higher. This should be fixed by either raising the speed limit to reflect the actual speed of traffic, or by adding traffic calming measures to make drivers slow down.		Kersey Way SE
The portion of Kersey Way SE between 50th St SE and the White River currently lacks non-motorized access. There should be a path for pedestrians and cyclists running parallel to this road on its west side. As someone who lives near 50th St, this would make it much more convenient for me to bike to school or downtown.		Kersey Way SE
The sidewalks are poor quality and in some places overgrown. Makes it difficult for anyone handicapper, strollers etc. to get around. There are several elderly residents on this road so would be nice to see some meaningful repair work done, not some more griding that literally did nothing to improve conditions. The street was skipped over for paving as part of the larger paving project in the area, which made sense but the sidewalks are a big miss for the area and promoting walkability.		L St SE between E Main St & 2nd St SE

 Active Transportation (Non-motorized, Walking or Biking)

 General Traffic Issues

 Safety

COMMENTS ON THE INTERACTIVE MAP

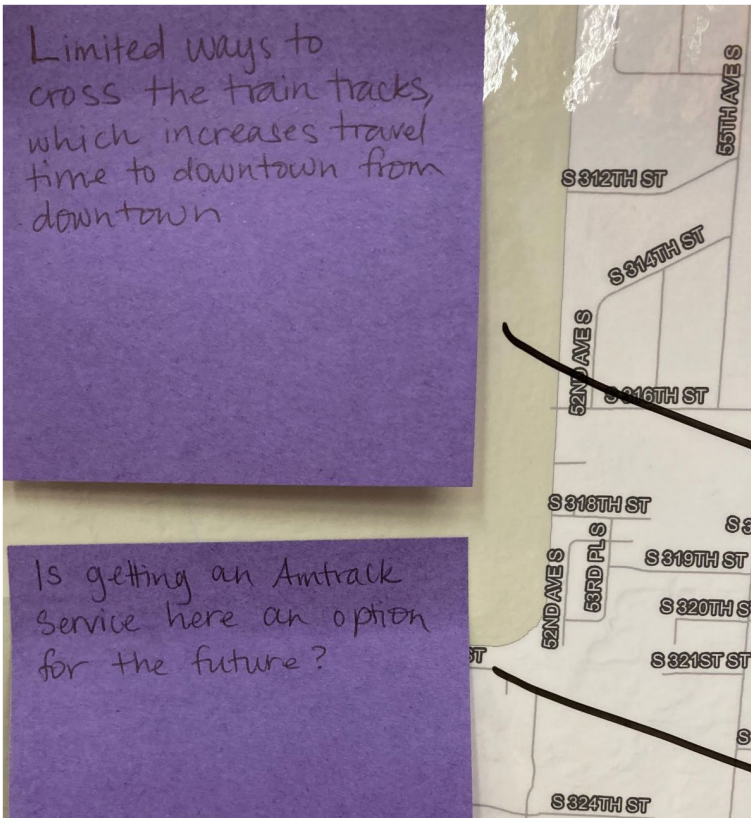
COMMENT	CATEGORY	PIN/LOCATION
Everyday I cross this intersection; everyday drivers fail to yield to pedestrians. Particularly drivers waiting to turn left ignore children AND adults in the crosswalks. Drivers even do this with the crossing guard waiving their flag! Several changes would make this intersection safer. Time the light to treat pedestrians with respect. Give us the time to cross the street without fear of drivers by keeping all lights red and making right turn on red illegal and left turn only on green arrow. For human behavior it seems best to make this 24 hour policy instead of only before and after school hours. That would be a big improvement without much expense. What is really appropriate for a pedestrian area like this is a traffic circle with raised crosswalks to return the right-of-way to pedestrian and bicycle modes.		Lakeland Hills Way SE & Evergreen Way SE
Because of high volumes of vehicular and pedestrian traffic, it may be wise to consider prohibiting right turns on red at the Lake Tapps Pkwy/Lakeland Hills Way intersection to improve safety.		Lakeland Hills Way SE & Lake Tapps Pkway E
The all-way stop at 29th St SE and M St SE can sometimes get congested or confusing. Maybe consider installing a roundabout instead, to improve safety and traffic flow. I'm no traffic engineer, but traffic patterns seem to be well-suited for a roundabout.		M St SE & 29th St SE
Maybe replace the all-way stop at 37th St SE and M St SE with a roundabout. Most people are making the same turn; right onto westbound 37th, or left onto northbound M. A roundabout would allow both of these movements to occur simultaneously without everyone having to stop.		M St SE & 37th St SE
The intersection of Sumner-Tapps Hwy E and 16th St E seems like a good place for a roundabout. From what I can tell, the traffic patterns here are more sporadic, making it a good fit for a roundabout to improve traffic flow and safety. Though, I understand that this intersection probably isn't a high priority for the city.		*Sumner Tapps Hwy E & 16th St E*

Comprehensive Plan Open House

Organized by the Community Development Department, this event was intended to inform the community about the update to the City's Comprehensive Plan, on April 25, 2023 from 4 pm to 7 pm, at Washington Elementary School. Transportation Staff was present to share information and engage with attendees on the Comprehensive Transportation Plan, which is the Transportation Element of the Comprehensive Plan.

Figure 17. Open House Photos







Other Events

Staff hosted a celebration station on **Bike Everywhere Day**, on the Interurban Trail at the West Main Street entrance to encourage cyclist and active transportation in Auburn, as an alternative to driving, as part of the CTR / TDM work. At the same time, staff took advantage of this event to also engage with cyclists on the plan update and the survey.

Staff displayed information at the **Kids' Day** event on June 23, 2023, to let the community know about the plan, and share information about the survey.

Staff reserved a booth and engaged with the community at the **Auburn Farmer's Market** on July 23, 2023, from 10 am to 3 pm.

Staff reserved a booth and engaged with the community at the **Church of Nazarene**, who was hosting a resource fair for families with free backpacks and school supplies in partnership with the Auburn Kiwanis on August 5, 2023, from 11 am to 2 pm.

Figure 18. Other Outreach Event Photos

Bike Everywhere Day



Farmer's Market



Kids' Day



Church of Nazarene Kiwanis Event





Public Comments from Outreach Events

Comments collected at all of our public outreach events are summarized in the table below and categorized by type:

Pedestrian Bicycle Transit Safety Parks

COMMENT	CONTEXT/ CLARIFICATION	COMMENT TYPE
Open House (April 5, 2023)		
1. *Dedicated and protected bike lanes needed. It's hard to feel safe if the bike lanes are not protected, as there are A LOT of distracted and bad drivers.*	*Comment was Auburn in general, not related to one specific location.*	Bicycle
2. *Need street lights, especially brighter LED lights as it's hard to see people at night.*	*Comment referring to neighborhood downtown, to the west of the BNSF tracks, south of Main St.*	Safety
3. *Is getting an Amtrak service an option for the future?*		Transit
4. *Limited ways to cross the train tracks, which increases travel time to downtown from downtown*	*Referring the access from the west side of the tracks to the core downtown area.*	Transit
5. *Need to improve safety and the perception of safety downtown.*		Safety
6. *Need to better enforce traffic laws and improve bike and pedestrian visibility at intersections downtown.*		Safety
7. *The 4-way stop by Zola's (Main St /D St) lacks compliance and there is a concern about pedestrian safety when crossing.*		Safety
8. *Bus shelters are not welcoming. We need shelters and seating to encourage riders, and need to address safety at bus stops, such as transient camps and unwanted activity taking place in bus shelters.*		Transit
9. *The interurban trail is not welcoming anymore; there is trash and homeless camps*		Pedestrian Bicycle
10. *There is lots of trash downtown - garbage bins were removed and people don't have places to throw away trash, so it's all over the sidewalks. This makes the sidewalk less appealing and less comfortable to walk downtown.*		Pedestrian
11. *Bathrooms are closed in downtown parks. It is not equitable when other parks out of downtown have access to bathrooms, but not downtown residents and families.*		Parks

(Continued on next page)

Pedestrian Bicycle Transit Safety Parks

COMMENT	CONTEXT/ CLARIFICATION	COMMENT TYPE
Bike Day (May 19, 2023)		
1. *The Interurban trail needs to be repaved.*		Pedestrian, Bicycle
2. *Accessing the Interurban Trail from the grocery Outlet area is difficult.*		Pedestrian, Bicycle
3. *Suggestion to replicate event from Seattle, where 8 miles of Lake Washington Boulevard are closed to traffic on Sundays for bicycles to ride. Something like this would be great in Auburn.*		Bicycle
4. *Corner radius in ADA compliant facilities should also accommodate bike turning radius, as sharp corners are challenging for bikes*		Bicycle
5. *Streets need to be bicycle friendly in general. Bike lanes with RPMs, rumble strips, or delineators would make it much more comfortable for cyclists. Solid curb is not ideal, however, as it presents a challenge to get out of the bike lane.*		Bicycle
6. *Bike lanes need to be cleaned regularly, and also plowed when there is snow.*		Bicycle
7. *Suggestion to extend the Interurban trail to Tacoma.*		Bicycle
8. *Auburn needs more protected bike lanes along large or busy roads.*		Bicycle
9. *Suggestion to look at Denver's bike network - they are a great model with a good bike network that connects Denver to any surrounding suburbs. The network is continuous, comfortable, and safe.*		Bicycle
10. *It would be great to connect the Green River Trail to the Interurban Trail.*		Bicycle

(Continued on next page)

Bike Day



Pedestrian Bicycle Transit Safety Parks

COMMENT	CONTEXT/ CLARIFICATION	COMMENT TYPE
Bike Everywhere Day Celebration Station (May 17, 2024)		
1. *There needs to be a connection between the Interurban Trail and the Sumner Link Trail.*		Pedestrian, Bicycle
2. *The trail condition on the Interurban Trail needs improvements, particularly the southern portion of the Interurban.*	*Comment is not specific to the portion of the Interurban in Auburn, but also pertains to portions of the trail outside of Auburn*	Bicycle
3. *The pavement quality of the Interurban Trail is poor, particularly from W Main St to 15th St SW*		Bicycle
4. *There should be restroom facilities on the Interurban Trail.*		Pedestrian, Bicycle
5. *There needs to be a better bicycle connection between Auburn and Federal Way*		Bicycle
6. *There needs to be better pedestrian facilities on W Valley Hwy*		Pedestrian
7. *There is no bus connection between W Valley Hwy and Auburn Station. People who work along W Valley Hwy have to walk to Auburn Station to get the train.*		Transit
8. *There should be water fountains along the Interurban Trail*		Pedestrian, Bicycle
9. *Make sure there are traffic calming features and RRFBs at trail crossings*		Bicycle
Senior Center Tabling (May 21, 2024)		
1. *There is a safety concern for pedestrians when walking under Hwy 18; there are many homeless people there making it feel unsafe.*		Pedestrian, Safety
2. *During the winter, there is often ice near the bus stop by the downtown Safeway. Please make sure that ice is clear near bus stops.*		Transit, Safety
3. *There is no transit access to Mary Olsen Farm; would like a bus route that goes there.*		Transit
4. *Drivers often don't see pedestrians during blinking yellow left turn signals.*		Pedestrian, Safety
5. *I generally have a good pedestrian experience walking around Auburn in terms of sidewalks and ramps.*		Pedestrian

(Continued on next page)

Pedestrian Bicycle Transit Safety Parks

COMMENT	CONTEXT/ CLARIFICATION	COMMENT TYPE
Farmer's Market (July 23, 2023)		
1. *Need easier / more affordable way to get to airport (SeaTac).*		Transit
2. *Parking garage for Sounder Train gets full early, and it's difficult to find parking to ride the train, unless arriving very early. There is no alternative parking available.*		Safety
Church of Nazarene One Community Kiwanis Event (August 5, 2023)		
1. *It is difficult for elderly residents to get around when they have mobility challenges.*		Safety
2. *Need to improve safety for kids to get to and from schools, parks, and around the neighborhood.*		Pedestrian, Bicycle
3. *The Government should not tell people what to do and let people chose to drive if that is what they want.*	*Comment related to the question "how to encourage people to walk, bike, and use transit."*	Pedestrian, Bicycle
4. *The City needs to install more roundabouts, and replace traffic signals with roundabouts.*		Safety

(Continued on next page)

Pedestrian Bicycle Transit Safety Parks

COMMENT	CONTEXT/ CLARIFICATION	COMMENT TYPE	LOCATION
OMS Requests (Comments are Summarized)			
1. *At the intersection of M St SE & 21st St SE, there are concerns about speeding and stop sign compliance. Multiple residents have complained about crashes resulting in both injuries and property damage. They've also voiced concern about this due to it's proximity to schools.*	*We have received 13 requests for this intersection: R41232, R41186, R39846, R39650, R39529, R39519, R39511, R39398, R39262, R38041, R37045. R36674, R34364*	Safety	M St SE & 21st St SE
2. *At the intersection of 112th Ave SE and SE 284th St, there have been requests about speeding and a request for a roundabout at this location to help with pedestrian safety concerns.*	*R399390*	Safety	112th Ave SE & SE 284th
3. *Stop compliance concern at W St NW & Terrace Dr/S 316th St*	*R39982*	Safety	W St NW & Terrace Dr/S 316th St
4. *Concern about speeding and the left turn at 124th Ave SE & SE 284th St. Requests a street light at this location.*	*R40588*	Safety	124th Ave SE & SE 284th St
5. *Concern about the road condition on 37th St NW between I St NE and the Interurban Trail. Would like the condition of the road improved for bicycles.*	*R41651*	Bicycle	37th St NW
6. *Concern about pedestrian safety at the intersection of SE 304th St and 116th Ave SE.*	*R42770*	Pedestrian, Safety	SE 304th St & 116th Ave SE
7. *Would like sidewalk along SE 304th St between 112th Ave SE and 116th Ave SE.*	*R42772*	Pedestrian, Safety	SE 304th St between 112th Ave SE & 116th Ave SE
8. *Concern about safety on Lea Hill Rd between 104th Ave SE and 112th Ave SE. Requests additional safety features, such as street lights, turtles, warning signs, etc.*	*R42796*	Safety	Lea Hill Rd between 104th Ave SE and 112th Ave SE
9. *Concern about safety at the AWS & SR-18 interchange. Reports that many drivers wait too long to get into the left turn lanes, stopping abruptly in the through lanes and cutting in front of other drivers.*	*R43047*	Safety	AWS & Sr-18 Interchange

(Continued on next page)

Pedestrian Bicycle Transit Safety Parks

	COMMENT	CONTEXT/ CLARIFICATION	COMMENT TYPE	LOCATION
Emails and Other Feedback (Comments are Summarized)				
1.	*When prioritizing bike facility projects, instead of focusing only on feeding into transit and larger trails, the City should also look at destinations within the city and how cyclists get to those destinations.*		Bicycle	General
2.	*A St SE should have bike lanes.*		Bicycle	A St SE
3.	*M St SE should have its bike lane extended all the way up to Les Gove.*		Bicycle	M St SE
4.	*37th St SE should have a bike lane, to complete a grid of bike lanes to make biking feasible in south Auburn.*		Bicycle	37th St SE
5.	*Would like bike lanes on Auburn Way, both North and South.*		Bicycle	AWN & AWS
6.	*Concerned about the lack of bike lanes on Evergreen Way SE between Lakeland Hills Way & Kersey.*		Bicycle	Evergreen Way SE
7.	*Concern about speeding and pedestrian safety on crosswalks crossing Evergreen Way.*		Pedestrian, Safety	Evergreen Way SE
8.	*Concern about speeding on 21st St SE near Shaughnessy Park*		Safety	21st St SE east of Hemlock
9.	*Would like sidewalk or wider shoulder on 53rd St SE east of Kersey for better pedestrian and bicycle access.*		Pedestrian, Bicycle, Safety	53rd St SE east of Kersey
10.	*Would like speed cushions on 22nd St SE between M St SE and R St SE. Would like street to be safe enough for children to play in.*		Safety	22nd St SE between M St SE & R St SE
11.	*Does not think the R St widening project will have any benefit*		General	R St SE
12.	*Does not think the R St SE/21st St SE roundabout will have any benefit*		General	R St SE & 21st St SE

(Continued on next page)

Pedestrian Bicycle Transit Safety Parks

	COMMENT	CONTEXT/ CLARIFICATION	COMMENT TYPE	LOCATION
13.	*The AWS/17th St SE/M St SE intersection improvements project will create inconveniences for accessing AWS and M St NE from her neighborhood*		Pedestrian, Safety	AWS/17th St SE/M St SE
14.	*Would like sidewalk on S 298th/65th Ave S/ S292nd, which connects 64th Ave S to W Valley Hwy.*		Pedestrian, Safety	S 298th St/65th Ave S/S 292nd St
15.	*Would like to see a speed enforcement camera on AWS at the bottom of the hill northwest of the casino.*		Safety	AWS
16.	*Would like the White River Trail to connect to the right bank of the White River in the Pacific Right Bank Flood Protection Project, crossing A St SE and the BNSF tracks.*		Bicycle	White River Trail
17.	*There is a lack of bicycle crossings across AWS between D St SE and M St SE.*		Bicycle	AWS
18.	*There is a lack of bicycle facilities on I St NE between 40th St NE and 45th St NE*		Bicycle	I St NE between 40th St NE & 45th St NE
19.	*Would like a signalized (RRFB) crossing of 8th St NE at Pike St NE/Henry St NE*		Bicycle	8th St NE & Pike St NE/ Henry St NE
20.	*A list of locations where signals do not detect bicycles was sent to the City.*		Bicycle	General
21.	*Concern about speeding on Evergreen Way SE near Lakeland Hills Elementary.*		Safety	Evergreen Way SE near Lakeland Hills Elementary
22.	*Concern about speeding and possible sight distance issues on Evergreen Way SE, particularly near 56th St SE and Bennett Ave SE.*		Safety	Evergreen Way SE

All Project Ratings

PROJECT/ COMP#	PROJECT NAME	AVERAGE RATING	NUMBER OF RATINGS	NOTES
	N/A (General)	4.00	1	
20	C St NW & 3rd St NW Intersection Improvements	5.00	1	
15	15th St NW & M St NW Access Management	4.00	1	
3	I St NE & 37th St NE Intersection Improvements			
17	S 316th S & 51st Ave S Intersection Improvements	4.00	1	
6	SE 304th St & 112th Ave SE Intersection Improvements	5.00	1	
7	SE 304th St & 118th Ave SE Intersection Improvements	3.00	1	
26	A St SE & 12th St SE Intersection Improvements	4.50	2	
2	Auburn Way N & 42nd St NE Intersection Improvements			
1	Auburn Way N & 45th St NE Intersection Improvements			
5	I St NE & 30th St NE Intersection Improvements			
8	SE 304th St & 116th Ave SE Intersection Improvements			
18	S 321st St & 44th Ave S/46th Pl S Intersection Improvements			
27	A St SE & 21st St SE Intersection Improvements	4.00	1	
16	S 316th St & 56th Ave S Intersection Improvements	3.00	1	
28	Lakeland Hills Way SE & Oravetz Rd SE Corridor and Intersection Improvements			
12	Pike St NE & 8th St NE Access Management			
22	Auburn Way S, M St SE, 17th St SE Intersection Improvements	1.90	21	*Ratings where either 4/5 or 1/2. No 3s*
23	M St SE & 12th St SE Intersection Improvements	4.00	1	
9	Lea Hill Rd Corridor Improvements (104th Ave SE - 112th Ave SE)			

(Continued on next page)

PROJECT/ COMP#	PROJECT NAME	AVERAGE RATING	NUMBER OF RATINGS	NOTES
10	Auburn Way S & 6th St SE Improvements (SR 18/ SR 164 Interchange)	5.00	1	
19	A St NW & 3rd St NW Improvements	5.00	1	
14	10th St NE Improvements (B St NW - Auburn Way N)	5.00	1	
11	116th Ave SE & SE 320th St Intersection Improvements			
9	Lea Hill Rd Corridor Improvements (SE 312th St from 112th Ave SE to 124th Ave SE)	5.00	1	
24	M St SE & 29th St SE Intersection Improvements			
21	M St SE By-Pass Rd (M St SE By-Pass & SE Auburn-Black Diamond Rd)	2.77	36	*14 prefer Option A; 24 prefer Option B; 5 don't like either option*
21	M St SE By-Pass Rd (M St SE By-Pass & SE Auburn-Black Diamond Rd)	3.54	35	*14 prefer Option A; 24 prefer Option B; 5 don't like either option*
3	I St Improvements (37th St NE - 45th St NE)	5.00	1	
13	8th St NE Improvements Project (Auburn Way N - Harvey Rd/M St NE)	5.00	1	
25	A St SE Projects	4.63	8	

AWS, 17th St SE, M St SE Project Ratings

RATING	COMMENT
1	*If you filter southbound M St SE traffic to 17th St SE, it will impact the residential area between 17th St SE and 21st St SE next to the middle school and overflow 21st St SE traffic. The right turn a car has to make from M St SE onto 17th St SE is what slows traffic going through the lights! There needs to be a light at M St SE and 21st St SE. Also, people going north from this end of town, who normally take M St SE will have to take R St SE and you also need a traffic light at R St SE and 21st St SE to handle that. During the evening rush hour, it's very difficult to get on R St going north to wind around, get on Auburn Way S for 1/2 a block and try to turn north onto M St SE. Come up with a better plan to not choke out R St SE, because this one you present will become an instant nightmare in a very wide area of southeast Auburn. A freeway exist running up to the Muckleshoot area of Auburn Way S, from the M St SE area under Hwy 18 would be a good spot for an exit! That would relieve traffic coming down M St SE to get to Auburn Way S and beyond.*
n/a	*The cul-de-sac will promote tent camping as there are no houses like a normal cul-de-sac. Let me just tent behind the Walgreens. And the antique store that already has a lot of theft will become a bigger target.*
n/a	*I have a lot of concerns. Will there be any public meetings or can I come down to see a whole plan? Do not block off and make a cul-de-sac of M St SE between 21st and 17th. All your improvements are pushing speeding traffic down neighborhood streets with no alternatives. If you close off M St SE between 21st and 17th, where is all the traffic supposed to go? Also, people in my area will now be forced into more traffic since there will be fewer options to get to the other side of town. Bad idea!*
5	*I am excited to reduce traffic in the residential area on and around M St SE. We have new schools in the area and a lot of kids walk to school. I live on the corner of M St SE and 21st St SE and I cannot count the number of accidents that have occurred and the number of near misses at this 4-way stop. It is a nonstop flow of traffic.*
5	*I live on the corner of M St SE and 21st St SE. Day and night, I hear cars spinning out and loud music. Oftentimes, people blow through the stop sign and cause accidents, one of which damaged our front fence. I believe the cul-de-sac will be the most beneficial for my family and everyone in this area! Thank you for this proposal, and I hope they all pass!*
1	*How am I supposed to get home when I live further south on M St SE?*
1	*I live on 23rd st SE. It is almost impossible to get out on R St SE to get to Auburn Way S in the morning, so I go to M St SE to get across Auburn Way S to get to work on the north end of town. This is going to force me and countless others to go through the school zones during the start of school and increase our time and fuel costs. Once in a while I will go to A St SE and the amount of inconsiderate parents dropping their kids off in the middle of the road is insane, all so they don't have to pull off the road and fight their way back in. My opinion is this will end in disaster.*
4	*I appreciate the multiple options provided. The lane being utilized for multiple left/right options makes the most sense to me.*
4	*Not a fan of the cul-de-sac on M St SE south of 17th St SE. It would cut off the direct access to Auburn Way S and M St SE from 21st St SE.*

(Continued on next page)

RATING	COMMENT
1	*I know it will make no difference since you will go through with these plans, but not having access to crossing Auburn Way S from M St SE is really an inconvenience to the hundred if not thousands of people that use it now. Change can really stink and this one is not helping.*
1	*Northbound coming from Lakeland, Lake Tapps, and Bonney Lake will only have R St SE/17th St SE to get on Auburn Way S instead of also having the option of M St SE. 17th St SE already backs up for blocks to get onto Auburn Way S. There will need to be a light at the bottom of Auburn Way S at 17th St SE for traffic from 17th St SE to get onto Auburn Way S. Also, how will fire trucks get through from the fire station onto Auburn Way S if 17th St SE is backed up? For southbound traffic, there needs to be a light at Howard Rd onto R St SE, as this already backs up onto Auburn Way S. Additionally, the pedestrian crossing at M St SE (from the church to Starbucks) is very dangerous. Needs to be "no vehicle turn on red" from Auburn Way S onto M St SE. Also, making M St SE a dead end is a horrible idea - there are only 3 north-south roads through Auburn.*
1	*No northbound traffic from M St SE to westbound AWS is a huge mistake. Putting in a cul-de-sac on M St SE is a nightmare waiting to happen. I suggest you put in a light at the intersection just south of the fire station on R St SE for everyone trying to make a left turn. I'd rather not ever shop in that area of Auburn since the access is so limited to go west on AWS. Also, this intersection was remade to its current flow to reduce accidents from cars attempting to cross over AWS at 17th St SE. Dead ending M St SE is a huge mistake. I'd rather see a roundabout for better traffic flow.*
4	*The 12th St SE signal with a u-turn? This isn't clear to me. Will there be a crosswalk at 12th? Will 12th ever go through to this land use that is being discussed at the miles sand pit?*
1	*Auburn Way S traffic up toward Muckleshoot and Enumclaw has gotten out of hand. The amount of incidents, traffic violations, and growing traffic is unbearable. Turning M St SE into a dead end doesn't seem like the correct answer. It seems like a cost effective, short sighted solution to a big problem.*
1	*By stopping northbound traffic from M St SE onto Auburn Way S, you did not provide a safe way for residents to access Auburn Way S from the streets west of Game Farm Park. This forces traffic onto R St SE, which means all those streets must make left turns and then go behind the apartments on Howard Rd to merge onto Auburn Way S without a traffic light. Or they will be forces to make a left turn at the four-way stop on 21st and then back track in order to turn onto 17th St SE. While this plan may move more volume, it totally ignores the current residents who live in this community.*
1	*This is not an improvement for traffic at all. M St SE is a major through road to reach the south end of town for families.*

(Continued on next page)

RATING	COMMENT
1	*This proposal, in my opinion, is not favorable to the citizens of Auburn whatsoever. I am a router for the Auburn School District and design the bus routes that travel these roads. This proposal would add significant costs, delays, and additional traffic to the intersection of Auburn Way S & M St SE. For our buses transporting students between all north end and south end schools, this would add significant delays where we wouldn't be able to make it to schools on time. Our bus fleet travels north and south on M St SE as the quickest way to access schools in north Auburn, mid-town, Lea Hill, and all the schools on the south end of Auburn. Eliminating access on M St SE from Auburn Way S to 21st St SE will cause major delays. Personally, I can't really believe it is being considered. We have bus stops at EJ Square (1210 M St SE) and if the eastbound left hand turn lane on Auburn Way S is eliminated, we will not be able to access this development. This is not even counting all the buses we have doing field trips that use that road to and from all the south and north schools. We have at least 30 routes that turn off Auburn Way S to 17th St SE. We have 23 routes that use R St SE and 17th St SE. We already have 22 buses that go from H St SE to 17th St SE to G St SE to 12th St SE to Auburn Way S. If you close M St SE, that will cause over 100 buses to use the neighborhood streets and we already get complaints when we use some of them.*
1	*This will make traveling north from our home on 25th St SE next to Pioneer Elementary very difficult. K St SE is already crowded in the morning. People park when dropping off kids and it's unsafe. This appears to make K St SE the only way out of our neighborhood. This plan will make traveling out of and in to south Auburn more congested.*
1	*The blocking off of M St SE from 21st St SE to 17th St SE is totally unacceptable! Having to use the neighborhood side streets to reach Olympic Middle School, Pioneer Elementary, or 17th St Plaza Retirement Center is not acceptable for emergency teams or school buses. Has anyone asked the police/fire departments about having to respond when more than one unit has to go there? The traffic on R St SE/17th St SE is already a major back up at the AM rush hour and so is the PM traffic on the road in front of the shopping center (Walgreens) connecting to R St SE. You think their deliver trucks can square the blocks through the 21st St SE neighborhoods? That short expanse of M St SE from 17th St SE to 21st St SE is a relief for the back ups at R St SE in the am/pm and so does the right hand turn of Auburn Way S to 17th St SE. Having them available decreases the response time for additional units coming into the SE Auburn area. This plan is a safety risk for the 21st St SE/R St SE/17th St SE/29th St SE residents.*
1	*The dead-end of M St SE does not make sense. It will cause increased traffic for nearby residential areas and a school zone. I do not understand the rationale. A better solution would involve adjusting the traffic light sequencing. No explanations for the changes have been presented. The communities south of 17th St SE will be negatively impacted. More thought needs to be given to the proposal, with better reasons given.*

A St SE Projects

RATING	COMMENT
5	*I believe that such improvements are needed on A St SE.*
4	*Yes, I think they need to add a road under the railroad tracks. Ellingson Rd is impossible at 3:00pm to 6:00pm in the afternoon. We cannot get in or out of our neighborhood. All of the traffic going to Lakeland Hills blocks us from leaving or coming home. So many people use that intersection. They don't follow the traffic light rules and block the intersection. It is definitely overrun with excessive traffic. There needs to be a separate road to cross over to A St SE.*
4	*I like it but we need serious help with the Skinner Rd and Ellingson Rd intersection. The traffic is backed up at the light going eastbound and it blocks the intersection. We have to drive around cars to continue on Ellingson northbound through the very short green light. It's been dangerous and dreadful whenever I leave my house on 2nd Ave NE during rush hours.*
4	*All around, this is a pretty good plan with sensible safety improvements. A few notes: 1) the illustration does not depict any bike lanes/paths along A St SE. This project should include quality bicycle facilities along the corridor; they would fill a crucial gap in the bike network and would make the proposed tunnel more useful. 2) It's unclear from the illustration if the existing median on Ellingson Rd will remain. If ti will, it may be worth considering allowing u-turns from eastbound Ellingson so eastbound traffic can access the shopping center with the Dominos and Starbucks. 3) For pedestrian safety, I'd recommend keeping the existing no turn on red restriction. 4) The sidewalks don't look particularly safe or pleasant to walk on since they're right up against the travel lanes. Consider adding some extra space between the road and sidewalks; this would have the additional benefit of not detouring pedestrians as much around the u-turn pockets.*

M Street Bypass Project Ratings

OPTION A RATING	OPTION B RATING	PREFERRED OPTION	COMMENT
3	5	B	*I live on 5th St NE and initially gravitated toward option A, but then as I read through the logic of Option B, I was swayed. My biggest complaint about my neighborhood is that it's not very walkable because it is cut off by several busy streets and people speed up and down R St. Not to mention I find the train horns to be a mild nuisance. I would love to live in a quieter, more walkable neighborhood and taking two extra minutes to drive a couple blocks further when I need to use that highway exit is most certainly worth that. Let's make this a more walkable, more connected city!*
n/a	n/a	B	*Option B looks best. It might move some traffic from residential streets to minor arterials. Also removes an at-grade railroad crossing. There are alternative routes to get access to Hwy 18, so no problem there. Please consider a roundabout instead of a new signal at the new M St SE intersection.*
3	5	B	*I live near there and the trains not sounding their horns sounds like a great idea to me.*
5	2	A	*Concern is losing access to Hwy 18 with Option B for us who take this everyday instead of Lea Hill or downtown Auburn. I vote for Option A because it is an additive with less negative due to opening up driving opportunities, improving train safety, and benefiting the community around it. 100% for train safety as we do not want a derailment ever.*
1	5	B	*Currently, the traffic along R St SE to Black Diamond Rd encourages some drivers to rev their engines, speed, and make a lot of noise, all of which is detrimental to the residents and community that neighbors R St SE. Option B would eliminate this nuisance and improve the quality of life for everyone along R St SE and neighboring streets. Currently, it is risky to walk along R St SE as a pedestrian, out for a stroll. Option B would make the walk far more pleasant and also better for bicycles. Bicycle traffic currently is dangerous and hazardous for both cyclists and motorists.*
1	5	B	*I've lived in this neighborhood for almost 30 years and experienced a decline in quality of life due to increased traffic on R St SE due to noise and pollution. The train hons continue to be a nuisance, especially at night. The closing of R St SE (Option B) would be a blessing to the neighborhood, restoring some peace and tranquility, preserving the residential character of the area. I fail to see the practical feasibility of Option A. R St south of E Main St is a narrow two-lane street, no sidewalks, minimal shoulder, lined with homes. The front yards of these homes are shallow. There is no space to widen the road. A further increase in traffic, as projected, would be disastrous for the residents of this area. Traffic delays would still occur at the redesigned railway crossing. I don't know anyone who would feel inconvenienced by driving a few extra blocks to reach Auburn Black Diamond Rd. Funneling traffic to M St SE makes more sense as M St SE is well-established as a major arterial.*
1	4	B	*The statement says we currently enjoy easy access to Hwy 18. It is much easier to go up over Lea Hill and enter the highway there. I would rather do that than to continue to endure the extra load of trucks that Option A would bring to our neighborhood.*
5	n/a	A	*I think it's critical that NE Auburn maintains access through R St.*
n/a	5	B	*We don't need more traffic on R St NE. This would make the 8th St NE and R St NE intersection more of a mess and the 8th St NE road over the bridge to Lea Hill more of a bottle neck.*

(Continued on next page)

OPTION A RATING	OPTION B RATING	PREFERRED OPTION	COMMENT
n/a	n/a	B	*I prefer Option B because Option A would give access to more traffic at high speeds through residential areas. We already have this issue when Hwy 18 is blocked due to accidents.*
5	1	A	*I live outside the city limits on Auburn Black Diamond Rd and use the R St connection to get into Auburn when Hwy 18 is backed up or block and have used it for years! Closing off the R St connection would have a huge negative impact for those of us who live out that way! Having the M St connection in addition to R St would absolutely help give options to easily commute to both north and south Auburn.*
1	3	Neither	*With Option A, it is imaginable traffic flow eventually increasing along R St to make those along it and surrounding areas uncomfortable. The little connector of 4th St SE (from to R) may suffer similarly. Residential streets are not meant as highways. It's better to keep traffic flow on streets already undertaking heavier flow, such as M St. This makes Option B preferable. Yet, Option B's closing older access from 4th to Auburn Black Diamond and train crossing seems overkill. Local access will be lost. Not everyone taking back roads is a distance commuter or looking for shortcuts. It is a mistake to assume so. As for the train horn, Auburn is a railroad town. Train hors are sounding all about. Residing in the very neighborhood of the intersection discussed, it strikes me that spending money on an "inconvenience" that will little effect pervasiveness is wasteful. I prefer a compromised Option B, one with 4th to Auburn Black Diamond and the train crossing remaining open.*
n/a	n/a	A	*My concern is the restriction access to Auburn Black Diamond Rd for neighbors. Being a resident of 4th St SE and T St SE, Auburn Black Diamond provides a quick and necessary route for our children to get to and from school at Lakeview Elementary, especially for emergencies. In addition to accessing recreational areas such as Flaming Geyser Park and community events, family, and friends.*
1	5	B	*I would much prefer to keep our neighborhood quiet and lose the convenient access to 18 than have trucks utilizing R St.*
1	5	B	*I am voting for keeping large volumes of truck traffic out of our neighborhoods. M St is a large street, which is much better suited to such traffic.*
n/a	n/a	Neither	*Option A puts a street in our yard! Option B cuts us off from Hwy 18. Option A, how many drivers are going to run the light? Or speed through our yard? How many more accidents are going to happen in our yard? Option B takes away our road to Hwy 18 or Flaming Geyser State Park. Option B also allows the trains to be longer and idle more next to the houses here. We the home owners have to live with the extra noise, pollution, danger of car crashing our yard, loss of property, and more vibrations. We do not want this! No Option A or B!*
n/a	n/a	Neither	*Neither option benefits the neighborhood. Both options harm the neighborhood that this construction is being planned around.*
1	5	B	*I do not think diverting traffic through a housing neighborhood is a best practices idea. As the old Miles Pit area is developed, this would increase. I dealt with the M St SE underpass project and the traffic that diverted through our neighborhood was obnoxious! Not only did they drive around road closed signs, many of them were speeding while driving through. I would not wish increased traffic through a neighborhood on anyone. We all know that with a new improved road, the speeding would increase and put the residents living in those areas at increased risk.*

(Continued on next page)

OPTION A RATING	OPTION B RATING	PREFERRED OPTION	COMMENT
n/a	n/a	Neither	*I'm not sure what traffic issue is being addressed. Congestion? Rush hour backup? Pollution and accidents? Train horn? Diverting traffic off of M St to push it back onto M St further south doesn't solve much; it only pushes issues further down the line. Adding a traffic signal to M St - this alone will cause more stoppage and congestion. Spending money to eliminate train horns is silly - Auburn is a train hub. Additionally, closing the railroad crossing eliminates local access, potentially increasing incidental traffic on M St. Pollution and accidents will certainly escalate along R St by using it as a diversion thoroughfare. It is easy to speculate, but it would be less so if your purpose was clearer. As it stands, the project seems to be solving a non-existent problem by using Auburn Black Diamond Rd as a catalyst to disregard an entire neighborhood. Dedicated money might be better spent directly connecting Hwy 18 to the top of SR 164 hill at Muckleshoot.*
n/a	n/a	Neither	*Both options hinder the local neighborhood. The planned route saves 2 minutes. Maybe at the cost of a loss of property, more accidents, more noise, and more pollution.*
n/a	1	Neither	*I've lived in this neighborhood for over 15 years. Current traffic volumes and conditions make this a dangerous area to add more vehicles. Current volumes are high enough that a train crossing during peak hours means cars back up and block driveway access all the way down to E Main St. The speed limit is only 25, but folks drive too fast and take out street signs, trees, and last summer even a telephone pole. Most driveways are back in/back out driveways all along R St, which is not great. Option B is not too great either. I can't see why we would want to limit the neighborhood's access to Hwy 18. Aren't the in/off ramps backed up enough during peak hours? I see the intersection at AWS blocked by traffic for the on ramps pretty frequently. Wouldn't decreasing access to 18 make this worse?*
1	5	B	*We do not want more traffic, especially truck traffic, on R St SE.*
1	5	B	*Extending R St to the M St bypass road would negatively impact the quality of life in the neighborhood. The area between M St and the river, and south of 8th St to the railroad tracks is completely residential. R St is a residential street. South of E Main St, it is a narrow two lanes, lined with homes, without sidewalks or shoulders to speak of. There doesn't appear to be much room for widening the street. As such, it is unsuitable for the anticipated increased traffic. The proposed "improvement" to the rail crossing would not eliminate traffic delays as it will remain an at-grade crossing. Current traffic level is a nuisance, as are the frequent train whistles. Most of the traffic is from people outside the neighborhood passing through. This will increase dramatically if R St is extended. The benefits of closing R St - reduced traffic, no train horns - far outweigh the "drawback" of driving a few extra blocks to access Auburn Black Diamond Rd.*
1	5	B	*I am at 19 N St NE in Auburn, and have non-stop traffic down my street all day. My camera records cars every 30 seconds at peak traffic time. I have asked for speed bumps to match the adjacent road for 8 years. We have had two speed studies that show many speeders. I have even offered to pay for the speed bump between myself and the concerned neighbors that have put in many speed concerns on the See-Click-Fix app. Option B seems to be the only one that may lessen people cutting down my road to avoid the light on E Main and M St.*
3	4	B	*We like the reduced cut-through traffic and train whistle elimination of Option B, but a traffic study should be done for westbound E Main St between R St SE and M St first. As it is, we sometimes have difficulty going north and turning left/westbound off of N St SE onto E Main St because of westbound traffic, and Option B would divert more traffic off of R St onto E Main st that would have otherwise continued south on R St to get to Auburn Black Diamond Rd.*

Respondent Demographics

AGE	RACE (SELECT ALL THAT APPLY)	OTHER - RACE (SELECT ALL THAT APPLY)	DISABILITY	COUNTRY OF BIRTH	LANGUAGES SPOKEN AT HOME (SELECT ALL THAT APPLY)
64+	Caucasian		Yes	USA	English
43 to 63	Caucasian			USA	English
64+	Caucasian		No	USA	English
43 to 63	Other	North Africa-middle east	No	USA	Arabic, English
64+				USA	English
22 to 42	Hispanic or Latino, Caucasian		No	USA	English
22 to 42	Caucasian		No	USA	English
64+	Caucasian		No	USA	English
22 to 42	Black or African American, Caucasian		No	USA	English
22 to 42	Asian		No	USA	English
22 to 42	Prefer not to answer				English
64+					
43 to 63	Caucasian		No	USA	English

APPENDIX E

Roadway Classification Changes



IN THIS APPENDIX

New Street Classification Changes by Street Name

ROADWAY CLASSIFICATION CHANGES

STREET NAME	BEGIN	END	PREVIOUS CLASSIFICATION	NEW CLASSIFICATION
S 324th Street	49th Avenue S	51st Avenue S	Local	Collector
62nd Place S	S 300th Street	End	Residential Collector	Local
63rd Place S	S 301st Street	End	Residential Collector	Local
Frontage Road	S 277th Street	44th Street NW	Minor Arterial	Local Industrial
D Street NW	S 277th Street	44th Street NW	Minor Arterial	Local Industrial
D Street NW Extension	44th Street NW	37th Street NW	Planned Minor Arterial	Remove
44th Street NW	Frontage Road NW	End	Minor Arterial	Local Industrial
I Street NW	44th Street NW	37th Street NW	Local	Local Industrial
49th Street NW	B Street NW	Auburn Way N	Non-Residential Collector	Local Industrial
49th Street NE Extension	I Street NE	L Street NE	Non-Residential Collector	Collector
L Street NE	51st Street NE	S 277th Street	Non-Residential Collector	Collector
M Street NW	15th Street NW	Gate	Non-Residential Collector	Local Industrial
M Street NW	Gate	29th Street NW	Non-Residential Collector	(Pending ROW Vacation)
29th Street NW	M Street NW	End	Non-Residential Collector	Private
29th Street NW	West Valley Hwy	End	Local	Local Industrial
26th Street NW	West Valley Hwy	End	Local	Local Industrial
R Street NW	15th Street NW	14th Street NW	Local	Local Industrial
14th Street NW	R Street NW	End	Local	Local Industrial
Pike Street NW	15th Street NW	20th Street NW	Local	Local Industrial
R Street NW	20th Street NW	End	Local	Local Industrial

(Continued on next page)

STREET NAME	BEGIN	END	PREVIOUS CLASSIFICATION	NEW CLASSIFICATION
20th Street NW	R Street NW	West Valley Hwy	Local	Local Industrial
22nd Street NW	R Street NW	West Valley Hwy	Local	Local Industrial
Outlet Collection Ramp	15th Street SW	Outlet Collection Way	Principal Arterial	Local Industrial
Outlet Collection Way (west)	15th Street SW	End	Principal Arterial	Local Industrial
Market Street	15th Street SW	End	Principal Arterial	Local Industrial
Outlet Collection Way (east)	15th Street SW	End	Principal Arterial	Local Industrial
Industry Drive SW	Boundary Blvd	15th Street SW	Minor Arterial	Local Industrial
Perimeter Rd	15th Street SW	End	Non-Residential Collector	Private
Sumner-Tapps Hwy E	Lake Tapps Pkwy SE	City Limit	Principal Arterial	Minor Arterial
55th Street SE	Bridget Ave SE	End	Rustic Collector	Rustic Local
Bridget Ave SE	55th Street SE	53rd Street SE	Rustic Collector	Rustic Local
M Street SE Extension	37th Street SE	41st Street SE	Planned Residential Collector	N/A
28th Street SE	Riverwalk Drive	Forest Ridge Dr. SE	Local	Collector
M Street SE	Auburn Way S	29th Street SE	Minor Arterial	Collector
Hemlock Street SE	Auburn Way S	End	Residential Collector	Local
15th Street SW Extension	C Street SW	A Street SE	Planned Minor Arterial	Remove
F Street SE	4th Street SE	Auburn Way S	Non-Residential Collector	Collector
A Street SW	Main Street	4th Street SW	Non-Residential Collector	Minor Arterial
4th Street SW	A Street SW	S Division St	Non-Residential Collector	Minor Arterial
S Division Street	3rd Street SW	4th Street SW	Non-Residential Collector	Minor Arterial

(Continued on next page)

STREET NAME	BEGIN	END	PREVIOUS CLASSIFICATION	NEW CLASSIFICATION
C Street SW	SR 18 EB ramps	SR 18 WB ramps	Minor Arterial	Principal Arterial
2nd Street SE/SW	Auburn Way North	D Street SE	Non-Residential Collector	Collector
2nd Street SE/SW	A Street SW	Auburn Way North	Non-Residential Collector	Minor Arterial
1st Street SE/SW	A Street SW	A Street SE	Non-Residential Collector	Minor Arterial
G Street SW	W Main Street	3rd Street SW	Non-Residential Collector	Local Industrial
3nd Street SW	E Street SW	G Street SW	Non-Residential Collector	Local Industrial
Lund Road	W Main Street	4th Street SW	Local	Local Industrial
Western St	W Main Street	End	Local	Local Industrial
Clay Street NW	W Main Street	End	Local	Local Industrial
H Street NW	W Main Street	6th Street NW	Non-Residential Collector	Local Industrial
6th Street NW	H Street NW	C Street NW	Non-Residential Collector	Local Industrial
2nd Street NW	D Street NW	H Street NW	Local	Local Industrial
D Street NW	2nd Street NW	3rd Street NW	Local	Local Industrial
3rd Street NW	C Street NW	D Street NW	Local	Local Industrial
1st Street NE/NW	B Street NW	Auburn Way N	Non-Residential Collector	Local
B Street NW	W Main Street	1st Street NW	Non-Residential Collector	Local
4th Street NE	Auburn Way N	M Street NE	Non-Residential Collector	Collector
8th Street NE	Harvey Road/M Street NE	104th Street SE	Minor Arterial	Principal Arterial
D Street NE	15th Street NE	16th Street NE	Non-Residential Collector	Local Industrial

(Continued on next page)

STREET NAME	BEGIN	END	PREVIOUS CLASSIFICATION	NEW CLASSIFICATION
16th Street NE	D Street NE	E Street NE	Non-Residential Collector	Local Industrial
E Street NE	16th Street NE	22nd Street NE	Non-Residential Collector	Local Industrial
E Street NE	22nd Street NE	23rd Street NE	Local	Local Industrial
23rd Street NE	E Street NE	E Street NE	Local	Local Industrial
E Street NE	23rd Street NE	26th Street NE	Local	Local Industrial
26th Street NE	E Street NE	Auburn Way N	Local	Local Industrial
22nd Street NE	E Street NE	Auburn Way N	Non-Residential Collector	Local Industrial
22nd Street NE	Auburn Way N	I Street NE	Non-Residential Collector	Minor Arterial
Riverview Drive NE	M Street NE	22nd Street NE	Residential Collector	Local
22nd Street NE	Pike Street NE	Riverview Drive	Residential Collector	Local
30th Street NE	B Street NW	Auburn Way N	Non-Residential Collector	Minor Arterial
30th Street NE	Auburn Way N	I Street NE	Non-Residential Collector	Minor Arterial
C Street NE	30th Street NE	42nd Street NE	Non-Residential Collector	Local Industrial
42nd Street NW/NE	B Street NW	Auburn Way N	Local	Local Industrial
B Place NW	B Street NW	End	Local	Local Industrial
85th Avenue S	Auburn Way N	City Limit	Non-Residential Collector	Local
37th Street NE	Auburn Way N	I Street NE	Non-Residential Collector	Collector
Green River Road	100th Avenue SE	City Limit	Non-Residential Collector	Rustic Collector
Green River Road	100th Avenue SE	104th Avenue SE	Non-Residential Collector	Collector

(Continued on next page)

STREET NAME	BEGIN	END	PREVIOUS CLASSIFICATION	NEW CLASSIFICATION
105th Place SE	Lea Hill Road	107th Place SE	Non-Residential Collector	Collector
107th Place SE	105th Place SE	SE 320th Street	Non-Residential Collector	Collector
SE 320th Street	107th Place SE	112th Avenue SE	Non-Residential Collector	Collector
116th Avenue SE	SE 316th Street	SE 315th Street	Residential Collector	Local
112th Avenue SE	SE 304th Street	SE 281st Street	Minor Arterial	Collector
SE 281st Street	112th Avenue SE	108th Avenue SE	Minor Arterial	Collector
108th Avenue SE	SE 281st Street	City Limit	Minor Arterial	Collector
SE 304th Street	132nd Avenue SE	City Limit	Minor Arterial	Principal Arterial
SE 288th Street	132nd Avenue SE	End	Local	Collector
SE 286th Street	124th Avenue SE	End	N/A	Local
SE 284th Street Extension	124th Avenue SE	SE 288th Street	Planned Residential Collector	Removed

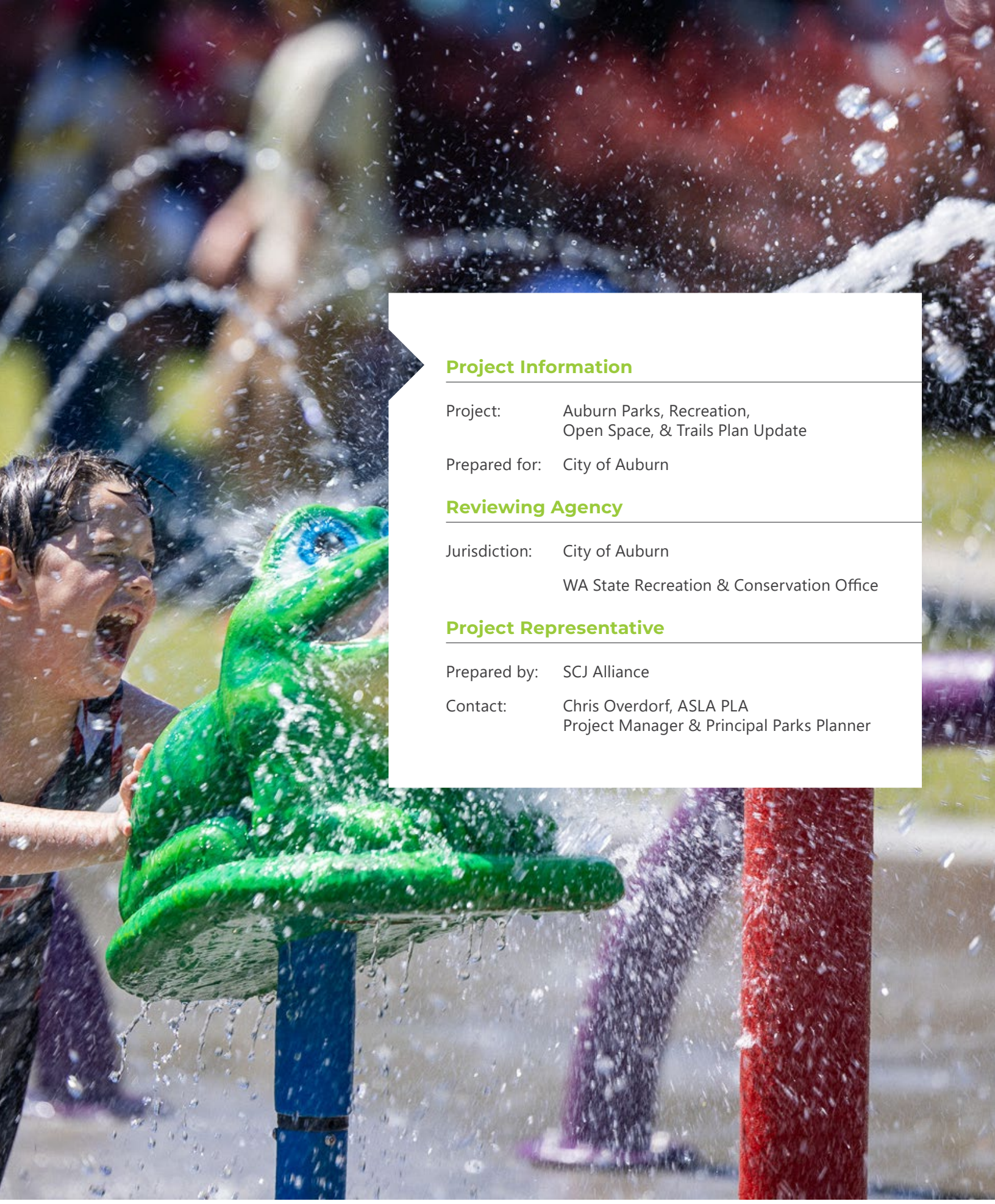


AUBURN

Parks, Recreation, Open Space, & Trails Plan Update

September 2024

CITY OF AUBURN
PARKS, ARTS & RECREATION



Project Information

Project: Auburn Parks, Recreation, Open Space, & Trails Plan Update

Prepared for: City of Auburn

Reviewing Agency

Jurisdiction: City of Auburn

WA State Recreation & Conservation Office

Project Representative

Prepared by: SCJ Alliance

Contact: Chris Overdorf, ASLA PLA
Project Manager & Principal Parks Planner



Table of Contents

Introduction 9

Purpose 10

Regulatory Requirements 11

Process 13

Inventory & Assessment 13

INVENTORY & ASSESSMENT 14

Planning Context 15

Physical Context 15

DEMOGRAPHIC CONTEXT 17

System Inventory 19

Public Involvement 42

Engagement Goals 43

Public Engagement Plan Overview 44

Age Range 46

Ethnicity 46

Household Size 46

Home Location 47

Neighborhood of Residence 47

Frequency 48

Length of Visit 48

Season 48

Types of Facilities Used 48

Recreational Facility Use 49

Recreational Facilities Outside Auburn 51



Barriers to Use 51
The City Needs 52

Demand & Needs 54

Quantifications vs Qualifications 55
Park Equity & Access 56
The "10-Min Walk" Metric 56
Recreation Trends 56
Level-of-Service (LOS) 63

Goals & Objectives 71

Capital Improvement Program 77

Developing The Capital Improvement Program 79

Park Impact Fee Analysis 103

Approvals 107

Adoption Process 108
Council Resolution 109

A - Terms & Definitions 117

B - Standards & Guidelines 119

C - Park Needs & Assessment Survey Comments 122

Summary

The City of Auburn's Parks, Recreation, and Open Space (PROS) Plan is an ambitious and visionary blueprint designed to elevate the city's parks and recreation facilities to meet the evolving needs of its vibrant community. This comprehensive plan, which spans from 2024 to 2030, is the result of extensive public engagement, reflecting the community's collective aspirations for a higher quality of life through enhanced recreational services and access to diverse outdoor opportunities.

The PROS Plan outlines a strategic Capital Improvement Program (CIP) that prioritizes both immediate enhancements and long-term projects, ensuring that Auburn's parks and open spaces continue to be cherished assets for generations to come. It reaffirms the city's commitment to fostering a healthy, walkable community, promoting environmental stewardship, and creating spaces that inspire connection, well-being, and a sense of place.

To bring this vision to life, the plan is designed with flexibility, allowing for adjustments as community needs evolve, new opportunities arise, and funding sources become available. The city is committed to leveraging a mix of municipal budgets, grants, and the passionate efforts of community volunteers to realize these improvements. Through ongoing review and adaptive management, Auburn aims to create a parks and recreation system that not only meets the current needs of its residents but also anticipates and shapes the future, ensuring that the city remains a dynamic, engaging, and inclusive place to live, work, and play.



August 23, 2024

Auburn is proud of its public parks, arts and recreation programs and facilities which include over 50 parks, community, teen and senior centers, the 18-hole Auburn Golf Course, Postmark Center for the Arts, White River Valley Museum and Mary Olson Farm, as well as two beautiful cemeteries. Our parks include something for everyone, from picnic areas to sports fields. The whole family can enjoy our extensive recreation trail system, enjoy community events such as Petpaloozza, Kids Day, Veterans Day Parade, Farmers Market as well as participate in youth and adult recreation programs as well as our beautiful open spaces and trails.

This PROS Plan is used to develop strategies to deliver the "right parks and programs in the right places" and bring those places to life through events and public programming. Active use of our Parks, Arts and Recreation system improves your health as well as the health of our community.

We continue to grow and change for the betterment of our community and the enjoyment of our citizens, visitors, and patrons. I invite you to visit our parks and facilities and enjoy the quality of life they offer – the benefits are endless.

Sincerely,
Daryl Faber
Director of Auburn
Parks, Arts and Recreation

Introduction









Welcome to the City of Auburn's Parks, Recreation, and Open Space Plan Update (PROS Plan). This document fulfills the requirements of the Growth Management Act (GMA), ensuring the City's eligibility for funding from the Washington State Recreation and Conservation Office (RCO) and other sources over the next six to ten years. It provides a comprehensive overview of Auburn's parks, recreation areas, open spaces, and non-motorized trails.

The PROS Plan incorporates public input gathered through surveys, outreach, and online tools to assess recreational needs and preferences. It evaluates the current conditions of the city's parks and open spaces, establishing a vision and goals based on community demand.

A critical component of this document is the Capital Improvement Plan (CIP). Upon approval, the CIP will finalize the PROS Plan by recommending enhancements aimed at improving services for Auburn residents over the next six years and beyond. These recommendations are strategically linked to potential grant funding sources, guiding the City in prioritizing projects that align with the community's desired quality of life.

Purpose

In Washington State, communities like Auburn rely on Parks, Recreation, and Open Space (PROS) Plans to shape the future of their outdoor spaces, serving as vital roadmaps for growth, development, and preservation. These plans are not just state mandates; they are essential tools for balancing growth with environmental protection and enhancing residents' quality of life.

For Auburn, the PROS Plan is crucial for complying with the Growth Management Act (GMA), which ensures thoughtful planning to accommodate growth while protecting the environment and enhancing residents' quality of life.

However, the PROS Plan goes beyond mere compliance. It embodies a vision and a commitment to community engagement, providing a platform for residents to express their needs and desires for parks, trails, and recreational areas. Through surveys, outreach, and online tools, the city gathers valuable input to ensure the plan reflects the diverse interests and aspirations of its people.

At its core, the PROS Plan is about dreaming big while remaining practical. It sets ambitious goals for improving access to recreational amenities, enhancing existing facilities, and expanding green spaces. These goals are not just lofty ideals; they are actionable steps toward creating a community where residents can live, work, and play.

Within the PROS Plan is the Capital Improvement Plan (CIP), a strategic blueprint for turning vision into action. The CIP outlines specific projects and improvements designed to enhance services for Auburn's residents over the next six years and beyond. These projects are carefully aligned with the community's goals and values, ensuring that every dollar spent brings tangible benefits.

In essence, the PROS Plan is Auburn's promise to its residents: a commitment to vibrant parks, thriving green spaces, and abundant opportunities for outdoor adventure. It is a testament to the city's dedication to building a sustainable future where nature and community flourish together.

Regulatory Requirements

Growth Management Act Requirements

RCW 36.70A.140, known as the Growth Management Act (GMA), is crucial to all Comprehensive Parks, Recreation, and Open Space (PROS) Plans in Washington State. This law mandates that local governments, such as cities and counties, plan for growth through comprehensive plans that consider natural resources, economic development, and residents' quality of life.

Specifically, the GMA requires local governments to adopt comprehensive plans that address various aspects, including parks and recreation. Additionally, it outlines the requirements for a Capital Facilities Plan (CIP) that includes:

- An inventory of existing public facilities, including green spaces.
- Forecasts for future needs of these facilities.
- Plans for expanding or building new facilities.
- A six-year funding plan with identified public funding sources.
- A requirement to reassess plans if funding falls short, ensuring all elements are coordinated. Parks and recreation facilities are integral to the CIP.

The Parks and Recreation element of the GMA further specifies that the plan should include:

- Estimates of park and recreation demand for at least ten years.
- An evaluation of existing facilities and service needs.
- Exploration of opportunities for regional collaboration on park and recreation services.

In the context of a PROS Plan, RCW 36.70A.140 provides the legal framework for integrating parks, recreation, and open space considerations into overall planning. The PROS Plan becomes a specific component of the broader comprehensive plan, focusing on developing, maintaining, and enhancing these aspects within the community.

By adhering to RCW 36.70A.140, cities like Auburn ensure their PROS Plans align with state goals for sustainable growth and development. Compliance with the GMA is essential for Auburn to access state funding and effectively manage its parks, recreation, and open spaces.

Washington Recreation and Conservation Office (RCO) Requirements

The Recreation and Conservation Office (RCO) promotes outdoor recreation and conservation in Washington State through grants and technical assistance, ensuring that all residents have access to well-maintained parks and protected natural spaces. However, their role extends beyond funding.

1. The RCO recognizes the importance of well-planned park systems, which not only serve local communities but also contribute to a statewide network of parks and open spaces. A well-implemented Parks, Recreation, and Open Space (PROS) Plan acts as a roadmap for a city's park system, communicating the current state of parks, recreation facilities, budgeting, and programs to the RCO. It identifies gaps in current and future service levels and develops an actionable vision for the community's future. This roadmap assures the RCO that grant money will be used effectively to meet community needs aligned with statewide goals.

The RCO requires a PROS Plan, updated every six years, to comply with the Growth Management Act (GMA). These plans should cover the following key elements:

2. Existing Conditions & Baseline Analysis: Establishes the groundwork by reviewing past plans, demographics, and park system trends.
3. Community & Systems Needs Assessment: Identifies gaps and needs in park infrastructure, assesses facility conditions, and sets service level benchmarks.
4. Priorities, Strategies, and Implementation Plan: Compiles the analyses and proposes recommendations. It prioritizes goals, outlines implementation strategies, and establishes a potential capital improvement plan for park development.

By following RCO's guidelines and creating a strong PROS Plan, Auburn can secure grant funding, improve its park system, and enhance the quality of life for its residents. To ensure compliance with RCO's framework

and alignment with the GMA, communities must submit the PROS Plan along with the RCO's Self-Certification Form (see Approvals Section). By adhering to this framework, Washington communities can develop a robust vision for their parks and recreation systems and strengthen their grant applications by demonstrating clear vision and strategic priorities.

More information can be found in RCO's Manual 2: Planning Guidelines (January 2024), available at:

https://rco.wa.gov/recreation-and-conservation-office-grants/grant-manuals/.

Process

While RCO has no specific requirements for the number of pages, number of chapters, or format for comprehensive parks plans, it is expected that the plan will capture the needs of the organization and, more importantly, the quality of life desired by the community.

The process used to develop the City of Auburn's Park's PROS Plan Update is modeled after six minimum elements noted in RCO Manual 2: Planning Policies & Guidelines. Whether this plan supports a grant application for a capital project (facility development and land acquisition) or a non-capital project (architectural, engineering, planning, etc.,) the organization of this plan and the process followed is purposefully designed to capture the elements expected by RCO.

Aside from this, the first section, the project overview, this plan is structured around six primary sections or elements needed for an effective comprehensive parks plan:

Existing Conditions (Systems Inventory)

A description of the planning or service area, including the physical setting, the community profile, other mutually supportive planning efforts, and a summary of conditions of the complete inventory of each existing outdoor recreation asset or program.

Public Involvement

A description of how the planning process gave the public ample opportunity to be involved in plan development and adoption.

Demand & Needs Analysis

An analysis that takes your inventory work and public involvement into consideration, balancing public demand with your organization's current capacity and future expectations.

Goals and Objectives

The plan must support the applicant's park and recreation mission, including the current project, with broad statements of intent, or goals that capture a community's desired outdoor recreation resources.



Capital Improvement Program

A list of the desired capital improvements or capital facility programs of at least 6 years that lists and prioritizes desired land acquisition, development, renovation, and restoration projects.

Approvals

A resolution, ordinance, or other adoption instrument showing formal approval of the plan and planning process by the governing entity.

The process diagram below identifies the priority sections needed to develop a GMA-compliant and RCO-certified PROST plan, however, many steps ran concurrently.





Inventory & Assessment



INVENTORY & ASSESSMENT

This section aims to provide a comprehensive understanding of the current conditions of Auburn's parks, recreation programs, open space, and trail system. It examines the condition of the City's parks system, the population served by these parks, and the regional context and planning efforts that shape the system.

The City of Auburn manages a diverse range of parks and recreation assets, including 10 neighborhood parks, 14 community parks, 6 parcels of dedicated open space, 13 pocket parks and tot lots, and 16 special use facilities, including a golf course and trail systems. Given Auburn's current population of 90,096 in 2024, this equates to approximately 11.8 acres of parkland per 1,000 residents. This ratio aligns Auburn with other communities across the country, which have a median of 11.2 acres of parkland per 1,000 residents. A more detailed analysis of the composition of Auburn's parks and recreation system is provided in the Demand & Needs section of this report.

The inventory and assessment section, and the information that follows, is divided into four distinct contexts that capture the structure upon which the parks system is a part of.

- **Physical Context**
- **Demographic Context**
- **Planning Context**
- **Site Evaluations**

Pocket Parks

21st Street Playground • North Tapps Estates
Riversands Park • Terminal Park
Village Square Park • Ballard Park
Dorothy Bothell Park • Dykstra Park
Edgeview Park • Forest Villa Tot Lot
Gaines Park • Indian Tom Park • Jordana Park

Neighborhood Parks

Auburndale 2 Park • Shaughnessy Park
Auburndale Park • Cameron Park
Cedar Lanes Park • Evergreen Park
Lakeland Hills Park • Riverpoint Park
Scootie Brown Park • Trail Run

Community Parks

104th Ave SE • Brannan Park • Fulmer Park
Game Farm Park • Game Farm Wilderness
GSA Park • Isaac Evans Park
Jacobsen Tree Farm (und.) • Lea Hill Park
Les Gove Park • Mill Pond Park • Roegner Park
Sunset Park • Veterans Memorial Park

Open Space

Auburn Environmental • Clark Property
Game Farm Open Space • Golf Course
Lakeland Nature Area • Mary Olson Farm
West Auburn Lake

Special Use Areas

B Street Plaza • Bicentennial Park
Centennial Viewpoint Park • City Hall Plaza
Clark Plaza • Community Garden A
Community Garden B • Environmental Park
Fenster Nature Park • Fly-in Lion
Mary Olson Farm • Mountain View Cemetery
Pioneer Cemetery • Plaza Park
Slaughter Memorial

Planning Context

Auburn: A History of Transformation

The Auburn area has a rich history of human settlement, with indigenous populations being the first inhabitants. Tribal groups such as the Skopamish, Smalhkamish, and Stkamish thrived at the confluence of local rivers, establishing trade routes over the Cascade Mountains, interacting with eastern tribes, and using the waterways for resource gathering and commerce with coastal groups.

In the mid-1800s, the first European pioneers arrived in the White River Valley. The following decades, particularly the 1880s, saw the arrival of railroads, which attracted settlers from various regions, including the eastern and Midwestern United States, Europe, and Asia. Early European and Japanese farmers began cultivating the fertile land, leading to bountiful harvests and establishing the White River Valley as a prominent agricultural center.

Auburn's central location between Seattle and Tacoma played a significant role in its development. The construction of a hydroelectric power plant on the upper White River in 1911 provided electricity for Auburn, Seattle, and Tacoma, and powered the Interurban Railway. Additionally, the selection of Auburn by the Northern Pacific Railroad in 1910 as the site for its western freight terminal spurred a population boom, driven by the influx of permanent rail workers in need of housing.

World War II had a profound impact on Auburn's trajectory. The federal government's wartime relocation of Japanese American citizens to internment camps resulted in the loss of numerous businesses, homes, and farms. Unfortunately, most of these families never returned.

Although Auburn remained an agricultural hub for some time, the city began transitioning towards increased industrialization in the post-war period. In the 1960s, the establishment of a Boeing aircraft plant in the city marked a pivotal shift. Efforts to address historical flooding issues, including the construction of Mud Mountain and Howard Hanson Dams by the U.S. Army Corps of Engineers, further supported Auburn's transformation from a frontier settlement to a developed industrial center.

Auburn's strategic position within south King County made it a desirable location during the 1990s, a period coinciding with a population surge across the Puget Sound region. The city's population, estimated to be around 30,000 in 1990, grew significantly over the next few decades, reaching approximately 76,347 by 2014—a 154.5% increase. However, from around 2014 onward, growth slowed to approximately 11%, marking a significant deceleration from the previous pace.

This slowdown during the 2000s can be attributed to a combination of economic and demographic factors. The region faced the aftermath of the dot-com bust and the early 2000s economic recession, which impacted job creation and investment. Additionally, the housing market crisis that culminated in the 2008 financial crash significantly affected real estate development and home purchases, leading to a decrease in population influx. Infrastructure limitations and congestion also played a role, as the city's capacity to accommodate rapid growth was stretched thin, particularly considering its physical context. Moreover, competition from nearby cities offering more attractive amenities or better economic opportunities may have diverted potential residents and businesses away from Auburn. These factors collectively contributed to a period of slower growth for the city during that decade.

Today, Auburn remains an attractive community known for its family-oriented, small-town atmosphere. With more affordable housing compared to most of King County, convenient highway access, and a charming small-town feel, Auburn is poised for continued, stable, and sustainable growth. This growth will increase the demand for quality of life elements that the community expects, including the demand for and access to recreational facilities.

Physical Context

Auburn's location in the Puget Sound region has profoundly influenced its historical development and future growth. The city's geography has been central to its evolution, with its proximity to rivers making it an essential transportation hub for both Native Americans and early settlers. The fertile valley attracted cultivation, and railways were later built to transport crops and timber from Auburn to larger cities like Tacoma and Seattle.

Today, Auburn is traversed by two major rivers, the White River and the Green River, along with two critical transportation corridors, SR-167 and SR-18. These natural and man-made features divide the city, with a flat valley floor surrounded by steep ascents leading to the West Hill and East Hill. The valley is further segmented by Highway 167 and distinct zoning designations, creating identifiable areas such as Downtown and the Industrial Valley.

The Green River is fed by numerous creeks that carve through the East Hill, forming ravines and preserving natural spaces, which in turn limit mobility within this region. East Hill is primarily a residential area with pockets of retail, and it is crossed by major roads like Highway 515 and E James Street. In contrast, West

Hill is somewhat isolated from the rest of the city, bounded by the Green River and Highway 516, and further divided by I-5.

Topography

Nestled within the Puget Sound Lowland region of the Pacific Northwest, Auburn is a city shaped by the enduring legacy of ancient glacial epochs and the ongoing influence of geological forces. Positioned between the eastern foothills of the Cascade Range and the shores of Puget Sound, Auburn features a diverse range of terrain types.

To the east, the Cascade foothills rise gradually, giving the landscape a gentle undulation that ascends toward the towering peaks of the Cascade Range. These foothills provide a rich tapestry of topographical variety, offering panoramic vistas and numerous recreational opportunities.

The city's landscape is marked by a broad, flat valley bordered by the Green River and Lea Hill to the east, and West Hill to the west. These green slopes define Auburn's contours, creating natural boundaries within the urban expanse while offering breathtaking views of the Cascade Range and the iconic silhouette of Mount Rainier.

To the west, Auburn's proximity to Puget Sound imparts a maritime character to its climate and geography. Located near the southern edge of the sound, the city benefits from easy access to waterfront areas and the thriving marine ecosystems they support. This maritime influence moderates the climate, resulting in milder winters and cooler summers compared to the more extreme conditions experienced further inland.

Hydrology

Auburn's intricate network of rivers and creeks holds deep significance for the community, serving a variety of crucial functions and enriching the local landscape. These waterways act as natural drainage systems, contribute to flood mitigation, provide vital habitats for diverse fish and wildlife, offer scenic beauty, hold historical importance, and create opportunities for recreation.

The history of Auburn's watercourses, particularly the White River, highlights the complex interaction between natural forces and human intervention. Before 1906, the White River flowed through King County, merging with the Green River before emptying into Elliot Bay. However, a significant debris blockage in 1906 altered the river's course, diverting floodwaters away from King County and redirecting them down the Stuck River into the Puyallup River. To manage this change, a permanent diversion wall was built at Game Farm Park in Auburn, directing the White River to its current path.

Today, the White River in southern Auburn serves as a natural boundary, separating the more developed urban core from the rural areas beyond. Historically, the city developed within the river valley, where many of its parks are located. However, with the valley reaching its developmental capacity, urban growth has expanded into newly annexed areas to the west, east, and south. Various water bodies, including the Green River, Mill Creek, Bowman Creek, Olson Creek, Mill Pond, and White Lake, have significantly influenced Auburn's spatial development. The wetlands along much of Mill Creek have limited extensive urbanization in that area, though some industrial properties have been established.

Among Auburn's water features, White Lake and West Auburn Lake are the only naturally occurring lakes or ponds. West Auburn Lake, acquired by the city within the past decade, offers recreational opportunities within a highly urbanized setting. In contrast, White Lake, located south of Highway 18, remains privately owned and inaccessible to the public, preserving its natural state.

Climate

Nestled within a temperate maritime climate, Auburn experiences a nuanced interplay of meteorological forces, shaping its seasonal identity with distinct variability.

Summer (June to August) brings warmth to the region, with temperatures typically ranging from 75°F to 85°F (24°C to 29°C). While the season is mostly dry, occasional light rainfall may punctuate the otherwise arid conditions.

Autumn (September to November) ushers in cooler temperatures, settling between 60°F and 70°F (15°C to 24°C). During this period, Auburn transitions to a wetter climate, with more frequent showers that cast the familiar Pacific Northwest veil of precipitation over the landscape.

Winter (December to February) sees temperatures dip to an average of 45°F to 50°F (7°C to 10°C). While cold air intrusions can briefly push temperatures below freezing, such occurrences are typically short-lived. Precipitation increases during the winter months, and although snowfall is rare, it occasionally blankets the city. When snow is accompanied by freezing rain, it can significantly impact local traffic.

Spring (March to May) signals a gradual warming, with temperatures rising to a moderate 55°F to 65°F (13°C to 18°C). Intermittent showers persist, remnants of the previous seasons' precipitation, as the landscape undergoes its annual rejuvenation.

Auburn receives approximately 37 inches (940 mm) of annual precipitation, evenly distributed across the seasons, reflecting its maritime influence. The city's proximity to the Pacific Ocean helps moderate extreme temperatures, tempering both the summer heat and winter chill.

Auburn's diverse topography, with its varying elevations and water bodies like the Green River, fosters the development of microclimates within the city. These microclimates create subtle weather patterns and temperature differences, adding richness and complexity to Auburn's overall climate.

DEMOGRAPHIC CONTEXT

Auburn, Washington, is a vibrant city with a diverse demographic profile. Based on the latest U.S. Census data, here is a detailed breakdown of key demographic aspects:

Population Size & Growth

Auburn is a mid-sized city in King County, Washington, with a population of approximately 90,096 as of July 2023. The city has experienced steady growth, reflecting broader trends in the Seattle metropolitan area. Since 2000, Auburn's population has increased by 54.4%. With a population density of about 3,046 people per square mile, the city continues to see urban development and residential expansion.

In recent years, Auburn's growth rate has moderated. Between 2020 and 2023, the population grew at an annual rate of about 0.99%. Looking ahead, the growth rate is projected to decelerate to approximately 0.31% annually from 2023 to 2028.

Employment

Auburn's economy is diverse, with key industries including retail, manufacturing, healthcare, education, and various service sectors. Major employers in the city reflect this diversity. Among them are Boeing, which operates a significant aerospace manufacturing facility in Auburn, employing thousands of workers and playing a central role in the city's industrial base. Multicare Health System and CHI Franciscan Health are also significant employers, providing a wide range of healthcare services to the region.

In addition to these, The Muckleshoot Indian Tribe is a major contributor to the local economy, not only through its government operations but also through its enterprises, such as the Muckleshoot Casino and Muckleshoot Bingo. Auburn School District is another key employer, reflecting the city's strong focus on education.

Many residents of Auburn work within the city, benefiting from the presence of these major employers. However, a significant portion of the population commutes to nearby employment hubs such as Seattle, Tacoma, and Bellevue, which are easily accessible due to Auburn's strategic location and robust transportation infrastructure, including major highways and rail services.

Auburn's accessibility and central location make it a vital center for both residential living and employment opportunities within the Puget Sound region. The combination of local employment and the city's position within a broader regional economy enhances Auburn's role as both a residential community and a significant economic hub.

Race and Ethnicity

Auburn stands out for its notable ethnic and racial diversity, which is somewhat unique compared to other cities in Washington State. According to recent data, the racial composition of Auburn's population is approximately 59.7% White, 11.6% Asian, 7.3% Black or African American, 2.1% American Indian or Alaska Native, and 2.8% Native Hawaiian or other Pacific Islander. Additionally, 16.5% of the population identifies as Hispanic or Latino. The city's diversity is further highlighted by the fact that 21.4% of Auburn's residents are foreign-born, a figure that exceeds the state average.

Auburn's significant Asian and Hispanic or Latino populations are particularly noteworthy. While many cities in Washington have diverse communities, Auburn's proportion of Asian residents stands out, reflecting broader trends in the Seattle-Tacoma-Bellevue metropolitan area, yet distinguishing itself from smaller or less urban areas in the state.

Moreover, Auburn is home to a significant population of Marshall Islanders, who have migrated to the United States primarily under the Compact of Free Association (COFA). This treaty allows citizens of the Marshall Islands, along with those from Micronesia and Palau, to live and work in the U.S. without visas. Auburn has become a notable center for Marshallese migrants, following Arkansas, which hosts the largest population on the mainland.

The migration of Marshallese to the U.S. has been driven

by various factors, including economic opportunities and better access to healthcare. Additionally, many Marshallese migrate due to environmental degradation and health issues linked to the legacy of nuclear testing conducted by the United States in the Marshall Islands during the mid-20th century. This has resulted in health concerns such as cancer and other chronic diseases, prompting many to seek better healthcare in the U.S.

In Auburn, the Marshallese community has maintained strong cultural ties, frequently gathering in local churches and community events to support one another and preserve their traditions. This tight-knit community aspect is crucial as they navigate the challenges of migration, including language barriers and economic adjustments.

Auburn's demographic diversity is rooted in its historical development as a key agricultural and industrial hub, which has attracted various immigrant communities over the years. This has created a rich cultural fabric that continues to shape the city's identity today.

Languages

While English is the primary language spoken in Auburn, with 69.36% of residents speaking it exclusively, the city's cultural diversity means that a variety of languages can be heard in everyday life. Spanish is the most common non-English language, spoken by 13.28% of the population. Additionally, other languages, including various Slavic languages, contribute to the city's linguistic landscape.

The Auburn School District reflects this diversity, with over 80 languages spoken in the homes of its students. More than 40% of students use multiple languages in their daily lives. The district's Multilingual Learner Program is designed to help students develop English language skills while also promoting the preservation of their home languages. Although the exact number of students speaking each language at home is not disclosed due to privacy concerns, the fact that the district's Multilingual Learners department serves students from over 80 different language backgrounds illustrates the rich tapestry of languages spoken in Auburn.

Moreover, the district offers translation services for a variety of languages, including Afrikaans, Burmese, Hmong, Marshallese, Russian, Spanish, and Ukrainian. While this is not an exhaustive list, it highlights some of the prominent languages spoken in the community alongside English.

These languages likely represent just a portion of Auburn's diverse linguistic landscape. However, by examining the languages supported by the school district, we can gain insight into the multilingual character of the city.

Age

Auburn has a diverse age distribution among its population of approximately 90,096 people. The largest age group consists of residents aged 35 to 54, comprising about 27% of the population. This is followed by children and teenagers (ages 5 to 17), who make up roughly 18%. Young adults aged 25 to 34 represent around 15%, while those in the 55 to 64 age bracket account for approximately 12%. The senior population (over 65 years) comprises about 13% of the population, and those aged 18 to 24 constitute around 9%. The youngest segment, children under 5 years old, represents about 7% of Auburn's population.

Recent trends in Auburn's age distribution have shown relative stability across the different age groups. However, there has been a slight increase in the senior population, mirroring broader national trends of an aging demographic. This shift suggests a growing need for services and amenities that cater to older residents, while also maintaining support for families and younger adults.

Gender

Auburn's gender distribution is close to an even split between males and females, with a slightly higher percentage of males. According to the latest U.S. Census Bureau data, Auburn has approximately 46,922 males (52.1%) and 43,174 females (47.9%), indicating a clear majority of males over females in the city. This trend is somewhat uncommon in many parts of the United States, where women typically outnumber men.

Income

Auburn's residents represent a wide range of income levels, reflecting the diverse economic profiles of its neighborhoods and communities. While some areas of Auburn are affluent, others have a higher percentage of lower-income households. The city's economic structure includes a mix of blue-collar and white-collar workers, contributing to this diversity. As of the most recent data, the median household income in Auburn is approximately $83,881, with a per capita income around $41,440. The city's poverty rate is 10.7%, and 14.9% of children live below the poverty line. Housing is a significant aspect of the local economy, with the median home value around $561,000 (per 2024 Zillow Home Value Index). This reflects a community with varied economic experiences, encompassing both substantial earning potential and areas in need of economic support.

Education

Auburn is served by a variety of educational institutions, including both public and private schools. The Auburn School District is a key provider, operating numerous elementary, middle, and high schools, such as Auburn High School, Auburn Riverside High School, and Auburn Mountainview High School, along with various elementary and middle schools spread throughout the city. The district serves a substantial student population, with an enrollment of over 17,000 students.

Private education options in Auburn include Valley Christian School, which offers a Christian-centered education from preschool through 12th grade, and Auburn Adventist Academy, a Seventh-day Adventist high school. Additionally, the Muckleshoot Tribal School, managed by the Muckleshoot Indian Tribe, provides education from kindergarten through high school, addressing the specific needs of its tribal community.

Green River College is a notable public institution in the area, offering a range of associate degrees, certificates, and transfer programs. Collectively, these educational institutions contribute to the diverse and comprehensive learning environment in Auburn.

Housing

Auburn's housing market is diverse, featuring a mix of single-family homes, apartments, and affordable housing options. As of mid-2024, the median home price in Auburn is approximately $621,000 (per 2024 Zillow Home Value Index), reflecting a 5.5% increase over the past year. The market remains highly competitive, with homes typically selling within a week of listing. Rental prices are also significant, with median rents around $1,919 per month. The city supports a range of affordable housing programs through the King County Housing Authority, including Section 8 vouchers and subsidized housing designed for low-income families, seniors, and individuals with disabilities.

This varied housing landscape influences Auburn's parks and recreation system by increasing the demand for accessible and inclusive recreational spaces. The presence of affordable housing communities, such as Burndale Homes and Firwood Circle, which offer on-site services and are located near parks, highlights the importance of maintaining and expanding public recreational facilities. These parks provide essential amenities and green spaces for residents of all income levels, promoting community well-being and environmental sustainability.

Commuters

Auburn is often considered a commuter city due to its strategic location in the Puget Sound region and its proximity to major employment centers such as Seattle, Tacoma, and Bellevue. The city's population fluctuates during the day as residents commute to jobs in these areas. The average one-way commute time for Auburn residents is approximately 31.6 minutes, covering an average distance of around 10.75 miles.

Here's an overview of key cities to which Auburn residents commonly commute for work and the respective employment opportunities:

1. Tacoma is a major city in the Puget Sound region offering a wide range of employment opportunities across various industries.
2. As a neighboring city, Puyallup provides job options in retail, healthcare, education, and other sectors.
3. Although farther from Auburn, some residents commute to Seattle for jobs in tech, finance, healthcare, and various other industries.
4. Located to the north, Kent offers job opportunities in logistics, manufacturing, and retail.
5. Also north of Auburn, Renton is home to companies in aerospace, technology, healthcare, and other industries.
6. To the west, Federal Way has a diverse job market, including opportunities in retail, healthcare, and education.

System Inventory

Auburn takes great pride in its expansive parks system, designed to cater to a variety of recreational interests while preserving the natural beauty of the area. Among the many parks throughout the city, Les Gove Park stands out as a tranquil oasis in downtown Auburn, offering verdant green spaces, meandering pathways, and designated picnic areas, providing a peaceful retreat amid the urban bustle. Game Farm Park, a premier destination for sports enthusiasts and families alike, spans 80 acres and features sports fields for soccer, baseball, and softball, along with tennis courts, a skate park, and playgrounds. Isaac Evans Park, located along the scenic Green River, delights visitors with riverside trails, scenic viewpoints, and inviting picnic spots, allowing nature lovers to immerse themselves in a serene environment. Brannan Park, near the Green River, is a picturesque spot for outdoor recreation, offering walking trails, picnic shelters, and a boat launch for water enthusiasts. For those seeking a more botanical experience, Soos Creek Botanical

Garden (privately owned) showcases a stunning array of native and exotic flora, inviting visitors to explore its themed gardens, winding paths, and tranquil ponds.

Auburn's park system extends beyond recreation to include educational and environmental initiatives. Auburn Environmental Park combines recreational amenities with interactive exhibits and interpretive trails, serving as a platform for environmental education and awareness. These programs enrich the community's understanding of local ecosystems and foster a deeper appreciation for the natural world. In essence, Auburn's parks system is more than just a collection of green spaces; it's a vibrant tapestry of recreational opportunities, natural wonders, and educational endeavors that enrich the lives of residents and visitors alike.

Auburn prioritizes the development of park spaces that align with the community's values. To determine what improvements are needed or desired, the first step is to catalog and assess the current conditions of all the city's existing parks, open spaces, and trail resources. This process involves identifying the assets that Auburn currently owns, manages, and maintains, and evaluating them to ensure they meet or exceed park development standards, safety criteria, liability and risk concerns, recreational trends, aesthetic appeal (placemaking), and landscape and climate change resiliency objectives.

To effectively plan for budgeting and resource allocation based on each park's level of service or area of influence, parks are also assessed to determine the individual contributions they provide to the community.

Physical & Mental Health: Assessing a park by expected or projected use helps visitors know what to expect and allows park managers to establish rules and guidelines that ensure visitors' safety and preserve the park's resources.

Ecological Diversity: Parks often vary in terms of their ecosystems and biodiversity. Assessing parks based on their ecological features can aid in understanding and protecting these unique natural environments.

Cultural and Historical Significance: Some parks are often assessed based on their cultural or historical importance. These designations help preserve and showcase sites of cultural heritage, such as historical landmarks, archaeological sites, and areas with indigenous significance.

Tourism & Branding Benefits: Classifying parks can aid in promoting tourism and attracting visitors. Visitors often have varying interests, so categorizing parks allows tourism agencies to target specific audiences with appropriate marketing strategies.

Educational and Interpretive Benefits: Classification helps in developing educational programs and interpretive materials tailored to the park's unique characteristics. This enhances visitor experiences by providing relevant information about the park's natural, cultural, and historical attributes.

Research and Conservation Planning: Scientists and conservationists can use classification systems to prioritize research efforts and develop conservation plans. By understanding the different types of parks and their specific features, they can focus on areas that are most in need of study and protection.



Categorized Recreation Programs

The City of Auburn offers a wide range of recreation programs designed to meet the diverse interests and needs of its community members. These programs, categorized by age group and activity type, provide opportunities for fitness, personal growth, social engagement, and community involvement.:

Fitness Programs:

- Fitness memberships
- Fitness classes
- Open gym sessions
- Equipment and weight room access at the Auburn Community & Event Center

Preschool Programs (Ages 1-5):

- Indoor playground
- Classes and programs
- Birthday party packages
- Youth Programs (Ages 6-12):
- Rec n Roll (mobile recreation unit)
- Summer camps
- Classes and programs
- Family programs
- Birthday party packages

Teen Programs (Ages 13-18):

- The REC Teen Center
- Classes and programs
- Camps
- MakerSpace

Adult Programs (Ages 18+):

- Art classes
- MakerSpace
- Fitness classes
- Open gym

Senior Programs (Ages 50+):

- Senior Activity Center
- Fitness classes
- Social activities
- Educational workshops

Family Programs:

- Various family-oriented activities and events

Specialized Recreation:

- Programs for individuals with disabilities
- Sports & Athletics:
- Youth leagues
- Youth sports classes

Community Events and Special Programs:

- Auburn Farmers Market
  (June-September at Les Gove Park)
- National Recreation and Park Month events
  Various special events throughout the year

Cultural Arts Programs:

- Performing arts
- Public art installations

Outdoor Recreation:

- MTB Trailblazers biking program
- Hiking and trail activities

Volunteer Opportunities:

- Community service and volunteer programs

Facility Rentals:

- Athletic fields
- Campground
- Meeting and banquet rooms
- Picnic shelters

Overall, the City of Auburn's diverse array of programs and services supports a healthy, active, and engaged community and highlights Auburn's commitment to providing diverse and inclusive recreational opportunities for its residents, promoting community well-being and engagement

Existing Parks & Recreation Facilities

The City of Auburn offers a wide array of recreational opportunities and park spaces for both residents and visitors, with a strong emphasis on developing park spaces that align with the community's values. Auburn's park system currently encompasses approximately 980 acres of mostly developed or partially developed parklands, along with non-contiguous trail segments along the White River that aim to connect to the downtown core.

To identify necessary or desired improvements, the City first catalogs and assesses the current conditions of all its existing parks, open spaces, and trail resources. This assessment process involves identifying and evaluating the assets that the City of Auburn owns, manages, and maintains, ensuring they meet or exceed park development standards, safety criteria, and liability and risk concerns. Additionally, this evaluation addresses recreational trends, enhances aesthetic appeal through placemaking, and supports landscape resiliency.

Assessment Methodology

Modeled after RCO's suggested Level-of-Service (LOS) grading system and NRPA's "system level" approach, a custom assessment methodology was used in this study to inventory and assess the current range of recreation and open space opportunities within any particular area. The methodology used in this report is ranked on a scale of 5 to 0, from high to low, across a number of different criteria, including:

- Location
- Park Classification
- Facility Age
- History
- Funding Encumbrances or Regulatory Framework
- Condition of Individual Components & Amenities
- Maintenance / Known Issues

Table 2-1: Assessment Rankings

Ranking (High to Low)	Description
0	n/a - Not Present
1	Major liability and structural failures present and imminent. Needs to be closed.
2	Condition is poor with major structural, cosmetic, maintenance, and liability issues observed.
3	Condition is moderate with some major cosmetic or maintenance issues that create minor liability concerns.
4	Condition is very nice with only minor cosmetic or maintenance issues observed.
5	Perfect condition with a long life cycle and no risk or liability issues.

Please note that park areas developed by private entities e.g., a HOA, or and public or private schools were not included on the overall City Park map, therefore they were not part of the assessment procedure.

Process

The following steps were executed to capture the institutional knowledge of City staff, while allowing the consultant team to assess each park and trail component.

1. Inventory and build maps of the existing parks.
2. Develop a detailed inventory of each park from the previous planning process and geospatial sources, including encumbrances research and park / funding histories.
3. Distribute inventory information to City for review.

Park Classifications

Classification systems provide a standardized method to develop, organize, operate, and manage parks based on certain criteria, which can include factors such as their size, ecological importance, recreational opportunities provided, historical or cultural significance, placemaking potential, economic development, and ability to support conservation & climate resiliency goals.

Table 2-2: Park Classifications

Key*	Classification
C	Community
N	Neighborhood
O	Natural Areas & Greenspaces (Open Space)
S	Special Use Facilities
P	Pocket Parks / Mini-Parks / Tot Lots
T	Trails, Bikeways & Pathways

* to be used when referring to the parks system key map, Figure 2-1.

Washington State Parks & RCO use different classification definitions but are built on the same premise - consistent methodology is critical to best manage our public spaces and to ensure the public are active and able to enjoy a quality mix of structured and natural environments and all the benefits that they provide.

There are six basic park and greenspace facility types typically classified and utilized by municipalities the size of Auburn of which are currently exhibited:

Pocket Parks / Mini-Parks / Tot Lots

Pocket parks are very small and serve a limited radius (up to ¼-mile) from the site; they provide passive and play-oriented recreational opportunities. Examples of pocket parks can include a tot lot with play equipment such as a climber, slide or swings; a viewpoint; or waterfront access areas such as at street ends.

A small urban plaza or civic recognition project may also be considered a pocket park. Parking is not often provided at pocket parks, although lighting may be used for security and safety.

Neighborhood (Local) Park

Generally considered the basic unit of traditional park systems, neighborhood or local parks are small park areas designed for unstructured play and limited active and passive recreation. They are generally up to around 5 acres in size, but can be larger depending on a variety of factors including neighborhood need, physical location and opportunity, and should meet a minimum size of 2 acre in size when possible.

Community Park

Larger multi-acre sites developed for organized play, contain a wider array of facilities and, as a result, appeal to a more diverse group of users. Community parks are generally 20 to 50 acres in size, meet a minimum size of 20 acres when possible and serve residents within a 1-mile radius of the site.

Natural Areas (Open Space)

Natural areas are those which are preserved to maintain the natural character of the site and are managed to protect valuable ecological systems, such as riparian corridors and wetlands, and to preserve native habitat and biodiversity. In managing for their ecological value, these natural areas may contain a diversity of native vegetation that provides fish and wildlife habitat and embodies the beauty and character of the local landscape. Low-impact activities, such as walking, nature observation, and fishing are allowed, where appropriate, and horseback riding is also permitted on certain sites.

Trails, Bikeways & Pathways

Trails are non-motorized transportation networks separated from roads. Trails can be developed to accommodate multiple uses or shared uses, such as pedestrians, in line skaters, bicyclists, and equestrians. Bikeways are different than trails in that their principal focus is on safe and efficient non-motorized transportation. Bikeways & pathways serve distinctly different user groups than trail users. For shared-use trails, it is important that the alignment and cross sections be designed with flexibility to accommodate higher speeds, passing zones and greater widths. Surfaces will vary with intended use and environmental considerations.

More information on the other classification types not used can be found in Appendix B.

Current Inventory

Over its 133-year history, Auburn, WA, has developed a robust park system under the guidance of its past and present Mayors and City Councils. The City has expanded its parkland through various means, including donations, dedications, and purchases. Each park undergoes regular evaluations and renovations to ensure they align with evolving recreational trends, aesthetic standards, safety protocols, and government regulations. To meet the needs of both current and future residents, Auburn must continue to acquire new parkland while also maintaining and enhancing its existing parks and facilities.

This section provides an overview of each park and open space, detailing the neighborhood it is located in, its year of establishment, classification, and acreage. As a prelude, the following table identifies the quantity and total acreage of the entire system, based on its classification.

Parks, Open Space & Special Use Facilities

The core of Auburn, WA's parks system is characterized by its diverse parklands, expansive open spaces, and specialized use facilities, all of which contribute to the community's recreational and aesthetic needs.

Auburn's parklands consist of a variety of mini-parks, neighborhood parks, community parks, open spaces, and special use facilities that provide residents with access to green spaces for leisure, sports, and recreational activities. These parks are equipped with amenities such as playgrounds, sports fields, picnic areas, and walking trails, ensuring they cater to the needs of individuals and families alike. Open spaces offer residents opportunities for passive recreation, such as hiking, bird-watching, and enjoying the scenic beauty of nature. The city's commitment to maintaining these open spaces ensures that natural resources are protected and accessible to the community.

Table 2-3: Existing Parks & Open Spaces

Key	Classification	Count	Acres
C	Community	14	283.30
N	Neighborhood	10	51.23
O	Open Space	6	321.42
S	Special Use Facilities	14	307.69
P	Tot-Lots	13	16.71
	Totals:	**57**	**980.35***

* does not include other non-park related properties, or other landbanked right-of-ways and easements.

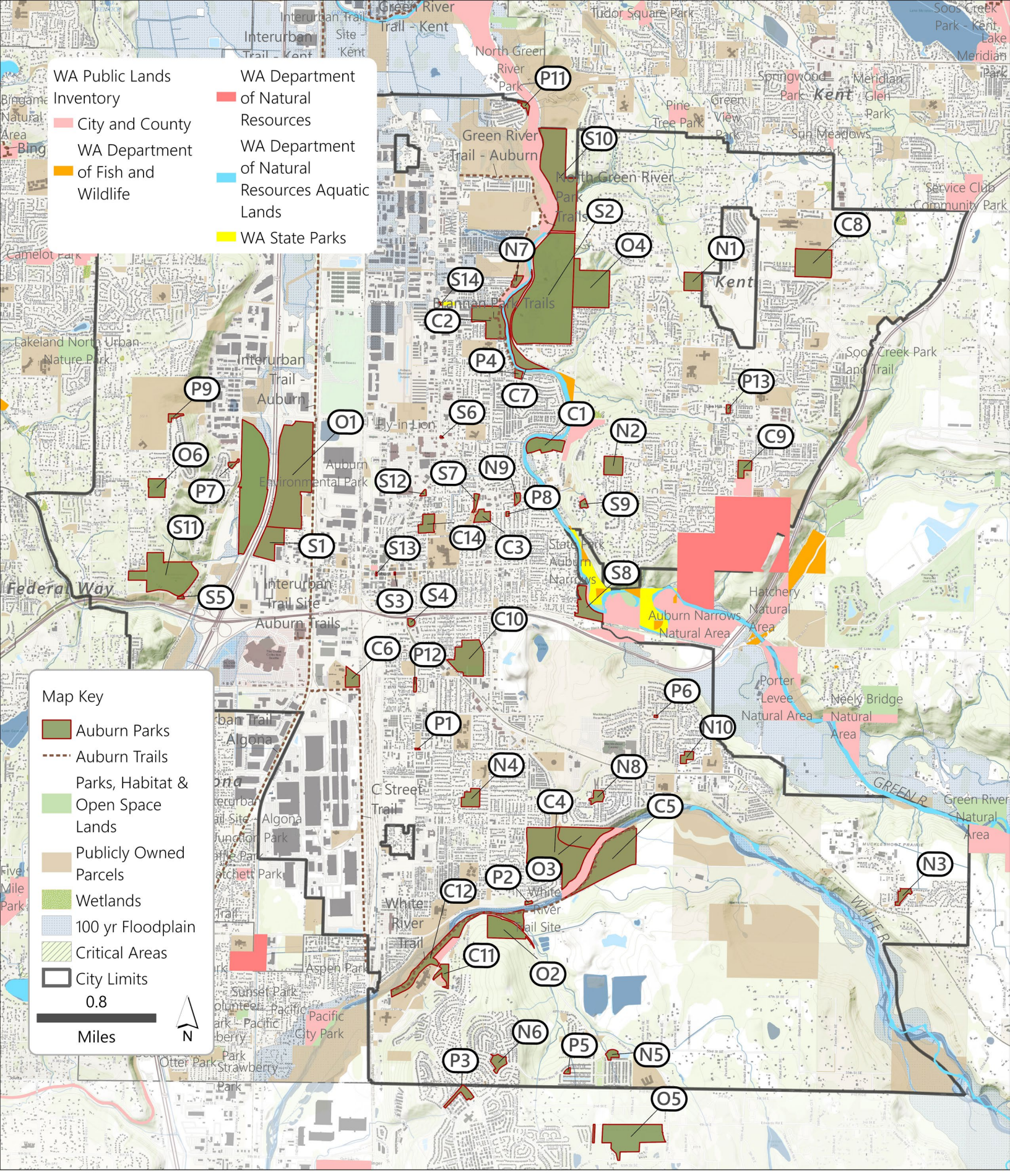

WA Public Lands Inventory
City and County
WA Department of Fish and Wildlife
WA Department of Natural Resources
WA Department of Natural Resources Aquatic Lands
WA State Parks
Map Key
Auburn Parks
Auburn Trails
Parks, Habitat & Open Space Lands
Publicly Owned Parcels
Wetlands
100 yr Floodplain
Critical Areas
City Limits
0.8
Miles
N
P11
S10
S2
O4
N7
S14
C2
P4
C7
S6
C1
N2
P13
C9
P9
O1
O6
P7
S12
S7
N9
P8
S9
S11
S1
S13
C14
C3
S8
S5
S3
S4
C10
C6
P12
P6
P1
N10
N4
N8
C4
C5
O3
P2
C12
N3
C11
O2
N6
P5
N5
P3
O5
Green River Trail - Kent
Tudor Square Park
North Green River Park
Green River Trail - Auburn
Kent
Interurban Trail Auburn
Auburn Environmental Park
Lakeland North Urban Nature Park
Auburn Trails
Interurban Trail Site
Federal Way
Auburn Narrows Natural Area
Hatchery Natural Area
Porter Levee Natural Area
Neely Bridge Natural Area
Green River Natural Area
C Street Trail
White River Trail
Algona
Aspen Park
Sunset Park
Pacific
Pacific City Park
Otter Park
Strawberry Park
GREEN R
WHITE R

Table 2-4: Existing Parks Inventory				
Key	Name	Classification	Acres	Rating
C1	104TH AVE SE PARK	COMMUNITY	13.22	3
C2	BRANNAN PARK	COMMUNITY	23.55	3.5
C3	FULMER PARK	COMMUNITY	4.88	4
C4	GAME FARM PARK	COMMUNITY	56.94	4
C5	GAME FARM WILDERNESS	COMMUNITY	48.59	3
C6	GSA PARK	COMMUNITY	6.34	3
C7	ISAAC EVANS PARK	COMMUNITY	17.94	3.75
C8	JACOBSEN TREE FARM	COMMUNITY	29.34	3
C9	LEA HILL PARK	COMMUNITY	5.32	3.5
C10	LES GOVE PARK	COMMUNITY	27.83	4.5
C11	MILL POND PARK	COMMUNITY	4.85	3
C12	ROEGNER PARK	COMMUNITY	21.79	4
C13	SUNSET PARK	COMMUNITY	15.46	3
C14	VETERANS MEMORIAL PARK	COMMUNITY	7.25	3
	Subototals	14	283.31	
N1	AUBURNDALE 2 PARK	NEIGHBORHOOD	9.39	3
N10	SHAUGHNESSY PARK	NEIGHBORHOOD	3.32	3
N2	AUBURNDALE PARK	NEIGHBORHOOD	10.14	4
N3	CAMERON PARK	NEIGHBORHOOD	3.79	3
N4	CEDAR LANES PARK	NEIGHBORHOOD	8.38	3.5
N5	EVERGREEN PARK	NEIGHBORHOOD	2.74	3
N6	LAKELAND HILLS PARK	NEIGHBORHOOD	5.15	3
N7	RIVERPOINT PARK	NEIGHBORHOOD	2.65	3
N8	ROTARY PARK	NEIGHBORHOOD	3.89	3
N9	SCOOTIE BROWN PARK	NEIGHBORHOOD	1.77	3
	Subototals	10	51.23	
O1	AUBURN ENVIRONMENTAL PARK OPEN SPACE	OPEN SPACE	180.17	3
O2	CLARK PROPERTY OPEN SPACE	OPEN SPACE	27.42	3
O3	GAME FARM OPEN SPACE	OPEN SPACE	22.67	3
O4	GOLF COURSE OPEN SPACE	OPEN SPACE	40.97	3
O5	LAKELAND HILLS NATURE AREA	OPEN SPACE	41.02	3
O6	LEWIS LAKE NATURE PARK	OPEN SPACE	9.17	3
	Subototal:s	6	321.42	
P1	21ST STREET PLAYGROUND	POCKET PARK / MINI-PARK / TOT LOT	0.21	3

Table 2-4: Existing Parks Inventory				
P11	TRAIL RUN PARK	POCKET PARK / MINI-PARK / TOT LOT	1.73	3
P12	TERMINAL PARK	POCKET PARK / MINI-PARK / TOT LOT	1.16	3
P13	VILLAGE SQUARE PARK	POCKET PARK / MINI-PARK / TOT LOT	0.97	3
P2	BALLARD PARK	POCKET PARK / MINI-PARK / TOT LOT	0.64	3
P3	DOROTHY BOTHELL PARK	POCKET PARK / MINI-PARK / TOT LOT	4.83	3
P4	DYKSTRA PARK	POCKET PARK / MINI-PARK / TOT LOT	1.73	2
P5	EDGEVIEW PARK	POCKET PARK / MINI-PARK / TOT LOT	0.80	3
P6	FOREST VILLA TOT LOT	POCKET PARK / MINI-PARK / TOT LOT	0.24	3
P7	GAINES PARK	POCKET PARK / MINI-PARK / TOT LOT	1.34	3
P8	INDIAN TOM PARK	POCKET PARK / MINI-PARK / TOT LOT	0.41	3
P9	JORNADA PARK	POCKET PARK / MINI-PARK / TOT LOT	1.87	3
	Subototal:s	13	16.71	
S1	AUBURN ENVIRONMENTAL PARK	SPECIAL USE AREA	18.81	3
S10	MARY OLSON FARM	SPECIAL USE AREA	68.78	3
S11	MOUNTAIN VIEW CEMETERY	SPECIAL USE AREA	50.29	3
S12	PIONEER CEMETERY	SPECIAL USE AREA	0.75	3
S13	PLAZA PARK	SPECIAL USE AREA	0.15	3
S14	SLAUGHTER MEMORIAL	SPECIAL USE AREA	0.15	3
S2	AUBURN GOLF COURSE	SPECIAL USE AREA	150.52	3.5
S3	B STREET PLAZA	SPECIAL USE AREA	0.13	3
S4	BICENTENNIAL PARK	SPECIAL USE AREA	1.34	3
S5	CENTENNIAL VIEWPOINT	SPECIAL USE AREA	0.50	3
S6	CLARK PLAZA	SPECIAL USE AREA	0.17	3
S7	COMMUNITY GARDEN	SPECIAL USE AREA	1.84	3
S8	FENSTER PROPERTY	SPECIAL USE AREA	12.72	3
S9	LEA HILL TENNIS COURTS	SPECIAL USE AREA	1.54	3.5
	Subototal:s	14	307.69	
	Totals:	**57**	**980.35**	

*** does not include other non-park related properties, or other landbanked right-of-ways and easements.**



21st Street Playground

405 21st Street SE
0.17 acres – Dedicated in 2006
Classification: Pocket Park
Status: Developed

This small pocket park is situated adjacent to a City stormwater detention pond. Park amenities include a playground, picnic table, and benches. The park is on a short list of parks that need to go through the naming process.



Auburndale Park

31700 108th ST SE
9.74 acres –Transferred in 2003
Classification: Neighborhood Park
Status: Developed

Auburndale Park falls into the neighborhood park category, and like many in this classification, is underused. The City recently constructed an entrance on the east side of the park in order to provide better access to the surrounding neighborhoods in an effort to increase use in the park. The main feature of the park is a natural wooded area with a loop trail. There is a play area, picnic tables and barbecue grill.



Auburndale Park II

29725 118th ST SE
9.34 acres – Transferred in 2003
Classification: Neighborhood Park
Status: Undeveloped

Auburndale II is an undeveloped park with a mix of native over-story, and an under-story that is dominated by Himalayan blackberry and scotch b room. A future trail connecting Lea Hill to the valley floor is being considered, which would likely run east to west along the northern boundary of the park.



Ballard Park

1612 37th Way SE
0.68 acres - Dedicated in 1966
Classification: Pocket Park
Status: Developed

Ballard Park is a neighborhood park with a distinctive stone picnic shelter. In 2003, a new playground and irrigation system was installed, as well as pathways and an entrance gate. Two new tables and benches were installed and a new concrete fence constructed at that same time. Ballard Park is situated high above the White River and benefits from an appealing view of the river. There is not direct river access.



Cameron Park

3727 Lemon Tree Lane
3.85 acres – Dedicated in 1989
Classification: Neighborhood Park
Status: Developed

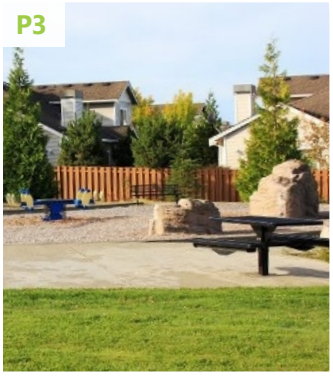
Cameron Park is a nestled between two rows of houses, east of the Muckleshoot Indian Reservation. The park has two entrances, one near the intersection of Lemon Tree Lane SE and Academy Drive SE, and the other off of Lemon Tree Lane SE. Visitors can take an asphalt path into the heart of the park that winds through a large grassy open field, planted with occasional trees. A colorful play structure is located in the northeast corner of the park. Picnic tables next to the playground provide seating for picnics or for caretakers of young children. The layout of the path provides a good opportunity to integrate the play area into the rest of the park using landscaping to create a more lush and cohesive setting. A limiting factor in achieving this is the utility easement of Northwest Pipeline, which reduces the ability to landscape and improve some parts of the park.



Cedar Lanes Park

1002 25th Street SE
8.36 acres – Dedicated in 1969
Classification: Neighborhood Park
Status: Developed

Cedar Lanes Park is a unique combination of native woodland, well-kept lawn, and a formal playground. The forested area contains a mix of western red cedar, big leaf maple, and cottonwood trees. The park includes a bike skills park with drop zones, a flow track and other features that was constructed in 2023. In 2024 an asphalt pump track, new restroom, and storage/shelter were constructed.



Dorothy Bothell Park

1087 Evergreen Way SE
4.35 acres – Dedicated in 2009
Classification: Pocket Park
Status: Developed

Located adjacent to the Lakeland Hill Community Center, Dorothy Bothell Park is a an attractive neighborhood park in Lakeland Hills. Park amenities include a playground, climbing boulders, and a trail that connects with other trails beyond the park. Dinosaur bones have been buried in the play area for the kids to uncover.

P4





Dykstra Park

1487 22nd Street NE

1.67 acres – Dedicated in 1979

Classification: Neighborhood Park

Status: Developed

Dykstra Park is a small, attractive park along the Green River. Its linkage to the larger Isaac Evans Park via a suspension bridge increases its value to the community. The bridge was substantially repaired in 2002, with major structural repair completed on the north end of the structure.

Dykstra is primarily a playground neighborhood park, and its proximity to the river also makes it popular with walkers and wildlife lovers. A new playground was installed in April 2015 made possible by a Dr. Pepper/ Kaboom! Playground grant. The playground was constructed using volunteer labor during the City's annual Clean Sweep volunteer event. In addition to the three new playground pieces, approximately 150 cubic yards of playground fiber wood chips were placed within the play area.

P6



Forest Villa Park

1647 Fir St. SE

0.23 acres – Dedicated in 1971

Classification: Pocket Park

Status: Developed

The Forest Villa Park is located on a single lot in a single family residential neighborhood. The play structure is the primary focus of the park.

P7



Gaines Park

1008 Pike Street NW

1.33 acres – Dedicated in 1999

Classification: Neighborhood Park

Status: Developed

Gaines Park is located in the Vistaria/Sunning Hills residential area. This park is a joint project between the City's Storm Water Division and Parks and Recreation. There is a short section of boardwalk through a wetland area on the east edge of the park. The park has a picnic area, play area, ½ basketball court, and a walking trail through the park.

P8



Indian Tom Park

1316 6th Street NE

0.42 acres – Deeded to the City in 1979 from King County

Classification: Pocket Park

Status: Developed

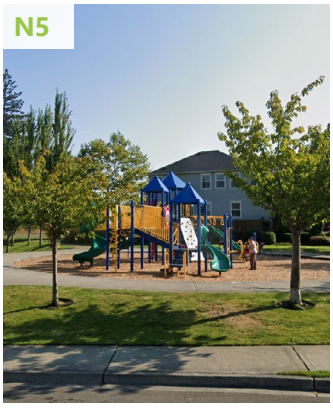
This small park is located on a single lot in the middle of a residential block. A playground was installed in April 2014 made possible by a Dr. Pepper/ Kaboom! Playground grant. The playground was constructed using volunteer labor at the City's annual Clean Sweep volunteer event.



Jornada Park

1433 U Court. NW
1.89 acres – Dedicated in 2004
Classification: Pocket Park
Status: Developed

This small park is located on a single lot in the middle of a residential block. It contains a play structure, climbing wall, picnic tables and a short loop trail.



Evergreen Park

5480 Charlotte Ave. SE
2.73 acres – Dedicated in 2014
Classification:Neighborhood Park
Status: Developed

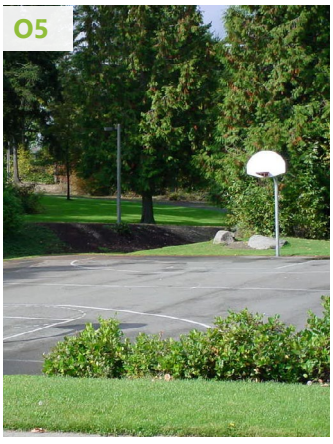
This park was constructed to meet level of service needs for a neighborhood park within in newly developed Kersey III neighborhood. A paved walking trail with picnic tables and benches connects the ball field, to the playground and the basketball court.



Edge View Park

1433 U Court. NW
0.79 acres – Dedicated in 2014
Classification: Pocket Park
Status: Developed

This park has similar features and amenities as nearby Evergreen Park, but on a smaller scale.



Lakeland Hills Park

1401 Evergreen Way SE
5.06 acres – Dedicated in 1993
Classification: Neighborhood Park
Status: Developed

Lakeland Hills Park serves the Lakeland development in south Auburn. This five-acre park is nestled into a wooded hillside, where many native trees were saved and integrated into the design of the park. The park provides active recreation facilities at a neighborhood scale, and also a paved trail around the circumference of the park. Restroom facilities were built in this park and share a common structure with some water utility equipment.



Lea Hill Tennis Courts

32121 105th Pl. SE.
1.18 acres
Classification: Special Use Facility
Status: Developed

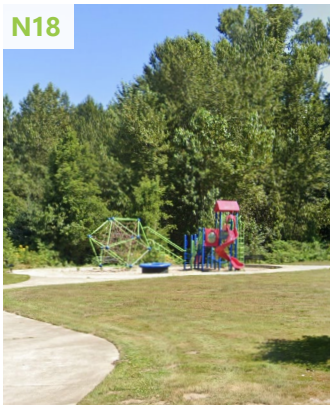
The Lea Hill Tennis Court has a unique location on top of a City of Auburn water reservoir. Originally, two courts were constructed, but one of these is now being used as a basketball court. The court is on Lea Hill, surrounded by an adjacent apartment complex. Standing water is evident in several low areas.



Riverpoint Park

1450 32nd St. NE
3.8 acres – Dedicated in 2005
Classification: Neighborhood Park
Status: Developed

Built in 2005, the park is adjacent to the Green River and provides an access point to the Green River Trail.



Trail Run

5014 Pike Street NE
1.76 acres – Dedicated in 2015
Classification: Neighborhood Park
Status: Developed

This pocket neighborhood park located is along the Green River near the northern City Limits. Visitors can gain direct access from the park to a bridge across the river that connects to the City of Kent's S. 277th Street Trail (1.1 miles). The future Green River Trail will run along the eastern boundary of the park if the trail is ever extended through Auburn.



Rotary Park

2635 Alpine Street SE
3.89 acres – Dedicated in 1966
Classification: Neighborhood Park
Status: Developed

Rotary Park was developed in 1966 by the Auburn Rotary Club. At first glance the playground is the only apparent facility here. The rolling topography, unusual shape of the site and the location of conifers obscure the presence of the other major recreation facilities, including the basketball court and informal softball field. An additional acre, and a half-court basketball was added to Rotary Park in connection with the development of the Riverwalk neighborhood.



Scootie Brown Park

1403 Henry Road NE
1.68 acres – Dedicated in 1973
Classification: Neighborhood Park
Status: Developed

The park is located at a junction between commercial and residential zones. Bounded on the north by 8th Street N.E., the park has a busy, open feel, with minimal landscaping. The City's youth baseball programs use this park for practice.



Shaughnessy Park

3302 21st Street SE
3.46 acres – Dedicated in 1973
Classification: Neighborhood Park
Status: Developed

Shaughnessy Park is located in an attractive setting of mature Douglas Firs on a quiet residential street. Several recreational courts are located in close proximity to the street. An open play field with a backstop is in a corner of the park and is not readily apparent from other parts of the park and street. The adjacent residential neighbors have erected fences between their backyards and the playing field. Recent park improvements were made possible by a Neighborhood Block Grant in the amount of $50,000.



Terminal Park

1292 C Street SE
1.22 acres – Dedicated in 1913
Classification: Neighborhood Park
Status: Developed

Terminal Park is a small park along a quiet residential street. The newly renovated playground at the center of the park is the focal point here. The remainder of the park contains a slightly rolling lawn, with mature trees scattered throughout. Improved irrigation has also been added. In 2013 broken patio pavers were replaced with colored concrete in the patio adjacent to the playground.



Village Square

12111 SE 310th Street
1.10 acres – Transferred in 2007
Classification: Pocket Park
Status: Developed

This is a small pocket park is located in the middle of an apartment complex. The park has a short loop trail with a small grassy area in the middle. Access to the park can either be gained from the adjacent apartment complex or from SE 310th Street.



104th Ave SE

31495 104th Ave. SE

14.73 acres – Transferred in 2006

Classification: Community Park

Status: Undeveloped

This undeveloped riverside property is comprised of two parcels along the Green River. A nice sandy beach along the Green River is popular for swimmers in the summer, and fishermen in the fall and winter months. Nearly two-thirds of the park is located within the 100-year floodplain so given the location of the park along the river and regulatory constraints, the park will likely be designed as a passive use nature park.



Brannan Park

1019 28th St. NE

21.68 acres – Dedicated in 1973

Classification: Community Park

Status: Developed

Brannan Park contains one of Auburn's most heavily used sports complexes. The City sponsors many sports events at Brannan Park; Cascade Middle School users and a variety of organizations – youth soccer leagues, and Little League - also use the playing fields extensively. Brannan Park is on a flat, open site, with the Green River forming the park's eastern boundary. The remaining sides are bounded by residential housing to the north and west, and Cascade Middle School to the south.



Fulmer Park

1005 5th Street NE

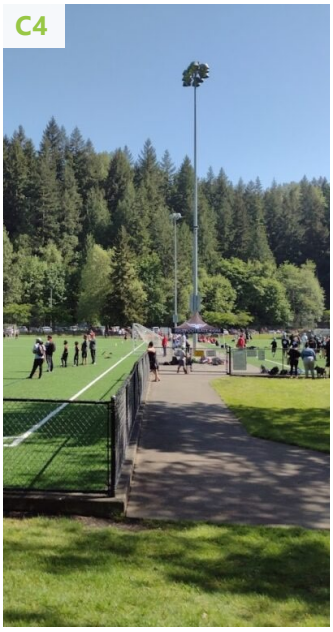
5.04 acres – Dedicated in 1979

Classification: Community Park

Status: Developed

Fulmer Park is primarily an active sports facility. In 2015 an undeveloped area on the north side of the park was bladed, all of the blackberry bushes were removed, and a new perimeter fence was installed. New irrigation, perimeter landscaping, and grass seed was added in 2014. New backstops, fencing, dugouts and drinking fountains, as well as scorekeeper tables, were added to the park in 1998. A new playground was installed in 2023.

C4



Game Farm Park

3030 R ST SE

57.20 acres – Dedicated in 1988

Classification: Community Park

Status: Developed

Game Farm Park continues to be one of the largest and most frequented parks in Auburn. The park contains a wide variety of facilities for organized sports activities as well as a distinctive natural setting. The hillside backdrop and the White River along its southern edge create an intimate setting for park for users to enjoy. The park with its many courts, fields and picnic facilities is heavily used. Game Farm Park was dedicated in 1988 and exhibits many successful design features. Designing and building the park in one phase resulted in functional architectural features and site layout. Passive uses such as trails or open grassy slopes are located where the park abuts residences. Good pedestrian access is available to the surrounding neighborhood at several points along the park's perimeter. A trail head off of Forest Ridge Drive SE provides access to a relatively unimproved gravel trail along the river in the eastern portion of the park. A pedestrian bridge was constructed in 2024 connecting the two Game Farm parks across the White River.

C5



Game Farm Wilderness Park

2407 Stuck River Dr. SE 48.50acres –

Dedicated in 1989

Classification: Community Park

Status: Developed

Game Farm Wilderness Park emphasizes a connection between park users and the natural environment. It has limited development and has preserved most of the native woodland along the White River. The White River Trail continues along the river on the north side of the park from Kersey Way beyond the east end of the park. The park is designed for both overnight and daytime visitors. The camping area is designed to accommodate recreation vehicles, providing each unit with water and power hook-ups. An 18-hole disc golf course is located in the wooded area between the campground and White River.

C6



GSA Park

413 15th St. SW

5.31 acres – Dedicated in 1966

Classification: Community Park

Status: Developed

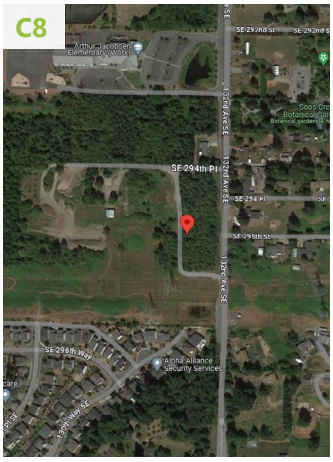
The land for GSA Park was donated to the City by the U.S. General Services Administration. Its location in a heavily trafficked industrial zone has resulted in an atypical park setting. Currently the park has two youth softball/baseball fields, a parks maintenance building, and dugouts. New dugout covers were recently added, made possible by donations from Auburn Little League. A greenhouse is located on the property near the maintenance that is used by the City's horticulturist to propagate new plants. The two ball fields were completed in 2003, including drinking fountains and an asphalt trail to the ball fields.



Isaac Evans Park

29827 Green River Road SE
19.87 acres – Dedicated in 1989
Classification: Community Park
Status: Developed

Isaac Evans Park is a riverfront park providing valuable passive recreation opportunities for the citizens of Auburn. The park's connection to Dykstra Park via the suspension bridge increases its accessibility to local residents and is an appealing feature for visitors. The pedestrian bridge may also accommodate future trail connections between the eastern and western sides of the river. A internal paved trail runs around the circumference of the park. The forested riparian area along the Green River remains in a natural condition with recent restoration plantings added to accommodate the Reddington Levee Setback project located across the river from the park. Scattered throughout the grassy space on the inside of the trail are clusters of picnic tables, a picnic shelter, restroom facilities, and playground equipment.



Jacobsen Tree Farm Park

29387 132nd Ave. SE
29.30 acres – Transferred in 2003
Classification: Community Park
Status: Undeveloped

The Jacobsen Tree Farm property is an undeveloped park located in the Lea Hill area of Auburn. The City went through a master planning process for the future park, which was completed in 2010. Future elements of the park include soccer fields, baseball fields, play grounds, and passive recreational opportunities. The park is adjacent to Arthur Jacobsen Elementary and Auburn Mountainview High School, and has magnificent views of Mount Rainier. A bond or levy will be needed in order to develop this large community park property.



Lea Hill Park

31693 124th Ave. SE
5.26 acres –Dedicated in 2013
Classification: Community Park
Status: Developed

Lea Hill Park is a community park that serves the Lea Hill neighborhood and is located adjacent to the Green River Community College Campus. Park amenities include a skate park, pervious walking pathways, a rentable picnic shelter, an amphitheater, baseball field, free game synthetic sport area, half basketball court, and a play area featuring a tractor and climbing toys. An ADA accessible restroom facility with two unisex bathrooms and drinking fountains was completed in the spring 2015.



Les Gove Park/Les Gove Community Campus

910 9th St. SE
26.07 acres –Dedicated in 1966
Classification: Community Park
Status: Developed

Les Gove Park is a recreational and educational facility serving the entire community. The Library, Parks and Recreation Administration Building, Community Center, Teen Center, Senior Center, the White River Valley Museum, and a variety of recreational features make Les Gove a very popular destination.



Mill Pond Park

4582 Mill Pond Dr. SE
4.20 acres – Dedicated in 1997
Classification: Community Park
Status: Developed

Mill Pond is unique in several ways. The park is a joint project between the Parks and Public Works Departments, the Auburn School District, and the developer of Lakeland Hills. All of these groups came together to create a park with a dual purpose: to provide a recreational experience in a natural setting, and to provide stormwater detention and filtering for a 400 acre area. The site includes a permanent pond, a grass-lined bio-swale that becomes a temporary pond during storms, a 1/4 mile paved trail around the circumference of the ponds, and a fishing dock. Fishing in the pond is limited to children under 15.



Roegner Park

601 Oravetz Road SE
19.22 acres – Dedicated in 1994
Classification: Community Park
Status: Developed

This community park is located along the banks of the White River, adjacent to Auburn Riverside High School. A trail system includes both hard and soft-surfaced sections that meet the needs of many different users, including equestrians from the near- by Hidden Valley neighborhood. Trail construction began in 1997 from the east side of Roegner Park to Kersey Way, and continuing east along the river to Game Farm Wilderness Park. An approximate ½- acre off-leash fenced dog park is located near the trail, and can be easily accessed from the parking area off of Oravitz Road. Commissioned artwork for the park includes a uniquely designed bench with a salmon motif, placed to allow views of the river.



Sunset Park

1420 69th St. SE
15.15 acres – Dedicated in 2003
Classification: Community Park
Status: Developed

Sunset Park was developed by the developer in Lakeland Hills. It is unique in several ways. The community park serves the Lakeland Hills neighborhood but also the community. The site includes a picnic shelter, two youth baseball/softball fields, trails, basketball court and skate park.



Veterans Memorial Park

405 E St. NE
7.67 acres – Dedicated in 1926
Classification: Community Park
Status: Developed

Veteran's Memorial Park, formerly City Park, is a popular community park located close to downtown Auburn and adjacent to Auburn High School's Memorial Stadium. The park is distinctive for its Veterans Memorial structure, shady woods and underlying expanse of green lawn. The Veterans Memorial structure was funded with donations and fund-raising events by local veterans groups. Its design and construction were accomplished with use of volunteer labor.

Special use facilities include unique recreational and cultural amenities that serve specific community interests. This includes the Auburn Golf Course, the White River Valley Museum, and various sports complexes and community centers, all enhancing the quality of life for Auburn residents.

Trails, Bikeways & Pathways

Auburn's parks system is designed to offer a balanced mix of recreational opportunities, natural preservation, and specialized facilities, which fosters a vibrant and active community. The city's mild climate, combined with a strong culture of outdoor activities, significantly contributes to the high usage and support of its extensive trail network.

The city categorizes its trails into three primary types:

1. Recreational loop trails
2. Linear trails
3. Recreation/transportation trails.

Recreational loop trails are typically short paths that form loops within a single park or site. These trails are designed for activities such as walking, bicycling, hiking, or skating, and they often connect various activity areas within a park or provide access to natural preserves or nearby neighborhoods. These trails can be constructed with either hard surface materials and are usable in all weather conditions, while soft surface trails offer a more rustic and natural experience.

Linear trails in Auburn are designed to connect different areas of the city or activity centers, leading to key destinations. These trails are generally hard-surfaced, making them suitable for activities like walking, bicycling, and skating, even in varying weather conditions. Notable examples of linear trails include the Green River (Reddington) Trail, Lakeland Hills Linear Trail, Lake Tapps Parkway Trail, and the White River Trail. The White River Trail, for example, stretches from Game Farm Wilderness Park through Roegner Park and ends at A Street SE, featuring both paved sections and soft surface areas that accommodate a variety of users, including mountain bikers, horseback riders, and hikers.

Recreation/transportation trails serve a dual purpose by connecting various parts of the city or activity centers for both recreational and transportation uses. Refer to Table 2-6 for the primary or major examples of these trails. These trails are typically linear, hard-surfaced, and designed to accommodate a variety of transportation modes, such as walking, bicycling, and skating. Sometimes referred to as "multi-modal trails," they are built to stricter standards and are generally designed for two-way traffic.

Table 2-5: Existing Trails					
Park/Trail	Description	Linear Trails Total (miles)	Recreational Loop Trails Total (miles)	Recreation / Transportation Trails Total (miles)	Total Length
Auburndale Park	Paved loop path around park		0.41		0.14
Auburn Environmental Park	Board Walk Trail		0.23		0.23
Brannan Park	Paved loop path around Park to Reddington levee. A paved surface linear trail extends along the levee.	1.7	0.72		2.42
C' Street SE Trail	Ellington Rd. SW to 15th Street SW			1.6	1.6
Cameron Park	Paved loop path through park and loops through Lemon Tree Lane		0.33		0.33
Cedar Lanes Park	Informal path through wooded area		0.25		0.25
Dorothy Bothell	Loop trail		0.25		0.25
Game Farm Park	Paved loop path around meadow, play structure, ball fields. Extensive sidewalk throughout park		3.3		3.3
Game Farm Wilderness Park	Paved trail along the White River and around the group camp area.	See White R. Trail			
Interurban Trail	Paved 12' wide trail runs alongside the Union Pacific railroad, from the city's northern to southern limits			4.5	4.5
Isaac Evans Park	Paved loop through wood and along the Green River		1.07		1.07
Jornada Park	Paved loop through wood and around park		0.1		0.1
Lakeland Hills Linear	Extensive sidewalk path on Lake- land Hills Way from Evergreen Way to Lake Tapps Parkway	0.73			0.73
Lakeland Hills Park Trail	Paved loop path around recreational fields		0.39		0.39
Lake Tapps Pkwy Trail	Paved sidewalk and asphalt trail	1.62			1.62
Les Gove Park Trail	Paved loop path around open space		0.58		0.58
Mill Pond Park Trail	Paved loop path around pond. Connects to Lakeland Hills Trail.		0.29		0.29
PSE (Lakeland)		0.4			0.4
Roegner Park	Both hard and soft surface trails are present in the park. A paved loop path is marked.	See White River Trail Below			
Sunset Park	Paved loop path around park.		1.19		1.19
West Auburn Lake			0.25		0.25
White River Trail	Paved and soft surface trail	3.5			2.3
Total		**7.95**	**9.11**	**6.1**	**23.16**

The Interurban Trail is managed by King County Parks for the sections outside specific municipal boundaries. However, within Auburn's city limits, the Auburn Parks Department is responsible for maintaining the segment of the trail that runs through the city. This collaborative effort ensures the trail remains well-maintained and accessible throughout its route. On the other hand, the White River Trail is primarily maintained by the City of Auburn Parks Department, which ensures its upkeep and accessibility as it connects several key parks within the city. The Interurban Trail is a prominent example of this type, serving as a major non-motorized route that runs north to south through several cities, including Tukwila, Kent, Auburn, Algona, and Pacific. This 12-foot-wide path follows the Puget Power right-of-way and parallels the Union Pacific Railroad for much of its length, making it a key transportation and recreational asset. The trail also provides access to several of Auburn's major employers, including Boeing, GSA, the Outlet Collection, and Auburn Environmental Park. Located less than half a mile from downtown Auburn, the Interurban Trail is a vital link for the community.

Table 2-6: Auburn Maintained Trails (Dedicated)

Type	Length
Interurban Trail (South)	4.5 mi
White River Trail	3.5 mi
Green River Trail*	TBD
	8.0 mi

* Future proposed extension

Both the Interurban Trail and the White River Trail are also designed to accommodate equestrians, making them versatile for a range of users. Additionally, informal trails in the open space areas of southeast Auburn and the shoulders of some rural roads are also used by equestrians, although these are not specifically designed or managed for this purpose. Auburn's commitment to providing diverse and accessible recreational options ensures that the city's parks and trails continue to meet the needs of its growing population.

Schools & Other Outdoor Recreation Amenities

In Auburn, recreational opportunities extend beyond city parks, encompassing other public lands and private facilities, which play a crucial role in assessing the adequacy of the City's park system. Among these, schools are one of the largest contributors to recreational space outside of city-managed parks.

Schools naturally serve as neighborhood gathering places and are often within walking distance of most homes in the city. School grounds typically feature sports fields, open grassy areas for play, playground equipment, and basketball courts. However, the accessibility and availability of these school facilities can vary. During the school year, these spaces are primarily used by the schools throughout the day and often during after-school hours, limiting their availability for individual use or non-school sports leagues. Additionally, some sports fields may be too small or not maintained to the standards required for organized league play. Therefore, while school facilities are valuable components of the community's overall recreational resources, they cannot substitute for a robust public park system.

Table 2-7 in the following pages summarizes the recreational facilities available at Auburn School District properties. It's important to note that the Auburn School District's boundaries extend beyond the Auburn city limits, resulting in a service area that does not fully align with that of the City of Auburn. As a result, the availability and utilization of these school facilities for Auburn residents may vary based on geographic and jurisdictional differences.

In addition to school properties, several other lands used informally for recreation are owned by other public entities. The Auburn Water Utility manages several watershed areas with restricted access to maintain water quality. The Coal Creek Spring Watershed in south Auburn is the city's primary water source, while the West Hill Watershed serves as a secondary source. Despite the proximity of these areas to neighborhoods, public access is generally discouraged to protect water quality.

King County Parks also owns several developed and undeveloped properties near Auburn. While Auburn's parks are more convenient for residents, many recreational users also utilize nearby King County parks, regardless of civic boundaries. A significant regional project, the Green River Trail, managed by King County, spans over 19 miles from Cecil Moses Park near Seattle's southern boundary to North Green River Park near Auburn. Extending the Green River Trail south from Kent has indeed faced challenges due to private property issues. However, plans are still in development to continue this extension through Auburn and eventually to Flaming Geyser State Park at the Green River Gorge. The project remains in the design and planning stages, with ongoing efforts to resolve these challenges and facilitate the trail's expansion further south.

Additionally, the State of Washington owns an easement along certain sections of the west side of the Green River within the city. This easement, which runs directly behind several residences, permits access for fishing only, limiting broader public use.

Table 2-7: Auburn School District Facilities	
School	Available Facilities
Elementary Schools	
Alpac	2 youth baseball/softball fields
Chinook	4 youth baseball/softball fields
Evergreen Heights	2 youth baseball/softball fields
Gildo Rey	2 youth baseball/softball fields
Ilalko	2 youth baseball/softball fields
Lakeview	3 youth baseball/softball fields
Lea Hill	2 youth baseball/softball fields
Dick Scobee	2 youth baseball/softball fields
Pioneer	3 youth baseball/softball fields
Terminal Park	2 youth baseball/softball fields
Washington	2 youth baseball/softball fields
Middle Schools	
Cascade	1 Football Field with Track,
	Gymnasium with 1 basketball court, Annex 2 Baseball/Softball Fields, 90' & 65' fields
Mt. Baker	1 Football Field with Track, 2 Gymnasium
	3 Baseball Fields, 90' & 65' fields
	3 Softball Fields
Olympic	1 Football Field, Track,
	Gymnasium with 1 basketball court
	2 Baseball/Softball Fields, 90' & 65' fields
Rainier	1 Football Field, Track
	Gymnasium with 2 basketball court
	2 Baseball/Softball Fields, 90' & 65' fields
Senior High Schools	
Auburn Riverside High	1 Football Field synthetic turf with Track (Lighted), 8 Tennis Courts
	5 Gymnasiums
	1 Baseball Field, 90' infield, 3 softball fields
Auburn Senior High	1 Football Field synthetic turf with Track (Lighted), 8 Lighted Tennis Courts
	Gymnasium with 2 basketball court 1 Baseball Field, 90' infield
Auburn Mountain View High	1 Football Field with Track,
	6 Gymnasiums, 8 Tennis Courts
	2 Baseball Fields, 90' & 65' fields, 2 Softball Fields
West Auburn High	1 Baseball/Softball Field, 65' infield
	1 Gymnasium

Existing Major Public Art Projects

The City of Auburn Parks Department plays a vital role in maintaining the city's vibrant public art installations. These installations not only enhance the beauty of public spaces but also reflect the cultural and artistic spirit of the community. Below is a list of the major public art installations that the Auburn Parks Department is responsible for maintaining, ensuring they remain in excellent condition for all residents and visitors to enjoy.



Table 2-8: Existing Public Art Inventory

Year	Artist	Piece	Location
1989	Meg Pettibone	Steelhead	Isaac Evans Park
1991	Richard Beyer	Children Playing Train at the Switch	City Hall
1993	Michele Van Slyke	Every Year the Salmon Return	Roegner Park
1994	Nancy Hammer	Burlington Northern Railroad Bridge	Auburn Way S & Hwy 18
1995	Garth Edwards	B Street Plaza	E Main & B St. SE
1996	Timothy Siciliano	Bus Shelter Murla	15th St SW
1996	Gerald Tsutukawa	Sun Circle	Game Farm Park
1997	Timothy Siciliano	The Equine Amusement	15th St. NE @ Metro P&R
1998	Deborah Merksy	Pioneer Cemetery Entryway	Auburn Way N & 8th St. NE
1999	Kulzer & Spitzer	Xtreme AtmosFearic Oscillator	Auburn Skate Park
2000	Evans & Mee	Mnemosyne's Opus	King County Library
2001	Phillip Levine	Threshold	Les Gove Park
2001	Ries Niemi	5 Moments Senior Center	Les Gove Park
2003	Paul Sorey	Running Figures	Sound Transit Plaza
2004	Brandon Zebold	Sighting	LL Hills Way & Evergreen Way
2004	Sidney Genette	Blue Neutron	Auburn Justice Center
2005	Ingrid Lahti	Les Gove Community Campus Sign	Auburn Way S & F Street
2006	Darel Grothaus	Evergreen-Washelli Cemetery: Seattle, WA	Cemetery Admin Building
2007	Greg Boudreau	Veteran's Day Parade	Veteran's Memorial Building
2008	Tom Askman Le Anne Lake	Tobu Bo	West Main Street
2008	Jesse Brown	Urban Art Works Mural	233 W. Main Street (A1 Collision Building)
2009	Susan Zoccola	Swing and Flight	Auburn Golf Course
2011	Bruce Meyers	Auburn Valley Topography	Les Gove Park
2011	Sheila Klein	Civic Lanterns	25 W. Main, City Hall
2011	Rachael Dotson	Utility Boxes	Various– Throughout Down- town
2011	Mauricia Robalino	Ride the Wave	116 A Street
2012	Chris Sharp	Railroads our Beginning Mural	364 W Main Street
1013	Michael Laughlin	Strawberry Calf	Lea Hill Park
2013	Lin McJunkin	Riparian Totem	Auburn Justice Center
2013	Patricia Vader	Watch My Tail	4910 A Street SE
2014	Kenneth Hall	Origami #2 – Fuchia	Sunset Park
2016	Virginia Paquette	Confluence/ Community	9910 Ninth Street SE
2016	Steve Tyree	Hawk	Game Farm Park
2017	David Varnau	Joie de Vivre	Auburn Community & Event Center
2019	Jacob Novinger	Heirloom Hare	Les Gove Park
2019	Peter Reiquam	Crow with Fries	Les Gove Park
2019	Nicholas Goettling	Pillow Fight Mural	F Street Bridge Underpass
2021	MacRae Wylde	Truth	Postmark Center for the Arts

Public Involvement









The successful development and implementation of a community's parks system ultimately relies on listening to the needs, demands, and ideas the community has to improve or suggest new additions to the system. Knowing that "the people who show up get to make the decisions", it was imperative that a successful public involvement process be implemented that allowed Auburn's citizens, and its visitors, multiple opportunities to inform the process and results. These opportunities hosted during this planning process included:

- Community Needs Assessment Survey
- Community Visioning Survey

With grant programs and other decision makers focusing on understanding a community's desired quality of life, public involvement is the most crucial and time-consuming element of the PROS planning process, allowing a correct assessment of a community's desired quality of life. This is where the public and users can share their ideas, goals, and objectives for their parks system and communicate these needs and desires to the City.

The intention behind the public involvement approach was to maximize an equitable distribution of needs, wishes, and ideas from the public. To ensure that the PROS Plan is reflective of the Auburn community and their interests, needs, and priorities, a series of engagement goals and methodologies were discussed and developed.

Engagement Goals

As this process began and continued through the COVID-19 pandemic, many public events were canceled or postponed due to safety concerns and government restrictions, leading to a substantial decline or, in many cases, the elimination of in-person participation. To adapt, more focus was placed on virtual engagement techniques, which provided a safer alternative for community engagement, though they could not fully replace in-person experiences. There was also a notable increase in the use of parks and outdoor spaces as people sought safe ways to engage in recreational activities while maintaining social distancing, with activities like hiking, biking, and outdoor fitness classes gaining popularity. The pandemic prompted a reevaluation of public health and safety practices, resulting in changes to engagement planning and execution. As restrictions eased, participation rates began to recover gradually, although some individuals still remained cautious about returning to large in-person events. Additionally, there was an increased focus on health

and wellness, driving interest in related programs offered by parks and recreation departments and encouraging the development of more diverse and inclusive programming to meet community needs. Overall, COVID-19 brought about significant changes in public participation, with a lasting impact on how events are conducted and attended. To overcome this potential lack of participation, a series of goals for the engagement plan was developed.

1. Continue to Build On or Validate Public Sentiment From Previous Surveys

The goal is to recognize that in communities like Auburn, public communication often relies heavily on informal channels such as word-of-mouth and conversations among neighbors. This approach is effective for disseminating information and fostering discussions about local events. Auburn also has other planning processes, such as the Comprehensive Plan and Downtown Master Plan, ongoing during this time. The current planning effort aims to incorporate a review of these past surveys to identify relevant data that can inform the understanding of the community's desired quality of life.

2. Ensure equitable distribution of new survey results throughout the city.

To gain a holistic understanding of a city's diverse communities and their needs, conducting surveys at the neighborhood level is crucial. This approach ensures that the concept of "quality of life" is not skewed towards a specific demographic. Ideally, the surveys are designed to capture respondents' residential locations within the city. This allows for the identification of localized needs and the development of tailored strategies for equitable resource allocation, targeted interventions, and effective community engagement. Using a GIS-based tool to identify the locations of comments will ensure we can achieve a desired level of response equity across all neighborhoods of Auburn.

3. Deploy multiple engagement opportunities

The inclusion of multiple participation methods effectively broadens the reach of the survey and addresses potential accessibility challenges. In addition to online and virtual surveys, the public is invited to participate in multiple engagement events online and complete paper surveys distributed at designated locations like City Hall, the Senior Center, and the Museum. This multi-modal approach ensures inclusivity by catering to residents with varying technological access and preferences.

4. Provide a broad range of constituents the ability to supply both broad and specific action-oriented feedback.

The goal is to transcend the collection of broad public needs and desires by implementing an online map-based engagement tool that uniquely incorporates opportunities for residents to actively participate in the "design" of their parks, generating site-specific suggestions. This approach will align with the principles of an inclusive planning framework, emphasizing citizen engagement in shaping service delivery. The aim is to create avenues for the public to contribute "real" ideas and concepts, fostering a sense of ownership and impact. Additionally, measures will be taken to ensure participant demographics accurately reflect the Auburn community profile.

Public Engagement Plan Overview

The engagement plan was organized around a series of both virtual and in-person events, noting the specific time dates. With the primary goal of the City always being to engage with the public about its park and recreation needs, the City developed a public engagement plan centered around two different kinds of virtual engagement techniques: 1) an online Needs & Assessment Survey, and 2) an online map-based project.

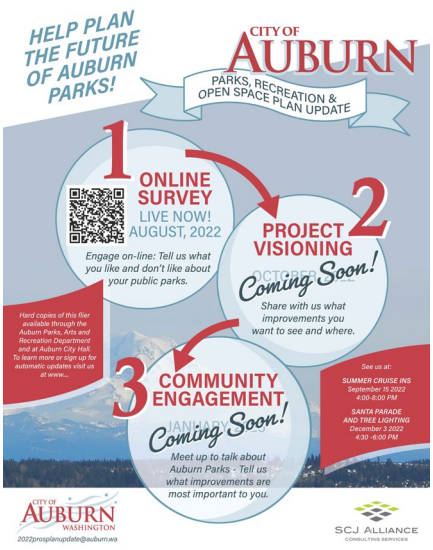
A successful engagement process harnesses the community's energy and inspires community ownership of the process, while also adapting to new insights and feedback. Stakeholders and community members supply the local knowledge, context, and information necessary to make informed project decisions.

As part of this engagement process, public comment was collected via an online community needs assessment survey, conducted in the Fall of 2022 and linked through the City's website. The project team will use the collected input, summarized in this report, to inform and drive the PROS Plan update.

Kickoff Meeting

SCJ met with City of Auburn Staff to conduct a kickoff meeting. At this meeting, the following was reviewed and discussed:

1. Determine the current parks, recreation, and open space issues
2. Brainstorm and finalize stakeholder interview list
3. Share and finalize the Public Engagement Plan







Engagement Marketing

With a primary goal of the City to always be engaging with the public about its park & recreation needs, the City developed a public engagement plan centered around two different kinds of virtual engagement techniques, 1) A online Needs & Assessment Survey, and 2) a on-line map-based project

A successful engagement process harnesses the community's energy and inspires community ownership of the process, while also adapting to new insights and feedback. Stakeholders and community members supply the local knowledge, context, and information necessary to make informed project decisions.

As part of this engagement process, public comment was collected via an online community needs assessment survey, conducted in the Fall of 2022 and linked through the City's website. The project team will use the collected input, summarized in this report, to inform and drive the PROS Plan update.

Note that all the engagement marketing, flyers, and surveys were all translated and offer in multiple languages, including Chinese, Russian, and Spanish. A Marshaleese translator was found but was not able to process the survey information in time.

Parks Needs & Assessment Survey

To assess how people were using Auburn's park and trail system, an online survey was conducted in the fall of 2022. This initiative aimed to gather valuable insights from both residents and visitors. The survey specifically focused on understanding current usage patterns of existing parks and trails, identifying any barriers that hinder their use, and gauging resident interest in adding or removing specific park and recreation features. The online survey consisted of both multiple-choice and open-ended questions focusing on community needs and issues with regards to Auburn's park facilities and recreation programs.

Additionally, the survey sought to identify the most popular parks and amenities among residents and visitors. To ensure broad participation, the survey was offered in both English, Spanish, Chinese, and Russian.

The list of questions asked, minus typical demographic inquiries, included:

How frequently do you use the City's park and recreation facilities?

How long is your average visit to these facilities?

What are the existing barriers to your use of parks in Auburn?

The survey was live for several months in the Fall of 2022, and a total of 619 completed surveys were received in that time. A summary of the responses to each question is provided on the following pages.

How much do you or would you use specific recreational elements?

What does Auburn need more or less of?

What is your connection to Auburn?

Other typical demographic questions were asked as well, in order to better understand the survey audience, identify any trends and ensure that a balanced representation was captured.

Full survey results are found in Appendix C, with key takeaways and highlights summarized here.

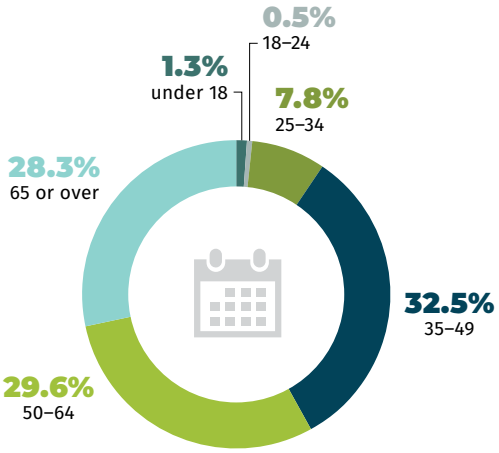


Demographics

Demographic information was collected to help ensure survey responses are representative of the community and amenities are tailored to patrons and residents. All responses were voluntary and were collected anonymously.

Age Range

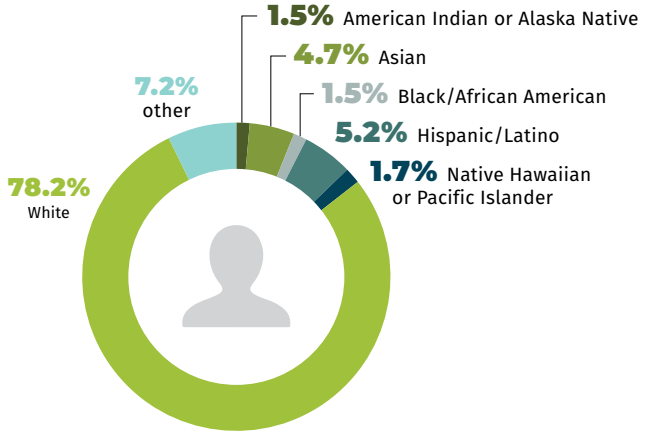
When asked the question, "What age range are you in?" the largest percentage (33%) were in the 35–49 age range. Another 30% were in the 50–64 range, and 28% were 65 or over. Only 10% of respondents were under the age of 35.



Ethnicity

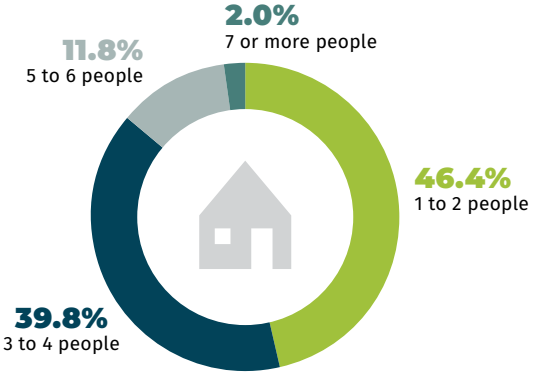
When asked "What is your ethnicity?" the largest percentage (78%) identified as "White", with another 5% identifying as "Hispanic/Latino" and 5% identifying as "Asian."

"American Indian or Alaska Native," "Black/ African American," and "Native Hawaiian or Pacific Islander" each accounted for less than 2% of the respondent population, and about 7% of respondents identified as "Other."



Household Size

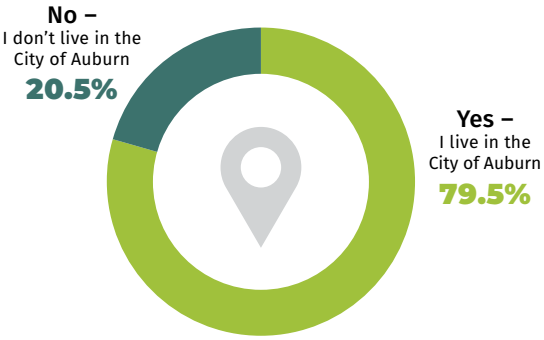
Nearly half of respondents (46%) indicated their household consists of only 1 to 2 people, and another 40% indicated their household consists of 3 to 4 people.

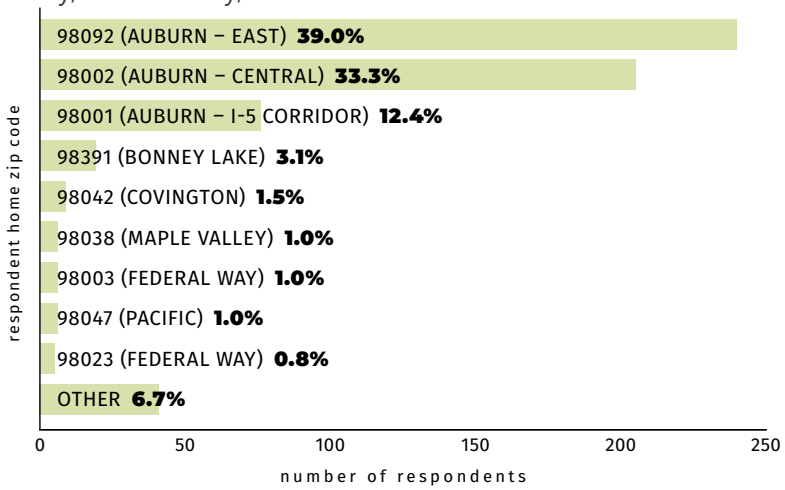


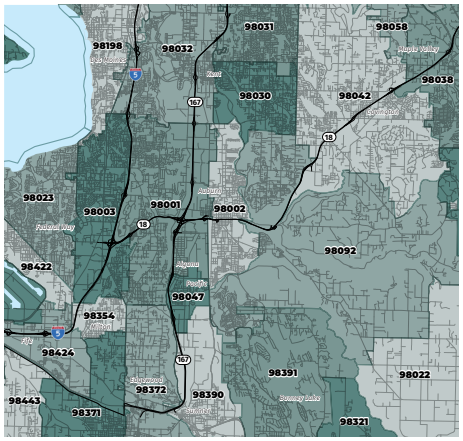
Demographics

Home Location

A majority of survey participants (79.5%) indicated they live in the City of Auburn. In order to better understand where Auburn's park users live, survey participants were also asked what zip code they live in. Nearly 40% of participants responded that they live in zip code 98092 (Auburn – east), with another third of participants in 98002 (Auburn – central) and 12% in 98001 (Auburn – I-5 corridor). The survey also saw a significant number of participants who lived in Bonney Lake, Covington, Maple Valley, Federal Way, and Pacific.

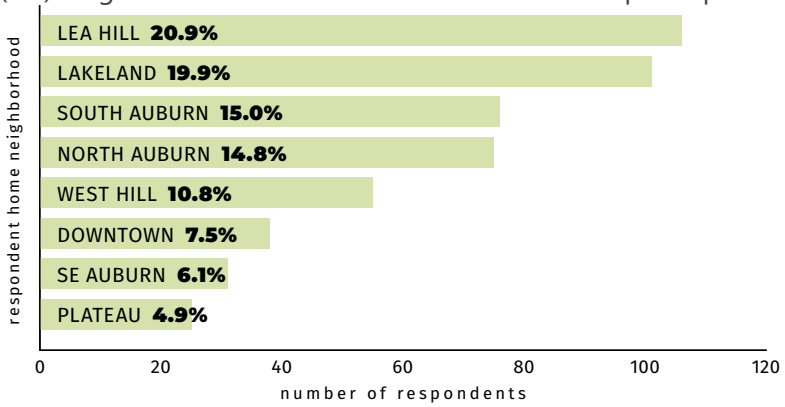


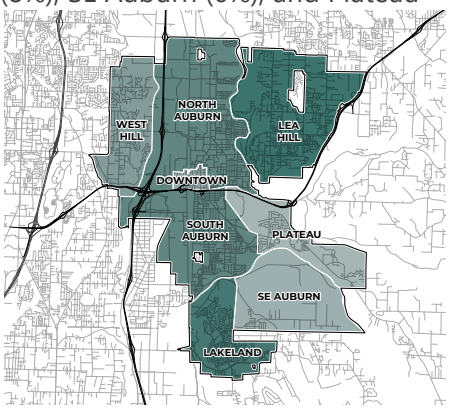




Neighborhood of Residence

Of the 507 survey participants who indicated they live in the City of Auburn, the highest percentages live in the Lea Hill (21%) and Lakeland (20%) neighborhoods. The Downtown (8%), SE Auburn (6%), and Plateau (5%) neighborhoods had the smallest numbers of participants.

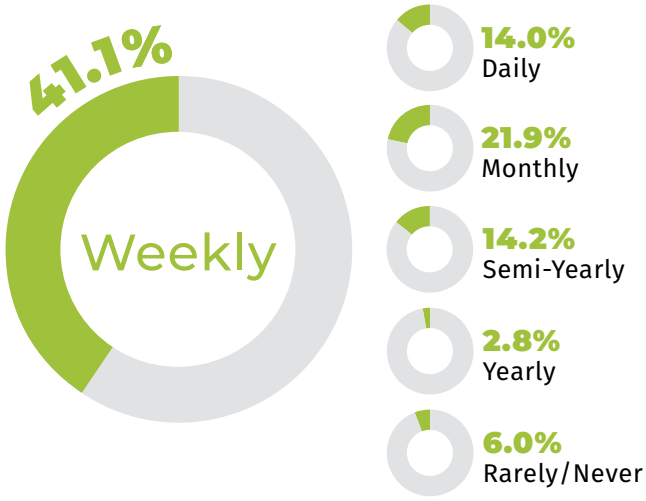




Use of Auburn's Existing Facilities

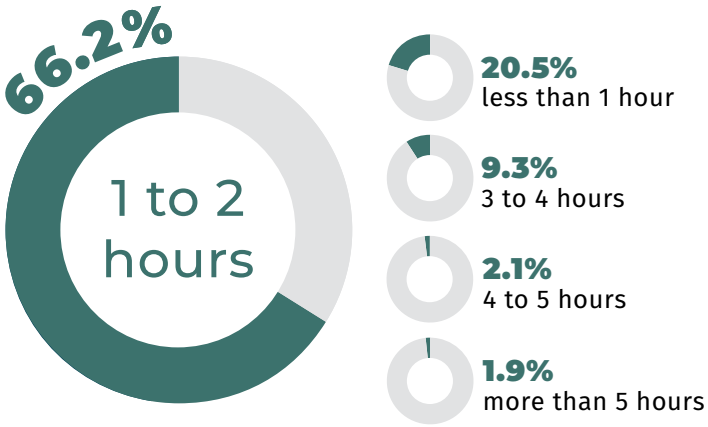
Frequency

Survey participants were asked, "How frequently do you visit the parks or recreational facilities within the City of Auburn?" Over 40% indicated they visit Auburn's parks weekly, with another 22% visiting monthly.



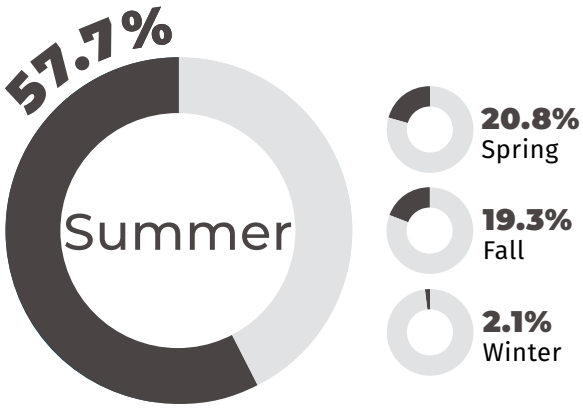
Length of Visit

When asked, "How long is your average visit to a park or recreational facility within the City of Auburn?" nearly two-thirds of participants responded with 1 to 2 hours, with another 21% indicating their average visits last less than 1 hour. Only 13% of respondents indicated their average visits were longer than 2 hours.



Season

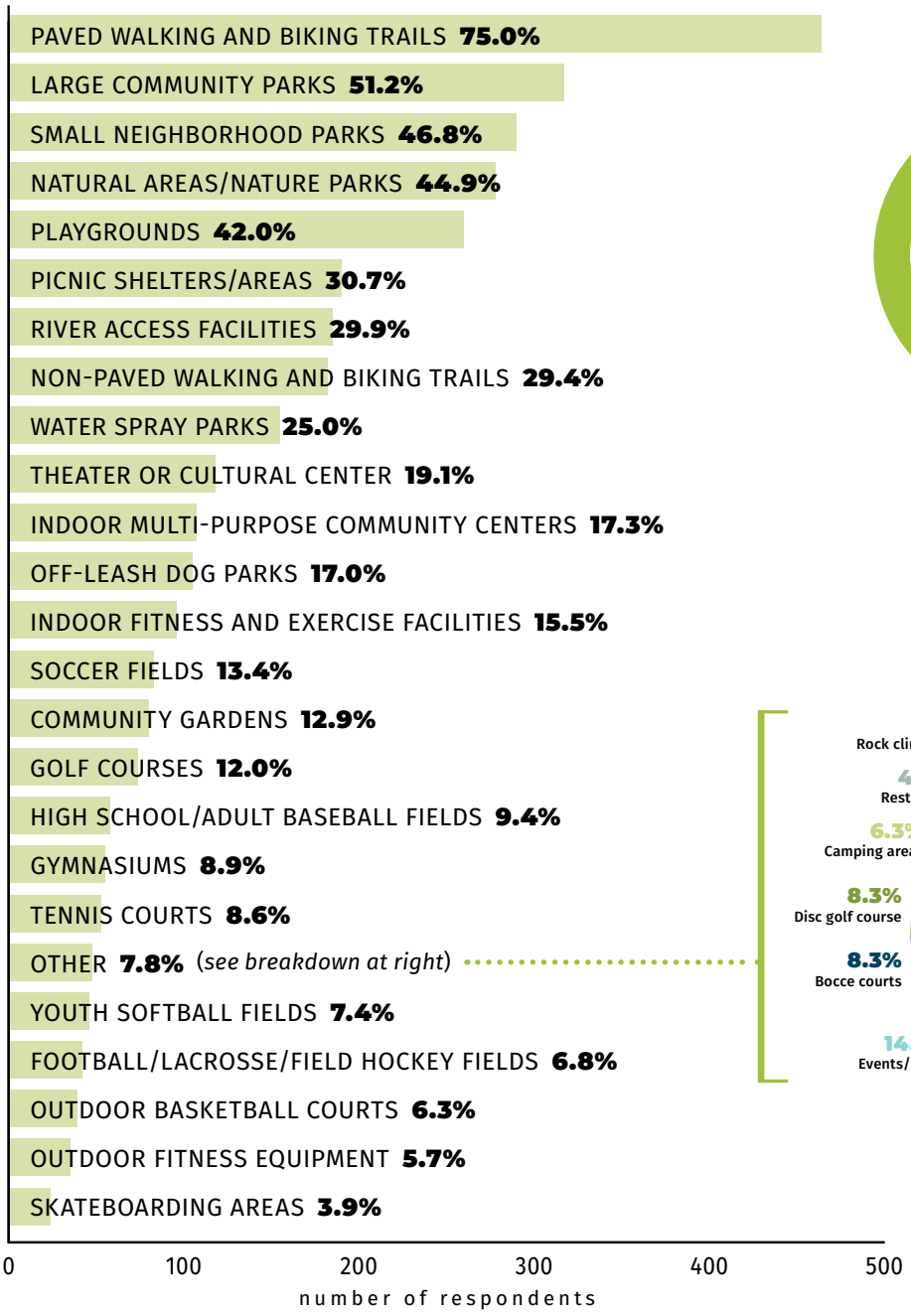
Participants were asked, "What is your favorite season to visit parks and recreational facilities in the City of Auburn?" Summer was the favorite time to visit for 58% of respondents, with Spring and Fall each garnering about 20% of the vote. Only 2% of respondents indicated winter was their favorite season for a parks visit.

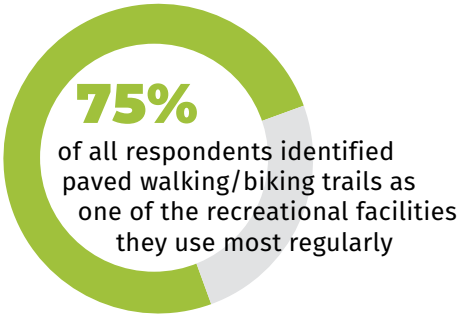


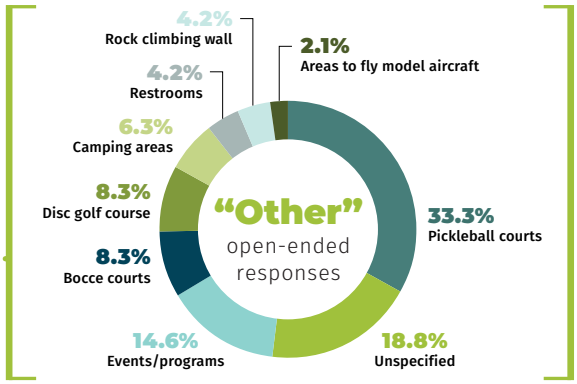
Recreational Facility Use

Types of Facilities Used

Respondents were asked to select from a multiple-choice list to answer the question, "What are the types of recreational amenities/facilities that you most regularly use?" Respondents could select as many choices as applicable for them/their household, regardless of whether the facilities were located in Auburn or not.



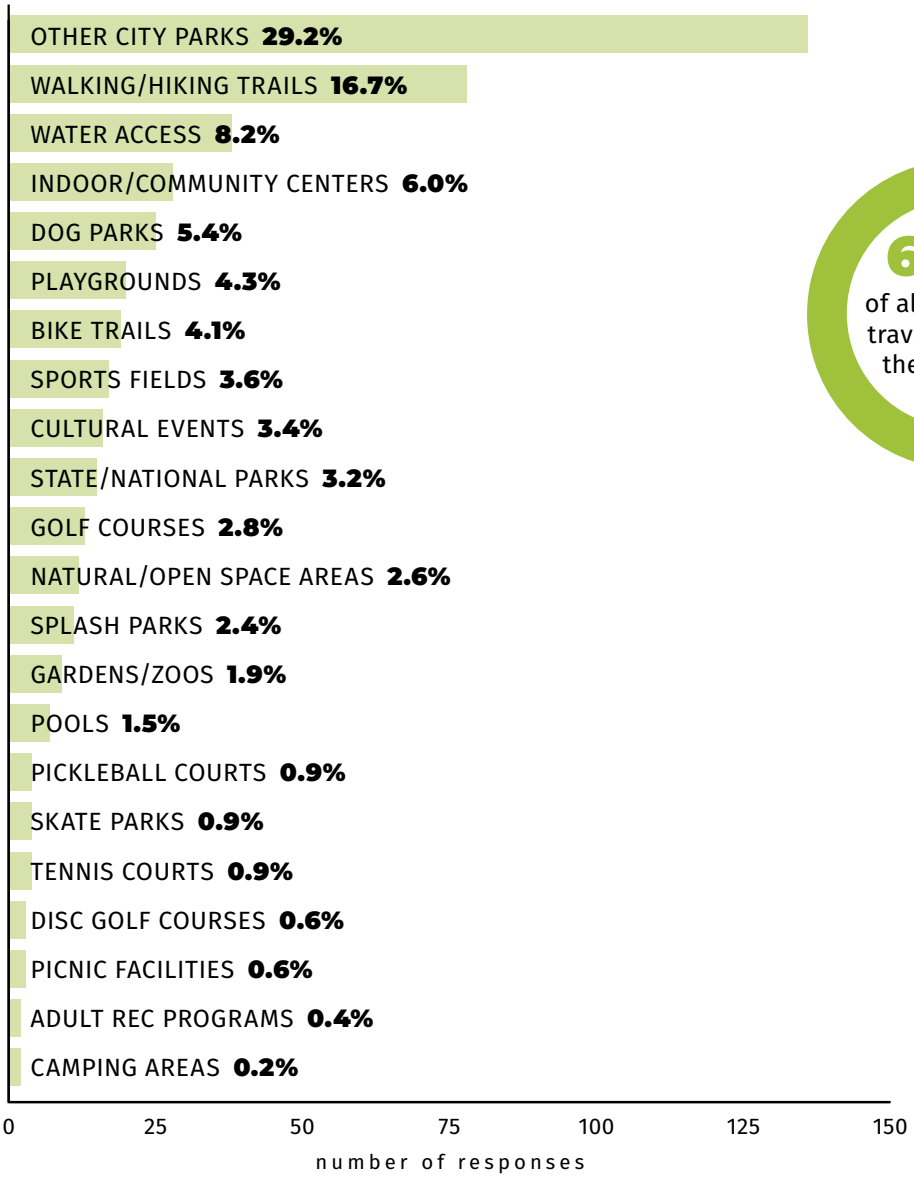


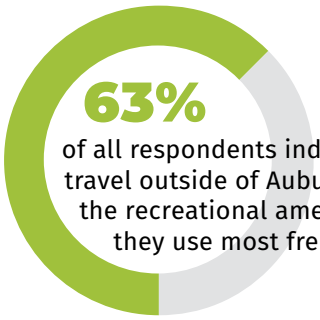


Recreational Facility Use

Recreational Facilities Outside Auburn

As a follow-up question to what types of recreational amenities/facilities they use most regularly, survey participants were asked, "Do you currently travel outside the City of Auburn for any of these amenities?" They were then asked to list the facilities they currently travel outside the City of Auburn to use. The open-ended answers provided by participants can be broadly broken into the categories below.



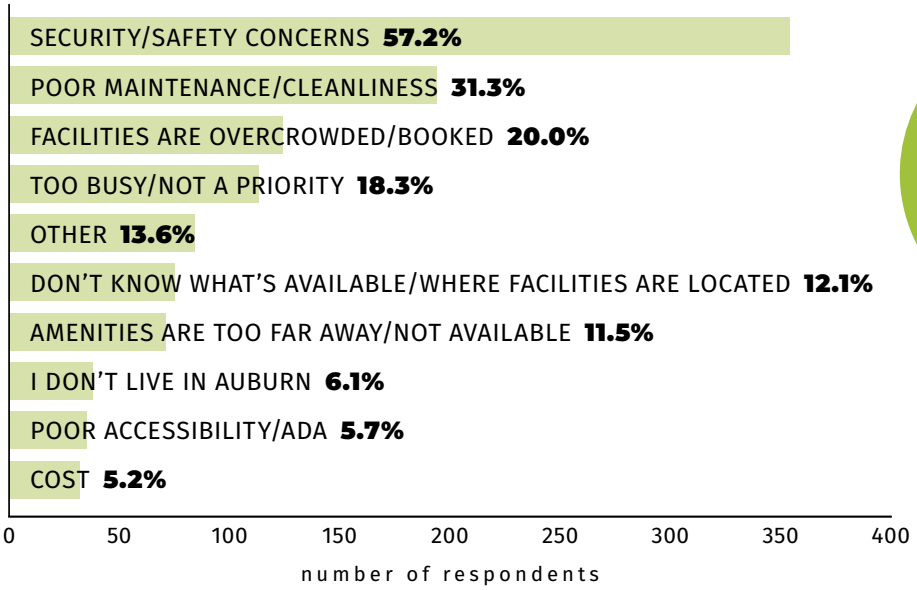


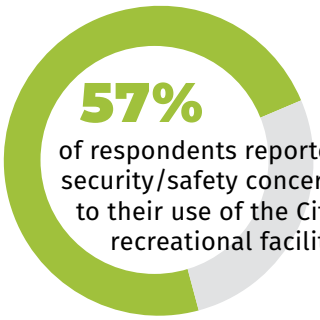
of all respondents indicated they travel outside of Auburn to access the recreational amenities/facilities they use most frequently

Recreational Facility Use

Barriers to Use

Survey participants were asked to select from a multiple-choice list to answer the question, "What are some of the existing barriers or reasons why you may not use available recreational facilities or participate in parks and recreational programs within the City of Auburn?" Participants were invited to select as many choices as applied for them/their household. Security/safety concerns (57%) were the top barrier to participants' use of existing facilities, followed by maintenance/cleanliness (31%) and overcrowded/booked facilities (20%).

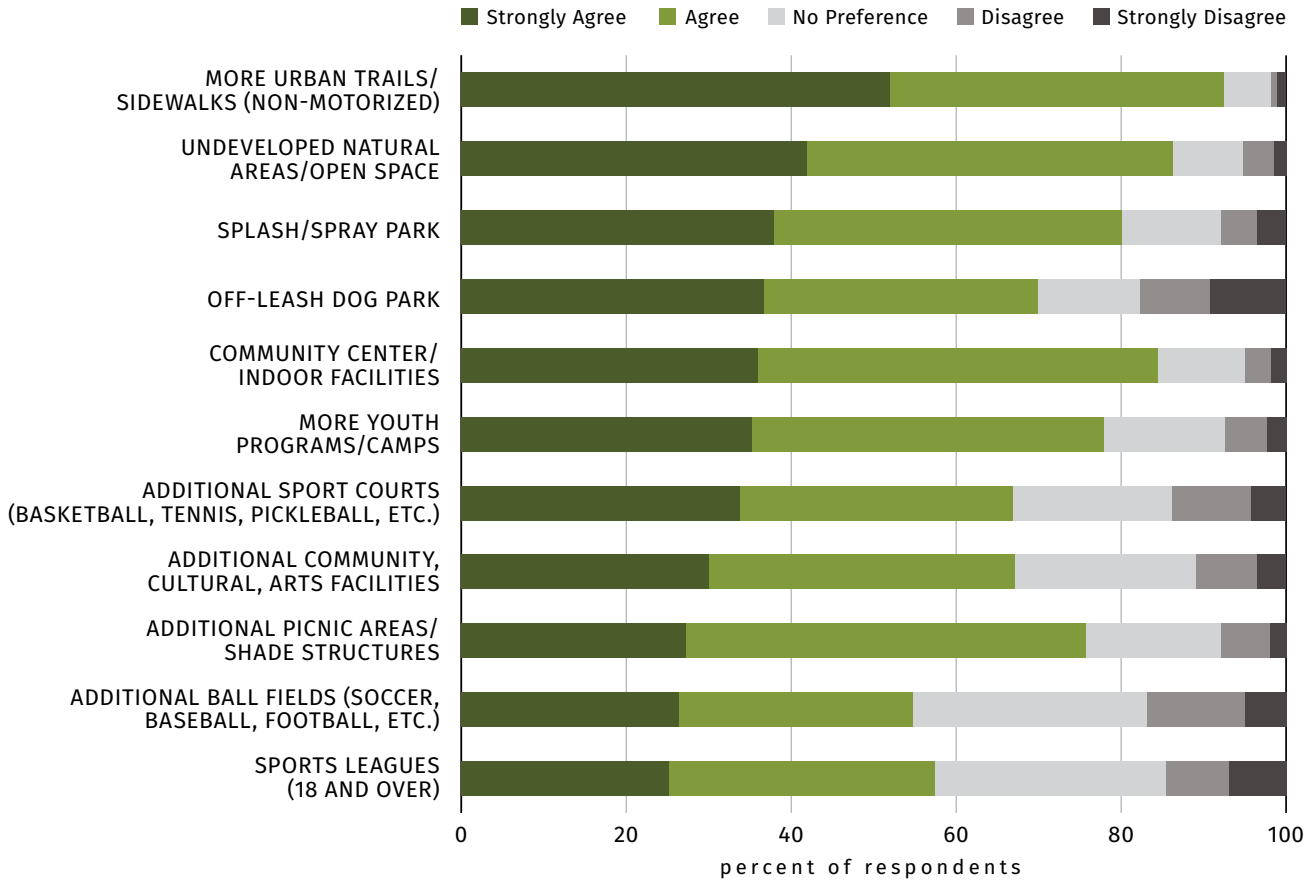




57% of respondents reported that security/safety concerns are a barrier to their use of the City's available recreational facilities or programs

Parks and Recreation Needs

The City Needs...



Survey participants were provided with a list of recreational facilities and amenities, each framed as a statement ("The City needs [facility/amenity]"). Participants were asked to select how strongly they agreed or disagreed with each statement on a sliding scale of one to five (5 = strongly agree, 4 = agree, 3 = no preference, 2 = disagree, 1 = strongly disagree). Responses are summarized in the above chart.

At the top of the list, over 90% of participants either agreed or strongly agreed that the City needs more urban trails/sidewalks (non-motorized). Strong support was also given for undeveloped natural areas/ open space, splash/spray parks, off-leash dog parks, community center/indoor facilities, and more youth programs/camps.

Key Takeaways

The project team will use the input collected through the community survey to inform and drive the PROS Plan update. Key takeaways from the survey data include:

- Survey respondents' **most-used** recreational facilities include **paved walking/biking trails** (used by 75% of respondents), **large community parks** (51%), **small community parks** (47%), small neighborhood parks (47%), **natural areas/nature parks** (45%), and **playgrounds** (42%).
- Survey respondents' **least-used** recreational facilities include **skateboarding areas** (used by 4% of respondents), **outdoor fitness equipment** (6%), **football/lacrosse/hockey fields** (7%), and **youth softball fields** (7%).
- 63% of survey participants indicated they **travel outside of Auburn** to access the recreational amenities/facilities they use most frequently. These facilities include other (nearby) **city parks** (29%), **walking/hiking trails** (17%), **water access** (8%), and **indoor community centers** (6%). These responses suggest there could be a need for more of these facility types in the City of Auburn, or a need to improve those that already exist within the city.
- **Barriers to use** indicate existing issues that need to be addressed by the City in order to improve Auburn parks users' experience. The largest barriers to use of the City's available recreation facilities or programs, as reported by survey respondents, are **security/safety concerns** (57% of respondents), **poor maintenance/cleanliness** (31%), and **overcrowded/booked facilities** (20%).
- According to survey respondents, the City of Auburn's biggest parks and recreation needs include:
  - More non-motorized urban trails/sidewalks (92.5% of respondents)
  - Undeveloped natural areas/open space (86.4%)
  - Community centers/indoor facilities (84.5%)
  - Splash/spray parks (80.2%)
  - More youth programs/camps (77.9%)
  - Off-leash dog parks (69.9%)

Demand & Needs









The purpose of the demand and needs analysis is to evaluate, quantify, and understand the current and future demand for recreational facilities and parkland. This analysis also identifies the existing and anticipated needs for providing parkland, facilities, and open spaces, both now and in the future. "Needs" in this context includes both the preservation of existing services and resources, as well as the projected future requirements based on population forecasts and economic outlooks.

This update reflects the community's needs, desires, and recommended priorities, establishing a foundation for the next 6 to 10 years. It also outlines longer-term aspirations for the next 15 to 20 years.

Quantifications vs Qualifications

Traditionally, quantitative standards have been used to assess the need for and identify potential actions to acquire or develop additional parks and recreation elements. Based on the National Recreation and Park Association's (NRPA) guidelines and its online database "Park Metrics," simple comparisons of adequate land, derived from normalized averages across the country, were used to determine the minimum amount of parkland required to effectively provide parks and recreation services.

While this plan is primarily focused on the needs identified by the public, it also evaluates the recreational demands of the City of Auburn using traditional level-of-service (LOS) standards, recreation trends, and a gap analysis of access within the current park system.

However, while quantifiable metrics allow for straightforward comparisons, they fall short when it comes to understanding the "quality" of life that a community expects or demands. Developing strong strategies and identifying potential improvements requires engaging with community members through surveys, public meetings, and other forms of public consultation. The previous section of this report outlines this process in detail.

This section concludes with a comparison of the quantitative and qualitative findings to refine a methodology for testing and ultimately selecting improvements that will enhance Auburn's quality of life, aligned with its demonstrated values and preferences.

Park Equity & Access

To better understand where the demand and need for park lands should occur, a service area map was created on the following pages that identifies the current service area of each existing park and the new service areas created by proposed improvements.

To develop the service maps, Open Street Map data was used to identify and verify known sidewalk data and the City's transportation grid that the City of Auburn provided. Sidewalks are considered to be safe walking routes. All the existing access points to each existing park and/or trail space were digitized and a network analysis of the safe walking routes to each access point was developed. The analysis would initially stop even if the end of a sidewalk was encountered before the 10-min range (approximately 1/2 mile) was reached.

A second analysis ignored the known sidewalks and trails but followed the City's existing transportation grid, essentially identifying known gaps in the walkshed that could be addressed by extending existing sidewalks.

Additional maps on pages 60 and 61 highlight specific areas of the City where residents identified gaps in the current park system, with a particular emphasis on the need for more sports fields, courts, and other recreational amenities, as indicated through public involvement responses.

The "10-Min Walk" Metric

A 10-minute walk is considered an important park access metric for several reasons. A 10-minute walk (approximately 1/2 mile on level ground) as a park access metric is important because it promotes physical activity, equity, sustainability, social interaction, and overall community well-being (see 'Benefits of the 10-min Walk' on the next page.) It aligns with various health, environmental, and social goals the City has and should encourage staff and policymakers to prioritize accessible green spaces as a fundamental part of Auburn's development and the community's desired quality of life.

The figure on the following page identifies the service areas, AKA the 10-minute "walksheds", for each existing park as well as showing the current gaps on the page after that.

Gap Analysis

As outlined in the Goals & Objectives and related policies, ensuring that residents have fair and easy access to parks located within a half-mile of their homes is crucial for the overall health and well-being of the community. This previous figure offer insights into population density and conducts a network analysis of park accessibility. This analysis examines each property's ability to reach a nearby park within a half-mile, either via a street or a trail. The service area maps are designed to demonstrate how accessible parks with various amenities are to the community and how accessibility could be enhanced through improvements to parks that currently offer limited amenities. It's worth noting that these accessibility gaps can be reduced by ensuring safe access to parks can be increased with new sidewalks and transportation improvements.

City of Auburn Projections

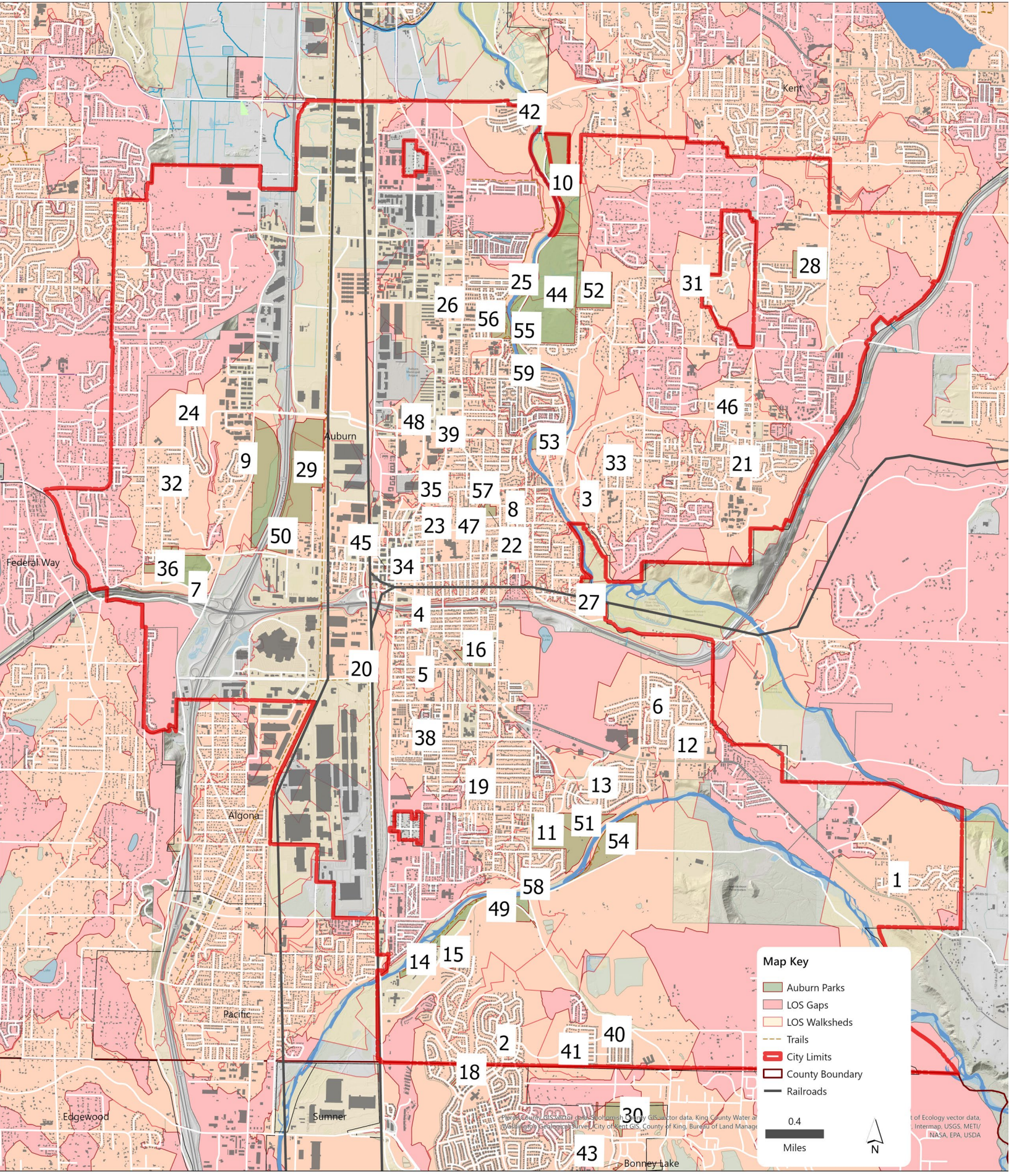
The City of Auburn, out of 635 named cities and populated areas, is currently ranked #14 in the list of cities in the State of Washington based on population size, and is located in the county with the highest desnity of people living per sq mile.

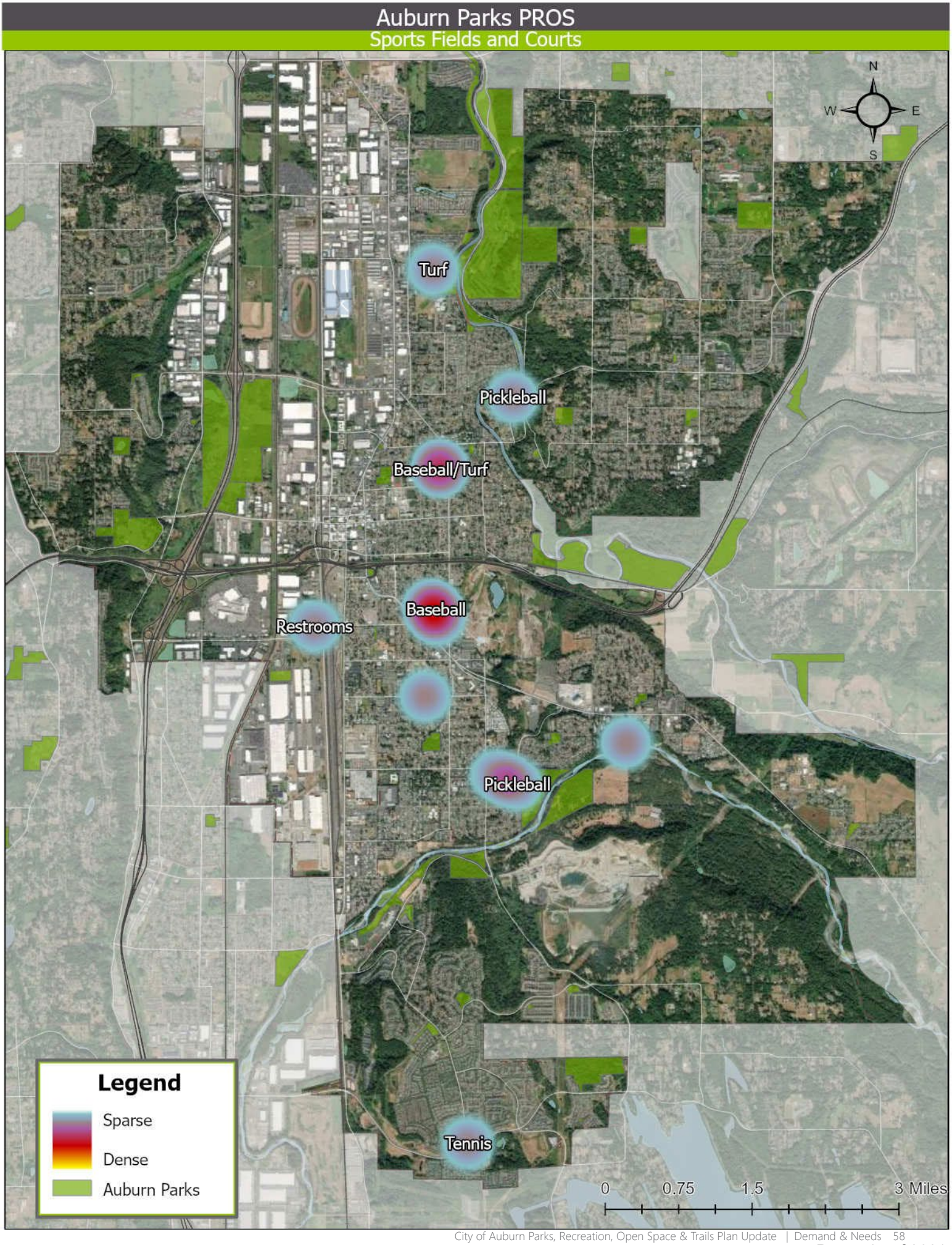
The Office of Financial Management (OFM) predicts population projections under the Growth Management Act (GMA) to accommodate growth over the next 20 years. While the most recent census data available is from 2020, it shows the population has grown to over 88,000. The rapid growth experienced during the '90's and '00's may have slowed, but Auburn remains an attractive community known for its family-oriented, small-town atmosphere. With affordable housing compared to most of King County, convenient highway access, and a charming small-town feel, Auburn is poised for continued, stable growth that will support the demand for recreational facilities.

Recreation Trends

Outdoor recreation is on the rise nationwide, and Washington State and all its communities is no exception. Since 2019, and especially throughout the Covid pandemic, outdoor recreation equipment sales saw a significant increase across all major product categories. In Washington, there has been a notable surge in the participation rates of 20 outdoor activities since 2017. Among these activities, non-motorized trails, nature and wildlife viewing, camping, paddling, winter recreation, and leisure activities in nearby parks are consistently in high demand among Washington residents. With an expected statewide population increase of 2 million residents in the next 25 years, it's more critical for cities such as Auburn to plan for the future demand on outdoor recreation facilities.

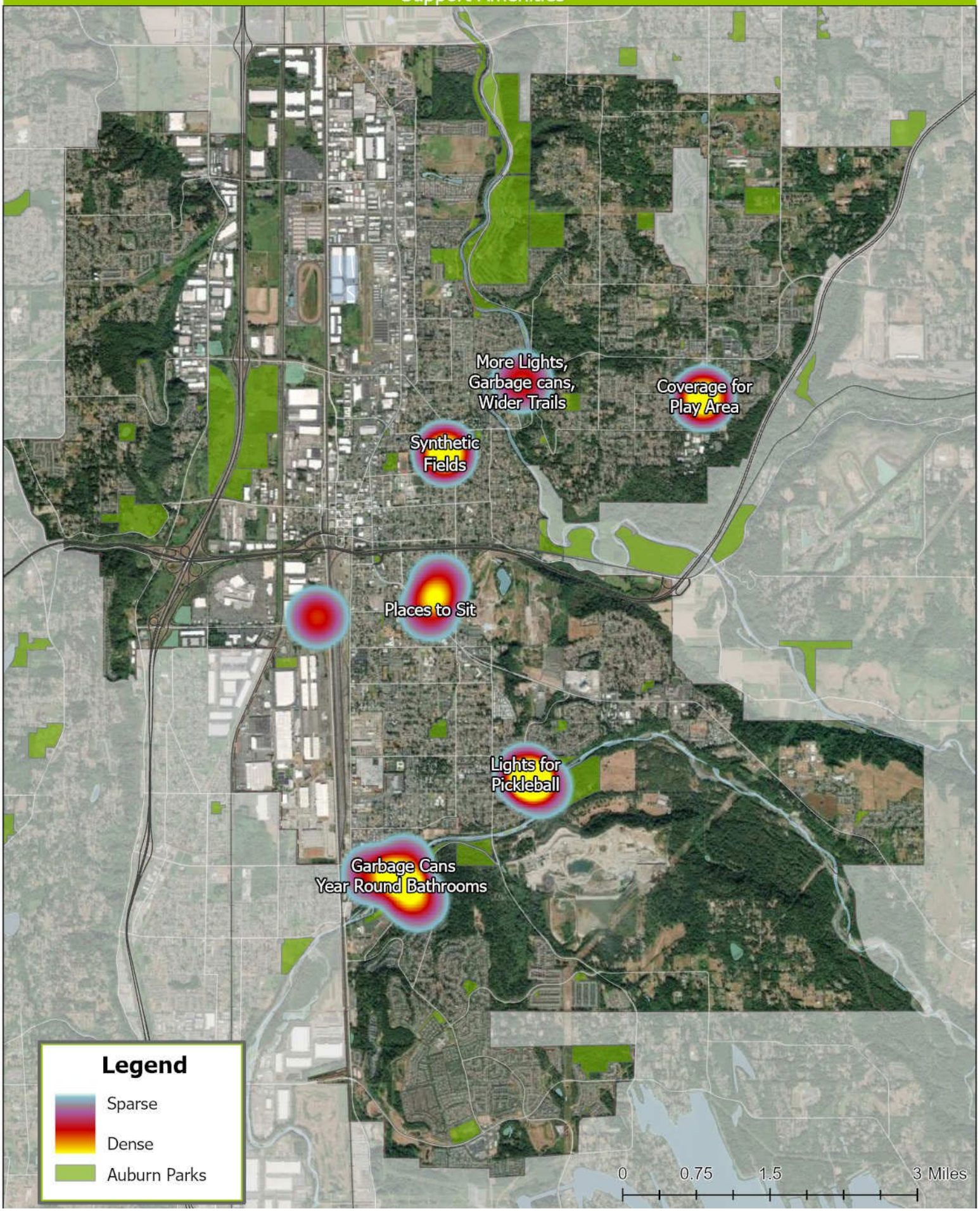
Outdoor recreation not only supports local economies


Kent
Auburn
Federal Way
Algona
Pacific
Edgewood
Sumner
Bonney Lake
42
10
25
44
52
26
56
55
59
31
28
24
48
39
53
46
9
29
32
35
57
8
33
21
3
50
45
23
47
22
36
34
7
27
4
16
20
5
6
38
12
19
13
11
51
54
1
58
49
14
15
2
40
41
18
30
43
Map Key
Auburn Parks
LOS Gaps
LOS Walksheds
Trails
City Limits
County Boundary
Railroads
0.4
Miles
N


Auburn Parks PROS
Sports Fields and Courts
N
W
E
S
Turf
Pickleball
Baseball/Turf
Baseball
Restrooms
Pickleball
Tennis
Legend
Sparse
Dense
Auburn Parks
0
0.75
1.5
3 Miles

Auburn Parks PROS

Support Amenities



but also connects people with the natural world, promoting physical and mental well-being. With the rise of work-from-home arrangements post-pandemic and housing shifts from larger cities to smaller communities, residents are increasingly seeking convenient access to a variety of outdoor experiences, both developed and primitive, that allow them to integrate nature-based recreation into their busy schedules while avoiding crowds and traffic.

However, striking a balance between providing access to outdoor recreation and safeguarding natural and cultural resources remains a significant concern statewide. The heavy concentration of outdoor recreation at popular sites has led to resource degradation and reduced user satisfaction. Many communities face disparities in access to meaningful outdoor recreation opportunities, and residents often struggle with the time, cost, and information needed to support their outdoor pursuits. As the state aims to promote equitable access to the social, health, and economic benefits of outdoor recreation, a careful approach to outdoor recreation management is essential to ensure the protection of natural and cultural resources.

2030 Statewide Comprehensive Outdoor Recreation Plan

The 2023 Recreation and Conservation Plan, or commonly referred to as the Statewide Comprehensive Outdoor Recreation Plan (SCORP), is a comprehensive document outlining the state's vision for outdoor recreation and public land conservation. Developed by the Recreation and Conservation Office (RCO), the plan guides investments for the next 5-10 years. It considers challenges and benefits of outdoor recreation, assesses current demand, and inventories existing opportunities. By establishing statewide priorities and goals, the plan serves a crucial role in securing funding, guiding investments strategically, and fostering collaboration between land managers. Public input through surveys and outreach ensures the plan reflects the needs of Washington residents. Ultimately, the WA State RCO SCORP Plan serves as a blueprint for a sustainable future where outdoor recreation and public lands are preserved and accessible for all.

RCO's 2022 Assessment of Resident Demand

In the 2022 Assessment of Resident Demand report, participation rates for 45 activities were compared to 2017. All but two of those activities (Technology-based games and Collecting or Gathering Things in Nature) showed an increase in participation. Activities that had the greatest increase in participation include the following:

- Wildlife or nature viewing increased by 28%
- Paddle sports increased by 28%
- Visiting outdoor cultural or historical facility increased by 27%
- Tent camping (undeveloped area) increased by 26%
- Backpacking increased by 25%
- Playing yard games (in a park) increased by 25%
- Snowshoeing increased by 23%
- Tent camping (developed area) increased by 19%
- Hanging out (in a park) increased by 19%
- Mountain biking increased by 18%

The SCORP document classifies Auburn within the 'Seattle King" region, encompassing King CVounty soley. Note that a portion of Auburn stretches into Pierce County. Regardless, the SCORP survey reveals a significant trend – "walking in a park or trail setting" that boasts the highest participation rate in the region (92% compared to the statewide average of 82%). This preference for walking holds true across diverse demographics, including age, gender, race, and income groups.

An interesting observation is the increasing popularity of walking as a recreational activity since the previous RCO survey in 2012. Additionally, participation in boating and swimming has also risen, with swimming now ranking among the top 10 recreational activities in the Seattle King region. Other favored activities include nature-based pursuits like visiting rivers, streams, and beaches, wildlife viewing, attending outdoor events like farmer's markets and fairs, and day hiking. These findings from the SCORP planning outreach program align with the trends identified in state-level surveys, underscoring the importance of walking/hiking opportunities and nature-based recreation in King County.

Trails

Trails, both within parks and connecting parks, schools, shops, and destinations are generally the top demand seen across the country. Providing trail connections between these popular destinations enhances a community's walkability and encourages active lifestyles. Trail usage has seen a significant uptick in recent years, with data suggesting a surge starting in 2020. Recent studies by both American Trails report increases ranging from 79% to 171% and can

attributed to several factors, especially as a response to the COVID-19 pandemic. With access to traditional forms of exercise and leisure activities significantly impacted due to closures and safety concerns, many people turned to outdoor recreation, including hiking and other trail-based activities as safe and accessible options. This trend has continued post-pandemic, with increased trail use likely due, in part, to the population continuing to seek alternative ways to exercise and maintain mental well-being.

While some pandemic restrictions have eased, evidence from the National Parks Service and the Washington State SCORP suggests a continued rise, or at least a steady hold, in trail use. This trend underscores the growing importance of well-maintained trail networks. This applies not just within parks themselves, but also in connecting parks and open spaces together. As demand for these outdoor spaces rises, so too does the need for additional supporting infrastructure to ensure their continued enjoyment by all.

Canines

The trend of dog ownership in the United States is experiencing a significant upswing, with estimates suggesting a population exceeding 89 and 94 million canine companions nationwide. This surge translates to a parallel rise in demand for designated dog parks across the country. These parks, particularly larger facilities, have become popular destinations, attracting dog owners and potentially boosting agency revenue through user fees and contributing to tourism.

In Washington State, the growing human-canine bond is likely influencing public land use plans. With dogs increasingly viewed as cherished family members, especially in urban environments, families are actively seeking opportunities to include their furry companions in outdoor activities. Cities are likely taking note of this trend, potentially leading to the inclusion of designated dog walking areas or off-leash spaces within their planning strategies.

Pickleball & Padel

The participation in pickleball has witnessed a remarkable surge, growing by 159% in just three years, reaching 8.9 million participants in 2022, as reported by the Sports & Fitness Industry Association.

This swift expansion has presented challenges for public parks and recreation departments, which must strike a balance between the competing interests of diverse recreational activities while working within constraints of limited space and budgets. Parks agencies are becoming more confronted with the task of accommodating pickleball enthusiasts, who favor this tennis-like sport with a smaller court, without causing discomfort or inconvenience to others. The noise and disruption generated by pickleball is becoming more a source of frustration for some neighbors, tennis enthusiasts, parents with young children, and other community members.

In various towns and cities, homeowners' associations and local residents have begun to impose restrictions on pickleball activities and thwart the construction of new courts. They have initiated petitions, pursued legal actions, and voiced their concerns at council and town hall meetings, all in an effort to temper the widespread enthusiasm for pickleball and its unique auditory characteristics.

Similar to pickleball, Padel is a racket sport of Mexican origin gaining popularity across the United States. This game is a cross between tennis, racquetball, and squash. It's currently estimated that Padel has over 100,000 players in the United States, and the number of courts has more than doubled in the last two years, expecting to grow to 30,000 courts by 2030. It is expected that the sport will grow substantially in communities with growing Hispanic populations, including Auburn.

Youth Sports

Participation in youth sports leagues has undergone a complex transformation in recent years. While traditional team sports remain popular, data suggests a decline in children (ages 6-12) consistently playing on teams. The Aspen Project reports a drop from 45% in 2008 to 38% in 2018, and the Sports & Fitness Industry Association (SFIA) confirms this trend with a 6% decline in core participation (ages 6-17) between 2019 and 2022. This translates to roughly 1.2 million fewer participants. Several factors may contribute to this decline, including the financial burden of participation fees, equipment, and travel expenses, concerns about over-specialization leading to burnout, and time constraints due to competing academic and extracurricular demands.

This changing landscape has potential implications for the need for large regional sports facilities. While the decline in regular participation suggests a decreased demand for facilities solely focused on traditional team sports, total team sports participation (including those playing at least once a year) remained stable between 2019 and 2022, suggesting a potential shift towards less structured forms of sports involvement. Basketball continues to be the most popular sport, with nearly a

quarter of youth (ages 6-17) participating at least once in 2022.

Multi-sport facilities catering to a wider range of activities and hosting tournaments or events attracting teams from a broader area are expected to see continued use. Well-designed facilities could also become community hubs, offering recreational activities for all ages and potentially incorporating amenities like fitness centers or indoor walking tracks that would noit be affected by inclement weather.

The future of youth sports will require adaptation in programs. Focusing on fun and inclusivity, offering flexible scheduling and shorter seasons, implementing strategies to reduce financial barriers, e.g. developing parks districts to help cover long-term operating & maintenance costs, and promoting foundational athletic skills applicable to various sports are all crucial considerations. By adapting to these trends, youth sports programs can ensure they continue to play a vital role in promoting physical activity, social development, and positive health outcomes for children.

Playground Trends

Modern playground design reflects a growing emphasis on inclusivity, fostering connections with nature, and catering to a wider range of users. A key trend to note is the creation of inclusive playgrounds, ensuring accessibility for children with various abilities through features like ramps, sensory panels, and equipment that accommodates different physical and cognitive needs.

Playgrounds are also increasingly designed to mimic natural environments, incorporating elements like logs, boulders, and water features. This reconnection with nature encourages open-ended and imaginative play.

The concept of multigenerational playgrounds is also gaining traction, offering adult fitness equipment and interactive features that promote intergenerational play within families and communities. Grant programs such as AARP's FitLot program is a great example.

Sensory play experiences are being actively integrated through musical instruments, textured panels, and fragrant plants. These elements stimulate different senses, enriching the play experience and catering to children with special needs.

While still emerging, some playgrounds are exploring seamless technology integration through augmented reality or interactive elements, adding a new layer to physical play.

Recognizing the limitations of shrinking green spaces in downtown cores or within communities, there's a growing focus on "playgrounds within reach." This involves maximizing the play value of smaller spaces through multifunctional equipment, innovative design, and better integration with surrounding areas.

Overall, these trends highlight a shift towards playgrounds that are not just fun, but also inclusive, educational, and promote holistic development in children.

Electrification

As electric technology develops, maintenance equipment, vehicles, mowers, and other equipment used in parks and recreation are transitioning from gas powered resources to electric assets. This transition provides long-term cost savings, environmental benefits, and decreased noise. Additionally, parks and trailheads should consider the addition of EV charging stations in parking lots, as the number of EV cars on the road continues to grow. Washington State has led this transition to electric vehicles, with over 18% of new cars sold in the first half of 2023 being fully electric or plug-in hybrids according to the Seattle Times. Vehicle chargers located at park facilities enable drivers to engage with park facilities while waiting for a full charge.

Climate Resiliency

The concept of electrification pertains to growing needs for climate resilience and the ways in which future park implementations can accommodate the increase of hotter days and nights, as well as the increase of storm and wildfire impacts. Parks create a great opportunity to address these goals through smart design and engineering. Parks and open space can mitigate urban heat islands, absorb flood and stormwater, and create fire breaks through green space and linear trail corridors. Climate change, stormwater/flooding implementations, and tree canopy coverage should be considered in future park renovations to increase resiliency.

Funding Threats & Availability

Funding for parks and municipal recreation services has been forced into a creative shift as municipalities have been forced to seek additional ways to fund operation and improvements. Long-standing grant and funding assistance programs have repeatedly come under threat at both the federal and state level. Congress let the Land and Water Conservation

Fund (LWCF) expire in 2015 for the first time in 50 years. In response to public outcry, several members in Congress fought for a short-term solution: an emergency authorization of three years. In 2016, Congress had another opportunity to permanently reauthorize LWCF, thanks to legislation championed by Washington's own Senator Maria Cantwell in the Energy Bill. While LWCF initially failed under the past administration, in September 2021, LWCF was permanently authorized with full funding through the Dingell Act. This act directed a significant portion of offshore oil and gas royalties to the LWCF for the preservation of public lands, waters, and recreational opportunities.

Since then, specific funding levels and appropriations for the LWCF have varied from year to year as part of the federal budgeting process. Funding for the LWCF depends on annual appropriations by Congress, hence the program's budget and funding levels can be subject to changes and priorities set by the federal government.

Investments in Parks Will Rise

Across other municipal agencies statewide, investment in state and local infrastructure, which had been depressed since the Great Recession of 2008, and especially since the COVID-related stimulus packages, e.g., ARPA, increased federal funding has helping that fund public works and park and recreation infrastructure improvements, such as buildings, restrooms, and roads.

State and local spending is up nearly 10 percent from last year, according to data from the Commerce Department, and spending on capital outlays continues to grow. The Commerce Department data also show that spending on amusement and recreation facilities is up 31 percent from a year ago. It appears that economic conditions will remain favorable for new investments in park and recreation infrastructure if local and state tax collections continue to rise and interest rates remain relatively low. Building on the momentum of the past few years, local and state governments will make even more park and recreation infrastructure investments in buildings, playground equipment, roads and bridges, and capital repairs to aging infrastructure, topping the highest level of infrastructure spending since the recession of 2008.

Level-of-Service (LOS)

To evaluate how different types of parks align with a community's desires, the National Recreation & Park Association (NRPA) developed and maintains simple demand standards as a guideline for identifying the number of park facilities potentially needed per community. While there are various methods to assess the service standards of a park system, the NRPA's standards focus primarily on comparing population size to the number and types of parks or recreational amenities offered.

Traditionally, the ratio of land acres per thousand people has been a widely adopted measure. However, this metric provides only a limited evaluation of a park system. A more comprehensive approach to determining service standards should consider the distribution of land and facilities throughout the community, the per capita value of the system, the availability of programs for all demographics, the characteristics of the park user base, the quality and upkeep of facilities, and, most importantly, public perception of the park system as an indicator of quality of life.

Recognizing that the vision, values, and needs of each community are unique, planners have acknowledged that simply applying local level-of-service (LOS) standards to a national benchmark is not an effective means of evaluating a community's specific needs and vision. Consequently, NRPA's LOS standards have evolved in recent decades, now recommending that each community develop its own standards based on local goals, priorities, and conditions.

NRPA Recommendations

The National Recreation and Park Association (NRPA) provides guidelines for Level of Service (LOS) standards, which help communities determine appropriate targets for parks and recreational facilities based on population. However, it's important to note that NRPA has moved away from prescribing specific numeric LOS standards (traditional benchmarks) for all communities, recognizing that each community has unique needs and contexts. Instead, they emphasize using data-driven approaches, including benchmarking against similar communities, community input, and local conditions to determine the appropriate LOS.

For communities with populations of 85,000 to 100,000 residents, the NRPA suggests the following general recommendations:

Total Parkland per 1,000 Residents

Traditional Benchmark: Historically, a common benchmark was to provide around 10 acres of parkland per 1,000 residents. However, this is no longer a one-size-fits-all recommendation. Communities are encouraged to set their own targets based on factors such as geographic constraints, population density, and specific recreational needs.

Contemporary Approach: Communities might set goals ranging from 5 to 20 acres per 1,000 residents, depending on their unique circumstances and priorities.

Park Access and Distribution

Accessibility: NRPA recommends that all residents should have access to a park or green space within a 10-minute walk (approximately 0.5 miles) from their home. This focus on accessibility ensures that park benefits are equitably distributed across the community.

Distribution: For larger communities, ensure that parks are evenly distributed across different neighborhoods and are easily accessible by diverse modes of transportation, especially safe walkable routes.

Programming and Services

Diversity: Communities should offer a wide range of recreational programs that meet the diverse needs of their population, including youth, adults, seniors, and special populations. This may include sports leagues, fitness classes, arts and culture programs, and environmental education.

Staffing Levels

Staffing is crucial for maintaining facilities and delivering quality programming. NRPA provides guidance on staffing ratios, often suggesting a mix of full-time, part-time, and seasonal staff based on the size and scope of the park system.

Staffing by Park Acreage Benchmark: NRPA recommends approximately 1 full-time equivalent (FTE) maintenance staff member per 10 to 20 acres of developed parkland. This number can vary depending on the complexity of the park, the intensity of maintenance required, and the specific facilities within the park (e.g., sports fields, playgrounds, trails).

Programming and Operations Staff: For every 50 to 100 acres of parkland, NRPA suggests having 1 FTE dedicated to programming and operations. This staff is responsible for organizing events, managing facilities, and overseeing day-to-day operations.

Staffing by Number of Parks: NRPA recommends approximately 1 FTE staff member (including maintenance, administrative, and programming roles) per park, assuming the park is of average size and complexity. Smaller parks might not require a full-time staff member and could be maintained by part-time

Budget and Funding

NRPA annually surveys parks organizations across the country to provide quantitative data on several budget and funding metrics:

Per Capita Spending: NRPA Park Metrics reports suggest that the average spending per capita by park and recreation agencies across the U.S. is around $85-$90 per resident. However, this can vary significantly depending on the size of the city, regional cost of living, and specific needs of the community.

Operating Budget Per Acre: NRPA's Park Metrics also indicate that the median operating expenditure is around $6,000 to $8,000 per park acre. This includes costs for maintenance, staffing, utilities, and other operational needs.

Capital Expenditures: A common benchmark is that capital expenses (new developments, major renovations, etc.) should be a significant portion of the overall budget. A rough guideline is allocating 20-30% of the total budget to capital projects, though this can fluctuate based on current needs and existing infrastructure.

Auburn's Quantitative LOS

With NRPA's recommendations in mind, a straightforward quantitative analysis of the City's Level of Service (LOS) can be conducted. The following section evaluates Auburn's current park system against expected NRPA benchmarks to identify current performance and future needs. Ultimately, these quantitative findings will be integrated with the public involvement findings to develop a customized set of LOS standards. This approach, grounded in extensive community engagement, ensures that Auburn's parks and recreation system reflects the community's priorities, whether that means more green spaces, enhanced sports facilities, expanded trails, or additional cultural amenities.

LOS Standards & Overview

Table 4.1 presents the current Level of Service (LOS) based on Auburn's park classifications and recreational amenities inventory. The LOS analysis utilizes assumed low to median values for each category, considering

Table 4-1: Existing Facility Type & LOS Targets					
Facility Type	Current	Recommended Standard*	Current Ratio	Current Difference	Projected Difference****
Park Classification					
Mini-Parks (Pocket Parks)	16.71 acres	0.25 to 0.5 acres	0.19	-0.06	-0.1
Neighborhood Parks	51.23 acres	1 to 2 acres	0.57	-0.43	-0.55
Community Parks	283.31 acres	5 to 8 acres	3.14	-1.86	-3.14
Open Space	321.42 acres	5 to 10 acres	3.57	-1.43	-2.19
Special Use Areas	307.69 acres	Variable			
Total Parkland	980.35 acres	10 acres	10.88	+0.88	-1.44
Total # of Parks	57	1 park per 2000	46	+11	-
Trails	21.96**	.25 to .5 miles	0.24	-	-6.67
Recreation Amenity					
Baseball/Softball Fields	7	1 per 5,000	18.02	-9	-13
Soccer Fields	4	1 per 10,000	9.01	-5	-11
Football Fields	2	1 per 20,000 to 25,000	3.6	-2	-4
Multi-use Fields	6	1 per 10,000	9.01	-3	-5
Basketball Courts	18	1 per 5,000	18.02	-	-5
Tennis Courts	8	1 per 4,000	22.52	-13	-20
Playgrounds	33	1 per 1,000 children under 12***	18	+15	+3
Pickleball Courts	16	1 per 4,000	22.52	-6	-12
Volleyball Courts	2	1 per 10,000	9.01	-7	-9
Recreation Centers	1	1 per 25,000	3.6	-2.6	+3.5
Splash Pads	2	1 per 25,000	3.6	-1.6	-2.5
Dog Parks	2	1 per 50,000	1.8	-	-
Skate Parks	4	1 per 25,000	3.6	-	-.5
Golf Courses (18-hole)	1	1 per 50,000	1.8	-1	-1
Community Gardens (Plots)	16	1 per 10,000	9.01	+7	+5
Amphitheaters	1	1 per 50,000	1.8	-0.8	-1

* measured as acres per 1000 population

** Includes other trails maintained by others

*** Projected 2044 Population = 114,540

**** Assumed # of childen under 12 approximately 20% of overall population

Auburn's current population of 90,096 (as of 2024) and a projected population of 114,540 by 2044. Below is an overview and guideline for LOS quantifications, structured around common park classifications and key recreational elements.

Total Parkland LOS Analysis

Overview: Currently, the City of Auburn boasts a diverse portfolio of parks and recreation assets, totaling 57 sites and covering over 980 acres. This exceeds the lower end of the expected range for parkland based on NRPA guidelines. The NRPA typically recommends between 10 to 20 acres of parkland per 1,000 residents as a general standard. With Auburn's current population of 90,096 (as of 2024), the expected median total acreage of parkland would range from approximately 900 to 1,800 acres. Auburn's park system is therefore well-aligned with these recommendations, supporting the recreational needs of its residents today.

- Total Number: 57 parks
- NRPA Target Number of Parks Based on Population: 57 Parks
- Total Acreage: 980.35 acres
- Average Size: 21.97 acres
- NRPA Target Acreage Based on Population: 10-20 acres per 1000
- Current LOS: 10.88 acres per 1,000 residents
- Projected LOS: 8.56 acres per 1,000 residents
- Auburn Target LOS: 10 acres per 1,000 residents or additional 164 acres of total parkland by 2024

Conclusion/Recommendations: Auburn's current total acreage of parkland is generally within the expected range for a community of its size and physical context. However, when analyzing the distribution and average size of its park types, especially neighborhood and community parks, there are notable discrepancies compared to national standards.

According to the National Recreation and Park Association (NRPA), the recommended level of service (LOS) for community parks is between 5 to 8 acres per 1,000 residents. Auburn currently averages only 3.14 acres per 1,000 residents, which is below this recommended standard. For neighborhood parks, the NRPA suggests an LOS of 1 to 2 acres per 1,000 residents, but Auburn's current average is just 0.57 acres per 1,000 residents. This indicates a significant shortfall in the provision of both neighborhood and community parks relative to the city's population.

Furthermore, the NRPA recommends 5 to 10 acres of open space per 1,000 residents, yet Auburn currently provides only 3.57 acres per 1,000 residents. When factoring in land managed by other organizations, such as King County's Department of Natural Resources, this figure improves and aligns more closely with the recommended range.

Auburn exceeds expectations in total acreage due to the significant footprint of its Special-Use Facilities. This surplus is largely attributed to the inclusion of extensive environmental areas and the golf course, both of which are managed differently from traditional parks and offer limited access to the general public. While reclassifying the golf course as open space might enhance Auburn's Level of Service (LOS) for open space, the specific use, management practices, and limited public access associated with the golf course support its continued classification as a special-use area.

In summary, while the overall size of Auburn's park system aligns with general recommendations, there is a clear shortfall in the distribution of neighborhood and community parks. Additionally, while the city maintains over 30 beautification areas that enhance its aesthetic appeal, these spaces do not replace the need for more neighborhood and community parks to meet national standards and adequately serve the recreational needs of Auburn's residents.

Parklets / Mini Parks / Tot-Lots LOS Analysis

Overview: These parks serve small areas, often a single neighborhood or part of one. They typically feature amenities like playgrounds, benches, and small open spaces with no restrooms. incorporating more parklets and mini-parks can be an effective strategy for addressing Level of Service (LOS) deficiencies, especially in urban areas where space is limited. These smaller parks can provide critical, but disconnected, green space, recreational opportunities, and social gathering spots within densely populated neighborhoods. They are often easier and quicker to implement than larger parks, making them a practical solution to improve accessibility and equity in park distribution. However, they generally require the same level of maintenance and operational purview as larger local or neighborhood parks and, factoring in the increased travel time, can potentially become a lrger burden on park staff.

- Number: 13 parks
- Acreage: 16.71 acres
- Average Size: 1.28 acres
- Target Size: Typically less than 1 acre
- NRPA Target LOS: 0.25 to 0.5 acres per 1,000 residents
- Current LOS (2024): 0.19 acres per 1,000 residents
- Projected LOS (2044): 0.15 acres per 1,000 residents
- Draft NEW LOS: 0.25 acres per 1,000 residents
- Projected Deficit (Acres): 11.29 acres
- Service Radius: 1/4 mile or less

Conclusion/Recommendations: To address the projected decline in the Level of Service (LOS) for mini-parks, parklets, and tot-lots, it is recommended that the City prioritize the strategic addition of these smaller park facilities only as opportunities arise. Currently, the LOS stands at approximately 0.19 acres per 1,000 residents, which close to NRPA's minimum of .25, but without intervention, this will decrease to 0.15 acres per 1,000 residents by 2044. To maintain an adequate LOS, the City should aim to add approximately 11 acres of new park areas in this classification by 2044, ensuring continued access to these essential recreational spaces for the growing population.

Neighborhood Parks LOS Analysis

Overview: Local or neighborhood parks serve as the recreational and social hubs of a neighborhood. These parks are designed to be accessible by foot or bicycle and typically feature amenities such as playgrounds, athletic fields, picnic areas, sports courts, and open play areas. Some parks may also include restrooms and other supportive facilities. Currently, there is a shortage of local or neighborhood parks based on current park classifications, but the total parkland acreage across the city exceeds the cumulative standard.

- Number: 10 parks
- Acreage: 51.23 acres
- Average Size: 5.12 acres
- Target Size: Generally 5 to 10 acres
- NRPA Target LOS: 1 to 2 acres per 1,000 residents
- Current LOS (2024): 0.57 acres per 1,000 residents
- Projected LOS (2044): 0.45 acres per 1,000 residents
- NEW LOS: 1 acres per 1,000 residents
- Projected Deficit (Acres): 63.31 acres
- Service Radius: 1/4 to 1/2 mile

Conclusion/Recommendations: The current Level of Service (LOS) for neighborhood parks in Auburn is 0.57 acres per 1,000 residents, which is projected to decline to 0.45 acres per 1,000 residents by 2044. This projected LOS falls significantly below the recommended minimum standard of 1 acre per 1,000 residents. To meet this new standard by 2044, Auburn will need to add approximately 63 acres of new neighborhood parks. This strategic addition is critical to ensuring that the growing population has sufficient access to neighborhood park facilities, maintaining a high quality of life and community well-being.

Community Park Inventory and Needs Analysis

A community park is planned primarily to provide active and structured recreation op- portunities for young people and adults. They often exceed 10 acres in size and may have sports fields, water bodies, gardens, nature trails or similar features as the central focus of the park. Community parks can also provide indoor facilities to meet a wide range of recre- ation interests. They require more support facilities such as parking and restrooms than neighborhood parks. Community parks serve a much larger area than neighborhood parks and offer more facilities. Where there are no neighborhood parks, the community park can also serve the neighborhood park function. The community park service area covers a one to two mile radius.

Community Parks LOS Analysis

Overview: Community parks serve broader community needs, often featuring larger facilities or arrays of facilities types, e.g., tournament baseball field complexes, and a wider range of amenities, such as swimming pools, and community centers that are intended to support the entire community. The number of community parks a city like Auburn, WA, should have depends on several factors, including NRPA guidelines, local demand, and geographic considerations. The target acreage for community parks typically ranges from 20 to 50 acres per park or 5-8 acres per 1000 residents, according to NRPA guidelines. Using those metrics, Auburn, WA, should have about 2 to 4 community parks based on its population, with an ideal total acreage between 40 - 200 acres. This ensures that the parks are large enough to accommodate a variety of amenities, such as sports fields, playgrounds, walking trails, and open spaces, while serving a significant portion of the population effectively.

- Number: 14 parks
- Acreage: 283.31 acres
- Average Size: 20.2 acres
- Target Size: Generally 20 to 50 acres
- NRPA Target LOS: 5 to 8 acres per 1,000 residents
- Current LOS (2024): 3.14 acres per 1,000 residents
- Projected LOS (2044): 2.47 acres per 1,000 residents
- NEW LOS: 3.5 acres per 1,000 residents
- Projected Deficit (Acres): 116.69 acres
- Service Radius: 1 to 2 miles

Conclusion/Recommendations: The current Level of Service (LOS) for community parks in Auburn is 3.14 acres per 1,000 residents, but it is projected to decline to 2.47 acres per 1,000 residents by 2044. This anticipated reduction highlights a significant shortfall, with a projected deficit of over 116 acres in this park classification. To meet the needs of Auburn's growing population and maintain the recommended LOS, the City will need to prioritize the addition of these 116 acres of new community parks by 2044.

Future community park sites should be strategically selected in areas like West Hill and Lea Hill, where development is ongoing, and large gaps exist between existing parks. Additionally, other residential areas, particularly in the northeast and southeast corners of the City, are on the edges of existing service areas and will require new community park acquisitions and development as population growth continues.

Two key sites, Jacobsen Tree Farm and the 104th Ave SE property along the Green River, offer significant potential for development into community parks. These sites account for 44 acres of undeveloped land that will be crucial in addressing the City's parkland needs. The development of these areas into community parks will help close the gap in service coverage and ensure that Auburn's residents continue to have access to ample recreational spaces, supporting the overall quality of life in the community.

Special Use Parks LOS Analysis

Overview: Unlike other recreational classifications, special use facilities serve very unique, often singular functions and include unique features that add depth and variety to the city's recreational and open space amenities. By integrating these specialized spaces, Auburn creates a vibrant public landscape that reflects the city's identity and enhances recreational opportunities for the community. Examples of these facilities include pocket landscape areas, community gardens, streetscapes, unique sections of the Environmental Park, viewpoints, historic sites, public art installations, and traffic islands.

- Number: 14
- Acreage: 307.69 acres
- Auburn Average Size: 21.9 acres
- Target Quanitity & Size: Varies depending on the facility type and use
- Target LOS: Depends on community needs; not typically defined by a strict LOS but considered based on demand.
- Service Radius: Typically serves the entire community or region.

Conclusion/Recommendations: Past and more recent survey comments indicate that residents have a strong desire to enhance the City's aesthetics by increasing the planting of street trees, flowers, and other greenery. Integrating these beautification efforts, along with the development of additional special-use areas as opportunities arise, presents a valuable chance to improve the overall appearance of the community.

However, there are currently no specific targets or goals for purposefully developing more special-use areas. Introducing a significant number of small, specialized facilities could result in higher-than-expected maintenance and operational costs for the department. As development continues and additional land is acquired—including smaller, less usable areas within the public right-of-way—it is essential to remain vigilant in assessing these opportunities. Evaluating them for their unique, heritage, natural, and activity-centric qualities that could provide community value is recommended.

The Parks Department should continue collaborating with relevant departments to ensure that landscaping standards support the inclusion of street trees and other plantings, further integrating existing green spaces and improving their connectivity. This will not only enhance the city's aesthetics but also contribute to public safety. Additionally, encouraging the development of boulevard-style streets in key locations can further improve the visual appeal and functionality of the urban environment.

Natural Resource Areas and Greenways (Open Space)

Overview: Open space areas are vital for protecting and preserving natural landscapes, wildlife habitats, and green corridors. The purpose of these amenities is to maintain natural landscapes, safeguard wildlife habitats, and protect critical natural infrastructure, while also providing residents with opportunities for passive recreation and environmental education, such as hiking and birdwatching.

NRPA provides general guidelines for the amount and size of open space and natural areas within a community. Typically, these guidelines recommend that a city should maintain between 7 to 10 acres of open space and natural areas per 1,000 residents. For a city the size of Auburn, with a population of 90,096 (as of 2024), this would equate to approximately 630 to 900 acres of open space and natural areas. Currently, Auburn has 321 acres of dedicated open space areas. However, when considering other greenways and open spaces within the city that are not maintained by the City of Auburn, the total approaches the minimum target of 630 acres.

Given Auburn's current inventory of open space areas available to residents, the city is close to meeting the lower range of the NRPA's recommendations for open space and natural areas. Auburn's commitment to preserving these areas aligns well with NRPA guidelines, and the city's existing acreage of natural areas and open spaces is well-positioned to support the ecological and recreational needs of its residents. This ensures that Auburn continues to provide valuable natural amenities as the community grows.

- Number: 6 Open Space and Natural Areas
- Total Acreage: 321.42
- Average Size: 53.57 acres
- Target Acreage: 630-900 acres
- NRPA Target LOS: 5 to 10 acres per 1,000 residents
- Current LOS (2024): 3.57 acres per 1,000 residents
- Projected LOS (2044): 2.81 acres per 1,000 residents

- NEW LOS: 4 acres per 1,000 residents
- Projected Deficit (Acres): 136.58 acres
- Service Radius: Typically regional, with users traveling farther to access these areas

Conclusion/Recommendations: Auburn's current Level of Service (LOS) for open space areas is 3.57 acres per 1,000 residents as of 2024. However, with the city's projected population growth, this LOS is expected to decline to 2.81 acres per 1,000 residents by 2044. This decrease places Auburn below both the National Recreation and Park Association's (NRPA) target LOS of 5 to 10 acres per 1,000 residents and the City's draft new LOS standard of 4 acres per 1,000 residents.

The decision to increase the LOS for open space reflects a growing recognition of the critical role these areas play in promoting climate change resiliency, managing flood hazards, supporting wildlife habitats, and mitigating the effects of urban heat on aging populations. As climate change continues to impact weather patterns, open spaces can serve as vital buffers, absorbing excess rainfall and reducing the risk of flooding, particularly in vulnerable areas along rivers and low-lying regions.

Furthermore, open spaces provide essential habitats for wildlife, helping to preserve biodiversity within the city. These natural areas are increasingly important as urbanization encroaches on green spaces, putting pressure on local ecosystems. By expanding and protecting open space, Auburn can help ensure that wildlife populations continue to thrive, maintaining ecological balance and enhancing the natural beauty of the community.

In addition to their environmental benefits, open spaces are crucial for the health and well-being of Auburn's residents, especially as the population ages. Access to nature has been shown to reduce the effects of heat islands in urban areas, where concrete and asphalt trap heat, leading to higher temperatures. These elevated temperatures can be particularly harmful to older adults, who are more susceptible to heat-related illnesses. Expanding open space provides shaded areas and cooling effects that are vital for protecting vulnerable populations.

To meet the new LOS standard of 4 acres per 1,000 residents by 2044, Auburn will need to acquire and develop an additional 136.58 acres of open space. This strategic expansion is essential not only to meet recreational needs but also to ensure the city's resilience in the face of climate change and urbanization. By investing in open spaces, Auburn can enhance its ability to manage environmental challenges, protect its natural heritage, and promote the long-term health and well-being of all its residents.

Trails LOS Analysis

Auburn, WA, boasts an extensive network of trails that weave through the city's diverse landscapes, offering residents and visitors a range of recreational opportunities. These trails, often referred to as linear parks, typically follow natural and man-made features such as stream corridors, abandoned railroads, or power line easements. They serve multiple purposes, including providing pathways for walking, running, and biking, as well as creating interpretive areas, open spaces, and landscaped zones.

The city's trail system is designed with minimal development to preserve the natural environment, focusing on essentials such as trailheads, educational signage, benches, and picnic tables. However, in areas with more space, like wide power line easements, there is potential for more extensive development, allowing for a broader range of recreational uses while still maintaining the primary function of these linear parks.

Auburn currently has 21 different trail segments of varying purposes covering a total of 21.96 miles across the city, however 6.75 miles of those trails are within existing parks (see Table 2-5.)

- Total Miles of Trails (All): .25 to .5 miles per 1,000 residents
- Total Miles of Trails (All): .25 to .5 miles per 1,000 residents
- Expected NRPA Standard: .25 to .5 miles per 1,000 residents
- Existing Ratio: Total: 0.28 miles per 1,000 residents
- Existing Inventory: 21.96 miles
- Current Need: 0.0 miles
- Future Need (2044): 6.69 miles
- NEW LOS: 0.125 miles per 1,000 residents

Conclusion/Recommendations: Auburn's current ratio of 0.24 miles of developed trail parkland per 1,000 residents aligns closely with the minimum expected average. However, with the projected population increase, there is an anticipated need for an additional 6 miles of trails by 2044. Given the existing opportunities for new trail development and the high level of public interest in trails, it is recommended to slightly adjust the standard to 0.125 miles of developed trail parkland per 1,000 residents. Although Auburn's current inventory of trails already exceeds the adopted standards, further expansion and development are essential to ensure connectivity across different areas of the city and beyond. The demand for an interconnected trail system is expected to grow, particularly as residents, especially post-pandemic, continue to express a strong interest in trails for

recreation and as an alternative means of commuting, as identified in the Statewide Comprehensive Outdoor Recreation Plan (SCORP). This underscores the importance of enhancing Auburn's trail network to meet the evolving needs of its community.

Future Trails/Linear Park Development:

There are several opportunities to develop additional trails and linear parks in Auburn providing local and regional trail systems. Considering the interest in trail activities as demonstrated by public invovlement results and national recreation trends, these additional trails are worth pursuing. Identified locations for potential loop trails within parks, new linear parks, or extensions of existing linear parks include:

- BPA Power Line Easement (Lea Hill to Green River Road)
- Green River TRail (Planned)
- White River Trail (A Street to Interurban Trail)
- Mill Creek Corridor
- Rotary Park
- Shaughnessy Park
- Fulmer Park

Goals & Objectives









The Auburn Parks, Arts, and Recreation Department is dedicated to preserving the city's natural beauty through a vibrant and well-maintained system of parks, open spaces, and trails. Our mission is to enrich the lives of Auburn's residents by providing diverse recreational and cultural opportunities that foster a strong sense of community, promote health and well-being, and celebrate the unique natural landscapes that define our city.

The goals and objectives outlined in this chapter have been meticulously crafted to align with the requirements of the Growth Management Act (GMA) and are the result of an extensive and thoughtful planning process. This process drew upon a range of valuable resources, including insights from the 2015 Park, Arts, and Recreation Open Space Plan, findings from the 2023 Parks, Recreation, and Open Space Survey, and input from dedicated Parks and Recreation staff. Additionally, we carefully analyzed recreation trends, participation rates, and the current state of our parks to ensure that these goals are both forward-looking and responsive to the evolving needs of our community.

Through this comprehensive approach, we aim to create a park system that not only meets the present demands but also anticipates future growth and challenges. Our commitment is to maintain and enhance Auburn's parks and recreation offerings, ensuring that they continue to serve as vital community assets for generations to come.

Goal 1: Serve all residents and provide a broad range of programs and facilities in order to serve all residents regardless of age or ability.

The Auburn Parks, Arts, and Recreation Department is committed to providing accessible leisure and recreational programs for all residents, with a focus on accommodating special needs. To ensure awareness of these programs, the City has adapted its marketing strategies, blending innovative social media with traditional outreach to engage the community effectively.

Goal 1: Objectives

1A. Provide a variety of recreation facilities and programs that will improve the physical and mental well being of community members.

1B. Provide a system of neighborhood and community parks so that residents live within a half mile walking distance to a developed park.

1C. Develop multi-use facilities to increase flexibility to meet recreational trends as demonstrated by community input.

1D. Continue to identify under-served segments of the population and develop programs that will satisfy unmet needs.

1E. Develop marketing strategies allowing the widest possible distribution of information concerning park facilities and recreation programs.

1F. Provide programs and facilities designed for maximum affordability to local residents.

1G. Continue to improve upon and expand the Fee Waiver and Scholarship Programs, where possible, to allow more low income youth and seniors to participate at reduced rates.

1H. Continue to improve access for the disabled and seniors by providing wheelchair ramps and other appropriate facilities in parks where they do not currently exist.

1I. Continue to maintain an open decision-making process that allows opportunity for resident input.

1J. Parks and Recreation Department staffing levels shall be sufficient to maintain and improve the existing cultural and recreation programs. As programs expand or additional parks are developed, the impact on current staff levels and the need for additional staff will be evaluated.

Goal 2: Provide a balanced mix of passive and active recreation opportunities to promote healthy and balanced activities.

The Auburn Parks and Recreation Department recognizes the importance of offering diverse recreational opportunities that cater to all residents. To promote a healthy and balanced lifestyle, our goal is to provide a well-rounded mix of both active and passive recreation options. This approach ensures that everyone, regardless of their activity level, can enjoy and benefit from the City's parks and recreational facilities.

Goal 2: Objectives

2A. Develop a park system that provides facilities for social, cultural and physical activities.

2B. Provide parks areas that accommodate passive recreation opportunities such as picnicking and walking.

2C. Provide park areas that accommodate active recreation such as ballfields, skate parks, spray parks, sports courts, etc.

2D. Track changing trends at the local, state, and national levels. Respond with appropriate programs and facilities to meet changing needs as funding and budgets are available and meet the level of service expectations of the residents of Auburn.

2E. Provide access to healthy foods through the continued operation of the Auburn Farmer's Market and Community Gardens.

Goal 3: Provide a system of high quality parks that are well maintained and aesthetically pleasing.

Parks are one of the most visible public features in a City, their design and maintenance can influence people's perceptions of the community. Long term maintenance, good design, and the use of high quality materials will all affect the appearance of a park for years to come.

Goal 3: Objectives

3A. Develop Level of Service Standards that are consistent with NRPA standards to assure that residents' expectations are met.

3B. Parks shall be intentionally designed to require low maintenance, and low water and energy consumption. Higher maintenance features like fountains or annual beds are reserved for high visibility locations or as appropriate.

3C. Select environmentally friendly materials that are durable and aesthetically pleasing.

3D. Parks shall exhibit a "cared for" appearance through close attention to maintenance.

3E. In order to maintain parks in a safe and attractive condition, maintenance staff levels will be evaluated with additions of new park land or facilities.

3F. Renovate deteriorating features. Identify conditions that require redesign or construction of new facilities; schedule and budget necessary changes in the City's Capital Facilities Plan.

3G. Conduct regularly scheduled inspections to identify necessary repairs and upgrades to ensure safe conditions.

Goal 4: Provide a park system that contributes to a positive city image for Auburn.

Auburn's Comprehensive Plan contains goals and objectives to enhance the City's identity by ensuring a quality visual environment. Parks are an effective tool in improving visual appearance, but many of Auburn's parks are tucked away in residential neighborhoods, unseen and unknown except to residents. This lack of visibility hinders the parks from effectively contributing to the city's overall appearance. Increased visibility and high quality design are paramount to "advertising" our community as a good place in which to live and work.

Goal 4: Objectives

4A. Select new park sites with high visibility and access. This may be accomplished by locating at least one side of larger parks along arterial streets.

4B. Increase the quantity of trees, shrubs and ground covers in parks.

4C. Continue to work on Tree City USA goals for better Urban Forestry design and tree preservation.

4D. Create a green spaces in the downtown core that will be a focal point for community activities and stimulate economic growth.

4E. Incorporate artwork as part of new park development or when upgrading existing parks or other public facilities.

Goal 5: Acquire and manage important open spaces in the City of Auburn.

Undeveloped open spaces contribute to the well-being of our community in many ways. We value them for their ability to provide buffers from urban encroachment; to provide opportunities for recreation; to provide public access to creeks, rivers and other water bodies; to create distinctive settings within the city; to provide connections between different areas for both people and wildlife; as well as offering health and safety benefits.

Goal 5: Objectives

5A. Maintain and protect a system of forested corridors and buffers to provide separation between natural areas and urban land uses.

5B. Target significant open space areas in the City, with emphasis on their planning and acquisition. Target areas include the land along the Green and White Rivers, steep hillsides, Mill Creek Corridor and West Hill Watershed.

5C. Explore all possible funding mechanisms to enable the acquisition of open space on a regular basis to identify properties as they become available.

5D. City owned open space lands shall be accessible to the public wherever possible and appropriate.

5E. Provide adequate management and maintenance of public open spaces, ensuring their ability to provide environmental benefits and wildlife habitat.

5F. When mitigation is required, develop a monitoring and maintenance plan to ensure successful establishment.

5G. Involve the community in habitat restoration activities through the City's annual Clean Sweep event, community service days, and an adopt a park program.

5H. Determine the ecosystem service value reach open space and park space continues to address climate resiliency goals.

Goal 6: Provide a network of pedestrian and bicycle trails.

To enhance Auburn's recreational and transportation infrastructure, we aim to create a comprehensive network of bike and pedestrian trails that serves both commuters and recreational users. This network will be strategically developed to connect key areas within the city and extend to neighboring communities. By prioritizing the acquisition of land, especially along the Green River, and focusing on trail designs that highlight Auburn's unique natural landscapes, we can offer diverse experiences to residents and visitors alike. Our commitment also includes ensuring accessibility for all users, enhancing safety through thoughtful design, and implementing a cohesive wayfinding system. To sustain this network, securing ongoing funding for maintenance will be essential. Through these objectives, Auburn will establish a robust and interconnected trail system that promotes active transportation, environmental stewardship, and community well-being.

Goal 6: Objectives

6A. Develop a network of trails created or extended to provide adequate coverage for both commuting and recreational cyclists. Locations for east/west trails shall be identified and developed.

6B. Acquisition of land for the proposed Green River Trail shall continue to be a priority.

6C. Trail design and layout shall take advantage of unique natural locations and provide access to a variety of landscapes and habitats.

6D. Participate in planning activities for regional trails in South King County and North Pierce County.

6E. Explore possibilities for new trail connections between Auburn and neighboring communities.

6F. Develop and maintain trails to comply with Americans with Disabilities Act.

6G. Provide safe trail system by discouraging crime through environmental design concepts.

6H. Develop a standardized interpretive and way-finding program to be used through- out our trail system.

6I. Identify and provide funding to maintain existing trail systems.

Goal 7: Expand our existing park inventory where level of service standards are not being met, with an emphasis on the West Hill and Lea Hill areas of the City.

Our goal is to prioritize the development of community and linear parks with trail systems, focusing on larger, multi-use spaces to meet Auburn's diverse needs. We will actively pursue funding to acquire and preserve key parklands, emphasizing shoreline properties for public access. To minimize land use conflicts, particularly in residential areas, we will implement thoughtful design and strategic placement. High-quality design standards will guide new park developments, supported by comprehensive Master Plans and public input. Additionally, we aim to create vibrant public gathering spaces in the downtown core to enhance community life.

Goal 7: Objectives

7A. Make the development of community parks and linear parks with trail systems a priority over small neighborhood parks when possible and appropriate.

7B. Apply for King County Conservation Futures and Recreation & Conservation Office grants and other available funding sources to acquire and preserve park land and natural areas.

7C. Acquisition of community amenities, such as shoreline property, shall be emphasized, to preserve or allow public access to these special places.

7D. Minimize land use conflicts between parks and other uses, and use sensitive design measures when locating parks in residential neighborhoods.

7E. Criteria for new park development ensures consistent high quality design meeting the needs of the community.

7F. Develop Master Plans for undeveloped park properties and incorporate future park development costs into the Capital Facilities plan as appropriate.

7G. Schedule public meetings as a part of the Master Planning process to ensure that residents' voices are heard and needs are met when developing new parks.

7H. Develop public gathering spaces in the downtown core.

Goal 8: Establish park and trail levels of service provided in the PROS plan.

To ensure Auburn's parks and recreational spaces continue to meet the needs of a growing population, we are committed to maintaining a consistent level of investment per capita. Currently, the City provides over 10 acres of parkland per 1,000 residents, a standard we aim to uphold even as our community expands. By sustaining this investment, Auburn will preserve its high quality of life and ensure that all residents have ample access to well-maintained and accessible parks and green spaces.

Goal 8: Objectives

8A. Fields, Courts, Tracks, Gyms: Improve the equivalent population per Auburn facility type based on expected demand and need ideintified by public survey responses.

8B. Informal Recreation Facilities: Increase the number of Picnic Shelters, Off Leash Areas, Playgrounds, Paths, Community Gardens, Flexible Open Turf Areas, Gathering Spaces and Amphitheaters: Resident equivalent population per facility consistent with the current ratio.

8C. Trails: Increase the number of per trail miles to be consistent with .25 miles per 1000 residents.

8D. Parks: Maintain a minimum total parkland Level of Service (LOS) of over 10 acres per 1,000 residents, regardless of park classification.

Capital Improvement Program









The vision articulated in this PROS Plan is not only a mandate of the Growth Management Act but is also essential to enhancing the quality of life and driving economic development in the City of Auburn. This plan is both pragmatic, addressing the immediate needs of current residents, and forward-looking, preparing the park system to meet future demands while delivering economic, social, and environmental benefits. This section outlines the City's approach to incorporating public feedback through a comprehensive Capital Improvement Program (CIP), presented initially in tabular form and followed by detailed descriptions of conceptual improvements planned for the next six years.

Serving as a crucial blueprint, this plan significantly impacts residents' quality of life via Auburn's Parks & Recreation system. The effective administration of these services by the City's limited staff requires a committed allocation of budget resources. Realizing this vision also depends on grant funding and the continued dedication of community volunteers. Annual investments in personnel, equipment, and supplies are vital for maintaining a diverse range of outdoor recreational opportunities, ensuring safety, and meeting public expectations.

Aligned with Auburn's strategic goals and integrated into the principles of the Comprehensive Plan, this PROS Plan promotes a safe, healthy, and walkable community, cultural enrichment, and environmental conservation, reflecting the aspirations and quality of life desired by the city's residents.

This section emphasizes Auburn's commitment to addressing public feedback and improving system deficiencies by detailing a comprehensive CIP. This program includes specific park-related projects and broader recommendations aimed at closing service gaps. The proposals, summarized in tables and elaborated upon in detail, outline enhancements and conceptual improvements scheduled for implementation over the next six years. Additionally, the inclusion of long-term visionary projects shows a readiness to seize opportunistic improvements based on market conditions or funding availability.

At the core of this plan are key recommendations designed to address current challenges, anticipate future needs, maximize funding flexibility, and align with public preferences. It thoroughly considers the range of parks and recreation amenities available within the city, ensuring that Auburn's park system evolves in a balanced and sustainable manner.

Developing The Capital Improvement Program

This plan spans a six-year period from 2024 through 2030, aiming to guide park and recreation improvements while also presenting a conceptual vision for additional long-term enhancements aligned with Auburn's projected growth. It is designed to be flexible and dynamic, recognizing that funding availability, public needs, and political priorities may shift over time. As such, the plan is not a rigid script but rather a strategic guide adaptable to unforeseen opportunities that may better serve the public.

The listed capital improvement projects are initially categorized into six-year and long-term (20-year) CIP lists based on specific recommendations. However, the implementation timeline is subject to various factors, including design and permitting durations, other critical public works projects, grant funding cycles, available budgets, and city staff capacity. These timelines are for planning purposes only and do not represent a commitment to implementation in any particular year. The plan should remain a living document, continually updated as conditions evolve.

The CIP project list reflects public demand and needs, validated through input from city staff, commission members, and the City Council. The actual implementation over the next six years will depend on available funding, success in securing grants, and essential maintenance and repair needs. In developing the CIP, several aspects were considered to ensure it is robust yet flexible, capable of adapting to changing circumstances and opportunities.

Strategic Project Development and Funding Opportunities

Improving the parks system is a collaborative effort, not solely reliant on city funding. Auburn should actively pursue grants and donations from various sources to maximize public investment in parks, recreation, and open space facilities. Specific improvements should be matched with appropriate Recreation Conservation Office programs, such as the Youth Athletic Field or Land Water Conservation Fund grants, which have a history of being funded. Additionally, many trail and access projects can integrate with Safe Route to School grants and other transportation-related projects. Combining park projects with transportation and economic development initiatives will enhance implementation flexibility and open up further funding opportunities from county, state, and federal programs.

Auburn's Fiscal Sources

Auburn, WA's parks budget is supported by a diverse mix of funding sources. The City's General Fund, which includes revenues from property and sales taxes, is a primary source of funding for the Parks, Arts, and Recreation Department. Additional revenue comes from fees collected for recreational programs, facility rentals, and special events. The City also actively pursues grants from sources like the Washington State Recreation and Conservation Office (RCO), King County Conservation Futures, and federal programs such as the Land and Water Conservation Fund (LWCF). To address the demands of population growth, Auburn charges impact fees on new developments to fund the expansion of parks and recreational facilities. The budget is further supplemented by a portion of the Real Estate Excise Tax (REET) and a dedicated sales tax, which is 1/10th of 1% of the countywide sales tax. Occasionally, the City issues bonds for large-scale park projects, which are repaid over time. Additional funding comes from donations, sponsorships, and partnerships with local businesses, non-profits, and other governmental agencies, all of which contribute to maintaining and enhancing Auburn's park system.

Estimate of Probable Cost

This CIP includes preliminary estimates of construction costs for recommended improvements at each park and city-wide. These estimates are intended for budgeting and scoping future design and construction projects and are subject to change based on site conditions, final design, and market circumstances. The estimates are based on current park master planning projects and include considerations for inflation, annual cost escalators, design contingencies, permitting, and other soft costs. However, staff time costs are not included in these estimates.

Performance and Monitoring

Auburn's plan addresses the level of service and needs for parks, recreation, open spaces, and trails identified at the time of the plan's creation. Recognizing the dynamic nature of communities and outdoor spaces, this plan is designed to be flexible and adaptable in its implementation. To monitor progress and adapt to changing circumstances, including new grant and funding sources, the following actions should be taken annually during the capital improvement budgeting cycle:

Annual Prioritization Review:

City staff and volunteers should conduct annual evaluations to determine if any changes to the park system are necessary, especially considering funding availability or demographic shifts.

Plan Update:

Beginning in early-to-mid 2030, a formal update process should engage Auburn residents, staff, and committee members to review changing service needs, propose new capital improvements, and renew eligibility for the Washington Recreation and Conservation Office (RCO) programs for the next performance period. By maintaining this proactive and adaptive approach, Auburn can ensure that its parks and recreational facilities continue to meet the evolving needs of its community.

Park Development:

The development of more mini-parks (under one or two acres) is not encouraged. Mini-parks have not been found to be as successful as larger community parks, because they tend to serve very small populations and are difficult and expensive to maintain. Developers may have the opportunity to develop neighborhood parks that are maintained by the local homeowners association but meet the City's park standards.

Unforeseen Threats to the CIP Strategy

Several unforeseen threats could impact the strategy and implementation of Auburn's Capital Improvement Program (CIP):

Economic Downturns:

A significant economic recession could reduce available funding from local, state, and federal sources, impacting the ability to finance planned projects.
Natural Disasters: Events such as earthquakes, floods, or wildfires could damage existing infrastructure and necessitate reallocation of funds for emergency repairs and rebuilding efforts.
Pandemics or Public Health Crises: Situations similar to the COVID-19 pandemic could disrupt project timelines, reduce workforce availability, and shift funding priorities towards health and safety measures.
Policy and Regulatory Changes: New laws or regulations at the local, state, or federal level could alter funding eligibility, increase costs, or impose new requirements on project implementation.
Environmental Issues: Unforeseen environmental challenges, such as soil contamination or endangered species habitats, could delay or complicate project execution.
Community Opposition: Public opposition or legal challenges to specific projects could result in delays or necessitate project modifications.
Technological Changes: Rapid advancements in technology may require updates to project plans or could render certain planned improvements obsolete.
Market Fluctuations: Changes in the cost of materials and labor due to market volatility can significantly impact project budgets and timelines.
Considering these potential threats, the CIP must remain adaptable, ensuring that Auburn can respond effectively to changing conditions and continue to meet the needs of its residents.



Table 5-1: Capita;l Facilities Plan Projects & Financing Municipal Parks Construction Fund (See the Capital Facilities Plan sheets for details on the following numbers.)								
Capacity Projects:		**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**Total**
Auburndale Park II								
	Capital Costs	-	-	$125,000	-	$2,000,000	-	$2,125,000
	Funding Sources:							
	Fund Balance	-	-	-	-	-	-	-
	Grants (Fed,State,Local)	-	-	-	-	$1,000,000	-	$1,000,000
	Other (TBD)	-	-	$125,000	-	$1,000,000	-	$1,125,000
BPA Trail on Lea Hill								
	Capital Costs	-	-	-	-	150,000	-	$150,000
	Funding Sources:							
	Fund Balance	-	-	-	-	150,000	-	$150,000
	Grants (Fed,State,Local)	-	-	-	-	-	-	-
	KC Prop 2	-	-	-	-	-	-	-
Fulmer Park Turf Fields								
	Capital Costs	-	-	-	-	-	-	-
	Funding Sources:							
	Fund Balance	-	-	-	-	-	-	-
	Grants (Fed,State,Local)	-	-	1,800,000	-	-	-	1,800,000
	Park Impact Fees	-	-	-	-	-	-	-
	KC Prop 2	-	-	-	-	-	-	-
Game Farm Park Improvements								
	Capital Costs	200,000	-	-	-	-	-	200,000
	Funding Sources:							
	Fund Balance	-	-	-	-	-	-	-
	Grants (Fed,State,Local)	200,000	1,500,000	-	-	-	-	1,700,000
	Park Impact Fees	-	500,000	-	-	-	-	500,000
Jacobsen Tree Farm Development								
	Capital Costs	125,000	5,000,000	-	-	5,000,000	-	10,125,000
	Funding Sources:							
	Fund Balance	-	-	-	-	-	-	-
	Grants (Fed,State,Local)	-	1,000,000	-	-	1,000,000	-	2,000,000
	KC Prop 2	-	-	-	-	-	-	-
	Other (TBD)	-	2,000,000	-	-	2,000,000	-	4,000,000
	Park Impact Fees	125,000	2,000,000	-	-	2,000,000	-	4,125,000

Table 5-1: Capita;l Facilities Plan Projects & Financing Municipal Parks Construction Fund (See the Capital Facilities Plan sheets for details on the following numbers.)								
Capacity Projects:		**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**Total**
Lakeland Hills Nature Area								
	Capital Costs	-	-	400,000	-	-	-	400,000
	Funding Sources:							
	Fund Balance	-	-	-	-	-	-	-
	Grants (Fed,State,Local)	-	-	200,000	-	-	-	200,000
	Park Impact Fees	-	-	200,000	-	-	-	200,000
Miscellaneous Parks Improvements								
	Capital Costs	150,000	150,000	150,000	150,000	150,000	150,000	900,000
	Funding Sources:							
	Fund Balance	50,000	50,000	50,000	50,000	50,000	50,000	300,000
	Grants (Fed,State,Local)	-	-	-	-	-	-	-
	KC Prop 2	150,000	150,000	150,000	150,000	150,000	150,000	900,000
	Park Impact Fees	100,000	100,000	50,000	50,000	50,000	50,000	400,000
Park Acquisitions/Development								
	Capital Costs	125,000	125,000	125,000	125,000	125,000	125,000	750,000
	Funding Sources:							
	Fund Balance	-	-	-	-	-	-	-
	Grants (Fed,State,Local)	-	-	-	-	-	-	-
	KC Prop 2	125,000	125,000	125,000	125,000	125,000	125,000	750,000
Sunset Park Improvements								
	Capital Costs	-	-	-	-	-	-	-
	Funding Sources:							
	Fund Balance	-	-	-	-	-	-	-
	Park Impact Fees	350,000	-	1,500,000	-	-	-	1,850,000
	Other (TBD)	-	-	500,000	-	-	-	500,000
West Hill Park Acquisition and Development								
	Capital Costs	-	-	750,000	1,000,000	-	-	1,750,000
	Funding Sources:							
	Fund Balance	-	-	-	-	-	-	-
	Grants (Fed,State,Local)	-	-	400,000	500,000	-	-	900,000
	Park Impact Fees	-	-	350,000	500,000	-	-	850,000

Table 5-1: Capita;l Facilities Plan Projects & Financing
Municipal Parks Construction Fund

(See the Capital Facilities Plan sheets for details on the following numbers.)

Capacity Projects:	2025	2026	2027	2028	2029	2030	Total
Subtotal, Capacity Projects:							
Capital Costs	600,000	5,275,000	1,550,000	1,275,000	7,425,000	275,000	16,400,000
Non-Capacity Projects:							
Dykstra Footbridge							
Capital Costs	-	-	-	-	-	-	-
Funding Sources:							
Fund Balance	-	-	-	-	-	-	-
ARPA funding	40,000	-	-	-	-	-	40,000
Other (TBD)	-	-	-	-	-	-	-
Fairway Drainage Improvement							
Capital Costs	30,000	30,000	30,000	30,000	30,000	30,000	180,000
Funding Sources:							
Fund Balance	-	-	-	-	-	-	-
Grants (Fed,State,Local)	-	-	-	-	-	-	-
REET 2	30,000	30,000	30,000	30,000	30,000	30,000	180,000
Capacity Projects:	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**Total**
Capacity Projects	600,000	5,275,000	1,550,000	1,275,000	7,425,000	275,000	16,400,000
Non-Capacity Projects	30,000	30,000	30,000	30,000	30,000	30,000	180,000
Total Costs	630,000	5,305,000	1,580,000	1,305,000	7,455,000	305,000	16,580,000
Fund Balance	50,000	50,000	50,000	50,000	200,000	50,000	450,000
Grants (Fed,State,Local)	200,000	2,500,000	2,400,000	500,000	2,000,000	-	7,600,000
Grants - Private	-	-	-	-	-	-	-
KC Prop 2	275,000	275,000	275,000	275,000	275,000	275,000	1,650,000
ARPA funding	40,000	-	-	-	-	-	40,000
Park Impact Fees	575,000	2,600,000	2,100,000	550,000	2,050,000	50,000	7,925,000
REET 2	30,000	30,000	30,000	30,000	30,000	30,000	180,000
Other (TBD)	-	2,000,000	625,000	-	3,000,000	-	5,625,000
Total Funding	1,170,000	7,455,000	5,480,000	1,405,000	7,555,000	405,000	23,470,000

Project Title: **Auburndale Park II**
Project No: **gpbd05**
Project Type: **Capacity**
Project Manager: **Thaniel Gouk**

Description:

Develop a Master Plan, improve the existing trail system and install signage and play structure.

Progress Summary:

n/a

Future Impact on Operating Budget:

Increased utility costs of $2,000 per year once the park is fully developed.

Activity:

Funding Sources:	Prior to 2024*	2024 Budget	2025 Budget	2026 Budget	Budget 2024-2026
Fund 321 -Unrestricted Fund Balance	-	-	-	-	-
Grants- Secured (Fed,State,Local)	-	-	-	-	-
REET	-	-	-	-	-
Impact Fees	-	-	-	-	-
Total Funding Sources:	**-**	**-**	**-**	**-**	**-**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Right of Way	-	-	-	-	-
Construction	-	-	-	-	-
Total Expenditures:	**-**	**-**	**-**	**-**	**-**

Forecasted Project Cost:

Funding Sources:	2027	2028	2029	2030	Total 2025-2030
Fund 321 -Unrestricted Fund Balance	-	-	-	-	-
Grants- Secured (Fed,State,Local)	-	-	-	-	-
REET	-	-	-	-	-
Impact Fees	-	-	-	-	-
Total Funding Sources:	**-**	**-**	**-**	**-**	**-**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Right of Way	-	-	-	-	-
Construction	-	-	-	-	-
Total Expenditures:	**-**	**-**	**-**	**-**	**-**

Unsecured Non-Budgeted Funding

Funding Sources:	2025	2026	2027	2028-2030	Total 2025-20230
RCO Local Parks Grant	-	-	125,000	2,000,000	2,125,000
Total Funding Sources:	**-**	**-**	**125,000**	**2,000,000**	**2,125,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	125,000	-	125,000
Right of Way	-	-	-	-	-
Construction	-	-	-	2,000,000	2,000,000
Total Expenditures:	**-**	**-**	**125,000**	**2,000,000**	**2,125,000**

Grants / Other Sources:

Project Title: **BPA Trail on Lea Hill**
Project No: **gpbd23**
Project Type: **Capacity**
Project Manager: **Thaniel Gouk**

Description:

Develop a feasibility study related to constructability of a pedestrian trail linking the Jacobsen Tree Farm site to the west end of Lea Hill. This trail would follow the alignment of the Bonneville Power Administration (BPA) transmission lines from 132nd to 108th Avenue SE. Construction would be in phases based on constructability.

Progress Summary:

Future Impact on Operating Budget:

None

Activity:

Funding Sources:	Prior to 2024*	2024 Budget	2025 Budget	2026 Budget	Budget 2024-2026
Fund 321 -Unrestricted Fund Balance	-	-	-	-	-
Grants- Secured (Fed,State,Local)	-	-	-	-	-
Bond Proceeds	-	-	-	-	-
REET	-	-	-	-	-
Other (KC Prop. 2)	-	-	-	-	-
Total Funding Sources:	**-**	**-**	**-**	**-**	**-**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Construction	-	-	-	-	-
Total Expenditures:	**-**	**-**	**-**	**-**	**-**

Forecasted Project Cost:

Funding Sources:	2027	2028	2029	2030	Total 2025-2030
Fund 321 -Unrestricted Fund Balance	-	-	150,000	-	150,000
Grants- Secured (Fed,State,Local)	-	-	-	-	-
Bond Proceeds	-	-	-	-	-
REET	-	-	-	-	-
Other (KC Prop. 2)	-	-	-	-	-
Total Funding Sources:	**-**	**-**	**150,000**	**-**	**150,000**
Capital Expenditures:					
Predesign	-	-	25,000	-	25,000
Design	-	-	125,000	-	125,000
Construction	-	-	-	-	-
Total Expenditures:	**-**	**-**	**150,000**	**-**	**150,000**

Grants / Other Sources:

MUNICIPAL PARKS CONSTRUCTION FUND (321)

Capital Facilities Plan

Six Year Capital Facilities Plan, 2025-2030

Capital Projects Fund

Project Title: **Brannan Park Improvements**
Project No: **cpxxxx**
Project Type: **Capacity**
Project Manager: **Thaniel Gouk**

Description:

Court upgrades, trail improvements, and new synthetic fields.

Progress Summary:

N/A

Future Impact on Operating Budget:

Lessened maintenance requirements and water for grass fields, savings of approx. $10,000/year.

Activity:

Funding Sources:	Prior to 2024*	2024 Budget	2025 Budget	2026 Budget	Budget 2024-2026
Municipal Parks Construction Fund	-	-	-	-	-
Grants- Secured (Fed,State,Local)	-	-	-	-	-
Impact Fees	-	-	-	-	-
REET	-	-	-	-	-
Other	-	-	-	-	-
Total Funding Sources:	**-**	**-**	**-**	**-**	**-**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Right of Way	-	-	-	-	-
Construction	-	-	-	-	-
Total Expenditures:	**-**	**-**	**-**	**-**	**-**

Forecasted Project Cost:

Funding Sources:	2027	2028	2029	2030	Total 2025-2030
Municipal Parks Construction Fund	-	-	-	-	-
Grants- Secured (Fed,State,Local)	-	-	-	-	-
Impact Fees	-	-	-	500,000	500,000
REET	-	-	-	-	-
Other	-	-	-	-	-
Total Funding Sources:	**-**	**-**	**-**	**500,000**	**500,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	50,000	50,000
Right of Way	-	-	-	-	-
Construction	-	-	-	450,000	450,000
Total Expenditures:	**-**	**-**	**-**	**500,000**	**500,000**

Unsecured Non-Budgeted Funding

Funding Sources:	2025	2026	2027	2028-2030	Total 2025-20230
Recreation Conservation Office (RCO) Youth Athletic Facilities and Community Outdoor Athletic Facilities Grants	300,000	-	-	1,000,000	1,300,000
Total Funding Sources:	**300,000**	**-**	**-**	**1,000,000**	**1,300,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Right of Way	-	-	-	-	-
Construction	300,000	-	-	1,000,000	1,300,000
Total Expenditures:	**300,000**	**-**	**-**	**1,000,000**	**1,300,000**

Grants / Other Sources:

Project Title: **Downtown Plaza and Alleyway Improvements**
Project No: CP2423
Project Type: **Capacity**
Project Manager: **Thaniel Gouk**

Description:

Create a new open space plaza in the downtown area near the Auburn Avenue Theater site. A portion of the project would be contingent on receiving King County Grant funds to purchase a property and demolishing a building. Also included would be alleyway improvements to the area between the Postmark Center for the Arts and theater building.

Progress Summary:

An application has been submitted for a King County Conservation Futures grant; a decision will be made in Fall of 2024 by KC Council. A portion of the funding would be from the direct appropriation monies for the rebuild of the theater.

Future Impact on Operating Budget:

Increased utility costs of $1,000.

Activity:

Funding Sources:	Prior to 2024*	2024 Budget	2025 Budget	2026 Budget	Budget 2024-2026
Municipal Parks Construction Fund	-	-	-	-	-
Grants- Secured (Fed,State,Local)	-	-	250,000	-	250,000
Grants- Unsecured (King County CFT)	-	-	950,000	-	950,000
REET	-	-	-	-	-
KC Parks Prop Levy	-	10,000	-	-	10,000
Total Funding Sources:	**-**	**10,000**	**1,200,000**	**-**	**1,210,000**
Capital Expenditures:					
Predesign	-	10,000	-	-	10,000
Design	-	-	75,000	-	75,000
Acquisition	-	-	700,000	-	700,000
Construction	-	-	425,000	-	425,000
Total Expenditures:	**-**	**10,000**	**1,200,000**	**-**	**1,210,000**

Forecasted Project Cost:

Funding Sources:	2027	2028	2029	2030	Total 2025-2030
Municipal Parks Construction Fund	-	-	-	-	-
Grants- Secured (Fed,State,Local)	-	-	-	-	250,000
Grants- Unsecured (King County CFT)	-	-	-	-	950,000
REET	-	-	-	-	-
KC Parks Prop Levy	-	-	-	-	-
Total Funding Sources:	**-**	**-**	**-**	**-**	**1,200,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	75,000
Acquisition	-	-	-	-	700,000
Construction	-	-	-	-	425,000
Total Expenditures:	**-**	**-**	**-**	**-**	**1,200,000**

Grants / Other Sources: King County Conservation Futures Grant & RCO Grant

Project Title: **Game Farm Park Improvements (Lighting)**
Project No: **cp2416**
Project Type: **Capacity**
Project Manager: **Daryl Faber**

Description:

Improve interior lighting and pathways and provide access from the newly acquired property on southwest corner of the park. The project will also add lighting to pickleball and basketball court. New turf infields.

Progress Summary:

N/A

Future Impact on Operating Budget:

None

Activity:

Funding Sources:	Prior to 2024*	2024 Budget	2025 Budget	2026 Budget	Budget 2024-2026
Fund 321 -Unrestricted Fund Balance	-	-	-	-	-
Grants- Secured (Fed,State,Local)	-	-	-	-	-
REET 1	-	-	-	-	-
Park Impact Fees	-	-	-	350,000	350,000
Total Funding Sources:	**-**	**-**	**-**	**350,000**	**350,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	150,000	150,000
Right of Way	-	-	-	-	-
Construction	-	-	-	200,000	200,000
Total Expenditures:	**-**	**-**	**-**	**350,000**	**350,000**

Forecasted Project Cost:

Funding Sources:	2027	2028	2029	2030	Total 2025-2030
Fund 321 -Unrestricted Fund Balance	-	-	-	-	-
Grants- Secured (Fed,State,Local)	-	-	-	-	-
REET 1	-	-	-	-	-
Park Impact Fees	150,000	-	-	-	500,000
Total Funding Sources:	**150,000**	**-**	**-**	**-**	**500,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	150,000
Right of Way	-	-	-	-	-
Construction	150,000	-	-	-	350,000
Total Expenditures:	**150,000**	**-**	**-**	**-**	**500,000**

Unsecured Non-Budgeted Funding

Funding Sources:	2025	2026	2027	2028-2030	Total 2025-20230
RCO Youth Athletic Facilities Grant	-	1,000,000	-	-	1,000,000
KC Youth and Amatuer Sports Grant	200,000	500,000	-	-	700,000
Total Funding Sources:	**200,000**	**1,500,000**	**-**	**-**	**1,700,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Right of Way	-	-	-	-	-
Construction	200,000	1,500,000	-	-	1,700,000
Total Expenditures:	**200,000**	**1,500,000**	**-**	**-**	**1,700,000**

Grants / Other Sources:

Project Title: **Golf Course Maintenance Building**
Project No: **cpxxxx**
Project Type: **Capacity**
Project Manager: **Thaniel Gouk**

Description:

Replace dilapidated mechanics building (built in 1970) at the Auburn Golf Course. A new approx. 1,000 sq.-ft. building would provide mechanics space for the Golf Course Fleet.

Progress Summary:

N/A

Future Impact on Operating Budget:

None

Activity:

Funding Sources:	Prior to 2024*	2024 Budget	2025 Budget	2026 Budget	Budget 2024-2026
Municipal Parks Construction Fund	-	-	-	-	-
Grants- Secured (Fed,State,Local)	-	-	-	-	-
Bond Proceeds	-	-	-	-	-
REET 2	-	-	-	-	-
Park Impact Fees	-	-	-	-	-
Total Funding Sources:	**-**	**-**	**-**	**-**	**-**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Right of Way	-	-	-	-	-
Construction	-	-	-	-	-
Total Expenditures:	**-**	**-**	**-**	**-**	**-**

Forecasted Project Cost:

Funding Sources:	2027	2028	2029	2030	Total 2025-2030
Municipal Parks Construction Fund	-	350,000	-	-	350,000
Grants- Secured (Fed,State,Local)	-	-	-	-	-
Bond Proceeds	-	-	-	-	-
REET 2	-	300,000	-	-	300,000
Park Impact Fees	-	-	-	-	-
Total Funding Sources:	**-**	**650,000**	**-**	**-**	**650,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	50,000	-	-	50,000
Right of Way	-	-	-	-	-
Construction	-	600,000	-	-	600,000
Total Expenditures:	**-**	**650,000**	**-**	**-**	**650,000**

Grants / Other Sources:

Project Title: **Jacobsen Tree Farm Development -Phase 2**
Project No: **cp2020**
Project Type: **Capacity**
Project Manager: **Daryl Faber**

Description:

Develop the 29.3 acre site into a Community Park. Phase 1 would include a new Master Plan (to replace 2009 plan); Phase 2 would include parking and frontage improvements, some park amenities; Phase 3 would include building out the property with expanded parking, restrooms, and sport fields.

Progress Summary:

A master plan was completed in 2009, however, is out of date and Phase 1 would include updating this plan for a more modern park layout.

Future Impact on Operating Budget:

No significant impact due to master plan. Future park development will result in maintenance and utility expenses undeterminable at this time.

Activity:

Funding Sources:	Prior to 2024*	2024 Budget	2025 Budget	2026 Budget	Budget 2024-2026
Fund 321 -Unrestricted Fund Balance	-	333,500	-	-	333,500
Grants- Secured (Fed,State,Local)	-	-	-	-	-
King County Prop 2	14,165	-	-	-	-
Park Impact Fees	-	-	125,000	-	125,000
Other	-	-	-	-	-
Total Funding Sources:	**14,165**	**333,500**	**125,000**	**-**	**458,500**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	14,165	333,500	125,000	-	458,500
Right of Way	-	-	-	-	-
Construction	-	-	-	-	-
Total Expenditures:	**14,165**	**333,500**	**125,000**	**-**	**458,500**

Forecasted Project Cost:

Funding Sources:	2027	2028	2029	2030	Total 2025-2030
Fund 321 -Unrestricted Fund Balance	-	-	-	-	-
Grants- Secured (Fed,State,Local)	-	-	-	-	-
King County Prop 2	-	-	-	-	-
Park Impact Fees	2,000,000	-	2,000,000	-	4,125,000
Other	-	-	-	-	-
Total Funding Sources:	**2,000,000**	**-**	**2,000,000**	**-**	**4,125,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	500,000	-	500,000	-	1,125,000
Right of Way	-	-	-	-	-
Construction	1,500,000	-	1,500,000	-	3,000,000
Total Expenditures:	**2,000,000**	**-**	**2,000,000**	**-**	**4,125,000**

Unsecured Non-Budgeted Funding

Unsecured Grants	2025	2026	2027	2028-2030	Total 2025-20230
RCO WA Wildlife & Recreation Prgm.	-	1,000,000	-	-	1,000,000
King County Parks Grant	-	2,000,000	-	-	2,000,000
RCO Community Outdoor Athletic Funds	-	-	-	1,500,000	1,500,000
RCO Youth Athletic Facilities Grant	-	-	-	1,500,000	1,500,000
Total Funding Sources:	**-**	**3,000,000**	**-**	**3,000,000**	**6,000,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Right of Way	-	-	-	-	-
Construction	-	3,000,000	-	3,000,000	6,000,000
Total Expenditures:	**-**	**3,000,000**	**-**	**3,000,000**	**6,000,000**

Grants / Other Sources:

Project Title: **Lakeland Hills Nature Area**
Project No: **gpbd11**
Project Type: **Capacity**
Project Manager: **Daryl Faber**

Description:

Complete Master Plan to include the development and construction of an environmental community park. Trails, fencing, parking and visitor amenities are included in the project.

Progress Summary:

Future Impact on Operating Budget:

Increased maintenance costs of $5,000

Activity:

Funding Sources:	Prior to 2024*	2024 Budget	2025 Budget	2026 Budget	Budget 2024-2026
Fund 321 -Unrestricted Fund Balance	-	-	-	-	-
Other (Pierce Co. Zoo Taxes)	-	-	-	-	-
Park Impact Fees	-	25,000	-	-	25,000
Park Mitigation Fees	-	-	-	-	-
Total Funding Sources:	**-**	**25,000**	**-**	**-**	**25,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	25,000	-	-	25,000
Right of Way	-	-	-	-	-
Construction	-	-	-	-	-
Total Expenditures:	**-**	**25,000**	**-**	**-**	**25,000**

Forecasted Project Cost:

Funding Sources:	2027	2028	2029	2030	Total 2025-2030
Fund 321 -Unrestricted Fund Balance	-	-	-	-	-
Other (Pierce Co. Zoo Taxes)	200,000	-	-	-	200,000
Park Impact Fees	200,000	-	-	-	200,000
Park Mitigation Fees	-	-	-	-	-
Total Funding Sources:	**400,000**	**-**	**-**	**-**	**400,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Right of Way	-	-	-	-	-
Construction	400,000	-	-	-	400,000
Total Expenditures:	**400,000**	**-**	**-**	**-**	**400,000**

Grants / Other Sources:

Project Title: **Les Gove Park Improvements**
Project No: **cp2232**
Project Type: **Capacity**
Project Manager: **Thaniel Gouk**

Description:

Construction of a covered multi-use pavilion building at the south end of Les Gove Park. Uses could include pickleball and farmers market, among others.

Progress Summary:

N/A

Future Impact on Operating Budget:

Future impacts are undeterminable at this time. Potential impacts include general building maintenance.

Activity:

Funding Sources:	Prior to 2024*	2024 Budget	2025 Budget	2026 Budget	Budget 2024-2026
Municipal Parks Construction Fund	15,259	79,430	-	-	79,430
Grants Secured (Fed,State,Local)	-	100,000	-	-	100,000
Park Impact Fees	-	-	-	-	-
REET 2	-	-	-	-	-
Other	-	-	-	-	-
Total Funding Sources:	**15,259**	**179,430**	**-**	**-**	**179,430**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Right of Way	-	-	-	-	-
Construction	15,259	179,430	-	-	179,430
Total Expenditures:	**15,259**	**179,430**	**-**	**-**	**179,430**

Forecasted Project Cost:

Funding Sources:	2027	2028	2029	2030	Total 2025-2030
Municipal Parks Construction Fund	-	-	-	-	-
Grants Secured (Fed,State,Local)	-	-	-	-	-
Park Impact Fees	750,000	-	-	-	750,000
REET 2	750,000	-	-	-	750,000
Other	-	-	-	-	-
Total Funding Sources:	**1,500,000**	**-**	**-**	**-**	**1,500,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	100,000	-	-	-	100,000
Right of Way	-	-	-	-	-
Construction	1,400,000	-	-	-	1,400,000
Total Expenditures:	**1,500,000**	**-**	**-**	**-**	**1,500,000**

Unsecured Non-Budgeted Funding

Unsecured Grants	2025	2026	2027	2028-2030	Total 2025-20230
KC Parks Capital and Open Space Grant	-	-	750,000	-	750,000
Total Funding Sources:	**-**	**-**	**750,000**	**-**	**750,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Right of Way	-	-	-	-	-
Construction	-	-	750,000	-	750,000
Total Expenditures:	**-**	**-**	**750,000**	**-**	**750,000**

Grants / Other Sources:

Project Title: **Miscellaneous Parks Improvements**
Project No: **gpbd03**
Project Type: **Capacity/Non-Capacity**
Project Manager: **Daryl Faber**

Description:

Minor park improvements including shelters, roofs, playgrounds, irrigation and restrooms.

Progress Summary:

Completed projects include: security cameras at Mary Olson Farm. At Les Gove installed gates at 12th Street parking lot, added a bench, art pedestals, poem etching, senior center walkway, and improvements at the spray park and playground. At Auburndale park added new playground and replaced dilapidated pathway. New split rail fence at Isaac Evans.

Future Impact on Operating Budget:

Activity:

Funding Sources:	Prior to 2024*	2024 Budget	2025 Budget	2026 Budget	Budget 2024-2026
Fund 321 -Unrestricted Fund Balance	-	247,700	50,000	50,000	347,700
Grants Secured (Fed,State,Local)	-	-	-	-	-
KC Prop 2	-	100,000	150,000	150,000	400,000
Park Impact Fees	-	213,869	50,000	100,000	363,869
Total Funding Sources:	**-**	**561,569**	**250,000**	**300,000**	**1,111,569**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	50,000	50,000	100,000
Right of Way	-	-	-	-	-
Construction	-	561,569	200,000	250,000	1,011,569
Total Expenditures:	**-**	**561,569**	**250,000**	**300,000**	**1,111,569**

Forecasted Project Cost:

Funding Sources:	2027	2028	2029	2030	Total 2025-2030
Fund 321 -Unrestricted Fund Balance	50,000	50,000	50,000	50,000	300,000
Grants Secured (Fed,State,Local)	-	-	-	-	-
KC Prop 2	150,000	150,000	150,000	150,000	900,000
Park Impact Fees	100,000	50,000	50,000	50,000	400,000
Total Funding Sources:	**300,000**	**250,000**	**250,000**	**250,000**	**1,600,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	100,000	100,000	100,000	100,000	500,000
Right of Way	-	-	-	-	-
Construction	200,000	150,000	150,000	150,000	1,100,000
Total Expenditures:	**300,000**	**250,000**	**250,000**	**250,000**	**1,600,000**

Grants / Other Sources:

Project Title: **Park Acquisitions/Development**
Project No: **gpbd04**
Project Type: **Capacity**
Project Manager: **Daryl Faber**

Description:

Land and other property acquisitions to occur based on demand and deficiencies including parks, open space, trails, corridors and recreational facilities.

Progress Summary:

The City purchased the Auburn Avenue Theater and the Qares property in 2020. The City will be purchasing a downtown open space plaza.

Future Impact on Operating Budget:

None

Activity:

Funding Sources:	Prior to 2024*	2024 Budget	2025 Budget	2026 Budget	Budget 2024-2026
Fund 321 -Unrestricted Fund Balance	-	-	-	-	-
Grants Secured (Fed,State,Local)	-	-	-	-	-
KC Prop 2	-	195,000	-	-	195,000
REET1	-	-	-	-	-
Other Sources	-	-	-	-	-
Total Funding Sources:	**-**	**195,000**	**-**	**-**	**195,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Acquisition	-	195,000	-	-	195,000
Construction	-	-	-	-	-
Total Expenditures:	**-**	**195,000**	**-**	**-**	**195,000**

Forecasted Project Cost:

Funding Sources:	2027	2028	2029	2030	Total 2025-2030
Fund 321 -Unrestricted Fund Balance	-	-	-	-	-
Grants Secured (Fed,State,Local)	-	-	-	-	-
KC Prop 2	-	-	-	-	-
REET1	-	-	-	-	-
Other Sources	-	-	-	-	-
Total Funding Sources:	**-**	**-**	**-**	**-**	**-**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Acquisition	-	-	-	-	-
Construction	-	-	-	-	-
Total Expenditures:	**-**	**-**	**-**	**-**	**-**

Unsecured Non-Budgeted Funding

Unsecured Grants	2025	2026	2027	2028-2030	Total 2025-20230
Local Grant KC Conservation Futures	125,000	125,000	125,000	375,000	750,000
Total Funding Sources:	**125,000**	**125,000**	**125,000**	**375,000**	**750,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Acquisition	125,000	125,000	125,000	375,000	750,000
Construction	-	-	-	-	-
Total Expenditures:	**125,000**	**125,000**	**125,000**	**375,000**	**750,000**

Grants / Other Sources:

Project Title: **Sunset Park Improvements**
Project No: **gpbd06**
Project Type: **Capacity**
Project Manager: **Daryl Faber**

Description:

Phase 2 improvements to include looking at options for new or modified court uses (e.g. pickleball). Phase 3 to include replacing the grass base/softball fields with new multi-sport synthetic turf fields.

Progress Summary:

RCO Community Outdoor Athletic Funds grant applied for in Spring 2024; decision expected Fall 2024. Phase 1 included drainage improvements to the playground area and were completed in 2022.

Future Impact on Operating Budget:

Less water use (Bonney Lake Water) for fields would save money for the City.

Activity:

Funding Sources:	Prior to 2024*	2024 Budget	2025 Budget	2026 Budget	Budget 2024-2026
Fund 321 -Unrestricted Fund Balance	-	-	-	-	-
Grants Secured (Fed,State,Local)	-	-	-	-	-
Park Impact Fees	-	88,161	200,000	-	288,161
Other (Pierce Co. Zoo Tax)	-	-	-	-	-
Total Funding Sources:	**-**	**88,161**	**200,000**	**-**	**288,161**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Right of Way	-	-	-	-	-
Construction	-	88,161	200,000	-	288,161
Total Expenditures:	**-**	**88,161**	**200,000**	**-**	**288,161**

Forecasted Project Cost:

Funding Sources:	2027	2028	2029	2030	Total 2025-2030
Fund 321 -Unrestricted Fund Balance	-	-	-	-	-
Grants Secured (Fed,State,Local)		-	-	-	-
Park Impact Fees	1,650,000	-	-	-	1,850,000
Other (Pierce Co. Zoo Tax)	500,000	-	-	-	500,000
Total Funding Sources:	**2,150,000**	**-**	**-**	**-**	**2,350,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	50,000	-	-	-	50,000
Right of Way	-	-	-	-	-
Construction	2,100,000	-	-	-	2,300,000
Total Expenditures:	**2,150,000**	**-**	**-**	**-**	**2,350,000**

Unsecured Non-Budgeted Funding

Unsecured Grants	2025	2026	2027	2028-2030	Total 2025-20230
Local Grant KC Conservation Futures	-	-	1,500,000	-	1,500,000
Total Funding Sources:	**-**	**-**	**1,500,000**	**-**	**1,500,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Right of Way	-	-	-	-	-
Construction	-	-	1,500,000	-	1,500,000
Total Expenditures:	**-**	**-**	**1,500,000**	**-**	**1,500,000**

Grants / Other Sources:

Project Title: **Dykstra Footbridge**
Project No: **cp2214**
Project Type: **Non-Capacity**
Project Manager: **Faber**

Description:

Engineering study was completed and results were better then expected. Most fixes have already been completed and remaining items to be done by a contractor.

Progress Summary:

Minor fixes by mainteance staff completed in 2023; remaining items will be completed in 2024 & 2025.

Future Impact on Operating Budget:

None

Activity:

Funding Sources:	Prior to 2024*	2024 Budget	2025 Budget	2026 Budget	Budget 2024-2026
Municipal Parks Construction Fund	-	-	-	-	-
Grants Secured (Fed,State,Local)	-	-	-	-	-
REET	-	-	-	-	-
Other (ARPA)	10,582	-	-	-	-
Total Funding Sources:	**10,582**	**-**	**-**	**-**	**-**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	10,582	-	-	-	-
Right of Way	-	-	-	-	-
Construction	-	-	-	-	-
Total Expenditures:	**10,582**	**-**	**-**	**-**	**-**

Forecasted Project Cost:

Funding Sources:	2027	2028	2029	2030	Total 2025-2030
Municipal Parks Construction Fund	-	-	-	-	-
Grants Secured (Fed,State,Local)	-	-	-	-	-
REET	-	-	-	-	-
Other (ARPA)	-	-	-	-	-
Total Funding Sources:	**-**	**-**	**-**	**-**	**-**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Right of Way	-	-	-	-	-
Construction	-	-	-	-	-
Total Expenditures:	**-**	**-**	**-**	**-**	**-**

Unsecured Non-Budgeted Funding

Unsecured Grants	2025	2026	2027	2028-2030	Total 2025-20230
King County	40,000	-	-	-	40,000
Total Funding Sources:	**40,000**	**-**	**-**	**-**	**40,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Right of Way	-	-	-	-	-
Construction	40,000	-	-	-	40,000
Total Expenditures:	**40,000**	**-**	**-**	**-**	**40,000**

Grants / Other Sources:

Project Title: **Fairway Drainage Improvement**
Project No: **gpbd19**
Project Type: **Non-capacity**
Project Manager: **Daryl Faber**

Description:

Apply top dressing sand to the approaches to numerous holes in order to firm up these landing areas so that the holes are playable year-round. Emphasis will also be on the practice area to increase our lesson program and prepare for the driving range. Sand will be applied with a three-yard top dressing machine.

Progress Summary:

Drainage improvements have greatly impacted the increase in play during the winter months as well as the quality of the turf year around. Continuing with the practice will ensure quality course conditions as well as an increase in rounds.

Future Impact on Operating Budget:

None

Activity:

Funding Sources:	Prior to 2024*	2024 Budget	2025 Budget	2026 Budget	Budget 2024-2026
Municipal Parks Construction Fund	-	-	-	-	-
Grants- Secured (Fed,State,Local)	-	-	-	-	-
Bond Proceeds	-	-	-	-	-
REET 2	-	30,000	30,000	30,000	90,000
Other	-	-	-	-	-
Total Funding Sources:	**-**	**30,000**	**30,000**	**30,000**	**90,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Right of Way	-	-	-	-	-
Construction	-	30,000	30,000	30,000	90,000
Total Expenditures:	**-**	**30,000**	**30,000**	**30,000**	**90,000**

Forecasted Project Cost:

Funding Sources:	2027	2028	2029	2030	Total 2025-2030
Municipal Parks Construction Fund	-	-	-	-	-
Grants- Secured (Fed,State,Local)	-	-	-	-	-
Bond Proceeds	-	-	-	-	-
REET 2	30,000	30,000	30,000	30,000	180,000
Other	-	-	-	-	-
Total Funding Sources:	**30,000**	**30,000**	**30,000**	**30,000**	**180,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Right of Way	-	-	-	-	-
Construction	30,000	30,000	30,000	30,000	180,000
Total Expenditures:	**30,000**	**30,000**	**30,000**	**30,000**	**180,000**

Grants / Other Sources:

Project Title: **Mary Olson Farm Mobile Home Replacement**
Project No: **gpbd32**
Project Type: **Non-Capacity**
Project Manager: **Thaniel Gauk**

Description:

This project consists of removing and replacing the 25+ year old mobile home (caretaker's residence) with a new/slightly used mobile home to be relocated on the existing pad. The existing caretaker residence is past its anticipated lifespan and in need of extensive repairs, that are not financially prudent as the repair costs are in excess of 50% of the replacement cost.

Progress Summary:

The existing mobile home condition has been accessed. Numerous repairs are required that are not financially prudent.

Future Impact on Operating Budget:

None

Activity:

Funding Sources:	Prior to 2024*	2024 Budget	2025 Budget	2026 Budget	Budget 2024-2026
Fund 321 -Unrestricted Fund Balance	-	-	-	-	-
Grants - Unsecured (Fed,State,Local)	-	-	-	-	-
KC Parks Prop Levy	-	-	40,000	-	40,000
Total Funding Sources:	**-**	**-**	**40,000**	**-**	**40,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Construction	-	-	40,000	-	40,000
Total Expenditures:	**-**	**-**	**40,000**	**-**	**40,000**

Forecasted Project Cost:

Funding Sources:	2027	2028	2029	2030	Total 2025-2030
Fund 321 -Unrestricted Fund Balance	-	-	-	-	-
Grants - Unsecured (Fed,State,Local)	-	-	-	-	-
KC Parks Prop Levy	-	-	-	-	40,000
Total Funding Sources:	**-**	**-**	**-**	**-**	**40,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Construction	-	-	-	-	40,000
Total Expenditures:	**-**	**-**	**-**	**-**	**40,000**

Unsecured Non-Budgeted Funding

Unsecured Grants	2025	2026	2027	2028-2030	Total 2025-20230
King County Open Doors	40,000	-	-	-	40,000
Total Funding Sources:	**40,000**	**-**	**-**	**-**	**40,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Construction	40,000	-	-	-	40,000
Total Expenditures:	**40,000**	**-**	**-**	**-**	**40,000**

Grants / Other Sources:

Project Title: **Public Art**
Project No: **gcbd05**
Project Type: **Non-Capacity**
Project Manager: **Julie Krueger**

Description:

The City designates $30,000 annually toward the purchase of public art, for placement at designated locations throughout the City.

Progress Summary:

Arts Commission will meet to assess future needs and seek approval from City Council on placement.

Future Impact on Operating Budget:

None

Activity:

Funding Sources:	Prior to 2024*	2024 Budget	2025 Budget	2026 Budget	Budget 2024-2026
Unrestricted Fund Balance		187,500	-	-	187,500
Grants - Secured (Fed,State,Local)		-	-	-	-
REET 2		30,000	30,000	30,000	90,000
Other		-	-	-	-
Total Funding Sources:		**217,500**	**30,000**	**30,000**	**277,500**
Capital Expenditures:					
Predesign		-	-	-	-
Design		-	-	-	-
Right of Way		-	-	-	-
Construction		217,500	30,000	30,000	277,500
Total Expenditures:		**217,500**	**30,000**	**30,000**	**277,500**

Forecasted Project Cost:

Funding Sources:	2027	2028	2029	2030	Total 2025-2030
Unrestricted Fund Balance	-	-	-	-	-
Grants - Secured (Fed,State,Local)	-	-	-	-	-
REET 2	30,000	30,000	30,000	30,000	180,000
Other	-	-	-	-	-
Total Funding Sources:	**30,000**	**30,000**	**30,000**	**30,000**	**180,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Right of Way	-	-	-	-	-
Construction	30,000	30,000	30,000	30,000	180,000
Total Expenditures:	**30,000**	**30,000**	**30,000**	**30,000**	**180,000**

Grants / Other Sources:

Project Title: **Golf Course Driving Range**
Project No: **cp2325**
Project Type: **Capacity**
Project Manager: **Daryl Faber**

Description:

The Auburn Golf Course is a leading public play golf course in the region hosting over 50,000 rounds per year. It is lacking a teaching/warm up area that will both create new revenues and "grow the game". An approximate 14-18 stall driving range is proposed on the current casual warm up area on the NW portion of the property. It is anticipated that the range will produce approximately $200,000 in new net revenue per year.

Progress Summary:

Cost Construction estimates have been provided. Two potential design options are under consideration. Preferred option will be determined during Phase 1 feasibility in 2023. Construction anticipated in 2027, pending funding.

Future Impact on Operating Budget:

This project will increase operating revenues by approximate $250,000 per year upon full implementation of programs. Expenses will increase by approximately $50,000 per year.

Activity:

Funding Sources:	Prior to 2024*	2024 Budget	2025 Budget	2026 Budget	Budget 2024-2026
Unrestricted Cap Improve	-	-	-	-	-
Park Impact Fees	-	-	-	-	-
REET 1	-	-	-	-	-
Total Funding Sources:	**-**	**-**	**-**	**-**	**-**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	-	-	-	-	-
Construction	-	-	-	-	-
Total Expenditures:	**-**	**-**	**-**	**-**	**-**

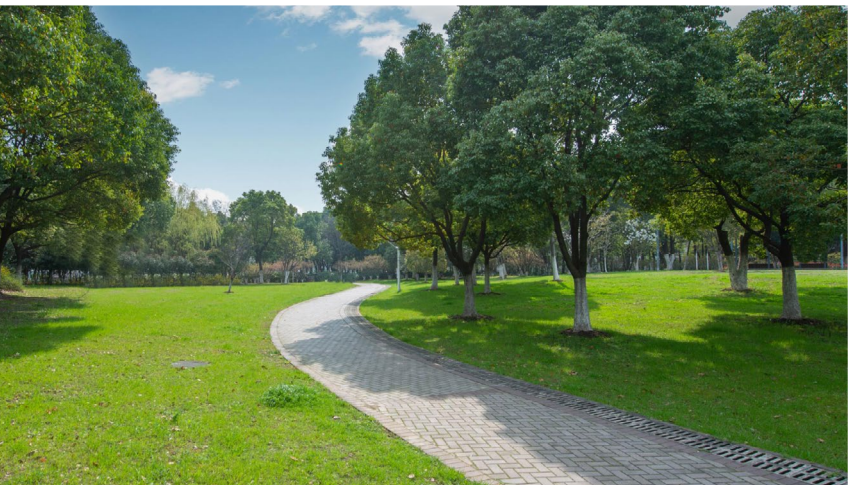
Forecasted Project Cost:

Funding Sources:	2027	2028	2029	2030	Total 2025-2030
Unrestricted Cap Improve	-	-	-	-	-
Park Impact Fees	300,000	-	-	-	300,000
REET 1	-	-	-	-	-
Total Funding Sources:	**300,000**	**-**	**-**	**-**	**300,000**
Capital Expenditures:					
Predesign	-	-	-	-	-
Design	100,000	-	-	-	100,000
Construction	200,000	-	-	-	200,000
Total Expenditures:	**300,000**	**-**	**-**	**-**	**300,000**

Park Impact Fee Analysis









Park Impact Fees (PIFs) are charges imposed on new residential developments to fund the acquisition, improvement, and expansion of public parks and recreational facilities. These fees are collected by local governments from developers or property owners when they construct new homes or residential units. The primary purpose of PIFs is to ensure that as communities grow, there are sufficient parks and recreational spaces to meet the needs of the increasing population.

The calculation of PIFs typically involves various factors, including the size and type of the new residential development, the projected increase in population, and the costs associated with providing additional park services to the new residents. Local governments often use specific formulas or criteria to determine the fee amount. The revenue generated from PIFs is earmarked for specific purposes related to parks and recreation, such as purchasing land for new parks, developing new recreational facilities, upgrading existing parks.

Implemented through local ordinances, PIFs are part of broader parks, recreation, and open space plans that outline the level of service standards for parks and recreational facilities. These standards ensure that the funds are used effectively to meet community needs. The underlying philosophy of PIFs is that growth should pay for growth, meaning that the financial burden of expanding public infrastructure to accommodate new residents should be borne by those who contribute to the growth, rather than existing residents. Overall, Park Impact Fees are a crucial tool for cities and municipalities to manage urban growth sustainably and ensure that all residents have access to quality parks and recreational facilities.

This document specifically addresses the impact fees related to parks and recreational facilities in Auburn. These fees are applied to all residential developments to ensure that the city's parks and recreational infrastructure can support the demands of a growing population.

Regulatory Framework for Impact Fees

Pursuant to state statute (RCW 82.02.050 - 82.02.100), Washington counties and cities, including Auburn, are authorized to collect impact fees to "ensure adequate facilities are available to serve new growth and development." These fees are designed to fund public facilities that support new developments, ensuring that the infrastructure required by a growing population is adequately financed.

Impact fees must be spent on projects related to the impacts of new development and cannot be used to correct pre-existing deficiencies or to pay for maintenance costs. They also cannot exceed a development's proportionate share of the total cost for system improvements. The fees must be based on a formula or other method that calculates this fair share, ensuring equity and effectiveness in funding public infrastructure.

Impact fees can be collected for four types of public facilities: public streets and roads, publicly owned parks, open spaces and recreational facilities, school facilities, and fire protection facilities (in areas not served by a fire district), as specified in RCW 82.02.050(2) and (4), and RCW 82.02.090(7). These fees must be used for "system improvements" that serve the broader community rather than "project improvements" specific to individual developments, as outlined in RCW 82.02.050(3)(a) and RCW 82.02.090(6) and (9).

Local governments must establish reasonable service areas and develop impact fee rate categories for various land uses, as mandated by RCW 82.02.060(6). The improvements funded by these fees must benefit new development and be reasonably related to it, ensuring that the new infrastructure meets the needs generated by growth.

In 2011, the Washington Legislature extended the period during which impact fees must be spent from six to ten years. According to RCW 82.02.070(3), if impact fees are not spent within ten years following their collection, they must be refunded. This extension provides local governments with more flexibility in planning and implementing necessary infrastructure projects to support new development.

By incorporating these statutes, Auburn ensures that its impact fees are used effectively to fund essential public facilities, maintaining a high quality of life for its residents while accommodating growth.

Auburn Municipal Code:

Chapter 19.08 of the Auburn Municipal Code establishes the legal framework for assessing parks impact fees, as authorized by RCW 82.02. These fees are imposed on new residential developments to ensure that adequate parks and recreational facilities are available to support growth. The assessment of these fees is based on a specific schedule and is typically due at the time of building permit issuance. The funds collected must be used exclusively for improvements to parks and recreational facilities that serve the new development, and cannot be used for maintenance or to address existing deficiencies. A dedicated account is established for managing these funds, with stringent reporting and management requirements to ensure transparency. The code also provides for refunds if the impact fees are not spent within ten years, as well as adjustments and credits under certain conditions, such as when developers provide on-site recreational facilities. Additionally, there are provisions for exemptions and an appeals process for disputing fee assessments.

Assessing the Need for Impact Fees

To establish appropriate impact fee rates in Auburn, several critical factors must be considered. These include determining which public facilities the city is responsible for, identifying the demand for additional parks and recreational spaces, securing the necessary revenue to support these facilities, and understanding the benefits these amenities bring to new developments.

The City of Auburn is responsible for its parks and recreational facilities, and impact fees can only be applied to public facilities, including those managed by other government entities, as outlined in RCW 82.02.090(7). Evaluating the need for new parks involves comparing current service levels with future demands based on population growth, identifying any gaps, and ensuring compliance with statutory requirements. Auburn's approach includes analyzing per capita investment in existing facilities to determine the need for additional parks and recreational spaces.

Revenue from impact fees is crucial for funding the development and maintenance of these facilities, ensuring that new developments contribute to the infrastructure they require. This process involves evaluating current funding levels and forecasting the additional revenue needed to support Auburn's growth. New parks and recreational facilities not only enhance the attractiveness of new developments but also improve residents' quality of life and provide significant economic and social benefits. Therefore, ensuring that new developments contribute to these amenities is essential for sustainable and balanced growth in the city.

Evaluating the Benefit of Impact Fees in Auburn

Impact fee laws in Auburn ensure that the fees imposed on new developments are justified and beneficial through several key principles and tests. These principles ensure that the fees are fair, equitable, and directly related to the needs generated by new development.

Rational Nexus Test

The rational nexus test requires a clear connection between the need for new public facilities and the development being charged the impact fees. In Auburn, this means that the fees must be used to fund improvements that directly address the impacts of new development. This test ensures that the impact fees are justified and applied appropriately.

Proportionality Test

The proportionality test ensures that the amount of the impact fee is proportional to the development's impact on public facilities. This means that the fees collected in Auburn should not exceed the cost of the facilities needed to accommodate the new development. The fees must be fair and reflect the actual cost of providing the necessary public services and infrastructure.

Specific Benefit

Auburn's impact fee laws require that the fees collected provide a specific benefit to the new development paying the fees. This ensures that the improvements funded by the impact fees directly enhance the facilities and services available to the new development, supporting growth in a way that benefits those contributing developments.

Compliance with Statutory Requirements

Impact fees in Auburn must comply with statutory requirements, which include detailed documentation and analysis to support the fees. This includes identifying existing deficiencies, reserve capacity, and new capacity needs. These statutory requirements ensure transparency and accountability in the use of impact fees.

In summary, Auburn's impact fee laws evaluate the benefit provided by these fees through the rational nexus and proportionality tests, ensuring that the fees are directly related to and proportional to the impact of new development. The laws also mandate that the fees provide a specific benefit to the development and comply with statutory requirements to maintain fairness, transparency, and accountability.

Methodology and Relationship to Capital Facilities Plan

In the City of Auburn, the calculation of impact fees for parks and recreational facilities is anchored in the per capita value of the city's capital improvements for these amenities. The purpose is to ensure that new housing and other private and public developments contribute their fair share of the investment necessary to support, often needing to improve, the city's level of service objectives for its parks and recreational facilities. This investment is typically supported by a combination of general revenue, capital improvement funds, grant funding, and impact fees.

To determine the amount of the impact fee, Auburn multiplies the average number of residents per dwelling unit by the per capita investment needed for new development. This per capita investment reflects the cost of future parks projects identified in the City's Capital Facilities Plan. By using this approach, Auburn ensures that the infrastructure required to support population growth is adequately financed and fairly shared.

This method is consistent with Auburn's municipal regulations and complies with RCW 82.02, which mandates that impact fees be equitable, proportional, and dedicated to system improvements that benefit new developments. This ensures transparency and fairness in funding the necessary expansions and enhancements to Auburn's parks and recreational facilities.

Current Impact Fee Summary

The City of Auburn, WA, has implemented impact fees to finance necessary infrastructure improvements due to new developments, ensuring that the cost of growth is shared equitably among developers. These fees cover transportation, schools, and parks, with a special focus on park impact fees. Park impact fees are authorized by RCW 82.02.090 (7) and are designed to support the acquisition, expansion, and development of parks, open spaces, and recreational facilities. In Auburn, "parks" include both developed recreational facilities and open spaces preserved for their natural and ecological value.

The impact fees are calculated based on the type and intensity of new development, ensuring a proportional distribution of costs. Different land uses, such as residential, commercial, and industrial developments, are assessed varying fees. Residential developments are categorized similarly to the transportation impact fee system for ease of understanding and administration. The City of Auburn ensures proper administration of these fees through regular updates, transparency, and accountability, with funds earmarked for specific park projects. The benefits of park impact fees include equitable cost distribution, enhanced quality of life, and sustainable growth.

Projected Growth and Density per Dwelling Unit Population Growth:

Between 2024 and 2044, Auburn, WA, is projected to experience significant population growth. The population is expected to increase from approximately 90,096 residents in 2024 to around 114,540 residents by 2044, the projected population growth rate for Auburn between 2024 and 2044 is approximately 27.13%, representing an addition of approximately 24,444 residents over the 20-year period, which will significantly impact housing demand and density. This growth underscores ongoing urban development, rising housing demand, and Auburn's attractiveness as a residential and economic hub in the region. To sustain the quality of life for both current and future residents, this projected growth necessitates careful planning and substantial investment in infrastructure, including parks and recreational facilities.

Per Unit Occupancy:

The most recent estimates from the Washington State Office of Financial Management indicate the following average number of occupants per dwelling unit for Auburn:

Single-Family Residential: 2.864 persons per unit
Multi-Family Residential: 1.907 persons per unit
Using these OFM estimates and the City's existing inventory of single-family and multi-family residential units, we have calculated a weighted average occupancy of 2.559 persons per unit. This average is used for a uniform impact fee calculation, ensuring equitable distribution of costs associated with accommodating the city's growth.

Using these estimates and the city's current inventory of single-family and multi-family residential units, the weighted average number of persons per unit is calculated to be approximately 2.545 persons. This figure is instrumental in calculating uniform impact fees and supporting future planning needs as Auburn continues to grow.

Level of Service Standards for Parks, Recreation, and Open Space

Auburn's previous Parks, Recreation, and Open Space Plan Update (2015) included a comprehensive demand and needs analysis including specific recreation facility types, that were used to develop proposed Level of Service (LOS) standards established within the same plan. After further review, and as detailed in this plan's Demand & Needs, it was determined these standards are no longer aligned with Auburn's current demographics, community needs, and future parks development plans. Consequently, this plan is adopting and revising the following recommended LOS standards:

Parks:

Neighborhood Parks: 1.25 acres per 1,000 population
Community Parks: 5 acres per 1,000 population

Trails: 0.25 miles per 1,000 population

The following analysis includes an update to the parks impact fees based on the updated standards. Importantly, as outlined in the Capital Improvement Program section, the City of Auburn has identified the need to exclude football fields and indoor pool facilities from the impact fee cost basis, as there are no immediate plans to develop additional amenities of this type. City staff determined that excluding these facilities more accurately reflects the current and future recreational needs of Auburn's residents, ensuring that the impact fees are aligned with planned improvements and community priorities.

Projected Costs for Parks and Facilities, and Total Cost Basis for the Parks Impact Fees

Based on this detailed analysis to update its parks impact fees, based on revised Level of Service (LOS) standards needed for this parks, recreation, and open space update, the 2002 standards were found to be outdated and not reflective of the city's current demographics, needs, or future development plans. As a result, the City adopted new standards, including 1.25 acres of neighborhood park per 1,000 residents, 5 acres of community park per 1,000 residents, and 0.25 miles of multi-use trail per 1,000 residents.

The total cost required to meet these standards through 2044, included developing 63.31 acres of neighborhood parks, 116 acres of community parks, and 6.68 miles of multi-use trails, had an estimated total cost of almost $56M.

After adjusting the total cost by accounting for external funding sources, including transfers from the General Fund and sales tax, as well as anticipated grant money. After these adjustments, the net cost basis for the parks impact fees was calculated to be approximately $6.134 million. This cost was then used to determine the per-household impact fee, ensuring that new developments contribute their fair share towards maintaining Auburn's parks and recreational facilities at the revised LOS standards.

Using the number of parks facilities needed to meet the revised standards for growth over the next six years and the unit cost estimates, the total cost of the growth was calculated. Based on the information provided and the calculations we discussed earlier, the calculated impact fee per household is approximately $4,612.

Table 6-: PIF Analysis					
City	Current Population 2024	Projected Population 2044	% Growth	Single-family fee	Multifamily fee
Renton	108,555	140,000	28.97	$2,915	$1,978
Tukwila	21,798	30,000	37.63	$3,006	$2,618
Woodinville	14,330	20,000	39.57	$3,175	$3,175
Auburn	83,870	120,000	43.08	$3,500	$3,500
University Place	35,500	50,000	40.85	$3,644	$2,660
Puyallup	42,861	65,000	51.65	$3,675	$3,675
Shoreline	61,353	80,000	30.39	$4,692	$3,077
Redmond	80,280	110,000	37.02	$5,124	$3,557
Kirkland	91,194	120,000	31.59	$5,629	$4,278
Lynnwood	40,592	60,000	47.81	$5,899	$4,238
Sammamish	65,116	90,000	38.21	$6,739	$4,362
Issaquah	40,380	70,000	73.35	$9,107	$5,590

This fee was determined by dividing the net cost basis of $6.134 million (after accounting for grants and other funding sources) by the projected population growth, and then calculating the fee on a per-household basis using the average occupancy of 2.545 persons per household.

Comparison Analysis

With an updated park impact fee of $4,612 per household, Auburn is positioned competitively compared to similar-sized communities in the region. This fee closely aligns with those charged by cities like Kent and Federal Way, reflecting a similar commitment to funding park infrastructure. Auburn's fee is slightly higher than those in Renton, Puyallup, and Lakewood, indicating a modestly greater investment in parks to accommodate future growth. However, it remains significantly lower than the fees in areas like Redmond, where higher development costs drive more substantial impact fees. Overall, Auburn's impact fee ensures a balanced approach to maintaining and enhancing park services while staying competitive within the region.



Approvals







Adoption Process

In order for this Plan to be formally adopted, the plan must be reviewed by several bodies, including the public, ultimately culminating with a resolution, ordinance, or other adoption instrument showing formal approval of the plan and planning process by the governing entity. Only after RCO approves the plan, may the organization may apply for grants for up to six calendar years from the date when the governing body adopted the plan.

With the depth of public and staff involvement made over the execution of this planning process, the following review and approvals have been included:

1. City Council Ordinance
2. RCO Self-Certification Checklist



ORDINANCE NO. 6956

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, ADOPTING THE 2025-2030 CAPITAL FACILITIES PLAN FOR THE CITY OF AUBURN, WASHINGTON

WHEREAS, pursuant to RCW 36.70A.040, the City of Auburn is required to produce and periodically review a comprehensive plan under the State Growth Management Act (RCW 36.70A); and

WHEREAS RCW 36.70A.070 requires that cities establish within their comprehensive plan, a capital facilities element, including a six-year minimum financing plan "that will finance...capital facilities within projected funding capacities and clearly identifies sources of public money for such purposes;" and

WHEREAS RCW 36.70A.120 states "Each county and city that is required or chooses to plan under RCW 36.70A.040 shall perform its activities and make capital budget decisions in conformity with its comprehensive plan;" and

WHEREAS RCW 36.70A.130 allows for "The amendment of the capital facilities element of a comprehensive plan that occurs concurrently with the adoption or amendment of a county or city budget;" and

WHEREAS, as set forth in the Capital Facilities Element of the Comprehensive Plan, users shall reference "the most recently adopted version" of the City of Auburn Capital Facilities Plan; and

WHEREAS the City prepares the six-year Capital Facilities Plan to coincide with the adoption of the biennial budget, having incorporated the first two years of the Capital Facilities Plan into the biennial budget, as presented to Council and the public during workshops on September 9, September 12 and September 13, 2024,

and in study session on October 28th, 2024, and in public hearings November 4 and November 18, 2024; and

WHEREAS the City Council finds that the 2025-2030 Capital Facilities Plan meets the criteria set forth in the Auburn City Code and all other applicable legal criteria, including those of the Growth Management Act.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, DO ORDAIN AS FOLLOWS:

Section 1. Adoption of the Capital Facilities Plan. Pursuant to RCW 36.70A.070, the Capital Facilities Element of the City of Auburn Comprehensive Plan is hereby amended by the adoption of the revised and updated six-year 2025-2030 Capital Facilities Plan for the City of Auburn, attached hereto as Exhibit A and incorporated herein by this reference as if set forth in full.

Section 2. **Implementation.** The Mayor is hereby authorized to implement such administrative procedures as may be necessary to carry out the directions of this legislation.

Section 3. **Severability.** The provisions of this ordinance are declared to be separate and severable. The invalidity of any clause, sentence, paragraph, subdivision, section or portion of this ordinance, or the invalidity of the application thereof to any person or circumstance shall not affect the validity of the remainder of this ordinance, or the validity of its application to other persons or circumstances.

Section 4. **Effective Date.** This Ordinance shall take effect and be in force five (5) days from and after its passage, approval and publication as provided by law.

INTRODUCED: NOV 18 2024

PASSED: NOV 18 2024

APPROVED: NOV 18 2024

NANCY BACKUS, MAYOR

ATTEST:

Shawn Campbell, MMC, City Clerk

APPROVED AS TO FORM:

Jason Whalen, City Attorney

Published: _____

Exhibit A

CAPITAL PROJECTS SUMMARY

2025

FUNDING SOURCES - 2025	Fund Balance	Federal Sources	State Sources	Local Sources	REET	Other Sources	Unsecured Sources	Total Sources By Fund
Transportation Projects	$ 4,190,000	$ 3,615,689	$ -	$ -	$ 650,000	$ 7,617,100	$ 373,000	$ 16,445,789
Water Projects	5,012,810	-	-	-	-	-	-	5,012,810
Sewer Projects	5,543,300	-	-	-	-	-	-	5,543,300
Storm Drainage Projects	2,882,012	-	-	-	-	-	-	2,882,012
Parks and Recreation Projects	50,000	-	250,000	950,000	30,000	565,000	705,000	2,550,000
General Muncipal Projects and Community Improvements	-	80,000	-	-	(249,900)	10,650,000	-	10,480,100
Other Proprietary Fund Projects	405,304	-	-	-	-	-	1,021,136	1,426,440
Total Funding by Source	$ 18,083,426	$ 3,695,689	$ 250,000	$ 950,000	$ 430,100	$ 18,832,100	$ 2,099,136	$ 44,340,451

EXPENDITURES - 2025	Design	Right of Way	Acquisition	Environmental & Monitoring	Demolition & Construction	Long Term Debt	Unsecured Expenditures	Total Expenditures
Transportation Projects	$ 1,717,000	$ 1,281,000	$ -	$ 75,000	$ 12,795,689	$ 204,100	$ 373,000	$ 16,445,789
Water Projects	260,000	-	934,810	-	3,818,000	-	-	5,012,810
Sewer Projects	671,000	-	-	-	4,872,300	-	-	5,543,300
Storm Drainage Projects	1,422,712	-	-	-	1,459,300	-	-	2,882,012
Parks and Recreation Projects	250,000	-	700,000	-	895,000	-	705,000	2,550,000
General Municipal Projects and Community Improvements	3,280,000	-	2,200,000	-	4,295,000	705,100	-	10,480,100
Other Proprietary Fund Projects	138,460	-	-	-	175,000	91,844	1,021,136	1,426,440
Total Capital Expenditures	$ 7,739,172	$ 1,281,000	$ 3,834,810	$ 75,000	$ 28,310,289	$ 1,001,044	$ 2,099,136	$ 44,340,451

2026

FUNDING SOURCES - 2026	Fund Balance	Federal Sources	State Sources	Local Sources	REET	Other Sources	Unsecured Sources	Total Sources By Fund
Transportation Projects	$ 3,370,000	$ 865,000	$ -	$ -	$ -	$ 4,605,400	$ 1,251,000	$ 10,091,400
Water Projects	4,927,810	-	-	-	-	-	-	4,927,810
Sewer Projects	2,826,000	-	-	-	-	-	-	2,826,000
Storm Drainage Projects	2,947,461	-	-	-	-	-	-	2,947,461
Parks and Recreation Projects	50,000	-	-	-	30,000	600,000	4,625,000	5,305,000
General Muncipal Projects and Community Improvements	-	420,000	-	-	1,539,700	11,990,000	-	13,949,700
Other Proprietary Fund Projects	629,844	-	-	-	-	-	1,200,000	1,829,844
Total Funding by Source	$ 14,751,115	$ 1,285,000	$ -	$ -	$ 1,569,700	$ 17,195,400	$ 7,076,000	$ 41,877,215

EXPENDITURES - 2026	Design	Right of Way	Acquisition	Environmental & Monitoring	Demolition & Construction	Long Term Debt	Unsecured Expenditures	Total Expenditures
Transportation Projects	$ 1,905,000	$ 355,000	$ -	$ 20,000	$ 6,236,000	$ 324,400	$ 1,251,000	$ 10,091,400
Water Projects	225,000	-	934,810	-	3,768,000	-	-	4,927,810
Sewer Projects	265,400	-	-	-	2,560,600	-	-	2,826,000
Storm Drainage Projects	242,337	-	-	-	2,705,124	-	-	2,947,461
Parks and Recreation Projects	200,000	-	-	-	480,000	-	4,625,000	5,305,000
General Municipal Projects and Community Improvements	1,940,000	-	-	-	11,310,000	699,700	-	13,949,700
Other Proprietary Fund Projects	185,000	-	-	-	353,000	91,844	1,200,000	1,829,844
Total Capital Expenditures	$ 4,962,737	$ 355,000	$ 934,810	$ 20,000	$ 27,412,724	$ 1,115,944	$ 7,076,000	$ 41,877,215

Exhibit A

2027

EXPENDITURES - 2027	Design	Right of Way	Acquisition	Environmental & Monitoring	Demolition & Construction	Long Term Debt	Unsecured Expenditures	Total Expenditures
Transportation Projects	$ 950,000	$ -	$ -	$ 20,000	$ 17,338,000	$ 323,567	$ 11,047,406	$ 29,678,973
Water Projects	740,000	-	934,810	-	2,570,000	-	6,909,000	11,153,810
Sewer Projects	987,100	4,000	-	-	1,423,900	-	-	2,415,000
Storm Drainage Projects	486,429	-	-	-	914,447	-	-	1,400,876
Parks and Recreation Projects	750,000	-	-	-	5,780,000	-	2,500,000	9,030,000
General Municipal Projects and Community Improvements	525,000	-	-	-	10,540,000	698,200	-	11,763,200
Other Proprietary Fund Projects	35,000	-	-	-	211,000	91,844	-	337,844
Total Capital Expenditures	$ 4,473,529	$ 4,000	$ 934,810	$ 20,000	$ 38,777,347	$ 1,113,611	$ 20,456,406	$ 65,779,703

2028

EXPENDITURES - 2028	Design	Right of Way	Acquisition	Environmental & Monitoring	Demolition & Construction	Long Term Debt	Unsecured Expenditures	Total Expenditures
Transportation Projects	$ 1,050,000	$ -	$ -	$ 20,000	$ 5,136,000	$ 322,873	$ 1,687,000	$ 8,215,873
Water Projects	915,000	-	934,810	-	3,625,000	-	11,641,000	17,115,810
Sewer Projects	2,103,200	10,000	-	-	2,737,600	-	-	4,850,800
Storm Drainage Projects	256,486	-	-	-	1,610,732	-	-	1,867,218
Parks and Recreation Projects	150,000	-	-	-	780,000	-	125,000	1,055,000
General Municipal Projects and Community Improvements	805,000	-	-	-	4,795,000	702,800	-	6,302,800
Other Proprietary Fund Projects	80,000	-	-	-	170,000	91,844	1,000,000	1,341,844
Total Capital Expenditures	$ 5,359,686	$ 10,000	$ 934,810	$ 20,000	$ 18,854,332	$ 1,117,517	$ 14,453,000	$ 40,749,345

2029

EXPENDITURES - 2029	Design	Right of Way	Acquisition	Environmental & Monitoring	Demolition & Construction	Long Term Debt	Unsecured Expenditures	Total Expenditures
Transportation Projects	$ 1,235,000	$ -	$ -	$ -	$ 5,371,000	$ 241,795	$ 1,687,000	$ 8,534,795
Water Projects	400,000	-	934,810	-	5,107,000	-	3,950,000	10,391,810
Sewer Projects	585,000	-	-	-	1,860,900	-	-	2,445,900
Storm Drainage Projects	484,143	-	-	-	970,745	-	-	1,454,888
Parks and Recreation Projects	750,000	-	-	-	1,680,000	-	5,125,000	7,555,000
General Municipal Projects and Community Improvements	225,000	-	-	-	3,925,000	695,700	-	4,845,700
Other Proprietary Fund Projects	100,000	-	-	-	135,000	91,844	465,000	791,844
Total Capital Expenditures	$ 3,779,143	$ -	$ 934,810	$ -	$ 19,049,645	$ 1,029,339	$ 11,227,000	$ 36,019,937

2030

EXPENDITURES - 2030	Design	Right of Way	Acquisition	Environmental & Monitoring	Demolition & Construction	Long Term Debt	Unsecured Expenditures	Total Expenditures
Transportation Projects	$ 2,100,000	$ -	$ -	$ -	$ 5,136,000	$ 241,503	$ 1,687,000	$ 9,164,503
Water Projects	1,775,000	-	-	-	5,265,250	-	-	7,040,250
Sewer Projects	1,109,900	-	-	-	6,018,200	-	-	7,128,100
Storm Drainage Projects	271,498	-	-	-	1,662,867	-	-	1,934,365
Parks and Recreation Projects	150,000	-	-	-	630,000	-	1,125,000	1,905,000
General Municipal Projects and Community Improvements	125,000	-	-	-	815,000	694,200	-	1,634,200
Other Proprietary Fund Projects	522,500	-	-	-	1,247,500	91,844	3,830,000	5,691,844
Total Capital Expenditures	$ 6,053,898	$ -	$ -	$ -	$ 20,774,817	$ 1,027,547	$ 6,642,000	$ 34,498,262

Planning Eligibility Self-Certification Form

Use this form to certify that the need for any grant projects have been developed through an appropriate planning process. Provide the completed form with the subject plans and adoption documentation to RCO via e-mail or other means of electronic access (i.e. Web link, Box.com, etc.).

Organization Name: CITY OF AUBURN

Contact Name: THANIEL GOUK

Adoption Date of Submitted Documents: DECEMBER 2024

Seeking Eligibility for: ☐ Recreation Grants ☐ Conservation Grants ☒ Both

Initial Each to Certify Completion	Plan Element Certification	Document and Page Number Location of Information
TG	**1. Goals, objectives:** The attached plan supports our project with broad statements of intent (goals) *and* measures that describe when these intents will be attained (objectives). Goals may include a higher level of service.	73
TG	**2. Inventory:** The plan includes a description of the service area's facilities, lands, programs, and their condition. *(This may be done in a quantitative format or in a qualitative/narrative format.)*	15
TG	**3. Public involvement***:* The planning process gave the public ample opportunity to be involved in plan development and adoption.	44
TG	**4a. Demand and need analysis:** In the plans: • An analysis defines priorities, as appropriate, for acquisition, development, preservation, enhancement, management, etc., and explains why these actions are needed. • The process used in developing the analysis assessed community desires for parks, recreation, open space, and/or habitat, as appropriate, in a manner appropriate for the service area (personal observation, informal talks, formal survey(s), workshops, etc.).	56
TG	**4b. Level of Service assessment (optional)**: An assessment of the criterion appropriate to your community. Possibly establish a higher level of service as a plan goal (above).	65
TG	**5. Capital Improvement Program:** The plan includes a capital improvement/facility program that lists land acquisition, development, and renovation projects by year of anticipated implementation; include funding source. The program includes any capital project submitted to the Recreation and Conservation Funding Board for funding.	79
TG	**6. Adoption:** The plan and process has received formal governing body approval *(that is, city/county department head, district ranger, regional manager/supervisor, etc., as appropriate).* Attach signed resolution, letter, or other adoption instrument.	110

Certification Signature

I certify that this information is true and complete to the best of my knowledge.

Print/Type Name: **Thaniel Gouk**

Signature (Hand Written or Digital): 
tgouk 11/05/2024

Title: **Park Planning & Development Manager**

Date: **11/5/2024**

This page intentionally left blank

This page intentionally left blank



SCJ ALLIANCE
CONSULTING SERVICES

CITY OF AUBURN
PARKS, ARTS & RECREATION



Appendices/Attachments

A - Terms & Definitions

Washington State Recreation & Conservation Office (RCO) has found that many terms commonly used in recreation planning do not have consistent definitions from one plan to another. RCO suggests, but does not require, the following definitions compiled from various sources, including Washington Administrative Code, Department of Natural Resources, and Washington State Parks & Recreation Commission used in this master parks plan include:

Table A1: Terms & Definitions

Term	Definition#
Access	The public's ability to physically use land or water.
Active Recreation	Predominately human muscle powered recreational activities.
Camping	An overnight stay in a tent or other non-permanent structure.
Capital Improvement Program (CIP)	A list or description of proposal capital projects.
Capital Project	A project that results in redevelopment of an existing property, acquisition of new property, or a new built facility with a budget that excess $10,000.00
Consumptive	Recreation that physically consumes resources; examples include berry picking, shellfish harvest, hunting, fishing.
Development	A development project is construction or work resulting in new elements, including but not limited to structures, facilities, and/or materials to enhance outdoor recreation resources.
Dispersed	Recreation that is scattered or spread across the landscape and not concentrated at a specific site. Examples include trail uses, camping, walking, cycling, and jogging.
Impact (Low, Medium, High)	The effect that recreational uses have on resources including but not limited to soils, water, species, habitat, sites, and facilities.



Table A1: Terms & Definitions	
Term	**Definition#**
Improve	Expanding an existing site or facility to serve more uses or more types of use.
Level of Service	Measure of the current status of a park and recreation system as a whole based on either quantitative or qualitative characteristics.
Maintain	To maintain existing areas and facilities through repairs and upkeep for the benefit of outdoor recreationists.
Multiple-use	Use by more than one type of recreation on the same facility.
Non-consumptive	Resource recreation that depends on, but does not consume, resources; for example, photographing wildlife.
Park	Land or an area set aside for a special purpose, but particularly for leisure or recreation. • **Totlot/Mini-Park/Pocket Park** – a small local park or civic space accessible to the general public without the capacity for large outdoor recreation activities like field sports and often associated with playground equipment for toddlers and young children. • **Neighborhood Park** – a local-scale park with a service area of a reasonable walking distance, typically ½ mile, but up to 1 mile. • **Community Park** – a community-scale park facility has a service area typically of 1-5 miles that includes the city limits of a town or city. • **Regional Park** – a larger park facility intended to serve populations and uses from multiple jurisdictions. • **State Park** – a park facility owned and managed by the State of Washington. • **Marine Park** – a state or regional park facility intended to serve populations spanning multiple jurisdictions with primary access via watercraft . • **Day-use Park** – any kind of park facility that does not allow overnight uses such as camping. • **Seasonal Parks** – any kind of parks intended for use in specific seasons.
Passive	Activities usually conducted in place and requiring minimal physical exertion such as picnicking, watching a sports event, sun bathing, or relaxing.
Qualitative	An adjective relating to the quality of something interpreted by its intrinsic non-numerical characteristics other than some quantity or measured value.
Quantitative	Relating to, measuring, or measured by the quantity of something obtained using a numerical measurement process.
Recreation	Activities of a voluntary and leisure time Nature that aid in promoting entertainment, pleasure, play, relaxation, or instruction.
Renovate (Renovation)	The activities intended to improve an existing site or structure in order to increase its useful service life beyond original expectations or functions. This does not include maintenance activities to maintain the facility for its originally expected useful life.
Restoration	Bringing a site back to its historic function as part of a natural ecosystem or improving the ecological functionality of a site.
Shared Use	Use by more than one type of recreation on the same facility.
Trail	According to the Washington State Trails Plan (RCO, 2013): *"...a path, route, way, right-of-way, or corridor posted, signed, or designated as open for travel or passage by the general public but not normally designated as open for the transportation of commercial goods or services by motorized vehicles."* A trail is a recreational facility that also can serve as a non-motorized route for transportation.

B - Standards & Guidelines

There are six basic park and greenspace facility types typically utilized by municipalities:

- Pocket Parks / Mini-Parks / Tot Lots
- Neighborhood Parks
- Community Parks
- Natural Areas & Greenspaces
- Trails, Bikeways & Paths
- Special Facilities

POCKET PARKS / MINI-PARKS / TOT LOTS

Pocket parks are very small and serve a limited radius (up to ¼-mile) from the site; they provide passive and play-oriented recreational opportunities. Examples of pocket parks can include a tot lot with play equipment such as a climber, slide or swings; a viewpoint; or waterfront access areas such as at street ends.

A small urban plaza or civic recognition project may also be considered a pocket park. Parking is not often provided at pocket parks, although lighting may be used for security and safety.

LOCAL / NEIGHBORHOOD PARK

Neighborhood parks are generally considered the basic unit of traditional park systems. They are small park areas designed for unstructured play and limited active and passive recreation. They are generally 3-5 acres in size, depending on a variety of factors including neighborhood need, physical location and opportunity, and should meet a minimum size of 2 acre in size when possible.

Neighborhood parks are intended to serve residential areas within short walking distance (up to ½-mile radius) of the park and should be geographically distributed throughout the community. Access is mostly pedestrian, and park sites should be located so that persons living within the service area will not have to cross a major arterial street or other significant natural or man-made barrier, such as ravines and railroad tracks, to get to the site.

Additionally, these parks should be located along road frontages to improve visual access and community awareness of the sites.

Generally, developed neighborhood parks typically include amenities such as pedestrian paths, picnic tables, benches, play equipment, a multi-use open field for youth soccer and baseball, sport courts or multi-purpose paved areas, landscaping and irrigation. Restrooms are not provided due to high construction and maintenance costs. Parking is also not usually provided; however, on-street, ADA accessible parking stall(s) may be included.

Neighborhood park development may proceed in phases.

COMMUNITY PARKS

Community parks are larger sites developed for organized play, contain a wider array of facilities and, as a result, appeal to a more diverse group of users. Community parks are generally 20 to 50 acres in size, meet a minimum size of 20 acres when possible and serve residents within a 1-mile radius of the site.

In areas without neighborhood parks, community parks can also serve as local neighborhood parks. In general, community park facilities are designed for organized or intensive recreational activities and sports, although passive components such as pathways, picnic areas and natural areas are highly encouraged and complementary to active use facilities.

Since community parks serve a larger area and offer more facilities than neighborhood parks, parking and restroom facilities are provided. Community parks may also incorporate community facilities, such as community centers, senior centers or aquatic facilities.



NATURAL AREAS & GREENSPACES

NATURAL AREAS

Natural areas are those which are preserved to maintain the natural character of the site and are managed to protect valuable ecological systems, such as riparian corridors and wetlands, and to preserve native habitat and biodiversity. In managing for their ecological value, these natural areas may contain a diversity of native vegetation that provides fish and wildlife habitat and embodies the beauty and character of the local landscape. Low-impact activities, such as walking, nature observation, and fishing are allowed, where appropriate, and horseback riding is also permitted on certain sites.

GREENSPACES

Greenspaces are passive-use open spaces and turf areas without developed amenities or structured functions.

TRAILS & BIKEWAYS

Trails are non-motorized transportation networks separated from roads. Trails can be developed to accommodate multiple uses or shared uses, such as pedestrians, in line skaters, bicyclists, and equestrians. Trail alignments aim to emphasize a strong relationship with the natural environment and may not provide the most direct route from a practical transportation viewpoint.

Bikeways are different than trails in that their principal focus is on safe and efficient non-motorized transportation. Bikeways serve distinctly different user groups than trail users. Typical bikeway user groups would include bicycle commuters, fitness enthusiasts and competitive athletes. Their emphasis is on speed, which can create conflicts with recreation-type trails and their respective user groups.

For shared-use trails, it is important that the alignment and cross sections be designed with flexibility to accommodate higher speeds, passing zones and greater widths. Surfaces will vary with intended use and environmental considerations. Additionally, parking, consistent signage (wayfinding, access, use hierarchy) and interpretive markers or panels should be provided as appropriate.

SPECIAL FACILITIES

Special facilities include single-purpose recreational areas such as skateparks and display gardens, along with community centers, aquatic centers and public plazas in or near the downtown core. Additionally, publicly-accessible sport fields and play areas of public schools are classified as special facilities; while they often serve as proxies to public parks, school sites have restricted daytime access and offer limited recreational use during non-school hours. No standards are proposed concerning special facilities, since facility size is a function of the specific use.

C - Park Needs & Assessment Survey Comments

ADDITIONAL COMMENTS

resources, costs and good staff who maintain the massive areas. Thank you for planning to address continuing future needs."

"Auburn has one of the best senior activity centers in King County. Keep up the good work."

"Bring parks to the west hill!!!"

"Did you miss my request for a park on West Hill with a playground???? Please please please. I've been asking for 4 years. My kids will be out of the house by the time it happens. You've been goldilocksing a park up here since you acquired West Hill 14 years ago. The lake park isn't for kids, theres no where for them to play. I know it's expensive but it's never going to be perfect or the right time, just get us a playground please!!!!!"

> "I absolutely love the community center and the activities they provide."

"Disability friendly off leash park with safe and secure parking area! Needs to be large enough to throw a ball, not a tiny fenced in area."

"Do better to rid the drug activity, homelessness n make trails more wheelchair friendly "

"Do whatever needs to be done so people will feel safe spending time at the parks. I know young mothers who would never come without their husbands to certain parks. Also, prioritize the needs and desires of law abiding citizens over those of the homeless."

"Doing a great job. Would like to see more open spaces. Thank you."

> "I appreciate all the community events and the close, friendly collaboration with the Muckleshoot Tribe."

"Emphasis on sports for elementary age kids. I called recently and was told basketball is not offered. "

"For an indigenous people to have an identity, we must have land on which we can reclaim our ancestral ways. Not "borrowed" day use land by portioned out indigenous owned and indigenous tended land. Auburn has PLENTY of open natural land that can be up for "reclaiming" by indigenous groups of people. Some king of process towards ownership. Open natural space for planting, harvesting, inipi temazcal (sweat ceremony) other relevant ceremonies around our calendar, outdoor kitchens ie stone, mud, brick, yurts, overnight amenities. A communal space for healing and reclaiming the ways of our ancestors."

"I absolutely love the community center and the activities they provide"

"I am a 72 year old active person and I love to walk, bike and hike, go to the gym for exercise. So, don't forget that older folks are sometimes a lot more active than younger folks. I have many neighbors that do not encourage their children to go or play outside. We need to get them out there. I think being inside all the time, and rushing from one activity to the next is causing societal stress. The out doors, green space, and activity is perfect for stress reduction and a healthy life."

"I am happy with the park facilities but do not feel safe at most community areas anymore. I have been robbed, my car window broken out well playing at a park with my family and most recently

ADDITIONAL COMMENTS

confronted by a homeless drug addicted man yelling at me to get him cigarettes. I no longer visit a majority of parks in the city as it's just not safe. "

"I am in my second career as a high school teacher and coach. I became a high school teacher and coach because I saw the need. I care about kids in my community and I want to help them be as successful as possible. They are the literal future. As a teacher I'm able to see behind the scenes at what our most at risk kids need. Please steward our money wisely. I see a crisis on the horizon and right now there is something we can do about it. Thank you! "

"I appreciate all the community events and the close, friendly collaboration with the Muckleshoot Tribe."

"I appreciate the recreational opportunities Auburn provides. One thing I don't like is maintaining so much grass and would like to see more of that converted to planting beds. Reducing fertilizing and mowing would be good for our city."

"I believe Auburn Parks to be the best part of Auburn. Thank you for all that you do."

"I just wanted to share with you my appreciation for being asked for input on this. Having safe, welcoming spaces is a hallmark of a healthy community."

> "As a single mother on a tight budget it helps me out so much to have so many free and low-cost activities available for me and my 8 year old."

"I live in West Hill Auburn, and I feel like we are almost a forgotten area. We are sometimes closer to Federal Way for things, but our address is Auburn, and our school district is Federal Way, so it makes being a part of a community difficult when we are sorta spread out."

"I love all the free activities you have for children!"

"I love Auburn parks. Lets keep them safe and beautiful!"

> "I live in West Hill Auburn, and I feel like we are almost a forgotten area."

"I love our parks and hope they are around for my grandkids to enjoy many years from now"

"I love the parks we have, but they are starting to feel unsafe and dirty. "

"I really appreciate that the parks department put a walkway in our neighborhood park. The park gets a lot more use since we don't have to get shoes wet on the grassy. Also the increased foot traffic makes the park safer. It would be fantastic if the park department would bring summer programs for kids to our local park. Arts and crafts or a nature education would be fabulous for our neighborhood kids."

"I really love Auburn and their Parks and Rec department, as a single mother on a tight budget it helps me out so much to have so many free and low-cost activities available for me and my 8 year old. Keep up the good work!"

"I think the biggest concern for all of Auburn residents is the safety issues because of the crime

ADDITIONAL COMMENTS

rate associated with the homeless drug problem plaguing our once safe city."

"I work in Auburn so I like to use your parks and facilities before and after work."

"I would love more lighting on darker streets, especially this time of year when it's dark and cold. We've lived here for 5 years after over 15 years in Seattle, I was surprised at the slow response to the traffic lights for pedestrians, especially on Auburn Way, I hit the button and wait FOREVER, and often no traffic or people driving like 50MPH because the lights aren't requiring them to stop. I don't feel safe standing on the corners with my toddlers/stroller etc. When it's cold and rainy, the pedestrian WALK light response should be faster. Traffic should stop and pedestrians should be able to cross and not stand and wait. Your traffic control people should talk to the Seattle planners because they are so pedestrian focused. I think I would opt to walk more if it wasn't clear the automobiles have priority."

"I'd like to see a park in the downtown core, close to coffee shop. There was benches at train station but have been removed. No homeless but nobody else. I use to see lots of folks visiting."

"In the last couple of years, there is a new trend to run motorized vehicles on our walking trails, mostly motorbikes. Either people don't read or ignore the no motorized vehicle signs. Its multiple times a week I'm seeing this, i get the police is busy but its getting pretty bad"

"It would be nice if the City of Auburn worked with the YMCA to provide more services and facilities for senior citizens to keep physically active at a cost that is affordable. Thanks for listening."

"I've lived here in Auburn all my life and have always enjoyed our beautiful parks. Thank you to the Auburn parks employees"

> "Keep parks safer. Add better lighting. Deter homeless and drug users. Update equipment. Replace/ repair missing/broken equipment."

"Keep growing the parks and public spaces. We love the free summer events or low cost including music, movies, art."

"Keep parks safer. Add better lighting. Deter homeless and drug users. Update equipment. Replace/repair missing/broken equipment. Les Gove was amazing when it opened- its horrible now."

"Keep prioritizing the needs of the citizens. :) And thanks for asking."

"Keep up the good work. Thanks for all you do."

"Lea Hill seems to be the area most ignored. The high school is the only place with nice fields and they are constantly locked."

"Les Gove and Game Farm get way too crowded during events and parking is impossible. Offering shuttles to events would be great."

"Lights in a dog park!!"

"Loved your Farmer's Market!"

"Make our parks safe again, please. We have some great recreation areas but they're just not safe anymore."

"Maybe a way to link the parks and such facilities to the walking trail along the rail road tracks/!!"

"More biking classes and ninja classes for kids would be so wonderful. It's really needed. Look at marymor park in Redmond. They are a perfect

ADDITIONAL COMMENTS

example. A bike track for riders would be a full family and healthy sport. "

"More safety efforts, more community outreach, more public and community focused events"

> "Overall, we have a great park system in Auburn. Keep up the good efforts to sustain and improve the wonderful parks we have."

"More support for agricultural businesses. More care needed for some of historic mature trees. Both trees and agriculture are part of the city's culture, so the cultural staff need to be kept in the loop and have input on these issues."

"My grandchildren and I love and appreciate the parks in Lakeland Hills! Thank you!"

"Our kids need more contact with mentors and good role models. The Scouts are having a hard time finding a permanent place to meet."

"Overall, we have a great park system in Auburn. Keep up the good efforts to sustain and improve the wonderful parks we have."

"perhaps list pickleball as an activity"

"Please build a playground a fulner asap"

"Please continue to work on the homeless problem. I know it is a very complex issue. I would like to see a more permanent solution. The camps have been cleared out by the Green River three times now. Within days they all move back. Stolen cars are routinely dumped and stripped there and the garbage just piles up again and again. I am also concerned about the river being polluted by all this as well as human waste. Shootings are a regular occurrence. I have had to call 911 numerous times while golfing on our City Golf Course because of gun shots during my golf game. One person was shot and killed on the road there. This is just so unsafe!!!"

"Please work to build the park maintenance crew as they are very understaffed from what I have learned this year. Also, it's VERY difficult for me to report concerns as I see them. I used to tell Mike Miller direct via text / cell but now I have no one to call and I have left numerous messages for the new head of maintenance and parks, with zero returned calls. I am disappointed."

"Safety, graffiti, equipment repair needs to be done in a more expeditious fashion. Parks and rec and the city police and City Hall need to work more closely together to make our community safer and cleaner"

"Shout out for all the work Auburn already does to provide great parks and recreation. Thanks for making these spaces and activities available to all."

"Thank you for asking for public opinion! I will feel safer using Auburn parks when the homeless/drug addict situation is under control."

"Thank you for creating this survey. I think that the main question Auburn should be concerned with is whether we can handle all the incoming people successfully as a city. It seems that the homeless population is growing exponentially, as is the low income population. We need to make sure that there are adequate jobs and services available

> "Parks and rec and the city police and City Hall need to work more closely together to make our community safer and cleaner."

ADDITIONAL COMMENTS

before we add any more folks who need them, if we want to have a safe and successful city."

"Thank you for having recreational facilities available as well as a way for the community to provide feedback."

"Thank you for putting out this survey, please consider Lea Hill Area for development and please look at safety. Slow down the vehicles before there is a serious accident. Walking and biking options are not provided"

"The farmers market is the place I most enjoy. and I appreciate how it has grown. To that end I would like to see the market manager get some needed help."

"The more Green Space available for people of any age, the more we can beautify our city!"

"The summer kids activities at the parks are great: disc golf, parkour, inflatable water slide."

"The trail along the White river is nice but too flat. Need more trails with some variety."

"The youth and adult tennis programs are very good. I appreciate the level of coaching."

"This is a well-designed and thoughtful survey! Before I retired I developed surveys for state government and school districts, so I appreciate the care that went into this. I especially liked the use of the map to identify where in Auburn we live. Please have more opportunities for local artists. Right now, unless the Auburn Arts Commission already knows you, there is slim chance of having your artwork posted or displayed. I know this is beyond the scope of this survey, but Renton and Burien, for example, are much friendlier to their community artists. Unfortunately, Auburn Arts Commission seems a bit clique-ish to me. There could be better use of the REC, for example, to display artwork. The Senior Center displays art but usually not from the people who take art classes there or have taken them there. Too much competition to get your artwork shown!!"

> "The more green space available for people of any age, the more we can beautify our city!"

> "I love that there are a lot of community events and the parks are great."

"We appreciate all of the programming and fun activities that you provide year round - thank you!"

"We appreciate seeing how Auburn takes care of itself and wants to be a place for community."

"We love Auburn parks and nice maintenance all the time. Sometimes I see homeless people at parking lots or next to green river. We wish we could do something for them, we hope we can kind a share each other those parks or trails nicely."

"We love Auburn. I love that there are a lot of community events and activities and the parks are great. Would love to see even more additions and/or improvements to make them even better!"

"We need to find ways to acknowledge and welcome the full diversity of our neighbors. The unsheltered neighbor is still my neighbor! As I would not seek to remove my trailer house living neighbor, nor apartment living, nor too fancy

ADDITIONAL COMMENTS

home for my taste neighbor – nor do I seek to remove these neighbors. How to help us be better neighbors to one another is a real question! What would help them to be better neighbors to me? Restrooms, showers, places to stay warm, cook food, share healthy interactions, places for dumping garbage, transportation opportunities .... hmmmm... hope we are finding a way to positively seek all these neighbors input on these vital questions! Thank you"

> "Working parents need options that are available during non-work hours."

"Working parents need options that are available during non work hours. And toddlers need places to play especially with the COVID baby boom"

"Would like to see the farmers market back on main street"

"Would like to use the parks/facilities again without fearing for my safety or theft."

"Would love an indoor playground near the Lea Hill area"



KEY TAKEAWAYS

The project team will use the input collected through the community survey to inform and drive the PROS Plan update. Key takeaways from the survey data include:

- Survey respondents' **most-used** recreational facilities include **paved walking/biking trails** (used by 75% of respondents), **large community parks** (51%), **small community parks** (47%), small neighborhood parks (47%), **natural areas/nature parks** (45%), and **playgrounds** (42%).
- Survey respondents' **least-used** recreational facilities include **skateboarding areas** (used by 4% of respondents), **outdoor fitness equipment** (6%), **football/lacrosse/hockey fields** (7%), and **youth softball fields** (7%).
- 63% of survey participants indicated they **travel outside of Auburn** to access the recreational amenities/facilities they use most frequently. These facilities include other (nearby) **city parks** (29%), **walking/hiking trails** (17%), **water access** (8%), and **indoor community centers** (6%). These responses suggest there could be a need for more of these facility types in the City of Auburn, or a need to improve those that already exist within the city.
- **Barriers to use** indicate existing issues that need to be addressed by the City in order to improve Auburn parks users' experience. The largest barriers to use of the City's available recreation facilities or programs, as reported by survey respondents, are **security/safety concerns** (57% of respondents), **poor maintenance/cleanliness** (31%), and **overcrowded/booked facilities** (20%).
- According to survey respondents, the City of Auburn's biggest parks and recreation needs include:
  - More non-motorized urban trails/sidewalks (92.5% of respondents)
  - Undeveloped natural areas/open space (86.4%)
  - Community centers/indoor facilities (84.5%)
  - Splash/spray parks (80.2%)
  - More youth programs/camps (77.9%)
  - Off-leash dog parks (69.9%)



consor



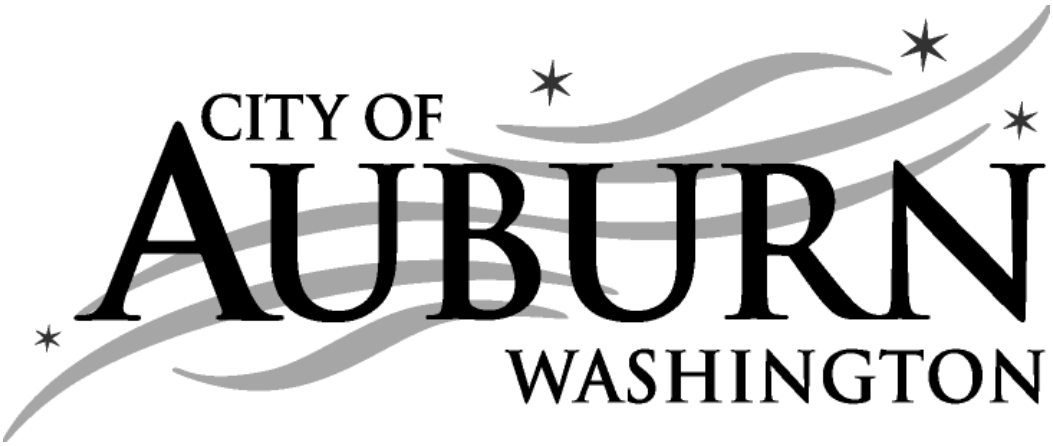
CITY OF AUBURN, WA

Water System Plan

October 2024

DRAFT

THIS PAGE LEFT INTENTIONALLY BLANK



2024
Water System Plan

City of Auburn, Washington

October 2024

DRAFT - FOR AGENCY REVIEW

PREPARED BY:
Consor
Point of Contact: Nichole Kruse
600 University Street, Suite #300
Seattle, WA 98101
P: 206-462-7030
E: Nichole.Kruse@consoreng.com

PREPARED FOR:
City of Auburn
Point of Contact: Ryan Vondrak
25 W Main Street
Auburn, WA 98001
P: 253-931-3086
E: Rvondrak@auburnwa.gov

THIS PAGE LEFT INTENTIONALLY BLANK

City of Auburn, WA
Water System Plan
October 2024

PREPARED BY:
Consor
Point of Contact: Nichole Kruse
600 University Street, Suite #300
Seattle, WA 98101
P: 206-462-7030
E: Nichole.Kruse@consoreng.com

PREPARED FOR:
City of Auburn
Point of Contact: Ryan Vondrak
25 W Main Street
Auburn, WA 98001
P: 253-931-3086
E: Rvondrak@auburnwa.gov

This Plan was prepared under the direction of the following registered professional engineers:



PRELIMINARY

Nichole Kruse, PE
Consor
Seattle, WA

Ryan Vondrak, PE
City of Auburn, Washington

THIS PAGE LEFT INTENTIONALLY BLANK

Table of Contents

Executive Summary

Introduction ES-1
ES.1 Description of Water System ES-1
Es.2 Basic Planning Data ES-5
Water Service Connections and Usage *ES-5*
Water Supply and Production *ES-5*
Future Population and Demand Projections *ES-5*
ES.3 System Analysis and Asset Management ES-7
Asset Management *ES-7*
Water Quality *ES-7*
Design Standards *ES-7*
Capacity Analysis *ES-8*
ES.4 Water Use Efficiency Program ES-9
Source and Service Metering *ES-9*
Distribution System Leakage *ES-10*
Water Use Efficiency Program *ES-10*
Climate Change Resiliency *ES-11*
ES.5 Source Water Protection ES-11
ES.6 Operations and Maintenance Program ES-12
ES.7 Distribution Facilities Design and Construction Standards ES-14
ES.8 Capital Improvement Program ES-14
ES.9 Financial Program ES-15

Chapter 1 Description of Water System

1.1 Objective 1-1
1.2 Plan Content 1-1
1.3 Ownership and Management 1-1
1.4 System History and Background 1-4
1.4.1 Geography *1-4*
1.4.2 Existing System Overview *1-5*

1.4.3 History *1-5*
1.5 Related Plans and Studies 1-13
1.6 Service Area, Maps, and Land Use 1-15
1.6.1 Wholesale Interties *1-16*
1.6.2 Emergency Interties *1-20*
1.7 System Policies 1-21
1.8 Duty of Service 1-22
1.9 Local Government Consistency 1-22
1.10 Watershed Plan Consistency 1-23

Chapter 2 Basic Planning Data

2.1 Water Service Area Population 2-1
2.2 Water Service Connection and Usage 2-2
2.2.1 Historical Accounts *2-2*
2.2.2 Historical Consumption *2-4*
2.2.3 Water Use Per Connection and Equivalent Residential Units *2-6*
2.2.4 Largest Water Users *2-7*
2.3 Water Supply and Production 2-10
2.3.1Historical Water Supply *2-10*
2.3.2 Average Day Demands and Maximum Day Demands *2-11*
2.3.3 Peak Hour Demand *2-12*
2.3.4 Seasonal Variations *2-13*
2.4 Distribution System Leakage 2-13
2.5 Water Supply Characteristics 2-14
2.6 Water Supply Reliability Evaluation 2-15
2.6.1 Use Impacts on Instream Flows *2-17*
2.6.2 Whole Interties *2-17*
2.6.3 Emergency Interties *2-18*
2.6.4 Potential Interties *2-18*
2.7 Future Population Projections and Land Use 2-18
2.7.1 Demographic Forecast *2-18*
2.7.2 Future Land Use and Zoning *2-19*
2.7.3 Projected Demographic Growth *2-23*
2.8 Future Water Demand 2-29

2.8.1 Projected Number of Connections *2-29*
2.8.2 Projected Water Demand *2-31*
2.8.3 Large User Demand Forecast *2-32*
2.8.4 Projected Retail ERUs *2-32*
2.8.5 Projected Retail Average Day and Maximum Day Demands *2-34*
2.8.6 Wholesale Demands *2-37*
2.8.7 Total Demands *2-38*

Chapter 3 System Analysis and Asset Management

3.1 Asset Management – Asset Inventory and Analysis 3-1
3.1.1 Distribution Facilities *3-6*
3.1.2 Water Source Facilities *3-14*
3.1.3 Water Treatment Facilities *3-17*
3.1.4 Storage Facilities *3-20*
3.1.5 Pump Station Facilities *3-22*
3.1.6 Facility Back-Up Power *3-23*
3.1.7 Facility Monitoring and Control *3-24*
3.1.8 2022 Sanitary Survey Findings *3-24*
3.2 Water Quality 3-25
3.2.1 Water Quality Treatment and Objectives *3-26*
3.2.2 Analysis of Source Water Quality *3-26*
3.2.3 Analysis of Distribution System Water Quality *3-28*
3.2.4 Recent Regulatory Changes *3-30*
3.3 Design Standards 3-31
3.4 Capacity Analysis 3-33
3.4.1 Water Rights *3-33*
3.4.2 Physical Capacity Analysis *3-35*
3.4.3 New Source of Supply Analysis *3-57*
3.5 Summary of System Deficiencies 3-57

Chapter 4 Water Use Efficiency Program

4.1 Source and Service Metering 4-2
4.1.1 Source Meters *4-2*
4.1.2 Service Meters *4-3*

4.2 Distribution System Leakage 4-4
4.2.1 Water Audits *4-5*
4.3 Water Use Efficiency Program 4-5
4.3.1 Program Requirements *4-6*
4.3.2 Mandatory Measures *4-7*
4.3.3 Program Goals *4-7*
4.3.4 2024-2034 Demand-Side Program Measures *4-8*
4.3.5 Reclaimed Water *4-10*
4.3.6 WUE Budget *4-10*
4.4 Water Use Efficiency Savings 4-10
4.5 Climate Change Resiliency 4-11
4.5.1 Expected Climate Changes for the City of Auburn *4-11*
4.5.2 Extreme Weather Events and Significant Challenges *4-12*
4.5.3 Assessment of Actions to Protect System *4-13*

Chapter 5 Source Water Protection

5.1 Sanitary Control Area 5-1
5.2 Wellhead Protection Program 5-1
5.2.1 Susceptibility Assessment *5-2*
5.2.2 Wellhead Protection Area Delineation *5-2*
5.2.3 Contaminant Source Inventory and Notification of Findings *5-4*
5.2.4 Contingency Plan *5-4*

Chapter 6 Operations and Maintenance Program

6.1 Water System Management and Personnel 6-1
6.1.1 Mission Statement *6-1*
6.1.2 Department Overview *6-1*
6.1.3 Internal and External Factors *6-1*
6.1.4 Water Utility Division Organization *6-2*
6.1.5 Communication System *6-4*
6.1.6 Operator Certification Program *6-5*
6.1.7 Education and Training Program *6-6*
6.2 Operations and Preventive Maintenance 6-6
6.2.1 Inspections, Preventive Maintenance, Repairs, and Replacement *6-7*

6.2.2 Reservoir Maintenance *6-9*
6.2.3 Pump Station Maintenance *6-9*
6.2.4 Treatment Facility Maintenance *6-10*
6.2.5 Pressure Reducing Valve Stations *6-10*
6.2.6 Utility Locating Service *6-10*
6.2.7 Fire Hydrant Inspection *6-10*
6.2.8 Dead-end Flushing *6-10*
6.2.9 Valve Exercising *6-11*
6.2.10 Unidirectional Flushing *6-11*
6.2.11 System Loss Program *6-12*
6.2.12 Distribution System Corrosion Inspection *6-13*
6.3 Comprehensive Water Quality Monitoring 6-14
6.4 Emergency Preparedness and Response 6-15
6.4.1 Vulnerability Assessment *6-16*
6.4.2 Wellhead Protection Program *6-16*
6.4.3 Water Shortage Contingency Plan *6-16*
6.5 Safety Procedures 6-16
6.6 Cross Connection Control Program 6-18
6.7 Sanitary Survey Findings 6-18
6.8 Customer Complaint Response Program 6-19
6.8.1 Customer Request Response Program *6-20*
6.9 Recordkeeping and Reporting 6-20
6.9.1 Cross Connection Control Program *6-21*
6.9.2 Water Meter Consumption *6-21*
6.9.3 Supervisory Control and Data Acquisition (SCADA) *6-21*
6.9.4 Water Meter Reading *6-21*
6.10 Summary of O&M Deficiencies and Recommended Improvements 6-22
6.10.1 Water Facilities Evaluation Study *6-22*
6.10.2 Recommended Improvements *6-22*

Chapter 7 Distribution Facilities Design and Construction Standards

7.1 Project Review Procedures 7-1
7.2 Policies and Requirements for Outside Parties 7-2

7.3 Design and Construction Standards 7-2
7.4 Construction Certification 7-4

Chapter 8 Capital Improvements Program

8.1 Prioritization 8-1
8.1.1 Project Identification 8-1
8.1.2 Prioritization Factors 8-2
8.1.3 Estimated Costs 8-2
8.2 Capital Improvement Program Summary and Schedule 8-4
8.2.1 Completed Projects 8-4
8.2.2 Active Projects 8-5
8.2.3 Capital Improvement Projects 8-8
8.3 CIP Summary and Schedule 8-18

Chapter 9 Financial Program

9.1 Introduction 9-1
9.2 Past Financial Performance 9-1
9.2.1 Comparative Financial Statements 9-1
9.3 Financial Plan 9-4
9.3.1 Capital Funding Plan 9-5
9.4 Available Funding Assistance and Financing Resources 9-6
9.4.1 City Resources 9-6
9.4.2 Outside Resources 9-8
9.4.3 Capital Financing Strategy 9-9
9.5 Financial Forecast 9-9
9.5.1 Current Financial Structure 9-10
9.6 Current and Projected Rates 9-14
9.6.1 Current Rates 9-14
9.6.2 Projected Rates 9-15
9.6.3 Conservation Based Rates 9-15
9.7 Affordability 9-15
9.8 Conclusion 9-16

List of Figures

ES-1 RWSA Vicinity Map ES-2

ES-2 Existing Facilities ES-3
ES-3 Hydraulic Profile ES-4
ES-4 Wellhead Protection Area Map ES-13
1-1 RWSA Vicinity Map 1-2
1-2 Water Utility – Organizational Chart 1-3
1-3 Existing Facilities 1-6
1-4 Adjacent Water Systems 1-17
1-5 Existing Land Use 1-18
1-6 Urban Growth Area 1-19
2-1 Comparison of Number of Connections to Annual Water Consumption per Customer Classification in 2022 2-5
2-2 Historical Annual Consumption of the Top 20 Largest Water Users in Million Gallons (MG) 2-9
2-3 Historical Water Production with Peaking Factor 2-12
2-4 Temperature Effects on Water Usage in 2022 2-13
2-5 Comprehensive Future Land Use and Zoning Map 2-20
2-6 Single Family Population Projections by Service Area 2-25
2-7 Multi-Family Population Projections by Service Area 2-26
2-8 Employment Projections by Service Area 2-27
2-9 Map of Projected Areas with Greatest Population Growth 2-28
2-10 Projected Retail Plus Firm Wholesale ADD and MDD 2-40
3-1 Map of Water System Assets and Pressure Zones 3-2
3-2 Hydraulic Profile 3-3
3-3 Hydraulic Profile - Detail A 3-4
3-4 Hydraulic Profile - Detail B 3-5
3-5 Water Main Leak and Break Repair Locations from 2014-2024 3-12
3-6 Low Pressure, Odor, and Discolored Water Complaints from 2014-2024 3-13
3-7 Illustration of Reservoir Storage Components 3-43
3-8 2024 PHD Scenario – Pressure and Velocity 3-49
3-9 2034 PHD Scenario – Pressure and Velocity 3-50
3-10 2044 PHD Scenario – Pressure and Velocity 3-51
3-11 MDD+FF Deficiency Locations for 2024, 2034 and 2044 Scenarios 3-53
3-12 Capital Improvement Projects Addressing Fire Flow Deficiencies 3-54
5-1 Wellhead Protection Area Map 5-3

6-1 Auburn Water Utility Organizational Chart 6-3

List of Tables

ES-1 ADD, MDD, and ERUs Summarized by Service Area with Wholesale Included ES-6
ES-2 Summary of Pump Station Capacity Results ES-8
ES-3 Summary Storage Capacity Analysis ES-9
ES-4 Source Susceptibility Assessment Ratings ES-11
ES-5 Water System Capital Improvement Program Budget 2024-2044 ..... ES-14
1-1 Water System Ownership Management 1-3
1-2 Water Facilities History 1-7
1-3 Emergency Interties 1-19
2-1 Historical Population 2-2
2-2 Historical Number of Connections per Customer Classification 2-3
2-3 Historical Consumption in Million Gallons (MG) by Customer Classification 2-4
2-4 Historical Annual Demand per ERU (gpd per ERU) 2-6
2-5 Historical Demand as Equivalent ERUs per Customer Classification 2-7
2-6 Historical Annual Consumption of the Top 20 Largest Water Users in Million Gallons (MG) 2-8
2-7 Historical Annual Water Supply by Source in Million Gallons (MG) 2-10
2-8 2022 Monthly Water Production by Source (MG) 2-10
2-9 Historical Annual ADD, MDD, Peak Day, and Peaking Factor 2-11
2-10 Historical Peak Hour Demand 2-12
2-11 Historical Distribution System Leakage 2-14
2-12 Summary of Source Water Pumping or Production Capacity Compared to 2022 Maximum Daily Production 2-16
2-13 Updated Zoning Districts and Fire Flow Requirements 2-21
2-14 Growth Rates by Customer Class and Service Area 2-23
2-15 Population and Employment Projections Calculated by Service Area 2-23
2-16 Connection Projections by Customer Classification and Service Area 2-29
2-17 Proposed Planning Values for Demand Projections 2-32
2-18 Large User Demand Projections 2-32
2-19 ERU Projections by Customer Class and Service Area 2-33
2-20 ADD Projections 2-34
2-21 MDD Projections 2-35
2-22 Wholesale Demand Projections 2-38

2-23 ADD, MDD, and ERUs Summarized by Service Area with Wholesale Included 2-39
3-1 Transmission and Distribution System Piping Inventory by Pipe Diameter 3-6
3-2 Transmission and Distribution System Piping Inventory by Material and Installation Decade .. 3-7
3-3 Pressure Reducing Valve (PRV) Inventory 3-8
3-4 Summary Customer Complaints 3-14
3-5 Source of Supply Well Pump Inventory 3-14
3-6 Water Treatment Facility Inventory 3-18
3-7 Inventory of Storage Reservoirs 3-21
3-8 Pump Station and Booster Pump Station Inventory 3-23
3-9 Back Up Power Inventory 3-23
3-10 Summary of 2022 Sanitary Survey Findings 3-24
3-11 Summary of Operator Certifications 3-26
3-12 EPA Primary Drinking Water Standards Results from 2015 through 2022 3-27
3-13 Total Chlorine Residuals Results from 2015 through 2022 3-29
3-14 Summary of Disinfection By-Product Rule Monitoring Results from 2015 through 2022 3-29
3-15 Summary of Lead and Copper Sampling Results from 2015 through 2022 3-30
3-16 PFAS State Action Levels and Monitoring Data 3-31
3-17 System Capacity Analysis Criteria 3-31
3-18 Summary of Existing Water Rights 3-33
3-19 Supply Analysis with Largest Source Out of Service 3-34
3-20 Buildings in Auburn with High Fire Flow Requirements 3-35
3-21 Pumps Station Capacity for Valley Service Area Open Pressure Zones 3-36
3-22 Pump Station Capacity for Lea Hill Service Area Open Pressure Zones 3-37
3-23 Pump Station Capacity for Lakeland Service Area Open Pressure Zones 3-38
3-24 Pump Station Capacity for Academy Service Area Open Pressure Zones 3-38
3-25 BPS Capacity for Lakeland Service Area Closed Pressure Zones 3-39
3-26 BPS Capacity for Academy Service Area Closed Pressure Zone 3-40
3-27 BPS Capacity for Lea Hill Service Area Closed Pressure Zone 3-40
3-28 BPS Capacity for Game Farm Park Closed Pressure Zone 3-41
3-29 System-Wide Storage Analysis for the 2024 Scenario 3-43
3-30 System-Wide Storage Analysis for the 2034 Scenario 3-44
3-31 System-Wide Storage Analysis for the 2044 Scenario 3-45
3-32 Final C-Factors for Piping Materials 3-47

3-33 Prioritized Pipeline Improvements to Address Fire Flow Deficiencies 3-55
3-34 System Capacity Analysis in ERU Basis 3-57
3-35 Summary of System Deficiencies 3-58
4-1 WUE Rule Requirements 4-1
4-2 Source Meter Details 4-3
4-3 Annual Average Day Demand (gpd) per Capita 4-7
4-4 Annual WUE Budget 4-10
4-5 Demand Forecast With and Without Projected WUE Savings 4-11
4-6 Predicted Increase in Demand from Baseline Due to Climate Change 4-12
5-1 Source Susceptibility Assessment Ratings Issued by DOH 5-2
5-2 State and Local Agencies Notified of CSI Findings 5-4
6-1 Water Operations and Distribution Staff and Certifications 6-5
6-2 Water Operations - Facility Inspection Schedule 6-8
6-3 Safety Policies and Procedures 6-17
6-4 Recommended Inspections 6-22
6-5 O&M Improvement Projects 6-23
7 1 Water Main Design and Construction Standards 7-3
8-1 Water Pipeline Construction Costs per Linear Foot 8-4
8-2 Reservoir Tank Construction Costs per Gallon 8-4
8-3 Prioritized Water Supply Improvement Projects 8-12
8-4 Storage Improvements Projects 8-14
8-5 Pump Station Improvement Projects 8-15
8-6 Water Repair & Replacements Cost Estimate 8-16
8-7 Distribution System Improvements Projects 8-17
8-8 General Water System Projects 8-18
8-9 Total CIP Cost by Project Category from 2024 through 2044 8-18
8-10 Capital Improvements Program Costs and Phasing 8-19
9-1 Summary of Historical Fund Resources and Uses Arising From Cash Transactions 9-2
9-2 Summary of Historical Comparative Statements of Net Position 9-3
9-3 10-Year and 20-Year CIPs 9-5
9-4 10-Year CIP (Escalated $) 9-6
9-5 10-Year and 20-Year Capital Financing Strategy 9-9
9-6 10-Year Financial Forecast 9-13

9-7 Ending Cash Balance Summary 9-14
9-8 Existing Schedule of Rates 9-14
9-9 Proposed Schedule of Rates 9-15
9-10 Community Affordability Test 9-16

Appendices

Appendix A Water System Policies and Criteria
Appendix B SEPA Checklist
Appendix C Local Government Consistency Determination Forms
Appendix D Public Meeting Documentation
Appendix E Ordinances and Approvals
Appendix F Local Government Consistency Review
Appendix G Water Service Area, Interlocal & Wholesale Water Agreements
Appendix H Water Facilities Inventory Form
Appendix I Water Rights Self-Assessment Form
Appendix J Water Rights Certifications
Appendix K Hydraulic Model Calibration Documentation
Appendix L Reclaimed Water Checklist
Appendix M Water Use Efficiency Reports
Appendix N Consumer Confidence Reports
Appendix O Water Quality Monitoring Plan
Appendix P Design and Construction Standards
Appendix Q Cross Connection Control Program
Appendix R Water Shortage Contingency Plan
Appendix S Conceptual Mitigation Plan for Water Right Application G1-28404
Appendix T Wellhead Protection Plan
Appendix U Natural Hazard Vulnerability Summary
Appendix V Worksheet 4-1 ERU Capacity Summary
Appendix W CIP Cost Information

THIS PAGE INTENTIONALLY LEFT BLANK

Acronyms & Abbreviations

A	
AACE	American Association of Cost Estimators
AC	Asbestos-Cement
ACC	Auburn City Code
ac-ft/year	Acre-Foot Per Year
ADD	Average Day Demand
ADU	Accessory Dwelling Unit
AFY	Acre Feet Per Year
Algona	City of Algona
AMC	Auburn Municipal Code
AMI	Advanced Metering Infrastructure
APWA	American Public Works Association
ASR	Aquifer Storage and Recovery
AWC	Association of Washington Cities
AWWA	American Water Works Association
B	
BCA	Bilaterial Compliance Agreement
Bonney Lake	City of Bonney Lake
BPS	Booster Pump Station
C	
Cascade	Cascade Water Alliance
ccf	Centum Cubic Feet
CCI	Construction Cost Index
CCPP	Calcium Carbonate Precipitation Potential
CCR	Consumer Confidence Report
CCT	Corrosion Control Treatment
CCTF	Corrosion Control Treatment Facility
CDBG	Community Development Block Grant
CDPW	Community Development & Public Works
CEMP	Comprehensive Emergency Management Plan
CERB	Community Economic Revitalization Board
CEU	Continuing Education Units
cfs	Cubic Feet Per Second
cfm	Cubic Feet Per Minute
CFP	Capital Facilities Plan
City	City of Auburn
CIP	Capital Improvement Plan
CMP	Coliform Monitoring Plan
CPR	Conservation Planning Requirements
CSCSL	Confirmed and Suspected Contaminate Sites

CWD	Covington Water District
CWSP	Coordinated Water System Plan
D	
D	Distribution Improvements
DBPR	Disinfectants and Disinfection Byproducts Rule
DBP	Disinfection Byproducts
DHS	Department of Homeland Security
DI	Ductile Iron
DNS	Determination of Non-Significance
DOE	Department of Ecology
DOH	Washington State Department of Health
DSL	Distribution System Leakage
DWSRF	Drinking Water State Revolving Fund
E	
EDCS	Engineering Design and Construction Standards
ENR	Engineering News Record
EOC	Emergency Operation Center
EPA	United States Environmental Protection Agency
EPS	Extended Period Simulation
ERU	Equivalent Residential Unit
EWE	Energy and Water Efficiency
F	
FEMA	Federal Emergency Management Agency
FF	Fire Flow
ft/s or fps	Feet Per Second
G	
G	General Improvements
gal/ERU	Gallons Per Equivalent Residential Unit
GIS	Geographic Information System
gpd	Gallons Per Day
gpm	Gallons Per Minute
GMA	Growth Management Act
G.O.	General Obligation
GWMP	Ground Water Management Plan
GWR	Groundwater Rule
GWUI	Groundwater Under the Influence of Surface Water
H	
HAA5	Haloacetic Acids
HGL	Hydraulic Grade Line
HPC	Heterotrophic Plate Count
HP	Horsepower
HWD	Highline Water District

I	
IA2	Interlocal Agreement 2
IA3	Interlocal Agreement 3
ICS	Incident Command System
IDSE	Initial Distribution System Evaluation
IGEA	Investment Grade Efficiency Audit
L	
LCRMR	Lead and Copper Rule Minor Revisions
LFC	Local Facilities Charge
LIDs	Local Improvement Projects
LMWD	Lake Meridian Water District
LRAAs	Locational Running Annual Averages
LR	Larson Ratio
LSI	Langelier
LWSD	Lakehaven Water and Sewer District
M	
MAG	Electromagnetic
Manual	Public Works Emergency Response Manual
MCL	Maximum Contaminant Level
MCLGs	Maximum Contaminant Level Goals
M/DBP	Microbial/Disinfection By-Product
MDD	Maximum Day Demand
MDRLs	Maximum Disinfectant Residual Level
MFR	Multifamily Residential
MG	Million Gallon
mgd	Million Gallons Per Day
MG/year	Million Gallons Per Year
MIT	Muckleshoot Indian Tribe
M&O	Maintenance and Operations
MRSC	Municipal Research and Services Center of Washington
MSDS	Material Safety Data Sheets
N	
NIMS	National Incident Management System
NOM	Natural Organic Matter
O	
O&M	Operations & Maintenance
OSHA	Occupational Safety and Health Administration
P	
PAA	Potential Annexation Areas
PGG	Pacific Groundwater Group
PHD	Peak Hour Demand
PHG	Public Health Goal

PIC	Forest Villa Manor
PI	Parcel Insight
Plan	Comprehensive Water Plan
PLC	Programmable Logic Controller
PNR	Public Notification Rule
PR	Pressure Reducing
Project ID	Identification Number
PRV	Pressure Reducing Valve
psi	Pounds Per Square Inch
PSRC	Puget Sound Regional Council
PS	Pump Stations
PUD	Planned Unit Development
PW	Public Works
PWB	Public Works Board
Q	
Qaw	White River Alluvium
Qd	Vashon Recessional Deltaic Deposits
Qom	Osceola Mudflow
Qua	Undifferentiated Alluvium
Qu	Undifferentiated Glacial and Interglacial Deposits
R	
R	Storage Improvement
R5	Residential 5 Du/Acre
RAA	Running Annual Average
RWSA	Retail Water Service Area
RWSS	Regional Water Supply System
S	
S	Supply Improvement
SCA	Sanitary Control Area
SCADA	Supervisory Control and Data Acquisition
SDC	Standard Development Charge
SDS	Safety Data Sheets
SDWA	Safe Drinking Water Act
SEATAC	Seattle-Tacoma International Airport
SEPA	State Environmental Policy Act
SFR	Single-Family Residential/Duplex
SMP	Standard Monitoring Program
SOC	Synthetic Organic Chemical
SOS	Save Our Streets
SSS	System-Specific Study
SWTR	Surface Water Treatment Rule

T	
Tacoma	City of Tacoma
TAZ	Transportation Analysis Zone
TCR	Total Coliform Rule
TPU	Tacoma Public Utility
TTHM	Total Trihalomethanes
U	
UCM	Unregulated Contaminant Monitoring
UDF	Unidirectional Flushing
UGA	Urban Growth Area
ULID	Utility Local Improvement District
USGS	United States Geological Survey
USEPA	United States Environmental Protectional Agency
UTC	Utilities And Transportation Commission
V	
VA	Vulnerability Assessment
VFD	Variable Frequency Drive
VOC	Volatile Organic Compound
W	
WAC	Washington Administrative Code
WCIA	Washington Cities Insurance Authority
WD#111	King County Water District #111
WETRC	Washington Environmental Training Resource Center
WFI	Water Facilities Inventory
WHP	Wellhead Protection
WHPA	Wellhead Protection Areas
WHPP	Wellhead Protection Plan
WISHA	Washington Industrial Safety and Health Act
WSP	Water System Plan
WSSIP	Water System Security Improvement Plan
WUE	Water Use Efficiency

THIS PAGE INTENTIONALLY LEFT BLANK

Executive Summary

Introduction

This Water System Plan (WSP) has been developed in accordance with Chapter 426-290 of the Washington Administrative Code (WAC), as presented in the Washington State Department of Health (DOH) regulations for Group A Public Water Systems. This WSP supersedes the City of Auburn's (City) 2015 WSP, approved by DOH on May 11, 2016, and the 2021 Limited WSP Update approved by DOH on December 16, 2021. The City's water system identification number is 03350V.

Th purpose of this WSP is to develop a long-term planning strategy for the City's Retail Water Service Area (RWSA). Updated every ten years per DOH, the WSP evaluates the existing system and its ability to meet the anticipated requirements for water source, treatment, transmission, storage, and distribution over a 20-year planning period. Historical data through the year 2022 were used for the analyses throughout the WSP. The ten-year planning period is 2024-2034. The long-term planning period is 2034-2044. Water system improvement projects have been developed to meet the changing demands of regulatory impacts, population growth, and necessary infrastructure repair and replacement. The WSP also identifies planning-level costs of the improvement projects and provides a financial plan for funding the projects.

ES.1 Description of Water System

The City limits are within both King County and Pierce County in the Puget Sound Region of Washington. Figure ES-1 shows the City's RWSA which encompasses approximately 30 square miles. Several water purveyors adjoin the City's RWSA, including the cities of Algona, Bonney Lake, Federal Way, Kent, Pacific, and Sumner. Also included are the Covington Water District (CWD), Lakehaven Water and Sewer District (LWSD), Lake Meridian Water District (LMWD) (formerly known as King County Water District #111), Highline Water District (HWD), and the Muckleshoot Indian Tribe (MIT). The City also provides internal staffing for the management, operations, and maintenance of the Braunwood Estates satellite system.

The City's water system consists of groundwater wells, springs, and interties with adjacent purveyors as water sources, chlorination and corrosion control treatment facilities, pump stations, pressure reducing valve stations, steel and concrete enclosed reservoirs for storage, and transmission and distribution pipelines to provide potable water to customers. The RWSA is further divided into four service areas (Valley, Lea Hill, Lakeland, and Academy) that include a total of 28 pressure zones. The City's four service areas and the location of key components of the water system are shown in Figure ES-2.

Interties provide a tool that water utilities use to move water between systems to meet supply needs, to increase reliability and respond to emergencies. The City maintains wholesale supply interties with three water systems: City of Tacoma (Tacoma), Algona, and LMWD. The City also has a supply contract with the MIT and the Indian Health Service, dating from 1972, for services along a pipeline at SE 368th PL extending from the City limits into the reservation. The City has emergency interties with seven water systems, Algona, Bonney Lake, Kent, Pacific, LWSD, LMWD and Tacoma.

A hydraulic profile of the City's water system is presented in Figure ES-3, showing all service areas, pressure zones, supplies, interties, reservoirs, and pump stations.

Figure ES-1 | RWSA Vicinity Map

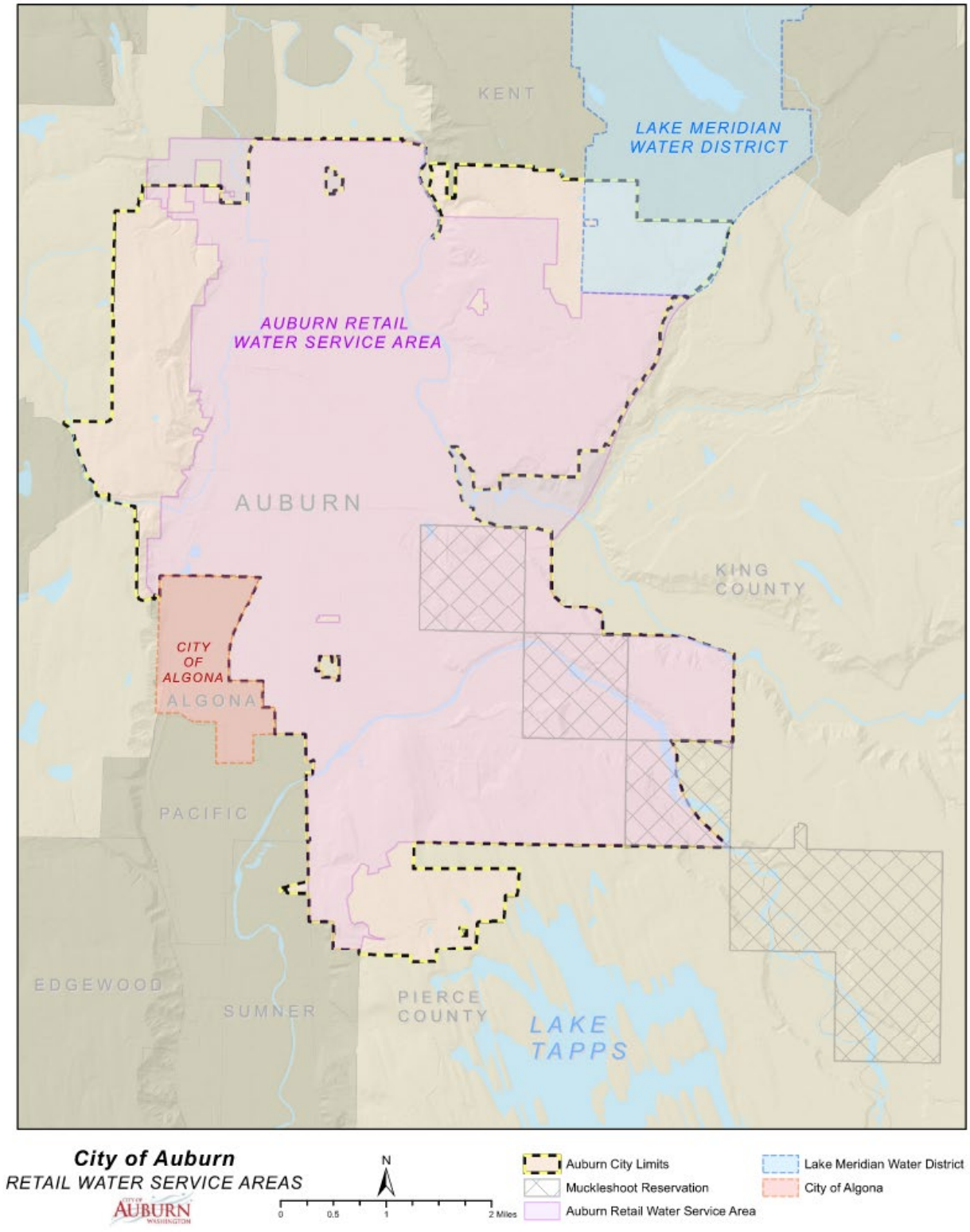


Figure ES-2 | Existing Facilities

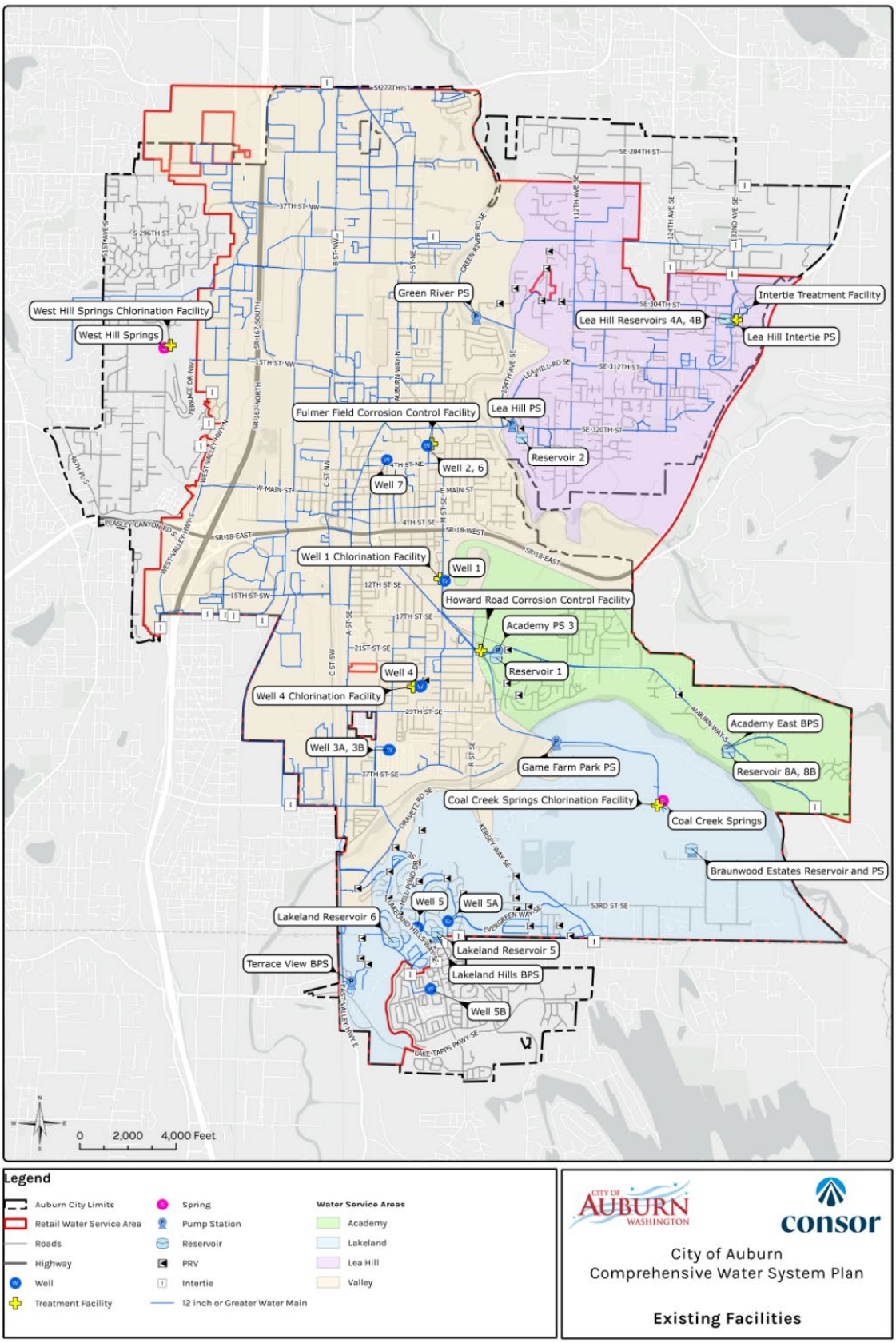
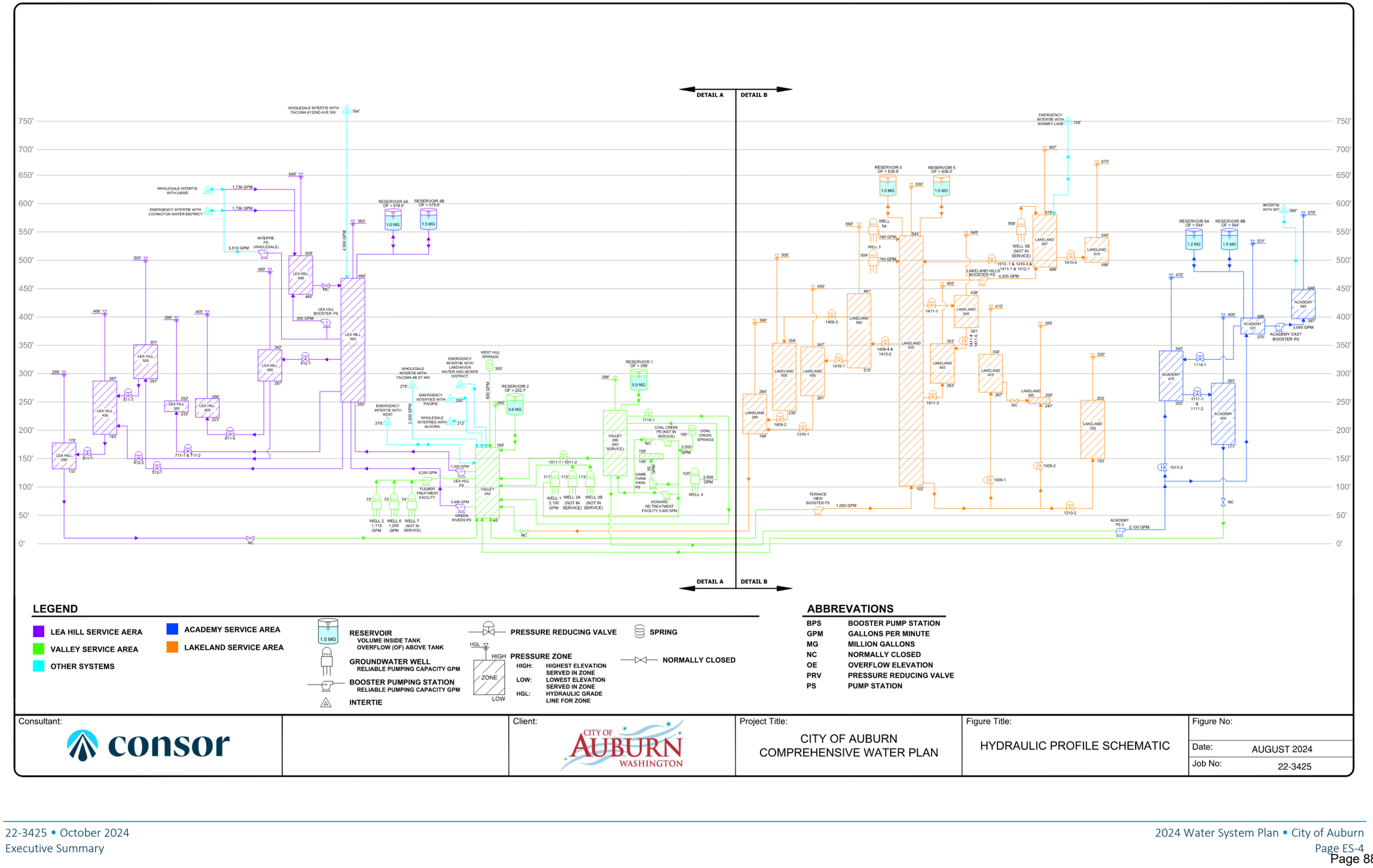


Figure ES-3 | Hydraulic Profile



ES.2 Basic Planning Data

Water Service Connections and Usage

The City's current and future water demand requirements were projected for each customer class (single-family residential/duplex, multifamily residential, commercial, manufacturing/industrial, schools, city accounts, irrigation, and wholesale). The water consumption, or demand, of each customer classification can be expressed in terms of equivalent residential units (ERUs) for forecasting and planning purposes. One ERU is defined as the average quantity of water used by one average, full-time, single-family residence per day. The quantity of water used by other customer classes, or by the entire system, can be expressed in terms of equivalent ERUs. The historical average and maximum water demands are important parameters when performing system and supply analyses. The Average Day Demand (ADD) is typically used in operational evaluations. The Maximum Day Demand (MDD) represents the single largest day water demand during the year and is a key parameter for infrastructure sizing.

The City provided water to approximately 63,450 customers through 15,046 connections as of the end of 2022. Between 2015 and 2022 the ADD ranged from 6.32 million gallons per day (mgd) on the low end in 2020 to 7.67 mgd on the high end in 2016. The MDD has ranged from 11.25 mgd in 2019 to 12.43 mgd in 2020. The total number of connections increased by approximately three percent between 2015 and 2022. The City has two active wholesale water agreements, one with the City of Algona and the other with LMWD that is interruptible.

Water Supply and Production

The City has a diverse water supply consisting of two springs, ten wells and an intertie with the City of Tacoma. Wells 1, 2, 3A, 3B, 4, 6, and 7 are in the lower alluvial aquifer in the Auburn Valley, referred to as the Valley Wellfield. Wells 3A, 3B and 7 are currently offline due to high manganese concentrations. Wells 5, 5A, and 5B are in the Upland Wellfield within the Lakeland Service Area. Once Well 5B came online, the City discovered that the aquifer was not recovering and Well 5B has been offline since 2006. The safe yield of Wells 5 and 5A have been decreased from their design capacity due to a drop in the aquifer's capacity. The City has sufficient water rights to meet current demands as well as 10- and 20-year demand projections, as shown in the Water Rights Self-Assessment Form provided in Appendix I. Additional information on the City meeting future demands is mentioned in the Capacity Analysis Section under ES.3 (System Analysis and Asset Management).

West Hill Springs draws from an unnamed confined aquifer. The spring source water flows by gravity into the Valley Service Area, although flows vary depending on aquifer conditions. Coal Creek Springs is the largest active water supply for the City and draws from a confined aquifer, however its flow varies depending on aquifer conditions. The City also owns two additional wells: the Algona Well 1, which is not operational and the Braunwood Well which serves the Braunwood satellite system.

Future Population and Demand Projections

Demographic projections are based on the Puget Sound Regional Council's (PSRC) 2044 forecasts for population and employment within the City's RWSA. Total population is projected to increase by 1.5 percent annually from 2021 to 2044 and total employment is projected to increase by 1.9 percent annually over the same period. Overall, the City is planning for an additional 24,987 residents and 20,525 employed people by 2044 within the RWSA. The Valley Service Area is projected to represent 64 percent of the system's population and 93 percent of the system's employment in 2044.

The projected ADD and MDD, along with wholesale demands, are summarized in **Table ES-1.** To be conservative, an ERU planning value higher than the average was used for demand forecasting. The 75th percentile of the historical ADD per ERU between 2015 and 2022 was used to select the planning ERU value of 182 gpd. The peak demands can be expressed as an MDD/ADD peaking factor, which is the relative magnitude of MDD compared to ADD. The City's MDD/ADD peaking factor was 1.77. Distribution system leakage and authorized unbilled consumption are accounted for in the projections.

Table ES-1 | ADD, MDD, and ERUs Summarized by Service Area with Wholesale Included

	2024	2034	2044
Lea Hill			
Average Day Demand (mgd)	1.00	1.04	1.09
Maximum Day Demand (mgd)	1.77	1.84	1.92
Equivalent Residential Units	5,506	5,729	5,966
Valley			
Average Day Demand (mgd)	5.11	5.84	6.72
Maximum Day Demand (mgd)	9.02	10.31	11.88
Equivalent Residential Units	28,034	32,037	36,920
Lakeland			
Average Day Demand (mgd)	0.51	0.59	0.67
Maximum Day Demand (mgd)	0.91	1.04	1.19
Equivalent Residential Units	2,815	3,217	3,684
Academy			
Average Day Demand (mgd)	0.43	0.48	0.54
Maximum Day Demand (mgd)	0.76	0.85	0.95
Equivalent Residential Units	2,375	2,642	2,946
Total Retail Customers			
Average Day Demand (mgd)	7.05	7.95	9.02
Maximum Day Demand (mgd)	12.47	14.04	15.94
Equivalent Residential Units	38,731	43,626	49,515
Algona (Firm Wholesale)			
Total Average Day Demand (mgd)	0.365	0.386	0.409
Total Equivalent Residential Units, ADD	2,005	2,120	2,246
Total Maximum Day Demand (mgd)	0.692	0.732	0.775
Total Equivalent Residential Units, MDD	3,800	4,018	4,256
Retail with Algona			
Total Average Day Demand (mgd)	7.42	8.33	9.43
Total Maximum Day Demand (mgd)	13.16	14.77	16.71
Retail with Firm Wholesale (Algona and MIT)			
Average Day Demand (mgd)	9.92	10.83	11.93
Maximum Day Demand (mgd)	14.66	16.27	18.21
Retail with Firm & Interruptible Wholesale (Algona, MIT, and LMWD)			
Average Day Demand (mgd)	12.42	13.33	14.43
Maximum Day Demand (mgd)	17.16	18.77	20.71

ES.3 System Analysis and Asset Management

Asset Management

The City actively assesses and plans for the maintenance, repair, and replacement of its assets while preventive maintenance practices keep assets in good condition, thereby extending their useful life. For asset management, the City utilizes CarteGraph in conjunction with the geographic information system (GIS). GIS is updated using as-builts as projects are completed and CarteGraph is auto-populated from this information. CarteGraph is used to track and schedule maintenance activities and track material and labor costs and project timelines.

An inventory of the City's existing water system assets including distribution system components, treatment, reservoirs, supply facilities, pump stations, backup power, and the telemetry system is presented in Chapter 3.

Water Quality

The DOH requires that source water be monitored for primary and secondary contaminants. Primary contaminant levels are not to be exceeded for health reasons and secondary contaminants should not be exceeded for aesthetic reasons. Distribution system water quality testing requirements include monitoring of many contaminants for which the DOH determines maximum contaminant levels.

Historically, the City has relied on groundwater supplies from wells and springs, which have been determined are not under the direct influence of surface waters. For these water sources, the City is required to meet the United States Environmental Protection Agency's (EPA's) Groundwater Rule. The treatment objectives of the City are to treat source water to contaminant concentrations below the maximum contaminant levels (MCLs) established by the EPA and WAC. All constituents are currently below their respective MCLs.

The required frequency of monitoring of inorganic chemical and physical parameters varies by source, however, the City typically monitors these constituents every 12 months. Within the study period, the maximum detected concentrations of these parameters did not exceed the MCLs published by the EPA.

All active sources are disinfected with chlorine prior to entering the distribution system except for Well 5. The City has a capital project discussed in Chapter 8 that will include the addition of a chlorination facility to Well 5. Corrosion control treatment is required on the water produced by Coal Creek Springs, Well 1, Well 2, Well 6, and Well 7 to limit the corrosion of lead and copper in the system. Since the corrosion control treatment facilities were constructed, the lead and copper levels in the City's system have been well below the action level. There were no water quality violations in the distribution system between 2015 and 2022.

Design Standards

The City's most recent Engineering Design and Construction Standards are available on the City's website and are provided as Appendix P.

The City's water quality design standards follow the design standards set forth by the EPA and the Washington DOH.

Capacity Analysis

The City's water supply (production) capacity compared with demand projections and DOH and City criteria indicate that the City has the supply facilities necessary to meet demand projections under current and future projections for all required criteria.

The City's Water Rights Self-Assessment Form is provided in **Appendix I** and was used to assess the City's water rights and includes supply that is available to the City through firm wholesale interties with Tacoma. The form includes a comparison of the available water rights to the existing, 10-year and 20-year demand projections for the "High Demand Scenario" provided in **Chapter 2**. The calculations presented in the Water Rights Self-Assessment Form conclude that the City's existing water rights are anticipated to be adequate to meet the current, 10-year, and 20-year projections for Qi and Qa.

The City does not currently have the infrastructure necessary to withdraw from all water rights (i.e., Wells 3A, 3B, 5B, and 7 are not currently operational). Additionally, some sources have underlying aquifer or infrastructure restrictions that limit the capacity of the source (i.e., Well 2, Well 6, and Coal Creek Springs). Several facility improvement projects are necessary for the City to maximize water production capacity to meet future demands, and planned supply related capital projects to meet this need are discussed further in **Chapter 8**.

Table ES-2 provides an overview of pump station supply analysis results expressed as either having a capacity surplus or deficit for open and closed zones. Open zones are pressure zones that are fed by gravity from a reservoir. Pressure zones that do not include a storage facility are analyzed as a closed zone. A closed zone in the Lea Hill Service Area and the Game Farm Park closed zone have a BPS capacity deficit identified in all planning scenarios. The City has planned a capital project to resolve the deficiency at the Intertie Pump Station/Lea Hill BPS. The Game Farm Park Pump Station only provides service to a recreational area with no residential or commercial property connections supplied by this facility. The City has reviewed the deficit with the Fire Marshal and the deficiency is not critical to address, therefore no actions are currently planned to resolve the deficiency at the Game Farm Park Pump Station. As further development progresses in and around the Game Farm Park Pump Station, modifications will be considered to address the deficiency.

Table ES-2 | Summary of Pump Station Capacity Results

	2024	2034	2044
Valley Open Zone Pump Station Capacity	Surplus	Surplus	Surplus
Lea Hill Open Zone Pump Station Capacity	Surplus	Surplus	Surplus
Lakeland Open Zone Pump Station Capacity	Surplus	Surplus	Surplus
Academy Open Zone Pump Station Capacity	Surplus	Surplus	Surplus
Lakeland Closed Zone BPS Capacity	Surplus	Surplus	Surplus
Academy Closed Zone BPS Capacity	Surplus	Surplus	Surplus
Lea Hill Closed Zone BPS Capacity	**Deficit**	**Deficit**	**Deficit**
Game Farm Park Closed Zone BPS Capacity	**Deficit**	**Deficit**	**Deficit**

The City's water storage facilities were analyzed to determine if they have sufficient capacity to meet the existing and future storage requirements. A summary of the results is provided in **Table ES-3**. New sources and pump stations allow for reliable and redundant operation of the system as an interconnected whole, rather than separate Service Areas. As such, excess storage in one service area can be used to

offset a deficit in another area of the system. The results of the storage analysis indicate that there is sufficient capacity to meet the projected 2024 and 2034 storage requirements, however additional storage is projected to be necessary in 2044. The City has a planned capital project to add a new reservoir in the Valley Service Area to address this deficiency.

Table ES-3 | Summary Storage Capacity Analysis

	Total Usable Storage	2024		2034		2044	
		Total Required Storage (MG)	Surplus/ (Deficit) (MG)	Total Required Storage (MG)	Surplus/ (Deficit) (MG)	Total Required Storage (MG)	Surplus/ (Deficit) (MG)
Academy	2.66	1.54	1.12	1.60	1.06	1.68	0.98
Lakeland	1.34	1.24	0.10	1.36	(0.02)	1.49	(0.15)
Lea Hill	2.12	2.29	(0.17)	2.34	(0.22)	2.40	(0.28)
Valley	7.96	7.72	0.24	8.68	(0.72)	9.86	(1.89)
RWSA	**14.08**	**12.79**	**1.29**	**13.98**	**0.10**	**15.42**	**(1.34)**

The City's existing distribution system was analyzed to determine if they have sufficient capacity to meet the existing and future demands and fire flow requirements using an updated and calibrated version of the City's hydraulic model. A low-pressure analysis was performed in the hydraulic model to confirm that pressures throughout the system were above 30 psi during under peak hour demand (PHD) conditions for 2024, 2034, and 2044. The results of this analysis indicated that all areas of existing and future system have pressures meeting this condition and were compliant with requirements.

An individual fire flow analysis was performed for each hydrant node in the hydraulic model to determine the available fire flow during MDD plus fire flow (FF) conditions, while maintaining a minimum residual pressure of 20 psi. The results of this analysis indicate that multiple pipeline improvement projects are necessary to address the distribution system deficiencies.

An analysis of the water system's overall physical capacity in terms of ERU using DOH Worksheet 4-1 is provided in Appendix V. The analysis indicates that the existing system has sufficient capacity to serve the current and projected water demands through 2034 (10-year planning horizon). Under 2024 and 2034 demand conditions, storage is the limiting system component for growth and development. In 2044 (20-year planning horizon) storage is deficient, which is consistent with the other analysis findings.

ES.4 Water Use Efficiency Program

Source and Service Metering

Each of the City's sources are metered to measure the amount of water produced. The meters are calibrated annually. If a meter cannot be calibrated properly, it is replaced with a new one. Propeller source meters are being replaced with electromagnetic (MAG) meters as part of on-going operation and maintenance (O&M) improvements.

Service meters are installed on every service line to measure the quantity of water used by a customer per WAC 246-290-496 and City Code Chapter 13.06.320. In 2015, the City began installing an Automated Metering Infrastructure (AMI) system, as a part of the Water Meter and Billing System Improvements project, which was completed in 2018. With the new AMI system, the City automatically receives meter reads via radio transmission and can integrate the data into the billing software.

Distribution System Leakage

Distribution System Leakage (DSL) represents the difference between production and documented water use (retail, wholesale, and authorized unmetered). The City's historical DSL performance complies with the DOH requirement that the three-year average DSL be under ten percent to minimize water waste. To further reduce DSL, the City has ongoing leak detection, meter calibration, and an active repair and replacement program for water system infrastructure.

Water Use Efficiency Program

The City's Water Use Efficiency (WUE) Program provides for efficient water use and supports stewardship of the City's resources. The selected program measures are interrelated and will help the City achieve its goals to both reduce average water use and peak water use per customer. Per the WUE requirements, the following measures implemented as part of the 2024-2034 WUE program:

- Install production (source) meters.
- Install consumption (service) meters.
- Perform meter calibration.
- Implement a water loss control action plan to control leakage if the three-year rolling average exceeds ten percent.
- Educate customers about water use efficiency practices.

Additionally, the following measures that must be evaluated are:

- Rates that encourage water demand efficiency (discussed in Chapter 9).
- Reclamation opportunities (discussed in detail in Chapter 4).

The DOH requires that the City estimate the amount of water saved through implementation of the system's WUE program over the last six years. Water use per-capita dropped from 112 gpd per capita in 2017 to 105 gpd per capita in 2022. The net water savings over this period equates to approximately 148 million gallons or 29.6 million gallons of savings per year.

The City has chosen to focus on implementing voluntary measures to decrease both the average and peak water usage. The City's goals are as follows:

- Decrease the planning ERU value (gpd/ERU) one percent annually from the current planning ERU value of 182 gpd/ERU,
- Decrease the planning peaking factor from the current 1.77 to 1.68, or less, and
- Maintain three-year average DSL under ten percent.

The City is committed to wastewater reuse and rainwater reclamation, as stated in its official water system policies summarized in Appendix A. Currently, there are no reclaimed water users in the City.

Climate Change Resiliency

To estimate the impact of climate change on the City's water demands, results from the Water Supply Forum's 2009 Regional Water Supply Outlook (WSF 2009 Outlook) were used. The impacts of climate change on sources that rely on groundwater are mostly unknown due to the variability between aquifers and site-specific effects. No changes to demand projections were made for the 20-year planning period to account for potential climate change due to the uncertain magnitude and timing of local effects. However, it is recognized that demand has the potential to increase in the future given these changes. In the event the City experiences such an increase, the City will use a model to compute firm yield from streamflow data, replacing historic inflows with projected inflows from three climate change scenarios as described by the WSF 2009 Outlook.

This WSP discusses short and long-term actions the City can take to improve the resiliency of the water system from the impacts of climate change. The short-term measures can improve resiliency within three to five years while the long-term measures may require decades to be fully implemented.

ES.5 Source Water Protection

Sanitary Control Areas (SCAs) have been established for each of the City's water sources per WAC 246-290-135(2). The standard SCA for wells has a minimum radius of 100 feet from the wellhead. The standard SCA for spring sources has a minimum radius of 200 feet from the spring head. All City water sources have SCAs that were established and approved by DOH, and are documented in the susceptibility forms provided in Appendix T.

The DOH has developed regulations that require Group A water systems using groundwater sources to develop and implement a Wellhead Protection Program (WHPP) in accordance with WAC 246-290-135. The City maintains its WHPP for 12 groundwater sources. A WHPP was prepared in 2014 for the City's 2015 WSP; this remains the current WHPP for the City.

Susceptibility Assessment Forms have been completed by the City and submitted to the DOH. The DOH's susceptibility assessment rating for each source is summarized in Table ES-4

Table ES-4 | Source Susceptibility Assessment Ratings

Source	DOH Issued Susceptibility Rating
Coal Creek Springs	High
West Hill Springs	High
Well 1	Moderate
Well 2	High
Well 3A	Low (Off-line)
Well 3B	Low (Off-line)
Well 4	Low
Well 5	Low
Well 5A	Low
Well 5B	Low (Off-line)
Well 6	High
Well 7	High (Off-line)

The Wellhead Protection Area (WHPA) defines the area around a groundwater source that has the potential to contaminate the source. This area is based on the source's capture zones, which are the zones of the source aquifer and ground surface that can contribute water to the source in six months, one year, five years, or ten years of time of travel. The established WHPAs are shown in Figure ES-4.

A summary of potential contaminant sources for the City's water sources was updated in July 2024 and is included in Appendix T.

ES.6 Operations and Maintenance Program

The Auburn Water Utility is operated as a utility enterprise under the direction of the Public Works (PW) Director. Specific water utility management responsibilities within the PW Department fall under either the Utilities-Water Section of Engineering Services or the Water Division of Maintenance and Operations Services. The Utilities-Water Section of Engineering Services is responsible for comprehensive water system planning, development of a Capital Improvement Program (CIP), as well as programming the design, construction, and inspection of projects related to the water system. The Water Division of Maintenance and Operations Services is responsible for operating and maintaining the water system, performing daily operation and inspection, water quality monitoring as required by DOH, and line management of the Water Utility.

The mission statement of the City's Water Utility is to provide for the efficient, environmentally sound, and safe management of the existing and future water system within the City's service area. Operations staff provide daily O&M of wells, corrosion control treatment facilities, pump stations, and reservoirs. They also implement the cross connection control program and provide locating services for all City utilities. Distribution staff maintains the complete distribution system including water mains, valves, hydrants, pressure reducing stations, and meters.

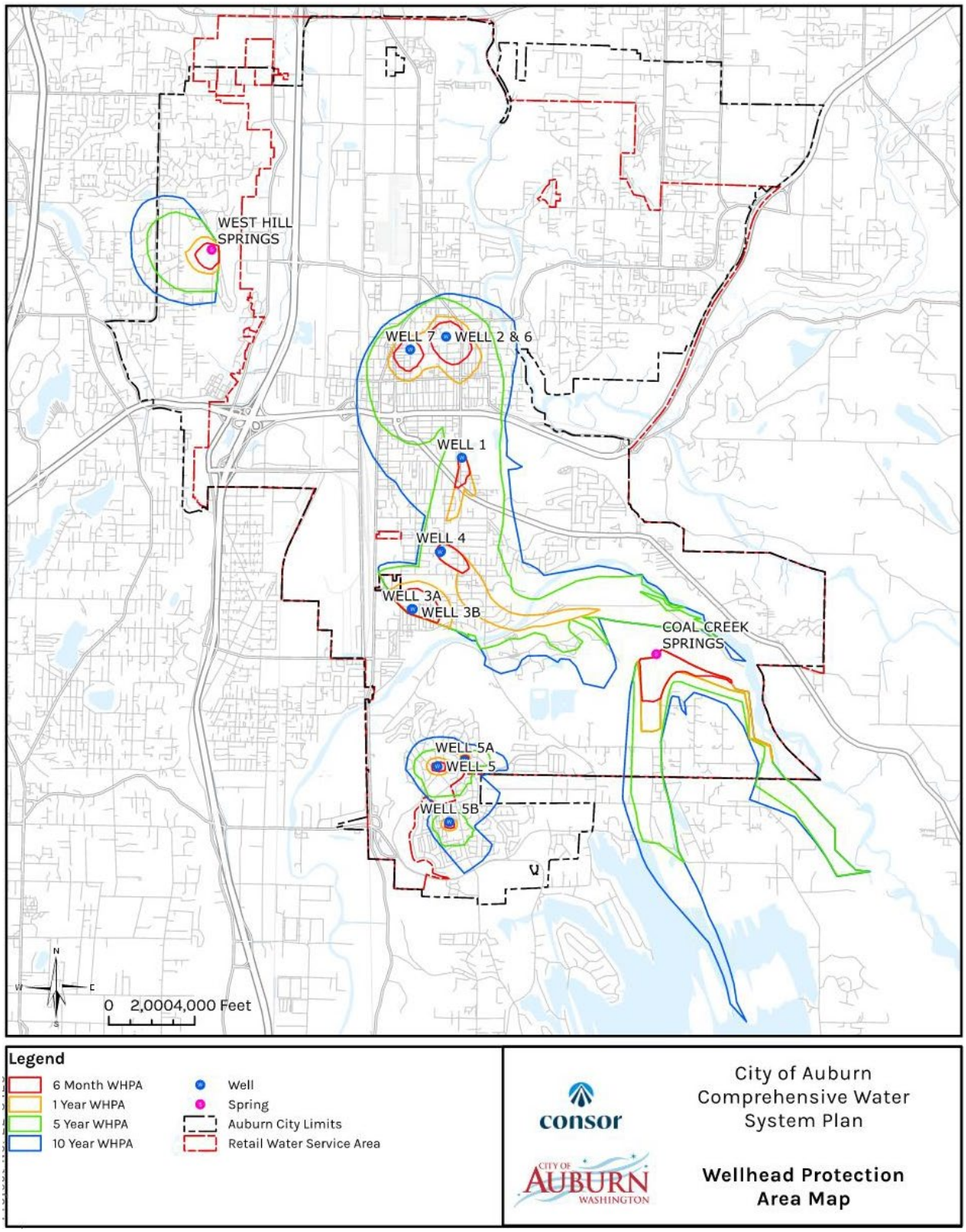
Primary operation of the water system is maintained via the Supervisory Control And Data Acquisition (SCADA) computerized control system. Wonderware software works in association with SCADA to provide real time graphical display of system data for staff interpretation and control.

The Water Operations staff maintains an active and ongoing program of water quality monitoring and reporting to ensure a safe, high quality water supply. Two staff members are responsible for water quality monitoring, sampling, control, and record keeping as outlined in the City's Water Quality Monitoring Plan provided in Appendix O.

The City has prepared an electronic Public Works Emergency Response Manual (Manual) as a guide for management of emergency situations, with the objective of protecting life and property and restoration of essential services, such as providing clean water, as quickly as possible. The Emergency Response Plan is updated annually at the first of the year. The master response program for the entire City is documented in the Comprehensive Emergency Management Plan (CEMP), which provides guidance to the Emergency Management Organization for mitigation, preparedness, responsibilities, recovery operations, training, and community education activities. The CEMP also describes the functions of local government and incorporation of essential non-governmental organizations into the Emergency Management Organization.

The City has a comprehensive safety program that meets Occupational Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Act (WISHA) regulations. The safety policies and procedures for the water department are documented in this WSP and cover the full range of hazards staff may experience while operating the water system.

Figure ES-4 | Wellhead Protection Area Map



The City's Cross Connection Control Program (provided in **Appendix Q**) protects the public water system from contamination via cross connection hazards. It describes minimum operating policies, provides guidelines for installation, testing, and maintenance of approved backflow prevention assemblies, permitting process, inspection, and survey requirements for existing and new water service connections. The findings of the 2022 Sanitary Survey are also summarized in this WSP, along with the actions completed or in progress to address the deficiencies. The next DOH sanitary survey is scheduled for 2027.

ES.7 Distribution Facilities Design and Construction Standards

The Engineering Design and Construction Standards (EDCS) encompass policies and procedures governing project review and approval. To ensure the highest level of water system reliability, integration of the EDCS into the broader City infrastructure is essential. The integration of the EDCS in this WSP empowers the City to employ an alternative review process for distribution main projects, through the submittal exception process, which permits the City to approve project reports and construction documents without written approval from the DOH.

The City's Utilities-Water Section of Engineering Services reviews plans, including calculations, reports, and AutoCAD files, to verify conformity with development requirements, City standards, City policies, as well as other federal, state, and local requirements. Compliance with Washington State Department of Transportation (WSDOT) "Standard Specifications for Road, Bridge, and Municipal Construction," and relevant City, State, and Federal regulations is also evaluated during the review process.

ES.8 Capital Improvement Program

The CIP was developed to identify system improvements needed to meet customer demands throughout the 20-year planning horizon. The capital projects identified are categorized as water supply (S), storage (R), pump stations (PS), distribution (D), and general improvements (G). Planning-level cost estimates were developed for each of the recommended projects for budgeting purposes.

The capital projects for the facilities improvements were prioritized based on existing capacity deficiencies, safety concerns, maintenance or capacity requirements, and regulatory requirements. A summary of the total planned CIP cost is provided in **Table ES-5.** All costs are presented as total project costs in March 2024 dollars. For future budgeting purposes, the latest Engineering News Record (ENR) Construction Cost Index (CCI) can be used to project current estimates to the year of implementation. The cost estimates for the Auburn area used the ENR Seattle CCI. The March 2024 CCI is 15,477. Overall, the City anticipates total projects costs of $214M over the next 20 years, with more than 50 percent of the cost being for distribution system improvements.

Table ES-5 | Water System Capital Improvement Program Budget 2024-2044

Capital Improvement Category	Total for 20-Year Period From 2024-2044 (2024 USD)
Distribution	$121,858,681
Supply	$60,416,013
Storage	$21,579,621
Pump Station	$9,230,000
General	$1,750,000
TOTAL	**$214,834,315**

ES.9 Financial Program

Chapter 9 was prepared by FCS GROUP to provide a financial program that allows the City to remain financially viable during the 20-year planning horizon. This viability analysis considers the financial condition of the utility of the past six-year period (2017-2022), current and identified future financial and policy obligations, O&M needs, and the financial impacts of the capital projects identified in Chapter 8. A review of the water utility's current rate structure with respect to rate adequacy and customer affordability is also included.

The City's water charges for services increased from $14.8M in 2017 to $16.5M in 2022, averaging an annual increase of approximately 2.2 percent per year. Operating expenditures increased by $1.7M across the six years with an average annual increase of 2.8 percent. Despite total operating expenses outpacing growth in operating revenues, operating income has been positive in all years observed.

The financial forecast indicates that at existing rate levels the utility will become deficient in 2025 as growth in expenses outpaces growth in revenues and the utility takes on additional debt obligations to fund capital infrastructure investments. The City has adopted a 7.50 percent increase for 2025 to resolve the remaining projected deficiency. Rates will need to potentially increase by 9.50 percent annually from 2026 through 2030, before decreasing to 3.00 percent annually through 2033. A detailed rate study is planned for completion in 2025. It is recommended that the City regularly review and update the key underlying assumptions that compose the multi-year financial plan to confirm that adequate revenues are collected to meet the City's total financial obligations.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 1

Description of the Water System

1.1 Objective

This Water System Plan (Plan) for the City of Auburn (City) has been prepared to serve as a guide for planning and designing future water system infrastructure and to assist the City in the efficient use of its water resources. The Plan identifies system improvements intended to meet the anticipated growth and changing needs of the City while maintaining reliable and quality water service to customers.

The Plan is designed to meet state, county, and local requirements. It complies with the requirements of the Washington State Department of Health (DOH) as set forth in the Washington Administrative Code (WAC) 246-290-100, Water System Plan. This Plan supersedes the City's 2015 Water System Plan, approved by DOH on May 11, 2016, and the 2021 Limited Water System Plan Update approved by DOH on December 16, 2021.

A 10-year approval period is desired for this Plan, and therefore the Plan analyzes the 10-year and 20-year planning periods. This Plan contains a framework for future funding decisions and capital projects. However, the timeframes are estimates and do not represent actual commitments by the City, which may depend on funding, resources availability, and/or other unidentified factors.

1.2 Plan Content

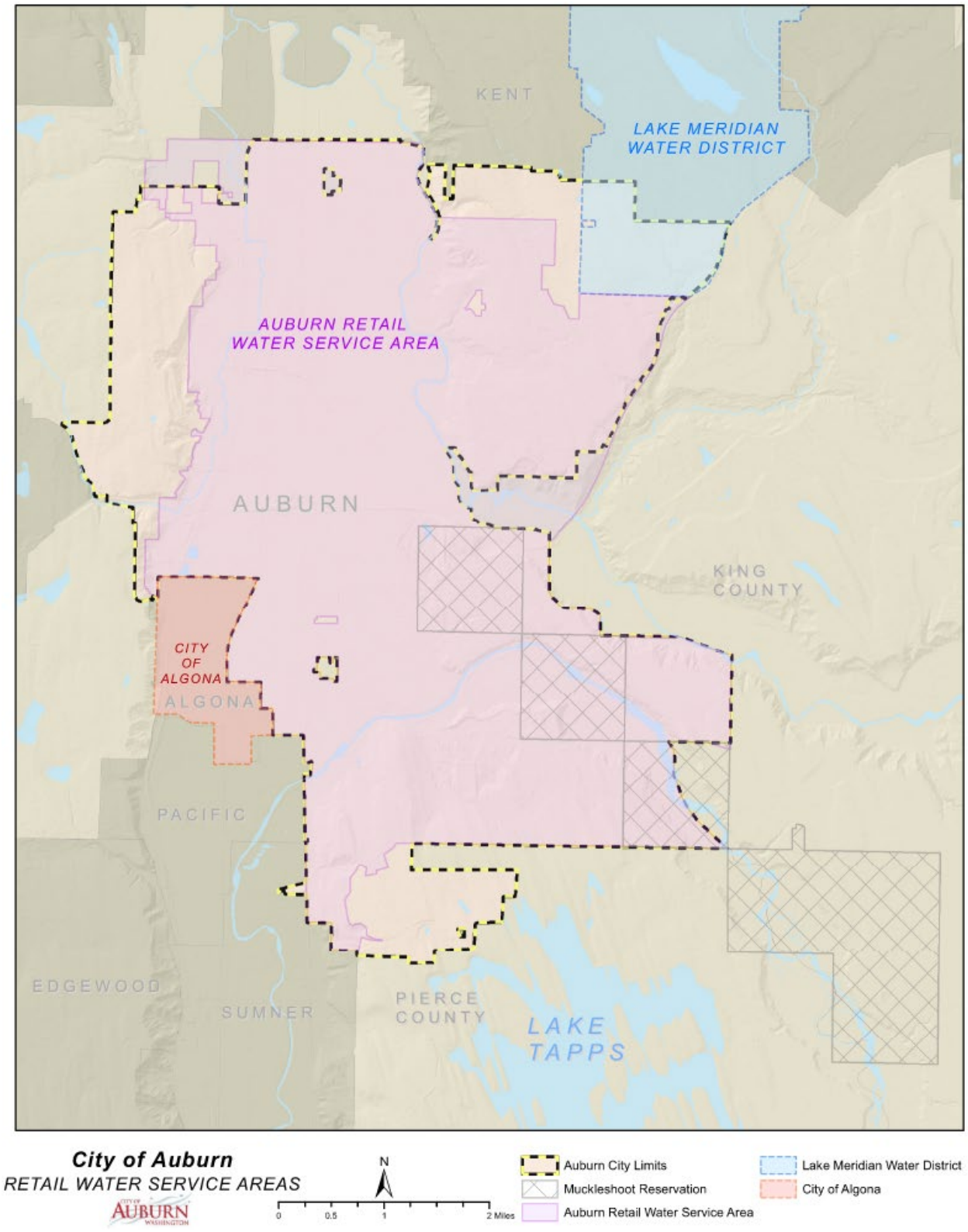
This chapter addresses the following topics:

1.3 Ownership and Management
1.4 System History and Background
1.5 Related Plans and Studies
1.6 Service Areas, Maps, and Land Uses
1.7 System Policies
1.8 Duty to Serve
1.9 Local Government Consistency
1.10 Watershed Consistency

1.3 Ownership and Management

The City owns and operates its water system and serves most of the City as delineated by the Retail Water Service Area (RWSA). The City also provides firm wholesale water supply to the City of Algona (Algona), and interruptible wholesale water supply to Lake Meridian Water District (LMWD) (formally known as King County Water District #111). The City RWSA boundary is further described in Section 1.4 and Figure 1-1 shows the City RWSA with wholesale customers.

Figure 1-1 | RWSA Vicinity Map



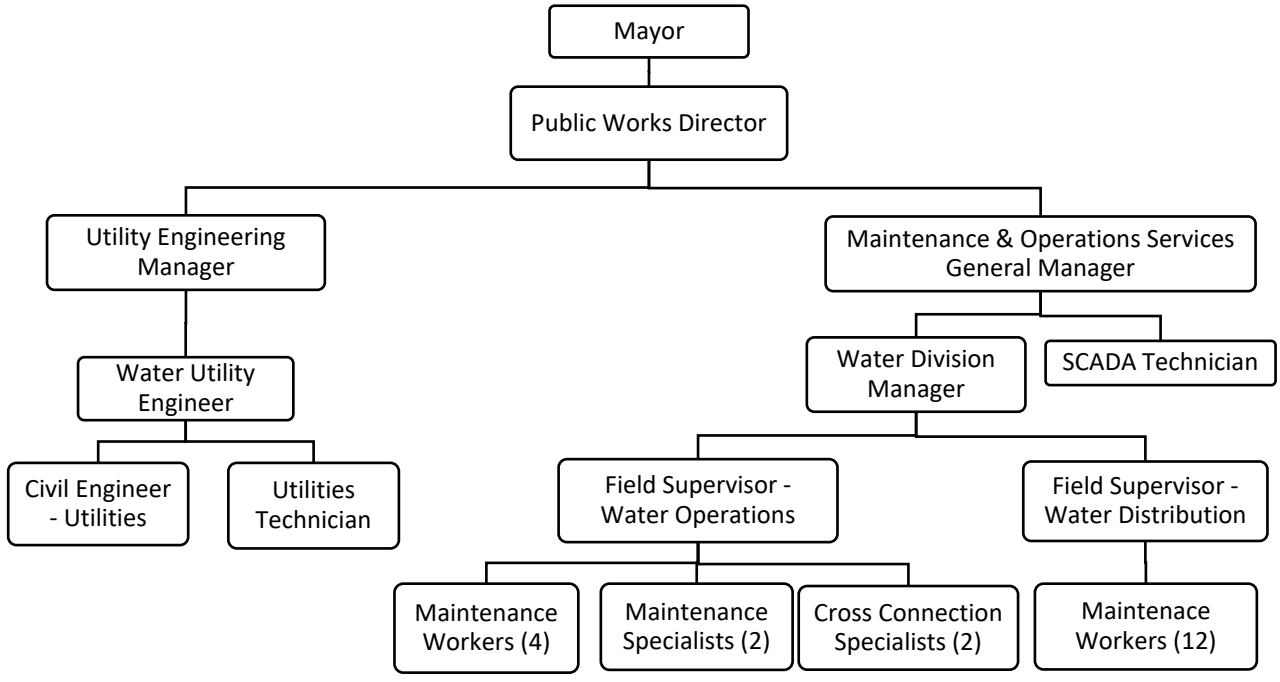
The City provides internal staffing for the management, operations, and maintenance of the water system and the Braunwood Estates satellite system. The DOH's data on these water systems, managed by the City, is presented in **Table 1-1**. The water management structure is presented in **Figure 1-2** and further elaborated in **Chapter 6**.

Chapter 3 provides details on the existing water facilities, while **Appendix H** includes a copy of the current Water Facility Inventory (WFI) form.

Table 1-1 | Water System Ownership Management

Information Type	Description
System Names	City of Auburn Braunwood Estates (Satellite System)
System Type	Group A - Community Public Water System
County	King County and Pierce County
City of Auburn System ID Number	03350V
Braunwood Estates System ID Number (Satellite System)	03336E
Address	25 W Main St Auburn, WA 98001
Primary Contact	Josh Flanders, Water Division Manager
Owner Contact	(253) 876-1998

Figure 1-2 | Water Utility – Organizational Chart



The City's water system is publicly owned, under the jurisdiction of the local government. As a result, it is exempt from regulation by the Washington Utilities and Transportation Commission (UTC), which is

responsible for overseeing some private water companies. There are no plans to bring the City's water utility service under UTC's regulatory authority during this planning period.

1.4 System History and Background

1.4.1 Geography

The City is centrally located between Seattle and Tacoma in both King and Pierce Counties, Washington. It encompasses approximately 30 square miles. Adjacent cities include Pacific, Algona, Bonney Lake, Federal Way, Kent, Sumner, and Covington.

1.4.1.1 Topography

The City's RWSA is dominated by a broad valley surrounded by uplifted plateaus. The Green River enters from the eastern City limit and then runs north cutting through the center of the City. Mill Creek, a tributary of the Green River, parallels the western corporate limits. The White River flows through the southern part of the City before turning south to join the Puyallup River. The topography of the service area is a result, in part, of the glaciation of the region.

Most of the City lies on a two to three-mile wide plain bound by Mill Creek on the west and the Green River on the east. Ground elevations in the area range between 50 to 100 feet and slope upward generally to the north. The terrain rises sharply to elevations of 400 to 500 feet on either side of the valley as well as in the southern portion of the City, south of the White River and between the White and Green Rivers.

The topographic features of the RWSA provide for a necessary divide of the water system into four major service areas serving the valley and the surrounding plateaus. The following are the major service areas and associated elevations:

- Valley Service Area (service elevation from 39 to 235 feet)
- Lea Hill Service Area (service elevation from 129 to 513 feet)
- Academy Service Area (service elevation from 171 to 444 feet)
- Lakeland Service Area (service elevation from 122 to 578 feet)

Each service area is further subdivided into smaller hydraulic operating areas based on topographic elevations, called pressure zones. Additional details on the City's major service areas are provided in Chapter 2.

1.4.1.2 Climate

The RWSA has a West Coast, marine-type climate caused by the influence of air masses coming from the Pacific Ocean. In late fall and winter, orographic lifting, and cooling cause moist air masses to create clouds and precipitation throughout the area. The average annual rainfall is approximately 40 inches, generally occurring between October and March. The average annual snowfall is 8.6 inches. The temperatures typically range from mid-70 degrees Fahrenheit in the summer to 38 degrees Fahrenheit during the winter, with an overall average of 54 degrees Fahrenheit.

Water consumption is notably impacted by climate conditions, as customers adjust their usage based on weather patterns. In periods of hot and dry weather, consumption rises, driven by activities such as lawn watering and outdoor water use. Conversely, consumption tends to decrease during wet weather.

1.4.1.3 Geology

The geology of the City is the result of glacial and interglacial processes acting over millions of years. During the periods when large continental glaciers, not rivers nor lakes, occupied the Puget Sound area, landslides created deposits and erosion through glacial and interglacial deposits. Generally, the uplands surrounding the City are composed of glacial and interglacial deposits and the valleys are filled with more recent deposits overlying older ones.

Five major geologic units lie within the White and Green River Valleys: White River Alluvium (Qaw), Osceola Mudflow (Qom), Undifferentiated Alluvium (Qua), Vashon Recessional Deltaic Deposits (Qd) and Undifferentiated Glacial and Interglacial Deposits (Qu). Bedrock is known to lie approximately 1,280 feet beneath the valley floors.

The Pacific Groundwater Group (PGG) completed an extensive geological and hydrogeological study within the City's RWSA, known as the Auburn Water Resources Program Study, and the results are documented in several volumes:

- 1996 Preliminary Hydrogeologic Characterization
- Summary of 1997 Hydrogeologic Investigations
- The 1997-1998 Test Well Drilling and Installation Program
- The 1999 Hydrogeologic Characterization Report and Appendices

The general groundwater flow system in the City's vicinity is characterized by recharge within uplands and discharge to the rivers in the lowland valleys. Precipitation and Lake Tapps are sources of groundwater recharge. Lake water flows from the lake bottom into the groundwater system. Contrary to recharge in other upland areas, recharge from Lake Tapps is not totally dependent upon precipitation because water is routed to the lake from outside the area. The main discharge zone for the City's area is the Green River Valley. Some groundwater discharges into the river in the City's vicinity and further downstream.

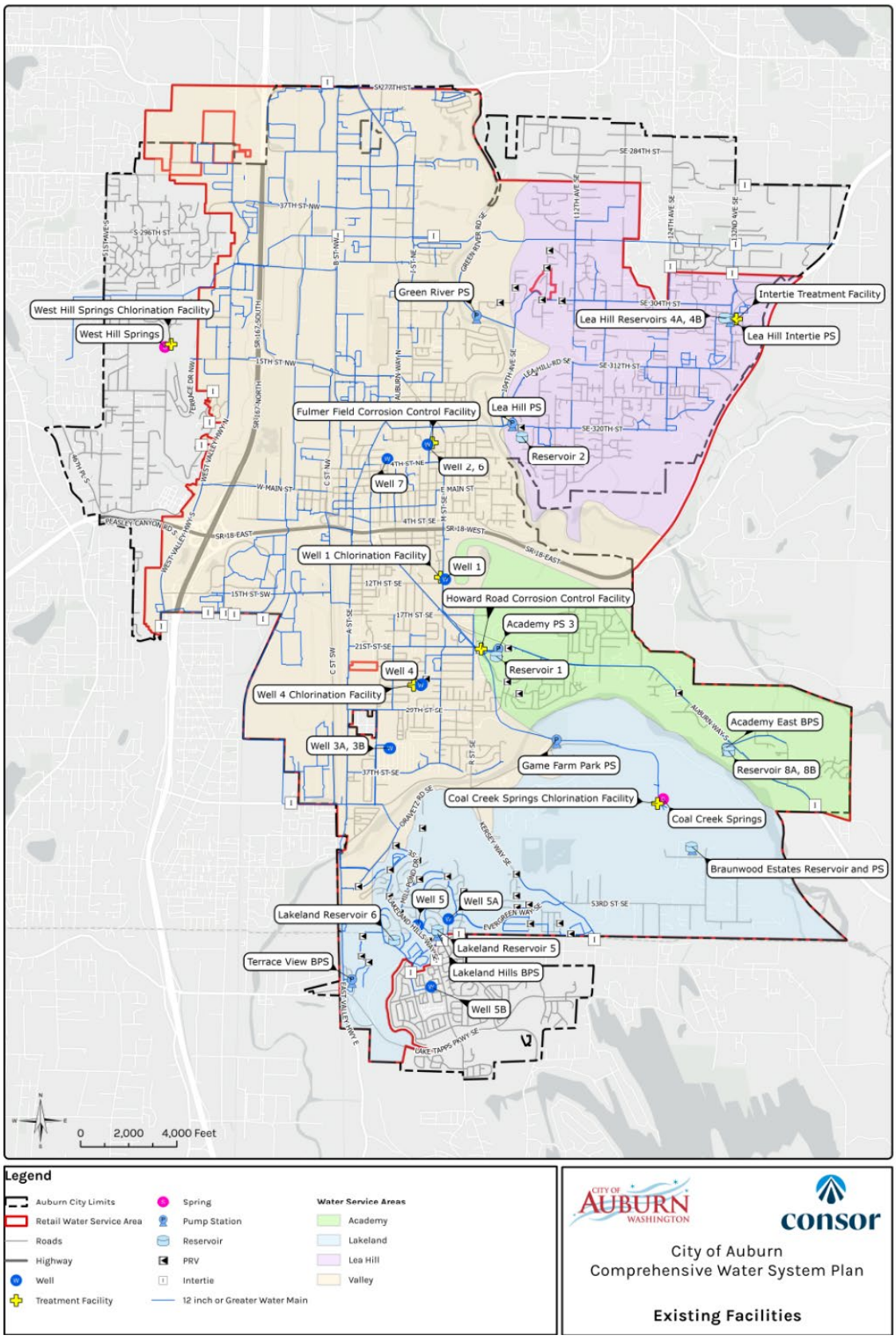
1.4.2 Existing System Overview

The City's water system consists of wells, springs and interties as water sources, chlorination stations and corrosion control facilities for water treatment, pump stations, pressure reducing stations, steel and concrete enclosed reservoirs for storage, and transmission and distribution pipelines to provide potable water to customers. Service is provided to four major service areas (Valley, Lea Hill, Lakeland, and Academy). Each major service area is further divided into pressure zones as required by local topography. The City's four major service areas and the location of key elements of the water system are shown in **Figure 1-3**. A more detailed inventory of assets and system hydraulic profile is presented in **Chapter 3**.

1.4.3 History

The earliest record of a potable water system for the City of Auburn traces back to 1884 with the establishment of the Peasley Canyon supply. Initially serving the City, then called Slaughter, a 4-inch wood-stave pipe connected Peasley Canyon Reservoir to deliver surface water. The year 1907 marked a pivotal moment as the City acquired West Hill Springs for $2,000, a source that continues to yield approximately 1 million gallons of water per day (600 gpm) and remains active.

Figure 1-3 | Existing Facilities



As the City's population grew to a few thousand by 1922, the demand for water prompted the introduction of groundwater wells alongside the existing West Hill Springs. These wells, strategically drilled in the downtown area, were complemented by pump stations, with one situated at the present site of City Hall. Despite their longstanding service, these early wells and pump stations have since been decommissioned.

The evolution of Auburn's water distribution system saw a transition from wooden pipes to the installation of the first recorded steel water main in 1924 - a 10-inch pipeline connecting West Hill Springs to the valley floor. The Coal Creek Springs water collection system, which included a 24-inch steel main under the White River was constructed in 1925, along with the construction of Reservoir 1 (later replaced in 1975), to meet the escalating water needs of the growing City.

By 1946, the population had increased, prompting construction of the Coal Creek Pump Station, to pump water from Coal Creek Springs to the distribution system.

In 1960, the City embarked on further enhancements by supplementing its two springs with a well system, beginning with Well 1 and then Well 2 in 1969.

In 1961, water system facilities were constructed in the Academy Service Area.

Expansion into the Lea Hill Service Area occurred between 1964 and 1965, coinciding with extensive modifications to the Coal Creek supply system and the implementation of a Supervisory Control and Data Acquisition (SCADA) system.

The early 1980s saw the extension of the water system into Lakeland Service Area.

A key development occurred in 1991 with the acceptance of Braunwood Estates (now called Hidden Valley) as a satellite water system operating independently outside the City's distribution network.

The late 1990s marked significant construction under the Interlocal Agreement 2 (IA2) project, a water supply project between LMWD, Covington Water District (CWD) and the City to provide LMWD and CWD with wholesale water supply, and as a result expanding the water system. Expansion into Pierce County and service agreement modifications characterized the late 1990s and early 2000s.

Table 1-2 summarizes key construction and enhancements related to the City's wells, springs, reservoirs, pump stations, treatment, water pipelines, and system upgrades. Notably, the water pipelines improvements focus on transmission mains, excluding distribution mains installation and replacements (due to the extensive list), with exceptions for distribution improvements mandated by environmental (water quality) regulations. The table provides a documented history of the water system, recognizing occasional gaps.

Table 1-2 | Water Facilities History

Springs	
West Hill Springs	• Before 1907: Established as a potable water supply for the City. • 1915: Construction of 210,000-gallon concrete reservoir to store water from West Hill Springs. • 1924: Installation of the first recorded steel water main (10" pipeline from West Hill Springs to the valley floor). • 1960: Ongoing use, with a replacement of collection boxes. • 1988: Removal of reservoir. West Hill Springs water flows continuously into the system.

	• 2000: Partial fencing of the watershed carried out according to the 2000 Water Comprehensive Plan. • 2017: Flow Control Improvements, including installation of an electromagnetic meter and flow control valve for automatic shutdown. • Current: The spring has a capacity of 600-gpm, with varying supply based on aquifer conditions. Equipped with chlorination station.
Coal Creek Springs	• 1925: Construction of Collection system. • 1925: Installation of 24" wood-stave supply pipeline connecting the Coal Creek Springs collection system to a booster pump station (present Howard Road site) and 14" transmission main to Reservoir 1, including installation of 24" steel pipe under the White River • 1964: Construction of south and middle collectors in the system. • 1964: Replacement of the 24" wood-stave supply pipeline connecting the Coal Creek Springs collection system to a booster pump station (present Howard Road site) with 24-inch concrete pipe. • 1998: Addition of the north collector for enhanced system performance. • 2023: Coal Creek Springs Transmission Main Replacement underway to install a new transmission main suspended from a utility/pedestrian bridge over the white river to replace a portion of the old main crossing the river. • Current: Flows by gravity to Howard Road Corrosion Control Treatment Facility (CCTF) and pumped into Reservoir 1, with typical production capacity of 3,000-gpm. Equipped with chlorination station.
Wells	
Well 1	• 1960: Construction of Well 1, within Valley Service Area. • 1998: Shutdown due to reduced well output and water levels. • 2010: The well was brought back into service temporarily to meet summer demands. • 2015: Phase 1 improvements to bring the facility back online. Construction of transmission main in M St SE, 17th St SE, R St SE & Howard Road SE to convey supplies from Well 1 to Howard Road CCTF. • 2016: Phase 2 improvements to bring the facility back online. Improvements included new well house, pumping system (2,200-gpm), disinfection with sodium hypochlorite, on-site emergency power, and upgraded electrical and SCADA controls. • Current: Operational and pumps to Howard Road CCTF, then boosted to Reservoir 1.
Well 2	• 1969: Construction of Well 2 (3,000-gpm capacity), within Valley Service Area. • 2000: Replacement with a new masonry building, pump (1,600-gpm) and associated equipment. • 2014: Installation of Variable-frequency Drive (VFD). • 2023: Rehabilitation and replacement of well pump and motor. • Current: Operational with the Fulmer Field CCTF, providing chlorination and emergency power.
Well 3A	• 1983: Construction of Well 3A (1,650-gpm) with automatic standby generator, pumps directly into Valley Service Area. • 1984: Installation of chlorination system. • Current: Inactive since mid-1990's (Est. 1995 – 1997) due to elevated manganese levels.
Well 3B	• 1984: Construction of Well 3B (1,650-gpm) adjacent to Well 3A, with chlorination system. • Current: Inactive since mid-1990's (Est. 1995 – 1997) due to elevated manganese levels.
Well 4	• 1985: Construction of Well 4 (2,600-gpm), to pump directly into Reservoir 1 and capable of feeding south end of Valley distribution system through pressure-reducing station. • 2016: Emergency Power Improvements project added a diesel-fueled generator and hypochlorite chlorination equipment.

	• 2018: Upgrade of Well soft starter. • 2023 (ongoing): Well 4 Facility Improvements project underway to replace aging mechanical equipment and electrical improvements. • Current: Pumps directly to Reservoir 1 and to south end of Valley Service Area through PRVs.
Well 5	• 1983: Construction of Well 5 (1,000-gpm) to serve the Lakeland Hills Development. • Current: Maximum production capacity of 650-gpm, not chlorinated and pumps directly into Lakeland Service Area and supplies Reservoirs 5 and 6.
Well 5A	• 1990: Construction of Well 5A (180-gpm) to supplement Well 5. • Current: Equipped with chlorination facilities and a manual transfer switch. Pumps directly into Lakeland Service Area and supplies Reservoirs 5 and 6.
Well 5B	• 2005: Construction of Well 5B (600-gpm) with hypochlorite generation and ATEC media filters, to remove iron and manganese prior to disinfection. • Current: Removed from service in 2006 due to irrecoverable aquifer.
Well 6	• 1998-2000: Construction of Well 6 (3,500-gpm) within Valley Service Area. • 2014: Replacement of pump bowl and installation of VFD. • 2000: Rehabilitation with a new masonry building, well pump (1,600-gpm), and associated equipment. • Current: Operational with the Fulmer Field CCTF, providing chlorination and emergency power.
Well 7	• 1997: Construction of Well 7 (3,500-gpm) within Valley Service Area. • Current: Inactive as of 2012, due to elevated manganese levels.
Reservoirs	
West Hill Springs Reservoir	• 1915: Construction of 210,000-gallon concrete reservoir to store water from West Hill Springs. • Current: Reservoir removal (1988). West Hill Springs water flows continuously into the system.
Academy Reservoir	• 1961: 500,000 gallons steel reservoir, supplied by Academy Pump Station. • Current: Reservoir removed (1978-1980) when Reservoir 8B was constructed.
Reservoir 1	• Est. 1925: Construction of 3.0 million gallons to store water from Coal Creek Springs. • 1975: Replacement of uncovered reservoir with covered 5-MG concrete reservoir. • 2019: Seismic isolation control valve installed on outlet piping. • Current: Primary storage for Coal Creek Springs and can also be filled with water from Well 4. Serves as water supply for the Academy Pump Station and Valley Service Area.
Reservoir 2	• 1975: Construction of a 3.6-MG pre-stressed concrete underground reservoir (dual-purpose facility with tennis court on top) in Lea Hill. • Current: Supplied with several City sources and Reservoir 1. Serves as water supply for Valley Service Area. Design for the addition of a seismic isolation control valve in 2024 with construction expected in 2025.
Reservoir 4A	• 1965: Construction of 1.0-MG steel reservoir in Lea Hill. • 1965: Installation of 12-inch ductile iron pipeline from Porter (8th St NE) Bridge to Reservoir 4A. • 1998: Replacement of exterior and interior protective coatings. • Current: Supplied by Valley Service Area through Lea Hill & Green River Pump Stations. Serves as water supply for Lea Hill Service Area. Addition of a seismic isolation control valve underway with construction anticipated in 2024.
Reservoir 4B	• 1983: Construction of 1.5-MG steel reservoir in Lea Hill. • 1998: Replacement of exterior protective coatings. • 2002-2003: Replacement of interior protective coatings

	• Current: Supplied by Valley Service Area through Lea Hill & Green River Pump Stations. Serves as water supply for Lea Hill Service Area. Addition of a seismic isolation control valve underway with construction anticipated in 2024.
Reservoir 5	• 1981: Construction of 1.0-MG steel reservoir for Lakeland Service Area. • 2015: Painting of the Interior and exterior, installation of seismic isolation control valve and addition of ladder. • Current: Supplied with wells 5, 5A and Terrace View Booster Pump Station. Serves as water supply for Lakeland Service Area.
Reservoir 6	• 2012: Construction of 1.0-MG reservoir in Lakeland Service Area (also provides storage for City of Algona). • Current: Supplied with wells 5, 5A and Terrace View Booster Pump Station. Serves as water supply for Lakeland Service Area and City of Algona.
Reservoir 8A	• 1973: Construction of 1.2-MG steel reservoir in Academy Service Area. • 2002-2003: Recoating of the reservoir's exterior and interior. • Current: Supplied with Reservoir 1 through the Academy Pump Station. Serves as water supply for Academy Service Area. Addition of a seismic isolation control valve underway with construction anticipated in 2024.
Reservoir 8B	• 1980: Construction of 1.5-MG steel reservoir in Academy Service Area. • 2002-2003: Recoating of the reservoir's exterior and interior. • Current: Supplied with Reservoir 1 through the Academy Pump Station. Serves as water supply for Academy Service Area. Addition of a seismic isolation control valve underway with construction anticipated in 2024.
Pump Stations	
Howard Road Site Pump Station	• 1925: Construction of Howard Road Site Pump Station with 5 hydraulic ram-type pumps to move water from coal creek springs to Reservoir 1 & distribution system. • Current: (1962) Operation of ram-type pumps ended.
Coal Creek Springs Pump Station	• 1946: Construction Coal Creek Springs Pump Station to pump water to Reservoir 1 and distribution system (consisted of pump house and an electric pump). • 1947-1952 (exact year unknown): Addition of second pump (2,000-gpm). • 1953: Addition of third pump (3,000-gpm) • 1964: Replacement of two pumps with new 1,500-gpm and 2,500-gpm pumps. • 1999: Replacement of Diesel fuel storage tanks for emergency generators with above-ground, double-walled fuel tanks (easier to inspect for fuel leakage). • Current: Pump station removed in 2003 to make way for Howard CCTF.
Academy Pump Station	• 1960: Construction of Academy Pump Station 1, housing Pumps 1 and 2 (300-gpm and 500-gpm capacity). • 1961: Installation of 2 miles 10" cast iron transmission main from Academy Pump station 1 to Academy reservoir. • 1980: Construction of Academy Pump Station 2, housing Pumps 3 and 4 (750-gpm capacity each), with emergency power generator. • 1980: Installation of 2 miles 14" ductile iron transmission main, connecting Academy Pump Station 2 to Reservoirs 8A & 8B. • 1999: Replacement of Diesel fuel storage tanks for emergency generators with above-ground, double-walled fuel tanks (easier to inspect for fuel leakage). • 2022: Academy Pump Stations 1 and 2 replaced with a single pump station, Academy Pump Station 3, that consists of 4 vertical turbines, variable speed drive pumps with firm pumping capacity of 2,100-gpm. • Current: Pumps water to the Academy Reservoirs (Reservoirs 8A & 8B)
Green River Pump Station	• 1999: Construction of the Green River Pump Station, equipped with 4 pumps (1,170-gpm capacity each), as part of the Interlocal Agreement 2 (IA2) to supply water to CWD & LMWD.

	• 2020: Facility improvements for emergency generator and associated electrical equipment. • Current: Pumps water to the Lea Hill Reservoirs (Reservoirs 4A & 4B).
Game Farm Park Pump Station	• 1988: Construction of the Game Farm Wilderness Park Pump station for water supply and fire protection of the park. • 1992: Installation of 60-gpm domestic pump. • 1993: Installation of 1,000-gpm fire pump. • Current: Pumps water to the Game Farm Wilderness Park from the Coal Creek gravity supply line.
(Lea Hill) Intertie/Booster Pump Station	• 1998-2000: Construction of Intertie Pump Station near Lea Hill Reservoirs, designed to operate in conjunction with Green River Pump Station to serve IA2 partners (using 4 pumps) and to also serve small area at the top of Lea Hill using a "package type" booster-pump station. • Current: Pumps water to small higher elevation service area in Lea Hill. Equipped with a hypochlorite chlorination system.
Lea Hill Pump Station	• 1965: Construction of Lea Hill Pump station with two 600-gpm and one 800-gpm pumps, to boost water from Valley Service Area to Lea Hill Service Area. • 1999: Replacement of Diesel fuel storage tanks for emergency generators with above-ground, double-walled fuel tanks (easier to inspect for fuel leakage). • Current: Pumps water to the Lea Hill Service Area.
Lakeland Hills Booster Pump Station	• 1990: Construction of Lakeland Hills Booster Pump Station, consisting of a three-pump pressure sustaining package system and two large-capacity fire pumps, to pump water from Lakeland Hills Reservoir to Lakeland Service Area. • 2013: Replaced for improved service to boosted Lakeland Service Area, using three low flow pumps (720-gpm capacity each) and two fire flow pumps (3,125-gpm capacity each). • Current: Pumps water to higher elevation service area in Lakeland.
Terrace View Booster Pump Station	• 2010: Construction of Terrace View Booster Pump Station with firm capacity of 1,100-gpm, to supply water from Valley 242 to Lakeland 630 pressure zone. • Current: Pumps Valley Service Area water to Lakeland Service Area. Equipped with hypochlorite feed pump.
Academy East Booster Pump Station	• 2014: Construction of the Academy East Booster Pump Station replaced the single pump Janssen's Addition Pump Station, equipped with three domestic pumps with firm capacity ranging from 750 to 1,250-gpm. • Current: Pumps water from Reservoirs 8A and 8B into Academy Service Area.
Treatment	
Howard Road Corrosion Control Treatment Facility (CCTF)	• 2004: Construction of the Howard Road CCTF (6,300-gpm capacity), to treat water from Coal Creek Springs and Well 1 and boost to Reservoir 1, using three 2,100-gpm booster pumps. • Current: Pumps water to Reservoir 1.
Fulmer Field CCTF	• 2004: Construction of the Fulmer Field CCTF (9,600-gpm capacity), to treat water from Well 2, 6 and 7 and boost to Reservoir 2 and distribution system, using four 3,200-gpm booster pumps. • 2013-2018: Evaluation of Fulmer Field CCTF (along with Wells 2, 6 and 7) to identify improvements to increase the supply and treatment capacity of the existing facilities and infrastructure. • Current: Pumps water to Reservoir 2 and the Valley Service Area.
Distribution Main Improvements (mandated by Environmental Regulations) & Interties	
Intertie with City of Algona	• After 1996: Construction of wholesale interties (combined 1.1-mgd capacity) at: ○ 1149 Industry Drive SW ○ Boundary Boulevard and Milwaukee Ave

	○ Iowa Drive and West Valley Highway ○ 1st Avenue • Emergency Interties at ○ Boundary Boulevard and Celery Ave ○ Boundary Boulevard and O Street
Intertie with City of Bonney Lake	• 2002: Construction of 8" emergency intertie at Evergreen Way, southwest of Lakeland Hills Way • After 2010: Construction of emergency interties at ○ Lakeland Hills Way & 59th Avenue ○ Evergreen Way and Nathan Avenue ○ Olive Avenue, south of Evergreen Loop
Intertie with City of Pacific	• After 2003: Construction of emergency interties at ○ Ellingson Road near Pacific Ave ○ A St SE, north of White River
Intertie with City of Kent	• After 2001: Construction of emergency intertie with 78th Avenue S and S 277th Street
Intertie with LMWD	• Est. 1996 – Construction of 12" wholesale intertie at 30502 132nd Avenue SE (5-mgd capacity) • 1996 – 2002: Construction of emergency interties in ○ 127th Place SE, south of SE 299th Place ○ 124th Avenue SE and SE 300th Way ○ SE 300th & 132nd Ave SE ○ 1998-2000 at SE 288th St & 132nd Ave SE
Intertie with Lakehaven Water & Sewer District (LWSD)	• Est. 1995: Construction of the Aaby Dr. emergency intertie with LWSD at R St. NW (named Intertie #2). • 2004: Transfer of Aaby Dr. pump station and service from City to LWSD. • 2006: Emergency intertie with LWSD at R St. NW (Intertie #2) was removed from service • After 2010: Installation of water meter and control valve vault for 6" emergency intertie at Aaby Dr. and Knickerbocker Dr. (reinstating Intertie #2)
Intertie with City of Tacoma	• Est. 2012: Construction of wholesale interties at: ○ 3240 B St NW (2,200-gpm max. instantaneous flow rate) ○ 29598 132nd Ave SE (4,500-gpm max. instantaneous flow rate) ○ Combined max. flow rate of 5.12 MGD (3,555 gpm) in a 24 hour period (the interties could flow at a higher rate for a portion of the day so long as the 24-hour average meets the contractual peak period flow)
Distribution Main Improvements (mandated by environmental (water quality) regulation)	• 2015: Replacement of 2,760 linear feet of Asbestos Cement (AC) water main with ductile iron main. • 2022: Removal and replacement of approximately 186 service lines with lead goosenecks and approximately 7,075 linear feet of distribution water main with ductile iron main.
System Upgrades	
Supervisory Control and Data Acquisition (SCADA) system	• 1975: Addition of SCADA/telemetry, to control all reservoirs, wells and pumps from the Maintenance and Operations building. • 2015: Extensive upgrade of the SCADA/telemetry system, to improve control of the water utility facilities and replace obsolete components. • 2024: Updated System Platform to AVEVA. Major components and new hardware were replaced to provide more reliable service.
Metering	• 2016: Installation of two master meters for Muckleshoot Indian Tribe (MIT) Casino, to facilitate City and MIT account administration.

	• 2017-2018: Installation of Advanced Metering Infrastructure (AMI) for all customers. The AMI allowed for more accurate meter reads, daily information for quicker detection of leaks, and improved efficiency of billing operations. • 2020 - 2022: Replacement of deduct meters used for irrigation purposes with separate water service tap on the city's main.

1.5 Related Plans and Studies

In preparing this Plan, related studies and plans were reviewed to ensure coordination with adopted documents that affect system planning and operations. The related plans are categorized into two groups for clarity: Internal Studies/Plans Specific to the City and External Plans Influencing City-Wide Water Management. A brief synopsis of these studies and plans are presented below.

Internal Studies/Plans Specific to the City:

Wellhead Protection Plan, City of Auburn, 2014: The City developed a Wellhead Protection Plan to identify and protect groundwater sources. The initial plan was created in 2000 by Pacific Groundwater Group (PGG) and subsequently updated by Robinson Noble in 2008 and 2014. The plan maintains existing wellhead protection areas (WHPAs) and contributes to hazard assessments within these zones. It aligns with county ordinances, impacting land use planning and reflecting in critical aquifer recharge areas as outlined in the King County Comprehensive Plan. Additionally, the plan developed a monitoring system for groundwater sampling, which enhanced operational readiness by providing early warnings of potential contaminations.

City of Auburn Water Resources Program, Pacific Groundwater Group, Inc., 1995-1999: Pacific Groundwater Group conducted a comprehensive groundwater study in response to recommendations of the 1995 Comprehensive Water Plan. The study was documented in a series of reports (listed below), collectively known as the Auburn Water Resources Program Study. The Auburn Water Resources Program assessed the long-term potential for the City's continued use of groundwater for its water supply. The study confirmed substantial quantities of groundwater underlying the valley area and provided the basis for the water supply conclusions for this Plan. This comprehensive program, spanning several years, strategically addresses water rights acquisition by delving into technical studies of the local groundwater system. Two key elements of the program were the installation of monitoring wells and river gauges, and the assessment of the existing City wells in the deep aquifer. The installation of monitoring wells and river gauges not only aids in system planning by understanding groundwater dynamics but also enhances operational efficiency through real-time data collection. The program also included the development of a regional ground-water model (MODFLOW), using the United States Geological Survey (USGS) model program. This provided a tool for analyzing potential withdrawal scenarios, offering valuable insights into optimizing water system operations.

- 1996 Existing Data Hydrogeologic Characterization
- 1996 Preliminary Hydrogeologic Characterization
- Summary of 1997 Hydrogeologic Investigations
- 1997-1998 Test Well Drilling and Installation Program
- 1999 Hydrogeologic Characterization Report and Appendices
- Regional Groundwater Model Report

Bilateral Compliance Agreement (BCA), 1996: This agreement, entered with the Department of Health (DOH) due to copper levels that exceeded the action levels in samples collected in 1993, outlined treatment options and schedules for corrosion control facilities. As a result, new corrosion facilities at the Howard Road/Coal Creek Springs Pump Station and Fulmer Field Park were completed in 2004. The completion of

these facilities in 2002 directly impacts operational efficiency, ensuring compliance with health standards and safeguarding water quality in the long term.

City of Auburn – Public Works Emergency Response Manual, 2022: This electronic manual is only one element of the City's overall Emergency Response Plan, which serves as a guide for management of emergency situations. It was first developed in 1999 in response to the potential impact of Y2K and it is updated annually at the first of the year. The manual is not all-inclusive for every type of disaster that could occur, but it is a valuable tool for dealing with many of the emergency situations that most water utilities could face.

City of Auburn Comprehensive Plan, 2015 and Amendments: This current plan, originally adopted in 2015 in accordance with the State Growth Management Act (GMA) is the City's comprehensive land use plan and policy document. It consists of goals, land use policies, and the Comprehensive Plan maps. The plan may be amended annually as needed. The update of the comprehensive plan is taking place concurrently with the revision of this water system plan.

City of Auburn 2015 Comprehensive Water Plan, City of Auburn Public Works, 2015: The previous Comprehensive Water Plan provided evaluation of needs and recommended improvements to the City system for 2015-2022. In 2021, DOH extended the approval period for the 2015 WSP until May 11, 2026. The plan adopted in 2015 constitutes the basis for this Plan.

Capital Facilities Plan (2023-2028), City of Auburn Finance Department, 2022: Adopted in 2022, this plan is instrumental in both planning and operations. It outlines goals, policies, and implementation programs mandated by the State GMA, providing a roadmap for capital improvements. This directly influences the operational landscape by defining necessary infrastructure enhancements and improvements, aligning with the city's capital improvements program.

Engineering Design and Construction Standards, City of Auburn, 2024: The City updates its Design and Construction Standards as needed, typically on an annual or bi-annual basis. These standards not only guide the planning of new infrastructure but also enhance day-to-day operations by ensuring adherence to the latest industry practices and regulations. The City of Auburn Design and Construction Standards are attached in **Appendix P**.

Water Shortage Contingency Plan, City of Auburn, 2024: The plan establishes actions and procedures for implementing Auburn City Code (ACC) 13.14 during impending or actual water shortages, to maintain levels of service essential for public health and safety, minimize adverse impacts on economic activity, and protect customer's lifestyle; refer to **Appendix R.**

Water Cost of Service Rate Update Study, City of Auburn, 2022: This study informs strategic decisions related to water rates and influences the operational budget.

System Development Charge Study, City of Auburn, 2014: Completed in 2014, this study examines system development charges, offering insights for future infrastructure development. Its findings directly influence the planning of new systems and infrastructure projects and provide a financial basis for expansion.

External Plans Influencing City-Wide Water Management:

King County 2016 Comprehensive Plan, King County Department of Local Services, 2016: The King County Comprehensive Plan establishes land use zoning for areas outside the City limits, but within the RWSA. Additionally, King County provides critical area ordinances and critical aquifer recharge areas that support

the City's wellhead protection efforts. The current King County Comprehensive Plan was first adopted on December 5, 2016, and was later amended in 2020.

Pierce County Comprehensive Plan, 2015 and Amendments: This is a comprehensive plan and policy document for Pierce County. The plan was developed in accordance with the GMA and is amended every two years. This plan influences planning by offering insights into regional policies.

Pierce County Coordinated Water System Plan, 2021: In 1983, all of Pierce County was declared a Critical Water Supply Service Area. In response to this declaration, Pierce County established the first Coordinated Water System Plan to coordinate planning and establish water service areas. The current Coordinated Water System Plan, adopted in 2021 through Ordinance 2018-39s2, influences both regional water planning and City's operational coordination with other systems in the county.

Pierce County White River Basin Plan, 2013: This plan provides a comprehensive guide to storm drainage and surface water management in portions of the White River Basin. Given that the City of Auburn utilizes this basin, the plan significantly influences operational considerations and emergency response strategies during storm events.

South King County Coordinated Water System Plan (CWSP), 1989: This plan, adopted in 1989, defined the initial service area boundaries for the water systems within the Critical Water Supply Area of South King County. The City of Auburn Comprehensive Water Plan, upon adoption, becomes an element of the CWSP.

South King County Ground Water Management Plan (GWMP), 2003: The GWMP was initiated by Ecology with the intent to develop methods to protect the quality and quantity of ground water, meet future resource needs while recognizing existing water rights and provide effective and coordinated management of ground-water resources. This plan is considered in planning for and operation of the City's water system.

Tribal Land Use Plan, Muckleshoot Indian Tribe, 1978: The adoption of the MIT's Zoning Ordinance in 1979, which influences land use within the Muckleshoot Indian Tribe, affects water-related considerations. This plan plays a crucial role in ensuring collaborative water management efforts that respect tribal land use.

USGS Hydrogeologic Framework, Groundwater Movement, and Water Budget in the Puyallup River Watershed and Vicinity, Pierce and King Counties, Washington: Scientific Investigations Report 2015-5068: A collaborative effort involving various entities (Cities of Auburn, Milton, Puyallup, Sumner, and Tacoma; Pierce Conservation District; DOH; Cascade Water Alliance; Lakehaven Utility District; Summit Water & Supply Company; Mt. View-Edgewood Water Company; and The Russell Family Foundation), this report contributes valuable insights into the hydrogeologic framework, groundwater movement, and water budget in the Puyallup River Watershed. It significantly influences both regional water planning and operational considerations, providing a scientific basis for understanding the water dynamics in the watershed.

Other Plans

In addition to the studies listed above, the current Water Comprehensive Plans from the following neighboring water systems (City of Algona, Bonney Lake, Kent, Pacific, CWD, LWSD, LMWD and Highline Water District (HWD)) were considered during the preparation of this Plan.

1.6 Service Area, Maps, and Land Use

The City's RWSA boundaries were initially defined and documented through the South King County CWSP in 1989. The boundaries of the RWSA have been adjusted since 1989. An area of Pierce County was incorporated into the RWSA through the Pierce County Coordinated Water System Planning process (1997) and interlocal agreements with Bonney Lake (1998 and 2016), LWSD (2004), Kent (2006), and LMWD (2006). Copies of the Water Service Area Agreements are provided in Appendix G. The RWSA covers a total area of 16,193 acres; 15,877 acres are in King County and the remaining 316 acres are in Pierce County within Auburn City Limits. A total of 700 acres (4.3 percent) of the RWSA is in unincorporated King County urban and rural areas.

Several water purveyors adjoin the City of Auburn RWSA, as shown in Figure 1-4. These include the cities of Algona, Bonney Lake, Kent, Pacific, and Sumner. Also included are the CWD, LWSD, LMWD, HWD, and MIT. Purveyors with wholesale water agreements and interties are discussed in Section 1.6.1.

Figure 1-5 reflects the City's current land use designations. The City includes a wide range of residential, commercial, institutional, and industrial land uses. Public and quasi-public land uses include parks, open space, and public recreation as well as institutional uses such as schools. Commercial and industrial uses occur primarily in the valley; however, large areas of residential land use and the Downtown Urban Center (DUC) also exist in the valley area.

The Academy and Lakeland Service Areas are primarily residential, although some commercial development is located along Auburn Way South (SR 164) in the Academy Service Area. The Lea Hill Service Area is also primarily residential although other uses include small amounts of commercial and open spaces, and Green River College.

Areas within the RWSA, but outside the City limits, are governed by unincorporated King County land uses which include agricultural, rural and residential land use types as shown in Figure 1-5. The unincorporated King County land uses shown in Figure 1-5 were obtained from King County's open data portal which reflects the current adopted land use designations established in the Comprehensive Plan. Those land use designations reflect the intended long-range use of land of the 20-year planning horizon of the plan.

Figure 1-6 reflects shows the Urban Growth Area (UGA), which is comprised of both the current City limits and potential annexation areas (PAA).

1.6.1 Wholesale Interties

Interties provide a tool that water utilities use to move water between systems to meet supply needs, to increase reliability and respond to emergencies. The City maintains wholesale supply interties with three water systems: City of Tacoma, Algona, and LMWD. The City also has a supply contract with the MIT and the Indian Health Service, dating from 1972, for services along a pipeline at SE 368th PL extending from the City limits into the reservation.

1.6.1.1 City of Tacoma

In 2012, Tacoma agreed to provide water to the City in the quantity of up to 1.0 mgd average day use, 1.8 mgd peak day use, and 1.62 mgd four-day peak use. Two interties were constructed to supply the City: located at 3200 B Street NW and 29600 132nd Avenue SE in Auburn. This agreement will remain in force as long as Tacoma (or its successors in interest of its water system) remains in the business of providing water, and as long as the City meets the terms and conditions of the agreement.

In 2014, Tacoma amended and restated the 2012 agreement with the City to provide a total of 3.5 mgd (2,430 gpm) of average use and 5.12 mgd (3,555 gpm) of peak use combined from the interties. The B Street NW Intertie is limited to a maximum flowrate of 2,200 gpm and the 132nd Avenue SE Intertie is limited to a maximum flowrate of 4,500 gpm. However, the combined use of the interties cannot exceed 5.12 mgd (3,555 gpm) in a 24 hour period.

Figure 1-4 | Adjacent Water Systems

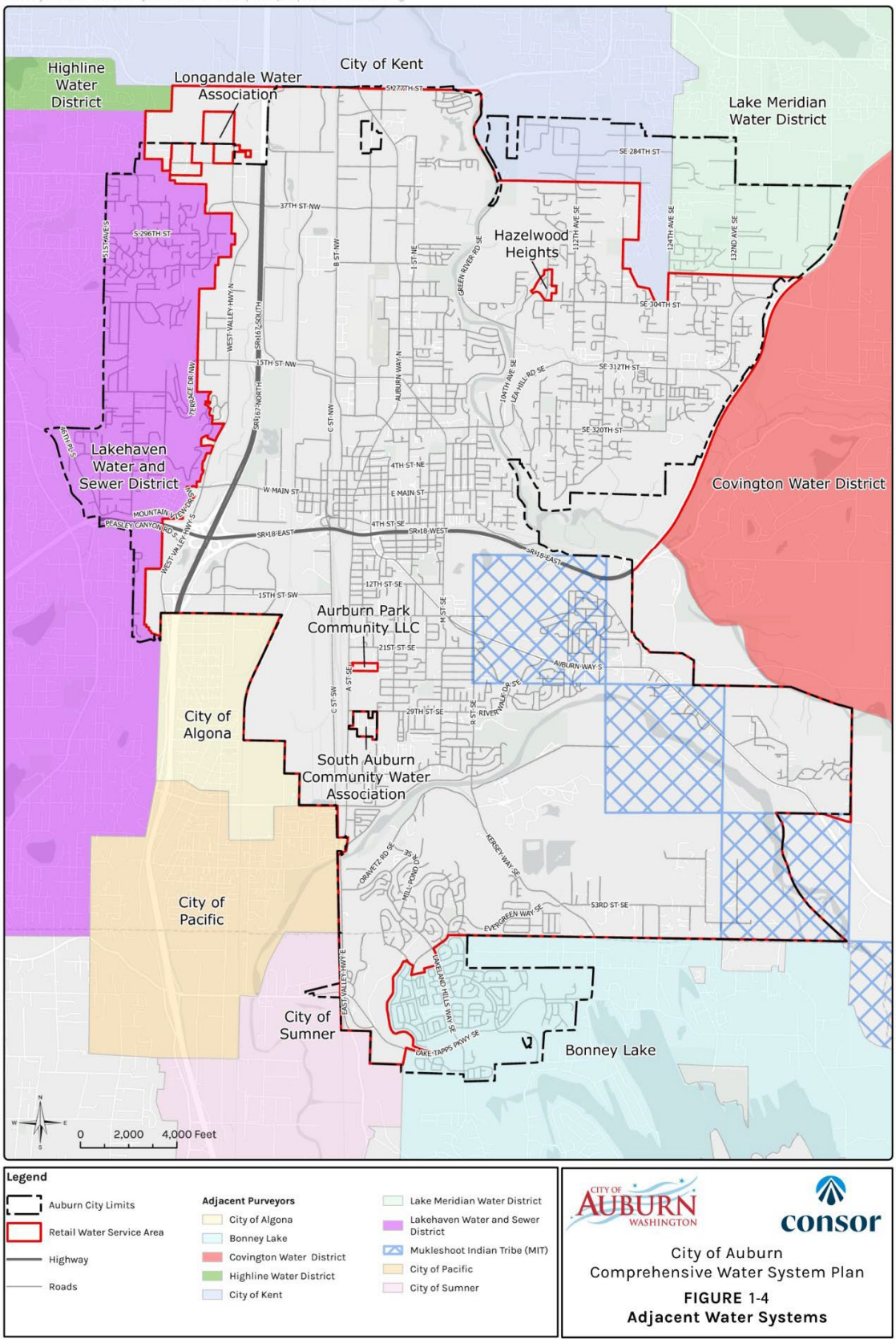


Figure 1-5 | Existing Land Use

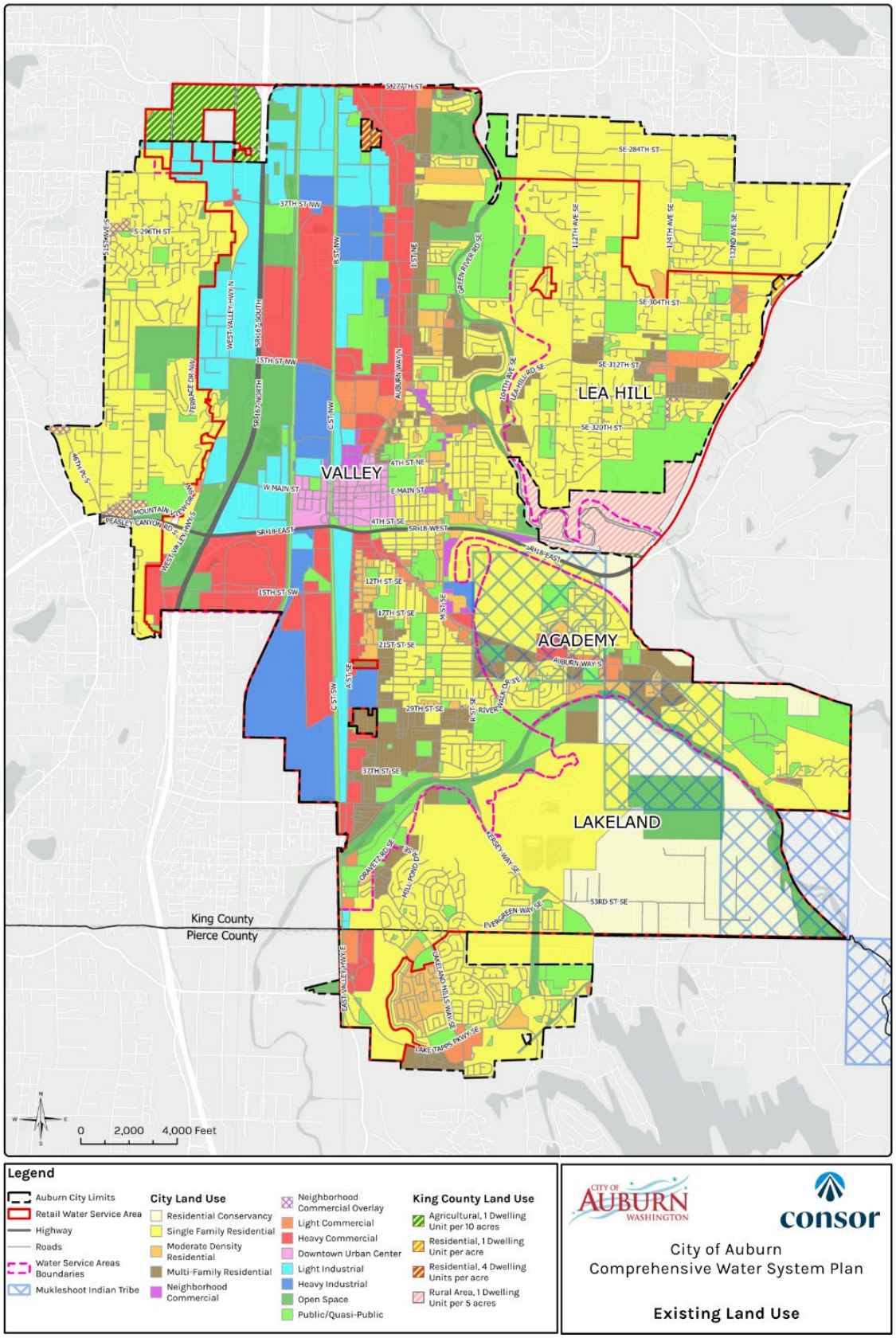
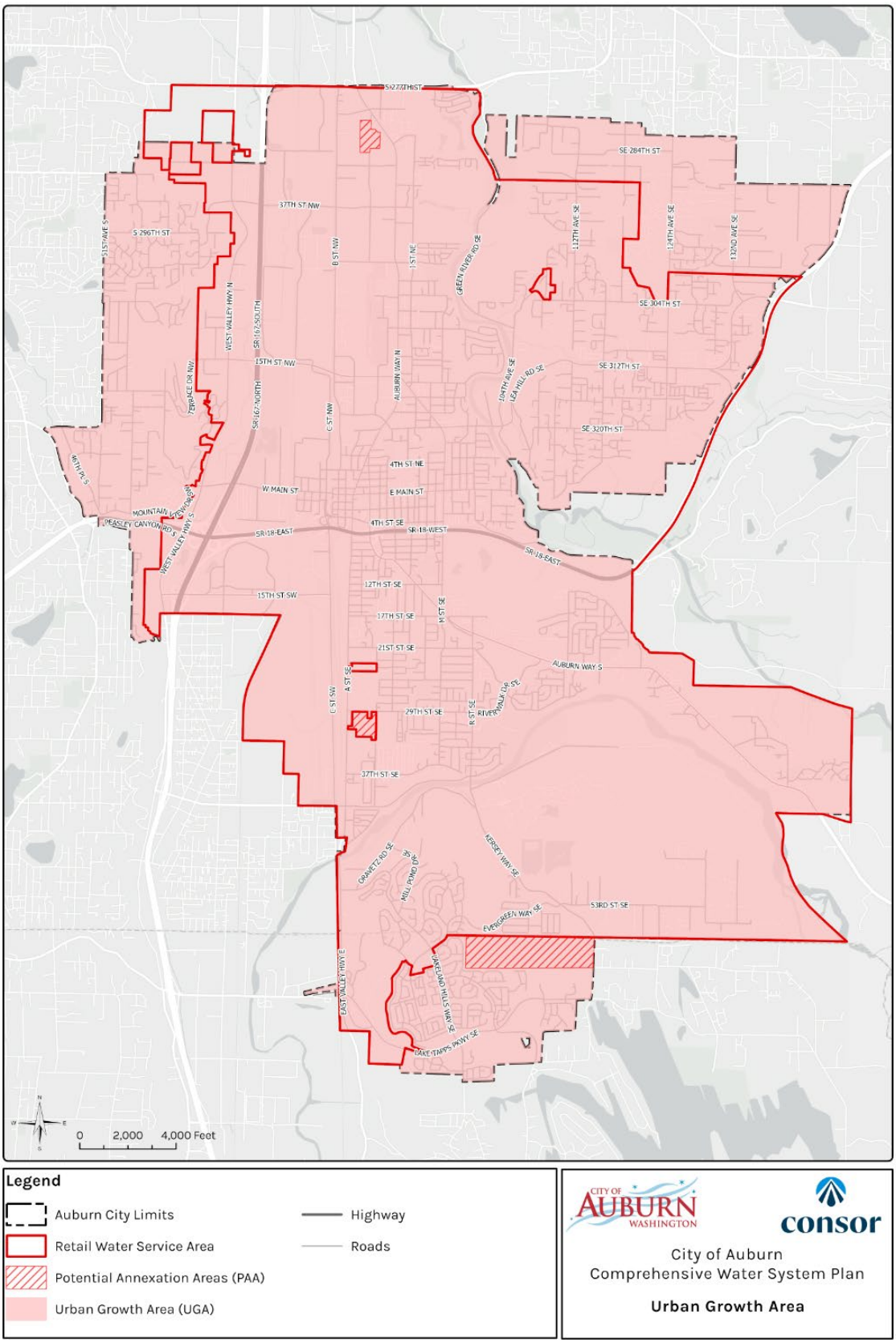


Figure 1-6 | Urban Growth Area



1.6.1.2 City of Algona (Algona)

In 1996, the City and Algona entered into a water supply interlocal agreement (IA3) for the City to provide wholesale water supply to Algona. In 2002, the agreement was superseded with Interlocal Agreement 3A (IA3A). IA3A called for the City to provide for a firm quantified (uninterruptible) wholesale water supply and Algona would provide the City its groundwater rights from the failed well located at the intersection of 3rd Avenue and Washington Boulevard. Per IA3A, Algona also agreed to maintain its 100,000 gallons of system storage and financially participate in an additional 180,000-gallon share of the City's Reservoir 6 storage capacity. Per request in 2016, Algona elected to increase its participation in Reservoir 6 by 100,000 gallons, which accounted for a total share of 280,000-gallon storage capacity. If the City experiences any failure or decreased capacity, the supply of water to Algona may be decreased by the same percentage that is experienced by the City.

Algona is served (per agreement IA3A) through 8-inch meter located at 1st Avenue and by two 8-inch intertie meter stations located at 1149 Industry Drive SW, and at Boundary Boulevard and Milwaukee Avenue. A fourth 8-inch master meter is located near Iowa Drive and West Valley Highway. All the interties are connected to the City's 242 zone.

1.6.1.3 Lake Meridian Water District (LMWD)

An intertie between the City and LMWD was constructed in 1996 as part of Interlocal Agreement 2 (IA2), to enable the District to purchase water from the City. The intertie also allows the City to provide an emergency supply to Kent's East Hill Service Area through LMWD. A provision of the IA2 agreement calls for the district to provide an emergency supply to the City when needed for the Lea Hill Service Area. As part of the IA2, the City agrees to provide up to 2.5 mgd of MDD to LMWD (total maximum day demand of 5.0 mgd).

Per the 2017 Amendment to the IA2, LMWD discontinued regular purchase of water from the City and instead switched their primary supply to CWD. The amendment maintained the intertie with LMWD but modified the conditions of service to interruptible.

1.6.2 Emergency Interties

The City has emergency interties with seven water systems as summarized in **Table 1-3.**

Table 1-3 | Emergency Interties

Water System	Receiver	Location	Auburn Pressure Zone	Mode of Operation	Meter Size	Operated by
City of Algona	City of Algona	Boundary Boulevard and Celery Ave	Valley 242	Manual	N/A	City of Auburn
City of Algona	City of Algona	Boundary Boulevard and O Street	Valley 242	Manual	8"	City of Auburn
City of Bonney Lake	City of Bonney Lake	Evergreen Way SE (southwest of Lakeland Hills Way)	Lakeland 697	Manual	8"	City of Bonney Lake
City of Bonney Lake	Two-way	Lakeland Hills Way & 59th Avenue	Lakeland 697	Manual	N/A	City of Auburn/ Bonney Lake
City of Bonney Lake	Two-way	Evergreen Way and Nathan Avenue	Lakeland 697	Manual	N/A	City of Auburn/ Bonney Lake
City of Bonney Lake	Two-way	Olive Avenue, south of Evergreen Loop	Lakeland 697	Manual	N/A	City of Auburn/ Bonney Lake

Water System	Receiver	Location	Auburn Pressure Zone	Mode of Operation	Meter Size	Operated by
City of Kent	Two-way	78th Avenue S and S 277th Street	Valley 242	Manual	6"	City of Auburn/ Kent
City of Pacific	City of Pacific	Ellingson Road near Pacific Ave	Valley 242	Manual	4"	City of Pacific
City of Pacific	City of Pacific	A St SE (north of White River)	Valley 242	Manual	N/A	City of Pacific
Lakehaven Water & Sewer District (LWSD)	City of Auburn	Aaby Drive and Knickerbocker Drive	Valley 242	Manual	6”	LWSD
LMWD	Two-way	127th Place SE, south of SE 299th Place	Lea Hill 648	Manual	N/A	City of Auburn
LMWD	Two-way	124th Avenue SE and SE 300th Way	Lea Hill 648	Manual	N/A	City of Auburn
LMWD	LMWD	SE 300th & 132nd Ave SE	Lea Hill 648	Manual	8”	City of Auburn
LMWD	LMWD	SE 288th St & 132nd Ave SE	Lea Hill 648	Manual	8”	City of Auburn

1.7 System Policies

The City manages the water utility in accordance with established water system policies that govern various facets of utility operations. The water system policies are established to support a vision or mission and to provide a framework for the design, operation, and ongoing wellbeing of the City’s water utility. The policies establish consistency and ensure that adequate levels of service are provided throughout the system. The policies also provide documentation to current water-system customers, as well as those considering service from the City.

The City’s Water Comprehensive Plan is based upon the following mission statement for the water utility:

“The City will provide for the efficient, environmentally sound and safe management of the existing and future water system within Auburn’s service area.”

For areas outside its municipal boundaries, the City maintains water franchises that allow for construction, operation, and maintenance of its facilities. Water system design and construction in the franchise areas are consistent with franchise requirements and the design and construction standards included in this Plan.

The City’s water system policies and criteria, provided in Appendix A, are grouped within goal statements that are headlined under seven categories: Business Practices, Service Area, Operations and Maintenance, Financial, Planning, Environmental Stewardship, and Design and Construction.

1.8 Duty to Serve

The City recognizes its duty to serve all new service connections within its RWSA when the following thresholds are met per WAC 246-290-106.

- The water system has sufficient capacity to serve water in a safe and reliable manner.
    - To ensure the water system's capacity for safe water delivery, hydraulic analysis is conducted. This involves assessment of peak demand patterns, pressure requirements, and potential system expansions. The goal is to establish and maintain a water supply infrastructure that can reliably and securely accommodate the needs of new connections.
- The service request is consistent with adopted local plans and development regulations.
    - Service requests undergo a comprehensive review to ascertain their alignment with local plans, including the City's Design and Construction Standards.
- The water system has sufficient water rights to provide service.
    - Assessment of water production data is performed for all sources to confirm the water system's capacity and compliance with available water rights.
- The water system can provide service in a timely and reasonable manner.
    - The assessment of the water system's capability to provide service promptly and reasonably encompasses evaluating infrastructure readiness, adherence to construction timelines, and minimizing disruption to existing customers.
    - If a customer or applicant is dissatisfied with a decision made by the City Engineer concerning water service, they may file a written objection with the Public Works Director within 15 working days of receiving the decision. The Director will respond within 15 working days. If the response is unsatisfactory, the appellant may request a hearing with the City's hearing examiner within 30 days.
    - The hearing examiner's decision is final, but can be appealed in superior court following RCW 34.05.510 through 34.05.598.
    - For customers in the city's RWSA located within unincorporated areas of King County, if all city-level appeals are exhausted and unresolved, the dispute may be escalated to the King County Utilities Technical Review Committee (UTRC) in accordance with King County Code (KCC) 13.24.080.

The City will plan to provide water service to all customers within its RWSA, in accordance with the WAC requirements and City Code. Revisions to the City's RWSA will be made only by written agreement and in accordance with local, county and state regulations.

1.9 Local Government Consistency

The City has submitted this plan to DOH, King and Pierce Counties, adjacent utilities, and local governments as part of the Agency Review process. Local government consistency review is completed in accordance

with WAC 246-290-100(7) and WAC 246-290-108 to confirm consistency between the water system plan and local comprehensive plans, development regulations, and other local codes.

The consistency review also supports planning and development, minimizing conflicts and legal entanglements. The completed and signed Local Government Consistency Determination forms (DOH 331-568) are provided in Appendix F.

1.10 Watershed Plan Consistency

The City is in the Duwamish-Green (WRIA 9) and Puyallup-White Watershed (WRIA 10). The City currently has no plans to expand water rights place of use to include any portion of the service area that was not previously within the place of use for the water right when documented in an approved planning or engineering document and as identified in this Plan.

If the City expands water rights place of use, the new area within the water rights place of use service area will be formed in compliance with the terms of WAC 246-290-107 and consistent with the Watershed Plan approved for WRIA 9 or WRIA 10, under RCW 90.54.040(1).

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 2

Basic Planning Data

This chapter's objective is to meet the requirements of WAC 246-290-100 (4)(b), incorporating basic planning data into this 2024 Water System Plan (WSP). It provides current population and water demand information; estimates future population and water demand; validates data; and compares future population and water demand estimates with locally adopted plans.

Projecting realistic future water requirements, or demand, is necessary for planning infrastructure projects and securing adequate water supply to meet future growth. Future water demands are a key component of the water system analyses presented in this WSP and in the City's Capital Improvement Program (CIP). Accurate demand projections require a thorough review of historical water use, predicting where and how much growth will occur, and estimating the future water use for existing and new customers.

The following topics are addressed in this chapter:

2.1 Water Service Area Population
2.2 Water Service Connections and Usage
2.3 Water Supply and Production
2.4 Distribution System Leakage
2.5 Water Supply Characteristics
2.6 Water Supply Reliability Evaluation
2.7 Future Population Projections and Land Use
2.8 Future Water Demand

2.1 Water Service Area Population

The City's current area within the RWSA boundary is smaller than its City limits, with adjacent purveyors serving the portion of the City's population that is outside its RWSA boundary, as shown in **Figure 1-1** presented in **Chapter 1**. As a result, historical City population data does not accurately represent the population served by the City's water system. To calculate the RWSA population, the Housing Unit Method was used, which is presented as an acceptable option for population determination in the Washington State Department of Health's (DOH) Water System Planning Guidebook 2020 Revision. The Housing Unit Method calculates the population based on the number of residential units and the area's average person's per household ratio.

The historical population data for the water system, as calculated using the Housing Unit Method, is presented in **Table 2-1**. These calculated populations are consistent with the numbers the City has reported on its Water Facilities Inventory (WFI), included in **Appendix H.**

Table 2-1 | Historical Population

	2015	2016	2017	2018	2019	2020	2021	2022
Persons per household[1]	2.73	2.75	2.76	2.77	2.79	2.80	2.81	2.82
Single-Family Residential Connections[2,3]	11,600	12,128	11,852	11,857	11,883	11,894	11,985	11,980
Multi-Family Residential Connections[2]	1,045	1,070	1,035	1,044	1,054	1,054	1,064	1,052
Calculated Multi-Family Units[4]	10,450	10,700	10,350	10,440	10,540	10,540	10,640	10,520
Calculated Population Served[5]	60,259	62,704	61,294	61,872	62,535	62,876	63,576	63,450
City Population[6]	78,210	80,362	82,058	84,352	86,353	87,256	88,080	88,750
City Employment (Non-Residential Population)[7]	37,298	39,466	29,487	40,855	41,985	39,092	37,871	N/A

Notes:

1. Persons per household per Washington State Office of Financial Management (OFM). 2021 and 2022 values are projected since OFM data is only available for the census period of 2010-2020.
2. Single and Multi-Family connections per City's water system billing records.
3. Single-Family Residential connections include duplexes per the City's design standards.
4. Assumed units per multi-family connection is 10 per the City's WFI, updated on 3/15/2022.
5. Calculated Population Served is calculated as the number of single-family connections plus the number of multi-family units multiplied by the persons per household.
6. City population per the Washington State OFM records.
7. Employment data is from the United States Census OnTheMap data source using a City-defined selection area.

Based on the calculated historical water system population presented in **Table 2-1**, the City's water system has seen growth in population between 2015 and 2022 averaging a one percent increase annually. The number of connections peaked in 2016 (along with the calculated population), however this was during the time when the City was transferring services to AMI metering, resulting in some apparent fluctuations of reported connections during the switchover that could not be easily rectified. The last row in **Table 2-1** provides the City population as reported by the Office of Financial Management (OFM). The City population has had a similar, steady growth to the calculated water system population, with an average annual growth rate of 1.8 percent annually. The City population as reported by the OFM is larger than the calculated water system population because the RWSA is smaller than the City limits as shown in the Water System Map (**Figure 1-3**). Additionally, growth in parts of the City beyond the RWSA has been greater than the rate of growth experienced within the RWSA. The OFM City population information is provided for reference; the calculated population served will be used for the purposes of this WSP.

2.2 Water Service Connections and Usage

Historical water use, or consumption, data was obtained from City records to characterize the demands of the City's customers. Annual water use data for the years 2015 to 2022 was used to develop historical demand patterns and parameters, which represent current and likely future water use. Two key demand parameters were generated from the data: typical water use per customer classification, and typical water use per equivalent residential unit. These parameters were used as the basis of future demand projections.

2.2.1 Historical Accounts

The City's water customers are divided into eight customer classifications, which are:

- Single-family Residential (SFR).
- Multi-family Residential (MFR).
- Commercial.

- Manufacturing and Industrial.
- Schools.
- Municipal (City Accounts).
- Irrigation.
- Wholesale.

The number of connections for each customer classification is summarized in Table 2-2. Unmetered, also referred to as non-revenue water, also accounts for a portion of the City's water use, however, this classification is not included in Table 2-2. Please note that per the City's standards, SRF connections include duplexes.

Table 2-2 | Historical Number of Connections per Customer Classification

	2015	2016	2017	2018	2019	2020	2021	2022
Single-Family Residential	11,600	12,128	11,852	11,857	11,883	11,894	11,985	11,980
Multi-Family Residential	1,045	1,070	1,035	1,044	1,054	1,054	1,064	1,052
Commercial	1,317	1,386	1,340	1,339	1,333	1,328	1,284	1,244
Manufacturing & Industrial	50	4	4	3	2	2	2	2
Schools	70	64	60	60	60	60	58	55
Municipal (City Accounts)	32	34	33	33	33	33	33	33
Irrigation	459	499	484	499	514	514	620	675
Wholesale	8	8	8	7	5	5	5	5
Number of Connections, Total	**14,581**	**15,193**	**14,816**	**14,842**	**14,884**	**14,890**	**15,051**	**15,046**

As summarized in Table 2-2, SFR connections make up approximately 80 percent of all accounts. The total number of connections has increased by approximately three percent between 2015 and 2022. Variation in the total number of water service connections in 2016 is linked to the rollout of AMI technology from 2016 to 2017. Throughout this transitional phase, there may have been instances of double counting meters in 2016, leading to an inflated number of connections. Subsequently, there was a notable decrease in 2017 as the number of connections were normalized.

A significant change in manufacturing and industrial accounts occurred between 2015 and 2016 due to some meters being reclassified as commercial connections. Manufacturing and industrial services are classified as businesses engaging in the manufacture of products, materials, equipment, machinery, and supplies with a meter size of two inches or larger and a monthly annual average water consumption equal to or greater than 30,000 cubic feet. There were several accounts that did not meet the criteria for this classification and were changed to Commercial classification rate following 2015. The total number of connections from 2016 to 2017 decreased due to low and high flow meters (two meters) being replaced with one meter; this impacted Commercial, Manufacturing and Industrial, and School connections.

The number of SFR, MFR, and commercial connections peaked in 2016, however, as mentioned in the opening paragraph, this is likely due to the fluctuations in the City's transition to AMI metering. Municipal connections remained constant over this period.

Wholesale connections were reduced in 2019 when Covington Water District (CWD) and Lake Meridian Water District (LMWD), formerly known as King County Water District # 111, discontinued regular purchase of water from the City.

2.2.2 Historical Consumption

The City's historical annual water consumption based on City billing data for each customer classification is presented in **Table 2-3** in million gallons (MG); the table does not include non-revenue (unmetered) water.

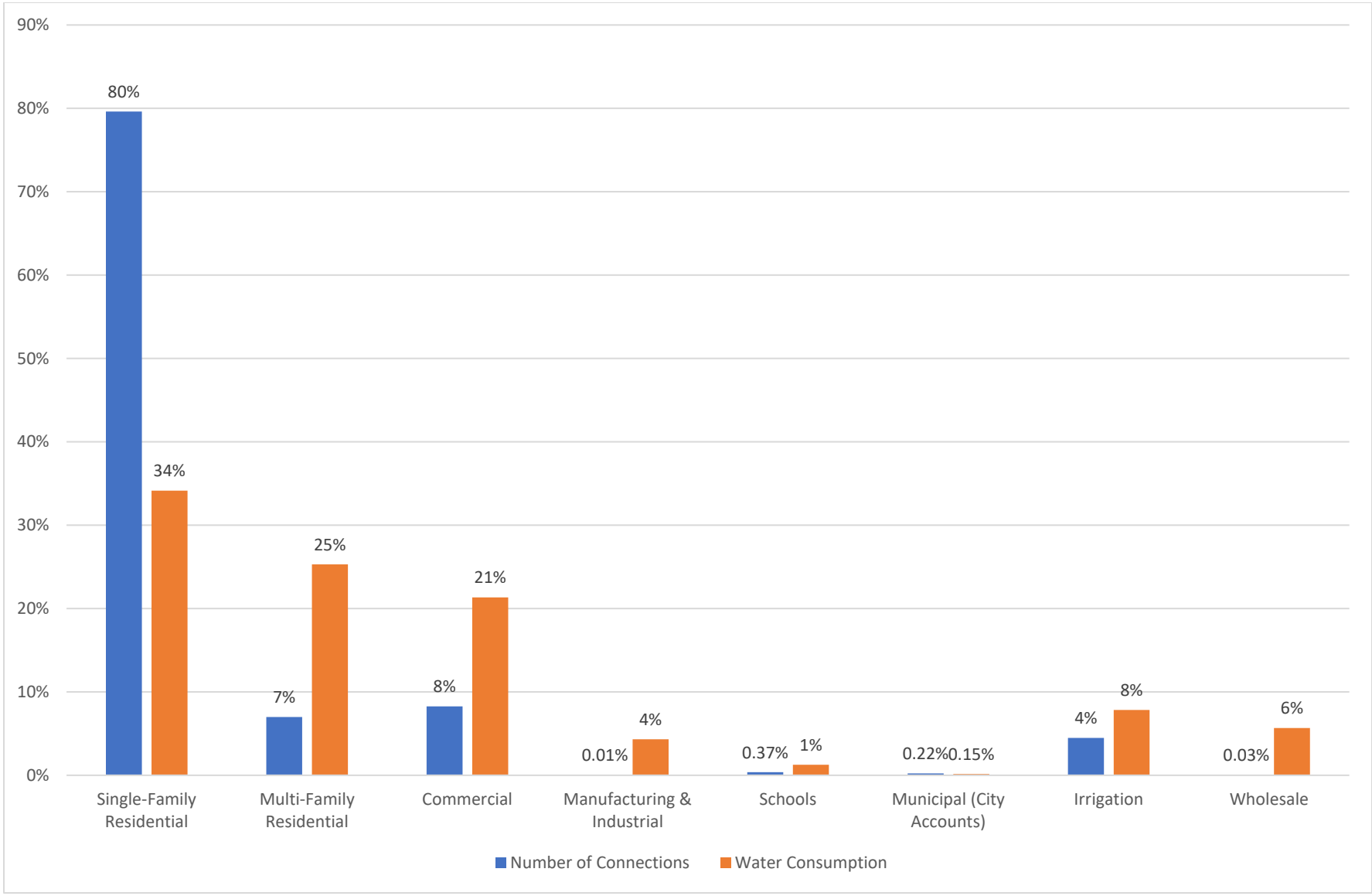
Table 2-3 | Historical Consumption in Million Gallons (MG) by Customer Classification

	2015	2016	2017	2018	2019	2020	2021	2022
Single-Family Residential	774	753	759	836	729	777	796	755
Multi-Family Residential	537	546	523	587	536	553	559	559
Commercial	501	581	595	594	585	461	470	472
Manufacturing & Industrial	170	153	123	124	121	101	94	96
Schools	41	49	56	49	42	30	33	28
Municipal (City Accounts)	5	4	5	5	5	4	4	3
Irrigation	163	162	160	102	102	118	173	173
Wholesale	425	428	153	137	130	131	128	125
Total Consumption, MG	**2,616**	**2,676**	**2,374**	**2,433**	**2,251**	**2,175**	**2,257**	**2,211**

Consumption has slightly declined over the period of record. While SFR and MFR consumption varied from year to year, it generally saw a slight increase during the study period which is correlated to the steady increase in the number of connections presented in **Table 2-2**. SFR and MFR consumption peaked in 2018, which is likely due to AMI meters implementation. Manufacturing and industrial demands decreased between 2015 and 2022 which is attributed to the reduced number of connections (reclassification) presented in **Table 2-2** as well as reduced consumption from Boeing which is the City's only current manufacturing and industrial customer. Commercial and school consumption decreased in 2020 through 2022 which is likely correlated with remote working and schooling that resulted during the COVID-19 pandemic. Wholesale demands also decreased over the planning period since LMWD and CWD discontinued purchase of water from the City. Additionally, no wholesale water was supplied to the Muckleshoot Indian Tribe (MIT) for the future fish hatchery; refer to **Section 2.8** for additional information.

Figure 2-1 presents the percentage of customer connections and annual billed water consumption by customer classification in 2022. Comparing the number of connections and water consumption illustrates the differences in water consumption between the different customer classifications. For example, SFR customers represent 80 percent of the connections, yet only 34 percent of the total consumption in 2022. Conversely, MFR customers represent seven percent of the connections, but 25 percent of the total consumption in 2022. Wholesale customers have six accounts in 2022 (0.04 percent of the total connections), but account for six percent of the total consumption in 2022. Similarly, manufacturing and industrial have two connections in 2022 (0.01 percent of the total connections), but account for four percent of the total consumption in 2022.

Figure 2-1 | Comparison of Number of Connections to Annual Water Consumption per Customer Classification in 2022



2.2.2.1 Historical Wholesale Consumption

Wholesale consumption decreased between 2015 and 2022. From 2015 to 2016 wholesale consumption represented 16 percent of the City's annual water consumption. In 2017 wholesale consumption decreased to six percent and remained relatively constant through 2022.

The City has two wholesale water agreements, one with the City of Algona and the other with LMWD. These agreements are described below, and copies of the agreements are included in **Appendix G**.

The City of Algona relies on the City of Auburn for water supply under the Water System Intertie Agreement, Algona/Auburn Intertie Agreement No. 3A (Agreement 3A). Agreement 3A was amended in 2002 to continue the agreement for the City of Auburn to provide a portion of the City of Algona's long-term water supply needs. Additionally, in 2016 the City of Algona purchased 100,000 gallons of additional storage in Lakeland Reservoir 6, bringing their total storage capacity to 280,000 gallons. Algona's consumption increased in 2018. Water consumption averaged 0.33 mgd between 2015 and 2017, and 0.36 mgd between 2018 and 2022. See **Table 2-6** for annual usage totals.

The City's Interlocal Agreement 2 (IA2) outlines the agreement with LMWD. The City's agreement with LMWD is on an interruptible basis and allows sales up to 2.5 mgd. This agreement was executed in October of 1996 and amended as Resolution 5332 in 2017. The agreement will remain in full force unless terminated by mutual agreement of the participants. LMWD did not purchase wholesale water during the planning period since they discontinued regular purchase of water from the City of Auburn in 2017 per the amendment to IA2. Instead, LMWD switched their primary supply to CWD, however, LMWD still maintains intertie with the City to use as a wholesale water supply on an as-needed basis.

The first amendment to IA2 also included the termination of CWD's wholesale agreement with the City; CWD did not purchase wholesale water during the planning period.

2.2.3 Water Use Per Connection and Equivalent Residential Units

The water use, or demand, of each customer classification can be expressed in terms of equivalent residential units (ERUs) for forecasting and planning purposes. One ERU is defined as the average quantity of water beneficially used by one average, full-time, SFR per day. The ERU calculation does not include non-revenue water or distribution leakage. **Table 2-4** summarizes the annual demand per ERU from 2015 to 2022 in gpd.

Table 2-4 | Historical Annual Demand per ERU (gpd per ERU)

	2015	2016	2017	2018	2019	2020	2021	2022
SFR Consumption (MG)[1]	774	753	759	836	729	777	796	755
Number of SFR Connections[2]	11,600	12,128	11,852	11,857	11,883	11,894	11,985	11,980
ERU_{ADD} (gpd)[3]	**183**	**170**	**176**	**193**	**168**	**179**	**182**	**173**

Notes:
1. Per annual residential consumption from **Table 2-3.**
2. Per residential connections from **Table 2-2.**
3. Calculated as annual consumption divided by number of connections.

To be conservative, an ERU planning value higher than the average was used by the City for demand forecasting. The 75th percentile of all the eight-year values was used to select the planning ERU value of 182 gpd. This methodology is consistent with the City's 2015 Plan. The ERU value of 182 gpd is seven percent lower than the 2015 Plan's ERU planning value of 195 gpd per ERU.

The conversion of total water consumption to ERUs provides a means to express water consumption by non-residential customers as an equivalent number of SFR accounts. The number of ERUs per account is obtained by dividing the water consumption per account by the water use per ERU (182 gpd for this planning period). Table 2-5 presents the number of ERUs per account for each customer classification based on the planning value of 182 gallons per ERU.

Table 2-5 | Historical Demand as Equivalent ERUs per Customer Classification

	2015	2016	2017	2018	2019	2020	2021	2022
Single-Family Residential(ERUs)[1]	11,600	12,128	11,852	11,857	11,883	11,894	11,985	11,980
Multi-Family Residential (ERUs)	8,078	8,194	7,864	8,832	8,067	8,295	8,403	8,411
Commercial (ERUs)	7,542	8,709	8,947	8,933	8,806	6,920	7,066	7,096
Manufacturing & Industrial (ERUs)	2,561	2,298	1,857	1,864	1,817	1,510	1,412	1,437
Schools (ERUs)	614	730	842	742	624	448	497	420
Municipal (City Accounts) (ERUs)	69	62	69	72	82	56	67	49
Irrigation (ERUs)	2,454	2,431	2,412	1,528	1,534	1,775	2,608	2,603
Wholesale (ERUs)	6,395	6,414	2,299	2,057	1,949	1,966	1,925	1,884
Annual Demand Equivalent (ERUs)	**39,314**	**40,967**	**36,141**	**35,884**	**34,762**	**32,863**	**33,963**	**33,881**

Note:

1. The number of Single-Family Residential ERUs is equivalent to the actual number of connections. For all other customer classifications, the planning value of one ERU is equivalent to 182 gpd.

2.2.4 Largest Water Users

The top 20 largest water users for the City's water system are summarized in Table 2-6 and Figure 2-2 with rank assignments based on 2022 consumption. Total consumption values are presented in MG. This list, in conjunction with the information above, provides information on where water is consumed in the system. It is important to note the type of customer classification, because the top 20 water users consume a significant percentage of the total consumption. As mentioned above, SFR connections make up most of the total connections and water consumption for the system, but no individual SFR connections are listed within the top 20 largest water users. Though the City of Algona is comprised of individual SFR's, the City of Algona is one of the top 20 largest water users because it is a wholesale customer supplied via a limited number of connections.

The top 20 water users in the City's water system accounted for approximately 24 percent of the total water system consumption in 2022. LMWD was the largest water user in 2015 and 2016, purchasing over 300 MG per year, but discontinued regular purchase of consumed water from the City in 2017. Copper Gate, Promenade Apartments, and Villas/Reserve are developments that were constructed after 2015, which pushed Tall Cedars and Leisure Manor multi-family users out of the top 20. Boeing and the City of Algona make up almost 50 percent of the top 20 water users' consumption.

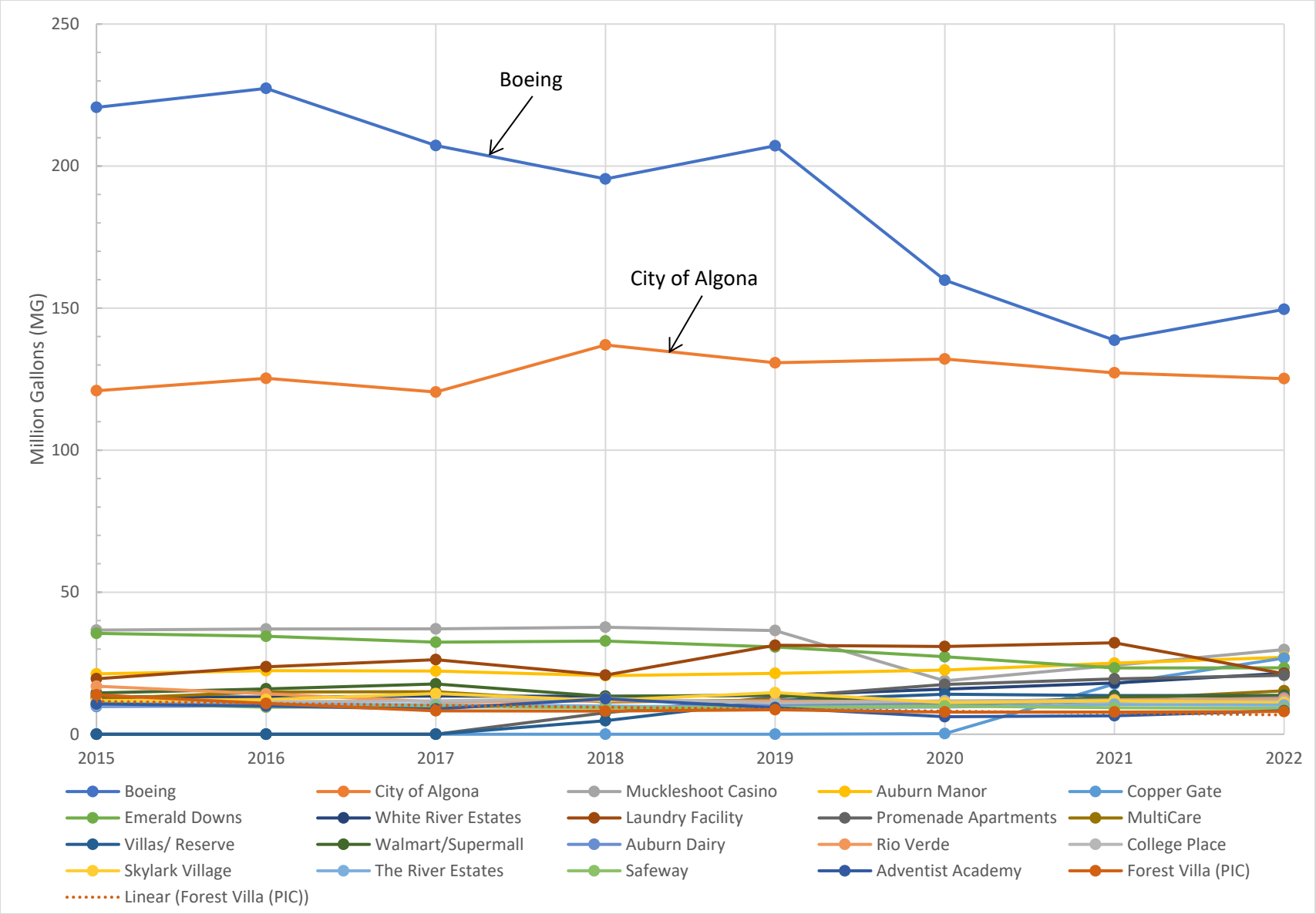
Table 2-6 | Historical Annual Consumption of the Top 20 Largest Water Users in Million Gallons (MG)

Rank[1]	Customer Name	Classification	Service Area	2015	2016	2017	2018	2019	2020	2021	2022
1	Boeing	Manufacturing/Commercial	Valley	220.67	227.34	207.23	195.48	207.15	159.83	138.70	149.57
2	City of Algona	Wholesale	Valley	120.93	125.29	120.46	137.04	130.75	132.07	127.22	125.18
3	Muckleshoot Casino	Commercial	Academy	36.65	37.04	37.08	37.66	36.49	18.79	24.24	29.79
4	Auburn Manor	Multi-Family	Valley	21.25	22.367	22.24	20.61	21.45	22.59	25.03	27.10
5	Copper Gate[2]	Irrigation/Multi-Family	Valley	-	-	-	-	-	0.22	17.70	26.80
6	Emerald Downs	Commercial/Irrigation	Valley	35.51	34.48	32.40	32.81	30.69	27.28	23.33	23.36
7	White River Estates	Multi-Family	Valley	13.24	13.09	13.42	13.36	13.66	15.87	18.06	21.47
8	Laundry Facility	Commercial	Valley	19.52	23.73	26.25	20.81	31.31	30.87	32.19	21.32
9	Promenade Apartments[2]	Commercial/Irrigation/Multi-Family	Lea Hill	-	-	-	7.58	13.00	17.53	19.48	20.74
10	MultiCare	Commercial/Irrigation	Valley	12.45	14.86	14.95	11.35	12.04	11.48	12.32	15.30
11	Villas/Reserve[2]	Commercial/Irrigation/Multi-Family	Valley	-	-	-	4.75	11.84	14.09	13.62	13.66
12	Wal-mart/Supermall	Commercial/Irrigation	Valley	14.54	15.98	17.70	13.31	13.78	9.79	13.26	13.58
13	Auburn Dairy	Commercial	Valley	9.73	10.03	9.73	9.49	10.38	10.63	11.58	12.82
14	Rio Verde	Multi-Family	Valley	16.91	14.21	11.41	11.72	11.72	11.46	12.12	12.48
15	College Place	Multi-Family	Lea Hill	10.81	11.46	11.75	12.59	10.99	11.77	11.89	11.74
16	Skylark Village	Multi-Family	Valley	11.80	12.23	14.30	11.93	14.65	11.13	11.73	11.11
17	The River Estates	Multi-Family	Valley	10.23	10.59	10.38	9.97	9.17	9.59	10.49	10.27
18	Safeway	Commercial	Valley	11.01	9.48	9.81	9.27	9.44	9.95	9.32	9.14
19	Adventist Academy	School/Multi-Family	Academy	10.66	9.92	8.89	12.49	9.33	6.17	6.50	8.26
20	Forest Villa (PIC)	Multi-Family	Academy	13.86	10.83	8.24	8.13	8.63	7.80	7.82	8.00
-	LMWD[3]	Wholesale	Lea Hill	302.89	303.02	29.40	-	-	-	-	-
		TOTAL CONSUMPTION (MG)[3]		**905.86**	**918.45**	**618.85**	**588.28**	**613.31**	**545.32**	**546.66**	**571.67**

Notes:

1. Rank assignments are based on 2022 consumption data.
2. Service location was constructed after 2015 WSP was published.
3. LMWD was the largest water user in 2015 and 2016 but discontinued purchase of water from the City in 2017. Included to contribute to the total consumption.
4. The annual total is the sum of the top 20 largest users from each year; Tall Cedars and Leisure Manor consumption data is not shown but is included in the total.

Figure 2-2 | Historical Annual Consumption of the Top 20 Largest Water Users in Million Gallons (MG)



2.3 Water Supply and Production

The historical average and maximum water demands are important parameters when performing system and supply analyses. The term "water demand" refers to all the water requirements of a system including metered customers, unmetered water use, and unaccounted for water loss such as leakage and theft. For this reason, the City's supply data, which accounts for all water demand, was used to calculate the Average Day Demand (ADD) and Maximum Day Demand (MDD) for each year.

2.3.1 Historical Water Supply

The City produces water through its springs, wells, and, when needed, wholesale water purchases. **Table 2-7** summarizes the amount of water produced and purchased by the City between 2015 and 2022 as MG. The City has not purchased water from the City of Tacoma since 2016.

Table 2-7 | Historical Annual Water Supply by Source in Million Gallons (MG)

	2015	2016	2017	2018	2019	2020	2021	2022
Lakeland Well 5	4.9	0.1	0.2	0.5	1.0	0.9	1.2	3.3
Lakeland Well 5A	54	45	64	76	68	65	72	59
Lakeland Well 5B	-	-	-	-	-	-	-	-
Valley Well 1	-	200	336	93	143	143	57	73
Valley Well 2	-	-	-	270	296	235	305	314
Valley Well 3A	-	-	-	-	-	-	-	-
Valley Well 3B	-	-	-	-	-	-	-	-
Valley Well 4	302	430	421	121	96	84	88	66
Valley Well 6	-	-	-	402	445	349	438	468
Valley Well 7	-	-	-	-	-	-	-	-
Coal Creek Springs	1,456	1,613	1,510	1,315	1,208	1,268	1,338	1,225
West Hill Springs	173	198	114	176	136	133	140	157
Algona Well 1	-	-	-	-	-	-	-	-
Total Production (MG)[1]	2,033	2,487	2,506	2,464	2,410	2,313	2,443	2,395
Total Purchased (MG)	732	321	-	-	-	-	-	-
Total Supply (MG)	**2,765**	**2,808**	**2,506**	**2,464**	**2,410**	**2,313**	**2,443**	**2,395**

Note:

1. Small differences exist between the total production value and the sum of individual production values by source. This is due to the use of raw unprocessed data for individual sources, which was subsequently processed to identify and remove outliers, correct data entry errors and account for anomalies that could distort the overall results. These adjustments ensure that the . Total Production values presented depict the most accurate information available.

Table 2-8 | 2022 Monthly Water Production by Source (MG)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Lakeland Well 5	0.4	0.2	0.2	0.2	0.2	0.2	0.9	0.6	0.1	0.1	0.1	0.1
Lakeland Well 5A	6	5	6	6	6	6	5	6	6	6	-	1
Lakeland Well 5B	-	-	-	-	-	-	-	-	-	-	-	-
Valley Well 1	3	1	-	1	-	3	19	41	5	-	-	-
Valley Well 2	27	25	29	28	29	25	30	29	24	23	21	24

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Valley Well 3A	-	-	-	-	-	-	-	-	-	-	-	-
Valley Well 3B	-	-	-	-	-	-	-	-	-	-	-	-
Valley Well 4	3	2	2	3	-	2	18	27	8	1	-	-
Valley Well 6	41	37	44	41	43	36	44	44	37	35	31	35
Valley Well 7	-	-	-	-	-	-	-	-	-	-	-	-
Coal Creek Springs	90	71	77	62	83	110	129	159	153	112	89	90
West Hill Springs	13	11	13	12	13	13	13	15	14	14	13	13
Algona Well 1	-	-	-	-	-	-	-	-	-	-	-	-

2.3.2 Average Day Demands and Maximum Day Demands

Table 2-9 summarizes the historical ADD and MDD based on production from 2015 through 2022.

To calculate the ADD, the total annual supply was divided by the number of days in the year.

Historical values of MDD are equivalent to the highest production and purchase in one day each year, usually during the summer when irrigation use is highest. The MDD is a key parameter used for supply capacity, pump station discharge rates, reservoir capacity, and pump sizes. The peaking factor is also a key parameter in developing the future MDD projections.

Table 2-9 | Historical Annual ADD, MDD, Peak Day, and Peaking Factor

	2015	2016	2017	2018	2019	2020	2021	2022
Annual Supply (MG)[1]	2,765	2,808	2,506	2,464	2,410	2,313	2,443	2,395
Average Day Demand (mgd)	7.57	7.67	6.87	6.75	6.60	6.32	6.69	6.56
Maximum Day Demand (mgd)	11.62	12.56	11.76	11.60	11.25	12.43	11.77	11.78
Max Day Date (month/day)	6/28	8/25	8/22	7/27	8/1	7/29	7/27	7/29
MDD/ADD Peaking Factor	1.53	1.64	1.71	1.72	1.70	1.97	1.76	1.80

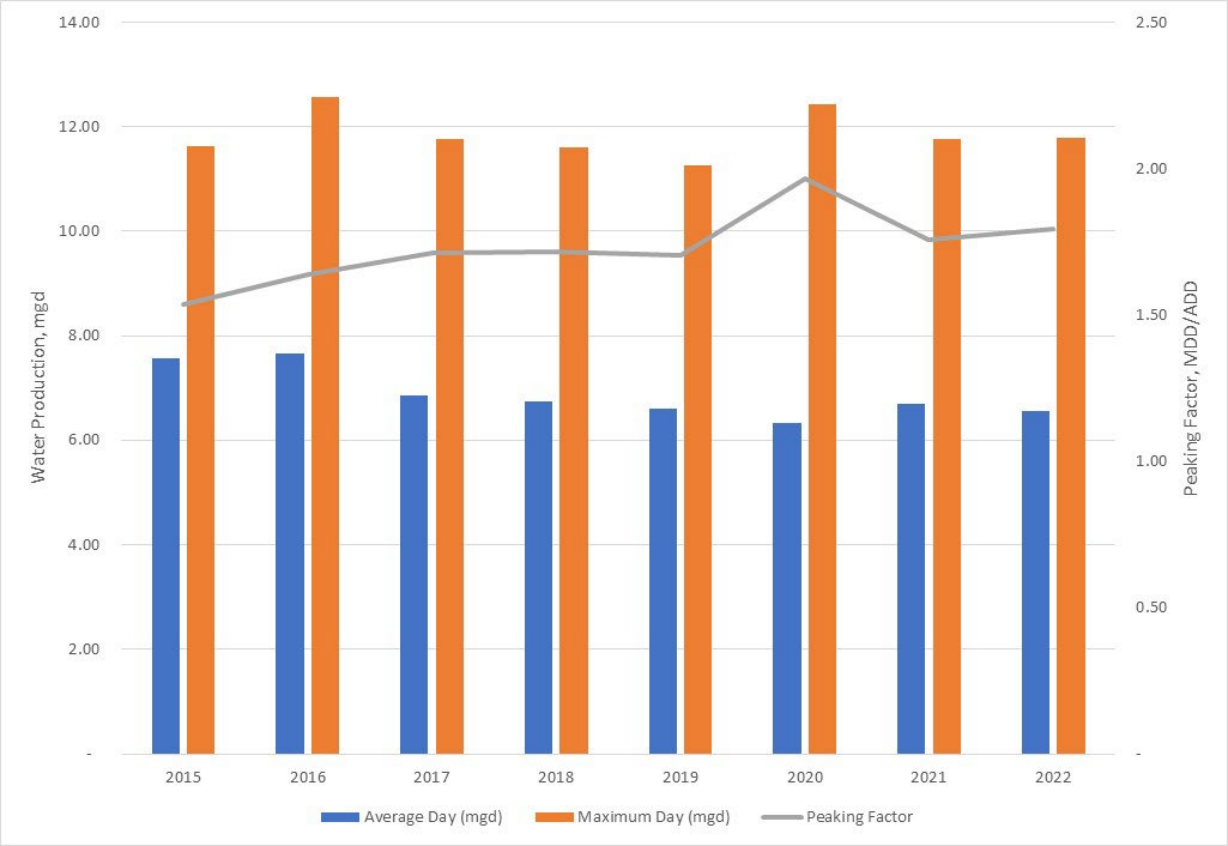
Note:
1. Value is from **Table 2-7.**

The last row of **Table 2-9** presents the historical MDD to ADD peaking factor, which normalizes the historical data to compare between years. The minimum MDD factor was 1.53 in 2015, and the maximum MDD was 1.97 in 2020.

Due to variability of the peaking factor, the City has chosen to use the 75th percentile of the historical peaking factors in demand projections, which is 1.77. This factor provides a better representation of the peaking factors observed historically for water supply predictions.

Figure 2-3 shows that from 2015 to 2022 the ADD has decreased, which is correlated with improved water use efficiency, but the MDD and MDD/ADD peaking factor have increased. This is likely due to warmer and drier summer months and a reduction in the ADD after CWD opted out of their original agreement with the City, terminating their purchase of water, and LMWD stopped regular purchase of consumed water from the City, switching to interruptible supply.

Figure 2-3 | Historical Water Production with Peaking Factor



2.3.3 Peak Hour Demand

Peak Hour Demand (PHD) is the amount of water used, excluding fire flow, during the largest use hour of the year. Because the City does not track hourly production data, PHD was estimated based on Equation 3-1 from the DOH Water Design Manual, which is as follows:

$PHD = (ERU_{MDD}/1440)\ [(C \times N) + F] + 18$

Where **PHD =** Peak Hourly Demand, total system (gpm)
C = Coefficient Associated with Ranges of ERUs (1.6 for systems with more than 500 ERUs)
N = Number of ERUs based on MDD
F = Factor Associated with Ranges of ERUs (225 for systems with more than 500 ERUs)
ERU_{MDD} = Maximum Day Demand per ERU (gpd)

The calculated annual PHD for the system is summarized in **Table 2-10**.

Table 2-10 | Historical Peak Hour Demand

	2015	2016	2017	2018	2019	2020	2021	2022
ERU_{MDD} (gpd)	279	298	312	313	310	358	320	327
Number of ERUs based on MDD	41,586	42,115	37,692	37,068	36,253	34,696	36,747	36,025
PHD (gpm)	12,973	14,019	13,135	12,950	12,567	13,881	13,140	13,159
PHD to MDD Factor	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61

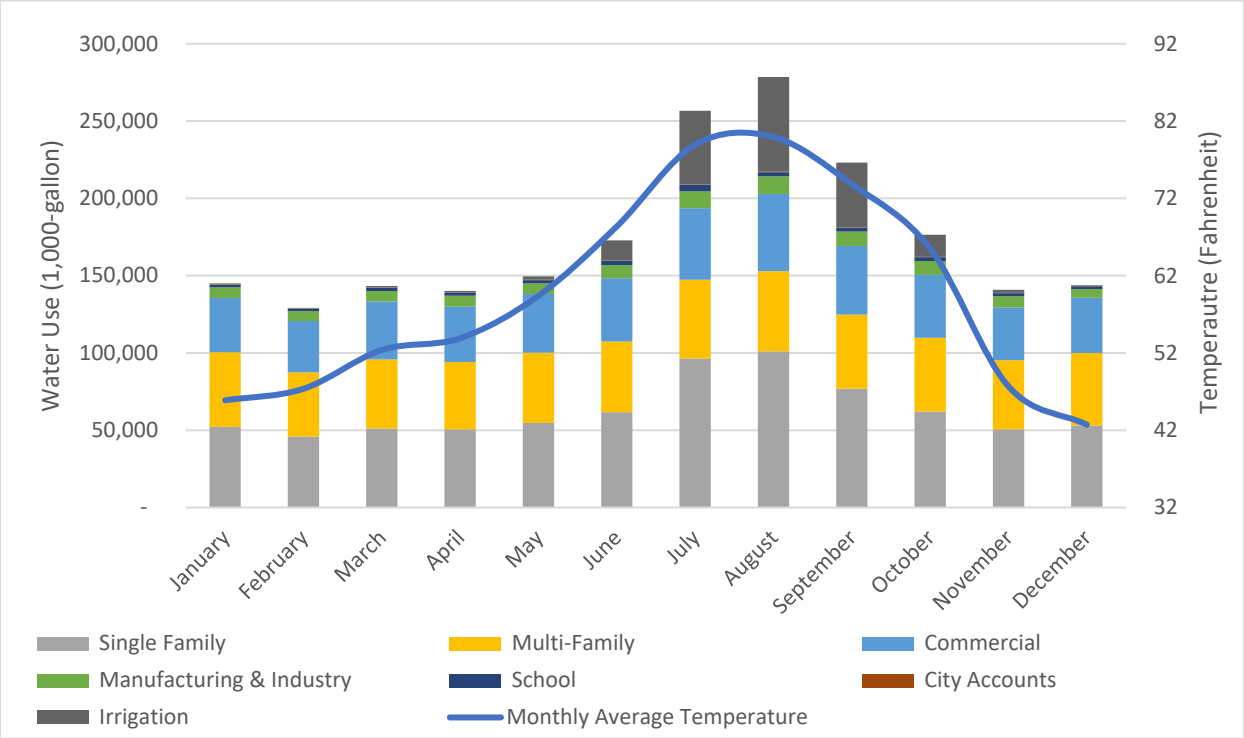
The last row of **Table 2-10** provides the calculated PHD to MDD factor, which normalizes the historical data to compare between years. The calculated PHD factor remained consistent at 1.61 between 2015-2022. Due to this consistency, the City has elected to use the PHD factor of 1.61 in future demand projections.

2.3.4 Seasonal Variations

The pattern of water consumption differs between the customer classifications. Water use increases significantly during the summer when daylight hours are longer, and lawn and landscape watering is prominent. Other outdoor uses, including car washing, pools, and recreation, are also at their highest during summer months.

Figure 2-4 presents the effect that temperature has on water usage by comparing 2022 monthly consumption data per customer classification to the average monthly temperature.

Figure 2-4 | Temperature Effects on Water Usage in 2022



As seen in **Figure 2-4**, SFR and irrigation customers show a significant peak in total consumption during the summer months. Other customer classifications show a smaller similar peak during these months. MFR customers do not show a significant peak during summer monthly because City's policy dictates the use of separate irrigation accounts for all non-SFR accounts. These monthly variations can be used to target water use efficiency efforts and/or to project future water-use patterns for planning purposes.

2.4 Distribution System Leakage

Distribution System Leakage (DSL) represents the difference between production and documented water use (retail, wholesale, and authorized unmetered). It may include inaccurate master and service connection meters, unaccounted-for non-revenue water use, pipeline leakage, and unauthorized use. DSL does not include authorized water usage such as water used for fire protection, flushing, construction, and other

maintenance and operations practices. However, to be credited, this must be accounted for by metering or estimating using credible means.

DSL is calculated as the difference between the total amount of water produced and the sum of water sold and authorized unbilled water usage. DOH requires the three-year average DSL to be under 10 percent to minimize water waste.

The City's estimated DSL for 2015 through 2022 is presented in **Table 2-11**. Revised DSL values have been provided to DOH for 2020, 2021 and 2022 that are lower than the values presented in **Table 2-11**. However, the revised values are not utilized for projections, as the revisions were made after the demand projections and system analysis were completed. Since the values used for demand projections and system analysis are slightly higher than the revised values, the projections are slightly more conservative than would have been necessary otherwise.

Table 2-11 | Historical Distribution System Leakage

	2015	2016	2017	2018	2019	2020	2021	2022
Total Water Supply[1] (MG)	2,765	2,808	2,506	2,464	2,410	2,313	2,443	2,395
Billed Consumption[2] (MG)	2,616	2,676	2,374	2,433	2,251	2,175	2,266	2,214
Authorized Non-Billed Consumption (MG)	7	4	6	13	7	4	5	5
Total Authorized Consumption (MG)	2,623	2,679	2,380	2,446	2,257	2,179	2,271	2,219
DSL (MG)	142	128	126	18	153	133	172	176
Annual Percent DSL	5.1%	4.6%	5.0%	0.7%	6.3%	5.8%	7.1%	7.4%
3-Year Rolling Average (Percent)	6.8%	5.1%	4.9%	3.4%	4.0%	4.3%	6.4%	6.7%
3-Year Rolling Average (MG)	183	139	132	91	99	101	153	161

Notes:
1. From **Table 2-7.**
2. From **Table 2-3.**

For the City's water system, the total three-year rolling average DSL ranged from 3.4 percent to 6.8 percent of the total production meeting DOH requirements and the City's goal. The City's annual average DSL over the period was 5.2 percent. During this period the City maintained a DSL below 10 percent on an annual basis, which is an improvement from the last planning period. Abnormally high authorized non-billed consumption was recorded in 2018 due to unidirectional flushing for the Valley Service Area. Starting in 2021, the billed consumption was updated to track hydrant water used during construction.

The City is committed to maintaining a 3-year rolling average DSL below 10 percent and actively works to identify and eliminate DSL throughout the system through its ongoing leak detection, meter calibration, and repair and replacement programs for water system infrastructure, as detailed in **Chapter 6 – Operations and Maintenance**. Additionally, the City has maintained efforts to reduce non-payment bills and water theft.

2.5 Water Supply Characteristics

The City has a diverse water supply consisting of two springs, ten wells and an emergency intertie with the City of Tacoma; refer to the Existing Facilities Figure provided in **Chapter 1** (**Figure 1-3**). The City's aquifer characteristics are described in several sources; this section draws mainly from the Conceptual Mitigation Plan (CMP) for Water Right Application G1-28404, provided in **Appendix S**.

Wells 1, 2, 3A, 3B, 4, 6, and 7 are in the lower alluvial aquifer in the Auburn Valley, referred to as the Valley Wellfield. This wellfield is mostly confined by the Osceola Mudflow, an important aquitard in the Auburn Valley depicted in Figure 4 of the CMP. Groundwater discharge from the upland aquifers is the primary source of recharge to the lower alluvial aquifer, which hosts all the City's wells. Groundwater generally moves upward in the valley aquifers and moves horizontally at approximately one to four feet per day. Alluvial groundwater from the White River also recharges the Green River alluvial aquifer. Groundwater in the vicinity of Wells 2, 6, and 7 discharges into the Puget Sound via the Green River and the Duwamish River valley. Wells 2, 6, and 7 are located northeast of downtown Auburn and collectively referred to as the Fulmer Wellfield. Wells 1, 3A, 3B, and 4 are in the White River Drainage Basin and Wells 2, 6, 7 and West Hill Springs are in the Green River Drainage Basin.

Wells 3A, 3B and 7 are not currently in use due to high manganese concentrations, however the City plans to install manganese treatment at each of these facilities to bring them back online. The City has a pending water right application for 13,443 acre-feet per year from the existing Wells 6 and 7 and a future Well 8. The City has sufficient water rights to meet current demands, 10-year, and 20-year demand projections, as shown in the Water Rights Self-Assessment Form provided in Appendix I. Mitigation obligations due to the proposed water right for Wells 6, 7, and 8 are listed below and are described in detail in the CMP:

- Mitigation of impacts to Green River,
- Mitigation of impacts to White River, and
- Mitigation of impacts to Mill Creek.

Wells 5, 5A, and 5B are in the Upland Wellfield and constructed within the Lakeland Service Area. The upland aquifers are recharged through precipitation and leakage from Lake Tapps and discharge into the White River system. Once Well 5B came online, the City discovered that the aquifer was not recovering. Well 5B has been offline since 2006. The safe yield of Wells 5 and 5A have been decreased from their design capacity due to a drop in the aquifer's capacity. Specific information on the individual wells and their associated water rights are provided in Section 3.4.1.

West Hill Springs draws from an unnamed confined aquifer. The spring source water flows by gravity into the Valley Service Area, although flows vary depending on aquifer conditions, and discharges into Mill Creek, which flows into the Green River.

Coal Creek Springs is the largest active water supply for the City and draws from a confined aquifer, however its flow varies depending on aquifer conditions. Coal Creek Springs collection system is located at the base of Lake Tapps Upland and is in the White River Drainage Basin. Further aquifer details are provided within the Wellhead Protection Program (WHPP) provided as Appendix T.

The City also owns two additional wells: the Algona Well 1 and the Braunwood Well. Algona Well 1 was acquired by the City in 1996 but has since been taken offline due to operational issues.

The City plans to use a groundwater flow model being developed by the USGS to predict potential impacts to surface water.

2.6 Water Supply Reliability Evaluation

The City's active water sources have maintained current production capacities and are deemed reliable, as they have back-up power sources available. The production of some water sources is limited by pump or intake capacity, as mentioned in Section 2.5, however all production is managed to be within available water rights and is managed by the physical capacity of each facility as summarized in Table 2-12.

Table 2-12 | Summary of Source Water Pumping or Production Capacity Compared to 2022 Maximum Daily Production

Source	Service Area	Pumping/Production Capacity (gpm)	Maximum Daily Production[1] (gpm)
Well 5	Lakeland	760	640
Well 5A	Lakeland	180	180
Well 5B	Lakeland	--[2]	--
Well 1	Valley	2,100	2,100
Well 2	Valley	1,600[4]	1,470
Well 3A	Valley	--[2]	--
Well 3B	Valley	--[2]	--
Well 4	Valley	2,600	1,796
Well 6	Valley	1,800	1,777
Well 7	Valley	--[2]	--
Coal Creek Springs	Valley	3,500[3]	4,383
West Hill Springs	Valley	600	563
Algona Well 1	--	--[2]	--
TOTAL		**13,140**	**12,909**

Notes:

1. Maximum daily production per source is the maximum production rate recorded in 2022.
2. The facility is currently offline. No production capacity is available without facility improvements.
3. Water rights for Coal Creek Springs allow for a Qi of 6,732 gpm. 3,500 gpm is the typical historical production capacity limitation experienced. The City is currently investigating the possible factors influencing the feasible withdrawal from this source.
4. The pump at Well 2 was replaced in 2023 and now has a capacity of 1,115 gpm.

Calculations presented in the Water Rights Self-Assessment Form (**Appendix I**) conclude that the City's existing water rights are anticipated to be adequate to meet the current, 10-year, and 20-year projections for maximum instantaneous flows (Qi) and total annual withdrawal (Qa).

However, the City does not have the infrastructure required to withdraw from all water sources, and some sources have underlying production restrictions that require further evaluation. Several facility improvement projects are required to maximize production and obtain the full water rights. Furthermore, potential demand from LMWD was not included in the assessment, as they have an interruptible wholesale agreement with the City which is a secondary priority to the City's demand. Currently, the City's interties with the City of Tacoma provide additional wholesale water for purchase if necessary to meet demands, however the City has not purchased water from Tacoma since 2016.

The City has established a policy of maintaining the capability to supply the MDD while the largest water source is out of service. The system analysis documented in **Chapter 3** confirms that with projected demands over the 20-year planning period, the City will maintain the capability to meet MDD if the largest pumping source is out of service. This evaluation includes the Tacoma interties as available sources to meet this need and excludes the capacity of facilities that are offline or not operational.

Of the twelve sources, only Wells 5 and 7 are currently without a standby power source. Standby power will be added to Wells 5 and 7 as part of CIP projects discussed in **Chapter 8.** The Fulmer Field Corrosion Control Treatment Facility has backup power.

The Game Farm Park Pump Station, Lea Hill BPS, and Intertie Pump Station are the only pump stations without a standby power source or connection. Backup power will be added to the Lea Hill BPS and the Intertie Pump Station as part of a capital projects discussed further in **Chapter 8**. The Game Farm Park Pump

Station is a small facility that serves a recreational area and does not serve residential or commercial properties, therefore back-up power is not a critical element.

2.6.1 Use Impacts on Instream Flows

New water right appropriations in the Green-Duwamish Basin are subject to instream flow (ISF) regulations as described in the CMP and WAC 173-509. These ISF are senior to the City's recent water rights application G1-28404. This requires mitigation for potential impacts to the Green River when instream flows are not met, such as predicting when streamflow will drop below ISFs as well as determining the lag time associated with impacts to instream flows from groundwater withdrawals. The CMP includes the following detailed description of the streamflow characteristics:

> "A review of historical streamflow data indicates that on average streamflow's are below the ISFs at the Auburn gauge approximately 20 percent of the time (Table 3). Streamflow's are generally more often below the minimum ISFs during the summer months, falling below the minimum ISFs 35 percent to 61 percent of the time between June and September. The flows are frequently above the minimum ISFs during the spring and winter months but can drop to below ISFs at any time of the year. For example, in April, streamflow falls below the minimum ISFs approximately 3 percent of the time (4.1.2)."

The City's current rights are senior to the instream rights and therefore not effected by the instream flow limitations, however as stewards of the watershed, the City has an aggressive water use efficiency program described in Chapter 4 meant to limit the volume of withdrawals, especially during the dry season. The City has a minor surplus of both annual volume withdrawn (Qa) and maximum instantaneous flow rate withdrawn (Qi) to meet MDD through the 20-year planning period. However, several facility improvements are required to make the withdrawals feasible.

2.6.2 Wholesale Interties

The City has three wholesale interties, described below and in further detail in Section 1.6.2.

City of Algona

The City has supplied water to Algona on a regular basis since 1996, when interlocal agreement IA3 was negotiated. A superseded agreement, IA3A, was negotiated in October 2002 which reflects the current status. The agreement will remain unless terminated by mutual agreement of the City and Algona. Currently, Algona is served through the metered Boeing Welded Duct Intertie and by two eight-inch, manually operated meter stations located at Boundary Boulevard and Industry Drive North, and at Boundary Boulevard and Milwaukee Avenue.

LMWD

An intertie between the City and LMWD was constructed in 1996 as part of IA2 to enable LMWD to purchase water from the City. The manually operated intertie also allows the City to provide an emergency supply to Kent's East Hill Service Area. The City agreed to provide up to 2.5 MGD average day and 5.0 MGD maximum day use. A provision of the agreement calls for LMWD to send an emergency supply of water to

the City when needed for the Lea Hill Service Area. The IA2 agreement also included several improvements to allow delivery of water:

- The Green River Pump Station and pipelines to deliver additional water into the Lea Hill Service Area
- The Intertie Pump Station and pipelines to deliver water from the Lea Hill Service Area to LMWD
- Construction of two additional wells (Wells 6 and 7).

LMWD discontinued regular purchase of water from the City in 2017 per the amendment to IA2, however LMWD still maintains the intertie with the City to use as a wholesale water supply on an as-needed basis. This interlocal agreement has a term of sixty years, commencing in 2017.

City of Tacoma

In 2012, Tacoma agreed to provide water to the City in the quantity of up to 1.0 MGD average day use, 1.8 MGD peak day use, and 1.62 MGD four-day peak use. Two interties were constructed to supply the City's Valley pressure zone: located at 3200 B Street NW and 29600 132nd Avenue SE in Auburn. In 2014, Tacoma amended and restated the 2012 agreement with the City to provide a total of 3.5 mgd (2,430 gpm) of average use and 5.12 mgd (3,555 gpm) of peak use from the interties. The B Street NW remotely operated intertie is limited to a maximum flowrate of 2,200 gpm and the 132nd Avenue SE Intertie is limited to a maximum flowrate of 4,500 gpm. However, the combined use of the interties cannot exceed 5.12 mgd (3,555 gpm) in a 24 hour period. This agreement will remain in force as long as the City of Tacoma remains in the business of providing water, however the City has not purchased water for consumption from the City of Tacoma since 2016.

2.6.3 Emergency Interties

Emergency interties are an important tool that helps water utilities increase reliability and respond to emergencies. The City has emergency interties with seven water systems, as described in Section 1.6.2 and summarized in Table 1-3.

2.6.4 Potential Interties

The City has an interest in acquiring additional interties that would enhance the reliability of water service in the City and among adjacent purveyors. Tacoma Public Utilities constructed the Second Supply Pipeline Project, which runs through the north end of the City's RWSA between 30th and 37th Streets NE. In addition to the B Street NW and 132nd Avenue SE interties, a third turnout was constructed as part of the pipeline project in the Valley Service Area. The City does not currently plan to develop this turnout but may do so in the future.

2.7 Future Population Projections and Land Use

2.7.1 Demographic Forecast

Demographic forecasts provide an estimate of future population and employment. The City is a member of the Puget Sound Regional Council (PSRC), which develops demographic analyses for the central Puget Sound region (King County, Kitsap County, Pierce County, and Snohomish County). The demographic projections are developed based on local planned development capacities and regional policies adopted by the PSRC Vision 2050. Vision 2050 established the region's strategy for accommodating population and employment growth to maintain the high quality of living, economic prosperity, and a healthy environment

through the year 2050. Through this planning process, the City is required to plan for a specific number of additional housing units and jobs.

Consistent with the Washington State Growth Management Act (GMA), the City uses the Vision 2050 growth values as the basis of the demographic projections.

Demographic projections are based on the PSRC's 2044 forecasts for housing, population, and employment for each Transportation Analysis Zone (TAZ) within the City's RWSA, as the City's policy is to serve all customers within its RWSA. Additional information on the City's existing land use, future zoning, demographic projections, and corresponding rates of growth are detailed in this Section.

2.7.2 Future Land Use and Zoning

Land use and zoning regulations provide important information in determining future water requirements. Land use and zoning determines the area available for various types of development including both SFR and MFR development, as well as commercial and other types of land use that provide the economic base necessary to support residential development. The housing, population and employment projections developed for the 2024 Periodic Comprehensive Plan are based on the employment and housing targets provided by King and Pierce counties that the City must accommodate over the 20-year planning horizon. This consistent approach is encouraged by the Washington State GMA and should result in predictable and stable land uses over longer planning periods.

Future land use and zoning designations for the City's RWSA are shown on the Comprehensive Zoning Map provided as Figure 2-5. Land uses in unincorporated King County which are part of the RWSA, but beyond City limits are anticipated to remain consistent with current designations, as the current land use designations reflect the intended long-range use of land for the 20-year planning horizon in the current Comprehensive Plan; additional data for future land use designation for unincorporated King County are not currently available. Zoning designations implement the land use identified in the City's Comprehensive Plan; therefore, the current land use reflects the City's historical zoning. House Bill 1337 and House Bill 1110, both effective as of July 2023, are geared at expanding housing options. As such, the City has adopted future zoning to allow for accessory dwelling units within areas previously dedicated to single-family detached housing. Table 2-13 summarizes the updating zoning designations and fire flow requirements. Note that the required fire flow in some zoning designations will be determined on a case-by-case basis pending development or re-development type. Fire flow requirements for portions of the RWSA located in unincorporated King County are also captured in Table 2-13.

Three of the updated residential zoning designations presented in Table 2-13 allow for Accessory Dwelling Units (ADUs). Policies related to ADU water service metering and connection fees are included in Appendix A. The demographic population projections are expected to be sufficient to account for growth that is realized by the additional ADUs within the service area. The demographic population projections are discussed in Section 2.7.3 and demand projections are discussed in Section 2.8.2. Required fire flow for ADUs will be determined on a case-by-case basis pending development or re-development type.

The City includes a wide range of residential, commercial, institutional, and industrial land uses. Public and quasi-public land uses include parks, open space, and public recreation as well as institutional uses such as schools. Commercial and industrial uses occur primarily in the Valley Service Area; however, large areas of residential land use and the Downtown Urban Center (DUC) also exist in the Valley Service Area.

The Academy and Lakeland Service Areas are primarily residential, although some commercial zoning is located along Auburn Way South (SR 164) in the Academy Service Area. The Lea Hill Service Area is also

primarily residential although other uses include small amounts of commercial and open space, and Green River College.

Areas within the RWSA, but outside the City limits, are governed by King County zoning. Land use was assumed to be consistent with zoning in these areas. The area in the northwest corner of the RWSA, west of SR167 and north of S 287th Street is zoned for Agriculture. A second area is located near Auburn Narrows State Park, which is north and west of SR18. This area includes Rural Residential, as well as Park and Greenbelt zoning. The City does not currently provide service in this area; however, it is willing to provide service to customers meeting the Service Area Policies. There are two additional unincorporated "pockets" of urban residential zoning within the RWSA that the City currently serves, where the southern area also contains a single parcel of Industrial zoning. The King County zoning was used in the demographic analyses.

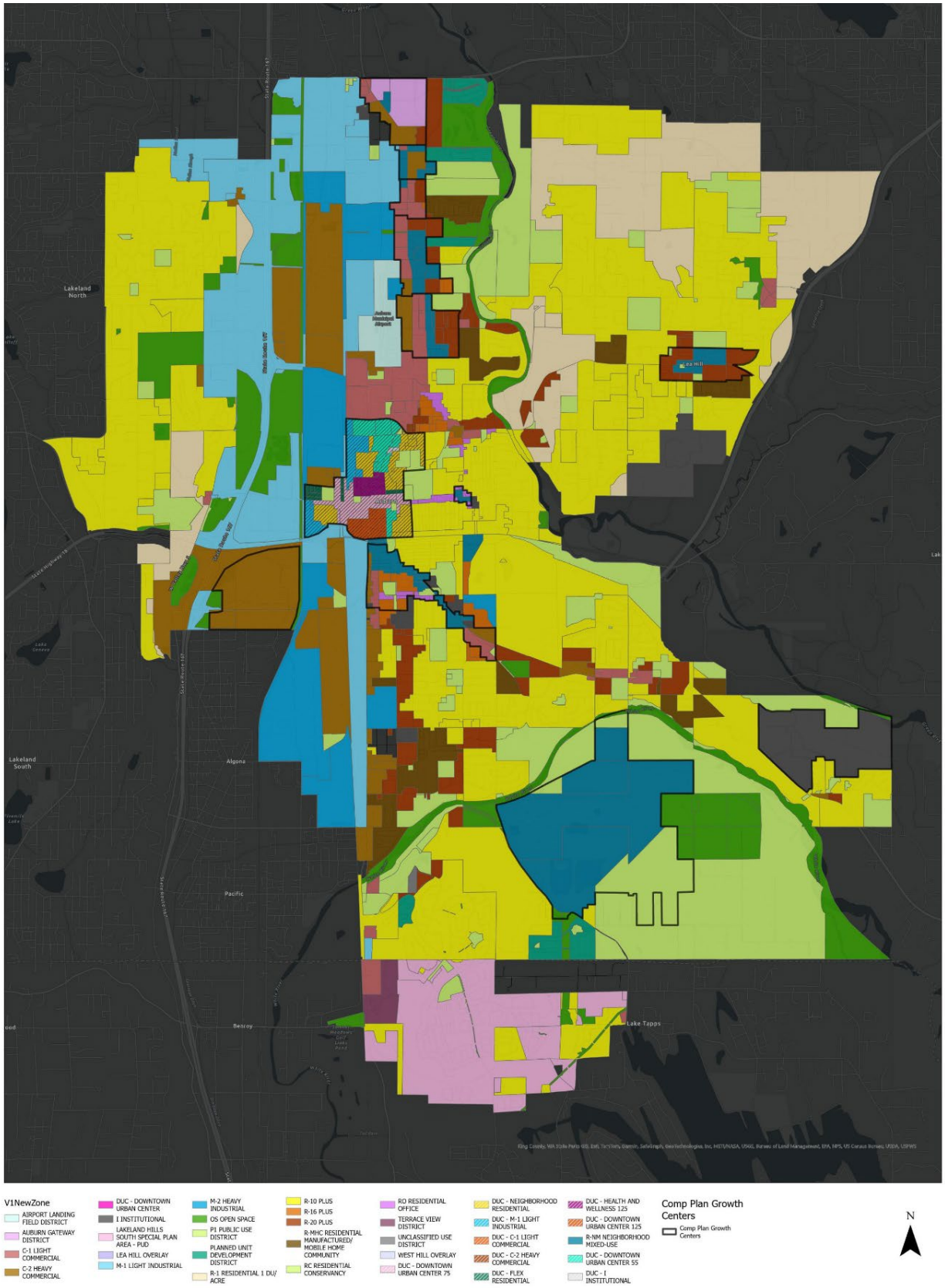
Table 2-13 | Updated Zoning Districts and Fire Flow Requirements

Zoning District	Land Use	Definition	Fire Flow Requirement (gpm)
RC RESIDENTIAL CONSERVANCY	Residential Conservancy	No change	1,500
R-1 RESIDENTIAL 1 DU/ACRE	Neighborhood Residential One	No change	1,500
R-10 PLUS[1]	Neighborhood Residential Two	Single family, townhouse, duplex, triplex, fourplex, two-story stacked flats, cottage housing-4-6 units/lot ADUs	1,500 - 2,500
R-16 PLUS	Neighborhood Residential Two	R-10, plus five-plex, six-plex, 3 story stacked flats, courtyard apartments, apartment buildings and mixed use up to 20 units ADUs	2,500
R-20 PLUS	Neighborhood Residential Three	R-16 plus apartment buildings, and mixed use over 20 units ADUs	2,500
R-NM NEIGHBORHOOD MIXED-USE	Mixed Use	R-16 and C-1 Uses + Mixed-use (horizontal or vertical) encouraged	2,500
R-MHC RESIDENTIAL MANUFACTURED/MOBILE HOME COMMUNITY	Neighborhood Residential Three	No change	2,500
RO RESIDENTIAL OFFICE	Mixed Use	Smaller scale R-NM with emphasis on conversion of existing structure	2,500
C-1 LIGHT COMMERCIAL DISTRICT	Commercial	Generally the same as existing	2,500
C-2 HEAVY COMMERCIAL DISTRICT	Commercial	Generally the same as existing	2,500
AUBURN GATEWAY DISTRICT	Mixed Use	North Auburn Subarea Use	2,500
M-1 LIGHT INDUSTRIAL DISTRICT	Industrial	Generally the same as existing	2,500
M-2 HEAVY INDUSTRIAL DISTRICT	Industrial	Generally the same as existing	2,500
AIRPORT ZONE	Industrial	No change	2,500
P1 PUBLIC USE DISTRICT	Public/Quasi-Public	Public schools, recreational spaces, police stations, fire stations, cemeteries	2,500

Zoning District	Land Use	Definition	Fire Flow Requirement (gpm)
I INSTITUTIONAL USE DISTRICT	Public/Quasi-Public	Private schools, Green River College, large campus development	2,500
OS OPEN SPACE	Open Space	No change	-
DUC - DOWNTOWN URBAN CENTER 125	Downtown Urban Center	DUC with up to 125-ft tall buildings where permitted	2,500
DUC - DOWNTOWN URBAN CENTER 75	Downtown Urban Center	DUC with up to 75-ft tall buildings where permitted	2,500
DUC - DOWNTOWN URBAN CENTER 55	Downtown Urban Center	DUC with up to 55-ft tall buildings where permitted	2,500
DUC - NEIGHBORHOOD RESIDENTIAL	Downtown Urban Center	Mixed-use and R-15	2,500
DUC - HEALTH AND WELLNESS 125	Downtown Urban Center	R-OH-MultiCare Zone	2,500
DUC - FLEX RESIDENTIAL	Downtown Urban Center	RO with permitted specific industrial uses (craft workshops, breweries, coffee, etc.)	2,500
LAKELAND HILLS SOUTH SPECIAL PLAN AREA – PUD[1]	Neighborhood Residential Two		1,500-2,500
AIRPORT LANDING FIELD DISTRICT	Industrial		2,500
AUBURN GATEWAY DISTRICT	Mixed Use		2,500
DUC - I INSTITUTIONAL	Downtown Urban Center		2,500
DUC - M-1 LIGHT INDUSTRIAL	Downtown Urban Center		2,500
I INSTITUTIONAL	Public/Quasi-Public		2,500
PLANNED UNIT DEVELOPMENT DISTRICT[1]		Varies by location	1,500-2,500
TERRACE VIEW DISTRICT	Commercial		2,500
UNCLASSIFIED USE DISTRICT[1]		Varies by location	1,500-2,500
A-10	Agricultural	1 Dwelling Unit per 10 acres, located in unincorporated King County.	1,500
RA-5	Rural Area	1 Dwelling Unit per 5 acres, located in unincorporated King County.	1,500
R-1	Residential	1 Dwelling Unit per acre, located in unincorporated King County	1,500
R-4	Residential	4 Dwelling Units per acre, located in unincorporated King County	1,500

Note:
1. Required fire flow will be determined on a case-by-case basis pending development or re-development type.

Figure 2-5 | Comprehensive Future Land Use and Zoning Map



2.7.3 Projected Demographic Growth

Many factors influence population growth including the state of the economy, interest rates, annexation of adjacent areas, and up-zoning for new development. Growth management policies, along with coordination between local governments, should make development more predictable and growth projections more accurate than they have been historically. The City's Comprehensive Plan, as well as this Plan, are key documents to aid the City in preparing for the predicted growth. However, it is common for actual growth rates to vary from those predicted. In addition, growth rates will vary between various parts of the City based on the availability of services and the costs to develop for the zoned use.

Housing, population, and employment projections were used to calculate rates of growth. PSRC's Vision 2050 requires the City to plan for a given number of additional housing units and jobs. The demographic projections for population and employment were allocated based on water meter locations within the four Water Service Areas that comprise the RWSA. Population projections extending beyond the RWSA boundary were modified or eliminated and are not included in the projections.

2.7.3.1 Demographic Projections

Existing and future demographic projections consistent with the City's GMA goals were provided by the City for 2021 and 2044. City planning provided projections of housing, population, and employment growth based on TAZ data. The intermediate 10-year planning horizon (2034) was interpolated assuming consistent compounding growth across the planning period.

The projections were further delineated by Service Area, as growth is expected to vary due to zoning, availability of vacant or re-developable land, existing and proposed infrastructure, etc. Demographic growth rates, rather than total number of people or employed people, were used to develop demand projections. The resulting demographic growth rates as a compounding annual percentage are presented in **Table 2-14.** Total population is projected to annually increase by 1.5 percent from 2021 to 2044 and total employment is projected to increase by 1.9 percent annually over the same period. Overall, the City is planning for an additional 24,987 people and 20,525 employed people by 2044 within the RWSA.

Table 2-14 | Growth Rates by Customer Class and Service Area

	Total Growth from 2021 to 2044 (Housing Units/Population)	Total Growth from 2021 to 2044 (%)	Annual Average Compounding Growth (%)
Single-Family Unit Projections			
Lea Hill	201	5.9%	0.248%
Valley	275	5.3%	0.223%
Lakeland	534	27.0%	1.043%
Academy	436	36.3%	1.355%
Multi-Family Unit Projections			
Lea Hill	254	12.6%	0.518%
Valley	7,862	77.1%	2.515%
Lakeland	1,003	55.7%	1.943%
Academy	124	10.4%	0.433%
Population Projections			
Lea Hill	1,245	8.2%	0.343%
Valley	18,009	44.1%	1.602%

	Total Growth from 2021 to 2044 (Housing Units/Population)	Total Growth from 2021 to 2044 (%)	Annual Average Compounding Growth (%)
Lakeland	4,113	39.4%	1.456%
Academy	1,621	24.6%	0.962%
Employment Projections			
Lea Hill	484	30.6%	1.168%
Valley	18,692	43.8%	1.586%
Lakeland	171	31.1%	1.172%
Academy	1,178	77.8%	0.316%

Table 2-15 summarizes the calculated demographic projections for population or employment projections by Service Area for each category when applying the growth rates from **Table 2-14.**

Table 2-15 | Population and Employment Projections Calculated by Service Area

	2024	2034	2044
Single-Family Population			
Lea Hill	10,498	10,864	11,243
Valley	19,889	23,315	27,330
Lakeland	4,394	5,077	5,866
Academy	5,009	5,512	6,066
Subtotal	**39,789**	**44,767**	**50,505**
Multi-Family Population			
Lea Hill	5,341	5,527	5,719
Valley	25,203	29,544	34,633
Lakeland	3,454	3,991	4,612
Academy	1,535	1,689	1,859
Subtotal	**35,533**	**40,752**	**46,824**
Total Population			
Lea Hill	15,839	16,391	16,962
Valley	45,092	52,859	61,964
Lakeland	7,848	9,068	10,478
Academy	6,544	7,201	7,925
Subtotal	**75,323**	**85,519**	**97,328**
Employment			
Lea Hill	1,720	1,932	2,170
Valley	46,946	54,948	64,313
Lakeland	596	669	752
Academy	1,605	1,656	1,709
Subtotal	**50,867**	**59,205**	**68,944**

The demographic growth for each Service Area is shown in **Figure 2-6, Figure 2-7**, and **Figure 2-8**, where single family population, multi-family population, and employment population growth are each presented in a different graph. The figures show the anticipated variability in growth between the Service Areas. For example, employment growth rate (percentage) is projected to be greater in the Valley Service Area than the other Services Areas between 2024 and 2044. Since the Valley Service Area has a much greater magnitude of population and employment than the other Service Areas, minor differences in growth projection percentages results in larger increases in total population and employment numbers. The Valley

Service Area is projected to represent 64 percent of the system's population and 93 percent of the system's employment in 2044.

Figure 2-6 | Single Family Population Projections by Service Area

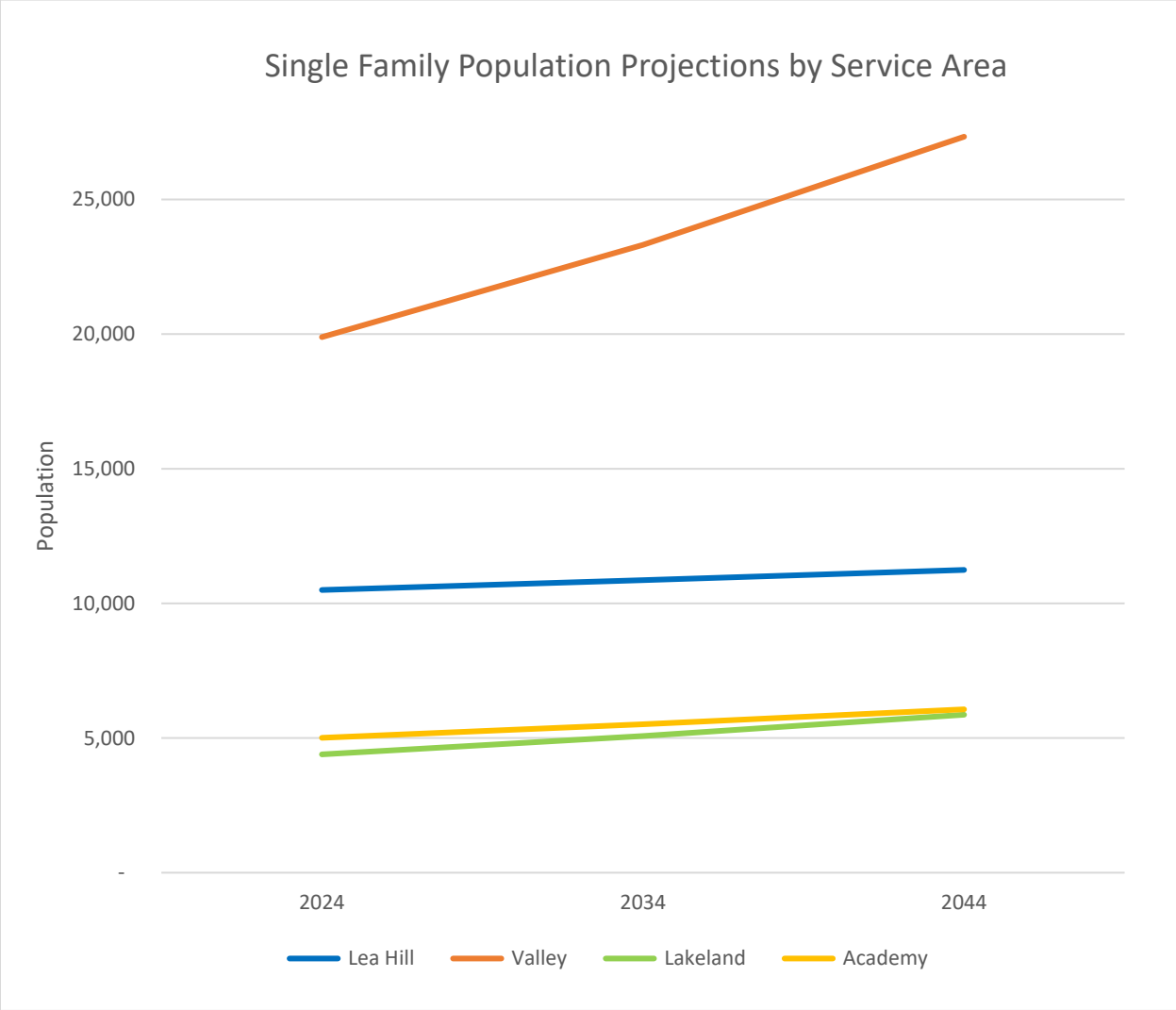


Figure 2-7 | Multi-Family Population Projections by Service Area

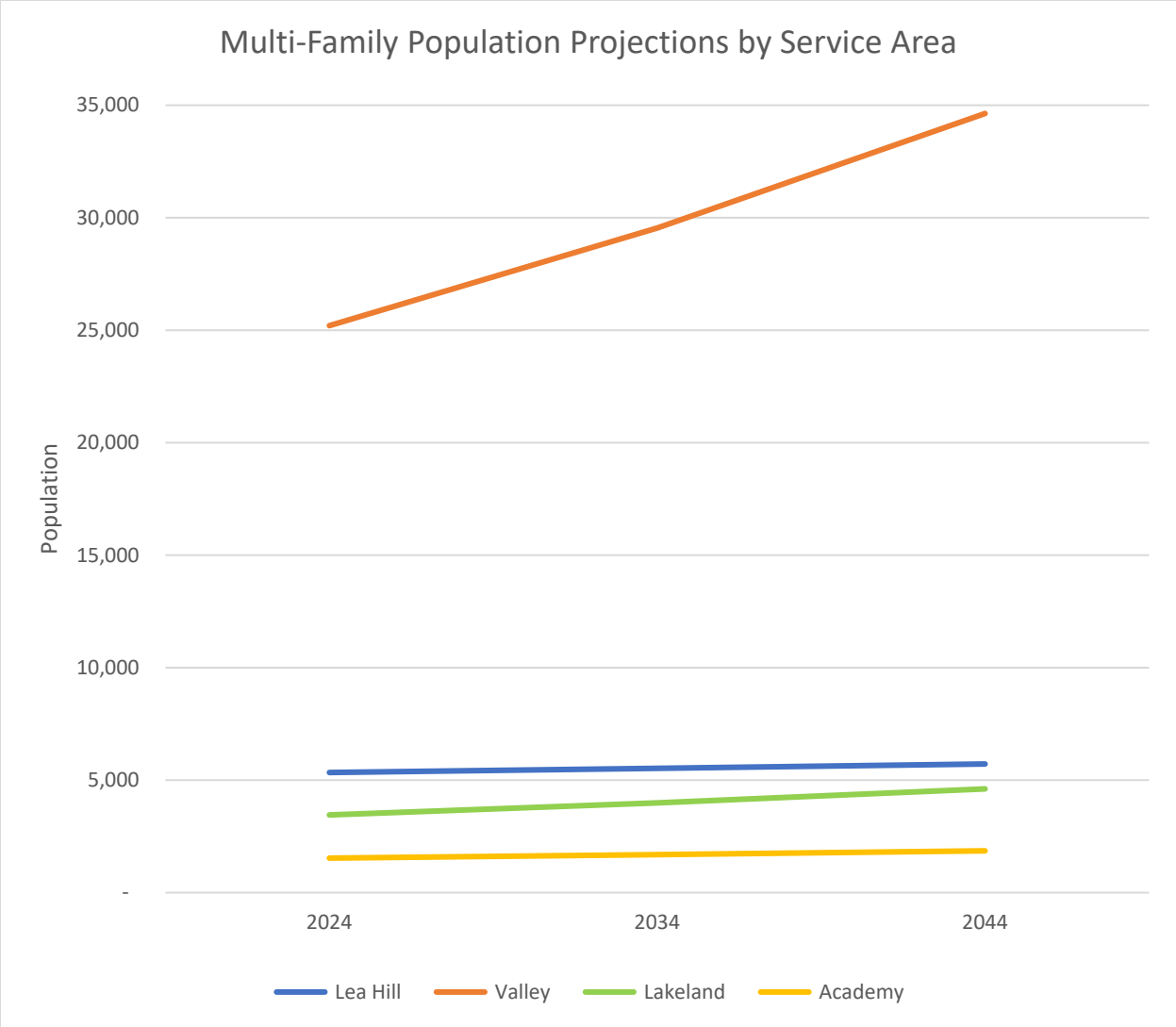
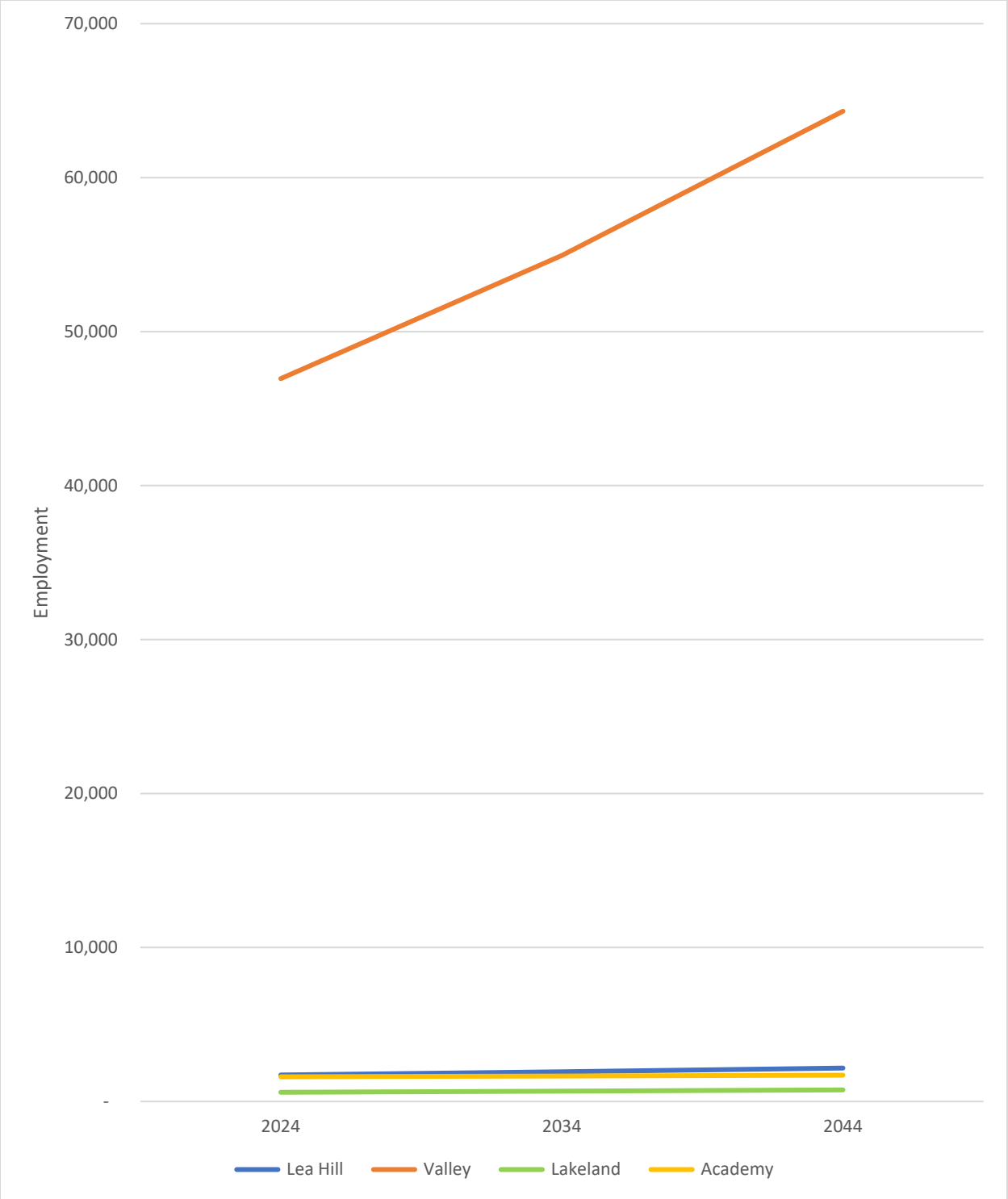
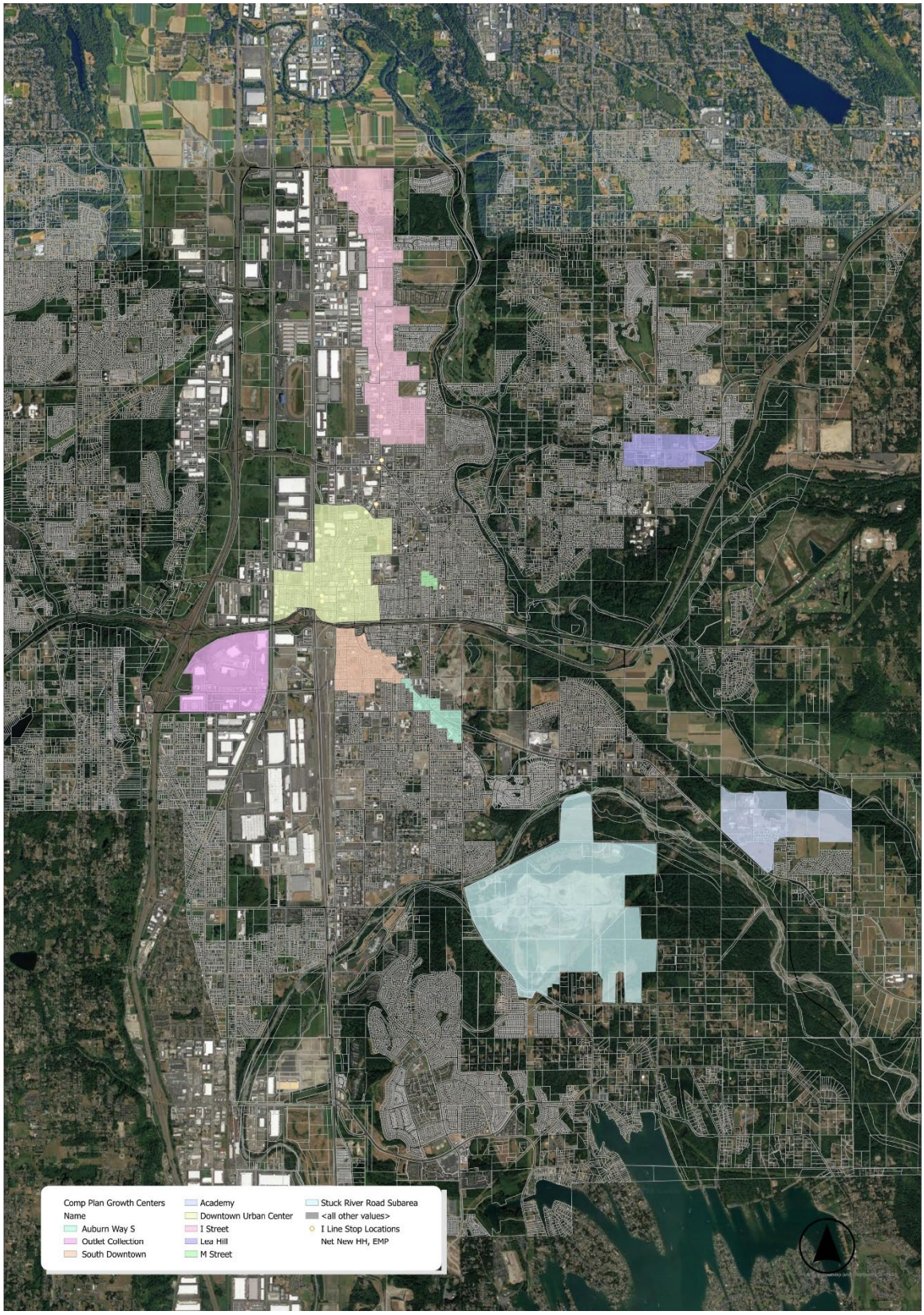


Figure 2-8 | Employment Projections by Service Area



Areas anticipated to have higher than average population and employment growth through 2044, termed "Growth Centers" identified in the City's Comprehensive Plan, are presented in **Figure 2-9.** Demand in each Service Area was modified during the system analysis to reflect focus growth in the areas identified in **Figure 2-9**, matching the population and employment growth projection data.

Figure 2-9 | Map of Projected Areas with Greatest Population Growth



2.8 Future Water Demand

2.8.1 Projected Number of Connections

The number of water connections was used in determining the ERU, ADD, and MDD projections. The number of water connections in the future was projected using the demographic growth rates presented in **Table 2-14** and the number of existing water accounts presented in **Table 2-2**. The projected future connections by both Service Area and customer classification are presented in **Table 2-16.**

- The respective housing unit growth rates for each Service Area were used to calculate projected SFR and MFR connections.
- The School connections were projected by multiplying the percentage of the City population aged 5-19 (22%) by population growth rates for each Service Area.
- The projected employment growth rates were used to calculate future Commercial, Municipal (City Accounts), and Irrigation connections.
- The City's largest user (Boeing) is not included in **Table 2-16**, their projections are based on individual demand and are presented separately. Boeing also accounts for the only Manufacturing and Industrial connections within the City.
- Wholesale customers are not included in **Table 2-16**, their projections are based on individual demand and are presented separately.

Table 2-16 | Connection Projections by Customer Classification and Service Area

	2024	2034	2044
Lea Hill			
Single-Family Residential	3,265	3,347	3,431
Multi-Family Residential	167	176	186
Commercial	22	24	27
Manufacturing/Industrial	-	-	-
Schools	11	11	11
Municipal (City Accounts)	1	1	1
Irrigation	61	69	78
Valley			
Single-Family Residential	5,954	6,088	6,226
Multi-Family Residential	807	1,035	1,327
Commercial	1,272	1,489	1,743
Manufacturing/Industrial	-	-	-
Schools	37	38	40
Municipal (City Accounts)	32	38	45
Irrigation	532	622	729
Lakeland			
Single-Family Residential	1,354	1,502	1,666
Multi-Family Residential	109	132	161
Commercial	34	39	43
Manufacturing/Industrial	-	-	-
Schools	9	9	9

	2024	2034	2044
Municipal (City Accounts)	-	-	-
Irrigation	21	23	26
Academy			
Single-Family Residential	1,581	1,808	2,069
Multi-Family Residential	47	49	51
Commercial	14	14	15
Manufacturing/Industrial	-	-	-
Schools	2	2	2
Municipal (City Accounts)	1	1	1
Irrigation	34	35	36
Total			
Single-Family Residential	12,153	12,745	13,391
Multi-Family Residential	1,131	1,393	1,725
Commercial	1,342	1,566	1,828
Manufacturing/Industrial	-	-	-
Schools	59	60	62
Municipal (City Accounts)	35	40	47
Irrigation	648	750	868

2.8.1.1 Lea Hill Service Area

The Lea Hill Service Area is located east of the Auburn-Kent Valley and the Green River. The area is mostly residential with supportive neighborhood businesses. Green River College is in the Lea Hill Service Area and has a concentration of multi-family residential units in the vicinity of the college.

The Lea Hill service area is projected to have the lowest growth rate in population with a 0.3 percent per year average increase from 2021 to 2044. This Service Area is projected to have a moderate growth in employment with a 1.2 percent growth per year from 2021 to 2044.

2.8.1.2 Valley Service Area

The Valley Service Area contains a significant amount of developable land designated as multi-family and commercial, including the Downtown Urban Center. The Service Area is projected to have the highest growth rate in population at 1.6 percent per year from 2021 to 2044. The multi-family connections in this area are projected to grow 2.5 percent per year from 2021 to 2044 and employment is projected to grow 1.6 percent per year. These growth projections are based on the City's anticipation of growth trends and the redevelopment of Auburn's Downtown Urban Center, as well as commercial developments in locations with available space throughout the Service Area.

2.8.1.3 Lakeland Service Area

The Lakeland Service Area includes the entire City south of the White River. A sizable portion of this Service Area is designated residential conservancy land use, which is anticipated to be developed within the planning horizon related to the anticipated closure of the Segale Gravel Pit. The area includes proposed special planning areas for Stuck River Road and Mount Rainier Vista anticipated to be developed with a moderate population growth rate of 1.5 percent per year. This Service Area is projected to have a moderate growth in employment with a 1.2 percent growth per year from 2021 to 2044.

2.8.1.4 Academy Service Area

The Academy Service Area is a well-developed portion of the City. It is expected to have a population growth of 1.0 percent per year from 2021 to 2044. This Service Area is projected to have minimal growth in employment with a 0.3 percent per year increase from 2021 to 2044.

2.8.2 Projected Water Demand

Projecting future water demand is one of the key elements of the water system planning process. Identification of system improvements such as supply, pumping, storage, and piping requirements are all related to demand projections. This section summarizes the ERU, ADD, and MDD projections, as well as the potential range in future demands associated with various factors, such as water use per ERU, DSL, and demographic growth rate.

2.8.2.1 Potential Range in Future Water Demand

Several factors and assumptions affect the accuracy of projected future water demands. Recognizing that certain assumptions built into the demand projections will vary in the future, the projections were developed for medium and high demand scenarios to provide a range in demands that may be experienced in the future. The medium projection will be used for the system analysis in **Chapter 3**, while the high projection will be used for the water right evaluation in **Chapter 5**. The system analysis determines future pumping, storage, and distribution system deficiencies and identifies potential improvements to achieve the City's established capacity criteria. The water right evaluation looks at both water rights and overall supply capacity. Only the medium projections are presented within this Chapter. The variables considered in developing the range of demand projections are summarized in **Table 2-17** and are discussed below.

- Future Water Connections: The future water connections are presented in **Table 2-16** and were used for both demand scenarios.
- Water Use Per ERU_{ADD}: Water use per ERU for the average demand day projections are based on the 75th percentile of the historical data, which is the medium demand scenario, presented in **Table 2-4**. This value equals 182 gpd per ERU. The high demand scenario used the highest annual value from the data set presented in **Table 2-4**, which equals 193 gpd per ERU.
- ERUs per Account: The historical ERU per account by customer classification presented in **Table 2-4** was used to develop demand projections. The ERU per Account values are based on the 75th percentile of the historical data and a water use per ERU value of 182 gpd per ERU. These values are used in both projections.
- Distribution System Leakage: Historical annual DSL varied between 0.7 and 7.4 percent of the City's total City production between 2015 and 2022. The average three-year rolling average of historical DSL values of 5.2 percent is utilized in the medium demand scenario and the maximum three-year rolling average of 6.8 percent was used for the high demand scenario.
- Authorized Unbilled Consumption: Historical annual authorized unbilled consumption varied between 0.14 and 0.54 percent of the City's total billed consumption between 2015 and 2022. The 75^{th} percentile value of 0.27 percent is utilized in the medium demand scenario and the maximum values of 0.54 percent is used for the high demand scenario.
- Water Use Per ERU_{MDD}: Water use per ERU for the maximum demand day projections are based on 75th percentile of the historical data, which is the medium demand scenario, presented in **Table**

2-10. This value equals 322 gpd per ERU. The high demand scenario used the highest annual value from the data set presented in Table 2-10, which is 358 gpd per ERU.

- MDD/ADD Peaking Factor: The 75th percentile of historical annual peaking factors of 1.77 is utilized in the medium demand scenario. The highest value in the historical annual peaking factor data set was used for the high demand scenario, which is 1.97.

The City's largest user (Boeing) and wholesale customers are not included in Table 2-17, their projections are based on individual demand and are presented separately.

Table 2-17 | Proposed Planning Values for Demand Projections

Assumptions	Medium Demand Scenario	High Demand Scenario
Water Demand per ERU_{ADD} (gpd)	182	193
DSL	5.2%	6.8%
Authorized Unbilled	0.27%	0.54%
Water Demand per ERU_{MDD} (gpd)	322	358
MDD/ADD Peaking Factor	1.77	1.97

2.8.3 Large User Demand Forecast

The large user term is used to identify customers consuming the greatest volume of water on an annual basis as presented in Table 2-6. Projections for the City's single largest user (Boeing) is separated from the demand forecasts to aid in accurate forecasting and in the system analyses. The forecasts were based on historical water use data from 2015 through 2022 and is presented in Table 2-18. The projected demand will use the 75th percentile of water use from the historical period of record. Boeing's consumption has trended down over the historical period of record, therefore, the projected demand is conservative and actual consumption is anticipated to be less than the value presented in Table 2-18.

Wholesale connections are also projected separately in Table 2-22. The remaining largest users are not presented separately in demand forecasts; their projected consumption is built into the overall Service Area projections by customer classification.

Table 2-18 | Large User Demand Projections

Large User	Customer Class	Service Area	Representative Historical Water Use Statistic[1]	Representative Annual Water Use (MG)[2]	Projected ERUs in 2044
Boeing	Manufacturing Commercial	Valley	75th percentile	210.6	3,168

Notes:
1. Historical water use data from 2015 through 2022
2. Based on representative historical water use statistic.

2.8.4 Projected Retail ERUs

Future water system demands are based on projected ERUs, which in turn are based on the projected water consumption by customer classification and the projected number of accounts discussed earlier in this chapter. Table 2-19 shows the projected ERUs for the City's individual service areas over the planning period. The projected number of ERUs for each Service Area was calculated by multiplying the projected number of accounts, provided in Table 2-16, by the number of ERUs per account, as summarized in Table

2-3, for each customer class. Wholesale customer demand in terms of ERUs is not included in the demand projections below and must be added separately as summarized in Table 2-23.

Table 2-19 | ERU Projections by Customer Class and Service Area

	2024 ERU	2034 ERU	2044 ERU
Lea Hill			
Single-Family Residential	3,265	3,347	3,431
Multi-Family Residential	1,379	1,452	1,529
Commercial	128	143	161
Manufacturing/Industrial	-	-	-
Schools	127	128	129
Municipal (City Accounts)	2	3	3
Irrigation	319	358	402
Authorized Unbilled	14	15	15
DSL	272	283	295
Valley			
Single-Family Residential	5,954	6,088	6,226
Multi-Family Residential	6,652	8,528	10,933
Commercial	7,554	8,841	10,348
Manufacturing/Industrial	-	-	-
Schools	435	451	467
Municipal (City Accounts)	70	82	96
Irrigation	2,758	3,228	3,778
Boeing (Largest User)	3,170	3,170	3,170
Authorized Unbilled	56	66	78
DSL	1,386	1,584	1,825
Lakeland			
Single-Family Residential	1,354	1,502	1,666
Multi-Family Residential	900	1,091	1,323
Commercial	204	230	258
Manufacturing/Industrial	-	-	-
Schools	102	106	109
Municipal (City Accounts)	-	-	-
Irrigation	108	121	136
Authorized Unbilled	7	8	9
DSL	139	159	182
Academy			
Single-Family Residential	1,581	1,808	2,069
Multi-Family Residential	388	405	423
Commercial	81	84	86
Manufacturing/Industrial	-	-	-
Schools	25	26	27
Municipal (City Accounts)	2	2	2
Irrigation	174	179	185
Authorized Unbilled	6	7	8
DSL	117	131	146
Total			
Single-Family Residential	12,153	12,745	13,391
Multi-Family Residential	9,320	11,477	14,209

	2024 ERU	2034 ERU	2044 ERU
Commercial	7,967	9,298	10,853
Manufacturing/Industrial	-	-	-
Schools	690	711	732
Municipal (City Accounts)	74	87	101
Irrigation	3,359	3,887	4,502
Boeing (Largest User)	3,170	3,170	3,170
Authorized Unbilled	83	96	110
DSL	1,914	2,156	2,447
City of Algona (Wholesale)	Refer to Table 2-22.		

2.8.5 Projected Retail Average Day and Maximum Day Demands

The ADD projections include the projected customer demands by customer classification, authorized unbilled consumption, and DSL by service area. The resulting ADD projections are summarized in **Table 2-20**.

- Customer demands by classification were calculated by multiplying the projected ERUs summarized in **Table 2-19** by the average ERU water use (182 gpd/ERU).
- Authorized unbilled consumption projections were calculated by multiplying the sum of all customer classification use by the medium demand scenario percentage presented in **Table 2-17**.
- DSL consumption projections were calculated by multiplying the sum of all customer classification use and authorized unbilled use by the medium demand scenario percentage presented in **Table 2-17** for DSL.

Table 2-20 | ADD Projections

	2024 (mgd)	2034 (mgd)	2044 (mgd)
Lea Hill			
Single-Family Residential	0.595	0.610	0.625
Multi-Family Residential	0.251	0.265	0.279
Commercial	0.023	0.026	0.029
Manufacturing/Industrial	-	-	-
Schools	0.023	0.023	0.023
Municipal (City Accounts)	-	-	0.001
Irrigation	0.058	0.065	0.073
Authorized Unbilled	0.003	0.003	0.003
DSL	0.050	0.052	0.054
Valley			
Single-Family Residential	1.084	1.109	1.134
Multi-Family Residential	1.212	1.553	1.991
Commercial	1.376	1.610	1.885
Manufacturing/Industrial	-	-	-
Schools	0.079	0.082	0.085
Municipal (City Accounts)	0.013	0.015	0.017
Irrigation	0.502	0.588	0.688
Boeing (Largest User)	0.577	0.577	0.577

	2024 (mgd)	2034 (mgd)	2044 (mgd)
Authorized Unbilled	0.010	0.012	0.014
DSL	0.252	0.288	0.332
Lakeland			
Single-Family Residential	0.247	0.274	0.303
Multi-Family Residential	0.164	0.199	0.241
Commercial	0.037	0.042	0.047
Manufacturing/Industrial	-	-	-
Schools	0.019	0.019	0.020
Municipal (City Accounts)	-	-	-
Irrigation	0.020	0.022	0.025
Authorized Unbilled	0.001	0.002	0.002
DSL	0.025	0.029	0.033
Academy			
Single-Family Residential	0.288	0.329	0.377
Multi-Family Residential	0.071	0.074	0.077
Commercial	0.015	0.015	0.016
Manufacturing/Industrial	-	-	-
Schools	0.005	0.005	0.005
Municipal (City Accounts)	-	-	-
Irrigation	0.032	0.033	0.034
Authorized Unbilled	0.001	0.001	0.001
DSL	0.021	0.024	0.027
Total			
Single-Family Residential	2.214	2.321	2.439
Multi-Family Residential	1.698	2.091	2.588
Commercial	1.451	1.694	1.977
Manufacturing/Industrial	-	-	-
Schools	0.126	0.129	0.133
Municipal (City Accounts)	0.014	0.016	0.018
Irrigation	0.612	0.708	0.820
Boeing (Largest User)	0.577	0.577	0.577
Authorized Unbilled	0.015	0.017	0.020
DSL	0.349	0.393	0.4546

The MDD projections include the projected customer demands by customer classification, authorized unbilled consumption, and DSL by service area and are summarized in **Table 2-21**.

- Customer demands by classification, authorized unbilled consumption projections, and DSL projections were calculated by multiplying the ADD projections as summarized in **Table 2-20** by the MDD/ADD Peaking Factor presented in **Table 2-17.**

Table 2-21 | MDD Projections

	2024 (mgd)	2034 (mgd)	2044 (mgd)
Lea Hill			
Single-Family Residential	1.051	1.077	1.104
Multi-Family Residential	0.444	0.468	0.492
Commercial	0.041	0.046	0.052
Manufacturing/Industrial	-	-	-

	2024 (mgd)	2034 (mgd)	2044 (mgd)
Schools	0.041	0.041	0.041
Municipal (City Accounts)	0.001	0.001	0.001
Irrigation	0.103	0.115	0.129
Authorized Unbilled	0.005	0.005	0.005
DSL	0.088	0.091	0.095
Valley			
Single-Family Residential	1.916	1.960	2.004
Multi-Family Residential	2.141	2.745	3.519
Commercial	2.431	2.846	3.331
Manufacturing/Industrial	-	-	-
Schools	0.140	0.145	0.150
Municipal (City Accounts)	0.022	0.026	0.031
Irrigation	0.888	1.039	1.216
Boeing (Largest User)	1.020	1.020	1.020
Authorized Unbilled	0.018	0.021	0.025
DSL	0.446	0.510	0.587
Lakeland			
Single-Family Residential	0.436	0.483	0.536
Multi-Family Residential	0.290	0.351	0.426
Commercial	0.066	0.074	0.083
Manufacturing/Industrial	-	-	-
Schools	0.033	0.034	0.035
Municipal (City Accounts)	-	-	-
Irrigation	0.035	0.039	0.044
Authorized Unbilled	0.002	0.003	0.003
DSL	0.045	0.051	0.059
Academy			
Single-Family Residential	0.509	0.582	0.666
Multi-Family Residential	0.125	0.130	0.136
Commercial	0.026	0.027	0.028
Manufacturing/Industrial	-	-	-
Schools	0.008	0.008	0.009
Municipal (City Accounts)	0.001	0.001	0.001
Irrigation	0.056	0.058	0.060
Authorized Unbilled	0.002	0.002	0.002
DSL	0.038	0.042	0.047
Total			
Single-Family Residential	3.912	4.102	4.310
Multi-Family Residential	3.000	3.694	4.573
Commercial	2.564	2.993	3.493
Manufacturing/Industrial	-	-	-
Schools	0.222	0.229	0.236
Municipal (City Accounts)	0.024	0.028	0.032
Irrigation	1.081	1.251	1.449
Boeing (Largest User)	1.020	1.020	1.020
Authorized Unbilled	0.027	0.031	0.036
DSL	0.616	0.694	0.788

2.8.6 Wholesale Demands

The City currently has a wholesale water contract with the City of Algona. The City is also planning to supply wholesale water for the MIT's future fish hatchery. As stated in the Retail Water Service Policy, "the City will plan for and provide water service to all retail customers and wholesale customers with firm contracts. As supply permits, the City may provide water to wholesale customers without firm contracts unilaterally or as part of a capital improvement partnership agreement." The wholesale demands for the City are summarized in Table 2-22.

Algona's current agreement allows for the sale of up to 525,000 gallons per day on a firm basis for the ADD and up to 1,114,00 gallons per day on a firm basis for the MDD. In 2022, Algona purchased an average of 342,953 gallons per day of water from the City. Algona's 2022 Water System Plan (WSP) projects 2042 ADD to be 404,278 gallons per day and 2042 MDD to be 766,137 gallons per day. Algona's WSP demand projections were used for projecting the wholesale water purchases by Algona, rather than the contractual amount, as presented in Table 2-22.

MIT plans to develop a fish hatchery on the White River. An agreement dated from 1986 (included in Appendix G) requires that the City provide the tribe with an average annual demand of 3.9 cubic feet per second (cfs) (2.52 mgd) from Coal Creek Springs for MIT's future fishery enhancement purposes. The agreement does not specify an MDD but rather states:

"The Tribe and the City agree to work in harmony toward a mutually satisfactory allocation of the Coal Creek waters. In furtherance of this goal, the City understands that the water requirements for fishery enhancement purposes are greatest in the winter and spring months. Accordingly, the City agrees to increase the amount of water above 3.9 cfs as needed for fishery purposes. The Tribe understands that the City's requirement for water for domestic use is greatest in the summer and fall months. Accordingly, the Tribe agrees to decrease its use of water below 3.9 cfs, as needed for domestic water purposes…It is further understood that the tribe requires a minimum of 3 cfs at all times for fishery enhancement purposes".

The intent of this agreement indicates that the MIT demand will be at a minimum when the City's demands are at their maximum. Based on this understanding, the planned MDD for the MIT is 1.5 mgd and the ADD was 2.5 mgd. For planning purposes, the MIT demand was added to the Algona demand and included in the "Retail + firm wholesale" group of demands.

LMWD has an interruptible wholesale contract that can be terminated at any time and is therefore represented separately. As discussed in the Historical Wholesale Consumption section, LMWD discontinued regular purchase of water from the City in 2017 per the amendment to IA2 but maintains an intertie with the City to use wholesale water supply on an as-needed basis. LMWD may purchase up to 2.5 mgd of wholesale water per IA2. The contract does not have an expiration date and therefore 2.5 mgd of interruptible wholesale demand is projected through 2044.

Table 2-22 | Wholesale Demand Projections

Wholesale Customer	Service Area	Contractual Delivery[1]	2024 (mgd)	2034 (mgd)	2044 (mgd)[2]
ADD					
Algona	Valley	Firm	0.37	0.39	0.41
MIT Fish Hatchery	Valley	Firm	2.5	2.5	2.5
LMWD	Lea Hill	Interruptible	2.5	2.5	2.5
MDD					
Algona	Valley	Firm	0.69	0.73	0.78
MIT Fish Hatchery	Valley	Firm	1.5	1.5	1.5
LMWD	Lea Hill	Interruptible	2.5	2.5	2.5

Notes:
1. The City will plan for and provide water services to all retail customers and wholesale customers with firm contracts. As supply permits, the City may provide water to wholesale customers without firm contracts unilaterally or as part of a CIP agreement.
2. Algona's projections are provided through 2042; their projected rate increase was used to project consumption to 2044.

2.8.7 Total Demands

The total projected demands are tabulated for retail customers, firm wholesale, and interruptible wholesale in **Table 2-23.** The demands are presented separately to show the level of obligation to the City's customers. Projected retail ADD, MDD, and ERUs are presented by Service Area for the medium demand scenario. Additionally, the ADD and MDD are presented as the total of the projected retail demand and firm wholesale. The retail with firm wholesale represents the projected demand that is used as the basis for the system analysis and are shown in **Figure 2-10**. The difference between the historical and projected wholesale demands is due to the projected allocation of the supply to the proposed MIT Fish Hatchery, per the 1986 Stipulation Settlement Agreement. Additionally, both CWD and LMWD discontinued regular purchase of water from the City in 2017.

The 2044 retail ADD demand is projected to 9.02 mgd, which represents a 28 percent increase from 2024. Throughout the planning period, approximately 40 percent of the City's demand may be from wholesale purchases when both firm and interruptible supply are considered. The MDD is projected to increase by 24 percent from 2024 to 2044 for the sum of firm wholesale customers and retail customers.

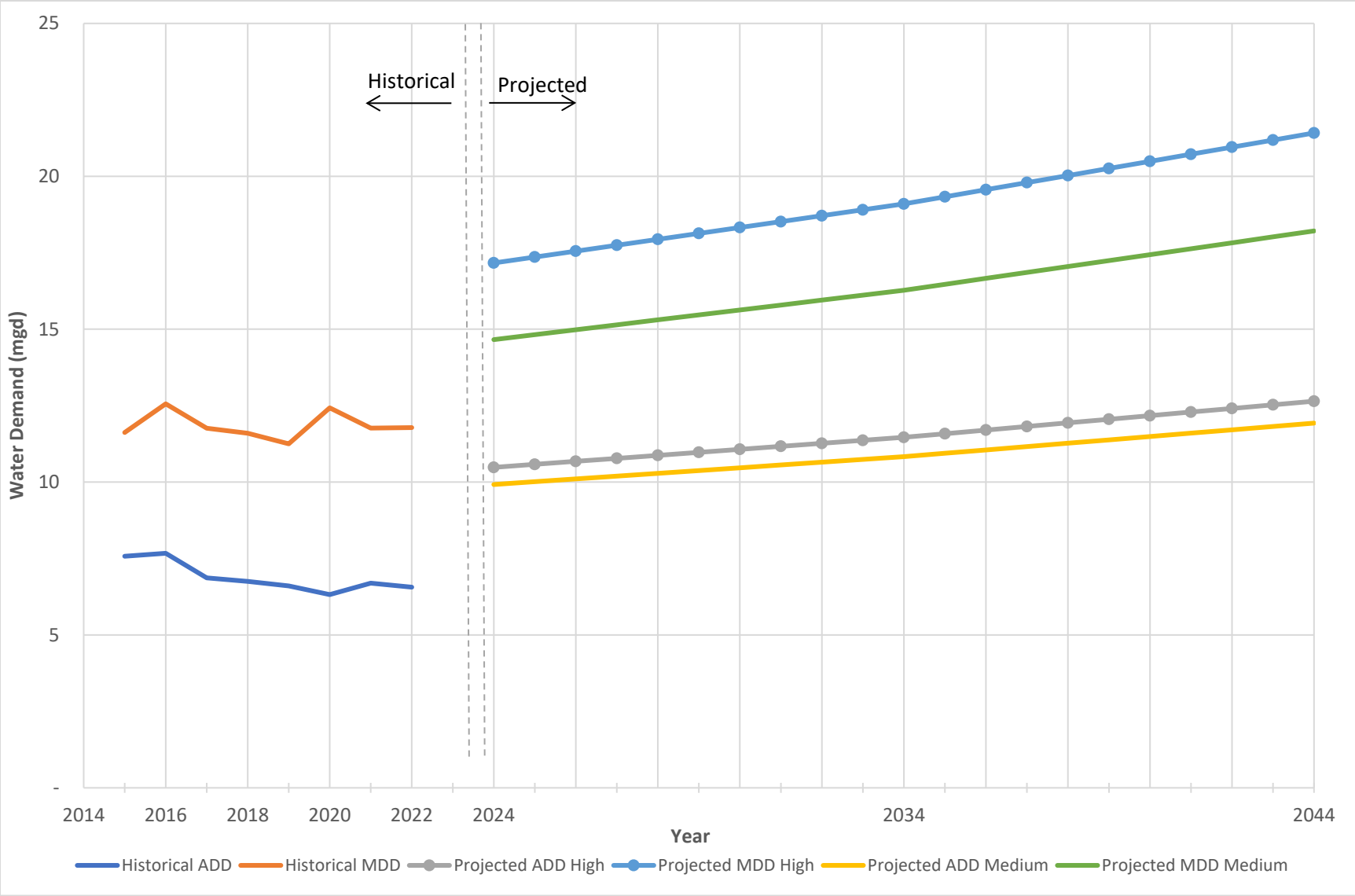
Table 2-23 | ADD, MDD, and ERUs Summarized by Service Area with Wholesale Included

	2024	2034	2044
Lea Hill			
Average Day Demand (mgd)	1.00	1.04	1.09
Maximum Day Demand (mgd)	1.77	1.84	1.92
Equivalent Residential Units	5,506	5,729	5,966
Valley			
Average Day Demand (mgd)	5.11	5.84	6.72
Maximum Day Demand (mgd)	9.02	10.31	11.88
Equivalent Residential Units	28,034	32,037	36,920
Lakeland			
Average Day Demand (mgd)	0.51	0.59	0.67
Maximum Day Demand (mgd)	0.91	1.04	1.19
Equivalent Residential Units	2,815	3,217	3,684
Academy			
Average Day Demand (mgd)	0.43	0.48	0.54
Maximum Day Demand (mgd)	0.76	0.85	0.95
Equivalent Residential Units	2,375	2,642	2,946
Total Retail Customers			
Total Average Day Demand (mgd)	7.05	7.95	9.02
Total Maximum Day Demand (mgd)	12.47	14.04	15.94
Total Equivalent Residential Units	38,731	43,626	49,515
Algona (Firm Wholesale)			
Total Average Day Demand (mgd)	0.365	0.386	0.409
Total Equivalent Residential Units, ADD[1]	2,005	2,120	2,246
Total Maximum Day Demand (mgd)	0.692	0.732	0.775
Total Equivalent Residential Units, MDD[1]	2,150	2,274	2,409
Retail Customer Demand with Algona (Firm Wholesale)			
Total Average Day Demand (mgd)	7.42	8.33	9.43
Total Maximum Day Demand (mgd)	13.16	14.77	16.71
Retail with Firm Wholesale (Algona and MIT Fish Hatchery)			
Total Average Day Demand (mgd)	9.92	10.83	11.93
Total Maximum Day Demand (mgd)	14.66	16.27	18.21
Retail with Firm & Interruptible Wholesale (Algona, MIT Fish Hatchery, and LMWD)			
Average Day Demand (mgd)	12.42	13.33	14.43
Maximum Day Demand (mgd)	17.16	18.77	20.71

Note:

1. The Algona ERU values were calculated using the City of Algona's projected demand and the City of Auburn's ERU_{ADD} and ERU_{MDD} factors.

Figure 2-10 | Projected Retail Plus Firm Wholesale ADD and MDD



CHAPTER 3

System Analysis and Asset Management

This chapter's objective is to identify existing facilities and determine their capacity to reliably satisfy current and projected water demands with safe drinking water. The cost of addressing identified infrastructure deficiencies and operational and maintenance improvements is addressed in priority order in Chapter 8.

This chapter addresses the following topics:

3.1 Asset Management – Asset Inventory and Analysis
3.2 Water Quality
3.3 Design Standards
3.4 Capacity Analysis
3.5 Summary of System Deficiencies

3.1 Asset Management – Asset Inventory and Analysis

This section establishes a date-based inventory of all system-owned water assets and satisfies the requirements of WAC 246-290-100(4)e(iii). The City actively assesses and plans for the maintenance, repair, and replacement of its major assets while preventive maintenance practices keep assets in good condition, thereby extending their useful life.

The City utilizes Cartegraph, an asset management software program, in conjunction with ESRI ArcGIS, a geographic information system (GIS) software program to manage its water assets. GIS is updated using record drawings as projects are completed and Cartegraph is linked to automatically update with new GIS information. Cartegraph is used to track and schedule maintenance activities, as well as materials, labor hours, costs and project timelines. Capital costs for the replacement of assets are assessed on a case-by-case basis.

The City's water system is comprised of groundwater wells, springs, interties with other water systems, treatment facilities, pump stations, storage facilities, pressure reducing stations, and water transmission and distribution pipelines. The City's water system includes 28 pressure zones in four different service areas: Lea Hill, Valley, Academy, and Lakeland. The location of major assets and pressure zones are shown in Figure 3-1. The hydraulic profile of the City's water system is presented in Figure 3-2, with enlargements provided as Figure 3-3 and Figure 3-4.

Water system vulnerabilities relating to risks from natural hazards, such as power outage, flooding, and earthquake are detailed in the Natural Hazard Vulnerability Summary, which is provided in Appendix U.

Figure 3-1 | Map of Water System Assets and Pressure Zones

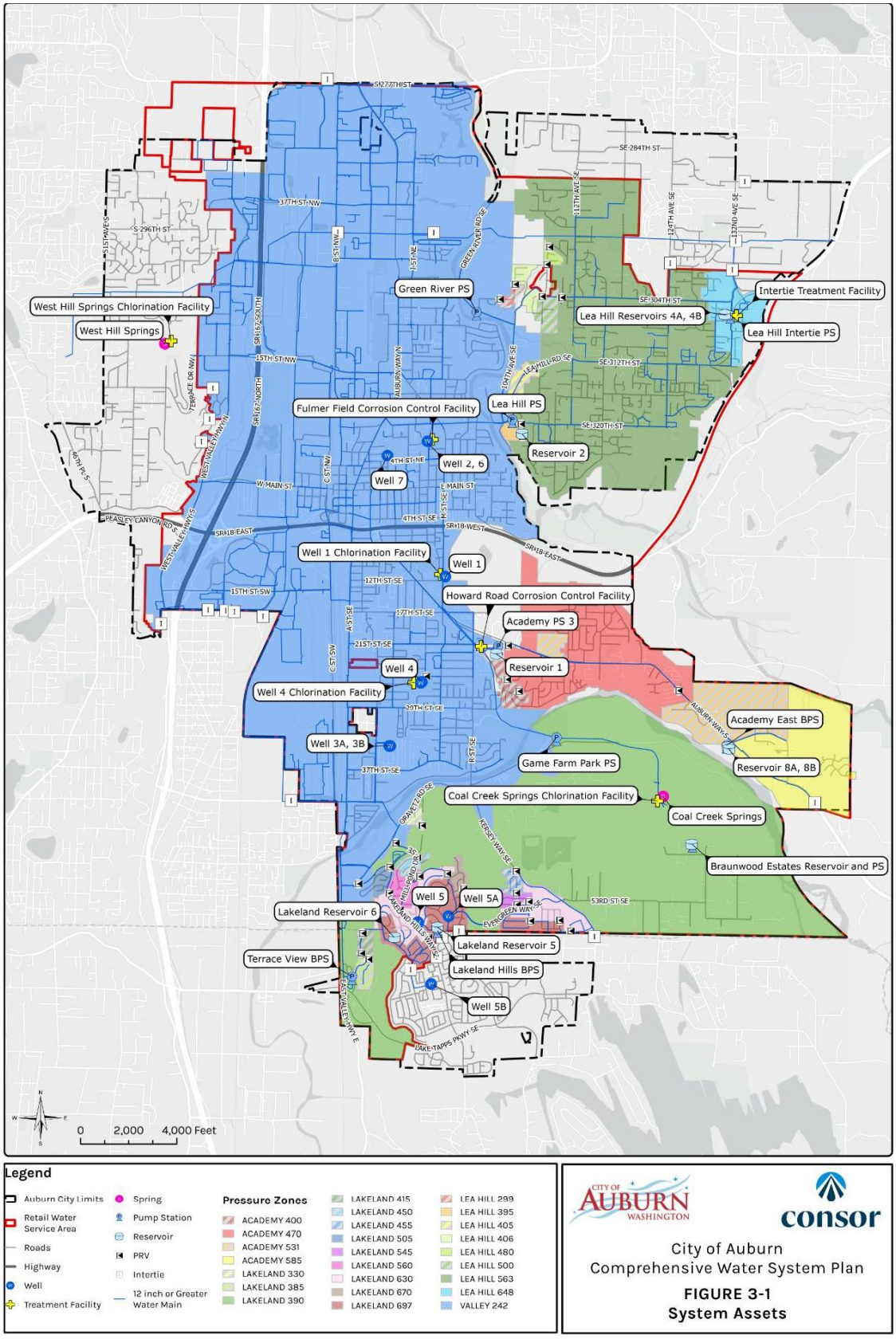
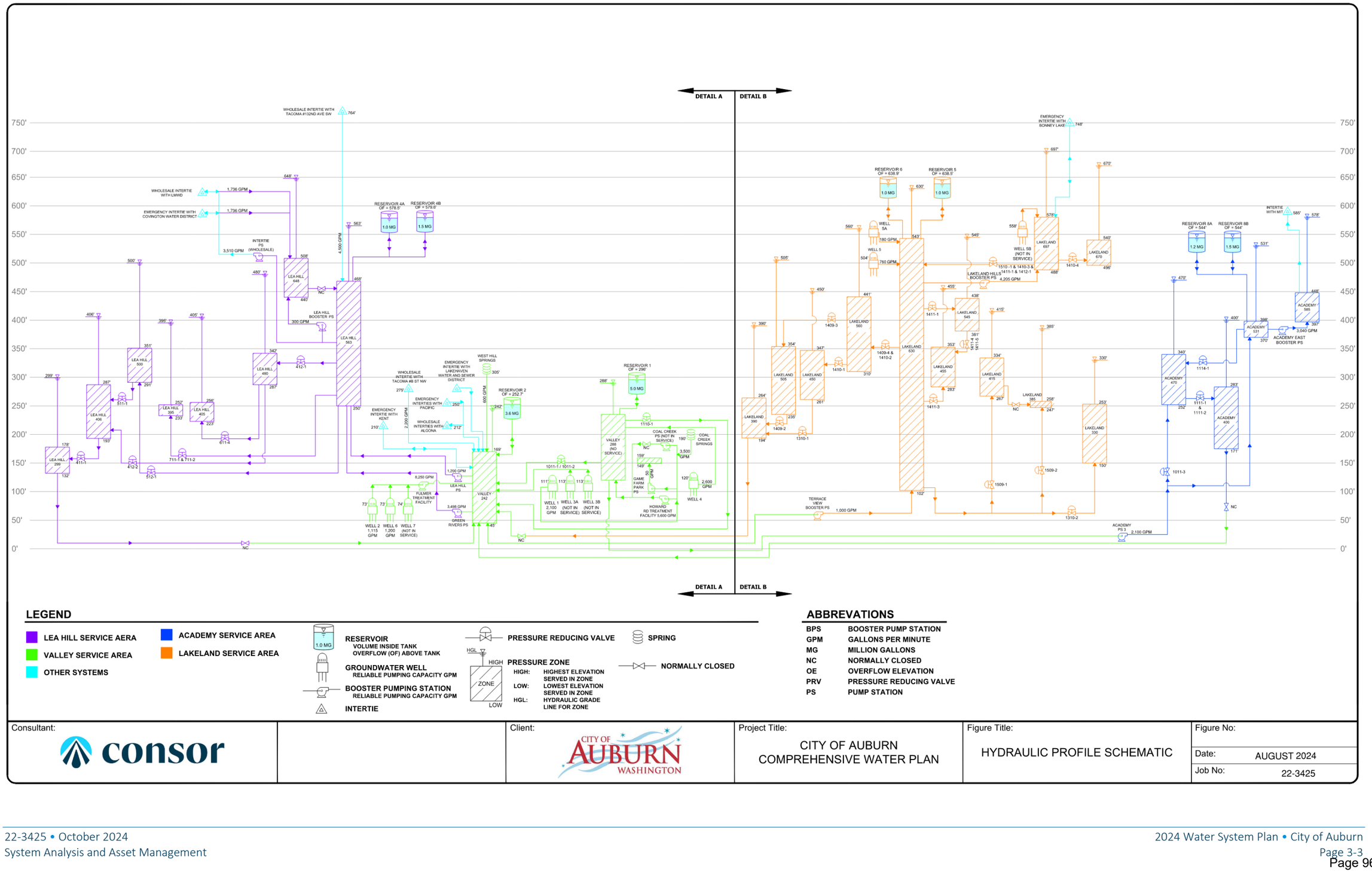


Figure 3-2 | Hydraulic Profile



LEGEND

- LEA HILL SERVICE AERA
- VALLEY SERVICE AREA
- OTHER SYSTEMS
- ACADEMY SERVICE AREA
- LAKELAND SERVICE AREA

RESERVOIR — VOLUME INSIDE TANK, OVERFLOW (OF) ABOVE TANK

GROUNDWATER WELL — RELIABLE PUMPING CAPACITY GPM

BOOSTER PUMPING STATION — RELIABLE PUMPING CAPACITY GPM

INTERTIE

PRESSURE REDUCING VALVE

PRESSURE ZONE
- HIGH: HIGHEST ELEVATION SERVED IN ZONE
- LOW: LOWEST ELEVATION SERVED IN ZONE
- HGL: HYDRAULIC GRADE LINE FOR ZONE

SPRING

NORMALLY CLOSED

ABBREVIATIONS

BPS	BOOSTER PUMP STATION
GPM	GALLONS PER MINUTE
MG	MILLION GALLONS
NC	NORMALLY CLOSED
OE	OVERFLOW ELEVATION
PRV	PRESSURE REDUCING VALVE
PS	PUMP STATION

Consultant: consor		Client: CITY OF AUBURN WASHINGTON	Project Title: CITY OF AUBURN COMPREHENSIVE WATER PLAN	Figure Title: HYDRAULIC PROFILE SCHEMATIC	Figure No:
					Date: AUGUST 2024
					Job No: 22-3425

Figure 3-3 | Hydraulic Profile - Detail A

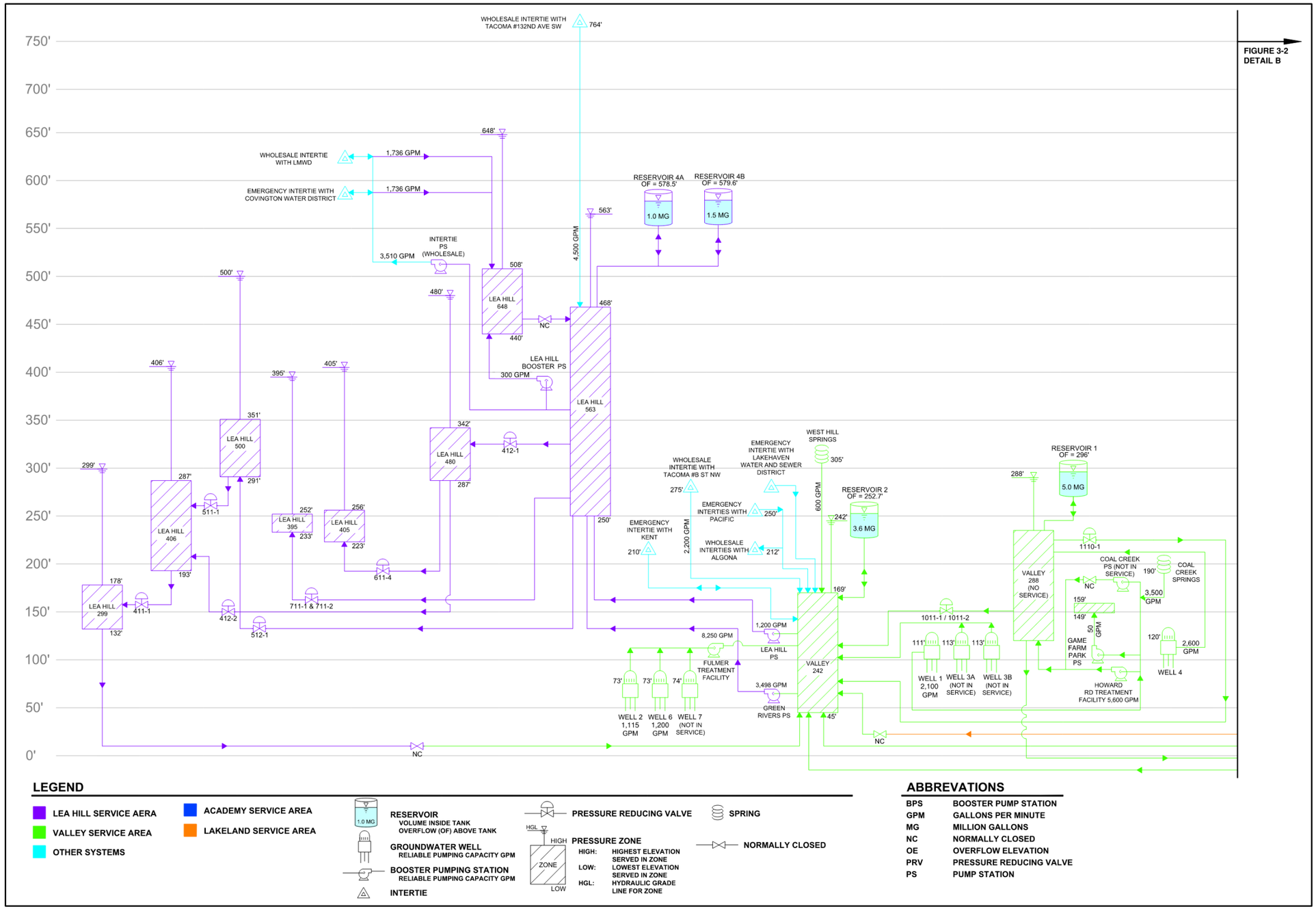
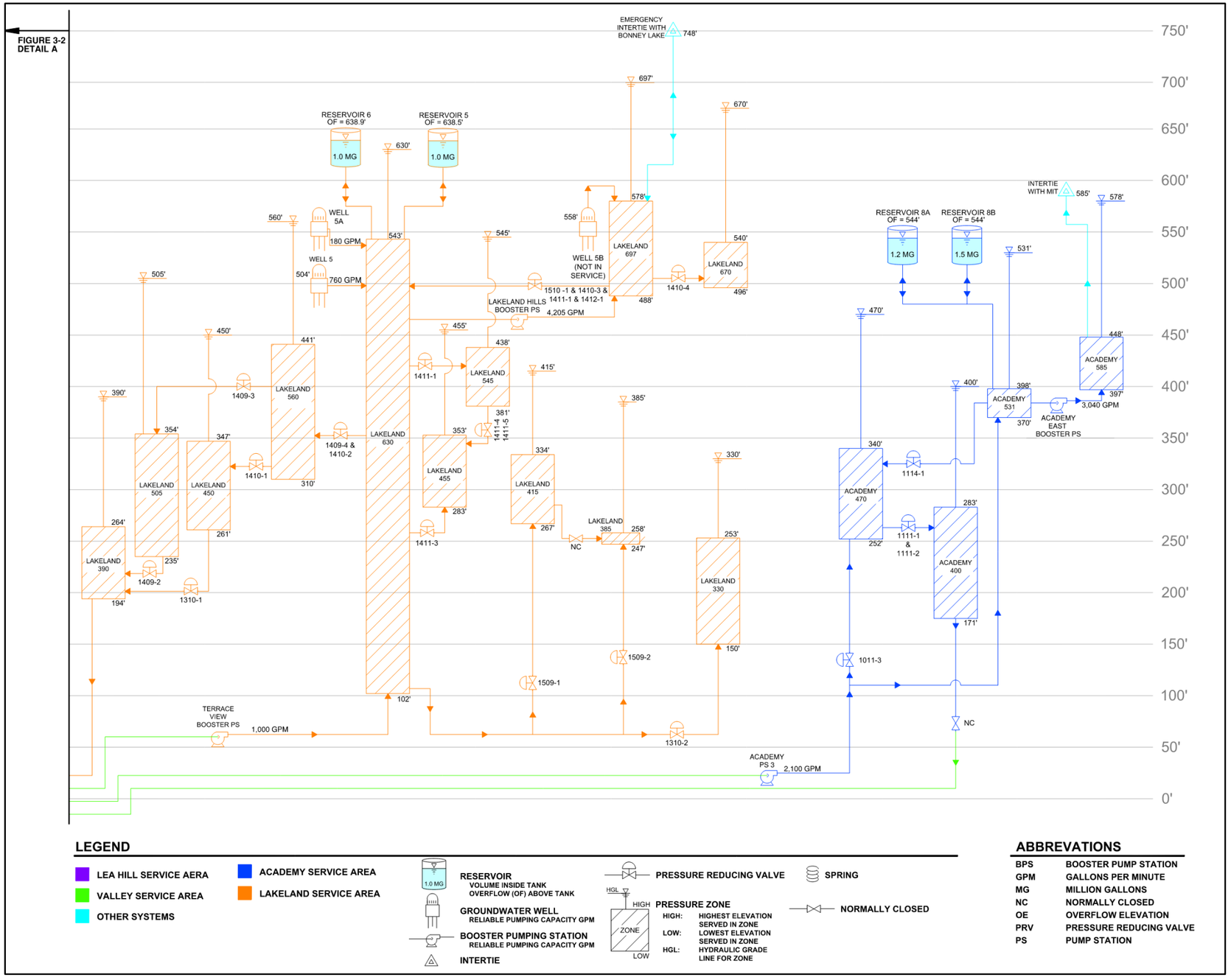


Figure 3-4 | Hydraulic Profile - Detail B



3.1.1 Distribution Facilities

The City' water distribution system includes approximately 300 miles of piping. **Table 3-1** summarizes the water piping inventory by size (diameter). The criticality ratings for the system's pipes are presented in **Table 3-1**, as criticality of the pipelines is assessed based on size. Water main and transmission pipelines vary in diameter from 4 to 36 inches, with a predominance of 8 and 12 inches, and range in age with the oldest piping dating back to 1925. Approximately 78 percent of the distribution system is ductile iron pipe.

Table 3-1 | Transmission and Distribution System Piping Inventory by Pipe Diameter

Distribution System Piping Diameter (inches)	Length (linear feet)	Design Life (years)	Criticality Rating (Bigger # = Less Critical)[1]
≤ 6	189,574	100	4
8-10	681,601		4
12-15	532,953		3
16-20	119,997		3
24-30	15,582		2
36-42	35		2
Unknown	1,380		--

Note:
1. Criticality was assessed based on pipe diameter. Larger diameter pipes were identified as being more critical than smaller diameter pipes.

Table 3-2 organizes water system piping by material and age and identifies the anticipated pipe condition. Pipe condition was assessed based on pipe age and remining useful life. Cast iron pipe that was installed after the 1930's, which constitutes over 48 miles of water mains or 16 percent of the total length of water mains in the City's system, was designated to have a significantly reduced design life of 50 years due to known pipe integrity issues. As such, the City is prioritizing replacement of cast iron pipe and regularly partners with other City projects to replace this piping efficiently and has capital programs to fund replacements as discussed further in **Chapter 8**. Piping that has an unknown material and unknown installation date will be updated in the City's GIS system and Cartegraph as more records research is completed.

In 2014, the City conducted leak detection testing and condition assessment of approximately 2.8 miles of 14 to 24-inch ductile iron and concrete composite pipe. The results indicated that the 20-inch and 16-inch ductile iron mains in the Lea Hill Service Area range from moderate to good condition. The Coal Creek Springs concrete composite main was identified as being in good condition. The 14-inch ductile iron main located in the Academy Service Area was suspected of being in poor condition, however this was later thought to be in decent condition as more information regarding the pipe material was obtained. A portion of the 14-inch piping was replaced as part of a roundabout project within Auburn Way S.

In 2020 the City conducted additional leak detection testing and condition assessment of approximately 13,500 feet of 10 to 16-inch cast iron main. With a focus on four specific sites: Auburn Way South, C Street Southwest, West Hill Springs, and Lea Hill Road. All the pipe on Auburn Way South and Lea Hill Road are in moderate condition. The pipe on C Street Southwest and at West Hill Springs are in poor to moderate condition. The C Street Southwest piping is currently being replaced by the City's "C St SW Preservation" capital project that will begin construction in in 2024.The West Hill Springs piping will be replaced in a forthcoming capital project titled "West Hill Springs Transmission Main Replacement" that is identified in **Chapter 8**.

Table 3-2 | Transmission and Distribution System Piping Inventory by Material and Installation Decade

Piping Material	Total Length (linear feet)	Install Decade (10-Year Period)	Length (linear feet)	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)[1]
Cast Iron	253,919	1920	11,877	100	-4	7
		1930	10,602		6	6
		1940	3,079	50	-34	10
		1950	5,937		-24	10
		1960	147,764		-14	9
		Unknown	74,660		--	--
Concrete[2]	11,284	1960	11,284	100	36	3
Ductile Iron	1,198,958	1960	48,235	100	36	4
		1970	115,184		46	4
		1980	283,977		56	4
		1990	299,293		66	4
		2000	230,295		76	3
		2010	156,307		86	2
		2020	50,594		96	1
		Unknown	15,072		--	--
HDPE	409	2010	409	100	86	1
PVC[2]	19,498	1960	1,630	100	36	4
		1970	2,598		46	4
		1980	1,251		56	4
		1990	1,784		66	4
		2000	2,647		76	3
		2010	2,588		86	2
		2020	1,117		96	1
		Unknown	5,884		--	--
RCP	1,014	1970	884	100	46	3
		2020	130		96	1
Steel	1,030	1920	870	100	-4	6
		1970	160		46	4
Unknown - Anticipated to be Cast Iron based on install date	4,022	1960	4,022	50	-14	4
Unknown – Anticipated to be Ductile Iron based	28,564	1970	4,001	100	46	4
		1980	3,822		56	4

Piping Material	Total Length (linear feet)	Install Decade (10-Year Period)	Length (linear feet)	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)[1]
on install date		1990	12,465		66	4
		2000	4,165		76	3
		2010	4,112		86	2
Unknown	23,089	Unknown	23,089	50	--	--

Note:
1. Condition was assessed based on remaining useful life of the pipe.
2. The City is investigating pipe materials in 2024 to verify pipe materials in the City's database that may be mislabeled.

The distribution system piping is delineated into pressure zones using Pressure Reducing Valves (PRVs). An inventory of the City's PRVs, as well as their size, remaining useful life, condition, and criticality are summarized in **Table 3-3**. As PRVs approach their anticipated design life, the City's Maintenance and Operations (M&O) staff remove and rebuild the valve to extend the useful life of the asset, when feasible.

Table 3-3 | Pressure Reducing Valve (PRV) Inventory

Valve ID #	PRV Location Description	Valve Size (inches)	Install Date (year)	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
Lea Hill Service Area							
411-10 - Primary Valve	Cobble Creek Upper at 30216 104th Ave SE	8	2024	40	40	1	3
411-11 - Secondary Valve		2					4
411-12 - Relief Valve		1.5					4
411-20 - Primary Valve	104th Ave SE/SE 302nd St. Cobble Creek Lower	6	1994		10	4	3
411-21 - Secondary Valve		2					4
411-22 - Relief Valve		1.5					4
412-10 - Primary Valve	298th Pl SE & 109th Ave SE	6	2011		27	2	3
412-11 - Secondary Valve		2					4
412-12 - Secondary Valve		2					4
412-20 - Primary Valve	300 Block SE & 108th Ave SE	6	2005		21	1	3
412-21 - Secondary Valve		2					4
412-22 - Secondary Valve		2					4
511-10 - Primary Valve	SE 304th St. & 108th Ave. SE	6	2016	40	32	1	3
511-11 - Secondary Valve		2					4
511-20 – Primary Valve	Cobble Creek Lower at 10230 304th Pl SE	6	1994		10	1	3
511-21 – Secondary Valve		2					4
511-22 – Relief Valve		1.5					4

Valve ID #	PRV Location Description	Valve Size (inches)	Install Date (year)	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
512-10 – Primary Valve	SE 304th St & 110th Pl SE	6	2018		34	1	3
512-11 – Secondary Valve		2					4
512-12 – Secondary Valve		2					4
611-30 - Primary Valve	Carriage Square	8	2018		34	1	3
611-31 - Secondary Valve		3					4
611-32 - Secondary Valve		3					4
711-10 - Primary Valve	Amberview North	8	1986		2	5	3
711-11 – Secondary Valve		2					4
711-20 - Primary Valve	Amberview South	8	1986		2	5	3
Valley Service Area							
1110-10 - Primary Valve	25th St SE & K St SE	10	1987	40	3	6	3
1110-20 - Secondary Valve		4					4
Lakeland Service Area							
1309-10 - Primary Valve	Mill Pond Dr SE & Oravetz Rd SE	10	1980	40	-4	6	3
1309-11 - Secondary Valve		3					4
1309-12 - Secondary Valve		3					4
1309-13- Secondary Valve		1					4
1310-10 - Primary Valve	Mill Pond Dr SE & Mill Pond Loop SE	10	1980		-4	6	3
1310-11 - Secondary Valve		3					4
1310-12 - Secondary Valve		2		40			4
1310-13 - Secondary Valve		1					4
1409-10 - Primary Valve	Oravetz Rd SE & Lakeland Hills Way SE	8	1990		6	5	3
1409-11 - Secondary Valve		4					4
1409-12 - Secondary Valve		2					4
1409-13 - Secondary Valve		2					4
1409-20 - Primary Valve	47th St SE & Lakeland Hills Way SE	8	1992		8	5	3
1409-21 - Secondary Valve		4					4
1409-22 - Secondary Valve		2					4
1409-23 - Secondary Valve		2					4
1409-30 - Primary Valve	Lakeland Hills Way SE & 51st St SE	10	2004		20	3	3
1409-31 - Secondary Valve		3					4
1409-32 - Secondary Valve		2					4
1409-40 - Primary Valve	Mill Pond Dr SE & Lakeland	10	1988		4	5	3

Valve ID #	PRV Location Description	Valve Size (inches)	Install Date (year)	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
1409-41 - Secondary Valve	Hills Way SE	3					4
1409-42 - Secondary Valve		3					4
1409-43 - Secondary Valve		1					4
1410-10 - Primary Valve	5018 Mill Pond Dr SE	10	1980		-4	6	3
1410-11 - Secondary Valve		3					4
1410-12 - Secondary Valve		2					4
1410-20 - Primary Valve	52nd St SE & East of Mill Pond Dr SE	8	1992		8	5	3
1410-21- Secondary Valve		4					4
1410-22- Secondary Valve		2					4
1410-23- Secondary Valve		2					4
1410-30 - Primary Valve	Nathan Ave SE & Highland Dr SE	8	1992		8	5	3
1410-31- Secondary Valve		4					4
1410-32- Secondary Valve		2					4
1410-33- Secondary Valve		2					4
1410-40 - Primary Valve	5203 Quincy Ave SE	8	1995	40	11	4	3
1410-41- Secondary Valve		4					4
1410-42- Secondary Valve		2					4
1410-43- Secondary Valve		2					4
1509-10 - Primary Valve	Terrace View Lower	10	2007		23	3	3
1509-11- Secondary Valve		3					4
1509-12- Secondary Valve		3					4
1509-20 - Primary Valve	Terrace View Middle	10	2007		23	3	3
1509-21- Secondary Valve		3					4
1509-22- Secondary Valve		3					4
1509-30 - Primary Valve	Terrace View Upper	10	2007		23	3	3
1509-31- Secondary Valve		3					4
1509-32- Secondary Valve		3					4
1509-40 - Primary Valve	Terrace View Dr SE & Alexander Pl SE	10	2007		23	3	3
1509-41- Secondary Valve		3					4
1509-42- Secondary Valve		3					4
1510-10 - Primary Valve	Lakeland Hills Way SE & Evergreen Way SE	8	1994		10	4	3
1510-11- Secondary Valve		4					4
1510-12- Secondary Valve		2					4

Valve ID #	PRV Location Description	Valve Size (inches)	Install Date (year)	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
1510-13- Secondary Valve		2					4
1411-10 - Primary Valve	56th St SE at Bennett Ave SE	6	2011		27	2	3
1411-11- Secondary Valve		2					4
1411-12- Secondary Valve		2					4
1411-20 - Primary Valve	5310 Bennett Ave SE	6	2010		26	2	3
1411-21- Secondary Valve		2					4
1411-22- Secondary Valve		2					4
1411-30 - Primary Valve	Kersey Way SE & 50th St SE	8	2015		31	2	3
1411-31- Secondary Valve		2					4
1411-32- Secondary Valve		2		40			4
1411-40 - Primary Valve	2305 54th St SE	10	2015		31	2	3
1411-41- Secondary Valve		3					4
1411-42- Secondary Valve		3					4
1411-50 - Primary Valve	5253 Wesley Ave SE	6	2015		31	2	3
1411-51- Secondary Valve		2					4
1411-52- Secondary Valve		2					4
1412-10 - Primary Valve	5539 Franklin Ave SE	6	2012		28	2	3
1412-11- Secondary Valve		2					4
1412-12- Secondary Valve		2					4
Academy Service Area							
1011-30 - Primary Valve	2003 Auburn Way S	8	2006		22	3	3
1011-31 - Secondary Valve		3					4
1011-32 - Secondary Valve		3					4
1111-10 - Primary Valve	Riverwalk Dr SE & Howard Rd SE	6	2006		22	3	3
1111-11 - Secondary Valve		2					4
1111-12 - Secondary Valve		2					4
1111-20 - Primary Valve	2204 27th St SE	6	1997		13	3	3
1111-21 - Secondary Valve		2					4
1111-22 - Secondary Valve		2					4
1114-10 - Primary Valve	4500 Auburn Way South	8	2006		22	3	3
1114-11 - Secondary Valve		3					4
1114-12 - Secondary Valve		3					4

Figure 3-5 shows the locations of water main breaks and leaks that have required repair since 2014. A total of 93 repairs have been completed during this timeframe and include water main break and leak repairs, water main appurtenance repairs, service lines repairs, and repairs due to damage caused by construction contractors.

Figure 3-5 | Water Main Leak and Break Repair Locations from 2014-2024

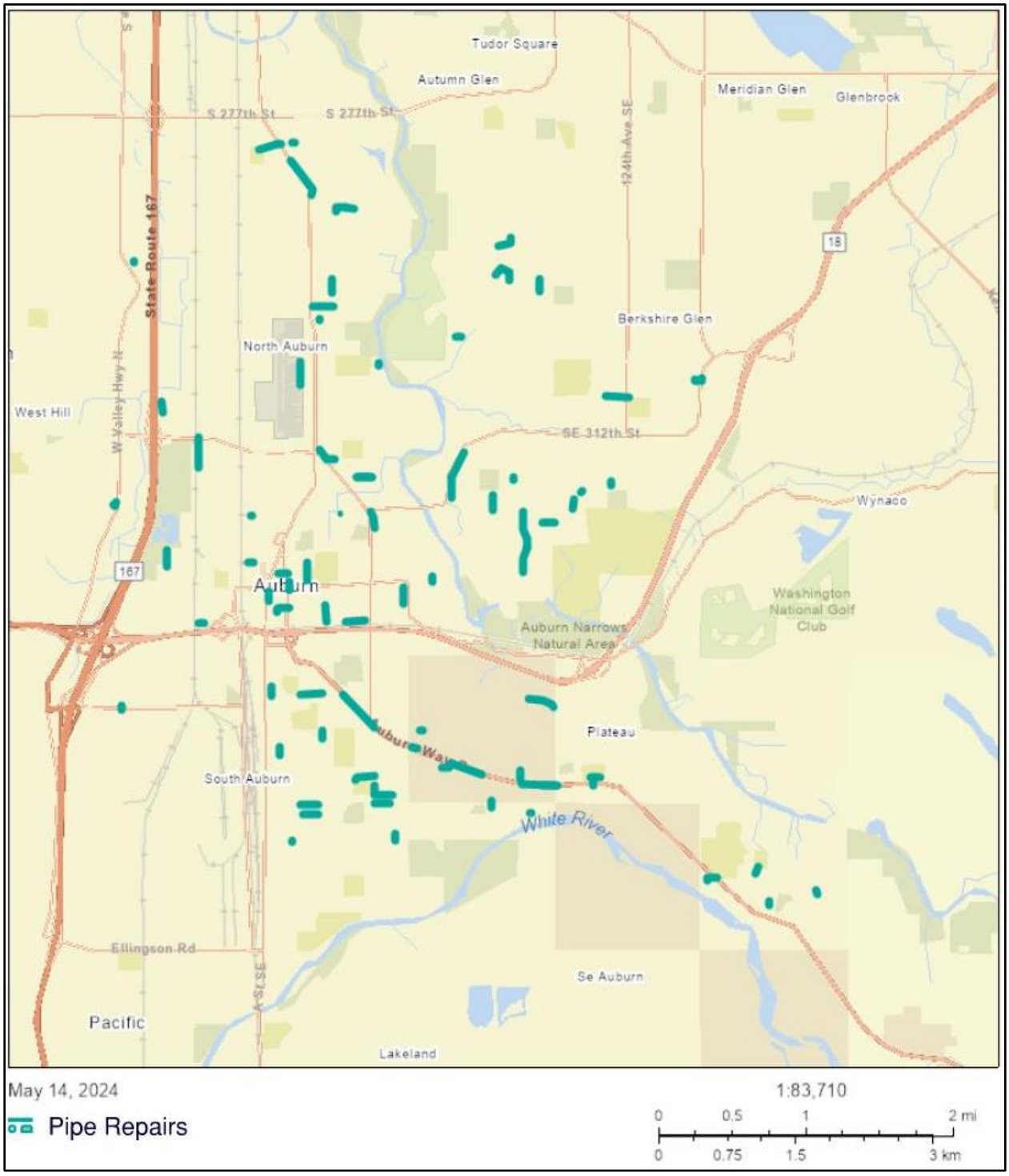
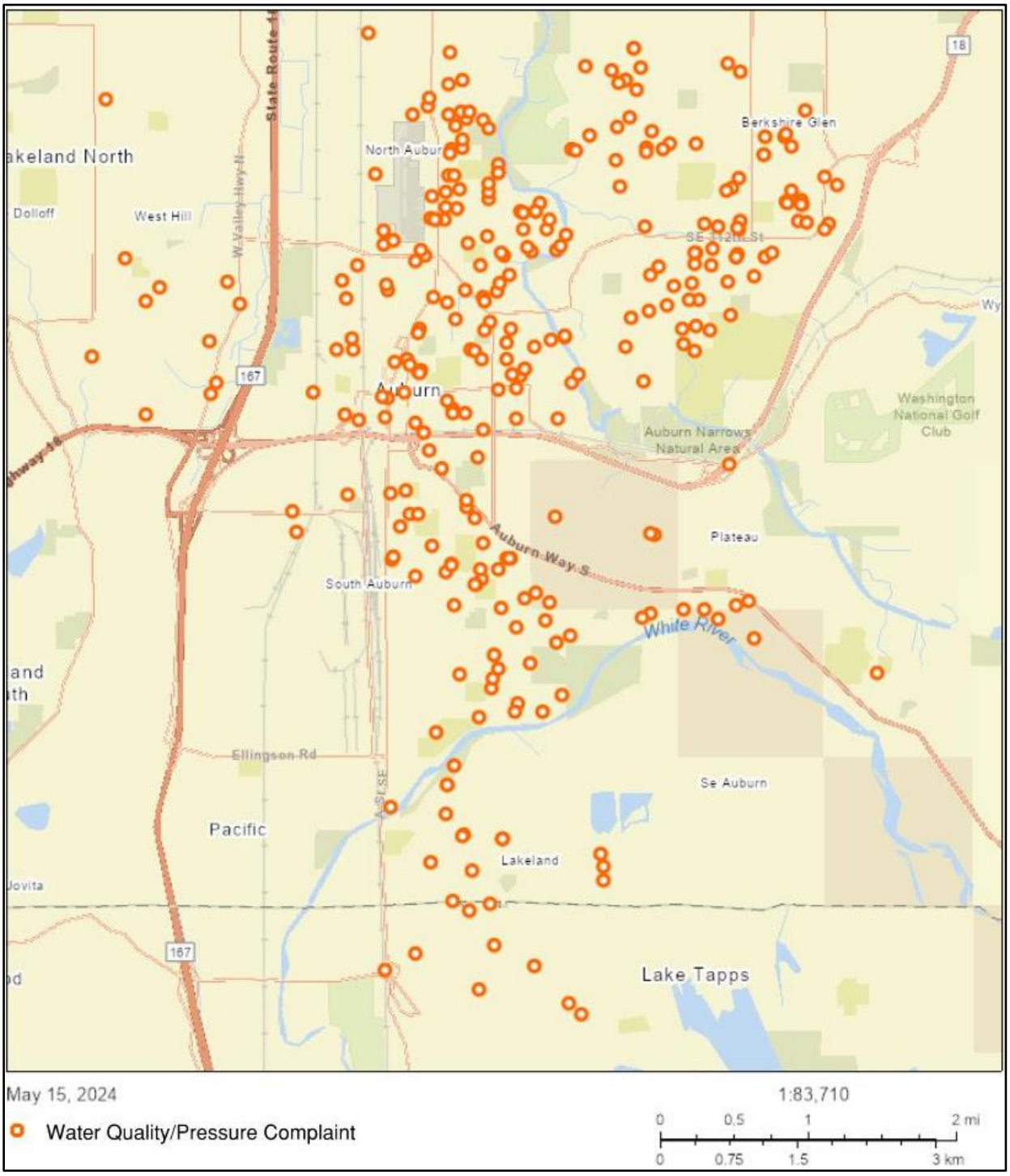


Figure 3-6 shows the locations of low pressure and water quality (odor and discolored water) complaints received since 2014.

Figure 3-6 | Low Pressure, Odor, and Discolored Water Complaints from 2014-2024



A summary of the customer complaints by category is presented in **Table 3-4**. Overall, there has been only one odor complaint within the last ten years. Pressure complaints and water quality complaints have remained fairly consistent, with the fewest number of complaints being made in 2023.

Table 3-4 | Summary Customer Complaints

Category	2014[1]	2015	2016	2017	2018	2019	2020	2021	2022	2023
Water Quality (Appearance)	0	40	47	23	14	55	48	47	27	9
Odor	3	1	0	0	0	0	0	0	0	0
Pressure	6	9	16	19	12	8	4	11	8	10
Total	**9**	**50**	**63**	**42**	**26**	**63**	**52**	**58**	**35**	**19**

Note:
1. Data in 2014 is incomplete due to the City transitioning to Cartegraph Asset Management.

3.1.2 Water Source Facilities

The City uses a combination of groundwater wells and springs as supply sources for the water system. The pumping capacity, remaining useful life, condition and criticality of the City's groundwater wells are summarized in **Table 3-5**. The City's two spring sources, Coal Creek Springs and West Hill Springs, are not included in **Table 3-5** since both these sources operate by gravity and have no on-site pumping equipment. Condition ratings are assigned based on the 2013 Water Facilities Evaluation Study.

A detailed description of each water source facility, including both springs and groundwater wells, and planned improvements is provided following **Table 3-5**. A summary of the pumping or production capacity of each source, including the springs, is included in **Section 2.6** of **Chapter 2**. Discussion of the City's current water rights for each water source is provided in **Section 3.4.1**.

Table 3-5 | Source of Supply Well Pump Inventory

Facility Name	Capacity (MGD)	No. of Pumps	Pump Type	Install Year	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
Valley Service Area								
Well 1	3.02	1	Vertical Turbine	2016	40	32	2	2
Well 2	1.61	1	Centrifugal	2023		39	3	1
Well 3A	Not in Service							
Well 3B	Not in Service							
Well 4	3.74	1	Centrifugal	1985	40	30	1	3
Well 6	1.73	1	Vertical Turbine	1999		15	4	1
Well 7	Not in Service							
Lakeland Service Area								
Well 5	0.94	1	Submersible	1983	40	-1	7	3
Well 5A	0.26	1	Submersible	1990		6	7	2
Well 5B	Not in Service							

3.1.2.1 Coal Creek Springs

Coal Creek Springs is a primary water supply for the City due to its production capacity. This source is more economical to operate than other sources as it can provide a large volume of water and does not require pumping for extraction. Much of the spring's collector system, including the south and middle collectors, was constructed in 1964. A third collector (the north collector) was added in 1998 to enhance system performance and to provide increased reliability. Currently, the flow from this collector is by gravity, however a buried manhole structure was installed in the line to provide space for a future pump station that could increase production.

Each collector is connected to an overflow structure before connection to a 24-inch transmission line that conveys flow to the Howard Road Corrosion Control Treatment (CCT) Facility where the water is treated for corrosion and is then pumped to Reservoir 1. Between the Coal Creek Springs headworks and the Howard Road CCT Facility is a single connection that supplies potable water to Game Farm Wilderness Park. This transmission main is in good condition, however a suspected leak on the 24-inch steel transmission main crossing the White River was identified in a facility evaluation study completed in 2014. It was later identified that there was not a leak, but the evaluation results were caused by river turbulence due to portions of the pipe being exposed along the riverbed. The City is currently constructing a project that replaces the river crossing with new transmission piping suspended from a utility and pedestrian bridge; the project will be completed in 2024 and is identified in Chapter 8.

In recent years, the production capacity of Coal Creek Springs has been reduced. A maximum instantaneous production rate up to 4,500 gpm is currently feasible, however a more consistent functional production capacity of 3,500 gpm is currently achieved (approximately 52 percent of the water right capacity). The City is currently investigating the cause of reduced production and potential solutions. A capital project is planned to rehabilitate Coal Creek Springs once a solution is identified; the project is discussed further in Chapter 8.

3.1.2.2 West Hill Springs

Although the use of West Hill Springs as a potable water supply dates to before 1907, most of the current facilities and equipment were constructed after 1960. More recent improvements include replacement of the collection boxes, as recommended in the 1995 Comprehensive Water Plan, and partial fencing of the watershed, as recommended by the 2000 Water Comprehensive Plan. The spring's existing transmission main is constructed of 10-inch diameter cast iron piping and has experienced two breaks. The City plans to replace approximately 1,250 linear feet of the transmission main with 12-inch diameter ductile iron pipe in an upcoming capital project identified in Chapter 8.

3.1.2.3 Well 1

Well 1 was constructed in 1960 and underwent substantial renovation in 2016, significantly improving the overall facility condition. Renovations included transmission piping to Howard Road CCT Facility, site improvements, a new well house, new pumping system, disinfection with sodium hypochlorite, on-site emergency power, and upgraded electrical and supervisory control and data acquisition (SCADA) controls. The new well pumping system is a two-stage, vertical turbine pump with a capacity of 2,100 gpm, driven by a 100-HP motor and controlled by a variable frequency drive (VFD). Supply from Well 1 will be routed along the recently constructed 16-inch transmission main and conveyed to the Howard Road CCT Facility.

3.1.2.4 Wells 2 & 6

Well 2 was constructed in 1970 and the well and well house were replaced in 2000 with a new masonry building and pumping equipment as part of the City's corrosion control strategy. The facility built in 2000 also houses Well 6, which was built in 1999. Within the facility is a two-stage 1,115 gpm centrifugal pump powered by a 125-HP motor, installed in 2023 (Well 2), and a two-stage, vertical-turbine pump driven by a 200-HP motor (Well 6). The pumping capacity of Well 6 has been reduced in recent years to a typical production rate of 1,200 gpm due to fouling of the well screen that requires occasional cleaning. The wells discharge to a 14-inch transmission main to Fulmer Field CCT Facility for treatment prior to distribution.

Since the Fulmer Field CCT Facility is required to re-pump the water from Wells 2 and 6 into the Valley Service Area and to Reservoir 2, Wells 2 and 6 are functional only with operation of the Fulmer Field CCT Facility. Chlorination and emergency power for both Wells 2 and 6 are housed in the Fulmer Field CCT Facility.

In 2023 the City completed an interim replacement of the pump at Well 2. Full replacement of Well 2 is planned as a capital project discussed further in **Chapter 8.** Additionally, rehabilitation work completed in 2013 and 2014 indicated that it would be beneficial to clean and rehab both wells on a regular basis. As such, the City initiated a program for regular cleaning of the wells established on a 3-year cycle which is discussed further in **Chapter 8**.

3.1.2.5 Wells 3A & 3B

Wells 3A and 3B are located at the same site, off 37th Street SE on the extension of E Street SE. The wells are approximately 50 feet apart and were constructed in 1983 and 1984 respectively. Each well is equipped with a four-stage, centrifugal pump driven by a 125-HP motor, each with a maximum pumping capacity of 1,650 gpm when operated individually. A standby generator capable of running one pump at a time is available on site. The system is equipped with an automatic transfer switch.

Currently, Wells 3A and Well 3B are not operated because they produce water that contains high concentrations of manganese. Since the wells were taken offline, the chlorination facilities have been removed. If operated, the wells pump directly into the Valley Service area distribution system. The City plans to construct treatment for these wells as part of the "Wells 3A/3B Treatment" project discussed further in **Chapter 8**.

3.1.2.6 Well 4

Well 4 was originally constructed in 1985, was rebuilt in 2012, and is currently undergoing significant upgrades to mechanical and electrical equipment, including well pump piping, valve replacement, and control panel replacement. Once the upgrades are complete this source will be considered in excellent condition. The well is equipped with a 2,600-gpm, four-stage, centrifugal, turbine pump driven by a 300-HP motor. Well 4 pumps directly to a 16-inch transmission main that can either convey water to Reservoir 1 or to distribution through a PRV. Well 4 is an important supply for the southern end of the City's Retail Water Service Area (RWSA). Operation of the well is normally controlled by the water level in Reservoir 1.

3.1.2.7 Well 5

Well 5 is one of three City wells that were constructed to serve the Lakeland Hills Development within the City's Lakeland Service Area. Well 5 pumps directly into the Lakeland Service Area distribution system. The well was constructed in 1983 and is equipped with a seven-stage submersible turbine pump, driven by a

125-HP motor. The well facility was assessed to be in poor condition in the 2013 Water Facilities Evaluation Study. The City plans to upgrade the facility as part of the Well 5/5A Upgrades project discussed in Chapter 8.

3.1.2.8 Well 5A

Well 5A is the second well serving the Lakeland Service Area and was constructed in 1990 to supplement Well 5. The well pumps directly into the Lakeland Service Area distribution system. The well is equipped with a ten-stage submersible turbine pump, driven by a 60-HP motor and has on-site chlorination facilities. A manual transfer switch is provided to allow operation of Well 5A using a portable emergency generator. The well facility was assessed to be in poor condition in the 2013 Water Facilities Evaluation Study. The City plans to upgrade the facility as part of the Well 5/5A Upgrades project discussed in Chapter 8.

3.1.2.9 Well 5B

Well 5B was constructed in 2005 with a 600 gpm pump. Once this source came on-line, the City discovered the aquifer was not recovering, so the well was taken out of service in 2006 and has not been operated since. The City has no plans to operate this well within the planning horizon.

3.1.2.10 Well 7

Well 7 was constructed in 1997 and was originally equipped with a 3,500-gpm variable-stage, vertical-turbine pump driven by a 500-HP motor. Well 7 is configured to pump directly to the Fulmer Field CCT Facility through a 16-inch transmission main. The treated water is then re-pumped into the Valley Service Area. If necessary, Well 7 can pump untreated water directly to the Valley Service Area through a PRV. The well was taken out-of-service in 2012 due to high manganese concentrations. The City has planned capital projects to expand the treatment capacity and treat manganese at Fulmer Field CCT Facility to accommodate flows from Well 7 so operation of this facility can be reinstated. The projects to provide treatment and back-up power for Well 7 are discussed in Chapter 8.

3.1.2.11 Algona Well 1

In 1996, the City acquired the water rights for Algona Well 1 as a condition of the wholesale agreement with the City of Algona (Algona). Due to pump operational problems, Algona Well 1 was removed from service. The 500-gpm pump and associated piping have been removed from the well house and the building has been demolished, but the well casing is still intact, and the well is plugged. The City has a capital project identified in Chapter 8 to study the well and options for potential use or relocation.

3.1.3 Water Treatment Facilities

The City's water treatment facilities provide chlorination and corrosion control. An inventory of the water system's treatment facilities, including the treatment type, capacity, remaining useful life, condition, and criticality is provided in Table 3-6. Condition ratings are assigned based on the 2013 Water Facilities Evaluation Study. A detailed description of each water treatment facility and planned improvements is provided following Table 3-6.

Table 3-6 | Water Treatment Facility Inventory

Facility Name	Treatment Type	Treatment/ Dosing Capacity	Install Date	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
Coal Creek Springs	Gas Chlorination	0.75-0.80 mg/L	1976	35	-13	3	2
West Hill Springs	Gas Chlorination	0.75-0.80 mg/L	1992		15	5	3
Fulmer Field CCT Facility	Hypochlorite	0.95 mg/L	2002	35	13	5	2
	Corrosion/Air-Stripping	11.88 MGD					1
Howard Road CCT Facility	Corrosion/Air-Stripping	8.06 MGD	2004		15	5	1
Terrace View Booster Pump Station	Re-chlorination	0.75 mg/L	2010		21	3	2
Well 1	Hypochlorite	0.75-0.80 mg/L	2016		27	2	2
Well 4	Hypochlorite	0.75-0.80 mg/L	2016		27	2	3
Well 5A	Hypochlorite	0.75-0.80 mg/L	1990		1	3	2

3.1.3.1 Chlorination Facilities

3.1.3.1.1 Coal Creek Springs Chlorination

The Coal Creek Springs chlorination station was built in 1976 and achieves 4-log treatment of the supply. The chlorination station is housed in a masonry building approximately 300 feet north of the collectors and is in fair condition. As a major source of water for the system, Coal Creek Springs is used to maintain chlorine residuals in the Academy Service Area and south end of the Valley Service Area.

This chlorination station is equipped with two chlorinators. Gaseous chlorine is stored on site in a separate room. Alarms from the chlorination equipment are transmitted back to the Water Control Center at the M&O Facility. A chlorine residual analyzer provides high and low alarms to the M&O Facility. Chlorine is dosed into the water at a range of 0.75-0.80 milligrams per liter (mg/L) and is adjusted based on the chlorine residual measured in the Academy and the south end of the Valley Service Area.

The City has a capital project planned to replace the chlorination building and upgrade the chlorination equipment from chlorine gas to hypochlorite disinfection. This project is discussed further in **Chapter 8**.

3.1.3.1.2 West Hill Springs Chlorination

The West Hill Springs Chlorination Facility was constructed in 1992. Water produced at West Hill Springs continuously flows from the collection boxes to the on-site chlorination station, housed in a wood building, where gas chlorine is metered continuously to treat the water. Chlorine dosage typically ranges from 0.75 – 0.80 mg/L and is adjusted based on the measured chlorine residual in the north end of the Valley Service Area. From the chlorination station, the water flows by gravity into the Valley Service Area.

3.1.3.1.3 Well 1

Liquid sodium hypochlorite treatment was installed at Well 1 in 2016. The chlorine dosage typically ranges from 0.75 - 0.80 mg/L. A residual monitoring system is tied into the City's existing SCADA system. The City plans to replace the liquid hypochlorite system with an on-site chlorine generation system (OSEC) to better accommodate seasonal changes to chemical demands and reduce chemical waste. This project is discussed further in Chapter 8.

3.1.3.1.4 Wells 2 and 6

Water produced at Wells 2 and 6 is treated and chlorinated at the Fulmer Field CCT Facility prior to distribution.

3.1.3.1.5 Well 4

Well 4 was equipped with a liquid sodium hypochlorite chlorination system in 2016. The chlorine dosage typically ranges from 0.75 – 0.80 mg/L. The City plans to replace the liquid hypochlorite system with an on-site chlorine generation system (OSEC) to better accommodate seasonal changes to chemical demands and reduce chemical waste. This project is discussed further in Chapter 8.

3.1.3.1.6 Well 5

There is currently no chlorination provided for water produced at Well 5. This City has a capital project discussed in Chapter 8 that will include the addition of a chlorination facility to Well 5.

3.1.3.1.7 Well 5A

Well 5A was equipped with a liquid sodium hypochlorite chlorination station in 1990. The chlorine dosage typically ranges from 0.75 – 0.80 mg/L and is adjusted based on the chlorine residual measured in the Lakeland Service Area.

3.1.3.1.8 Fulmer Field CCT Facility

The Fulmer Field CCT Facility was constructed in 2004. Chlorination at Fulmer Field CCT, along with B Street Intertie, is a major source of chlorine residual in the north end of the Valley Service Area and in the Lea Hill Service Area and is achieved using an on-site chlorine generation system. The existing on-site chlorine generation cell was replaced in 2012, but the system was identified as being in poor condition and sourcing replacement parts for repairs has become increasingly more difficult. A capital project to replace the entire on-site generation system is planned and discussed further in Chapter 8.

The Fulmer Field CCT Facility treats the water from Wells 2, 6, and 7 (when operational). Chlorine is introduced into the system prior to the air-stripping towers at a dose of approximately 0.95 mg/L. The chlorine is adjusted based on measured chlorine residual at the station analyzer. The treated water is then stored in the clearwell and boosted into the distribution system and Reservoir 2. If needed, the chlorine can be manually introduced into the clearwell rather than prior to the towers.

3.1.3.1.9 Terrace View Booster Pump Station (BPS)

The Terrace View BPS was equipped with a liquid sodium hypochlorite chlorination system in 2010, adding 6 percent solution to the discharge piping of the station at an approximate dose of 0.75 mg/L.

3.1.3.1.10 Intertie Pump Station

Through the First Amendment to Interlocal Agreement No. 2 for the Lea Hill Intertie project executed in 2017, Covington Water District (CWD) terminated its rights or obligations to Interlocal Agreement No. 2 or the First Amendment and Lake Meridian Water District (LMWD) continues to receive wholesale water from the City, as needed, on an interruptible basis. The chlorination equipment was removed from the Intertie Pump Station since the intertie is not used on regular basis.

3.1.3.2 CCT Facilities

To limit the corrosion of lead and copper in the system, the City treats major supplies. The treatment process increases the pH of the water, which reduces the solubility of lead and copper, allowing the water to comply with the Lead and Copper Rule. The goal of the CCT facilities is to adjust the water leaving the facility to a pH of approximately 7.5.

3.1.3.2.1 Fulmer Field CCT Facility

The Fulmer Field CCT Facility also adjusts the pH of the water from its sources to approximately 8.0 by air-stripping in three 33,000 gallon air-stripping towers to provide corrosion control treatment. Three 10,000 cubic feet per minute (CFM) blowers provide air. As the carbon dioxide is stripped from the water, the treated water is stored in the clearwell and boosted through four booster pumps back into the distribution system and Reservoir 2. The firm capacity of the facility is 11.88 MGD.

3.1.3.2.2 Howard Road CCT Facility

The Howard Road CCT Facility was constructed in 2004. It has a life expectancy of an additional 15 years and is generally in fair condition. This facility is housed in a masonry building and treats the water from Coal Creek Springs and Well 1. The pH of the water from Coal Creek Springs and Well 1 is then adjusted to approximately 7.8 by air-stripping in two 33,000 gallon air-stripping towers. Two 9,300 CFM blowers provide air. The treated water is then stored in the clearwell at the facility and re-boosted through three booster pumps to Reservoir 1 and the Valley Service Area. The firm capacity of the facility is 8.06 MGD.

3.1.4 Storage Facilities

The City currently maintains a total of 15.7 million gallons (MG) of water storage in eight water reservoirs located throughout the system. Storage reservoirs are present in each of the City's Service Areas. The location of each storage reservoir is shown in **Figure 3-1**. A summary of the City's storage reservoirs, as well as the type of storage tank, installation date, remaining useful life, condition and criticality is provided in **Table 3-7**. Condition ratings are assigned based on the 2013 Water Facilities Evaluation Study. The storage volumes provided in **Table 3-7** represent the maximum tank volume; however, the City commonly operates the reservoirs at below the maximum levels. A detailed description of reservoir and planned improvements is provided following **Table 3-7**.

Table 3-7 | Inventory of Storage Reservoirs

Reservoir Name	Storage Volume (MG)	Type	Install Date	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
Valley Service Area							
Reservoir 1	5.0	Prestressed Concrete	1975	100	45	5	2
Reservoir 2	3.6	Prestressed Concrete	1975		45	3	2
Lea Hill Service Area							
Reservoir 4A	1.0	Steel Standpipe	1965	70	11	3	2
Reservoir 4B	1.5	Steel Standpipe	1983		29	4	2
Lakeland Service Area							
Reservoir 5	1.0	Steel Standpipe	1981	70	27	2	3
Reservoir 6	1.0	Steel Standpipe	2012		58	2	3
Academy Service Area							
Reservoir 8A	1.2	Steel Standpipe	1973	70	19	3	3
Reservoir 8B	1.5	Steel Standpipe	1980		26	3	3

3.1.4.1 Reservoir 1

Reservoir 1 is located at the southeast end of the Valley Service Area and is the primary storage location for water produced at Coal Creek Springs and pumped from the Howard Road CCT Facility. Reservoir 1 can also be filled by water produced at Well 4. The reservoir was constructed in 1975 and is a covered, pre-stressed concrete tank with a capacity of 5 MG. Reservoir 1 is 184.5 feet in diameter and has an overflow elevation of 269 feet. Academy Pump Station 3 draws water from Reservoir 1 to feed the Academy Service Area. Reservoir 1 also serves the Valley Service Area through Control Valve 1. Control Valve 1 is essential to limit flow and maintain adequate supply to the Valley Service Area.

Reservoir 1 was last inspected and cleaned on March 15, 2023. Recommended improvements identified in 2013 Water Facilities Evaluation Study are planned to be completed as part of the "Reservoir Capital Improvements" project discussed further in **Chapter 8**.

3.1.4.2 Reservoir 2

Reservoir 2 is located on the northeast side of the City's Water Service Area and serves the Valley Service Area. The reservoir was constructed in 1975 and is a buried, pre-stressed concrete tank with public tennis courts on the concrete roof. The reservoir has a maximum storage capacity of 3.6 MG, has a diameter of 143 feet and an overflow elevation of 252.7 feet. Reservoir 2 is filled by the water sources located in the Valley Service Area and is also filled from Reservoir 1 through Control Valve 1.

Reservoir 2 was last inspected and cleaned on March 13, 2023. A capital project is planned to replace the fill and drain valves associated with the reservoir; the project is discussed further in **Chapter 8**. This project will also resolve improvements identified in the 2022 sanitary survey.

3.1.4.3 Reservoirs 4A and 4B

Storage in the Lea Hill Service Area is provided in two steel standpipe reservoirs located in the northeast corner of the City's RWSA, Reservoir 4A and Reservoir 4B. The reservoirs have capacities of 1.0 MG and 1.5 MG respectively. Reservoir 4A was constructed in 1965 with a diameter of 46 feet and an overflow elevation of 578.5 feet. Reservoir 4B was constructed in 1983 with a diameter of 58 feet and an overflow elevation of 579.6 feet. Water is supplied to the Lea Hill reservoirs from the City's Valley Service Area through the Green River Pump Station and Lea Hill Pump Station.

The reservoirs were last inspected and cleaned in June and April of 2018. A capital project is currently installing seismic control valves on the outlet piping from both reservoirs to prevent catastrophic flow during a seismic pipe failure; the project is discussed further in **Chapter 8**. Additionally, required improvements identified in the 2022 Sanitary Survey will be completed as part of the Reservoir Repair and Replacements Program also discussed in **Chapter 8**.

3.1.4.4 Reservoir 5

Reservoir 5 is one of two reservoirs providing storage for the Lakeland Service Area. The reservoir was constructed in 1981 and has a total capacity of 1.0 MG. The reservoir is filled by Well 5, Well 5A, and the Terrace View BPS. Reservoir 5 is steel standpipe with a 53.25-foot diameter and an overflow elevation of 638.5 feet. The reservoir was last cleaned and inspected in 2019 and the interior and exterior were last painted in 2016 as part of routine maintenance.

3.1.4.5 Reservoir 6

Reservoir 6 is in the Lakeland Service Area within the boundary of the Lakeland 697 pressure zone but is connected to distribution piping for the Lakeland 630 pressure zone. Reservoir 6 is a steel standpipe constructed in 2012 and has a total capacity of 1.0 MG. This reservoir has a diameter of 63.4 feet and an overflow elevation of 638.9 feet. The reservoir is filled by Well 5, Well 5A, and the Terrace View BPS. The reservoir was last cleaned and inspected in 2019.

3.1.4.6 Reservoir 8A and 8B

Reservoirs 8A and 8B are steel standpipes that provide storage for the Academy Service Area. The reservoirs are normally operated in parallel, functioning as one large reservoir. Reservoir 8A has a diameter of 52.75 feet and a total storage volume of 1.2 MG and was constructed in 1973. Academy Reservoir 8B has a diameter of 60 feet and a total storage volume of 1.5 MG and was constructed in 1980. Both reservoirs have an overflow elevation of 544 feet. Academy Pump Station 3 fills the reservoirs.

The reservoirs were last cleaned and inspected in October 2019. A capital project is currently installing seismic control valves on the outlet piping from both reservoirs to prevent catastrophic flow during a seismic pipe failure; the project is discussed further in **Chapter 8**. Additionally, required improvements identified in the 2022 Sanitary Survey will be completed as part of the Reservoir Repair and Replacements Program also discussed in **Chapter 8**.

3.1.5 Pump Station Facilities

The City operates and maintains several pump stations to move water throughout the distribution system and to provide water at the required service pressures. An inventory of the City's pump stations is provided in **Table 3-8** and locations are shown in **Figure 3-1**. Condition ratings provided in **Table 3-8** are assigned based on findings from the 2013 Water Facilities Evaluation Study.

Table 3-8 | Pump Station and Booster Pump Station Inventory

Facility Name	Firm Capacity (gpm)	Firm Capacity (MGD)	Install Date	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
Lea Hill Service Area							
Intertie Pump Station (Wholesale)	3,510	5.05	1999	40	15	3	4
Lea Hill BPS	300	0.432	1999		15	3	3
Lea Hill Pump Station	1,200	1.73	1965		-19	6	3
Green River Pump Station	3,498	5.04	1999		15	3	2
Valley Service Area							
Game Farm Park Pump Station	50	0.07	1988	40	4	7	4
Lakeland Service Area							
Lakeland Hills BPS	4,205	6.06	2012	40	28	2	2
Terrace View BPS	1,000	1.44	2010		26	2	2
Fulmer Field CCT Facility	8,250	11.88	2004		20	3	1
Howard Road CCT Facility	5,600	8.06	2004		20	4	1
Academy Service Area							
Academy Pump Station 3	2,100	3.02	2023	40	39	1	1
Academy East BPS	3,040	4.38	2014		30	2	2

3.1.6 Facility Back-Up Power

An inventory of the City's existing facilities with backup power accommodation is provided in **Table 3-9**. Of the City's twelve water sources, only Wells 5 and 7 are currently without a standby power source. Standby power will be added to both wells as part of capital projects discussed in **Chapter 8**. Back-up power for Wells 2 and 6 is housed at the Fulmer Field CCT Facility.

The Game Farm Park Pump Station, Lea Hill BPS, and Intertie Pump Station are the only pump stations without a standby power source or connection. Backup power will be added to the Lea Hill BPS as part of a capital project discussed further in **Chapter 8**. The Game Farm Park Pump Station is a small facility that serves a recreational area and does not serve residential or commercial properties, therefore back-up power is not a critical element.

Table 3-9 | Back Up Power Inventory

Generator Location	Generator Type and Size	Install or Purchase Date	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
Fulmer Field CCT Facility	On-site, 1000 kW	2001	25	2	4	3
Howard Road CCT Facility	On-site, 600 kW	2004		5	3	3
Academy East BPS	On-site, 600 kW	2010		11	2	3

Generator Location	Generator Type and Size	Install or Purchase Date	Design Life (years)	Remaining Useful Life (years)	Condition Rating (Bigger # = Worse Condition)	Criticality Rating (Bigger # = Less Critical)
Academy Pump Station 3	On-site, 450 kW	2023		24	1	3
Green River Pump Station	On-site, 515 kW	2004		5	2	3
Lakeland Hills BPS	On-site, 300 kW	2012		13	2	3
Lea Hill Pump Station	On-site, 250 kW	1964		-35	6	3
Terrace View BPS	On-site, 250 kW	2010		11	2	3
Well 1	Portable, 230 kW	2014		15	2	3
Well 3A/3B	On-site, 210 kW	1983		-16	5	3
Well 4	On-site, 450 kW	2016		17	2	3
Well 5A	Portable, 230 kW	1992		-7	4	3
Well 5B	On-site, 400 kW	2005		6	3	4
Coal Creek Springs	On-site, 20 kW	1964		-35	6	3

3.1.7 Facility Monitoring and Control

Primary monitoring and operation of the City's water system and facilities is conducted via a SCADA computerized control system. A software program called "AVEVA" works in association with SCADA to provide real time graphical display of system data, set points, and alarms for staff monitoring and control. The City's SCADA system controls are centralized at the Public Works M&O Facility. Major upgrades of the City's SCADA system were complete in 2015 and again in 2024, and the system regularly undergoes updates as facility upgrades or improvements are completed.

3.1.8 2022 Sanitary Survey Findings

The City has already taken corrective actions and will continue to resolve all deficiencies identified in the 2022 Sanitary Survey, as summarized in **Table 3-10**.

Table 3-10 | Summary of 2022 Sanitary Survey Findings

Issues/Recommended Improvements		Required Action
Sources and Treatment		
Well 3A	Offline due to manganese issues	--
Well 3B	Offline due to manganese issues	--
Well 5	Water supply lines to chlorine solution tanks must be provided with either air gaps or reduced pressure backflow assemblies to eliminate potential cross connections.	This deficiency was mislabeled by DOH, This should have been for Well 4. A letter from the DOH acknowledging the error was received on October 17, 2022.
	Pump to waste line should terminate above grade.	Will be addressed in Well 5/5A Upgrades project included in CIP; refer to **Chapter 8**.
Well 5A	Water supply lines to chlorine solution tanks must be provided with either air gaps or reduced pressure backflow assemblies to eliminate potential cross connections.	Completed. On September 21, 2022, a reduced pressure backflow assembly was installed at Well 5A, on the water supply line to the chlorine tank.
	Raise casing to terminate above grade or provision of sump pump or alarms that activate when water accumulates in vault. In the meantime, the vault	City implemented an inspection program in October 2022.

	Issues/Recommended Improvements	Required Action
	should be inspected weekly and immediately following significant storm events.	Will be addressed further in Well 5/5A Upgrades project included in CIP; refer to **Chapter 8**.
Well 7	Offline due to manganese issues	--
Storage		
Reservoir 2	Reservoir overflow should not be connected directly to any drain, sanitary sewer, or storm sewer.	Will be addressed in Reservoir 2 improvements project included in CIP; refer to **Chapter 8**.
Reservoir 4A	Reservoir vents should open downward to prevent windblown debris from entering tank.	Will be completed as part of City's annual Reservoir Repair and Replacement program or Reservoirs 4 and 8 Seismic Rehabilitation project; refer to **Chapter 8**.
	Reservoir overflow should not be connected directly to any drain, sanitary sewer, or storm sewer.	Will be completed as part of City's annual Reservoir Repair and Replacement program or Reservoirs 4 and 8 Seismic Rehabilitation project; refer to **Chapter 8**.
Reservoir 4B	Reservoir overflow should not be connected directly to any drain, sanitary sewer, or storm sewer.	Will be completed as part of City's annual Reservoir Repair and Replacement program or Reservoirs 4 and 8 Seismic Rehabilitation project; refer to **Chapter 8**.
Reservoir 8A	Reservoir overflow screen must be repaired	Completed. On September 13, 2022, the overflow screen at Reservoir 8A was repaired.
	Reservoir vents should open downward to prevent windblown debris from entering tank.	Will be completed as part of City's annual Reservoir Repair and Replacement program or Reservoirs 4 and 8 Seismic Rehabilitation project; refer to **Chapter 8**.
Reservoir 8B	Reservoir overflow screen must be repaired	Completed. On September 13, 2022, the overflow screen at Reservoir 8B was repaired.
	Reservoir vents should open downward to prevent windblown debris from entering tank.	Will be completed as part of City's annual Reservoir Repair and Replacement program or Reservoirs 4 and 8 Seismic Rehabilitation project; refer to **Chapter 8**.

3.2 Water Quality

The quality of drinking water in the United States is regulated by the EPA. Under provisions of the Safe Drinking Water Act (SDWA) established in 1974, the EPA is allowed to delegate primary enforcement responsibility for water quality control to each state. In the State of Washington, DOH is the agency responsible for implementing and enforcing the drinking water regulations. For the State to maintain the authority to implement requirements under the SDWA, it must adopt drinking water regulations that are at least as stringent as federal regulations. In meeting these requirements, the State has published drinking water regulations that are contained in Chapter 246-290 of the WAC.

As a Group A system, the City is responsible for monitoring and complying with all applicable SDWA and WAC regulations pertaining to source water and distribution system water quality. The purpose of this section is to document the water system's water quality compared to the above drinking water standards, satisfying the requirements of WAC 246-290-100(4)(e)(ii).

The City also owns and operates the Braunwood satellite system located in southeast Auburn in the Braunwood development, also known as the Hidden Valley Acres development. This system is classified as a Group A - Community Water System by DOH. This system is not discussed further in this chapter since it is a small satellite system that is regularly monitored by the City as required and has not had water quality issues as documented in the City's annual water quality reports for the system.

This section includes the following:

- Water quality and treatment objectives
- Analysis of source water quality
- Analysis of distribution system water quality
- Recent regulatory changes

3.2.1 Water Quality Treatment and Objectives

The treatment objectives of the City are to treat source water to contaminant concentrations below the MCLs established by the EPA and WAC.

Historically, the City has relied on groundwater supplied from wells and springs, which have been determined to be not under the direct influence of surface waters (DOH 2004 for Coal Creek Springs). For these water sources, the City is required to meet the EPA's Groundwater Rule (GWR). The City treats water from all groundwater and spring sources, except for Well 5. The City's water treatment facilities provide chlorination and corrosion control. A summary of the required operator certifications for each type of facility is provided in Table 3-11.

Table 3-11 | Summary of Operator Certifications

Treatment Facility	Required Operator Certifications
Corrosion Control Treatment (CCT) Facilities	Water Distribution Manager 4 (WDM-4) and Water Treatment Plant Operator (WTPO)
Chlorination Facilities	WDM-4

The City began using surface water in 2012 through the B-St Wholesale Intertie with the City of Tacoma (Tacoma). This supply, referred to as the Regional Water Supply, originates from the Green River and the Howard Hansen Dam. Since the City receives treated water as a wholesale purchaser, it is not required to meet the Surface Water Treatment Rule. Tacoma maintains compliance with the Interim Enhanced Surface Water Rule, Long Term 1 and Long Term 2 Enhanced Surface Water Treatment Rules; and the Filter Backwash Recycling Rule. The City has not purchased water for consumption from Tacoma since 2016.

3.2.2 Analysis of Source Water Quality

3.2.2.1 Raw Water Quality

The City only samples post-treatment water except for Well 5, which does not currently have treatment or chlorination. Water quality data for Well 5 is provided in Table 3-12.

3.2.2.2 Finished Water Quality

Monitoring of inorganic chemical and physical parameters varies by source but is typically required once per 36-month compliance period, however, the City typically monitors these constituents every 12 months (annually) in July. Samples are collected from each source following treatment. A summary of the maximum detected concentrations for monitoring data from 2015 through 2022 is provided in **Table 3-12**. During this time, none of the MCLs published by the EPA were exceeded; all samples were below required limits.

Asbestos sampling is usually required once per 36-month compliance period. However, the City has a waiver that requires sampling once every nine years at three distribution system sample sites. No data was collected during the study period. The City is expected to sample again in 2028. Annual VOC sampling is required for Wells 2 and 6, which are both currently represented by the Fulmer Field CCT Facility. All active sources are disinfected with chlorine prior to entering the distribution system except for Well 5, which serves the Lakeland Service Area.

Monitoring data for 2015 through 2022 for inorganic constituents, physical parameters, SOCs, and VOCs were reviewed and is summarized in **Table 3-12**. All values are post-treatment, except for Well 5 since water from this source is not treated. Wells 3A, 3B, 5B, and 7 were not used during this period and were therefore not sampled.

Table 3-12 | EPA Primary Drinking Water Standards Results from 2015 through 2022

Constituent	MCL	Units	Maximum Detected Concentration From 2015 Through 2022[1] (mg/L)						
			Coal Creek Springs	West Hill Springs	Well 1	Well 4	Well 5	Well 5A	Fulmer Field CCT Facility[2]
EPA Primary Drinking Water Standards									
Arsenic	0.01	mg/L	0.001	0.001	0.001	0.001	0.001	0.002	0.002
Barium	2	mg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cadmium	0.005	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Chromium	0.1	mg/L	0.007	0.007	0.007	0.007	0.007	0.007	0.007
Mercury	0.002	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Selenium	0.05	mg/L	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Beryllium	0.004	mg/L	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
Nickel[3]	-	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Antimony	0.006	mg/L	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Thallium	0.002	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cyanide	0.2	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Fluoride	4.0	mg/L	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nitrite-N	1	mg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Nitrate-N	10	mg/L	1.7	3.6	2.4	1.4	1.9	0.4	1.7
Total Nitrate/Nitrite[4]	10	mg/L	1.7	3.6	2.4	1.4	1.9	0.5	1.7
EPA Secondary Drinking Water Standards[5]									
Iron	0.3	mg/L	0.1	0.1	0.1	0.62[6]	0.16	0.1	0.1
Manganese	0.05	mg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.032
Silver	0.1	mg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Chloride	250	mg/L	5	8	5	4	6	3	9
Sulfate	250	mg/L	9	15	12	12	11	6	14
Zinc	5	mg/L	0.2	0.2	0.2	0.2	0.2	0.2	0.2
State Regulated Characteristics									
Sodium	20	mg/L	6	8	7	7	10	6	12
Conductivity	700	µmhos/cm	150	254	184	152	275	133	224

Constituent	MCL	Units	Maximum Detected Concentration From 2015 Through 2022[1] (mg/L)						
			Coal Creek Springs	West Hill Springs	Well 1	Well 4	Well 5	Well 5A	Fulmer Field CCT Facility[2]
Turbidity	1	NTU	0.4	1.5	9.6	5.8	1.2	0.4	3.1
Color	15	Color Units	5	5	10	5	5	5	5
Total Dissolved Solids (TDS)[7]	600	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	N/A
State Unregulated									
Lead[8]	0.015	mg/L	0.001	0.001	0.001	0.018	0.001	0.001	0.001
Copper	1.3	mg/L	0.02	0.3	0.02	0.2	0.02	0.02	0.02
Hardness[9]	-	mg/L	66	122	83	100	130	62	100

Notes:

1. Based on monitoring conducted between 2015 and 2022. Wells 3A, 3B, and 5B were not in use during this time period and no monitoring was conducted.
2. The Fulmer Field CCT Facility was monitored in 2015, 2018,2020, 2021, and 2022, it replaces monitoring of Wells 2, 6, and 7.
3. There is no state or federal MCL, but Washington state has a detection reporting limit of 0.005 mg/L.
4. EPA has set a treatment goal of Total Nitrate at 10 mg/L.
5. EPA does not enforce these "secondary maximum contaminant levels" (SMCLs). They are established as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color, and odor. These contaminants are not considered to present a risk to human health at the SMCL.
6. Iron levels in Well 4 exceeded the Secondary Drinking Water Standards in 2015 but have since all been below the MCL.
7. N/A - not applicable, no testing conducted; testing for total dissolved solids is only required if the specific conductivity is greater than 700 micomhos per centimeter (umhos/cm).
8. On November 30, 2023, the EPA announced the proposed Lead and Copper Rule Improvements, which would lower the Lead Action Level from 0.015 mg/L to 0.010 mg/L if finalized in October 2024.
9. No MCL, as hardness is not a regulated characteristic.

3.2.2.3 Water Quality and Treatment Technique Violations

There were no water quality treatment violations from 2015 through 2022.

3.2.3 Analysis of Distribution System Water Quality

3.2.3.1 Seasonal Water Quality Changes

Water quality within the distribution system is relatively consistent throughout the year. The Valley Service Area distribution water experiences low pH during the winter, however no changes are implemented to offset seasonal variations.

3.2.3.2 Distribution Water Quality Objectives

The City collects 100 samples at 70 dedicated sampling sites for total and fecal coliform monitoring. Sampling is conducted at one quarter of the routine sample locations each week during the first four weeks of a month. The City also monitors weekly for total and fecal coliform at Coal Creek Springs and West Hill Springs at their respective collector vaults, as well as after treatment, and at several additional sites to support operations on a weekly basis. The City uses two types of disinfectant for treatment, chlorine gas and liquid sodium hypochlorite, which both produce free chlorine residuals in the distribution system. Average chlorine residuals throughout the distribution system ranged from 0.57 to 0.71 mg/L from 2015 through 2022, as summarized in Table 3-13. Although the range of chlorine residual varies throughout the year, the range of chlorine residual is relatively consistent from year to year. Planned improvements to chlorination facilities at Well 1 and Well 4 are expected to help maintain a more consistent chlorine residual level within the water system.

Table 3-13 | Total Chlorine Residuals Results from 2015 through 2022

Year	Sample Results (mg/L)	
	Average	Range
2015	0.71	0.40 - 1.09
2016	0.64	0.37 – 0.89
2017	0.58	0.32 – 0.79
2018	0.57	0.30 – 0.78
2019	0.59	0.33 – 0.77
2020	0.57	0.33 – 0.80
2021	0.58	0.36 – 0.78
2022	0.59	0.40 – 0.77

The Stage 1 Disinfection By-Product Rule (DBPR) monitoring was superseded in 2012 with Stage 2 DBPR monitoring because the City's population exceeded 50,000 people. The City conducts monthly sampling within the distribution system to determine the concentration of fluoride. This sampling is in addition to the inorganic source monitoring required by DOH. The City does not add fluoride to their water. The City of Tacoma does fluoridate their water and is wholesale supplier to the City, but the City has not purchased water for consumption from Tacoma since 2016. Sampling is conducted for informational purposes only and to answer customer questions regarding natural fluoride in the City's water. Should the City purchase water from Tacoma, this information would also be used to monitor the blending of different water sources within the distribution system.

The City conducted both Stage 1 and Stage 2 DBPR monitoring since the last water system plan (WSP). **Table 3-14** provides a summary of the sample results from 2015 through 2022. The City's Total Trihalomethanes (TTHMs) and Haloacetic Acid 5 (HAA5) monitoring has been conducted once per year during the month with the warmest water temperature (i.e., July or August). All samples were well below the concentrations that DOH uses to determine whether a water system qualifies for reduced monitoring (0.080 mg/L for TTHMs and 0.060 mg/L for HAA5).

Table 3-14 | Summary of Disinfection By-Product Rule Monitoring Results from 2015 through 2022

Year	TTHM Concentration (µg/L)[2]		HAA5 Concentration (µg/L)[2]	
	Range for LRAA[1]	Compliance	Range for LRAA[1]	Compliance
2015	2.6 – 19.0	< 80	Not Detected – 4.8	< 60
2016	2.2 – 23.1	< 80	Not Detected – 6.0	< 60
2017	1.7 – 15.0	< 80	1.1 – 6.9	< 60
2018	6.7 – 15.1	< 80	Not Detected – 6.9	< 60
2019	ND	< 80	0.2 – 0.3	< 60
2020	7.5 – 11.95	< 80	Not Detected – 3.66	< 60
2021	6.45 – 17.62	< 80	1.25 – 12.41	< 60
2022	9.03 – 10.41	< 80	Not Detected	< 60

Notes:
1. Local running annual average.
2. Microgram per liter (µg/L).

Corrosion control treatment (CCT) is required for the water produced at Coal Creek Springs, Well 1, Well 2, Well 6, and Well 7. Per the Lead and Copper Rule (LCR), the City is required to collect at least 30 water samples per 36-month compliance period in alignment with reduced lead and copper monitoring

requirements of WAC 246-290. Sample results from 2015 through 2022 are presented in **Table 3-15**. Since the CCT facilities were constructed, the lead and copper levels have been well below the action level.

Table 3-15 | Summary of Lead and Copper Sampling Results from 2015 through 2022

Constituent	Range of Results from 2015 through 2022
Copper Concentrations (mg/L)	
Copper Concentration Range	<0.02 – 0.3
Copper 90th Percentile	0.091
Lead Concentrations (mg/L)	
Lead Concentration Range	<0.001-0.018
Lead 90th Percentile	<0.001

3.2.3.3 Water Quality and Treatment Technique Violations

There were no water quality violations in the distribution system from 2015 through 2022.

3.2.4 Recent Regulatory Changes

The EPA established a health advisory for drinking water of 70 parts per trillion (ppt) for perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA), two commonly found Perfluorinated compounds (PFAS). When both compounds are found in the water, the combined health advisory is also 70 ppt. The Washington State Board of Health (Board) adopted rule changes to chapter 246-290 WAC, Group A Public Water Supplies and WAC 246-390, Drinking Water Laboratory Certification and Data Reporting. The newly adopted rules became effective on January 1, 2022.

The rule establishes the administrative processes for setting drinking water quality standards as State Action Levels (SAL) and state MCLs. The rule establishes SALs for five PFAS contaminants: PFOA, PFOS, perfluorohexane sulfonic acid (PFHxS), perfluorononanoic acid (PFNA), and perfluorobutane sulfonic acid (PFBS). The rule requires Group A community and non-transient noncommunity public water systems to test for PFAS. For those Group A water systems that have detections of PFAS, but do not exceed the SAL, the rule requires additional ongoing monitoring, with the frequency of monitoring based upon the detected level in comparison to the SAL. It also establishes reporting, recordkeeping, and consumer confidence report requirements. For those Group A water systems that exceed the SAL, the rule requires follow-up actions such as monitoring, public notification, additional recordkeeping, and reporting requirements. SALs for regulated PFAS compounds are shown in

Table 3-16 with results from the City's latest samples. Most results indicated that the PFAS compounds were not detected (ND), being they were below detectable limits. PFBS was detected at Well 1, Coal Creek Springs, and West Hill Springs, however the levels are far below regulated levels. In more recent results received in May 2024, all samples were below detection limits for all facilities and the City was approved for a 3-year testing schedule.

Table 3-16 | PFAS State Action Levels and Monitoring Data

PFAS Compound	SAL (ng/L)[1]	Maximum Detected Concentration (ng/L)[1]									
		Well 1	Fulmer Field CCT Facility	Well 3A	Well 3B	Well 4	Well 5	Well 5A	Well 5B	Coal Creek Springs	West Hill Springs
PFOA	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PFOS	15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PFHxS	65	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PFNA	9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PFBS	345	2.8	ND	ND	ND	ND	ND	ND	ND	3.1	3.0

Notes:
1. Nanograms per liter (ng/L).
2. Not detected (ND).

3.3 Design Standards

The City's most recent Engineering Design Standards are available on the City's website and are provided as **Appendix P**. **Table 3-17** highlights keys standards that are used to evaluate the capacity of the City's water system, summarizing both DOH criteria and City criteria. The City's water quality design standards follow the design standards set forth by the EPA and DOH, as discussed in **Section 3.2**.

Table 3-17 | System Capacity Analysis Criteria

Evaluation Type		Evaluation Criteria	Agency's Standard
Water Reliability Recommendations	Multiple Source	2 or more supply sources are available	DOH
	Backup Power	Source of supply pump stations have power connections to two independent primary public power sources, have in-place auxiliary power available, and/or maintain adequate gravity standby storage	DOH
	Surface Water Reliability	Firm watershed yield for surface water provides 98% reliability to meet normal, anticipated system demands.	DOH
	Groundwater Reliability	Factor of safety is applied to well pumping test safe yield determination.	DOH
Water Source	Source Capacity	MDD while replenishing Fire Suppression Storage (FSS) within 72-hrs (24-hr source pumping may be assumed).	DOH
		ADD with largest source out of service.	DOH
		MDD in a pumping period of 20 hours or less of pumping.	DOH
		MDD with the largest active water source out of service.	City
Pump Stations	Capacity - Open System (sufficient storage in zone)	ADD with largest pump out of service.	DOH
		MDD with all pumps in service.	
		MDD with largest pump out of service.	City
		Fire Flow is met from storage reservoir.	
	Capacity - Closed System (no/insufficient storage in zone)	PHD with largest pump out of service.	DOH
		MDD + Fire Flow at a pressure of at least 20 psi at all points throughout the distribution system.	
		PHD + Fire Flow with largest pump out of service.	City
		Standby power with capacity to run with any single pump out of service.	

Evaluation Type		Evaluation Criteria	Agency's Standard
Storage Facilities	Total Storage Capacity	Sum of operational, equalization, standby, fire suppression, and dead storage.	DOH
	Operating Storage (OS)	The volume of water before sources turn on.	DOH
		(pump off elev. – pump on elev.) x gal/ft	
	Equalizing Storage (ES)	(PHD – maximum supply capacity) x 150 min	DOH
		Min. pressure of 30 psi.	
		Must be provided when source pumping capacity cannot meet the peak hourly demand.	
	Standby Storage (SB)	Min. standby storage of 200 gallons per ERU.	DOH
		Min. pressure of 20 psi.	
		Standby storage volume equal to one day of MDD for the pressure zone(s) served.	
	Fire Suppression Storage (FSS)	(required fire flow rate) x (duration in minutes)	DOH
		Min. pressure of 20 psi.	
		Nested storage (same storage for Standby and Fire Suppression Storge) requires written consent of fire protection authority.	
	Dead Storage (DS)	Volume that cannot provide minimum design pressure (20 psi) to all customers.	DOH
		Volume below the outlet pipe and cannot be used because of hydraulic limitations.	City
Distribution System	Minimum Pressures	PHD at no less than 30 psi.	DOH
		MDD + Fire Flow at no less than 20 psi.	
	Maximum Pressures	Add individual PRVs for ADD pressures more than 80 psi.	DOH
		Max. target pressure of 80 psi in water distribution system.	City
	Maximum Velocity	No more than 8 feet per second (fps) under PHD conditions.	DOH
		No more than 8 fps in distribution mains and 5 fps in transmission mains under PHD conditions. No more than 18 fps under MDD+FF conditions.	City
	Minimum Pipe Size	6-inch diameter in residential areas and 8-inch diameter in commercial areas, unless a hydraulic analysis justifies another size.	DOH
		Single-Family Residential minimum 8-inch diameter and Industrial/Commercial/Multi-Family minimum 12-inch diameter.	City
	Telemetry	Each parcel receiving water service shall have its own meter	City
		Meters shall be located as close to the water main from which the service is taken as possible, distance not to exceed 50 feet.	
		Meters shall be placed in landscape strips, behind the sidewalk, or at the right-of-way limits in that order of availability.	
		Meters in landscaped or unimproved areas shall be set 2 inches above the finished grade.	
	Maximum Valve Spacing	Maximum 400-foot spacing and at the intersection of lateral lines in all zones.	City
	Hydrant Spacing	Single-Family Residential maximum 600-foot spacing.	City
		Industrial/Commercial/Multi-Family maximum 300-foot spacing.	
Fire Flow & Duration	Residential	Minimum 1,500 gpm at 2 hours.	City
	Multi-Family Residential	Minimum 2,500 gpm at 3 hours.	
	Commercial		
	Industrial		

3.4 Capacity Analysis

This section provides an analysis of legal and physical capacity of the water system based on the system's available water rights, sources, treatment, storage, and distribution components.

3.4.1 Water Rights

A summary of the City's current water rights is presented in **Table 3-18**. The maximum instantaneous allowable flow for each source (Qi) is in units of gpm. The total annual withdrawal for each source (Qa) is in units of acre-feet per year. The City does not have any interruptible water rights.

Table 3-18 | Summary of Existing Water Rights

Water Right	Primary Qi (gpm)	Primary Qa (acre-feet/year)
Coal Creek Springs	6,732	9,410
Well 1, 6, & 7	2,200	1,120
Well 2, 6, & 7	2,400	1,360
Well 3A & 3B, 6, & 7	2,800	3,600
Well 4, 6, and 7	2,800	3,600
Wells 5, 5A, 5B, &5C	1,000	720
Well 5A	167	0
Algona Well	500	175
Braunwood Well[1]	20	6.5
West Hill Springs[2]	625	1,010
TOTAL	**19,244**	**21,002**

Notes:

1. Water from the Braunwood well is administered through water right certificate G1-25173C, originally issued for a small domestic water system to serve up to 13 connections. Braunwood is a standalone non-municipal satellite water system that currently serves 12 connections.
2. Water from West Hill Springs operates through water right claim S1-049354CL. A claim is an assertion that a water right was created pre-code (1917 for surface water and 1945 for groundwater).

In addition to the water rights presented above, the City also has a wholesale agreement with the City of Tacoma and can purchase water through two interties as discussed in **Chapter 1, Section 1.6.1**. These two interties are also considered to be supply facilities. The City also has several emergency interties with adjacent purveyors.

3.4.1.1 Analysis Criteria

Supply facilities must be reliable and provide sufficient water at pressures that meet the requirements of WAC 246-290-230. The capacity of supply facilities in a pressure zone with adequate storage must be sufficient to provide water at a rate that is equal to or greater than the MDD of the zone being served. This approach assumes that demands greater than the MDD will be supplied using equalizing storage.

According to Section 3.10.5 and Section 5.4 of the 2020 DOH Water System Design Manual, water system sources must be capable of supplying MDD and replenishing depleted within 72-hours (assuming continuous pumping), provide MDD in a pumping period of 20 hours or less, and provide ADD with the

largest source out of order. The City's standards have a more stringent requirement to provide MDD with the largest active source out of service.

3.4.1.2 Analysis Results

The City's water supply (production) capacity compared with demand projections and DOH and City criteria are summarized in **Table 3-19**. It is worth noting that the water supply (production) capacity is not synonymous with the supply water rights. The MDD and ADD values are based on the demand projections included in **Chapter 2** and include wholesale supply projections for the City of Algona. Demand allocation for the Muckleshoot Indian Tribe (MIT) Fish Hatchery and LMWD are not included. LMWD is not included since they do not rely on the City as their main source of water and have an interruptible wholesale agreement. Demand from the MIT Fish Hatchery is also not included since it is unknown when this facility will be constructed, however the analysis presented in **Table 3-19** shows that the City has sufficient surplus supply to support this demand when it comes to fruition. The FSS flow rate is calculated as the sum of the FSS for each service area presented in **Section 3.4.2.3.2**, which totals 797 gpm, divided over a 72-hour period.

The results presented in **Table 3-19** demonstrate that the City has the supply facilities necessary to meet demand projections under current and future projections for all required criteria.

Table 3-19 | Supply Analysis with Largest Source Out of Service

Description	2024 Scenario	2034 Scenario	2044 Scenario
Required Supply (gpm)			
FSS Replenished in 72-hours	797	797	797
Maximum Day Demand[1], gpm	8,657	9,751	11,068
Average Day Demand[1], gpm	4,899	5,518	6,263
Available Supply (gpm)			
Largest Source (Q_L) – Tacoma Interties	3,555	3,555	3,555
Largest Active Source – Coal Creek Springs[2]	3,500	3,500	3,500
Total Sources (Q_t)[3,4]	15,610	15,610	15,610
DOH Criteria: MDD while replenishing FSS within 72-hrs (24-hr source pumping may be assumed)			
Surplus / (Deficit) of Supply, gpm	6,156	5,062	3,746
DOH Criteria: ADD with largest source out of service			
Surplus / (Deficit) of Supply, gpm	7,156	6,537	5,792
DOH Criteria: MDD in a pumping period of 20 hours or less of pumping			
Surplus / (Deficit) of Supply, gpm	4,352	3,257	1,941
City Criteria: MDD with largest active water supply source out of service			
Surplus / (Deficit) of Supply, gpm[2]	3,453	2,359	1,042

Notes:

1. Current analysis does NOT include a separate allocation for wholesale customers who have not purchased water from the City since 2019 or earlier (i.e., MIT or LMWD).
2. The City's largest active source is Coal Creek Springs since the City has not purchased water from Tacoma since 2016.
3. Total sources are: Well 1, 2, 4, 5, 5a, and 6 (7,955 gpm), Coal Creek Springs (3,500 gpm), West Hill Springs (600 gpm), and two Tacoma Interties (3,555 gpm).
4. Supplies do NOT include emergency interties with CWD (1,736gpm) or LMWD (1,736 gpm).

The City's Water Rights Self-Assessment Form is provided in **Appendix I** and was used to assess the City's water rights water rights and includes supply that is available to the City through firm wholesale interties with Tacoma. The form includes a comparison of the available water rights to the existing, 10-year and 20-year demand projections for the "High Demand Scenario" presented in **Chapter 2**. The calculations

presented in the Water Rights Self-Assessment Form conclude that the City's existing water rights are anticipated to be adequate to meet the current, 10-year, and 20-year demand projections.

The City does not have all the infrastructure required to withdraw from all water rights (i.e., Wells 3A, 3B, 5B, and 7 are not currently operational). Additionally, some sources have underlying aquifer or infrastructure restrictions that limit the capacity of the source (i.e., Well 2, Well 6, and Coal Creek Springs). Several facility improvement projects are necessary for the City to maximize water production capacity to meet future demands, and planned supply related capital projects to meet this need are discussed further in Chapter 8.

3.4.2 Physical Capacity Analysis

This section includes an analysis of the physical capacity of the City's distribution system. The specific components analyzed include:

- Pump Station Capacity Analysis
  - Open Pressure Zones: Zones with storage reservoirs
  - Closed Pressure Zones: Zones without storage
- Storage Capacity Analysis
- Hydraulic Analysis of the Distribution System
- System Analysis based on ERUs

To complete the physical capacity analysis, the projected demands calculated in Chapter 2 were utilized for the 2024 scenario (existing conditions), 2034 scenario (10-year projections) and 2044 scenario (20-year projections). When evaluating facilities under fire flow conditions, the largest fire flow demand was utilized in each Service Area. The fire flow required for single family residential customers is 1,500 gpm for two hours and all other customer types have a requirement of 2,500 gpm for two hours. There are select buildings throughout the system that require fire flow capacity in the water system that exceeds 2,500 gpm for two hours as determined by the Fire Marshal; these individual locations and their fire flow requirements are summarized in Table 3-20.

Table 3-20 | Buildings in Auburn with High Fire Flow Requirements

ID #	Location Description	Address	Service Area	Flow Required (gpm)
1	RPS Distribution Center	3702 C St. NE	Valley	4,000
2	Emerald Downs	2300 Emerald Downs Drive	Valley	3,000
3	Panattoni Warehouse	816 44th ST NW	Valley	4,000
4	Span Alaska Transportation Inc.	3815 W Valley Highway N	Valley	3,125
5	AMB Valley Distribution Center	2202 Perimeter Road SW	Valley	4,000
6	Grace Community Church	1106 12th Street SE	Valley	3,750
7	Riverside High School	501 Oravetz Road SE	Valley	3,000
8	Wesley Homes Senior Housing	10805 SE 320th Street	Lea Hill	4,000
9	Auburn Elementary School at Lakeland	1020 Evergreen Way SE	Lakeland	3,125
10	Academy Campus	5000 Auburn Way South	Academy	4,000
11	MIT Casino Expansion	2402 Auburn Way South	Academy	2,625

3.4.2.1 Pump Station Analysis: Open Pressure Zones

This section evaluates the pumping capacity of the water system on a zone-by-zone basis with consideration for pump stations between zones and supply wells pumping directly into the pressure zones that contain a storage reservoir. All reduced pressure zones are included in the open zone analysis, as they are ultimately fed by gravity from a reservoir. Pressure zones that do not include a storage facility are analyzed as a closed zone.

3.4.2.1.1 Valley Service Area

The Valley Service Area is the largest service area in the water system and consists of two pressure zones: Valley 288 and Valley 242. The Valley 288 pressure zone is a transmission zone that does not directly serve any customers. Valley 242 is the largest pressure zone in the RWSA and is draws supply from the following facilities:

- Wells 2 and 6 via the Fulmer Field CCT Facility
- Coal Creek Springs and Well 1 via the Howard Road CCT Facility with transmission through Valley 288
- Well 4 with transmission through Valley 288
- West Hill Springs

Table 3-21 provides an overview of the total pump station capacity into the Valley Service Area compared with demand projections and DOH and City criteria. The results presented in **Table 3-21** demonstrate that the City has adequate pumping capacity within the open pressure zones of the Valley Service Area to meet current and future demand projections for all required criteria.

Table 3-21 | Pumps Station Capacity for Valley Service Area Open Pressure Zones

Description	Valley 2024 Scenario	Valley 2034 Scenario	Valley 2044 Scenario
Required Capacity (gpm)			
FSS Replenished in 72-hours	222	222	222
Maximum Day Demand, gpm	6,266	7,161	8,252
Average Day Demand, gpm	3,546	4,052	4,670
Available Capacity (gpm)			
Largest Pump (Q_L), gpm	2,800	2,800	2,800
Total Pumping Capacity (Q_t), gpm	19,400	19,400	19,400
DOH Criteria: Reliable Capacity (ADD + largest pump out of service)			
Surplus / (Deficit), gpm	15,854	15,348	14,730
DOH Criteria: Total Capacity (MDD + replenish FSS in 72-hours)			
Surplus / (Deficit), gpm	13,134	12,239	11,148
City Criteria: MDD + largest pump out of service			
Surplus / (Deficit), gpm	10,334	9,439	8,348

3.4.2.1.2 Lea Hill Service Area

Water supply for the Lea Hill Service Area is provided by the Lea Hill Pump Station and the Green River Pump Station. In 2014, the City added wholesale water supply from Tacoma through the 132nd Ave SW intertie, however the City has not purchased water for consumption from Tacoma since 2016. The intertie and pump stations feed the Lea Hill 563 pressure zone, which includes Reservoirs 4A and 4B. Therefore, the Lea Hill and Green River Pump Stations were evaluated based on the open zone criteria. **Table 3-22** provides a summary of the pump station capacity into the Lea Hill Service Area compared with demand projections and DOH and City criteria. The results presented in **Table 3-22** demonstrate that the City has adequate pumping capacity within the open pressure zones of the Lea Hill Service Area to meet current and future demand projections for all required criteria.

Table 3-22 | Pump Station Capacity for Lea Hill Service Area Open Pressure Zones

Description	Lea Hill 2024 Scenario	Lea Hill 2034 Scenario	Lea Hill 2044 Scenario
Required Capacity (gpm)			
FSS Replenished in 72-hours	222	222	222
Maximum Day Demand, gpm	1,231	1,281	1,333
Average Day Demand, gpm	696	725	755
Available Capacity (gpm)			
Largest Pump (Q_L), gpm	1,166	1,166	1,166
Total Pumping Capacity (Q_t), gpm	6,664	6,664	6,664
DOH Criteria: Reliable Capacity (ADD + largest pump out of service)			
Surplus / (Deficit), gpm	5,968	5,939	5,909
DOH Criteria: Total Capacity (MDD + replenish FSS in 72-hours)			
Surplus / (Deficit), gpm	5,433	5,383	5,331
City Criteria: MDD + largest pump out of service			
Surplus / (Deficit), gpm	4,267	4,217	4,165

3.4.2.1.3 Lakeland Service Area

The Lakeland Service Area is supplied from the Upland Well Field (Wells 5 and 5A) and by sources in the Valley Service Area using the Terrace View BPS. The Terrace View BPS supplies the Lakeland 630 pressure zone from the Valley Service Area, which is then distributed through the Service Area. Since the Lakeland 630 pressure zone contains two reservoirs (Reservoirs 5 and 6), the Terrace View BPS was evaluated based on the open zone criteria. **Table 3-23** provides a summary of the pump station capacity into the Lakeland Service Area compared with demand projections and DOH and City criteria. The results presented in **Table 3-23** demonstrate that the City has adequate pumping capacity within the open pressure zones of the Lakeland Service Area to meet current and future demand projections for all required criteria.

Table 3-23 | Pump Station Capacity for Lakeland Service Area Open Pressure Zones

Description	Lakeland 2024 Scenario	Lakeland 2034 Scenario	Lakeland 2044 Scenario
Required Capacity (gpm)			
FSS Replenished in 72-hours	130	130	130
Maximum Day Demand, gpm	629	719	823
Average Day Demand, gpm	356	407	466
Available Capacity (gpm)			
Largest Pump (Q_L), gpm	500	500	500
Total Pumping Capacity (Q_t), gpm	1,500	1,500	1,500
DOH Criteria: Reliable Capacity (ADD + largest pump out of service)			
Surplus / (Deficit), gpm	1,144	1,093	1,034
DOH Criteria: Total Capacity (MDD + replenish FSS in 72-hours)			
Surplus / (Deficit), gpm	871	781	677
City Criteria: MDD + largest pump out of service			
Surplus / (Deficit), gpm	371	281	177

3.4.2.1.4 Academy Service Area

The Academy Service Area is supplied from the Valley Service Area using Academy Pump Station 3. The pump station operates based on levels in Reservoirs 8A and 8B located in the Academy 531 pressure zone. **Table 3-24** provides a summary of the pump station capacity into the Academy Service Area compared with demand projections and DOH and City criteria. The results presented in **Table 3-24** demonstrate that the City has adequate pumping capacity within the open pressure zones of the Academy Service Area to meet current and future demand projections for all required criteria.

Table 3-24 | Pump Station Capacity for Academy Service Area Open Pressure Zones

Description	Academy 2024 Scenario	Academy 2034 Scenario	Academy 2044 Scenario
Required Capacity (gpm)			
FSS Replenished in 72-hours	222	222	222
Maximum Day Demand, gpm	531	591	658
Average Day Demand, gpm	300	334	373
Available Capacity (gpm)			
Largest Pump (Q_L), gpm	700	700	700
Total Pumping Capacity (Q_t), gpm	2,800	2,800	2,800
DOH Criteria: Reliable Capacity (ADD + largest pump out of service)			
Surplus / (Deficit), gpm	2,500	2,466	2,427
DOH Criteria: Total Capacity (MDD + replenish FSS in 72-hours)			
Surplus / (Deficit), gpm	2,269	2,209	2,142
City Criteria: MDD + largest pump out of service			
Surplus / (Deficit), gpm	1,569	1,509	1,442

3.4.2.2 Booster Pump Station Analysis: Closed Pressure Zones

The City operates a closed zone in each of its Service Areas. Closed zones do not have a storage reservoir directly serving the zone and are required to supply the peak hour demand (PHD) and fire flow via a BPS. The BPS serving each closed pressure zone was evaluated using the closed zone criteria as defined by DOH.

3.4.2.2.1 Lakeland Hills BPS

The Lakeland Service Area has two closed pressure zones served by the Lakeland Hills BPS: Lakeland 697 and Lakeland 670.

Table 3-25 provides a summary of the BPS capacity into the Lakeland closed pressure zones compared with demand projections and DOH and City criteria. The results presented in

Table 3-25 demonstrate that the City has adequate pumping capacity within the closed pressure zones of the Lakeland Service Area to meet current and future demand projections for all required criteria.

Table 3-25 | BPS Capacity for Lakeland Service Area Closed Pressure Zones

Description	Lakeland 670 & 697 2024 Scenario	Lakeland 670 & 697 2034 Scenario	Lakeland 670 & 697 2044 Scenario
Required Capacity (gpm)			
Fire Flow Required, gpm	3,125	3,125	3,125
Maximum Day Demand, gpm	231	261	296
Peak Hour Demand, gpm	372	419	476
Available Capacity (gpm)			
Largest Pump (Q_L), gpm	3,125	3,125	3,125
Total Pumping Capacity (Q_t), gpm	7,330	7,330	7,330
DOH Criteria: Firm Capacity (no storage; PHD + largest pump out of service)			
Surplus / (Deficit), gpm	3,833	3,786	3,729
DOH Criteria: Reliable Capacity (no storage; MDD + FSS + largest pump out of service)			
Surplus / (Deficit), gpm	3,974	3,944	3,909
City Criteria: PHD+ FSS + largest pump out of service			
Surplus / (Deficit), gpm	708	661	604

3.4.2.2.2 Academy East BPS

The Academy Service Area has one closed zone served by the Academy East BPS: Academy 585. Table 3-26 provides a summary of the BPS capacity into the Academy closed pressure zone compared with demand projections and DOH and City criteria. The results presented in Table 3-26 demonstrate that the City has adequate pumping capacity within the closed pressure zones of the Academy Service Area to meet current and future demand projections for all required criteria.

Table 3-26 | BPS Capacity for Academy Service Area Closed Pressure Zone

Description	Academy 585 2024 Scenario	2 Academy 585 2034 Scenario	Academy 585 2044 Scenario
Required Capacity (gpm)			
Fire Flow Required, gpm	2,500	2,500	2,500
Maximum Day Demand, gpm	87	98	111
Peak Hour Demand, gpm	140	158	179
Available Capacity (gpm)			
Largest Pump (Q_L), gpm	1,250	1,250	1,250
Total Pumping Capacity (Q_t), gpm	4,290	4,290	4,290
DOH Criteria: Firm Capacity (no storage; PHD + largest pump out of service)			
Surplus / (Deficit) of Supply, gpm	2,900	2,882	2,861
DOH Criteria: Reliable Capacity (no storage; MDD + FSS + largest pump out of service)			
Surplus / (Deficit), gpm	1,703	1,692	1,679
City Criteria: PHD+ FSS + largest pump out of service			
Surplus / (Deficit), gpm	400	382	361

3.4.2.2.3 Lea Hill BPS

The Lea Hill Service Area has one closed zone served by the Lea Hill BPS: Lea Hill 648. **Table 3-27** provides a summary of the BPS capacity into the Lea Hill closed pressure zone compared with demand projections and DOH and City criteria. The results presented in **Table 3-27** indicate that the Lea Hill BPS is currently deficient and cannot meet the required criteria for existing or future demands.

Table 3-27 | BPS Capacity for Lea Hill Service Area Closed Pressure Zone

Description	Lea Hill 648 2024 Scenario	Lea Hill 648 2034 Scenario	Lea Hill 648 2044 Scenario
Required Capacity (gpm)			
Fire Flow Required, gpm	2,500	2,500	2,500
Maximum Day Demand, gpm	110	124	141
Peak Hour Demand, gpm	178	200	227
Available Capacity (gpm)			
Largest Pump (Q_L), gpm	1,500	1,500	1,500
Total Pumping Capacity (Q_t), gpm	1,800	1,800	1,800
DOH Criteria: Firm Capacity (no storage; PHD + largest pump out of service)			
Surplus / (Deficit), gpm	122	100	73
DOH Criteria: Reliable Capacity (no storage; MDD + FSS + largest pump out of service)			
Surplus / (Deficit), gpm	(810)	(824)	(841)
City Criteria: PHD+ FSS + largest pump out of service			
Surplus / (Deficit), gpm	(2,378)	(2,400)	(2,427)

The Intertie Pump Station shares a building with the Lea Hill BPS and contains pumps which were originally purposed to serve the intertie for wholesale supply to CWD and LMWD. Since CWD and LMWD no longer rely on the City as their primary water source, the City plans to complete facility modifications so the pumps

at the Intertie Pump Station can serve the Lea Hill 648 pressure zone. This project is discussed further in Chapter 8 and will resolve the deficiencies identified in Table 3-27.

3.4.2.2.4 Game Farm Park Pump Station

The Valley Service Area has one closed zone served by the Game Farm Park Pump Station: Game Farm Park (no assigned pressure zone name). Table 3-28 provides a summary of the BPS capacity into the Valley closed pressure zone compared with demand projections and DOH and City criteria. The results presented in Table 3-28 indicate that the Game Farm Park Pump Station is currently deficient and cannot meet the required criteria for existing or future demands.

The Game Farm Park Pump Station provides service to a park restroom facility, two fire hydrants, and individual RV campsites. As this is a small BPS with the single purpose of providing service to a recreational area, and there are no residential or commercial property connections supplied by this facility, no actions are planned to resolve this deficiency. The DOH and City criteria are geared towards providing reliable service for residents and businesses and are not applicable for this minor facility. The City has reviewed this condition with the Fire Marshal, and no exceptions were taken. As further development progresses in and around the Game Farm Park Pump Station, modifications will be considered to address the deficiency.

Table 3-28 | BPS Capacity for Game Farm Park Closed Pressure Zone

Description	2024 Game Farm	2034 Game Farm	2044 Game Farm
Required Capacity (gpm)			
Fire Flow Required, gpm	1,500	1,500	1,500
Maximum Day Demand, gpm	0.4	0.4	0.4
Peak Hour Demand, gpm	0.6	0.6	0.7
Available Capacity (gpm)			
Largest Pump (Q_L), gpm	1,000	1,000	1,000
Total Pumping Capacity (Q_t), gpm	1,050	1,050	1,050
DOH Criteria: Firm Capacity (no storage; PHD + largest pump out of service)			
Surplus / (Deficit), gpm	49	49	49
DOH Criteria: Reliable Capacity (no storage; MDD + FSS + largest pump out of service)			
Surplus / (Deficit), gpm	(450)	(450)	(451)
City Criteria: PHD+ FSS + largest pump out of service			
Surplus / (Deficit), gpm	(1,451)	(1,451)	(1,451)

3.4.2.3 Storage Analysis

This section evaluates the City's existing water storage facilities to determine if there is sufficient capacity to meet existing and future storage requirements of the system.

3.4.2.3.1 Components of Storage

The City currently maintains a total of 15.7 MG of water storage in eight reservoirs located throughout the service area. Each Service Area has two reservoirs, providing redundancy for cleaning and maintenance. Historically, the City has evaluated each Service Area independently. However, new sources, pump stations, and PRV facilities now allow for reliable and redundant operation of the system as an interconnected whole, rather than as separate Service Areas. The storage analysis reflects the new operational ability by allowing sharing of emergency storage between the Service Areas. The existing infrastructure and customer expectations still require that other storage components, such as FSS, be stored in individual Service Areas.

Water storage requirements are typically defined by the following components: operational storage, equalizing storage, standby storage, fire suppression storage, and dead storage. A description of each storage component and the criteria used to evaluate the capacity of the City's reservoirs is as follows:

- Operational Storage: Operational storage is used to supply the water system under normal demand conditions and provides pump protection to avoid frequent starting and stopping of pumps for pump stations that are used to fill reservoirs. The operational storage is calculated per the DOH Design Manual as the pump supply firm capacity (in gpm) times 2.5-minutes.

- Equalizing Storage: When the source pumping capacity cannot meet the periodic daily (or longer) peak demands placed on the water system, equalizing storage must be provided as a part of the total storage for the system and must be available at 30 psi to all service connections. The criteria for determining the equalizing storage requirements for the City's system is based on the equalizing calculation in the DOH Design Manual (refer to equation 7-1).

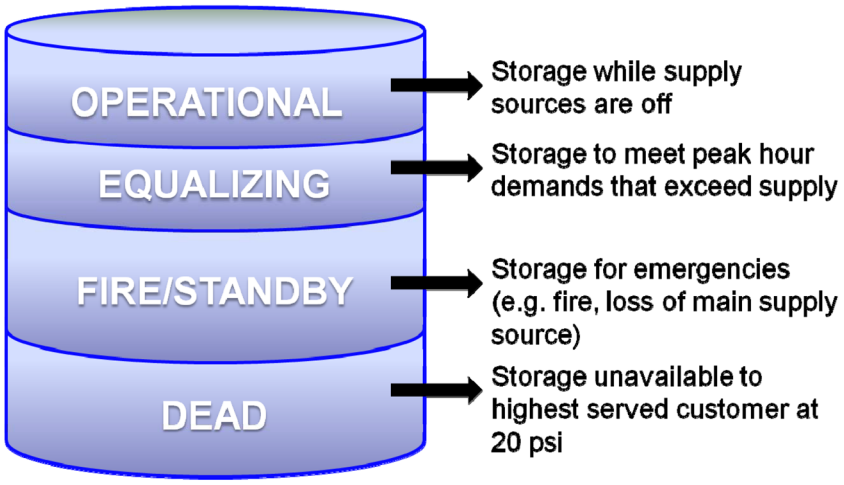
- Standby Storage: Standby storage is the portion of the reservoir used to supply the water system when supply facilities are out of service. DOH allows water systems with multiple sources to require that standby volume be supplied with the largest supply source out of service but recommends a minimum standby storage of 200 gallons per ERU in the system. The City calculates standby storage as the maximum volume required to supply all ERUs at least 240 gallons (based on the DOH minimum times a 20 percent factor of safety).

- Fire Suppression Storage (FSS): FSS is the portion of the reservoir with sufficient volume to supply water to the system at the maximum rate and duration required to extinguish a fire at the building with the highest fire flow requirement. The required volume of the FSS is the product of the fire flow rate and duration of the system's maximum fire flow requirement.

- Dead Storage: Dead storage is the bottom portion of the reservoir that cannot be used because water is stored at an elevation that is too low to provide sufficient system pressure (below 20 psi at the highest elevation served by the reservoir). This unusable storage occupies the lower portion of many ground-level standpipe-type reservoirs. When the highest service elevation is not the limiting factor, the City defines dead storage as being 1-foot above the reservoir inlet elevation for operational reasons.

The City's reservoir storage requirements depend on the water system's configuration, seasonal and daily variation in water-use patterns, and the reliability of various water system components. This section describes the five components of storage, summarizes the existing system's capacity to meet the storage needs of each Service Area, and makes recommendations to address identified storage deficits.

Figure 3-7 | Illustration of Reservoir Storage Components



3.4.2.3.2 Storage Analysis Results

The storage available in the four Service Areas was evaluated to confirm each is provided with the required usable Operational, Equalizing, Fire Suppression, and Emergency Storage volumes. Reflecting the interconnectedness of the system, excess storage in higher Service Areas (i.e., Lea Hill, Lakeland and Academy) can be used in the Valley Service Area and vice versa through use of the system pump stations. The storage analysis compares the required storage, based on the criteria in Table 3-17, and the available storage. The FSS for each region was calculated using 4,000 gpm for four hours except for Lakeland, which used 3,125 gpm for three hours based on buildings with the highest fire flow requirement in each Service Area (see Table 3-20).

Table 3-29 summarizes the existing 2024 storage analysis and results. The results indicate a deficit in the Lea Hill Service Area, however, this deficit is offset by surplus storage available in other Service Areas.

Table 3-29 | System-Wide Storage Analysis for the 2024 Scenario

Description	RWSA 2024	Academy 2024	Lakeland 2024	Lea Hill 2024	Valley 2024
Usable Storage (MG)					
Maximum Storage Capacity	15.86	2.72	2.06	2.48	8.60
Algona Reserve Storage Capacity[1]	0.28	--	0.28	--	--
Dead Storage	1.50	0.06	0.44	0.36	0.64
Total Usable Storage	14.08	2.66	1.34	2.12	7.96
Required Storage (MG)					
Operational Storage	0.05	0.01	0.00	0.01	0.03
Equalizing Storage	0.00	0.00	0.00	0.00	0.00
Standby Storage (Emergency)	9.30	0.57	0.68	1.32	6.73
FSS (Emergency)	3.44	0.96	0.56	0.96	0.96
Total Required Storage	12.79	1.54	1.24	2.29	7.72
Surplus/ (Deficit) Storage	**1.29**	**1.12**	**0.10**	**(0.17)**	**0.24**

Note:

1. The water supply interlocal agreement (IA3) between the City of Algona and the City of Auburn was updated in 2016. Through this updated agreement, Algona elected to financially participate in Lakeland Reservoir 6 to obtain a total share of 280,000-gallons of storage capacity. The agreement stipulates that if the City experiences any failure or decreased capacity, the supply of water to Algona may be decreased by the same percentage that is experienced by the City.

Table 3-30 summarizes the 2034 storage analysis and results (10-year projections). The results indicate a deficit in the Lea Hill, Lakeland, and Valley Service Areas, however, this deficit is offset by surplus storage available in other Service Areas. Additionally, the deficit in the Lakeland Service Area may not be realized based on the City's terms and conditions of the IA3 agreement with Algona.

Table 3-30 | System-Wide Storage Analysis for the 2034 Scenario

Description	RWSA 2034	Academy 2034	Lakeland 2034	Lea Hill 2034	Valley 2034
Usable Storage (MG)					
Maximum Storage Capacity	15.86	2.72	2.06	2.48	8.60
Algona Reserve Storage Capacity[1]	0.28	--	0.28	--	--
Dead Storage	1.50	0.06	0.44	0.36	0.64
Total Usable Storage	14.08	2.66	1.34	2.12	7.96
Required Storage (MG)					
Operational Storage	0.05	0.01	0.00	0.01	0.03
Equalizing Storage	0.02	0.00	0.02	0.00	0.00
Standby Storage (Emergency)	10.47	0.63	0.77	1.38	7.69
FSS (Emergency)	3.44	0.96	0.56	0.96	0.96
Total Required Storage	13.98	1.60	1.36	2.34	8.68
Surplus/ (Deficit) Storage	**0.10**	**1.06**	**(0.02)**	**(0.22)**	**(0.72)**

Note:

1. The water supply interlocal agreement (IA3) between the City of Algona and the City of Auburn was updated in 2016. Through this updated agreement, Algona elected to financially participate in Lakeland Reservoir 6 to obtain a total share of 280,000-gallons of storage capacity. The agreement stipulates that if the City experiences any failure or decreased capacity, the supply of water to Algona may be decreased by the same percentage that is experienced by the City.

The 2044 storage analysis was performed to determine the ability of the proposed storage facilities to meet the future storage requirements in 2044, based on projected demands. The analysis results indicate that the existing storage facilities do not have sufficient capacity to meet the future demands of the system based on the demand projections presented in Chapter 2. The City is currently planning a new reservoir in the Valley Service area to address these future deficiencies in the 20-year time frame. Table 3-31 summarizes the buildout 2044 storage analysis.

Table 3-31 summarizes the 2044 storage analysis and results (20-year projections). The results indicate an overall deficit in the RWSA, spurred largely by the projected growth within the Valley Service Area in the 20-year horizon.

Table 3-31 | System-Wide Storage Analysis for the 2044 Scenario

Description	RWSA 2044	Academy 2044	Lakeland 2044	Lea Hill 2044	Valley 2044
Usable Storage (MG)					
Maximum Storage Capacity	15.86	2.72	2.06	2.48	8.60
Algona Reserve Storage Capacity[1]	0.28	--	0.28	--	--
Dead Storage	1.50	0.06	0.44	0.36	0.64
Total Usable Storage	14.08	2.66	1.34	2.12	7.96
Required Storage (MG)					
Operational Storage	0.05	0.01	0.00	0.01	0.03
Equalizing Storage	0.05	0.00	0.05	0.00	0.00
Standby Storage (Emergency)	11.88	0.71	0.88	1.43	8.86

FSS Storage (Emergency)	3.44	0.96	0.56	0.96	0.96
Total Required Storage	15.42	1.68	1.49	2.40	9.86
Surplus/ (Deficit) Storage	**(1.34)**	**0.98**	**(0.15)**	**(0.28)**	**(1.89)**

Note:

1. The water supply interlocal agreement (IA3) between the City of Algona and the City of Auburn was updated in 2016. Through this updated agreement, Algona elected to financially participate in Lakeland Reservoir 6 to obtain a total share of 280,000-gallons of storage capacity. The agreement stipulates that if the City experiences any failure or decreased capacity, the supply of water to Algona may be decreased by the same percentage that is experienced by the City.

Since most of the future storage deficiency is in the Valley Service Area, a new storage reservoir is planned in the northeastern portion of the Service Area (Valley 242 pressure zone). The reservoir is a planned capital project to be completed in the 20-year horizon and is discussed further in Chapter 8.

The Lea Hill PS has sufficient capacity to transfer standby storage from Valley to Lea Hill. In addition, there are multiple PRVs which can be used to transfer water from the Academy and Lakeland Service Areas back to Valley to utilize excess standby storage in those areas. No other projects are necessary to resolve this deficiency.

3.4.2.4 Distribution and Transmission Capacity Analysis

This section evaluates the City's existing distribution and transmission mains to determine if the water pipelines are sized and looped adequately to provide the required flow and pressures to meet existing and future system conditions. The evaluation used an updated version of the City's computerized hydraulic water system model and InfoWater Pro, a GIS-based modeling software developed by Autodesk (formerly Innovyze). The model was updated to accurately reflect the City's existing water system and verified against field hydrant test data. Results from the model were used to evaluate the existing system and identify deficiencies.

3.4.2.4.1 Model Update

The following updates were made to the City's hydraulic model prior to conducting the capacity analyses:

- Facility updates
- Pipeline network updates
- Elevation updates
- Demand updates

Each update is described in further detail below.

Facility Updates

Existing facilities within the hydraulic model were reviewed and updated based on information provided by the City. The facilities reviewed included groundwater wells, springs, interties with adjacent water systems, potable water reservoirs, pump stations, treatment facilities, flow control valves, and PRVs. The following documents were used to confirm the accuracy of the facility information within the hydraulic model:

- Interlocal agreements
- Record drawings
- PRV calibration records
- Pump curves
- SCADA data
- Operations and maintenance data

Pipeline Network Updates

The existing pipeline network within the hydraulic model was compared to the City's existing GIS data to locate areas where pipelines may have been missing in the model. In addition, the pipeline material type was added to the model to match data available from GIS to more accurately reflect the existing distribution system.

Elevation Updates

Node elevations within the model were updated using United States Geological Survey (USGS) Digital Elevation Model (DEM). The DEM is a tile of the 3-Dimenional Elevation Program (3DEP) with data that is updated regularly and distributed in geographic coordinates in units conforming with the North American Datum of 1983 (NAD 83). All elevation values are in meters and, over the contiguous United States, are referenced to the North American Vertical Datum of 1988 (NAVD 88). The assigned elevations were converted to feet when applied to the model.

In addition to the general elevation update of the model nodes, the record drawings of the water reservoirs were used to verify the bottom and overflow elevations of the reservoirs within the model. Where necessary based on date, the as-built elevations were corrected to NAVD88 values, as some of the reservoirs were constructed using National Geodetic Vertical Datum of 1929 (NGVD 29). A conversion of 3.51 feet was used to update elevations from NGVD 29 to NAVD 88.

Demand Updates

Demands in the model were updated using the City's customer billing database. The meters were geolocated based on the customer's address and assigned to the closest model junction. No demands were allocated to transmission pipelines or facility nodes (i.e., pump station, reservoirs, etc.). Approximately 10 percent of the demand was unable to be allocated using this method. The remaining demand and non-billed usage, like DSL and construction meters, was distributed uniformly throughout the model by applying a scaling factor to match the 2022 production data. The demand sets in the model sought to distribute the demand projections provided in Chapter 2. A scaling factor was then applied to all demand nodes to equal the demand projection in years 2024.

As discussed in Chapter 2, TAZ data was used to determine growth projections and the future water demand. Based on the TAZ data, each Service Area was split between focused growth areas and non-growth areas. Future demands were allocated equally across all current demand nodes within the focused growth and non-growth areas of each Service Area. Demand peaking factors from Chapter 2 were used to adjust demands to MDD for the fire flow analyses and PHD for the pressure analysis.

3.4.2.4.2 Model Calibration

To verify and calibrate the hydraulic model, the City collected field hydrant testing data. A map of the hydrant testing locations and testing plan is included in Appendix K. The City also collected static pressure at the test locations to verify the hydraulic grade line (HGL) of specific areas of the water system.

In addition to the hydrant tests results, the boundary conditions of the water system facilities at the time of each test were provided. The boundary conditions were used to calculate the demand observed during each test. The boundary conditions were also entered into the model for each hydrant test to accurately simulate the system conditions during the hydrant test. At most locations, hydrants were operated to stress the system to identify required changes to the boundary conditions and pipe roughness factors (C-factors) within the hydraulic model.

A fire flow calibration scenario was set up within the hydraulic model and each of the hydrant test locations was simulated. Appendix K provides the field flow data compared to the flow data input into the model and a comparison of the static pressures and pressure drops observed at each hydrant test. Table 3-32 summarizes the final Hazen Williams C-factors used during the calibration based on piping material.

Table 3-32 | Final C-Factors for Piping Materials

Material	C-Factor
Cast Iron	90-120
Concrete	120
Ductile Iron	120
HDPE	130
PVC	130
RCP	120
Steel	120
Unknown	115

Valley Service Area

A total of 16 hydrant tests were conducted in the Valley Service Area, however the results from one test were excluded as the static pressure was not recorded. The static pressure and pressure drop in the calibrated model is now within 5 psi, or less, of the observed data for each of the hydrant tests.

Lea Hill Service Area

A total of nine hydrant tests were conducted in the Lea Hill Service Area. The static pressure and pressure drop in the calibrated model is now within 5 psi, or less, of the observed data for each of the hydrant tests.

The HGL from the hydrant testing was higher than the reported HGL in the hydraulic model for the Lea Hill 462 pressure zone. The PRV setpoints were referenced to confirm the higher HGL observed during the hydrant testing. As such, the naming for the pressure zone was updated to Lea Hill 480. The update and supporting calculations are included in Appendix K.

Academy Service Area

A total of five hydrant tests were conducted in the Academy Service Area. The static pressure and pressure drop in the calibrated model is now within 5 psi, or less, of the observed data for each of the hydrant tests.

The HGL from the hydrant testing was higher than the reported HGL in the hydraulic model for the Academy 350 and Academy 445 pressure zones. The PRV setpoints were referenced to confirm the higher HGL observed during the hydrant testing. As such, the naming for each pressure zone was updated to Academy 400 and Academy 470 respectively. The updates and supporting calculations are included in Appendix K.

Lakeland Service Area

A total of ten hydrant tests were conducted in the Lakeland Service Area, however the results from one test were excluded as the recorded static pressure was determined to be incorrect. The static pressure and pressure drop in the calibrated model is now within 5 psi, or less, of the observed data for each of the hydrant tests.

The HGL from the hydrant testing varied from the reported HGL in the hydraulic model for the Lakeland 440, Lakeland 441, Lakeland 446, and Lakeland 485 pressure zones. The PRV setpoints were referenced to

confirm the HGLs observed during the hydrant tests. As such, the naming for each pressure zone was updated as follows:

- Lakeland 440 pressure zone was split into two pressure zones: Lakeland 450 and Lakeland 405.
- Lakeland 441 pressure zone was updated to Lakeland 385
- Lakeland 446 pressure zone was updated to Lakeland 415
- Lakeland 485 pressure zone was updated to Lakeland 455.

The hydrant test for Lakeland 575 was not simulated in the model as observed in the field since a static pressure of 101 psi was recorded during the hydrant test. According to the PRV setpoints, the HGL on the test date was anticipated to be an error. The City re-checked the hydrant on February 8, 2024, and a static pressure of 69 psi was recorded. It was concluded that the original hydrant test data was inaccurate, and the test was voided. The Lakeland 575 pressure zone was updated to Lakeland 560 instead based on the PRV setpoints and static pressure reading completed in February 2024. The updates and supporting calculations are included in Appendix K.

3.4.2.4.3 Hydraulic Analysis

PHD Analysis

During PHD conditions, the water system must maintain a minimum pressure of 30 psi at all service nodes, a maximum velocity of 8 fps in wall water mains, and a maximum velocity of 5 fps in all transmission mains in accordance with DOH and City standards. The hydraulic model was set up to evaluate pressures and velocities throughout the system under PHD conditions for the 2024 (existing conditions), 2034 (10-year), and 2044 (20-year) scenarios. The results of this analysis are shown in Figure 3-8, Figure 3-9, and Figure 3-10 respectively. The results of this analysis indicate that all areas of the water system meet these requirements under existing and future conditions.

Figure 3-8 | 2024 PHD Scenario – Pressure and Velocity

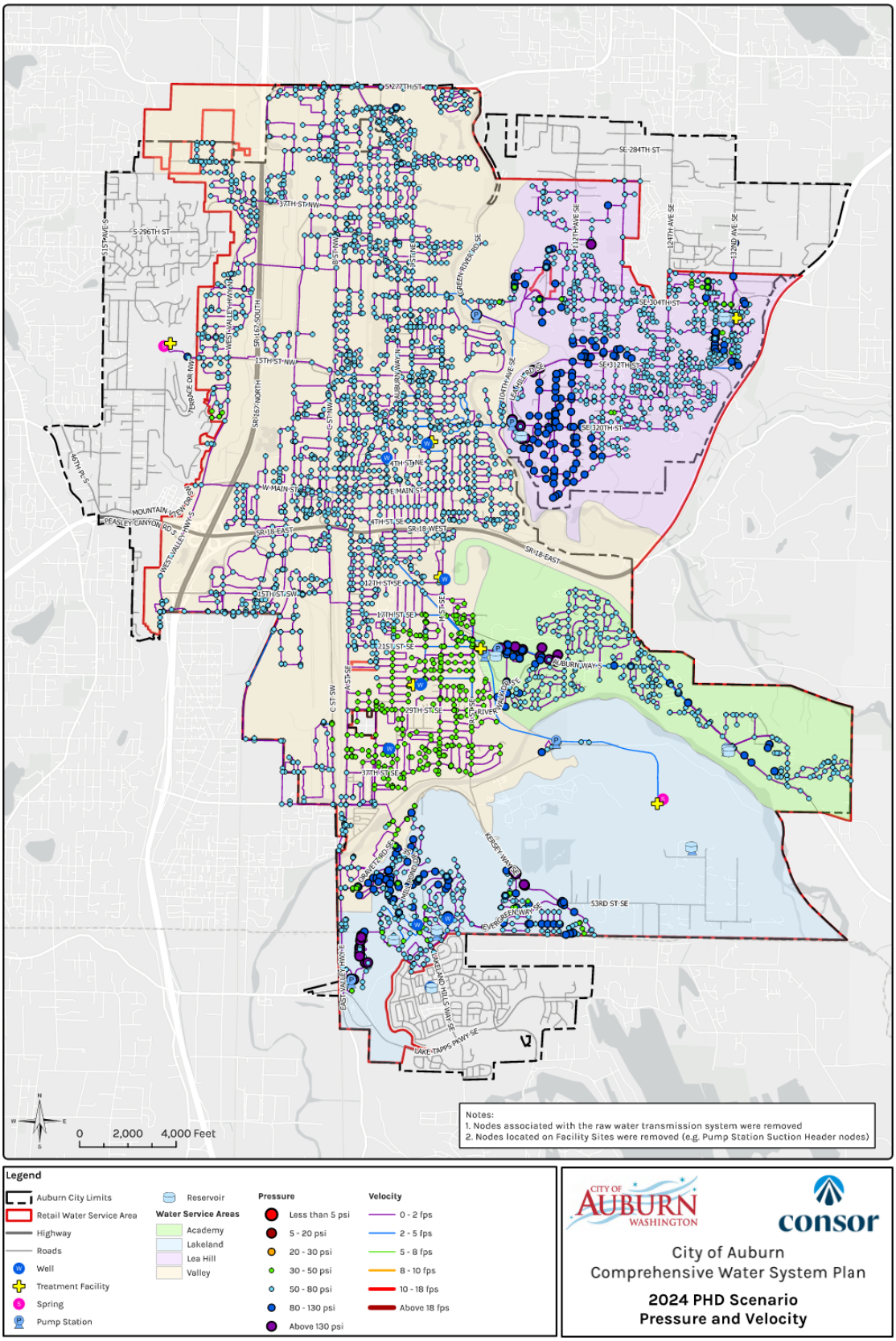


Figure 3-9 | 2034 PHD Scenario – Pressure and Velocity

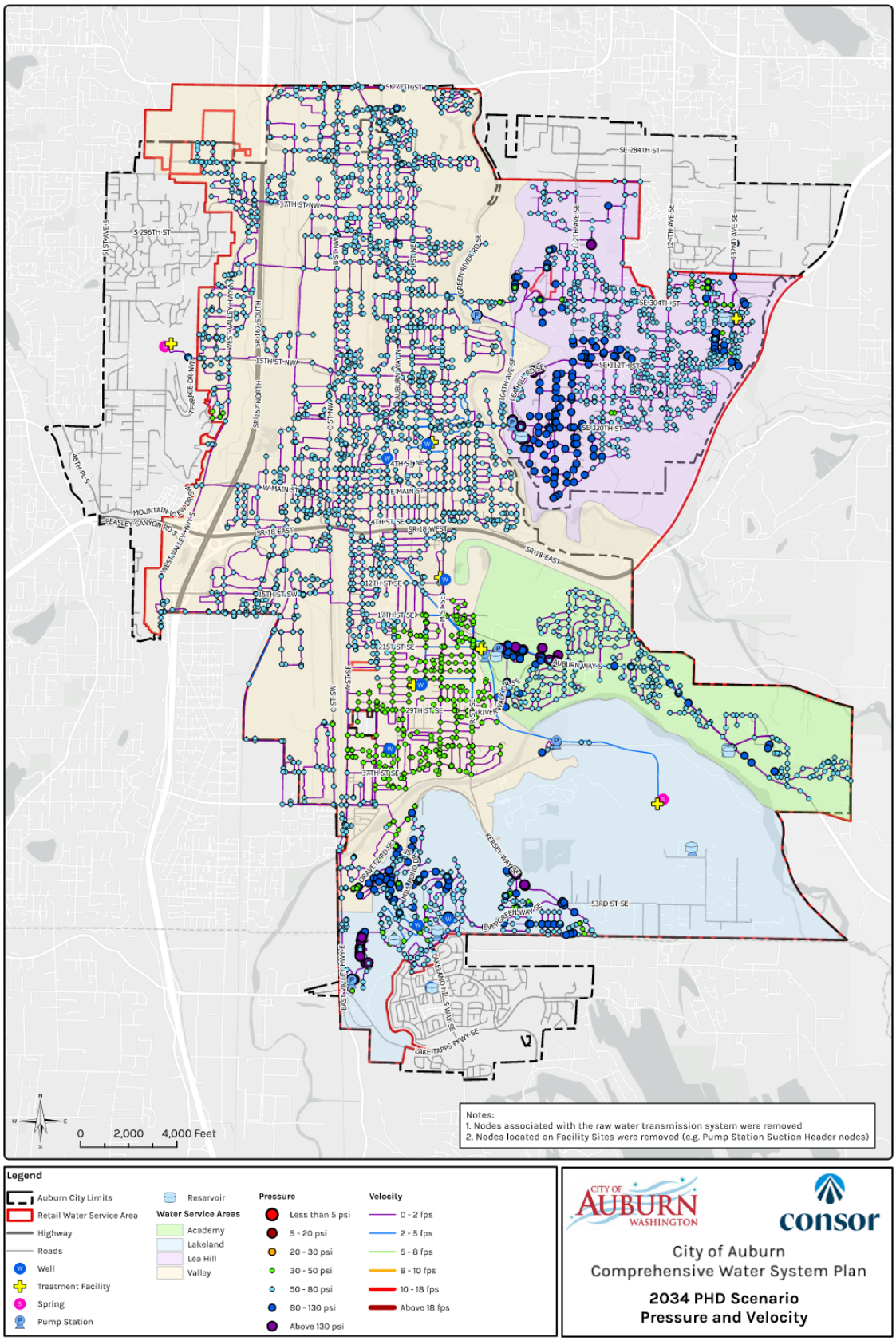
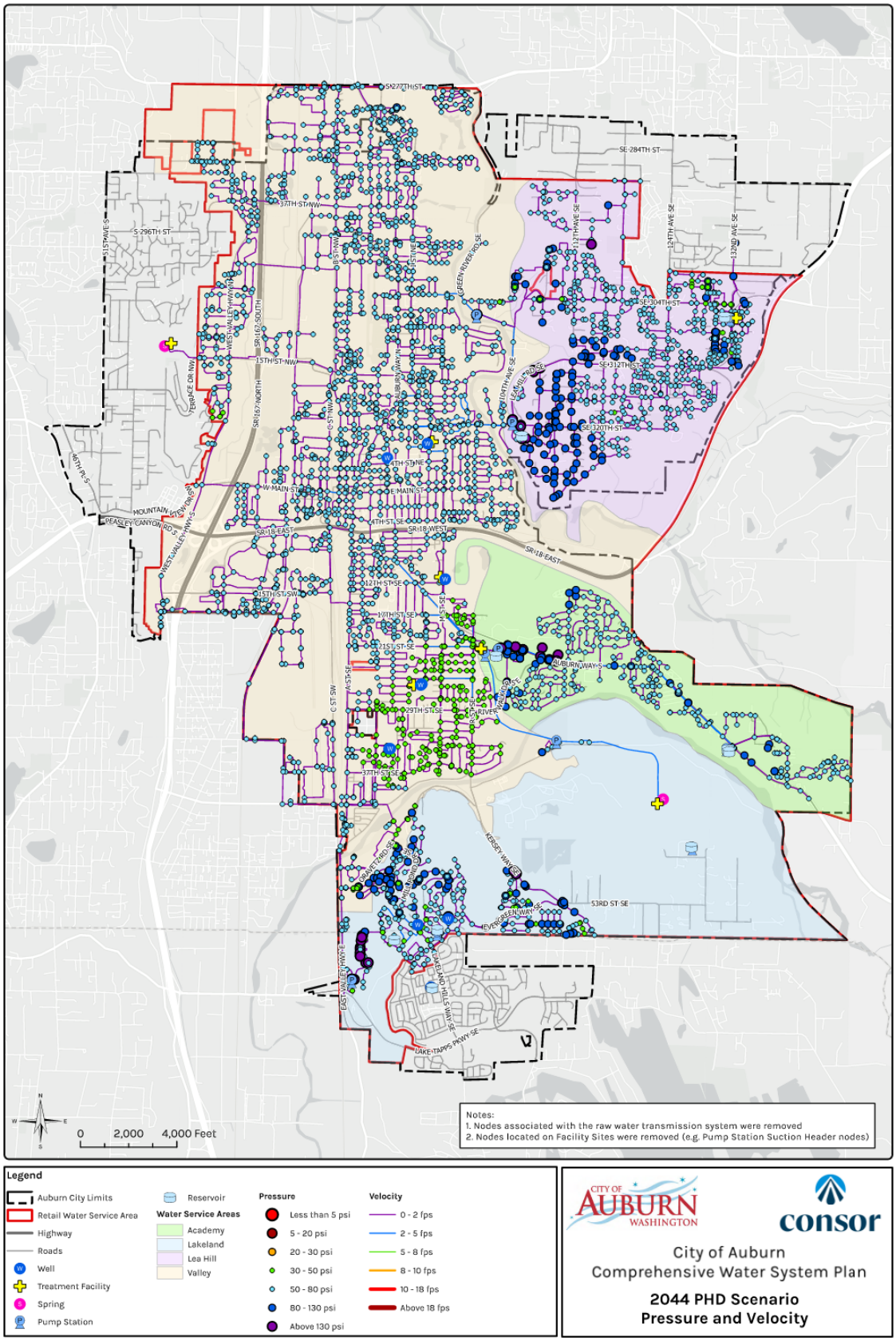


Figure 3-10 | 2044 PHD Scenario – Pressure and Velocity



Fire Flow Analysis

The fire flow analysis assesses each hydrant node in the hydraulic model to determine the available fire flow while maintaining a minimum residual pressure of 20 psi throughout the respective pressure zone. To complete the analysis, the water elevation in each reservoir was set to top of dead storage (below operational, equalizing and standby storage) per DOH recommendations. In addition, the system demands were set to MDD for each scenario (2024, 2034 and 2044). For each node, the modeled available fire flow was compared to its target fire flow requirement as follows:

- Single Family Residential Meters: 1,500 gpm of fire flow required.
- All Other Meters (i.e., multi-family, commercial, etc.): 2,500 gpm of fire flow required.
- Specific Buildings with Higher Fire Flow Requirements: Assessed individually per **Table 3-20**.

Fire flow requirements were assigned to the model nodes based on account classifications of the assigned water meters. Where multiple meters with different account classifications were assigned to the same node, the highest fire flow requirement was assigned to the node. The hydrant locations provided in the City's GIS system do not correspond to the exact location of the hydrant node in the model. Therefore, the nodes that were predicted to have fire flow below what is required were checked based on their proximity to the nearest hydrant to verify whether the appropriate hydrant could provide the required fire. As shown in **Figure 3-11** the results of this analysis indicated that multiple areas of the system under current and future demand conditions have fire flow deficiencies. A summary of the proposed pipeline improvements to resolve the deficiencies is shown in **Figure 3-12** and summarized in **Table 3-33**. **Figure 3-12** also includes on-going projects currently being completed by the City or developers.

Valley Service Area

Multiple deficiencies are identified in the Valley Service Area. The highest priority project assists with raising the HGL of the highest critical node on the west side of the RWSA. This project will increase the available fire flow at most of the western failure locations. The remaining improvements assist with specific failure locations by upsizing water mains experiencing significant headloss.

Additionally, a new PRV facility is proposed to rezone a portion of the Valley 242 pressure zone to the Academy 350 pressure zone to resolve deficiencies in the area. This PRV facility will also allow storage transfer from the Academy Service Area where this is surplus storage to the Valley Service Area to resolve the 2034 storage deficit projections. This project is discussed further in **Chapter 8**.

Lakeland Service Area

There were no failure locations identified within the Lakeland Service Area for the existing and future demand conditions.

Lea Hill Service Area

Multiple deficiencies are identified in the Lea Hill Service Area. The highest priority project in this area is to rezone a portion of Lea Hill 563 pressure zone to the Lea Hill 648 pressure zone. In addition, deficiencies were noted in the northern part of Lea Hill 563, in the vicinity of 112th Avenue, 290th Street, 295th Street, and 293rd Street. These pipelines were replaced recently and provide an available fire flow of approximately 1,350 gpm after the rezoning of the Lea Hill 563 pressure zone is completed. Therefore, a project was not proposed in this area and was confirmed with the Fire Marshal. The remaining improvements assist with specific failure locations by upsizing water mains experiencing significant headloss.

Figure 3-11 | MDD+FF Deficiency Locations for 2024, 2034 and 2044 Scenarios

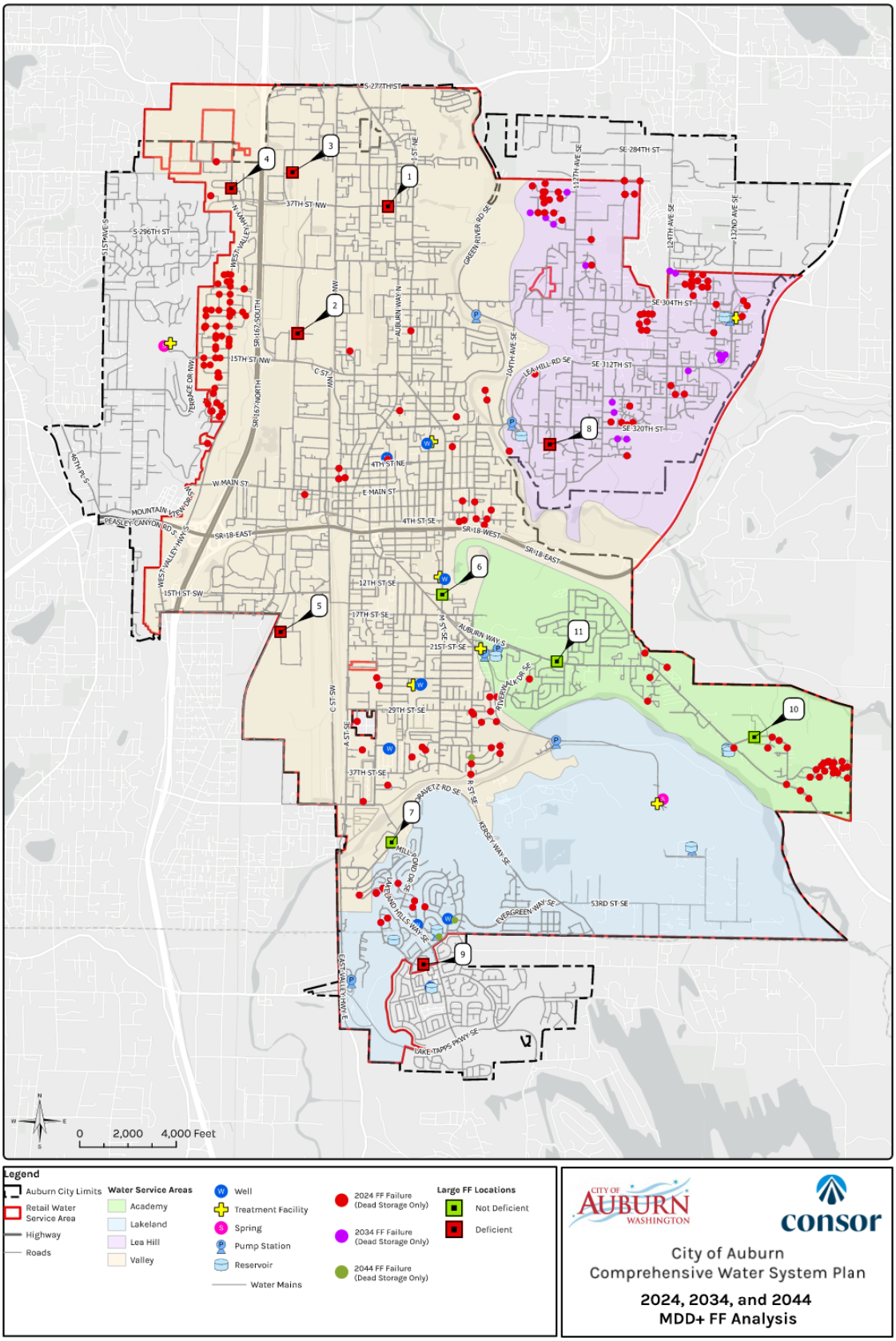
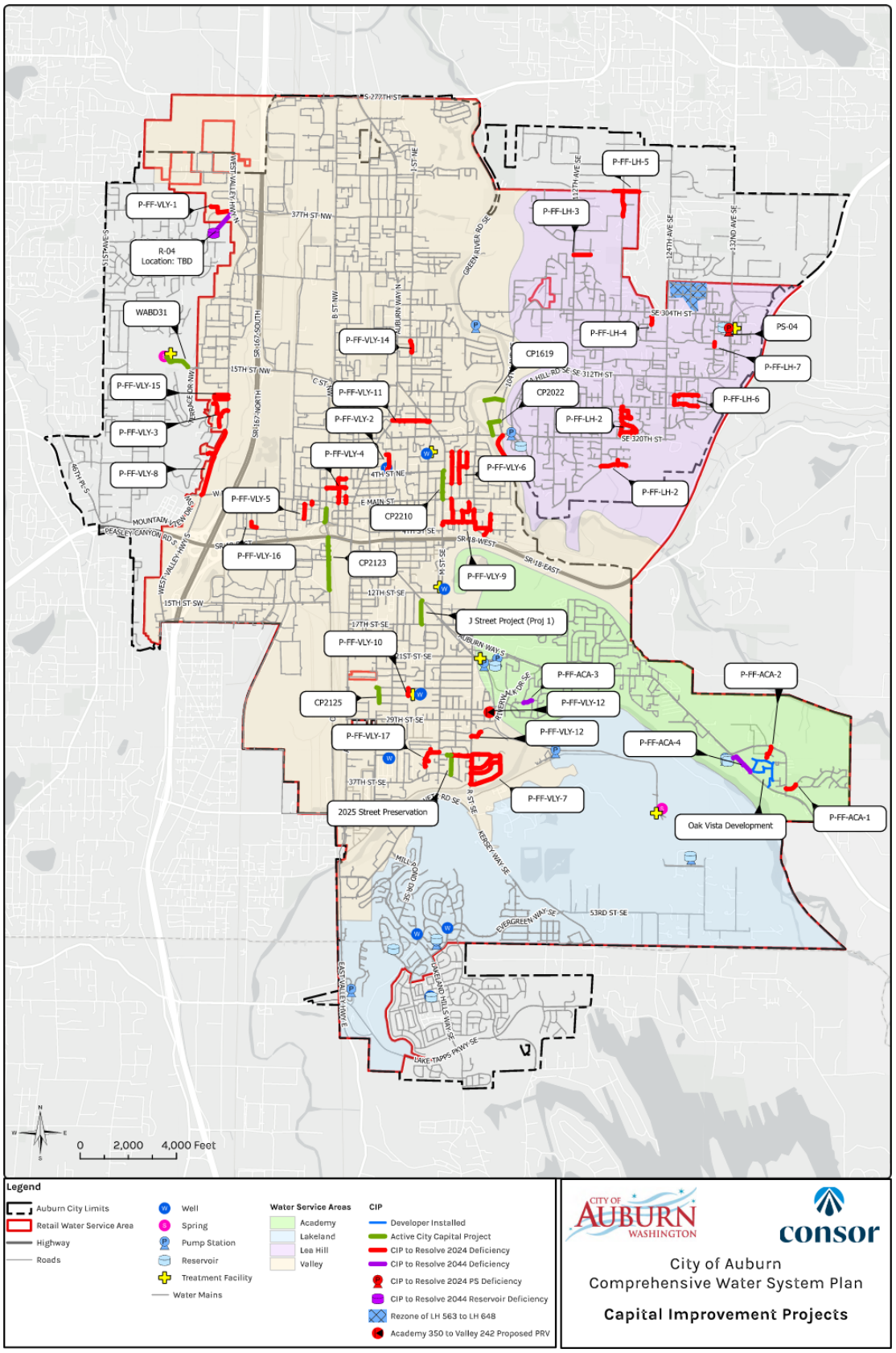


Figure 3-12 | Capital Improvement Projects Addressing Fire Flow Deficiencies



Academy Service Area

Multiple deficiencies are identified in the Academy Service Area. The planned Oak Vista Development provides a significant increase in available fire flow in Academy 585 pressure zone. The remaining improvements assist with specific failure locations by upsizing pipelines with high predicted headloss.

Table 3-33 | Prioritized Pipeline Improvements to Address Fire Flow Deficiencies

Project Priority	Service Area	Project ID	Summary of Deficiency	Summary of Improvements
1	Valley	P-FF-VLY-8	2024 Scenario: Hydrants less than 500 gpm	Replace existing with 3,200 LF of 16-inch diameter piping.
2	Lea Hill	P-FF-LH-3	2024 Scenario: Hydrants less than 1,000 gpm	Replace existing with 690 LF of 12-inch diameter piping.
3	Lea Hill	P-FF-LH-7	2024 Scenario: Hydrants less than 1,000 gpm.	Replace existing with 180 LF of 8-inch diameter piping. Move hydrant connection to higher zone.
4	Lea Hill	P-FF-LH-5	2024 Scenario: Hydrants less than 1,000 gpm	Replace existing with 1,080 LF of 12-inch diameter piping and 1,170 LF of 16-inch diameter piping.
5	Valley	P-FF-VLY-15	2024 Scenario: Hydrants less than 1,000 gpm	Replace existing with 1,320 LF of 12-inch diameter piping.
6	Valley	P-FF-VLY-6	2024 Scenario: Hydrants less than 1,000 gpm	Replace existing with 3,590 LF of 8-inch diameter piping.
7	Valley	P-FF-VLY-7	2024 Scenario: Hydrants less than 1,500 gpm	Replace existing with 7,9840 LF of 8-inch diameter piping and 4,380 LF of 12-inch piping.
8	Valley	P-FF-VLY-13	2024 Scenario: Hydrants less than 1,000 gpm	Replace existing with 1,290 LF of 12-inch diameter piping.
9	Valley	P-FF-VLY-12	2024 Scenario: Hydrants less than 1,000 gpm	Replace existing with 1,440 LF of 8-inch diameter piping and 550 LF of 12-inch piping.
10	Lea Hill	P-FF-LH-1	2024 Scenario: Hydrants less than 1,500 gpm	Replace existing with 4,540 LF of 8-inch diameter piping.
11	Lea Hill	P-FF-LH-2	2024 Scenario: Hydrants less than 1,500 gpm	Replace existing with 1,300 LF of 8-inch diameter piping.
12	Lea Hill	P-FF-LH-6	2024 Scenario: Hydrants less than 1,500 gpm	Replace existing with 2,470 LF of 12-inch diameter piping.
13	Academy	P-FF-ACA-2	2024 Scenario: Hydrants less than 1,500 gpm.	Replace existing with 590 LF of 8-inch diameter piping.
14	Academy	P-FF-ACA-1	2024 Scenario: Hydrants less than 1,500 gpm.	Replace existing with 500 LF of 12-inch diameter piping.
15	Lea Hill	P-FF-LH-4	2024 Scenario: Hydrants less than 1,500 gpm	Replace existing with 340 LF of 8-inch diameter piping.
16	Valley	P-FF-VLY-9	2024 Scenario: Multiple hydrants less than 1,500 gpm	Replace existing with 190 LF of 8-inch diameter piping and 5,765 LF of 12-inch piping.
17	Valley	P-FF-VLY-14	2024 Scenario: Hydrants less than 2,500 gpm	Replace existing with 510 LF of 12-inch diameter piping.
18	Valley	P-FF-VLY-2	2024 Scenario: Hydrants less than 2,500 gpm	Replace existing with 910 LF of 12-inch diameter piping.

Project Priority	Service Area	Project ID	Summary of Deficiency	Summary of Improvements
19	Valley	P-FF-VLY-17	2024 Scenario: Hydrants less than 2,500 gpm	Replace existing with 170 LF of 8-inch diameter piping and 1,270 LF of 12-inch piping.
20	Valley	P-FF-VLY-4	2024 Scenario: Hydrants less than 2,500 gpm	Replace existing with 2,610 LF of 12-inch diameter piping.
21	Valley	P-FF-VLY-10	2024 Scenario: 4-inch Cast Iron near 1,500 gpm dead end	Replace existing with 320 LF of 12-inch diameter piping.
22	Valley	P-FF-VLY-3	2024 Scenario: Hydrant less than 1,500 gpm available.	Replace existing with 1,010 LF of 8-inch diameter piping and 660 LF of 12-inch piping. Complete P-FF-VLY-8 has higher priority for initial improvement in this area.
23	Valley	P-FF-VLY-1	2024 Scenario: Hydrants less than 2,500 gpm	Replace existing with 960 LF of 12-inch diameter piping.
24	Valley	P-FF-VLY-11	2024 Scenario: Hydrants less than 2,500 gpm	Replace existing with 1,630 LF of 12-inch diameter piping.
25	Valley	P-FF-VLY-16	2024 Scenario: Hydrants less than 2,500 gpm	Replace existing with 390 LF of 12-inch diameter piping.
26	Valley	P-FF-VLY-5	2024 Scenario: Hydrants less than 2,500 gpm	Replace existing with 750 LF of 12-inch diameter piping.
27	Academy	P-FF-ACA-3	2044 Scenario: Hydrants less than 2,500 gpm	Replace existing with 380 LF of 12-inch diameter piping.
28	Academy	P-FF-ACA-4	2044 Scenario: Hydrants less than 2,500 gpm	Replace existing with 1,040 LF of 16-inch diameter piping.

3.4.2.5 System Capacity Analysis Results

Chapter 2 of this WSP calculated the ADD ERU planning value to be at 182 gallons per day per Equivalent Residential Units (gpd/ERU) and an MDD ERU planning value of 322 gpd/ERU. An analysis of the water system's overall physical capacity in terms of ERU using DOH Worksheet 4-1 is provided in Appendix V. Demand projection values include retail customer demands, distribution system losses, authorized unbilled consumption, and wholesale demand from Algona. Projections for the MIT Fish Hatchery and LMWD are not included. LMWD is not included since they do not rely on the City as their main source of water and have an interruptible wholesale agreement. Demand from the MIT Fish Hatchery is also not included since it is unknown when this facility will be constructed or what the actual demands will be.

The results of the ERU analysis included in Appendix V are summarized in Error! Not a valid bookmark self-reference.. The analysis indicates that the existing system has sufficient capacity to serve the current and projected water demands through 2034 (10-year planning horizon). Under 2024 and 2034 demand conditions, storage is the limiting system component for growth and development. In 2044 (20-year planning horizon) storage is deficient, which is consistent with the analysis findings summarized in Section 3.4.2.3 and is planned to be resolved with a new reservoir project included in Chapter 8.

Table 3-34 | System Capacity Analysis in ERU Basis

Description of Capacity Parameter	2024	2034	2044
Demands per ERU Basis			
Average Day Demand, gpd/ERU	182	182	182
Maximum Day Demand, gpd/ERU	322	322	322
Peak Hour Demand, gpd/ERU	518	518	518
Projected Retail Customer Demand, ERUs	**38,731**	**43,626**	**49,515**
Algona (Firm Wholesale) Projected ADD, ERUs	2,005	2,120	2,246
Algona (Firm Wholesale) Projected MDD, ERUs	2,150	2,274	2,409
Total ERUs Required for Qa Analysis (ADD), ERUs	**40,736**	**45,746**	**51,761**
Total ERUs Required for Qi and Qs Analysis (MDD), ERUs	**40,881**	**45,900**	**51,924**
Source Capacity (Qi)			
Total Supply Capacity, Qi (20 hours of pumping), gpd	23,092,800	23,092,800	23,092,800
Maximum Day Demand, gpd/ERU	322	322	322
Maximum Supply Capacity, ERUs	**71,744**	**71,744**	**71,744**
Projected MDD Demand, ERUs	40,881	45,900	51,924
Remaining Qi Capacity Surplus/(Deficit), ERUs	**30,863**	**25,845**	**19,820**
Water Rights (Qa)			
Supply Capacity, Qa (Total), gpd	18,749,377	18,749,377	18,749,377
Average Day Demand, gpd/ERU	182	182	182
Maximum Supply Capacity, ERUs	**102,938**	**102,938**	**102,938**
Projected ADD Demand, ERUs	40,736	45,746	51,761
Remaining Qa Capacity Surplus/(Deficit), ERUs	**62,202**	**57,192**	**51,177**
Pumping Capacity (Qs)			
Total Pumping Capacity, Qs (20 hours of pumping), gpd	22,506,000	22,506,000	22,506,000
Maximum Day Demand, gpd/ERU	322	322	322
Maximum Supply Capacity, ERUs	**69,921**	**69,921**	**69,921**
Projected MDD Demand, ERUs	40,881	45,900	51,924
Remaining Pumping Capacity Surplus/(Deficit), ERUs	**29,040**	**24,022**	**17,997**
Storage Capacity			
Maximum Usable Storage Capacity, MG	14.07	14.07	14.07
Available Standby and Equalization Storage Capacity, MG	10.58	10.58	10.58
Standby Storage Requirement, gal/ERU	240	240	240
Equalizing Storage Requirement, gal/ERU	-	-	-
Maximum Storage Capacity, ERUs	**44,071**	**44,071**	**44,071**
Projected Retail System ERUs	38,731	43,626	49,515
Remaining Storage Capacity Surplus/(Deficit), ERUs	**5,340**	**445**	**(5,445)**
System Capacity Analysis Summary			
Limiting Component of System Capacity Surplus/ (Deficit), ERUs	**5,340**	**445**	**(5,445)**

3.4.3 New Source of Supply Analysis

The City has a pending water right application for 13,443 acre-feet from the existing Wells 6 and 7 and a future Well 8. The location of the future Well 8 has not been determined but is expected to be located near Wells 6 and 7. Flows from future Well 8 would be treated at the Fulmer Field CCT Facility. It is anticipated that water quality from Well 8 would be similar to Wells 6 and 7 and may require manganese treatment.

Calculations presented in the Water Rights Self-Assessment Form (**Appendix I**) conclude that the City's existing water rights are anticipated to be adequate to meet the current, 10-year, and 20-year demand projections for maximum instantaneous flows (Qi) and total annual withdrawal (Qa).

The City has established a policy of maintaining the capability to supply the MDD while the largest water source is out of service. The system analysis documented in this chapter confirms that, with projected demands over the 20-year planning period, the City will maintain the capability to meet MDD with the largest pumping source is out of service with the use of the Tacoma interties as an available source.

Mitigation obligations due to the proposed water right for Wells 6, 7, and 8 are listed below and are described in detail in the Conceptual Mitigation Plan (**Appendix S**):

- Mitigation of impacts to Green River,
- Mitigation of impacts to White River, and
- Mitigation of impacts to Mill Creek.

Water Use Efficiency measures described in **Chapter 4** will be applied to the expanded supplies from Wells 6 and 7 and the new supply from Well 8 if the pending water right is approved.

Aside from the pending water right application, the City has several projects planned over the 20-year horizon to improve supply production or fully utilize their existing water rights, as discussed in **Section 3.1.2**.

3.5 Summary of System Deficiencies

Table 3-35 provides a summary of the system deficiencies described in this chapter. Proposed improvements include pump station improvements, storage improvements, and distribution system improvements. Total project costs and the anticipated source of funding for each project are provided in **Chapter 8**.

Table 3-35 | Summary of System Deficiencies

CIP Improvement	Classification of Deficiency	Description of Project Solution	Location in WSP Where Deficiency is Identified	Location in WSP Where Analysis Demonstrates Deficiency will be Addressed by Project
Supply Improvements	Reliability, Resiliency	• Coal Creek Springs Rehabilitation • Well 2 Replacement • Well 2 and Well 6 Cleaning Program • Wells 5/5A Upgrades • Well 7 Back-up Power • Algona Well 1 Study	Section 3.1.2	Section 3.1.2 and Chapter 8

CIP Improvement	Classification of Deficiency	Description of Project Solution	Location in WSP Where Deficiency is Identified	Location in WSP Where Analysis Demonstrates Deficiency will be Addressed by Project
Treatment Improvements	Reliability	• Wells 3A/3B Treatment • Well 5 Chlorination • Well 7 Treatment • Coal Creek Springs Chlorination Building Replacement • Wells 1 and 4 On-site Chlorination Improvements • Fulmer Field CCT Facility Chlorination Improvements	Section 3.1.3	Section 3.1.3and Chapter 8
Storage Improvements	Growth, Fire Flow, Reliability, Resiliency	• Reservoir 2 Valve Improvements • Reservoirs 4 and 8 Seismic Rehabilitation • Additional storage in the Valley Service Area	Section 3.1.4 and Section 3.4.6	Section 3.1.4, Section 3.4.6, and Chapter 8
Pump Station Improvements	Reliability, Fire Flow	• Modifications to Lea Hill BPS/Intertie PS	Section 3.4.5	Section 3.4.5 and Chapter 8
Distribution Improvements	Growth, Fire Flow	• Coal Creek Springs Transmission Improvements • West Hill Springs Transmission Improvements • Replacing and upsizing pipelines where needed	Section 3.1.2 and Section 3.4.7	Section 3.1.2, Section 3.4.7, and Chapter 8

CHAPTER 4

Water Use Efficiency Program

The purpose of this chapter is to describe the water system's program to improve water use efficiency (WUE). WUE contributes to the long-term water supply reliability and promotes good stewardship of the state's water resources.

This chapter addresses the following topics.

4.1 Source and Service Metering
4.2 Distribution System Leakage
4.3 Water Use Efficiency Program
4.4 Water Use Efficiency Savings
4.5 Climate Change Resiliency

Table 4-1 lists the requirements of the WUE Rules from the DOH 2020 Water Use Efficiency Guidebook and reflects the City's level of compliance with these requirements.

Table 4-1 | WUE Rule Requirements

Category	Requirement	City of Auburn Compliance Status
Meters		
	Meter all sources.	Yes, all sources are metered.
	Meter all service connections.	Yes, all services are metered.
Data Collection		
	Provide annual consumption by customer class.	Yes, provided in Section 2.2.2.
	Provide "seasonal variations" consumption by customer class.	Yes, provided in Section 2.5.
	Evaluate reclaimed water opportunities.	Yes, provided in Section 4.3.5.
	Consider water use efficiency rate structure.	Yes, the City has an inverted block rate structure to promote conservation.
	Provide monthly and annual production for each source.	Yes, provided in Section 2.3.1.
Distribution System Leakage		
	Calculate annual volume and percent using formula defined in WUE Rules.	Yes, distribution leakage is calculated and reported in Section 4.2.
	Report annually: annual leakage volume, annual leakage percent, and for systems not fully metered, meter installation progress and leak minimization activities.	Yes, distribution leakage is reported to DOH on an annual basis.
	Develop water loss control action plan (if leakage is over 10% for 3-year average).	N/A, system has a 3-year average water loss of less than 10%.
Goals		
	Establish measurable (in terms of water production or usage) conservation goals and re-establish every 6 years. Provide schedule for achieving goals.	Yes, measurable goals were established via a public process. See Section 4.3.3.
	Use a public process to establish goals.	

Category	Requirement	City of Auburn Compliance Status
	Report annually on progress.	Yes, report submitted annually to DOH.
WUE Program		
	Describe existing conservation plan.	Yes, see Section 4.3.
	Estimate water saved over last 6 years due to conservation program.	Yes, see Section 4.3.1.
	Describe conservation goals.	Yes, see Section 4.3.3.
	Implement or evaluate 1-12 measures, depending on size. Nine measures for City of Auburn.	Yes, see Section 4.3.4.
	Describe conservation programs for next 6 years including schedule, budget, and funding mechanism.	Yes, see Section 4.3.6.
	Describe how customers will be educated on efficiency practices.	Yes, see Section 4.3.4.
	Estimate projected water savings from selected measures.	Yes, see Section 4.4.
	Describe how efficiency program will be evaluated for effectiveness.	Yes, see Section 4.3.1.
	Estimate leakage from transmission lines (if not included in distribution system leakage).	N/A, transmission line leakage included in distribution system leakage as system does not have true transmission lines.
Demand Forecast		
	Provide demand forecast reflecting no additional conservation.	Yes, provided in Section 4.4.
	Provide demand forecast reflecting all "cost effective" evaluated measures.	
Performance Reports		
	Develop annual report including goals and progress towards meeting them, total annual production, annual leakage volume and percent and, for systems not fully metered, status of meter installation and actions taken to minimize leakage.	Yes, reports will be submitted annually to DOH.
	Submit annually by July 1 to DOH and customers and make available to the public.	

4.1 Source and Service Metering

4.1.1 Source Meters

Source meters, also known as production meters, measure the amount of water emitted from the City's springs and wells. Each of the City's sources are metered to measure the amount of water produced. The meters are calibrated annually by an outside contractor under the direction of the Water Operations Supervisor to ensure an accurate accounting of water produced. If a meter cannot be calibrated properly, it is replaced with a new one. Propeller source meters are being replaced with electromagnetic (MAG) meters in conjunction with planned capital improvements projects, or as the budget allows.

Table 4-2 | Source Meter Details

Source Meter ID	Manufacturer	Meter Type	Meter Size	Years in Service	Date of Last Calibration
Coal Creek Springs	Siemens	Magnetic	24-inch	26	August 2023
West Hill Springs	Siemens	Magnetic	10-inch	10	Unknown
Algona Well 1	N/A	N/A	Not in use	Not in use	Not in use
Valley Well 1	Siemens	Magnetic	12-inch	14	August 2023
Valley Well 2	Siemens	Magnetic	10-inch	24	August 2022
Valley Well 3A	Sparling	Turbine	Not in use	Not in use	Not in use
Valley Well 3B	Sparling	Turbine	Not in use	Not in use	Not in use
Valley Well 4	Siemens	Magnetic	12-inch	39[1]	August 2023
Lakeland Well 5	Sparling	Turbine	8-inch	41[1]	August 2023
Lakeland Well 5A	Siemens	Magnetic	4-inch	34	August 2023
Lakeland Well 5B	Siemens	Magnetic	Not in use	Not in use	Not in use
Valley Well 6	Siemens	Magnetic	12-inch	24[1]	August 2023
Valley Well 7	Sparling	Turbine	Not in use	Not in use	Not in use

Note:
1. Years in service assumed to be from source's original construction date.

4.1.2 Service Meters

Water meters are installed on every service line to measure the quantity of water used by a customer per WAC 246-290-496 and City Code Chapter 13.06.320. All new direct service connections must be metered at the time-of-service activation per WAC 246-290-496(2)(d). All meters shall remain the property of the City and shall not be removed except by the City. In all cases where meters are lost, damaged or broken by carelessness, negligence, or willful actions of owners/operators of premises, they shall be replaced or repaired by or under the direction of the City. The actual cost of repairs or replacement of meters will be charged against the owners/operators. In case of nonpayment of fees, fines, charges, or penalties, the water shall be shut off and will not be turned on until all charges are paid.

In 2015, the City began installing an Automated Metering Infrastructure (AMI) system, as a part of the Water Meter and Billing System Improvements project, which was completed in 2018. With the new AMI system, the City automatically receives meter reads via radio transmission and can integrate the data into the billing software. The benefits of an AMI system include increased accuracy and efficiency, early leak detection, and improved customer service. The AMI system is anticipated to have a 20-year life, including the system components and batteries in the radios.

In conjunction with the AMI system installation, the City also completed a meter changeout in 2018. Since 2015, the City has installed 15,156 meters, ranging in size from ¾ inch to ten inches. Meter replacement will be on a 20-year program to coincide with the AMI system. Large source meters and three-inch and larger commercial meters will be tested and calibrated annually. Small meters (less than three inches) are not calibrated.

All new service connections under three inches, in addition to repairs, retrofits or replacements of existing services, are typically conducted by Water Distribution Staff unless unusual circumstances arise. Meter

services consist of meters, meter vaults, meter boxes, service lines, valves, setters, re-setters, and other associated equipment.

- Small Meters (3/4 to two inch)
    - Replacement Cost: $700 - $1,620
    - New Installation Cost: $550 - $1,500
- Large Meters (three to eight inch)
    - Replacement Cost: $3,300 - $12,000
    - New Installation Cost: $2,800 - $11,500

The City uses master meters when beneficial to the City and its customers. Master meters are used at certain locations such as mobile home parks, the Auburn Business Park (formerly the Federal General Services Administration Property), and Muckleshoot Indian Tribe (MIT) commercial properties.

4.1.2.1 Large Meters

Large meters are used to measure water consumption by customers with significant demand requirements. They are usually employed by the following customer classes.

- Commercial
- Farms or Parks – Irrigation
- Schools
- Multifamily Complexes
- Industrial / Manufacturing Businesses
- Wholesale Customers
- Municipal Buildings

Large meters are defined as water meters three inches or larger and new meters are installed by contractors rather than City maintenance staff. There are a total of 127 large meters in the City's system. All large meters are calibrated for accuracy each year, usually between the months of April and June, as part of the City's System Loss Program. Calibration of large meters is conducted by an outside contractor, but two maintenance staff members under the direction of the Water Distribution Supervisor assist in the process. If a meter cannot be calibrated, it is replaced with a new one by City maintenance staff.

4.2 Distribution System Leakage

Distribution System Leakage (DSL) represents the difference between production and documented water use (retail, wholesale, and authorized unmetered). It may include inaccurate master and service connection meters, unaccounted-for non-revenue water use, pipeline leakage, and unauthorized use. DSL does not include authorized water usage such as water used for fire protection, flushing, construction, and other maintenance and operations practices. However, to be credited, this must be accounted for by metering or estimating using credible means.

The DSL is calculated as the difference between the total amount of water produced and the sum of water sold plus any authorized unmetered water usage. The City's estimated DSL for 2015 through 2022 is presented in Chapter 2, Table 2-11. For the City's water system, the 2022 three-year rolling average DSL was 6.7 percent of total production (corrected value submitted by the City to DOH in 2024). This falls below the DOH requirement that the three-year average DSL be under ten percent to minimize water waste.

The City is committed to maintaining DSL below the required ten percent and is actively working to identify and minimize DSL. To minimize DSL, the City has ongoing leak detection, meter calibration, and an active repair and replacement program for water system infrastructure, as detailed in Chapter 6 – Operations and Maintenance. The City completes a leak detection study of 25 percent of the water distribution system every year to detect and fix leaks. Additionally, the City has recently increased its efforts to reduce non-payment of bills and water theft. The City recently completed a major SCADA system upgrade in 2024. These investments should significantly increase the City's ability to measure DSL both temporally and geographically. The resulting information may allow the City to better target its WUE activities to reduce DSL.

4.2.1 Water Audits

The City has implemented AMI throughout the system, completing installations between 2015 and 2018. AMI is a tool that improves the effectiveness of the WUE Program measures, providing detailed water use data for each customer that allows the City to better understand water use patterns and target WUE Program measures to specific customers. Data can be sent in real-time or stored for several weeks or months. Potential AMI capabilities vary depending on the chosen hardware and software however, most systems can aid in the WUE Program. Below is a summary of how the City can use the AMI data.

- Advanced algorithms and metering data will allow the City to identify customer leaks.
- Advanced metering will provide cost savings in the Leak Detection and Repair and Service Meter Replacements programs.
- Advanced metering will aid in the City's efforts to reduce non-payment of bills and water theft.
- By comparing production and customer water use, DSL can be evaluated in greater temporal and geographic detail. For example, DSL may be calculated by month or for a given service area.
- Advanced metering data will help the City identify groups of customers to target for WUE measures and can be used to track the effectiveness of the measures for the same customers.
- Advanced metering data will allow additional reporting options to educate customers, such as their peak water use.

The City reports DSL annually; refer to Appendix M for the previous three annual WUE reports. The newly installed AMI system will provide substantial benefits for the WUE Program and improve savings, further outlined in Section 4.4 of this chapter.

4.3 Water Use Efficiency Program

In 2003, the Washington State Legislature passed the 2003 Municipal Water Law (MWL) which added a requirement that water purveyors use water efficiently. This law was expanded in January 2007 with the WUE Rule and has since been updated. WUE requirements are listed under WAC 246-290 and include:

- Publicly establishing a water savings goal.
- Evaluating water use efficiency opportunities specific to each community.
- Developing a WUE planning program.
- Meter installation on all customer connections by January 22, 2017.
- Achieve a standard of no more than ten percent water loss, on a three-year rolling annual average.
- Annual reporting on WUE progress.

The City's WUE Program provides for efficient water use and supports continued growth. This program fulfills all the necessary requirements of DOH. The selected program measures will allow the City to meet its WUE goals, resulting in decreased water demand. Measures are interrelated and will help the City achieve its goals to both reduce average water use and peak water use per customer. Public education measures (showing water use in bills, workshops, school outreach, fairs/trade shows, etc.) will continue to be a focus of the WUE Program to increase customer awareness and knowledge of WUE opportunities. Public education is needed to support the City's other WUE measures and to support reductions in both average and peak water use. Continued appliance rebates and shower head giveaways help customers implement what is learned in the public education campaign. With the implementation of AMI, it is expected that the City and customers will be able to identify more water loss reduction opportunities than previously possible. Therefore, customer and City leak detection, water audits, and meter repair and replacement may have a prominent role in the 2024-2034 WUE Program. The program will also continue to provide financial disincentives for excessive water use through metering and WUE pricing. This aspect of the program is likely to help reduce peak water usage further. These measures will result in the City being able to achieve its WUE goals, which includes reduced demand.

The 2024-2034 WUE Program will be a continuation of the City's successful existing WUE Program. The program has also been updated to leverage the City's investments in improved SCADA, leak detection, and AMI. The 2024 Plan complies with regulations as set forth in WAC 246-290-830 and DOH's 2020 Water Use Efficiency Guidebook. This section summarizes the program's goals, demand and supply side measures, reclaimed water, and DSL. The projected demand with the conservation goals, program budget, and cost savings are also presented.

4.3.1 Program Requirements

The WUE requirements emphasize the importance of measuring water usage and evaluating the effectiveness of the City's program. There are three fundamental requirements of a WUE Program that the City follows.

- **Planning Requirements** – Municipal water suppliers are required to:
  - Collect data.
  - Forecast demand.
  - Evaluate WUE measures.
  - Calculate DSL.
  - Implement a WUE Program to meet their goals.
- **Distribution Leakage Standard** – Municipal water suppliers are required to meet a distribution system leakage standard to minimize water loss from their distribution system.
- **Goal setting and performance reporting** – Municipal water suppliers are required to set WUE goals through a public process and report annually to their customers and DOH.

The DOH requires that the City estimate the amount of water saved through implementation of the system's WUE program over the last six years. **Table 4-3** shows the average day demand per-capita from 2017 to 2022. Water use per-capita dropped from 112 gpd per capita in 2017 to 103 gpd per capita in 2022. The net water savings over this period equates to approximately 195.2 million gallons or 39.0 million gallons per year. This was calculated by multiplying the population for each individual year (over the six-year period) by the difference in calculated savings in gpd per capita year after year. The result was then multiplied by the total days in each year. Annual totals were summed for the entire six-year period.

Table 4-3 | Annual Average Day Demand (gpd) per Capita[1]

2017	2018	2019	2020	2021	2022
112	109	106	100	105	103

Note:
1. Average day demand per capita was calculated by dividing the Average Day Demand from Table 2-9 by the population served from Table 2-1 and converting to gpd.

4.3.2 Mandatory Measures

The WUE Program includes supply side measures that the City implements to understand and control leakage including new meters, leak detection surveys, and water audits. Per the WUE requirements, the following measures shall be continued for the 2024-2034 WUE program.

- Install production (source) meters.
- Install consumption (service) meters.
- Perform meter calibration.
- Implement a water loss control action plan to control leakage if the three-year rolling average exceeds ten percent.
- Educate customers about water use efficiency practices.

Additionally, the following measures that must be evaluated are:

- Rates that encourage water demand efficiency (discussed in Chapter 9)
- Reclamation opportunities (discussed below)

The City has complied with these requirements in the past and will continue to comply with these regulations.

4.3.3 Program Goals

Per the WAC 246-290-830(4)(a), all water purveyors with 1,000 or more connections were required to set efficiency goals through a public process. The City has chosen to focus on implementing voluntary measures to decrease both the average and peak water usage. The 2024 program has established the following goals.

- Water Use per ERU Goal: Decrease the planning ERU value (gpd/ERU) one percent annually from the current planning ERU value of 182 gpd/ERU, which is the 75th percentile of eight years of historical data (2015 – 2022). Revaluate goal when the planning ERU value reaches less than 172 gpd/ERU.
    - To be conservative, an ERU planning value higher than the average was used by the City for demand forecasting. The 75th percentile of the eight-years of data was used to select the planning ERU value of 182 gpd. This methodology is consistent with the City's 2015 Plan. The ERU value of 182 gpd is seven percent lower than the 2015 Plan's ERU planning value of 195 gpd per ERU.
- MDD/ADD Peaking Factor: Decrease the planning peaking factor from the current 1.77, which is equal to the 75th percentile of eight years of historical data (2015-2022), to a planning peaking factor of less than 1.68, the average peaking factor from 2015-2022.

- Distribution System Leakage: Maintain three-year average DSL under ten percent to minimize water waste.

- Customer Support: Provide the service and support necessary to those water customers expressing a desire to conserve water as a part of their environmental ethic and as a means of minimizing water bills.

The WUE Program measures, as summarized below, are designed to help meet these established goals.

4.3.4 2024-2034 Demand-Side Program Measures

To encourage WUE and support customers, the City has incorporated program measures that target demand reductions. Under the WUE requirements, a program measure may include water efficient devices, actions, business practices, or policies that promote efficient water use. With 14 measures as part of the 2024 Program, the City exceeds the minimum DOH requirement of nine measures. WUE measures can target specific customer classes or a combination of customer classes. The City's demand-side program measures are summarized below.

1. School Outreach: The City will continue to participate in programs arranged to educate students on efficient water usage as requested by schools.

2. Speakers' Bureau: The City will seek speaking opportunities to discuss efficient water use with a wide audience spectrum. Topics could include water efficient fixtures and appliances, curbing seasonal peak demands, lawn watering practices, etc.

3. Program Promotion: The City will seek opportunities for social media, television, and/or radio public service announcements for WUE and submit news articles to local papers and Auburn Magazine on efficient water usage especially during the spring and summer months.

4. Theme Shows/Fairs: The City hosts an annual Kids Day fair. The fair includes a wide range of activities for all ages of kids. As part of the fair, the City has fun, water-related activities and provides water efficiency brochures and other materials. The City will conduct outreach at other Theme Shows/Fairs if requested. Water saving device kits are distributed to interested single-family and multiple-family residential customers.

5. Water Audits: The City will conduct a water audit upon the request of a customer, including industrial, commercial, and institutional customers. The audits will review items such as: recirculation of cooling water, reuse of cooling and process water, reuse of treated wastewater, efficient landscape irrigation, low water using fixtures, fixing leaks, and process modifications.

6. Customer Leak Detection: The City identifies potential leaks through investigation of the water meter upon request of customers. The City runs multiple reports in the AMI system to analyze data and investigate water meters to identify leaks.

7. Bills Showing Consumption History: The City will continue to provide customer bills showing the previous year's water usage. The City provides water usage information from AMI on the customers e-portal.

8. Water Saving Device Kits: The City will participate in distribution of water use efficiency kits through education events such as speakers' bureaus, theme shows, fairs, and through bill insert request forms.

9. WUE Pricing: The City has an inverted block rate structure for single-family residential customers to encourage WUE. The City will consider WUE in future cost of service/rate studies. Studies should determine the most appropriate water structures and rate levels to achieve the City's WUE goals, while generating sufficient revenues for utility operations. It is recommended that the studies consider uniform rates by class, inverted block rates, seasonal rates, and excess use rates.

10. Water Efficient Toilet Rebate Program: The City will continue to provide rebates to customers that replace old toilets with new high-efficiency toilets through their Environmental Protection Agency (EPA) WaterSense Toilet Rebate program.

11. Low-Flow Shower Heads Giveaways: The City gives away free low-flow shower heads at the Utility Billing Counter.

12. School Outdoor Water Use Reduction: The City will target schools to reduce their outdoor water consumption. Water audits and education on the benefits of replacing inefficient irrigation systems or landscaping (including turf) will be conducted.

13. City Water Use Reduction: The City will audit the water use of City accounts to identify both indoor and outdoor water saving opportunities. The Water Utility staff will help educate City account holders on WUE; however, no water budget has been allocated to implement water saving devices at City facilities.

14. Rainwater Harvesting: The City will evaluate implementation of a rainwater harvesting (rainwater reclamation) promotion program as a means to reduce irrigation water usage by commercial, public, and residential customers. The City's Stormwater Utility's requirements to use Low Impact Development (LID) measures, where feasible, strives to keep rainwater on the property, further reducing irrigation demands.

It is important to note that in addition to the water cost savings for the WUE measures, other benefits result, both to the utility and to its customers, from WUE activities. Such additional benefits could include:

- Significant customer energy savings because water heaters are the second largest energy users in the home. Hot water use can be reduced by almost one-third by cost-effective WUE measures, such as water efficient fixtures and appliances. Significant energy savings can also occur for industrial processes requiring water heating and other power uses.

- Efficient landscaping and irrigation techniques save on maintenance costs.

- Reductions in water production decrease energy required by utilities to treat and distribute water and to collect and treat wastewater. Chemical costs are also reduced in water and wastewater operations.

- System measures could provide substantial benefits in addition to water production cost savings including:

    - Identification of non-revenue water could result in recovery of unbilled revenue (inaccurate meters) and reduced unauthorized water usage (theft).

    - Leak detection helps prevent major main breaks, which could result in significant repair costs to the utility.

- Leak detection reduces a utility's liability due to prevention of potential property damage.
- Repair and/or replacement of service and source meters allows a utility to recover unbilled water revenues.

4.3.5 Reclaimed Water

According to WAC 246-290-100 and the WUE requirements, water systems with over 1,000 connections must collect and evaluate information on reclaimed water opportunities. The City is committed to wastewater reuse and rainwater reclamation, as stated in its official water system policies summarized in Appendix A. The City participates in the King County reclaimed water program, which completed a Reclaimed Water Comprehensive Plan in 2012. Additionally, the City has completed the King County Water Reclamation Evaluation Checklist, included as Appendix L. Currently, there are no reclaimed water users in the City. The City considers the most likely candidates for use of reclaimed water to be the irrigation customer class. Since the City conveys all sewage to King County's regional sewerage system, there is not an opportunity for the City to sell reclaimed water without significant capital investments to develop a reclaimed water distribution system, and there is not currently an alternative reclaimed water source in the area.

The City will implement reclaimed water as a conservation measure and include these savings in the demand projections when specific opportunities arise. The City, in conjunction with King County, may develop projects or consider participation in water reuse projects and programs developed by adjacent purveyors and others as appropriate. The efforts may include demonstration or pilot projects developed in accordance with applicable federal, state, and local laws and regulations.

4.3.6 WUE Budget

The City has established a budget for each program measure from 2023 to 2029, as required per WAC 246-290-810 4.e, shown in Table 4-4. WUE measures are funded through rates.

Table 4-4 | Annual WUE Budget

Measure	2023	2024	2025	2026	2027	2028	2029
School Education (NPDES & Water)	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000
Conservation Public Education/ WQ Report	$6,350	$6,350	$6,350	$6,350	$6,350	$6,350	$6,350
Toilet Rebates & Low-flow Shower Heads	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000
Large Meter Test/Repair/Replace	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000
WSP Update (WUE)	$22,000	-	-	-	-	-	-
Total	**$89,350**	**$67,350**	**$67,350**	**$67,350**	**$67,350**	**$67,350**	**$67,350**

4.4 Water Use Efficiency Savings

The WUE Program primarily provides cost savings in two ways, reducing demand and reducing DSL. Reducing demand may reduce or delay capital projects for additional supply and expanded distribution infrastructure. Reducing DSL can provide additional revenue, as well as increase the efficiency of supplying existing water uses. Additionally, advanced metering will provide cost savings in the Leak Detection and Repair and Service Meter Replacements programs.

The City has completed a cost analysis of their proposed WUE Program using historical data and projected annual water savings. Table 4-5 shows projected demands with and without annual water savings. This analysis maintains the target water use efficiency goal of one percent reduction per year in the planning ERU value. This goal will be reached through implementation of the proposed program measures. These reductions in demand can be translated into tangible benefits once realized, such as more time before new sources must be developed, increased ERUs that can be served by the existing water infrastructure, and cost savings in power and water treatment.

Table 4-5 | Demand Forecast With and Without Projected WUE Savings

Year	ADD (mgd)				MDD (mgd)			
	Without WUE	With WUE	Savings	% Savings	Without WUE	With WUE	Savings	% Savings
2024	7.05	6.98	0.07	1%	12.47	12.34	0.12	1%
2025	7.14	6.99	0.14	2%	12.61	12.36	0.25	2%
2026	7.22	7.00	0.22	3%	12.76	12.38	0.38	3%
2027	7.31	7.01	0.29	4%	12.91	12.39	0.52	4%
2028	7.39	7.02	0.37	5%	13.06	12.41	0.65	5%
2029	7.48	7.03	0.45	6%	13.22	12.43	0.79	6%
2030	7.57	7.04	0.53	7%	13.38	12.44	0.94	7%
2031	7.66	7.05	0.61	8%	13.54	12.46	1.08	8%
2032	7.75	7.06	0.70	9%	13.70	12.47	1.23	9%
2033	7.85	7.06	0.78	10%	13.87	12.48	1.39	10%
2034	7.95	7.07	0.87	11%	14.04	12.50	1.54	11%

4.5 Climate Change Resiliency

In 2023, the Washington State Legislature passed House Bill 1181, which requires all group A community public water systems serving 1,000 or more connections to include a climate resilience element in water system plans initiated after June 30, 2025. Though this requirement is not yet in effect, the following section is included to initiate discussion and planning for climate resilience and to supplement the Climate Element being incorporated into the City's 2024 Comprehensive Plan update.

4.5.1 Expected Climate Changes for the City of Auburn

Climate is a key factor driving water use as temperature, precipitation, and other climate-driven weather patterns affect irrigation, and commercial and industrial cooling. Auburn's maritime climate is characterized by wet cool winters and dry warm summers. The City's temperate climate is largely protected from continental weather by the Cascade Mountains to the east.

According to the publication Climate Change Impacts and Adaptation in Washington State, Washington State is projected to experience decreases in snowpack, increases in stream temperatures, and widespread changes in streamflow timing, flooding, and summer minimum flows. Climate change is expected to cause more frequent summer water shortages, especially in fully allocated watersheds with little management

flexibility. The average spring snowpack in Washington is projected to decline by 38 percent to 46 percent by the 2040s[1].

To estimate the impact of this change in climate on the City's water demands, results from the Water Supply Forum's 2009 Regional Water Supply Outlook (WSF 2009 Outlook) were used. The impacts of climate change on sources that rely on groundwater are mostly unknown due to the variability between aquifers and site-specific effects, such as recharge rates.

Continued increases in average annual and seasonal air temperatures in the Puget Sound are projected due to climate change, as well as increases in extreme heat. Projected changes in annual precipitation are generally minor, although summer precipitation is projected to decrease and heavy rainfall events are projected to become more severe[2].

No changes to demand projections were made for the 20-year planning period to account for potential climate change due to the uncertain magnitude and timing of local effects. However, it is recognized that demands have the potential to increase in the future given these changes. In the event the City experiences an increase in demand, to understand the scale of the impact, the City will run a model of the City water system that would compute firm yield from inputted streamflow data, replacing historic inflows with projected inflows from three climate change scenarios as described by the WSF 2009 Outlook. Those climate change scenarios for King County are provided in Table 4-6.

Table 4-6 | Predicted Increase in Demand from Baseline Due to Climate Change[1]

Climate Change Scenario	2005	2020	2030	2040
Baseline	0.0%	0.0%	0.0%	0.0%
Warm	3.5%	4.4%	4.9%	5.4%
Warmer	4.6%	4.9%	5.8%	7.4%
Warmest	4.8%	6.2%	7.6%	9.5%

4.5.2 Extreme Weather Events and Significant Challenges

To meet the requirements for risk and resilience assessments in America's Water Infrastructure Act (AWIA) of 2018, the City completed a Risk and Resilience Analysis (RRA) in December 2020 using the EPA's Vulnerability Self-Assessment Tool (VSAT). VSAT was developed to serve as an all-hazards assessment tool for water and wastewater utilities of all sizes and addresses malevolent acts, dependency/proximity threats, and natural hazards. Through this effort, the City has identified the following assets as the most vulnerable to flood hazards.

- Coal Creek Springs aquifer
- Coal Creek Springs and West Hill Springs piping
- Valley Aquifer (Wells 1, 2, 3A, 3B, 4, 6, 7)
- Green River and Lea Hill pump stations
- Distribution System

Climate change exacerbates existing challenges with flooding, landslides, droughts, wildfire, and other natural hazards by potentially changing the frequency, intensity, and duration of these events. Heavier

[1] Climate Change Impacts and Adaptation in Washington State: Technical Summaries for Decision Makers (uw.edu)
[2] *2009RegionalWaterSupplyOutlook.pdf (amazonaws.com)

rainfall increases the threat of flooding. In addition to immediate flood threats, flood waters can damage and contaminate wells and water treatment plants resulting in short-term outages and increased risk of waterborne diseases in drinking water. Higher levels of pathogens in runoff from areas around drinking water wells and surface water intakes from flooding of the wells themselves.

In October 2018, the Intergovernmental Panel on Climate Change (IPCC) released the Special Report on Global Warming of 1.5 degrees Celsius (^{O}C). Warming of 1.5^{O}C is projected to decrease summer streamflow in the Puget Sound by 23 percent. Average temperatures in 2015 were 2.7^{O}C warmer than pre-industrial era temperatures which resulted in low summer streamflow and warmer waters[3]. According to the King County Climate Change GIS map "Summer Runoff: Change, 2040s", summer (July-September) runoff in the City of Auburn is expected to decrease by 2.4 percent by the 2040s from historical conditions (1970-1999)[4]. The WSF 2009 Outlook believes the region is reasonably well prepared for drought, however further actions could improve drought preparation. During droughts, water supplies may fall short of meeting demands, especially in summer months. In the past, water utilities in the Puget Sound have adapted to fluctuations in water supplies from droughts through reservoir management and system adaptations such as long-term conservation programs and short-term demand curtailments[1].

Warming of 1.5^{O}C is also expected to bring larger and more frequent wildfires, which could disrupt regional water supplies. Significant water quality impairments from a wildfire include increased turbidity and introduction of radionuclides, metals, and fire-retardant chemicals[5], although impacts to the City's water quality is not likely as there are not surface water sources. The City can maintain existing emergency interties to mitigate wildfires that affect adjacent systems more severely than the City's. While the City contains land that is considered Wildland-Urban Interface, the United States Forest Service has classified the City as either Very Low or Non-burnable in its Potential Wildfire Hazard GIS map (2020)[6].

4.5.3 Assessment of Actions to Protect System

In the face of continued warming, there are actions the City can take to improve the resiliency of the water system from the impacts of climate change. Below are possible short-term and long-term actions for the City to consider. The short-term measures can improve resiliency within three to five years while the long-term measures may require decades to be fully implemented[5].

4.5.3.1 Short-Term Actions

Source Inventory: Identify sources that will remain online in the event of a 100-year or 500-year flood. Utilize GIS or other mapping tools to create a map to visualize which sources are at risk of inundation in such events. Develop protocols for isolating these sources. Determine how sources could be used for critical health and safety following an extreme weather event and how these sources relate to emergency shelters and critical facilities, such as hospitals.

Groundwater Supplies: Develop new groundwater supplies or augment existing groundwater supplies to improve drought resiliency and offset challenges posed by the wetter winters and drier summers expected with warming temperatures. Establish models to understand the effects of drier summers and increased

[3] NoTimeToWaste_CIG_Feb2019.pdf (uw.edu)
[4] https://climate-kingcounty.opendata.arcgis.com/maps/bab86832a962416cbdbb35644dacb11b
[5] Phase2SummaryReport20180731FINAL.pdf (amazonaws.com)
[6] https://hub.arcgis.com/datasets/usfs::wildfire-hazard-potential-version-2020-classified-image-service/explore?location=47.307822%2C-121.937736%2C10.98

risk of drought on groundwater supplies. Evaluate impacts of lower snowpack levels in the Cascade Mountains on aquifer recharge.

Wildfire Mitigation: Evaluate fire-fighting capacity for open space areas such as Game Farm Park and Wilderness Area.

Interaction with Research Community: Build and sustain routine interactions with the research community on the subject of climate change and water supply. Consider opportunities to fund water-industry research with direct application to water supplies in western Washington. Explore opportunities to have imbedded persons, such as employing a scientist with climate change expertise.

Rate Factors: Implement less frequently used rate factors, such as a rate for drought periods, to encourage lower demands.

Floodproofing: Build flood barriers such as levees and dikes to protect critical infrastructure. Elevate critical equipment or place it within waterproof containers or foundation systems.

Power Supplies: Extreme weather events can cause power outages. Consider alternative or on-site power supplies to provide resiliency during such events.

4.5.3.2 Long-Term Actions

Monitor Aquifer Conditions: Establish a program of long-range monitoring of aquifer recharge and water levels as affected by climate change. Assess risk of saltwater intrusion. Establish models to assess source redundancy in extreme drought events.

Green Infrastructure: Apply green infrastructure strategies to collect and manage stormwater. Regional or water-shed scale plans for stormwater management can be more cost effective than individual plans.

Water Use Efficiency: Continue to invest in and evaluate WUE programs to reduce water consumption and improve efficiency. Consider partnering with King County to assess reclamation and reuse programs to augment non-potable water demands.

Water Rights: Invest in permanent or mobile infrastructure to ensure access to all available water rights to maximize available sources.

CHAPTER 5

Source Water Protection

The City relies on groundwater sources to meet current water supply demands. This chapter's objective is to update the City of Auburn's (City's) program to protect and improve source water used by the City. As the City's sources only include groundwater wells and springs which are not under the influence of surface water, a Watershed Control Program is not required.

This chapter addresses the following topics:

5.1 Sanitary Control Area
5.2 Wellhead Protection Program

5.1 Sanitary Control Area

Sanitary Control Areas (SCAs) have been established for each of the City's water sources per WAC 246-290-135(2). An SCA is the front-line protection against contamination of the water source. The standard SCA for wells has a minimum radius of 100 feet from the wellhead. The standard SCA for spring sources has a minimum radius of 200 feet from the spring head. All City water sources have SCAs that were established and approved by DOH, and are documented in the susceptibility forms provided in Appendix T. All properties within the SCA for each water source are under the City's ownership and control.

5.2 Wellhead Protection Program

DOH has developed regulations that require Group A water systems using groundwater sources to develop and implement a Wellhead Protection Program (WHPP) in accordance with WAC 246-290-135. The basic elements required of a WHPP are:

- Assessment of initial groundwater susceptibility (physical susceptibility to contamination) for each water supply source,
- Delineation of the wellhead protection area (WHPA) that directly contributes groundwater to each water supply well,
- Identification of potential sources of contamination within each WHPA,
- Documentation of notification to owner/operators of known or potential hazards, and
- Development of spill prevention plans and water contingency plans that minimize or eliminate the possibility of contamination to the groundwater supply and development of options for maintaining water supply in the event the aquifer contributing to a source is contaminated.

The City maintains its WHPP for 12 groundwater sources. A WHPP was prepared in 2014 for the City's 2015 WSP; this remains the current WHPP for the City. The purpose of the WHPP is to help prevent the City's water supply from becoming contaminated and to develop contingency and emergency response procedures in case one or more sources are lost due to contamination. This is accomplished by providing

WHPAs around public groundwater sources, identifying existing groundwater contamination sources, and managing potential groundwater contamination sources prior to their entry into the drinking water system.

The WHPP provides tasks for the City to implement wellhead protection and the City prioritizes those tasks by criteria such as available staff, time to complete, cost, and urgency due to limited available resources. The City maintains an annual operating budget for implementing tasks related to the wellhead protection program, as well as identifying and monitoring potential new hazards. The City allocates budget annually for the Water Resources Protection Program, as discussed in **Chapter 8.**

5.2.1 Susceptibility Assessment

Susceptibility Assessment Forms have been completed by the City and submitted to the DOH. The forms are provided in **Appendix T**. The DOH's susceptibility assessment rating for each source is summarized in **Table 5-1.**

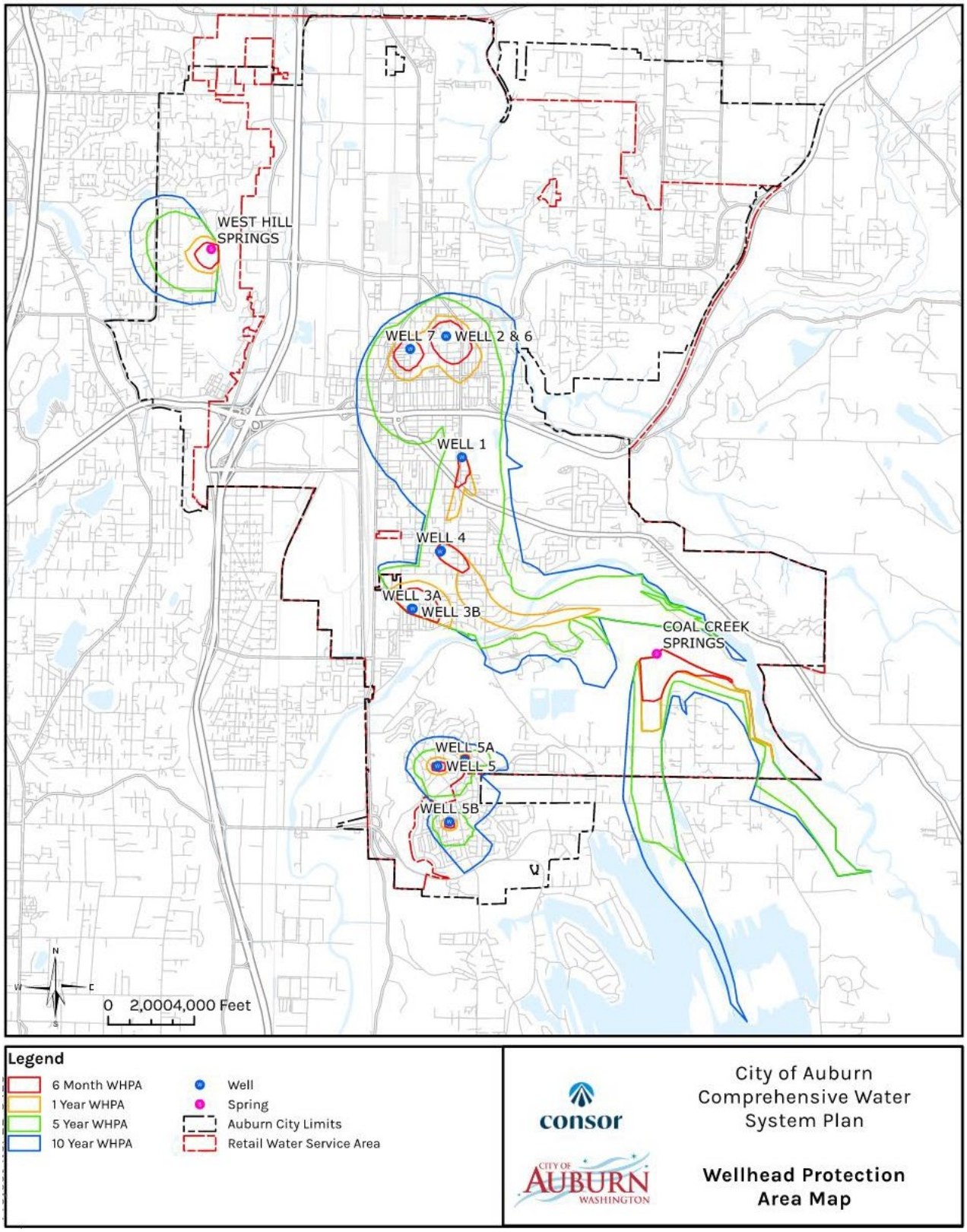
Table 5-1 | Source Susceptibility Assessment Ratings Issued by DOH

Source	Susceptibility Rating
Coal Creek Springs	High
West Hill Springs	High
Well 1	Moderate
Well 2	High
Well 3A	Low (Off-line)
Well 3B	Low (Off-line)
Well 4	Low
Well 5	Low
Well 5A	Low
Well 5B	Low (Off-line)
Well 6	High
Well 7	High (Off-line)

5.2.2 Wellhead Protection Area Delineation

The WHPA defines the area around a groundwater source that has the potential to contaminate the source. This area is based on the source's capture zones, which are the zones of the source aquifer and ground surface that can contribute water to the source in six months, one year, five years, or ten years. The City's 2014 WHPP largely replaced the initial plan created in 2000. The study area, physiographic settings, and WHPAs were defined in the 2000 WHPP and remain valid. Capture zones were delineated using a three-dimensional particle-tracking program with a steady-state head distribution created by a numerical model. The established WHPAs are shown in **Figure 5-1.**

Figure 5-1 | Wellhead Protection Area Map



5.2.3 Contaminant Source Inventory and Notification of Findings

A summary of potential contaminant sources for the City's water sources was updated in April 2024. The Contaminant Source Inventory (CSI) was updated utilizing Ecology's Facility/Site ID database. The contaminant sources are organized by water source and time travel zones, and are included in **Appendix T**.

DOH requires notifications be sent to landowners with potential contaminant sources, as well as state and local agencies, of the CSI findings. Letters and WHPA maps were mailed to landowners in June 2024; copies of the notification letter template and maps that were sent to landowners are included in **Appendix T.**

State and local agencies use the CSI findings and WHPAs to help prioritize local and state pollution control outreach, to provide incentives to landowners for risk reduction, and to support local land-use planning decisions. DOH requires that state and local emergency responders be notified of the WHPAs, results of the susceptibility assessment, CSI findings, and the contingency plan. Copies of the notifications sent to emergency responders and regulatory agencies, as well as the WHPA maps, are included in **Appendix T**. A list of state and local agencies that were sent notifications letters, along with the date of the notification is summarized in **Table 5-2**.

Table 5-2 | State and Local Agencies Notified of CSI Findings

Agency	Notification Date
Washington Department of Ecology	June 2024
Washington State Department of Health Southwest Regional Office	June 2024
King County Public Health	June 2024
Auburn Police Department	June 2024
East Pierce Fire and Rescue	June 2024
King County Fire Protection District 31	June 2024
Mountain View Fire and Rescue	June 2024
South King Fire and Rescue	June 2024
Valley Regional Fire Authority	June 2024

5.2.4 Contingency Plan

The City developed a Water Source Loss Mitigation Plan (City of Auburn Standard Operating Procedure 5.2.1) to address how the water system will provide consumers with adequate supply of potable water in the event one or more sources become temporarily or permanently unavailable; this plan is included in **Appendix T**. Should one water source be unavailable, the City has sufficient capacity across the remaining sources and interties to supply potable drinking water to its customers; water supply availability is evaluated in greater detail in **Chapter 3**.

CHAPTER 6

Operations and Maintenance Program

This chapter provides an overview of the City of Auburn's (City) Water Utility organization, operations and maintenance (O&M). The purpose of the chapter is to document existing procedures and to identify areas where improvements or changes could enhance system operation.

The following topics are addressed in this chapter:

6.1 Water System Management and Personnel
6.2 Operations and Preventive Maintenance
6.3 Comprehensive Water Quality Monitoring
6.4 Emergency Preparedness and Response
6.5 Safety Procedures
6.6 Cross Connection Control Program
6.7 Sanitary Survey Findings
6.8 Customer Complaint Response Program
6.9 Recordkeeping and Reporting
6.10 Summary of O&M Deficiencies and Recommended Improvements

6.1 Water System Management and Personnel

6.1.1 Mission Statement

The mission statement of the City's Water Utility is to provide for the efficient, environmentally sound, and safe management of the existing and future water system within the City's service area.

6.1.2 Department Overview

The Water Utility is responsible for providing potable water to the City's customers that meets or exceeds the recognized standards of today and the future by efficiently administering, operating, and maintaining the water supply. The Water Utility will also continue to enhance its customer service through public education and information. A primary responsibility of the Water Utility is implementing the Comprehensive Water Plan (Plan).

6.1.3 Internal and External Factors

The objective of the Water Utility is based on compliance with internal and external factors. An internal Work Plan Overview is generated at the beginning of each work year with a review process at the end of the year. The Work Plan Overview describes budget goals, performance measures, engineering tasks,

capital projects, and maintenance and operations tasks. External factors include adoption of goals, recommendations, and standards established by the following regulatory or professional practice agencies:

- Washington State Department of Health (DOH)
- Washington State Department of Ecology (Ecology)
- American Public Works Association (APWA)
- Association of Washington Cities (AWC)
- Department of Homeland Security (DHS)
- American Water Works Association (AWWA)
- Washington Cities Insurance Authority (WCIA)
- Municipal Research and Services Center of Washington (MRSC)
- United States Environmental Protection Agency (USEPA)

6.1.4 Water Utility Division Organization

The Auburn Water Utility is operated as a utility enterprise under the direction of the Public Works (PW) Director. Specific Water Utility Management Responsibilities within the PW Department fall under either the Utilities-Water Section of Engineering Services or the Water Division of Maintenance and Operations Services.

The Utilities-Water Section of Engineering Services is responsible for comprehensive water system planning, development of a Capital Improvement Program (CIP), as well as programming the design, construction, and inspection of projects related to the water system.

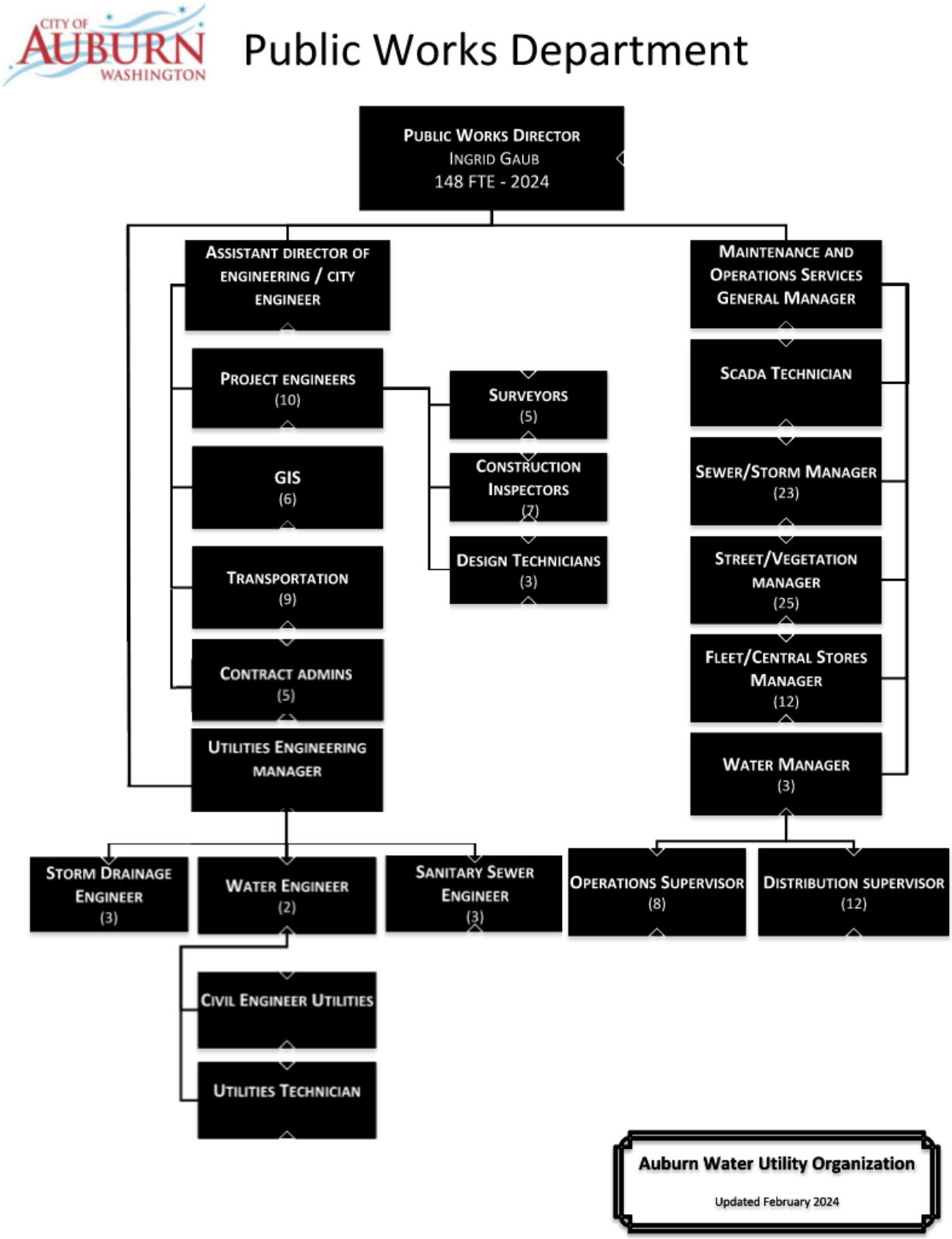
The Water Division of Maintenance and Operations Services is responsible for operating and maintaining the water system, performing daily operation and inspection, water quality monitoring as required by DOH, and line management of the Water Utility.

The organization of the Water Utility is shown within the Public Works Organizational chart in Figure 6-1. The responsibilities of each staff within the Utilities-Water Section of Engineering Services, including professional and technical support staff from within Engineering Services that are not specifically within the Water Utility are summarized below.

- Utilities Engineering Manager and Water Utility Engineer: Primarily responsible for development of the comprehensive water plans, water capital facility plan, annual project budgeting, technical design, and construction standards, "as-built" drawings, and designs, utilized in the construction of the water systems facilities. They also provide technical computations, water modeling and other analysis required to support system operation. Additional responsibilities include engineering, consultant contracts, capital projects planning, and customer assistance with City code, drawings, and permits.

- Water Quality Programs Coordinator: Assist with the Water Quality and Water Conservation Programs and is responsible for compiling DOH sampling data and verifying DOH sampling was conducted per the sampling schedule.

Figure 6-1 | Auburn Water Utility Organizational Chart



- City Engineer: Responsible for issuance of the City's Design and Construction Standards. Responsible for the management and the design and construction of capital projects managed by Project Engineers, including consultant-designed projects and construction contractors. Under the direction of the City Engineer, GIS Specialists are responsible for the transfer of data from "as-built" drawings to the GIS database. GIS is a mapping software that records and locates infrastructure related to the water system. GIS Specialists are also responsible for provision of maps and statistics to staff within the PW Department.

- Utilities Technician: Assist with certain permit-related activities involving the water system. The Technician is also responsible for customer inquiries, assistance with applications, tracking water system usage for reporting, and updating and updating water system records.

- Utilities Civil Engineer: Review City capital improvements and development projects pertaining to water system improvements and provides customer assistance regarding projects and permit activities.

Personnel lists for Engineering and Maintenance and Operation (M&O) staff that are responsible for daily operations are summarized in Table 6-1 and Table 6-2. Operations staff provide daily O&M of wells, corrosion control treatment facilities, pump stations, and reservoirs. They also implement the cross connection control program and provide locating services for all City utilities. Distribution staff maintains the complete distribution system including water mains, valves, hydrants, pressure reducing stations, and meters.

The City has a mayor-council form of government; therefore, the PW Director reports to the Mayor. The City Council provides oversight of the Water Utility regarding policy, planning, and management of the water system.

6.1.5 Communication System

The City maintains a robust communication system to contact Water Utility personnel during normal work hours and after hours. This system is necessary to respond to customer requests, routine maintenance, or emergency situations. Maintenance staff vehicles and other rolling stock are all equipped with radios and personnel carry cellular phones. The Water Utility also has access to an inventory of portable emergency use radio units, should they be required.

A Standby Call-Out Program was initiated in 2006 to ensure that coverage for after-hours response was guaranteed. One staff member in Operations and one staff member in Distribution always carry a dedicated cell phone during their off hours. Standby duration runs for one week before responsibility is rotated to the next staff member on the roster.

Water problems involving service leaks, quality issues, main breaks, broken hydrants, etc., that occur outside normal working hours, are reported through the City's 911 emergency response system. An "Emergency Call-Out List" is provided to the emergency operators who will attempt to contact the designated standby Water Distribution or Water Operations employee, based on the type of service required. If contact cannot be made, the operator will contact the designated Standby Public Works Maintenance and Operation Manager.

Table 6-1 | Water Operations and Distribution Staff and Certifications

Position	Primary Function(s)	Certification(s)[1]
Water Manager	Management	Water Distribution Manager 4
Water Operations Field Supervisor	Management (Operations)	Water Distribution Manager 4, Water Treatment Plant Operator 1, Cross Connection Specialist
Water Distribution Field Supervisor	Management (Distribution)	Water Distribution Manager 3
Maintenance Lead (Distribution)	Management (Distribution)	Water Distribution Manager 2
Cross Connection Control Specialist	Cross Connection Control & Backflow Assembly Tester	Water Distribution Manager 1, Cross Connection Specialist, Backflow Assembly Tester
Distribution Specialist	Distribution Operations Maintenance	Water Distribution Manager 1
Maintenance Worker II / Locator	Operations & Distribution Maintenance	N/A
Maintenance Worker I	Operations & Distribution Maintenance	N/A

There are 12 staff members on the On-Call Manager Standby List and one of them has call-out responsibility for an entire week until it rotates to the next staff member. The 12 staff positions on the Standby List are:

- Water Manager
- Water Distribution Supervisor
- Water Operation Supervisors
- Sanitary Sewer and Storm Drainage Manager
- Sanitary Sewer Supervisor
- Storm Drainage Supervisor
- Streets and Vegetation Manager
- Street Supervisor
- Vegetation Supervisor
- Fleet/General Service Manager
- Maintenance & Operations (M&O) Support Supervisor
- M&O Services General Manager

There are also three other maintenance staff members on standby that can be called out as needed. The staff members are employed by Sanitary Sewer Division, Storm Drainage Division, and Street Division. The 911 operator also has phone access to the other Public Works staff, if the situation warrants it.

Telemetry alarms that occur after hours are handled by an automated Supervisory Control and Data Acquisition (SCADA) alarm and an automated dialer for notification called WIN911. The SCADA alarm calls standby staff from the WIN911 list. If no one responds within 15 minutes, then WIN911 calls the Water Operations standby staff on the call out list. The system will continue to cycle through the roster of seven employees until contact is made.

6.1.6 Operator Certification Program

The Washington Administrative Code (WAC) 246-292, requires minimum standards for the certification status of water operators. Also, the City has recognized the value of having a knowledgeable and well-trained staff operating the Water Utility and encourages employees to obtain the highest level of certification available. The City currently serves a population of greater than 50,000, which classifies their

distribution system into a group 4 according to WAC 246-292-040. Certifications required per staff role are summarized in Table 6-1.

The City pays for annual certification fees, provides time and tuition for certification training courses, and allows time for certification examinations. In addition, the City provides opportunities for staff to obtain continuing education units (CEUs) to maintain certification. Professional growth requirements for certification CEUs are monitored and maintained by the Washington Certification Services.

6.1.7 Education and Training Program

Continuing educational opportunities are fundamental for staff in the Water Utility. The Water Utility training budget is funded to support staff in maintaining their technical awareness and skill sets. Seminars, conferences, and college coursework: 1) broaden their knowledge and 2) allow them to network with other professionals involved in Water Utility work. Subjects include cross connection control, pumps, motors, pressure reducing valves, hydrants, chlorination, generators, forklift training, confined space, first aid, CPR, electrics, and other essential topics.

Most staff are tasked with specific job functions during their normal work shift and the consistent nature of the work allows them to complete their jobs in a very professional and efficient manner. However, all staff are rotated through an active cross training program to cope with employee absences such as vacation, sickness, retirement, and termination.

6.2 Operations and Preventive Maintenance

The City's water system is comprised of pump stations, chlorination stations, corrosion control facilities, reservoirs, springs, and wells. Figure 1-3 presented in Chapter 1 provides an overview map of the major existing system facilities. These components all work together to ensure that water is available to meet customer demands. Primary operation of the water system is maintained via the SCADA computerized control system. AVEVA software works in association with SCADA to provide real time graphical display of system data for staff interpretation and control. The SCADA system is often referred to as the Telemetry system based on one of the definitions of Telemetry (the science and technology of the transmission and measurement of data from a distant source). The City's SCADA system is monitored in the Public Works M&O Building, 1305 C Street SW, and responsibility for the system related to the Water Utility falls under the Water Manager and associated staff.

Some of the functions that SCADA monitors, records, and controls include:

- Reservoir levels
- Source meter production
- Pumps
- Motors
- Valves
- Chlorination
- Pressures: Low, High, Discharge, Suction
- Alarms: Intrusion, Fire, Generator Run, Low Fuel, Overflows, Failures, Turbidity

Status reports are continuously received via radio and information regarding system demand is used to determine system activation. The SCADA system includes logic programming which automates the process; however, Operations staff can manually override most computer decisions, if necessary. The alarm infrastructure is linked to WIN911 for after-hour call-out and response.

All data monitored by the SCADA system is electronically recorded by a computer server maintained by the Innovation & Technology (IT) Department. A back-up copy is made each evening to ensure that records are retrievable should hardware or software failures occur. SCADA records are available to all PW staff via the City's computer server. Access and control of the system is relegated to two dedicated computer terminals at the M&O Building. The computer terminal that houses SCADA is password protected and entry into the building is keycard access controlled.

The SCADA software and historical data is maintained on the City's Wide Area Network (WAN). Staff have access to the system via workstations connected to the WAN or remote network applications. A telephone connection provides the auto-dialer for the WIN911 notification to phones or pagers. An Ethernet radio connected to the computer system at the M&O Building sends and receives radio signals to/from the Programmable Logic Controllers (PLCs) at the water facilities. PLCs at the facilities are also able to communicate directly with each other via radio signal.

The City recently completed a SCADA Upgrade Project, completed in 2024, which updated the system platform to the most current version, modernizing the City's SCADA system from its last major upgrade in 2015. Major components were also replaced throughout the system to provide more reliable communication. The new hardware, in conjunction with software upgrades, provides additional control of the city's facilities.

6.2.1 Inspections, Preventive Maintenance, Repairs, and Replacement

Systematic inspection of Water Utility facilities is conducted on a daily or weekly basis by Distribution Specialists under direction of the Water Operations Supervisor as summarized in Table 6-2. The inspection process serves the following purposes:

- System Confirmation - proper operation of automated control and monitoring equipment
- Sound Check - listen for unusual noises
- Well Levels - static and dynamic
- Equipment Check - pumps, motors, valves, chlorination, heaters, vents, generators, etc.
- Security Verification - intrusion, vents, hatches, locks, gates, graffiti, etc.

A portion of the maintenance tasks handled by the Operations staff are associated with a Preventive Maintenance Program and some of those activities are arranged to coincide with the Facility Inspection Schedule shown in Table 6-2. The maintenance activities are based on equipment manufacturer recommendations and maintenance staff observations for infrastructure located within and outside the facility. Preventive maintenance tasks are essential for reliable operations and preservation of investment so adherence to the program is stressed. Additional maintenance activities handled by Water Operations staff include repairs, replacement, small improvement projects, and response to customer requests.

The Distribution staff is involved in the same activities as Water Operations staff regarding inspection, preventive maintenance, repairs, replacement, and response to customer requests. Water Distribution staff activities are usually in response to damage or leaks involving mainlines, service laterals, meters, meter boxes, and hydrants. Other Distribution tasks include fire flow testing, system flushing, meter installation, and miscellaneous small improvement projects.

Most customer requests are associated with water quality concerns and water pressure issues. Those requests are handled by the Distribution staff and/or Cross Connection Specialists, on a case-by-case basis.

Table 6-2 | Water Operations - Facility Inspection Schedule

Type of Facility	Facility Name	Daily Inspection 5 Day Workweek	Weekly Inspection
Booster Pump Station	Academy Pump Station 3	X	
	Academy East Booster Pump Station	X	
	Green River Pump Station	X	
	Lea Hill Pump Station	X	
	Lea Hill Booster Pump Station		X
	Lea Hill Intertie Booster Pump Station	X	
	Terrace View Booster Pump Station	X	
	Lakeland Hills Booster Pump Station	X	
	Game Farm Park Pump Station		X
	Braunwood Booster Pump Station	X	
Chlorination Facility	Lea Hill Intertie Pump Station (Re-chlorination)	X	
	Terrace View Booster Pump Station (Re-chlorination)	X	
	Coal Creek Springs – Chlorine Gas	X	
	West Hill Springs - Chlorine Gas	X	
	Well 1 – Hypochlorite	X	
	Well 3A – Chlorine Gas (when well is in operation)		Off-line
	Well 3B – Chlorine Gas (when well is in operation)		Off-line
	Well 4 - Hypochlorite	X	
	Fulmer Field Corrosion Control Facility – Onsite Generated Hypochlorite (Treats Well 2, 6, and 7 sources)	X	
	Well 5A - Hypochlorite	X	
	Braunwood Well - Hypochlorite	X	
Corrosion Control Facility	Howard Road Corrosion Control Treatment Facility (Treats Coal Creek Springs source)	X	
	Fulmer Field Corrosion Control Treatment Facility (Treats Well 2, 6 and 7 sources)	X	
Metals Removal Facility	Well 5B (Treats iron and manganese)		Off-line
Reservoir	Reservoir 1 – Valley Service Area	X	
	Reservoir 2 – Valley Service Area	X	
	Reservoir 4A – Lea Hill Service Area	X	
	Reservoir 4B – Lea Hill Service Area	X	
	Reservoir 5 – Lakeland Service Area	X	
	Reservoir 6 – Lakeland Service Area	X	
	Reservoir 8A - Academy Service Area	X	
	Reservoir 8B - Academy Service Area	X	
	Braunwood Reservoir	X	
Spring Source	Coal Creek Springs	X	
	West Hill Springs	X	

Type of Facility	Facility Name	Daily Inspection 5 Day Workweek	Weekly Inspection
Well Source	Well 1	X	
	Well 2	X	
	Well 3A (Off-line)		Off-line
	Well 3B (Off-line)		Off-line
	Well 4	X	
	Well 5	X	
	Well 5A	X	
	Well 5B (Off-line)		Off-line
	Well 6	X (when on)	X (when off)
	Well 7 (Off-line)		Off-line
	Braunwood Satellite Well	X	
Intertie Supply	Tacoma B Street Intertie		X
	Tacoma 132nd Avenue Intertie		X

6.2.2 Reservoir Maintenance

Reservoirs are a fundamental part of the water distribution system. They act as storage and regulating devices for water flow and maintaining them in prime physical condition is an essential activity. The Water Utility began a rigorous reservoir maintenance program in 1997 and it has evolved into an annual routine function. Each year, two of the reservoirs have their interiors thoroughly inspected by a contractor experienced in reservoir maintenance. The annual inspection process is based on a rotational schedule to ensure inspection of each reservoir on a 5-year timetable.

Since the reservoirs are usually filled with water, a diver must conduct the inspection. The diver is equipped with lights and an audio/video device to record the process. Issues of concern include corrosion, cracks, and condition of coating on the walls, valve, fasteners, etc. The diver is also equipped with a vacuum unit to remove sedimentation. The contractor also performs a visual inspection of the exterior of the reservoir for the same elements noted for the interior. The recording is reviewed by the contractor, a report is generated based on the interior and exterior inspection and a copy of the report and recording are given to the Water Manager and Water Utility Engineer for review.

If the report and recording indicate that a reservoir needs major repair, relining, or repainting, another contractor is acquired for a recommended course of action. If interior work is required, the reservoir must be drained of water. In those situations, a carefully orchestrated timetable and shifting of water resources is necessary to balance maintenance with the needs of the City's customers.

6.2.3 Pump Station Maintenance

Pump Stations are inspected daily or weekly depending on the station by Water Operations staff. The inspection checklist includes confirming that proper operation of the automated controls and monitoring equipment align with the standard operating procedures for the equipment, sound checks for unusual noises, static and dynamic well level checks, equipment checks (pumps, motors, valves, chlorination, heaters, vents, generators, etc.), security checks through visual inspection of the facility grounds for

intrusion, graffiti, or issues with vents, hatches, locks, gates, and anything else that may seem unusual or misaligned.

6.2.4 Treatment Facility Maintenance

Treatment Facilities are inspected daily by Water Operations staff. The inspection checklist includes confirming that proper operation of the automated controls and monitoring equipment align with the standard operating procedures for the equipment, sound checks for unusual noises, equipment checks (pumps, motors, valves, chlorination, heaters, vents, generators, aeration towers, etc.), security checks through visual inspection of the facility grounds for intrusion, graffiti, or issues with vents, hatches, locks, gates, and anything else that may seem unusual or misaligned.

6.2.5 Pressure Reducing Valve Stations

Pressure Reducing Valve (PRV) Stations are inspected every month by Water Operations staff. The inspection checklist includes condition of the vault, valves, inlet pressure, outlet pressure, and pilot controls. Staff inspections are supplemented by a more thorough inspection and calibration process conducted annually by a contractor that specializes in PRVs. Repair or replacement maintenance, unless minor, is usually performed by the contractor. The City plans to implement an in-house repair maintenance program.

Rebuilds of PRVs are typically done every three to five years based on the rebuild schedule.

6.2.6 Utility Locating Service

Two Water Utility staff are designated as the Utility Locators for all City utilities and roadway infrastructure (Water, Storm Drainage, Sanitary Sewer, and Street lights and traffic signals) and additional staff may also be present to provide flagging when safety issues arise. The number of location requests varies daily but averages out to a full-time commitment. The Utility Locators report to the Water Operation Supervisor, but location requests may be made indirectly by the Water Distribution, Sanitary Sewer, or Storm Drainage Supervisors.

6.2.7 Fire Hydrant Inspection

In 1999, a fire hydrant inspection goal was initiated. The intent was to inspect, repair, and test at least one third of the utility owned fire hydrants in the system each year. The importance of this program cannot be understated since fire hydrants are the first defense against loss of life or property due to fire. The inspections also improve water quality due to the stagnant water that is purged from the hydrant stubs. A water de-chlorination program, in response to Ecology guidelines, was initiated in 2001 to treat water purged from hydrant stubs. The Water Distribution Supervisor has made public hydrant inspection a year-round routine task of Water Utility operations. Secondary maintenance of public hydrants such as rust removal, painting, street reflector replacement, clearing obstructions, etc., is handled by seasonal part time staff when time permits. Property owners with private hydrants are solely responsible for obtaining annual, satisfactory inspections of their private hydrants from a qualified inspector.

6.2.8 Dead-end Flushing

A key component of water quality control is dead-end line flushing. The City has approximately 548 dead-end mains throughout the distribution system. The water in dead-end mains tends to stagnate due to lack of turnover which can have an impact on water quality for customers in the immediate vicinity. Flushing dead-ends is the only effective way to purge the lines of stagnant water and associated particulate matter.

In 2000, an engineering consulting firm was hired to assist the City with the development of a Dead-end Flushing Program. They examined the City's distribution system via GIS data and supplemented the study with field inspections. A comprehensive operating procedure detailing separate flushing instructions for each dead-end was developed and continues to be used today.

Maintenance staff, under the direction of the Water Distribution Supervisor, follow the program instructions and record their activities. This program has been incorporated into the Unidirectional Flushing program, see Section 6.3.8.

6.2.9 Valve Exercising

The AWWA technical manual *M44 Distribution Valves: Selection, Installation, Field Testing, and Maintenance*, suggests that valve exercising should be conducted each year and more frequently for valves 16 inches and larger.

The Water Utility has a Valve Exercising Program, which is in concert with the Unidirectional and Dead-end Flushing programs. Historically, distribution valves have only been exercised on a limited and sporadic basis. Through the Valve Exercising Program, the City's goal is to exercise 25 percent of the distribution valves each year. Hydrant foot valves are not included in the valve exercising program and instead, are exercised as part of the hydrant inspection process.

Opening and closing valves by hand is a repetitive, ergonomically unsafe, and time-consuming task. The City has purchased a portable valve exercising machine and vacuum device to speed up removal of debris that collects in the bottom of valve boxes. Valves requiring repair or replacement are documented and corrected by City Staff or contractors.

Additionally, Distribution staff work with GIS staff to correct inaccurate valve information in the City's GIS data.

6.2.10 Unidirectional Flushing

In 2013, the City implemented a comprehensive Unidirectional Flushing (UDF) program to flush its water system. The program's goals include:

- Improving cleaning of accumulated deposits on pipes,
- Reducing water use, as compared with conventional flushing, and
- Reducing the impact on customers.

The Water Distribution Supervisor is responsible for the UDF program to maintain Water Quality.

The UDF process concentrates flow within a pipe by closing valves and using specific hydrants to isolate each pipeline and create flow in a single direction. The concentrated flows increase velocities within the pipe that results in scouring of accumulated deposits on pipes. UDF may remove sand, gravel, plastic, biofilms, and other accumulated materials that are not removed by conventional flushing. The cleaned mains may have improved water clarity or color, reduced turbidity, and improved chlorine residual.

Flushing times of a half hour or less are typical, which can equate to substantial water savings. Therefore, UDF is a key component of the City's Water Use Efficiency (WUE) program. The reduced flushing time also limits the impact on the Water Utility's customers.

As previously mentioned, the City has incorporated the valve exercising and dead-end flushing programs into the UDF program. Valves not used as part of a flushing sequence along each pipe length are exercised by distribution system staff to complete the Valve Exercising Program. While the UDF program flushes dead-end mains, more frequent dead-end main flushing may be required for water quality reasons. The UDF program also provides static pressure measurements.

The City's goal is to conduct UDF of approximately 20 percent of the system each year.

6.2.11 System Loss Program

The City has committed to an active System Loss Program to maintain water loss under 10 percent. The achievement is documented each year in the Distribution System Leakage Report. Elements of the Program include Leak Detection, Source Meter Calibration, Large Meter Testing, and Meter Replacement. Each of these is discussed in detail below.

6.2.11.1 Leak Detection

The City is committed to a tight, non-leaking water distribution system. As of 2016, the city implemented an in-house Leak Detection program, with a goal to inspect 90 miles of water main every year.

6.2.11.2 Source Meters

Source meters, also known as production meters, measure the amount of water emitted from the City's springs and wells. They are calibrated by an outside contractor under the direction of the Water Operations Supervisor and if a meter cannot be calibrated properly, it is replaced with a new one.

6.2.11.3 Meter Replacement Program

Between 2017 and 2018, the City replaced all service meters with an Automated Metering Infrastructure (AMI) system, under the Water Meter and Billing System Improvements project. The system automatically receives meter reads via radio transmission and integrates the data into the City's billing software. The benefits of an AMI system include increased accuracy and efficiency; early leak detection; high usage, zero usage, and backflow detection; and improved customer service. This has saved staff time associated with regular meter reading, missed or incorrect reads, final reads for customer account close-out, and confirmation of high reads for potential leaks. An optional interactive customer portal allows customers to view their monthly, daily, and hourly usage to see exactly when they are using water and how much. This allows customers to better understand their water usage, encourages conservation, and potentially saves them money.

The AMI system is anticipated to have a 20-year life. That includes the system components and batteries in the radios. Meter replacement will be on a 20-year program to coincide with the AMI system.

6.2.11.4 Meter Services

Water Distribution staff are responsible for all new service connections under three inches and contractors are usually secured for installation of sizes three inches and larger. Repairs, retrofits, or replacements of existing services are typically conducted by Water Distribution Staff unless unusual circumstances arise. Meter services consist of meters, meter vaults, meter boxes, service lines, valves, setters, and other associated equipment. The City uses master meters when beneficial to the City and its customers. Master meters are currently used at several mobile home parks, the Auburn Business Park, and Muckleshoot Indian Tribe (MIT) commercial properties.

6.2.11.5 Large Meter Testing

Large meters are devices that measure water consumed by customers with significant demand requirements. They are usually employed by the following customer classes:

- Commercial
- Farms or Parks – Irrigation
- Schools
- Multifamily Complexes
- Industrial / Manufacturing Businesses
- Wholesale Customers
- Municipal Buildings

Large meters are defined as water meters three inches or larger. The system contains a total of 151 large meters, all of which are calibrated annually, as part of the City's System Loss Program.

Calibration of large meters is conducted by an outside contractor, but one maintenance staff member under the direction of the Water Distribution Supervisor assists in the process. If a meter cannot be calibrated, it is replaced with a new one.

6.2.12 Distribution System Corrosion Inspection

One program that the Water Distribution Division would like to activate, if additional funds and labor resources are available, is a Distribution System Corrosion Inspection program. A significant percentage of the City's piping system is constructed of metal which is subject to corrosive deterioration. Corrosion is an electrochemical reaction whereby metal is eroded and reduced. It is not possible to stop corrosion of metal pipe, but it can be substantially reduced if proper anti-corrosive measures are taken.

The Distribution System Corrosion inspection will identify which pipes can benefit from corrosion resistance measures, resulting in a longer serviceable life. Popular measures taken to resist corrosion include coatings, poly-bagging, and anode packs, and they are described further below:

- Coatings are electrical insulator types of finishes applied to a surface and is the most common method of corrosion protection. Though coatings are common, they are subject to damage and decay. Damage from soil stress such as contraction and expansion can rip coatings from pipes. Pinholes in the insulation, also known as holidays, can allow seepage between the coating and pipe and accelerate corrosion. Penetration of the pipe occurs even more rapidly when pinholes are present than it would on a bare line.

- Anode packs are metal cylinders that are connected to a metal structure via electrically conductive wires and inserted into the ground adjacent to the structure. The ground is subject to stray electric currents and these currents are the electrical component of the electrochemical nature of corrosion. Anode packs become the sacrificial metal to corrode in lieu of the structure. This type of treatment, when initiated, provides benefits in two ways: 1) it could save substantial amounts of money by reducing unnecessary, early replacement of pipe and 2) it would reduce possible disruptive service to the City's customers that could occur if pipe replacement were necessary. Though anodes packs are effective and economical, their current capacity is limited and they typically have a short lifespan.

- Poly-bagging is the process of wrapping the exterior of buried water mains and appurtenances, typically under the influence of corrosive soils, with polyethylene, creating a protective layer around the mains and appurtenances. Poly-bagging is an effective method for corrosion protection of water mains and they are resistant to tearing or puncturing. Though economical, they are not as environmentally friendly and add another layer to maintenance activities.

6.3 Comprehensive Water Quality Monitoring

The Water Operations staff maintains an active and ongoing program of water quality monitoring and reporting to ensure a safe, high quality water supply. Two staff members are responsible for water quality monitoring, sampling, control, and record keeping. The Water Operations staff also receives assistance from the Engineering Services - Water Quality Program Coordinator. A detailed description of the City's water quality monitoring and results is presented in Appendix Q, which includes the following:

- Summary of the City's water quality monitoring programs.
- Summary of recent water quality testing results.
- Summary of the Wholesale Interties Blending Evaluation.

The City's Water Quality Monitoring Program is detailed in a manual entitled "City of Auburn Public Water System Water Quality Monitoring Plan" provided in Appendix O. The document includes plans associated with coliform, lead and copper, disinfection by-products and treatment specific monitoring, and the Water Quality Monitoring Schedule. These plans comply with DOH regulations for Group A public water systems. All sampling is conducted in accordance with the annual Water Quality Monitoring Schedule received from DOH. The City samples for inorganic and physical parameters, synthetic and volatile organic compounds, asbestos, nitrate and nitrite, radionuclides, coliforms, residual chlorine, disinfection byproducts, lead and copper, fluoride, and per and poly-fluoroalkyl substances (PFAS). A map of the sampling locations is included with the documents provided in Appendix O.

Additional sampling also occurs based on special requests by DOH or by customers concerned about water quality issues involving unusual taste, odor, or color.

The Water Manager maintains hard copies of the water quality analysis laboratory reports. These reports are kept at the M&O Building in files organized by years and analysis type. As specified by DOH regulations, chemical analysis reports are kept indefinitely, and bacteriological reports are maintained for a minimum of five years.

The City will comply with the Follow-Up Action Requirements of WAC 246-290-320 whenever water quality results exceed a prescribed level. The Water Utility also complies with the requirements of WAC 246-290 for public notification, as established by the Safe Drinking Water Act (SDWA) and DOH.

Forms for "Water Boil Notification" and "Drinking Water Problem Corrected Notification" have been developed and are available for immediate distribution, if necessary. A list of the appropriate print, TV, and radio media to contact for public notice is included in the electronic Emergency Response Manual. An additional procedure described in the Emergency Response Manual to address water quality issues involves an "Action Plan for Water System Contamination Via Threat Warning."

The City maintains equipment to perform some basic water quality monitoring functions. However, all testing required for water quality regulatory compliance is contracted to independent testing laboratories. The current primary laboratory used by the City is:

Water Management Laboratory
1515 80th Street East
Tacoma, Washington 98404
206-531-3121

If testing cannot be done on a timely basis, the City also uses the following laboratory:

Analytical Resources, Inc.
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200

6.4 Emergency Preparedness and Response

The City has prepared an electronic Public Works Emergency Response Manual (Manual) as a guide for management of emergency situations, with the objective of protecting life and property and restoration of essential services, such as providing clean water, as quickly as possible. The Manual is only one element of the City's overall Emergency Response Plan, which serves as a guide and was first developed in 1999 in response to the potential impact of Y2K. The Emergency Response Plan is updated annually at the first of the year. It is not all-inclusive for every type of disaster that could occur but is a valuable tool for dealing with many of the emergency situations that most utilities could face.

The Manual contains a detailed table of contents and is tabbed to allow quick access to information. Three copies of the Manual have been published. Copies are located at the M&O Building, in Engineering Services with the Public Works Director, and at the Valley Regional Fire Authority, Station 31. The Manual is also available in digital format on the City's computer server.

The master response program for the entire City is documented in the Comprehensive Emergency Management Plan (CEMP), which provides guidance to the Emergency Management Organization for mitigation, preparedness, responsibilities, recovery operations, training, and community education activities. The CEMP also describes the functions of local government and incorporation of essential non-governmental organizations into the Emergency Management Organization. Copies are in each City Department, the Public Works M&O Building, and the Valley Regional Fire Authority, Station 31. The CEMP is also available in digital format on the City's Emergency Operation Center (EOC) computer server.

An additional emergency response manual that is available for use is the Water Division Intertie Locations and Policy Manual. This manual contains contact names, addresses, and phone numbers for cities and water districts that have intertie connections with the City. Included are photos of the intertie vaults, valves, and meters, along with information for activating or deactivating an intertie. Three copies have been published and are located at the M&O Building, in Engineering Services with the Water Utility Engineer, and at the Valley Regional Fire Authority, Station 31.

The City has been involved with several tabletop exercises to prepare for emergencies and they are an ongoing feature of the City's Emergency Response Program. Staff, depending on their position, have also been trained for emergencies in accordance with the Federal Emergency Management Authority (FEMA)

under the auspices of Homeland Security. The training program, known as the National Incident Management System (NIMS), offers educational classes tailored for the Incident Command System (ICS).

The NIMS and ICS program is a solid blueprint for federal and local emergency command activities, but it does not provide the type of response details needed by PW maintenance staff and managers. Consequently, the PW Emergency Response Manual is the reference tool referred to on a more intimate scale.

6.4.1 Vulnerability Assessment

The City's Vulnerability Assessment (VA) was prepared in 2004 under the guidance of an engineering consultant firm and it was submitted to the USEPA on November 15, 2004. A Water System Security Improvement Plan (WSSIP) was also prepared in conjunction with the VA to prevent or significantly lessen the impact of intrusive activities.

Recommendations noted in the WSSIP have been adequately addressed by completing the SCADA system upgrades and physical security project. As further upgrades are completed at City facilities, the recommendations noted in the WSSIP are considered, as well as other considerations as technology continues to advance.

6.4.2 Wellhead Protection Program

The City's wellhead protection program is key to managing potential sources of groundwater contamination prior to their entry into the drinking water system. The wellhead protection plan (WHP) was updated as part of the Plan and summarized in Chapter 5.

Engineering Services staff are charged with implementation of the program. Staff track and follow up on construction projects, spills, and monitor possible contamination sources, as possible.

6.4.3 Water Shortage Contingency Plan

In Auburn City Code (ACC) 13.14 the Mayor may order water use restrictions and conservation measures, when necessary, to protect public health, safety, and welfare during a water shortage or emergency caused by drought conditions, city water utility damage or destruction, or any other cause which threatens to disrupt or diminish the City's water supply below its ability to meet normal demands.

The City has also updated its Water Shortage Contingency Plan, attached as Appendix R, which establishes actions and procedures during impending or actual water shortages. These actions and activities maintain levels of service essential for public health and safety, minimize adverse impacts on economic activity, and protect customers' lifestyles. The plan addresses both progressive situations, such as those that are weather-related, and more drastic and immediate situations such as facility emergencies (e.g., a pipeline break). Initial stages of the Water Shortage Contingency Plan may coincide with efforts in the WUE program; however, it is distinct as it is a response to a specific situation, and it may lead to mandatory restrictions and curtailment.

6.5 Safety Procedures

The City has a comprehensive safety program that meets Occupational Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Act (WISHA) regulations. The safety policies and procedures for the water department are documented in 25 policies that are summarized in Table 6-3. The

policies cover the full range of hazards staff may experience while operating the water system. These include, but are not limited to, operation of motor vehicles and equipment, chemicals, confined spaces, falls, traffic, and fires. Each policy includes a purpose, organization affected, references, the policy, definitions, procedures to implement the policy, and responsibilities for the implementation. Responsibilities are assigned to individual roles, such as employee, supervisor, or safety manager. The policies and procedures clearly identify contact information of the applicable regulating agencies in case of a serious incident. All policies are available on the City's intranet.

Table 6-3 | Safety Policies and Procedures

Number	Policy Name	Description
300-01	Workplace Health & Safety	Document workplace health and safety policy
300-03	Hearing Conservation	Implement program to protect employee hearing
300-04	Personal Protective Equipment	Establish policy that requires employees to always use personal protective equipment when performing certain tasks or when in an unsafe environment
300-05	Flagger Certification	Flagger certification requirements
300-06	First Aid	Employee first aid training, first aid supplies and emergency stations
300-07	Hazard Reporting	Procedure to report an obvious or potential safety or health hazard
300-08	Incident Reporting	Procedures for reporting non-vehicular incidents
300-09	On The Job Injury	Establish policy to monitor on-the-job injuries
300-10	Safety Inspection of City Owned Facilities	Procedure for inspection of all City-owned and operated facilities
300-11	Central Safety Committee	Establish function and structure of Central Safety Committee
300-13	Emergency Evacuations of City Buildings	Procedure for evacuation of City buildings in the event of an emergency
300-14	Safety Restraints & Seat Belts	Requires mandatory use of safety restraints/seat belts while driving or riding in the City vehicles
300-15	Excavation Trenching & Shoring	Establish policy for shoring and sloping all excavations or trenches over four (4) feet in depth
300-16	Safety Line Procedure All Cranes, Backhoes, & Hoists	Procedures for controlling moving loads being hoisted or swinging ground or truck using hoists, backhoes, cranes, or any mechanical device use in moving loads
300-17	Chemical Hazard Communication (Worker Right To Know)	Establish chemical and global hazard communication program to assure the health and safety of City employees
300-18	Welding, Brazing, & Cutting	Procedure for welding, cutting or brazing work or practices which may result in an injury or death
300-19	Lockout & Tagout	Requirements for the lockout or tagout of energy isolating devices
300-20	Bloodborne Pathogens	Procedure to prevent exposure to blood or other substances and materials that may carry bloodborne pathogens. Procedures for decontamination of equipment and evaluation and treatment of employees who experience exposure.
300-21	Reporting Vehicle Accidents	Procedure for reporting vehicle accidents
300-22	Heat Related Illness	Training for potential heat related illness

Number	Policy Name	Description
300-23	Confined Spaces	Procedures for entering a confined space
300-24	Green Housekeeping Guidelines	Procedures that sustain a "Green Cleaning" environment
300-25	Respiratory Protection Program	Procedures that will prevent employees from inhaling hazardous airborne chemicals
300-26	Fall Protection & Rooftop Safety	Procedures for rooftop safety and use of fall protection
300-27	Powered Industrial Trucks	Training, operation, and safety of powered industrial vehicles

In addition to the policies, all M&O staff receive safety training. The contents of the training are periodically reviewed and updated, if necessary, through departmental and city-wide safety committees. The Human Resources and Risk Management Department maintains information and schedules on safety training.

The City maintains appropriate safety equipment and information. Each vehicle and facility have a fire extinguisher and first aid kit. All staff use personal protective equipment, such as hard hats, safety glasses, safety vests, etc., appropriate to the task. Climbing equipment and lockout/tagout equipment is available and stored at the M&O Building and the Well 7 storage facility. Additionally, each site with chemicals has a Safety Data Sheets (SDS) book that contains the Material Safety Data Sheets (MSDS) for all chemicals on site. A master sheet of all chemicals used by the Water Utility is maintained at the M&O Building.

6.6 Cross Connection Control Program

The City's Cross Connection Control Program (provided in Appendix Q) protects the public water system as defined by WAC 246.290.010, WAC 246.290.490, and Auburn City Code (ACC) 13.12 from contamination via cross connection hazards. It describes minimum operating policies, provides guidelines for installation, testing, and maintenance of approved backflow prevention assemblies, permitting process, inspection, and survey requirements for existing and new water service connections. The program is maintained by two Cross Connection Specialists under the direction of the Water Operations Supervisor. The specialists are responsible for identification and elimination of potential and actual cross connections and contamination hazards within the public water system.

6.7 Sanitary Survey Findings

DOH completes periodic inspections of the City's water facilities, their operations, and facility records to identify potential health risks to the public. The sanitary survey, conducted by DOH on August 22, 2022, identified significant deficiencies such as air gaps or backflow assemblies that must be added to the water supply lines at Wells 5 and 5A. Additionally, repair needs were identified for the reservoir overflow screens at Reservoirs 8A and 8B.

DOH identified the need to terminate the pump to waste line at Well 5 above grade and either raise the casing at Well 5A or provide a sump pump or alarms to address potential water accumulation in the vault. Weekly vault inspections, especially after significant storms, were recommended until a permanent solution is implemented.

The survey noted that the reservoir vents at Reservoirs 4A, 4B, and 8A should open downward to prevent debris entry. It also identified a need for evaluation of the overflow piping at Reservoirs 2, 4A, and 4B, to ensure compliance with regulations.

The next DOH sanitary survey is scheduled for 2027.

The City has taken the following actions to address some of the deficiencies identified in the sanitary survey.

- A backflow assembly was installed at Well 5A.
- The reservoir overflow screen at Reservoirs 8A and 8B was repaired on September 13, 2022.
- The City implemented an inspection and maintenance program to conduct weekly inspections at Well 5A and immediately after a significant storm even.
- The direct connections of reservoir overflows (Reservoirs 4A and B to drains, sanitary sewer, and/or storm sewer) have been addressed.

The following deficiencies identified in the sanitary survey will be addressed with ongoing or planned Capital Improvement Projects identified in Chapter 8 and are captured in Section 6.13 as recommended improvements:

- Reservoir vents will be retrofitted or replaced as part of the ongoing Reservoirs 4A, 4B, 8A, and 8B Seismic Valves Retrofit capital project.
- The request for the pump to waste line at Well 5 to terminate above grade will be addressed with a capital improvement project.
- The direct connections of reservoir overflows (Reservoirs 2) to drains, sanitary sewer, and/or storm sewer, will be addressed with a capital improvement project.

6.8 Customer Complaint Response Program

One member of the Water Distribution staff is a Customer Service Representative. This individual is responsible for meter turn-on and turn-off, delinquency notices, meter rereads, new service reads, final service reads, leak adjustments, high consumption investigations, account documentation, and other duties, as assigned. The employee maintains a modified work schedule, which provides more flexibility in dealing with emergency service requests by customers.

Beginning in 2006, the Water Utility, along with the rest of PW transitioned to an asset management software system called CarteGraph. Some of the benefits include:

- Ability to assign and track citizen complaints and requests
- Produce work orders
- Monitor work and maintenance projects
- Track costs for labor, equipment, and material
- Enhanced inventory control
- Integration with GIS
- Benchmark analysis
- Generate reports
- Track infrastructure conditions – GASB 34

The City has a customer service program accessible by the public and City staff via the City's website. Customers fill out the online Citizen Report form and describe the services they are seeking. The submitted form downloads into the CarteGraph system for review and action by staff. In addition, customers can stay connected with the City on mobile devices with a SeeClickFix application. The SeeClickFix app allows customers to report graffiti, abandoned vehicles or potholes, water issues, etc.

6.8.1 Customer Request Response Program

As described above, the CarteGraph system can assign and track customer requests (or complaints) and produce work orders. The City maintains a list of requests and identifies the work done to respond to any requests from the public. The City categorizes the citizen reported issues into the following five categories:

- Water Appearance: contains all requests related to the color of the water (brown, discoloration, cloudy, etc.)
- Odor: contains all requests related to water smell (chemical, sulfur, chlorine smell, etc.)
- Pressure: contains all requests related to change in water pressure (pressure drop, high water pressure, fluctuation in pressure, etc.)
- Taste: contains all requests related to water taste (poor, bitter, strong chlorine taste, etc.)
- Water Quality: contains all requests related to a combination of odor, taste, and discoloration issues.

Customer requests are entered into the CarteGraph or SeeClickFix and a work order is generated. Typically, a Distribution staff member or team will investigate the issue and respond directly to the customer.

A table summarizing the number and type of requests or complaints is provided in Chapter 3.

6.9 Recordkeeping and Reporting

All recordkeeping and reporting practices follow DOH regulations as specified in WAC 246-290-480. The Water Manager maintains hard copies of the water quality analysis laboratory reports. These reports are kept at the M&O Building in files organized by year and analysis type.

Analytical laboratories submit reports directly to DOH. As specified by the regulations, chemical analysis reports are kept indefinitely, and bacteriological reports are maintained for a minimum of five years. Additionally, Construction Completion Reports are submitted to DOH, as required. Construction Completion Reports for distribution main projects are maintained on file at the City and are available upon request by DOH, in accordance with WAC 246-290-125.

Water production and purchase source meters are read daily (during the work week). Paper copies are scanned at the end of the month and digital copies in pdf format are maintained on the City computer server by month and year. Annual summary spreadsheets are also maintained on the computer server. This data is added to the monthly DOH reports. Records are maintained for a minimum of 10 years.

Chlorine residual samples are collected in the distribution system and analyzed on a weekly basis. Summary spreadsheets are maintained on the City computer server by year. Records are maintained for a minimum of three years.

Monthly reports containing water production and treatment data are submitted to DOH by the 10th day of the following month, using forms provided by DOH. Signed paper copies are scanned to produce a digital copy and are maintained on the City computer server, organized by year. Digital copies are maintained for a minimum of 10 years.

Most records that Water Utility collected in the past are based on hard copy paper forms. This includes forms that track maintenance and inspection records used for pumps, valves, meters, reservoirs, hydrants, operating equipment, etc. A portion of the integration process with CarteGraph involved the collection and collation of historical data into a form that can be downloaded into the software system. The City's goal is a near-paperless documentation system that can be accessed by staff in the office, field, or home on a 7-day, 24-hour basis. Existing electronic records include those described below.

6.9.1 Cross Connection Control Program

Cross Connection Control records are managed with Tokay software and Laserfiche. Test reports conducted are stored in Laserfiche and are kept for 5 years. Tokay is used for creating reports, identifying and updating when tests are required, and general data entry and management of cross connection devices per parcel.

6.9.2 Water Meter Consumption

Water meter consumption records are maintained by the Finance Department using the Springbrook Utility Billing System. These records include customer account data for classes of customers, billing, service, comments, and questions. The system also includes a tracking feature for water sold each month as well as annual total water sales. The tracking feature is useful because data on water consumption by customer type and season supports the City's WUE Program, per Chapter 4. The Finance Department also provides staff with monthly financial reports regarding Water Utility operations.

The City also uses AMI throughout the system as a tool for the WUE Program. Using AMI data, the City may be able to identify customer leaks and, as a result, provide cost savings in the Leak Detection, Repair, and Service Meter Replacements programs. Advanced metering also aids the City's efforts to reduce non-payment of bills and water theft.

6.9.3 Supervisory Control and Data Acquisition (SCADA)

The SCADA system monitors, records, and controls water system operations at various facilities. The electronic records are maintained by the IT Department and a back-up copy is made each evening to ensure that records are retrievable should hardware or software failure occur.

Please note that the SCADA system is discussed more thoroughly in Section 6.2 of this chapter.

6.9.4 Water Meter Reading

Effective January 1, 2019, the City transitioned to monthly consumption billing. The Utility Billing staff imports the water meter reads monthly into the City Utility Billing System. With the implementation of the AMI system, the City obtained a Cloud-Based Data Analytics Solution with meter data management capabilities called Sensus Analytics. Within Sensus Analytics, is a billing access application, which enables Utility Billing staff to generate and export a billing request file defined by a billing cycle and billing window. Subsequently, the file that contains meter numbers, account numbers, and current water meter reads are imported into the City Utility Billing System. The Utility Billing staff reviews abnormally high or low consumption levels compared to previous readings from the previous year, same period.

Water service meters are read monthly to document customers' water usage for billing purposes. The AMI system automatically stores and transmits the water use data for utility billing, without the need for personnel to collect the data on site.

6.10 Summary of O&M Deficiencies and Recommended Improvements

6.10.1 Water Facilities Evaluation Study

The City completed an extensive Water Facilities Evaluation Study in 2014. The study conducted a physical inspection and evaluation of 40 out of the City's 97 water supply facilities. Inspections included pump stations, treatment facilities, reservoirs, wells, transmission mains, and PRVs. Inspections considered general conditions, corrosion and rust, structural deficiencies, ability to meet current code, and operational constraints. In addition to the inspections, the remaining useful life of the facilities were developed in a desktop analysis for pump, motor, pipe, valve, general electrical equipment, and major electrical equipment.

Where notable deficiencies were identified in the inspections or assets exceeded their usable life, improvements were recommended. Many of the recommended improvements have been completed or are currently scheduled to be completed and identified in the Capital Improvement Plan. Remaining improvements less than or equal to $10,000 are considered capital maintenance projects, which the City staff or a small works contractor will address as part of the normal M&O budget and are not identified in the Capital Improvement Plan.

Based on the observed facilities, general maintenance improvements are recommended for each facility to create a schedule of improvements based on the facility's remaining useful life. Regular facility inspections are also recommended, as summarized Table 6-4. Additionally, maintenance plans were developed for each inspected water system facility. These plans included the improvement type, estimated project cost, and frequency the improvement is required.

Table 6-4 | Recommended Inspections

Asset Type	Recommended Inspection	Frequency (years)
Pump	Perform pump test	5
Motor	Check motor amp draw	5
Reservoir	Inspect coating thickness	5
Reservoir	Inspect reservoir interior	5
PRV Station	Inspect for corrosion and signs of flooding	1
Structure	Inspect for cracks in grout (where applicable)	1
Piping	Inspect for general coating conditions	3

6.10.2 Recommended Improvements

The City operates and maintains an efficient, environmentally sound, and safe water system. Recommended improvements include the outstanding projects identified from the 2014 Facility Evaluation Study, outstanding items to be corrected from the 2022 Sanitary Survey, and general continued repairs and maintenance activities that are conducted by M&O staff or contracted out. Table 6-5 provides a summary of the identified O&M projects and their costs.

Table 6-5 | O&M Improvement Projects

O&M Deficiency	Planned Year	Notes
The pump to waste line at Well 5 to terminate above grade will be addressed with a capital improvement project. (Identified in 2022 Sanitary Survey)	2026-2028	Included with the Well 5/Well 5A Upgrades Project
Raising the casing at Well 5A to terminate above grade or the provision of a sump pump or alarms to activate when water accumulates in the vault. (Identified in 2022 Sanitary Survey)	2026-2028	Included with the Well 5/Well 5A Upgrades Project
Reservoir vents will be retrofitted or replaced as part of the ongoing Reservoirs 4A, 4B, 8A, and 8B Seismic Valves Retrofit capital project. (Identified in 2022 Sanitary Survey)	2024-2025	Included in CP2219 – Reservoirs 4 and 8 Seismic Rehabilitation
The direct connections of reservoir overflows at Reservoirs 2 to drains, sanitary sewer, and/or storm sewer, will be addressed with a capital improvement project. (Identified in 2022 Sanitary Survey)	2024-2025	Included in Reservoir 2 Valves Project
Conduct inspections of facilities at frequency recommended in the Facilities Evaluation Study.	--	Refer to **Table 6-4**. To be completed via annual M&O operating budget.
Continue distribution system corrosion inspection.	TBD	To be completed via annual M&O operating budget as funds are available.
Develop a UDF Program for the Lakeland Service Areas.	TBD	To be completed via annual M&O operating budget as funds are available.
Replace source water supply meters with flow transmitters for improved electronic data transmission and record keeping.	TBD	To be completed via annual M&O operating budget as funds are available.
Continue PRV Vault Repairs	2024-2026	To be completed via annual M&O operating budget as funds are available.
Continue Pump and Equipment Repairs and Maintenance	2024-2026	To be completed via annual M&O operating budget as funds are available.
Continue Annual HVAC Maintenance and Repairs	2024-2026	To be completed via annual M&O operating budget as funds are available.
Continue Fencing Repairs at Water Facilities	2024-2026	To be completed via annual M&O operating budget as funds are available.
Continue Generator Maintenance and Repair	2024-2026	To be completed via annual M&O operating budget as funds are available.
Continue Large Meter Repair and Testing	2024-2026	To be completed via annual M&O operating budget as funds are available.
Continue Chlorine Feed and Analyzer Maintenance	2024-2026	To be completed via annual M&O operating budget as funds are available.

O&M Deficiency	Planned Year	Notes
Continue Vegetation Control and Maintenance at Water Facilities	2024-2026	To be completed via annual M&O operating budget as funds are available.

CHAPTER 7

Distribution Facilities Design and Construction Standards

This chapter outlines the Engineering Design and Construction Standards (EDCS) of the City of Auburn (City), concerning its water system. It encompasses policies and procedures governing project review and approval. To ensure the highest level of water system reliability, integration of the EDCS into the broader city infrastructure is essential. The City recognizes the interdependence of its water system with other municipal services. As such, there is an ongoing collaborative effort between the Water Division and other relevant City departments, such as Community Development and Finance, as well as non-City stakeholders, such as the Valley Regional Fire Authority (VRFA).

The integration of the EDCS in this Water System Plan empowers the City to employ an alternative review process for distribution main projects, through the submittal exception process, which permits the City to approve project reports and construction documents without written approval from the Department of Health (DOH). This submittal exception is granted provided the conditions specified in WAC 246-290-125(2) are met.

The submittal exception does not apply for source of supply, reservoir, pump station, and water treatment projects. For those projects, the City will seek approval from DOH through the submittal process outlined in WAC 246-290-110 and 246-290-120.

The following topics are addressed in this chapter:

7.1 Project Review Procedures
7.2 Policies and Requirements for Outside Parties
7.3 Design and Construction Standards
7.4 Construction Certification

7.1 Project Review Procedures

For all construction activities related to the City's water system, coordination must be done directly through the City's Water Department. The City's Water Department reviews plans, including calculations, reports, and AutoCAD files, to verify conformity with development requirements, City standards, City policies, as well as other federal, state, and local requirements. The plan sets are required to feature an overall utility plan illustrating public water facilities and private connections within the water service boundary, regardless of whether the project is inside or outside the City limits. City staff also review projects proposed by developers or other water purveyors to determine impacts to the City's water system facilities.

Development review processes are detailed in the Engineering Design Standards (EDS), available on the City's website. Compliance with Washington State Department of Transportation (WSDOT) "Standard Specifications for Road, Bridge, and Municipal Construction," and relevant City, State, and Federal regulations is also evaluated during the review process.

All water-related improvements projects, whether for capital improvement or development, undergo a thorough review process by the Water Division, including evaluation by the VRFA and City's Fire Authority for fire protection standards. Additionally, all plans involving main extensions, modifications, and fire service installations must be stamped by a Professional Engineer licensed in Washington State.

7.2 Policies and Requirements for Outside Parties

The City manages the water utility in accordance with established water- system policies that govern various facets of utility operations. City policies are established by the City to provide a vision or mission of the water utility and to provide a framework for the design, operation, and ongoing wellbeing of the City's water utility.

Policies are developed specifically for the City's multi-source municipal water system and seek to provide consistent treatment to all utility customers and to provide documentation to current water-system customers as well as those considering service from the City. What is included in these policies is limited to those things related to the water system and its design, maintenance, and operation. There are other policies and criteria that pertain to the water utility the City has in place regarding land use, development, and financial components that could still have an impact on the needs of the water system. These policies and criteria may include factors such as zoning regulations, building codes, infrastructure requirements, and financing options. These additional factors will be considered when planning for the water system, to meet the needs of the community in a sustainable and effective matter.

Policies set forth for development are described in the Water System Policies provided as Appendix A of this Plan.

7.3 Design and Construction Standards

Within the Retail Water Service Area (RWAS), the City has established specific standards governing the design and construction of water mains, detailed in the City's EDCS. The EDCS collectively contains the following:

- City of Auburn Engineering Design Standards (EDS).
- City of Auburn Engineering Construction Standards (ECS):
    - City of Auburn Engineering Construction Standards – Standard Details (STD DTL)
    - City of Auburn Engineering Construction Standards – General Special Provisions (GSP)
    - City of Auburn Engineering Construction Standards – Technical Special Provisions (TSP)

These standards undergo periodic updates, with the most recent revision in 2024. The City's 2024 design standards and construction specifications related to the water system are outlined in Appendix P. Additionally, this plan incorporates relevant sections of the City's current construction standards, including materials, methods, and standard details applicable to the construction of water system appurtenances.

For detailed information, the latest versions of the collective EDCS are accessible for view on the City's Public Works web page.

Table 7-1 lists sections of the EDCS sections for the specifications, drawing standards, and special conditions of water main installations, extensions, and replacements. Standards for supply sources, reservoirs, pump stations, and water treatment facilities are not presented due to the complex nature of these facilities. For

those projects, the City will seek approval from DOH through the submittal process outlined in WAC 246-290-110 and 246-290-120.

Table 7-1 | Water Main Design and Construction Standards

Specifications for:	
Pipe material and pipe class. ANSI/NSF Standard 61 certified materials required for all pipes.	EDS Section 7.01.02
Disinfection procedures (include de-chlorination or chlorinated water disposal specifications).	TSP – 7.09.3(24)
Pipe bedding and installed depth of bury.	EDS Section 9.05
Bacteriological testing.	TSP – 7.09.3(24)N
Pressure and leakage testing.	TSP – 7.09.3(23)
Separation from sewer mains, non-potable conveyance systems, and other buried utilities.	EDS Section 6.02
Valve spacing.	EDS Section 7.03
Construction Drawings Standards	
Plan and profile views drawn to a particular scale	EDS Sections 3.03, 3.04 & 3.04.07
Easement locations and dimensions	EDS Sections 2.02, 3.04 & 3.04.07.B, 6.01, 7.01.04, 7.01.05, 7.02.01, 7.03 and STD DTL W-06.3, W-22.2, W-23.3,
Appurtenant Design Standard Drawings	
Pipeline trench cross-section, including pipe bedding, backfill, compaction, and road restoration standard details	STD DTL T-01
Hydrants (for fire, flushing)	STD DTL W-07, W-08
Valves	STD DTL W-17, W-18, W-19
Service Meters	STD DTL W-15, W-16, W-16a
Service lines and service connection to main	STD DTL W-9, W-13, W-14
Air relief, vacuum relief, and combination air-vacuum relief valve and valve vault	STD DTL W-02
Pressure reducing valve stations	Submittal review (project specific)
Thrust blocking	STD DTL W-01
Backflow prevention assemblies	STD DTL W-21, W-22, W-23, W-24, W-25
Blow-offs	STD DTL W-03, W-04
Special Conditions	
Pipeline corrosion mitigation measures	TSP 7.09.03(25)
Potable/non-potable pipeline crossing construction details	EDS Section 6.02
Stream-crossing construction details	N/A
Individual service booster pumps	N/A
Temporary water service (i.e., employed during water main replacement or emergency repair)	N/A

7.4 Construction Certification

Construction work aimed at improving City roads and utilities, whether initiated by private developers or the City itself, must adhere to approved contract documents. City approval is mandatory for any modifications to approved plans before implementation, especially for work within the public right-of-way (ROW) or designated easements. Compliance with general WSDOT/APWA Standard Specifications, approved plans, and the City's EDCS is strictly enforced.

Prior to the start of construction, a pre-construction meeting must be held by the City and the developer, contractor, and/or designated representative. Pre-construction meetings establish the first touch point between the City and developer/contractor to discuss the schedule, certain unique aspects of the work, any special restrictions, and general coordination and communication protocols. Consistent presence of the approved set of plans with redline markups identified and requisite permits at the job site during construction is a shared responsibility of the City, the developer, and the construction contractor. The City exercises its authority to enforce standards through appointed project engineers, assistants, and inspectors, ensuring collective adherence to specified standards. Inspections, test measurements, and actions outlined in the City's Development Guidelines and Public Works Standards are pivotal. Post-construction, the submission of as-built drawings is mandated.

Non-compliance with approved project documents can lead to stop-work orders and potential removal of completed elements, subject to penalties established by ordinance. The project's conclusive status is granted only when the City issues a formal letter of acceptance to the responsible party.

Upon completion of construction activities related to the water system, including disinfection, flushing, and pressure testing for water mains, a construction completion report must be submitted. This document becomes part of the project records, and the release of water meters for any lot or building linked to a project is contingent upon final acceptance.

CHAPTER 8

Capital Improvements Program

This chapter's objective is to develop a cohesive Capital Improvement Program (CIP) for the City of Auburn (City) by summarizing and prioritizing all capital projects identified in the previous chapters. The CIP provides a comprehensive accounting of capital projects needed to continue consistent, efficient water supply to the City's Retail Water Service Area (RWSA) through the 20-year planning horizon. The recommended projects were developed in coordination with City staff.

Projects identified as part of the City's asset management program that are anticipated to cost greater than $50,000 were included as capital projects. The capital projects discussed in Section 8.2 include water supply and storage improvements, improvements to the distribution system, and upgrades or replacement of aging facilities and distribution piping as discussed in Chapter 3.

Projects were allocated to the 10-year (2025 to 2034) and 20-year (2035-2044) planning horizons. Planned projects coincide with the City's current Capital Facilities Plan (CFP) and have been placed into specific years for planned completion. These timeframes are intended to be a framework for future funding decisions that directs when future actions and decisions are intended to occur. However, these timeframes are estimates, and depending on factors involved in the processing of applications and project work, and availability of funding, the timing may change from the included timeframes. The framework does not represent actual commitments from the City, which may depend on funding and staffing resources available.

8.1 Prioritization

8.1.1 Project Identification

Capital projects are organized into two categories to help provide a better understanding of the primary project driver as follows:

- Capacity Projects (CAP): These projects are needed to expand infrastructure capacity to meet increased demands associated with current deficiencies or projected growth.
- Non-Capacity (Non-CAP): These projects are needed to address aged and/or obsolete equipment to maintain and/or improve the reliability of the infrastructures system. These projects are needed to improve existing infrastructure for reasons other than capacity.

The capital projects are also identified and grouped into categories based on the infrastructure they are focused on. Each project is assigned an identification number (Project ID) with the following ID prefixes:

- Supply (S): These projects are associated with the City's water supply sources and treatment facilities.

- Storage (R): These projects are associated with the City's storage reservoirs or allow modifications in the system impacting reservoir storage transfer throughout the RWSA.
- Pump Stations (PS): These projects are associated with the City's pump stations or booster pump stations (BPS).
- Distribution (D): These projects are associated with the City's transmission and distribution piping systems.
- General Improvements (G): General improvement projects do not fit into the other categories and may be broader, impacting multiple components of the City's water system.

8.1.2 Prioritization Factors

The capital projects for the facilities improvements were prioritized based on system deficiencies, safety concerns, maintenance or capacity requirements, and regulatory requirements.

The capital projects for the capacity driven distribution system improvements were prioritized based on the fire flow availability; projects resolving the largest deficits were prioritized higher, and as such are planned to be completed sooner than projects resolving smaller deficits. The capital projects for the condition driven distribution improvements were prioritized based on the existing pipe age, size, and material. More details are discussed in Chapter 3.

The priority order of these improvements is reflected in the schedule of improvements, which is presented in Section 8.3 and Appendix W.

8.1.3 Estimated Costs

"Active projects" are projects that are currently underway for completion. The project costs presented include total project costs for the current and future years and are presented in 2024 dollars.

For projects already included in the City's 2023 CFP, it was assumed that the project cost in 2024 dollars remains the same, unless the costs were identified as needing to be reassessed.

For planned capital projects identified in the 2015 WSP that have not been completed and are not included in the City's 2023 CFP, the project costs were escalated from 2014 dollars as presented in the 2015 WSP to 2024 dollars using the Engineering News Record (ENR) Construction Cost Index (CCI).

For all other projects that were newly identified, modified, or reassessed, planning-level project cost estimates were developed for the improvements using average costs from RSMeans, HeavyBid Construction Cost Data, recent City of Auburn project bid tabs, City input, industry experience, and local contractor and supplier costs. These project costs are planning-level estimates and are categorized as Class 5 estimates, as defined by the Association for the Advancement of Cost Engineering (AACE) International:

> *Class 5 estimates are generally prepared based on very limited information, and subsequently have wide accuracy ranges. As such, some companies and organizations have elected to determine that due to the inherent inaccuracies, such estimates cannot be classified in a conventional and systemic manner.*
>
> *Class 5 estimates are prepared for any number of strategic business planning purposes, such as but not limited to market studies, assessment of initial viability, evaluation of alternate schemes, project*

screening, project location studies, evaluation of resource needs and budgeting, long-range capital planning, etc.

Typical accuracy ranges for Class 5 estimates are -50 % to -20% on the low side and +30% to +100% on the high side, depending on the construction complexity of the project, appropriate reference information and other risks (after inclusion of an appropriate contingency determination). Ranges could exceed those shown if there are unusual risks.

All project descriptions and cost estimates in this WSP represent planning-level accuracy and opinions of costs (-50 percent to +100 percent).

During the pre-design phase of each project, the project definition, scope, and specific information (e.g., pipe length and diameter, roadway restoration requirements, permitting requirements) should be verified. The final cost of individual projects will vary depending on actual labor and material costs, site conditions, market conditions, regulatory requirements, project schedule and other factors. Because of these factors, project feasibility and risks must be carefully reviewed prior to making specific financial decisions or establishing project budgets to support proper project evaluation and adequate funding.

Total estimated project costs were developed through a progression of steps and multiple methodologies. The steps included development of component unit costs, construction costs and, finally, total project costs. The component unit cost includes the sum of materials, labor and equipment of a project's basic features. The construction cost is the sum of component costs and construction markups, which includes a 30 percent allowance for contingency and 10.2 percent for sales tax. The total project costs presented is the sum of construction costs with the following additional allowances:

- 15 percent for City management, survey, legal, and project administration.
- 15 percent engineering design.
- 15 percent construction management and inspection.

The following costs are not included, unless specifically noted:

- Land or right-of-way acquisition.
- Maintenance expenses.
- Operation expenses.

All cost estimates were developed as total project costs in March 2024 dollars. In Table 8-10, costs have been inflated and escalated using an annual increase rate from 2024 dollars to their planned implementation year. For projects that will be designed or constructed in 2024, an annual increase of eight percent was used. For projects that will be designed or constructed after 2024, an annual increase of five percent was used. For future budgeting purposes, the latest engineering news record (ENR) Construction Cost Index (CCI) can be used to project current estimates to the year of implementation. The cost estimates for the Auburn area used the ENR CCI in Seattle of 15,477 (March 2024).

8.1.3.1 Pipeline Component Unit Costs

The pipelines unit costs were developed using recent City construction bid tabs assuming the use of ductile iron pipe and a typical cover depth of four feet. The estimated unit cost is provided by pipe diameter per linear foot of pipe in Table 8-1, which includes the cost for the pipe, trench, roadway restoration, appurtenances, installation, and direct construction markups. As the diameter of pipe and the trench width increase, the costs also increase.

Table 8-1 | Water Pipeline Construction Costs per Linear Foot

Pipe Diameter (inch)	Unit Construction Cost ($/linear foot)
8	$490
10	$510
12	$520
14	$570
16	$630
18	$730
20	$780
24	$880

8.1.3.2 Reservoir Component Unit Costs

Reservoir (storage tank) unit costs were determined based on the tank volume in gallons. Conceptual costs for tanks vary based on the material of storage: prestressed concrete and welded steel being the most common options. Unit costs for the different reservoir options are presented in Table 8-2 in terms of cost per gallon of storage. The unit costs do not include site piping, site improvements, land acquisition, repair, or recoating. Storage reservoir costs are sensitive to site-specific geotechnical and seismic considerations. A tank siting study is necessary whenever a new tank project is initiated to obtain the information required to inform the design.

Table 8-2 | Reservoir Tank Construction Costs per Gallon

Tank Material	Unit Construction Cost ($/gallon)
Prestressed Concrete	$1.50
Welded Steel	$1.25

8.2 Capital Improvement Program Summary and Schedule

8.2.1 Completed Projects

The following projects have been completed since 2015 WSP was completed:

- S-01: Onsite Improvements Projects, completed in 2016.
- S-02: Emergency Power Improvements Project, completed in 2016.
- S-17: West Hill Springs Flow Control Improvements, completed in 2017.
- S-19: Fulmer Field Improvements Project, completed in 2018.
- R-01: Lakeland Hills Reservoir 5 Improvements, completed in 2016.
- D-03: SCADA Upgrades, completed in 2015.
- D-10: Pipeline Asset Management Study, completed in 2020.
- D-13: Lea Hill PRV Station Improvements, completed in 2018.
- D-14: Valley AC Main Replacement, completed in 2015.
- PS-03: Green River Pump Station Emergency Power, completed in 2020.
- PS-07: Academy Pump Station No.1 Improvements, completed in 2023.
- G-06: Muckleshoot Indian Tribe (MIT) Casino Master Meters, completed in 2016.
- G-09: Water Meter & Billing System Improvements, completed in 2018

The following projects have been eliminated since 2015 WSP was prepared:

- G-05 - Utilities Field Operations Center: This project was replaced with a more comprehensive upgrade to the City's Operations and Maintenance Facilities as reported in the 2021 Limited Comprehensive Plan Update.

- D-12 - Academy Transmission Replacement: This project was eliminated, after further investigation found no issues with the existing pipeline.

- D-15: Braunwood Transmission: This project was split from Reservoir Seismic Rehabilitation (R-06) identified in the 2015 WSP. This project was originally planned to incorporate the Braunwood Satellite System, however after further evaluation, there is not a business case to support this project. Instead, it is replaced in this WSP with a mechanical upgrades project for the Braunwood Pump Station to maintain operation. The potential for incorporation of the Braunwood Satellite System may be more viable in the future pending potential development in the southern portion of the City's RWSA.

- D-16 - Game Farm Park Transmission: This project was originally planned to allow for the decommissioning and removal of the Game Farm Park Pump Station, however after further evaluation, there is not a business case to support this project. Instead, it is replaced in this WSP with a mechanical upgrades project to maintain operation of the Game Farm Park Pump Station. Elimination of the Game Farm Park Pump Station may be more viable in the future pending potential development in the southern portion of the City's RWSA.

- S-12 - West Hill Springs Water Quality Improvements: The City had planned to replace the aging West Hill Springs chlorination building and equipment with a new liquid chlorination system. However, since this project is not required to meet regulatory requirements and after further review of the City's Financial Program, this project was eliminated to prioritize projects required to resolve deficiencies. This project will be completed later, likely beyond the planning horizon for this WSP.

- S-14 - Algona Well 1 Redevelopment: This project was eliminated until the Algona Well 1 Study is completed. A new capital project may be developed in the 10 to 20-year planning horizon pending the outcome of the study.

8.2.2 Active Projects

The following projects are currently underway for completion by the City and are referred to as "Active Projects" that have remaining costs to be spent in the near term:

- CP2021 - Well 4 Facility Improvements: This project was split from the Well 4 Pump Improvements project (S-22) identified in the 2015 WSP. This project includes upgrades to much of the mechanical systems at the facility.

- CP2043 - Well 4 Electrical Improvements: This project was split from the Well 4 Pump Improvements project (S-22) identified in the 2015 WSP to accommodate beneficial electrical improvements outside the original scope of the project. The well facility is over 40 years old and much of the electrical equipment is original. Upgrades to the electrical system will improve the overall efficiency of the facility.

- CP2219 - Reservoir 4 and 8 Seismic Rehabilitation: This project was split from Reservoir Seismic Rehabilitation (R-06) identified in the 2015 WSP. The City plans to install seismic control valves on outlet piping of the Lea Hill Reservoirs (4A & 4B) and Academy Reservoirs (8A & 8B). A seismic control valve isolates the reservoir to prevent catastrophic flows from the reservoir during a seismic pipe failure. This project will also address outstanding deficiencies identified in the 2022 Sanitary Survey, including vent modifications, overflow connection modifications and overflow screen repairs.

- CP2134 - Comprehensive Water System Plan Update: This project was split from identified in the 2015 WSP (G-08), which originally included updates for both 2024 and 2034. This project will be carried forward in the CIP with further WSP updates being required in 2034 and 2044.

- CP1603 - Coal Creek Springs Transmission Main Replacement: This project was identified in the 2015 WSP as project (D-11) will be completed in 2024. The project will replace the existing 24-inch diameter steel transmission main crossing the White River with a new transmission main suspended from a utility and pedestrian bridge to cross the White River.

- CP2204 - Coal Creek Springs Rehabilitation (Phase 1): The Coal Creek Springs Rehabilitation project aims to investigate the cause of low yield and identify potential upgrades to improve water production. The updates will be completed in Phase 2 of the project.

- CP2413 - Reservoir 2 Valves: This project was split from Reservoir Seismic Rehabilitation (R-06) identified in the 2015 WSP. This project will replace the existing 20-inch supply valve with a seismic control valve and replace the 12-inch drain valve at Reservoir 2. Both valves will be installed in a vault. This project was identified as a maintenance issue due to limited access to the valves. The addition of a seismic control valve will improve the resiliency of the distribution system. This project will address the outstanding deficiency identified in the 2022 Sanitary Survey by modifying the overflow connection.

- CP1914 - Cascade Water Alliance Water Purchase: This project was identified in the 2015 WSP as project (S-04) and finances System Development Charges for the right to purchase water from Tacoma Public Utilities (TPU) through the Second Supply Pipeline to meet future projected demand, based on agreements with Cascade Water Alliance. Council approved the agreements for permanent and reserve wholesale supply in September 2013, and a new agreement was executed in 2014. Budget reflects purchase of permanent supply; payments will continue through 2029.

- S-08 - Water Resources Protection Program (Wellhead Protection): This program provides annual funding for implementing strategies identified in the Wellhead Protection Plan. Although some tasks will be performed as part of the water operations budget, other tasks will require consultants with expertise in review and investigation of contaminant sites and other environmental databases, development of spill response plans, and leaking underground storage tanks. This program will continue through the 20-year planning horizon.

- R-03 - Reservoir Repair and Replacements: This is an annual program that provides budget for general reservoir maintenance and minor repairs. This program will continue through the 20-year planning horizon.

- R-05 - Reservoir Painting: This is a program that operates on a 10-year cycle to complete reservoir coatings. This program will continue through the 20-year planning horizon with the next anticipated painting project planned in 2025.

The following projects include distribution improvements identified in the 2015 WSP to be completed as part of either the Annual Distribution System Improvements Program (D-02), Water Repair and Replacement Program (D-09) or are in partnership with other City utilities and are funded by budget available in the Street Utility Improvements annual program (D-06). All three programs have been updated and will continue through the 20-year planning horizon. In total the following active projects will replace approximately 9,000 linear feet of water main in the City's system. The locations of all active distribution system improvement projects are identified in Figure 3-12 in Chapter 3.

- CP1619 - 104th Park Development (104th to 102nd Water Main Loop)
- CP2301 - 104th Avenue SE PRV Replacement
- CP2123 - C St SW Preservation
- CP2125 - D St SE and 23rd Street SE Storm Improvements
- CP2410 - 112th Pl SE Water Main Replacement
- CP1622 - Auburn Way South - Hemlock St SE to Poplar St SE
- CP2022 - Garden Avenue Realignment
- CP2210 - M Street NE Widening
- CP2116 - R Street SE Widening
- CP2308 - R St SE and 21st St SE Roundabout
- CP2315 - R St SE Preservation - 33rd St SE to 37th St SE
- CP2319 - Lea Hill Road/104th Ave SE Roundabout
- CP2404 - 12th St SE and Auburn Way South Water R&R
- CP2412 - 2025 Local Street Preservation
- 2026 Local Street Preservation

The following active projects were not identified in the 2015 WSP:

- CP2405 - Fulmer Treatment Facility VFD Replacements: The variable frequency drive (VFD) for pumps 1 and 2 at Fulmer Corrosion Control Treatment Facility (CCTF) were installed in 2002. They are at the end of their useful life and require replacement as repair parts are no longer available.

- CP2329 - Coal Creek Springs Flowmeter Replacement: The project will replace existing source meters on the Coal Creek Springs collectors to improve the accuracy and frequency of production readings.

- Algona Well 1 Study – Phase 1: The project will conduct a preliminary assessment of options to utilize the existing water right.

- Valley Service Area Reservoir No. 3 Siting Analysis: The project will conduct a siting analysis to identify and evaluate possible locations for the new reservoir.

- Braunwood Pump Station Assessment: The project will identify process mechanical upgrades necessary to continued operation. The project will also evaluate roofing replacement material options and costs.

- Coal Creek Springs Rehabilitation – Phase 1: The project will investigate the cause of reduced production from Coal Creek Springs and recommend improvements to increase production capacity.

8.2.3 Capital Improvement Projects

The following projects identified in the 2015 WSP have not been completed since the WSP was prepared, but have been revisited and are discussed in detail in the following sections for completion during this planning period. The timing of most projects has been adjusted based on the City's financial analysis and project prioritization updates.

- S-03 - Well 7 Back-Up Power: Delayed to 2032 since Well 7 has been offline due to high levels of Manganese. The timing of this project will be aligned with the completion of the Well 7 Treatment Phase 1 project (S-15) that will allow the Well to resume operation.
- S-06 - Well 5/5A Upgrades: Delayed from 2022 to 2026.
- S-07 - Well Inspection and Redevelopment Program: Delayed from 2015-2033 to 2026.
- S-09 - Coal Creek Springs Rehabilitation: Delayed from 2018 to 2027 based on awaiting results of ongoing investigations to identify the cause and possible solutions to improve production from Coal Creek Springs. The timing of this project may be adjusted pending results of the on-going investigation.
- S-11 - Wells 3A/3B Treatment: Delayed from 2035 to 2036.
- S-13 - Algona Well 1 Study: Delayed from 2015 to 2039.
- S-15 - Well 7 Treatment Phase 1: Delayed from 2022 to 2030 based on City financial analysis and updated project prioritization.
- S-16 - Well 7 Treatment Phase 2: Moved forward from 2035 to 2033.
- S-18 - Howard Road CCTF Expansion: Delayed from 2025 to 2032. The timing of this project must be aligned with the completion of the Coal Creek Springs Rehabilitation project, as its purpose is to provide increased treatment capacity to accommodate increased flows from Coal Creek Springs.
- S-20 - Well 2 Replacement: Moved forward from 2035 to 2030.
- S-21 - Coal Creek Springs Chlorination Building Replacement: Moved forward from 2035 to 2030.
- R-04 - Valley Service Area Reservoir No. 3: Delayed from 2025 to 2041.
- R-07 - Reservoir Capital Improvements: Delayed from 2025 to 2027 to avoid timing conflicts with other current projects at Reservoirs 4A, 4B, and 8A.
- R-07 - Braunwood Reservoir Improvements: Separated from "Reservoir Capital Improvements" project and delayed from 2025 to 2039.
- PS-04 - Intertie Booster Pump Station Improvements: Delayed from 2021 to 2024.
- PS-09 - Game Farm Park Pump Station Mechanical Upgrades: Replaces original project 'Game Farm Park Pump Station/Distribution System Improvements. Delayed from 2025 to 2034.
- PS-10 - Lea Hill Pump Station Replacement: Delayed from 2025 to 2027 to avoid conflicts with concurrent work in area being completed as part of a separate project.

- G-08 - Comprehensive Water System Plan Update: This project was split into two separate completion years for future updates (2034 and 2044).

Based on the information provided by the City, information included in the 2023 CFP, asset management program input, and results of the system capacity analysis provided in **Chapter 3**, the following new projects were identified that are included in the CIP and are discussed in further detail below:

- Rehabilitate & Clean Wells 2 and 6 (3-year Cycle).
- On-Site Chlorine Generation Systems (OSEC) at Wells 1 and 4.
- Academy PRV Project.
- Braunwood Pump Station Mechanical Upgrades.
- Water Trench Patches Program.
- West Hill Springs Transmission Main Replacement.
- Lea Hill 648 Zoning Adjustment.

8.2.3.1 Water Supply

The City's water supply strategy details both project sizing and timing. A summary of the 0 to 10-year and 10 to 20-year capital projects recommended for securing adequate supply to meet the system's future demands are presented in **Table 8-3**. Project IDs have been revised to reflect the updated prioritization and planned timing of projects presented in this WSP. Previous project IDs from the 2015 WSP as presented above will be discontinued for clarity purposes. Active projects identified above are not discussed in detail as they are already well defined and in progress.

8.2.3.1.1 Cascade Water Alliance Water Purchase (S-01)

Financing to purchase water from Tacoma Public Utilities (Tacoma) to meet water demands is based on an agreement with Cascade Water Alliance (Cascade), which had purchased water supply from Tacoma. The Council approved the agreement for permanent wholesale supply in September 2013. The agreement provides an additional 3.32 mgd of supply during the peak day and 1.5 mgd of average day supply. The City's permanent and reserve agreement requires System Development Charges (SDC) payments of $21,073,743 between 2017 and 2029. A total of $934,810 of payments will continue from 2023 through 2029. The SDC costs will decrease if less than the full reserve amount is purchased. The project ID was previously S-04 in the 2015 WSP.

8.2.3.1.2 Water Resources Protection Program (Wellhead Protection) (S-02)

Annual funding for implementing strategies identified in the Wellhead Protection Plan. Although some tasks will be performed as part of the water operations budget, other tasks will require consultants with expertise in review and investigation of contaminant sites and other environmental databases, development of spill response plans, and leaking underground storage tanks. The project ID was previously S-08 in the 2015 WSP.

8.2.3.1.3 Rehabilitate & Clean Wells 2 and 6 (3-year Cycle) (S-3)

Rehabilitation work completed in 2013-2014 indicated it would be beneficial to clean and rehabilitate both wells on a regular basis to improve production capacity and pumping efficiencies. Cleaning was completed in 2020 and again in late 2023/early 2024. This program was originally established as a 5-year cycle, however based on more recent evidence, more frequent cleaning is required. Cleaning and rehabilitation for Wells 2 and 6 will be performed over a 3-year cycle. This program was not identified in the 2015 WSP.

8.2.3.1.4 Well Inspection and Redevelopment Program (S-04)

The City allocates annual funding for investigations and redevelopment of supply wells and springs necessary to support production at maximum capacity for efficient utilization. This program is to be used for production wells and spring collectors, and is not intended to finance the replacement of pumps, motors, buildings, etc. The project ID was previously S-07 in the 2015 WSP.

8.2.3.1.5 On-Site Chlorine Generation Systems (OSEC) at Wells 1 and 4 (S-05)

The existing liquid chlorine (sodium hypochlorite) used at Wells 1 and 4 degrades during low winter demand periods when the volume used is much lower and product turnover is decreased. This results in more chemical consumption to achieve the same chlorine dose which is not cost effective. The hypochlorite systems will be replaced with on-site chlorine generation systems sized to meet peak summer demands while providing flexibility during winter months. This project was not identified in the 2015 WSP.

8.2.3.1.6 Fulmer CCTF Replace On-Site Chlorine Generation System (OSEC) (S-06)

The existing on-site chlorine generating equipment was installed in 2002. The generation cell was replaced in 2012. Sourcing parts for equipment repairs has become increasingly difficult due to the equipment age. An analysis performed in 2018 comparing chlorine alternatives indicated that on-site generation has the lowest overall cost. This project will replace the entire generation system. The chlorination system will be sized to accommodate future production from Well 7.

8.2.3.1.7 Well 5/5A Upgrades (S-07)

Well 5 needs significant improvements including a new building, a backup generator, chlorination, and a hydrologic investigation to evaluate observed decreased production. Due to the small size of the existing site, the acquisition of an adjacent parcel may be required. Additionally, the project will address the recommended Capital Improvements identified in the 2014 Facility Evaluation Study (CIP Project G-01), including a new pump at Well 5 and new pump and motor at Well 5A. Additional upgrades may be identified in the hydrologic investigation; therefore, the cost of this CIP item should be revisited upon completion of the study. This project will also include improvements to address outstanding deficiencies identified in the 2022 Sanitary Survey, including modifications to the pump waste line for Well 5 and addressing water accumulation in the vault at Well 5A. The project ID was previously S-06 in the 2015 WSP.

8.2.3.1.8 Coal Creek Springs Rehabilitation – Phase 2 (S-08)

Complete rehabilitation of the Coal Creek Springs collectors to improve production capacity resulting in greater utilization of the water right. Improvements are to be defined by the outcomes of the 2023/2024 hydrogeologic study currently being completed as Phase 1 (S-04). Additional upgrades may be identified in the hydrologic investigation; therefore, the cost of this CIP item should be revisited upon completion of the study.

8.2.3.1.9 Coal Creek Springs Chlorination Building Replacement (S-09)

Coal Creek Springs chlorination building was identified as requiring replacement in the 2013 Facility Evaluation Study. Additionally, the project will upgrade the source treatment from chlorine gas to a liquid sodium hypochlorite disinfection system. Sizing of the new equipment will be dependent upon capacity improvements completed as part of the Coal Creek Springs Rehabilitation Project. A new building will be constructed to house the equipment. The project ID was previously S-21 in the 2015 WSP.

8.2.3.1.10 Well 7 Treatment Phase 1 (S-10)

Well 7 is not operational due to high manganese levels. Manganese treatment is required to allow operation of this facility to be restored and to utilize the full water right for this well. Due to space limitations at the Well 7 site, the treatment facilities will be added at the Fulmer Field CCT Facility. The treatment facility will be installed in two phases. The first phase will provide 2.5 mgd of capacity. Additionally, phase 1 of the project will address the recommended improvements to the Fulmer Field CCT Facility identified in the 2013 Facility Evaluation Study, including a new pump and motor. The project ID was previously S-15 in the 2015 WSP.

8.2.3.1.11 Well 2 Replacement (S-11)

The Fulmer Well Field Improvement project found that Well 2 can continue to serve the City but would need to be replaced to resolve ongoing operational challenges. This project includes installation of a new large diameter well. It is assumed that the well will remain on its existing site, or other City-owned property. The project ID was previously S-20 in the 2015 WSP.

8.2.3.1.12 Howard Road CCTF Expansion (S-12)

The inflow to the Howard Road CCTF will increase with the completion of the Well 1 Improvements project in 2016 and planning production improvements for Coal Creek Springs Collector Improvements. The existing facility will be expanded to its full capacity to provide additional treatment capacity and redundant pump capacity to match increased flows. Additionally, the project will address the recommended improvements to Howard Road CCTF identified in the 2013 Facility Evaluation Study, including a new pump and motor. The expansion will include an additional aeration tower and a pump to match existing. The project ID was previously S-18 in the 2015 WSP.

8.2.3.1.13 Well 7 Back-up Power (S-13)

Well 7 is currently out of service, but the City has plans to bring the facility back online once manganese treatment is provided as part of the Well 7 Treatment Phase 1 Project. Without back-up power to its pumps, Well 7 is not considered a reliable source of supply for the Valley Service Area. The City has limited land available at the Well 7 site, therefore, backup power will be installed at the Fulmer Field CCT Facility. The project also includes installing underground electrical transmission capability between Well 7 and the Fulmer Field CCT Facility. The project ID was previously S-03 in the 2015 WSP.

8.2.3.1.14 Well 7 Treatment Phase 2 (S-14)

Well 7 Treatment Phase 2 will complete the manganese treatment facilities at the Fulmer Field CCT Facility to allow year-round use of Well 7. Phase 2 will add 2.5 mgd of treatment for a total capacity of 5.0 mgd. The project ID was previously S-16 in the 2015 WSP.

8.2.3.1.15 Wells 3A/3B Treatment (S-15)

Wells 3A and 3B are not operated due to high manganese levels. Manganese treatment is required to allow these wells to be used, which would add 4.03 mgd of instantaneous flow capacity to the City's supply capabilities. The project includes manganese treatment, a new well and treatment building, well pumps, and onsite backup-power. Additionally, a new sodium hypochlorite system for chlorination will be installed. The project ID was previously S-11 in the 2015 WSP.

Table 8-3 | Prioritized Water Supply Improvement Projects

Project Name	Project ID	Project Timing	Added Qi Capacity (mgd)	Estimated Cost 2024 USD	Brief Project Description
0 to 10-Year Planning Horizon					
Cascade Water Alliance Water Purchase	S-01	2024-2029	3.32	$5,608,860	The agreement provides an additional 3.32 mgd of supply during the peak day and 1.5 mgd of average day supply.
Water Resources Protection Program (Wellhead Protection)	S-02	2024-2044 (Annual)		$1,287,700	Annual funding for Wellhead Protection activities.
Rehabilitate & Clean Wells 2 and 6 (3-year Cycle)	S-03	2025-2044		$1,750,000	3-year cycle program to clean and rehab Wells 2 and 6.
Well Inspection and Redevelopment Program	S-04	2026-2027		$420,000	Annual funding allocation for investigations and redevelopment of wells and springs to maximize production capacity.
On-Site Chlorine Generation Systems (OSEC) at Wells 1 and 4	S-05	2026-2027		$275,000	Replace liquid hypochlorite systems with on-site generation systems.
Fulmer CCTF Replace On-Site Chlorine Generation System (OSEC)	S-06	2026-2027		$500,000	Replace aged on-site chlorine generation equipment.
Well 5/5A Upgrades	S-07	2026-2028		$2,715,000	New building, back-up generator, chlorination, and a hydrologic investigation to evaluate the reasons for decreased production.
Coal Creek Springs Rehabilitation – Phase 2	S-08	2027-2030	4.32	$5,337,000	Rehabilitation of the Coal Creek Springs collectors to improve production.
Coal Creek Springs Chlorination Building Replacement	S-09	2030-2031		$2,081,000	Replace chlorination system and building at Coal Creek Springs Facility with hypochlorite disinfection system.
Well 7 Treatment Phase 1	S-10	2030-2032	2.5	$10,097,000	Requires manganese treatment facilities
Well 2 Replacement	S-11	2030-2031	3.46	$1,960,000	Replace Well 2 to resolve ongoing operational challenges.
Howard Road CCTF Expansion	S-12	2032-2033		$1,450,000	Expand the facility to its full capacity (including an additional aeration tower and pumps).
Well 7 Back-Up Power	S-13	2032-2033		$2,075,000	Provide back-up power for this source.
Well 7 Treatment Phase 2	S-14	2033-2035	2.5	$8,054,000	Requires completion of manganese treatment facilities.
10 to 20-Year Planning Horizon					
Wells 3A/3B Treatment	S-15	2036-2038	4.03	$13,945,000	Provide manganese treatment for well operation
Algona Well 1 Study – Phase 2	S-16	2039		$250,000	Evaluate possible uses of water right.
Subtotal				**$57,805,560**	

8.2.3.1.16 Algona Well 1 Study – Phase 2 (S-16)

Algona Well 1 has been abandoned and all related facilities removed. This project will study possible options to utilize the existing water right. One option may be to redevelop the well on-site at its previous location. Another alternative may be to pursue an alternative well location or how to use the water right at another existing facility. The project does not include the development of design, permitting or construction of well infrastructure. The project ID was previously S-13 in the 2015 WSP.

8.2.3.2 Storage

Table 8-4 provides a summary of the planned reservoir projects. Project IDs have been revised to reflect the updated prioritization and planned timing of projects presented in this WSP. Previous project IDs from the 2015 WSP as presented above will be discontinued for clarity purposes. Active projects identified above are not discussed in detail as they are already well defined and in progress.

8.2.3.2.1 Reservoir Repair & Replacements (R-01)

The City has allocated an annual capital expenditure for general reservoir maintenance and minor improvements. Projects are identified by the City on an as-needed basis. The project ID was previously R-03 in the 2015 WSP.

8.2.3.2.2 Reservoir Painting (10-year Cycle) (R-02)

The City plans to paint the welded steel reservoirs to extend their useful life. This program finances the painting of two reservoirs every 10 years. The project ID was previously R-05 in the 2015 WSP.

8.2.3.2.3 Academy PRV Project (R-03)

A new PRV facility will be located to rezone a portion of the Valley 242 pressure zone to the Academy 350 pressure zone to resolve fire flow deficiencies in the area. This PRV facility will also allow storage transfer from the Academy Service Area where this is surplus storage to the Valley Service Area to resolve 2034 storage deficit projections, allowing for more system flexibility. The PRV facility location is assumed to be in a cul-de-sac where U St SE meets 28th St SE but will be confirmed during design. The PRV vault is assumed to house a 2-inch PRV for low flows (normal operation) and a 6-inch PRV for fire flows. This project was not identified in the 2015 WSP.

8.2.3.2.4 Reservoir Capital Improvements (R-04)

The 2013 Facility Evaluation Study identified improvements to reservoir facilities based on the condition and remaining useful life of the assets within the facilities. Improvements were identified at Reservoir 1, Reservoir 4A & 4B, and Reservoir 8A & 8B. The project ID was previously R-07 in the 2015 WSP.

8.2.3.2.5 Braunwood Reservoir Improvements (R-05)

The 2013 Facility Evaluation Study identified improvements to reservoir facilities based on the condition and remaining useful life of the assets within the facilities. Improvements were identified at the Braunwood Reservoir and were previously included in Reservoir Capital Improvements project (R-07) in the 2015 WSP.

8.2.3.2.6 Valley Service Area Reservoir No. 3 (R-06)

To meet future storage requirements in the Valley Service Area, it is recommended that a new, 2-MG storage reservoir. A siting study should be conducted to identify the preferred reservoir location and other details; it is assumed that the reservoir will be in the northeast portion of the Valley 242 pressure zone.

Property acquisition is expected to be required and an allowance of $1M is included in the project budget. The project ID was previously R-04 in the 2015 WSP. It was assumed that the new reservoir will be a prestressed concrete tank, however this should be confirmed during the siting study.

Table 8-4 | Storage Improvements Projects

Project Name	Project ID	Project Timing	Added Storage (MG)	Estimated Cost 2024 USD	Brief Project Description
0 to 10-Year Planning Horizon					
Reservoir Repair & Replacements	R-01	2024-2044 (Annual)		$1,392,000	Annual program for reservoir maintenance and minor improvements.
Reservoir Painting (10-year Cycle)	R-02	2025-2044		$3,500,000	Required for maintenance and reservoir longevity in both Academy and Lea Hill service areas.
Academy PRV Project	R-03	2027		$470,000	PRV for storage transfer and rezoning to meet fire flow demands.
Reservoir Capital Improvements	R-04	2027		$470,000	Improvements to Reservoir 1, Reservoir 4A&4B, Reservoir 8A&8B based on the condition and remaining useful life.
10 to 20-Year Planning Horizon					
Braunwood Reservoir Improvements	R-05	2039-2040		$250,000	Improvements based on condition and remaining useful life.
Valley Service Area Reservoir No. 3	R-06	2041-2044	2.0	$11,745,000	Required to meet future storage requirements in the Valley service area.
Subtotal				**$17,827,000**	

8.2.3.3 Pump Stations

Table 8-5 provides a summary of the planned pump station projects. Project IDs have been revised to reflect the updated prioritization and planned timing of projects presented in this WSP. Previous project IDs from the 2015 WSP as presented above will be discontinued for clarity purposes. Active projects identified above are not discussed in detail as they are already well defined and in progress.

8.2.3.3.1 Intertie Pump Station/Lea Hill BPS Improvements (PS-01)

The Lea Hill BPS serves the closed 648 Pressure Zone and does not have sufficient capacity to meet fire flow requirements under current or future demand projections. To meet fire flow requirements, an additional 2,500 gpm of firm capacity is required. The Lea Hill BPS and that Intertie Pump Station share a building. To increase capacity of the Lea Hill PS, the project will provide additional piping and modify the existing Intertie Pump Station/Lea Hill BPS building to utilize the existing Intertie Pump Station pumps to serve the Lea Hill 648 pressure zone. The project will also add pressure reducing valves and control valves at Lea Hill reservoirs, and system valves to provide efficient operation of the 132nd Ave Tacoma Intertie. On-site back-up power improvements for the Lea Hill BPS are also included to improve facility reliability.

In the 2015 WSP, this project also included distribution system improvements to rezone a portion of the Lea Hill Service Area; this work has been shifted to a separate project titled the Lea Hill 648 Zoning Adjustment project. This project ID was previously PS-04 in the 2015 WSP.

8.2.3.3.2 Lea Hill Pump Station Replacement (PS-02)

The Lea Hill Pump Station will be reconstructed to provide redundant pumped supply to the Lea Hill area. If the Green River Pump Station is out of service for maintenance, a redundant pump station would avoid the need to purchase more expensive regional surface water through the 132nd Intertie. The pump station needs to be relocated from its current location on the shoulder of Lea Hill Road at the base of a steep hill for safety and reliability considerations. Two separate active projects (Garden Avenue Realignment and Lea Hill Roundabout) will construct approximately 900 feet and 835 feet of 12-inch diameter transmission main respectively, that is required for the future pump station. The project ID was previously PS-10 in the 2015 WSP.

8.2.3.3.3 Braunwood Pump Station Mechanical Upgrades (PS-03)

The Braunwood Pump Station is an aging facility that serves the Braunwood Satellite System. The project will include minor mechanical or electrical improvements to rehabilitate the facility for continued use. This project ID was previously PS-09 in the 2015 WSP. This project was not identified in the 2015 WSP.

8.2.3.3.4 Game Farm Park Pump Station Mechanical Upgrades Project (PS-04)

The Game Farm Wilderness Park Pump Station is an aging facility that serves the Game Farm Wilderness and recreational area. The 2013 Facility Evaluation Study identified improvements to allow continued use of the station including pump replacement and building repairs. Additional minor mechanical or electrical improvements may be warranted to rehabilitate the facility for continued use. This project ID was previously PS-09 in the 2015 WSP.

Table 8-5 | Pump Station Improvement Projects

Project Name	Project ID	Project Timing	Added Firm/Reliable Capacity (gpm)	Estimated Cost 2024 USD	Brief Project Description
0 to 10-Year Planning Horizon					
Intertie Pump Station/Lea Hill BPS Improvements	PS-01	2024-2026	2,500 gpm	$2,325,000	Expand the fire flow capacity of the Lea Hill BPS by connecting to the Intertie PS pumps.
Lea Hill Pump Station Replacement	PS-02	2027-2029		$6,365,000	Decommission and replace the pump station at the end of its usable life.
10 to 20-Year Planning Horizon					
Braunwood Pump Station Mechanical Upgrades	PS-03	2034-2035		$250,000	Rehabilitate Pump Station to allow continued use.
Game Farm Park Pump Station Mechanical Upgrades	PS-04	2034-2035		$250,000	Rehabilitate Pump Station to allow continued use.
Subtotal				**$9,190,000**	

8.2.3.4 Distribution System

The City's water distribution system will require many improvements to address fire flow deficiencies identified by the system analysis presented in **Chapter 3**. Additionally, the City has undersized, and aging piping within the water system that needs to be replaced to reduce the risk of breaks and leaks. The identified distribution system improvements programs are described below and summarized in **Table 8-7**.

Project IDs have been revised to reflect the updated prioritization and planned timing of projects presented in this WSP. Previous project IDs from the 2015 WSP as presented above will be discontinued for clarity purposes. Active projects identified above are not discussed in detail as they are already well defined and in progress.

8.2.3.4.1 Annual Distribution System Improvements Program (D-01)

The Annual Distribution System Improvements Program is focused on capacity related improvements to the City's water distribution system as identified in **Figure 3-12** and **Table 3-33** of **Chapter 3**. These improvements address deficiencies during fire flow demand scenarios. A comprehensive list of the projects and their individual estimated costs are provided in **Appendix W**. The total of all project costs is distributed across the 20-year planning horizon and will be prioritized to address the areas with the greatest deficiency first. This project ID was previously D-02 in the 2015 WSP.

8.2.3.4.2 Street Utility Improvements (D-02)

The City Street Utility program provides an annual budget to perform water main improvements in coordination with the Street Preservation programs and general arterial street improvements. By replacing water infrastructure concurrent with other utility or street improvement projects, the City can reduce overall project costs. Identified projects are anticipated to occur annually throughout the planning period. This project ID was previously D-06 in the 2015 WSP.

8.2.3.4.3 Water Repair & Replacements (D-03)

Previous WSPs identified pipelines for the City's Water Repair & Replacement program focus on replacement of old cast iron pipes, pipes under 6-inches that serve fire hydrants, dead-end mains in non-residential areas, and decommissioned duplicate pipes. The budget for this project has been re-evaluated and is revised to focus on the replacement of undersized cast iron pipe. The budget was developed focusing specifically on 4-inch diameter cast iron pipe, however the City may also allocate this budget to replace other undersized cast iron pipe within the system. **Table 8-6** summarizes the basis of the program budget using the same unit cost assumptions and allowances established in **Section 8.1.3**. The City's pipeline water repair and replacement program will be accomplished through the combination of the Street Utility Improvements (D-02) and this program. Ideally, Water Repair and Replacement and Street Utility projects will be constructed on alternating years to maintain consistent levels of capital expenditures. This project ID was previously D-09 in the 2015 WSP.

Table 8-6 | Water Repair & Replacements Cost Estimate

Length (LF)	Existing Size (inch)	New Size (inch)	Unit Cost	Component Cost	Construction Cost	Project Cost
11,740	4	8	$490/LF	$5,752,500	$8,241,000	$11,950,000

8.2.3.4.4 Water Trench Patches Program (D-04)

This program provides annual funding for roadway restoration of trench patches from water main leak repairs and water service installation that are beyond the scope of work done by City maintenance staff. This project was not identified in the 2015 WSP.

8.2.3.4.5 West Hill Springs Transmission Main Replacement (D-05)

The 2020 pipeline assessment indicated the existing cast iron transmission main is in poor condition. The main has experienced two breaks in the past. The project will replace approximately 1,250 LF of 10-inch

diameter cast iron pipe with 12-inch diameter ductile iron pipe. The project includes preliminary geotechnical investigations prior to design and construction. This project was not identified in the 2015 WSP.

8.2.3.4.6 Lea Hill 648 Zoning Adjustment (D-06)

The system capacity analysis identified deficiencies in the upper portion of the Lea Hill 563 pressure zone where the highest service elevations of the zone are located. This project includes system piping and valving modifications to rezone a portion of the Lea Hill 563 pressure zone to the Lea Hill 648 pressure zone. GIS and site verification, as well as minimal system modeling are required to verify necessary modifications.

Table 8-7 | Distribution System Improvements Projects

Project Name	Project ID	Project Timing	Estimated Cost 2024 USD	Brief Project Description
0 to 20-Year Planning Horizon				
Annual Distribution System Improvements Program	D-01	2025-2044 (Annual)	$59,699,000	Pipe improvement projects required to address system capacity deficits.
Street Utility Improvements	D-02	2025-2044 (Annual)	$24,618,000	Water main improvements concurrent with street improvements.
Water Repair & Replacements	D-03	2025-2044 (Annual)	$11,950,000	Pipe improvements to replace aging and undersized pipes.
Water Trench Patches Program	D-04	2024-2044 (Annual)	$3,360,000	Annual program for restoration following water and service leaks.
West Hill Springs Transmission Main Replacement	D-05	2024, 2026-2027	$1,401,000	Transmission piping replacement.
Lea Hill 648 Zoning Adjustment	D-06	2027	$104,000	Pressure zone modifications to address fire flow capacity deficit.
Subtotal			**$101,132,000**	

8.2.3.5 General Utility Projects

The general water system projects and their estimated costs are provided in **Table 8-8**. Project IDs have been revised to reflect the updated prioritization and planned timing of projects presented in this WSP. Previous project IDs from the 2015 WSP as presented above will be discontinued for clarity purposes.

8.2.3.5.1 Water System Plan Updates (G-01, G-02)

DOH requires Water System Plans to be updated every ten years. The City has allocated budget to complete Water System Plan Updates in 2034 and 2044. The project ID for both updates was previously G-08 in the 2015 WSP.

Table 8-8 | General Water System Projects

Project Name	Project ID	Project Timing	Estimated Cost 2024 USD	Brief Project Description
0 to 10-Year Planning Horizon				
Water System Plan Update - 2034	G-01	2033-2034	$750,000	Mandated by Washington Department of Health.
10 to 20-Year Planning Horizon				
Water System Plan Update - 2044	G-02	2043-2044	$750,000	Mandated by Washington Department of Health.
Subtotal			**$1,500,000**	

8.3 CIP Summary and Schedule

Table 8-9 summarizes the total CIP cost by project categories for the 20-year planning horizon. All costs shown are in 2024 dollars. Distribution system improvements comprise more than 50 percent of the allocated costs for the CIP.

Table 8-9 | Total CIP Cost by Project Category from 2024 through 2044

Category	Total CIP Cost Summary 2024 – 2044 (2024 USD)
Supply	$60,416,013
Storage	$21,579,621
Pump Stations	$9,230,000
Distribution	$121,858,681
General	$1,750,000
TOTAL	**$214,834,315**

The results of prioritizing the improvements were used to establish an implementation schedule that can be used by the City for preparing its 20-year CIP and 6-year CFP. The implementation schedule for the active projects and planned CIP projects is summarized in **Table 8-10**. More details are included in **Appendix W**. The City uses this information to develop rates and SDC charges.

The City will schedule the water main projects in the Annual Distribution Improvements Program and Water Repair and Replacements during the annual budget process. This provides the City with the flexibility to coordinate these projects with roadway or other projects within the same area.

Table 8-10 | Capital Improvements Program Costs and Phasing

CIP ID	Name	CAP/Non-CAP	Total Estimated Cost 2024 USD	2024	10-Year										20-Year		
					2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035-38	2039-42	2043-44
Active Projects																	
CP1619	104th Park Development (104th to 102nd Water Main Loop)	Non-CAP	$350,000	$350,000													
CP2301	104th Avenue SE PRV Replacement	Non-CAP	$390,475	$390,475													
CP2123	C St SW Preservation	Non-CAP	$1,802,075	$901,038	$901,038												
CP1603	Coal Creek Springs Transmission Main Replacement	Non-CAP	$4,450,422	$4,450,422													
CP2125	D St SE and 23rd Street SE Storm Improvements	Non-CAP	$2,285,677	$2,285,677													
CP2021	Well 4 Facility Improvements	Non-CAP	$884,822	$884,822													
CP2403	Well 4 Electrical Improvements	Non-CAP	$1,050,000	$200,000	$850,000												
CP2410	112th Pl SE Water Main Replacement	Non-CAP	$2,100,000	$255,000	$1,845,000												
CP1622	Auburn Way South - Hemlock St SE to Poplar St SE	Non-CAP	$2,398,000		$2,398,000												
CP2022	Garden Avenue Realignment	Non-CAP	$699,797	$699,797													
CP2210	M Street NE Widening	Non-CAP	$357,000	$37,000		$320,000											
CP2116	R Street SE Widening	Non-CAP	$1,762,488		$100,000	$1,662,488											
CP2308	R St SE and 21st St SE Roundabout	Non-CAP	$544,897	$61,897	$483,000												
CP2315	R St SE Preservation - 33rd St SE to 37th St SE	Non-CAP	$301,850	$301,850													
CP2319	Lea Hill Road/104th Ave SE Roundabout	Non-CAP	$850,000	$100,000		$150,000	$600,000										
CP2405	Fulmer Treatment Facility VFD Replacements	Non-CAP	$175,000	$175,000													
CP2219	Reservoirs 4 and 8 Seismic Rehabilitation	Non-CAP	$1,433,871	$1,433,871													
CP2404	12th St SE and Auburn Way South Water R&R	Non-CAP	$636,000	$318,000	$318,000												
CP2412	2025 Local Street Preservation	Non-CAP	$725,000	$65,000	$660,000												
	2026 Local Street Preservation	Non-CAP	$1,073,000	$50,000	$150,000	$873,000											
CP2329	Coal Creek Springs Flowmeter Replacement	Non-CAP	$375,017	$375,017													

CIP ID	Name	CAP/Non-CAP	Total Estimated Cost 2024 USD	2024	10-Year										20-Year		
					2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035-38	2039-42	2043-44
CP2134	Comprehensive Water System Plan Update - 2024	Non-CAP	$250,000	$250,000													
CP2209	Coal Creek Springs Rehabilitation - Phase 1	Non-CAP	$75,614	$75,614													
CP2413	Reservoir 2 Valves	Non-CAP	$2,268,750	$68,750	$2,200,000												
	Algona Well 1 Study – Phase 1	Non-CAP	$50,000	$50,000													
	Valley Service Area Reservoir No. 3 Siting Analysis	Non-CAP	$50,000	$50,000													
	Braunwood Pump Station Assessment	Non-CAP	$40,000	$40,000													
Supply																	
S-01	Cascade Water Alliance Water Purchase	CAP	$5,608,860	$934,810	$934,810	$934,810	$934,810	$934,810	$934,810								
S-02	Water Resources Protection Program (Wellhead Protection)	Non-CAP	$1,287,700	$87,700	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$240,000	$240,000	$120,000
S-03	Rehabilitate & Clean Wells 2 and 6 (3-year Cycle)	Non-CAP	$1,750,000		$250,000			$250,000			$250,000			$250,000	$250,000	$250,000	$250,000
S-04	Well Inspection and Redevelopment Program	Non-CAP	$420,000			$210,000	$210,000										
S-05	On-Site Chlorine Generation Systems (OSEC) at Wells 1 and 4	Non-CAP	$275,000			$100,000	$175,000										
S-06	Fulmer CCTF Replace On-Site Chlorine Generation System (OSEC)	Non-CAP	$500,000			$150,000	$350,000										
S-07	Well 5/5A Upgrades	CAP	$2,715,000			$950,000	$265,000	$1,500,000									
S-08	Coal Creek Springs Rehabilitation – Phase 2	CAP	$5,337,000				$500,000	$1,000,000	$2,000,000	$1,837,000							
S-09	Coal Creek Springs Chlorination Building Replacement	Non-CAP	$2,081,000							$520,250	$1,560,750						
S-10	Well 7 Treatment Phase 1	CAP	$10,097,000							$1,500,000	$2,597,000	$6,000,000					
S-11	Well 2 Replacement	CAP	$1,960,000							$400,000	$1,560,000						
S-12	Howard Road CCTF Expansion	CAP	$1,450,000									$450,000	$1,000,000				
S-13	Well 7 Back-Up Power	Non-CAP	$2,075,000									$414,961	$1,660,039				
S-14	Well 7 Treatment Phase 2	CAP	$8,054,000										$1,654,000	$3,800,000	$2,600,000		
S-15	Wells 3A/3B Treatment	CAP	$13,945,000												$13,945,000		

CIP ID	Name	CAP/Non-CAP	Total Estimated Cost 2024 USD	2024	10-Year										20-Year		
					2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035-38	2039-42	2043-44
S-16	Algona Well 1 Study – Phase 2	Non-CAP	$250,000													$250,000	
Storage																	
R-01	Reservoir Repair & Replacements	Non-CAP	$1,392,000	$192,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$240,000	$240,000	$120,000
R-02	Reservoir Painting (10-year Cycle)	Non-CAP	$3,500,000		$250,000	$1,500,000									$1,750,000		
R-03	Academy PRV Project	CAP	$470,000				$470,000										
R-04	Reservoir Capital Improvements	Non-CAP	$470,000				$470,000										
R-05	Braunwood Reservoir Improvements	Non-CAP	$250,000													$250,000	
R-06	Valley Service Area Reservoir No. 3	CAP	$11,745,000													$1,500,000	$10,245,000
Pump Station																	
PS-01	Intertie Pump Station/Lea Hill BPS Improvements	Non-CAP	$2,325,000	$75,000	$250,000	$2,000,000											
PS-02	Lea Hill Pump Station Replacement	Non-CAP	$6,365,000				$765,000	$3,000,000	$2,600,000								
PS-03	Braunwood Pump Station Mechanical Upgrades	Non-CAP	$250,000											$70,000	$180,000		
PS-04	Game Farm Park Pump Station Mechanical Upgrades	Non-CAP	$250,000											$70,000	$180,000		
Distribution																	
D-01	Annual Distribution System Improvements Program	CAP	$59,699,000		$400,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$3,572,636	$14,290,546	$14,290,546	$7,145,273
D-02	Street Utility Improvements	Non-CAP	$24,618,000		$601,000	$617,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000	$5,200,000	$5,200,000	$2,600,000
D-03	Water Repair & Replacements	Non-CAP	$11,950,000		$150,000	$450,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$650,000	$2,600,000	$2,600,000	$1,300,000
D-04	Water Trench Patches Program	Non-CAP	$3,360,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$640,000	$640,000	$320,000
D-05	West Hill Springs Transmission Main Replacement	Non-CAP	$1,401,000	$50,000		$200,000	$1,151,000										
D-06	Lea Hill 648 Zoning Adjustment	CAP	$104,000				$104,000										
General																	
G-01	Comprehensive Water System Plan Update - 2034	Non-CAP	$750,000										$375,000	$375,000			
G-01	Comprehensive Water System Plan Update - 2044	Non-CAP	$750,000														$750,000
Total Project Cost (March 2024 USD)			**$214,834,315**	**$15,368,740**	**$13,020,848**	**$12,897,298**	**$10,674,810**	**$11,364,810**	**$10,214,810**	**$8,937,250**	**$10,647,750**	**$11,544,961**	**$9,369,039**	**$10,367,636**	**$42,115,546**	**$25,460,546**	**$22,850,273**
Cost in Future USD with Inflation/Escalation				**$15,505,949**	**$13,438,366**	**$15,356,813**	**$13,346,021**	**$14,919,117**	**$14,079,931**	**$12,934,911**	**$16,181,050**	**$18,421,739**	**$15,697,211**	**$18,238,810**	**$84,303,230**	**$61,753,697**	**$64,192,441**

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 9

Financial Program

9.1 Introduction

This chapter was prepared by FCS GROUP to provide a financial program that allows the City of Auburn (City) water utility to remain financially viable during the planning period. This financial viability analysis considers the historical financial condition, current and identified future financial and policy obligations, operation and maintenance (O&M) needs, and the financial impacts of the capital projects identified in this Water System Plan (WSP). Furthermore, this chapter provides a review of the water utility's current rate structure with respect to rate adequacy and customer affordability.

9.2 Past Financial Performance

This section includes a historical summary of financial performance as reported by the City, including fund resources and uses arising from cash transactions.

9.2.1 Comparative Financial Statements

The City legally owns and operates a water utility. Table 9-1 shows a summary of water fund resources and uses arising from cash transactions for the previous 6 years (2017 through 2022). 2023 financial statements were not available at the time the chapter was developed. Table 9-2 shows a summary of assets and liabilities, with the difference between the two reported as "net position." Increases and decreases in net position are useful indicators of the financial position of the City's utility. Noteworthy findings and trends for the historical performance and condition of the City's water utility are then discussed.

9.2.1.1 Findings and Trends

- The City's water charges for services increased from $14.8M in 2017 to $16.5M in 2022. The average annual increase was approximately 2.2 percent per year, with a total increase of 11.4 percent from 2017 to 2022. Charges for services increase each year, except for 2019 and 2020 where revenues fell by 1.5 percent and 1.4 percent respectively. Operating Expenditures increased by $1.7M across the six years with an average annual increase of 2.8 percent. Similar to observations made in revenues, expenditures dropped in 2020 but to a greater extent, decreasing by 2.0 percent. Despite total operating expenses slightly outpacing growth in operating revenues, operating income has been positive in all years observed. 2019 and 2020 had slightly less operating income than other years, observed at $2.7M, with the remainder of the years averaging $3.1M.

- The O&M coverage ratio (total operating revenues divided by total operating expenses) was 126.3 percent in 2017. With expenses slightly outpacing revenues this metric decreased and ended 2022 at 122.8 percent. A ratio of 100.0 percent or greater shows that operating revenue will successfully cover operating expenses, and the utility has remained above this ratio for all years observed.

Table 9-1 | Summary of Historical Fund Resources and Uses Arising From Cash Transactions

	2017	2018	2019	2020	2021	2022
OPERATING REVENUES						
Charges for Service	$ 14,781,310	$ 15,293,485	$ 15,057,517	$ 14,846,679	$ 15,879,799	$ 16,459,868
Other Operating Revenue	-	600	835	835	-	-
Total Operating Revenues	$ 14,781,310	$ 15,294,085	$ 15,058,352	$ 14,847,514	$ 15,879,799	$ 16,459,868
OPERATING EXPENSES						
Operations and Maintenance	$ 3,753,573	$ 3,692,419	$ 3,789,093	$ 3,727,553	$ 3,912,937	$ 3,840,391
Administration	4,672,569	4,702,259	4,727,971	4,615,503	5,221,782	6,028,393
Depreciation and Amortization	3,269,581	3,407,933	3,848,016	3,774,956	3,826,387	3,533,926
Other Operating Expenses	8,964	-	-	-	-	-
Total Operating Expenses	$ 11,704,687	$ 11,802,611	$ 12,365,080	$ 12,118,012	$ 12,961,106	$ 13,402,710
Operating Income (Loss)	$ 3,076,623	$ 3,491,474	$ 2,693,272	$ 2,729,502	$ 2,918,693	$ 3,057,158
NONOPERATING REVENUES (EXPENSES)						
Interest Revenue	$ 104,564	$ 178,271	$ 261,654	$ 49,808	$ 22,790	$ 278,430
Other Non-Operating Revenue	269,264	324,228	589,809	148,433	26,542	86,333
Gain (Loss) on Sale of Capital Assets	-	-	-	-	-	-
Interest Expense	(703,321)	(697,363)	(658,808)	(910,452)	(663,857)	(601,400)
Other Non-Operating Expense	-	-	-	(225,230)	-	(90,443)
Total Non-Operating Revenues (Expenses)	$ (329,493)	$ (194,864)	$ 192,655	$ (937,441)	$ (614,525)	$ (327,080)
Income (Loss) Before Contributions and Transfers	$ 2,747,130	$ 3,296,610	$ 2,885,927	$ 1,792,061	$ 2,304,168	$ 2,730,078
Capital Contributions	$ 1,176,756	$ 1,271,234	$ 3,246,853	$ 2,170,407	$ 5,382,110	$ 1,772,439
Transfers In	2,500,000	2,686,332	39,258	6,536,029	-	-
Transfers Out	(2,693,946)	(2,800,400)	(147,002)	(6,643,340)	(119,472)	(96,339)
Change in Net Position	$ 3,729,940	$ 4,453,776	$ 6,025,036	$ 3,855,157	$ 7,566,806	$ 4,406,178
Net Position, January 1	75,751,705	79,481,645	83,935,421	89,960,457	93,815,614	101,382,420
Net Position, December 31	$ 79,481,645	$ 83,935,421	$ 89,960,457	$ 93,815,614	$ 101,382,420	$ 105,788,598
O&M Coverage Ratio	126.3%	129.6%	121.8%	122.5%	122.5%	122.8%
Net Operating Income as a % of Operating Revenue	20.8%	22.8%	17.9%	18.4%	18.4%	18.6%
Debt Service Coverage Ratio	3.83	4.16	3.93	3.63	3.17	2.85

Table 9-2 | Summary of Historical Comparative Statements of Net Position

	2017	2018	2019	2020	2021	2022
CURRENT ASSETS						
Cash and Cash Equivalents	$ 5,765,412	$ 7,294,288	$ 9,568,609	$ 11,417,193	$ 14,719,905	$ 13,826,776
Investments	-	-	-	-	-	-
Restricted Cash:						
Bond Payments	1,690,316	1,687,994	1,672,123	2,334,270	2,246,000	2,183,144
Customer Deposits	43,892	31,541	40,062	64,792	91,672	104,070
Other (Reserve for Bonds and Rate Stabilization)	1,630,313	1,630,314	1,627,520	11,586,722	5,987,879	2,448,053
Customer Accounts	1,363,945	1,837,533	1,912,797	2,090,429	2,007,050	2,203,858
Other Receivables	-	-	-	-	-	-
Due From Other Governmental Units	17,968	14,338	-	-	10,000	-
Inventories	135,450	183,252	189,071	233,015	242,192	313,273
Total Current Assets	$ 10,647,296	$ 12,679,260	$ 15,010,182	$ 27,726,421	$ 25,304,698	$ 21,079,174
NONCURRENT ASSETS						
Net Pension Asset	$ -	$ -	$ -	$ -	$ 2,266,854	$ 920,143
Capital Assets Not Being Depreciated:						
Land	897,971	897,971	897,971	1,283,524	1,283,524	1,283,524
Intangible - Water Rights	5,449,186	5,701,772	5,954,358	6,889,163	7,823,968	8,758,773
Construction In Progress	8,374,328	620,533	3,488,784	4,443,772	6,918,228	6,283,865
Capital Assets:						
Buildings and Equipment	2,509,599	2,509,599	2,509,599	2,509,599	2,509,599	2,509,599
Improvements Other Than Buildings	131,463,582	142,480,531	145,175,810	151,038,789	159,207,726	167,888,532
Less Accumulated Depreciation	(54,538,817)	(57,946,751)	(61,794,767)	(65,569,723)	(69,396,109)	(72,930,035)
Total Noncurrent Assets Net of Accumulated Depreciation	$ 94,155,849	$ 94,263,655	$ 96,231,755	$ 100,595,124	$ 110,613,790	$ 114,714,401
TOTAL ASSETS	$ 104,803,145	$ 106,942,915	$ 111,241,937	$ 128,321,545	$ 135,918,488	$ 135,793,575
DEFFERED OUTFLOWS OF RESOURCES						
Deferred Outflow from Bond Refunding	$ -	$ -	$ -	$ 78,146	$ 78,146	$ 78,146
Deferred Outflow related to Pensions	312,206	274,590	296,941	334,033	309,166	866,866
Total Deferred Outflows of Resources	312,206	274,590	296,941	412,179	387,312	$ 945,012
CURRENT LIABILITIES						
Current Payables	$ 1,354,856	$ 831,153	$ 971,724	$ 1,015,566	$ 1,627,369	$ 700,718
Claims Payable	-	-	-	-	-	-
Loans Payable - Current	634,328	652,107	467,646	478,000	250,914	224,800
Employee Leave Benefits - Current	125,285	122,115	128,188	122,116	172,872	172,114
Leases Payable - Current	-	-	-	-	-	-
Revenue Bonds Payable - Current	871,737	902,092	935,347	1,215,345	1,268,753	1,327,964
Payable From Restricted Assets:						
Accrued Interest	828,486	794,779	754,158	1,126,592	1,065,376	998,923
Deposits	43,892	31,541	40,062	64,792	91,672	104,070
Other Liabilities Payable	600	-	-	-	-	-
Total Current Liabilities	$ 3,859,184	$ 3,333,787	$ 3,297,125	$ 4,022,411	$ 4,476,956	$ 3,528,589
NONCURRENT LIABILITIES						
Employee Leave Benefits	$ 37,836	$ 44,177	$ 34,069	$ 44,176	$ 74,823	$ 66,026
Loans Payable	3,689,390	3,123,514	2,697,219	2,359,332	2,108,418	1,883,620
Leases Payable	-	-	-	-	-	-
Revenue Bonds Payable	14,899,559	13,952,693	12,972,571	26,189,156	24,596,375	22,944,382
Net Pension Liability	2,775,633	2,245,967	1,937,559	1,917,936	1,216,710	1,478,887
Total Non Current Liabilities	$ 21,402,418	$ 19,366,351	$ 17,641,418	$ 30,510,600	$ 27,996,326	$ 26,372,915
TOTAL LIABILITIES	$ 25,261,602	$ 22,700,138	$ 20,938,543	$ 34,533,011	$ 32,473,282	$ 29,901,504
DEFERRED INFLOWS OF RESOURCES						
Deferred Inflow Related to Leases	$ -	$ -	$ -	$ -	$ -	$ -
Deferred Inflow Related to Pensions	372,104	581,946	639,878	385,099	2,450,098	1,048,485
Total Deferred Inflows of Resources	$ 372,104	$ 581,946	$ 639,878	$ 385,099	$ 2,450,098	$ 1,048,485
NET POSITION						
Net Investment in Capital Assets	$ 75,751,151	$ 77,321,243	$ 80,831,095	$ 72,687,561	$ 86,632,404	$ 87,779,897
Restricted For:						
Debt Service	801,827	835,535	873,362	10,460,130	658,575	3,265,869
Rate Stabilization	-	-	-	-	-	-
Pension Asset	-	-	-	-	-	920,143
Unrestricted	2,928,667	5,778,643	8,256,000	10,667,923	14,091,441	13,822,689
TOTAL NET POSITION	$ 79,481,645	$ 83,935,421	$ 89,960,457	$ 93,815,614	$ 101,382,420	$ 105,788,598
Current Ratio	2.8	3.8	4.6	6.9	5.7	6.0
Debt to Net Position Ratio	0.26	0.23	0.20	0.33	0.29	0.26
Debt to Noncurrent Capital Assets Ratio	0.22	0.21	0.19	0.31	0.26	0.24

- Net operating income as a percentage of operating revenue was 20.8 percent in 2017, decreasing to a low of 17.9 percent in 2019, before ending 2022 at 18.6 percent. Similar to the O&M coverage ratio, these trends show how successfully operating revenue actually covered operating expenses, with higher positive numbers being the best and negative numbers showing a need for improvement. In addition, these trends demonstrate the ability of the utility to invest in capital, whether through direct cash transfers or the issuance and servicing of debt.

- The debt service coverage ratio measures the amount of cash flow available to meet principal and interest payments. Typically, revenue bond debt service coverage requires a minimum factor of 1.25 during the life of the loans. This ratio is calculated by dividing cash or net operating income (operating revenues less operating expenses) by annual revenue bond debt service. The debt service coverage ratio for all outstanding revenue bond debt ended 2017 at 3.83, decreasing to 2.85 by 2022, as the City took on more debt liabilities. The fact that this ratio has sustained levels higher than the minimum target of 1.25 indicates a stable capacity for new debt and will likely result in favorable terms when entering the bond market.

9.2.1.2 Findings and Trends

- The current ratio is calculated by dividing unrestricted current assets by current liabilities and measures an entity's ability to pay short-term obligations. This ratio ranges from a low of 2.8 in 2017 to a high of 6.9 in 2020, ending at 6.0 in 2022. Anything above 2.0 for this liquidity ratio is good.

- The Debt to Net Position Ratio compares total debt to total net position, which is the difference between total assets and liabilities. This ratio ranged from a high of 0.33 or 33 percent in 2020 to a low of 0.20 or 20 percent in 2019. For utilities, a ratio of 40 to 60 percent helps to moderate rate impacts by spreading costs over a longer period of time. Based on these results, the City may consider utilizing debt service for future capital investments, especially if it benefits system expansion.

- The Debt to Noncurrent Capital Asset Ratio compares total debt to noncurrent capital assets, which are also known as property, plant and equipment. This ratio begins at 0.22 or 22 percent debt to 78 percent noncurrent assets in 2017. Noncurrent capital assets increase by $20.6 million throughout the six-year history while debt increased by $6.2 million, and the ratio increases to 24 percent by 2022. Similar to the debt to net position ratio, these results indicate the utility has ample borrowing capacity and may consider utilizing debt service for future capital investments, especially if it benefits system expansion. A ratio of 40 percent debt to 60 percent equity or below is a general industry target.

9.3 Financial Plan

The water utility is responsible for generating sufficient revenue to meet all of its costs. The primary source of funding is derived from ongoing monthly service charges, with additional revenue coming from late penalties and interest earnings. The City controls the level of user charges and, with City Council approval, can adjust user charges as needed to meet financial objectives.

The financial plan can only confirm financial feasibility if it considers the total system costs of providing water services, both operating and capital. To meet these objectives, the following elements have been completed.

1. **Capital Funding Plan.** Identifies the total capital improvement plan (CIP) obligations of the planning period. The plan defines a strategy for funding the CIP, including an analysis of available resources from rate revenues, existing reserves, connection charge revenues, debt financing, and any special resources that may be readily available (e.g., grants, developer contributions, etc.). The capital funding plan impacts the financial plan through the use of debt financing (resulting in annual debt service) and the assumed rate revenue made available for capital funding.

2. **Financial Forecast.** Identifies future annual non-capital costs associated with the operation, maintenance, and administration of the water system. Included in the financial plan is a reserve analysis that forecasts cash flow and fund balance activity, along with testing for satisfaction of actual or recommended minimum fund balance policies. The financial plan ultimately evaluates the sufficiency of utility revenues in meeting all obligations, including cash uses such as operating expenses, debt service, capital outlays, and reserve contributions, as well as any coverage requirements associated with long-term debt. The plan also identifies the future adjustments required to fully fund all utility obligations in the planning period.

9.3.1 Capital Funding Plan

To properly evaluate future capital funding needs, capital costs were escalated by 3.00 percent annually to the year of planned spending. The CIP developed for this WSP identifies $129.4M in escalated project costs over the 10-year planning horizon from 2024-2033. The 20-year period, through 2043, includes $262.6M in total escalated project costs.

A summary of the 10-year and 20-year CIPs are shown in **Table 9-3**. As shown, each year has varied capital cost obligations depending on construction schedules and infrastructure planning needs.

Table 9-3 | 10-Year and 20-Year CIPs

Year	Unescalated $	Escalated $
2024	$ 15,368,740	$ 15,368,740
2025	13,020,848	13,411,473
2026	12,897,298	13,682,743
2027	10,674,810	11,664,653
2028	11,364,810	12,791,194
2029	10,214,810	11,841,764
2030	8,937,250	10,671,544
2031	10,647,750	13,095,389
2032	11,544,961	14,624,811
2033	9,369,039	12,224,471
10-Year Total	**$ 114,040,315**	**$ 129,376,782**
2034 - 2043	87,371,364	133,200,307
20-Year Total	**$ 201,411,679**	**$ 262,577,089**

Table 9-4 provides more detail for the 10-year CIP.

Table 9-4 | 10-Year CIP (Escalated $)

Project	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Active Projects (In Design or Construction)										
104th Park Development (104th to 102nd Water Main Loop)	$ 350,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
104th Avenue SE PRV Replacement	390,475									
C St SW Preservation	901,038	928,069								
Coal Creek Springs Transmission Main Replacement	4,450,422									
D St SE and 23rd Street SE Storm Improvements	2,285,677									
Well 4 Facility Improvements	884,822									
Well 4 Electrical Improvements	200,000	875,500								
112th Pl SE Water Main Replacement	255,000	1,900,350								
Auburn Way South - Hemlock St SE to Poplar St SE		2,469,940								
Garden Avenue Realignment	699,797									
M Street NE Widening	37,000		339,488							
R Street SE Widening		103,000	1,763,734							
R St SE and 21st St SE Roundabout	61,897	497,490								
R St SE Preservation - 33rd St SE to 37th St SE	301,850									
Lea Hill Road/104th Ave SE Roundabout	100,000		159,135	655,636						
Fulmer Treatment Facility VFD Replacements	175,000									
Reservoirs 4 and 8 Seismic Rehabilitation	1,433,871									
12th St SE and Auburn Way South Water R&R	318,000	327,540								
2025 Local Street Preservation	65,000	679,800								
2026 Local Street Preservation	50,000	154,500	926,166							
Coal Creek Springs Flowmeter Replacement	375,017									
Comprehensive Water System Plan Update - 2024	250,000									
Reservoir 2 Valves	68,750	2,266,000								
Supply										
Cascade Water Alliance Water Purchase	934,810	962,854	991,740	1,021,492	1,052,137	1,083,701				
Water Resources Protection Program	87,700	61,800	63,654	65,564	67,531	69,556	71,643	73,792	76,006	78,286
Rehabilitate & Clean Wells 2 and 6 (3-year Cycle)		257,500			281,377			307,468		
Well Inspection and Redevelopment Program			222,789	229,473						
Coal Creek Springs Rehabilitation	75,614			546,364	1,125,509	2,318,548	2,193,474			
Coal Creek Springs Chlorination Building Replacement							621,206	1,919,526		
Howard Road CCTF Expansion									570,047	1,304,773
On-Site Chlorine Generation Systems (OSEC) at Wells 1 and 4			106,090	191,227						
Fulmer CCTF Replace On-Site Chlorine Generation System (OSEC)			159,135	382,454						
Well 5/5A Upgrades			1,007,855	289,573	1,688,263					
Well 7 Treatment Phase 1							1,791,078	3,193,982	7,600,620	
Well 7 Back-Up Power									525,660	2,165,974
Well 7 Treatment Phase 2										2,158,095
Well 2 Replacement							477,621	1,918,603		
Algona Well 1 Study	50,000									
Storage										
Reservoir Repair and Replacements	192,000	61,800	63,654	65,564	67,531	69,556	71,643	73,792	76,006	78,286
Reservoir Painting (10-year Cycle)		257,500	1,591,350							
Academy PRV Project				513,582						
Reservoir Capital Improvements				513,582						
Valley Service Area Reservoir No. 3	50,000									
Pump Stations										
Intertie Booster Pump Station Improvements	75,000	257,500	2,121,800							
Lea Hill Pump Station Replacement				835,936	3,376,526	3,014,112				
Braunwood Pump Station Mechanical Upgrades	40,000									
Distribution System										
Annual Distribution System Improvements Program		412,000	2,652,250	2,731,818	2,813,772	2,898,185	2,985,131	3,074,685	3,166,925	3,261,933
Street Utility Improvements		619,030	654,575	1,420,545	1,463,161	1,507,056	1,552,268	1,598,836	1,646,801	1,696,205
Water Repair & Replacements		154,500	477,405	655,636	675,305	695,564	716,431	737,924	760,062	782,864
Water Trench Patches Program	160,000	164,800	169,744	174,836	180,081	185,484	191,048	196,780	202,683	208,764
West Hill Springs Transmission Main Replacement	50,000		212,180	1,257,729						
Lea Hill 648 Zoning Adjustment				113,644						
General										
Comprehensive Water System Plan Update - 2034										489,290
	$15,368,740	$13,411,473	$13,682,743	$11,664,653	$12,791,194	$11,841,764	$10,671,544	$13,095,389	$14,624,811	$12,224,471

9.4 Available Funding Assistance and Financing Resources

9.4.1 City Resources

Resources appropriate for funding capital needs include accumulated cash in the capital fund, rate revenues designated for capital spending purposes, developer contributions, and capital-related charges

such as system development charges. The first two resources will be discussed in the **Fiscal Policies** section of the **Financial Forecast**. Capital-related charges are discussed below.

9.4.1.1 System Development Charges

A connection charge such as the City's system development charge (SDC) refers to a one-time charge imposed on new customers as a condition of connecting to the water system. The purpose of the SDC is two-fold: 1) to promote equity between new and existing customers; and 2) to provide a source of revenue to fund capital projects necessary for meeting growth. This revenue can only be used to fund utility capital projects or to pay debt service incurred to finance those projects. In the absence of a connection charge, growth-related capital costs would be borne in large part by existing customers. In 2024, the City charged all new customers an SDC of $9,553 per meter capacity equivalent (MCE). MCEs are defined by the American Water Works Association and represent the maximum safe operating flow capacity in gallons per minute, relative to the base meter size.

9.4.1.2 Local Facilities Charges

While a connection charge is the manner in which new customers pay their share of system investment costs, local facilities charge funding is used to pay the costs of local facilities that connect each property to the system's infrastructure. Local facilities funding is often overlooked in rate forecasting because it is funded upfront by either connecting customers and developers, or through an assessment to properties, but never from rates.

A number of mechanisms can be considered toward funding local facilities. One of the following scenarios typically occurs: (a) the utility charges a connection fee based on the cost of the local facilities (under the same authority as the facilities assessment fee); (b) a developer funds an extension of the system to its development and turns those facilities over to the utility (contributed capital); or (c) a local assessment is set up called a Utility Local Improvement District (ULID/LID) or a Local Utility District (LUD), which collects tax revenue from benefited properties.

A local facilities charge (LFC) is a variation of the connection charge. It is a city-imposed charge to recover the cost related to service extension to local properties. Often called a front-footage charge and imposed on the basis of footage of the main "fronting" a particular property, it is usually implemented as a reimbursement mechanism to a city for the cost of a local facility that directly serves a property. It is a form of a connection charge and thus can accumulate up to 10 years of interest. It typically applies in instances when no developer-installed facilities are needed through developer extension due to the prior existence of available mains already serving the developing property.

The developer extension is a requirement that a developer install on-site and sometimes off-site improvements as a condition of extending service. These are in addition to the connection charge required and must be built to City standards. Part of the agreement between the City and the developer planning to extend service might include a latecomer agreement (also called payback agreements), resulting in a latecomer charge to new connections for the developer extension.

Latecomer charges are a variation of developer extensions, whereby new customers connecting to a developer-installed improvement make a payment to the City based on their share of the developer's cost. The City passes this charge on to the developer who installed the facilities. As part of the developer extension process, this defines the allocation of costs and records latecomer obligations on the title of affected properties. No interest is allowed, and the reimbursement agreement cannot exceed 20 years in duration.

ULID/LID is another mechanism for funding infrastructure that assesses benefited properties based on the special benefit received by the construction of specific facilities. Most often used for local facilities, some ULIDs also recover related general facilities costs. Substantial legal and procedural requirements can make this a relatively expensive process, and there are mechanisms by which a ULID can be rejected.

9.4.2 Outside Resources

This section outlines various grant, loan, and bond opportunities available to the City through federal and state agencies to fund the CIP identified in the WSP.

9.4.2.1 Grants and Low-Cost Loans

Historically, federal and state grant programs were available to local utilities for capital funding assistance. However, these assistance programs have been mostly eliminated, substantially reduced in scope and amount, or replaced by loan programs. Remaining grant programs are generally lightly funded and heavily subscribed. Nonetheless, the benefit of low-interest loans makes the effort of applying worthwhile.

The State of Washington's Department of Commerce maintains a document currently entitled "*Funding Programs for Drinking Water and Wastewater Projects; Updated 3-5-2024*", which contains details on government programs, eligibility requirements, and contact information, should the City wish to inquire about program offerings and eligibility requirements.

9.4.2.2 Bond Financing

General Obligation Bonds – General obligation (G.O.) bonds are bonds secured by the full faith and credit of the issuing agency, committing all available tax and revenue resources to debt repayment. With this high level of commitment, G.O. bonds have relatively low interest rates and few financial restrictions. However, the authority to issue G.O. bonds is restricted in terms of the amount and use of the funds, as defined by the Washington constitution and statute. Specifically, the amount of debt that can be issued is linked to assessed valuation.

Revised Code of Washington (RCW) 39.36.020 states:

> (2)(a)(ii) Counties, cities, and towns are limited to an indebtedness amount not exceeding one and one half percent of the value of the taxable property in such counties, cities, or towns without the assent of three-fifths of the voters therein voting at an election held for that purpose.
>
> (b) In cases requiring such assent counties, cities, towns, and public hospital districts are limited to a total indebtedness of two and one-half percent of the value of the taxable property therein.

While bonding capacity can limit the availability of G.O. bonds for utility purposes, these can sometimes play a valuable role in project financing. A utility rate savings may be realized through two avenues: the lower interest rate and related bond costs, and the extension of repayment obligation to all tax-paying properties (not just developed properties) through the authorization of an ad valorem property tax levy.

Revenue Bonds – Revenue bonds are commonly used to fund utility capital improvements. The debt is secured by the revenues of the issuing utility. With this limited commitment, revenue bonds typically bear higher interest rates than G.O. bonds and require security conditions related to the maintenance of

dedicated reserves (a bond reserve) and financial performance (added bond debt service coverage). The City agrees to satisfy these requirements by resolution as a condition of bond sale.

Revenue bonds can be issued in Washington without a public vote. There is no bonding limit, except perhaps the practical limit of the utility's ability to generate sufficient revenue to repay the debt and provide coverage. In some cases, poor credit might make issuing revenue bonds problematic.

9.4.3 Capital Financing Strategy

An ideal capital financing strategy would include the use of grants and low-cost loans when debt issuance is required. However, these resources are very limited and competitive in nature and do not provide a reliable source of funding for planning purposes. It is recommended that the City pursue these funding avenues but assume revenue bond financing to meet the needs which can't be met by available cash resources. The capital financing strategy developed to fund the CIP identified in this WSP assumes the following funding resources:

- Accumulated cash reserves,
- Transfers of excess cash (over minimum balance targets) from the Operating Fund,
- System development charge revenue,
- Interest earned on Capital Fund balances,
- Grant proceeds, and
- Revenue bond financing.

The cash resources described above are anticipated to fund 47.1 percent of the 10-year CIP and 56.4 percent of the 20-year CIP. The remaining funding is assumed to be from new debt obligations of $69.1M in the next 10-year planning period and an additional $45.3M between 2034-2043. Table 9-5 presents the 10-year and 20-year capital financing strategy.

Table 9-5 | 10-Year and 20-Year Capital Financing Strategy

Year	Capital Expenditures Escalated	System Development Charge Revenue	Grant Funding	Revenue Bond Proceeds	Cash / Reserve Funding	Total Financial Resources
2024	**$ 15,368,740**	$ 325,000	$ 2,717,531		$ 12,326,209	**$ 15,368,740**
2025	**13,411,473**	452,813		12,958,660	-	**13,411,473**
2026	**13,682,743**	468,497		3,541,340	9,672,907	**13,682,743**
2027	**11,664,653**	484,723		11,179,930	-	**11,664,653**
2028	**12,791,194**	501,511		6,320,070	5,969,613	**12,791,194**
2029	**11,841,764**	518,881		10,400,000	922,883	**11,841,764**
2030	**10,671,544**	536,853		-	10,134,691	**10,671,544**
2031	**13,095,389**	555,446		12,539,943	-	**13,095,389**
2032	**14,624,811**	574,684		2,260,057	11,790,070	**14,624,811**
2033	**12,224,471**	594,589		9,305,411	2,324,471	**12,224,471**
Subtotal	**$ 129,376,782**	**$ 5,012,997**	**$ 2,717,531**	**$ 68,505,411**	**$ 53,140,843**	**$ 129,376,782**
2034 - 2043	**133,200,307**	7,204,781		45,894,589	80,100,937	**133,200,307**
Total	**$ 262,577,089**	**$ 12,217,778**	**$ 2,717,531**	**$ 114,400,000**	**$ 133,241,780**	**$ 262,577,089**

9.5 Financial Forecast

The financial forecast, or revenue requirement analysis, forecasts the amount of annual revenue that needs to be generated by user rates. The analysis incorporates operating revenues, O&M expenses, debt service

payments, rate-funded capital needs, and any other identified revenues or expenses related to operations. The objective of the financial forecast is to evaluate the sufficiency of the current level of rates. In addition to annual operating costs, the revenue needs also include debt covenant requirements and specific fiscal policies and financial goals of the City.

For this analysis, two revenue sufficiency tests have been developed to reflect the financial goals and constraints of the City: cash needs must be met; and debt coverage requirements must be realized. In order to operate successfully with respect to these goals, both tests of revenue sufficiency must be met.

Cash Test – The cash flow test identifies all known cash requirements for the City in each year of the planning period. Typically, these include O&M expenses, debt service payments, rate-funded system reinvestment funding or directly funded capital outlays, and any additions to specified reserve balances. The total annual cash needs of the City are then compared to projected cash revenues using the current rate structure. Any projected revenue shortfalls are identified, and the rate increases necessary to make up the shortfalls are established.

Coverage Test – The coverage test is based on a commitment made by the City when issuing revenue bonds and some other forms of long-term debt. For the purposes of this analysis, revenue bond debt is assumed for any needed debt issuance. As a security condition of issuance, the City would be required per covenant to agree that the revenue bond debt would have a higher priority for payment (a senior lien) compared to most other expenditures; the only outlays with a higher lien are O&M expenses. Debt service coverage is expressed as a multiplier of the annual revenue bond debt service payment. For example, a 1.00 coverage factor would imply that no additional cushion is required. A 1.25 coverage factor means revenue must be sufficient to pay O&M expenses, annual revenue bond debt service payments, and an additional 25.0 percent of annual revenue bond debt service payments. The excess cash flow derived from the added coverage, if any, can be used for any purpose, including funding capital projects. Targeting a higher coverage factor can help the City achieve a better credit rating and provide lower interest rates for future debt issues.

9.5.1 Current Financial Structure

The City maintains a fund structure and implements financial policies that target management of a financially viable and fiscally responsible water system.

9.5.1.1 Fiscal Policies

A summary of the key financial policies employed by the City, as well as those recommended and incorporated in the financial program, are discussed below.

Operating Reserve – Operating reserves are designed to provide a liquidity cushion to ensure that adequate cash working capital will be maintained to deal with significant cash balance fluctuations, such as seasonal fluctuations in billings and receipts, unanticipated cash expenses, or lower than expected revenue collections. Like other types of reserves, operating reserves also serve another purpose: they help smooth rate increases over time. Target funding levels for an operating reserve are generally expressed as a certain number of days of O&M expenses, with the minimum requirement varying with the expected revenue volatility. Industry practice for utility operating reserves ranges from 30 days (8.0 percent) to 120 days (33.0 percent) of O&M expenses, with the lower end more appropriate for utilities with stable revenue streams and the higher end more appropriate for utilities with significant seasonal or consumption-based fluctuations. The City's current goal is to maintain a minimum balance in the Operating Fund equal to 90 days of O&M expenses for working capital.

Capital Reserve – A capital contingency reserve is an amount of cash set aside in case of an emergency should a piece of equipment or a portion of the utility's infrastructure fail unexpectedly. The reserve also could be used for other unanticipated capital needs, including capital project cost overruns. Industry practices range from maintaining a balance equal to 1.0 to 2.0 percent of fixed assets, an amount equal to a 5-year rolling average of CIP costs, or an amount determined sufficient to fund equipment failure (other than catastrophic failure). The final target level should balance industry practices with the risk level of the City.

This financial plan targets a minimum balance in the water utility capital fund equal to 1.0 percent of fixed assets.

System Reinvestment – System reinvestment funding promotes system integrity through ongoing repair and replacement of system infrastructure. Ideally, a detailed asset management plan would guide the level of rate funded system reinvestment, however, in absence of this level of effort, annual depreciation expense is commonly used as a measure of the decline in asset value associated with routine use of the system. Particularly for utilities that do not already have an explicit system reinvestment policy in place, implementing a funding level based on full depreciation expense could significantly impact rates. An alternative benchmark is annual depreciation expense net of debt principal payments on outstanding debt. This approach recognizes that customers are still paying for certain assets through the debt component of their rate and intends to avoid simultaneously charging customers for an asset and its future replacement. The specific benchmark used to set system reinvestment funding targets is a matter of policy that must balance various objectives, including managing rate impacts, keeping long-term costs down, and promoting "generational equity" (i.e., not excessively burdening current customers with paying for facilities that will serve a larger group of customers in the future).

The City is currently phasing in system reinvestment funding, aiming to reach 100 percent of annual depreciation levels by 2030. With this phase-in strategy in place, the City is forecast to fund an average of $3.8 million in capital costs annually through dedicated rate revenues within the 10-year forecast period.

Debt Management – It is prudent to consider policies related to debt management as part of a broader utility financial policy structure. Debt management policies should be evaluated and formalized, including the level of acceptable outstanding debt, debt repayment, bond coverage, and total debt coverage targets. The City has three outstanding water revenue bonds, a Public Works Trust fund loan, and two other low interest loans. This forecast meets or exceeds the required revenue bond debt service coverage of 1.25.

9.5.1.2 Financial Forecast

The financial forecast is primarily based upon the City's budget through 2024 and takes into consideration other key factors and assumptions needed to develop a complete portrait of the City's annual water utility financial obligations. The following is a list of the key revenue and expense factors and assumptions used to develop the financial forecast.

- Growth – Rate revenue is escalated utilizing a 0.45 percent growth rate developed based on actual historical trends at the City.

- Revenue – The City has two general revenue sources: 1) water service charges (rate revenue); and 2) miscellaneous (non-rate) revenue. In the event of a forecasted annual shortfall, rate revenue can be increased to meet the annual revenue requirement. For the purpose of this financial forecast, rate revenues are forecasted to increase with customer growth. Non-rate revenues are

held constant throughout the forecast period, with the exception of interest earnings which are calculated based on projected balances and assumed investment rates.

- System Development Charge Revenue – the existing system development charges are applied to the projected new connections to forecast revenue. Connection charges are forecast to generate an average of $501,000 annually from 2024-2033. This equates to an average of 46 new MCEs per year. Connection charge revenue is directed towards annual capital needs.

- Expenses – O&M expense projections are based on the City's budget through 2024 with general cost inflation increases of 3.0 percent, labor cost inflation of 5.0 percent for 2025 and 2026, decreasing to 3.0 percent thereafter and benefit cost inflation increases of 12.50 percent for 2025 and 2026, decreasing to 5.5 percent per year thereafter. Budget figures were used for taxes in 2024. Future taxes are calculated based on forecasted revenues and prevailing tax rates.

    - Facilities GO Bond - In order to construct a new facility for Maintenance and Operations for the City, the water utility will fund part of a General Obligation Bond totaling approximately $39.1 million. Beginning in 2025, the water utility's proportionate share of the bond is forecasted at $333,000 annually for the remainder of the twenty-year forecast.

- Existing Debt – The water utility has six (6) outstanding debt issues: three (3) revenue bonds, one (1) Public Works Trust Fund (PWTF) loan and two (2) Drinking Water State Revolving Fund (DWSRF) loans. Total annual existing debt service obligations begin 2024 at $2.7 million, decreasing to $1.1 million by 2033 as four (4) of the six (6) loans are fully repaid.

- Future Debt – The capital financial strategy developed for this WSP forecasts the need for $69.1M in new debt proceeds in five (5) separate instances throughout the ten-year forecast. The analysis performed assumes all new debt is through revenue bond financing. Annual new debt service obligations are forecasted to begin in 2025 at $1.5 million increasing to $6.1 million by 2033.

- Transfers to Capital - Operating fund balance above the minimum requirement is assumed to be available to fund capital projects and projected to be transferred to the Capital Fund each year, if needed. In total, the utility is forecast to fund $16.7 million in capital projects from excess operating fund cash within the 10-year forecast period.

Although the financial plan is completed through 2043, the rate strategy focuses on the shorter-term planning period of 2024 through 2033. It is recommended that the City revisit the proposed rates every 3 to 4 years to ensure that the rate projections developed remain adequate. Any significant changes should be incorporated into the financial plan and future rates should be adjusted as needed.

Table 9-6, following, summarizes the annual revenue requirements based on the forecast of revenues, expenditures, fund balances, and fiscal policies.

Table 9-6 | 10-Year Financial Forecast

Revenue Requirement	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Revenues										
Rate Revenues Under Existing Rates	$ 18,398,987	$ 18,480,409	$ 18,562,210	$ 18,644,392	$ 18,726,956	$ 18,809,906	$ 18,893,241	$ 18,976,964	$ 19,061,078	$ 19,145,583
Non-Rate Revenues	711,618	995,023	921,087	742,167	760,542	763,594	775,863	779,012	795,263	798,519
Total Revenues	**$ 19,110,605**	**$ 19,475,432**	**$ 19,483,297**	**$ 19,386,559**	**$ 19,487,499**	**$ 19,573,500**	**$ 19,669,104**	**$ 19,755,976**	**$ 19,856,341**	**$ 19,944,102**
Expenses										
Cash Operating Expenses	$ 14,490,240	$ 15,195,624	$ 15,775,495	$ 16,147,464	$ 16,560,290	$ 16,986,418	$ 17,429,740	$ 17,888,499	$ 18,366,342	$ 18,860,547
Existing Debt Service	2,674,248	2,671,361	2,665,106	2,615,447	2,611,734	2,601,528	2,598,336	1,759,410	1,759,292	1,090,490
New Debt Service	-	1,455,336	1,455,336	2,998,874	2,998,874	3,916,177	3,916,177	5,221,569	5,221,569	6,094,771
Rate Funded System Reinvestment	1,738,857	1,037,921	2,016,114	1,877,607	3,393,539	4,213,598	5,626,454	5,888,362	6,180,858	6,425,348
Total Expenses	**$ 18,903,345**	**$ 20,360,242**	**$ 21,912,050**	**$ 23,639,392**	**$ 25,564,438**	**$ 27,717,721**	**$ 29,570,707**	**$ 30,757,840**	**$ 31,528,062**	**$ 32,471,155**
Total Surplus (Deficiency)	**$ 207,259**	**$ (884,810)**	**$ (2,428,754)**	**$ (4,252,833)**	**$ (6,076,939)**	**$ (8,144,221)**	**$ (9,901,603)**	**$ (11,001,863)**	**$ (11,671,720)**	**$ (12,527,053)**
Annual Rate Adjustment	**0.00%**	**7.50%**	**9.50%**	**9.50%**	**9.50%**	**9.50%**	**9.50%**	**3.00%**	**3.00%**	**3.00%**
Cumulative Annual Rate Adjustment	**0.00%**	**7.50%**	**17.71%**	**28.90%**	**41.14%**	**54.55%**	**69.23%**	**74.31%**	**79.54%**	**84.92%**
Rate Revenues After Rate Increase	$ 18,398,987	$ 19,866,440	$ 21,850,041	$ 24,031,724	$ 26,431,269	$ 29,070,437	$ 31,973,157	$ 33,078,288	$ 34,221,651	$ 35,404,570
Additional Taxes from Rate Increase	-	229,097	543,446	890,472	1,273,446	1,695,963	2,161,979	2,330,808	2,505,891	2,687,448
Net Cash Flow After Rate Increase	**$ 207,259**	**$ 272,124**	**$ 315,632**	**$ 244,027**	**$ 353,928**	**$ 420,347**	**$ 1,016,334**	**$ 768,653**	**$ 982,962**	**$ 1,044,486**
Coverage After Rate Increases	3.00	2.10	2.40	1.91	2.24	2.19	2.52	2.41	2.50	2.43

The financial forecast indicates that at existing rate levels the utility will become deficient in 2025 as growth in expenses outpaces growth in revenues and the utility takes on additional debt obligations to fund capital infrastructure investment. The City has adopted a 7.50 percent increase for 2025, to resolve the remaining projected deficiency, rates will need to increase by 9.50 percent annually from 2026 through 2030, before decreasing to 3.00 percent annually through 2033.

9.5.1.3 City Funds and Reserves

Table 9-7 shows a summary of the projected Operating Fund and Capital Fund ending balances through 2033 based on the rate forecasts presented above. The Operating Fund is maintained above 90 days of O&M expenses. The Capital Fund balance meets or exceeds the minimum target of 1 percent of fixed assets in most years of the study timeframe with the exception of 2026, 2028 and 2030 where balances fall below target. Fund balances are rebuilt and meet or exceed target balances by the end of the ten-year timeframe.

Table 9-7 | Ending Cash Balance Summary

Ending Fund Balance	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Operating Fund	$ 8,988,743	$ 9,260,867	$ 3,943,874	$ 4,036,866	$ 4,140,073	$ 4,246,604	$ 4,357,435	$ 4,472,125	$ 4,591,586	$ 4,715,137
Capital Fund	2,019,201	6,659,039	1,226,711	9,587,690	1,038,144	4,653,056	1,096,853	9,910,203	3,003,538	8,649,973
Total	**$11,007,944**	**$15,919,905**	**$ 5,170,585**	**$13,624,556**	**$ 5,178,217**	**$ 8,899,660**	**$ 5,454,288**	**$14,382,328**	**$ 7,595,123**	**$13,365,110**

9.6 Current and Projected Rates

9.6.1 Current Rates

The existing water rates are composed of a fixed monthly charge that varies by meter size and a variable consumption charge per hundred cubic feet (CCF) for all water usage. While fixed charges are consistent across customer classes for all meter sizes except one inch, usage charges are different for each customer class. Consumption for the single family class is divided into three escalating pricing tiers that are applied year-round. This type of inclining tier structure is designed to discourage discretionary usage of water and encourage conservation. All other customers are charged a uniform rate for all consumption used. Table 9-8 shows the existing City of Auburn water system rate schedule.

Table 9-8 | Existing Schedule of Rates

Description	2024 Existing
Monthly Fixed Charges (All Classes)	
3/4"	$ 21.08
1" - Single Family	21.08
1" - All Other Classes	23.66
1 1/2"	25.76
2"	29.69
3"	57.11
4"	71.66
6"	91.57
8"	118.30
10"	167.97
Volume Charges per CCF	
Single Family	
0-7 CCF	$ 4.18
7-15 CCF	5.11
Greater Than 15 CCF	5.81
Multi-Family	$ 5.00
Commercial	5.27
Manufacturing / Industrial	5.15
Schools	5.61
Municipal	5.19
Irrigation	6.94

9.6.2 Projected Rates

The financial forecast discussed above indicates the need for annual rate adjustments to satisfy all forecasted financial obligations. The city has adopted a 7.50 percent increase for 2025, with annual 9.50 percent increases forecasted from 2026 through 2030, and 3.00 percent increases from 2031 to 2033. Table 9-9 shows the projected rates with increases applied uniformly to the water fixed and volume components for all classes. A more detailed rate study that will analyze the projected increases beyond the current adopted rates will be conducted in 2025.

Table 9-9 | Proposed Schedule of Rates

Description	Existing	Proposed								
	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Monthly Fixed Charges (All Classes)										
3/4"	$ 21.08	$ 22.66	$ 24.81	$ 27.17	$ 29.75	$ 32.58	$ 35.68	$ 36.75	$ 37.85	$ 38.99
1" - Single Family	21.08	22.66	24.81	27.17	29.75	32.58	35.68	36.75	37.85	38.99
1" - All Other Classes	23.66	25.43	27.85	30.50	33.40	36.57	40.04	41.24	42.48	43.75
1 1/2"	25.76	27.69	30.32	33.20	36.35	39.80	43.58	44.89	46.24	47.63
2"	29.69	31.92	34.95	38.27	41.91	45.89	50.25	51.76	53.31	54.91
3"	57.11	61.39	67.22	73.61	80.60	88.26	96.64	99.54	102.53	105.61
4"	71.66	77.03	84.35	92.36	101.13	110.74	121.26	124.90	128.65	132.51
6"	91.57	98.44	107.79	118.03	129.24	141.52	154.96	159.61	164.40	169.33
8"	118.30	127.17	139.25	152.48	166.97	182.83	200.20	206.21	212.40	218.77
10"	167.97	180.57	197.72	216.50	237.07	259.59	284.25	292.78	301.56	310.61
Volume Charges per CCF										
Single Family										
0-7 CCF	$ 4.18	$ 4.49	$ 4.92	$ 5.39	$ 5.90	$ 6.46	$ 7.07	$ 7.28	$ 7.50	$ 7.73
7-15 CCF	5.11	5.49	6.01	6.58	7.21	7.89	8.64	8.90	9.17	9.45
Greater Than 15 CCF	5.81	6.25	6.84	7.49	8.20	8.98	9.83	10.12	10.42	10.73
Multi-Family	$ 5.00	$ 5.38	$ 5.89	$ 6.45	$ 7.06	$ 7.73	$ 8.46	$ 8.71	$ 8.97	$ 9.24
Commercial	5.27	5.67	6.21	6.80	7.45	8.16	8.94	9.21	9.49	9.77
Manufacturing / Industrial	5.15	5.54	6.07	6.65	7.28	7.97	8.73	8.99	9.26	9.54
Schools	5.61	6.03	6.60	7.23	7.92	8.67	9.49	9.77	10.06	10.36
Municipal	5.19	5.58	6.11	6.69	7.33	8.03	8.79	9.05	9.32	9.60
Irrigation	6.94	7.46	8.17	8.95	9.80	10.73	11.75	12.10	12.46	12.83

9.6.3 Conservation Based Rates

In 2003 the Washington State Legislature passed the Municipal Water Supply Efficiency Requirements Act. The Water Use Efficiency rules went into effect on January 22, 2007 and typically apply to Water System Plans that each jurisdiction is required to develop every six to ten years. The Revised Code of Washington (RCW) outlines the rules of this act, under RCW 70.119.180. In section 4(B), the RCW states that jurisdictions must perform an "evaluation of the feasibility of adopting and implementing water delivery rate structures that encourage water conservation." The City of Auburn currently charges their single family residential customers based on an inclining block rate structure to incentivize water use conservation, therefore no additional evaluation was performed.

9.7 Affordability

The Washington State Department of Health and the Department of Commerce Public Works Board use an affordability index to prioritize low-cost loan awards depending on whether rates exceed 2.5 percent of the median household income for the service area. The average median household income for the City was $87,406 between 2018 and 2022, expressed in 2022 dollars, according to the U.S. Census Bureau. The 2022 value is escalated based on the actual rate of inflation in 2023 of 4.31 percent and the 3.00 percent inflation rate used in the financial forecast to project the median household income in future years. Table 9-10

presents the City's monthly water bill, projected to 2033 and tested against the 2.5 precent monthly affordability threshold.

Table 9-10 | Community Affordability Test

Year	Inflation	Median HH Income	2.5% Monthly Threshold	Projected Monthly Bill	% of Median HH Income
2022		$ 87,406			
2023	4.31%	91,173			
2024	3.00%	93,908	$ 195.64	$ 50.34	0.64%
2025	3.00%	96,726	201.51	54.09	0.67%
2026	3.00%	99,627	207.56	59.25	0.71%
2027	3.00%	102,616	213.78	64.90	0.76%
2028	3.00%	105,695	220.20	71.05	0.81%
2029	3.00%	108,866	226.80	77.80	0.86%
2030	3.00%	112,132	233.61	85.17	0.91%
2031	3.00%	115,495	240.62	87.71	0.91%
2032	3.00%	118,960	247.83	90.35	0.91%
2033	3.00%	122,529	255.27	93.10	0.91%

Applying the 2.5 percent monthly affordability test, the City's rates are forecasted to remain within the indicated affordability range through 2033.

9.8 Conclusion

The results of this analysis indicate that at existing rate levels the utility will be deficient beginning in 2025. To keep pace with expenses and prepare for new debt obligations needed to fund system infrastructure needs, the City has adopted a 7.50 percent rate increase in 2025. Forecasting into the future a 9.5 percent annual rate increase will be required from 2026 through 2030, followed by 3.00 percent increases through 2033. It is recommended that the City regularly review and update the key underlying assumptions that compose the multi-year financial plan to ensure that adequate revenues are collected to meet the City's total financial obligations.



2024 Comprehensive Sewer Plan

FINAL / November 2024

2024 Comprehensive Sewer Plan

FINAL / November 2024

Digitally signed by Edward A. Wicklein
Contact Info: Carollo Engineers, Inc.
Date: 2024.11.20 15:02:07-08'00'



1200 FIFTH AVENUE, SUITE 900 ▪ SEATTLE, WASHINGTON 98101 ▪ P 206-684-6532

Contents

EXECUTIVE SUMMARY

ES.1 Introduction ES-1
ES.2 System Goals for Long Term ES-2
ES.3 Sewer Utility Evaluation ES-2
ES.4 Capital Improvement and Financial Plan ES-3
ES.5 System Administration Plan ES-3

CHAPTER 1 INTRODUCTION AND BACKGROUND

1.1 Purpose and Objectives 1-1
1.2 Document Organization 1-2
1.3 Background 1-3
1.3.1 Previous Auburn Comprehensive Sewer Plans 1-3
1.3.2 City Comprehensive Plan 1-3
1.3.3 Sanitary Sewer Service Area 1-3
1.3.4 Existing Land Use Plans 1-3
1.3.5 Wastewater Treatment 1-5
1.3.6 City of Auburn Water Resources Protection Report 1-8
1.3.7 City of Auburn Water Conservation 1-8
1.4 Neighboring Sewer Utilities 1-8
1.4.1 Soos Creek Water and Sewer District and City of Kent 1-8
1.4.2 City of Pacific 1-8
1.4.3 Muckleshoot Indian Tribe Reservation 1-9
1.4.4 Lakehaven Water and Sewer District 1-9
1.4.5 City of Algona 1-9
1.4.6 City of Bonney Lake 1-10
1.4.7 King County 1-10

CHAPTER 2 WASTEWATER SYSTEM GOALS AND POLICIES

2.1 City Comprehensive Plan Consistency 2-1
2.2 Business Practices/Asset Management 2-1
2.3 Sewer Comprehensive Plan Policies, Standards, and Guidelines 2-2
2.3.1 Service Area 2-2
2.3.2 System Planning 2-3
2.3.3 Operations and Maintenance 2-4
2.3.4 Environmental Stewardship 2-4
2.3.5 System Performance and Reliability 2-5
2.3.6 Fiscal Responsibility 2-7

CHAPTER 3 PLANNING CONSIDERATIONS

3.1 Planning Area 3-1
3.2 Basis of Planning 3-1
3.3 Land Use 3-2
3.3.1 Description of Land Use Designations 3-4
3.4 Sewer System Flow Components 3-5
3.4.1 Dry Weather Flow Components 3-6
3.4.2 Wet Weather Flow Components 3-6
3.5 Average Dry Weather Flow 3-7
3.5.1 Average Dry Weather Flow Development 3-7
3.6 Wet Weather Flow 3-8

CHAPTER 4 DESCRIPTION OF EXISTING SYSTEM

4.1 Overview 4-1
4.1.1 Valley Sewer Basin 4-1
4.1.2 West Hill Sewer Basin 4-1
4.1.3 Lea Hill Sewer Basin 4-2
4.1.4 Auburn Way South Sewer Basin 4-2
4.1.5 South Hill Sewer Basin 4-2
4.2 Sanitary Sewer Facilities 4-3
4.2.1 Critical Infrastructure 4-6
4.2.2 Pump Stations 4-6
4.2.3 Gravity and Force Main Collection System 4-7
4.2.4 Side Sewer Laterals 4-7
4.2.5 River Crossings 4-7
4.3 King County Conveyance 4-11
4.4 Infiltration and Inflow 4-11
4.5 Odor Control and Corrosion 4-12
4.6 Industrial Waste Discharges 4-12
4.7 Water Reclamation and Reuse 4-14
4.7.1 Regulatory Framework 4-14
4.7.2 Potential Reclaimed Water Sources 4-15
4.7.3 Potential Reclaimed Water Users 4-16
4.7.4 Reclaimed Water Summary 4-16

CHAPTER 5 WASTEWATER SYSTEM ANALYSIS

5.1 Introduction 5-1
5.2 Design and Performance Criteria 5-1
5.2.1 Design Storm 5-2
5.2.2 Climate Risk 5-3
5.2.3 Conveyance System 5-3
5.2.4 Lift Stations and Force Mains 5-4

5.3 Future Conditions Flow Projection 5-5
5.3.1 Future Conditions Average Dry Weather Flow Development 5-5
5.3.2 Future Conditions Wet Weather Flow Assumptions 5-5
5.4 Gravity Collection System Deficiencies 5-9
5.4.1 Key Causes of Deficiencies 5-9
5.4.2 Existing System Potential Deficiencies 5-9
5.4.3 2044 Potential System Deficiencies 5-9
5.5 Lift Station and Force Main Evaluation 5-13
5.6 Inflow and Infiltration Evaluation 5-14
5.7 Remaining Useful Life 5-17
5.8 Recommendations 5-19
5.8.1 Asset Inventory, System Inspections, and Remaining Useful Life 5-19
5.8.2 Capacity Evaluation Recommendations 5-19
5.8.3 Future Population Growth 5-19
5.8.4 Inflow and Infiltration Evaluation Recommendations 5-22

CHAPTER 6 MAINTENANCE AND OPERATIONS

6.1 Utility Responsibility and Authority 6-1
6.1.1 Organizational Structure 6-1
6.1.2 Staffing Level 6-2
6.1.3 Level of Service 6-3
6.1.4 Operator Training and Education 6-3
6.2 Routine Operations 6-3
6.2.1 Pump Station Maintenance 6-3
6.2.2 Collection System Maintenance 6-6
6.2.3 Field Operations 6-7
6.3 Fats, Oils, and Grease Reduction Program 6-7
6.4 Non-Routine and Emergency Operations 6-8
6.4.1 Customer Service Requests 6-8
6.4.2 Emergency Response Program 6-9
6.5 Communications, Data Collection, and Record-Keeping 6-10
6.5.1 Telemetry and Pump Station Controls 6-10
6.5.2 Data Collection and Record-Keeping 6-10
6.6 Existing Staffing Requirements 6-12
6.7 Potential Improvement Opportunities and Capital Needs 6-13

CHAPTER 7 CAPITAL IMPROVEMENT PLAN

7.1 Capital Improvement Plan 7-1
7.1.1 Project Priority 7-2
7.1.2 Project Cost 7-2
7.1.3 Project Summary 7-2

7.2 Capital Improvement Projects 7-2
7.2.1 Summary Table 7-2
7.2.2 Project Descriptions 7-4

CHAPTER 8 FINANCIAL PLAN

8.1 Introduction 8-1
8.2 Past Financial Performance 8-1
8.2.1 Comparative Financial Statements 8-1
8.3 Financial Plan 8-5
8.3.1 Capital Funding Plan 8-6
8.4 Available Funding Assistance and Financing Resources 8-8
8.4.1 City Resources 8-8
8.4.2 Outside Resources 8-9
8.4.3 Capital Financing Strategy 8-10
8.5 Financial Forecast 8-11
8.5.1 Current Financial Structure 8-11
8.6 Current and Projected Rates 8-16
8.6.1 Current Rates 8-16
8.6.2 Projected Rates 8-16
8.7 Affordability 8-18
8.8 Conclusion 8-18

Appendices

APPENDIX A INTER-LOCAL AGREEMENTS AND OUTSIDE AGENCY CORRESPONDENCE
APPENDIX B AGENCY COMMENT LETTERS AND RESPONSES
APPENDIX C APPROVALS
APPENDIX D HYDRAULIC MODEL UPDATE, CALIBRATION, AND CAPACITY ANALYSIS
APPENDIX E PUMP STATION DATA SUMMARY
APPENDIX F SEPA CHECKLIST
APPENDIX G RECLAIMED WATER CHECKLIST

Tables

Table 3.1 Land Use Categories 3-2
Table 4.1 City of Auburn Sewer Pump Station Inventory 4-6
Table 4.2 City of Auburn Industrial Waste Discharge Permits 4-12
Table 5.1 Summary of Potential Future Characteristics for the Design Storm, 2030 - 2059 5-3
Table 5.2 Summary of Potential Future Characteristics for the Design Storm, 2079 - 2099 5-3
Table 5.3 Flow Projections Summary 5-5
Table 5.4 Lift Station Analysis 5-13
Table 5.5 I/I Summary by Flow Monitoring Basin for the Design Storm 5-15

Table 5.6	Useful Life of Pipes	5-17
Table 5.7	Remaining Useful Life	5-18
Table 5.8	Capacity Deficiencies	5-21
Table 6.1	Sewer Utility M&O Field Personnel	6-2
Table 6.2	Sewer System Maintenance and Operation Task Summary	6-12
Table 7.1	Annual Project Cost Summary for 6-Year and 20-Year CIP	7-3
Table 7.2	Project Descriptions	7-4
Table 8.1	Summary of Historical Fund Resources and Uses Arising from Cash Transactions	8-2
Table 8.2	Summary of Historical Comparative Statements of Net Position	8-4
Table 8.3	10-Year and 20-Year CIPs	8-6
Table 8.4	10-Year CIP (Escalated $)	8-7
Table 8.5	10-Year and 20-Year Capital Financing Strategy	8-10
Table 8.6	10-Year Financial Forecast	8-15
Table 8.7	Ending Cash Balance Summary	8-15
Table 8.8	Existing Schedule of Rates	8-16
Table 8.9	Proposed Schedule of Rates	8-17
Table 8.10	Community Affordability Test	8-18

Figures

Figure 1.1	Vicinity	1-6
Figure 1.2	Plan Study Area	1-7
Figure 3.1	City of Auburn Land Use Designations	3-3
Figure 4.1	Sewer Service Basins	4-4
Figure 4.2	Existing Wastewater Conveyance System	4-5
Figure 4.3	Critical Sewers	4-9
Figure 4.4	City of Auburn Collection System Summary Statistics	4-10
Figure 5.1	20 Year Design Storm	5-2
Figure 5.2	Design and Performance HGL Criteria	5-4
Figure 5.3	TAZ Data	5-6
Figure 5.4	Future Contributing Areas	5-7
Figure 5.5	Existing and Future Sewer System	5-8
Figure 5.6	Existing System Deficiencies	5-10
Figure 5.7	2044 System Deficiencies	5-11
Figure 5.8	2044 Climate Change Design Storm System Deficiencies	5-12
Figure 5.9	Peak I/I Rate by Flow Monitoring Basin	5-16
Figure 5.10	Recommended Remediation Strategies	5-20
Figure 6.1	City of Auburn Public Works Department Organizational Chart	6-2
Figure 7.1	CIP Development Flow Chart	7-1

Abbreviations

ACC	Auburn City Code
ADWF	average dry weather flow
APWA	American Public Works Association
BWF	base wastewater flow
CCF	per hundred cubic feet
CCTV	closed-circuit television
CFP	Capital Facilities Program
CIG	Climate Impacts Group
CIP	capital improvement program
City	City of Auburn, Washington
CMMS	computerized maintenance management system
CP	concrete pipe
CSWD	Criteria for Sewage Works Design
D	diameter
d/D	depth/diameter
DOC	Department Operations Center
DOH	Washington State Department of Health
DWF	dry weather flow
Ecology	Washington State Department of Ecology
Engineering	Engineering Services Division
FOG	fats, oils, and greases
FSE	food service establishment
FTE	full-time equivalent
G.O.	general obligation
GIS	geographic information system
gpad	gallons per acre per day
gpm	gallons per minute.
GWI	groundwater infiltration
H&H	hydrologic and hydraulic
HGL	hydraulic grade line
I/I	inflow and infiltration
LID	Local Improvement District
LOS	Level of Service
LWSD	Lakehaven Water and Sewer District
M	million
M&O	Maintenance and Operation
MBR	membrane bioreactor

mgd	million gallons per day
MH	manhole
MIT	Muckleshoot Indian Tribe
MWPAAC	Metropolitan Water Pollution Abatement Advisory Committee
NASSCO	National Association of Sewer Service Companies
NE	northeast
NW	northwest
PAA	potential annexation area
PACP	Pipeline Assessment and Certification Program
Plan	Comprehensive Sewer Plan Update
PW	Public Works
PWTF	Public Works Trust Fund
PWWF	peak wet weather flow
R&R	repair and replacement
RCE	Residential Customer Equivalents
RCW	Revised Code of Washington
RDI	rainfall derived infiltration
RUL	remaining useful life
RWSP	Regional Wastewater Services Plan
SCADA	supervisory control and data acquisition
SCWSD	Soos Creek Water and Sewer District
SDC	system development charges
SE	southeast
SOS	Save Our Streets
SSO	sanitary sewer overflow
SSSA	Sanitary Sewer Service Area
SW	southwest
TAZ	traffic area zone
TM	technical memorandum
ULID	Utility Local Improvement District
Utility	Sanitary Sewer Utility
VCP	vitrified clay pipe
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation
WWF	wet weather flow

EXECUTIVE SUMMARY

ES.1 Introduction

This *Comprehensive Sewer Plan* (Plan) for the City of Auburn, Washington (City) is an update to the previous Plan, adopted in 2016. This Plan should be considered a General Sewer Plan under the authority of Washington Administrative Code (WAC) Section 173-240-050. This Plan reflects changes in existing and projected land use and population levels, extensions to the public sewer collection system, and completion of sewer capital projects since the completion of the previous Plan.

Additionally, since the adoption of the previous Plan, both the City and King County have performed extensive flow monitoring of the City's collection system that, along with updated asset data, provides valuable information for updating the hydrologic and hydraulic (H&H) model used for system capacity assessment.

This Plan includes estimated periods that are intended to be used as a framework for future workload planning and funding decisions, and within which future actions and decisions are anticipated to occur. The purpose of the Plan is to guide the City with respect to future activities and improvements for the Sanitary Sewer Utility (Utility). To fulfill this stated purpose, the following objectives were achieved:

- Evaluation and updates to sewer policies to better reflect and integrate with overall City Comprehensive Plan policies.
- Plan for updating the comprehensive sanitary sewer system inventory, based on the City's geographic information system (GIS), that incorporates currently available infrastructure data into a digital database that can be directly linked with the hydraulic model used for analyzing the system.
- Hydraulic modeling analysis to evaluate existing system capacity.
- Future population and development projections were used to evaluate future sewer capacity needs.
- The Plan for sewer service extensions was refined, including where extensions will occur and how the City will serve these areas.
- Documentation of the City's existing Maintenance and Operation (M&O) program, and evaluation of existing Utility staffing and standard procedures.
- Completed a financial analysis of the Utility, including a projection of cost to provide sewer service and development of a funding strategy for identified goals.
- Developed a capital improvement program (CIP) by sustainably meeting required customer service needs, effectively managing risks, and minimizing the City's costs of sewer asset ownership.
- Prioritization of capital improvement projects to accommodate both 6- and 20-year funding frameworks.

ES.2 System Goals for Long Term

This Plan presents policies and standards related to system development, maintenance, funding, and general guidelines for Sanitary Sewer Utility operation. These policies define limits and outline how the wastewater collection system should be operated and maintained and are grouped within the following goal statements:

- **Goal 1:** Plan for sewer extensions and capacity upgrades to reflect the planning and growth projections included in the City's Comprehensive Plan, such that the public sewer system, when constructed, will have adequate capacity to support all future planned development.
- **Goal 2:** Plan for future service to all properties in the City within urban density areas.
- **Goal 3:** Manage the extension of the public sewer system to minimize future costs to operate and maintain.
- **Goal 4:** Design, operate, and maintain the public sewer system in a manner that increases reliability and efficiency, and demonstrates environmental stewardship.
- **Goal 5:** Apply asset best management principles to the City's sewer infrastructure.
- **Goal 6:** Manage the sewer utility funds and resources in a professional manner in compliance with applicable laws, regulations, and City financial policies, which requires ongoing monitoring of revenues and expenses in order to make prudent business decisions and report to City officials, as needed, regarding the status of utility operations.

ES.3 Sewer Utility Evaluation

The City customer base continues to increase through system growth by development, redevelopment, and connection of on-site system properties to the system. With the additional customers served, some of the City's sewer infrastructure may reach its conveyance capacity. In addition, the installed sewer infrastructure continues to age:

- Hydraulic Modeling: The City hydraulic model was updated to reflect currently installed infrastructure. Current sanitary loading was developed from flow monitor data collected through recent temporary monitor programs, as well as long term sites. A total of 22 sites were used for modeling to develop land used based flow factors, and dry and wet weather model calibration.
- System Evaluation: The flow factors were used to develop a future flow projection based on a combination of general population projects, anticipated land use changes to address City and State requirements. The hydraulic model was used for evaluating current and figure capacity needs. In addition, installed infrastructure age was evaluated relative to anticipated useful life expectancy.
- Maintenance and operation: The current organization and common procedures associated with the ongoing maintenance and operation of the City sewer utility system are reviewed. The primary purpose being to establish a baseline understanding of the proactive and responsive maintenance procedures performed by City staff. This baseline understanding is used herein to evaluate Sewer Utility (Utility) staffing, data collection and computerized record-keeping needs, and other Utility requirements to continue to meet the Utility's goals.

ES.4 Capital Improvement and Financial Plan

This Plan includes time frames, which represent the intended framework for future funding decisions and within which future actions and decisions are intended to occur. However, these time frames are estimates, and depending on factors involved in the processing of applications and project work, and availability of funding, the timing may change. The framework does not represent actual commitments by the City. Project identification is an ongoing effort requiring periodic evaluation.

The CIP list was developed based on incorporating the City's Capital Facilities Plan (CFP), identification of equipment limitations within the M&O group, and identification of areas of improvement. The CIP focuses on addressing known problems in a manner identifying cost-effective solutions that incorporate the risks associated with substandard facilities and the uncertainty inherent in engineering calculations/model simulations. The CIP places emphasis on projects identified for implementation between 2025 and 2030, which constitutes the 6-year planning period for utility capital funding requirements and staffing needs. This period provides a realistic outer limit for accurately forecasting the annual cycle of utility projects and priorities. This Plan also includes a 20-year CIP that examines long-term capital requirements, such as the replacement of infrastructure as it exceeds its useful life. All projects in the CIP are consistent with the LOS.

For implementing the CIP and sustaining long term operation of the Utility, a financial program is outlined that allows the City sewer utility to remain financially viable during the planning period. This financial viability analysis considers the historical financial condition, current and identified future financial and policy obligations, M&O needs, and the financial impacts of the capital projects identified in this Plan. Furthermore, this chapter provides a review of the sewer utility's current rate structure with respect to rate adequacy and customer affordability. The results of this analysis indicate that at existing rate levels the utility will be deficient beginning in 2028. To keep pace with expenses, the City has adopted a 7.50 percent rate increase in 2025. An annual rate increase is recommended for several years, as well as a regular review and update the key underlying assumptions that compose the multi-year financial plan to ensure that adequate revenues are collected to meet the City's total financial obligations.

ES.5 System Administration Plan

In addition to the projects listed in the CIP, this Plan includes other tasks and activities that should be priorities during this planning period. These include:

- Renewal of the franchise agreement with King County which expires in 2027, and beginning negotiation of an extension to the Sewage Disposal Agreement which expires in 2036.
- The continued implementation of asset management principles including:
  - Completing the inventory of sewer assets
  - Verifying and updating asset data/information as part of normal maintenance activities.
  - Integrating condition assessment information into the City's CMMS as a tool for prioritizing rehabilitation and replacement decisions
  - For assets with poor condition scores, determining the consequences of failure to help assess asset criticality.
  - Use condition assessment studies included in the CIP to make long-term maintenance, upgrade, rehabilitation, and replacement decisions for key assets.

- Proactively discouraging the discharge of substances detrimental to the sanitary sewer and wastewater treatment system by:
  - » Enforcing the requirements to manage fats, oils, and grease (FOG) by restaurants and other businesses likely to discharge FOG into the sewer system.
  - » Educating residents about the negative effects of discharging FOG on both private and public portions of the sanitary sewer system.
  - » Educating residents about the negative effects of discharging cleaning wipes, pharmaceuticals, and other prohibited discharges to the sewer system, and promoting alternative disposal methods.

CHAPTER 1 INTRODUCTION AND BACKGROUND

This *Comprehensive Sewer Plan* (Plan) for the City of Auburn, Washington (City) is an update to the previous Plan, adopted in 2016. This Plan should be considered a General Sewer Plan under the authority of Washington Administrative Code (WAC) Section 173-240-050, and within this document, Comprehensive Sewer Plan and General Sewer Plan should be considered synonymous. This Plan reflects changes in existing and projected land use and population levels, extensions to the public sewer collection system, and completion of sewer capital projects since the completion of the previous Plan.

Additionally, since the adoption of the previous Plan, both the City and King County have performed extensive flow monitoring of the City's collection system that, along with updated asset data, provides valuable information for updating the hydrologic and hydraulic (H&H) model used for system capacity assessment.

This Plan includes estimated periods that are intended to be used as a framework for future workload planning and funding decisions, and within which future actions and decisions are anticipated to occur. These time lines are estimates and depending on factors including staff availability, available resources, coordination with other City departments, and overall development activity, the actual timing of actions described by this Plan may differ. The timing estimates for activities included in this Plan do not represent actual commitments by the City.

This Plan meets the requirements of the Washington State Department of Ecology (Ecology) as set forth in WAC Section 173-240-050. The Plan was submitted to Ecology; the Washington State Department of Health (DOH); King and Pierce counties; the cities of Algona, Bonney Lake, Kent, and Pacific; Lakehaven Water and Sewer District (LWSD); Soos Creek Water and Sewer District (SCWSD); and the Muckleshoot Indian Tribe (MIT).

1.1 Purpose and Objectives

The purpose of the Plan is to guide the City with respect to future activities and improvements for the Sanitary Sewer Utility (Utility). To fulfill this stated purpose, the following objectives were achieved:

- Evaluation and updates to sewer policies to better reflect and integrate with overall City Comprehensive Plan policies.
- Plan for updating the comprehensive sanitary sewer system inventory, based on the City's geographic information system (GIS), that incorporates currently available infrastructure data into a digital database that can be directly linked with the hydraulic model used for analyzing the system.
- Hydraulic modeling analysis to evaluate existing system capacity.
- Future population and development projections were used to evaluate future sewer capacity needs.
- The Plan for sewer service extensions was refined, including where extensions will occur and how the City will serve these areas.
- Documentation of the City's existing Maintenance and Operation (M&O) program, and evaluation of existing Utility staffing and standard procedures.
- Completed a financial analysis of the Utility, including a projection of cost to provide sewer service and development of a funding strategy for identified goals.

- Developed a capital improvement program (CIP) by sustainably meeting required customer service needs, effectively managing risks, and minimizing the City's costs of sewer asset ownership.
- Prioritization of capital improvement projects to accommodate both 6- and 20-year funding frameworks.

1.2 Document Organization

This Plan is organized to focus on the actions that the Utility will take while implementing Plan recommendations. Supporting documentation and background information is included in appendices where appropriate. The Plan is organized into the following chapters:

- **Chapter 1 - Introduction and Background:** Explains the need for updating previous sewer planning documentation and outlines specific objectives of the Comprehensive Sewer Plan Update and provides background information regarding the Utility and Sanitary Sewer Service Area (SSSA).
- **Chapter 2 - Wastewater System Goals and Policies:** Specifies the utility's goals and policies used to develop capital improvements and future M&O activities.
- **Chapter 3 - Planning Considerations**: Describes the factors used to project the future capacity needs of the system.
- **Chapter 4 - Description of Existing System:** Describes the existing conditions of the City's sanitary sewer system.
- **Chapter 5 - Wastewater System Analysis:** Presents methodologies used to evaluate system capacity and future sewer extensions.
- **Chapter 6 - Maintenance and Operations:** Provides an overview of the organization and common procedures associated with the ongoing M&O program and evaluates existing Utility staffing needs based on established Level of Service (LOS) goals.
- **Chapter 7 - Capital Improvement Plan:** Describes recommended capital improvement projects including cost estimates.
- **Chapter 8 - Finance:** Develops a funding plan that optimizes use of rates, systems development charges, and other service fees based on projected Utility spending requirements and a review of funding sources and City financial policies.
- **Appendix A - Inter-local Agreements and Outside Agency Correspondence:** Provides copies of inter-local agreements related to sanitary sewer conveyance and disposal.
- **Appendix B - Agency Comment Letters and Responses:** Provides copies of key agency review, resolution of comments, and final approval.
- **Appendix C - Approval:** Provides a copy of final council adoption ordinance.
- **Appendix D - Hydraulic Model Update, Calibration, and Capacity Analysis:** Provides a detailed review of the hydraulic modeling completed for near- and long-term land use modeling scenarios to identify areas of capacity concern.
- **Appendix E - Pump Station Information:** Provides detailed information related to the pump stations (pump sizes, wet well size, etc.).
- **Appendix F - SEPA Compliance:** Provides a letter documenting the "Determination of Non-Significance."
- **Appendix G –** Reclaimed Water Checklist: A copy of the King County reclaimed water checklist from the 2024 Water System Plan.

1.3 Background

This section includes background information related to the development of the City's current wastewater collection and conveyance system. A description of the City SSSA is also included, along with information on adjacent sewer utilities, which will facilitate an understanding of existing and potential collaboration opportunities with other purveyors to enhance system reliability and/or reduce costs. Changes to land use planning efforts affecting the City SSSA are also discussed.

The City of Auburn vicinity within the greater region is shown in Figure 1.1.

1.3.1 Previous Auburn Comprehensive Sewer Plans

The current wastewater planning effort supersedes previous plans prepared in 1968, 1982, 2001, 2009, and 2016. This Plan builds upon concepts established in the five previous plans modifying, or updating goals, policies, and analyses to account for present conditions.

1.3.2 City Comprehensive Plan

The City most recently revised its City Comprehensive Plan in June 2015. The City Comprehensive Plan incorporates the Comprehensive Sewer Plan by reference. The City is in the process of updating the City Plan for adoption in 2024.

1.3.3 Sanitary Sewer Service Area

The City SSSA has not changed significantly since the 2016 *Comprehensive Sewer Plan*. Service has been extended to a small area of unincorporated King County located west of Algona. The current SSSA is shown on Figure 1.2.

As of September 2023, the City serves 13,417 single-family residential customers within its SSSA. Additionally, commercial customers (including non-single-family customers) equate to 19,980 Residential Customer Equivalents (RCE) based on total water consumption records for commercial connections. The City tracks total RCEs and reports to the County quarterly.

The City coordinates service at the boundary of its SSSA with nearby sewer utilities. When the City's SSSA extends beyond current corporate limits, the City requires a franchise to own, maintain, and manage the wastewater facilities within King and Pierce counties' rights-of-way. This coordination with other utilities and King and Pierce counties is discussed in Section 1.4.

1.3.4 Existing Land Use Plans

Various land use plans govern development with the City SSSA; these plans are described in the following sections.

1.3.4.1 King County Comprehensive Plan

Urban unincorporated areas of the City's SSSA within King County are subject to the King County *Comprehensive Plan*, as most recently updated and adopted in December 2022. This section highlights portions of the King County document affecting policy direction for functional plans, such as this City of Auburn *Comprehensive Sewer Plan*.

In the 2022 King County *Comprehensive Plan*, policy F-255 states:

In the Urban Growth Area, all new development shall be served by public sewers unless:

a. *Application of this policy to a proposal for a single-family residence on an individual lot would deny all reasonable use of the property; or*
b. *Sewer service is not available for a proposed short subdivision of urban property in a timely or reasonable manner as determined by the Utility Technical Review Committee. [1]These on-site systems shall be managed by one of the following entities, in order of preference:*
    i. *The sewer utility whose service area encompasses the proposed short subdivision; or*
    ii. *The provider most likely to serve the area; or;*
    iii. *An Onsite Sewage System Maintainer certified by Public Health - Seattle & King County.*

The onsite system shall meet all state and county approval requirements. The approved short subdivision shall indicate how additional lots to satisfy the minimum density requirement of the zoning will be located on the subject property in case sewers become available in the future. There shall be no further subdivision of lots created under this policy unless served by public sewers.

In conjunction with policy F-255, policy F-256 states:

> *In the Urban Growth Area, King County and sewer utilities should jointly prioritize the replacement of on-site systems that serve existing development with public sewers, based on the risk of potential failure. King County and sewer utilities should analyze public funding options for such conversion and should prepare conversion plans that will enable quick and cost-effective local response to health and pollution problems that may occur when many on-site systems fail in an area.*

Chapter 5 discusses potential sewer extensions within currently unsewered areas. The City's SSSA currently includes three areas of unincorporated King County, as shown on Figure 1.2.

1.3.4.2 Pierce County Comprehensive Plan

Urban unincorporated areas of the City's SSSA within Pierce County are subject to the *Pierce County Comprehensive Plan*, as most recently updated and adopted in July, 2023. Several goals and policies included in the Pierce County document affect policy direction for functional plans, this City of Auburn *Comprehensive Sewer Plan Update* such as:

- GOAL U-2 - Provide urban level facilities and services only within the designated Urban Growth Areas prior to or concurrent with development.
    - » U-2.1 - Encourage the provision of urban level services from cities or appropriate regional service providers.
    - » U-2.3 - Preserve the rural way of life by not providing urban LOS' within rural areas.
- GOAL U-15 - Provide sanitary sewers within the urban area.
    - » U-15.6 - Recognize on-site septic systems within the Urban Growth Area are considered interim facilities.

Chapter 5 discusses potential sewer extensions within currently unsewered areas. The City's SSSA currently includes one area of unincorporated Pierce County, as shown on Figure 1.2.

[1] The Utility Technical Review Committee (UTRC) is a King County Committee that reviews sewer and water plans and makes recommendations to the Council/Executive.

1.3.5 Wastewater Treatment

The City is a component agency of the King County Wastewater Treatment Division. As such, its Sewer Utility operates a collection system that discharges collected wastewater to King County facilities for conveyance to King County's South Plant for treatment, outside of the service area to the North. The South Plant operates under a permit from the Department of Ecology, and the County is required to continually upgrade its treatment processes to ensure its effluent and other treatment byproducts meet the most current environmental standards.

The City's agreements with King County can be found in Appendix A, and are active until 2036. It is expected that negotiations for extending that agreement will occur during this planning period. Under the current agreement, the City is obligated to deliver all of the sewage and industrial wastes collected or received by the City, and Metro (King County) shall accept the sewage and industrial wastes delivered for treatment. There is currently no limit on the quantity of wastewater delivered by the City to Metro (King County).

1.3.5.1 King County Regional Wastewater Services Plan

In 2007, King County adopted a revised *Regional Wastewater Services Plan* (RWSP), which outlined proposed wastewater conveyance improvements. Improvements that impact the City collection and conveyance system included the following:

- Stuck River Trunk: New gravity pipe constructed to convey flow away from the M Street Trunk to the Lakeland Hills Trunk Line and eventually the Auburn West Interceptor.
- Pacific Pump Station discharge: New pipe to convey flow north from the Pacific Pump Station to the Auburn West Interceptor.
- Auburn West Interceptor Parallel: New gravity pipe to replace or parallel an existing portion of the Auburn West Interceptor between 15th Street SW and West Main Street.

The Stuck River Trunk was completed in 2013. The Pacific Pump Station discharge and Auburn West Interceptor Parallel were completed in 2018.

Based on the completion of most of the projects included in the RWSP, King County issued its final report on the RWSP in 2017.

The County has continued to identify projects for its Conveyance System Improvements Program based on decennial flow monitoring data and updated land use and population projections. Those projects include the replacement of the Lakeland Hills Pump Station located along the White River within Roegner Park, which is planned for the year 2031.

In 2019, the County began the planning process for what is to be called the Clean Water Plan. Activities included evaluation of existing assets, analysis of evolving environmental regulations, decennial flow monitoring, future land use projection, and gathering stakeholder input. This planning effort is currently paused pending clarity on future regulations but is expected to resume once that clarity is achieved.

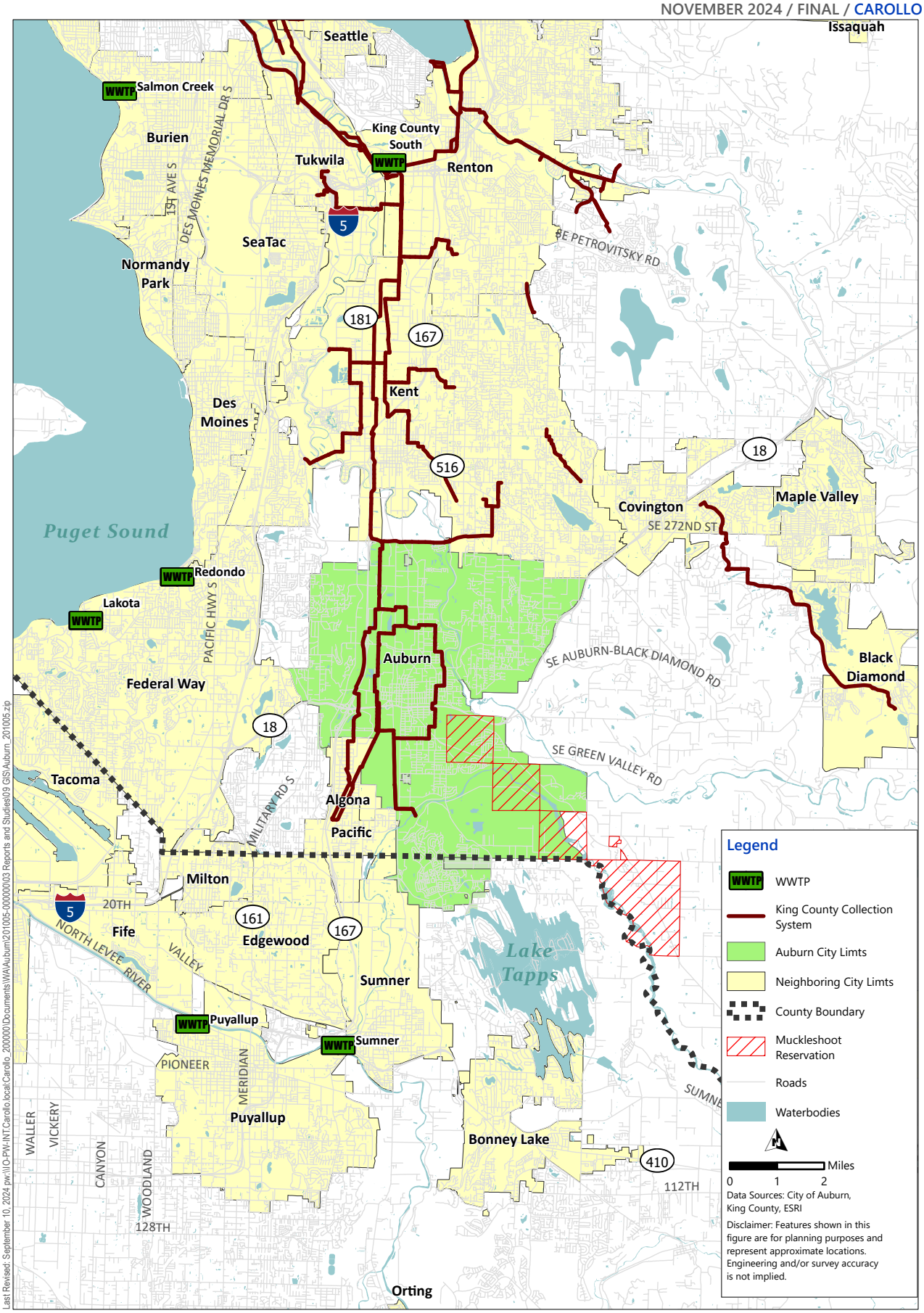


Figure 1.1 Vicinity Map
CITY OF AUBURN
2024 COMPREHENSIVE SEWER PLAN

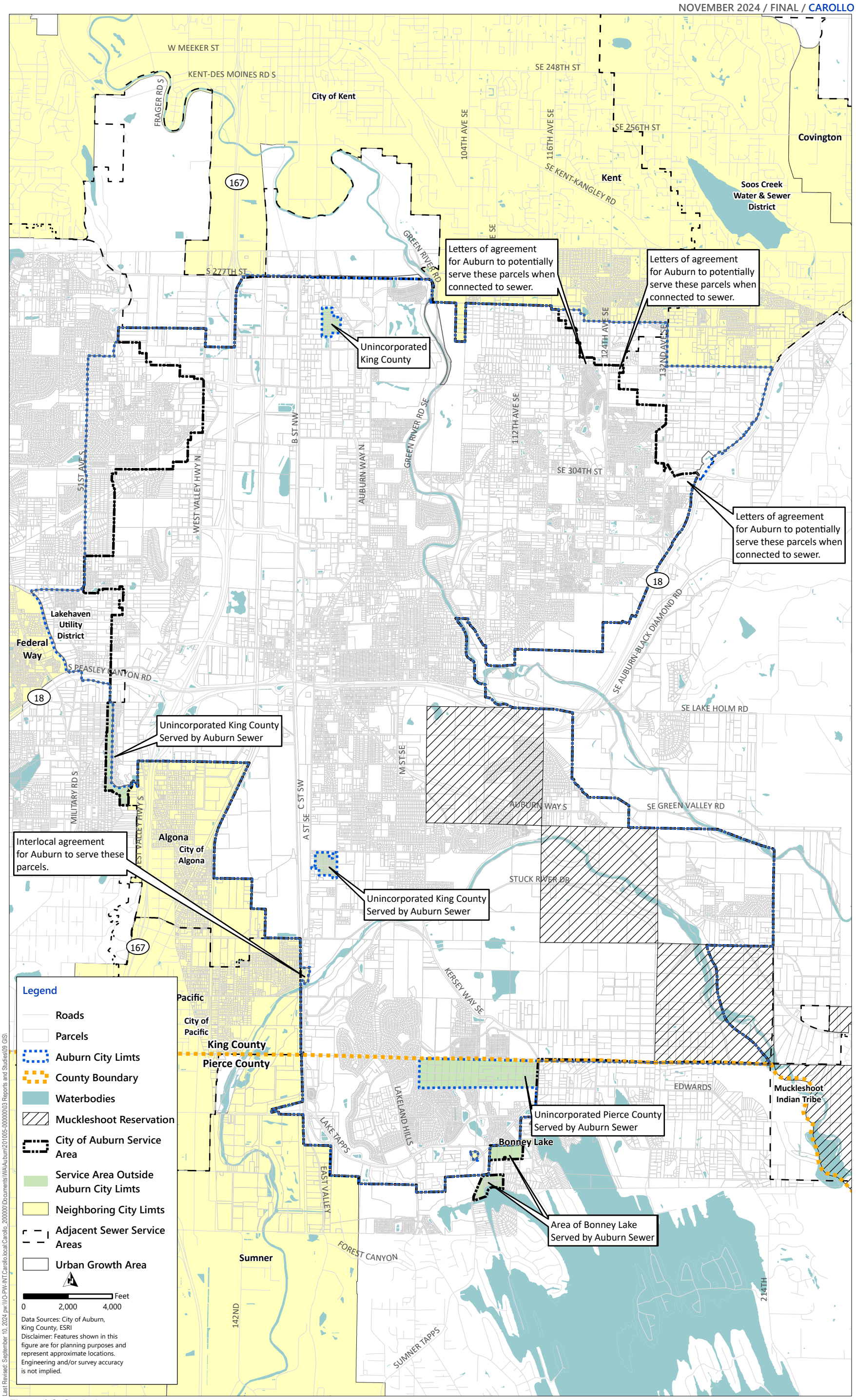


Figure 1.2 Study Area
CITY OF AUBURN
2024 COMPREHENSIVE SEWER PLAN

1.3.6 City of Auburn Water Resources Protection Report

As identified in the City's 2016 *Sewer Plan*, coordination with the Water Utility will be necessary in the future, as many of the City's unsewered areas lie within the Water Resource Protection Areas identified in the *Water Resources Protection Report* completed in 2000. In particular, planning for future wastewater infrastructure could include the importance of removing potential contamination (i.e., onsite sewer systems) from those areas, based on coordination with the Water Utility. Auburn City Code 16.10 (Critical Areas) now refers to the areas as "Aquifer Recharge Areas" and regulates activities within them.

1.3.7 City of Auburn Water Conservation

The City of Auburn's Sanitary Sewer Service Area largely overlaps with its Water Service Area, therefore, water conservation efforts undertaken by the City's Water Utility will, by far, be the most likely to affect sewage flows handled by the City's sewage collection system. The Water Utilities program is described in Section 4.3 of the 2024 Water System Plan. The primary effect of such measures on the sewer system would be to reduce the overall wastewater flow, while potentially increasing wastewater strength. Since the City's sewer hydraulic model calibration was based on actual measured flows, the effects of existing conservation measures have been accounted for. Further increased effectiveness of water conservation efforts could result in capacity improvement projects being eliminated or delayed if anticipated flow increases are not realized.

1.4 Neighboring Sewer Utilities

The communities surrounding the City administer their own wastewater conveyance and collection systems. The following sections describe these systems and discuss interlocal agreements between the City and these communities that establish SSSA boundaries and other conditions of service. Neighboring sewer utilities that serve a portion of Auburn are identified in Figure 1.2.

1.4.1 Soos Creek Water and Sewer District and City of Kent

In the northeast corner of the city, within the Lea Hill sewer basin (as shown on Figure 1.2), there are small areas served by the Soos Creek Water and Sewer District (SCWSD) and the City of Kent. In 2001, prior to annexation of the Lea Hill area by the City, the City executed interlocal agreements with SCWSD and the City of Kent, establishing sanitary sewer service area boundaries in the basin. The agreements enable SCWSD and the City of Kent to provide the most efficient method of sanitary sewer service to this portion of the City while ensuring adherence to the City's development standards. Copies of these agreements are included in Appendix A.

As development in Lea Hill occurs, the City will continue to work with both agencies to refine our respective planning areas as needed.

1.4.2 City of Pacific

An interlocal agreement establishing sanitary sewer service area boundaries between the City and the City of Pacific was executed in 2008. This agreement allows Auburn to provide sanitary sewer service to property located on the eastern portion of Pacific's municipal boundary, which lies in the vicinity of

Auburn's wastewater infrastructure. The agreement recognizes that Auburn has sufficient wastewater conveyance capacity to support the SSSA with maximum efficiency in the use of existing and future facilities, together with orderly and efficient sanitary sewer planning. The cities of Auburn and Pacific are considering allowing the area described in the agreement to be annexed by Auburn. A copy of this agreement is included in Appendix A.

1.4.3 Muckleshoot Indian Tribe Reservation

The MIT reservation is located within and to the southeast of Auburn city limits, as shown in Figures 1.1 and 1.2. In 1997, the MIT, Indian Health Service, and City of Auburn entered into an agreement for the City to provide wastewater service to the MIT property located outside city limits, outside the potential annexation area (PAA), and outside the Urban Growth Area. An additional agreement, signed in 2004, superseded the 1997 agreement, and outlined cost sharing in the replacement and maintenance to the conveyance system from the south end of the City on Auburn Way South to the connection to King County's M Street Trunk. Two outcomes of that agreement were that (1) the MIT become a component agency of the King County Wastewater Treatment Division, which officially occurred in July 2004; and (2) the MIT would own a portion of the capacity within the Auburn Way South sewer line for the conveyance of sewage from a portion of MIT properties located outside the City's service area to King County.

In 2013, Resolution 4902 established a master agreement/provision for City utility services on MIT lands. Lands owned by the MIT within the City SSSA are billed as ordinary ratepayers. Development of lands within the MIT reservation must be in accordance with the master agreement. MIT-related agreements are included in Appendix A.

1.4.4 Lakehaven Water and Sewer District

In 2004, an interlocal agreement was established between LWSD (then known as Lakehaven Utility District) and the City delineating a mutual sewer service area boundary within a portion of the West Hill Service Area within the City.

Amendments to this agreement were made in 2005, and 2018, transferring sewer service from LWSD to the City for portions of the area known as Jovita Heights-West Hill. Copies of both LWSD agreements are included in Appendix A.

1.4.5 City of Algona

The City of Algona borders the City of Auburn to the southwest. In 2003, the cities of Algona and Auburn executed an interlocal agreement establishing sanitary sewer service area boundaries. The agreement allows Algona to provide sewer service to a small area in southwest Auburn, within the city limits and adjacent to Algona. Sewer service by Algona provides efficiency in the use of existing and future facilities. An additional agreement between Auburn and Algona was executed in 2020 to clarify the connection locations and billing responsibilities for several parcels located along the service area boundary. Copies of both Algona agreements are included in Appendix A.

1.4.6 City of Bonney Lake

An addendum to a 1998 interlocal agreement establishing sanitary sewer service area boundaries between the cities of Bonney Lake and Auburn to roughly coincide with Auburn's PAA boundaries was executed in February 2005. The addendum added a single parcel to the City SSSA because the parcel was partially located in both Auburn's and Bonney Lake's service areas as a result of the previous agreement.

In April 2005, an interlocal agreement was established for Auburn to provide sanitary sewer service to a parcel within Bonney Lake's SSSA (and designated within Pierce County's Urban Growth Area). The maximum efficiency in the use of existing and future facilities is achieved by having Auburn provide sewer service to this area within Bonney Lake. A subsequent agreement, executed in August 2005, allows for Bonney Lake to serve the parcel in question once a sewer franchise with Pierce County has been secured for the area of Pierce County in which this parcel is located. Copies of both Bonney Lake agreements are included in Appendix A.

1.4.7 King County

In 2002, the City of Auburn was granted a sanitary sewer franchise from King County to operate, maintain, repair, and construct sewer mains, service lines, and appurtenances in, over, along, and under County roads and rights-of-way in areas that, at that time, were located within unincorporated areas of King County. The legal descriptions of the areas covered by that agreement were updated through an amendment approved in January 2013. Copies of the agreement and amendment (Resolution 5027) are included in Appendix A. That franchise agreement will expire in 2027, so a renewal of the agreement should be sought during this planning period.

Contents

CHAPTER 2 - WASTEWATER SYSTEM GOALS AND POLICIES

2.1 City Comprehensive Plan Consistency 2-1
2.2 Business Practices/Asset Management 2-1
2.3 Sewer Comprehensive Plan Policies, Standards, and Guidelines 2-2
2.3.1 Service Area 2-2
2.3.2 System Planning 2-3
2.3.3 Operations and Maintenance 2-4
2.3.4 Environmental Stewardship 2-4
2.3.5 System Performance and Reliability 2-5
2.3.6 Fiscal Responsibility 2-7

Abbreviations

APWA	American Public Works Association
CCTV	closed-circuit television
CMMS	computerized maintenance management system
CSWD	Criteria for Sewage Works Design
FOG	fats, oils, and greases
I/I	inflow and infiltration
NASSCO	National Association of Sewer Service Companies
PACP	Pipeline Assessment and Certification Program
R&R	repair and replacement
SCADA	supervisory control and data acquisition
SDC	system development charges
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation

CHAPTER 2 WASTEWATER SYSTEM GOALS AND POLICIES

This chapter presents policies and standards that guide the operation and development of the City's wastewater collection and conveyance system.

2.1 City Comprehensive Plan Consistency

The City Comprehensive Plan serves as the City's blueprint for managing growth, encompassing policies aimed at protecting critical areas and preserving natural resource lands. This plan also designates urban growth areas, outlines the preparation of comprehensive utility plans, and an implementation approach through capital investments, and development regulations. The City Comprehensive Plan provides a framework of policies for development, expansion, and maintenance of the Utility reflected in this Plan.

2.2 Business Practices/Asset Management

The City desires to employ recognized best business practices that result in an efficient and cost-effective operation of the Sanitary Sewer Utility. The City shall identify the key business functions within the Sanitary Sewer Utility (e.g., billing, permitting, asset management, and planning) and develop supporting best business practices for each.

The City understands that defining and implementing best business practices is a long-term effort and will require a stepwise approach. Given that the Utility is largely composed of physical assets that have the greatest value and deserve the greatest commitment to operate and maintain, the City shall continue to prioritize asset management.

Asset management is a systematic approach to keep assets in good working order to minimize future maintenance and replacement costs, and especially to avoid costly deferred maintenance. The best practices for asset management involve systematically basing choices on an understanding of asset condition and performance, risks, and costs in the long term. Asset management best practices include:

- Having extensive knowledge about assets and their costs for maintenance and replacement (i.e., detailed inventories).
- Maintaining Levels of Service.
- Taking a life-cycle approach to asset management planning.
- Implementing the planned solutions to provide a reliable, cost-effective service.

Since the adoption of the 2016 Comprehensive Sewer Plan, the Utility has compiled an inventory of assets and their conditions for approximate 70 percent of its current assets. The Utility shall continue implementing the above best practices during the next planning period.

2.3 Sewer Comprehensive Plan Policies, Standards, and Guidelines

This Plan presents policies and standards related to system development, maintenance, funding, and general guidelines for Sanitary Sewer Utility operation. These policies define limits and outline how the wastewater collection system should be operated and maintained and are grouped within goal statements that are headlined under the following categories:

- Service Area.
- System Planning.
- Operations and Maintenance.
- Environmental Stewardship.
- System Performance and Reliability.
- Fiscal Responsibility.

2.3.1 Service Area

Goal 1: Plan for sewer extensions and capacity upgrades to reflect the planning and growth projections included in the City's Comprehensive Plan, such that the public sewer system, when constructed, will have adequate capacity to support all future planned development.

- Policy 1.1 - Incorporate the Comprehensive Sewer Plan as an Element of the City's Comprehensive Plan.
- Policy 1.2 - Sewer Service provided by outside purveyors within City limits are required to obtain a franchise with the City and are required to conform to all federal, state, and local laws and regulations. (ACC 20.02.040 and 20.04).
- Policy 1.3 - Future land use patterns for the SSSA will correspond to existing uses or current designations or as otherwise identified in the City's Comprehensive Plan.
- Policy 1.4 - Require that, if a sewer system extension is needed to serve new development, that it is built prior to or simultaneously with such development, according to the size and configuration identified by the Comprehensive Sewer Plan and the City's Comprehensive Plan, as necessary to serve all planned development. (ACC 13.20.270).
- Policy 1.5 - Require the owner of a property connecting to the public sewer system be responsible for the cost of the sewer line across the frontage of, and within their property (ACC 13.20.270), and for a proportionate share of the costs of pump stations, trunk lines, and other facilities specifically designed to enable service to a larger basin. As such:
  - Property owners connecting to existing sewer facilities may be required to reimburse the installer of those facilities, if the facilities satisfy the responsibility described above. (ACC 3.25).
  - Developers, or the City if it funds the construction, may be eligible to be reimbursed, by property owners connecting to the public sewer system, for the cost of installing those facilities that benefit multiple properties. (ACC 3.25).
  - Required improvements may be deferred for reasons of efficiency, but the property owner will, in the future, be obligated to pay a proportionate share of the construction of that required improvement.

2.3.2 System Planning

Goal 2: Plan for future service to all properties in the City within urban density areas.

- Policy 2.1 - System planning will include a provision for future sewer service to all unsewered properties within the SSSA.
- Policy 2.2 - Identify, through interlocal agreements, a sanitary sewer provider for those properties located within the City, but outside the City's SSSA.
- Policy 2.3 - Consider, but not encourage, providing sanitary sewer service to properties outside the SSSA. Property owners outside the SSSA bear the burden of pursuing adjacent sewer providers for service prior to seeking service from Auburn. Considerations for service include:
  - An analysis of the capacity of existing City of Auburn facilities.
  - Required upgrades to City of Auburn facilities.
  - Operational costs added to the Utility.
  - Potential revenue from the added service area.
  - Concurrence of the existing sanitary sewer service area provider.
  - The temporary or permanent nature of the service.
  - The need to permanently adjust the service area boundary and have it approved by the Boundary Review Board.
  - Potential impacts to public health.
- Policy 2.4 - Consider allowing properties within the SSSA to receive service from an adjacent sewer agency. Considerations for service by an adjacent agency include:
  - Future City of Auburn sewer service plans and the anticipated short and long-term timing of such an extension.
  - The effect of long-term capital costs on other future City of Auburn Customers.
  - The willingness/ability of the adjacent agency to provide service.
  - The temporary or permanent nature of the service change.
  - The need to permanently adjust the service area boundary and have it approved by the Boundary Review Board.
  - The potential impact on public health.
- Policy 2.5 - The Sanitary Sewer Utility does not intend and will not plan to extend sanitary sewer service to or through King or Pierce County rural zoned property. Exceptions will only be considered for reasons of health, safety, or service to a school in accordance with King or Pierce County policies and with the approval of King or Pierce County as appropriate.
- Policy 2.6 - Allow development where public sewer service is not readily available to be served by individual onsite (septic) systems, if the individual lots are suitable for onsite systems, per the requirements and approval of King County or Pierce County Department of Health, and the City's or Counties' development codes as appropriate. The allowance of the use of onsite systems will consider City water resource protection efforts and possible impacts to city drinking water sources. (ACC 13.20.060, 13.20.080, and 13.20.090).

- Policy 2.7 - Require a connection to public sewer if an existing onsite (septic) system fails and a permit to repair that system cannot be issued by the County Health Department that has jurisdiction. (ACC13.20.060 and 13.20.070).
- Policy 2.8 - Maintain an asset database to be used in prioritizing asset maintenance and repair and replacement activities. The database includes asset age and material information, and will be validated and updated through inspections, records review, and other available information.

2.3.3 Operations and Maintenance

Goal 3: Manage the extension of the public sewer system to minimize future costs to operate and maintain.

- Policy 3.1 - Set standards for the design and construction of the sanitary sewer infrastructure primarily based on the technical criteria found in the most recent versions of the Ecology publication Criteria for Sewage Works Design (CSWD) and Washington State Department of Transportation (WSDOT)/ American Public Works Association (APWA) Standard Specifications. (ACC 13.20.270).
- Policy 3.2 - Maintain specific criteria for the design and repair of public and private sewer systems, through the City of Auburn Engineering Design and Construction Standards. (ACC13.20.270 and 13.20.300).
- Policy 3.3 - Require the transport of sewage by gravity whenever feasible in order to increase reliability, sustainability, and long-term cost effectiveness.
- Policy 3.4 - Allow pumped systems when it is not feasible to install a total gravity system. Feasibility criteria include the relative elevations of the property to be served and existing sewer infrastructure and physical conditions, such as the existence and nature of critical areas, which may impact the constructability and maintainability of proposed gravity sewer extensions.
- Policy 3.5 - Allow non-gravity services (e.g., grinder pumps, low-pressure force mains, or other on-site pumping facilities) in extenuating circumstances when service by gravity is infeasible, provided that the cost of installation, operation, and maintenance of a non-gravity system shall be borne by the property owner, community association, developer, etc. The City will evaluate applications for non-gravity services consistent with ACC 13.20.200. The City will not install, own, or maintain (outside of emergencies) any part of a private non-gravity system. (ACC 13.20.500 and 13.20.510).
- Policy 3.6 - Give preference to the construction of fewer large public pump stations over a greater number of smaller public pump stations.
- Policy 3.7 - Allow private sewer conveyance systems, consistent with Washington Administrative Code (WAC) 173-240-104(3)(b), within the SSSA as long as they are designed and operated per City standards and are not part of sewer extensions to other parcels. Multiple connections per parcel are allowed. (ACC13.20.500).

2.3.4 Environmental Stewardship

Goal 4: Design, operate, and maintain the public sewer system in a manner that increases reliability and efficiency, and demonstrates environmental stewardship.

- Policy 4.1 - Comply with all federal, state, and local regulations in operation and maintenance of the City's wastewater collection and conveyance infrastructure.

- Policy 4.2 - Prevent storm drainage from entering the sanitary sewer system and pursue inflow and infiltration (I/I) reduction for the purposes of eliminating or reducing required capacity upgrades and reducing maintenance costs (to include reducing wear and tear on pump stations) when determined to be cost-effective. (ACC13.20.130).
- Policy 4.3 - In order to protect public health and the environment, require a property owner to promptly repair any private sewer system failure. If the property owner fails to do so, the City will take such action, as it deems necessary, to prevent or rectify an overflow, including but not limited to temporarily suspending occupancy of the premises or repairing the system at the property owner's expense. (ACC 13.20.500 and 13.20.510).
- Policy 4.4 - Support the use of reclaimed water technologies where economically feasible. City staff will evaluate opportunities for reclaimed water use and support initiatives where the benefits outweigh costs.
- Policy 4.5 - Size the sewer collection system for peak wet weather flow rates that include I/I flows. Gravity sewers will be sized to convey the once-per-20-year peak hour flow without surcharging.
- Policy 4.6 - Size pump stations and force mains for peak wet weather flow rates that include I/I flows. Pump stations will be sized to convey the once per 5-year flow with one pump out of service and convey the once per 20-year flow with all pumps in service.
- Policy 4.7 - Maintain, operate, and repair public sewers and portions of private side sewers located within public rights-of-way, except when damage is caused by discharges from private property or trees located on private property. (ACC13.20.120 and 13.20.182).
- Policy 4.8 - Review complaints/citizen reports and claims made against the City for damages caused by sanitary sewers to identify and make improvements as required.
- Policy 4.9 - Communicate proactively with the community and stakeholders regarding wastewater service improvements.
- Policy 4.10 - Investigate all customer service calls within 24 hours and record results in the computerized maintenance management system (CMMS).
- Policy 4.11 - In cooperation with King County, seek to eliminate prohibited discharges to the public sanitary sewer system. (ACC 13.20.140, 13.20.156, 13.20.158, and 13.20.160).
- Policy 4.12 - Require that businesses which may introduce fats, oils, and greases (FOG) into the waste stream have a grease interceptor installed and maintained to minimize FOG discharge to the public sewer system. (ACC 13.22.020).

2.3.5 System Performance and Reliability

Goal 5: Apply asset best management principles to the City's sewer infrastructure.

- Policy 5.1 - Develop and implement system improvements, infrastructure renewal (repair, rehabilitation, or replacement), and M&O programs for the wastewater system according to asset management principles that address the triple bottom line (economic, social, and environmental benefits and costs), minimize asset life-cycle costs, and incorporate risk management into decision making.
- Policy 5.2 - Monitor the frequency and causes of any service disruptions and develop programmatic methods for reducing the number of disruptions.

- Policy 5.3 - Perform condition assessments of critical assets, developing and implementing a condition assessment schedule for all critical assets.
- Policy 5.4 - Assign industry standard design lives for sewage assets. The actual physical assessment will be compared to the theoretical design life to determine the optimal economic life. Seek to repair or replace system assets before they exceed their economic life. The number of high-criticality assets beyond their economic life will be minimized.
- Policy 5.5 - Conduct maintenance activities at a level that is consistent with optimizing system reliability, asset economic life, and system performance.
- Policy 5.6 - Maintain a level of reliability for pump stations provided by redundancy of critical mechanical and electrical components. Provide backup power generators or dual power feeds and provide a minimum of two pumps at each pump station.
- Policy 5.7 - Implement the use of the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) for inspection of all pipelines.
- Policy 5.8 - Create, update on a routine basis, and use an emergency response plan for critical facilities.
- Policy 5.9 - When necessary, work on private property on private assets when the private asset is negatively impacting the public system. If the condition requiring such work is the responsibility of the owner, the City shall seek to recover the costs for the work. (ACC 13.20.510).
- Policy 5.10 - Replace or repair private side sewers as part of a City initiated project to reduce I/I of extraneous water into the sanitary sewer system where shown to be cost-effective versus capacity improvements. (ACC13.20.130).
- Policy 5.11 - Monitor the frequency, location, and details of all odor-related complaints. At a minimum, respond, research the cause of, and propose control methods once three complaints per month at a site are documented.
- Policy 5.12 - Take adequate measures to ensure system security. At a minimum, maintain security at pump stations by using the SCADA system (motion detection, intrusion alarms) to alert City personnel when unauthorized access is occurring.
- Policy 5.13 - Take appropriate measures to ensure the redundancy and security of data related to the sewer system, including, but not limited to the supervisory control and data acquisition (SCADA), CMMS, GIS, and closed-circuit television (CCTV) systems as well as permitting and other development records.
- Policy 5.14 - Encourage employee participation in workshops, seminars, and other education programs to improve job skills. The City may pay fees and employees' time for the required certification testing, as well as required annual renewal fees if such certification is a job requirement.

2.3.6 Fiscal Responsibility

Goal 6: Manage the sewer utility funds and resources in a professional manner in compliance with applicable laws, regulations, and City financial policies, which requires ongoing monitoring of revenues and expenses in order to make prudent business decisions and report to City officials, as needed, regarding the status of utility operations.

- Policy 6.1 - Implement an adequate system of internal financial controls and adopt a biennial budget.
- Policy 6.2 - Remain a self-supported enterprise fund; however, grants and other alternative financing may be sought and used.
- Policy 6.3 - Assess appropriate rates and system development charges (SDC) to fund the ongoing maintenance, operation, and capital expenditures of the Utility, in accordance with the Comprehensive Sewer Plan. Periodic cost of service studies shall be completed to reassess the monthly service and SDCs.
- Policy 6.4 - Maintain adequate reserves for operation and maintenance, capital improvement, and Sewer revenue bond obligations in order to ensure that the Utility can provide continuous, reliable service and meet its financial obligations under reasonably anticipated circumstances.
- Policy 6.5 - Establish Sewer rates at a level sufficient to pay expenses and maintain adequate reserves.
- Policy 6.6 - Structure Sewer rates to allocate costs fairly and equitably among different customer classes.
- Policy 6.7 - Charge uniform Sewer rates for all Utility customers of the same class throughout the SSSA.
- Policy 6.8 - Consider providing rate assistance programs for qualified specific low-income seniors or totally or permanently disabled citizens.
- Policy 6.9 - Establish fees and charges to recover utility costs related to development.
- Policy 6.10 - Require new customers to substantially pay for the costs of improvements designed to accommodate growth, while the costs to operate, maintain, repair, replace, and improve the existing system capacity are paid by all sewer system customers.
- Policy 6.11 - Sustain funding for the CIP at a level sufficient to maintain system integrity.
- Policy 6.12 - Reinvest in Utility capital assets in order to ensure that the integrity of the existing Utility plant and equipment is maintained. This reinvestment is generally referred to as repair and replacement (R&R).
- Policy 6.13 - In addition to projects designed to maintain and replace existing facilities, seek to invest annually in system improvements designed specifically to upgrade the system in order to meet State regulations and the City's standards and criteria. These improvements may include upgrades to the sanitary sewer SCADA and data management systems, and upgrades to increase safety for both City personnel and the public, bring noncompliant infrastructure into compliance, and reduce environmental impacts.

- Policy 6.14 - Consider replacing or upsizing sewer facilities in the right-of-way whenever a street is to be substantially reconstructed or other significant utility work is to be completed, especially when sewer improvements are specifically identified in the Comprehensive Sewer Plan. In addition, consider street and other utility improvement needs when replacing or upsizing sewer facilities.
- Policy 6.15 - Consider installing public sewer extensions by the formation of Local Improvement Districts whenever a street is to be substantially reconstructed or a new street built where public sewer does not currently exist.
- Policy 6.16 - Consider investing in sewer extensions and the construction of pump stations based on the following considerations:
  - Cost of the infrastructure.
  - Size of the service area as measured by potential customers or customer equivalents.
  - Potential coordination with other City Capital projects that will decrease the overall cost of the proposed extension.
  - The ability to recoup costs from future customers whose connection was facilitated by the investment.

CHAPTER 3 PLANNING CONSIDERATIONS

This chapter includes information related to the projected future development of the City and the resulting needs for capacity improvements to the wastewater collection and conveyance system. Recent needs for changes to land use planning efforts affecting the City SSSA are also discussed.

3.1 Planning Area

The Comprehensive Sewer Plan Study Area is shown in Figure 1.2. It generally encompasses the area within the incorporated city limits of Auburn with the following exceptions (Shown on Figure 1.2):

- Some areas on the West Hill are within the City but are served by the LWSD.
- Some areas of Lea Hill are within the City but are served by the SCWSD or the City of Kent.
- The City currently conveys flows from areas within Bonney Lake's service area that are adjacent to the southernmost boundary of Auburn's service area and for which Bonney Lake does not yet have adequate infrastructure.
- The City currently serves a small area of the City of Pacific just north of the White River.
- The City currently serves an area of Unincorporated King County just west of the city limits.
- There are several areas within the City which are islands of unincorporated King or Pierce County. These areas are within the City's urban growth area and sewer service area.

3.2 Basis of Planning

An evaluation was made of the existing system conditions and for the projected flow conditions in 2044.

Hydraulic modeling for the existing flow conditions was developed using measured rainfall, flow data collected from October 2020 to May 2022 and the physical characteristics of the existing collection and conveyance system.

Future flow conditions were projected using estimated growth developed during the current preparation of the City's Comprehensive Plan. Housing Unit and Employment growth projections/goals were distributed to areas of expected growth throughout the City based on the availability, or anticipated availability of necessary infrastructure such as transportation and utilities, as well as the concentration of developable land. The anticipated additional flow from that growth was then incorporated into the hydraulic model to identify areas where increased capacity will be required as that growth occurs.

3.3 Land Use

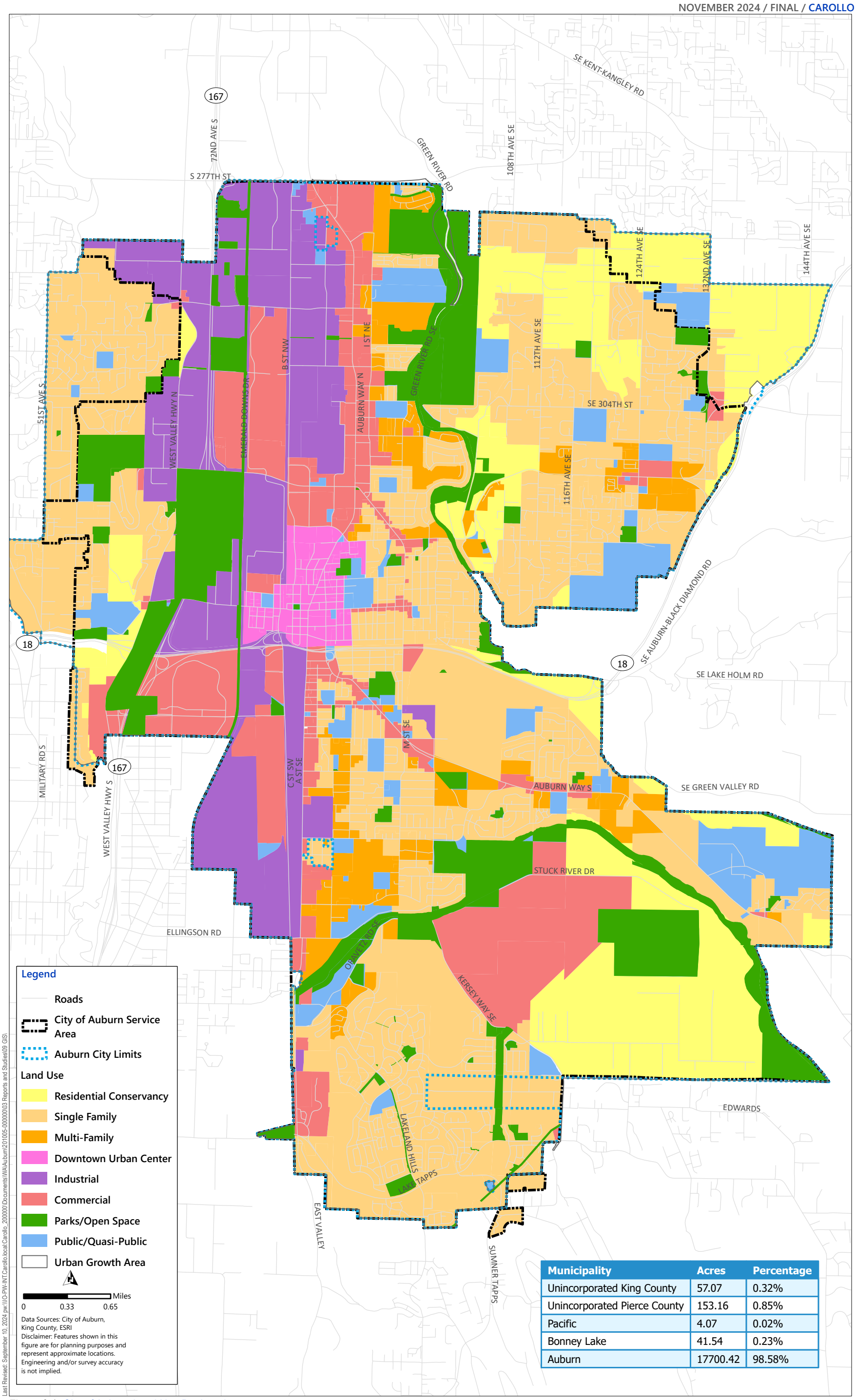
Land use designations are used to encourage growth in areas where the City's infrastructure, including the sanitary sewer system, is or will be adequate to serve that additional growth. The City currently uses 13 land use designations within four general categories.

Table 3.1 Land Use Categories

General Categories	Designations
Residential	▪ Residential Conservancy ▪ Single Family Residential ▪ Moderate Density Residential ▪ Multiple Family
Commercial	▪ Downtown Urban Center ▪ Neighborhood Commercial ▪ Light Commercial ▪ Heavy Commercial ▪ Mixed Use
Industrial	▪ Light Industrial ▪ Heavy Industrial
Public and Institutional	▪ Open Space ▪ Public/Quasi Public

These designations, along with their accompanying zoning, aim to achieve the growth patterns included in the projections. Any changes to land-use designations during the current planning cycle are expected to support the projected growth, and therefore, expected to maintain the projected wastewater flows.

The current land use designations for the City are shown in Figure 3.1



Municipality	Acres	Percentage
Unincorporated King County	57.07	0.32%
Unincorporated Pierce County	153.16	0.85%
Pacific	4.07	0.02%
Bonney Lake	41.54	0.23%
Auburn	17700.42	98.58%

Figure 3.1 City of Auburn Land Use Designations

3.3.1 Description of Land Use Designations

Below is a description of the characteristics and goals of each of the land use designations. Each of the categories and designations are accompanied by specific policies and associated zoning designed to achieve the described character.

3.3.1.1 Residential

- Residential Conservancy - This designation should consist primarily of low-density residential uses (one dwelling unit per four acres is allowed) and accessory agricultural uses in areas featuring environmental constraints or requiring special protection such as the Coal Creek Springs watershed area, low-lying areas along the Green River, and areas that are isolated from urban services. This designation will serve to both protect environmental features and to hold areas for higher density development until public facilities become available.
- Single Family Residential - This designation is the predominant land-use category in the City. Maintaining and creating a diverse arrangement of interconnected subdivisions, neighborhoods, and communities that have a mix of densities and housing types; linkages with other residential areas and commercial hubs through nonmotorized modes, such as pedestrian and bicycling, and vehicular modes will be encouraged.
- Moderate Density Residential - These designated areas are planned to accommodate a variety of residential dwelling types. Varying densities may be permitted to provide a transition between single-family residential and other more intensive uses or activities (such as arterial streets) based on adjacent density, intensity, and/or character. Appropriate densities in these areas generally range from 7 to 20 dwelling units per acre. Dwelling types generally range from single-family dwelling to multiple-family dwellings, with larger structures allowed (within the density range) where offsetting community benefits can be identified.
- Multiple Family - This category shall be applied to those areas that are either now developed or are reserved for multiple family dwellings. Densities may range from 20 to 24 units per acre. These communities are served by transit, have nonmotorized connections to surrounding amenities and services, or have access to on-site amenities.

3.3.1.2 Commercial

- Downtown Urban Center - This category should be applied exclusively to downtown Auburn. The area should be developed in consistently with and conducive to pedestrian-oriented activities. The ambiance of the downtown area should encourage leisure shopping, provide services to local residents and area employees, and provide amenities that attract regional visitors and shoppers.
- Neighborhood Commercial - Low-intensity, small-scale commercial services that meet the daily needs of and complement the quality of the residential neighborhoods they serve. Commercial uses need to be carefully located, (if located within single-family residential neighborhoods), or should be buffered from single-family residential areas. These areas are characterized by lower traffic, fewer operating hours, smaller-scale buildings, and less signage than light commercial areas.

- Light Commercial - This category represents the prime commercial designation for small- to moderate-scale commercial activities. These commercial areas should be developed in a manner consistent with and attractive to pedestrian-oriented activities. Such areas should encourage walkability, leisure shopping, engaging public space, and should provide other amenities conducive to attracting shoppers.
- Heavy Commercial - This category is intended to accommodate uses that would also facilitate a wide range of heavier commercial uses involving extensive storage or vehicular movement.

3.3.1.3 Industrial

- Light Industrial - This category is intended to accommodate a wide range of industrial and commercial uses. This designation is intended to provide an attractive location for manufacturing, processing and assembling land use activities that contribute to quality surroundings. A wide variety of appropriate commercial uses in this designation benefit from the location, access, physical configuration, and building types of these properties. It is distinguished from heavier industrial uses by means of performance criteria. All significant activities shall take place inside buildings, and the processing or storage of hazardous materials shall be strictly controlled and permitted only as an incidental part of another use.
- Heavy Industrial - This designation allows the full range of industrial uses, as well as certain heavy commercial uses that serve the needs of workers in light industries are also appropriate.

3.3.1.4 Public and Institutional

- Open Space - This category shall be applied to areas that are owned by a public entity and maintained in a largely undeveloped state. It includes parks, watersheds, shoreline areas, significant wildlife habitats, storm drainage ponds, utility corridors with public access, and areas with significant development restrictions.
- Public/Quasi Public - This category covers those areas that are reserved for public or quasi-public uses. It is intended to include those areas of a significant size, and not those smaller public uses that are consistent with and may be included in another designation. These public uses include public schools, developed parks, and uses of quasi-public character such as large churches and private schools. Public uses of an industrial character are included in the industrial designation, and small-scale religious institutions of a residential character are included in the residential designation. Streets, utilities, and other separate uses are not intended to be mapped separately as Public/Quasi-Public.

3.4 Sewer System Flow Components

The City has separate sewer and stormwater collection systems, where only wastewater is conveyed in the sanitary sewer system. However, some groundwater and stormwater inevitably enter the sanitary sewer through defects in pipes and manholes (MH) and illicit storm drain connections. Therefore, sewer flows may vary substantially between dry and wet weather.

The different flow components are described in the section below.

3.4.1 Dry Weather Flow Components

There are two components of dry weather flow:

- Base wastewater flow (BWF).
- Dry weather groundwater infiltration (GWI).

3.4.1.1 Base Wastewater Flow

The BWF is the sanitary flow generated by routine water usage of the City's residential, commercial, and mixed-use customers. The collection system's primary function is conveying this flow. The flow has a diurnal pattern that varies by customer. Typically, a residential diurnal pattern has two peaks with the more pronounced peak following the wake-up hours of the day, and a less pronounced peak occurring in the evening. Commercial and mixed-use patterns, though they vary depending on the type of use, typically have more consistent higher flow patterns during business hours, and lower flows at night. Furthermore, a weekend diurnal flow pattern may vary from the diurnal flow experienced during a typical weekday.

3.4.1.2 Groundwater Infiltration

Dry weather GWI enters the sewer system through defects such as cracks, misaligned joints, MH defects, and broken pipelines. Dry weather GWI only occurs when the relative depth of the groundwater table is higher than the depth of the pipeline and where there is a defect; therefore, it varies throughout the system. Dry weather GWI (or base infiltration) cannot easily be separated from BWF by flow measurement techniques. Therefore, dry weather GWI is typically grouped with BWF.

3.4.1.3 Average Dry Weather Flow

Average dry weather flow (ADWF) is the average flow that occurs on a daily basis during the dry weather season and is representative of routine wastewater discharges into the collection system from customers as well as baseline groundwater infiltration.

3.4.2 Wet Weather Flow Components

Wet weather flow (WWF) includes two components:

- Inflow and Infiltration (I/I).
- Wet weather GWI.

3.4.2.1 Inflow and Infiltration

The stormwater I/I response in the sewer system to rainfall is seen immediately (inflow) or within hours after the storm (infiltration).

Inflow is stormwater that enters the sewer system via a direct connection to the system, such as roof drain and downspout connections, leaky MH covers, and illicit storm drain cross-connections. Infiltration is stormwater that enters the sewer system by percolating through the soil and then through defects in pipelines, MHs, and joints. An adverse effect of I/I entering the sewer system is an increase both the flow

volume and peak flows so that the sewer system could be operating at or above its capacity. If too much I/I enters the sewer system, sanitary sewer overflows (SSO) could occur.

3.4.2.2 Wet Weather Groundwater Infiltration

Wet weather GWI is not specific to a single rainfall event, but rather to the effects on the sewer system over the entire wet weather season. The depth of the groundwater table rising above the pipe invert elevation causes GWI. Sewer pipes within close proximity to a body of water can be greatly influenced by groundwater effects.

Wet weather GWI is associated with extraneous water entering the sewer system through defects in pipes and MHs while the ground is saturated during the wet weather season. Wet weather GWI may occur throughout the year, although rates are typically higher in the late winter and early spring in the Pacific Northwest.

3.4.2.3 Peak Wet Weather Flow

Peak wet weather flow (PWWF) is the highest observed hourly flow that occurs following the selected design storm event. PWWF in a sewer system can be more than ten times the base flow, causing utilities to construct high-capacity infrastructure to convey and treat these flows. For Auburn most of the basins have a peak factor below 5 for the 20-year design storm, with one small basin over 10 as noted in Chapter 5.

3.5 Average Dry Weather Flow

Developing an accurate estimate of the future quantity of wastewater generated at build-out of the collection system is an important step in maintaining and sizing sewer system facilities, for both existing conditions and future scenarios.

Base flow can be estimated for a wastewater system by comparing dry weather flow and wet weather flow at the various flow monitoring locations. To estimate ADWF for more specific areas, such as individual wastewater basins, dry weather flows are typically estimated based on the area contributing to flows and flow coefficients developed for each land use type. This method is developed based on the assumption that areas with similar land uses, such as low-density residential parcels, produce equivalent quantities of wastewater flow. System-wide flows can be compared to measured flows at flow monitor locations. This method of estimating base flows is an industry standard for planning and provides sufficiently accurate data for planning purposes.

3.5.1 Average Dry Weather Flow Development

Existing ADWFs for each basin were estimated using data from the Flow Monitoring Program for each of the flow monitoring basins. ADWF was developed using the driest days from the flow monitoring period based on the following set of minimum criteria:

- Less than 0.1 inch of rain the previous day.
- Less than 0.4 inch of rain in the previous three days.
- Less than 1.0 inch of rain in the previous five days.

- Selected days must exhibit average-day flows within 85 percent to 115 percent of the average-day flows of remaining dry days.
- In addition, those dry days that exhibited unusual flow patterns were not used to generate net dry day flow values for a basin.

Characteristic dry weather 24-hour diurnal flow patterns for each site were developed based on the hourly data. The hourly flow data were also used to calibrate the hydraulic model for the observed dry weather flows during the flow monitoring period. Hourly patterns for weekday and weekend flows vary and were separated to better understand dry weather flow. Additional information on this process is outlined in Appendix D.

3.6 Wet Weather Flow

PWWF in a wastewater collection system are caused by rainfall dependent I/I. Peak hour flows can result in flows more than ten times the base flow, causing utilities to construct high-capacity infrastructure to convey and treat these extraneous flows.

Existing and projected PWWFs are predicted using the hydraulic model and design storm used for this Plan. This analysis uses a 20-year recurrence interval design storm, illustrated in Chapter 5 - Wastewater System Analysis. This storm was identified in the 2012 King County I/I Study and corresponds to the recurrence interval within historical King County rainfall. To represent typical Pacific Northwest winter rainfall conditions, antecedent rainfall was added from historical data. Additionally, climate change risk was evaluated by modifying the design storm to represent possible changes to local rainfall based on the latest available research. Further details on the development of the design storm and climate evaluation can be found in Chapter 5 - Wastewater System Analysis.

CHAPTER 4 DESCRIPTION OF EXISTING SYSTEM

This chapter describes the existing wastewater collection and conveyance system and SSSA. The City provides wastewater collection services to city residences and businesses through multiple facilities including gravity sewers, pump stations, and force mains. The wastewater flow is conveyed to the King County Regional Wastewater System for treatment and disposal. The City's system consists of 17 sewer pump stations, approximately 5,500 MHs, and approximately 210 miles of sewers and force mains. The City's system is intended to collect and convey only sanitary flow, but the flow also includes rainfall-derived I/I. There are no known SSO in the system.

4.1 Overview

For purposes of discussion, the City's wastewater collection system is divided geographically into five major sewer basins. The descriptions of the five major sewer basins (Valley, West Hill, Lea Hill, Auburn Way South, and South Hill) are presented below and shown on Figure 4.1.

4.1.1 Valley Sewer Basin

The Valley Sewer Basin is located on the valley floor and contains the oldest portions of the City's sewer collection system. Four primary King County trunk sewer lines (Stuck River Trunk Sewer, M Street Trunk Sewer, Auburn Interceptor Sewer, and Auburn West Interceptor Sewer) convey flow from south to north along this sewer basin, providing the backbone for service to the City. The Valley Sewer Basin receives flows from the other four sewer basins and conveys these flows to the King County sewer trunk lines. The topography of the valley is very flat with a minor incline, sloping down from the south end of Auburn (elevation 109 feet) to the north end of Auburn (elevation 53 feet). Seven pump stations are located within the Valley Sewer Basin to serve areas which are unable to reach the King County trunk lines by gravity. The City provides service to two small areas of unincorporated King County, located within the sewer basin. The Valley Sewer Basin is bounded by the Lea Hill and Auburn Way South sewer basins to the east, the South Hill Sewer Basin and the Cities of Algona and Pacific to the south, the West Hill Sewer Basin to the west, and the city of Kent to the north.

4.1.2 West Hill Sewer Basin

The West Hill Sewer Basin includes areas located on the West Hill above the valley floor as well as areas of the valley adjacent to the hill. Flows from the West Hill Basin are conveyed to two King County trunk lines—the Auburn West Valley Interceptor and the Auburn Interceptor. Two pump stations serve portions of this basin. The Peasley Ridge Pump Station serves a small area on the westernmost edge of the basin. The Hudson Pump Station serves a flat area on the valley floor in the north end of the basin. The West Hill Sewer Basin is bounded by the Valley Sewer Basin to the east, city of Algona to the south, LWSD to the west, and City of Kent to the north.

The western boundary of the West Hill Sewer Basin, which is also the western boundary of the service area, was established by interlocal agreements with LWSD in 2004, 2005, and 2018 (see Appendix A).

4.1.3 Lea Hill Sewer Basin

The Lea Hill Sewer Basin is the portion of the city located to the east of the Green River. Sewer flows exit this basin into the Valley Sewer Basin by river crossings at the 8th Street Bridge or the Green River Siphon (see Section 4.2.4). Four pump stations serve the Lea Hill Sewer basin. The Rainier Ridge, Verdana, and Promenade Pump Stations are located on the east portion of the Lea Hill Sewer basin and convey sewage to high points on the hill where it can flow via gravity to the river crossings. The Riverside Pump Station serves low areas just east of the Green River and lifts sewage to the gravity sewer main that conveys flows across the 8th Street Bridge. There is a significant unsewered area in the north portion of the Lea Hill Sewer Basin. The area is substantially developed with single-family homes on lots between ¼-acre and 1 acre that use existing on-site septic systems. The northeast area of the sewer basin is served by SCWSD and the City of Kent (see Figure 4.1).

The basin is bounded on the south and west by the Green River. The north and east boundaries of the Lea Hill Sewer Basin were established by a 2001 interlocal agreement with the City of Kent and by a 2006 interlocal agreement with the SCWSD (see Appendix A).

4.1.4 Auburn Way South Sewer Basin

The Auburn Way South Sewer Basin is located east of the Valley Sewer Basin along Auburn Way South on the Enumclaw Plateau. It is geographically bounded by State Route 18 to the north and the White River to the south. The southeast portion of the Auburn Way South Sewer Basin borders the MIT reservation sewer service area. The City and the Muckleshoot Utility District jointly own a major trunk line that discharges to King County's Stuck River Trunk Line and/or the M Street Trunk Line at the northwest edge of the sewer basin.

4.1.5 South Hill Sewer Basin

The South Hill Sewer Basin is bounded by the White River to the north and east, City of Pacific to the west, and City of Sumner and Pierce County to the south. Portions of the Pierce County area lie with the City of Bonney Lake's Sewer Service Area. The western half of the South Hill Sewer Basin has been developed as a residential area. The eastern half (east of Kersey Way) of the sewer basin is currently developed as a low-density residential area and is unsewered. There is a large 300–400-acre gravel pit that is intended to be developed as a residential area within the next several years. Its development will require the installation of a sewer pump station to convey the flow from at least a portion of that project. Three pump stations (Area 19, Terrace View, and North Tapps) serve the southern extent of the sewer basin. All of the flow from the South Hill Sewer Basin is conveyed to King County's Lakeland Hills Pump Station, then pumped to King County's Lakeland Hills Trunk sewer located in the Valley Sewer Basin.

4.2 Sanitary Sewer Facilities

The following sections provide information regarding the City's wastewater facilities. Locations of the pumping facilities, river crossings, King County trunk lines, and other key system elements are shown in Figure 4.2. Ownership of interceptor and collection system pipelines is indicated by line color. Figure 4.2 also shows the City's potable water pumps, wells, and reservoirs. The City draws its potable water from deep aquifer wells located throughout its geographical boundaries. While no sewage treatment facilities are located within the City, portions of the conveyance system are located in the vicinity of some of those wells. Most of the sewer lines are located more than 100 feet from the wellheads as stipulated for new sewer works by Ecology's CSWD (G2-1.5.3), two well sites are close to 100 feet from existing sanitary sewers in the central part of the system. As part of the sewer inspection activities outlined the Chapter 7 CIP, the distance between wellheads and sewers will be definitively measured at these sites. If sanitary sewers are within 100 feet from the wellheads, based on condition and other projects in the vicinity, the sewer distance can be addressed as part of the Sanitary Sewer Repair and Replacement/System Improvements project summarized in Chapter 7, following the outlined priority methodology.

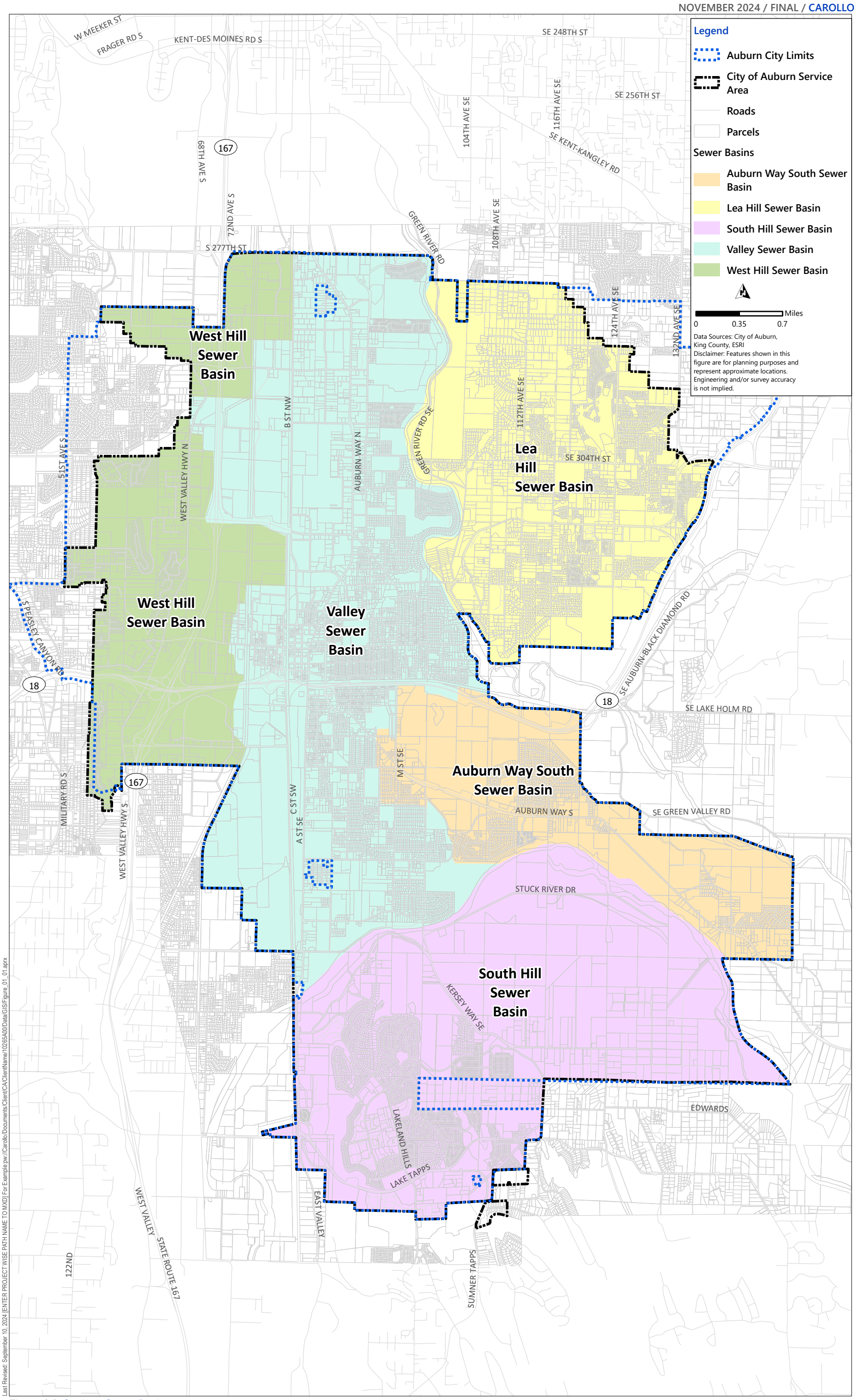


Figure 4.1 Sanitary Sewer Basins
CITY OF AUBURN
2024 COMPREHENSIVE SEWER PLAN

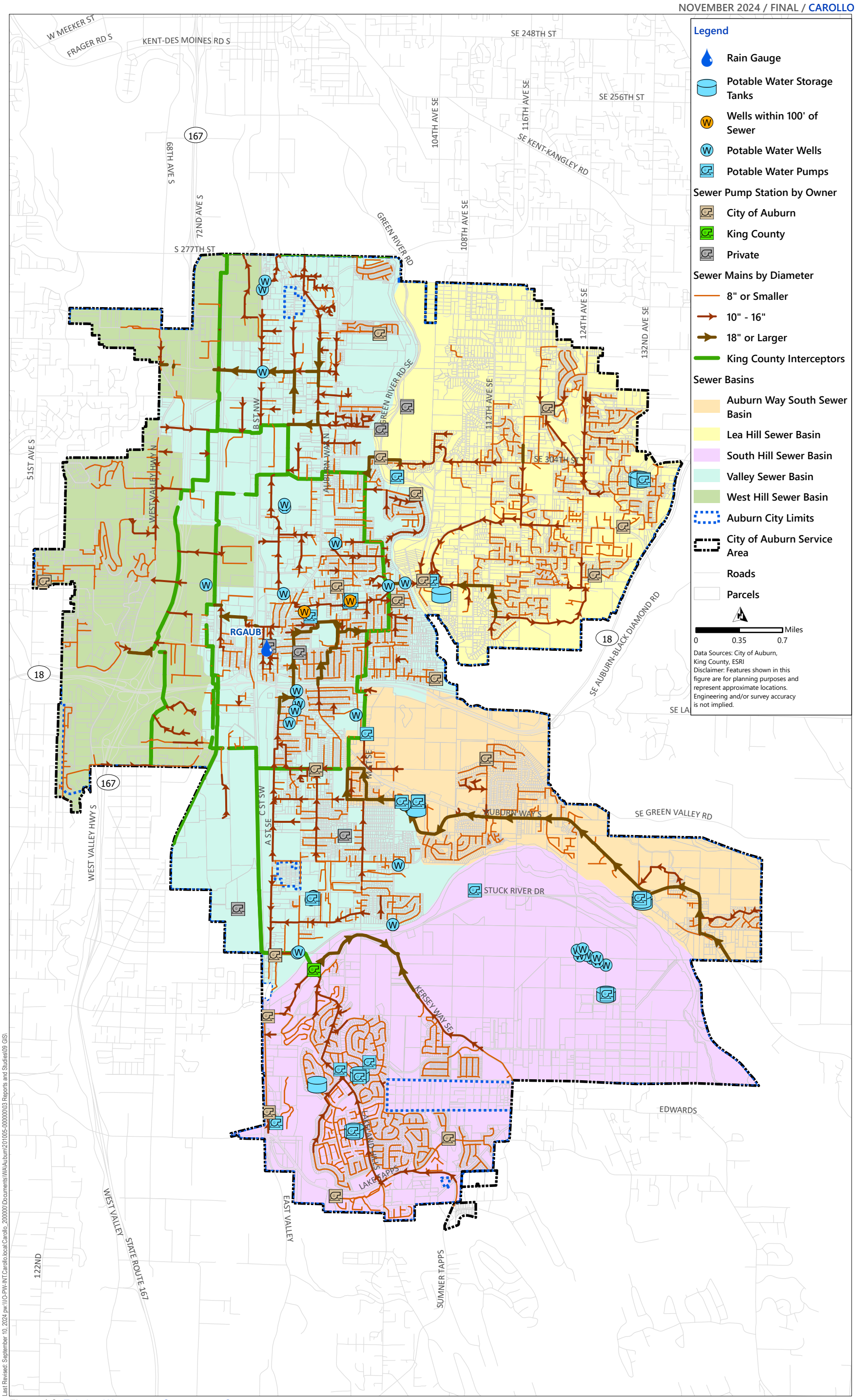


Figure 4.2 Existing Wastewater Conveyance System
CITY OF AUBURN
2024 COMPREHENSIVE SEWER PLAN

4.2.1 Critical Infrastructure

For planning purposes, the City considers all sewer pump stations, force mains, river crossings, and areas downstream of these facilities to be critical infrastructure. The critical infrastructure designation also applies to major trunk lines (pipes greater than or equal to 12 inches in diameter). Also, all gravity sewer lines serving the hospital, city hall, City maintenance facility, Justice Center, and fire stations are considered critical. These critical assets are shown in Figure 4.3.

4.2.2 Pump Stations

Since preparation of the *2016 Comprehensive Sewer Plan*, the City has added two new sewer pump stations associated with new developments, the Hudson, and Promenade Pump Stations.

The City currently has 17 pump stations within its SSSA. The pump stations are listed in Table 4.1 along with their location and year of construction or most recent replacement. More detailed information regarding the pump stations is provided in Appendix E.

Table 4.1 City of Auburn Sewer Pump Station Inventory

Pump Station	Year Constructed/ Replaced	Cross Streets	Approximate Address
South Hill Sewer Basin			
Area 19	2006	Lake Tapps Pkwy. E and west of 72nd St. SE	800 71st Street SE
North Tapps	2007	Lake Tapps Pkwy. SE and west of 176th Ave. E	2610 Lake Tapps Pkwy. SE
Terrace View	2007	East Valley Hwy. E and north of Terrace View Dr. SE	6005 East Valley Highway
Valley Sewer Basin			
Auburn 40	2010	42nd St NE and O Pl. NE	4159 O Pl. NE
Ellingson	2011	41st St. SE, East of A St. SE	40 41st St. SE
F Street	1980	F St. SE and 17th St. SE	1700 F St. SE
Hudson	2020	S 287th St and West Valley Hwy	6408 S 287th St.
R Street	1977	R St. NE and 6th St. NE	600 R St. NE
Valley Meadows	1992	4th St. SE and V St. SE	2022 4th St. SE
8th Street	1974	J St. NE and 8th St. NE	900 8th St. NE
22nd Street	1967	22nd St. SE and Riverview Dr.	1950 22nd St. NE
Auburn Way South Sewer Basin			
Dogwood	2010	Dogwood St. SE and 15th St. SE	1423 Dogwood St. SE
West Hill Sewer Basin			
Peasley Ridge	2001	S. 320th St. and 53rd Ave. S	5225 S 320th St.
Lea Hill Sewer Basin			
Promenade	2018	SE 312th St and 132nd Way SE	12900 SE 312th St.
Rainier Ridge	1980	125th Pl. SE and south of SE 318th Way	31809 125th Pl. SE
Riverside	1981	8th St. NE and 104th Ave. SE	31902 104th Ave. SE
Verdana	2011	118th Ave SE and SE 296th Pl.	11807 SE 296th Place (Kent)

4.2.3 Gravity and Force Main Collection System

The City sewer collection system includes approximately 205 miles of gravity and 5 miles of force main pipe. The collection system is primarily composed of polyvinyl chloride pipe with an 8-inch diameter. Older areas of the collection system consist of concrete or clay pipe, which the City has been replacing with other material when repairs are required or anticipated. The City is continually updating its digital geographic and record-keeping systems to include pipeline information such as material, diameter, installation date, and TV reports. Figure 4.4 provides a visual representation (by overall system percentage) of pipeline characteristics, including unknown and/or unrecorded data. The largest current data gap is the installation date of collection system facilities. The recently formed Public Works GIS group has begun a more detailed inventory and data collection effort that is compiling data from a variety of sources to increase the reliability and usefulness of the system data. As part of the City's asset management efforts, City maintenance staff will verify collection system information during routine inspections.

Additional conveyance facilities, primarily owned by King County, are also located within the Auburn SSSA. King County conveyance facilities are discussed in Section 4.3.

4.2.4 Side Sewer Laterals

Generally, each building has a separate side sewer lateral connecting the building sewer to the public main. The Utility is responsible for the maintenance and repair of the portion of side sewer laterals within the right-of-way.

4.2.5 River Crossings

The City of Auburn collection system contains two crossings of the Green River. The crossings are located at the 8th Street NE bridge and near 26th Street NE, both are shown in Figure 4.2. Detailed descriptions of each river crossing are provided below.

4.2.5.1 Green River Crossing (via 8th Street NE)

The Green River crossing was constructed in 1965. The crossing consisted of a cast-iron pipe mounted on the 8th Street NE bridge. When the bridge was replaced in 1971, that pipe was replaced with a combination of ductile iron pipe and "reinforced plastic mortar pipe cast in concrete." Because the midpoint of the bridge is at a higher elevation than the bank on either side, the pipe does not have a positive downhill slope across the bridge and must rely on upstream pressure developed in the line as it comes down Lea Hill to force the flow across the bridge. The pipe continuing up Lea Hill is approximately 900 linear feet and is constructed of 14-inch-diameter cast-iron pressure pipe. At the bottom of the hill, just upstream of the bridge, a valve chamber once housed a mechanically operated control valve. The valve was originally designed to remain closed until pressure, as caused by the upstream pipe filling, opened the valve, and released the flow across the bridge. Due to significant development on the east side of the river, flow within this sewer segment became sufficiently high to maintain continuous scouring flow along the flatter portion of the pipeline, so the valve has been removed.

4.2.5.2 Green River Crossing (via Inverted Siphon at 26th Street NE)

The inverted siphon across the Green River near 26th Street NE was constructed in 1986 and includes parallel 8- and 12-inch-diameter siphon pipelines. The 8-inch-diameter siphon is typically in use. When increased flows occur, wastewater will be redirected to the 12-inch-diameter siphon. If needed, both siphons are capable of operating together. The siphon facility includes a flushing manhole, located in Isaac Evans Park.

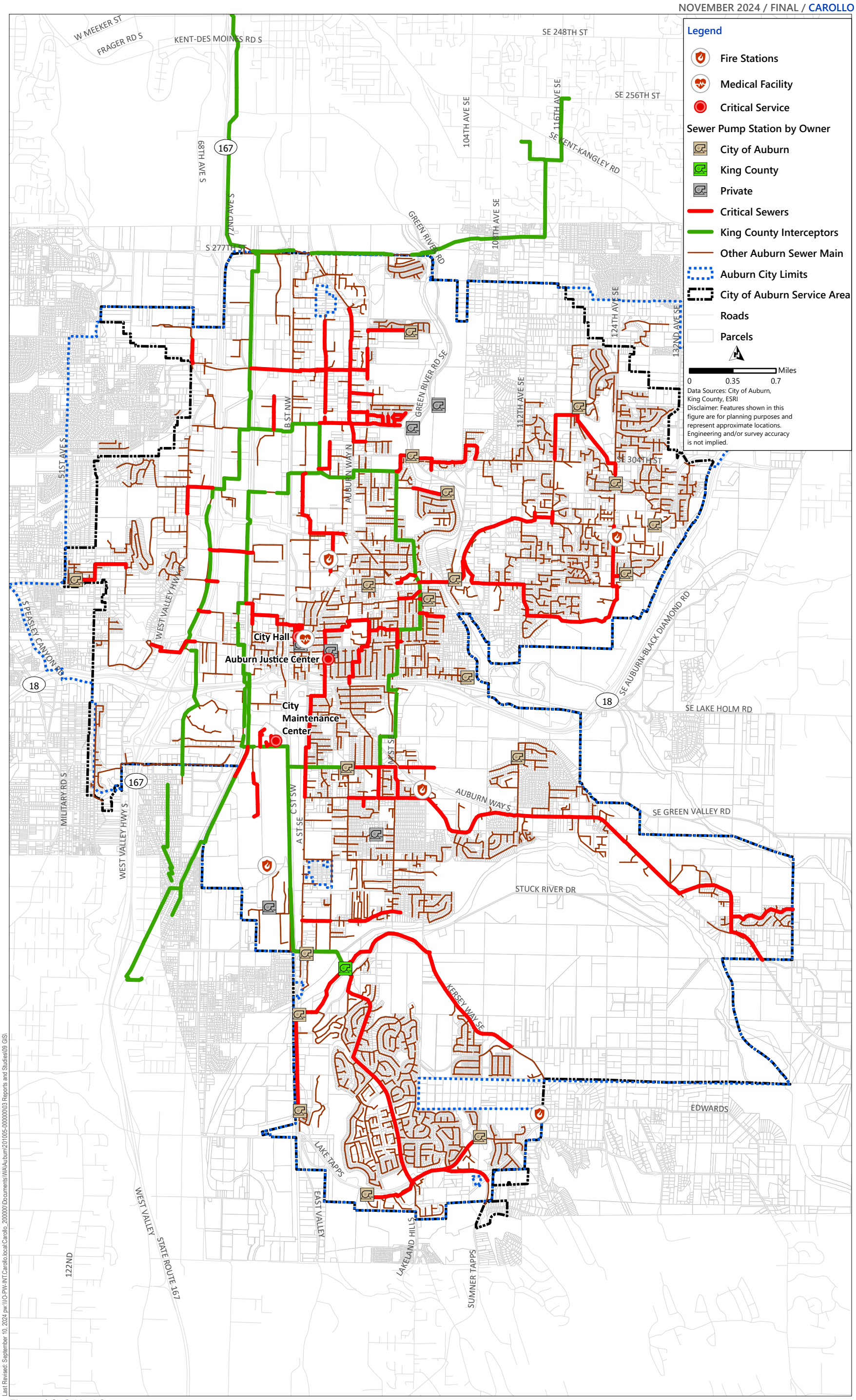


Figure 4.3 Critical Sewers
CITY OF AUBURN
2024 COMPREHENSIVE SEWER PLAN

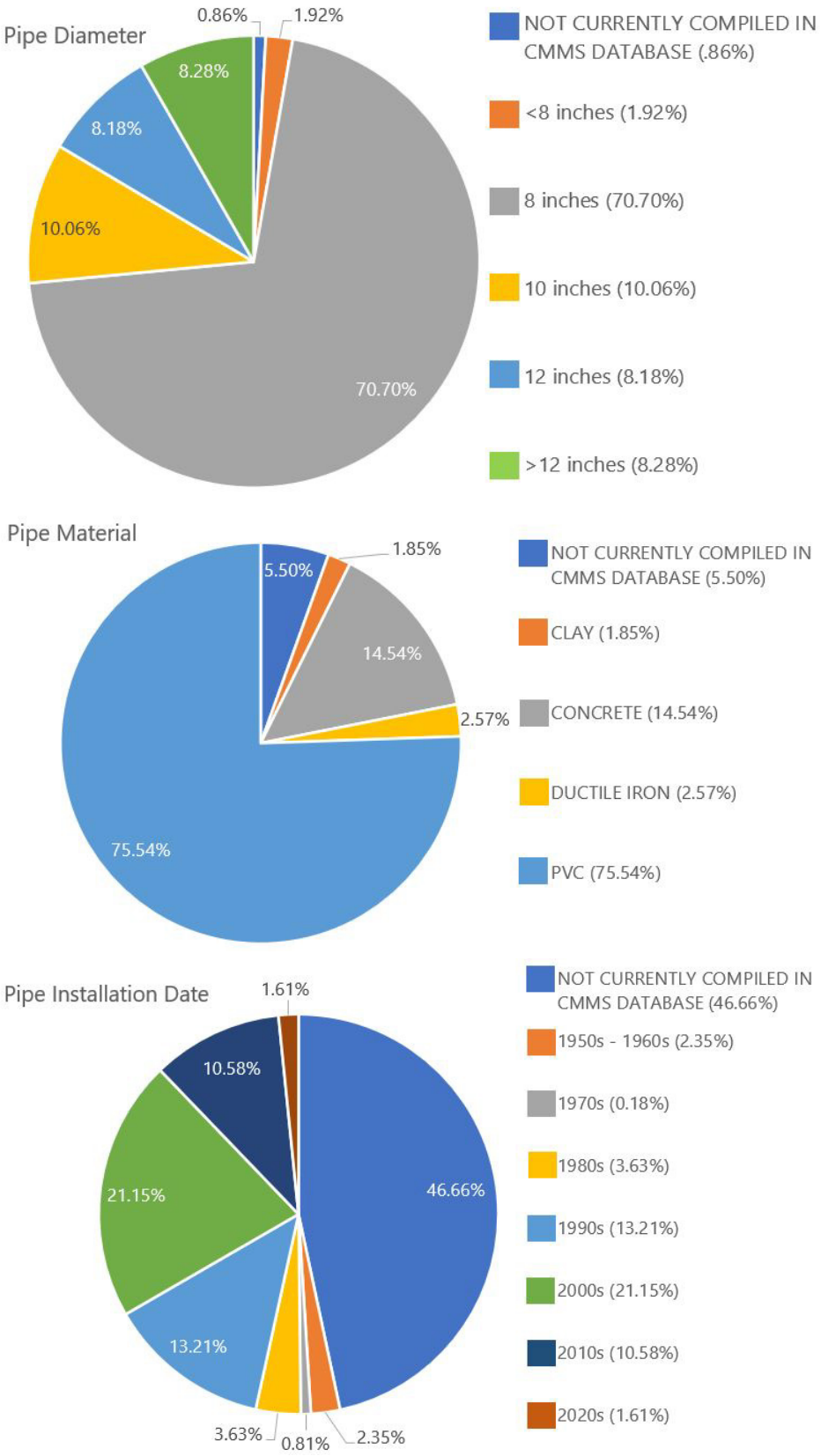


Figure 4.4 City of Auburn Collection System Summary Statistics

4.3 King County Conveyance

The King County wastewater conveyance facilities serving the City include the Auburn Interceptor, Auburn West Valley Interceptor, Auburn West Interceptor, M Street Trunk sewer, the newly constructed Stuck River Trunk sewer, the Lakeland Hills Trunk sewer, and the Lakeland Hills Pump Station. As shown in Figure 4.2, the King County facilities convey wastewater from the south to the north, collecting flow from the Auburn SSSA. The Auburn West Valley Interceptor begins in Algona and flows through the West Hills sewer basin. The Lakeland Hills Trunk sewer and Auburn West Interceptor carry flow from the Lakeland Hills Pump Station north. The M Street Trunk sewer lies mainly on the eastern side of the Valley basin. The Stuck River Trunk sewer extends from the south end of the M Street Trunk sewer in a westerly direction, where it intersects the Lakeland Hills Trunk sewer. All flows are conveyed to the King County South Treatment Plant in Renton, Washington.

King County has initiated a project to replace the Lakeland Hills Pump Station by 2031. The replacement station will serve the same basin as the existing station but will include elements to increase its reliability and maintainability. The capacity of the station will be designed to reflect future growth within its basin.

4.4 Infiltration and Inflow

As part of the analysis of the 2016 Plan, the City used King County Decennial Flow Monitoring (from 2009-2011) and sewer pump station data to identify areas within the service area that may be experiencing high levels of I/I. During this planning period, City staff hired a contractor to install temporary flow meters at specific locations within the potential high I/I areas to locate specific areas of high I/I more precisely. This monitoring corresponded with King County's most recent decennial flow monitoring effort (2020-2022), so that the data from both projects could be shared. The results and conclusions from this effort are included in Chapter 5.

King County, along with the Metropolitan Water Pollution Abatement Advisory Committee (MWPAAC), which is made up of component agencies (Cities and Districts who operate sewer collection systems convey the wastewater to King County for treatment), have worked together since 2000 to measure I/I and have piloted several programs to identify and reduce I/I. Actions included flow monitoring, smoke testing, CCTV inspection, and construction projects designed to reduce I/I to the extent that the required capacity of conveyance and storage facilities could be reduced. While the pilot projects were somewhat successful in reducing I/I, it was not clear that costs of the projects were less than the costs of expanding downstream capacity to convey such flows.

From 2017 until now, King County and MWPAAC have explored concepts to reduce I/I programmatically, focusing on private side sewers and the reduction of I/I over the long term. These efforts included developing or enhancing standards for side sewer construction, encouraging proactive maintenance for side sewers, and identifying and mitigating sources on private property. The strategy with the most potential impact is a proposal to require inspection and repair of side sewers at the point-of-sale of a property. Since this proposal will likely require legislative action and input from a large field of stakeholders, pursuit of that strategy may be included in the upcoming Clean Water Plan planning effort.

4.5 Odor Control and Corrosion

Sewer Policy 5.11 commits the City to monitor frequent odor complaints and to act when three per month are documented. City staff investigate all odor complaints to determine their source, persistence, and potential source if it can be identified. Strategies for mitigating odor include sealing sewer manhole lids, adding bioxide to pump station wet wells to minimize the generation of hydrogen sulfide gas, and filtering wet well ventilation at pump stations. These strategies have been effective, and the City currently has no sites where persistent odor has been detected or reported.

City staff assess corrosion in the system as part of manhole inspections, CCTV inspections of sewer mains, and pump station wet well maintenance activities. The City has not identified any persistent widespread problems with corrosion, but as specific incidents of corrosion are identified those observations are recorded in the City's CMMS. Strategies for managing corrosion include replacing or lining (using Cured-in-Place Pipe) sewer mains, replacing corroded manhole rings and covers, and coating concrete pump station wet wells.

4.6 Industrial Waste Discharges

As part of its conveyance service, the City accepts industrial waste from permitted industrial waste dischargers. King County staff manage the industrial waste program, including permitting, inspection, record-keeping, and enforcement. While that responsibility lies mainly with County staff, City staff help to proactively identify potential dischargers as part of the business license review process. Table 4.2 below identifies the current industrial waste dischargers within the City SSSA. For updated Industrial Waste Discharge Permit information, contact King County's Industrial Waste Program by phone (206.477.5300) or E-mail (Info.KCIW@kingcounty.gov).

Table 4.2 City of Auburn Industrial Waste Discharge Permits

Company name	Business type	Address	Permit type	Permitted Discharge (gpd)
ABAF - Imaginetics	Metal Finishing - Cfr 433	3410 A Street SE	Permit	21.000
Accurate Industries	Metal Finishing - Cfr 433	233 D Street NW	Zero Discharge (Categorical)	0
Aero Controls Inc. - 20th Street	Metal Finishing - Cfr 433	1610 20Th Street NW	Minor Discharge Authorization	100
American Powder Coating	Metal Fabrication	3802 B Street NW	Letter Of Authorization	250
Auburn Dairy Products Inc.	Food Processing-Dairy	702 W. Main Street	Permit	50.000
Auburn, City of - Decant Facility	Decant Station	1305 C Street SW	Major Discharge Authorization	2.000
Boeing Commercial Airplane - Auburn	Metal Finishing - Cfr 433	700 15Th Street SW	Permit	1.209.000
Costco Optical Lab No. 190 - Auburn	Manufacturing-Misc	1802 M Street NW	Major Discharge Authorization	24.500
Formula Corp. - Auburn	Soap And Detergent Mfg - Cfr 417	4432 C Street NE	Permit	16.000

Company name	Business type	Address	Permit type	Permitted Discharge (gpd)
Hexacomb Corp.	General Type	2820 B Street NW, Suite 111	Letter Of Authorization	705
Hospital Central Services Association Inc.	Laundry - Linen	1600 M Street W	Major Discharge Authorization	50,000
MechPro Inc.	Metal Finishing - Cfr 433	1320 26Th Street NW #4	Zero Discharge (Categorical)	0
Oldcastle Infrastructure	Cement/Readymix	2808 A Street SE	Major Discharge Authorization	7.000
Ply Gem Pacific Windows Corp.	Manufacturing-Misc	5001 D Street NW	Minor Discharge Authorization	19.000
Plymouth Poultry Vanguard	Food Processing	3416 B St NW	Letter Of Authorization	1.000
Safeway Inc. - Auburn Distribution Center	Vehicle Washing	3520 Pacific Avenue S.	Letter Of Authorization	1,750
Skills Inc. - Auburn Facility	Metal Finishing - Cfr 433	715 30Th Street NE	Permit	16,300
Thermaline Inc.	Metal Finishing - Cfr 433	1531 14Th St NW	Zero Discharge (Categorical)	0
Thyssenkrupp Aerospace, dba TMX Aerospace	General Type	5002 D Street NW, Suite 104	Major Discharge Authorization	10,000
Waste Management Inc. - South Sound	Container Washing	701 2Nd Street NW	Major Discharge Authorization	5,000
WCR Inc.	Metal Finishing - Cfr 433	3126 C Street Ne	Permit	21,000
Fleet Clean	Pressure Washing	104 49th Street NW	Major Discharge Authorization	1,000
New Type	Laboratory Wastewater	3205 C Street NE	Letter of Authorization	100
Auburn Mechanical	Manufacturing	22 42nd Street NW		19,000

King County Industrial Waste staff have indicated that the overall volume of industrial waste flows has generally been consistent and primarily concentrated during working hours during weekdays. While the City does not limit or prescribe the number or types of industrial businesses in the City, it is assumed that collectively, the amount and quality of future industrial wastewater flows from those businesses will be similar to existing flows.

City Engineering staff manage commercial restaurant dischargers in accordance with ACC Chapter 13.22. Maintenance activities related to commercial pretreatment facilities, specifically the City's FOG Reduction Program, are discussed in Chapter 6, Section 6.3.

4.7 Water Reclamation and Reuse

Reclaimed water is wastewater that has been treated to a level at which it can be used safely and effectively for beneficial, non-drinking water purposes. The City does not currently use reclaimed water because there are no nearby sources or transmission pipelines for reclaimed water. While immediate opportunities are not available, the City is in favor of the concept of water reuse, and as technology, economics, and/or the development of infrastructure makes such use feasible, the City would encourage its use. The City participates in the King County reclaimed water program, which completed a Reclaimed Water Comprehensive Plan in 2012, and includes a completed King County Water Reclamation Evaluation Checklist, a copy of which is included as Appendix G, as part of the Water System Plan (WSP).

This section summarizes the regulatory framework surrounding the generation and use of reclaimed water, potential reclaimed water sources and users, and City planning for near-term reclaimed water use within the City SSSA.

4.7.1 Regulatory Framework

The state has identified reclaimed water as an important water resource management strategy that offers benefits related to potable water supply, wastewater management, and environmental enhancement. State law supports the beneficial reuse of reclaimed water for consumptive applications (such as irrigation, commercial and industrial process use, etc.) and non-consumptive purposes (including groundwater recharge via surface percolation or direct injection, wetland enhancement, and stream flow augmentation).

DOH and Ecology have developed standards that guide the planning and development of reclaimed water projects and systems. These standards, summarized in the jointly published *Water Reclamation and Reuse Standards* (September 1997), describe the allowable beneficial uses of reclaimed water and the required levels of treatment appropriate for each use. The Standards establish four classes of reclaimed water; A, B, C, and D. Class A reclaimed water represents the highest level of treatment, referring to water that is oxidized, coagulated, filtered, and disinfected to certain standards. Of all levels of reclaimed water, Class A is acceptable for the widest range of uses. Additional clarification and guidance related to the design of reclaimed water facilities are provided in Ecology's Criteria for Sewage Works Design (Ecology, 2008).

Ecology prepared draft reclaimed water regulations (WAC 173-219) to further define and provide guidance for reclaimed water facilities and uses. The rule-making process began with legislation in 2006 that amended the Reclaimed Water Use Act, Revised Code of Washington (RCW) Chapter 90.46, and directed Ecology to coordinate with DOH, form a stakeholder Rule Advisory Committee, and adopt a comprehensive rule for reclaimed water use by December 2010. The overall goal was to develop a Reclaimed Water Program through rules, guidance, and statutes that runs smoothly and consistently while protecting public health and the environment. Several drafts of the proposed rule were made available for review by stakeholders, and significant comments were submitted, but the rule-making process was suspended by executive order before it could be completed. Ecology reactivated the rulemaking process in June 2014. The revised reclaimed water rule was incorporated into WAC 173-219 in 2018.

4.7.2 Potential Reclaimed Water Sources

This section identifies potential sources of reclaimed water in the vicinity of the City SSSA.

Receiving water from any of the existing treatment plants would involve the construction of long (7-15 mile) pipelines since none of them are located in or immediately adjacent to Auburn. Also, since reclaimed water cannot be mixed with potable water, all of the options listed below would also require the installation of a separate reclaimed water distribution system to convey that water directly to potential users.

4.7.2.1 King County

City of Auburn wastewater is treated at King County's South Treatment Plant, located in Renton, approximately 13 miles north of Auburn. Although South Plant does generate reclaimed water for onsite uses, nearby irrigation, and habitat restoration, there are no existing or planned transmission lines south to the City of Auburn. The status of current King County reclaimed water comprehensive planning is discussed in Section 4.6.3.

4.7.2.2 City of Sumner

The City of Sumner wastewater treatment plant is located approximately 8 miles south of the city of Auburn. Sumner does not currently produce reclaimed water for offsite uses, but the City will continue to monitor Sumner's plans for reclaimed water use to determine if transmission of reclaimed water from Sumner to the City is feasible and cost-effective for potential users within the City SSSA.

4.7.2.3 Lakehaven Water and Sewer District

LWSD owns and operates two wastewater treatment plants, the Lakota and Redondo facilities, located approximately seven miles to the west and northwest of the City. LWSD does not currently produce reclaimed water but has evaluated the feasibility of producing reclaimed water for landscape irrigation and groundwater recharge. Because the Redondo facility site is limited with respect to expansion area, reclaimed water improvements, if implemented, would likely occur at the Lakota facility. The City will continue to monitor LWSD planning efforts with respect to reclaimed water production and reuse.

4.7.2.4 City of Auburn

Although the City does not operate a centralized wastewater treatment plant, a smaller, satellite reclaimed water production facility could feasibly be installed at one of the City's pump stations. A satellite facility could be used to capture wastewater flows from a specific basin, and then generate reclaimed water for uses nearby. While a range of treatment approaches may be employed at a satellite facility, many utilities are implementing membrane bioreactor (MBR) technology in these types of applications, because of the small footprint required relative to other, more conventional forms of wastewater treatment. Solids generated at the satellite facility would be returned to the collection system and conveyed to King County's South Treatment Plant. While currently, the capital investment for such a facility is prohibitive as technology and cost effectiveness improves, such a facility would be considered.

4.7.3 Potential Reclaimed Water Users

Starting in 2009, King County began development of a Reclaimed Water Comprehensive Plan to evaluate expansion of its existing reclaimed water program over a 30-year period. The City of Auburn supported the County's planning process by providing non-potable water use data by specific parcel. City staff and elected officials also participated in reclaimed water workshops held at key points in the County planning process. Although the Reclaimed Water Comprehensive Plan was not completed, some of the concepts evaluated during that process will inform the development of a plan for reclaimed water as part of King County's Clean Water Plan. The most likely reclaimed water customers would be in the irrigation class, as noted in the WSP.

4.7.4 Reclaimed Water Summary

The City of Auburn is not planning any specific capital improvements related to producing and/or conveying reclaimed water for the following reasons:

- King County and other nearby treatment plant sources of reclaimed water are unlikely to be developed for use within the City SSSA in the near term.
- The City currently has adequate water supply in the near term and the need for offsetting potable water demands is low at this time.
- The capital costs related to design, construction, and permitting of a reclaimed water production facility are large relative to the benefit at this time.

The City acknowledges the value that a reclaimed water program might offer in the future, especially if a nearby reclaimed water source with associated conveyance piping is extended to the City's SSSA. The City will continue to monitor reclaimed water planning by nearby purveyors, the adequacy of the City's water rights to meet current and future potable water demand, and the industrial user base, or other significant user to evaluate whether reclaimed water is a feasible and economically viable alternative. City staff will also continue to participate in King County's Clean Water Plan to promote the City's interests in County policies, criteria, and implementation strategies.

CHAPTER 5 WASTEWATER SYSTEM ANALYSIS

5.1 Introduction

The City customer base continues to increase through system growth by development, redevelopment, and connection of on-site system properties that were not previously connected to the system. With the additional customers served, some of the City's sewer infrastructure may reach its conveyance capacity. This chapter presents an evaluation of the available capacity of the existing system to convey current and future projected sewer flows and develops appropriate CIP to address any deficiencies. Using the City's updated and re-calibrated collection system hydraulic model, major pipes and lift stations in the collection system were evaluated using the established capacity criteria. The modeled collection system consists primarily of large gravity sewers which represents a skeletonized version that includes all key components of the system. The modeling focused on the key conveyance infrastructure, neglecting smaller collector pipes which generally have adequate capacity to convey the flow. This approach reduces the modeling computational effort, while providing necessary conveyance information. Additional details on the hydraulic model update and calibration can be found in Technical Memorandum (TM) 1 - Model Calibration Report (Appendix D).

The collection system was evaluated for two planning scenarios:

- Existing - Based on 2020-2021 flow monitor data.
- Future year 2044 - Based on traffic area zone (TAZ) projected population and employment developed from Puget Sound Regional Council projections by Leland Consulting Group.[1][2]

This chapter presents potential deficiencies under both existing and future conditions and includes an I/I analysis.

5.2 Design and Performance Criteria

Defining performance criteria and key conveyance events is a critical step in the master planning process because it sets evaluation metrics for the collection system infrastructure's ability to meet service goals set by the City. It is important to differentiate performance criteria from design criteria when judging the performance of collection system infrastructure:

- Design criteria establish the standards for designing and constructing new sewers and lift stations.
- Performance criteria establish the standards that are used to analyze adequacy of existing facilities and to trigger infrastructure improvements meeting design criteria.

The collection system's function is to convey sanitary flows from residential and commercial customers to King County's trunk system that takes flows to the King County South Treatment Plant. However, additional wet weather flow from rain and groundwater sources may enter the system that also need to

[1] Auburn Comprehensive Plan: Industry Composition, Location, and Work from Home Memo | Draft, 10/6/2023, Leland Consulting Group.
[2] Auburn Comprehensive Plan: TAZ Allocations under No Action and Preferred Land Use Scenarios | Draft, 10/6/2023, Leland Consulting Group.

be conveyed. Wet weather flows vary with storm size, intensity, and timing. For planning purposes, a design storm is simulated in the hydraulic model, which is used as the evaluation point for the modeled infrastructure. The following sections describe the City's established design criteria and performance criteria used in this analysis.

5.2.1 Design Storm

Design storms are simulated rainfall events used to analyze the performance of a collection system under peak flows and have a specific recurrence interval and rainfall duration. The National Oceanic and Atmospheric Administration publishes isopluvial (rainfall contour) maps that can be used to approximate the total rainfall depth for a range of design storms. Additionally, an appropriate hydrograph for the storm is required to distribute the rain through the design period. Finally antecedent conditions should be considered, as Pacific Northwest storms tend to span multiple days which can lead to saturated ground conditions increasing runoff. The best approach to address hydrograph and antecedent conditions is to base analysis on a historical precedent. The City has selected a weather event from 1996 with a recurrence interval of 20 years for the design storm based on an analysis done for the 2016 Comprehensive Sewer Plan. At that time, a long-term simulation was done with rainfall data from January 1, 1949 through December 31,2012 to identify 20-year peak flow frequency. The third largest event appeared to have a 25-year recurrence and fourth largest appeared to have an 18-year recurrence, with both events producing similar peak RDII flows of 27.19 mgd and 27.03 mgd, respectively. Therefore, the third largest event that occurred on February 5, 1996 was selected to represent the 20-year design storm.

Figure 5.1 shows the historical design storm used for the capacity analysis. A period of rain events occurred over five days. The storm peak lasts 24 hours at the end of the event, with a peak rainfall intensity of 0.29 inches per hour and a 24-hour volume of 2.39 inches.

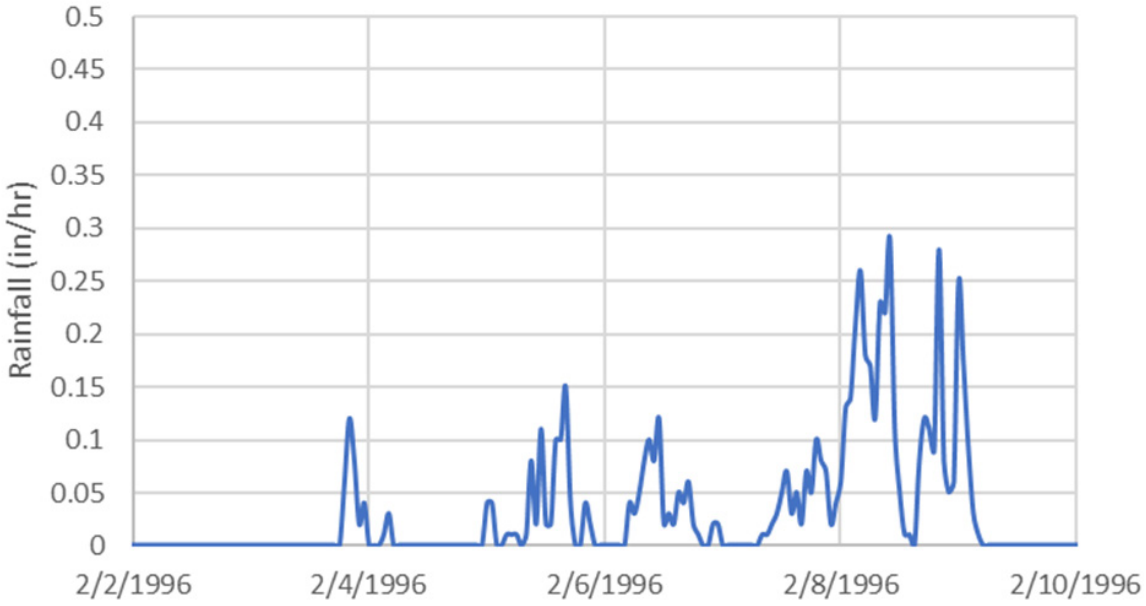


Figure 5.1 20 Year Design Storm

5.2.2 Climate Risk

As described in the previous section, the performance criteria for this master planning effort are evaluated using historical events and by performing statistical analysis to determine the likelihood of recurrence. This is standard practice but does not incorporate expected local and regional climate changes in the future. Over the coming decades, it is expected that the Pacific Northwest will see extreme precipitation events with increasing frequency.

To help plan for this future, this master planning effort evaluated regionally-downscaled climate model results from the University of Washington Climate Impacts Group (CIG). CIG has statistically downscaled an ensemble of global climate models to a 12-km grid and provides expected increases in 1-hour and 24-hour precipitation for various recurrence intervals. These values were used to determine the expected percent change for the 20-year design storm characteristics (peak rainfall intensity of 0.29 inches per hour and a 24-hour volume of 2.39 inches) for the future year being evaluated (2044) as well as the end of the century. Since CIG averages model results over a 30-year period, 2044 is represented by the 2030 - 2059 model ensemble results and the end of the century is represented by 2070 - 2099. Table 5.1 and 5.2 show the ensemble average, maximum and minimum results for both time periods.

Table 5.1 Summary of Potential Future Characteristics for the Design Storm, 2030 - 2059

Parameter	Ensemble Average	Ensemble Maximum	Ensemble Minimum
Peak Intensity (inches per hour)	0.36 (+24%)	0.46 (+58%)	0.26 (-10%)
24-hr Volume (inches)	3.85 (+17%)	5.07 (+54%)	2.89 (-12%)

Table 5.2 Summary of Potential Future Characteristics for the Design Storm, 2079 - 2099

Parameter	Ensemble Average	Ensemble Maximum	Ensemble Minimum
Peak Intensity (inches per hour)	0.42 (+45%)	0.59 (+103%)	0.30 (+2%)
24-hr Volume (inches)	4.24 (+29%)	5.76 (+75%)	3.39 (3%)

These results were used in the existing models to analyze the adequacy of existing facilities and can be used to set future design criteria. Climate change modeling will continue to advance, with new techniques and improved computer processing allowing for more robust projections in the future. In 2021, the Intergovernmental Panel on Climate Change released the most recent major update to the global Coupled Model Intercomparison Project. CIG is currently working to downscale results from those models and compare them to the previous generation used in this study. Following CIG's work, it is recommended that the City review those results to determine if further changes to future design criteria are required.

5.2.3 Conveyance System

It is common practice to use a diameter-based flow depth criteria for pipes both when evaluating exiting sewers and designing new sewers. The depth/diameter (d/D) ratio is defined as the depth (d) of flow in a pipe divided by the pipe's diameter (D). For the conveyance system, the design criteria and performance criteria are outlined below and shown in Figure 5.2:

- Performance Criteria: During PWWF for the design storm, water levels should not surcharge pipes (maximum d/D of 1.0). Pipes that surcharged and exceeded a d/D of 1 and were less than 6 feet from the ground surface in manholes were considered deficient. In Figure 5.2, the hydraulic grade line (HGL) is surcharged and therefore would be considered deficient.

- Design Criteria: Sewers shall be designed to not surcharge or flow at a maximum d/D of 1.0 at peak flow rates for both existing and build-out conditions.

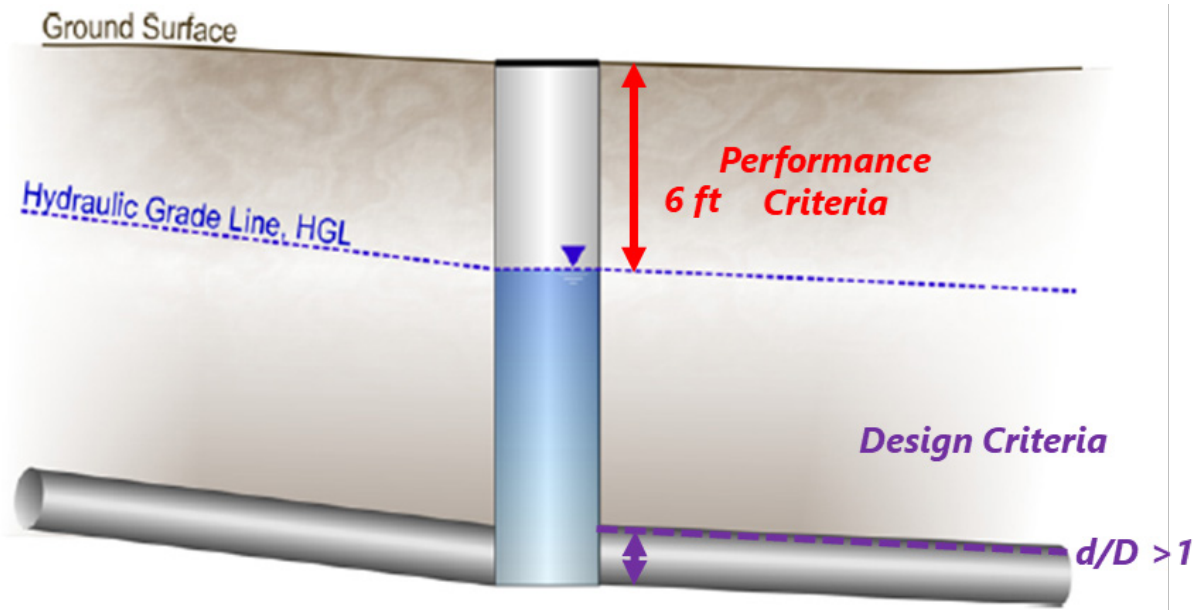


Figure 5.2 Design and Performance HGL Criteria

5.2.4 Lift Stations and Force Mains

Any new lift station recommendations will need to follow Washington State Department of Ecology's Criteria for Sewage Works Design (Orange Book) recommendations for lift stations and force main construction to meet Ecology requirements. Ecology's requirements are outlined below:

- The firm capacity of a pumping station shall be equal to or greater than the peak hourly design flow. Because mechanical and electrical equipment is typically designed for a 20-year life, it is recommended that the peak design flow be based on a 20-year forecast or greater.
- The number of pumps selected shall allow the station to provide the peak design flow with the largest pump out of service.
- The station shall be designed to remain fully operational during the 100-year event.
- Pumps should be designed for pumping sewage and capable of passing solids at least 3 inches in diameter. Pump suction and discharge should be 4 inches or greater.

The City's performance criteria requirements for existing lift stations include firm capacity (i.e., capacity with largest pump out of service) and force main velocities. According to Washington's Orange Book, firm lift capacity shall be provided to manage the design storm peak hour flow, also known as the PWWF, from the lift station's tributary area with the largest pump out of service. Therefore, the City's lift stations should have sufficient firm capacity to pump the PWWF during the design storm.

The evaluation of existing force mains is based on recommendations in the Orange Book for a maximum pipe velocity of 8 feet per second or less during the PWWF for the design storm. The design of new force mains should keep the minimum velocity above 2 feet per second to minimize solids settling.

5.3 Future Conditions Flow Projection

The 2044 scenario flow projection was based on the existing condition flows developed in Appendix D, TM 1 - Model Calibration Report Section 1.6.

5.3.1 Future Conditions Average Dry Weather Flow Development

TAZ blocks provided estimates of existing (2021) and future (2044) units of employment, single family, multi family, housing units, and population. These TAZ blocks were spatially joined to the modeled catchment layer to determine the units in the City's collection system. Figure 5.3 outlines the TAZ blocks within the City's service area.

Table 5.3 outlines the TAZ unit type for 2021 and 2044. The unit type increase was used to calculate a scaling factor, or the unit of increase between the 2021 and 2044 units. The scaling factor was used to project the future ADWF for every catchment in the collection system. The project sanitary flow summary by TAZ type are shown in Table 5.3.

Table 5.3 Flow Projections Summary

TAZ Type	2021 Total Units	2044 Total Units	Scaling Factor	2021 Sanitary Flow (mgd)	2044 Sanitary Flow (mgd)
Single Family	14,841	21,631	1.46	3.03	4.50
Multi-Family	16,985	20,578	1.21	0.90	1.16
Employment	47,738	65,674	1.38	4.49	6.25
Housing Unit	31,457	42,219	-	-	-
Population	86,149	114,056	-	-	-
Total	-	-	-	8.45	11.92

Notes:
mgd - million gallons per day.

5.3.2 Future Conditions Wet Weather Flow Assumptions

Figure 5.4 identifies the portion of the collection system that is currently developed with available sewer in yellow, the portion that likely will not be developed is in red, and the orange section identifies areas that can be developed or are not currently connected to a sewer. The areas shown that likely cannot be developed are due to steep slopes greater than 40 percent grade or large wetlands occupying a large portion of the area. There are likely smaller areas within the system that similarly cannot be developed, but are not easily captured in the larger planning effort. It was assumed that all developable parcels would be developed and connected for the 2044 scenario in the model including those with on-site systems, contributing a WWF I/I component from the contributing area. It was assumed that the I/I of future sewered areas would be 1,500 gallons per acre per day (gpad) during the design storm. This I/I rate is slightly higher than the King County target value of 1,100 gpad, providing a level of conservatism in projecting future peak flows, and closer to the actual level of I/I into the system. The hydrologic model components Model A and rainfall derived infiltration (RDI) were set at 0.65 percent and 2.58 percent respectively, to represent such an I/I rate. Figure 5.5 below shows a detailed map of the City's existing and future sewer system, including future pump stations and mains.

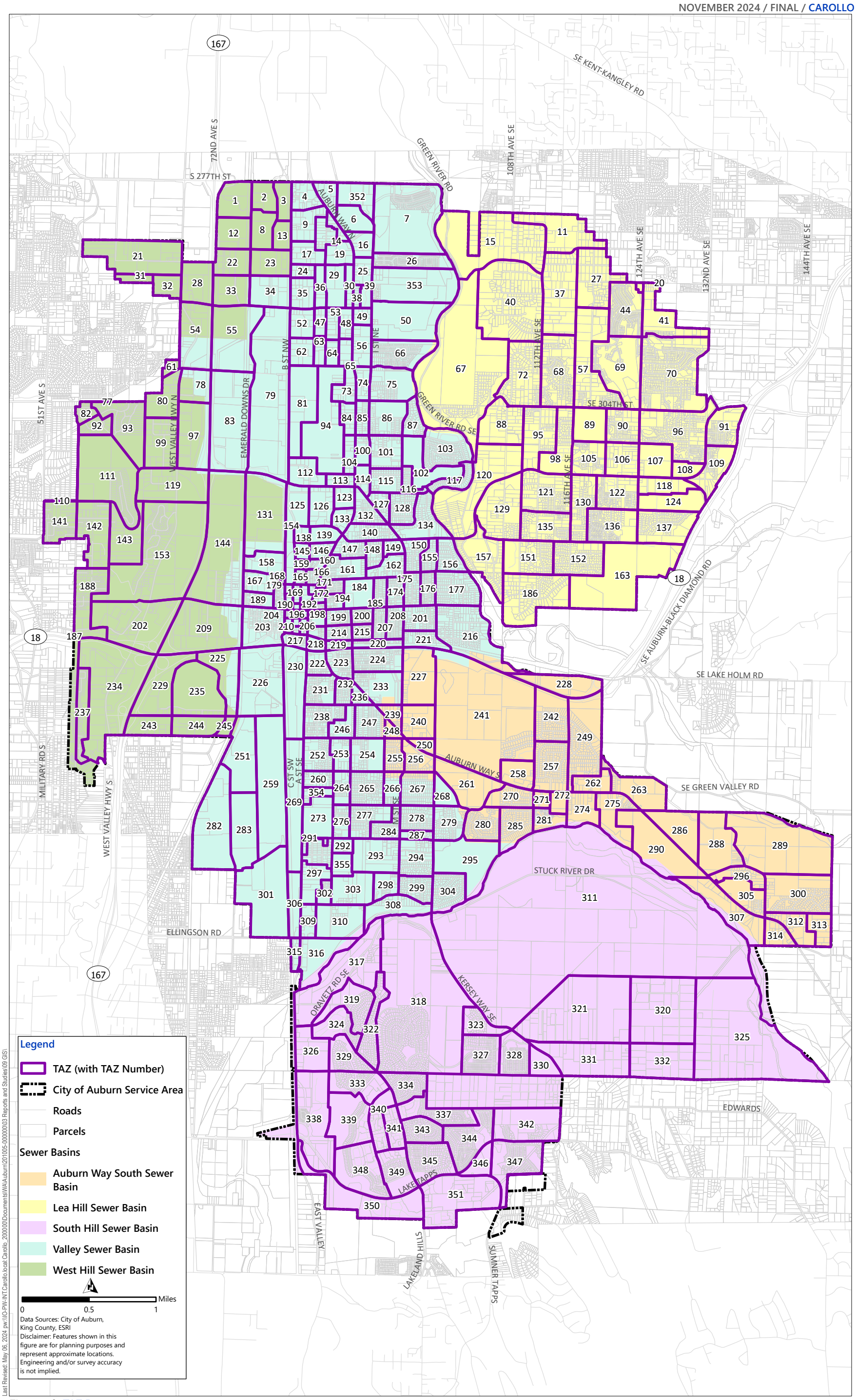


Figure 5.3 TAZ Data
CITY OF AUBURN
2024 COMPREHENSIVE SEWER PLAN

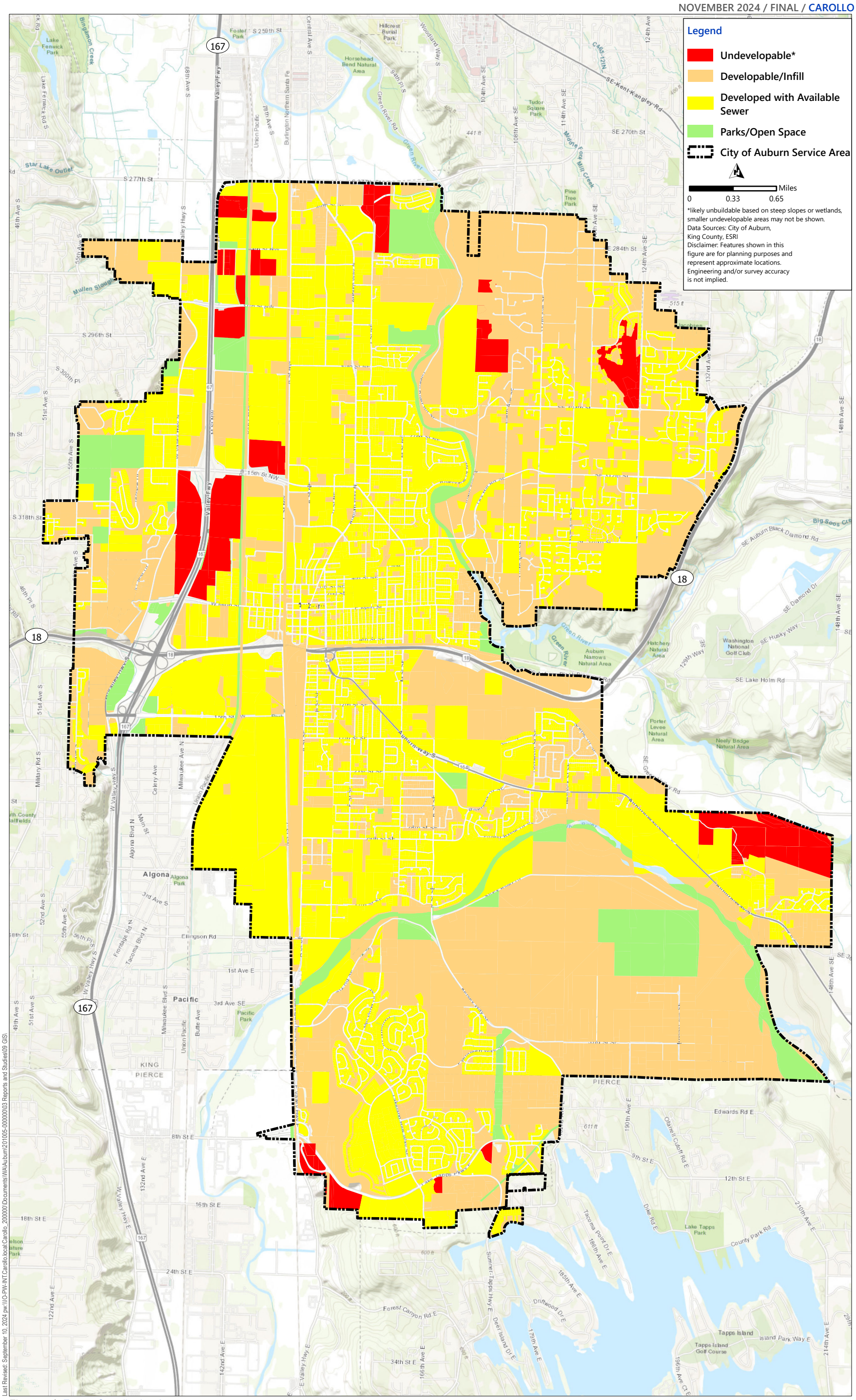
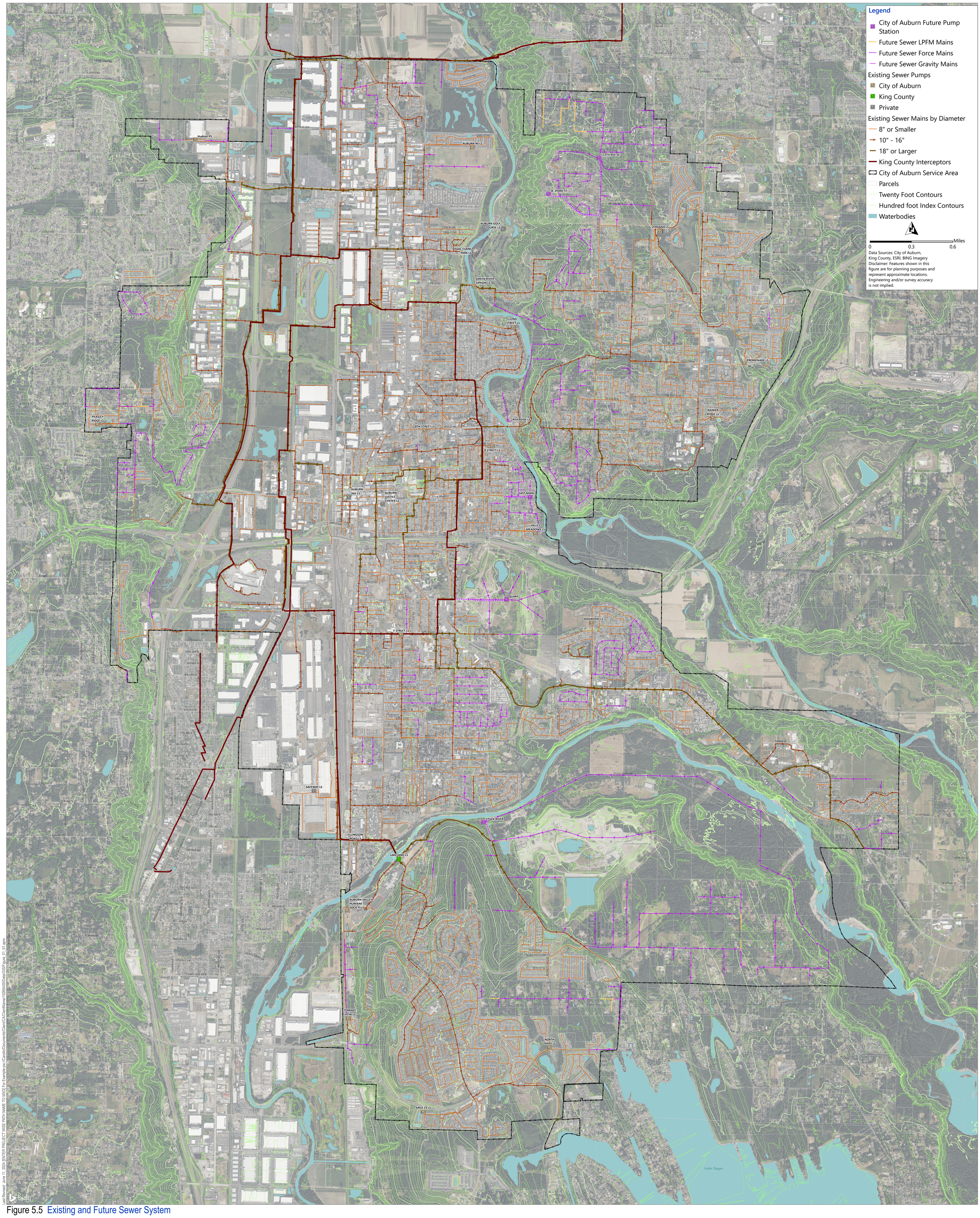


Figure 5.4 Future Contributing Areas



Last Revised: June 11, 2024 [ENTER PROJECT WISE PATH NAME TO MXD] For Example:pw://Carollo\Documents\Client\CA\ClientName\102654A00\Data\GIS\Figure_01_01.aprx

Figure 5.5 Existing and Future Sewer System
CITY OF AUBURN
2024 COMPREHENSIVE SEWER PLAN

5.4 Gravity Collection System Deficiencies

A capacity analysis of the modeled collection system was performed using the City's calibrated hydraulic model, the design storm, and referring to the above outlined evaluation criteria in Section 5.2. The capacity analysis entailed identifying areas in the sewer system where the performance criteria or the capacity of lift stations was exceeded.

5.4.1 Key Causes of Deficiencies

The calibrated hydraulic model was run with the design storm to determine areas that may be triggering potential capacity deficiencies based on the system performance criteria. The key causes triggering deficiencies in the City's collection system included:

- Adverse slopes and misaligned inverts.
- Pipe restrictions (a single or few smaller diameter pipes between larger diameter pipes).
- Pipe diameter too small or at too flat a slope to convey the PWWF.

5.4.2 Existing System Potential Deficiencies

For the existing planning scenario, the current PWWF was routed through the hydraulic model. The peak HGL in manholes and gravity pipelines were compared to the established performance criteria. In general, the modeled collection system has sufficient capacity to convey existing flows during the design storm. The existing deficiencies are relatively minor; their locations are shown on Figure 5.6 in red and yellow. Figure 5.7 also identifies shallow manholes (manholes with a depth less than 6 feet). A total of 7,428 feet of pipe is surcharged, 1 manhole (MH) may flood, and 47 MHs are within 6 feet of the rim during the design storm.

5.4.3 2044 Potential System Deficiencies

For the 2044 planning scenario, additional contributing areas, and additional dry weather flow (DWF) were added to the model based on the projected growth identified in Section 5.3. In general, system HGL increases with additional flows. A total of 16,842 feet of piping may surcharge during PWWF, 3 MH are potentially flooding and 64 MHs are within 6 feet of the rim. The 2044 deficiencies are identified in red and yellow on Figure 5.7. The 2044 deficiencies with the climate change design storm are shown in red and yellow on Figure 5.8. The climate change design storm leads to 29,538 feet of surcharging pipe, 6 MH potentially flooding and 76 MHs within 6 feet of the rim.

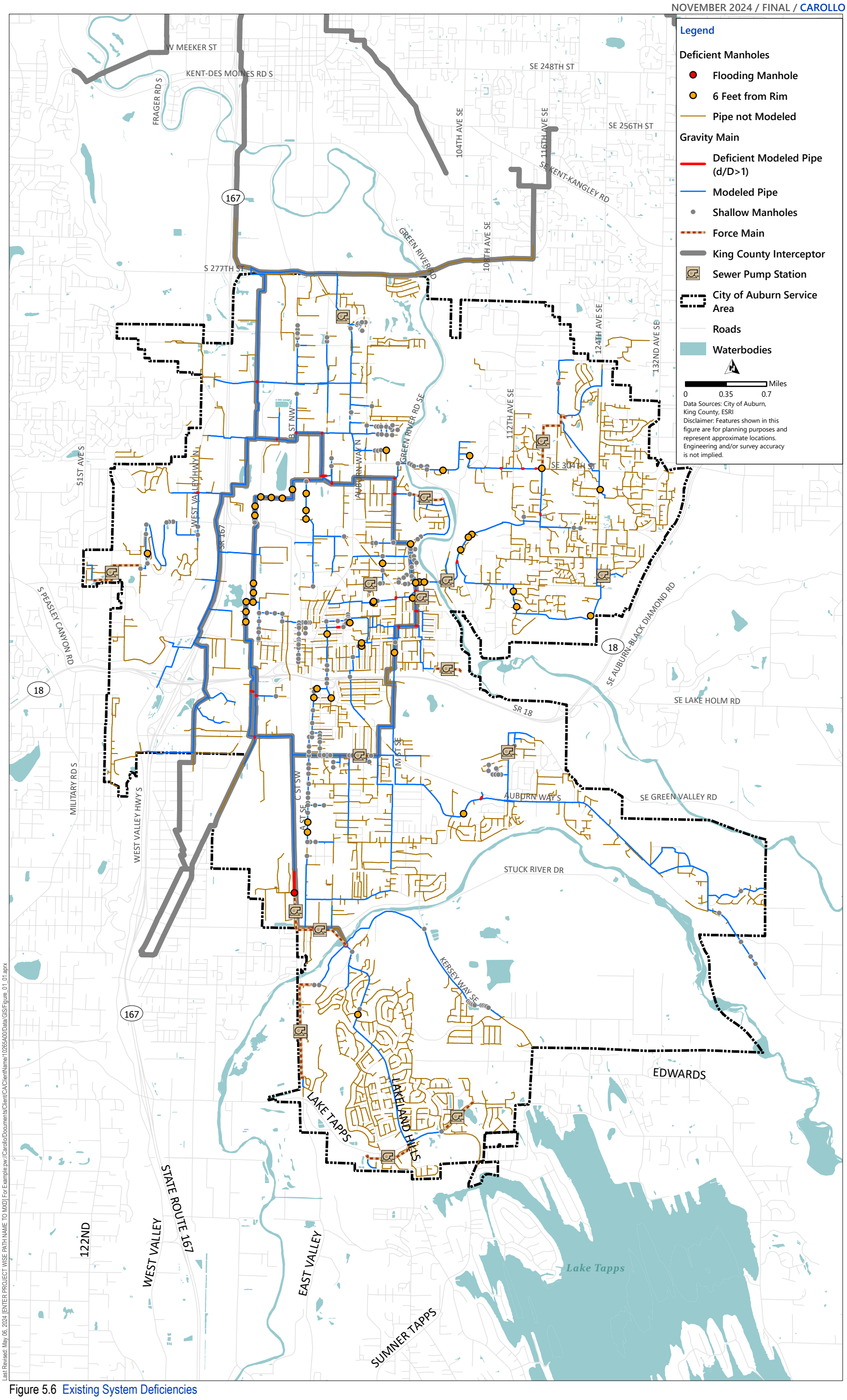


Figure 5.6 Existing System Deficiencies
CITY OF AUBURN
2024 COMPREHENSIVE SEWER PLAN

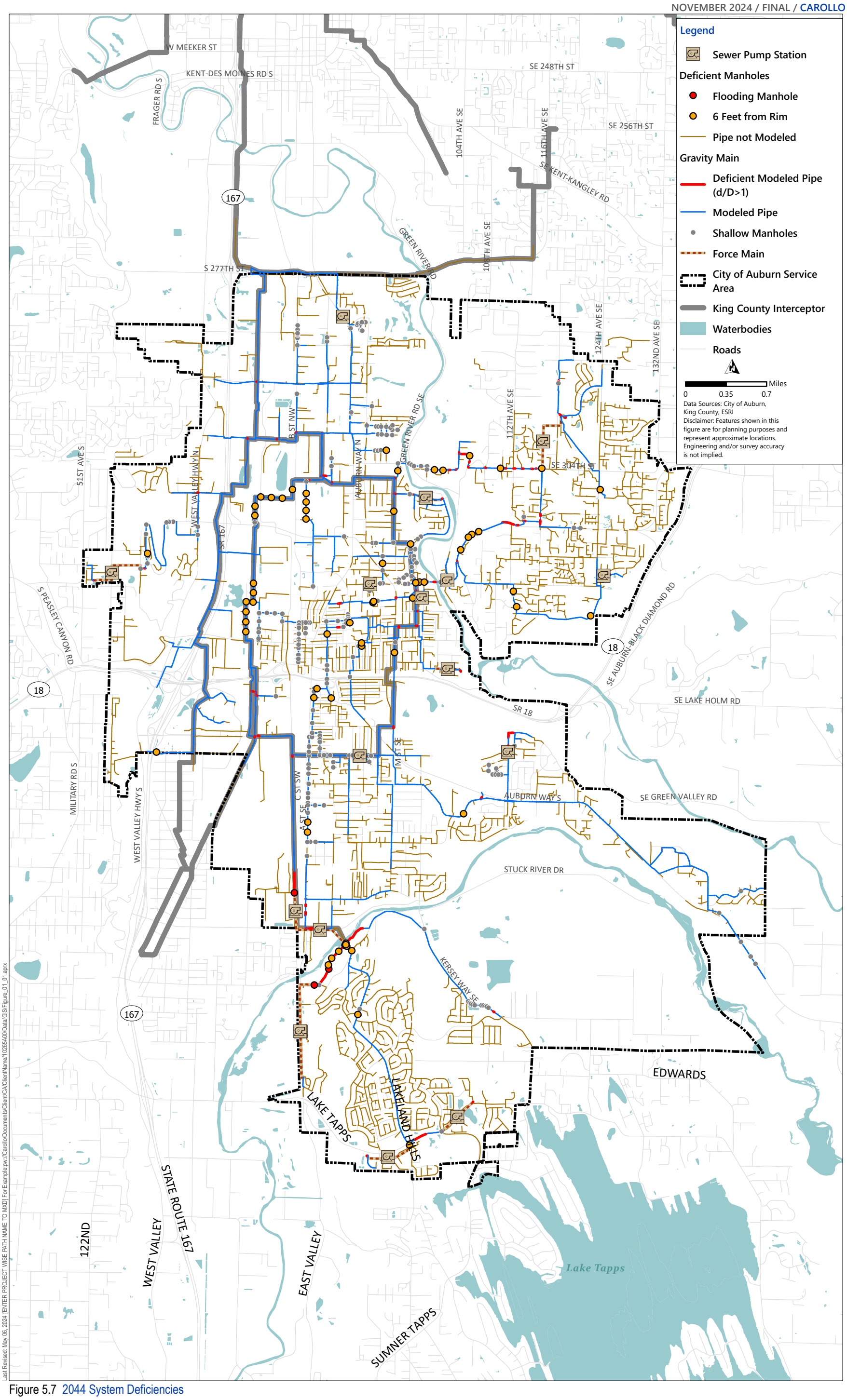


Figure 5.7 2044 System Deficiencies
CITY OF AUBURN
2024 COMPREHENSIVE SEWER PLAN

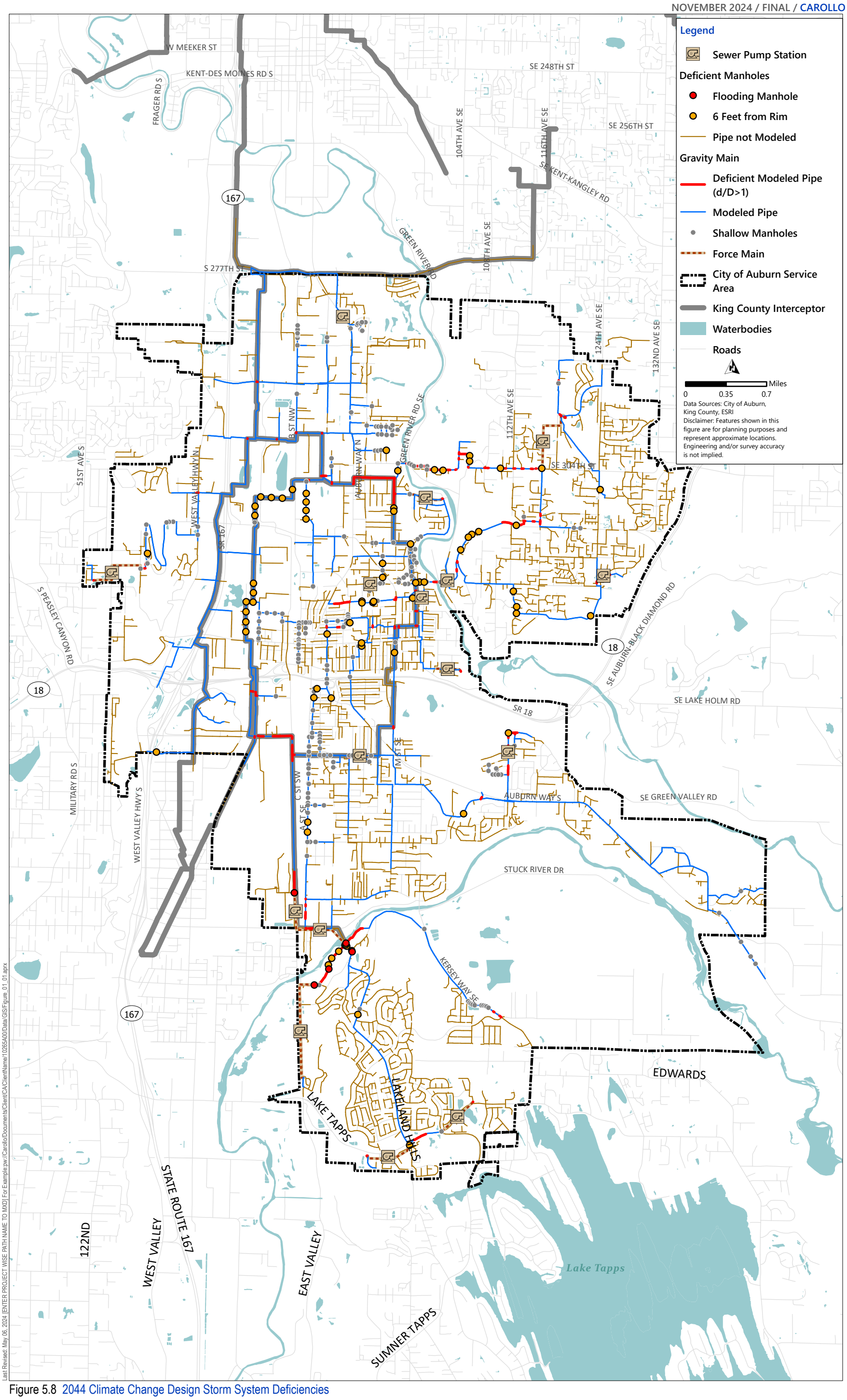


Figure 5.8 2044 Climate Change Design Storm System Deficiencies

5.5 Lift Station and Force Main Evaluation

Ensuring lift stations have adequate capacity to convey PWWFs is important for preventing sewage overflows at or near lift stations. In accordance with the established performance criteria, the City's existing modeled lift stations were evaluated to determine if each one has the available capacity to convey existing and future PWWFs with the largest pump out of service (i.e., its firm capacity). If a lift station has inadequate capacity to pump the PWWFs, the water level in the wet well may rise to the overflow point, spilling sewage.

The City's hydraulic model includes 14 of the 17 City owned lift stations located in the collection system. The estimated current and future PWWFs were compared to the 14 lift stations' firm capacities. Lift stations with an influent PWWF above the existing firm capacity were flagged as deficient. Table 5.4 summarizes the results of the lift station evaluation. Rainier Ridge and Dogwood are shown as deficient under 2044 PWWFs.

Table 5.4 Lift Station Analysis

Lift Station	Number of Pumps	Total Capacity(1) (gpm)	Firm Capacity(1) (gpm)	Existing PWWF (gpm)	2044 PWWF (gpm)
Area 19	2	650	325	120	124
Terrace View	2	1,350	675	114	282
Ellingson Road	2	3,054	1,527	1,355	1,456
Auburn 40	2	880	440	---(2)	---(2)
F Street	2	800	400	265	370
Riverside	2	800	400	126	198
R Street	2	200	100	50	58
Peasley Ridge	2	550	275	47	115
Rainier Ridge	2	400	200	184	**366**
Valley Meadows	2	250	125	20	66
22nd Street	2	1,100	550	90	109
8th Street	2	300	150	94	106
North Tapps	2	1020	510	24	28
Verdana	3	3,000	2,000	975	1,219
Dogwood	2	600	300	239	**395**
Hudson	2	1,200	600	---(2)	---(2)
Promenade	2	348	174	---(2)	---(2)

Notes:
(1) The total and firm capacity of the station is based on the pump design point, assuming the pumps will be able to steadily deliver the flow.
(2) The model is skeletonized, including only larger diameter piping and key connections, these pumps our outside of the modeled portion of the system.
gpm - gallons per minute.

5.6 Inflow and Infiltration Evaluation

I/I occurs in all sanitary sewer systems. Infiltration is defined as water entering the sanitary sewer system through pipes, joint connections, manhole covers, and walls. Inflow is defined as water discharged to the sanitary sewer system through connections to roof drains, yard drains, foundation drains, and cross connections with storm sewers and combined sewers. The combination of I/I may be a major portion of the total wastewater flow which is carried by the sanitary sewer system.

The *City of Auburn 2016 Comprehensive Sewer Plan, Brown and Caldwell* (2016 CSP) provided recommendations to improve the City's collection system. The *Auburn Washington Rainfall Derived Infiltration and Inflow Report 2022, ADS* (2022 RDII Report) provided an initial look at the I/I across the City. The results of both the analyses are summarized below:

- Current levels of I/I were not causing capacity-related issues (2016 CSP).
- Recommended the City to do an initial I/I investigation to support an eventual I/I management program (2016 CSP).
- Sewer extension projects are recommended to serve every parcel within the City limits.
- Two of the larger basins, Y-1 and Y-3 exhibited slightly higher than the moderate threshold level of 10 gallons/linear feet/inch rainfall as RDII (2022 RDII Report). Converting to area based RDII shows that Y-1 is estimated at 2,700 gpad and Y-3 at 4,100 gpad.
- The upper most part of basin A9 (sub basin A9e) is responsible for the large majority of RDII measured from this A9 area. In the basin A8 area, only sub basin A8b stood out as having potentially elevated RDII. Only the southern part of basin A7 (A7e and A7g) area stood out as having potentially elevated RDII (2022 RDII Report). These four basins had greater than 25 gallons/linear feet/inch rainfall, or all greater than 12,000 gpad.

The City's hydraulic model can be used to estimate peak flows for the different flow monitoring basins and areas included in the model during the design storm. The following parameters were calculated to better understand I/I severity in the collection system:

- **Peaking Factor:** Peaking factors are the ratio between peak flow and base sanitary flow and are commonly used for wastewater infrastructure design. These factors are derived by dividing the peak flow by the base sanitary flow for each basin. Due to the prolonged rainy season, wastewater agencies in the Pacific Northwest typically experience peaking factors from 2 to 10, and in some cases more than 10.
  - » Systems with a Peaking Factor of 3 or less are often considered as performing well. High Peaking Factors above 5 are typically signs of direct inflow to the collection system.
- **Peak I/I Rate:** The Peak I/I rate is the peak flow rate of all non-sanitary flows. Peak I/I rates are calculated by subtracting the base sanitary flow from the peak flow for each basin. Peak I/I rates are largely dependent on local hydrology, the condition of the collection system, and drainage connections, with the rate expressed in terms of gpad. The Peak I/I rate is calculated by dividing the Peak I/I flow by the total contributing area of land in acres in each basin. Peak I/I Rates can range from 1,000 gpad to over 20,000 gpad in areas in the Pacific Northwest. High peak I/I rates are usually signs of infiltration.

Table 5.5 summarizes the peaking factor and I/I rate for each flow monitoring basin during the design storm. Figure 5.9 outlines the Peak I/I rate by flow monitoring basin. King County has a target I/I rate of 1,100 gpad during the design storm. Although some basins exceed the County target, the City average I/I rate is 1,446 gpad during the design storm.

Table 5.5 I/I Summary by Flow Monitoring Basin for the Design Storm

Flow Monitoring Basin	Gross ADWF (mgd)	Gross PWWF (mgd)	Net ADWF (mgd)	Net PWWF (mgd)	Contributing Area (acres)	I/I Rate (gpad)	Peaking Factor
A1	0.33	0.78	0.10	0.24	244	627	2.4
A1c	0.23	0.54	0.15	0.32	151	1,180	2.2
A1d	0.08	0.21	0.08	0.21	52	2,417	2.5
A3	0.14	0.21	0.14	0.21	83	802	1.5
A4	0.25	0.40	0.25	0.40	113	1,273	1.6
A6	0.09	0.47	0.09	0.47	98	3,847	5.1
A7	0.14	1.28	0.14	1.28	109	10,409	8.8
A9	0.06	0.43	0.06	0.43	53	7,000	7.4
A10	0.29	1.15	0.05	0.66	115	5,366	14.4
A11(1)	0.07	0.43	0.01	0.00	17	-	-
A12	0.02	0.08	0.02	0.08	21	3,063	4.6
A13	0.04	0.11	0.04	0.11	63	1,048	2.5
A14	0.18	0.43	0.12	0.28	102	1,580	2.3
A15	0.06	0.15	0.06	0.15	72	1,300	2.7
A16	0.24	0.48	0.24	0.48	285	855	2.0
Y-1	0.40	1.01	0.40	1.01	94	6,454	2.5
Y-2	1.03	4.06	1.03	4.06	872	3,471	3.9
Y-3	0.66	3.63	0.66	3.63	541	5,494	5.5
Y-4	0.14	0.29	0.14	0.29	179	840	2.0
WINT003	3.26	8.11	2.32	2.91	1,871	314	1.3
MSTTR02(1)	2.73	7.99	0.62	0.25	482	-	-
AUBRN53	7.81	20.03	1.34	2.95	1,212	1,322	2.2
Average						1,446	

Notes:
(1) PWWF constrictions upstream limit net PWWF calculation, making it difficult to determine accurate I/I values in these basins.

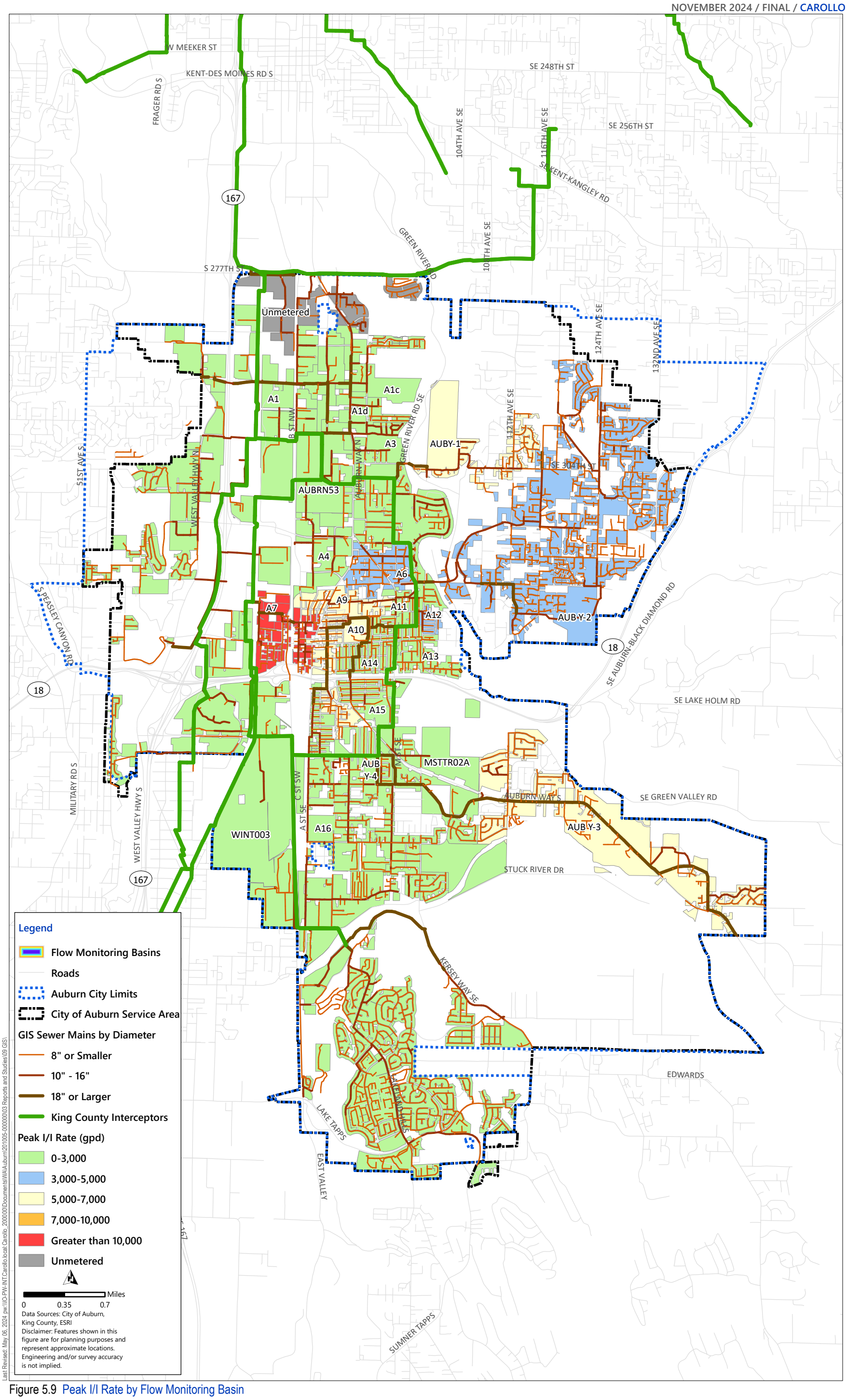


Figure 5.9 Peak I/I Rate by Flow Monitoring Basin

5.7 Remaining Useful Life

One key criteria used for assessing vulnerability and long-term rehabilitation and replacement needs is a remaining useful life (RUL) estimate. This estimate represents how many years a pipe with a certain material has before the likelihood of failure significantly increases.

Pipe age and material type are used to determine the RUL of the collection system pipelines. GIS data and field research were used to determine the type of material and year or decade that pipe segments were installed and identify data gaps. The City is in the process of updating its asset inventory, so the data to conduct a comprehensive analysis of RUL across the system is not complete. Upon substantial completion of the inventory work, the City should analyze the complete set of data to project rehabilitation and replacement needs.

Pipe manufacturers establish a theoretical useful life based on pipe material; however, the actual useful life is also influenced by local soil conditions, aggressive wastewater materials, methods of installation, etc. The original useful life for pipe of known material varies from 75 years for concrete pipe (CP) to 100 years for vitrified clay pipe (VCP). Since the age and material data for some of the pipelines were unavailable, it is assumed that the original useful life for all pipes of unknown age and materials is 75 years. Table 5.6 presents the estimated useful life of pipes of various materials.

Table 5.6 Useful Life of Pipes

Pipe Material	Original Useful Life (years)
Polyvinyl Chloride	100
Unknown	75
Concrete	75
Vitrified Clay	100
Ductile Iron	75
High Density Polyethylene	90
Clay	75
Cured in Place Liner	75

Table 5.7 summarizes the City's gravity sewer system available information by material type and known age into short (less than 10 years), medium (10-20 years), and long-term (greater than 20 years) for replacement needs, as well as unknown where age or material type is not current in the GIS. The cells are color-coded to show the three categories of RUL and unknown; orange is the unknown, red indicates pipe that is expected to reach the end of useful life in the next 10 years or has reached its useful life, yellow represents pipe with a RUL of between 10 and 20 years, and green represents pipe that has a RUL of over 20 years. In total, approximately one percent of the existing collection pipes with a known installation year are expected to reach the end of their useful lives by the year 2034. The table shows that the City GIS database is currently missing information of material type and/or approximate installation year for a large portion of the system.

Table 5.7 Remaining Useful Life

Feet of Pipeline					
Pipe Material	Less than 10 Years	10-20 Years	Greater than 20 Years	Unknown Install Date	Total
Unknown	1,541	2,153	10,855	55,723	70,272
Clay			199	13,226	13,425
Concrete		14,998	8,219	119,443	142,660
Cured in Place Liner			3,408		3,408
Ductile Iron			14,860	9,616	24,475
High Density Polyethylene			18,759	4,555	23,315
Polyvinyl Chloride			443,899	381,190	825,089
Vitrified Clay			3,280(1)	3,280	3,280
Total	1,541	17,150	500,199	587,033	1,105,923

Notes:
(1) Likely greater than 20 years as material use was stopped more than 20 years ago.

As noted earlier, prior to developing any detailed formal replacement and rehabilitation programs based on this information, a thorough assessment of the collection system asset management should be completed to update the age and material information in the GIS system where missing. Material and age of pipelines is critical to understanding when pipeline replacement may be needed. The material type and age will provide a picture of when the asset may need updating. The asset inventory effort should determine the following attributes for all City owned facilities:

- Material.
- Age of installation, or estimate based on material.

As the majority of the system has more than 20-years or unknown remaining useful life, the City should focus on identifying the unknown information prior to the next plan update. Based on a complete picture of material and age, long term costing can then be developed to create an effect renewal and replacement program, thereby ensuring the long term reliability of this key City asset.

While the RUL analysis provides a guide to when pipes may need replacing, short term decisions that prioritize which pipes to rehabilitate or replace must take other factors into account, including:

- Pipe Condition Scores - Based on CCTV inspections and standard scoring criteria.
- Pipe Criticality - The consequences of a pipe failure both for customers affected and environmental concerns.
- Efficiency - Considering replacement or rehabilitation of pipes in conjunction with other City projects save funds.

5.8 Recommendations

5.8.1 Asset Inventory, System Inspections, and Remaining Useful Life

An asset inventory effort is underway that will update the asset database with information available from as-built drawings and inspection records. An inspection program of laterals in City right-of-way (ROW) is being planned by the City to better understand current conditions. This inspection program would provide several key benefits for the City, including better information on pipe material, condition, and age. This program would allow for filling in GIS data gaps on pipe materials to enhance asset management capabilities. When updating GIS records with material, the installation date could also be added to the records to further improve understanding of a pipeline's potential remaining useful life. The inspection program would also provide significant insights on potential sources of I/I within the limited areas having elevated WWFs.

5.8.2 Capacity Evaluation Recommendations

Figure 5.10 outlines the key conveyance deficiencies in the system, where a pipe is both surcharged and 6 feet from the rim. The figure identifies which scenario the deficiency is a part of with existing surcharged pipes shown in red, the 2044 surcharged pipes in green, and the 2044 with climate change pipes in purple. The figure also shows the peak I/I rate to help identify if I/I is a significant contributing factor. I/I investigation is recommended to address capacity deficiencies in basins with an I/I rate above 5,000 gpad. Ideally, the lateral inspection program would start with a high I/I basin.

Table 5.8 outlines six different deficiency areas. These areas are classified by timing, recommendation, and extent of surcharging and deficient manholes. These areas are included withing the CIPs in Chapter 7 with some additional discussion, however not all of them have a specific CIP number associated with them. Area 1 has high I/I and is recommended for continued monitoring with a specific CIP Project 9. Area 4 is a large project with a specific CIP. Areas 2, 3 5 and 6 are all shorter lengths of piping and included within a programmatic CIP.

5.8.3 Future Population Growth

Although this Plan anticipates population and employment growth projected during the development of the City Comprehensive Plan, recent legislation (e.g. HB1110 passed in 2023 and upcoming HB1245) may permit or promote growth in a manner not anticipated by this Plan. As growth occurs, the utility may need to reevaluate pump station or other conveyance systems to ensure adequate capacity exists.

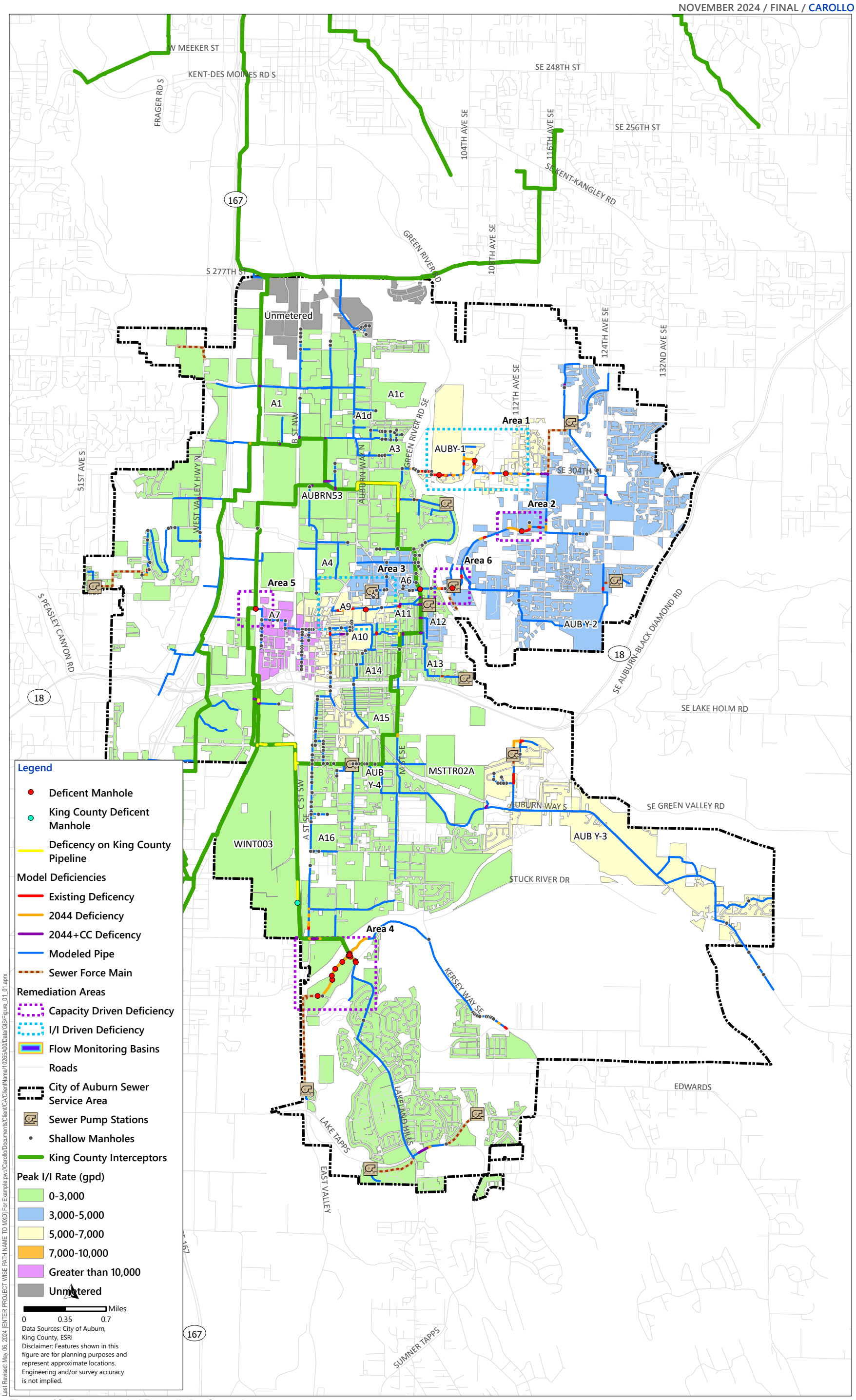


Figure 5.10 Recommended Remediation Strategies

Table 5.8 Capacity Deficiencies

Area Number	Location	Timing	Pipe Diameter	Approximate Depth (feet)	Number of Manholes Impacted	Linear Feet of Surcharged Pipe (feet)	Flow Monitoring Basin I/I Rate (gpad)	Recommendation
Area 1	Along SE 304th Street and 304th Place, between 116th Avenue SE and the Green River crossing	2044	10-inch to 18-inch	9	3	2,666	6,454	Additional I/I Monitoring
Area 2	From Lea Hill Road SE to SE 311 Street	2044	12-inch	10	1	1,243	3,471	Capacity Driven – Recommend Upsizing
Area 3	6th Street NE to H Street NE, through Veterans Memorial Park	2044	10-inch	7	1	836	7,000	I/I Remediation
Area 4	Oravetz Place SE to the Lakeland Hills force main, through Roegner Park	Existing	8-inch to 24-inch	12	11	4,158	314	Capacity Driven – Recommend Upsizing
Area 5	Just south of 6th Street NW near the Interurban Trail	Existing	18-inch	6	1	72	314	Capacity Driven – Recommend Upsizing
Area 6	SE 320th Street and 102nd Avenue SE	Existing	12-inch to 14-inch	10	1	602	3,471	Capacity Driven – Recommend Upsizing

Notes:
NE - northeast; NW - northwest; SE - southeast; SW - southwest.

5.8.4 Inflow and Infiltration Evaluation Recommendations

5.8.4.1 Recommended Strategies for Additional Monitoring or Investigation

The City has few high I/I basins and minimal I/I driven capacity deficiencies. Figure 5.8 outlined the location of three areas that are in high I/I rate basins. Based on previous I/I analyses, and capacity deficiencies identified in the model, the following I/I basins are to be prioritized:

- A10.
- A9.
- A8.
- A7.
- AUB Y-1.
- AUB Y-3.

ADS flow monitoring performed additional micro monitoring for basins A9, A8, and A7 and identified sub-areas of focus, discussed in the next section. Basins AUB Y-1 and AUB Y-3 both have elevated I/I rates that cause some risk of deficiency. It is recommended that additional monitoring at and upstream of meter AUB Y-1 and AUB Y-3 be done and continued periodical monitoring of flows in the high I/I basis to understand if conditions are stable or degrading.

5.8.4.2 Recommended Remediation Strategies

Reduction of I/I in wastewater systems can be a difficult and costly task to undertake. Identifying specific sources, developing metrics for tracking the effectiveness of reduction techniques, and balancing the cost against capacity projects are all major challenges.

Common techniques for reducing I/I include the following:

- Direct Disconnects: This includes disconnecting roof downspouts, yard drains, foundation drains, stormwater catch basins, and/or any connection to the wastewater system causing inflow. Disconnection of these items may require additional provisions for stormwater drainage.
- Repair and replacement of Pipes: This includes replacing or repairing public wastewater pipes, typically due to poor condition, root intrusion, and disconnected joints. Options for pipe replacement include open-cut trench construction or using trenchless technologies, such as pipe bursting or cured in-place pipe. These options need to be assessed for local conditions, such as pipe condition, adjacent utilities, and soil type.
- Repair and replacement of Manholes: Several options exist for sealing manholes and preventing infiltration through faulty joints and cracks. Alternatives include grouting, coating, installing a liner, and/or applying an external sealant.

- Repair and replacement of Laterals and Side Sewers: This includes replacing or repairing laterals and side sewers due to poor condition and the presence of infiltration. Faulty side sewers and laterals are known to be large contributors of I/I. Identifying and repairing multiple faulty laterals and side sewers on private property can be more difficult and expensive than repairing a public wastewater pipe, and replacing or repairing side sewers on private property is the responsibility of property owners. Methods for repairing or replacing laterals and side sewers are similar to those described for public pipes. Trenchless technologies, which are less obtrusive than open-cut trenches are effective for replacing laterals and side sewers while minimizing impacts to landscaping and driveways. The City can repair or replace portions of side sewers within rights-of-way, and should support efforts to encourage property owners to replace portions on private property.

At this point, the City is experiencing relatively low I/I driven issues in concentrated areas. Area 6 is likely deficient due to elevated I/I in the A9e subbasin. It is recommended that the I/I remediation strategies outlined above be investigated further for I/I reduction in subbasin A9e. The lateral inspection program should start with this basin.

CHAPTER 6 MAINTENANCE AND OPERATIONS

This chapter provides an overview of the organization and common procedures associated with the ongoing maintenance and operation of the City sewer utility system, the primary purpose being to establish a baseline understanding of the proactive and responsive maintenance procedures performed by City staff. This baseline understanding is used herein to evaluate Sewer Utility (Utility) staffing, data collection and computerized record-keeping needs, and other Utility requirements to continue to meet the Utility's goals.

The City sewer system, detailed in Chapter 4, consists of approximately 210 miles of collection system piping, approximately 5,500 manholes, 17 sewer utility pump stations, and 3 siphons and serves more than 16,000 Utility customers. Utility staff also maintain 7 stormwater pump stations and 5 sewer pump stations serving individual facilities owned by other City departments.

6.1 Utility Responsibility and Authority

This section provides an overview of the Utility organization and basic information related to Utility staffing, training, and education.

6.1.1 Organizational Structure

The Utility is operated as a utility enterprise under the direction of the Public Works (PW) Department Director. PW is responsible for planning, design, construction, operation, maintenance, quality control, and management of the sewer system. The City has a mayor-council form of government; therefore, the PW Director reports to the Mayor. The Mayor provides direct administration and management of the utility. The City Council provide direction on policies and budget.

The Engineering Services Division (Engineering) within PW is the lead group for comprehensive sewer system planning, development of a CIP, and the design, construction, and inspection of projects related to the sewer system. The Utilities Engineering Manager oversees Utilities Engineering, including the Sewer Utility Engineer, and reports directly to the PW Director.

The M&O Services Division within PW is the lead group for the maintenance, inspection, and operation, of the physical assets of the Sewer Utility. The Storm/Sewer Manager oversees the Utility's 10 employees including the Sewer Field Supervisor and is responsible for the day-to-day maintenance and operation of the system. The Storm/Sewer Manager reports to the M&O Services General Manager, who, in turn, reports to the PW Director.

The location of the Utility within the overall PW organizational structure is shown in Figure 6.1.

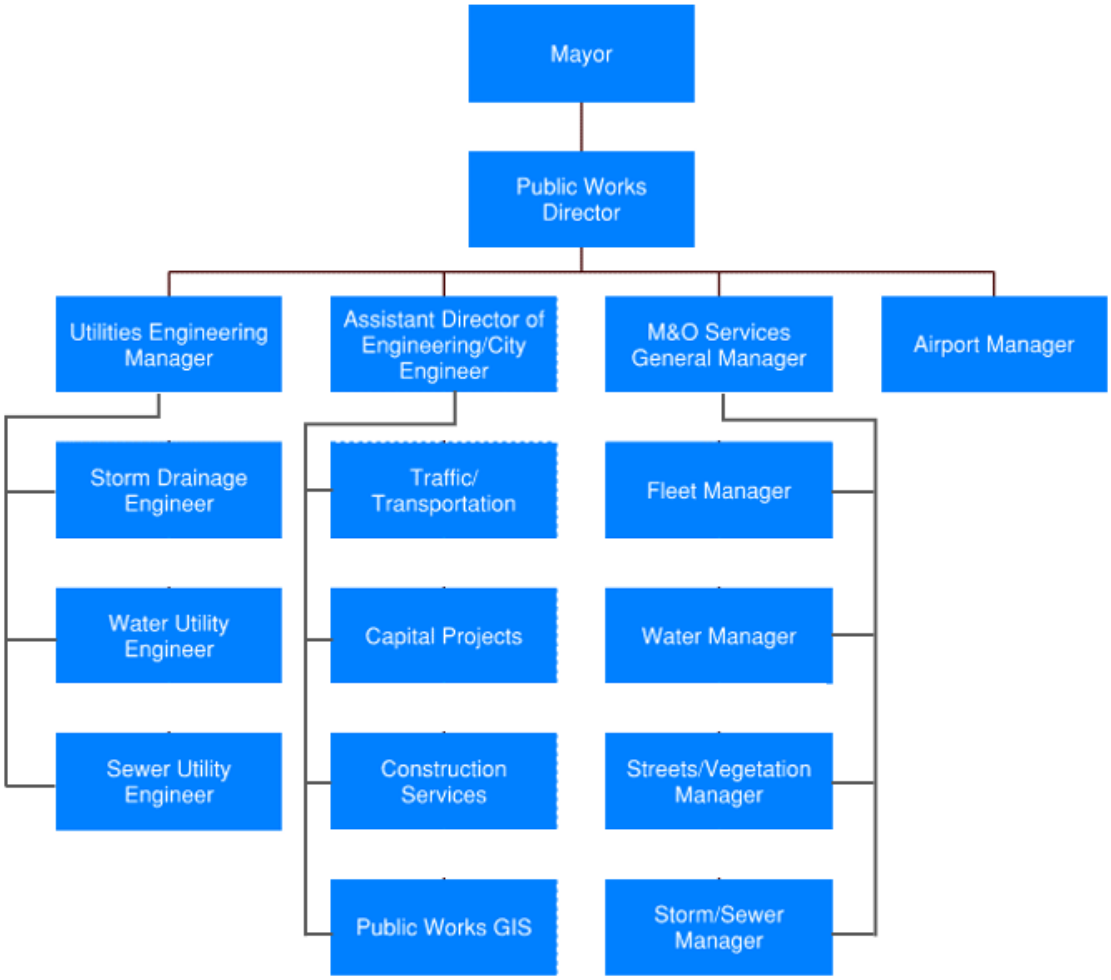


Figure 6.1 City of Auburn Public Works Department Organizational Chart

6.1.2 Staffing Level

The Utility currently employs 10 full-time M&O field staff plus a Storm/Sewer Manager and a Sewer Field Supervisor, who perform administrative duties. This chapter does not include an evaluation of Utility management, including regulatory compliance, planning, and coordination with other City departments. The position titles and primary functions of the full-time M&O field staff working within the Sewer Division are shown in Table 6.1.

Table 6.1 Sewer Utility M&O Field Personnel

Position	Primary Function(s)
Sewer/Storm Manager	Utility administrative duties.
Sewer Field Supervisor	Supervision of field staff.
Sewer Specialist	Two full-time staff dedicated to pump station inspection and maintenance.
Lead Maintenance Worker II	One full-time staff dedicated to operating the CCTV Inspection Program.
Maintenance Worker II	Five full-time staff dedicated to field inspection and maintenance.
Maintenance Worker I	Two full-time staff dedicated to field inspection and maintenance.

6.1.3 Level of Service

The Utility operates in accordance with the policies outlined in Chapter 2, and internally adopted goals integral to policy implementation. These goals are generally based on the current staffing level and tasks deemed most critical to the City and its residents.

6.1.4 Operator Training and Education

The City recognizes the value of having a knowledgeable and well-trained staff operating the Utility and encourages employees to obtain the highest level of training available. At this time, the State of Washington does not require certification for sewer maintenance operators. Seminars, conferences (specifically the annual Washington Wastewater Collection Personnel Association conference), and college coursework have become tools to advance knowledge for maintenance staff with subjects covered including safety, pumps, generators, forklift training, confined space, first aid, CPR, and electric and electronic fundamentals.

Many M&O staff serve in a specialized capacity. This can promote expertise, but also has the potential to limit the ability of the Utility to absorb absences due to vacation, sickness, retirement, and termination. To mitigate this limitation, the City has broadened the scope of the Utility's education system by cross-training staff, primarily staff that will serve in an on-call capacity and will be required to respond to off-duty emergencies.

6.2 Routine Operations

Routine M&O activities for the Utility can be divided into functional groups by facility type, as described in the following sections.

6.2.1 Pump Station Maintenance

Utility staff are responsible for maintenance of 29 pump stations, including 17 sewer utility stations (see Chapter 4), 7 stormwater utility stations, and 5 pump stations serving facilities owned by other City departments, at the Auburn Golf Course, Auburn City Hall, Auburn Justice Center, Isaac Evans Park, and Auburn Valley Humane Society. M&O activities include scheduled weekly and monthly equipment and grounds maintenance as well as emergency generator testing and maintenance. Pump station maintenance is a full-time commitment for two Utility staff teams which each include a maintenance worker and a sewer specialist.

6.2.1.1 Weekly Activities

Weekly pump station inspections are intended as a quick check to ensure proper operation and performance, and to identify potential non-emergency concerns to be addressed during scheduled monthly maintenance. Equipment maintenance schedules are based on manufacturers' recommendations. Depending on the site and time of year, ground maintenance may also be performed weekly or monthly as conditions dictate.

Weekly pump station maintenance activities include the following tasks:

- Perform a general visual inspection of grounds and pump station structure or vault.
- Check equipment for abnormal vibrations.
- Check lubrication of all pumping equipment.
- Check and clean, as needed, seal filters.
- Check ultrasonic level sensor.
- Check pump run times.
- Bleed lines of moisture.
- Inspect/exercise control valves.
- Check wet well for debris.
- Manually run the pump and observe wet well level.
- Security fencing inspection.

Weekly inspection activities are intended to be completed in less than one hour for each pump station.

6.2.1.2 Monthly Activities

Monthly pump station maintenance activities incorporate weekly activities while allowing more time for detailed maintenance and to address any previously identified concerns. Monthly maintenance can be particularly important for older pump stations, where equipment and facilities require more attention.

Monthly pump station maintenance activities include the following tasks:

- Inspect and test engine-generators (see below).
- Inspect pump station mechanical bypass pumping.
- Flush sump pit and manually run sump pump.
- Clean pump station interior and, at a minimum, wipe down control panels and pumps, and wash down/disinfect floor.
- Inspect fall restraint system.
- Spot-check control system and telemetry alarms.
- Inspect cathodic protection.
- Conduct building safety inspection.
- Test automatic transfer switch operation.
- Clean seal filters and vacuum probes.
- Clean check valves.
- Inspect the bioxide system.
- Inspect odor control systems.
- Inspect ventilation systems.
- Inspect chain hoist and crane systems.
- Inspect ladders and stairs.

- Check dehumidifier.
- Inspect electrical panels and variable frequency drive pumps.
- Inspect remote terminal units that connect pump stations to the Supervisory Control and Data Acquisition (SCADA) system.

The duration of monthly inspection activities varies widely depending upon the age/condition of the pump station and observations made during previous weekly inspections. On average, monthly inspections are assumed to be completed within four hours at each pump station.

6.2.1.3 Yearly Activities

Yearly maintenance includes actions that take significantly more time than routine activities and often require coordination/scheduling with additional City staff and/or outside vendors.

Yearly pump station maintenance activities include, but are not limited to, the following tasks:

- Mag meter calibrations.
- Chain hoist and crane load testing.
- Impellers an expeller inspection.
- Volute and motor inspection.

6.2.1.4 Generator Testing and Maintenance

City Utility staff perform limited maintenance on emergency generators serving sewer and stormwater pump stations, primarily to verify the generator's ability to perform in an emergency. Emergency generators are exercised, and fuel levels are evaluated during monthly maintenance activities. Private contracting services are used for detailed generator maintenance. It is recommended that detailed generator maintenance be performed annually, including filter changes and load bank testing.

Permanent generators are located at all 17 Utility-owned sewer pump stations. Four of the stormwater pump stations are equipped with permanent engine-generators. During a power outage, pump stations at City Hall and the Justice Center are run via generators that serve the building. Those two generators are maintained by the Administration Department, Facilities Division. In the event of a generator failure, pump stations can be operated using portable generators owned and maintained by the PW Department.

6.2.1.5 Wet Well Cleaning and Inspection

Wet well cleaning is performed by Utility staff as needed, but on average is necessary twice annually. Some pump stations in service areas with a noted high amount of fat, oils, and grease (FOG) accumulation require cleaning at a higher frequency (see Section 6.3).

During cleaning, wet wells are drained and the inside is cleaned with high-pressure water. Accumulated FOG and sludge/sediments are suctioned from the wet well using the City's vactor truck and transported to a disposal facility. During cleaning, Utility staff inspect all floats, sensors, and other hardware while the wet well is drained, and they also visually inspect the wet well structure for damage.

6.2.2 Collection System Maintenance

Utility staff are responsible for maintenance of approximately 210 miles of collection system piping and approximately 5,500 manholes. M&O activities include pipe cleaning/jetting, closed-circuit television (CCTV) inspection, and manhole inspection and maintenance.

6.2.2.1 Manhole Maintenance

Manhole maintenance includes initial inspection and potential follow-up cleaning and/or repair. Inspection is usually performed in conjunction with CCTV and jetting operations. The inspection includes the following:

- Visual confirmation of proper flow conveyance.
- Assessment of solids buildup in the manhole.
- Evaluation of structural damage or wear and the integrity/condition of manhole covers and ladder rungs.
- Confirmation and/or population of data stored in the computerized maintenance management system (CMMS).

Follow-up cleaning and maintenance work orders are generated based upon the results of initial inspection recorded in the CMMS, and typically require a two-person crew. Based upon recent maintenance history, it is estimated that approximately one in 10 manhole inspections leads to further cleaning. The City estimates that a total of 50 manholes per year require some repair.

6.2.2.2 Sewer Pipeline Cleaning and CCTV Inspection

Cleaning and inspection of the sewer system is performed using City-owned vactor/jet truck and CCTV equipment. Cleaning and CCTV inspection are typically performed in tandem from manhole to manhole by a two- or three-person crew for each task.

Jetting of sewer pipelines and subsequent vactor truck removal is the principal means of removing debris, sludge, FOG, and obstructions from the sewer system. A hose with a special end fitting is inserted into a pipe and high-pressure water (up to 2,500 pounds per square inch) is sent through the hose. The high-pressure water exits the small hole at the tip of the nozzle, breaking down and/or scouring obstructions. Debris is then removed via suction by the vactor truck equipment at each manhole.

Following cleaning, CCTV inspection is performed to identify structural defects and potential pipeline leaks. Routine CCTV inspection of the sewer system is an essential component of the M&O program as it can identify trouble spots before larger failures occur and can provide the City with accurate information about the condition of the sewer collection system. Between 2007 and 2019, inspection reports and digital video captured by the CCTV crews have been stored within the City's computer network using PIPELOGIX software). Since 2020, inspection data has been stored electronically using WinCan software. The PW GIS Group is in the process of inventorying sewer assets and updating data attributes. As part of that effort, Engineering staff is developing a procedure to export condition assessment data from WinCan to the CMMS. The intent of this data sharing is to be able to provide a more accurate planning tool based upon the known condition of wastewater system assets.

The City's goal is to clean and inspect all sewer collection pipes, using the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP), within the system on a seven-year cycle. On average, a three-person crew can clean approximately 3,000 feet of pipe per day or inspect approximately 1,500 feet of pipe per day.

Some of the City's larger, high-flow pipes are challenging for staff to inspect using the current set of equipment. In 2019-2020, the City hired a contractor to perform CCTV inspections on all 18-inch diameter sewer pipes and larger. While no major deficiencies were found, some degradation of older concrete pipe was observed. Staff intends to repeat some of those large diameter pipe inspections during this planning cycle to assess whether additional degradation has occurred and to help project and plan for future repair and replacement needs.

6.2.3 Field Operations

In addition to the M&O activities discussed in Sections 6.2.1 and 6.2.2, the Utility typically maintains a two-person field crew that performs a variety of other ongoing Utility functions. The Utility is also available to assist other PW divisions such as Water, Stormwater, or Transportation during manpower shortages or emergencies. Sewer staff perform liaison functions with Engineering and construction inspections for new projects, repairs, or modification of existing lines.

Currently, services for Utility locates are performed by two designated locators who are under the supervision of the Water Division Manager.

Examples of field operations activities include:

- **Repair:** Sewer staff perform repair of minor pipe breaks/leaks and other system infrastructure.
- **Engineering:** Sewer staff often provide facility inspection services for Engineering projects and support Engineering through visual observation in the field.
- **Vehicle and Equipment Maintenance**: The Utility maintains an extensive inventory of equipment available to respond to problems or emergencies. The fleet is currently equipped with seven trucks, one CCTV van, one sewer vactor/jet truck, and one emergency bypass pump. Each component of this fleet is equipped with valve operators and traffic control equipment.
- **Supply Inventory:** The Utility maintains an inventory of supplies and parts that are available for use in responding to emergency situations as well as normal Utility operations. Supplies and parts are tracked in an inventory control system that allows easy identification of available materials.

It is difficult to quantify the field tasks performed by Utility staff in terms of equivalent staff. Many of these tasks are performed outside of a regular maintenance schedule. The evaluation of existing staffing requirements in Section 6.6 assumes that a two-person field operations crew is maintained for a majority (0.75) of working days, or 1.5 full-time equivalent (FTE).

6.3 Fats, Oils, and Grease Reduction Program

FOG causes many operational challenges in the collection and treatment systems when not properly disposed of at the source. When FOG enters a sewer, it cools, solidifies, and can stick to the interior of pipes. FOG buildup increases over time, reducing the capacity of pipe to convey wastewater, potentially causing backups in the sewer system and operational concerns within pump stations. As of 2024,

Engineering employs two staff members who, among other duties, implement and oversee the City's FOG Reduction Program. The program focuses on regulation of food service establishments (FSE) and FOG generating food processing businesses, as well as public education to minimize the amount of FOG entering the City sewer system. (Note: Each staff member designates 25 percent of their time to the FOG program. Prior to 2024, only one position was available for this effort).

The City currently monitors approximately 174 FSEs within the service area, most of which are required to use grease trap/interceptor pretreatment facilities before discharging to the sewer collection system. FSEs are identified through the business licensing process, during which all FSEs are required to submit a FOG Control Plan per Auburn City Code (ACC) Chapter 13.22. ACC also codifies requirements for installation of pretreatment facilities (typically grease traps and interceptors), cleaning and maintenance, water quality testing, and record-keeping. City policy is to work with FSEs on a cooperative basis through outreach activities; however, refusal to comply with City requirements can result in code enforcement action.

Because of limited staffing for the program, inspection and education efforts have focused primarily on managing requirements for businesses to have a FOG Control Plan and reacting to areas with observed FOG issues. In 2024, an additional staff person was hired to enable a more regular, proactive inspection schedule and more consistent monitoring of grease interceptor cleaning. Regular FOG inspections will also be combined with stormwater source control inspections to use staff resources more efficiently.

Because areas with observed FOG issues are not all downstream from FSEs, staff will continue to monitor those areas and reach out to residents of both single-family and multi-family housing.

In addition to efforts to reduce the amount of FOG in the system, education and outreach efforts include:

1. Discouraging the flushing of cleaning wipes that may be labeled "flushable," but that do not disperse in water. These items can clog sewer lines and get caught in pumps, increasing maintenance efforts within both the City collection and conveyance system, and King County's treatment system.
2. Discouraging the disposal into the sewer system of pharmaceuticals, microplastics, and other prohibited discharges by educating the public on the harmful effects of those substances in the wastewater stream and by promoting alternative disposal methods.
3. Working with the King County Wastewater Treatment Division, Industrial Waste Program, to identify manufacturing and other businesses that discharge substances that may be detrimental to the wastewater treatment process.

6.4 Non-Routine and Emergency Operations

This section discusses unscheduled activities performed by Utility staff and provides a response plan for emergency conditions. The intent of the routine inspection and maintenance activities discussed in Sections 6.2 and 6.3 is to minimize, through proactive management of the sewer facilities, the potential for conditions that could lead to emergencies.

6.4.1 Customer Service Requests

Customer service requests, such as a localized sewer backup complaint, trigger creation of a task to inspect the affected area or sewer facility and identify potential solutions. In some cases, relatively simple solutions can alleviate the issue. However, other cases require coordination with Engineering or

other City departments. On average, Utility staff respond to approximately 50 customer service/complaint-related tasks per year. The effort required to resolve complaints varies considerably.

Good record-keeping can help with complaint resolution by ensuring that all relevant data are gathered and by serving as a reminder to resolve the complaint and notify the complainant. When a complaint is received, the following information should be recorded to the greatest extent possible:

- Name and contact information of the person making the complaint.
- Brief description of the nature of the complaint.
- If sewer overflow, include estimate of volume and duration of overflow.
- Time and date the complaint was received.
- M&O staff assigned to respond.

If any sewage is spilled to the environment or backs up into a building due to problems with the City sewer system, staff will immediately report the spill to the Department of Ecology's ERTS System.

Following the initial response, the complaint record is updated to include the results of inspections and corrective actions taken, if any. If the complaint cannot be resolved internally within the Utility, the complaint record is forwarded to Engineering for further investigation. Notification of any system investigation and/or action is provided to the customer making the complaint.

6.4.2 Emergency Response Program

For specifically sewer related emergencies, the Utility has implemented a standby program whereby one on-call employee is designated to be the first to receive after-hours emergency calls. Most sewer system problems that occur outside normal working hours are reported through the City's 911 emergency response system. An emergency call-out list is provided to the emergency operator in order to contact Utility staff in case of an emergency. Pump station SCADA alarms are also forwarded to the on-call employee. The primary responder to those after-hours calls is the on-call employee. Utility staff have been trained to respond to system emergencies and staff maintains a "Wastewater Standby Manual" with pertinent information helpful in resolving spills, blockages, and other emergencies. The contacted staff assesses the situation, contacts additional staff as necessary, and then responds in accordance with established emergency response procedures.

For citywide emergencies such as severe weather events, flooding, landslides, power outages, or other events with widespread impact across the PW Director or designee will activate the Department Operations Center (DOC) which operates at the M&O facility. By direction of the DOC Operations Chief, Sewer Utility staff will be used for any PW operations and will not necessarily be limited to sewer operations. To help manage staff and operations during such incidents, the PW Department has implemented several standard operating procedures that outline employee responsibilities for availability, work response, etc.

For longer lasting or regional emergencies, City resources, including staff will be managed in accordance with the City's Comprehensive Emergency Management Plan dated October 21, 2019. The primary objectives of the Comprehensive Emergency Management Plan are to ensure public safety, restore essential services as quickly as possible, and provide assistance to other areas as required. That plan outlines responsibilities of City departments related to the mitigation of the emergency situation within

the City, and coordination and support of or from other organizations such as King County, Pierce County, the State of Washington, and neighboring cities.

6.5 Communications, Data Collection, and Record-Keeping

This section describes the electronic communication, data collection, and record-keeping systems used by Utility staff.

6.5.1 Telemetry and Pump Station Controls

The Utility uses a SCADA system to monitor and operate, as necessary, the sewer and storm pump stations from a centralized location. SCADA information from all sewer, storm, and water facilities is routed via radio signals to the M&O control center located at 1305 C Street SW. The control center monitors wet well levels at all of the sewer pump stations together with pump run times and cycles.

Logic programming automates the sewer pump station operation via ultrasonic level detectors with backup high float switches. The control center is configured to sound an alarm in the M&O building if a recognized anomaly is detected. The alarm system is contacts Utility staff to investigate the anomaly in the event that the problem occurs during non-working hours. All alarm and pump information is recorded within the computer that functions as the control center.

6.5.2 Data Collection and Record-Keeping

Data collection and record-keeping functions for the Utility are performed using a Web-based CMMS software package provided by Cartegraph Inc. The CMMS integrates GIS data with Utility records, providing managers with overview information about system and operational performance, and field crews with information related to the condition and failure history of specific wastewater facilities. The City currently uses the CMMS to plan field staff activities (tasks), record results of both routine and non-routine maintenance, and compare actual maintenance efforts to City goals. The City is also using the CMMS as an asset management tool, through which the City optimizes staffing and capital resource planning.

In recent years, the City has made considerable progress in adding asset information to the CMMS, specifically GIS data, physical information related to size and material, and installation date. However, significant inventory work, which is underway, is still required to fully utilize the asset management function of the CMMS, and the addition of information related to risk, asset criticality, and condition is also necessary. To assist the City's transition to an asset management program, the attributes listed below should be used within the CMMS to define each of the City sewer assets (manhole, pipe segment, pump, etc.).

6.5.2.1 Asset-Specific Attributes

The following asset-specific attributes are related to the asset and, besides replacement cost, remain relatively unchanged over time:

- **Asset ID:** The unique asset number that is used by all business systems to identify an asset.
- **Location:** Where the asset is located (GIS).
- **In-service date:** The date the asset was placed into service.

- **Replacement cost:** The cost to replace the asset and the year that the cost data were calculated.
- **Useful life:** The average life expectancy of the asset.
- **Asset criticality:** A value assigned to each asset that indicates how essential it is to maintain service. Typically, it is defined as a combined score based on the consequence of failure and the likelihood of failure, as defined below:
  - **Consequence of failure:** The social and economic cost if the asset fails.
  - **Likelihood of failure (condition):** The estimated time until the asset fails, usually based on condition.
- **Asset class:** A group of assets that share the same characteristics (e.g., manholes, pipe segments). Asset class is used to estimate replacement costs and useful life of groups of assets.
- **Nameplate information and asset specifications:** Important information that is used to uniquely describe an asset such as the manufacturer name, type of asset, serial number, size, material, etc. This information is used for asset identification, replacement, and repair.

6.5.2.2 Maintenance and Operation Attributes

The following M&O attributes are captured as part of the operations, maintenance, and repair history associated with each asset.

- **Asset ID:** Most work orders should be associated with one or more assets. The asset ID is used to uniquely associate work with individual assets.
- **Issue, cause, action:** These codes are used to classify historical M&O activities associated with corrective actions or unplanned maintenance.
  - **Issue:** What is the problem observed in the field?
  - **Cause:** What is the underlying cause of the problem?
  - **Action:** What was done to address the cause?
- **Target start/stop date and actual dates:** Recording the estimated and actual start and stop dates for a work order can help in determining efficiency, planning workloads, and assessing repair costs.
- **Task costs:** Task order costs include labor, parts, materials, and equipment, and should be accurately recorded for each work order.
- **Task type:** Task order types are used to group and compare different types of work activities. Typical work order types include:
  - **Capital improvement:** Work associated with a capital improvement project.
  - **Corrective maintenance:** Work associated with an unplanned repair.
  - **Preventive maintenance:** Work associated with a planned preventive maintenance activity.
  - **Predictive maintenance:** Work associated with predictive measures (usually for critical assets).
- **Warranty information:** Helps to determine assets that are under warranty and the warranty maintenance requirements.

6.6 Existing Staffing Requirements

Existing staffing requirements for M&O activities as discussed in this chapter were compiled and evaluated to determine staffing requirements needed to efficiently operate, maintain, repair, and collect and report the information necessary to properly operate the sewer system. Table 6.2 evaluates the estimated time to conduct sewer system M&O tasks in the manner currently performed. Calculated days for each M&O activity are for a single person performed over an eight-hour "day." Therefore, an activity that is performed quarterly and that requires four hours and two M&O staff to complete would result in an annual requirement of four days.

Table 6.2 Sewer System Maintenance and Operation Task Summary

Work Activity	FTE Days Required Annually	Assumptions/City Goal
Collection System Maintenance		
Manhole inspection	35	Inspect once every 5 years, total of 5,500 manholes. Perform 32 inspections per day with one-person crew.
Manhole cleaning	28	One cleaning is required for every 20 inspections. Two-person crew, 2 hours each.
Manhole repair	40	40 repairs per year. Two-person crew, 4 hours each.
Pipeline cleaning	238	City goal is 220,000 feet per year (entire system in 7 years). A three-person crew cleans approximately 3,000 feet of pipe per day.
CCTV inspection	370	City goal is 220,000 feet per year (entire system in 7 years). A two-person crew inspects approximately 1,200 feet of pipe per day.
Pump Station Maintenance		
Weekly routine maintenance	377	29 pump stations weekly (52 per year). Two-person crew, 1 hour each.
Monthly routine maintenance	174	29 pump stations monthly (12 per year). Two-person crew, 2 hours each.
Wet well cleaning	29	29 pump stations, 2 per year. Two-person crew, 2 hours each.
Other Sewer M&O Activities		
Field operations	375	Two-person field crew for 0.75 of working days (1.5 FTE).
Customer service requests/complaints	50	50 requests per year. Two-person crew, 4 hours each.
Data entry	130	20 hours per week total.
Subtotal	1,846	
Total	2,172	Assumes 15% unquantified work
Total number of working days available at current staffing level	2,140	Based on 5-year average
Current FTEs	10	2,045 days required divided by 200 days per FTE year.
Number of FTEs required	10.1	

Table 6.2 shows that the Utility is appropriately staffed with respect to meeting current City goals for M&O activities. The analysis confirms the qualitative assessment of staffing adequacy provided by City Maintenance staff. The City has consistently approached assessment and maintenance goals, but has little room for deviation from normal procedure due to equipment failure, employee turnover, sickness, additional training, etc. To mitigate shortfalls, areas of the collection system have received higher priority due to frequent need for maintenance (older pipe in poor condition), relatively flat slopes, or high concentrations of FOG. As the system grows and ages, there will likely be a need for additional staff to perform more frequent cleaning and CCTV inspection of the entire system and to account for sewer system expansion with overall city growth.

6.7 Potential Improvement Opportunities and Capital Needs

Based upon discussions with City staff and analysis of M&O activities discussed in this chapter, the following improvement opportunities are available to the Utility. These opportunities are based on improving existing services and improving work productivity:

- Continue to integrate asset management with existing Utility management software (CMMS and GIS):
  - » Continue to add GIS attributes to known Utility assets.
  - » Perform and document condition assessments. Use defined criteria (such as leaks/cracks observed, cleanliness, and other specific measures) and provide staff training to ensure assessment consistency. Use NASSCO PACP-certified inspection programs to integrate inspection results with CMMS.
  - » Use the results of condition assessments to move toward risk-based maintenance to best utilize staff resources. For example, consistently high assessment scores would result in a lower risk or need for maintenance/inspection, allowing M&O staff to be diverted to more essential activities.
  - » Use the compiled results of condition-based assessments to more systematically program repair, rehabilitation and replacement of aging sewer pipes.
- Complete CCTV inspection of inverted siphons that cross the Green River. The City does not have the equipment to inspect these facilities; therefore, contract services will be required.
- Hire a contractor to perform follow-up inspections of the City's large diameter pipes (with a greater than 18-inch diameter) to assess degradation since the previous inspections in 2020.
- Initiate a program to inspect and correct deficiencies in portions of side sewers that are the City's responsibility, meaning the portions located within City rights-of-way. Such a program could include adding additional "side launch" inspection capabilities to the City's current CCTV equipment, hiring a contractor to conduct inspections, or some combination of the two. The compiled results of those inspections would be used to initiate repairs, whether they be done by current staff, or by one of various methods of delivering a capital project.
- Utilize new engineering staff to oversee the cleaning programs more proactively for grease traps and interceptors by food service establishments, and more frequently educate the public about the harmful effects of discharging FOG and other prohibited substances to the public sewer system.

CHAPTER 7 CAPITAL IMPROVEMENT PLAN

This chapter discusses recommended capital projects for the City's sewer system service area (SSSA). The capital projects necessary to meet and maintain the City's level of service (LOS), as described by the goals and policies in Chapter 2 of this Plan, through the 20-year planning period (2025–2044) are presented as a Capital Improvement Plan (CIP).

This Plan includes time frames, which represent the intended framework for future funding decisions and within which future actions and decisions are intended to occur. However, these time frames are estimates, and depending on factors involved in the processing of applications and project work, and availability of funding, the timing may change. The framework does not represent actual commitments by the City. Project identification is an ongoing effort requiring periodic evaluation. This CIP list was developed based on incorporating the City's Capital Facilities Plan (CFP), identification of equipment limitations within the M&O group, and identification of areas of improvement.

7.1 Capital Improvement Plan

The CIP focuses on addressing known problems in a manner identifying cost-effective solutions that incorporate the risks associated with substandard facilities and the uncertainty inherent in engineering calculations/model simulations. A flow chart depicting the process of CIP development is shown in Figure 7.1.

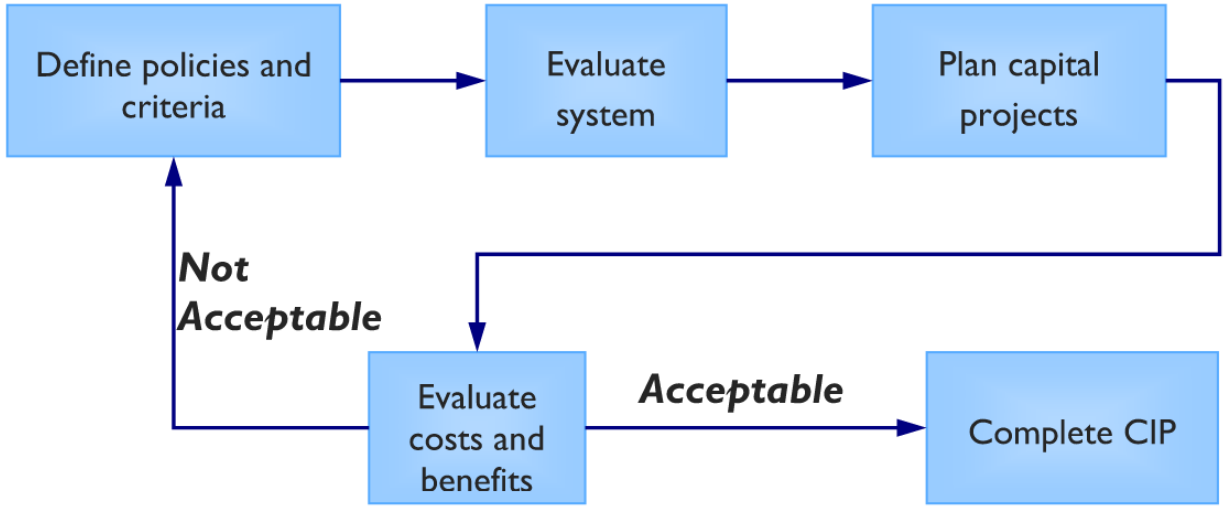


Figure 7.1 CIP Development Flow Chart

The CIP places emphasis on projects identified for implementation between 2025 and 2030, which constitutes the 6-year planning period for utility capital funding requirements and staffing needs. This period provides a realistic outer limit for accurately forecasting the annual cycle of utility projects and priorities. This Plan also includes a 20-year CIP that examines long-term capital requirements, such as the replacement of infrastructure as it exceeds its useful life. All projects in the CIP are consistent with the LOS.

7.1.1 Project Priority

All projects in the CIP have been prioritized for implementation. Priority was assigned as one of three designations. Projects in the top tier, or highest priority, are designated Priority 1; projects in the middle tier are designated Priority 2; and projects with the lowest priority relative to the other projects are considered Priority 3. The priority levels are based on how the proposed project impacts LOS. The project descriptions below include the designated priority.

7.1.2 Project Cost

Estimated costs for each project are included in the CIP descriptions below. The costs are planning-level estimates. Actual costs will depend on various factors at the time of design and construction including labor and material costs. Estimated costs include an allowance for engineering, legal, and administration fees, construction contingencies, contractor overhead, and general conditions. Permitting and land, easement, and/or right-of-way acquisitions are not included in the cost estimate. The costs estimates are in 2024 dollars. CIP Projects 1 and 2 are part of the City's Capital Facilities Plan, where the City developed the costs for these projects.

7.1.3 Project Summary

The CIP projects mainly consist of ongoing and programmatic capital improvements. Ongoing projects include projects identified through previous studies. The City has previously allocated funding to each of these projects, which are currently in various stages of execution. These projects must continue to receive funding under the CIP until completion and have been included in this document to provide a complete picture of the program. Programmatic projects are included in the CIP to provide funding for maintaining and/or improving the LOS. These projects do not address a problem at a specific location but allocate budget for addressing LOS goals citywide. As discussed in Chapter 5, the system hydraulic analysis outlined six areas with future capacity deficiencies. Capacity-related capital projects have been included in the six-year or 20-year planning period, specifically Projects 1 and 4, which are described below in Section 7.2.2. The next Plan update, scheduled for 2032 and repeating every 10 years, has been included as a cost in Table 7.1.

7.2 Capital Improvement Projects

7.2.1 Summary Table

Table 7.1 presents Annual Project Cost Summary for 6-Year and 20-Year CIP.

Table 7.1 Annual Project Cost Summary for 6-Year and 20-Year CIP

Project Number	Project Name	Priority	2025	2026	2027	2028	2029	2030	2025-2030	2031-44	20-Year Project Cost	CIP Allocation (Growth/ Expansion)	CIP Allocation (Repair/ Replacement)
1	Sanitary Sewer Repair and Replacement/System Improvements (Includes Areas 2, 3, 5 and 6 identified in Figure 5.10)	1	$350,000	$1,800,000	$350,000	$1,800,000	$350,000	$1,800,000	$6,450,000	$15,050,000	$21,500,000	5%	95%
2	Street Utility Improvements	1	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$1,800,000	$4,200,000	$6,000,000		100%
3	Side Sewer Inspections	1	$370,000	$370,000	$370,000	$370,000	$370,000	$370,000	$2,220,000	$1,480,000	$3,700,000		100%
4	Sewer Pump Station Replacement/Improvement	2	$0	$0	$400,000	$800,000	$1,000,000	$2,000,000	$4,200,000	$10,950,000	$15,150,000	25%	75%
5	Siphon Assessment and Cleaning	1	$0	$0	$580,000	$0	$0	$0	$580,000	$580,000	$1,160,000		100%
6	Pump Station Condition Assessment	1	$0	$105,000	$0	$0	$0	$0	$105,000	$105,000	$210,000		100%
7	Manhole Ring and Cover Replacement	2	$90,000	$90,000	$90,000	$90,000	$90,000	$90,000	$540,000	$1,260,000	$1,800,000		100%
8	Cleaning and Inspection of Large-Diameter Pipe (21-inches and larger)	2	$0	$0	$0	$950,000	$0	$0	$950,000	$1,900,000	$2,850,000		100%
9	Inflow and Infiltration Monitoring (Area 1, Figure 5.10)	3	$0	$0	$0	$0	$0	$530,000	$530,000	$1,590,000	$2,120,000		100%
10	Roegner Park Sewer Capacity Improvements (Area 4, Figure 5.10)	1	$0	$0	$120,000	$0	$0	$1,080,000	$1,200,000	$0	$1,200,000	60%	40%
11	Rainier Ridge Pump Station Replacement	1	$4,000,000	$0	$0	$0	$0	$0	$4,000,000	$0	$4,000,000	50%	50%
12	1st and R Sewer Replacement	2	$400,000	$0	$0	$0	$0	$0	$400,000	$0	$400,000		100%
13	Plan Update	1	$0	$0	$0	$0	$0	$0	$0	$800,000	$800,000		100%
	Total Cost of Priority 1 Projects		**$5,020,000**	**$2,575,000**	**$1,720,000**	**$2,470,000**	**$1,020,000**	**$3,550,000**	**$16,355,000**	**$20,735,000**	**$37,090,000**		
	Total Cost of Priority 2 Projects		**$490,000**	**$90,000**	**$ 490,000**	**$1,840,000**	**$1,090,000**	**$2,090,000**	**$6,090,000**	**$14,110,000**	**$20,200,000**		
	Total Cost of Priority 3 Projects		**$0**	**$0**	**$0**	**$0**	**$0**	**$530,000**	**$530,000**	**$1,590,000**	**$2,120,000**		
	Total CIP Cost		**$5,510,000**	**$2,665,000**	**$2,210,000**	**$4,310,000**	**$2,110,000**	**$6,170,00**	**$22,975,000**	**$36,435,000**	**$59,410,000**		

7.2.2 Project Descriptions

Table 7.2 Project Descriptions

Project Number	1
Project Name	**Sanitary Sewer Repair and Replacement/System Improvements (Includes Areas 2, 3, 5 and 6 identified in Figure 5.10)**
Location	Throughout the SSSA
Priority	1
Schedule	Ongoing, alternating a large project every other year
Problem Summary	As infrastructure ages, failures begin to appear, causing LOS issues
Description	This project is R&R of existing sewer lines, manholes, public side sewers, and other facilities. These assets will be identified through modeled capacity evaluation, areas identified with elevated inflow and infiltration, CCTV inspection and routine cleaning and monitoring. This particular program includes proposed projects that do not have an approved Project Management Plan, or are not associated primarily with the Save Our Streets (SOS) or other transportation improvements. Anticipated projects include biannual, standalone, R&R projects for sewer lines that are broken, misaligned, "bellied," or otherwise require an inordinate amount of maintenance effort or present a risk of backup or trench failure, and facilities that generate consistent odor complaints. Improvements identified through this program may be completed as components of larger projects to gain efficiency in project costs. Additionally, system improvements that enhance the ability to maintain service are included here. It is anticipated, as data such as pipe age, pipe material, condition rating (based on CCTV inspection), and consequence of failure are consolidated in Cartegraph, that planning for the R&R program will be based on a systematic analysis of that data. This project is planned to occur during both the 6- and 20-year CIPs.
Recommended Predesign Refinements	As sewer mains are prioritized for replacement based on age, criticality and condition assessments, continual coordination with other utility and street improvements should be made to increase efficiency.
Cost Estimate	Costs developed by the City and carried over from the Capital Facilities Plan: ▪ 2025 - $350,000 ▪ 2026 - $1,800,000 ▪ 2027 - $350,000 ▪ 2028 - $1,800,000 ▪ 2029 - $350,000 ▪ 2030 - $1,800,000 ▪ 2031–44 - $15,050,000
20 Year Project Cost	$21,500,000

Project Number	2
Project Name	**Street Utility Improvements**
Location	Throughout the SSSA
Priority	1
Schedule	Ongoing
Problem Summary	As infrastructure ages, failures begin to appear, causing LOS issues.
Description	This project is R&R of existing sewer lines, manholes, and public side sewers located within the project limits of City arterial transportation projects and within the SOS program. Coordinating sanitary sewer utility projects with local street and arterial transportation projects can lower the unit cost of pipe replacement by eliminating the pavement restoration component of the sewer project's costs. This project is planned to occur during both the 6- and 20-year CIPs.
Recommended Predesign Refinements	Refine list as additional information becomes available.
Cost Estimate	Costs developed by the City and carried over from the Capital Facilities Plan: ▪ 2025 - $300,000 ▪ 2026 - $300,000 ▪ 2027 - $300,000 ▪ 2028 - $300,000 ▪ 2029 - $300,000 ▪ 2030 - $300,000 ▪ 2031–44 - $4,200,000
20 Year Project Cost	$6,000,000

Project Number	3
Project Name	**Side Sewer Inspections**
Location	Throughout the SSSA
Priority	1
Schedule	2025-2034
Problem Summary	The most common cause for sewer backups in the City in recent years has been the failure of side sewers. Throughout the City the condition of lateral sewers on City property is generally unknown.
Description	Use the services of a contractor to systematically inspect, via CCTV, lateral sewers within City rights-of-way and identify needed repairs. Anticipate conducting approximately 1,600 inspections per year, for 10 years to capture information on 100% of these facilities. Initial inspections will concentrate on areas known to primarily have concrete or clay side sewers.
Recommended Predesign Refinements	Review existing CCTV and GIS information to identify gaps in material type and age that should also be collected during the program.
Cost Estimate	$370,000 per year for 10 years
10 Year Project Cost	$3,700,000

Project Number	4
Project Name	**Sewer Pump Station Replacement/Improvements**
Location	Throughout the SSSA
Priority	1
Schedule	2025-30
Problem Summary	The 2016 Pump Station Condition Assessment identified Rainier Ridge and 22nd Street pump stations as the highest priority stations, followed by R Street and 8th Street pump stations for needing to be renovated, replaced, and/or relocated based on condition, safety concerns, and to accommodate growth. The Rainer Ridge pump station project is ongoing and expected to be mostly complete under the prior CIP. This CIP provides for a programmatic program to renovate or replace the next pump stations on a bi-annual basis following completion of Rainer Ridge. The preliminary anticipated order for modification/replacement is: 1. 22nd Street Pump Station. 2. Riverside Pump Station. 3. Dogwood Pump Station Capacity Improvements. 4. R Street Pump Station. 5. 8th Street Pump Station. It is anticipated that additional stations will require significant improvements and/or replacement within the 6 – 20 year planning horizon as well. The estimated cost for 22nd Street is distributed between 2027 and 2030. The estimated costs for the next identified pump stations are used as a placeholder for project value and distributed from 2031 to 2044. Following the results of the systematic pump station evaluation study updated scheduled for 2026 (CIP project 6, Pump Station Inspections), the sequence or identification of pump stations requiring R&R, and detailed scope of improvements for each of these stations will be developed.
Description	This project will renovate or replace one pump station within the 6-year CIP and allocates money for R&R of unknown pump stations in the 6- to 20-year CIP.
Recommended Predesign Refinements	The costs below for all pump stations do not include provisions for new gravity or force main piping. The costs also assume that the existing generators on site will be reused and that no additional land or site improvements are required.

Project Number	4	
Project Name	**Sewer Pump Station Replacement/Improvements**	
Cost Estimate	1. **22th Street Pump Station (2027-2030)**	
	Based on 2016 Condition Assessment	$4,200,000
	Subtotal	**$4,200,000**
	2. **Riverside Pump Station (2031-2033)**	
	Package pump station	$2,724,000
	Project contingency (50% of all above costs)	$1,362,000
	Washington State and King County taxes (10.2% of construction costs)	$417,000
	Subtotal construction costs	**$4,503,000**
	Administration, engineering design, and permitting (30% of costs)	$1,347,000
	Subtotal	**$5,850,000**
	3. **Dogwood Pump Station (2034-2035)**	
	Package pump station	$256,000
	Project contingency (50% of all above costs)	$128,000
	Washington State and King County taxes (10.2% of construction costs)	$39,000
	Subtotal construction costs	**$423,000**
	Administration, engineering design, and permitting (30% of costs)	$127,000
	Subtotal	**$550,000**
	4. **R Street Pump Station (2037-2039)**	
	Package pump station	$605,000
	Project contingency (50% of all above costs)	$302,500
	Washington State and King County taxes (10.2% of construction costs)	$93,000
	Subtotal construction costs	**$1,000,500**
	Administration, engineering design, and permitting (30% of costs)	$299,500
	Subtotal	**$1,300,000**
	5. **8th Street Pump Station (2041-2043)**	
	Package pump station	$1,513,000
	Project contingency (50% of all above costs)	$756,500
	Washington State and King County taxes (10.2% of construction costs)	$231,000
	Subtotal construction costs	**$2,500,500**
	Administration, engineering design, and permitting (30% of costs)	$749,500
	Subtotal	**$3,250,000**
20 Year Project Cost	$15,150,000	

Project Number	5	
Project Name	**Siphon Assessment and Cleaning**	
Location	Green River crossing near 26th Street NE; Green River crossing over 8th Street NE Bridge	
Priority	1	
Schedule	2027, repeated in 10 years, 2037 or as inspection results warrant	
Problem Summary	Currently, the City does not have the required equipment to complete inspections of the three siphons located within its collection system, and little is known about their condition.	
Description	This project would inspect each siphon to determine and or update its condition and help set future inspection/cleaning protocols. The siphons would be inspected prior to cleaning to determine what their in-situ condition is, then if required the lines would be cleaned and re-inspected. Based on the debris level and condition of the pipes, future activities can be planned. Repeat in 10 years. For cost efficiencies, it is assumed that all three sites would be completed under one contract. This project is planned to occur during both the 6- and 20-year CIPs.	
Recommended predesign refinements	Determine flow rates required for bypass pumping/trucking. Verify the assumption that the Green River crossing at 26th Street NE can be diverted to each barrel without the need for additional bypass pumping.	
Cost Estimate	**Green River crossing via Inverted Siphon at 26th Street NE: 488 feet of 8-inch and 12-inch HDPE**	
	Initial CCTV	$6,600
	Cleaning	$15,600
	Post-cleaning CCTV	$6,600
	Subtotal	**$28,800**
	Green River Crossing via 8th Street NE Bridge: 1,191 feet of 14-inch CIP	
	Traffic control	$117,000
	Bypass pumping	$124,000
	Initial CCTV	$8,000
	Cleaning	$23,000
	Post-cleaning CCTV	$8,000
	Subtotal	**$280,000**
	Subtotal line-item costs	**$308,800**
	Project contingency (30% of all above costs)	$92,600
	Washington State and King County taxes (10.2% of construction costs)	$40,900
	Subtotal construction costs	$**442,300**
	Administration, engineering design, and permitting (30% of costs)	$132,700
20 Year Project Cost	$1,160,000	

Project Number	6	
Project Name	**Pump Station Condition Assessment**	
Location	Throughout the SSSA	
Priority	1	
Schedule	2026 and 2036	
Problem Summary	The City last completed a pump station condition assessment in 2016. Since that time, improvements/ upgrades to the stations have been made, and the pump stations have continued to age. To adequately plan for future pump station investments, re-inspection is required.	
Description	The assessment will evaluate the apparent physical condition of existing stations and equipment. The purpose of the assessment is to predict future serviceability and anticipated longevity for development of future CIPs. Pump stations must meet the adopted system performance and reliability goals, and current code conditions, which may differ from those that existed when the stations were originally built. The assessment would identify requirements necessary to meet the City's goals, requirements necessary for the health and safety of staff and the public, and suggestions that might increase reliability or reduce cost of operations or maintenance. Similar to the 2016 assessment, equipment checklists will be prepared for mechanical/hydraulic and electrical/control systems, site visits to all stations will be made, as-built information and M&O manuals will be reviewed, and M&O personnel will be asked about known issues at each location. Station operation will be observed, but no detailed physical testing of equipment, wiring, controls, or structures will be included. The results of this assessment will compared to the previous inspection to identify observable degradation of especially the older stations. To continue to stay up to date on pump station needs, it is recommended to repeat the inspection within the 20-year CIP.	
Recommended Predesign Refinements	None	
Cost Estimate	Engineering services for condition assessment	$70,200
	Subtotal line-item costs	**$70,200**
	Project contingency (30% of all above costs)	$21,100
	Subtotal inspection costs	**$91,300**
	Administration (15% of costs)	$13,700
20 Year Project Cost	$210,000	

Project Number	7	
Project Name	**Manhole Ring and Cover Replacement**	
Location	Throughout the SSSA	
Priority	2	
Schedule	Ongoing	
Problem Summary	Frame and covers on sewer manholes are continually subject to impact from vehicles. While other portions of the of the manhole structures generally remain in adequate condition, the frames and covers often to be replaced.	
Description	This project would establish an ongoing CIP to provide funds for continued replacement of frames and covers. These replacements may occur as part of other City capital projects or as a stand-alone ring and cover replacement project. The cost for this effort is based on historical, all-inclusive spending from previous City of Auburn work. This project is planned to occur during both the 6- and 20-year CIPs.	
Recommended Predesign Refinements	None.	
Cost Estimate for year 2025	Frame and cover replacement annual	$90,000
	Subtotal line-item costs	**$90,000**
	Project contingency (0% of all above costs)	$0
	Washington State and King County taxes (10.2% of construction costs)	Included
	Subtotal construction costs	**$90,000**
	Administration, engineering design, and permitting (0% of costs)	$0
20 Year Project Cost	$1,800,000	

Project Number	8	
Project Name	**Cleaning and Inspection of Large-Diameter Pipe**	
Location	Throughout the SSSA	
Priority	2	
Schedule	2028, positioned in an off year of CIP 1, repeated in 10 years, 2037 or as initial inspection warrants.	
Problem Summary	M&O staff are not currently equipped to efficiently clean and inspect pipe larger than 18 inches in diameter and meet other goals for cleaning and inspection.	
Description	This project would clean and internally inspect approximately half of the pipe owned by the City that is 21 inches and larger in diameter per effort. This is approximately 39,000 feet, ranging in diameter from 21 inches up to 36 inches. This project is planned to occur during both the 6- and 20-year CIPs.	
Recommended Predesign Refinements	Review existing CCTV inspection information to see if any of the large-diameter pipe has been inspected and determine if it needs cleaning.	
Cost Estimate	Cleaning	$318,000
	CCTV	$106,000
	Disposal	$6,000
	Traffic control	$12,000
	Subtotal line-item costs	**$442,000**
	Project contingency (50% of all above costs)	$221,000
	Washington State & King County taxes (10.2% of construction costs)	$67,600
	Subtotal construction costs	**$730,600**
	Administration, engineering design, and permitting (30% of costs)	$219,000
20 Year Project Cost	$2,850,000	

Project Number	9	
Project Name	**Long Term Inflow and Infiltration Monitoring**	
Location	Throughout the SSSA	
Priority	3	
Schedule	Collect additional data during plan updates to monitor system conditions	
Problem Summary	Based on previous flow monitoring, I/I does not appear to be causing any large scale capacity issues within the city system, and limited areas of elevated I/I have been identified. As part of future plan updates, the I/I should be evaluated and compared with past results to understand if conditions are stable or changed. Excessive localized I/I can also be an indicator of poor sewer main and side sewer condition, and could help prioritize ongoing sewer cleaning and replacement programs.	
Description	This project would monitor flow at key points in the collection system during plan updates. This data will then be used in for Comprehensive Sewer Plan for modeling purposes and I/I assessment. Effort should be made to coordinate flow monitoring with the King County's Decennial Flow Monitoring.	
Recommended Predesign Refinements	Analyze prior flow metering data and hydraulic model results to develop a flow monitoring plan.	
Cost Estimate	Flow monitoring (four flow meters and two rain gauges for 6 months per year)	$284,500
	Subtotal line-item costs	**$284,500**
	Project contingency (30% of all above costs)	$85,400
	Washington State & King County taxes (10.2% of construction costs	$37,700
	Subtotal construction costs	**$407,600**
	Administration, engineering design, and permitting (30% of costs)	$122,300
20 Year Project Cost	$2,120,000	

Project Number	10
Project Name	**Roegner Park Sewer Capacity Improvements (Area 4, Figure 5.10)**
Location	Roegner Park between Oravetz Place to just north of the Lakeland Hills Pump Station.
Priority	1
Schedule	Anticipated design to begin in 2027, with construction anticipated 2030. As King County proceeds with plans to replace the Lakeland Hills Pump Station, staff will determine the optimal time to replace the lines depending on the siting and construction schedule of the County project.
Problem Summary	Hydraulic modelling indicated that the sewer mains just upstream of the Lakeland Hills Pump Station will be surcharged during the design storm event by the year 2044.
Description	This project will replace the potentially surcharging sewer mains will larger pipes or pipes with a modified slope to increase their capacity. The Lakeland Hill Pump Station is being replaced by King County and that project is expected to be complete in 2031. The City will work with County staff during the design phase of each project to identify the most efficient time to construct both projects.
Recommended Predesign Refinements	Coordinate final location and discharge elevations for the pump station wet well prior to design. Some of the surcharged pipes lie within an easement across Auburn School District Athletic Fields. Construction should be scheduled to be least impactful to their operations.
Cost Estimate	2027 - $120,000 2030 - $1,080,000
6 Year Project Cost	$1,200,000
Project Number	**11**
Project Name	**Rainier Ridge Pump Station Replacement**
Location	126th Avenue SE within the Rainier Ridge Development
Priority	1
Schedule	Design will be complete and preliminary construction will begin in 2024. The remainder of the construction will be completed in 2025.
Problem Summary	The existing station is currently under capacity and has little room to expand, and the force main has needed repair several times over the past 20 years.
Description	The project is replacing the existing Rainier Ridge Pump Station located by the edge of a cul-de-sac with a new station located on a City owned parcel that includes a storm pond. The project involves installing gravity lines to accommodate the station relocation and a new force main to be located within an easement on the Green River College property.
Recommended Predesign Refinements	Project is underway
Cost Estimate	2025 - $4,000,000
Current Planning Period Project Cost	$4,000,000

Project Number	12
Project Name	**1st and R Sewer Replacement**
Location	Between 1st Street NE and 2nd Street NE, east of 'R' Street NW.
Priority	2
Schedule	Design work will begin 2024. Construction is anticipated to be completed in 2025.
Problem Summary	There is an existing clay pipe that has significant sags which allow sediment and debris to collect and has caused periodic backups in homes served by the line.
Description	The project will replace the line with a new PVC pipe and reconnect all side sewers. The project requires significant coordination between the City and residents, as the sewer main lies along abutting back property lines of the homes served by the line. The City does not have explicit easements for the sewer main.
Recommended Predesign Refinements	During design, contact will be made with each property owner to discuss rights-of-entry, permanent easements, etc.
Cost Estimate	2025 - $400,000
6 Year Project Cost	$400,000
Project Number	**13**
Project Name	**Plan Update**
Location	Throughout the SSSA
Priority	1
Schedule	Every 10 years
Problem Summary	The City maintains a current Comprehensive Sewer Plan to meet Washington Administrative Code (WAC) Section 173-240-050.
Description	The plan update is a combination of City and Consultant work. The update typically includes review of the existing system and practices, hydraulic modeling, evaluation of system capacity, development of a 6 and 20 year capital improvement program, planning for enhancement of the utility's maintenance and operations, and final plan preparation and assembly
Recommended Predesign Refinements	N/A
Cost Estimate	$400,000
20 Year Project Cost	$800,000

CHAPTER 8 FINANCIAL PLAN

8.1 Introduction

This chapter was prepared by FCS GROUP to provide a financial program that allows the City sewer utility to remain financially viable during the planning period. This financial viability analysis considers the historical financial condition, current and identified future financial and policy obligations, M&O needs, and the financial impacts of the capital projects identified in this Plan. Furthermore, this chapter provides a review of the sewer utility's current rate structure with respect to rate adequacy and customer affordability.

8.2 Past Financial Performance

This section includes a historical summary of financial performance as reported by the City, including fund resources and uses arising from cash transactions.

8.2.1 Comparative Financial Statements

The City legally owns and operates a sewer utility. Table 8.1 shows a summary of sewer fund resources and uses arising from cash transactions for the previous six years (2017 through 2022). 2023 financial statements were not available at the time the chapter was developed. Table 8.2 shows a summary of assets and liabilities, with the difference between the two reported as "net position". Increases and decreases in net position are useful indicators of the financial position of the City's utility. Noteworthy findings and trends for the historical performance and condition of the City's sewer utility are then discussed.

Table 8.1 Summary of Historical Fund Resources and Uses Arising from Cash Transactions

	2017	2018	2019	2020	2021	2022
Operating Revenues						
Charges for Service	$26,369,496	$26,582,233	$26,559,461	$25,357,477	$27,402,561	$28,925,941
Other Operating Revenue	$-	$-	$-	$-	$-	$-
Total Operating Revenues	**$26,369,496**	**$26,582,233**	**$26,559,461**	**$25,357,477**	**$27,402,561**	**$28,925,941**
Operating Expenses						
Maintenance and Operations	$19,055,093	$19,117,920	$19,553,676	$19,125,939	$19,244,065	$20,656,344
Administration	$4,464,901	$4,509,602	$4,519,668	$4,556,451	$5,455,736	$4,115,950
Depreciation and Amortization	$2,199,711	$2,234,136	$2,275,905	$2,337,347	$2,382,652	$2,478,902
Other Operating Expenses	$6,648	$103,267	$-	$-	$-	$-
Total Operating Expenses	**$25,726,353**	**$25,964,925**	**$26,349,249**	**$26,019,737**	**$27,082,453**	**$27,251,196**
Operating Income (Loss)	$643,143	$617,308	$210,212	$(662,260)	$320,108	$1,674,745
Non-Operating Revenues (Expenses)						
Interest Revenue	$164,566	$350,596	$451,889	$120,844	$21,240	$335,524
Other Non-Operating Revenue	$73,739	$71,039	$279,452	$36,167	$765	$21,860
Gain (Loss) on Scale of Capital Assets	$-	$-	$-	$-	$-	$-
Interest Expense	($258,270)	(244,962)	($231,100)	($38,434)	($72,545)	($58,844)
Other Non-Operating Expense	$-	$-	$-	($31,102)	$-	($240,442)
Total Non-Operating Revenues (Expenses)	**$(19,965)**	**$176,673**	**$500,241**	**$87,475**	**($50,540)**	**$58,098**
Income (Loss) Before Contributions and Transfers	$623,178	$793,981	$710,453	($574,785)	$269,568	$1,732,843
Capital Contributions	$873,779	$2,299,751	$2,417,611	$2,801,816	$2,653,740	$666,761
Transfers In	$800,000	$-	$-	$-	$-	$-
Transfers Out	($962,905)	($95,244)	($64,119)	($63,399)	($91,086)	($59,555)
Change in Net Position	$1,334,052	$2,998,488	$3,063,945	$2,163,632	$2,832,222	$2,340,049
Net Position, January 1	**$84,591,243**	**$85,925,295**	**$88,923,783**	**$91,987,728**	**$94,151,360**	**$96,983,582**
Net Position, December 31	**$85,925,295**	**$88,923,783**	**$91,987,728**	**$94,151,360**	**$96,983,582**	**$99,323,631**
M&O Coverage Ratio	102.5%	102.4%	100.8%	97.5%	101.2%	106.1%
Net Operating Income as a % of Operating Revenue	2.4%	2.3%	0.8%	-2.6%	1.2%	5.8%
Debt Service Coverage Ratio	5.41	5.40	4.70	5.59	6.94	10.68

8.2.1.1 Findings and Trends

- The City's sewer charges for services increased from $26.4 million (M) in 2017 to $28.9M in 2022. The average annual increase was approximately 1.9 percent per year, with a total increase of 9.7 percent from 2017 to 2022. Charges for service increased each year, except for 2020 where revenues fell by 4.5 percent. Operating expenditures increased by $1.5M across the six years with an average annual increase of 1.2 percent. Similar to revenues, expenditures dropped in 2020, but to a lesser extent, decreasing by 1.3 percent. With growth in total operating revenues slightly outpacing growth in operating expenses, operating income has been positive in five of the last six years, with 2020 being the exception, where the utility posted an operating loss of $662,000. As many will note, 2020 was not a typical year and likely affected by the global pandemic restrictions in place at the time.
- The M&O coverage ratio (total operating revenues divided by total operating expenses) was 102.5 percent in 2017. With relatively stable revenues and expenses, this metric has maintained its stability, ending 2022 at 106.1 percent. A ratio of 100.0 percent or greater shows that operating revenue will successfully cover operating expenses, and the utility has remained above this ratio for five of the last six years. Again, 2020 was the exception when the ratio decreased to 97.5 percent.
- Net operating income as a percentage of operating revenue was 2.4 percent in 2017, decreasing to negative 2.6 percent in 2020, before recovering back to 5.8 percent by 2022. Similar to the M&O coverage ratio, these trends show how successfully operating revenue actually covered operating expenses, with higher positive numbers being the best and negative numbers showing a need for improvement. In addition, these trends demonstrate the ability of the utility to invest in capital, whether through direct cash transfers or the issuance and servicing of debt.
- The debt service coverage ratio measures the amount of cash flow available to meet principal and interest payments. Typically, revenue bond debt service coverage requires a minimum factor of 1.25 during the life of the loans. This ratio is calculated by dividing cash or net operating income (operating revenues less operating expenses) by annual revenue bond debt service. The debt service coverage ratio for all outstanding revenue bond debt ended 2017 at 5.4, decreasing to 4.7 in 2020, when revenues decreased, before rebounding to 10.7 by 2022. The fact that this ratio has sustained levels higher than the minimum target of 1.25 indicates a stable capacity for new debt and will likely result in favorable terms when entering the bond market.

Table 8.2 Summary of Historical Comparative Statements of Net Position

	2017	2018	2019	2020	2021	2022
Current Assets						
Cash and Cash Equivalents	$16,427,725	$15,768,440	$13,572,363	$16,258,323	$20,799,254	$22,972,741
Investments	$-	$2,004,660	$6,578,855	$4,521,754	$-	$-
Restricted Cash:						
Bond Payments	$535,820	$535,243	$534,067	$451,161	$438,395	$438,395
Customer Deposits	$79,473	$95,300	$77,353	$61,526	$61,527	$61,527
Other (Reserve for Bonds and Rate Stabilization)	$516,173	$516,173	$516,075	$295,639	$295,639	$294,444
Customer Accounts	$2,745,457	$3,516,161	$3,971,951	$4,063,452	$4,146,223	$4,504,623
Other Receivables	$-	$19,200	$19,200	$19,200	$-	$-
Due From Other Governmental Units	$-	$-	$-	$-	$-	$-
Inventories	$9,103	$8,316	$9,220	$13,117	$13,059	$12,867
Total Current Assets	$20,313,751	$22,463,493	$25,279,084	$25,684,172	$25,754,097	$28,284,597
Noncurrent Assets						
Long-Term Contracts, Leases and Notes	$645,900	$623,400	$623,400	$623,400	$600,900	$578,400
Net Pension Asset	$-	$-	$-	$-	$1,360,112	$533,150
Capital Assets Not Being Depreciated:						
Land	$1,695,023	$1,695,023	$1,695,023	$1,695,023	$1,695,023	$1,695,023
Intangible - Water Rights	$-	$-	$-	$-	$-	$-
Construction In Progress	$1,121,482	$1,270,093	$243,140	$1,053,882	$865,150	$883,132
Capital Assets:						
Buildings and Equipment	$1,255,947	$1,274,801	$1,304,180	$1,304,180	$1,304,180	$1,304,180
Improvements Other Than Buildings	$101,366,336	$103,581,870	$106,432,969	$109,169,429	$113,189,587	$114,548,300
Right of Use (Leases)	$-	$-	$-	$-	$-	$-
Less Accumulated Depreciation	($31,609,927)	($33,844,064)	($36,119,969)	($38,457,317)	($40,839,968)	($43,318,870)
Total Noncurrent Assets Net of Accumulated Depreciation	**$74,474,761**	**$74,601,123**	**$74,178,743**	**$75,388,597**	**$78,174,984**	**$76,223,315**
Total Assets	**$94,788,512**	**$97,064,616**	**$99,457,827**	**$101,072,769**	**$103,929,081**	**$104,507,912**
Deferred Outflows of Resources						
Deferred Outflow from Bond Refunding	$-	$-	$-	$34,939	$34,939	$34,939
Deferred Outflow related to Pensions	$200,138	$174,689	$187,172	$208,339	$193,419	$535,880
Total Deferred Outflows of Resources	**$200,138**	**$174,689**	**$187,172**	**$243,278**	**$228,358**	**$570,819**
Current Liabilities						
Current Payables	$393,163	$409,231	$515,602	$895,896	$612,294	$516,801
Claims Payable	$-	$-	$-	$-	$-	$-
Loans Payable - Current	$288,262	$288,262	$288,262	$288,262	$288,262	$288,262
Employee Leave Benefits - Current	$103,747	$105,009	$94,806	$105,009	$153,048	$151,157
Leases Payable - Current	$-	$-	$-	$-	$-	$-
Revenue Bonds Payable - Current	$262,685	$274,960	$287,235	$233,225	$244,273	$255,320
Payable From Restricted Assets:						
Accrued Interest	$279,081	$265,509	$251,338	$160,194	$146,794	$132,796
Deposits	$79,473	$95,300	$77,353	$61,526	$61,527	$61,527
Other Liabilities Payable	$172	$-	$-	$-	$-	$-
Total Current Liabilities	**$1,406,583**	**$1,438,271**	**$1,514,596**	**$1,744,112**	**$1,506,198**	**$1,405,863**
Noncurrent Liabilities						
Employee Leave Benefits	$31,332	$37,988	$25,197	$37,988	$66,243	$57,986
Loans Payable	$2,090,408	$1,802,146	$1,513,884	$1,225,622	$937,360	$649,098
Leases Payable	$-	$-	$-	$-	$-	$-
Revenue Bonds Payable	$4,206,276	$3,924,924	$3,631,296	$3,341,264	$3,030,092	$2,707,872
Net Pension Liability	$1,130,142	$771,584	$599,334	$588,136	$167,400	$328,393
Total Noncurrent Liabilities	**$7,458,158**	**$6,536,642**	**$5,769,711**	**$5,193,010**	**$4,201,095**	**$3,743,349**
Total Liabilities	**$8,864,741**	**$7,974,913**	**$7,284,307**	**$6,937,122**	**$5,707,293**	**$5,149,212**
Deferred Inflows Of Resources						
Deferred Inflow Related to Leases	$-	$-	$-	$-	$-	$-
Deferred Inflow Related to Pensions	$198,614	$340,609	$372,964	$227,565	$1,466,564	$605,888
Total Deferred Inflows of Resources	$198,614	$340,609	$372,964	$227,565	$1,466,564	$605,888
Net Position						
Net Investment in Capital Assets	$67,517,050	$68,222,674	$68,368,733	$70,127,985	$72,152,380	$71,568,397
Restricted For:						
Debt Service	237,092	250,664	264,737	196,971	148,845	242,859
Rate Stabilization	$-	$-	$-	$-	$-	$-
Pension Asset	$-	$-	$-	$-	$-	533,150
Unrestricted	18,171,153	20,450,445	23,354,258	23,826,404	24,682,357	26,979,225
Total Net Position	**85,925,295**	**88,923,783**	**91,987,728**	**94,151,360**	**96,983,582**	**99,323,631**
Current Ratio	14.4	15.6	16.7	14.7	17.1	20.1
Debt to Net Position Ratio	0.08	0.07	0.06	0.06	0.05	0.04
Debt to Noncurrent Capital Assets Ratio	0.10	0.09	0.08	0.07	0.06	0.05

8.2.1.2 Findings and Trends

- The Current Ratio is calculated by dividing unrestricted current assets by current liabilities and measures an entity's ability to pay short-term obligations. This ratio ranges from a low of 14.4 in 2017, ending at a high of 20.1 in 2022. Anything above 2.0 for this liquidity ratio is good.
- The Debt to Net Position Ratio compares total debt to total net position, which is the difference between current assets and liabilities. This ratio begins at 0.08 or 8 percent debt in 2017 and decreases to 0.04 by 2022. For utilities, a ratio of 40 to 60 percent helps to moderate rate impacts by spreading costs over a longer period of time. Based on these results, the City may consider utilizing debt service for future capital investments, especially if it benefits system expansion.
- The Debt to Noncurrent Capital Asset Ratio compares total debt to noncurrent capital assets, which are also known as property, plant, and equipment. This ratio begins at 0.10 or 10 percent debt to 90 percent noncurrent assets in 2017. Noncurrent capital assets increase by $1.7M throughout the six-year history while debt decreases $2.9M, and the ratio decreases to 5 percent by 2022. Similar to the debt to net position ratio, these results indicate the utility has ample borrowing capacity and may consider utilizing debt service for future capital investments, especially if it benefits system expansion. A ratio of 40 percent debt to 60 percent equity or below is a general industry target

8.3 Financial Plan

The sewer utility is responsible for generating sufficient revenue to meet all of its costs. The primary source of funding is derived from ongoing monthly service charges, with additional revenue coming from late penalties and interest earnings. The City controls the level of user charges and, with City Council approval, can adjust user charges as needed to meet financial objectives.

The financial plan can only confirm financial feasibility if it considers the total system costs of providing sewer services, both operating and capital. To meet these objectives, the following elements have been completed.

1. **Capital Funding Plan** - Identifies the total CIP obligations of the planning period. The plan defines a strategy for funding the CIP, including an analysis of available resources from rate revenues, existing reserves, connection charge revenues, debt financing, and any special resources that may be readily available (e.g., grants, developer contributions, etc.). The capital funding plan impacts the financial plan through the use of debt financing (resulting in annual debt service) and the assumed rate revenue made available for capital funding.
2. **Financial Forecast** - Identifies future annual non-capital costs associated with the operation, maintenance, and administration of the sewer system. Included in the financial plan is a reserve analysis that forecasts cash flow and fund balance activity, along with testing for satisfaction of actual or recommended minimum fund balance policies. The financial plan ultimately evaluates the sufficiency of utility revenues in meeting all obligations, including cash uses such as operating expenses, debt service, capital outlays, and reserve contributions, as well as any coverage requirements associated with long-term debt. The plan also identifies the future adjustments required to fully fund all utility obligations in the planning period.

8.3.1 Capital Funding Plan

To properly evaluate future capital funding needs, capital costs were escalated by 3.00 percent annually to the year of planned spending. The CIP developed for this Plan identifies $45.7M in escalated project costs over the 10-year planning horizon from 2024-2033. The 20-year period, through 2043, includes $81.3M in total escalated project costs.

A summary of the 10-year and 20-year CIPs are shown in Table 8.3. As shown, each year has varied capital cost obligations depending on construction schedules and infrastructure planning needs.

Table 8.3 10-Year and 20-Year CIPs

Year	Unescalated $	Escalated $
2024	$6,725,000	$6,725,000
2025	$5,510,000	$5,675,300
2026	$2,665,000	$2,827,299
2027	$2,210,000	$2,414,927
2028	$4,310,000	$4,850,943
2029	$2,110,000	$2,446,068
2030	$6,170,000	$7,367,303
2031	$1,720,000	$2,115,383
2032	$3,490,000	$4,421,028
2033	$5,240,000	$6,837,011
10-Year Total	**$40,150,000**	**$45,680,261**
2034 - 2043	$22,845,000	$35,581,679
20-Year Total	**$62,995,000**	**$81,261,940**

Table 8.4 provides more detail for the 10-year CIP.

Table 8.4 10-Year CIP (Escalated $)

Project	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Sanitary Sewer Repair and Replacement/System Improvements	$300,000	$360,500	$1,909,620	$382,454	$2,025,916	$405,746	$2,149,294	$430,456	$2,280,186	$456,671
Street Utility Improvements	$347,000	$309,000	$318,270	$327,818	$337,653	$347,782	$358,216	$368,962	$380,031	$391,432
Side Sewer Inspections	$-	$381,100	$392,533	$404,309	$416,438	$428,931	$441,799	$-	$-	$-
Sewer Pump Station Replacement/Improvement	$-	$-	$-	$437,091	$900,407	$1,159,274	$2,388,105	$553,443	$1,140,093	$5,871,479
Siphon Assessment and Cleaning	$-	$-	$-	$633,782	$-	$-	$-	$-	$-	$-
Pump Station Condition Assessment	$-	$-	$111,395	$-	$-	$-	$-	$-	$-	$-
Manhole Ring and Cover Replacement	$86,000	$92,700	$95,481	$98,345	$101,296	$104,335	$107,465	$110,689	$114,009	$117,430
Cleaning and Inspection of Large-Diameter Pipe (21-inches and larger)	$-	$-	$-	$-	$1,069,233	$-	$-	$-	$-	$-
Inflow and Infiltration Monitoring	$-	$-	$-	$-	$-	$-	$632,848	$651,833	$-	$-
Roegner Park Sewer Capacity Improvements	$-	$-	$-	$131,127	$-	$-	$1,289,576	$-	$-	$-
Rainier Ridge Pump Station Replacement	$4,400,000	$4,120,000	$-	$-	$-	$-	$-	$-	$-	$-
1st and R Sewer Replacement	$-	$412,000	$-	$-	$-	$-	$-	$-	$-	$-
Plan Update	$300,000	$-	$-	$-	$-	$-	$-	$-	$506,708	$-
Garden Avenue Realignment	$200,000	$-	$-	$-	$-	$-	$-	$-	$-	$-
Jornada Park Access Imp	$100,000	$-	$-	$-	$-	$-	$-	$-	$-	$-
M Street Widening	$232,000	$-	$-	$-	$-	$-	$-	$-	$-	$-
Regional Growth Center Access Improvements	$160,000	$-	$-	$-	$-	$-	$-	$-	$-	$-
2024 Sewer Repair and Replacement	$600,000	$-	$-	$-	$-	$-	$-	$-	$-	$-
Total	$6,725,000	$5,675,300	$2,827,299	$2,414,927	$4,850,943	$2,446,068	$7,367,303	$2,115,383	$4,421,028	$6,837,011

8.4 Available Funding Assistance and Financing Resources

Feasible long-term capital funding strategies must be defined to ensure that adequate resources are available to fund the CIP identified in this Plan. In addition to the City's resources, such as accumulated cash reserves, capital revenues, and rate revenues designated for capital purposes, capital needs can be met from outside sources, such as grants, low-interest loans, and bond financing. The following is a summary of the City's internal and external resources.

8.4.1 City Resources

Resources appropriate for funding capital needs include accumulated cash in the capital fund, rate revenues designated for capital spending purposes, developer contributions, and capital-related charges such as system development charges. The first two resources will be discussed in the **Fiscal Policies** section of the **Financial Forecast**. Capital-related charges are discussed below.

8.4.1.1 System Development Charges

A connection charge such as the City's system development charge (SDC) refers to a one-time charge imposed on new customers as a condition of connecting to the sewer system. The purpose of the SDC is two-fold: 1) to promote equity between new and existing customers; and 2) to provide a source of revenue to fund capital projects. Revenue can only be used to fund utility capital projects or to pay debt service incurred to finance those projects. In the absence of a connection charge, growth-related capital costs would be borne in large part by existing customers. In 2024, the City charged all new customers an SDC of $3,544 per residential customer equivalent.

8.4.1.2 Local Facilities Charges

While a connection charge is the manner in which new customers pay their share of system investment costs, local facilities charge funding is used to pay the costs of local facilities that connect each property to the system's infrastructure. Local facilities funding is often overlooked in rate forecasting because it is funded upfront by either connecting customers and developers, or through an assessment to properties, but never from rates.

A number of mechanisms can be considered toward funding local facilities. One of the following scenarios typically occurs: (a) the utility charges a connection fee based on the cost of the local facilities (under the same authority as the facilities assessment fee); (b) a developer funds an extension of the system to its development and turns those facilities over to the utility (contributed capital); or (c) a local assessment is set up called a Utility Local Improvement District (ULID/LID) or a Local Utility District, which collects tax revenue from benefited properties.

A local facilities charge is a variation of the connection charge. It is a city-imposed charge to recover the cost related to service extension to local properties. Often called a front-footage charge and imposed on the basis of footage of the main "fronting" a particular property, it is usually implemented as a reimbursement mechanism to a city for the cost of a local facility that directly serves a property. It is a form of a connection charge and thus can accumulate up to 10 years of interest. It typically applies in instances when no developer-installed facilities are needed through developer extension due to the prior existence of available mains already serving the developing property.

The developer extension is a requirement that a developer install on-site and sometimes off-site improvements as a condition of extending service. These are in addition to the connection charge required and must be built to City standards. Part of the agreement between the City and the developer planning to extend service might include a latecomer agreement, resulting in a latecomer charge to new connections for the developer extension.

Latecomer charges are a variation of developer extensions, whereby new customers connecting to a developer-installed improvement make a payment to the City based on their share of the developer's cost. The City passes this charge on to the developer who installed the facilities. As part of the developer extension process, this defines the allocation of costs and records latecomer obligations on the title of affected properties. No interest is allowed, and the reimbursement agreement cannot exceed 20 years in duration.

ULID/LID is another mechanism for funding infrastructure that assesses benefited properties based on the special benefit received by the construction of specific facilities. Most often used for local facilities, some ULIDs also recover related general facilities costs. Substantial legal and procedural requirements can make this a relatively expensive process, and there are mechanisms by which a ULID can be rejected.

8.4.2 Outside Resources

This section outlines various grant, loan, and bond opportunities available to the City through federal and state agencies to fund the CIP identified in the Plan.

8.4.2.1 Grants and Low-Cost Loans

Historically, federal and state grant programs were available to local utilities for capital funding assistance. However, these assistance programs have been mostly eliminated, substantially reduced in scope and amount, or replaced by loan programs. Remaining grant programs are generally lightly funded and heavily subscribed. Nonetheless, the benefit of low-interest loans makes the effort of applying worthwhile.

8.4.2.2 Bond Financing

General Obligation Bonds - General obligation (G.O.) bonds are bonds secured by the full faith and credit of the issuing agency, committing all available tax and revenue resources to debt repayment. With this high level of commitment, G.O. bonds have relatively low interest rates and few financial restrictions. However, the authority to issue G.O. bonds is restricted in terms of the amount and use of the funds, as defined by the Washington constitution and statute. Specifically, the amount of debt that can be issued is linked to assessed valuation.

Revised Code of Washington 39.36.020 states:

> *(2)(a)(ii) Counties, cities, and towns are limited to an indebtedness amount not exceeding one and one-half percent of the value of the taxable property in such counties, cities, or towns without the assent of three-fifths of the voters therein voting at an election held for that purpose.*
>
> *(b) In cases requiring such assent counties, cities, towns, and public hospital districts are limited to a total indebtedness of two and one-half percent of the value of the taxable property therein.*

While bonding capacity can limit the availability of G.O. bonds for utility purposes, these can sometimes play a valuable role in project financing. A utility rate savings may be realized through two avenues: the lower interest rate and related bond costs, and the extension of repayment obligation to all tax-paying properties (not just developed properties) through the authorization of an ad valorem property tax levy.

Revenue Bonds – Revenue bonds are commonly used to fund utility capital improvements. The debt is secured by the revenues of the issuing utility. With this limited commitment, revenue bonds typically bear higher interest rates than G.O. bonds and require security conditions related to the maintenance of dedicated reserves (a bond reserve) and financial performance (added bond debt service coverage). The City agrees to satisfy these requirements by resolution as a condition of bond sale.

Revenue bonds can be issued in Washington without a public vote. There is no bonding limit, except perhaps the practical limit of the utility's ability to generate sufficient revenue to repay the debt and provide coverage. In some cases, poor credit might make issuing revenue bonds problematic.

8.4.3 Capital Financing Strategy

An ideal capital financing strategy would include the use of grants and low-cost loans when debt issuance is required. However, these resources are very limited and competitive in nature and do not provide a reliable source of funding for planning purposes. It is recommended that the City pursue these funding avenues but assume revenue bond financing to meet the needs which can't be met by available cash resources. The capital financing strategy developed to fund the CIP identified in this Plan assumes the following funding resources:

- Accumulated cash reserves,
- Transfers of excess cash (over minimum balance targets) from the Operating Fund,
- System development charge revenue, and
- Interest earned on Capital Fund balances.

The cash resources described above are anticipated to fund 100.0 percent of the 10-year CIP and 20-year CIP. No new debt is anticipated in the next 10-year or 20-year planning periods. Table 8.5 presents the 10-year and 20-year capital financing strategy.

Table 8.5 10-Year and 20-Year Capital Financing Strategy

Year	Capital Expenditures	System Development Charge Revenue	Cash/Reserve Funding	Total Financial Resources
2024	$6,725,000	$325,000	$6,400,000	$6,725,000
2025	$5,675,300	$468,144	$5,207,156	$5,675,300
2026	$2,827,299	$484,117	$2,343,181	$2,827,299
2027	$2,414,927	$500,635	$1,914,291	$2,414,927
2028	$4,850,943	$517,717	$4,333,226	$4,850,943
2029	$2,446,068	$535,382	$1,910,687	$2,446,068
2030	$7,367,303	$553,649	$6,813,654	$7,367,303
2031	$2,115,383	$572,539	$1,542,844	$2,115,383
2032	$4,421,028	$592,074	$3,828,953	$4,421,028
2033	$6,837,011	$612,276	$6,224,736	$6,837,011
Subtotal	**$45,680,261**	**$5,161,534**	**$40,518,727**	**$45,680,261**
2034-2043	$35,581,679	$7,397,790	$28,183,889	$35,581,679
Total	**$81,261,940**	**$12,559,324**	**$68,702,617**	**$81,261,940**

8.5 Financial Forecast

The financial forecast, or revenue requirement analysis, forecasts the amount of annual revenue that needs to be generated by user rates. The analysis incorporates operating revenues, M&O expenses, debt service payments, rate-funded capital needs, and any other identified revenues or expenses related to operations. The objective of the financial forecast is to evaluate the sufficiency of the current level of rates. In addition to annual operating costs, the revenue needs also include debt covenant requirements and specific fiscal policies and financial goals of the City.

For this analysis, two revenue sufficiency tests have been developed to reflect the financial goals and constraints of the City: cash needs must be met; and debt coverage requirements must be realized. In order to operate successfully with respect to these goals, both tests of revenue sufficiency must be met.

Cash Test - The cash flow test identifies all known cash requirements for the City in each year of the planning period. Typically, these include M&O expenses, debt service payments, rate-funded system reinvestment funding or directly funded capital outlays, and any additions to specified reserve balances. The total annual cash needs of the City are then compared to projected cash revenues using the current rate structure. Any projected revenue shortfalls are identified, and the rate increases necessary to make up the shortfalls are established.

Coverage Test - The coverage test is based on a commitment made by the City when issuing revenue bonds and some other forms of long-term debt. For the purposes of this analysis, revenue bond debt is assumed for any needed debt issuance. As a security condition of issuance, the City would be required per covenant to agree that the revenue bond debt would have a higher priority for payment (a senior lien) compared to most other expenditures; the only outlays with a higher lien are M&O expenses. Debt service coverage is expressed as a multiplier of the annual revenue bond debt service payment. For example, a 1.00 coverage factor would imply that no additional cushion is required. A 1.25 coverage factor means revenue must be sufficient to pay M&O expenses, annual revenue bond debt service payments, and an additional 25.0 percent of annual revenue bond debt service payments. The excess cash flow derived from the added coverage, if any, can be used for any purpose, including funding capital projects. Targeting a higher coverage factor can help the City achieve a better credit rating and provide lower interest rates for future debt issues.

In determining the annual revenue requirement, both the cash and coverage sufficiency tests must be met, and the test with the greatest deficiency drives the level of needed rate increase in any given year.

8.5.1 Current Financial Structure

The City maintains a fund structure and implements financial policies that target management of a financially viable and fiscally responsible sewer system.

8.5.1.1 Fiscal Policies

A summary of the key financial policies employed by the City, as well as those recommended and incorporated in the financial program, are discussed below.

Operating Fund - Operating reserves are designed to provide a liquidity cushion to ensure that adequate cash working capital will be maintained to deal with significant cash balance fluctuations, such as seasonal fluctuations in billings and receipts, unanticipated cash expenses, or lower than expected revenue

collections. Like other types of reserves, operating reserves also serve another purpose: they help smooth rate increases over time. Target funding levels for an operating reserve are generally expressed as a certain number of days of M&O expenses, with the minimum requirement varying with the expected revenue volatility. Industry practice for utility operating reserves ranges from 30 days (8.0 percent) to 120 days (33.0 percent) of M&O expenses, with the lower end more appropriate for utilities with stable revenue streams and the higher end more appropriate for utilities with significant seasonal or consumption-based fluctuations.

This financial plan targets a minimum balance in the sewer utility Operating Fund equal to 60 days of M&O expenses.

Capital Fund - A utility capital contingency reserve is an amount of cash set aside in case of an emergency should a piece of equipment or a portion of the utility's infrastructure fail unexpectedly. The reserve also could be used for other unanticipated capital needs, including capital project cost overruns. Industry practices range from maintaining a balance equal to 1.0 to 2.0 percent of fixed assets, an amount equal to a 5-year rolling average of CIP costs, or an amount determined sufficient to fund equipment failure (other than catastrophic failure). The final target level should balance industry practices with the risk level of the City.

This financial plan targets a minimum balance in the sewer utility capital fund equal to 1.0 percent of fixed assets.

Metro Sub Fund - The City's sewer utility collects rate revenue for treatment expenses provided by King County's Sewer Treatment Division. Rates are collected to offset regional treatment expenses and are treated as a pass-through for forecasting purposes. Similar to the operating and capital reserves, the metro sub-fund reserve is meant to provide a liquidity cushion as well as provide for unexpected contingencies.

The current metro sub-fund reserve target is set at $625,000, or approximately 3.0 percent of total operating expenses.

System Reinvestment - System reinvestment funding promotes system integrity through ongoing repair and replacement of system infrastructure. Ideally, a detailed asset management plan would guide the level of rate funded system reinvestment, however, in absence of this level of effort, annual depreciation expense is commonly used as a measure of the decline in asset value associated with routine use of the system. Particularly for utilities that do not already have an explicit system reinvestment policy in place, implementing a funding level based on full depreciation expense could significantly impact rates. An alternative benchmark is annual depreciation expense net of debt principal payments on outstanding debt. This approach recognizes that customers are still paying for certain assets through the debt component of their rate and intends to avoid simultaneously charging customers for an asset and its future replacement. The specific benchmark used to set system reinvestment funding targets is a matter of policy that must balance various objectives, including managing rate impacts, keeping long-term costs down, and promoting "generational equity" (i.e., not excessively burdening current customers with paying for facilities that will serve a larger group of customers in the future).

The City is currently phasing in system reinvestment funding, aiming to reach 75.0 percent of annual depreciation levels by 2029. With this phase-in strategy in place, the City is forecast to fund an average of $1.7M in capital costs annually through rate revenues within the 10-year forecast period.

Debt Management - It is prudent to consider policies related to debt management as part of a broader utility financial policy structure. Debt management policies should be evaluated and formalized, including the level of acceptable outstanding debt, debt repayment, bond coverage, and total debt coverage targets. The City has one outstanding sewer revenue bond, as well as two Public Works Trust Fund loans, which will both be repaid between 2024-2026. This forecast meets or exceeds the required revenue bond debt service coverage of 1.25.

8.5.1.2 Financial Forecast

The financial forecast is primarily based upon the City's budget through 2024 and takes into consideration other key factors and assumptions needed to develop a complete portrait of the City's annual sewer utility financial obligations. The following is a list of the key revenue and expense factors and assumptions used to develop the financial forecast.

- **Growth** - Rate revenue escalation is based on a 0.40 percent growth rate developed based on actual historical trends at the City. While the Plan assumes an annual growth rate of 1.33 percent for units and 1.51 percent for flow, the City preferred a more conservative growth rate for the financial planning purpose.
- **Revenue** - The City has two general revenue sources: 1) sewer service charges (rate revenue); and 2) miscellaneous (non-rate) revenue. In the event of a forecasted annual shortfall, rate revenue can be increased to meet the annual revenue requirement. For the purpose of this financial forecast, rate revenues are forecasted to increase with customer growth. Non-rate revenues are held constant throughout the forecast period, with the exception of interest earnings which are calculated based on projected balances and assumed investment rates.
  - **King County Metro Service Charges** - The City collects rate revenue for treatment expenses provided by King County's Sewer Treatment Division. Rates are collected to offset regional treatment expenses and are treated as a pass-through for forecasting purposes.
- **System Development Charge Revenue** - The existing system development charges are applied to the projected new connections to forecast revenue. Based on the growth assumptions described above, the connection charge will generate an average of $516,000 annually from 2024-2033. This equates to an average of 126 new connections per year. Connection charge revenue is directed towards annual capital needs.
- **Expenses** - M&O expense projections are based on the City's budget through 2024 with general cost inflation increases of 3.0 percent, labor cost inflation of 5.0 percent for 2025 and 2026, decreasing to 3.0 percent thereafter and benefit cost inflation increases of 12.50 percent for 2025 and 2026, decreasing to 5.5 percent per year thereafter. Budget figures were used for taxes through 2024. Future taxes are calculated based on forecasted revenues and prevailing tax rates.
  - **King County Metro Service Charges** - Rates are expected to increase by approximately 5.75 percent in 2025, followed by 7.00 percent annually from 2026-2028, increasing to 8.25 percent annually from 2029-2031 and finally 9.26 percent annually from 2032-2034 (Based on the recent King County Sewer Treatment Division Financial Plan).
  - **Facilities G.O. Bond** - In order to construct a new facility for the City, the sewer utility will fund part of a General Obligation Bond totaling $38M. Beginning in 2025, the sewer utility's proportionate share of the bond is forecasted at $333,000 annually for the remainder of the twenty-year forecast.

- **Existing Debt** - The sewer utility has three outstanding debt issues: one revenue bond, and two Public Works Trust Fund (PWTF) loans. The 2020 refunding revenue bond has annual payments averaging $375,000 that end after 2030 when the loan is repaid. The PWTF loans combined annual payment is $292,000 in 2024 before the first PWTF loan is repaid, dropping the annual payment to $182,000 for 2025 and 2026, when the second PWTF loan is repaid. The total annual existing debt service obligations begin 2024 at $669,000, decreasing to $376,000 with the repayment of the PWTF loans and will be completely repaid by 2030.
- **Future Debt** - No new debt is anticipated in the 10-year and 20-year forecast periods.
- **Transfers to Capital** - Operating fund balance above the minimum requirement is assumed to be available to fund capital projects and projected to be transferred to the Capital Fund each year, if needed. In total, the utility is forecast to fund $23.5M in capital projects from excess operating fund cash.

Although the financial plan is completed through 2043, the rate strategy focuses on the shorter-term planning period of 2024 through 2033. It is recommended that the City revisit the proposed rates every two to three years to ensure that the rate projections developed remain adequate. Any significant changes should be incorporated into the financial plan and future rates should be adjusted as needed.

Table 8.6, following, summarizes the annual revenue requirements based on the forecast of revenues, expenditures, fund balances, and fiscal policies.

The financial forecast indicates that at existing rate levels the utility will become deficient in 2028 as growth in expenses outpaces growth in revenues and the utility phases in rate funded system reinvestment levels towards their fiscal policy goal of full annual depreciation funding.

8.5.1.3 City Funds and Reserves

Table 8.7 shows a summary of the projected Operating Fund and Capital Fund ending balances through 2033 based on the rate forecasts presented above. The Operating Fund is maintained at a minimum of 60 days of M&O expenses, and the Capital Fund balance continues to meet or exceed the minimum target of 1.00 percent of fixed assets in every year of the forecast.

Table 8.6 10-Year Financial Forecast

Revenue Requirement	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Revenues										
Rate Revenues Under Existing Rates	$10,794,348	$10,837,525	$10,880,876	$10,924,399	$10,968,097	$11,011,969	$11,056,017	$11,100,241	$11,144,642	$11,189,220
King County Metro Charge	$22,023,000	$23,289,792	$24,920,237	26,666,572	28,536,789	30,894,541	33,444,109	36,205,476	39,558,279	43,218,789
Non-Rate Revenues	$136,700	$139,751	$123,600	106,765	106,847	106,947	107,062	106,636	107,338	107,501
Total Revenues	$32,954,048	$34,267,068	$35,924,713	$37,697,736	$39,611,733	$42,013,457	$44,607,188	$47,412,353	$50,810,259	$54,515,510
Expenses										
Cash Operating Expenses	$8,270,883	$8,529,150	$8,893,962	$9,137,639	$9,392,749	$9,657,439	$9,932,109	$10,217,105	$10,513,087	$10,820,294
King County Metro Charge	$22,023,000	$23,289,792	$24,920,237	26,666,572	28,536,789	30,894,541	33,444,109	36,205,476	39,558,279	43,218,789
Existing Debt Service	$668,964	$558,512	$557,058	375,738	375,001	373,528	373,774	$-	$-	$-
New Debt Service	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Rate Funded System Reinvestment	$198,877	$414,781	$761,873	$1,435,024	$1,780,240	$2,261,992	$2,372,501	$2,404,232	$2,470,547	$2,573,102
Total Expenses	**$31,161,724**	**$32,792,235**	**$35,133,130**	**$37,614,973**	**$40,084,780**	**$43,187,499**	**$46,122,493**	**$48,826,813**	**$52,541,914**	**$56,612,186**
Total Surplus (Deficiency)	**$1,792,324**	**$1,474,834**	**$791,583**	**$82,763**	**($473,047)**	**($1,174,043)**	**($1,515,305)**	**($1,414,459)**	**($1,731,655)**	**($2,096,675)**
Annual Rate Adjustment		**7.50%**	**2.25%**	**2.25%**	**2.25%**	**2.25%**	**2.25%**	**.25%**	**2.25%**	**2.25%**
Cumulative Annual Rate Adjustment		**7.50%**	**9.92%**	**12.39%**	**14.92%**	**17.51%**	**20.15%**	**2.85%**	**25.62%**	**28.44%**
Rate Revenues After Rate Increase	$10,794,348	$11,650,340	$11,960,122	$12,278,142	$12,604,618	$12,939,775	$13,283,843	$13,637,061	$13,999,670	$14,371,921
Additional Taxes from Rate Increase	-	$119,726	$158,971	$199,404	$241,056	$283,962	$328,155	$373,669	$420,540	$468,806
Net Cash Flow After Rate Increase	**$1,792,324**	**$2,167,922**	**$1,711,859**	**$1,237,102**	**$922,417**	**$469,801**	**$384,367**	**$749,174**	**$702,834**	**$617,220**
Coverage After Rate Increases	10.63	13.46	12.55	12.15	12.29	12.39	12.50	n/a	n/a	n/a

Table 8.7 Ending Cash Balance Summary

Ending Fund Balances	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Operating Fund	$1,378,480	$1,421,525	$1,482,327	$1,522,940	$1,565,458	$1,609,573	$1,655,351	$1,702,863	$1,752,181	$1,803,382
Capital Fund	$20,036,228	$17,969,817	$18,398,962	$19,300,174	$17,820,089	$18,775,281	$14,860,470	$16,572,125	$16,032,955	$13,107,670
Total	**$21,414,708**	**$19,391,342**	**$19,881,289**	**$20,823,114**	**$19,385,547**	**$20,384,854**	**$16,515,821**	**$18,274,988**	**$17,785,136**	**$14,911,052**

8.6 Current and Projected Rates

8.6.1 Current Rates

The existing sewer rates consist of a monthly fixed rate for the single family class. The non single family class pays a monthly fixed rate plus a volume rate per hundred cubic feet (CCF) of flow over the monthly usage allowance of 7.5 CCF per unit. In addition to the monthly rates charged by the City, separate rates are applied to each account for treatment expenses provided by King County. Rates for treatment expenses are set by the King County Sewer Division and are treated as a path-through. The exhibits below summarize the existing and proposed City of Auburn rates, as well as the existing and proposed King County Sewer Division rates. Total bills for customers will include both a City of Auburn and a King County Treatment component.

Table 8.8 shows the existing City of Auburn and King County Sewer Division rate schedule.

Table 8.8 Existing Schedule of Rates

Description	2024 Existing
Monthly Fixed Charges	
Single Family	$30.04
Non Single Family	$32.95
King County Treatment	$55.11
Volume Charge per CCF (Over 7.5 CCF/unit)	
Non Single Family	$3.34
Non Single Family - King County	$7.35

8.6.2 Projected Rates

The financial forecast discussed above indicates the need for annual rate adjustments in order to satisfy all forecasted financial obligations. The City has adopted a 7.50 percent rate increase for 2025, with annual 2.25 percent increases forecasted from 2026 through 2033. Table 8.9 shows the projected rates with increases applied uniformly to the sewer fixed and flow components of all classes, where applicable.

Table 8.9 Proposed Schedule of Rates

Description	Existing	Proposed								
		2025	2026	2027	2028	2029	2030	2031	2032	2033
Monthly Fixed Charges										
Single Family	$30.04	$32.29	$33.02	$33.76	$34.52	$35.30	$36.09	$36.90	$37.73	$38.58
Non Single Family	$32.95	$35.42	$36.22	$37.03	$37.86	$38.71	$39.58	$40.47	$41.38	$42.31
King County Treatment	$55.11	$58.28	$62.36	$66.73	$71.41	$77.31	$83.69	$90.60	$98.99	$108.15
Volume Charge per CCF (over 7.5 CCF/unit)										
Non Single Family	$3.34	$3.59	$3.67	$3.75	$3.83	$3.92	$4.01	$4.10	$4.19	$4.28
Non Single Family - King County	$7.35	$7.77	$8.32	$8.90	$9.52	$10.31	$11.16	$12.08	$13.20	$14.42

8.7 Affordability

A common affordability metric used by the Environmental Protection Agency to measure the relative financial impact sewer rates have on a community as a whole considers whether rates exceed 2.50 percent of a community's median household income. The average median household income for the City was $87,406 between 2018 and 2022, expressed in 2022 dollars, according to the U.S. Census Bureau. The 2022 value is escalated based on the actual rate of inflation in 2023 of 4.31 percent and the 3.00 percent inflation rate used in the financial forecast to project the median household income in future years. Table 8.10 presents the City's monthly sewer bill, inclusive of the King County Sewer Division's component, projected to 2033 and tested against the 2.50 percent monthly affordability threshold.

Table 8.10 Community Affordability Test

Year	Inflation	Median HH Income	2.5% Monthly Threshold	Projected Monthly Bill	% of Median HH Income
2022	-	$87,406	$-	$-	-
2023	4.31%	$91,173	$-	$-	-
2024	3.00%	$93,908	$195.64	$85.15	1.09%
2025	3.00%	$96,726	$201.51	$90.57	1.12%
2026	3.00%	$99,627	$207.56	$95.38	1.15%
2027	3.00%	$102,616	$213.78	$100.49	1.18%
2028	3.00%	$105,695	$220.20	$105.93	1.20%
2029	3.00%	$108,866	$226.80	$112.61	1.24%
2030	3.00%	$112,132	$233.61	$119.78	1.28%
2031	3.00%	$115,495	$240.62	$127.50	1.32%
2032	3.00%	$118,960	$247.83	$136.72	1.38%
2033	3.00%	$122,529	$255.27	$146.73	1.44%

Applying the 2.50 percent monthly affordability test, the City's rates are forecasted to remain within the indicated affordability range through 2033.

8.8 Conclusion

The results of this analysis indicate that at existing rate levels the utility will be deficient beginning in 2028. To keep pace with expenses and continue to uphase in rate funded system reinvestment towards depreciation levels, the City has adopted a 7.50 percent rate increase in 2025. Forecasting into the future a 2.25 percent annual rate increase will be required from 2026 through 2033. It is recommended that the City regularly review and update the key underlying assumptions that compose the multi-year financial plan to ensure that adequate revenues are collected to meet the City's total financial obligations.

APPENDIX A

INTER-LOCAL AGREEMENTS AND OUTSIDE AGENCY CORRESPONDENCE

A1: KING COUNTY

- Sewage Disposal Service with Metro (Ordinance 2774, and Resolutions 1727 and 2090)
- Franchise Agreement No. 14458

A2: SOOS CREEK WATER AND SEWER DISTRICT

- Service Area Boundaries (Resolution 3321)

A3: CITY OF KENT

- Sewer Service Boundaries (Resolution 3322)

A4: CITY OF PACIFIC

- Sewer Service Boundaries (Resolutions 4335 and 730)

A5: MUCKLESHOOT INDIAN TRIBE

- Sewer Service Boundaries (Resolution 4902)
- Wastewater Conveyance Cost Sharing (Resolution 3660)
- Temporary Sewage Lift Station Operation (Resolution 3502)

A6: LAKEHAVEN UTILITY DISTRICT

- Sewer Service Boundaries (Resolutions 3651, 3824, and 2005-1038)
- Sewer District's Sanitary Sewer Service Area (Resolution 5353)

A7: CITY OF ANGOLA

- Sewer Service Boundaries (Resolution 3589)
- Water And Sewer Utility Service, Billing, And Collection (Resolution 5505)

A8: CITY OF BONNEY LAKE

- Sewer Service Boundaries (Resolutions 3760 and 3796)
- Right of Way Use Permits (Resolutions 3873 and 1471)

APPENDIX A1

KING COUNTY

- Sewage Disposal Service with Metro (Ordinance 2774, and Resolutions 1727 and 2090)
- Franchise Agreement No. 14458

CITY OF AUBURN, WASHINGTON

ORDINANCE NO. 2774

AN ORDINANCE authorizing the Mayor and City Clerk to sign an agreement for sewage disposal between the City of Auburn and the Municipality of Metropolitan Seattle.

WHEREAS, the City of Auburn and the Municipality of Metropolitan Seattle (Metro) have engaged in extensive negotiations relating to the provision by Metro of sewage disposal service to the City; and

WHEREAS, the City Council now believes that the negotiators for the City and Metro have agreed to and have submitted to the City Council an agreement which serves the best interest of the City; NOW, THEREFORE,

THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, DO ORDAIN, as follows:

Section 1. The Mayor and City Clerk of the City are hereby authorized to execute on behalf of the City the agreement for sewage disposal between the City and the Municipality of Metropolitan Seattle, and to cause that agreement to be transmitted to the Municipality of Metropolitan Seattle.

PASSED at a regular open public meeting of the Auburn City Council, Auburn, Washington, this 5th day of November, 1973.

Stanley P Kinsey
Mayor

ATTEST:

Lorna L Byerley
City Clerk

APPROVED AS TO FORM:

City Attorney

PUBLISHED: 3-1-74

Executed in 6 counterparts of which this is counterpart No. 6

MUNICIPALITY OF METROPOLITAN SEATTLE

CITY OF AUBURN

AGREEMENT FOR SEWAGE DISPOSAL

THIS AGREEMENT is made as of this 1st day of March, 1974, between the CITY OF AUBURN, a municipal corporation of the State of Washington (hereinafter referred to as the "City"), and the MUNICIPALITY OF METROPOLITAN SEATTLE, a municipal corporation of the State of Washington (hereinafter referred to as "Metro").

W I T N E S S E T H:

WHEREAS, the public health, welfare and safety of the residents of the City and the residents of the metropolitan area require the elimination of potential sources of water pollution and the preservation of the fresh and salt water resources of the area; and

WHEREAS, the State of Washington Department of Ecology has adopted water quality standards and a plan of implementation thereof which requires that certain major sewage disposal works be constructed and operated and that the cities and special districts within the metropolitan area dispose of their sewage in accordance with a comprehensive plan for the metropolitan area; and

WHEREAS, Metro is engaged in developing and operating a metropolitan sewage disposal system and the City is engaged in developing and operating a sewage collection system; and

WHEREAS, to provide for the disposal by Metro of sewage collected by the City, it is necessary that a contract be now entered into establishing the rights and duties of the parties;

NOW, THEREFORE, in consideration of the mutual covenants contained herein, IT IS HEREBY AGREED AS FOLLOWS:

Section 1. Definition of Terms. The following words and phrases used in this contract shall have the meanings hereinafter set forth in this section:

a) The words "Comprehensive Plan" shall mean the Comprehensive Sewage Disposal Plan adopted in Resolution No. 23 of the Municipality of Metropolitan Seattle and all amendments thereof heretofore or hereafter adopted.

b) The words "Metropolitan Sewerage System" shall mean all of the facilities to be constructed, acquired or used by Metro as a part of the Comprehensive Plan. The Metropolitan Sewerage System shall generally include sewage disposal facilities with capacity to receive sewage from natural drainage areas of approximately one thousand acres or more. The Metropolitan Sewerage System shall thus include trunk or interceptor sewer facilities extending to a point within each tributary and natural drainage area where not more than one thousand acres remain to be served beyond the upper terminus of such trunk or interceptor sewer.

c) The words "Local Sewerage Facilities" shall mean all facilities owned or operated by a Participant for the local collection of sewage to be delivered to the Metropolitan Sewerage System and all side sewers and connection fittings connected directly to such System which serve customers of the Participant.

d) The words "Metropolitan Area" shall mean the area contained within the boundaries of the

Municipality of Metropolitan Seattle as now or hereafter constituted.

e) The word "Participant" shall mean each city, town, county, sewer district, municipal corporation, person, firm or private corporation which shall dispose of any portion of its sanitary sewage into the Metropolitan Sewerage System and shall have entered into a contract with Metro providing for such disposal.

f) The words "Residential Customer" shall mean a single family residence billed by a Participant for sewerage charges.

Section 2. Delivery and Acceptance of Sewage. On the first day of the month next following the execution of this contract or the acceptance by Metro of a federal grant by the United States Environmental Protection Agency for construction of the "Auburn Interceptor" as hereinafter defined, whichever is the later, the City shall deliver to the Metropolitan Sewerage System all of the sewage and industrial wastes collected or received by the City, and Metro shall accept the sewage and industrial wastes delivered for treatment subject to such reasonable rules and regulations as may be adopted from time to time by the Metropolitan Council. Metro shall not directly accept sewage or wastes from any person, firm or corporation which is located within the boundaries of or is delivering its sewage into the Local Sewerage Facilities of the City without the written consent of the City. The City shall not deliver sewage to any other agency for disposal without the written consent of Metro.

The treatment and disposal by Metro of the sewage and industrial waste delivered by the City to Metro shall comply with all applicable federal and state standards and requirements.

Section 3. Construction of Metro Facilities. Metro shall construct, acquire or otherwise secure the right to use all facilities within King County required for the disposal of sewage delivered to Metro pursuant to this Agreement and shall perform all services required for the maintenance, operation, repair, replacement or improvement of the Metropolitan Sewerage System, including any additions and betterments thereto. Except as otherwise provided in Sections 9 and 10 of this Agreement, Metro shall in its sole discretion determine the nature, location and the time of construction of facilities of the Metropolitan Sewerage System.

Section 4. Connection of Local Sewerage Facilities to Permanent Facilities of the Metropolitan Sewerage System. Local Sewerage Facilities of the City shall be connected to the Metropolitan Sewerage System at such time as any of the permanent facilities of such Metropolitan Sewerage System shall be available to receive sewage collected by such local facilities. The initial connection of all such local facilities existing at the time of this Agreement shall be accomplished at the expense of Metro. Subsequent connections shall be accomplished at the expense of the City in accordance with the rules and regulations of Metro and at such point or points of connection as shall be determined by Metro, except that the City shall have the right to connect any of its local facilities into any manhole of the Metropolitan Sewerage System, and such right may be exercised whether or not the same has been approved by any agency other than the parties. The City shall secure and pay for the right to use all Local Sewerage Facilities of another Participant which may be required to deliver the City's sewage to the Metropolitan Sewerage System.

Section 5. Payment for Sewage Disposal. For the disposal of sewage hereafter collected by the City and delivered to Metro the City shall pay to Metro, on or before the last day of each month during the term of this Agreement, commencing on the first day of the month next following the date of execution of this contract or the acceptance by Metro of a federal grant by the United States Environmental Protection Agency for the construction of the "Auburn Interceptor," as hereinafter defined, whichever is the later, a sewage disposal charge determined as provided in this Section 5.

1. For the quarterly periods ending March 31, June 30, September 30 and December 31 of each year, every Participant shall submit a written report to Metro setting forth (a) the number of Residential Customers billed by such Participant for local sewerage charges as of the last day of the quarter, (b) the total number of all customers billed by such Participant as of such day and (c) the total water consumption during such quarter for all customers billed by such Participant other than Residential Customers. The quarterly water consumption report of the City shall be taken from water meter records and may be adjusted to exclude water which, under the rules and regulations of Metro, needs not and in fact does not enter the sanitary facilities of a customer. Where actual sewage flow from an individual customer is metered, the metered sewage flow shall be reported in lieu of adjusted water consumption. The total quarterly water consumption report in cubic feet shall be divided by 2,700 to determine the number of Residential Customer equivalents represented by each Participant's customers other than single family residences. Metro shall maintain a permanent record of the quarterly customer reports from each Participant.

The City's first quarterly report shall cover the period from the date when sewage is first delivered to Metro to the end of the quarter in which such delivery occurs and shall be submitted within thirty days thereafter. Succeeding reports

shall be made for each quarterly period thereafter and shall be submitted within thirty (30) days following the end of the quarter.

2. a) To form a basis for determining the monthly sewage disposal charge to be paid by each Participant during any particular quarterly period, Metro shall ascertain the number of Residential Customers and Residential Customer equivalents of each Participant. This determination shall be made by taking the sum of the actual number of Residential Customers reported as of the last day of the next to the last preceding quarter and the average number of Residential Customer equivalents per quarter reported for the four quarters ending with said next to the last preceding quarter, adjusted for each Participant to eliminate any Residential Customers or Residential Customer equivalents whose sewage is delivered to a governmental agency other than Metro or other than a Participant for disposal outside of the Metropolitan Area. The number thus determined is hereinafter called the "basic reported number".

b) For the initial period until the City shall have submitted six consecutive quarterly reports, the basic reported number of Residential Customers and Residential Customer equivalents of the City shall be determined as provided in this subparagraph (b). On or before the tenth day of each month beginning with the month prior to the month in which sewage from the City is first delivered to Metro, the City shall submit a written statement of the number of Residential Customers and Residential Customer equivalents estimated to be billed by the City during the next succeeding month. For the purpose of

determining the basic reported number of Residential Customers or Residential Customer equivalents of the City for such next succeeding month, Metro may at its discretion adopt either such estimate or the actual number of Residential Customers and Residential Customer equivalents reported by the City as of the last day of the next to the last preceding reported quarter. After the City shall have furnished six consecutive quarterly reports, the basic reported number of Residential Customers and Residential Customer equivalents of the City shall be determined as provided in the immediately preceding subparagraph (a).

c) If the City shall fail to submit the required monthly and/or quarterly reports when due, Metro may make its own estimate of the number of Residential Customers and Residential Customer equivalents of the City and such estimate shall constitute the basic reported number for the purpose of determining sewage disposal charges.

d) The basic reported number of Residential Customers and Residential Customer equivalents of the City shall be further adjusted by adding thereto twenty-five percent (25%) of the number of Residential Customers or Residential Customer equivalents of the City located outside the boundaries of Metro. The sum thus determined is hereinafter called the "adjusted reported number". If all of the area located within the City or any area located outside the City and served into its Local Sewerage Facilities shall be annexed to Metro at any time after the date of this agreement or if the twenty-five percent additive adjustment shall have been paid by the City for a period of ten years, said additive adjustment shall be eliminated effective as of the first day of the month following such annexation as to the number of

Residential Customers or Residential Customer equivalents located within such annexed area and in any event shall be eliminated entirely upon the tenth anniversary of the date when sewage disposal charges shall have first been paid to Metro by the City. If the additive adjustment described above shall not be applied to the Residential Customers or Residential Customer equivalents of any other Participant located outside of the present boundaries of Metro under any future agreement between Metro and such Participant or shall be applied in a lesser amount, then the additive adjustment described in this paragraph (d) shall be correspondingly reduced or deleted. The adjusted reported number of Residential Customers and Residential Customer equivalents of the City shall be the number of Residential Customers and Residential Customer equivalents reported by the City for the purpose of determining sewage disposal charges pursuant to Paragraph 3 of this section.

3. The monthly sewage disposal charge payable to Metro shall be determined as follows:

a) Prior to July 1st of each year, Metro shall determine its total monetary requirements for the disposal of sewage during the next succeeding calendar year. Such requirements shall include the cost of administration, operation, maintenance, repair and replacement of the Metropolitan Sewerage System, establishment and maintenance of necessary working capital and reserves, the requirements of any resolution providing for the issuance of revenue bonds of Metro to finance the acquisition, construction or use of sewerage facilities, plus not to exceed 1% of the foregoing requirements for general administrative overhead costs.

b) To determine the monthly rate per Residential Customer or Residential Customer equivalent to be used during

the next succeeding calendar year, the total monetary requirements for disposal of sewage as determined in subparagraph 3(a) of this section shall be divided by twelve and the resulting quotient shall be divided by the total number of Residential Customers and Residential Customer equivalents of all Participants for the October-December quarter preceding said July 1st.

c) The monthly sewage disposal charges paid by each Participant to Metro shall be obtained by multiplying the monthly rate by the number of Residential Customers and Residential Customer equivalents of the Participant. An additional charge may be made for sewage or wastes of unusual quality or composition requiring special treatment, or Metro may require pretreatment of such sewage or wastes. An additional charge may be made for quantities of storm or ground waters entering those Local Sewerage Facilities which are constructed after January 1, 1961, in excess of the minimum standard established by the general rules and regulations of Metro, except that any such additional charges shall be offset by any expenditures made by the City on the planning and development of facilities for the correction of inflow and infiltration into the existing sewerage system of the City. If the City shall expend more than $50,000.00 in any one year on such planning and development from any source other than categorical grants, the amount expended over $50,000.00 in that year may be credited once to any future years in which the actual expenditure was less than $50,000.00 so as to avoid the collection in those years of the additional charge provided in the immediately preceding sentence.

4. A statement of the amount of the monthly sewage disposal charge shall be submitted by Metro to each Participant on or before the first day of each month and payment of such charge shall be due on the last day of such month. If any charge or portion thereof due to Metro shall remain unpaid for fifteen days following its due date, the Participant shall be charged with and pay to Metro interest on the amount unpaid from its due date until paid at the rate of 6% per annum, and Metro may, upon the failure of any Participant to pay such amount, enforce payment by any remedy available at law or equity.

5. The City irrevocably obligates and binds itself to pay its sewage disposal charge out of the gross revenues from sewage collected or received by the City. City further binds itself to establish, maintain and collect charges for sewer service which will at all times be sufficient to pay all costs of maintenance and operation of the sewer system of the City, including the sewage disposal charge payable to Metro hereunder and sufficient to pay the principal of and interest on any revenue bonds of the City which shall constitute a charge upon such gross revenues. It is recognized by Metro and the City that the sewage disposal charge paid by the City to Metro shall constitute an expense of maintenance and operation of the sewer system of the City. The City shall provide in the issuance of future sewer revenue bonds of the City that expenses of maintenance and operation of the sewer system of the City shall be paid before payment of principal and interest of such bonds. The City shall have the right to fix its own schedule of rates and charges for sewer service provided that same shall produce revenue sufficient to meet the covenants contained in this Agreement.

Section 6. Responsibility of City. The City shall be responsible for the delivery to the Metropolitan Sewerage System of sewage collected by the City, for the construction, maintenance, and operation of Local Sewerage Facilities, for the prompt connection of all premises served by such facilities, and for the payment of all costs incident to the collection of such sewage and its delivery to the Metropolitan Sewerage System.

Section 7. Records. Permanent books and records shall be kept by Metro and the City of the respective rates established, the volumes of sewage delivered and discharged into the Metropolitan Sewerage System wherever such volumes are measured and the number of Residential Customers and Residential Customer equivalents reported. In addition, Metro shall keep complete books of account showing all costs incurred in connection with the Metropolitan Sewerage System, and the City shall

keep complete records showing the amount billed to each of its customers for sewer service and the basis used for such billing including sewage flow and water consumption for each customer where applicable. The records required by this paragraph shall be available for examination by either party at any reasonable time.

Section 8. Development of Metropolitan Sewerage System It is contemplated that the Metropolitan Sewerage System will be developed in stages and, except as provided in Section 9 hereof, the nature of all facilities of the Metropolitan Sewerage System to be constructed, acquired or used and the time of such construction, acquisition or use shall be determined in the sole discretion of Metro, it being contemplated that Metro shall ultimately provide sewage disposal for the entire Metropolitan Area and such adjacent areas as may feasibly be served into the Metropolitan Sewerage System.

Section 9. Construction of Certain Metropolitan Trunk Sewers by Metro. Metro agrees that it will design, construct and inspect facilities of the Metropolitan Sewerage System generally described on Exhibit "A" attached hereto (the "Auburn Interceptor") upon the execution of this contract and the acceptance by Metro of a federal grant by the United States Environmental Protection Agency for construction of said Auburn Interceptor. The facilities shall be connected and ready for service within twenty-four calendar months next after the execution of this contract and the acceptance by Metro of a federal grant by the United States Environmental Protection Agency for the construction of the Auburn Interceptor. The date of connection may be extended by the time consumed by acts of God, strikes, material shortages or other delays beyond the control of Metro or its contractors. In the event of a dispute

over the existence of any of the delays permitting such date to be extended or over the amount of time of such extension, either party may submit such dispute to the Superior Court of King County for arbitration. If such facilities are not completed by such date or extension thereof, the amount of Metro charges paid by the City from such date to the actual date of completion thereof may be used by the City as a credit in determining the feasibility of construction of future Metropolitan Sewerage System facilities which the City may request Metro to build. Such credit shall be applied directly against that portion of the cost of such future facilities which is borne by Metro, other than by grants, and the test of feasibility used by Metro shall be one which is then generally applied by Metro to all extensions of the Metropolitan Sewerage System.

In addition, Metro shall place in every construction contract relating to the Interceptor sewers described in Exhibit "A" a provision for the payment of each such contractor of liquidated damages to the City of $300.00 per day for each day such construction has not been completed after such date or extension thereof, and such liquidated damage provision shall provide for the enforcement thereof by the City. Metro shall not approve any such time extension without prior approval of the City, which shall not be unreasonably withheld.

Metro shall construct that portion of the West Valley Interceptor from 11th Avenue North (in Algona) to Main Street (in Auburn) within a reasonable time after the Auburn Interceptor shall have been completed and the City shall have requested such construction, and the City shall provide a pump station and force main connection from the West Valley Highway along Main Street to

the existing Boeing Trunk sewer. Metro shall approve the design of and shall operate and maintain the pump station. At such time as the pump station is no longer required by Metro, the possession of such facility and responsibility for operation and maintenance therefor shall revert to the City.

At such time as the City shall request Metro to construct additional Metropolitan Sewerage System facilities within King County and within the drainage area of the City's Local Sewerage Facilities and such construction is feasible under the test of feasibility then generally applied by Metro to all extensions of the Metropolitan Sewerage System, Metro shall construct such additional facilities within a reasonable time after such request.

The City shall grant to Metro without cost a fifteen-foot permanent easement and an adequate construction easement on City property for the construction of a portion of the Auburn Interceptor. The location of such easement shall commence at the influent structure of the existing City Sewage Lagoon, thence northerly and generally parallel to the existing City Sewage Lagoon to 30th Street Northeast, the exact location to be agreed upon by Metro and the City.

Section 10. Use by Metro of City Sewerage Facilities. Certain existing sewerage facilities of the City can serve as "temporary" Metropolitan Sewerage System facilities and certain existing sewerage facilities can serve as "permanent" Metropolitan Sewerage System facilities. Effective on the date sewage disposal charges shall first be chargeable hereunder, or such earlier date as may be mutually agreed upon (hereinafter called "takeover date"), Metro shall have the right to use and the duty to maintain, operate, repair and replace the facilities owned by the City which are described on Exhibit "B" attached hereto and by this reference made a part hereof. The City shall have the right to jointly use the interceptor sewers described on Exhibit "B" as

City trunk sewers for the delivery of any sewage collected by the City, but the making of any additional lateral and side sewer connections shall be subject to approval by Metro of the manner such connections are to be made, based on adopted Metro standards.

If sewage disposal charges are chargeable to the City and if the City shall construct an additional freeway crossing with the approval by Metro of the design and location of such facility or crossing, the City shall be reimbursed for the City's actual cost thereof (less any grants received) in addition to the amount of reimbursement set forth below. The freeway reimbursement shall be made in cash within thirty-five (35) days following completion and billing by the City, but no sooner than the takeover date. The City shall continue to own the facilities described in this Section 10 and shall continue to pay the principal of and interest on any bonds issued to pay in whole or in part the cost of acquisition and construction of such facilities, provided that facilities which are designated as "permanent" shall be conveyed by the City to Metro by quit claim deed upon payment of all presently outstanding revenue bonds or general obligation bonds of the City secured by or issued to acquire or construct said facilities.

The right of Metro to use any of the facilities which are designated as "temporary" shall expire at such time as Metro shall no longer require the use of such portion. Upon thirty (30) days' notice by Metro to the City, such temporary facilities shall be returned to the City and Metro's obligation to maintain, operate, repair and replace these temporary facilities shall cease. It is contemplated by this Agreement that the City shall, at the earliest practicable date and at its expense, separate the storm and sanitary sewage in areas of the City where storm and sanitary sewage are now combined. The right of Metro to use the

City Sewage Treatment Lagoon after interception shall terminate when the City shall have applied after the date of this contract at least $207,000 of City funds, from any source other than categorical grants, to the construction of storm sewer separation facilities. Metro shall have the right to salvage any equipment which it has installed or purchased from the City in the "temporary" facilities after the period of Metro's use, otherwise such facilities shall be returned to the City in "as then is" condition upon expiration of use by Metro.

For the privilege of using the facilities described in Exhibit "B" Metro shall pay to the City the total amount of $713,713 (hereinafter called "amount of reimbursement"). Said amount of reimbursement shall be subject to reduction and reimbursement to Metro for any grant hereafter received by the City applicable to such facilities. Metro shall also reimburse the City for the package lift station located at 41st and A Street S.E. as shown on Exhibit "B" within thirty (30) days after the City transfers title to the lift station facility and underlying property to Metro. The Metro reimubrsement shall include the actual cost of acquisition of the property plus the current depreciated value of the lift station facility which is agreed to be $37,445.00..

Metro further agrees that prior to advertisement for bids for the construction of the facilities generally described on Exhibit "A" attached hereto, or any future construction of Metropolitan Sewerage System facilities to which Local Sewerage Facilities of the City could directly connect, it will submit plans and specifications for those facilities to the City for its review and upon timely notice to the City may indicate to Metro where manhole stub connections should be installed and Metro shall thereafter install same, in anticipation of further future connections by the City at those points. The installation of such stubs will be at no cost or expense to the City. The City shall have the right to connect any Local Sewerage Facilities to those stubs. The City shall also have a right to approve the location of Metropolitan Sewerage System facilities on City-owned property or right of ways, which approval shall not be unreasonably withheld.

The City shall give written notice to Metro prior to the takeover date, setting forth the manner in which the amount of reimbursement shall be paid. The City may elect to receive all or any portion of said amount in cash within thirty (30) days following the date when sewage disposal charges shall first be chargeable hereunder (hereinafter called "cash payment date") and may elect to receive any portion which is not paid on said cash payment date together with interest thereon at the rate of 4% per annum from said date, in the form of a credit against the City's monthly sewage disposal charge in equal monthly amounts sufficient to amortize such unpaid amount of reimbursement and interest thereon prior to July 1, 1980. The City may at any time after the cash payment date elect to receive any unpaid portion of the amount of reimbursement in cash with interest at the rate of 4% per annum to date of final payment by giving written notice to Metro at least one year prior to the date such final payment is to be made.

Section 11. Joint Use of Auburn Interceptor. The City and Metro agree that the Auburn Interceptor (hereinafter called "the Interceptor") shall serve as both a Metropolitan and a Local Sewerage Facility wherever the City has authority to provide local service. The City shall have the right to make direct local connections to said Interceptor for which the City shall pay to Metro, before making said connection, the sum of $8.00 per front foot of each parcel of property served on each side of the Interceptor or a total of $16.00 per front foot of each parcel of property served if local service is given on both sides of the Interceptor. Said amount represents the estimated cost of constructing an eight-inch (8") local sewer on the same alignment as the Interceptor throughout that portion where local connections are allowed. Upon payment of said amount, the City shall own an eight-inch (8") equivalent share of the Interceptor where local service is given on both sides of the Interceptor, and one-half thereof where service is given on only one side. Local connection to the Interceptor may be made by the City in such a manner as

shall be approved by Metro. The City shall hold Metro harmless from any loss, cost, charge, liability or expense resulting from or arising out of damage to the Interceptor or to the persons or property of others caused by the making of such connections or the City's failure to observe any covenant of this Agreement relating to such connections.

Section 12. Construction and Maintenance of Local Sewerage Facilities. The City shall either construct, operate and maintain at its expense or cause others to construct, operate and maintain at their expense in a proper fashion, any Local Sewerage Facilities other than joint use facilities connected to the Interceptor up to and including the tee connection. Metro shall have no responsibility for either construction, operation or maintenance of such Local Sewerage Facilities.

Section 13. Infiltration and Inflow in Auburn System. The City shall prepare and deliver to Metro on or before April 15, 1974, an inflow and infiltration analysis and survey of the existing Auburn Sewer System which shall comply with applicable regulations of the United States Environmental Protection Agency. Metro shall include in the Auburn Interceptor grant application the grant eligible portions of the cost of such evaluation studies and the grant eligible portions of the cost of any improvements or corrections to Auburn Sewer System facilities which are tributary to such Interceptor, which are recommended by the evaluation studies and which comply with applicable United States Environmental Protection Agency regulations.

Metro shall reimburse the City for the eligible portions of the evaluation studies and improvements or corrections as grant funds are received by Metro for such purposes.

Section 14. Insurance and Liability for Damages. The City and Metro shall respectively secure and maintain with responsible insurers all such insurance as is customarily maintained with respect to sewage systems of like character against loss of or damage to the

sewerage facilities of the City and Metro respectively and against public and other liability to the extent that such insurance can be secured and maintained at reasonable cost. Any loss or damage occurring as a result of the operation by Metro of the Metropolitan Sewerage System, the temporary facilities described in Exhibit "B" and the joint use sewers referred to in Section 10, shall be the sole liability of Metro and any loss or damage occurring as a result of the operation by the City of the Local Sewerage Facilities shall be the sole liability of the City.

Section 15. Assignment. The City shall not have the right to assign this Agreement or any of its rights and obligations hereunder either by operation of law or by voluntary agreement without the written consent of Metro, acting reasonably, and neither party may terminate its obligations hereunder by dissolution or otherwise without first securing the written consent of the other party, acting reasonably, and this Agreement shall be binding upon and inure to the benefit of the respective successors and assigns of the parties hereto. In the event that the City should be dissolved or should no longer be authorized to operate sewer facilities, the Local Sewerage Facilities owned and operated by the City shall be assigned and transferred to Metro or such other public agency authorized by law to operate sewer facilities which agrees to carry out the terms of this Agreement, subject to any outstanding debts of the City which have been incurred for the specific purpose of constructing or acquiring such facilities and subject to the acceptance by Metro or that other agency of the obligation to continue to provide sewer service to the residents served by such local facilities upon payment by such residents of sewage disposal charges determined as herein provided and the reasonable costs of local sewer service.

Section 16. Effective Date and Term of Contract. This Agreement shall be in full force and effect and binding upon the

parties hereto upon the execution of the Agreement and shall continue in full force and effect until July 1, 2016.

Section 17. Termination of Auburn-Algona Pacific Agreement. Upon execution of this Agreement and the execution of sewage disposal agreements between Metro and the Cities of Algona and Pacific, that certain sewage disposal contract dated August 18, 1970 between the Cities of Auburn, Algona and Pacific shall be terminated by the City. This same paragraph shall be included in any subsequent contract for sewage disposal entered into between Metro and the Cities of Algona and Pacific.

Section 18. Notice. Whenever by this Agreement notice is required to be given, the same shall be given by registered mail addressed to the respective parties at the following addresses:

Municipality of Metropolitan Seattle
410 West Harrison Street
Seattle, Washington 98119

City of Auburn
20 "A" Street Northwest
Auburn, Washington 98002

unless a different address shall be hereafter designated in writing by either of the parties. The date of giving such notice shall be deemed to be the date of mailing thereof. Billings for and payments of sewage disposal costs may be made by regular mail.

Section 19. Execution of Documents. This Agreement shall be executed in six counterparts, any of which shall be regarded for all purposes as one original. Each party agrees that it will execute any and all deeds, instruments, documents and resolutions or ordinances necessary to give effect to the terms of this Agreement.

Section 20. Waiver. No waiver by either party of any term or condition of this Agreement shall be deemed or construed as a waiver of any other term or condition, nor shall a waiver of any breach be deemed to constitute a waiver of any subsequent breach whether of the same or a different provision of this Agreement.

Section 21. Remedies. In addition to the remedies provided by law, this Agreement shall be specifically enforceable by either party.

Section 22. Entirety. This Agreement merges and supersedes all prior negotiations, representations and agreements between the parties hereto relating to the subject matter hereof and constitutes the entire contract between the parties.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

CITY OF AUBURN, WASHINGTON

Stanley P. Kersey, Mayor

ATTEST:

Earla L. Byerley, City Clerk

MUNICIPALITY OF METROPOLITAN SEATTLE

By C. Carey Denworth
Chairman of the Council

ATTEST:

B. J. Carol
Clerk of the Council

STATE OF WASHINGTON)
) ss
COUNTY OF KING)

On this 1st day of March, 1978, before me personally appeared STANLEY P. KERSEY and EARLA L. BYERLEY, to me known to be the Mayor and City Clerk, respectively, of the City of Auburn, a municipal corporation, and acknowledged the within and foregoing instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that they were authorized to execute said instrument and that the seal affixed is the corporate seal of said corporation.

IN WITNESS WHEREOF I have hereunto set my hand and affixed my official seal the day and year first above written.

Marian Osborn
NOTARY PUBLIC in and for the State of Washington, residing at Enumclaw

STATE OF WASHINGTON)
) ss
COUNTY OF KING)

On this 1ST day of MARCH, 1978, before me personally appeared C. CAREY DONWORTH and B. J. CAROL, to me known to be the Chairman of the Council and Clerk of the Council, respectively, of the Municipality of Metropolitan Seattle, a municipal corporation, and acknowledged the within and foregoing instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that they were authorized to execute said instrument and that the seal affixed is the corporate seal of said corporation.

IN WITNESS WHEREOF I have hereunto set my hand and affixed my official seal the day and year first above written.

Jack A Hakala
NOTARY PUBLIC in and for the State of Washington, residing at SEATTLE

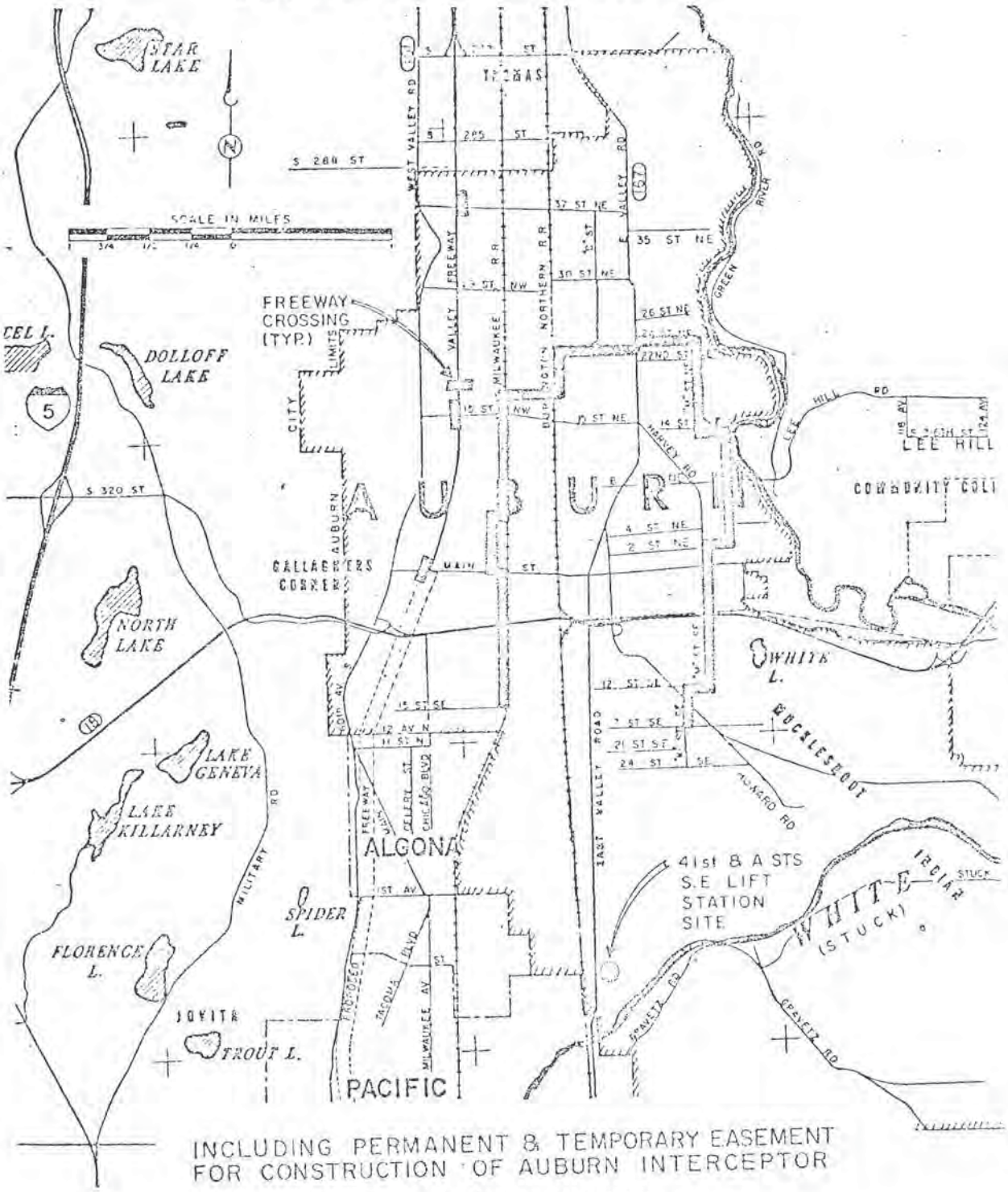
EXHIBIT "A"

The Auburn Interceptor is a permanent Metropolitan Sewerage System facility that will provide interceptor service for that portion of the Green River Valley that includes Auburn's sewer service area south and west of the Green River, the towns of Algona and Pacific, and the West Hill, South Kent and Thomas sewer service areas. The interceptor commences at the influent structure of the existing Auburn sewage lagoon, thence northerly and westerly in easement and public right-of-way through the City of Kent to a connection with the existing Metro-Kent Cross Valley Interceptor.

EXHIBIT "B"

PERMANENT FACILITIES

INTERCEPTOR SEWERS AND LIFT STATION SITE * DESCRIBED ON THE MAP BELOW



INCLUDING PERMANENT & TEMPORARY EASEMENT FOR CONSTRUCTION OF AUBURN INTERCEPTOR

TEMPORARY FACILITIES

TEMPORARY FACILITIES INCLUDE THE EXISTING SEWAGE LAGOON AND APPURTENANT STRUCTURES AND EQUIPMENT LOCATED BETWEEN BURLINGTON NORTHERN RAILROAD AND "C" STREET N.E. EXTENDED AND SOUTH OF 30TH STREET N.E. THE EXISTING LAGOON OUTFALL AND PACKAGE LIFT STATION LOCATED AT 41ST AND A STREET S.E. *

* Purchase of LIFT STATION SITE and PACKAGE LIFT STATION subject to separate action.

RESOLUTION NO. 1727

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, AUTHORIZING THE MAYOR AND CITY CLERK OF THE CITY OF AUBURN, TO EXECUTE AN EXTENSION OF AGREEMENT FOR SEWAGE DISPOSAL BETWEEN THE CITY OF AUBURN AND THE MUNICIPALITY OF METROPOLITAN SEATTLE (METRO), ORIGINAL AGREEMENT AUTHORIZED BY CITY OF AUBURN ORDINANCE NO. 2774 DATED NOVEMBER 5, 1973.

THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, IN A REGULAR MEETING DULY ASSEMBLED, HEREWITH RESOLVES THAT:

THE Mayor and City Clerk of the City of Auburn, Washington, are hereby authorized to execute an Extension of Agreement for Sewage Disposal between the City of Auburn and the Municipality of Metropolitan Seattle (METRO). (The original Agreement was authorized by City of Auburn Ordinance No. 2774, dated November 5, 1973.) A copy of said Extension of Agreement is attached hereto, denominated as Exhibit "A" and made a part hereof as though set forth in full herein.

The Mayor is hereby authorized to implement such administrative procedures as may be necessary to carry out the directions of this legislation.

DATED and SIGNED this 2nd day of February, 1987.

CITY OF AUBURN

MAYOR

ATTEST:

City Clerk

RESOLUTION NO. 1727 EXHIBIT "A"

CITY OF AUBURN

MUNICIPALITY OF METROPOLITAN SEATTLE

EXTENSION OF AGREEMENT FOR SEWAGE DISPOSAL

WHEREAS, the City of Auburn, (the "City") and the Municipality of Metropolitan Seattle (the "Municipality") are parties to a certain Agreement for Sewage Disposal (the Agreement") dated March 1, 1974, pursuant to which the City delivers to the Municipality for treatment and disposal all the sewage and industrial wastes it collects from its service area; and

WHEREAS, the Agreement expires by its terms on July 1, 2016; and

WHEREAS, it is in the best interests of the City and the Municipality that the expiration date of the Agreement be extended in order to allow the Municipality to sell and issue its sewer revenue bonds with maturities extending beyond 2016;

NOW, THEREFORE, in considreation of the mutual covenants contained herein and in the Agreement, it is hereby agreed as follows:

The Agreement for Sewage Disposal between the City of Auburn and the Municipality of Metropolitan Seattle dated March 1, 1974, is hereby extended for a period of twenty years and shall continue in full force and effect until July 1, 2036.

IT IS FURTHER AGREED that all other provisions of said Agreement shall remain unchanged, and the Agreement dated March 1, 1974, as extended herein shall constitute the entire Agreement for Sewage Disposal between the parties.

DATED this ~~9th~~ 19th day of ~~February~~ March, 1987.

CITY OF AUBURN

MAYOR

ATTEST:

Robin Wohlhueter, City Clerk

MUNICIPALITY OF METROPOLITAN SEATTLE

By: Gary Zimmerman
Chairman of the Council

ATTEST:

Bonnie Mattson, Clerk of the Council

RESOLUTION NO. 2090

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, AUTHORIZING THE MAYOR AND CITY CLERK TO EXECUTE AN INTERAGENCY AGREEMENT BETWEEN THE CITY OF AUBURN AND METRO TO PROVIDE AN AMENDMENT TO THE SEWAGE DISPOSAL AGREEMENT.

THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, IN A REGULAR MEETING DULY ASSEMBLED, HEREWITH RESOLVES THAT:

Section 1. The Mayor and City Clerk of the City of Auburn are herewith authorized to execute an Interagency Agreement between the City of Auburn and METRO to provide an amendment to the sewage disposal agreement in order to implement the recommendations of the Rate Structure Advisory Committee adopted by the Metro Council July 6, 1989. A copy of said Agreement is attached hereto and denominated Exhibit "A".

Section 2. The Mayor is hereby authorized to implement such administrative procedures as may be necessary to carry out the directives of this legislation.

DATED and SIGNED this 4th day of June, 1990.

CITY OF AUBURN

MAYOR

ATTEST:

Robin Wohlhueter, City Clerk

APPROVED AS TO FORM:

Marguerite Schellentrager,
City Attorney

RECEIVED
JUN 21 1990
CITY OF AUBURN
CITY CLERKS OFFICE

CITY OF AUBURN

MUNICIPALITY OF METROPOLITAN SEATTLE

AMENDMENT TO AGREEMENT
FOR SEWAGE DISPOSAL

THIS AMENDMENT made as of the 4th day of June, 1990 between the City of Auburn, a municipal corporation of the State of Washington (hereinafter referred to as the "City") and the Municipality of Metropolitan Seattle, a metropolitan municipal corporation of the State of Washington (hereinafter referred to as "Metro");

WITNESSETH:

WHEREAS, the parties have entered into a long term Agreement for Sewage Disposal dated March 1, 1974 (hereinafter referred to as the "Basic Agreement"); and

WHEREAS, an advisory committee composed of elected and appointed officials in the metropolitan area was appointed by the Metropolitan Council to examine the structure of Metro's charges to its participants; and

WHEREAS, said advisory committee, following extensive research, study and deliberations, has recommended certain changes in the structure of Metro's charges to its participants and implementation of said changes requires amendment of the Basic Agreement; and

WHEREAS, the parties have determined that the recommendations are in the best public interest and therefore desire to amend said Basic Agreement to implement said recommendations;

NOW, THEREFORE, it is hereby agreed as follows:

Copy filed Pro

Pro 2091

Section 1. Amendment of Section 5 of the Basic Agreement. Section 5 of the Basic Agreement is hereby amended to read as follows:

"Section 5. Payment for Sewage Disposal. For the disposal of sewage hereafter collected by the City and delivered to Metro the City shall pay to Metro on or before the last day of each month during the term of this Agreement, a sewage disposal charge determined as provided in this Section 5.

1. For the quarterly periods ending March 31, June 30, September 30 and December 31 of each year every Participant shall submit a written report to Metro setting forth:

(a) the number of Residential Customers billed by such Participant for local sewerage charges as of the last day of the quarter,

(b) the total number of all customers billed for local sewerage charges by such Participant as of such day, and

(c) the total water consumption during such quarter for all customers billed for local sewerage charges by such Participant other than Residential Customers.

The quarterly water consumption report shall be taken from water meter records and may be adjusted to exclude water which does not enter the sanitary facilities of the customer. Where actual sewage flow from an individual customer is metered, the metered sewage flows shall be reported in lieu of adjusted water consumption. The total quarterly water consumption report in cubic feet shall be divided by 2,250 to determine the number of Residential Customer equivalents represented by each Participant's customers other than single family residences. Metro shall maintain a permanent record of the quarterly customer reports from each Participant.

Pln. Dept.

The City's first quarterly report shall cover the first quarterly period following the date when sewage is first delivered to Metro and shall be submitted within thirty days following the end of the quarter. Succeeding reports shall be made for each quarterly period thereafter and shall be submitted within thirty (30) days following the end of the quarter.

2. (a) To form a basis for determining the monthly sewage disposal charge to be paid by each Participant during any particular quarterly period, Metro shall ascertain the number of Residential Customers and Residential Customer equivalents of each Participant. This determination shall be made by taking the sum of the actual number of Residential customers reported as of the last day of the next to the last preceding quarter and the average number of Residential Customer Equivalents per quarter reported for the four quarters ending with said next to the last preceding quarter, adjusted for each Participant to eliminate any Residential Customers or Residential Customer equivalents whose sewage is delivered to a governmental agency other than Metro or other than a Participant for disposal outside of the Metropolitan Area.

(b) For the initial period until the City shall have submitted six consecutive quarterly reports, the reported number of Residential Customers and Residential Customer equivalents of the City shall be determined as provided in this subparagraph (b). On or before the tenth day of each month beginning with the month prior to the month in which sewage from the City is first delivered to Metro, the City shall submit a written statement of the number of Residential Customers and Residential Customer equivalents estimated to be billed by the City during the next succeeding month. For the purpose of determining the basic reported number of Residential Customers and

Pos 2091

Residential Customer equivalents of the City for such next succeeding month, Metro may at its discretion adopt either such estimate or the actual number of Residential Customers and Residential Customer equivalents reported by the City as of the last day of the next to the last preceding reported quarter. After the City shall have furnished six consecutive quarterly reports the reported number of Residential Customers and Residential Customer equivalents of the City shall be determined as provided in the immediately preceding subparagraph (a).

(c) If the City shall fail to submit the required monthly and/or quarterly reports when due, Metro may make its own estimate of the number of Residential Customers and Residential Customer equivalents of the City and such estimate shall constitute the reported number for the purpose of determining sewage disposal charges.

3. The monthly sewage disposal charge payable to Metro shall be determined as follows:

(a) Prior to July 1st of each year Metro shall determine its total monetary requirements for the disposal of sewage during the next succeeding calendar year. Such requirements shall include the cost of administration, operation, maintenance, repair and replacement of the Metropolitan Sewerage System, establishment and maintenance of necessary working capital and reserves, the requirements of any resolution providing for the issuance of revenue bonds of Metro to finance the acquisition, construction or use of sewerage facilities, plus not to exceed 1% of the foregoing requirements for general administrative overhead costs.

(b) To determine the monthly rate per Residential Customer or Residential Customer equivalent to be used during said next succeeding calendar year, the total monetary requirements for disposal of sewage as determined

in subparagraph 3(a) of this section shall be divided by twelve and the resulting quotient shall be divided by the total number of Residential Customers and Residential Customer equivalents of all Participants for the October-December quarter preceding said July 1st; provided, however, that the monthly rate shall not be less than Two Dollars ($2.00) per month per Residential Customer or Residential Customer equivalent at any time during the period ending July 31, 1972.

(c) The monthly sewage disposal charge paid by each Participant to Metro shall be obtained by multiplying the monthly rate by the number of Residential Customers and Residential Customer equivalents of the Participant. An additional charge may be made for sewage or wastes of unusual quality or composition requiring special treatment, or Metro may require pretreatment of such sewage or wastes. An additional charge may be made for quantities of storm or ground waters entering those Local Sewerage Facilities which are constructed after January 1, 1961 in excess of the minimum standard established by the general rules and regulations of Metro.

4. The parties acknowledge that, by resolution of the Metropolitan Council, Metro may impose a charge or charges directly on the future customers of a Participant for purposes of paying for capacity in Metropolitan Sewage Facilities and that such charges shall not constitute a breach of this agreement or any part thereof. The proceeds of said charge or charges, if imposed, shall be used only for capital expenditures or defeasance of outstanding revenue bonds prior to maturity.

In the event such a charge or charges are imposed, the City shall, at Metro's request, provide such information regarding new residential customers and residential customer

P11/2097

equivalents as may be reasonable and appropriate for purposes of implementing such a charge or charges.

5. A statement of the amount of the monthly sewage disposal charge shall be submitted by Metro to each Participant on or before the first day of each month and payment of such charge shall be due on the last day of such month. If any charge or portion thereof due to Metro shall remain unpaid for fifteen days following its due date, the Participant shall be charged with and pay to Metro interest on the amount unpaid from its due date until paid at the rate of 6% per annum, and Metro may, upon failure to pay such amount, enforce payment by any remedy available at law or equity.

6. The City irrevocably obligates and binds itself to pay its sewage disposal charge out of the gross revenues of the sewer system of the City. The City further binds itself to establish, maintain and collect charges for sewer service which will at all times be sufficient to pay all costs of maintenance and operation of the sewer system of the City, including the sewage disposal charge payable to Metro hereunder and sufficient to pay the principal of and interest on any revenue bonds of the City which shall constitute a charge upon such gross revenues. It is recognized by Metro and the City that the sewage disposal charge paid by the City to Metro shall constitute an expense of the maintenance and operation of the sewer system of the City. The City shall provide in the issuance of future sewer revenue bonds of the City that expenses of maintenance and operations of the sewer system of the City shall be paid before payment of principal and interest of such bonds. The City shall have the right to fix its own schedule of rates and charges for sewer service provided that same shall produce revenue sufficient to meet the covenants contained in this Agreement.

Pen 2197

Section 2. Effective Date of Amendment. This amendment shall take effect at the beginning of the first quarter following the date first written above with quarters beginning January 1, April 1, July 1, and October 1.

Section 3. Basic Agreement Unchanged. Except as otherwise provided in this amendment, all provisions of the basic agreement shall remain in full force and effect as written therein.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the day and year first written above.

CITY OF AUBURN

Mayor

ATTEST:

ROBIN WOHLHUETER, CITY CLERK

APPROVED AS TO FORM:

MARGUERITE SCHELLENTRAGER, CITY ATTORNEY

MUNICIPALITY OF METROPOLITAN SEATTLE

Gary Zimmerman
Chair of the Council

ATTEST:

Res 2090

Section 2. Effective Date of Amendment. This amendment shall take effect at the beginning of the first quarter following the date first written above with quarters beginning January 1, April 1, July 1, and October 1.

Section 3. Basic Agreement Unchanged. Except as otherwise provided in this amendment, all provisions of the basic agreement shall remain in full force and effect as written therein.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the day and year first written above.

CITY OF AUBURN

Mayor

ATTEST:

ROBIN WOHLHUETER, CITY CLERK

APPROVED AS TO FORM:

MARGUERITE SCHELLENTRAGER, CITY ATTORNEY

MUNICIPALITY OF METROPOLITAN SEATTLE

~~Gary Zimmerman~~
Chair of the Council

ATTEST:

Res 2090

Return Address:
Auburn City Clerk
City of Auburn
25 West Main St
Auburn, WA 98001

20021001001676
PACIFIC NW TIT AG 42.00
PAGE 001 OF 024
10/01/2002 14:08
KING COUNTY, WA

2002 100 1031676

RECORDER'S COVER SHEET

Document Title(s) (or transactions contained therein)

24/42

1 Franchise Agreement

PNWT

Reference Number(s) of Documents assigned or released:

W4072-12

☐ Additional reference #'s on page ___ of document

Grantor(s) (Last name first, then first name and initials)

1 King County

Grantee: (Last name first)

1 Auburn, City of

said document(s) were filed for record by Pacific Northwest Title as an accommodation only. It has not been examined as to proper execution or as to its affect upon title

Legal Description (abbreviated i.e. lot, block, plat or section, township, range)

See Exhibit A

☒ Additional legal is on page 3 of the document

Assessor's Property Tax Parcel/Account Number:

King County Franchise No 14458

☐ Assessor Tax # not yet assigned

Unofficial Document

Unofficial Document

14458
July 23, 2002

Franchise No. 14458

In the matter of the application for a franchise to operate, maintain, repair, and construct and sewer mains, service lines, and appurtenances in, over, along, and under County roads and rights-of-way in King County, Washington

---

The application of the City of Auburn for a franchise to operate, maintain, repair and construct sewer mains, service lines, and appurtenances in, over, along, and under County roads and rights-of-way located within the area described in attached Exhibit "A" has been heard on this 26th day of August, 2002 All of the property described in Exhibit "A" lies outside the limits of any incorporated Town or City.

Legal notice of the franchise application and of the hearing has been given as is required by law.

The King County Council, having considered the interests proposed and advanced, and finding that the granting of this franchise is in the public interest, ORDERS that a franchise be granted to the City of Auburn, the Grantee, subject to the conditions set forth in Exhibit "B" attached hereto, this franchise and Ordinance No 14458. This franchise grants the right, privilege, authority and franchise to operate, maintain, repair and construct mains and service lines and appurtenances as a part of its distribution system in, over, along, and under County roads and rights-of-way located within the area described in Exhibit "A"

2002 100 1031676

Res 3511

This franchise is granted subject to all of the terms and conditions contained herein, within Ordinance No 14458 and Exhibit "B", and shall expire in twenty-five years on 9/14, 2027.

Dated this 4 day of September, 20___.

KING COUNTY, WASHINGTON

BY _____

TITLE King County Executive

2002 100 1031676

The undersigned accepts all the rights, privileges, and duties of this franchise subject to all terms, conditions, stipulations, and obligations contained herein, within Ordinance 14458 and Exhibit "B"

CITY OF AUBURN
GRANTEE

BY _____

TITLE Mayor

Dated this 16th day of September, 2002

Unofficial Document

EXHIBIT " A"

Area A

BEGINNING AT THE INTERSECTION OF THE EAST-WEST CENTERLINE OF SECTION 16, TOWNSHIP 21 NORTH, RANGE 5 EAST, W.M WITH THE SOUTHEASTERLY MARGIN OF THE RIGHT OF WAY FOR PRIMARY STATE HIGHWAY NUMBER 2, AKA STATE HIGHWAY 18,
THENCE NORTHEASTERLY ALONG SAID SOUTHEASTERLY MARGIN OF SAID RIGHT OF WAY FOR STATE HIGHWAY NUMBER 2 TO THE SOUTH LINE OF SECTION 34, TOWNSHIP 22 NORTH, RANGE 5 EAST, W.M ,
THENCE WESTERLY ALONG THE SOUTH LINE OF SAID SECTION 34 AND ALONG THE SOUTHERLY LIMITS OF THE CITY OF KENT TO THE SOUTHWEST CORNER OF SAID SECTION 34,
THENCE CONTINUING NORTHERLY AND WESTERLY ALONG THE WEST LINE OF SAID SECTION 34 AND THE SOUTHERLY LIMITS OF THE CITY OF KENT THROUGH SECTIONS 33 AND 32, TOWNSHIP 22 NORTH, RANGE 5 EAST, W.M. TO THE NORTHEAST CORNER OF THAT PORTION OF LAND ANNEXED BY THE CITY OF KENT BY CITY OF KENT ORDINANCE NUMBER 3171,
THENCE SOUTHERLY ALONG THE EAST BOUNDARY OF SAID KENT CITY LIMITS ESTABLISHED BY CITY OF KENT ORDINANCE NUMBER 3171 TO THE SOUTHEAST CORNER THEREOF, AND AN ANGLE POINT IN THE EASTERLY BOUNDARY OF THE CITY OF AUBURN CITY LIMITS AS ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE 4710,
THENCE SOUTHERLY ALONG THE EASTERLY CITY LIMITS OF THE CITY OF AUBURN ANNEXED TO THE CITY OF AUBURN BY ORDINANCES 4710, 3266, AND 5370 TO THE EASTERLY EDGE OF THE GREEN RIVER,
THENCE SOUTHERLY ALONG THE EASTERLY EDGE OF THE GREEN RIVER TO THE NORTHERLY LINE OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE NUMBER 5346,
THENCE NORTHEASTERLY, EASTERLY AND SOUTHERLY ALONG THE EASTERLY CITY LIMITS OF THE CITY OF AUBURN ANNEXED TO THE CITY OF AUBURN BY ORDINANCES 5346, 5088, AND 5346 TO THE EAST-WEST CENTERLINE OF SECTION 17, TOWNSHIP 21 NORTH, RANGE 5 EAST, W.M.;
THENCE EASTERLY ALONG SAID EAST-WEST CENTERLINE OF SAID SECTION 17 AND ALONG THE EAST-WEST CENTERLINE OF SECTION 16, TOWNSHIP 21 NORTH, RANGE 5 EAST, W M. TO THE POINT OF BEGINNING

SITUATE IN KING COUNTY, WASHINGTON

2002 100 1001676

Area B

BEGINNING AT THE NORTHWEST CORNER OF THE SOUTH HALF OF SECTION 35, TOWNSHIP 22, RANGE 4, SOUTH ALONG THE WEST LINE OF SAID SECTION TO A POINT WHERE IT INTERSECTS WITH NORTH LINE OF SECTION 2, TOWNSHIP 21, RANGE 4 EAST, THENCE SOUTH ALONG SAID LINE TO ITS INTERSECTION WITH NORTHWEST CORNER OF SECTION 11, TOWNSHIP 21, RANGE 4, THENCE SOUTH ALONG SAID LINE TO ITS INTERSECTION WITH THE NORTHEAST CORNER OF SECTION 15, TOWNSHIP 21, RANGE 4 EAST, THENCE WEST ALONG THE NORTH LINE OF SECTION 15, TOWNSHIP 21, RANGE 4, TO THE NORTHWEST CORNER OF THE NORTHEAST QUARTER OF SAID SECTION 15, THENCE SOUTH ALONG THE WEST LINE OF SAID SECTION 15, TO SOUTHWEST CORNER OF THE SOUTHEAST QUARTER OF SAID SECTION 15, THENCE EAST ALONG THE SOUTH LINE OF SAID SECTION 15 TO ITS INTERSECTION WITH THE NORTHWEST CORNER OF SECTION 23, TOWNSHIP 21, RANGE 4, THENCE SOUTH ALONG THE WEST LINE OF SAID SECTION 23, TO SOUTHWEST CORNER OF NORTHWEST QUARTER OF SAID SECTION 23, THENCE EAST ALONG THE SOUTH LINE OF THE NORTHWEST QUARTER OF ITS INTERSECTION WITH THE WEST LINE OF THE CORPORATE BOUNDARY OF THE CITY OF AUBURN LOCATED IN SAID SECTION 23, THENCE CONTINUING ALONG SAID CORPORATE BOUNDARY LOCATED IN SECTION 14, 11, 2 , 35, 22, 5, TO ITS NORTH LINE OF THE SOUTH HALF
OF SECTION 36, TOWNSHIP 22, RANGE 5 EAST, THENCE WEST ALONG SAID NORTH LINE TO ITS INTERSECTION WITH THE NORTHWEST CORNER OF THE SOUTH HALF OF SECTION 35, TOWNSHIP 22, RANGE 4 EAST, ALSO KNOWN AS THE TRUE POINT OF BEGINNING.

2002 100 1031676

Area C

THAT PORTION OF WHITE RIVER VALLEY HOME TRACTS SECOND ADDITION LOCATED IN THE WEST HALF OF SOUTHWEST QUARTER OF SECTION 31 TOWNSHIP 22 NORTH, RANGE 5 EAST, W M , DESCRIBED AS FOLLOWS

BEGINNING AT THE SOUTHEAST CORNER OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE NUMBER 3823, THENCE NORTHERLY ALONG THE EAST BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 3823 TO THE SOUTHEAST CORNER OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE NUMBER 4347, THENCE NORTHERLY ALONG THE EAST BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 4347 TO AN ANGLE POINT IN THE SOUTHERLY BOUNDARY OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE NUMBER 4780 AND AMENDED BY CITY OF AUBURN ORDINANCE NUMBER 4843, THENCE NORTHERLY, EASTERLY AND NORTHERLY ALONG THE BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 4843 TO THE SOUTHWESTERLY MARGIN OF

AUBURN WAY NORTH AND THE WESTERLY BOUNDARY OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE NUMBER 2511, THENCE SOUTHEASTERLY ALONG THE WESTERLY BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 2511 TO THE NORTHEAST CORNER OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE NUMBER 3621, THENCE WESTERLY ALONG THE NORTHERLY BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 3621 TO THE NORTHWEST CORNER OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE NUMBER 3621, THENCE SOUTHERLY AND EASTERLY ALONG THE BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 3621 TO THE WESTERLY LINE OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE NUMBER 2511; THENCE SOUTHERLY ALONG THE WESTERLY BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 2511 TO THE NORTHEAST CORNER OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE NUMBER 5412, THENCE WEST ALONG THE NORTHERLY BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 5412 TO THE NORTHWEST CORNER OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE NUMBER 5412; THENCE SOUTHERLY ALONG THE WESTERLY BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 5412 TO THE BOUNDARY OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE 2511; THENCE WEST ALONG SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 2511 TO THE POINT OF BEGINNING

SITUATE IN KING COUNTY, WASHINGTON

2002 100 10031676

Area D

A PORTION OF THE SOUTHEAST QUARTER OF SECTION 31, AND THE SOUTHWEST QUARTER OF SECTION 32, ALL IN TOWNSHIP 22 NORTH, RANGE 5 EAST, W M , DESCRIBED AS FOLLOWS

BEGINNING AT THE NORTHWEST CORNER OF THAT PORTION OF LAND ANNEXED BY THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE NUMBER 4710,
THENCE SOUTHERLY ALONG THE WESTERLY BOUNDARY OF SAID AUBURN CITY LIMITS ESTABLISHED BY CITY OF AUBURN ORDINANCE NUMBER 4710 TO THE EASTERLY EDGE OF THE GREEN RIVER,
THENCE NORTHERLY ALONG SAID EASTERLY EDGE OF THE GREEN RIVER TO THE SOUTHERLY LINE OF THE CITY OF KENT CITY LIMITS,
THENCE EASTERLY ALONG SAID SOUTHERLY LINE OF THE CITY OF KENT CITY LIMITS TO THE POINT OF BEGINNING

SITUATE IN KING COUNTY, WASHINGTON

Agreement

Area E

THAT PORTION OF THE NORTHWEST QUARTER OF SECTION 17, TOWNSHIP 21 NORTH, RANGE 5 EAST, W M DESCRIBED AS FOLLOWS·

BEGINNING AT A POINT ON WESTERLY MARGIN OF THE GREEN RIVER AT THE INTERSECTION OF THE NORTHERLY BOUNDARY OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE 1543, THENCE WESTERLY AND NORTHERLY ALONG SAID NORTHERLY BOUNDARY THEREOF, TO A POINT ON THE WEST BOUNDARY OF THE EAST HALF OF THE SOUTHWEST QUARTER OF THE NORTHWEST QUARTER OF SAID SECTION 17; THENCE NORTHERLY ALONG SAID WEST BOUNDARY OF THE EAST HALF OF THE SOUTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 17, A DISTANCE OF 320 FEET MORE OR LESS TO THE SOUTHERLY BOUNDARY OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE 4317, THENCE EASTERLY AND NORTHERLY ALONG THE EASTERLY BOUNDARY THEREOF TO THE WESTERLY MARGIN OF SAID GREEN RIVER, THENCE SOUTHEASTERLY ALONG SAID WESTERLY MARGIN OF THE GREEN RIVER TO THE POINT OF BEGINNING

SITUATE IN KING COUNTY, WASHINGTON

2002 100 1031676

Area F

THAT PORTION OF THE SOUTHWEST QUARTER OF SECTION 17, TOWNSHIP 21 NORTH, RANGE 5 EAST, W M , KING COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS

BEGINNING AT THE NORTHWEST CORNER OF SAID SOUTHWEST QUARTER OF SECTION 17, THENCE SOUTHERLY ALONG THE WEST BOUNDARY OF SAID SOUTHWEST QUARTER OF SECTION 17 A DISTANCE OF 33.01 FEET TO THE SOUTH MARGIN OF EAST MAIN STREET (SE 328TH ST.) EXTENDED TO THE WEST AND THE TRUE POINT OF BEGINNING, THENCE CONTINUING SOUTHERLY ALONG SAID WEST BOUNDARY OF THE SOUTHWEST QUARTER OF SECTION 17 TO THE NORTHWEST CORNER OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 1991, THENCE EASTERLY TO THE NORTHEAST CORNER OF SAID AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 1991, THENCE SOUTHERLY ALONG THE EAST BOUNDARY OF SAID AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 1991 TO THE NORTHERNMOST BOUNDARY OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 2085, THENCE EASTERLY ALONG SAID NORTHERNMOST BOUNDARY OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 2085 AND CONTINUING EASTERLY ALONG THE NORTHERNMOST BOUNDARY OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 2229 TO THE WESTERNMOST BOUNDARY OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 3525, THENCE NORTHERLY ALONG SAID WESTERNMOST BOUNDARY OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 3525 TO THE NORTH BOUNDARY OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 3525, THENCE EASTERLY ALONG SAID NORTH BOUNDARY OF

AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 3525 TO THE EAST BOUNDARY OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 3525, THENCE SOUTHERLY ALONG THE EAST BOUNDARY OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 3525 TO THE NORTH MARGIN OF SECOND STREET SE (SE 330TH ST) AND THE NORTH BOUNDARY OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 5350, THENCE EASTERLY ALONG SAID NORTH MARGIN OF SECOND STREET SE AND SAID NORTH BOUNDARY OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 5350 TO THE SOUTHWEST CORNER OF LOT 1, BLOCK 2 OF THE PLAT OF EAST AUBURN GARDEN TRACTS AS RECORDED IN VOLUME 18 OF PLATS, PAGE 98, RECORDS OF KING COUNTY, WASHINGTON, THENCE SOUTHERLY ALONG THE WEST BOUNDARY OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 5350 TO THE NORTH BOUNDARY OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 4605, THENCE EASTERLY ALONG THE NORTH BOUNDARY OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 4605 TO THE WEST BOUNDARY OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 5505, THENCE NORTHERLY AND EASTERLY ALONG THE BOUNDARY OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 5505 TO THE WEST MARGIN OF THE GREEN RIVER, THENCE NORTHWESTERLY ALONG SAID WEST MARGIN OF THE GREEN RIVER TO THE SOUTH BOUNDARY OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 5084, THENCE WESTERLY ALONG SAID SOUTH BOUNDARY OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 5084 TO THE SOUTHWEST CORNER THEREOF, THENCE NORTHERLY ALONG THE WEST BOUNDARY OF AUBURN ANNEXATION DESCRIBED IN CITY OF AUBURN ANNEXATION ORDINANCE 5084,TO THE SOUTH MARGIN OF EAST MAIN STREET (SE 328TH ST), THENCE WESTERLY ALONG SAID SOUTH MARGIN OF EAST MAIN STREET TO THE TRUE POINT OF BEGINNING.

SITUATE IN KING COUNTY, WASHINGTON

2002 100 1016 76

Area G

THAT PORTION SOUTH AUBURN GARDEN TRACTS LOCATED IN GOVERNMENT LOT 2 IN THE NORTHWEST QUARTER OF SECTION 30 TOWNSHIP 21 NORTH, RANGE 5 EAST, W M., DESCRIBED AS FOLLOWS

BEGINNING AT THE SOUTHEAST CORNER OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE NUMBER 3726; THENCE NORTHERLY ALONG THE EAST BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 3726 TO THE SOUTHEAST CORNER OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE 4138, THENCE NORTHERLY ALONG THE EAST BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 4138 TO THE SOUTHEAST CORNER OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE NUMBER 4665; THENCE NORTHERLY ALONG THE EAST BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 4665 TO THE SOUTHERLY BOUNDARY THAT PORTION OF LAND ANNEXED TO THE CITY OF

AUBURN BY CITY OF AUBURN ORDINANCE 1279, THENCE EAST ALONG THE SOUTHERLY BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE 1279 TO THE NORTHWEST CORNER OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE 3244, THENCE SOUTH ALONG THE WESTERLY BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE 3244 TO THE SOUTHWEST CORNER OF SAID PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE 3244, THENCE EAST ALONG THE SOUTHERLY BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 3244 TO THE SOUTHEAST CORNER OF SAID PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE 3244; THENCE NORTH ALONG THE EASTERLY BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 3244 TO THE SOUTHERLY BOUNDARY OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE 1279; THENCE EAST ALONG THE SOUTHERLY BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 1279 TO THE NORTHWEST CORNER OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE NUMBER 1225, THENCE SOUTH ALONG THE WESTERLY BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 1225 TO THE NORTHERLY BOUNDARY OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE 3839, THENCE WESTERLY, NORTHERLY AND WESTERLY ALONG THE NORTHERLY BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 3839 TO THE NORTHEAST CORNER OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE NUMBER 4449, THENCE WEST ALONG THE NORTHERLY BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 4449 TO THE SOUTHEAST CORNER OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE NUMBER 4518, THENCE NORTH ALONG THE EASTERLY BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 4518 TO THE NORTHEAST CORNER OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE 4518, THENCE WEST ALONG THE NORTHERLY BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 4518 TO THE EAST MARGIN OF "A" STREET SE AND THE EAST BOUNDARY OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ANNEXATION 1171, THENCE NORTH ALONG THE EASTERLY BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 1171 TO THE SOUTHWEST CORNER OF THAT PORTION OF LAND ANNEXED TO THE CITY OF AUBURN BY CITY OF AUBURN ORDINANCE NUMBER 3726; THENCE EAST ALONG THE SOUTHERLY BOUNDARY OF SAID CITY LIMITS AS ESTABLISHED BY ORDINANCE NUMBER 3726 TO THE POINT OF BEGINNING

SITUATE IN KING COUNTY, WASHINGTON

2002 100 1091675

Consent

EXHIBIT "B"

TERMS AND CONDITIONS APPLICABLE TO UTILITIES FRANCHISES GRANTED BY KING COUNTY

THIS FRANCHISE is subject to the following terms and conditions:

1 DEFINITIONS

References to any County official or office also refers to any office that succeeds to any or all of the responsibilities of the named office or official. References to laws or "applicable laws" include federal, state, and local laws and regulations adopted pursuant to those laws; unless otherwise stated, references to laws include laws now in effect, as the same may be amended from time to time during the operation of this franchise. In addition, the following definitions shall apply:

2002 100 10031676

Cable Services The term "Cable Services" is used as defined in 47 United States Code 522 (5), as amended

Cable System The term "Cable System" is used as defined in 47 United States Code 522 (6), and King County Code 6.a 010 (J) as amended

County Road Rights-of-Way. The term "County Road Rights-of-Way" includes any road, street, avenue, or alley located within the area described in the attached Exhibit "A", it does not include recreational or nature trails except where the trails intersect or are within roads, streets, avenues or alleys

Director. The term "Director" refers to the chief executive of the King County Department of Transportation.

Grantee. The term "Grantee" refers to the City of Auburn, its successors and those assignees approved pursuant to paragraph 16 herein

Utility. The term "utility" refers either to the Grantee or, depending on the context, to any other person, firm, or corporation, public or private, which may hold a franchise to maintain and operate similar facilities in, under, over, across, and along any of the County property described in Exhibit "A"

Council. The term "Council" refers to the King County Council, acting in its official capacity.

Other Governing Body The term "Other Governing Body" refers to any public official or other public board or body as may have the power and jurisdiction to permit or regulate the installation and maintenance of utilities and other facilities in, under, over, across, and along any of the county property described in Exhibit "A"

2 ACCEPTANCE BY GRANTEES OF TERMS AND CONDITIONS

The full acceptance of this franchise and all of its terms and conditions shall be filed with the Clerk of the Council within thirty (30) days from _____, 20____, by the Grantee. Full acceptance of this franchise is a condition precedent to its taking effect, and unless this franchise is accepted within the time specified, this grant will be null and void and have no force or effect.

3 NON-EXCLUSIVE FRANCHISE

This franchise is not exclusive. It does not prohibit King County from granting franchises for other public or private utilities, in, under, over, across, and along any County property, including County road rights-of-way.

This franchise does not prevent or prohibit King County from constructing, altering, maintaining or using any County road rights-of-way covered by this franchise. King County retains full power to make all changes, relocations, repair, maintenance, etc as it may deem fit.

4. JURISDICTION

This franchise is intended to convey limited rights and interest only as to those roads and rights-of-way in which King County has an actual interest It is not a warranty of title or of interest in County road rights-of-way.

Whenever any of the County road rights-of-way as designated in this franchise, by reason of the subsequent incorporation of any Town or City or extension of the limits of any Town or City, shall later fall within the City or Town limits, this franchise shall continue in force and effect until such time as the incorporation and/or annexation is complete according to applicable State law, after which time the County will no longer have any responsibility for maintenance of any County roads, rights-of-way or other County property within the area of annexation/incorporation.

None of the rights granted to the Grantee shall affect the jurisdiction of King County over County road rights-of-way or the County's power to perform work upon its roadways, rights-of-way or appurtenant drainage facilities including by constructing, altering, renewing, paving, widening, grading, blasting or excavating

All of the rights herein granted shall be subject to and governed by this franchise; provided, however, that nothing in this franchise may be construed in any way as limiting King County's rights to adopt ordinances which are necessary to protect the health, safety and welfare of the general public

2002 100 1031676

5. REGULATION OF USE AND CONTROL

This franchise does not deprive King County of any powers, rights, or privileges it now has or may later acquire in the future to regulate the use of and to control the County road rights-of-way covered by this franchise

This franchise authorizes the use of County rights-of-way solely for the delivery by the Grantee of sewer service to it customers. Additional uses of County rights-of-way by the Grantee, including for cable communication services, shall first require a separate franchise from King County, which conforms to the requirements of K.C.C 6.27 as amended, or K C C. 6.27A as amended, and other applicable law.

Any use of the Grantee's equipment of facilities in County rights-of-way by others, including for telecommunication or cable communication services, is prohibited unless separately authorized and approved in writing by King County The Grantee agrees that prior to authorizing any person to use the Grantee's equipment or facilities located in County rights-of-way, the Grantee will require the user to provide the Grantee with an affidavit that it has obtained the necessary franchise or other approval from the County to operate and provide the proposed service in County rights-of-way. At least thirty (30) days prior to executing any agreement with a potential user for the use of the Grantee's equipment or facilities, the Grantee shall fax the affidavit to the King County Office of Cable Communication at 206-296-0842.

2002 100 1031676

6 EMINENT DOMAIN

This franchise and the limited rights and interests for the operation, maintenance, repair, and construction of Grantee's transmission and service lines and appurtenances are subject to the exercise of eminent domain In the event of an exercise of eminent domain by King County, the value to be attributed to all the rights and interests granted under this franchise shall not exceed the actual amount the Grantee paid to King County in obtaining this franchise.

7 ENFORCEMENT

Failure of King County, on one or more occasions to exercise a right or to require compliance or performance under this franchise or any applicable law, shall not be deemed to constitute a waiver of such right or a waiver of compliance or performance, unless such right has been specifically waived in writing Failure of King County to enforce or exercise its rights under any provision of this franchise or applicable law does not constitute a waiver of its rights to enforce or exercise a right in any other provision of this franchise or applicable law.

8 INDEMNITY AND HOLD HARMLESS

The Grantee agrees to indemnify and hold harmless King County as provided herein to the maximum extent possible under law Accordingly, the Grantee agrees for itself, its successors, and assigns to defend, indemnify and hold harmless King County, its appointed and elected officials, and employees from and against liability for all claims, demands, suits, and judgments, including

costs of defense thereof, for injury to persons, death, or property damage which is caused by, arises out of, or is incidental to Grantee's exercise of rights and privileges granted by this franchise The Grantee's obligations under this section shall include:

(a) Indemnification for such claims whether or not they arise from the sole negligence of the Grantee, the concurrent negligence of both parties, or the negligence of one or more third parties.

(b) The duty to promptly accept tender of defense and provide defense to the County at the Grantee's own expense

(c) Indemnification of claims made by the Grantee's own employees or agents.

(d) Waiver of the Grantee's immunity under the industrial insurance provisions of Title 51 RCW, which waiver has been mutually negotiated by the parties.

2002 100 1031676

In the event it is necessary for the County to incur attorney's fees, legal expenses, or other costs to enforce the provisions of this section, all such fees, expenses and costs shall be recoverable from the Grantee.

In the event it is determined that RCW 4 24.115 applies to this franchise agreement, the Grantee agrees to defend, hold harmless and indemnify King County to the maximum extent permitted thereunder, and specifically for its negligence concurrent with that of King County to the full extent of Grantee's negligence Grantee agrees to defend, indemnify and hold harmless the County for claims by Grantee's employees and agrees to waiver of its immunity under Title 51 RCW, which waiver has been mutually negotiated by the parties.

King County shall give the Grantee timely written notice of the making of any claim or of the commencement of any such action, suit, or other proceeding covered by the indemnity in this section. In the event any such claim arises, the County or any other indemnified party shall tender the defense thereof to the Grantee and the Grantee shall have the duty to defend, settle, or compromise any claims arising hereunder and the County shall cooperate fully therein

Notwithstanding the above, the County shall have no obligation to tender a defense as a condition of the indemnity where there is a material conflict between the interests of the Grantee and King County.

9 VACATION

If at any time King County vacates any County road rights-of-way covered by this franchise, King County will not be held liable for any damages or loss to the Grantee by reason of such vacation King County may, after giving thirty (30) days written notice to the Grantee, terminate this franchise with respect to any County road rights-of-way vacated

10. REPAIR, REMOVAL OR RELOCATION

The Grantee hereby covenants, at its own expense, to repair, remove, or relocate existing facilities including all appurtenant facilities and service lines connecting its system to users, within King County road rights-of-way if such repair, removal, or relocation is required by King County for any County road purpose Such repair, removal, or relocation shall not be unreasonably required

The grantee shall, at no expense to the County, adjust, remove or relocate existing facilities within County road rights-of-way, including all appurtenant facilities and service lines connecting its system to users, if the County determines such adjustment, removal or relocation is reasonably necessary to allow for an improvement or alteration planned by the County in such road right-of-way The County shall give the Grantee written notice of such requirement as soon as practicable, at the beginning of the pre-design stage for projects that are part of the County's capital improvement program, including such available information as is reasonably necessary for the Grantee to plan for such adjustment, removal or relocation

For projects that are a part of the County's capital improvement program, in addition to any other notice given to the Grantee, the County shall provide a vertical and horizontal profile of the roadway and drainage facilities within it, both existing and as proposed by the County, and the proposed construction schedule; notwithstanding any permit conditions that may later be applied to the County project, this initial design information shall be given at least 180 days before construction is scheduled to begin, except in cases of urgent construction or emergencies The Grantee shall respond to this notice, and to any later notices of revised designs based on permit conditions, within no more than thirty (30) days by providing to the County the best available information as to the location of all of the Grantee's facilities, including all appurtenant facilities and service lines connecting its system to users and all facilities that it has abandoned, within the area proposed for the public works project

The County shall offer the Grantee the opportunity to participate in the preparation of bid documents for the selection of a contractor to perform the public works project as well as all required adjustments, removals or relocations of the Grantee's facilities Such bid documents shall provide for an appropriate cost allocation between the parties The County shall have sole authority to choose the contractor to perform such work The Grantee and the County may negotiate an agreement for the Grantee to pay the County for its allocation of costs, but neither party shall be bound to enter into such an agreement Under such an agreement, in addition to the Grantee's allocation of contractor costs, the Grantee shall reimburse the County for cost, such as for inspections or soils testing, related to the Grantee's work and reasonably incurred by the County in the administration of such joint construction contracts Such costs shall be calculated as the direct salary cost of the time of County professional and technical personnel spent productively engaged in such work, plus overhead costs at the standard rate charged by the County on other similar projects, including joint projects with other County agencies

2002 100 1001676

11. REQUIREMENT OF CONSTRUCTION PERMITS

The Grantee, its successors or assigns, has the right, privilege, and authority to enter the County road rights-of-way for the purpose of operating, maintaining, repairing or construction its transmission and service lines and appurtenances on the condition that it obtains permits approved by the Director and Property Services Division and, when applicable, by the Department of Development and Environmental Services. Applications for work permits shall be presented to the Property Services Division, which may require copies of plans, blueprints, cross-sections, or further detailing of work to be done In the event of an emergency, the Grantee may immediately commence the necessary work and shall apply the next business day for the work permit Any work done, whether by Grantee, its contractors, or third parties will include necessary paving, patching, grading and any other reasonably necessary repair or restoration to the County road rights-of-way. All work shall be done to the satisfaction of the Director.

2002 100 1031676

All equipment, lines and appurtenances which are used in the operation, maintenance, repair or construction of the Grantee's service and which are located within the County road rights-of-way shall be considered to be part of the Grantee's system and shall be the responsibility of the Grantee. All permits for the operation, maintenance, repair or construction of said system shall be applied for and given in the name of the Grantee, who will be responsible for all work done under the permit The Grantee remains responsible whether the work is done by the Grantee, its contractors, or by third parties

The Grantee shall post a bond to King County in the amount necessary for road restoration. The amount of the bond shall be set by the Department of Transportation, Roads Services Division and shall be filed with the Property Services Division before the issuance of any permit.

The Grantee shall, at no expense to the County, assume the following obligations with respect to the facilities connected to its system that are within County road rights-of-way and which it does not own, including appurtenant facilities and service lines connecting its system to users

(a) The Grantee shall apply for, upon request and on behalf of the owner of the facilities, a County right-of-way construction permit for any repairs required for such facilities; provided such owner agrees to reimburse the Grantee for all costs incurred by the Grantee and any other reasonable conditions the Grantee requires as a precondition to applying for the permit All work to be performed in the County right-of-way shall comply with all conditions of the County permit and all applicable County requirements. The Grantee may at its option perform any part of the repair with its own forces or require the owner to employ a contractor for that purpose, provided such contractor is approved by the County;

(b) In the event that the County determines emergency repair of such facilities is necessary to halt or prevent significant damage to County road rights-of-way or significant threats to the health, safety and welfare of parties other than the owner or the occupants of the building served by such facilities, the Grantee shall take prompt

remedial action to correct the emergency to the County's approval, which the County shall not unreasonably withhold,

(c) When the County or its contractor provides notice to the Grantee, pursuant to RCW 19.122, of its intent to excavate within County road rights-of-way, the Grantee shall provide to the County or its contractor the best information available from the Grantee's records or, where reasonable, from the use of locating equipment as to the location of such facilities, including surface markings where these would reasonably be of use in the excavation. If the Grantee fails to make good faith efforts to provide the above information within the deadlines provided by RCW 19 122, the Grantee shall hold the County harmless for all reasonable costs that result from damage to such facilities if such damage occurs as a result of the failure to provide such information. Nothing in this subsection is intended or shall be construed to create any rights in any third party or to form the basis for any obligation or liability on the part of the County or the Grantee toward any third party, nor is anything in this subsection intended to be construed to alter the rights and responsibilities of the parties under RCW 19.122, as amended

2002 100 1001676

12. RESTORATION OF COUNTY ROAD RIGHTS-OF-WAY

After work on, under or adjacent to County road rights-of-way, the Grantee is responsible for and will leave all County road rights-of-way in as good a condition as they were in before any work was done. In the event that the Grantee, its contractors, or third parties working under permit should fail to restore County road rights-of-way to the satisfaction of the Director, King County may make such repairs or restorations as are necessary to return the County road rights-of-way to its pre-work condition. Upon presentation of an itemized bill for repairs or restorations, including the costs of labor and equipment, the Grantee will pay the bill within thirty (30) days If suit is brought upon the Grantee's failure to pay for repair and restoration, and if judgment in such a suit is entered in favor of King County, then the Grantee shall pay all of the actual costs, including interest from the date the bill was presented, disbursements, and attorney's fees and litigation related costs incurred.

13 PERFORMANCE OF WORK

The Grantee covenants that in consideration for the rights and privileges granted by this franchise, all work performed by the Grantee on County road rights-of-way shall conform to all County requirements including, but not limited to, the requirements of the current edition of the County Road Standards in force when the work is performed and all traffic control shall also conform to the current edition of the Manual of Uniform Traffic Control Devices in force when the work is performed.

14 BLASTING REQUIREMENTS

The right to operate, maintain, repair and construct Grantee's distribution and service lines and appurtenances granted by this franchise does not preclude King County, its agents or contractors

from blasting, grading, or doing other road work to the Grantee's lines and appurtenances Except in the case of an emergency, the Grantee will be given ten (10) business days written notice of any blasting so that the Grantee may protect its lines and appurtenances If the Grantee notifies the County within ten (10) business days that the facilities will have to be relocated to protect them from blasting, the County will defer the blasting for up to ninety (90) days from the date of the original notice. In no event will the Grantee be given less than two (2) business days written notice of any blasting Notification of any excavation shall be provided through the One-Call System as provided by RCW 19.122, as hereinafter amended.

15 SURVEY MARKERS AND MONUMENTS

It shall be the responsibility of the Grantee performing any construction work in the County road rights-of-way to restore any survey markers or monuments disturbed by such construction in accordance with RCW 58.09.130, and as hereinafter amended

2002 100 1031676

16. ASSIGNMENT

The Grantee shall not have the right to assign this franchise without the consent of the Metropolitan King County Council given by Ordinance No assignment shall be effective unless an acceptance by the assignee of all rights, conditions, terms, provisions, and responsibilities contained within the franchise, as well as surety bonds, which the Council deems necessary to be posted, are received. Council approval of the assignment may be made subject to the assignee's acceptance of new or modified terms of the franchise

17. EXPIRATION AND RENEWAL

To the extent described in Exhibit "A", all rights granted by this franchise to County road rights-of-way outside incorporated Towns and Cities apply to all existing County road rights-of-Way improved and unimproved and to all County road rights-of-way acquired by King County during the term of this franchise

If the Grantee has initiated a renewal of this franchise before it expires, the County may, at its sole discretion, extend the term of the franchise on a month to month basis for up to one year. Should the County elect to extend the franchise, written notice shall be provided to the Grantee before the franchise expiration date

If the Grantee has not applied for a renewal of this franchise before it expires, King County has the right to remove or relocate any lines and appurtenances of the Grantee as is reasonably necessary for the public's health, welfare, safety, or convenience including, but not limited to, the safe operation of County roads, franchise holders, or for the construction, renewing, altering, or improving of any County road right-of-way, or for the installation of lines and/or facilities of other franchise holders Grantee shall be liable for the costs incurred in any removal or relocation of its lines and appurtenances under this section Costs include the expense of labor and equipment

Upon expiration of this franchise, the Grantee shall continue to be responsible for the operation and maintenance of existing facilities in the County road rights-of-way until removed, assigned to another franchised utility or abandoned; however, the Grantee shall not have the right to provide additional services or construct new facilities. King County will issue permits required for the repair and maintenance of the existing facilities in accordance with K.C.C. 14.44 055 as amended and Section 11 of this franchise. This section and sections 8, 10-13 and 15 of this franchise shall continue in force until such time as the lines are removed from County road rights-of-way, assigned to another franchised utility, or abandoned in place with the approval of the Manager of the Department of Transportation, Road Services Division.

18. RESERVATION OF RIGHTS

2602 100 1031676

King County specifically reserves for itself the right to impose a utility tax on the Grantee if State of Washington grants such taxing authority and the local option is exercised by the King County Council

King County also specifically reserves the right to exercise authority it has or may acquire in the future to secure and receive fair market compensation for the use of its property, pursuant to an ordinance. If King County elects to exercise such authority, the fair market compensation requirement for Grantee shall be imposed by ordinance not less than one hundred eighty (180) days after written notice ("Compensation Notice") is delivered to the Grantee, said Compensation Notice identifying with specificity the definition, terms and/or formula to be used in determining such fair market compensation. Acceptance of King County's definition terms and/or formula identified in the Compensation Notice will occur if the Grantee accepts in writing within thirty (30) days of receipt of the Compensation Notice, or, if Grantee takes no action in writing within thirty (30) days of receipt of the Compensation Notice, in which case the applicable ordinance that the King County Council passes will be determinative

Nothing in this section shall be construed as an agreement by the Grantee of King County's right to exercise authority it has or may acquire in the future to secure and receive fair market compensation for the use of property. Nothing in this section shall be construed to prohibit the Grantee from challenging, in King County Superior Court or a court of competent jurisdiction, the legality of such right

Grantee's rejection of the definition, terms, and/or formula identified in the Compensation Notice will only occur if such rejection is in written form, identifying with specificity the grounds for such rejection, and delivered to King County within thirty (30) days after receipt of the Compensation Notice, in which case the below identified arbitration terms will apply.

(a) The Grantee and King County will select one arbitrator each, and the two selected arbitrators will select a third arbitrator. If the two arbitrators have not selected a third arbitrator within thirty (30) days after the selection of the last selection of the two, either the Grantee or King County may apply to the presiding judge of the King County Superior Court for the appointment of a third arbitrator. The three

arbitrators will determine the method for determining the fair market compensation for the County property used by the Grantee The arbitration procedure employed shall be consistent with the rules and procedures of the American Arbitration Association The decision of a majority of the arbitrators will bind both the Grantee and King County. At the conclusion of the arbitration, the arbitrators will submit written reports to the Grantee and King County, which shall contain all pertinent evidence that, led to their conclusion together with an explanation of their reasoning for such conclusion.

(b) The fees of the arbitrators selected by each party shall be paid by that party and the fees of the third arbitrator shall be paid one-half by the County and the Grantee. The County and the Grantee shall share the other costs of the proceeding equally

(c) In event that the question of fair market compensation is not resolved prior to the effective date specified by the ordinance authorizing said compensation, the arbitration decision will be applied retroactively to the effective date in the ordinance The Grantee will pay the retroactive sum plus interest in the amount of twelve percent (12%) per annum

2002 100 1001676

Nothing in this franchise may be construed to limit the exercise of authority now or later possessed by the County or any other governing body having competent jurisdiction to fix just, reasonable and compensatory rates or other requirements for services under this franchise. Nothing in this section shall be construed to prohibit the Grantee from challenging, in King County Superior Court or a court of competent jurisdiction, the authority of the County or any other governing body to fix rates or other requirements for services.

19. COMPLIANCE WITH LAWS

Grantee shall conform to all applicable federal, state and local laws and regulations including, but not limited to, the State Environmental Policy Act and King County environmental standards and ordinances.

20 NON-DISCRIMINATION CLAUSE

In all hiring or employment made possible or resulting from this franchise agreement, there shall be no discrimination against any employee or applicant for employment because of sex, sexual orientation, age, race, color, creed, national origin, marital status or the presence of any sensory, mental, or physical handicap, unless based upon a bona fide occupational qualification, and this requirement shall apply to but not be limited to the following: employment, advertising, lay-off or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship

No person shall be denied, or subjected to discrimination in receipt of the benefit of any services or activities made possible by or resulting from this agreement on the grounds of sex, sexual

orientation, race, color, creed, national origin, age except minimum age and retirement provisions, marital status, or the presence of any sensory, mental or physical handicap

Any violation of this provision shall be considered a violation of a material provision of this agreement and shall be grounds for cancellation, termination or suspension in whole or in part, of the agreement by the County and may result in ineligibility for further County agreements.

The Grantee shall make the best efforts to make opportunities for employment and/or contracting services available to women and minority persons The Grantee recognizes that King County has a policy of promoting affirmative action, equal opportunity and has resources available to assist Grantee in these efforts.

2002 100 1031676

21. PENALTY FOR VIOLATION OF CONDITIONS

If the Grantee shall violate or fail to comply with any of the material terms, conditions, or responsibilities of this franchise through neglect or failure to obey or comply with any notice given the Grantee under the provisions of this franchise or if the Grantee abandons its franchise, the Council may revoke this franchise King County shall give written notice of its intent to revoke this franchise. A public hearing shall be scheduled within forty-five (45) days following the notification. The decision to revoke this franchise will become effective ninety (90) days following the public hearing if the County, by ordinance, finds·

A That the Grantee has not substantially cured the violation or failure to comply which was the basis of the notice; or

B. that the violation or failure to comply which was the basis of the notice is incapable of cure, or

C that the Grantee has repeatedly violated or failed to comply with any of the material terms, conditions, or responsibilities of the franchise, even though the individual violations have been cured, and

D. that the revocation of the franchise is in the public interest.

During the forty-five (45) days following the notification, the Grantee shall have the opportunity to remedy the failure to comply

22 RIGHT OF APPEAL

Decisions, requirements, or approvals of the Director are binding on the parties to this document Appeals from the Director's determinations will be made by filing a complaint with the King County Superior Court

Unofficial Document

23 SEVERANCE

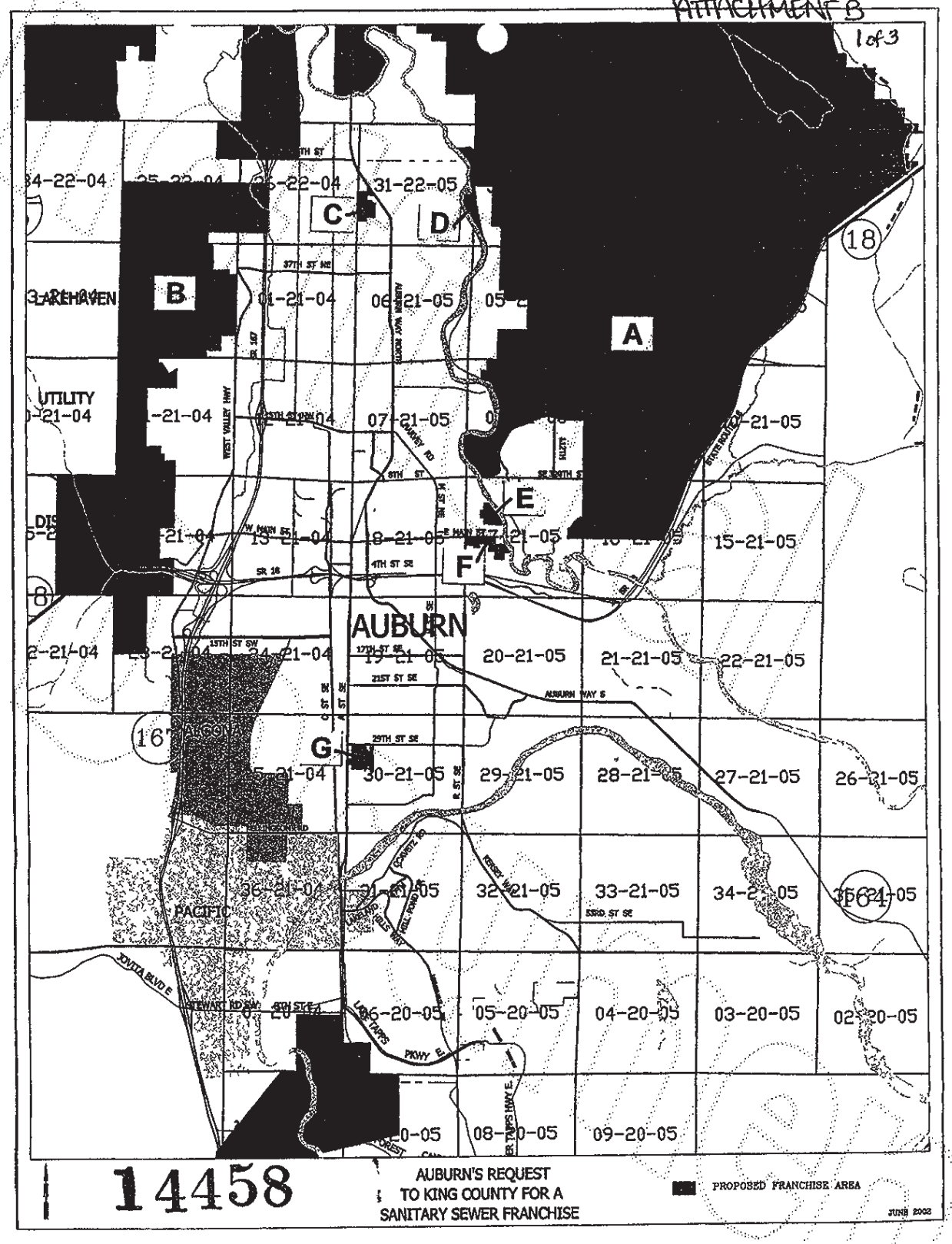
This franchise gives effect to purposes and uses, which are consistent with economical and efficient services rendered in the public interest. If any provision of this franchise, or its application is determined to be invalid by a court of law, then the remaining provisions of this franchise shall continue and remain valid unless the dominant purpose of the franchise would be prevented or the public interest is no longer served

2002 100 1001676

Unofficial Document

ATTACHMENT B
1 of 3

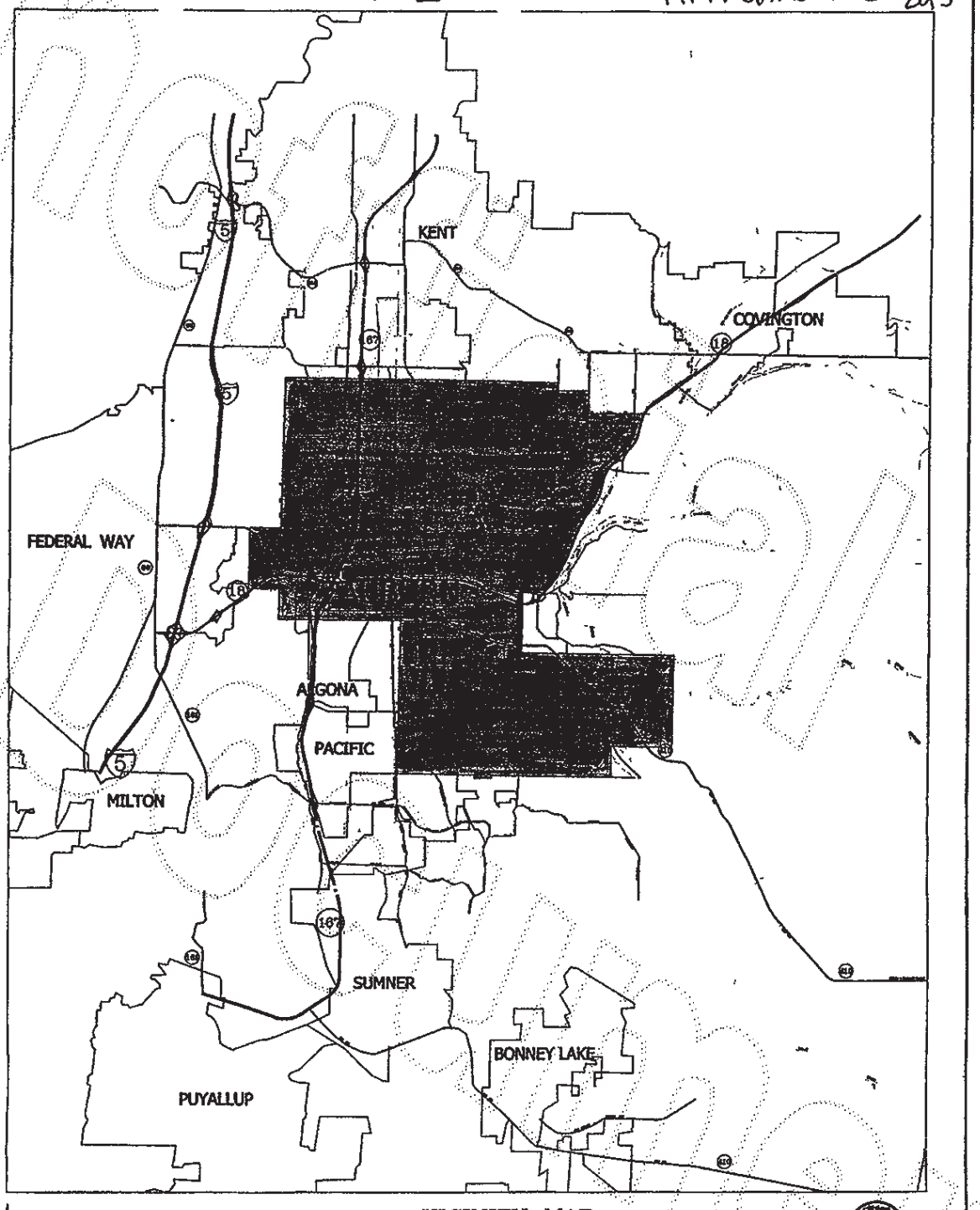
2002 100 1001676



14458

ATTACHMENT B 2 of 3

2002 100 1001676



VICINITY MAP

SCALE 1" = 2 MILES

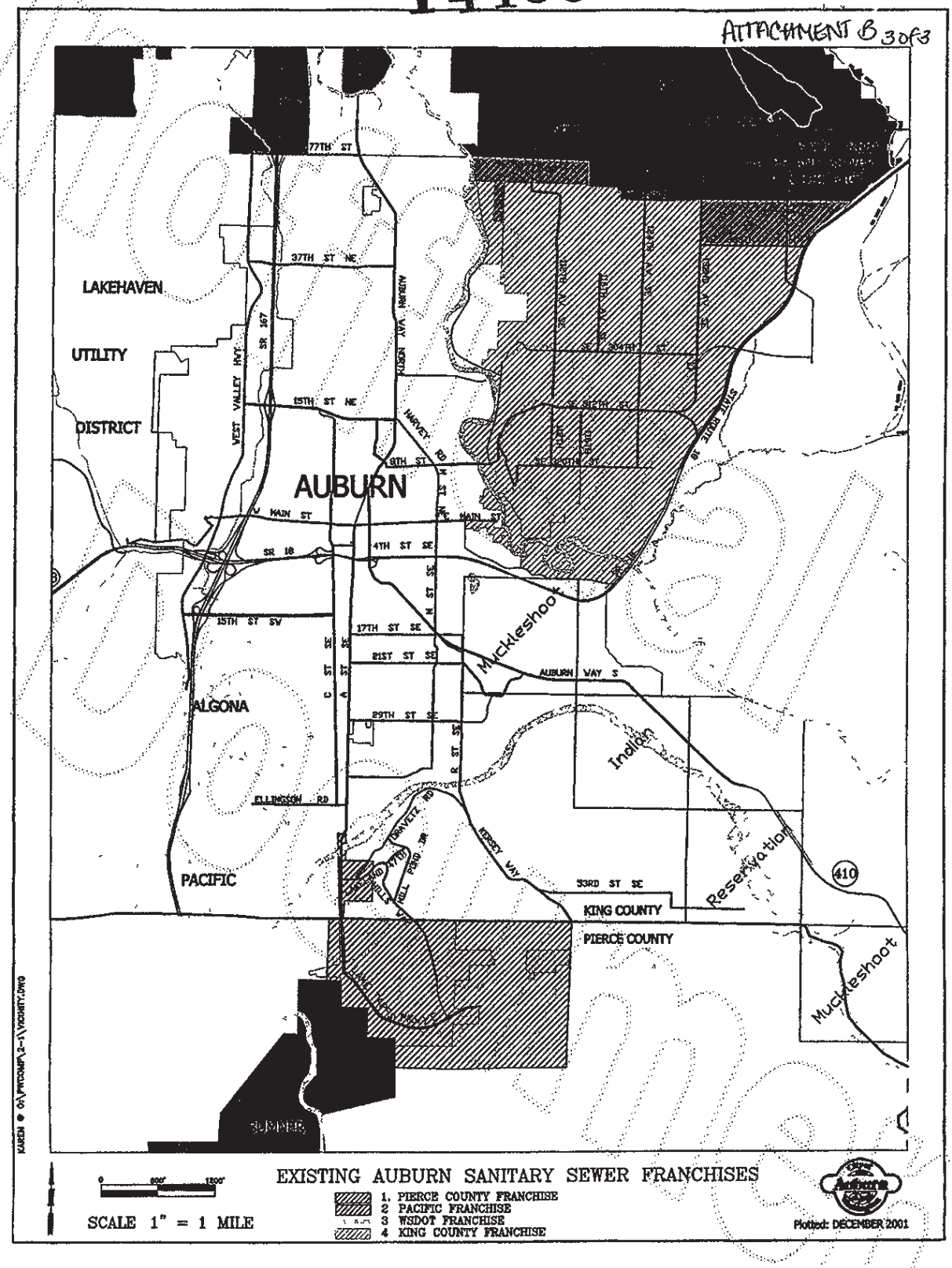
Plotted: DECEMBER 2001

Unofficial Document

14458

ATTACHMENT B 3 of 3

2002 100 1001676



APPENDIX A2

SOOS CREEK WATER AND SEWER DISTRICT

- Service Area Boundaries (Resolution 3321)

RESOLUTION NO. 3321

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, AUTHORIZING THE MAYOR AND CITY CLERK TO EXECUTE AN INTERLOCAL AGREEMENT ESTABLISHING SANITARY SEWER SERVICE BOUNDARIES BETWEEN THE CITY OF AUBURN AND THE SOOS CREEK WATER AND SEWER DISTRICT.

WHEREAS, pursuant to RCW 35A.11.040, Auburn has the legal authority to exercise its powers and perform any of its functions as set forth in RCW 39.34; and

WHEREAS, pursuant to RCW 39.34, the Interlocal Cooperation Act, Auburn has the legal authority to cooperate with other localities on the basis of mutual advantage and provision of services; and

WHEREAS, pursuant to RCW 35A.21.150 Auburn has the legal authority to maintain a sewerage system; and

WHEREAS, pursuant to RCW 57.08.044, Soos Creek Water and Sewer District has the legal authority to provide sewer service to property owners in areas outside existing district boundaries; and

WHEREAS, pursuant to RCW 57.08.044, Soos Creek Water and Sewer District has the legal authority to enter into contracts with any municipal corporation for the purpose of providing sewer service to those property owners outside the existing district boundaries.

NOW, THEREFORE, THE COUNCIL OF THE CITY OF AUBURN, WASHINGTON, IN A REGULAR MEETING DULY ASSEMBLED, HEREWITH RESOLVES THAT:

Section 1. The Mayor and City Clerk of the City of Auburn are herewith authorized to execute an Interlocal Agreement establishing sanitary sewer service boundaries between the City of Auburn and Soos Creek Water and Sewer District District. A copy of said Agreement is attached hereto, denominated as Exhibit "1" and made a part hereof as though set forth in full herein.

Section 2. The Mayor is hereby authorized to implement such administrative procedures as may be necessary to carry out the directives of this legislation.

DATED this 20th day of February, 2001.

CITY OF AUBURN

Charles A. Booth

CHARLES A. BOOTH
MAYOR

ATTEST:

Danielle E. Daskam,
City Clerk

APPROVED AS TO FORM:

Michael J. Reynolds,
City Attorney



Return Address:
Auburn City Clerk
City of Auburn
25 West Main St.
Auburn, WA 98001

RECORDER'S COVER SHEET

Document Title(s) (or transactions contained therein):
10/17 PNWT W-8384-12

INTERLOCAL AGREEMENT BETWEEN CITY OF AUBURN AND THE SOOS CREEK WATER & SEWER DISTRICT FOR THE ESTABLISHMENT OF SANITARY SEWER SERVICE BOUNDARIES

Reference Number(s) of Documents assigned or released:
☐Additional reference #'s on page _____ of document

Grantor(s)/Borrower(s) (Last name first, then first name and initials)

CITY OF AUBURN & SOOS CREEK WATER & SEWER DISTRICT

Grantee/Assignee/Beneficiary: (Last name first)

CITY OF AUBURN & SOOS CREEK WATER & SEWER DISTRICT

Legal Description (abbreviated: i.e. lot, block, plat or section, township, range)

PER RCW 39.34

☐ Additional legal is on page ____ of document.

Assessor's Property Tax Parcel/Account Number

PER RCW 39.34

☐ Assessor Tax # not yet assigned

Said document(s) were filed for record by Pacific Northwest Title as accommodation only. It has not been examined as to proper execution or as to its effect upon title.

2001 040 6001622

SOOS CREEK WATER AND SEWER DISTRICT and CITY OF AUBURN INTERLOCAL AGREEMENT FOR THE ESTABLISHMENT OF SANITARY SEWER SERVICE BOUNDARIES

THIS AGREEMENT, made and entered into this 21st day of March, 2001, by and between the **SOOS CREEK WATER AND SEWER DISTRICT**, a Washington municipal corporation (hereinafter referred to as "Soos Creek"), and the **CITY OF AUBURN**, a Washington municipal corporation, (hereinafter referred to as "Auburn"), both being duly organized and existing under and by virtue of the laws of the State of Washington,

WITNESSETH:

WHEREAS, pursuant to RCW 35A.11.040, Auburn has the legal authority to exercise its powers and perform any of its functions as set forth in RCW 39.34; and

WHEREAS, pursuant to RCW 39.34, the Interlocal Cooperation Act, Auburn has the legal authority to cooperate with other localities on the basis of mutual advantage and provision of services; and

WHEREAS, pursuant to RCW 35A.21.150 Auburn has the legal authority to maintain a sewerage system; and

WHEREAS, pursuant to RCW 57.08.044, Soos Creek has the legal authority to provide sewer service to property owners in areas outside existing district boundaries; and

WHEREAS, pursuant to RCW 57.08.044, Soos Creek has the legal authority to enter into contracts with any municipal corporation for the purpose of providing sewer service to those property owners outside the existing district boundaries, and

WHEREAS, the parties recognize the responsibility of public sanitary sewer utilities to provide efficient and reliable service to their customers at reasonable cost; and

WHEREAS, Auburn desires new development within it's Potential Annexation Area to complete a Pre-annexation agreement with Auburn prior to receiving a certificate of sanitary sewer availability; and

WHEREAS, portions of the Soos Creek sanitary sewer system have been sized and are situated so as to be capable of affording sewer service to a portion of Auburn's Potential Annexation Area; and

2001 040 6001622

WHEREAS, Auburn has evaluated and determined it is not cost feasible to provide sewer service to those properties located within Auburn's Potential Annexation Area adjacent to Soos Creek's sanitary sewer infrastructure; and

WHEREAS, the parties desire to allow Soos Creek to construct, reconstruct, repair and maintain sewer facilities as necessary, and to authorize connections for service to noted areas, or portions thereof; and

WHEREAS, Soos Creek's sewer service to these areas will provide for maximum efficient use of existing and future facilities together with orderly and efficient sanitary sewer planning.

NOW, THEREFORE:

IT IS HEREBY AGREED by and between the parties hereto as follows:

1. **Sewer Service Area.** The parties have agreed to a permanent sewer service area boundary between them. The boundary is graphically depicted on the map attached hereto as Exhibit "A", which is by this reference incorporated herein. Both parties further agree that Soos Creek in providing sewer service to the area shown on Exhibit "A", as "Area To Be Served By Soos Creek", shall be furnishing sewer service to properties within Auburn's Potential Annexation Area. Soos Creek shall provide service in accordance with and subject to the terms and conditions of this Agreement.

2. **Service Area Responsibility.** Auburn shall have responsibility to provide sanitary sewer service to the area(s) on Auburn's side of the respective service area boundaries as delineated by this agreement, whether or not annexed to Auburn, and subject to such reasonable conditions and terms of service as Auburn deems appropriate. Soos Creek shall have responsibility to provide sanitary sewer service to the area(s) on Soos Creek's side of the respective service area boundaries as delineated by this agreement, whether or not annexed to Auburn, and subject to such reasonable conditions and terms of service as Soos Creek deems appropriate. Auburn hereby gives consent to Soos Creek for such service within Soos Creek's corporate boundaries as they presently exist, or as they may be modified in the future by annexation. Soos Creek shall be responsible for obtaining all necessary governmental franchises, approvals, easements and permits for the installation of said sewerage system within their delineated boundary.

3. **Sewer Availability Certificates.** Both parties acknowledge that Auburn may exercise planning jurisdiction over territory to which it will not provide sanitary sewer service in accordance with this agreement. Auburn hereby agrees that its planning shall be for sanitary sewer service to be provided by Soos Creek in those areas shown in Exhibit "A" as Soos Creek's service area; provided, however, that commencing on March 1, 2001, Soos Creek sewer availability certificates for all

2001 040 6001622

service areas to be served by Soos Creek within Auburn and/or Auburn's Potential Annexation Area (PAA) in accordance herewith, shall be issued to applicants for sewer service only through Auburn.

4. Soos Creek Comprehensive Sewer Planning Area. The terms of this agreement will be included as an element of Soos Creek's Comprehensive Sewerage Plan. Soos Creek will submit to Auburn all Comprehensive Sewerage Plans thereto involving area and/or system improvements within Auburn's planning area. The Comprehensive Sewerage Plans and amendments shall be in compliance with Auburn's Standards for sanitary sewer service within Auburn and/or Auburn's PAA, except where preexisting facilities may differ from Auburn's standards. As facilities are replaced or as new facilities are planned and constructed within Auburn and/or Auburn's PAA, they shall conform to Auburn's service and facility standards for sanitary sewer service then in effect.

5. Auburn Comprehensive Plan. The terms of this agreement will be included as an element of the sewerage portion of Auburn's Comprehensive Plan, and Soos Creek's Comprehensive Plan.

6. Future Annexations. Each of the parties agree that Soos Creek shall provide sanitary sewer service to the areas shown in Exhibit "A" without regard to the present corporate limits of the parties, and without regard to future corporate limits as they may be amended by annexation to either party.

2001 040 0001622

7. Reliance. Each party hereto acknowledges that the terms hereof will be relied upon by the other in its comprehensive planning to meet the needs of the service area designated herein.

8. Liability. Neither party to this agreement shall be liable for any failure or interruption of service in the service area of the other party, as designated herein, except as may be specifically caused by the other party.

9. Government Approvals. The parties will give notice of the adoption of this Agreement to Metropolitan/King County, to the Department of Ecology, to the Department of Health, and to any other agency with jurisdiction or mission relevant to the terms hereof, and shall cooperate and assist in all reasonable manner in procuring any necessary approvals hereof by those agencies.

10. Boundary Review Board. In the event that implementation of the terms hereof results in permanent sewer service to areas that will be outside the respective service boundaries of Soos Creek or Auburn, the parties will at the time of such service jointly seek approval of the King County Boundary Review Board in accordance with R.C.W. 36.93.090.

11. Service Amendments. Any changes to the service areas described herein shall be by mutual agreement. Each party may give permission to the other on a case-by-case basis to provide service by one party into the other party's adjacent or nearby service area based upon considerations of economic efficiency for providing the service with mutual consent of Auburn's Director of Public Works and Soos Creek's District Manager.

12. Alteration, Amendment, Modification, or Termination. Soos Creek and Auburn hereby reserve the right to alter, amend modify or terminate the terms and conditions of this Agreement upon consent of both Parties given in writing.

13. Indemnification and Hold Harmless. Each Party hereto agrees to protect, defend, and indemnify the other Party, its officers, officials, employees and agents from any and all cost, claims judgements and/or awards of damages, arising out of or in any way resulting from the Party's default, failure of performance, or negligent conduct associated with this agreement, by the Party, its employees, subcontractors or agents. Each Party agrees that its obligations under this provision extend to any claim, demand, and/or cause of action brought by or on behalf of any of its employees, or agents. The foregoing indemnity is specifically and expressly intended to constitute a waiver of each Party's immunity under Washington's Industrial Insurance Act, RCW Title 51, as respects the other Party only, and only to the extent necessary to provide each Party with a full and complete indemnity of claims made by the other Party's employees. The Parties acknowledge that these provisions were specifically negotiated and agreed upon by them.

In the event either Party incurs any costs including attorney fees to enforce the provisions of this article and prevails in such enforcement action, all such costs and fees shall be recoverable from the losing Party.

The provisions of this section shall survive the expiration or earlier termination of this agreement with regard to any event that occurred prior to or on the date of such expiration or earlier termination.

14. Dispute Resolution. In the event that any dispute arises between the Parties, either Party may request in writing that the issue in dispute be resolved by Mediation and, if necessary, binding Arbitration. In the event the matter cannot be resolved by the mediation process then it shall go promptly to binding Arbitration with no right of appeal. Arbitration shall be by the American Arbitration Association, or by such other entity as the Parties agree.

15. Sanctity of Agreement. This agreement constitutes the entire agreement of the parties regarding the subject matter hereof, and there are no other representations or oral agreements other than those listed herein, which vary the

2001 040 0001622

terms of this agreement. Future agreements may occur between the parties to transfer additional or future service areas by mutual agreement.

16. Obligation Intact. Nothing herein shall be construed to alter the rights, responsibilities, liabilities, or obligations of either Soos Creek or Auburn regarding provision of sewer service, except as specifically set forth herein.

SOOS CREEK WATER AND SEWER DISTRICT

Approved by Resolution No. 2141-S of the Soos Creek Water and Sewer District, Washington, at its regular meeting held on the 21st day of March, 2001.

By:

~~Ben Spear~~, President of Board
Karen L. Webster

Attest:

Secretary of Board
Philip W. Sullivan

Approved as to form:

Soos Creek Attorney
Michael R. Harris

2001 040 6001622

CITY OF AUBURN

Approved by Resolution No. 3321 of the City of Auburn, Washington, at its regular meeting held on the 20th day of February, 2001.

By:

Charles A. Booth, Mayor

Attest:

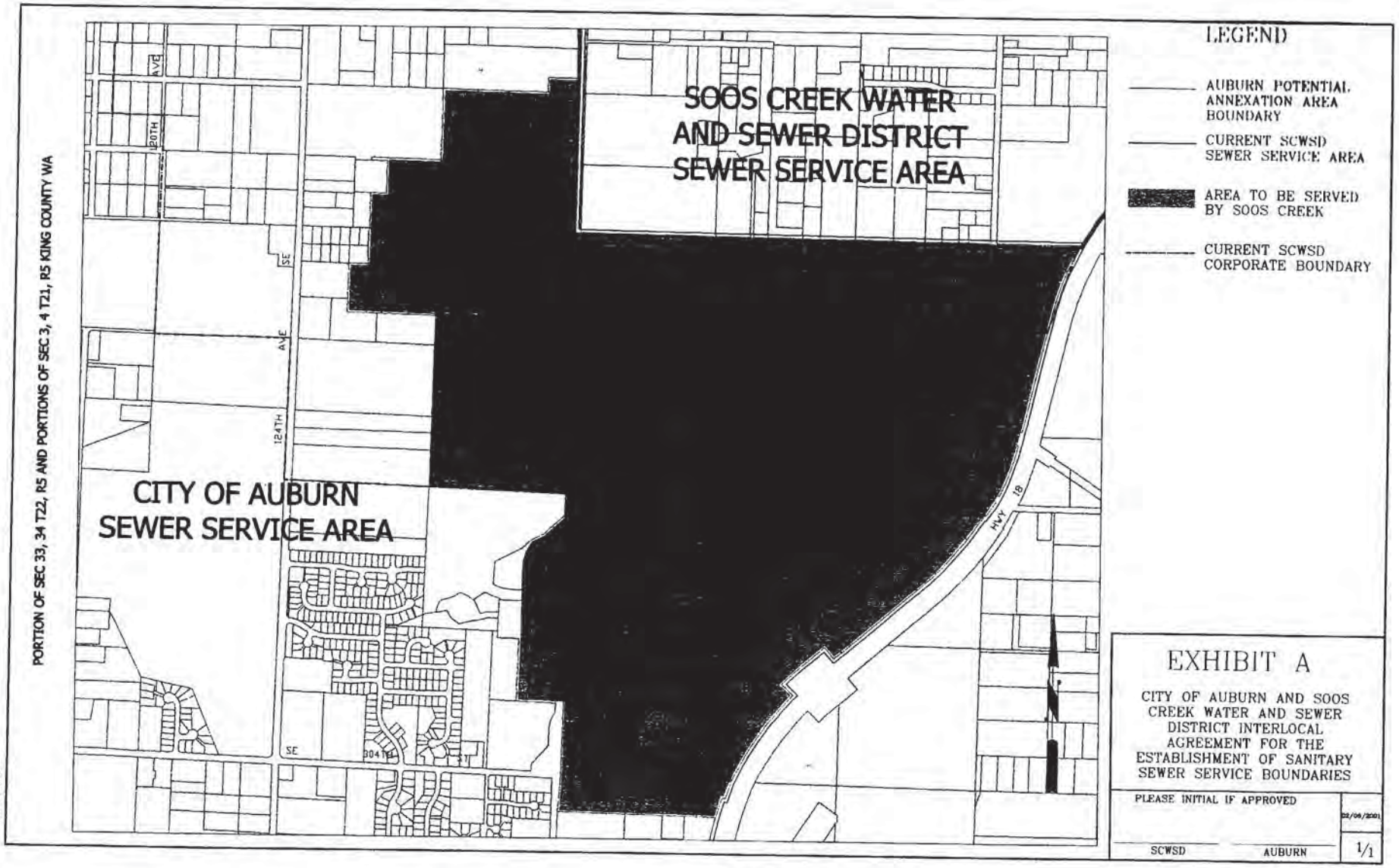
Danielle Daskam, City Clerk

THE CITY OF AUBURN CORPORATE SEAL

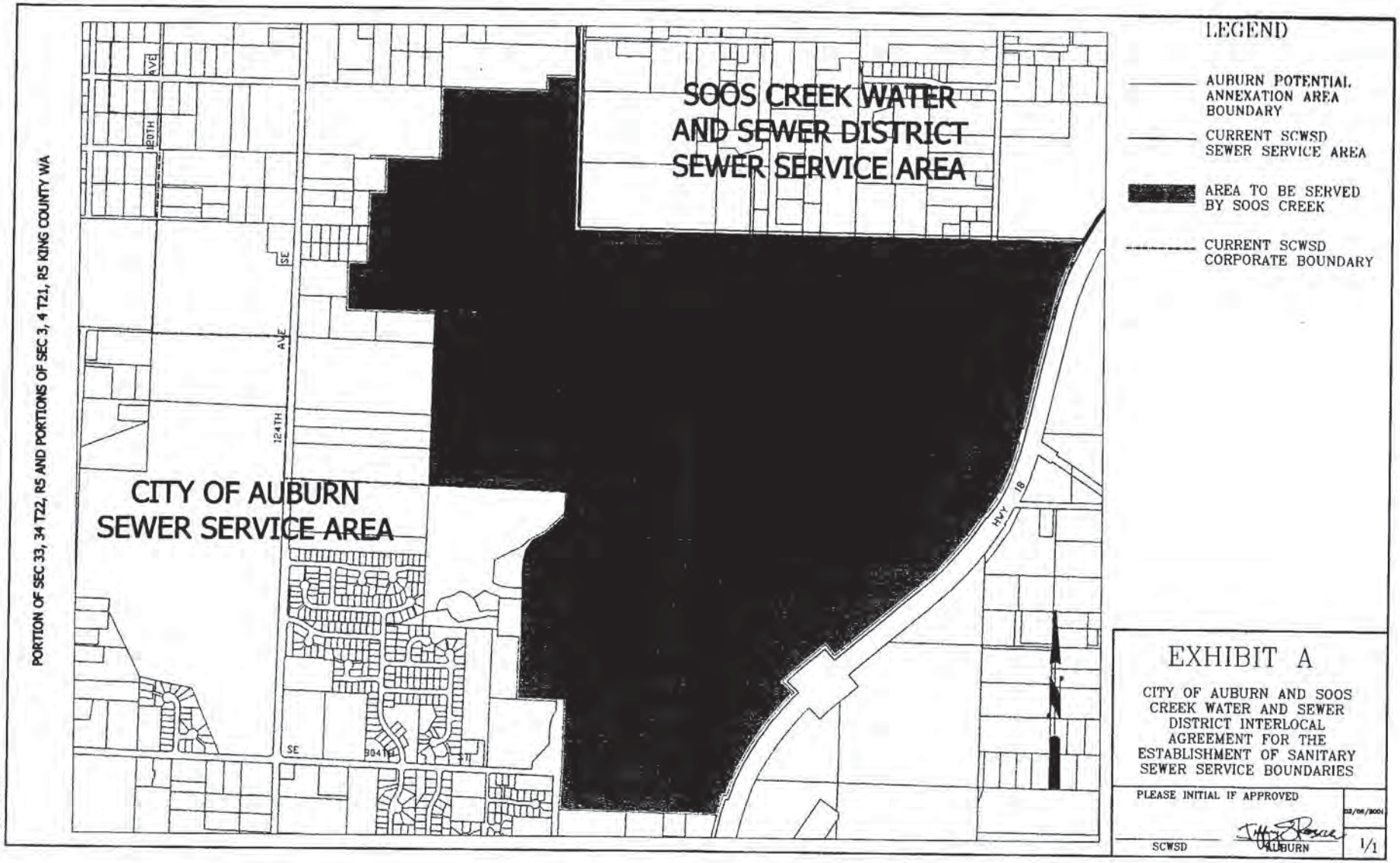
Approved as to form:

Michael Reynolds, City Attorney

2001 040 6001622



2001 040 6001622



2001 040 6001622

JUNE 2000

LEGEND

- SCWSD CORPORATE BOUNDARY
- SCWSD SEWER PLANNING AREA BOUNDARY
- CITY OF KENT CORPORATE BOUNDARY
- CITY OF AUBURN SEWER SERVICE AREA BOUNDARY
- SEWER SERVICE DIVISION LINE

EXHIBIT "A"

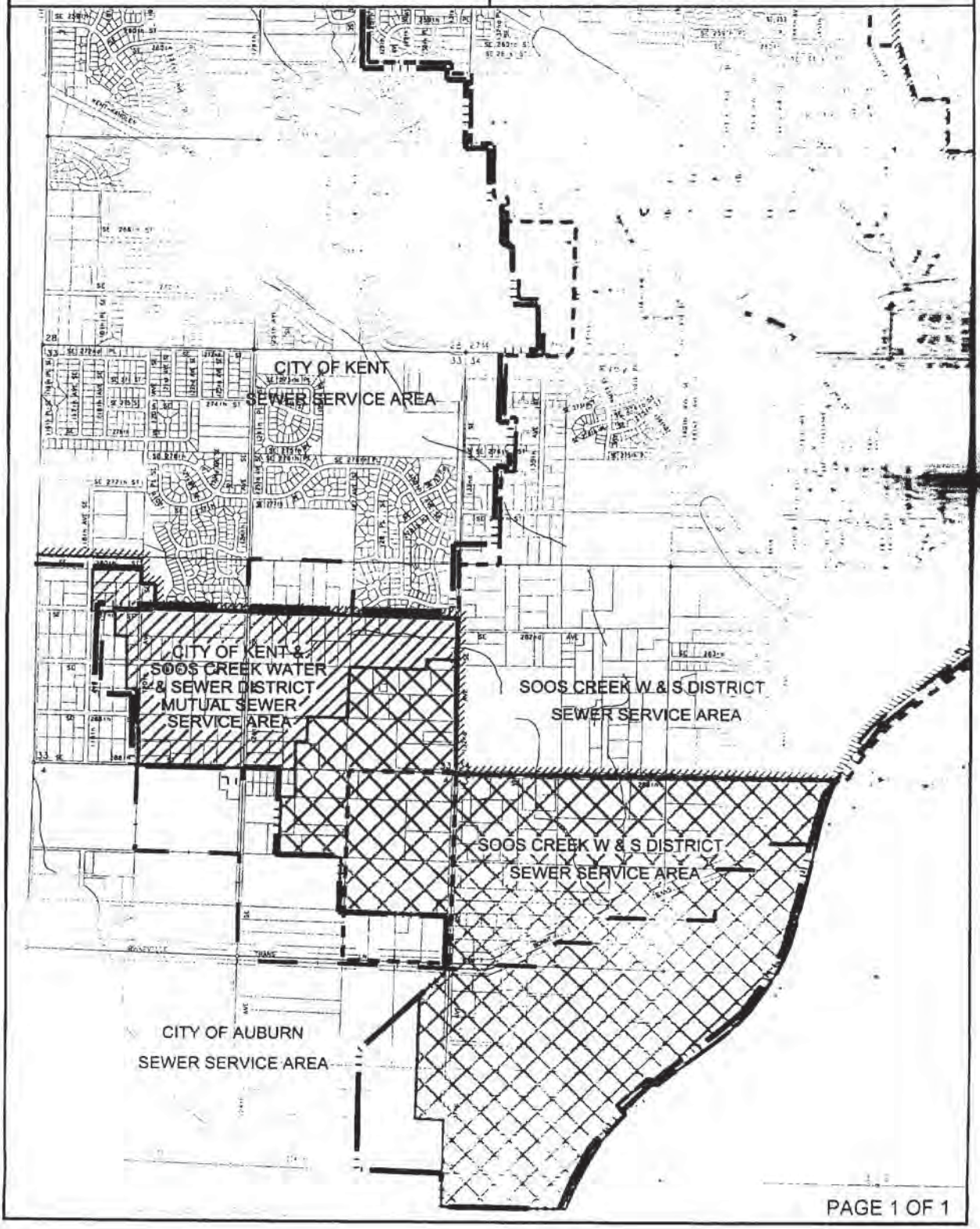
CITY OF AUBURN / SOOS CREEK WATER & SEWER DISTRICT INTERLOCAL AGREEMENT

PROPOSED SEWER SERVICE PLANNING AREAS

APPROVAL

SOOS CREEK W & S DISTRICT

CITY OF AUBURN



PAGE 1 OF 1

2001 040 6001622

APPENDIX A3

CITY OF KENT

- Sewer Service Boundaries (Resolution 3322)

RESOLUTION NO. 3322

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, AUTHORIZING THE MAYOR AND CITY CLERK TO EXECUTE AN INTERLOCAL AGREEMENT ESTABLISHING SANITARY SEWER SERVICE BOUNDARIES BETWEEN THE CITY OF AUBURN AND THE CITY OF KENT.

WHEREAS, pursuant to RCW 35A.11.040 Auburn and Kent have the legal authority to exercise their powers and perform any of their functions as set forth in RCW 39.34; and

WHEREAS, pursuant to RCW 39.34, the Interlocal Cooperation Act, Auburn and Kent have the legal authority to cooperate with other localities on the basis of mutual advantage and provision of services; and

WHEREAS, pursuant to RCW 35A.21.150 Auburn and Kent have the legal authority to maintain a sewerage system.

NOW, THEREFORE, THE COUNCIL OF THE CITY OF AUBURN, WASHINGTON, IN A REGULAR MEETING DULY ASSEMBLED, HEREWITH RESOLVES THAT:

Section 1. The Mayor and City Clerk of the City of Auburn are herewith authorized to execute an Interlocal Agreement establishing sanitary sewer service boundaries between the City of Auburn and the City of Kent. A copy of said Agreement is attached hereto, denominated as Exhibit "1" and made a part hereof as though set forth in full herein.

Section 2. The Mayor is hereby authorized to implement such administrative procedures as may be necessary to carry out the directives of this legislation.

DATED this 20th day of February, 2001.

CITY OF AUBURN

Charles A. Booth

CHARLES A. BOOTH
MAYOR

ATTEST:

Danielle E. Daskam

Danielle E. Daskam,
City Clerk

APPROVED AS TO FORM:

Michael J. Reynolds,
City Attorney



20010406001623
PACIFIC NW TIT AG 14.00
PAGE 001 OF 007
04/06/2001 15:37
KING COUNTY, WA

Return Address:
Auburn City Clerk
City of Auburn
25 West Main St.
Auburn, WA 98001

2001 040 6001623

RECORDER'S COVER SHEET

Document Title(s) (or transactions contained therein):
7/14 PNWT W-8385-12

INTERLOCAL AGREEMENT BETWEEN CITY OF AUBURN AND THE CITY OF KENT FOR THE ESTABLISHMENT OF SANITARY SEWER SERVICE BOUDNARIES

Reference Number(s) of Documents assigned or released:
☐Additional reference #'s on page _____ of document

Grantor(s)/Borrower(s) (Last name first, then first name and initials)

CITY OF AUBURN & CITY OF KENT

Grantee/Assignee/Beneficiary: (Last name first)

CITY OF AUBURN & CITY OF KENT

Legal Description (abbreviated: i.e. lot, block, plat or section, township, range)

PER RCW 39.34

☐ Additional legal is on page ____ of document.

Assessor's Property Tax Parcel/Account Number

PER RCW 39.34

☐ Assessor Tax # not yet assigned

Said document(s) were filed for record by Pacific Northwest Title as accommodation only. It has not been examined as to proper execution or as to its effect upon title.

CITY OF KENT and CITY OF AUBURN INTERLOCAL AGREEMENT FOR THE ESTABLISHMENT OF SANITARY SEWER SERVICE BOUNDARIES

THIS AGREEMENT, made and entered into this 5th day of March, 2001, by and between the **CITY OF KENT**, a Washington municipal corporation (hereinafter referred to as "Kent"), and the **CITY OF AUBURN**, a Washington municipal corporation, (hereinafter referred to as "Auburn"), both being duly organized and existing under and by virtue of the laws of the State of Washington,

WITNESSETH:

WHEREAS, pursuant to RCW 35A.11.040 Auburn and Kent have the legal authority to exercise their powers and perform any of their functions as set forth in RCW 39.34; and

WHEREAS, pursuant to RCW 39.34, the Interlocal Cooperation Act, Auburn and Kent have the legal authority to cooperate with other localities on the basis of mutual advantage and provision of services; and

WHEREAS, pursuant to RCW 35A.21.150 Auburn and Kent have the legal authority to maintain a sewerage system; and

WHEREAS, the parties recognize the responsibility of public sanitary sewer utilities to provide efficient and reliable service to their customers at reasonable cost; and

WHEREAS, Auburn desires new developments within it's Potential Annexation Area to complete a Pre-annexation agreement with Auburn prior to receiving a certificate of sanitary sewer availability; and

WHEREAS, portions of the Kent sanitary sewer system have been sized and are situated so as to be capable of affording sewer service to a portion of Auburn's Potential Annexation Area; and

WHEREAS, Auburn has evaluated and determined it is not cost feasible to provide direct sewer service to Auburn's Potential Annexation Area property existing adjacent to Kent's sanitary sewer infrastructure; and

2001 040 0001623

WHEREAS, the parties desire to allow Kent to construct, reconstruct, repair and maintain sewer facilities as necessary, and to authorize connections to Kent's sewer system for service to noted areas, or portions thereof; and

WHEREAS, Kent's sewer service to these areas will provide for maximum efficient use of existing and future facilities together with orderly and efficient sanitary sewer planning.

NOW, THEREFORE:

IT IS HEREBY AGREED by and between the parties hereto as follows:

1. Sewer Service Area. The parties have agreed to a sewer service area boundary between them. The boundary is graphically depicted on the map attached hereto as Exhibit "A", which is by this reference incorporated herein. Both parties further agree that Kent in providing sewer service to the area shown on Exhibit "A", as Area To Be Served By Kent, shall be furnishing sewer service to properties within Auburn's Potential Annexation Area. Kent shall provide service in accordance with and subject to the terms and conditions of this Agreement.

2. Management, Regulation and Control of Sewer System. Kent shall have the sole responsibility and authority to construct, maintain, manage, conduct and operate its sewerage system as installed within the area described in Exhibit "A", together with any additions, extensions and betterments thereto. Kent shall also be responsible for obtaining all necessary governmental franchises, approvals, easements and permits for the installation of said sewerage system as described above.

2001 040 6001623

3. Service Rates and Connection Charges.

a) **Permit Required.** No connection shall be made to Kent's sanitary sewer system unless the property owner first pays the associated fees and submits the proper information to obtain a Kent sanitary sewer connection permit. The connection shall be subject to inspection and approval for compliance with Kent's Sanitary Sewer Standards as adopted at the time the connection is made.

b) **Rates.** The rates charged to the sanitary sewer customer by Kent within the area described in Exhibit "A" shall be fixed, altered, regulated and controlled by Kent pursuant to all applicable laws or regulations promulgated on the subject of rates and charges for sewer service. No surcharge shall be charged to the customers served under this agreement on the sole basis that those customers are within Auburn's Potential Annexation Area.

4. Planning Areas. Kent hereby acknowledges the region to be within Auburn's Potential Annexation Area. Both parties acknowledge that Auburn desires a Pre-annexation Agreement from property seeking a sewer certificate of availability within Auburn's Potential Annexation Area.

5. Sewer Availability Certificates. Commencing on March 1, 2001, Kent shall issue sewer availability certificates for property within the area described in Exhibit "A". Kent agrees not to issue the availability certificate or any side sewer permit in the case of an existing development until Kent receives a copy of the City of Auburn Pre-Annexation Agreement in a form accepted and approved by the City of Auburn.

6. Future Annexations. Each of the parties agree that Kent shall provide sanitary sewer service to the areas shown in Exhibit "A" without regard to the present corporate limits of the parties, and without regard to future corporate limits as they may be amended by annexation to either party.

7. Kent Comprehensive Sewer Planning. The terms of this Agreement will be included as an element of Kent's Comprehensive Sewerage Plan. Kent will submit to Auburn all Comprehensive Sewerage Plans and amendments thereto involving area and/or system improvements within Auburn's planning area.

8. Auburn Comprehensive Planning. The terms of this Agreement will be included as an element of the sewerage portion of Auburn's Comprehensive Plan.

2001 040 6001623

9. Reliance. Each party hereto acknowledges that the terms hereof will be relied upon by the other in its comprehensive planning to meet the needs of the service area designated herein.

10. Liability. Neither party to this agreement shall be liable to the other party for any failure or interruption of service in the service area of the other party.

11. Government Approvals. The parties will give notice of the adoption of this Agreement to Metropolitan/King County, to the Department of Ecology, to the Department of Health, and to any other agency with jurisdiction or mission relevant to the terms hereof, and shall cooperate and assist in all reasonable manner in procuring any necessary approvals hereof by those agencies.

12. Boundary Review Board. In the event that implementation of the terms hereof results in permanent sewer service to areas that will be outside the respective service boundaries of Kent or Auburn, the parties will at the time of such service jointly seek approval of the King County Boundary Review Board in accordance with R.C.W. 36.93.090.

13. Service Amendments. Any changes to the service areas described herein shall be by mutual agreement. Each party may give permission to the other on a

case-by-case basis to provide service by one party into the other party's adjacent or nearby service area based upon considerations of economic efficiency for providing the service with mutual consent of the Director of Public Works from both jurisdictions.

14. Alteration, Amendment or Modification. Kent and Auburn hereby reserve the right to alter, amend or modify the terms and conditions of this Agreement upon written agreement of both parties to such alteration, amendment or modification.

15. Sanctity of Agreement. This agreement constitutes the entire agreement of the parties regarding the subject matter hereof, and there are no other representations or oral agreements other than those listed herein, which vary the terms of this agreement. Future agreements may occur between the parties to transfer additional or future service areas by mutual agreement.

16. Obligation Intact. Nothing herein shall be construed to alter the rights, responsibilities, liabilities, or obligations of either Kent or Auburn regarding provision of sewer service, except as specifically set forth herein.

2001 040 0001623

CITY OF KENT
Approved by ~~Resolution No~~. MOTION of the City of Kent, Washington, at its regular meeting held on the 6TH day of FEBRUARY, 2001.

By:

Mayor

Attest:

Brenda Jacober
City Clerk, City of Kent

Approved as to form:

Kent City Attorney, DEPUTY

CITY OF AUBURN

Approved by Resolution No. 3322, of the City of Auburn, Washington, at its regular meeting held on the 20th day of February, 2001.

By: Attest:

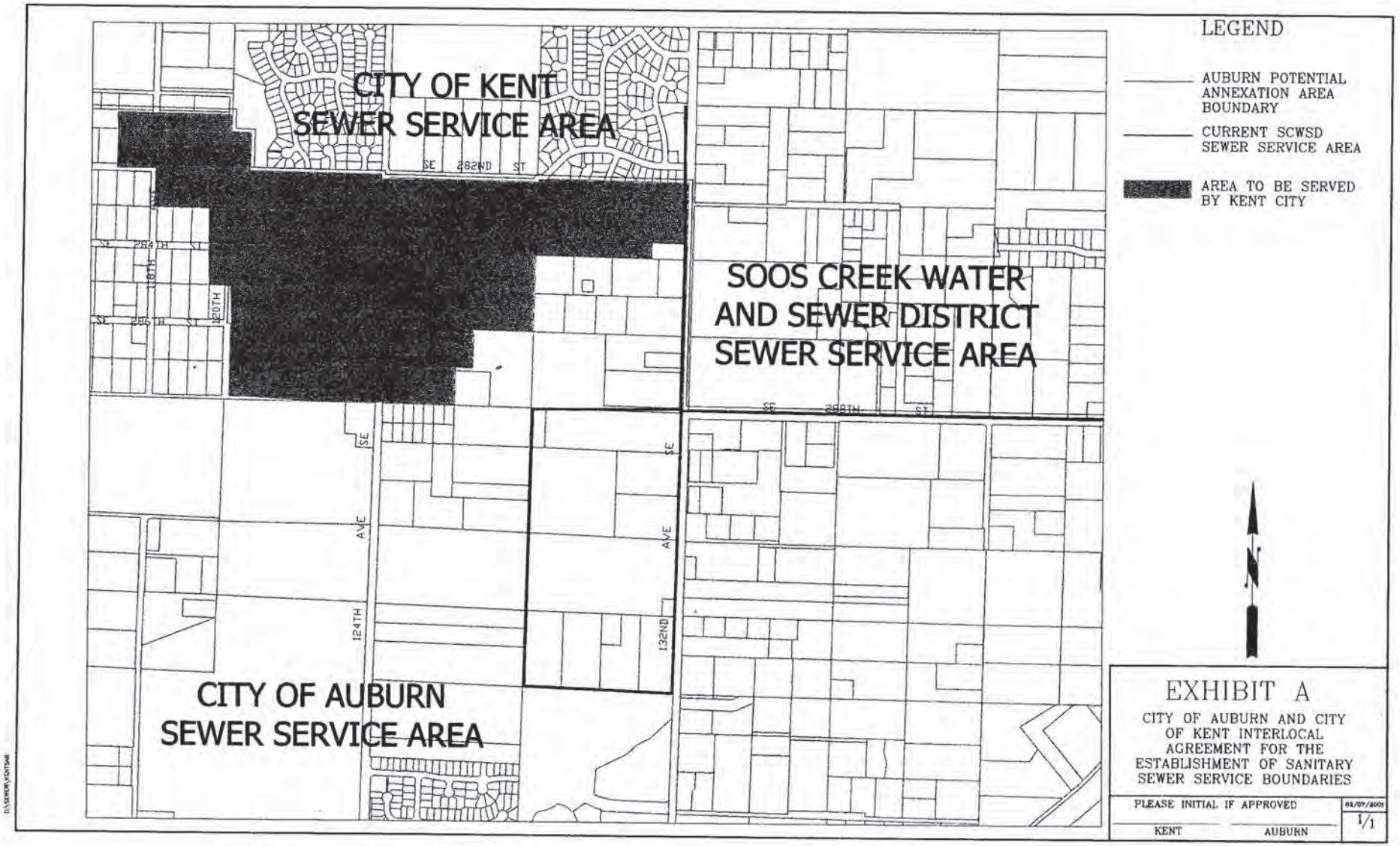
Charles A. Booth
Charles A. Booth, Mayor

Danielle Daskam
Danielle Daskam, City Clerk

Approved as to form:

Auburn City Attorney

2001 040 6001623



200104060016 23

APPENDIX A4

CITY OF PACIFIC

- Sewer Service Boundaries (Resolutions 4335 and 730)

RESOLUTION NO. 4335

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, AUTHORIZING THE MAYOR AND CITY CLERK TO EXECUTE AN INTERLOCAL AGREEMENT ESTABLISHING SANITARY SEWER SERVICE BOUNDARIES BETWEEN THE CITY OF AUBURN AND THE CITY OF PACIFIC

WHEREAS, pursuant to RCW 35A.11.040 and RCW 35A.21.150 the City of Auburn ("Auburn") and the City of Pacific ("Pacific") have the authority to exercise a wide variety of municipal powers, including providing sewer service; and

WHEREAS, pursuant to RCW 39.34, the Interlocal Cooperation Act, Auburn and Pacific have the legal authority to cooperate with other localities on the basis of mutual advantage and provision of municipal services; and

WHEREAS, the parties recognize the responsibility of public sanitary sewer utilities to provide efficient and reliable service to their customers at reasonable cost; and

WHEREAS, portions of the Auburn sanitary sewer system have been sized and are situated so as to be capable of affording public sanitary sewer service to a portion of Pacific; and

WHEREAS, Pacific has evaluated and determined it is in Pacific's best interest to allow Auburn to provide sanitary sewer service to property within

Pacific's municipal boundary that lies in the vicinity of Auburn's sanitary sewer infrastructure; and

WHEREAS, Auburn has sufficient wastewater conveyance capacity within their sanitary sewer facilities to support these adjustments to the existing sanitary sewer service areas; and

WHEREAS, Auburn's delivery of sanitary sewer service to these areas will provide the maximum efficiency in the use of existing and future facilities, together with orderly and efficient sanitary sewer planning.

NOW, THEREFORE, THE COUNCIL OF THE CITY OF AUBURN, WASHINGTON, IN A REGULAR MEETING DULY ASSEMBLED, HEREWITH RESOLVES THAT:

Section 1. The Mayor and City Clerk of the City of Auburn are herewith authorized to execute an Interlocal Agreement establishing sanitary sewer service boundaries between the City of Auburn and the City of Pacific, which agreement shall be in substantial conformity with the Agreement a copy of which is attached hereto, marked as Exhibit "A" and incorporated herein by this reference.

Section 2. The Mayor is hereby authorized to implement such administrative procedures as may be necessary to carry out the directives of this legislation.

Section 3. This resolution shall be in full force and effect upon passage and signatures hereon.

DATED this 5th day of May, 2008.

CITY OF AUBURN

PETER B. LEWIS
MAYOR

ATTEST:

Danielle E. Daskam, City Clerk

APPROVED AS TO FORM:

Daniel B. Heid, City Attorney

INTERLOCAL AGREEMENT
between
CITY OF PACIFIC and CITY OF AUBURN
for the
THE ESTABLISHMENT OF SANITARY SEWER SERVICE BOUNDARIES

THIS AGREEMENT, made and entered into by and between the **CITY OF PACIFIC**, a Washington municipal corporation (hereinafter referred to as "Pacific"), and the **CITY OF AUBURN**, a Washington municipal corporation, (hereinafter referred to as "Auburn"), both being duly organized and existing under and by virtue of the laws of the State of Washington,

WITNESSETH:

WHEREAS, pursuant to RCW 35A.11.040 Auburn and Pacific have the legal authority to exercise their powers and perform any of their functions as set forth in RCW 39.34; and

WHEREAS, pursuant to RCW 39.34, the Interlocal Cooperation Act, Auburn and Pacific have the legal authority to cooperate with other localities on the basis of mutual advantage and provision of services; and

WHEREAS, pursuant to RCW 35A.21.150 Auburn and Pacific have the legal authority to maintain a sewerage system; and

WHEREAS, the parties recognize the responsibility of public sanitary sewer utilities to provide efficient and reliable service to their customers at reasonable cost; and

WHEREAS, portions of the Auburn sanitary sewer system have been sized and are situated so as to be capable of affording public sanitary sewer service to a portion of Pacific; and

WHEREAS, Pacific has evaluated and determined it is in Pacific's best interest to allow Auburn to provide sanitary sewer service to property within Pacific's municipal boundary that lies in the vicinity of Auburn's sanitary sewer infrastructure; and

WHEREAS, Auburn has sufficient wastewater conveyance capacity within their sanitary sewer facilities to support these adjustments to the existing sanitary sewer service areas; and

WHEREAS, the parties desire to allow Auburn to construct, reconstruct, repair and maintain sewer facilities, and to authorize connections to Pacific's sewer system for service to the areas noted in Attachment "A"; and

WHEREAS, Auburn's delivery of sanitary sewer service to these areas will provide the maximum efficiency in the use of existing and future facilities, together with orderly and efficient sanitary sewer planning.

NOW, THEREFORE:

IT IS HEREBY AGREED by and between the parties hereto as follows:

1. **Sewer Service Area.** The parties have agreed that Auburn will provide sanitary sewer service to a portion of Pacific as graphically depicted on the map attached hereto as Attachment "A", which is by this reference incorporated herein. Both parties further agree that Auburn, in providing sewer service to the area as shown on Attachment "A", shall be furnishing sewer service to properties within Pacific's water service area and Pacific's municipal jurisdiction in accordance with and subject to the terms and conditions of this Agreement.

2. **Management, Regulation and Control of Sewer System.** Auburn shall have the sole responsibility and authority to construct, maintain, manage and operate its sewerage system as installed within the areas described in Attachment "A", together with any additions, extensions and betterments thereto. Auburn shall also be responsible for obtaining all necessary governmental franchises, approvals, easements and permits for the installation, maintenance, and operation of said sewerage systems as described above.

3. **Rates, Charges, Permits, and Billing Responsibilities.** Through this Agreement Auburn will be responsible to own, operate, and maintain the sanitary sewer system including private side sewers within the public right of way. Auburn shall issue certificates of sewer availability when requested by the property owners.

No connection or modification shall be made to Auburn's sanitary sewer system and or private side sewer services connected to Auburn's sewer system unless the property owner first pays the associated fees and submits the proper information to obtain an Auburn sanitary sewer permit. Sanitary sewer permits shall be subject to inspection and approval for compliance with Auburn's Sanitary Sewer Standards as adopted at the time the connection is made.

The rates charged to Auburn's sanitary sewer customers shall be fixed, altered, regulated and controlled by Auburn pursuant to all applicable laws or regulations promulgated on the subject of rates and charges for sewer service. No surcharge shall be charged to the customers served under this agreement on the sole basis that those customers are outside of Auburn's city limits.

To establish a quantitative usage, Pacific shall provide to Auburn the quantity of potable water used by those properties connected to Auburn's sanitary sewer system. Pacific shall provide water usage information every other month to Auburn and Auburn shall send a bill every other month for sewer service. Pacific shall give Auburn the right to read water meters described in Attachment "A" manually if desired by Auburn. Auburn shall also have the ability to annually request water usage data from Pacific for said properties.

4. Boundary Review Board. Pacific and Auburn will, at the time of service through this agreement provide a copy of to the King County Boundary Review Board in accordance with R.C.W. 36.93.090.

5. Comprehensive Sewer Planning. The terms of this Agreement will be included as an element of Auburn and Pacific's Comprehensive Sewerage Plans.

6. Reliance. Each party hereto acknowledges that the other will rely upon the terms of this agreement in its comprehensive planning to meet the needs of the service area designated herein.

7. Indemnification. Pacific agrees to indemnify and hold Auburn and its agents, employees, and/or officers, harmless from and shall process and defend at its own expense any and all claims, demands, suits, at law or equity, actions, penalties, loses, damages or costs, of whatsoever kind or nature, brought against Auburn arising out of, in connection with, or incident to the execution of this agreement and/or Pacific's performance or failure to perform any aspect of this Agreement; provided, however, that if such claims are caused by or result from the concurrent negligence of Auburn, its agents, employees, and/or officers, this indemnity provision shall be valid and enforceable only to the extent of the negligence of Pacific; and provided further, that nothing herein shall require Pacific to hold harmless or defend Auburn, its agents, employees, and/or officers, from any claims arising from the sole negligence of Auburn, its agents, employees, and/or officers. No liability shall attach to Auburn by reason of entering this agreement except as expressly provided herein.

Auburn agrees to indemnify and hold Pacific and its agents, employees, and/or officers, harmless from and shall process and defend at its own expense any and all claims, demands, suits, at law or equity, actions, penalties, loses, damages or costs, of whatsoever king or nature, brought against Pacific arising out of, in connection with, or incident to the execution of this agreement and/or Auburn's performance or failure to perform any aspect of this Agreement; provided, however, that if such claims are caused by or result from the concurrent negligence of Pacific, its agents, employees, and/or officers, this indemnity provision shall be valid and enforceable only to the extent of the negligence of Auburn; and provided further, that nothing herein shall require Auburn to hold harmless or defend Pacific, its agents, employees, and/or officers, from any claims arising from the sole negligence of

Pacific, its agents, employees, and/or officers. No liability shall attach to Pacific by reason of entering this agreement except as expressly provided herein.

8. Assignment. The parties shall not assign this agreement or any interest, obligation or duty therein without the express written consent of the other party.

9. Attorney's Fees. If either party shall be required to bring any action to enforce any provision of this Agreement, or shall be required to defend any action brought by the other party with respect to this Agreement, and in the further event that one party shall substantially prevail in such action, the losing party shall, in addition to all other payments required therein, pay all of the prevailing party's reasonable costs in connection with such action, including such sums as the court or courts may adjudge reasonable as attorney's fees in trial court and in appellate courts.

10. Government Approvals. The parties will give notice of the adoption of this Agreement to King County's Department of Natural Resources – Wastewater Treatment Division, to the Department of Health, and to any other agency with jurisdiction or mission relevant to the terms hereof, and shall cooperate and assist in all reasonable manner in procuring any necessary approvals hereof by those agencies.

11. Service Amendments. Any changes to the service areas described herein shall be by mutual agreement. Each party may give permission to the other on a case-by-case basis to provide service by one party into the other party's adjacent or nearby service area based upon considerations of economic efficiency for providing the service with mutual consent of Auburn's Director of Public Works and Pacific's Director of Public Works.

12. Notices. All notices between the two agencies hereunder may be delivered or mailed. If mailed, they shall be sent to the following respective addresses:

City of Pacific
Director of Public Works
PO Box 250
100 3rd Avenue SE
Pacific, WA 98047
253-833-2741

City of Auburn
Director of Public Works
25 west Main Street
Auburn, WA 98001
253-931-3010

or to such other representative as either party may hereafter from time to time designate in writing. All notices and payments mailed by regular post (including first class) shall be deemed to have been given on the second business day following the date of mailing, if properly mailed and addressed. Notices and payments sent by certified or registered mail shall be deemed to have been given on the day next

following the date of mailing, if properly mailed and addressed. For all types of mail, the postmark affixed by the United States Postal Service shall be conclusive evidence of the date of mailing.

13. Alteration, Amendment or Modification. Pacific and Auburn hereby reserve the right to alter, amend or modify the terms and conditions of this Agreement upon written agreement of both parties to such alteration, amendment or modification. Such written consent(s) shall be filed with this agreement for future reference.

14. Sanctity of Agreement. This agreement constitutes the entire agreement of the parties regarding the subject matter hereof, and there are no other representations or oral agreements other than those listed herein, which vary the terms of this agreement. Future agreements may occur between the parties to transfer additional or future service areas by mutual agreement.

15. Obligation Intact. Nothing herein shall be construed to alter the rights, responsibilities, liabilities, or obligations of either Pacific or Auburn regarding provision of sewer service, except as specifically set forth herein.

16. Miscellaneous.

A. The captions in this agreement are for convenience only and do not in any way limit or amplify the provisions of this agreement.

B. This agreement is established in perpetuity. Modifications can be established upon written agreement between both parties.

C. The purpose of this agreement is to clarify Pacific and Auburn's sanitary sewer responsibilities for providing service and maintaining public sewer facilities.

D. If any term, provision, condition or portion of this Agreement is held to be invalid, or unenforceable by a final decision of any court having jurisdiction on the matter, the remaining of this Agreement or the application of such term or provision to persons or circumstances other then those as to which it is held invalid or unenforceable shall not be affected thereby and shall continue in full force and effect, unless such court determines that invalidity or unenforceability materially interferes with or defeats the purposes hereof, at which time Auburn or Pacific shall have the right to terminate the Agreement.

E. No modifications or amendments of this agreement shall be valid or effective unless evidenced by an agreement in writing signed by both parties.

IN WITNESS WHEREOF the parties hereto have executed this agreement as of the day and year first above written.

CITY OF PACIFIC
Approved by Resolution No. 730 of the City of Pacific, Washington, at its regular meeting held on the 12th day of May, 2008.

By:



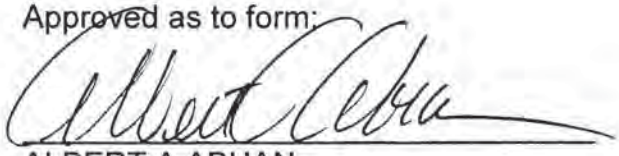
RICHARD HILDRETH,
Mayor, City of Pacific

Attest:



SANDY PAUL-LYLE,
City Clerk, City of Pacific

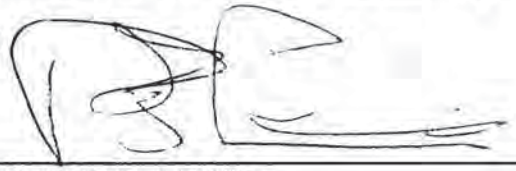
Approved as to form:



ALBERT A ABUAN,
City Attorney, City of Pacific

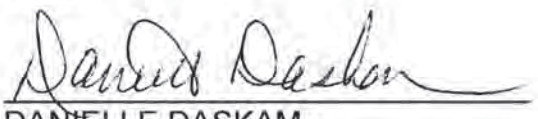
CITY OF AUBURN
Approved by Resolution No. 4335, of the City of Auburn, Washington, at its regular meeting held on the 5th day of May, 2008.

By:



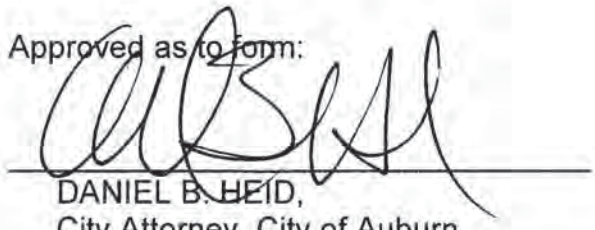
PETER B. LEWIS,
Mayor, City of Auburn

Attest:

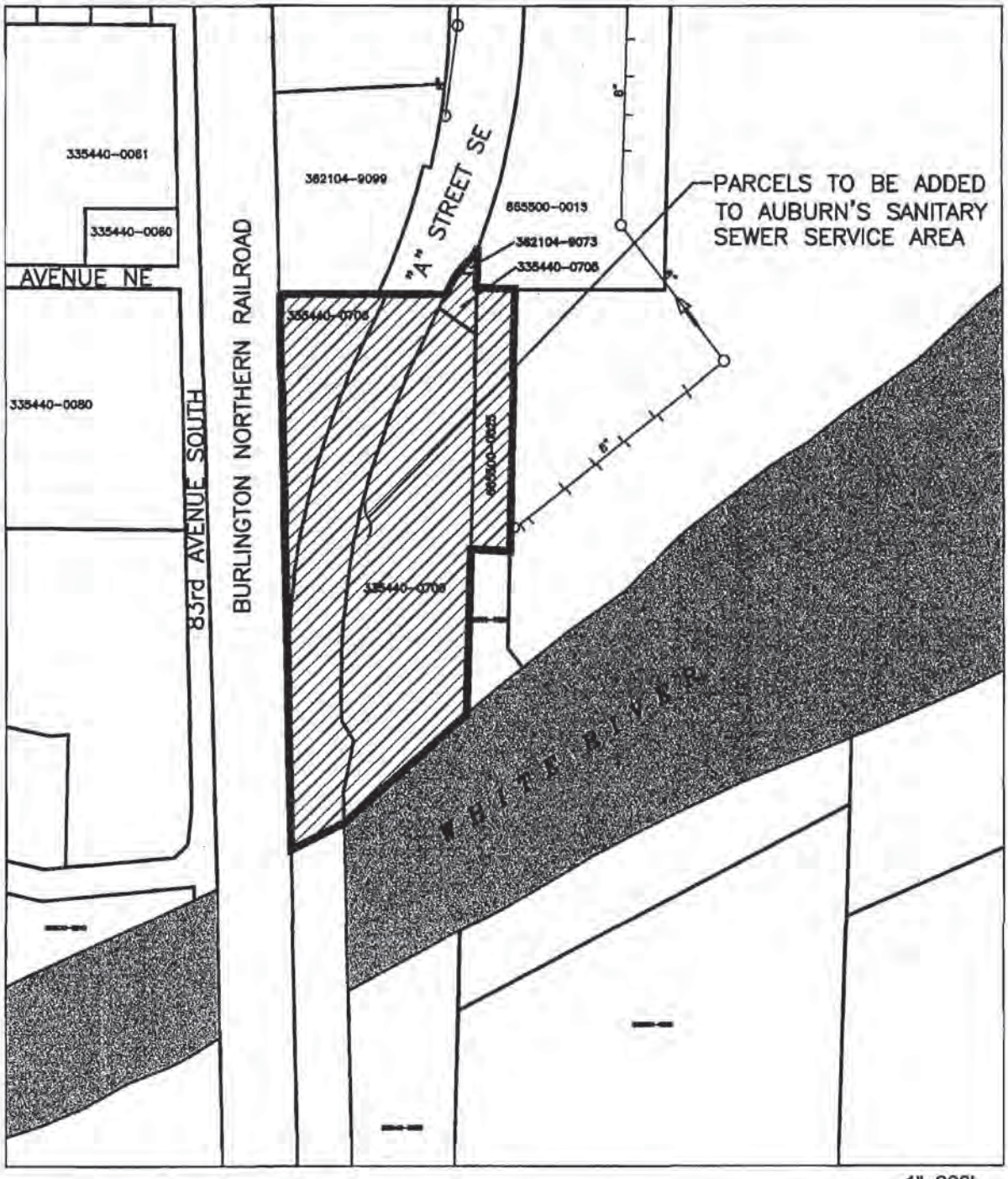


DANIELLE DASKAM,
City Clerk, City of Auburn

Approved as to form:



DANIEL B. HEID,
City Attorney, City of Auburn



1"=200'

CITY OF AUBURN WASHINGTON

ATTACHMENT A

PACIFIC - AUBURN
SANITARY SEWER SERVICE AGREEMENT

Exhibit A
Resolution No. 4335
Page 7 of 7

CITY OF PACIFIC
WASHINGTON

COPY

RESOLUTION NO. 730

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF PACIFIC, WASHINGTON, AUTHORIZING THE MAYOR AND CITY CLERK TO EXECUTE AN INTERLOCAL AGREEMENT ESTABLISHING SANITARY SEWER SERVICE BOUNDARIES BETWEEN THE CITY OF PACIFIC AND THE CITY OF AUBURN

WHEREAS, pursuant to RCW 35A.11.040 Pacific and Auburn have the legal authority to exercise their powers and perform any of their functions as set forth in RCW 39.34; and

WHEREAS, pursuant to RCW 39.34, the Interlocal Cooperation Act, Auburn and Pacific have the legal authority to cooperate with other localities on the basis of mutual advantage and provision of services; and

WHEREAS, pursuant to RCW 35A.21.150 Auburn and Pacific have the legal authority to maintain a sewerage system.

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF PACIFIC, WASHINGTON, AS FOLLOWS:

Section 1. The Mayor and City Clerk of the City of Pacific are herewith authorized to execute an Interlocal Agreement establishing sanitary sewer service boundaries between the City of Pacific and the City of Auburn. A copy of said Agreement is attached hereto, as Exhibit "1" and made a part hereof as though set forth in full herein.

Section 2. The Mayor is hereby authorized to implement such administrative procedures as may be necessary to carry out the directives of this legislation.

PASSED BY THE PACIFIC CITY COUNCIL AT A REGULAR MEETING THEREOF ON THE 12TH DAY OF MAY, 2008.

CITY OF PACIFIC

Mayor Richard Hildreth

ATTEST/AUTHENTICATED:

Sandy Paul CMC

Sandy Paul - Lyle, City Clerk

Approved as to form:

Albert Abuan, City Attorney

Filed with the City Clerk: May 1, 2008
Passed by the City Council: May 12, 2008
Resolution No. 730
Effective: May 12, 2008

APPENDIX A5

MUCKLESHOOT INDIAN TRIBE

- Sewer Service Boundaries (Resolution 4902)
- Wastewater Conveyance Cost Sharing (Resolution 3660)
- Temporary Sewage Lift Station Operation (Resolution 3502)

RESOLUTION NO. 4902

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, AUTHORIZING THE MAYOR AND CITY CLERK TO ENTER INTO A MASTER AGREEMENT/PROVISIONS FOR MUNICIPAL UTILITY SERVICES ON TRUST LANDS, REPLACING AND SUPERSEDING THE AGREEMENT PREVIOUSLY APPROVED AND AUTHORIZED BY RESOLUTION NO 4883

WHEREAS, the City of Auburn has been approached by representatives of the Muckleshoot Indian Tribe with a request for an agreement whereby the City would provide municipal utilities to the Tribe for property being developed by the Tribe, and

WHEREAS, representatives of the City and the Tribe have negotiated an agreement that accommodates that request and that addresses the relationship of the City and the Tribe in connection with the provision of such utilities, the terms of which are beneficial to both parties, and

WHEREAS, in connection herewith, the Auburn City Council heretofore approved and authorized an agreement for municipal utility services on Tribal or Indian Trust lands through Resolution No 4883, and

WHEREAS, following the passage of said Resolution No 4883, representatives of the City of Auburn and the Muckleshoot Indian Tribe discussed some changes to the agreement authorized by resolution No 4883, which changes are acceptable to both the City and the Muckleshoot Indian Tribe

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, HEREBY RESOLVES as follows

Section 1. That the Mayor and City Clerk, or designees, are hereby authorized to execute the Master Agreement/Provisions for Municipal Utility Services on Trust

Lands in substantial conformity with the Agreement marked as Exhibit A attached hereto and incorporated herein by this reference, replacing the Agreement approved and authorized by Resolution No 4883

Section 2 That the Mayor is authorized to implement such administrative procedures as may be necessary to carry out the directives of this legislation

Section 3. That this Resolution shall take effect and be in full force upon passage and signatures hereon

Dated and Signed this 22nd day of January, 2013

CITY OF AUBURN

PETER B LEWIS, MAYOR

ATTEST

Danielle E Daskam, City Clerk

APPROVED AS TO FORM

Daniel B Heid, City Attorney

CITY OF AUBURN WASHINGTON

MASTER AGREEMENT/PROVISIONS FOR MUNICIPAL UTILITY SERVICES ON TRUST LANDS

City of Auburn
Engineering Division
Development Section
Public Works Department

25 West Main St.
Auburn, WA 98001-4998
(253) 931-3010
FAX (253) 931-3053

MASTER AGREEMENT FOR MUNICIPAL UTILITY SERVICES ON TRUST LANDS

The **CITY OF AUBURN** ("City"), and the **MUCKLESHOOT INDIAN TRIBE** ("Tribe" - also hereafter referred to in this agreement as "Developer") enter into this Municipal Utilities Service Agreement ("Agreement"), and make the following expressed mutual promises and covenants regarding the Developer's proposed Public Facility Extension ("Extension(s)")

The City agrees to accept the Extension(s) for operation and maintenance if the Developer, at the Developer's expense, designs, constructs, conveys and transfers said Extension(s) to the City pursuant to the terms and conditions of this Agreement. This Agreement is valid and binding for the Developer's Extension(s) serving Indian owned lands within the Muckleshoot Indian Reservation and the City of Auburn's municipal water and sewer service area.

I. DEFINITIONS

For the purposes of this agreement the terms in this Section shall have the following meanings

- **Public Facilities.** City sanitary sewer facilities (sewer mains, manholes, and appurtenances) and water facilities (water mains, service lines between mains and water meters, meter services including setter, meter and box, fire hydrants, and appurtenances)
- **Utility Right-of-Way Easement.** A nonexclusive perpetual right-of-way easement on the Property granting the City the right to operate, maintain, repair, replace, improve, remove, enlarge Public Facilities and the right to access the Property for providing Solid Waste services.
- **Indian Property.** For the purposes hereof, Indian Property refers to residential properties owned by the Tribe or held in Trust by the Bureau of Indian Affairs (BIA) for the benefit of the Tribe or individual Indians.
- **Utility Services.** City water, sanitary sewer, storm drainage, and solid waste services, pursuant to Chapters 13 06, 13.20, 13 48 and 8 08, respectively, of the Auburn City Code (ACC)

II. CITY RESPONSIBILITIES

Pursuant to the terms and conditions of this agreement the City agrees to:

A. Provide municipal Utility Services to the Property in conformance with City regulations governing Utility Services.

B Comply with the Utility Right-of-way provisions herein.

III. TRIBE RESPONSIBILITIES

Pursuant to the terms and conditions of this agreement the Tribe shall be responsible for the following:

A. Complying with the Utility Right-of-way provisions herein.

B Extending Public Facilities in compliance with terms herein.

IV. INDIAN PROPERTY RESIDENT RESPONSIBILITIES

Those people who reside on the residential properties of the Tribe and who receive utility services from the City pursuant to this Agreement shall comply with and be subject to, the ACC provisions and requirements for the construction, operation, maintenance, and payment for the above described Utility Services, and their receipt of and eligibility for City Utilities shall be conditioned on and subject to the following:

A. City Utility Customers who are residents of Indian Property shall, in advance of the City initiating new City Utility Services or re-initiating previously established City Utility Service that has been cancelled or suspended for nonpayment, deposit with the City the amounts of Utility Service Deposits required for City Utilities. The deposit for residents of Indian Property may be made in the form of cash, cash equivalent, or a bond or guarantee for the deposit amount in a form acceptable to the City, whereby the Tribe is guaranteeing the deposit amount._Residents of Indian property who cannot pay the deposit amount, or provide the City with a bond or guarantee of the deposit amount by the Tribe in a form acceptable to the City, may request that the City grant a full or partial waiver(s) to the Utility Customer from the deposit requirement because of special humanitarian or health circumstances. The City shall have the sole discretion to grant such waivers, and determine if they shall be full or partial waivers. If the waiver is granted by the City, no deposit or only a reduced deposit shall be required.

B City Utility Customers who are residents of Indian Property shall agree to pay, and shall execute documents evidencing such agreement to pay, the utility bills in accordance with the requirements of Chapter 8 08 [Solid Waste Utility], Chapter 13 06 [Water Utility], Chapter 13.20 [Sewer Utility] and Chapter 13.48 [Storm Drainage Utility] of the Auburn City Code (ACC).[1]

V. EXTENSION FEES

City of Auburn Ordinance No 5819 amended ACC13 40 050, Utility Extension Fees, so that fees for private streets or private drainage associated with Planned Unit Developments or Gated

[1] The form of the Agreement for Payment of Utilities shall be in a form devised by the City, such as the sample set forth herein as Exhibit "F" APPLICATION FOR UTILITY SERVICE & DEPOSIT AGREEMENT, Provided that the City reserves the right to modify or amend the Agreement as it deems advisable, to accomplish the purposes intended.

Communities can be included in the Facility Extension Fees. The Developer agrees to pay applicable City Utility Extension Fees as calculated by the City in accordance with applicable City Codes, generally as indicated herein below in Exhibit D hereto

The Developer shall also pay reasonable additional fees to the City in the event the City needs to obtain consulting support services to assist the City when the scope of the Extension is beyond the City's normal area of expertise or the City's ability to review within a reasonable time.

Furthermore, the Developer is responsible to pay fees associated with the Valley Regional Fire Authority's (VRFA) review of plans as requested by the City The City will allocate these fees, as established by the Auburn Fee Schedule; at the time the 40% Extension Fee is submitted. If extended review is required additional fees will be collected prior to Construction.

VI. CONSTRUCTION DRAWINGS

The Developer shall submit construction drawings ("plans") and supporting technical documents designed and developed by a professional engineer registered in the State of Washington to the City for review and approval at the time of application.

The plans and supporting materials shall comply with the City of Auburn's Design Standards and Construction Standards for water, sanitary sewer, and storm water drainage utilities. For all work conducted in City streets and rights-of-ways, and for work to be conducted in the portion of any tribal or private road or right of way immediately abutting City streets or rights-of-way, the plans shall also be in compliance with City design and construction standards for City streets and rights-of-way.

If design or construction activities on the extension(s) become inactive on the Developer's part for a period of six months, the City may require the plans be revised to conform to existing field conditions, or to meet current City design standards and regulations. The City may also require the execution of a new Agreement, in which case, this Agreement shall become null and void.

After all plan reviews have been completed and corrections made, and if all other requirements have been met, the City will request that the Developer/Engineer submit a full set of plans on mylar for City approval and signature. The Developer/Engineer shall also submit AutoCAD electronic files with the mylar. The signed mylar shall then be used to make all plan copies for use during the construction process.

VII. UTILITY RIGHTS-OF-WAY EASEMENT

At the Developer's expense, a nonexclusive perpetual right-of-way easement on the Property shall be granted to the City giving the City the right to operate, maintain, repair, replace, improve, remove, enlarge Public Facilities and the right to access the Property for providing Solid Waste services. The Utility Right-of-way or Easement shall be in a form acceptable to the

City Recording of the Utility Right of Way or Easement shall take place upon acceptance by the City of affected Public Utilities.

VIII. PAYBACK AGREEMENT

The City may enter into a Payback Agreement, if applicable, with the Developer pursuant to the requirements of RCW 35 91, RCW 35 72, and ACC 12.70 and 13 40.060. The Developer must submit a complete application to the City no later than 90 calendar days of the acceptance of the facility improvements. The City shall not consider an application for a payback agreement that is submitted later than 90 days after acceptance of the facility improvements. If the City has agreed to a warranty acceptance as provided for in Section XIII of this Agreement, the Developer must file an application for a payback agreement no later than 90 days after the warranty acceptance date for those improvements accepted under the warranty application, and no later than 90 days after final acceptance for the remaining improvements. After a complete application has been accepted the City will then work with the Developer to determine the appropriate cost allocation method and evaluate the eligibility of the submitted costs. A standard form of the agreement and an application handout outlining the payback process are available upon request.

IX. INSURANCE

Throughout the period of performance of this Agreement for all construction related activities, the Developer or Contractor shall carry and maintain commercial general liability insurance with limits of not less than one million dollars ($1,000,000 00) per occurrence for bodily injury, including death, and one million dollars ($1,000,000.00) per occurrence for property damage or, alternatively, one million dollars ($1,000,000.00) per occurrence combined single limit for bodily injury and property damage combined, and two million dollars ($2,000,000.00) general aggregate.

This insurance shall be in a form and with an insurer acceptable to the City, and shall contain coverage for all premises and operation, broad form property damage, contractual liability (including without limitation that specifically mentioned in the Agreement, and products and contemplated operations insurance.

This insurance shall provide coverage for explosion, collapse, underground excavation, and lateral support.

Any policy or policies that provide the insurance required in this Agreement shall name the City as an additional insured on a separate endorsement, to the extent of the contractual obligations set forth here. If the Contractor, as the Agent of the Developer, provides the required insurance, then such insurance shall name both the Developer and the City as additional insured.

Before the beginning of the period of performance under this Agreement, the Developer shall provide for City review and approval, a certificate of insurance reflecting full compliance with

the requirements set forth in this Agreement. The certificate shall be kept current and in compliance throughout the period of performance until final acceptance by the City (and for two years thereafter for products and contemplated operations liability), and shall provide for 30 days advance written notice to the City if cancellation or material change adversely affect the interests of the City

Throughout the period of performance of the Agreement, the Developer shall cover or maintain insurance in compliance with the applicable worker's compensation laws, with respect to all of its respective employees working on or about the facility site, regardless of whether such coverage or insurance is mandatory or merely elective under the law

For the purposes hereof, the period of performance of this Agreement includes and refers to the time during which any party hereto is obligated to perform tasks required herein.

X. INDEMNIFICATION

The Developer shall defend, indemnify and hold the City, its elected and appointed officials, employees, and agents harmless from any actions, causes of action, liabilities, claims, suits, judgments, liens, awards, demands, and damages of any kind including, property damage, personal injury, or death (including any claims brought by employees of the Contractor or any subcontractor) arising out of or in connection with the performance of this Agreement, to the extent that such claims arise out of the negligent act or omission or willful misconduct of the Developer, Contractor, any subcontractor, or their employees arising out of, or in any way related to, their performance of the Agreement, including without limitation the provision of services, personnel, facilities, equipment, support, supervision or review. The City shall be indemnified and held harmless for all expenses, costs of litigation, and reasonable attorney's fees, expert witness fees, and costs of services of engineering and other personnel related to any such action, or incident to establishing the right to indemnification, to the extent such claims arise from any negligent act or omission or willful misconduct of the Developer, Contractor, any subcontractor, or their employees arising out of, or in any way related to, their performance of the Agreement, including without limitation the provision of services, personnel, facilities, equipment, support, supervision, or reviews. The City's obligations herein are subject to judicial, legislative, and regulatory restrictions beyond the City's control (Including, but not limited to the Endangered Species Act) The applicant releases the City from any and all direct or indirect liability or damages related to actions beyond the City's control.

In the event of liability for damages arising out of bodily injury to persons or damages to property caused by or resulting from the concurrent negligence of the Developer and the City, its officers, officials, employees, and volunteers, the Developer's liability hereunder shall be only to the extent of the Developer's negligence. The Developer expressly waives any immunity under industrial insurance, whether arising from RCW Title 51 entitled "Industrial Insurance" or any other statute or source as provided in Article IX solely for the benefit of the City and solely to the extent of the indemnity set forth in this Agreement. This waiver has been mutually agreed by

the Parties. The provisions of this section shall survive the expiration or termination of this Agreement.

The Developer shall, at the City's request, furnish comprehensive evidence that all obligations of the nature designated in this agreement have been paid, discharged, or waived.

XI. CONSTRUCTION

All of the following applicable conditions shall be satisfied before a notice to start construction will be issued to the Contractor·

A. Approved Plans have been copied and distributed to all applicable parties and the signed original mylars returned to the City (see Article VI herein)

B Attend a Pre-construction Meeting between the City and the Developer's contractor

C Provide a Performance Bond or Assignment of Funds to the City in an amount and fashion that would adequately cover any work needed in any City right-of-way or on City utility lines.

D Provide Certificate of Insurance to the City naming the City (and Developer if Contractor supplies insurance) as an additional insured (see Article IX herein)

E. Non-Indian Contractors Possess an Active Contractor's Labor & Industry license; and Indian Contractors Possess an Active Contractor's Labor & Industry license if they are going to do any work in or on the City's right-of-way or City utility lines.

F Provide an Emergency Call List for Contractor and Subcontractors.

G Obtain a Business License with the City for all non-Indian contractors and subcontractors when working within the City limits, and for all contractors and subcontractors who will do any work in or on the City's right-of-way or City utility lines.

H. Obtain Authorized Construction Period for construction work to be completed within the existing public right-of-way (see additional information in Article VII herein), if applicable.

I. For work outside of Auburn's City limits, adequate County permits/approvals must be in place. The City will apply for the right-of-way permit(s) once plans are approved.

J If sewer extension, King County Waste Water Treatment Division approval is needed. The City will submit for approval, once plans are approved.

K. Provide Proof of Contract for Private Utility Relocates. The Developer acknowledges the obligation to enter into a separate contract, at the Developer's

expense, to relocate private utility facilities as necessary to comply with City Standards where applicable.

The City shall provide part-time inspection of the public and private Extension, to assist in determining that the work and materials meet the City's design standards and construction standards. The City shall also assist the Developer in complying with the present City rules, regulations, and resolutions and the terms of this Agreement. This assistance does not relieve the Developer of responsibility for complying with the plans, specifications, or terms of this Agreement, or any rules and regulations imposed by the City, County, or other agencies.

All construction performed by the Developer shall be in compliance with City design and construction standards for water, sanitary sewer and storm drainage utilities. For all work conducted in City streets and rights-of-ways, and for work to conducted in the portion of any tribal or private road or right of way immediately abutting City streets or rights-of-way, the work shall also be in compliance with City design and construction standards for City streets and rights-of-way

The Developer shall be responsible for acquiring the City's Construction Standards and having a copy on-site during construction.

The Developer agrees to comply with all Federal, State, County, and City regulations applicable to the Developer while construction is in progress in public rights-of-way

For public extensions that include construction within the existing public right-of-way or work on City utility lines, the City shall determine a reasonable time frame in which the Developer will complete all work within the existing right-of-way, including final clean up This time frame shall be the Authorized Construction Period for such work, and it shall be designated in calendar days and will be determined at the pre-construction conference. The Authorized Construction Period shall start when work first begins on this phase of the project or on a date specific set to minimize any public inconvenience. If the required work is not completed within the allotted time, the City will suspend all public and private Extension-related work other than those activities necessary to complete the required right of way improvements. If the restoration of the existing public right-of-way is not completed within the time period defined above, the Developer agrees that the City may hire an independent contractor to complete the necessary work and bill the Developer for the actual costs.

The City has the authority to decide all questions regarding the quality and acceptability of the materials furnished and of the work performed for the construction of the improvements. The City shall also have the authority to suspend construction work, in whole or part, for the failure of the Developer/Contractor to carry out the work in conformance with City development regulations, City construction standards, and approved plans.

The Developer's contractor shall make a written request to the City a minimum of 72 hours in advance when work is to be performed on Saturdays, Sundays, Holidays, or other than normal working hours. Written permission from the City shall be required before the contractor is allowed to work during any such requested hours. Approval of the contractor's request shall be dependent on the City's ability to provide adequate construction project monitoring during the requested time.

XII. ACCEPTANCE OF EXTENSION FOR OPERATION AND OWNERSHIP

The City agrees to accept the Extension for operation and ownership upon approval of the completion of all the facilities and the full compliance of the terms and conditions of this Agreement, including the following requirements

A. Approved Maintenance Guarantee (see Section XIII herein)

B. Executed Bill of Sale (see Section XIV herein)

C Certified and Approved Record Construction Drawings on Mylar & a copy of the Electronic CAD Drawing File(s) (see Section XV herein).

D. Executed Public Utility Right of Way or Easement (see Section XVII herein and Exhibit A).

E. Approved Developer Contribution Document provided for all facilities involving work in City right-of-way or on City utility lines (see Section XIV herein)

F Final Storm Water Site Plan (Report) and Cover Letter. This letter shall address any changes between the project's original storm water site plan (report) and the final construction of detention/retention and water quality facilities (see Section XVI herein).

Upon approval and acceptance, the City shall send a letter to the Developer accepting the system for ownership and operation.

If a Payback Agreement is applicable, the Developer will be required to provide the City with cost data within 90 calendar days of project acceptance. The City will provide sample cost data documentation for information.

The City shall release the Performance Guarantee, if applicable, to the Developer within 30 days of the letter of acceptance.

XIII. MAINTENANCE GUARANTEE

Before the City accepts the public portion of the Extension for operation and ownership, the Developer shall provide a one-year Maintenance Guarantee in the amount of two thousand dollars ($2,000.00) or ten percent (10%) of the City's estimated replacement costs of the

improvements, whichever is greater For some facilities, the City may require the Developer to provide a Maintenance Guarantee beyond the one-year period. If the City elects to so require, the City shall notify the Developer before the start of construction.

Two forms of Maintenance Guarantees are acceptable: 1) a Maintenance Bond or 2) an Assignment of Funds. Any request to use other forms of Maintenance Guarantee will be determined on a case by case basis by the City Engineer

The Developer may designate an Agent, such as a contractor or engineer, to provide the required Maintenance Guarantee to the City In such event, the Developer shall remain responsible for the contractual obligations set forth in this agreement. If the Agent defaults on the Maintenance Bond, this authorization for designation of an Agent does not preclude the City proceeding to foreclosure or demanding forfeiture of the bond against the Developer

The Developer shall bear the expense of the bond. If at any time a surety on any such bond is declared bankrupt, loses its right to do business in the State of Washington, or is removed from the list of Surety companies acceptable on Federal bonds, the Developer shall substitute an acceptable bond or bonds in such form and sum and signed by such other surety or sureties as may be satisfactory to the City. The Developer shall pay all premiums on these bonds.

The Assignment of Funds will be in a required amount held in a Financial Institution acceptable by the City and secured under the use of the City of Auburn Standard Assignment of Funds form. During this maintenance guarantee period, the Developer shall warrant that the materials and equipment furnished by the Developer for the Extension are in normal working order and condition except where abused or neglected by the City The Developer shall guarantee that it will repair or replace at its own expense any work or material that proves to be defective during such warranty period.

Two months prior to the end of the maintenance guarantee period (usually one year), the Developer will be required to have all public sanitary sewer and storm lines cleaned and then inspected with a remote television unit by an approved firm, **at Developer's expense**. The video will then be compared to the tape made prior to acceptance to ensure that no substantial change has occurred. The City shall then re-inspect the Extension for warranty compliance. If this re-inspection determines that the Extension functions as intended at the time of acceptance, the City shall release the Maintenance Bond. If the re-inspection determines that the Extension is not functioning as intended at the time of acceptance, the Developer shall replace or repair said Extension and the City, at its option, may extend the maintenance period for such replacement or repair for another one year. After an acceptable maintenance inspection, the City will release the Maintenance Bond and accept the facility for maintenance.

XIV. BILL OF SALE

Before the City accepts the public portion of the Extension for operation and ownership, the Developer agrees to execute an approved Bill of Sale (the City will prepare this document, once information is received, for Developer's signature) for the improvements that are to be dedicated to the City The Bill of Sale will provide for the transfer of title of the public portion of the Extension from the Developer to the City and will further include the following items.

A. The Developer is the lawful Owner of the public portion of the Extension and it is free from all encumbrances.

B The Developer has paid all bills for all labor and material used during construction of the Extension or has obtained lien wavers from all persons who have not been paid for their labor or material.

C. The Developer has the right to transfer the public portion of the Extension to the City for the consideration of incorporation into the City system.

D The Developer will warrant the public portion of the Extension and defend the same against lawful claims and demands of all persons for one year from the date the Bill of Sale is accepted by the City

XV. RECORD CONSTRUCTION DOCUMENTS

Before the City accepts the public portion of the Extension for operation and ownership, the Developer agrees to provide the City with certified record construction drawings and related electronic file information.

The Certified Record Construction Drawing comes in a **two-step process** as follows

Step 1: The certified paper (red-line) record drawings for all facilities shall be submitted for review and approval using the Engineer of Record as the point of contact. These drawings must accurately reflect all field design revisions made to the Extension during the construction process. The changes shall be in conformance with the City's record construction drawing requirements, available upon request from the City. The revisions shall be noted on the approved paper plan set.

Step 2: Once the City approves the certified paper (red-line) record drawings, then all required record drawing information shall be clearly shown on the original approved mylars. The electronic record drawing file shall also be provided at this time.

XVI. FINAL STORM WATER SITE PLAN (REPORT)

A certified and final storm (drainage) water site plan (report) and cover letter will also be required. Document the as-constructed changes to the storm improvements, not included in the original approved report. Record construction document requirements are available upon request from the Public Works Department.

It is provided, however, that insofar as the Developer provides Low Impact Development, as defined in the ACC, the Developer shall be entitled to the fee structure and adjustments included therewith.

The City and Tribe further agree that should the Tribe in the future desire to provide comparable municipal solid waste service to Indian property within Auburn's utility service area, the Tribe and the City will engage in good faith discussions on the discontinuance of City solid waste service to persons on Indian property eligible to receive tribal solid waste service.

XVII. PUBLIC UTILITY RIGHTS OF WAY OR EASEMENTS

The plan approval process may require providing utility rights of way or easements(s) for the facility extension. The Developer shall provide a legal description and an exhibit of the affected property, an updated title report, plat certificate (current to within 30 days), or other documentation acceptable to the City demonstrating its authority to convey a utility right of way or easement, and documentation of signatory authority (whether representative, individual, partnership or corporation) All legal descriptions must be signed and stamped by a professional Land Surveyor The City and Tribe will then draft the required legal documents and return them to the Developer for signatures and approval by the Bureau of Indian Affairs. The signed documents shall then be returned to the City where, concurrent with City acceptance of the utility improvements the documents will be sent to the Bureau of Indian Affairs and King County for recording. If during construction, changes are made that affect the right-of-way dedication and/or easement(s), corrections will be made and the documents will be re-recorded.

NOTE.

- King County or Pierce County Recorder's offices require a specific format on submittals. All attachments submitted shall be provided electronically in the following formats; Legal Descriptions in MS Word, and Exhibits in AutoCAD PDF is also acceptable provided the county specific format is followed. All attachments shall be formatted to 8 ½ x 11-inch and 8 ½ x 14-inch paper size and have a minimum margin of 1-inch top, bottom and sides. Use of 8 ½ x 14-inch paper size shall be limited to exhibit attachments.
- Any writing or markings, including the notary stamp, which intrudes into the document's margin area, may be cause for the document to be returned. Original documents used for recording **shall not** be stapled.

XVIII. SERVICE CONNECTIONS

There will be no water meter installation or usage of the public portion of the Extension before the City accepts the Extension for operation and ownership or the Developer has entered into the Warranty Acceptance of Partial Extension (Alternative Process), as described above.

The Developer shall notify the City in writing of any intent to make service connections to the public portion of the Extension or any existing City system. No connections to, nor utilization of, the public portion of the Extension or any existing City system shall be made without the express written consent of the City Note that certain other utility permit fees and system development charges may be required prior to service connection. In addition, the City shall supervise all service connections.

Connections to and utilization of the public portion of the Extension shall not relieve the Developer of the obligation to correct defects in labor or materials as provided in the Maintenance Bond section of this Agreement. All City-authorized connections shall be subject to the control, use, and operation of the City, which shall be subject to all regulations and conditions of service.

XIV. DEVELOPER CONTRIBUTION DOCUMENTATION

As per ACC 13 40 040, a written statement as to the actual cost of the public utility and street extension(s) shall be provided at the time the public utility extension(s) is turned over to the City This is to be turned in on the Developer Contribution Document at the time the Bill of Sale and/or Record Drawings are turned in.

XX. STATE LAW REQUIREMENTS

Nothing herein shall be construed as to limit the City of Auburn's ability to take such actions as it deems necessary to comply with the requirements of Washington state law in implementing this Agreement, provided that, nothing herein shall be deemed as granting or expanding the jurisdiction of the City of Auburn to regulate the use of Indian lands or Indian activity within the Muckleshoot Indian Reservation, or the City of Auburn's authority to tax Indian lands or activities.

XXI. AGREEMENT ALTERATIONS OR AMENDMENTS

No amendment, modification or waiver of any condition, provision or term of this Agreement shall be valid or of any effect unless made in writing, signed by the party or parties to be bound, or such party's or parties' duly authorized representative(s) and specifying with particularity the nature and extent of such amendment, modification or waiver Any waiver by any party of any default of the other party shall not effect or impair any right arising from any subsequent default.

Nothing herein shall limit the remedies or rights of the parties under this Agreement.

XXII. ASSIGNMENT BINDING ON SUCCESSORS AND ASSIGNS

Neither party to this Agreement shall assign any right or obligation hereunder in whole or in part, without the prior written consent of the other party hereto No assignment or transfer of any interest under this Agreement shall be deemed to release the assignor from any liability or obligation under this Agreement, or to cause any such liability or obligation to be reduced to a secondary liability or obligation.

This Agreement shall be binding upon, and the benefits and obligations provided for herein shall inure to and bind, the parties hereto and their respective successors and assigns, provided that this section shall not be deemed to permit any transfer or assignment otherwise prohibited by this Agreement. This Agreement is for the exclusive benefit of the parties hereto and it does not create a contractual relationship with or exist for the benefit of any third party, including contractors, sub-contractors and their sureties, except as provided in Article XXIII.

The tenants and occupants of the residences to be served by the Grantee's utilities shall execute an agreement agreeing to be bound by the terms hereof, including the provisions of Article XXV, Governing Law, and agreeing to comply with the utility payment obligations in accordance with City of Auburn City Codes.

XXIII. NO THIRD PARTY BENEFICIARIES

This Agreement is solely for the benefit of the Parties and the owners and occupants of residences served by City utilities who have executed an agreement to be bound by the terms of this Agreement. No third party other than an owner or occupant of a residence who has executed an agreement to be bound by this Agreement shall be entitled to claim or enforce any rights here under.

XXIV. WAIVER

A failure by either party to exercise its rights under this Agreement shall not preclude that party from subsequent exercise of such rights and shall not constitute a waiver of any other rights under this Agreement unless stated to be such in writing signed by an authorized representative of the party and attached to the original Agreement.

XXV. GOVERNING LAW

This Agreement and the rights of the parties hereunder , including actions to enforce the terms of this Agreement and actions to collect monies due as utility payments including utility deposits provided in connection herewith, shall be governed by the interpreted in accordance with applicable provisions of the Auburn City Code and the laws of the State of Washington and venue for any action hereunder shall be in the courts of King County State of Washington in which the project is located, provided, however, that it is agreed and understood that any applicable statute of limitation shall commence no later than the final acceptance date of the Extension or, if the City declines to accept the extension, the date of the letter from the City declining to accept the Extension.

The Developer (Muckleshoot Indian Tribe) does hereby expressly waive its right to sovereign immunity and its right to assert sovereign immunity defense in the courts of the State of Washington for the limited purpose of any legal claim or complaint for the interpretation and/or and/or enforcement of this Agreement, and/or for any complaints or counterclaims for monetary damages or equitable relief for any breach of this Agreement, and/or for the enforcement of any

final judgment by any court of the State of Washington regarding such matters. This limited waiver of immunity is solely for the benefit of the City of Auburn for the purposes stated herein, and the Tribe does not waive its sovereign immunity as to any party other than the City.

XXVI. SEVERABILITY AND SURVIVABILITY

If any provisions of this Agreement or any provision of any document incorporated by reference shall be held invalid, such invalidity shall not affect the other provisions of this agreement which can be given effect without the invalid provision, if such remainder conforms to the requirements of applicable law and the fundamental purpose of this Agreement. To this end, the provisions of this Agreement are declared to be severable.

In addition to the length of time elements of this agreement remain in force and effect, some provisions hereof shall remain in full force and effect indefinitely, for as long as utility services are provided by the City to the property owned by or under the influence or control of the Developer, including, but not limited to the obligations to pay City Utility Fees and Indemnify the City per Article X.

XXVII. ATTORNEY FEES

In the event of litigation or other legal action to enforce any rights, responsibilities or obligations under this Agreement, the prevailing parties shall be entitled to receive its reasonable costs and attorney's fees.

XXVIII. CAPTIONS, HEADINGS AND TITLES

All captions, headings or titles in the paragraphs or sections of this Agreement are inserted for convenience of reference only and shall not constitute a part of this Agreement or act as a limitation of the scope of the particular paragraph or sections to which they apply As used herein, where appropriate, the singular shall include the plural and vice versa and masculine, feminine and neuter expressions shall be interchangeable. Interpretation or construction of this Agreement shall not be affected by any determination as to who is the drafter of this Agreement, this Agreement having been drafted by mutual agreement of the parties.

//////

//////

//////

XXIV. ENTIRE AGREEMENT

This Agreement with Exhibits A through D contains the entire understanding of the parties hereto in respect to the transactions contemplated hereby and supersedes all prior agreements and understandings between the parties with respect to such subject matter.

DATED this 8th day of March, 2012.

CITY OF AUBURN

Peter B. Lewis, Mayor

STATE OF WASHINGTON)
)ss
COUNTY OF KING)

I certify that I know or have satisfactory evidence that ~~Dennis Selle,~~ Peter B Lewis to me known as the ~~City Engineer~~ Mayor representing the City of Auburn's ~~Department of Public Works~~, who acknowledged that he signed this instrument and acknowledged it to be his free and voluntary act for the uses and purposes mentioned in this instrument.

Dated March 3, 2013

Shawn Campbell

Shawn Campbell
Notary Public in and for the State of Washington
residing at Auburn WA
My appointment expires Apr. 9, 2016

SHAWN K. CAMPBELL NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES 4-09-16

SIGNATORY - INDIVIDUALS

DATED this _____ day of _____, 20____

_____

_____

STATE OF WASHINGTON)
)ss.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that _____ and _____ is/are the person(s) who appeared before me, and said **individuals(s)** acknowledged that he/she/they signed this instrument and acknowledged it to be his/her/their free and voluntary act for the uses and purposes mentioned in this instrument.

Dated _____

_____

_____
Notary Public in and for the State of Washington
residing at _____
My appointment expires _____

SIGNATORY - PARTNER

DATED this _____ day of _____, 20____.

_____

_____

STATE OF WASHINGTON)
)ss.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that _____ and _____ is/are the person(s) who appeared before me, and said **partner(s)** acknowledged that he/she/they signed this instrument and acknowledged it to be his/her/their free and voluntary act for the uses and purposes mentioned in this instrument.

Dated _____

_____

_____
Notary Public in and for the State of Washington
residing at _____
My appointment expires _____

SIGNATORY - TRIBAL

DATED this 1st day of March, 2013

Virginia Cross
Chairperson

STATE OF WASHINGTON)
)ss.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that Virginia Cross is the person who appeared before me, and said person acknowledged that he/she signed this instrument, on oath stated that he/she was authorized to execute the instrument and acknowledged it as the Chairperson of the Muckleshoot Indian Tribe, a federally recognized Indian tribe, to be the free and voluntary act of such party for the uses and purposes mentioned in this instrument.

Dated 3/1/2013

Bobbie Jo Norton
Notary Public in and for the State of Washington
residing at Auburn, WA
My appointment expires 7/25/2015

BOBBIE JO NORTON
NOTARY PUBLIC
STATE OF WASHINGTON
COMMISSION EXPIRES
07-27-15

SIGNATORY – TAX EXEMPT AGENCY

DATED this _____ day of _____, 20___

_____
Representative

STATE OF WASHINGTON)
)ss.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that _____ is the person who appeared before me, and said person acknowledged that he/she signed this instrument, on oath stated that he/she was authorized to execute the instrument and acknowledged it as the Representative _____ of _____ _____, a **Tax Exempt Agency**, to be the free and voluntary act of such party for the uses and purposes mentioned in this instrument.

Dated _____

_____

_____
Notary Public in and for the State of Washington
residing at _____
My appointment expires _____

SIGNATORY - LLC

DATED this _____ day of _____, 20____

_____
Authorized Signature

_____
Authorized Signature

STATE OF _____)
)ss.
COUNTY OF _____)

I certify I have know or have satisfactory evidence that _____
_____
_____ is/are the person(s) who appeared before me, and said person(s) acknowledged that he/she/they signed this instrument on oath stated that he/she/they was/were authorized to execute the instrument and acknowledge as the _____ of the _____, a limited liability company, to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

Dated _____

_____

_____
Notary Public in and for the State of Washington
residing at _____
My appointment expires_____

EXHIBIT A

GRANT UTILITY SERVICES EASEMENT FOR RIGHT OF WAY ON TRUST LANDS

REFERENCE #·
GRANTOR. **THE MUCKLESHOOT INDIAN TRIBE**
GRANTEE **CITY OF AUBURN**
SHORT LEGAL. NE ¼ SE ¼ SEC 20, TWN 21N, R5E
ASSESSOR'S PROPERTY TAX PARCEL. 202105-9001
TRUST ALLOTMENT #· 109-2

For and in consideration of the CITY OF AUBURN'S Agreement to provide municipal water sanitary sewer, storm drainage and solid waste services to lots adjacent to this Right of Way, One Dollar ($1 00) and other valuable consideration in hand paid, **THE MUCKLESHOOT INDIAN TRIBE** ("Grantor" herein), hereby apportions, conveys and warrants to **THE CITY OF AUBURN,** a Washington Municipality ("Grantee" herein), for the purposes hereinafter set forth, a nonexclusive perpetual municipal utilities right-of-way easement over, under, along, across and through the following described real property (the "Property" herein) in King County, Washington.

SEE EXHIBIT "B" ATTACHED HERETO AND BY THIS REFERENCE MADE A PART HEREOF.

Except as may be otherwise set forth herein Grantee's rights shall be exercised upon that portion of the Property (the "Right-of-Way" herein) described as follows.

SEE EXHIBIT "C" ATTACHED HERETO AND BY THIS REFERENCE MADE A PART HEREOF.

Grantor also conveys to Grantee all of its right, title, and interest in the water service lines, meters, valves, and other portions of the water distribution system located within the Right of Way.

1. **PURPOSE.** In order for the City of Auburn to provide municipal utilities to properties that are held in Federal Trust status, the parties to this agreement hereby set forth the terms and conditions that are required for such services to be provided. Grantee shall have the right to operate, maintain, repair, replace, improve, remove, enlarge one or more water distribution or sanitary sewer utility facilities to include but are not limited to underground pipes,

lines, vaults, manholes, meters and valves within the easement defined in Exhibit D for the purposes of serving the properties described in this agreement.

The Utilities shall be designed and constructed in conformance with the City of Auburn Design and Construction Standards to secure the payment of all City utility fees & charges for existing and new developments on Federal trust lands within the city, the city will establish a security account that will be applicable to all new utility accounts effective with the date of approval of this agreement.

2. SPECIFIC PROVISIONS. The parties agree to the following terms

GRANTOR AGREES

A. The Grantor agrees to construct all Utilities and upon acceptance by the City, grant ownership to the Grantee.

B. The Grantor agrees all Utilities shall be designed and constructed in accordance to City of Auburn Design and Construction Standards.

C The Grantor agrees to obtain all permits and approvals from the Grantee for the extension of the Utilities including water connection permits, sanitary sewer connection permits and the execution and compliance with the Public Facility Extension Agreement.

D. Conservation. Grantor will be responsible for any and all soil and resource conservation and protection measures, including weed control, on the land covered by the Right-of-Way

GRANTEE AGREES:

A No Compensation; Damages. Grantee owes no compensation to Grantor or any third parties for the rights herein granted.

B Indemnification. Grantee agrees to indemnify the Grantor, against any liability, personal injury and property damage to the extent caused by the negligent acts or omissions of Grantee in the re-construction, maintenance, occupancy or use of the Right-of-Way by Grantee, its employees, contractors and their employees, or subcontractors and their employees. Provided, however, that nothing herein shall require Grantee to indemnify, defend, and hold the Grantor, harmless for any such liability attributable to the negligence of the Grantor

C. Restoration. Grantee agrees to restore the easement area as nearly as reasonably possible to their original condition upon the completion of construction or maintenance activities to the extent compatible with the purpose for which the

Right-of-Way was granted, however, Grantee has no obligation for preservation or repair beyond the area directly impacted by said activities

D Revocation/Abandonment/Termination. Grantee agrees that upon termination of the Right-of-Way by mutual consent Grantee shall, be responsible for abandoning the utility services in place.

3. USE. Grantor reserves the right to use the Right-of-Way for any purpose not inconsistent with the rights herein granted and Grantee agrees not to interfere with the use of the lands by or under the authority of the landowners for any purpose not inconsistent with the primary purpose for which the Right-of-Way is granted, provided, however, Grantor shall not construct or maintain any buildings, structures or other objects on the Right-of-Way. Grantor's use of the Right-of-Way may include, but is not limited to, use for an existing or future Tribal or Bureau of Indian Affairs roadway and for the installation, operation and transmission of utility services by third parties, including Tribal utilities once by mutual consent the parties agree to terminate City utility services.

4. ACCESS. Grantee shall have the right of access to the Right-of-Way over and across the Easement Property to enable Grantee to exercise its rights hereunder, provided that Grantee shall reasonably compensate Grantor for any damage to the property caused by the Grantee in exercise of such right of access. To the extent reasonably practicable, Grantee shall use Grantor's right of way for such access, and shall utilize portions of the Property outside Grantor's right of way only when and to the extent additional access is reasonably necessary or in the event of an emergency

5. CUTTING OF TREES. Grantee shall have the right to cut or trim any and all brush or trees or other vegetation standing or growing upon the Right-of-Way pursuant to section 2(e) above. However, any trees upon property outside of this Right-of-Way which, in falling, could in Grantee's reasonable judgment, be a hazard to Grantee's facilities may not be cut absent permission of the property owner, except in the case of any overhead facilities, if any, Grantee reasonably believes an emergency exists that requires the cutting of such trees.

6. SUCCESSORS AND ASSIGNS. Grantee shall have the right to assign, apportion or otherwise transfer any or all of its rights, benefits, privileges and interests arising in and under this easement. Without limiting the generality of the foregoing, the rights and obligations of the parties shall inure to the benefit of and be binding upon their respective successors and assigns.

7. TERMINATION AND ABANDONMENT. This Right of Way may be terminated or abandoned as follows:

A. The rights herein granted shall continue until such time as Grantee ceases to use the Right-of-Way for a period of two (2) successive years, in which event this agreement shall terminate and all rights hereunder, and any improvements remaining in the Right-of-Way shall revert to or otherwise become the property of Grantor

B The Right of Way may be terminated by mutual consent in a written agreement.

8. GRANTOR'S LIMITED WAIVER OF SOVEREIGN IMMUNITY. Grantor voluntarily grants Grantee a waiver of its sovereign immunity and its right to assert a sovereign immunity defense in the Courts of Washington for for the limited purpose of any legal claim or complaint for the interpretation and/or enforcement of this agreement, and/or for any complaints or counterclaims for monetary damages or equitable relief for any breach of this agreement, and/or for the enforcement of any final judgment entered by any court of the State of Washington regarding such matters. Grantor consents to jurisdiction of the courts of the State of Washington as having exclusive jurisdiction to hear, resolve and enter final judgment on any legal dispute by and between the parties to this agreement and/or their affected officers, officials, and employees concerning the interpretation of this agreement, enforcement of any of its provisions, and any complaints or counterclaims for monetary damages and/or equitable relief for any alleged or actual breach of any provision of this agreement and/or for the enforcement of any final judgment entered by any court of the State of Washington regarding such matters. The limited waiver of sovereign immunity set out in this paragraph is solely for the benefit of Grantee. This agreement is not intended to and shall not be interpreted or construed to create any rights, benefits or interests in any person or entity other than the parties hereto

DATED this _____ day of _____, 2012.

GRANTOR.
The Muckleshoot Indian Tribe

By: _____

Title: _____

STATE OF WASHINGTON)
) ss.
COUNTY OF _____)

On this _____ day of _____, 2012, before me, the undersigned, a Notary Public in and for the State of Washington, duly commissioned and sworn, personally appeared _____, to me known to be the person who signed as _____ of THE MUCKLESHOOT INDIAN TRIBE that executed the within and foregoing instrument, and acknowledged said instrument to be the free and voluntary act and deed of said TRIBE for the uses and purposes therein mentioned, and on oath stated that _____ was authorized to execute said instrument on behalf of THE MUCKLESHOOT INDIAN TRIBE.

IN WITNESS WHEREOF I have hereunto set my hand and official seal the day and year first above written.

_____
(Signature of Notary)

_____
(Print or stamp name of Notary)
***NOTARY PUBLIC** in and for the State of Washington,*
residing at _____
My Commission expires _____

Notary seal, text and all notations must be inside 1" margins

APPROVAL.
United States Department of the Interior
Bureau of Indian Affairs

Approved pursuant to 209 DM 8, 230 DM 1, 3 IAM 4, 4a.

BY: _____

TITLE: _____

EXHIBIT B

LEGAL DESCRIPTION OF THE PROPERTY

EXHIBIT ATTACHED AND ADDED AS THE NEXT PAGE

EXHIBIT C

SURVEYOR'S EASEMENT AND LEGAL DESCRIPTION

EXHIBIT ATTACHED AND ADDED AS THE NEXT PAGE

EXHIBIT D

PUBLIC FACILITIES EXTENSION FEES

The Public Facilities Extension Fees shall be generally calculated as follows:[2]
The extension fee shall be the greater of the sum of the categories (a+b+c+d) as shown below, for a total of $_____ (the amount of the extension fee shall be as calculated per the formulas below) This fee pays for the detailed plan review, field inspections and other City Administrative costs accrued during this project. The fee is based on the preliminary plan information provided by the Developer. The parties agree that the City may require an adjusted fee in addition to the fee calculated in this section based on the final improvement quantities at the time of approval of the construction drawings if the improvement quantities have changed from those indicated above.

The Developer shall pay forty percent (**40%**) of this extension fee $_____ (the amount of the extension fee shall be as calculated per the formulas below) before the City will begin detailed plan review

a) For water, sewer, & storm facilities the extension fee is based on the combined linear footage of all utilities and is determined by:

   The first 0 LF to 1000 LF will be charged at $5.50 per LF plus,

   The next 1001 LF to 2500 LF will be charged at $2.80 per LF plus,

   Any additional over 2500 LF will be charged at $1 65 per LF

b) For street facilities the extension fee is determined by:

   The first 0 LF to 500 LF will be charged at $6 90 per LF plus,

   The next 501 LF to 1000 LF will be charged at $4 10 per LF plus,

   Any additional over 1000 LF will be charged at $1 10 per LF

[2] It is provided, however, that in the event of any inconsistency or discrepancy between the above provisions and provisions of the Coty Code, the City Code shall control.

c) For non-linear extension such as pump stations and traffic signals the extension fee will be determined by the City Engineer based on an estimate of the City's labor cost associated with the plan review, inspection, and administration of the application.

d) For that portion of the water and sewer facility located outside City limits, but within existing County (King or Pierce) right-of-way, an additional fee is determined by:

$444 00 plus $5 00 per LF of the combined water and sewer extension located in existing County (King or Pierce) right-of-way

The remaining sixty percent **(60%)** of the extension fee $_____ (the amount of the extension fee shall be as calculated per the formulas above) and any fee adjustment, shall be paid upon approval of the construction drawings and prior to the start of construction.

EXHIBIT E

PERFORMANCE GUARANTEE

Before construction starts, the Developer will be required to furnish an approved Performance Guarantee based on one hundred twenty-five percent (125%) of the City-estimated installation costs for the public improvements constructed within the existing **City** right-of-way, easements, or when the City Engineer deems it to be in the City's best interest to secure a Performance Guarantee.

Two forms of Performance Guarantees are acceptable· 1) a Performance Bond or 2) an Assignment of Funds. Any request to use other forms of Performance Guarantee will be determined on a case by case basis by the City Engineer

The Developer may designate an Agent such as a contractor or engineer to provide the required Performance Guarantee to the City. In such event, the Developer shall remain responsible for the contractual obligations set forth in this Agreement:

The Performance Bond in a penal sum equal to a minimum of the amount described above shall be conditioned upon the performance by the Developer of all undertakings, covenants, terms, and conditions of the Agreement relating to the Extension. The Developer or Agent shall execute such bond and a corporate bonding company licensed to transact such business in the State of Washington, and who are named on a current list of surety companies acceptable as published by the Insurance Commissioner's office, shall act as surety.

The Developer shall bear the expense of the bond. If at any time a surety on any such bond is declared bankrupt, loses its right to do business in the State of Washington, or is removed from the list of approved surety companies, the Developer shall substitute an acceptable bond or bonds in the form and sum and signed by another surety or sureties as may be satisfactory to the City. The Developer shall pay the premiums on such bonds.

The Assignment of Funds will be in a required amount held in a Financial Institution acceptable by the City and secured under the use of the City of Auburn Standard Assignment of Funds form.

EXHIBIT F
CITY OF AUBURN
25 W MAIN STREET
AUBURN, WA 98001

APPLICATION FOR UTILITY SERVICE & DEPOSIT AGREEMENT

Service Address _____ Phone _____ Own _____ Rent _____

Name of Landlord _____ Mailing Address _____

Applicant One

Name _____ Phone _____ Date of Birth _____

Current Employer _____ Employer Phone _____

Employer Address _ _____

Applicant Two

Name _____ Phone _____ Date of Birth _____

Current Employer _____ Employer Phone _____

Employer Address _____

In case emergency services are required, and we are unable to locate you, please list a friend or relative whom we could contact:

Name _____ Phone _____ Address _____

I/we agree to pay all required utility deposits and to pay service fees for utilities provided to me by the City of Auburn, including water, sanitary sewer, storm drainage, and solid waste services, pursuant to Chapters 13.06, 13.20, 13 48 and 8 08, respectively, of the Auburn City Code (ACC). I/we further agree to comply with the requirements of said chapters of the ACC If I/we fail to pay bills on a timely basis, I/we understand that utility service may be discontinued. Should I/we leave the City of Auburn service area with an outstanding utility balance due, or should my service be disconnected/discontinued for non-payment, my deposit will be applied to said outstanding account, and the balance (if any) forwarded to me/us. In case of disconnection for non-payment, I/we understand that full payment of any outstanding balance up to and including the date of disconnection, and service charge(s) will be required in order to have utilities reconnected at the location or for me/us to get utility service at a new location in the service area. I/we understand that in the event that I/we are renting, our landlord may request information or be notified of the status of my/our account. I/we further agree that in the event that any action is taken to collect payments due for utility services or for enforcement of any other requirement or obligations of the City utility services, or my/our rights thereto, venue for such action shall be in the courts of King County, Washington.

Date _____ Signed _____

Date _____ Signed _____

FOR OFFICE USE

Application taken by _____ *Deposit Amount $*_____ *Date Deposit Received* _____

Customer Moved, Applied on Final Bill _____ *Date* _____ *Check #*_____

Customer Move, Refunded Full Deposit _____ *Date* _____ *Check #*_____

RESOLUTION NO. 3660

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, AUTHORIZING THE MAYOR TO EXECUTE AN INTERLOCAL AGREEMENT WITH THE MUCKLESHOOT INDIAN TRIBE FOR THE COST SHARING IN THE REPLACEMENT AND MAINTENANCE OF A NEW WASTEWATER CONVEYANCE FACILITY CONVEYING WASTEWATER FROM MUCKLESHOOT INDIAN TRIBE PARCELS LOCATED OUTSIDE CITY LIMITS TO KING COUNTY CONVEYANCE AND TREATMENT FACILITIES

WHEREAS, both the City and the MIT are agencies qualified to engage in furnishing sanitary sewer service within their approved service areas; and

WHEREAS, the King County Department of Natural Resources, Water Pollution Control Division is engaged in developing and operating a regional sewage disposal system and the City and the MIT are engaged in developing and operating a sewage collection system; and

WHEREAS, the City and MIT intend to replace the Auburn Way South Sanitary Sewer Conveyance System (hereinafter AWSCS); and

WHEREAS, the replaced AWSCS is the subject of this Agreement, and is intended to be consistent with applicable law and comprehensive planning for sewage disposal; and

WHEREAS, the MIT desires to provide sewer service only to customers within the MIT's approved sewer service area; and

WHEREAS, Auburn's existing wastewater conveyance facility surcharges and requires improvements to allow for additional flow capacity and avoiding potential overflow of sewage and the damages associated with said overflows; and

WHEREAS, the MIT desires ownership of a portion of the capacity within a sanitary sewer conveyance facility extending from that portion of the MIT service area, outside of the City's service area, into King County's wastewater conveyance system; and

WHEREAS, this agreement shall supercede the existing Auburn – MIT sanitary sewer Agreement, executed in accordance with City Ordinance No. 4967; and

WHEREAS, to provide wastewater conveyance and ownership responsibilities of the public sanitary sewer facilities that extend from the boundary of the City's service area along Auburn Way South to King County's conveyance facilities at the corner of 17th Street SE and K Street SE, it is necessary that this agreement be entered into between the City and the MIT, establishing the rights and duties of the parties; and

WHEREAS, the Muckleshoot Indian Tribe, and the City of Auburn are authorized to enter into this Agreement under the authority of their respective enabling legislation and under the authority of Chapter 39.34 RCW, the Interlocal Cooperation Act; and

WHEREAS, the MIT received approval from the Bureau of Indian Affairs, hereinafter referred to as "BIA", for this agreement, pursuant to Title 25, Section 81, of the U.S. Code, or the BIA has determined and so informed the MIT that approval of this Agreement is not required under 25 USC 81.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, HEREBY RESOLVES as follows:

Section 1. The Mayor is hereby authorized to execute an interlocal agreement with the Muckleshoot Indian Tribe, in substantial conformity with the

agreement attached hereto, marked as Exhibit 1and incorporated herein by this reference.

Section 2. That the Mayor is authorized to implement such other administrative procedures as may be necessary to carry out the directives of this legislation.

Section 3. That this resolution shall take effect and be in full force upon passage and signatures hereon.

DATED and signed this 1st day of March 2004.

CITY OF AUBURN

PETER B. LEWIS
MAYOR

ATTEST:

Danielle E. Daskam,
City Clerk

APPROVED AS TO FORM:

Daniel B. Heid,
City Attorney



Return Address:
Auburn City Clerk
City of Auburn
25 West Main St.
Auburn, WA 98001

RECORDER'S COVER SHEET

Document Title(s) (or transactions contained therein):

Interlocal Agreement (RES 3660)

41/59 PNWT
W9276-12

Reference Number(s) of Documents assigned or released:
☐Additional reference #'s on page _____ of document

Grantor(s)/Borrower(s) (Last name first, then first name and initials)
Auburn, City of

Grantee/Assignee/Beneficiary: (Last name first)
1. Muckleshoot Indian Tribe

Legal Description (abbreviated: i.e. lot, block, plat or section, township, range)

PER RCW 39.34

☐ Additional legal is on page of document.

Assessor's Property Tax Parcel/Account Number
N/A

☐ Assessor Tax # not yet assigned

EXHIBIT 1

AUBURN - MUCKLESHOOT INDIAN TRIBE SANITARY SEWAGE AGREEMENT

(Auburn Way South Sanitary Sewer Conveyance System)

For the construction, ownership, and maintenance of the sanitary sewer conveyance facility that provides service to Muckleshoot tribal property located outside of Auburn's municipal limits to King County's wastewater conveyance and treatment facilities.

This Agreement is entered into in King County, Washington, between the City of Auburn, a municipal corporation under the laws of the State of Washington, hereinafter referred to as the "City" and the Muckleshoot Indian Tribe, a federally recognized Indian Tribe located on the Muckleshoot Indian Reservation, hereinafter referred to as the "MIT"

WHEREAS, both the City and the MIT are agencies qualified to engage in furnishing sanitary sewer service within their approved service areas; and

WHEREAS, the public health, welfare and safety of the residents of the City, the MIT and the residents of their service areas require the elimination of potential sources of water pollution and the preservation of the fresh water resources of the area; and

WHEREAS, the King County Department of Natural Resources, Water Pollution Control Division, hereinafter referred to as "King County", is engaged in developing and operating a regional sewage disposal system and the City and the MIT are engaged in developing and operating a sewage collection system; and

WHEREAS, consistent with the standards prescribed by the State of Washington, Department of Ecology, hereinafter referred to as "DOE", for the collection and disposal of sewage effluent within the State, the City and the MIT are improving a sanitary sewage conveyance system that conveys wastewater from the MIT and the City service areas to King County's facilities; and

WHEREAS, the City and MIT intend to replace the Auburn Way South Sanitary Sewer Conveyance System (hereinafter AWSCS); and

WHEREAS, the replaced AWSCS is the subject of this Agreement, and is intended to be consistent with applicable law and comprehensive planning for sewage disposal; and

WHEREAS, the MIT desires to provide sewer service only to customers within the MIT's approved sewer service area; and

WHEREAS, Auburn's existing wastewater conveyance facility surcharges and requires improvements to allow for additional flow capacity and avoiding potential overflow of sewage and the damages associated with said overflows; and

WHEREAS, the MIT desires ownership of a portion of the capacity within a sanitary sewer conveyance facility extending from that portion of the MIT service area, outside of the City's service area, into King County's wastewater conveyance system; and

WHEREAS, to provide for the conveyance and disposal of sewage conveyed to King County from properties located within City's service area and from that portion of the MIT service area located outside of the City's service area, the two parties are entering into contracts with King County; and

WHEREAS, this agreement shall supercede the existing Auburn – MIT sanitary sewer Agreement, hereinafter referred to as the "1997 Auburn MIT Agreement" executed in accordance with City Ordinance No. 4967; and

WHEREAS, the City and MIT are entering into this Agreement, on a government to government basis, with the intention of cooperatively and equitably designing, and constructing the AWSCS and thereafter assuring that its operation meets the needs of the parties, as more fully set out in this Agreement; and,

WHEREAS, to provide wastewater conveyance and ownership responsibilities of the public sanitary sewer facilities that extend from the boundary of the City's service area along Auburn Way South to King County's conveyance facilities at the corner of 17th Street SE and K Street SE (the King County M Street Trunk Line), it is necessary that this agreement be entered into between the City and the MIT, establishing the rights and duties of the parties; and

WHEREAS, the MIT has determined and so informed the City that approval of this Agreement is not required by the Bureau of Indian Affairs under Title 25, Section 81, of the U.S. Code.

NOW, THEREFORE, in consideration of the mutual covenants contained herein and in order to provide a connection between the City's, the MIT's and King County's wastewater conveyance facilities, IT IS HEREBY AGREED AS FOLLOWS:

I. SEWAGE FLOW CAPACITY

1.1 MIT's comprehensive planning has determined that the portion of MIT service area located outside of Auburn's municipal city limits (south of the south section line to Section 27, Township 21, Range 5) will require a maximum peak capacity of 7.85 CFS within the AWSCS.

1.2 The City's comprehensive planning has determined that the City's maximum peak capacities within the AWSCS are as set out in Exhibit "A". The AWSCS shall be sized to convey the MIT's and the City's combined maximum peak capacities consistent with this Agreement. A table listing the capacity requirements for the AWSCS is provided in Exhibit "A", a copy of which is attached hereto and is incorporated herein by this reference.

2. MIT/CITY RELATIONSHIP FOR WASTEWATER CAPACITY AND NATURE OF PARTICIPATION

2.1 Ownership and Participation: The MIT and the City shall each own a portion of the capacity of the AWSCS as shown in Exhibit "A". MIT affirms that the City shall have the administrative role for the implementation of the AWSCS and the City affirms that MIT may, in its discretion, maintain active participation in the implementation consistent with the terms of this Agreement and the equity provided by the MIT to the AWSCS project.

2.1.1 Nature of capacity ownership: The respective capacity ownership interests of the MIT and City in the AWSCS shall be determined by the maximum capacity contribution that each makes to the AWSCS, as noted in Exhibit "A". The MIT and City have agreed on wastewater conveyance capacity maximums at specific locations along the sections of AWSCS. Those maximum capacity estimates are set out in Exhibit "A". Until changed by mutual agreement of the parties the capacities set out in Exhibit "A" shall govern the capacity ownership under this Agreement. The parties will share equally in the project costs.

2.1.2 Additional Capacity: Should either party desire to increase its respective capacity in the AWSCS beyond the maximum capacities set out in Exhibit A, the party seeking the additional capacity shall be responsible for the costs associated with the facilities necessary to provide the additional capacity. Either party may rent, assign or convey to the other a portion of the capacity that a party has as set out in Exhibit A if a party has no need for the capacity. Any conveyance of capacity may be for an agreed period or may be a permanent transfer. If a party does convey a portion of its capacity to the other party the parties shall agree on fair compensation for the transferred capacity. In the absence of an agreement between the parties, no party may take any

action that would use, or appropriate to itself any of the unused capacity that the other party may have in the AWSCS; nor take any action that would limit, reduce or interfere with the ability or right of the other party to fully use the full capacity that the party owns under this Agreement. The right held by both parties to this Agreement to use its full ownership interests in the AWSCS shall not be subject to modification under Section 10.

2.1.3 Total Capacity: The City's maximum capacity and the MIT's maximum capacity shall be equal to 100% of the AWSCS capacity. Any remaining excess capacity within the AWSCS due to pipe sizing shall be owned by the parties based upon their respective percentage contributions determined from the maximum capacities as set out in Exhibit "A".

2.1.4 City and MIT Representation: The City and MIT will each designate a representative who may be assisted by other employees and/or project advisors, to assure that each may fully participate as provided under this Agreement. The representatives and advisors will work to minimize areas of dispute, and to resolve all implementation issues as they arise and, as far as possible, minimize the need for recourse to dispute resolution provisions of this Agreement.

2.2 Project Costs and Responsibilities: For purposes of this Agreement, the MIT and City have agreed upon a plan as outlined in Exhibit "A", for the upgrade of the AWSCS to meet the needs of both the City and MIT. Only costs directly attributable to the AWSCS shall be considered as Project Costs. Activities, responsibilities, and costs not directly attributable to the AWSCS are not to be considered Project Costs and shall not be included in the allocation of costs under this Agreement.

2.2.1 Allocation of Costs: The parties have agreed to share equally (50%-50%) in the costs required to upgrade the AWSCS. The capacity each party will have in the upgraded system is as noted in Exhibit "A". "Project Costs" subject to allocation include the following: design engineering, construction, permitting, inspection, contract administration services, and other cost items agreed to by the parties. Each party will be responsible for payment of its share of the actual agreed costs. An estimate of the agreed costs for each segment is set out in Exhibit "A". The following costs incurred by the City prior to the execution of this Agreement shall be included in the allocated costs between the parties, subject to the cost allocation formula set out in this section:

Consoer Townsend Envirodyne Engineers, Inc. for Section B design plans and a preliminary design for the entire AWSCS, $276,585.16.

Pentec Environmental, Inc. for a wetland assessment for Section B's proposed alignment, $3,499.75.

2.2.2 Invoicing and Fund Distribution: The City shall provide to the MIT an invoice for the design, construction and project management and inspection work of the AWSCS done pursuant to Section 2.3 of this Agreement. The MIT shall provide for a fund transfer of the MIT's share of the invoice amount to a financial institution of the City's choice within 5 calendar days of the date that the MIT receives the invoice. To the extent that the MIT disputes the amount of the invoice, or whether the contract or the work performed is in conformity with this Agreement and the approved contract documents, that dispute shall be resolved under Section 10 of this Agreement. Interest of 5% shall be added to any invoice that is 30 days past due and found to be properly owed.

2.2.3 Alternative Invoicing and Fund Distribution: At the option of the City, it may elect to receive the MIT share of the design, construction, project management work and inspection of the AWSCS done pursuant to Section 2.3 and this section, but not under Section 2.2.2. The City shall make its election in writing to the MIT at the same time that the design or construction contracts to design or build each segment of the AWSCS is executed by the City. Once the City makes election it may not change its decision during the design or construction of the segment awarded without the consent of the MIT.

(a) Prior to letting of the consultant contract or the request for bids and upon notification by the City that the City has committed funds to meet its payment obligations under this Agreement, the MIT shall deposit their share of the estimated project costs into a bank account that Auburn can draw from to pay for work related to the AWSCS segment being constructed or the consultant contract. The parties agree that costs incurred in design and construction of the AWSCS will be paid equally by the City and MIT as the costs are incurred, except as otherwise set out in this Agreement. Once funds are deposited into this account they will be unavailable for MIT until project completion or if the project is terminated early, upon termination. The account will earn interest for the MIT. Payment from this account does not guarantee MIT approval or waive the MIT's right to protest any expenditure by the City.

(b) MIT approved contract changes may require additional funds be deposited into this account to ensure sufficient funding to support MIT's portion of said change. Account adjustments shall occur within 10 calendar days of MIT approval for said change.

(c) To the extent that the MIT has provided construction funds that remain unexpended at the end of the construction of a segment of

the AWSCS, any remaining funds shall be carried forward and shall be used to fund a portion of the MIT's share of a subsequent section. When the entire AWSCS is completed or upon termination if terminated early with funds remaining in the MIT's account, those funds, with accrued interest, shall be refunded to the MIT. The City shall provide periodic reports, no less frequently than quarterly on the expenditure of funds for the project, as noted in Section 2.2.4 and at the completion or termination of each segment a final accounting of the funds expended will be provided.

(d) To the extent that the parties to this Agreement have a dispute with respect to invoices, the reasonableness of costs associated with a segment or other matters related as a party's duty to fund, that dispute shall be resolved under the procedures set out in Section 10 of this Agreement.

2.2.4 Final Accounting: The City shall provide periodic reports, no less frequently than quarterly on the expenditure of funds for the project, as noted in Sections 2.2.1 and 2.2.2. At the completion or termination of each segment the City will provide a final accounting of the funds expended.

2.3 Design and Construction Contract Development: The City shall be the contracting agent responsible for managing contracts with design and construction professionals consistent with the terms of this agreement and applicable laws. Direction to the consultant and contractor shall be through the City, which is the contracting party.

2.3.1 Reviews: The MIT shall have the opportunity to participate in the review and approval of: (1) the selection of any consultants, contractors, consistent with any bid documents and bid procedures, and the development of their corresponding contracts for work to be paid by allocated funds under this Agreement; and (2) design documents (including any intermediate designs that require approval) bid documents, construction plans, budgets, sequencing changes, schedules, project specifications, and similar documents. MIT review(s) and approval(s) shall take place prior to the time that such document(s) are considered final by the City and prior to the time that such documents are submitted by the City to the contracting party for signature. The parties shall work cooperatively to assure that all relevant comments are considered in the contract development process. MIT shall provide its approval, disapproval, comments, or notice of its intention to waive its rights to approve within 15 calendar days of the date that the documents are submitted for MIT review and approval. Failure to respond in the time set out in this section shall constitute approval of the document. Once MIT approval is granted, no further changes to the contract shall be allowed without further concurrence between both parties.

2.3.2 Correspondence and Meetings: The MIT shall receive pertinent copies of project correspondence and may, at its option, audit the City's project file and participate in any matter relating to the project including work schedules, project meetings, project reports, change orders, claims, pay estimates, billings, project close out, provision for continuation of services, and related matters. The City shall inform the MIT of all progress and design meetings with the consultant/contractor and MIT may, at its option, attend these meetings. The MIT may contest any billing as not being consistent with applicable contract documents or the terms of this Agreement and take any actions necessary to protect its interests if claims are filed. Progress meetings will be established regularly but no less frequently than monthly to confer on the construction project and any other aspect of the AWSCS project. To the extent that the MIT believes that the City is not complying with the terms of any construction contract or the terms of this Agreement and the dispute is not resolved, either party may seek to resolve the dispute under Section 10 of this Agreement.

2.3.3 Scheduling: The proposed construction sequencing for improvements to the AWSCS is as identified in Exhibit A. Approval of this Agreement confirms the parties' agreement with the sequencing and grants the City authority to begin processing bills for funds expended on the design of the AWSCS consistent with the provisions set out in Section 2 of this Agreement.

To the extent the parties are unable to reach agreement or any party believes the other is acting inconsistent with the terms of this section, the dispute shall be resolved under Section 10 of this Agreement.

2.4 Actual Construction: The City shall be responsible for the actual construction of the AWSCS, paying all construction related costs consistent with the construction/bid documents and assuring that construction of each segment is completed pursuant to the contract terms and consistent with the terms of this Agreement and Exhibit "A". The City shall be responsible for preparing record drawings and providing one full and complete copy to the MIT within 90 calendar days of final project acceptance by the City. The City shall follow normal contracting rules, procedures, and standards as commonly accepted by the public works industry, except as might be modified by this Agreement.

2.4.1 Project Monitoring: The City shall be responsible for monitoring construction, and shall assure that all contractors, subcontractors and material men are paid and any liens are discharged as required in the respective contracts, or by operation of law. MIT shall not be liable for any cost, expense or liability associated with the failure to pay any contractor, subcontractor or material man.

The MIT shall have access to the project site at all times that construction operations are underway for the purpose of monitoring the project progress and ensuring compliance with contract documents and the terms of this Agreement. The MIT shall follow appropriate safety requirements for construction zones and shall report any concerns to the City Project Manager or Project Inspector consistent with Section 2.3.

2.4.2 The City shall indemnify MIT against any loss, cost or expense arising out of any action brought against MIT seeking payment for work done on the AWSCS based on a contract that is not approved by MIT.

2.5 Contract Changes: The City may, without MIT prior concurrence, approve changes for consultant and construction contracts up to 5% of original contract costs. The 5% of an approved construction contract may be set out in any one segment as either,

(a) minor changes (individual changes under $5,000 each),
(b) line item quantity changes (changes to a line item quantity on the bid form), or as
(c) a change order (if the individual change exceeds $5,000).

Changes in bid quantities, minor changes, or change orders shall all be brought to the MIT's attention no later than the next scheduled progress meeting between the City and MIT. A description of the change along with an explanation for the change shall be supplied to the MIT for its concurrence. If MIT determines that the change was not proper it may refuse to pay that portion of the cost of the change that would otherwise be allocated to the MIT. If the parties do not agree on this issue then the issue or disagreement shall be resolved under the procedures set out in Section 10.

Contract changes exceeding 5% of the total contract estimate shall require City and MIT approval prior to implementation. All changes that require City council approval shall also require MIT approval without regard to the amount. City and MIT shall provide their approval, disapproval, comments, or notice of its intention to waive its rights to approve within 15 calendar days of the date that the change is submitted in writing to each of the agencies. Failure to respond in the time set out in this section shall constitute approval of the document.

2.6 Final Inspection: Every contract let to construct, modify, or repair the AWSCS shall provide for a final inspection of the work done prior to any final payment under the contract or the release of any funds held back. The City shall take the lead in providing a final inspection. The MIT shall be informed of any final inspection or testing events at the time of scheduling, or 5 calendar days prior to any scheduled inspection, whichever is the shorter. The MIT may provide input and options, on the methods and means to be used to

inspect the completion of each segment; the entire AWSCS; and during the life of this Agreement, any repairs or modifications done to the AWSCS. The MIT, in its discretion, may participate in or monitor the final inspection. If the parties cannot agree on the methods and means of any final inspection the dispute shall be resolved under the procedures set out in Section 10 of this Agreement.

3. OPERATIONS AND MAINTENANCE

3.1 Operation and Maintenance Duty: The City shall be responsible for undertaking all the routine operation and maintenance associated with the AWSCS. Routine operations and maintenance shall consist of inspection and cleaning of the trunk line together with the activities set out in Exhibit "B. The MIT's duty to contribute to operations and maintenance shall commence when the MIT and King County execute the Agreement set out in Section 4.

3.2 MIT Contribution: MIT's maximum obligation to contribute towards the operations and maintenance set out in Section 3.1 shall be $600.00 (six hundred dollars) per year. This fee shall be payable within the month of January of each year. The MIT shall have no other financial obligation to fund operation and maintenance set out in Section 3.1.The MIT shall begin making this contribution upon the establishment of the MIT as a King County Component Agency for the conveyance and treatment of wastewater flows to King County. This fee shall be reviewed after 15 years from the date of this Agreement. If an increase in the annual fee is determined justifiable then the City and the MIT shall negotiate the new fee.

3.2.1 In order to measure MIT wastewater volume and contribution, MIT shall install and maintain a flow meter to be located at the southern terminus of the AWSCS. The meter shall have a totalizer that records the volume of wastewater conveyed to the AWSCS. This meter shall be used in quantifying MIT wastewater flow into King County's system.

3.2.2 If requested by MIT, the City will install, at the City's expense and at a location designated by the MIT, a temporary flow monitor to sufficiently capture the cumulative City and MIT flows in the conveyance piping. The meter will be installed at a frequency not to exceed once every 20 months. The City shall have three months to establish the meter upon receipt of written request by the MIT. All information concerning the flows from said meter shall be provided to the MIT. Any information provided from King County to City concerning the flows from the AWSCS shall be forwarded to MIT for their records within 15 calendar days of receipt.

3.3 Extraordinary Repair: Should the AWSCS require additional repair or maintenance or upgrade over and above the routine maintenance

described in part 3.1, in order to meet the requirements of the MIT and City, and where the need for maintenance is not caused by the negligence of either party, the City and MIT shall meet together to agree on the nature and cost of the repair or upgrade. Upon reaching agreement on the nature and costs of the repair, each party shall contribute to the repair and/or upgrade in the same percentage as each contributed to the construction of the AWSCS. The City may complete repairs without concurrence from MIT where the failure to immediately complete the repairs would create a public health hazard caused by the release of wastewater outside of the sewer system. When the City acts without the concurrence of MIT, the City shall document the reasons for such repair and costs. MIT may contest the need for the emergency repair and or the amount expended. If the parties are unable to reach agreement on the nature of Extraordinary Repairs, the costs associated with such repairs, or any dispute than resolution will be sought under Section 10 of this Agreement.

3.4 Coordination of Operation and Maintenance: The parties shall each name one representative to coordinate operation and maintenance matters and to serve as a medium of communication on such matters. The representatives shall meet at least monthly to examine and agree on maintenance schedules, cost items and similar matters relating to the operation and maintenance of the AWSCS. Neither representative shall have the power to bind or commit a party to costs that exceed the operation and maintenance fund established in the Agreement. Disputes shall be resolved under the procedures set out in Section 10.

3.5 Effective Date: The duty of the MIT to contribute to Extraordinary Repairs under Section 3.3 shall apply only to those segments of the AWSCS that are replaced under this Agreement and only when the replacement is complete. The MIT shall not be responsible for the cost of ordinary repairs and maintenance under Section 3.1 on Segments of the AWSCS that have not been replaced under this Agreement where the cost of ordinary maintenance and repair is related to the age of the AWSCS extant as of the date of this Agreement.

4. SEPARATE AGREEMENT BETWEEN KING COUNTY AND TRIBE.

4.1 The MIT shall execute a separate interlocal agreement with King County for King County's conveyance and treatment of the MIT's wastewater.

4.2 The MIT shall be governed by the existing conditions of the 1997 Auburn MIT Agreement for wastewater conveyance established with the City as noted in Exhibit "C", a copy of which is attached hereto and is incorporated herein by this reference, until an agreement is established between the MIT and King County for the conveyance and treatment of

wastewater. Upon the establishment of said agreement with King County the MIT shall begin paying Operation and Maintenance fees as set out in Section 3.2 of this Agreement.

4.3 Upon the establishment of said agreement with King County the City shall provide the MIT with a final monthly sewer bill based upon all the facilities that have connected to the sanitary sewer pipe that drains into Auburn. The MIT shall supply documentation detailing all of the MIT connections to the wastewater conveyance facility.

4.4 Upon the execution of this Agreement, Section 5.1 of the 1997 Agreement shall not apply, and the MIT may continue to move wastewater through the existing and when completed new AWSCS without regard to the number of MIT hook-ups or the source of the wastewater so long as the wastewater meets the standards set out in the 1997 agreement and capacity within the AWSCS is not exceeded. Prior to the completion of the AWSCS, if capacity within the existing AWSCS is exceeded then the MIT shall be required to delay their peak flows until off-peak hours or until the problem lines are repaired. For the purpose of this Section 4.4 off-peak hours shall be defined as weekends and anytime except 6:30 AM to 6:30 PM.

4.5 The parties agree that upon establishment of the MIT as a King County wastewater agency, the MIT will no longer be subject to any City fees including but not limited to monthly service fees and new connection system development charges, unless otherwise noted in this Agreement. All fees associated with conveyance, treatment, and disposal of wastewater shall be billed from King County directly to the MIT except the maintenance and operational costs outlined in Section 3.2 above.

4.5.1 The King County capacity charge shall continue to be billed directly to the MIT from King County for new connections to the sanitary sewer system.

5. WASTEWATER COLLECTION LIMITATIONS

5.1 The MIT agrees to limit its local sanitary sewer service area for sewer connections to Indian lands located on or near the MIT Reservation located outside of the City's service area as defined as of the effective date of this Agreement. This region is consistent with the area used to define the peak flows noted in Exhibit "A".

5.2 The capacity required by the City for the AWSCS shall provide service to those properties within the City's approved service area based upon existing zoning, future growth projections, and topographical features.

5.2.1 Nothing in this Agreement is intended to apply City zoning to MIT owned lands within the City.

5.3 The MIT and City may agree in the future to add MIT land located within the City's service area to the MIT's service area. If the MIT and the City so agree, the respective Operation and Maintenance obligation of the parties set out in Section 3 shall be adjusted.

6. WASTEWATER OPERATIONAL LIMITATION

6.1 The MIT and City agree to maintain soluble hydrogen sulfide levels in the City's and MIT's wastewater below 0.5 ppm over a six-hour average. Each will provide chemical addition to its wastewater infrastructure if sulfide is determined to be creating a corrosive environment. In addition, the parties shall require pretreatment of industrial wastes to King County standards and shall require grease traps to be installed and maintained by all restaurants.

6.2 The MIT and City shall enforce all sewage collection and transmission system wastewater quality standards required by King County Department of Natural Resources and Parks, Wastewater Treatment Division and/or the EPA, as applicable, for all wastewater discharged into the AWSCS. To the extent that the City imposes additional limits on sewage that may be accepted into the City's sanitary sewer system, those additional limitations shall apply to the MIT so long as they (a) address the quality of effluent accepted into the system; and (b) apply to all customers served by the City either directly or by contract. Provided, that prior to the imposition of any limit, the City shall confer with the MIT and provide assurances to the MIT that any change will not affect or otherwise limit existing MIT services. Provided further, the City may not impose any additional limit that would affect the right of the MIT to fully utilize its capacity ownership rights in the AWSCS, or that would be inconsistent with the express provisions and limits set out in this Agreement. The MIT shall deliver to the AWSCS only such sewage collected or received by the MIT as is in conformity with the rules and standards set out in this section. The MIT shall not accept sewage or wastes from any person, firm, corporation, or other entity that is located outside of its service area boundaries, without written consent of the City. Should the MIT or the City at any time suspect that the wastewater is not meeting these standards, the party suspected of being in violation shall make every effort to locate and eliminate the source of contamination.

6.3 Damage to the AWSCS resulting from wastewater from either the MIT or City collection systems that does not meet the standards of Section 6.1 and 6.2, shall be addressed as follows: Where the MIT is the offending party, it will reimburse the City for any and all such damages; where the City is the offending party it shall be responsible for repairing any damage at its sole

cost and expense. In addition, either party that believes that the other party is delivering wastewater to the AWSCS that does not meet the standards set out in this section may seek injunctive relief under Section 10.3 against the offending party to enjoin the violation without first complying with the requirements of Sections 10.1 and 10.2.

6.4 MIT specifically agrees that should the City believe that the MIT is delivering wastewater that does not meet the standards set out in this Agreement and the City does not take action permitted under Section 6.3, the failure to take such action shall not be deemed a waiver of any of the City's rights under this Agreement and the MIT will not assert the doctrine of wavier, estoppel, or laches against the City in any subsequent action relating to the delivery of wastewater that does not meet the standards under this Agreement.

7. RESPONSIBILITY FOR DAMAGES

7.1 The City and the MIT shall each be responsible for any damage that is caused to the AWSCS (not including routine maintenance and repair) by their respective negligent acts or the acts of their customers. In such case the cost of repair shall be born by the negligent party.

7.2 The City shall perform repairs to the AWSCS as noted in Section 3.3. Where the repair was necessitated by the negligent actions of the MIT as described in Section 7.1 above, the reasonable cost for such repairs will be billed to the MIT, and shall bear interest, at the then existing ninety (90) day Treasury Bill rate, after thirty days from the date of billing. Where the repairs to the AWSCS are caused by the City, the City shall complete the repairs, at its sole expense, in a reasonable time so as not to interfere with the continued operation of the AWSCS. Where the damage is caused by both the MIT and City, each shall be equally (50%-50%) responsible for its share of the damage repair costs. Questions as to whether particular damage is the result of the negligence of either or both parties and the needed repairs to fix the damage shall be resolved under Section 10.

8. CAPACITY RIGHTS

Payment of invoices associated with the design, construction, inspection and project management of AWSCS's sewer improvements entitles the MIT to ownership of capacity within the AWSCS as outlined within Exhibit "A".

9. TERMINATION OF AGREEMENT

It is the intention of the parties that this Agreement shall not terminate during its term. If a party believes that the other party is in violation of this Agreement, that party may seek redress under Section 10. Provided, that the

parties thereto may agree in writing to terminate this Agreement on whatever terms and conditions they determine to be acceptable. Provided further, that neither party may force the other party to terminate this Agreement, nor shall the failure to agree to terminate this Agreement be subject to the procedure setout in Section 10.

10. DISPUTE RESOLUTION AND LIMITED WAIVER OF SOVEREIGN IMMUNITY

10.1 **Dispute Resolution - Mediation.** In the event the MIT and the City are engaged in a dispute, which relates to or arises under this Agreement, and they are unable to resolve said dispute within 30 calendar days, either party may request mediation.

10.1.1 The party requesting Mediation shall notify the other party in writing of its request to mediate a dispute identified in Section 10.1. If the parties agree to enter into mediation within 20 calendar days from such request the matter shall be deemed stayed and the arbitration clause contained herein shall not be put into effect. Mediation shall continue for no more than 90 calendar days at which point the mediation shall be deemed failed unless the parties have reached an agreement and have had such agreement approved by the governing bodies of each respective party and, if applicable, the Bureau of Indian Affairs. The parties may agree to continue mediation for a longer period. If such agreement is not approved by the governing bodies of each respective party or is not enforceable in the United States District Court for the Western District of Washington, the mediation shall be deemed failed and the unresolved issue shall be submitted to binding arbitration as set forth herein.

10.2 **Failure to mediate:** In the event that the parties do not reach an agreement to mediate within 20 calendar days of receipt of the notice requesting mediation by the non-requesting party, the matter shall be submitted to binding arbitration as set forth herein.

10.3 **Arbitration:** Any controversy or claim that relates to or arises under this Agreement or the breach thereof, shall be settled by arbitration administered by the American Arbitration Association in accordance with its applicable rules. Judgment on the decision rendered by the arbitrator may be entered into the United States District Court for the Western District of Washington. The arbitrator shall not have authority to enter an order terminating this Agreement.

10.4 **Attorney fees and costs:** Each party shall bear its own costs of mediation and arbitration.

10.5 **Limited Waiver of Sovereign Immunity and Consent to Jurisdiction of Federal Court.** The MIT hereby waives its sovereign immunity and consents to the jurisdiction of the United States District Court for the Western District of Washington concerning disputes regarding the interpretation of this Agreement and the enforcement of any rights, obligations or liabilities, in law or in equity, pertaining to hold harmless provisions of this Agreement. Such waiver of Sovereign Immunity and Consent to jurisdiction shall apply to no other court. This Limited Waiver of Sovereign Immunity and Consent to Jurisdiction has been specifically negotiated by the parties and the decision of the City to enter into this Agreement was made in part based on this limited waiver of sovereign immunity.

10.6 **Disclaimer of MIT Tribal Court Jurisdiction.** The MIT agrees that the MIT Tribal Court has no jurisdiction over the force, effect, and interpretation of this Agreement, nor the resolution of disputes that pertain to its implementation. The MIT further agrees that it has no authority to submit the City to the jurisdiction of the MIT Tribal Court with regard to any sewer-related matters or disputes that may arise between the parties under this Agreement.

11. PERFORMANCE, AMENDMENT, AND INTERPRETATION

Each party agrees that it will execute any and all instruments, documents and resolutions or ordinances necessary to give effect to the terms of this Agreement.

This Agreement may be modified only if such modifications are written and approved by written resolutions adopted jointly by the Auburn City Council, the MIT Tribal Council, and the BIA, if required.

The parties shall comply with all applicable rules and regulations pertaining to them in connection with the matters covered herein.

This document has been mutually negotiated between the parties. No adverse inference or ambiguity shall be construed against the party preparing this document for signature. No waiver by either party of any term or condition of this Agreement shall be deemed or construed to be a waiver of any other term or condition, nor shall a waiver of any breach be deemed to constitute a waiver of any subsequent breach, whether of the same or a different portion of this Agreement.

12. TERM OF AGREEMENT

The initial Term of this Agreement shall continue until the AWSCS constructed under this Agreement is replaced in its entirety or 50 years whichever is the longer. If the parties jointly agree to replace the AWSCS the

parties shall negotiate the terms and conditions of a new agreement that provides for both MIT and City ownership and use of capacity in the new sewer line. If the parties can not reach an agreement on the terms of a new agreement with respect to the new AWSCS, then the MIT may continue to have the right to use the AWSCS in the same manner and under the same conditions as set out in this Agreement until the existing AWSCS is fully replaced or until the 50 year term referred to above ends, whichever is longer.

13. INDEMNIFICATION

The MIT agrees to indemnify and hold the City and its agents, employees, and/or officers, harmless from and shall process and defend at its own expense any and all claims, demands, suits, at law or equity, actions, penalties, losses, damages or costs, of whatsoever kind or nature, brought against the City arising out of, in connection with, or incident to the execution of this Agreement and/or the Tribe's performance or failure to perform any aspect of this Agreement; provided, however, that if such claims are caused by or result from the concurrent negligence of the City, its agents, employees, and/or officers, this indemnity provision shall be valid and enforceable only to the extent of the negligence of the Tribe; and provided further, that nothing herein shall require the Tribe to hold harmless or defend the City, its agents, employees, and/or officers, from any claims arising from the sole negligence of the City, its agents, employees, and/or officers. No liability shall attach to the City by reason of entering this Agreement except as expressly provided herein.

The City agrees to indemnify and hold the MIT and its agents, employees, and/or officers, harmless from and shall process and defend at its own expense any and all claims, demands, suits, at law or equity, actions, penalties, losses, damages or costs, of whatsoever kind or nature, brought against the MIT arising out of, in connection with, or incident to the execution of this Agreement and/or the City's performance or failure to perform any aspect of this Agreement; provided, however, that if such claims are caused by or result from the concurrent negligence of the MIT, its agents, employees, and/or officers, this indemnity provision shall be valid and enforceable only to the extent of the negligence of the City; and provided further, that nothing herein shall require the City to hold harmless or defend the MIT, its agents, employees, and/or officers, from any claims arising from the sole negligence of the MIT, its agents, employees, and/or officers. No liability shall attach to the MIT by reason of entering this Agreement except as expressly provided herein.

Each party shall maintain in full force and effect throughout the term of this Agreement a policy of comprehensive general liability insurance, or demonstrate that the party is self-insured, with minimum coverage of one

million dollars per occurrence / two million dollars aggregate for personal injury, including death, and property damage. The parties may agree to increase the coverage limits set out in this section or if no agreement on different limits can be reached, any party can submit the issue for resolution under Section 10. If insurance is provided the insured party shall include the other party as an additional named insured. If a party relies on self-insurance, the other party shall be named as a third party beneficiary with enforcement rights to seek indemnification.

The City and MIT agree to hold each other harmless from third-party claims arising from the use of wastewater conveyance facilities within the respective jurisdictions and service areas.

14. ASSIGNMENT

The parties shall not assign this Agreement or any interest, obligation or duty therein without the express written consent of the other party.

15. ATTORNEY'S FEES

If either party shall be required to bring any action to enforce any provision of this Agreement, or shall be required to defend any action brought by the other party with respect to this Agreement, and in the further event that one party shall substantially prevail in such action, the losing party shall, in addition to all other payments required therein, pay all of the prevailing party's reasonable costs in connection with such action, including such sums as the court or courts may adjudge reasonable as attorney's fees in trial court and in appellate courts.

16. NOTICES

All notices between the two agencies hereunder may be delivered or mailed. If mailed, they shall be sent to the following respective addresses:

City of Auburn
Public Works Director
25 West Main Street
Auburn, WA 98001
(253)-931-3010

Muckleshoot Indian Tribe
Assistant Tribal Operations Manager
Community Development
39015 172nd Ave. S.E.
Auburn, WA 98092
253-876-3104

or to such other representative addresses as either party may hereafter from time to time designate in writing. All notices and payments mailed by first class mail, postage prepaid shall be deemed to have been given on the second business day following the date of mailing, if properly mailed and addressed.

Notices and payments sent by certified or registered mail shall be deemed to have been given on the day next following the date of mailing, if properly mailed and addressed. For all types of mail, the postmark affixed by the United States Postal Service shall be conclusive evidence of the date of mailing.

17. NONDISCRIMINATION

Each of the parties, for itself, its heirs, personal representatives, successors in interest, and assigns, as part of the consideration hereof, does hereby covenant and agree that it will comply with statutes, executive orders and such rules as are promulgated there under that are applicable to a party to assure that no person shall on the grounds of race, creed, color, national origin, sex, age, or the presence of any sensory, mental or physical handicap be discriminated against or receive discriminatory treatment by reason thereof.

18. INTEGRATION.

This Agreement constitutes the entire agreement of the parties regarding the subject matter hereof, and there are no other representations or oral agreements other than those listed herein, which vary the terms of this Agreement. Future agreements may occur between the parties to transfer additional or future service areas by mutual agreement.

19. OBLIGATION INTACT.

Nothing herein shall be construed to alter the rights, responsibilities, liabilities, or obligations of either the MIT or the City regarding provision of sewer service, except as specifically set forth herein.

20. OBLIGATION TO COMPLETE PROJECT.

The Parties expect that the AWSCS shall be constructed in substantially the same form as described in Exhibit A. The parties expect that, absent an unforeseen intervening event that is outside the control of the parties, that could not be avoided by the use of due care, that all segments of the AWSCS will be completed within six years of the effective date of this Agreement, unless otherwise agreed upon by the parties. Should either party fail to take any action required under this Agreement such that the AWSCS is delayed or its construction stopped, the other party may seek injunctive relief under Section 10 to compel the other party to undertake any required action under this Agreement to complete the AWCSC. Provided, that if the City is the non-complying party, the MIT may continue to transport effluent through the existing Auburn Way South sewer line to accommodate at least a peak flow of 1.34cfs without any limitation on the source of such effluent so long as it comes from the MIT service area and meets effluent standards set out in this Agreement until the AWSCS is completed. Provided further, unless a court holds otherwise, should the City be held to be legally incapable of completing the AWSCS the MIT may transport effluent through the existing Auburn Way South

sewer line to accommodate at least a peak flow of 1.34cfs without any limitation on the source of such effluent so long as it comes from the MIT service area and meets effluent standards set out in this Agreement. Provided further, to the extent that the MIT has paid any money to the City as required under this Agreement and the City has become legally incapable of completing the AWSCS, the City shall return to the MIT any funds paid by the MIT, including accrued interest, without regard to whether the funds have been expended by the City, unless some other agreement between the MIT and the City can be established.

IN WITNESS TO THE TERMS OF THIS AGREEMENT, the parties hereto have subscribed their names:

MUCKLESHOOT INDIAN TRIBE

3-19-04

John Daniels Jr. Date
Chairperson, Muckleshoot Tribal Council

CITY OF AUBURN

3/26/04

Peter B. Lewis, Date
Mayor, City of Auburn

ATTEST:

Danielle Daskam,
City Clerk, City of Auburn

APPROVED AS TO FORM:

Daniel B. Heid
City Attorney, City of Auburn

Exhibit A
Auburn - Muckleshoot Indian Tribe Sanitary Sewage Agreement
Auburn Way South Conveyance System (AWSCS)

Section	Begin SSMH	End SSMH	Length of Pipe (ft)	Peak Flows (cfs)			Pipe Size (in)	Flow Allocation (%)		Estimated Construction Cost ($)
				MIT	Auburn	Total Accum.		MIT	Auburn	
	1216-20	1216-18	680	7.85	1.10	8.95	21			
A	1216-18	1216-13	1,090	7.85	1.10	8.95	21	86.6%	13.4%	$ 693,700
	1216-13	1216-63	410	7.85	1.75	9.60	21			
	1216-63	1115-13	1,330	7.85	2.24	10.09	24			
	1115-13	1115-11	640	7.85	2.85	10.70	24			
B	1115-11	1115-28	2,080	7.85	3.98	11.83	24	69.2%	30.8%	$ 2,481,800
	1115-28	1114-07	1,780	7.85	3.98	11.83	24			
	1114-07	1114-04	1,000	7.85	3.98	11.83	24			
	1114-04	1013-15	2,490	7.85	6.63	14.48	24			
C	1013-15	1012-36A	1,310	7.85	7.02	14.87	24	53.6%	46.4%	$ 1,500,800
	1012-36A	1012-35	330	7.85	7.02	14.87	24			
	1012-35	1012-33	350	7.85	7.43	15.28	24			
D	1012-33	1012-17	630	7.85	10.67	18.52	24	43.3%	56.7%	$ 1,217,000
	1012-17	1011-07	2,370	7.85	10.67	18.52	24			
	1011-07	1010-44	2,610	7.85	11.4	19.25	24			
E	1010-44	1010-31	1,400	7.85	13.69	21.54	27	38.3%	61.7%	$ 2,612,000
	1010-31	910-29	2,010	7.85	13.69	21.54	36			
Total			22,510	7.85	13.69	21.54				$ 8,505,300

Priority Schedule:

Priority 1	MH 1216-13 to MH 1114-04
Priority 2	MH 1114-04 to MH 1010-44
Priority 3	MH 1010-44 to MH 910-29
Priority 4	MH 1216-20 to MH 1216-13

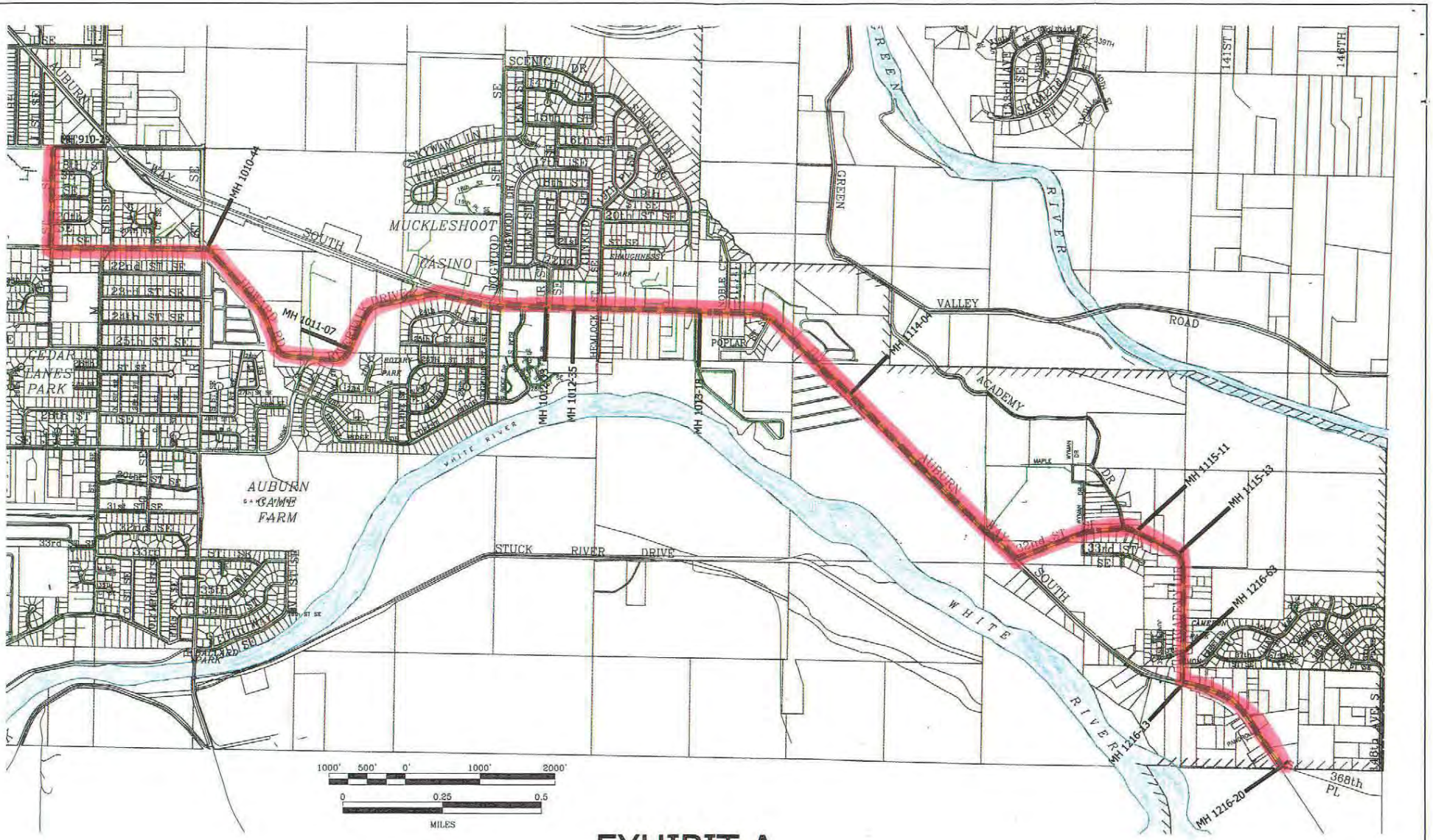


EXHIBIT A

AUBURN MUCKLESHOOT INDIAN TRIBE SANITARY SEWAGE AGREEMENT

AUBURN WAY SOUTH CONVEYANCE SYSTEM

Existing Sanitary Sewer
Proposed Replacement
Auburn City Limits

Plotted: December 2003

Exhibit 1 Exhibit A
Resolution No. 3660
Page 2 of 2

Exhibit B
Auburn-Muckleshoot Indian Tribe Sanitary Sewage Agreement

Auburn Way South Conveyance System (AWSCS) Operation and Maintenance Activities

Line Locates
Locate sewer lines for construction activities that take place near existing sewer pipes.

High Velocity Jetting
Use high-pressure water discharged from a nozzle to scrub the internal surfaces of the AWSCS.

Vacuum Cleaning
Vacuum clean the AWSCS to collect solids, fats, oils and possibly grease that may have accumulated. This will typically be done in conjunction with high pressure cleaning.

Rat Baiting
Place rat poison in manholes to eliminate existing or potential problems.

Visual Inspection of AWSCS
Pull manhole lids to visually observe the flow and assess whether capacity problems are being experienced. This will be done most frequently during storm events.

Smoke Testing
Smoke test AWSCS to determine if any cracks or broken pipe exist.

TV Inspection
Inspect AWSCS for breaks, bellies or other pipeline problems.

Manhole Maintenance
Re-grout AWSCS manhole collars that may have shifted and cracked allowing ground water to enter the manhole. Add a riser ring if needed due to manhole settlement.

Repairs and Replacement
Repairs and replacement to the AWSCS shall be made consistent with the terms of the Agreement.

Exhibit C

SANITARY SEWAGE CONNECTION AGREEMENT

between the

CITY OF AUBURN

and the

MUCKLESHOOT INDIAN TRIBE

of the

MUCKLESHOOT INDIAN RESERVATION
KING COUNTY, WASHINGTON, USA

This Agreement is entered into on this ___ day of _____, 1997, in King County, Washington, between the City of Auburn, a municipal corporation under the laws of the State of Washington, hereinafter referred to as the "City," and the Muckleshoot Indian Tribe, a federally recognized Indian Tribe located on the Muckleshoot Indian Reservation, hereinafter referred to as the "MIT" and "MIT Reservation" respectively.

WHEREAS, in order to meet the standards prescribed by the State of Washington, Department of Ecology, for the collection and disposal of sewage effluent within the State, the City constructed a sanitary sewage collection system including transmission facilities to the King County Department of Natural Resources, Water Pollution Control Division, hereinafter referred to as "Metro", wastewater treatment plant; and

WHEREAS, the MIT has identified the need for community sewage collection and disposal facilities to resolve current sanitation needs of the MIT Reservation not currently served by a sanitary sewage collection system; and

WHEREAS, the Indian Health Service, hereinafter referred to as "IHS," the Environmental Protection Agency, hereinafter referred to as "EPA," the MIT and the City concur in the need for a sewage collection, treatment and disposal system to protect the health of MIT members and to safeguard the environment in and around the MIT Reservation; and

WHEREAS, the IHS, the EPA, the MIT and the City have entered into a separate Memorandum of Agreement to provide for the construction of a sewage collection and transmission system on the MIT Reservation and for connection of this sewage system to the City's sewage system utilizing funding from the Indian Set-Aside Program of the Clean Water Act - 1987 amendments, through the EPA and funding from the IHS through Sanitation Facilities Construction Program, Public Law 86-121, under Project PO-94-690; and

WHEREAS, this Agreement is required by EPA and IHS for the MIT to obtain the funding to resolve its current residential sanitation needs; and

WHEREAS, the consideration the City will receive from this Agreement is enhancement of public health by connecting current septic systems to a new sewer system; and

WHEREAS, furtherance of public health and safety of area inhabitants requires that all sewage collected by the MIT and discharged into the City's system of sanitary sewers be both non-harmful and non-toxic to both the City's system of sanitary sewers and area residents, as well as in conformity with reasonable rules and regulations; and

WHEREAS, the Auburn City Council has by Resolution No. 2800 and 2671, a copy of which is attached hereto and is incorporated herein by this reference, expressly reviewed and reaffirms the policy set forth in Resolution No. 2671 authorizing the execution of the September 6, 1995, Memorandum of Agreement Among the IHS, the EPA, the City, and the MIT of the MIT Reservation, also identified as Public Law 86-121, Project PO-94-690 ("Four Party Agreement" herein), and thereby authorized its Mayor to execute this Agreement which authorizes sanitary sewage connections for residential, single family housing units and specific existing non-residential facilities;

WHEREAS, all parties agree that this Agreement is solely for the purpose of protecting public health and contemplates only the connection of the 40 existing homes in the Skopabsh Village, up to 230 units of residential housing, and those other facilities set forth in the City's Resolution No. 2671, page two, which are defined as "Tribal administration, Tribal school, library, senior center, Tribal store, churches";

WHEREAS, the MIT Tribal Council has by Resolution No. 97-188, a copy of which is attached hereto and is incorporated herein by this reference, expressly reviewed and approved this Agreement and secured Bureau of Indian Affairs, hereinafter referred to as "BIA", approval pursuant to Title 25, Section 81, of the U.S. Code; and

WHEREAS, the dispute resolution provisions of this Agreement shall apply to all issues arising between the parties which relate to sewer and sewer related services; and

NOW, THEREFORE, in order to provide for connection and continued use of the MIT's sewage collection and transmission system to the City's sewage system, the parties mutually agree:

I. CONNECTION AUTHORIZED

1.1 MIT is authorized to connect to City sewer line to service only 40 existing homes in Skopabsh Village, MIT residential units in existence at the time of City Resolution No. 2671 passage (estimated to be approximately 130 units), up to a maximum of 100 additional units of single family housing, and MIT governmental or community facilities such as administration, school, library, senior center, store, and churches.

II. CITY'S SYSTEM DEVELOPMENT CHARGE

2.1 **Determination of System Development Charge.** That the MIT agrees to provide the City with a listing of all connections to the MIT's sewage system and agrees to pay the City a one-time System Development Charge, hereinafter referred to as SDC, for each connection to the MIT's sewage system. This listing will be updated by the MIT as needed on a monthly basis as an attachment to the monthly utility fee paid to the City. The SDC for each connection shall be as calculated utilizing Metro forms 1057, 1058, and 0461, latest revisions, copies of which are attached hereto, for Residential Customer Equivalents, hereinafter referred to as "RCE's". The MIT has already pre-paid the SDC's for 230 RCE units with IHS funds in April, 1996. The current charge for a single family residential and every other RCE connection is $840.

2.2 This SDC rate is subject to change as described in Article XIV. of this Agreement.

2.3 The City agrees to waive the SDC for the 40 existing MIT homes in the Skopabsh Village housing area due to these homes being connected to the City sewage system since 1977.

III. CITY'S USER FEE

3.1 Because the MIT has responsibility for ownership, operation and maintenance of the MIT's sewage collection and transmission system, the parties agree that the MIT will provide the City with a monthly user fee equivalent to fifty percent (50%) of the user fee charged to City customers.

3.2 The MIT will provide the City with 50% of the City monthly user fee as charged to the City customers. For other than single family residential connection, this will include an additional volume amount per month. The volume amount shall be calculated as follows:

V = monthly volume from water service meter, in cubic feet
R = current applicable rate, in dollars

$$\text{Volume amount billing} = \frac{[V - 750] * R * (0.5)}{(100) * (7.5)}$$

3.3 Each connection other than single family residential shall have a water service meter installed prior to sanitary sewer connection. Each single family residential connection shall have a water service meter installed prior to 1 September 1997, or prior to sanitary sewer connection thereafter.

3.4 This rate and the applicable percentage to ownership, operation, and maintenance is subject to change as described in Article XIV. of this Agreement.

IV. METRO'S USER FEE

4.1 The MIT will provide the City with the Metro monthly user fee as charged to the City customers. For other than single family residential connection, this will include an additional volume amount per month. The volume amount shall be calculated as follows:

V = monthly volume from water service meter, in cubic feet
R = current applicable rate, in dollars

$$\text{Volume amount billing} = \frac{[V - 750] * (R)}{(100) * (7.5)}$$

4.2 Each connection other than single family residential shall have a water service meter installed prior to sanitary sewer connection.

4.3 This rate is subject to change as described in Article XIV. of this Agreement.

V. QUALITY OF SEWAGE

5.1 The MIT agrees to connect only the 40 homes in the Skopabsh Village, up to 230 units of residential housing, and those other facilities set forth in the City's Resolution No. 2671, page two, which are defined as "Tribal administration, Tribal school, library, senior center, Tribal store, churches ..." that discharge domestic type sewage into the City's sewage system. The MIT will not permit industrial waste producing developments to connect to their community sewage system. For

purposes of this Agreement domestic type sewage shall be defined as that type of sewage which is contributed by a residential user.

5.2 The MIT agrees to enforce all sewage collection and transmission system effluent quality standards as required by the City, Metro and/or the EPA for all effluent discharged into the City's sewage system. The MIT shall deliver to the City sanitary sewer system only such sewage collected or received by the MIT as is in conformity with and subject to such reasonable rules and regulations as currently exist or as may be adopted from time to time by the City, Metro, or the EPA. The MIT shall not accept sewage or wastes from any person, firm, corporation, or other entity which is located within or without it boundaries, or is otherwise delivering its sewage into the MIT's sanitary sewer system, without written consent of the City. Should the MIT or the City at any time suspect that the effluent from the MIT collection system is not meeting these standards, the MIT shall make every effort to locate and eliminate the source of contamination.

5.3 Should damages to the City system result from effluent from the MIT's collection system that does not meet the standards of Section 5.2, the MIT will reimburse the City for any such damages.

5.4 The MIT's transmission of effluent to the City which does not meet the effluent quality standards as required by the City, Metro, and/or the EPA shall constitute a material breach of this Agreement by the MIT entitling the City to immediately terminate this Agreement for cause. Without terminating this Agreement, the City may in its sole discretion and upon provision of notice to the MIT refuse to accept any effluent it believes is not meeting the effluent quality standards as required by the City, Metro, and/or the EPA and continue to accept effluent which does meet applicable standards. In such event, the MIT specifically agrees that the City shall not be deemed to have waived any of its rights under this Agreement and the MIT will not assert doctrines of waiver, estoppel, and laches against the City in any subsequent action pertaining to this Agreement and the rejection and acceptance of conforming and non-conforming effluents.

VI. ~~SEWER COMMISS~~SYSTEMS COORDINATION

6.1 In the interest of continuing to promote better communication and cooperation between the MIT and the City, both parties agree to send a representative to participate in all regular and special meetings of the MIT's Utility District and the City's Public Works Committee. Both parties shall notify the other party in writing of all such meetings.

6.2 The MIT and the City agree to provide technical and operational assistance to the other party upon request and as resources of manpower or equipment or plant may be available on a cost reimbursable basis. If one party assists the other, the party assisted agrees to honor payment of billings for labor and equipment rental. Both parties will make available established hourly rates for purposes of encouraging this program.

VII. SEWAGE FLOW MEASUREMENT

7.1 The quantity of sewage entering the City's collection system shall be measured by a flow meter located in the City's regulation station. The proper calibration of this flow meter will be the responsibility of the City. The MIT shall keep monthly records of the sewage pumps running time hour meters and of the average pumping rate for each pump for comparison and confirmation of the flow meter calibration on an annual cycle. In the event that the flow meter appears to have malfunctioned, the hour meter readings and the corresponding flow rates shall be used to determine the amount of sewage that has been pumped to the City's sewage system until the flow meter repairs are completed. The MIT will report the total sewage flow as measured utilizing the pump running time hour meters estimated method to the City monthly, as an attachment to the monthly user fee payment.

VIII. TRIBAL OR CITY OWNERSHIP AND MAINTENANCE

8.1 The MIT shall own, operate and maintain all gravity collection lines, sewage lift stations and force main piping located upstream of the City's regulation station and generally within the southeastern portion of the MIT Reservation in Sections 1, 2 and 12 of Township 20 North, Range 5 East, W.M., but, also including the gravity and force main piping located outside of the MIT Reservation boundaries in Section 35 of Township 21 North, Range 5 East, W.M., upstream from the City's regulation station.

8.2 The gravity and force main line located downstream from the City's regulation station to the connection manhole at the corner of Auburn-Enumclaw Highway and 368th Street shall be conveyed to and be owned, operated and maintained by the City provided however that MIT residential connections will be permitted, but no non-MIT connections will be authorized without MIT written approval.

8.3 The MIT operations staff shall operate their facilities in conformance with the Plan of Operation developed with the assistance of the IHS during the design and construction of the facilities.

8.4 In order to maintain compatibility of design/construction operating systems, the MIT agrees to construct and maintain all property referred to herein in accordance with standards and specifications provided by the City.

IX. INTERRUPTION OF SERVICE

9.1 It is understood that the City will periodically need to restrict or shut off sewage flow into their collection system in order to perform repair or maintenance on downstream facilities. For scheduled maintenance or repair activities the City shall notify the MIT, in writing, at least five working days in advance. Such notice shall indicate the work that is to be performed, the anticipated duration of this work, what restrictions or changes to the Plan of Operation will be necessary and a contact person for coordinating all activities with the MIT's operations staff.

9.2 It is also understood that emergency situations may arise that could threaten public health and/or the continued operation of the City's sewage collection system and the City may be unable to notify the MIT in the manner prescribed above (in Section 9.1). In such a situation the City shall use best efforts to contact the MIT's Utility staff (operator or Council officers) and request assistance in regulating the discharge of effluent from the MIT's sewage system.

9.3 The MIT, by reason of this Agreement, shall grant the City an access easement to pump station #2 sufficient to permit the City to regulate the sewage flow and to permit emergency repair work on the City's sewage system. A copy of the Easement form is attached hereto as Exhibit A and is incorporated herein by reference as though fully set forth.

9.4 The MIT agrees to assume liability, if any, for sewage back-ups, if any, within the MIT's sewage system that are caused by capacity shortfalls and flow control spill incidents within the MIT's sewage system, and will hold the City harmless from any such claims, all as more particularly described in Article X. of this Agreement.

9.5 The MIT shall procure and maintain in full force and effect throughout the term of this Agreement a policy of comprehensive general liability insurance with minimum coverage of one million dollars per occurrence/two million dollars aggregate for personal injury including death, and property damage. As a condition of providing service, the City reserves the right, in its sole discretion, to demand increased minimum coverage limits at five (5) year intervals from the date of signing hereof. In the event the MIT does not provide proof of insurance issued by a company approved by the City, with increased limits, within thirty (30) days of such request the City shall be authorized to procure such a policy on its own behalf and deduct such policy premiums from the reserve account established pursuant to this Agreement. Such policy shall name the City as an additional named insured and shall include a provision in such policy prohibiting cancellation or reduction in coverage except upon at least thirty (30) written days notice to the City. Cancellation or reduction of the required insurance shall constitute a material breach of this Agreement and, at the City's sole option, may constitute grounds for the City to immediately terminate this Agreement. Further, the MIT agrees to execute all documents and do all things necessary to allow the City, as additional named insured, to recover directly from the insurance carrier in the event of loss, without having to first commence dispute resolution proceedings or bring suit against the MIT.

X. SEWAGE FLOW CAPACITY

Release Monitoring, Metering and Regulation:

10.1 **Conceptual Premises.** The MIT and the City agree to the following conceptual premises with regard to operation and maintenance of the sewer system pursuant to this Agreement:

A. Prior to City approval of sanitary sewer connection, the City shall approve construction documents as per the Four Party Agreement and the following plans, specifications, and conditions will be met:

1. The MIT agrees to construct and dedicate in fee title all infrastructure concerning the system, except for the regulation station vault to be designed and constructed by the City, from the upstream side of the vault, northwesterly to the City's receiving manhole near the City limits. (Exhibit B: general map illustration)

2. The City will design and construct the regulation station, downstream monitoring gauges, telemetry and control cabinet. The City will seek to coordinate this design with the MIT's consultant (IHS) to assure compatibility with the connection and regulation telemetry of the MIT's #2 pump station.

3. The MIT and City agree to cost share the City's design and construction effort referenced in Section 10.1.A.2. on a 50/50 percentage basis according to and for the mutual benefits accruing to both parties. The MIT agrees to pay its share of the City's improvements prior to construction contract award. No connection shall be allowed until such time as all payments are received by the City.

4. The MIT and City agree to share the monthly communication and any associated maintenance and repair bills as necessary to operate and maintain the telemetry system so long as the MIT's sanitary sewer system is connected to the City's sanitary sewer system. These costs will be included on each monthly sewer bill presented to the MIT. The City will be responsible for maintaining the telemetry system up to and including the telemetry intertie box located at the pump station #2. The MIT hereby grants the City and its system maintenance agents right of entry to all locations served by the City's telemetry system.

10.2 **Regulatory Concept:** Generally the system components consist of:

1. Downstream monitoring gauges will be installed at two manholes in the City's system for purposes of measuring, recording and telemetering "real time" control signals to the MIT's pump station that regulates releases to the City's system.

2. A regulatory vault consisting of and containing a manual gate valve, a motor operated ball valve, flow meter, and telemetry devices shall be installed at a location along the force main downstream of Pump Station #2.

3. In Pump Station #2 the design shall provide an additional wet well surcharge minimum capacity volume of 1,400 cubic feet to accommodate pump regulation. Pumping capacity at Pump Station #2 may be overridden by City telemetry. Override telemetry will control operation of both high volume and low volume pumps, as the IHS has installed no variable flow pumps. As such, the only operations available are fixed high volume, fixed low volume, and all off - no volume.

4. The regulation of the pump station shall be responsive to the downstream monitoring gauge signals and the flow control valve in the regulation vault to assure the performance objectives outlined herein are met, and maximum flows are therefor not exceeded.

5. The telemetry system shall be capable of recording the actual flow data in digital format on a continuous basis and down-loading to a computer system in both the MIT office and the City utility office via modem. The computer software will be capable of showing the real-time flow data at all monitored points (Pump Station #2, Regulatory vault, and monitoring gauges).

6. As the City and MIT decide to modify this Agreement to accommodate adjustments of release rates allowable, the telemetry system shall be capable of receiving programmable updates.

7. Prior to issuance of the connection approval the MIT and its contractor will perform commissioning tests to demonstrate to the City's satisfaction that the system accomplishes the following performance objectives:

a. The pump station responds to regulate the flow releases to the City's system in such a manner that when the City's pipe being monitored is equal to or greater than 80% full as measured by

flow depth within the pipe, the pumping rate is curtailed, and if necessary, reduced to zero.

b. As the City's pipe being monitored drops to a 75% of full condition, the system will query the status of wet well levels and pump down times to assess when pumps are re-energized to commence pumping. The system will periodically continue to query system status at such time as pumping decisions are required.

c. The pump station can be calibrated to deliver flows as dictated by the City's downstream capacity available, and within the limits of flow control as provided by IHS construction to date.

d. At a monitored one-foot surcharge within a gauging manhole, the regulation station will automatically shut off influent flow from the MIT's Pump Station #2, and influent flow shall remain off until the surcharge has disappeared. This will be the only condition mandating zero flow from the MIT's Pump Station #2 except for emergency conditions.

10.3 **Maximum Flow to Be Accepted By City.** The maximum allowable sewage flow rate from the MIT's sewage system to the City's sewage system shall not exceed the capacity available within the City's system at any time as determined by City monitoring gauges. Such flow can be released at any time capacity is available within the City's system.

10.4 **Funding of Future Improvements By MIT A Condition Precedent to Continuing Flow to the City System.**

a. The MIT acknowledges that its share of funding the design and construction of any future capacity expansion effort of the City system is an express condition precedent to the City proceeding with expansion of its system. Payment of this funding share by the MIT is necessitated by the fact that acceptance of MIT flow by the City will consume previously existing capacity, makes such capacity unavailable to the City, and requires subsequent improvements to the City system in order for the City to have and maintain the capacity necessary for the City's own needs and uses. Such funding amounts may be credited against future MIT SDC amounts, if any.

b. The prorata share of City system expansion projects between the MIT and the City shall be determined based on benefit received.

XI. COLLECTION OF FEES, TERMINATION OF SERVICE, AND BREACH OF AGREEMENT

11.1 Collection of Development Charges, User, and Connection Fees.

A. Payment as Condition Precedent. The Agreement is between the MIT and the City and no third parties, even though third parties may be indirectly benefited. As a condition precedent to connection and continued service, the MIT shall pay all necessary development charges and user fees. Additionally the MIT shall apply for any necessary City approvals on behalf of members or property owners within MIT jurisdiction who desire to be connected to the sewer system. The City's issuance of a permit shall be directly conditioned upon completion of those items specified in any particular permit as well as the MIT's payment of the permit fees. The MIT and the City expressly agree that the City shall not be responsible for collecting of SDC's, user charges, permitting fees, or any other moneys of any kind from any other individual or entity.

B. Establishment of Reserve Account for Future System Expansion and Related Costs. The City and MIT shall, upon execution of this Agreement, establish a supplemental reserve account in the amount of Five Hundred Thousand Dollars ($500,000.00) to provide for future funding of anticipated system expansion necessitated on account of increased flows resulting from this Agreement, non-budgeted uses of funds necessitated by natural disasters and other public health reasons, payment of insurance premiums, and any other unpaid charges or fees pertaining to the use of the system or permits pertaining thereto. The City and the MIT shall each contribute Two Hundred Fifty Thousand Dollars ($250,000.00) and the fund shall be maintained at this level with each party replacing the funds which are withdrawn on account of its respective obligations. The fund shall be established in a Restricted Use account of the Sanitary Sewer Fund as designated by the City. The interest accruing thereon, if any, shall be apportioned between the parties in relation to their respective contributions and any such interest and principal remaining at the termination of this Agreement shall be returned to the remitter of such funds upon such termination and settlement of all claims and disputes pertaining to this Agreement. The City shall, upon consultation

with the MIT, be authorized to immediately draw upon and use the funds in the reserve account for the uses and purposes herein mentioned. The City shall account to the MIT for all such funds used. Nothing contained herein shall derogate from the need of the MIT to pay in advance as a condition precedent for the City's performance under other provisions of this Agreement.

11.2 **MIT's Right to Terminate Agreement.** The MIT shall have the right to terminate the discharge of sewage from their sewage system to the City's at any time for any reason, or no reason whatsoever, by providing the City with a minimum of five (5) years' written notice prior to termination of such discharge. The City agrees to terminate this Agreement with the MIT at the date noted upon said written notice. Monetary and other obligations owed by the MIT to the City on the date of termination shall survive.

11.3 **City's Right to Terminate Agreement.** The City shall have the right to terminate this Agreement at any time for any reason, or no reason whatsoever, by providing the MIT with a minimum of five (5) years' written notice prior to termination. The City shall also have the right to immediately terminate this Agreement for any reason constituting a material breach. In addition to those breaches defined by law, the City and the MIT expressly agree that a material breach justifying the City to immediately terminate service shall include, but not be limited to, the non-payment of SDC's or user fees, failure of the MIT to provide proof of insurance required herein, exceeding the number of type of sewer connections allowed under this Agreement, discharge of non-domestic sewage into the system, and/or failure of MIT to honor easements, and/or failure to fund the reserve account specified herein.

11.4 **Right to Rely upon Notice of Termination.** As between the City and the MIT, in the event that one party, hereinafter referred to as the "Transmitting Party," sends the other party a notice to terminate this Agreement, the party receiving such notice, hereinafter referred to as the "Receiving Party," shall have a right to rely upon such notice. Absent prior written agreement to the contrary, the Transmitting Party shall not be allowed to revoke its notice of intent to terminate this Agreement or to otherwise keep this Agreement in full force and effect beyond the termination date specified in the notice. This provision shall be effective regardless of whether or not the Transmitting Party actually changes its position, or the Receiving Party otherwise relies in any material manner upon the Transmitting Party's notice of termination.

XII. DISPUTE RESOLUTION AND LIMITED WAIVER OF SOVEREIGN IMMUNITY

12.1 **Dispute Resolution - Mediation.** In the event the MIT and the City are engaged in a dispute which relates to this Agreement or any other issue arising relating to sanitary sewer, and they are unable to resolve said dispute within ninety (90) days, either party may request mediation of any dispute, in any manner agreed upon by the parties.

a. Mediation shall be commenced by the party requesting it notifying the other party in writing of its request to mediate a dispute arising between the parties which relate to sanitary sewer and sewer related services. If the parties agree to enter into mediation within 20 days from such request the matter shall be deemed stayed and the arbitration clause continued herein shall not be put into effect. Mediation shall continue for no more than one hundred twenty (120) days at which point the mediation shall be deemed failed unless the parties have reached an agreement and have had such agreement approved by the governing bodies of each respective party and, if applicable, the Bureau of Indian Affairs. If such agreement is not approved by the governing bodies of each respective party or is not enforceable in the United States District Court for the Western District of Washington, the mediation shall be deemed failed and the unresolved issue shall be submitted to binding arbitration as set forth herein.

b. In the event the parties do not reach an agreement to mediate within twenty (20) days of receipt of the notice requesting mediation by the non-requesting party, the matter shall be submitted to binding arbitration as set forth herein.

c. Each party shall bear its own costs of mediation.

12.2 **Arbitration.** Any controversy or claim arising out of or relating to this Agreement, or the breach thereof, shall be settled by arbitration administered by the American Arbitration Association in accordance with its applicable rules. Judgment on the decision rendered by the arbitrator may be entered into the United States District Court for the Western District of Washington. Each party shall bear its own costs of arbitration.

12.3 **Limited Waiver of Sovereign Immunity and Consent to Jurisdiction of Federal Court.** The MIT hereby waives its sovereign immunity and consents to the jurisdiction of the United States District Court for the Western District of Washington concerning disputes regarding the interpretation of this Agreement and the enforcement of any rights hereunder, including collection of any SDC's, User Fees, or other obligations or liabilities, in law or in equity, pertaining to hold harmless provisions of this Agreement. Such waiver of Sovereign Immunity and Consent to jurisdiction shall apply to no other court. This Limited Waiver of Sovereign Immunity and Consent to Jurisdiction has been specifically negotiated by the parties and decision of the City to extend sanitary sewer service to the MIT and a portion of the MIT's payments hereunder are expressly made the consideration for this Limited Waiver and Consent to Jurisdiction.

12.4 **Disclaimer of MIT Tribal Court Jurisdiction.** The MIT agrees that the MIT Tribal Court has no jurisdiction over the force, effect, and interpretation of this Agreement, nor the resolution of disputes which pertain to its implementation. The MIT further agrees that it has no authority to submit the City to the jurisdiction of the MIT Tribal Court with regard to any sewer-related matters or disputes which may arise between the parties.

XIII. FEE AND CHARGES PAYMENTS

13.1 The City shall bill the MIT on a monthly basis for any fees or charges as determined in Articles II, III, and IV of this Agreement. The MIT shall have thirty (30) days to provide payment of the amount to the City from the date of bill issuance.

13.2 In the event that any payments for a sewer bill due under this Agreement shall remain unpaid in excess of the thirty (30) days from the date of issuance, then the bill shall be delinquent. In the event that a bill becomes delinquent, the City shall give the MIT fifteen (15) days' notice of its intent to enforce collection of said bill. A bill which has been properly addressed and deposited in the United States Postal Service shall be deemed to be presented to the MIT for payment.

13.3 If the MIT believes that the City's bill for fees or charges is in error, the MIT shall notify the City of the error no later than fifteen (15) days following the date of bill issuance, accompanied by any supporting documents. Within ten (10) days thereafter, the City and MIT shall meet to attempt to resolve the dispute. If the dispute cannot be resolved

informally, then the parties shall proceed pursuant to Article XII (Dispute Resolution). In any event, the MIT shall pay any uncontested portion of the bill within thirty (30) days after date of issuance. The MIT shall also continue to pay uncontested subsequent monthly bills as provided in this Section.

13.4 If the bill remains unpaid fifteen (15) days following the City's notice of intent to enforce collection, then the City may at its discretion discontinue service to the MIT; provided that the MIT has not provided notice to the City pursuant to Paragraph 12.1. If the MIT has given such notice, the City shall have the authority to discontinue service for failure to pay only in the event that the MIT has not paid the uncontested portion of the bill.

13.5 If the billing dispute is resolved in favor of the City pursuant to Article XII (Dispute Resolution), and the bill remains unpaid for five working days thereafter, the City may at its discretion discontinue service to the MIT unless otherwise specified within the dispute resolution.

XIV. CHANGES TO RATES AND CHARGES

The City's and/or Metro's user fee rate structure and charges for the MIT shall be changed only at such times as the City and/or Metro adjusts its rates and charges through established procedures for all other users.

XV. HOLD HARMLESS AND INDEMNIFICATION

The MIT agrees to indemnify and hold harmless City, and its agents and employees, from and against all claims, damages, losses, and expenses, including reasonable attorneys' fees, which originate from events which occur on MIT owned or controlled land or facilities including, but not being limited to, sanitary sewer backups, floods, spillage, property damage, personal injury, and other types of sewage contamination, except that this indemnification shall not apply to the sole negligent or intentional acts of the City and its agents and employees.

XVI. PERFORMANCE OF AGREEMENT

Each party agrees that it will execute any and all instruments, documents and resolutions or ordinances necessary to give effect to the terms of this Agreement. Furthermore, the City shall have access at reasonable times and on reasonable notice to inspect the MIT's sanitary sewer system and related

facilities for the purpose of verification of the number of hook ups, type of discharge, and operation levels which constitute the basis of the MIT's obligations to the City on account of fees and charges.

XVI. AMENDMENT OF THIS AGREEMENT

This Agreement may be modified only if such modifications are written and are approved by written resolutions adopted jointly by the Auburn City Council, the MIT Tribal Council, and the BIA.

XVII. CONSTRUCTION AND INTERPRETATION.

This document has been mutually negotiated between the parties. No adverse inference or ambiguity shall be construed against the party preparing this document for signature. No waiver by either party of any term or condition of this Agreement shall be deemed or construed to be a waiver of any other term or condition, nor shall a waiver of any breach be deemed to constitute a waiver of any subsequent breach, whether of the same or a different portion of this Agreement.

XVIII. TERM OF AGREEMENT.

The initial Term of this Agreement shall be fifty (50) years from the date that the parties executed this Agreement unless terminated earlier pursuant to Section XI of this Agreement. This Agreement shall be automatically renewed for an additional term of fifty (50) years (without any action required by either party), provided that either party may decline to renew the Agreement by notifying the other party by written notice at least five (5) years prior to the end of the initial Term of this Agreement.

IN WITNESS TO THE TERMS OF THIS AGREEMENT, the parties hereto have subscribed their names:

MUCKLESHOOT INDIAN TRIBE

John Daniels Jr.

~~Virginia Cross~~, Chairperson,
Muckleshoot Tribal Council
Date: 5-6-97

Consented to, Agreed and Approved as to Form:

United States Department of Interior

Bureau of Indian Affairs
Accommodation Approval

BY: Jill A. Black MAY 20 1997

Its: Superintendent, Puget Sound Agency Date: _____

Approved as to Form:

N/A
Tribal Attorney

CITY OF AUBURN

BY: Charles A. Booth
CHARLES A. BOOTH,
MAYOR

ATTEST:

Robin Wohlhueter
Robin Wohlhueter,
City Clerk

APPROVED AS TO FORM:

Michael Reynolds
Mike J. Reynolds,
City Attorney

RESOLUTION NO. 3502

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, AUTHORIZING THE MAYOR AND CITY CLERK TO EXECUTE AN INTERLOCAL AGREEMENT BETWEEN THE CITY OF AUBURN AND THE MUCKLESHOOT INDIAN TRIBE FOR THE OPERATION OF A TEMPORARY SEWAGE LIFT STATION.

WHEREAS, the Muckleshoot Indian Tribe (Tribe), and the City of Auburn (Auburn) are authorized to enter into this Agreement under the authority of their respective enabling legislation and under the authority of Chapter 39.34 RCW, the Interlocal Cooperation Act; and

WHEREAS, the parties desire clarification on the ownership, the maintenance, and the operational responsibilities for a lift station serving the Swan Flats development; and

WHEREAS, it is in the public interest for the parties herein to enter into a sanitary sewer agreement for the operation of a sanitary sewer lift station to facilitate service from the Swan Flats plat.

NOW, THEREFORE, THE COUNCIL OF THE CITY OF AUBURN, WASHINGTON, IN A REGULAR MEETING DULY ASSEMBLED, HEREWITH RESOLVES THAT:

Section 1. Pursuant to RCW 39.34, the Interlocal Cooperation Act, Auburn and the Tribe have legal authority to cooperate with other localities on the basis of mutual advantage and provision of services.

Section 2. The Mayor and City Clerk of the City of Auburn are herewith authorized to execute the Interlocal Agreement between Auburn and the Tribe with minor administrative changes if required. A copy of said Agreement is attached hereto, denominated as Exhibit "A" and made a part hereof as though set forth in full herein.

Section 3. The Mayor is hereby authorized to implement such administrative procedures as may be necessary to carry out the directives of this legislation.

Section 4. This resolution shall be in full force and effect upon passage and signatures hereon.

DATED this 5th day of August, 2002.

CITY OF AUBURN

PETER B. LEWIS
MAYOR

ATTEST:

Danielle E. Daskam,
City Clerk

APPROVED AS TO FORM:

Daniel B. Held,
City Attorney



200307140027 26
PACIFIC NW TIT IAG 26.00
PAGE 001 OF 008
07/14/2003 15:21
KING COUNTY, WA

Return Address:
Auburn City Clerk
City of Auburn
25 West Main St.
Auburn, WA 98001

RECORDER'S COVER SHEET

Document Title(s) (or transactions contained therein):

Interlocal Agreement (RES 3502) Sanitary Sewer – Swan Flats

3/26 PNLT
W6179-12

Reference Number(s) of Documents assigned or released:
☐Additional reference #'s on page _____ of document

Grantor(s)/Borrower(s) (Last name first, then first name and initials)
Auburn, City of

Grantee/Assignee/Beneficiary: (Last name first)
1. Muckleshoot Indian Tribe

Legal Description (abbreviated: i.e. lot, block, plat or section, township, range)

PER RCW 39.34

☐ Additional legal is on page of document.

Assessor's Property Tax Parcel/Account Number

N/A

☐ Assessor Tax # not yet assigned

EXHIBIT "A"

Interlocal Agreement between the Muckleshoot Indian Tribe and the City of Auburn

(Sanitary Sewer Service for Swan Flats)

THIS INTERLOCAL AGREEMENT made and entered into, pursuant to the interlocal Cooperation Act, chapter 39.34 of Revised Code of Washington, on the 5th day of, August, 2002, by and between the CITY OF AUBURN, a municipal corporation of the State of Washington (hereinafter referred to as "Auburn"), and the MUCKLESHOOT INDIAN TRIBE, a federally recognized Indian Tribe located upon the Muckleshoot Indian Reservation (hereinafter referred to as "Tribe").

WITNESSETH:

WHEREAS, the Tribe has purchased the single-family housing plat known as Swan Flats for the construction of single-family homes; and

WHEREAS, a temporary, private sewage lift station is established to facilitate the conveyance of the Swan Flats' wastewater into Auburn's public sanitary sewer system; and

WHEREAS, the lift station required by the Swan Flats plat for sanitary sewer services shall be owned, maintained, and operated by the Tribe; and

WHEREAS, once improvements have been made to the public sanitary sewer system located along Academy Drive to facilitate gravity wastewater flow from Swan Flats to the improved sewer line then Auburn shall bypass the private lift station and establish the piping required to connect Swan Flats plat with Auburn's sewer system without the use of pumps; and

WHEREAS, the property owners' responsibility to own, operate, and maintain the sanitary sewer lift station servicing the Swan Flats plat was imposed upon the plat and is not being imposed upon the Tribe as a special condition; and

WHEREAS, the Tribe and Auburn are willing to enter into this agreement which clarifies the maintenance responsibilities for the existing lift station servicing the Swan Flats plat; and

WHEREAS, the Tribe has purchased a majority of the properties within the Swan Flats plat and desires to be the responsible party for the operation and maintenance of the private sanitary sewer lift station in lieu of a homeowners association.

NOW, THEREFORE in consideration of their mutual covenants, conditions, and promises, THE PARTIES HERETO DO HEREBY AGREE as follows:

1. CONDITIONS

A. Auburn shall install sanitary sewer pipe to bypass the Swan Flats lift station concurrent with any sanitary sewer improvements done to the existing public sewer line along Academy Drive that would facilitate gravity sewer service from Swan Flats.

B. The Tribe shall own, operate, and maintain the lift station established upon Lot 1 of the Swan Flats plat until the gravity facilities are constructed and the pump station is no longer required for service.

C. The Muckleshoot Indian Tribe shall post an all weather sign with a minimum letter height of one inch that details the appropriate person and/or agency and phone number of who to contact if the sewer lift station requires service. The current contact information established by the Muckleshoot Indian Tribe for the servicing of the lift station is as follows:

DEWEY MILLER
Muckleshoot Indian Tribe
Public Works
360-802-4727

After hour phone numbers and emergency contacts shall be mentioned on the sign and supplied to Auburn 20 days prior to the effective date of this Agreement.

D. If Tribal response is delayed and the City is contacted, and a health hazard is created due to the failure of the lift station then the City may respond to contain and possibly correct the health situation until Tribal response is on-site. The Tribe agrees to reimburse the City for reasonable expenses for time and materials related to any such response.

E. No connections shall be made to Auburn's public sewer system without first obtaining the appropriate permits from the City as established within Auburn City Code 13.20.

F. Upon installation of the sanitary sewer bypass of the Swan Flats lift station by the City, the Tribe shall cap the existing eight-inch PVC sewer pipe, conveying wastewater from the City's sewer system to the lift station, at the property line to lot one. The tribe may request that the City do this work at the time of the diversion at no cost to the Tribe. After connection to the City gravity sewer system the Tribe may dispose of or retain the lift station as it deems appropriate.

2. INSURANCE

The Tribe shall maintain, at a minimum, a two million liability insurance policy as of the effective date of this agreement; the Tribe shall continue such insurance coverage during the term of this agreement unless otherwise agreed upon by the parties.

3. INDEMNIFICATION

A. The Tribe agrees to indemnify and hold the City and its agents, employees, and/or officers, harmless from and shall process and defend at its own expense any and all claims, demands, suits, at law or equity, actions, penalties, loses, damages or costs, of whatsoever kind or nature, brought against the City arising out of, in connection with, or incident to the execution of this agreement and/or the Tribe's performance or failure to perform any aspect of this Agreement; provided, however, that if such claims are caused by or result from the concurrent negligence of the City, its agents, employees, and/or officers, this indemnity provision shall be valid and enforceable only to the extent of the negligence of the Tribe; and provided further, that nothing herein shall require the Tribe to hold harmless or defend the City, its agents, employees, and/or officers, from any claims arising from the sole negligence of the City, its agents, employees, and/or officers. No liability shall attach to the City by reason of entering this agreement except as expressly provided herein.

B. The City agrees to indemnify and hold the Tribe and its agents, employees, and/or officers, harmless from and shall process and defend at its own expense any and all claims, demands, suits, at law or equity, actions, penalties, loses, damages or costs, of whatsoever king or nature, brought against the Tribe arising out of, in connection with, or incident to the execution of this agreement and/or the City's performance or failure to perform any aspect of this Agreement; provided, however, that if such claims are caused by or result from the concurrent negligence of the Tribe, its agents, employees, and/or officers, this indemnity provision shall be valid and enforceable only to the extent of the negligence of the City; and provided further, that nothing herein shall require the City to hold harmless or defend the Tribe, its agents, employees, and/or officers, from any claims arising from the sole negligence of the Tribe, its agents, employees, and/or officers. No liability shall attach to the Tribe by reason of entering this agreement except as expressly provided herein.

4. COMPLIANCE WITH REGULATIONS AND LAWS

The parties shall comply with all applicable rules and regulations pertaining to them in connection with the matters covered herein.

5. DISPUTE RESOLUTION AND LIMITED WAVIER OF SOVEREIGN IMMUNITY

A. In the event the Tribe and the City are engaged in a dispute, which relates to this Agreement, and they are unable to resolve said dispute within ninety (90)

days, either party may request mediation of any dispute in any manner agreed upon by the parties.

a. Mediation shall be commenced by the party requesting it by notifying the other party in writing of its request to mediate a dispute arising between the parties which relate to sanitary sewer and sewer related services to Swan Flats. If the parties agree to enter into mediation within twenty (20) days from such request the matter shall be deemed stayed and the arbitration clause continued herein shall not be put into effect. Mediation shall continue for no more than one hundred and twenty (120) days at which point the mediation shall be deemed failed unless the parties have reached an agreement and have had such agreement approved by the governing bodies. If such agreement is not approved by the governing bodies of each respective party or is not enforceable in the United States District Court for the Western District of Washington, the Mediation shall be deemed failed and the unresolved issue shall be submitted to binding arbitration as set forth herein.

b. In the event the parties do not reach an agreement to mediate within twenty (20) days of receipt of the notice requesting mediation by the non-requesting party, the matter shall be submitted to binding arbitration as set forth herein.

c. Each party shall bear its own cost of mediation.

B. Any controversy or claim arising out of or relating to this agreement, or the breach thereof, shall be settled by arbitration administered by the American Arbitration Association in accordance with its applicable rules. Judgment on the decision rendered by the arbitrator may be entered into the United States District Court for the Western District of Washington. Each party shall bear its own costs of arbitration.

C. The Tribe hereby waives its sovereign immunity and consents to the jurisdiction of the United States District Court for the Western District of Washington concerning disputed regarding the interpretation of this Agreement and the enforcement of any rights hereunder, including other obligations or liabilities, in law or in equity, pertaining to immunity provisions of this Agreement. Such waiver of Sovereign Immunity and Consent to jurisdiction shall apply to no other court.

D. The Tribe agrees that the Muckleshoot Indian Tribal Court has no jurisdiction over the force, effect, and interpretation of this Agreement, nor the resolution of disputes that pertain to its implementation. The Tribe further agrees that it has no authority to submit the City to the jurisdiction of the Muckleshoot Indian Tribal Court with regards to any sewer-related matters or disputes which may arise between the parties.

6. ASSIGNMENT

The parties shall not assign this agreement or any interest, obligation or duty therein without the express written consent of the other party.

7. ATTORNEY'S FEES

If either party shall be required to bring any action to enforce any provision of this Agreement, or shall be required to defend any action brought by the other party with respect to this Agreement, and in the further event that one party shall substantially prevail in such action, the losing party shall, in addition to all other payments required therein, pay all of the prevailing party's reasonable costs in connection with such action, including such sums as the court or courts may adjudge reasonable as attorney's fees in trial court and in appellate courts.

8. NOTICES

All notices between the two agencies hereunder may be delivered or mailed. If mailed, they shall be sent to the following respective addresses:

The Muckleshoot Indian Tribe
Thomas Reber
Muckleshoot Indian Tribe
Assistant Tribal Operations Manager
Community Development
40320 Auburn Enumclaw Road
Auburn, WA 98092
Phone # 360.802.1922
Fax # 360.802.4727

The City of Auburn
Jeff Roscoe
Sanitary Sewer Engineer
Auburn Public Works
Department
25 West Main Street
Auburn WA 98001-4998
Phone # 253.931.4008
FAX # 253.931.3053

or to such other representative addresses as either party may hereafter from time to time designate in writing. All notices and payments mailed by regular post (including first class) shall be deemed to have been given on the second business day following the date of mailing, if properly mailed and addressed. Notices and payments sent by certified or registered mail shall be deemed to have been given on the day next following the date of mailing, if properly mailed and addressed. For all types of mail, the postmark affixed by the United States Postal Service shall be conclusive evidence of the date of mailing.

9. NONDISCRIMINATION

Each of the parties, for itself, its heirs, personal representatives, successors in interest, and assigns, as part of the consideration hereof, does hereby covenant and agree that it will comply with applicable statutes, executive orders and such rules as are promulgated to assure that no person shall on the grounds of race, creed, color, national origin, sex, age, or the presence of any sensory, mental or physical handicap be discriminated against or receive discriminatory treatment by reason thereof.

10. INTEGRATION.

This agreement constitutes the entire agreement of the parties regarding the subject matter hereof, and there are no other representations or oral agreements

other than those listed herein, which vary the terms of this agreement. Future agreements may occur between the parties to transfer additional or future service areas by mutual agreement.

11. OBLIGATION INTACT.

Nothing herein shall be construed to alter the rights, responsibilities, liabilities, or obligations of either the Tribe or the City regarding provision of sewer service, except as specifically set forth herein.

12. MISCELLANEOUS

A. The captions in this agreement are for convenience only and do not in any way limit or amplify the provisions of this agreement.

B. The duration of this agreement shall be until the sanitary sewer improvements are established that will allow the City to extend a gravity sewer main to bypass the private lift station or for the period of time it reasonably takes for the performance of parties as completed herein.

C. The purpose of this agreement is to clarify the Tribe's role for the maintenance and operation of the private lift station together with the City's role in the establishment of a gravity sewer system to serve Swan Flats.

D. The performances of the duties of the parties provided hereby shall be done in accordance with standard operating procedures and customary practices of the parties.

E. No provision of this agreement shall relieve either party of its public agency obligations and/or responsibilities imposed by law.

F. If any term, provision, condition or portion of this Agreement is held to be invalid, or unenforceable by a final decision of any court having jurisdiction on the matter, the remaining of this Agreement or the application of such term or provision to persons or circumstances other then those as to which it is held invalid or unenforceable shall not be affected thereby and shall continue in full force and effect.

G. No modifications or amendments of this agreement shall be valid or effective unless evidenced in writing and signed by both parties.

IN WITNESS WHEREOF the parties hereto have executed this agreement as of the day and year first above written.

MUCKLESHOOT INDIAN TRIBE

PASSED by Resolution No. **02-235** of the Muckleshoot Indian Tribe, at its special meeting held on the 2nd day of August, 2002.

By:

11/6/02

JOHN DANIELS, JR., CHAIR — Date

CITY OF AUBURN

PASSED by Resolution No. **3502** of the City of Auburn, Washington, at its regular meeting held on the 5th day of August, 2002.

By:

11/2/02

PETER B. LEWIS, MAYOR — Date

Attest:

Danielle Daskam, City Clerk

Approved as to form:

Daniel B. Heid, City Attorney

APPENDIX A6

LAKEHAVEN UTILITY DISTRICT

- Sewer Service Boundaries (Resolutions 3651, 3824, and 2005-1038)
- Sewer District's Sanitary Sewer Service Area (Resolution 5353)

RESOLUTION NO. 3651

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, AUTHORIZING THE MAYOR TO EXECUTE AN INTERLOCAL AGREEMENT ESTABLISHING SANITARY SEWER SERVICE BOUNDARIES BETWEEN THE LAKEHAVEN UTILITY DISTRICT AND THE CITY OF AUBURN

WHEREAS, pursuant to RCW 35.A.11.040, Auburn has the legal authority to exercise its powers and perform any of its functions as set forth in RCW 39.34; and

WHEREAS, pursuant to RCW 39.34, the Interlocal Cooperation Act, Auburn has the legal authority to cooperate with other localities and utilities on the basis of mutual advantage and the efficient provision of municipal services; and

WHEREAS, pursuant to RCW 35A.21.150, Auburn has the legal authority to maintain a sewerage system; and

WHEREAS, pursuant to RCW 57.08.044, Lakehaven has the legal authority, whether by contract or otherwise, to provide sewer service to property owners in areas outside existing district boundaries; and

WHEREAS, the parties recognize the responsibility of public sanitary sewer utilities to provide efficient and reliable service to their customers at reasonable cost; and

WHEREAS, Lakehaven's 1999 Draft Comprehensive Wastewater System Plan notes a region within Auburn's Potential Annexation Area (hereinafter referred to as "Auburn's PAA") to which Lakehaven intends to provide sanitary sewer service; and

WHEREAS, Lakehaven is currently providing sanitary sewer service within Auburn's PAA; and

WHEREAS, portions of the Lakehaven sanitary sewer system have been sized and are situated so as to be capable of affording sewer service to a portion of Auburn's PAA; and

WHEREAS, Auburn has evaluated sewer service issues and determined that it is not cost feasible to provide direct sewer service within its PAA adjacent to Lakehaven's sanitary sewer infrastructure; and

WHEREAS, Lakehaven's delivery of sewer service to these areas will provide the maximum efficiency in the use of existing and future facilities and sanitary sewer planning;

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, HEREBY RESOLVES as follows:

Section 1. The Mayor is hereby authorized to execute an Interlocal Agreement Establishing Sanitary Sewer Service Boundaries between the Lakehaven Utility District and the City of Auburn in substantial conformity with

the agreement attached hereto, marked as Exhibit "A" and incorporated herein by this reference.

Section 2. The Mayor is hereby authorized to implement such administrative procedures as may be necessary to carry out the directives of this legislation.

Section 3. This resolution shall be in full force and effect upon passage and signatures hereon.

DATED this 20th day of January, 2004.

CITY OF AUBURN

PETER B. LEWIS
MAYOR

ATTEST:

Danielle E. Daskam,
City Clerk

APPROVED AS TO FORM:

Daniel B. Heid,
City Attorney



20041129000249
PACIFIC NW TIT AG 31.00
PAGE001 OF 013
11/29/2004 10:09
KING COUNTY, WA

Return Address:
Auburn City Clerk
City of Auburn
25 West Main St.
Auburn, WA 98001

RECORDER'S COVER SHEET

Document Title(s) (or transactions contained therein):

Interlocal Agreement (RES 3651)

13/31 PMNT
W9278-12

Reference Number(s) of Documents assigned or released:
☐Additional reference #'s on page _____ of document

Grantor(s)/Borrower(s) (Last name first, then first name and initials)
Auburn, City of

Grantee/Assignee/Beneficiary: (Last name first)
1. Lakehaven Utility District

Legal Description (abbreviated: i.e. lot, block, plat or section, township, range)

PER RCW 39.34

☐ Additional legal is on page of document.

Assessor's Property Tax Parcel/Account Number
N/A

☐ Assessor Tax # not yet assigned

EXHIBIT "A"

LAKEHAVEN UTILITY DISTRICT and CITY OF AUBURN INTERLOCAL AGREEMENT ESTABLISHING SANITARY SEWER SERVICE BOUNDARIES

THIS AGREEMENT, made and entered into this 2nd day of February, 2004, by and between **LAKEHAVEN UTILITY DISTRICT**, a Washington municipal corporation (hereinafter referred to as "Lakehaven"), and the **CITY OF AUBURN**, a Washington municipal corporation, (hereinafter referred to as "Auburn"), both being duly organized and existing under and by virtue of the laws of the State of Washington,

WITNESSETH:

WHEREAS, pursuant to RCW 35.A.11.040, Auburn has the legal authority to exercise its powers and perform any of its functions as set forth in RCW 39.34; and

WHEREAS, pursuant to RCW 39.34, the Interlocal Cooperation Act, Auburn has the legal authority to cooperate with other localities and utilities on the basis of mutual advantage and the efficient provision of municipal services; and

WHEREAS, pursuant to RCW 35A.21.150, Auburn has the legal authority to maintain a sewerage system; and

WHEREAS, pursuant to RCW 57.08.005(5) and 57.08.044, Lakehaven, as a special purpose water/sewer district, has the legal authority, whether by contract or otherwise, to provide sewer service to property owners in areas outside existing district boundaries; and

WHEREAS, the parties recognize the responsibility of public sanitary sewer utilities to provide efficient and reliable service to their customers at reasonable cost; and

WHEREAS, Lakehaven's adopted and approved 1999 Comprehensive Wastewater System Plan and its Amendment No. 1 notes a region within Auburn's Potential Annexation Area (hereinafter referred to as "Auburn's PAA") to which Lakehaven intends to provide sanitary sewer service; and

WHEREAS, Lakehaven is currently providing sanitary sewer service within Auburn's PAA; and

WHEREAS, portions of the Lakehaven sanitary sewer system have been sized and are situated so as to be capable of affording sewer service to a portion of Auburn's PAA; and

WHEREAS, Auburn has evaluated sewer service issues and determined that it is not cost feasible to provide direct sewer service within its PAA adjacent to Lakehaven's sanitary sewer infrastructure; and

WHEREAS, Lakehaven's delivery of sewer service to these areas will provide the maximum efficiency in the use of existing and future facilities and sanitary sewer planning;

NOW, THEREFORE:

IT IS HEREBY AGREED by and between the parties hereto as follows:

1. **Sewer Service Area.** The parties have agreed to a mutual sewer service planning boundary as depicted on the maps attached hereto as Attachment 1 and legally described in Attachment 2, which are by this reference incorporated herein. Both parties further agree that, through this designation of the service boundary, Lakehaven shall provide sanitary sewer service to properties mutually within its sanitary sewer service area and Auburn's PAA, also depicted on Attachment 1, in accordance with and subject to the terms and conditions of this Agreement.

2. **Management, Regulation and Control of Sewer System.** Lakehaven shall have the sole responsibility and authority to construct, maintain, manage, conduct and operate its sewerage system within the area mutually designated as Lakehaven's sanitary sewer service area and Auburn's PAA as depicted in Attachment 1, together with any additions, extensions and betterments thereto. Lakehaven shall also be responsible for obtaining all necessary governmental franchises, approvals, easements and permits for the installation of the sewerage system and improvements to be located therein.

3. **Service Rates and Connection Charges.**

   a) **Permit Required.** No connection shall be made to Lakehaven's sanitary sewer system unless the property owner first pays the associated fees and submits the proper information to obtain a Lakehaven sanitary sewer connection permit, and otherwise meets the requirements for service as provided in duly adopted Resolutions of Lakehaven. The connection shall be subject to inspection for compliance with Lakehaven's standards as adopted at the time the connection is made.

b) **Rates.** The rates charged to the sanitary sewer customer by Lakehaven mutually within Lakehaven's sanitary sewer service area and Auburn's PAA, as depicted on Attachment 1, shall be fixed, altered, regulated and otherwise controlled by Lakehaven pursuant to the limitation on such authority as set forth in Chapter 57 RCW, or other applicable laws.

4. **Sewer Availability Certificates.** Lakehaven shall continue to issue sewer availability certificates for property located both within its sanitary sewer service area and Auburn's PAA, as depicted in Attachment 1.

5. **Future Annexations.** Each of the parties agree that Lakehaven shall provide sanitary sewer service to the area depicted in Attachment 1 without regard to the present corporate boundaries of the parties and without regard to future corporate boundaries as they may be periodically altered through annexation.

6. **Lakehaven Comprehensive Sewer Planning.** The terms of this Agreement will be included as an amendment to Lakehaven's Comprehensive Wastewater System Plan. Lakehaven will submit to Auburn all Comprehensive Wastewater System Plans and amendments thereto involving areas and/or system improvements within Auburn's PAA.

7. **Auburn Comprehensive Sewer Planning.** The terms of this Agreement will be included as an amendment to Auburn's Comprehensive Sewerage Plan. Auburn will submit to Lakehaven all Comprehensive Sewerage System Plans and amendments thereto involving area and/or system improvements within Auburn's PAA.

8. **Reliance.** Each party hereto acknowledges that the terms hereof will be relied upon by the other in its comprehensive planning to meet the needs of the service area designated herein.

9. **Liability.** The parties agree that this Agreement shall not be a source of liability for either party for any failure or interruption of service in the service area of the other party, as designated herein.

10. **Government Approvals.** Auburn will give notice of the adoption of this Agreement to Metropolitan/King County, to the Department of Ecology, to the Department of Health, and to any other agency with jurisdiction over, or other interest in, the terms hereof, and the parties shall cooperate and assist each other in all reasonable manner in procuring any necessary approvals hereof by those agencies.

11. **Boundary Review Board.** In the event that implementation of the terms hereof results in permanent sewer service to areas that will be outside the respective service boundaries of Lakehaven or Auburn, the parties will, at the time of such service, jointly seek King County Boundary Review Board approval of such service in accordance with RCW 36.93.090.

12. Service Amendments. Any changes to the service areas described herein shall be by mutual written agreement. Each party, through Auburn's Director of Public Works and Lakehaven's General Manager respectively, may give written permission to the other, on a case-by-case basis, to provide service to the other party's adjacent or nearby sewer service area based upon considerations of economic efficiency. Such written permission(s) shall be filed with this agreement for future reference.

13. Alteration, Amendment or Modification. Any alterations, amendments or modifications to this agreement shall be by mutual consent of the parties.

14. Indemnification and Hold Harmless. Each Party hereto agrees to protect, defend, and indemnify the other Party, its officers, officials, employees and agents from any and all cost, claims judgements and/or awards of damages, arising out of or in any way resulting from the Party's default, failure of performance, or negligent conduct associated with this agreement, by the Party, its employees, subcontractors or agents. Each Party agrees that its obligations under this provision extend to any claim, demand, and/or cause of action brought by or on behalf of any of its employees, or agents. The foregoing indemnity is specifically and expressly intended to constitute a waiver of each Party's immunity under Washington's Industrial Insurance Act, RCW Title 51, as respects the other Party only, and only to the extent necessary to provide each Party with a full and complete indemnity of claims made by the other Party's employees. The Parties acknowledge that these provisions were specifically negotiated and agreed upon by them.

15. Miscellaneous. Auburn and Lakehaven agree that an area in the vicinity of 51st Avenue South and South 320th Street and depicted in Attachment 3 is currently being served by Auburn via temporary pump station and may in the future be more efficiently served by a gravity conveyance system discharging to Lakehaven's facilities. This section does not obligate Lakehaven to accept any sanitary sewer facilities in said area. This section is intended only to make Lakehaven aware of Auburn's desire to eventually adjust the sanitary sewer service boundaries to allow Lakehaven to provide sanitary sewer service to said area, and for Lakehaven to plan for this action. Auburn and Lakehaven will abide by Section 12 of this Agreement when adjusting sanitary sewer service boundaries.

16. Integration. This agreement constitutes the entire agreement of the parties regarding the subject matter hereof, and there are no other representations or oral agreements other than those listed herein, which vary the terms of this agreement. Future agreements may occur between the parties to transfer additional or future service areas by mutual agreement.

17. Obligation Intact. Nothing herein shall be construed to alter the rights, responsibilities, liabilities, or obligations of either Lakehaven or Auburn regarding provision of sewer service, except as specifically set forth herein.

LAKEHAVEN UTILITY DISTRICT

Approved by Resolution No. 2004-1006 of the Lakehaven Utility District, Federal Way, Washington, at its regular meeting held on the 8th day of January, 2004.

By:

Donald T. Perry, General Manager
Lakehaven Utility District

Approved as to form:

Steven H. Pritchett, General Counsel
Lakehaven Utility District

CITY OF AUBURN

Approved by Resolution No. **3651** of the City of Auburn, Washington, at its regular meeting held on the 20th day of January, 2004.

By:

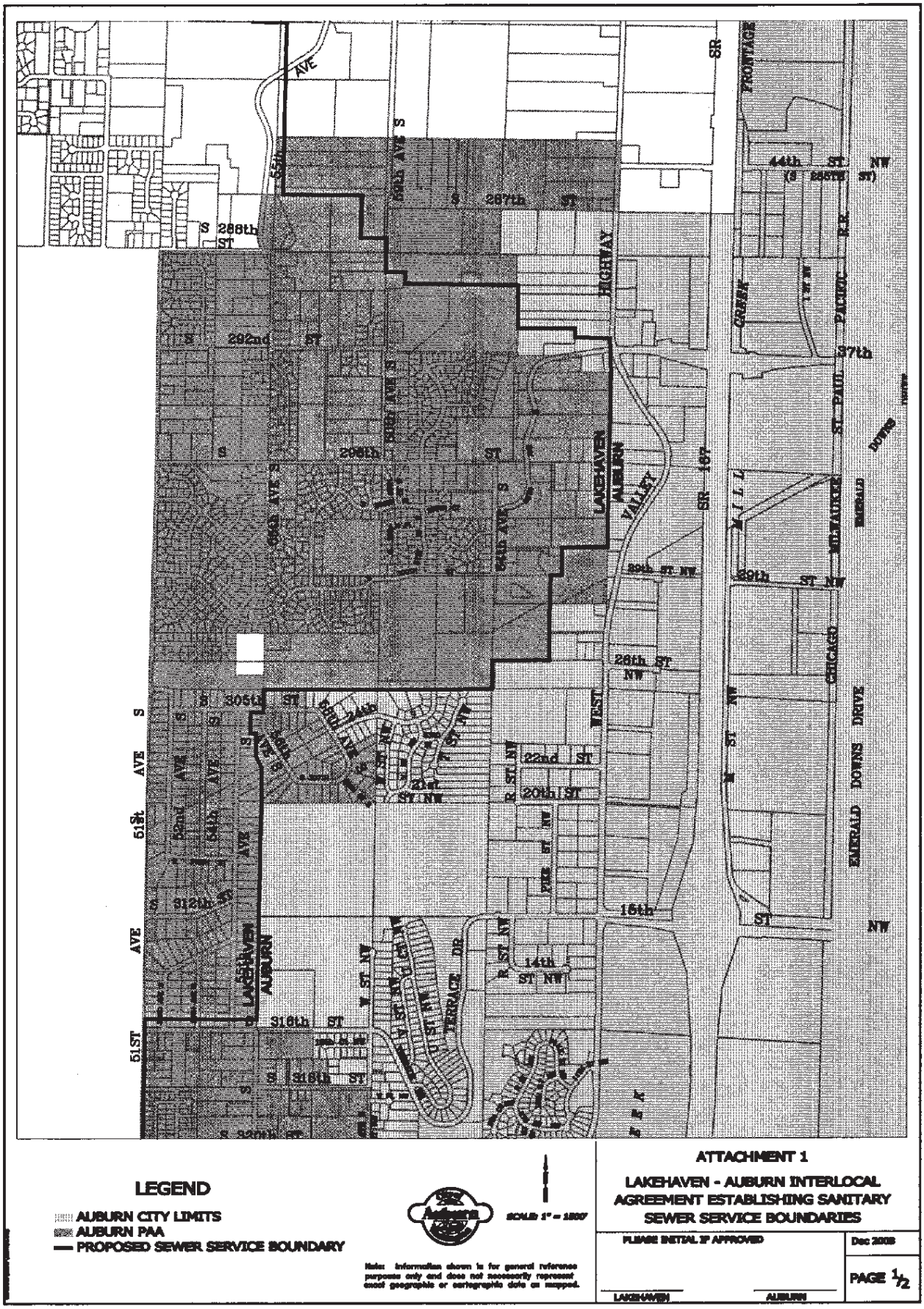
Peter B. Lewis, Mayor
City of Auburn

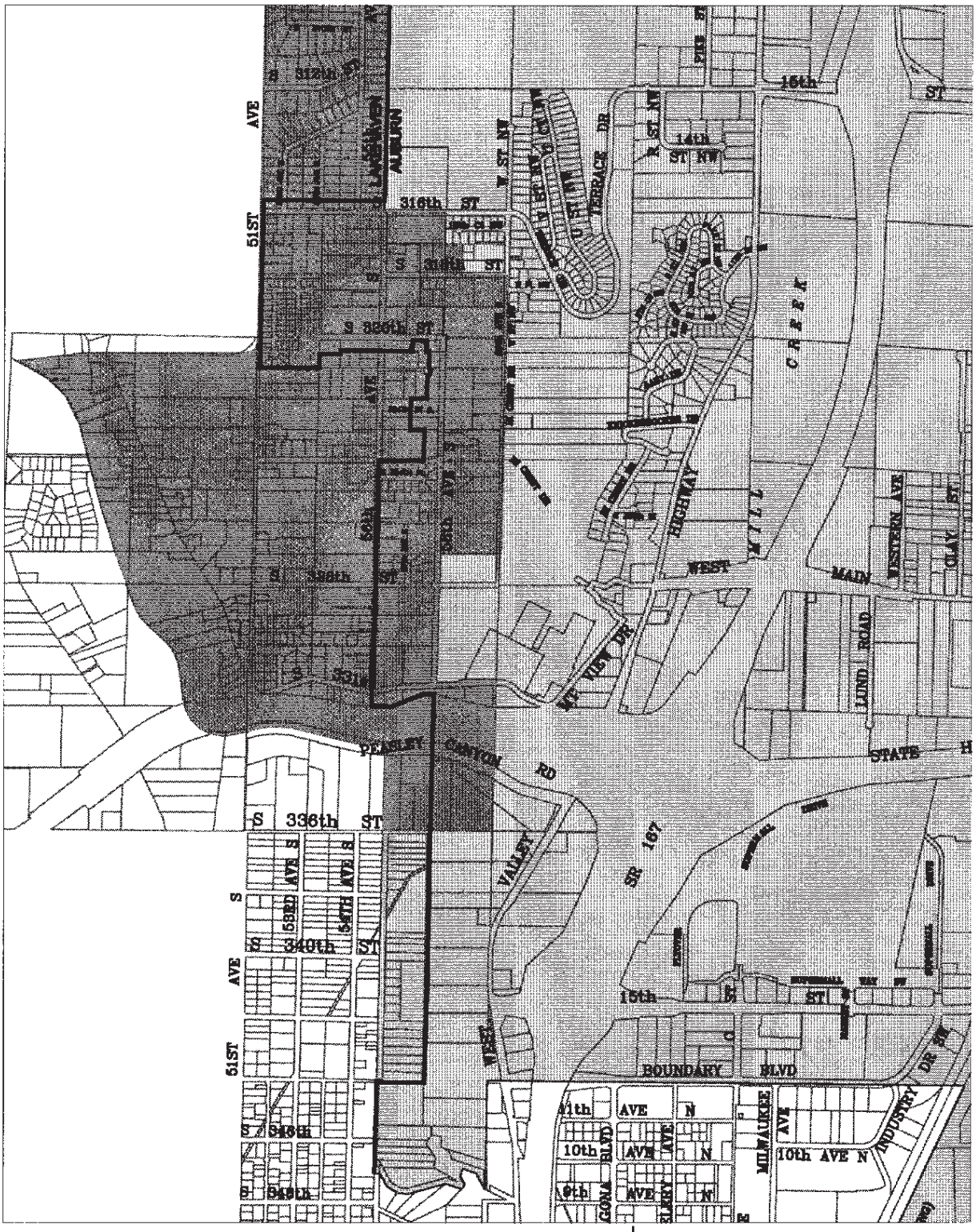
Attest:

Danielle Daskam, City Clerk

Approved as to form:

Daniel B. Heid, City Attorney


AVE
S 288th ST
S 292nd ST
S 296th ST
S 305th ST
S 312th ST
S 316th ST
51st AVE S
55th AVE S
60th AVE S
64th AVE S
68th AVE S
LAKEHAVEN
AUBURN
HIGHWAY
SR 167
FRONTAGE
44th ST NW
(S 284TH ST)
287th ST
GREEN RIVER
P.S.E.
PACIFIC
37th
ST. PAUL
EMERALD DOWNS
DRIVE
89th ST NW
CHICAGO
WEST
26th ST NW
22nd ST
20th ST
20th ST NW
15th ST NW
14th ST NW
TERRACE DR
316th ST
LEGEND
AUBURN CITY LIMITS
AUBURN PAA
PROPOSED SEWER SERVICE BOUNDARY
SCALE 1" = 1800'
Note: Information shown is for general reference purposes only and does not necessarily represent exact geographic or cartographic data as mapped.
ATTACHMENT 1
LAKEHAVEN - AUBURN INTERLOCAL AGREEMENT ESTABLISHING SANITARY SEWER SERVICE BOUNDARIES
PLEASE INITIAL IF APPROVED
Dec 2008
LAKEHAVEN
AUBURN
PAGE 1/2



LEGEND

- AUBURN CITY LIMITS
- AUBURN PAA
- PROPOSED SEWER SERVICE BOUNDARY

SCALE 1" = 1500'

Note: Information shown is for general reference purposes only and does not necessarily represent exact geographic or cartographic data as mapped.

ATTACHMENT 1

LAKEHAVEN - AUBURN INTERLOCAL AGREEMENT ESTABLISHING SANITARY SEWER SERVICE BOUNDARIES

PLEASE INITIAL IF APPROVED

LAKEHAVEN _____ AUBURN _____

Dec 2008

PAGE 2/2

Attachment 2

LAKEHAVEN UTILITY DISTRICT and CITY OF AUBURN INTERLOCAL AGREEMENT ESTABLISHING SANITARY SEWER SERVICE BOUNDARIES

BOUNDARY DESCRIPTION

BEGINNING at a point 170 feet east of the Northwest corner of the Southeast quarter of the Southwest quarter of Section 35, Township 22 North, Range 4 East, W.M., in King County, Washington;

THENCE south 662.54 feet, more or less, to the North line of the South half of said subdivision;

THENCE easterly along said North line to a point 300 feet west of the East line of said subdivision;

THENCE south to a point 170 feet north of the South line of said subdivision;

THENCE east 300 feet, more or less, to the East line of said subdivision;

THENCE southerly along said East line to the South line of said Section 35;

THENCE continuing southerly along the West line of the Northeast quarter of Section 2, Township 21 North, Range 4 East, W.M., in King County, Washington, a distance of 221.12 feet;

THENCE easterly, parallel with the North line of said subdivision, 220.20 feet;

THENCE southerly, parallel with the West line of said subdivision, 130 feet;

THENCE easterly, parallel with the North line of said subdivision, 1,304.44 feet;

THENCE southerly, parallel with the West line of said subdivision, 494 feet;

THENCE easterly, parallel with the North line of said subdivision, 680.8 feet;

THENCE southerly, parallel with the West line of said subdivision, 100 feet;

THENCE easterly, parallel with the North line of said subdivision, 428 feet, more or less, to the East line of said subdivision;

THENCE southerly, along said East line to the Northeast corner of the South half of the South half of the Northeast quarter of the Southeast quarter of said Section 2;

THENCE westerly, along the North line of said subdivision, 518.77 feet;

THENCE southerly, parallel with the East line of said subdivision, 328.01 feet;

THENCE westerly, along the South line of said subdivision, 130.02 feet, more or less to the Northeast corner of the West half of the Southeast quarter of the Southeast quarter of said Section 2;

THENCE southerly, along the East line of said subdivision, 964.41 feet;

THENCE westerly, parallel with the North line of said subdivision, 650 feet, more or less, to the East line of the Southwest quarter of the Southeast quarter of said Section 2;

THENCE southerly, along said East line, 328.77 feet, more or less, to the South line of said subdivision;

THENCE westerly, along said South line, to the centerline of 56th Avenue South;

THENCE southerly, along said centerline of 56th Avenue South, to the centerline of South 305th Street in Section 11, Township 21 North, Range 4 East, W.M., in King County, Washington;

THENCE westerly, along said centerline of South 305th Street, to a point of intersection with the northerly projection of the West line of Lot 2, Block 5, Auburn Heights Park Division No. 2, according to the plat thereof recorded in Volume 49, Page 99, records of King County, Washington;

THENCE southerly, 320 feet, more or less, parallel with said West line of Lot 2, to the South line of Lot 4, Block 5, of said plat;

THENCE easterly, along said South line of Lot 4, to the Northwest corner of Lot 5, Block 5 of said plat;

THENCE southerly and southeasterly, along the West lines of Lots 5 and 9, of said plat, to the Northeast corner of Block 7, Auburn Heights Park Division No. 1, according to the plat thereof recorded in Volume 49 of Plats, Page 56, records of King County, Washington;

THENCE southerly, along the East line of Block 7 of said plat, to the Southeast corner of Lot 2, Block 7, of said plat;

THENCE westerly, parallel with the South line of said plat, along the north lines of Lot 19 and Lot 1, Block 6, Lot 15 and Lot 1, Block 5, and Lot 26, Block 4, of said plat, to the centerline of 51st Avenue South;

THENCE southerly, along said centerline of 51st Avenue South, to the Southwest corner of said Section 11;

THENCE continue southerly, along the West line of Section 14, Township 21 North, Range 4 East, W.M., in King County, Washington, 329.57 feet;

THENCE east 30 feet to the Southwest corner of Lot 15, Peasley Ridge, according to the plat thereof recorded in Volume 201, Pages 66-71, records of King County, Washington;

THENCE continue easterly, along the South line of said plat, to the Southeast corner of Tract D Peasley Ridge;

THENCE northerly, along the East line of said Tract D, 150 feet, more or less, to the Northwest corner of Lot 2, King County Short Plat No. 1080026R, as recorded under Recording No. 8106080708, records of King County, Washington;

THENCE easterly, along the North line of said Lot 2, to the West line of Lot 1, King County Short Plat No. 1080027, as recorded under Recording No. 8106080709, records of King County, Washington;

THENCE northerly, along the West line of said Lot 1, to the Northwest corner thereof;

THENCE easterly, along the North lines of Lots 1, 2 and 4, of said short plat, to the Northeast corner of said Lot 4;

THENCE East 60 feet to the West line of Lot 19, West Auburn Five-Acre Tracts, according to the plat thereof recorded in Volume 15, Page 12, records of King County, Washington;

THENCE southerly, along the West line of said Lot 19, 9.43 feet;

THENCE easterly, parallel with the North line of said Lot 19, 294.8 feet;

THENCE northerly, parallel with the West line of said Lot 19, 119.43 feet, more or less, to the South margin of South 320th Street;

THENCE easterly, along said south margin of South 320th Street, 150 feet;

THENCE southerly, parallel with the West line of said Lot 19, 119.43 feet;

THENCE easterly, parallel with the North line of said Lot 19, 9.59 feet;

THENCE southerly, parallel with the West line of said Lot 19, 5 feet;

THENCE easterly, parallel with the North line of said Lot 19, 13.53 feet;

THENCE southerly, parallel with the West line of said Lot 19, 178.866 feet, more or less, to the most Northwesterly corner of Lot 4, King County Short Plat No. 278048, as recorded under Recording No. 8004030782, records of King County, Washington;

THENCE southerly, along the West line of said Lot 4, to the Southwest corner thereof and the North line of Lot 2, King County Short Plat No. 1077053, as recorded under Recording No. 7808100856;

THENCE westerly, along the North line of said Lot 2, to the Northwest corner thereof;

THENCE southerly, along the West lines of Lot 2 and Lot 4 of said short plat, to the North line of Lot 30, West Auburn Five-Acre Tracts, according to the plat thereof recorded in Volume 15, Page 12, records of King County, Washington;

THENCE easterly, along the North line of said Lot 30, 147.35 feet;

THENCE southerly, parallel with the East line of said Lot 30, to the centerline of South 324th Street;

THENCE westerly, along said centerline of South 324th Street, to the centerline of 56th Avenue South;

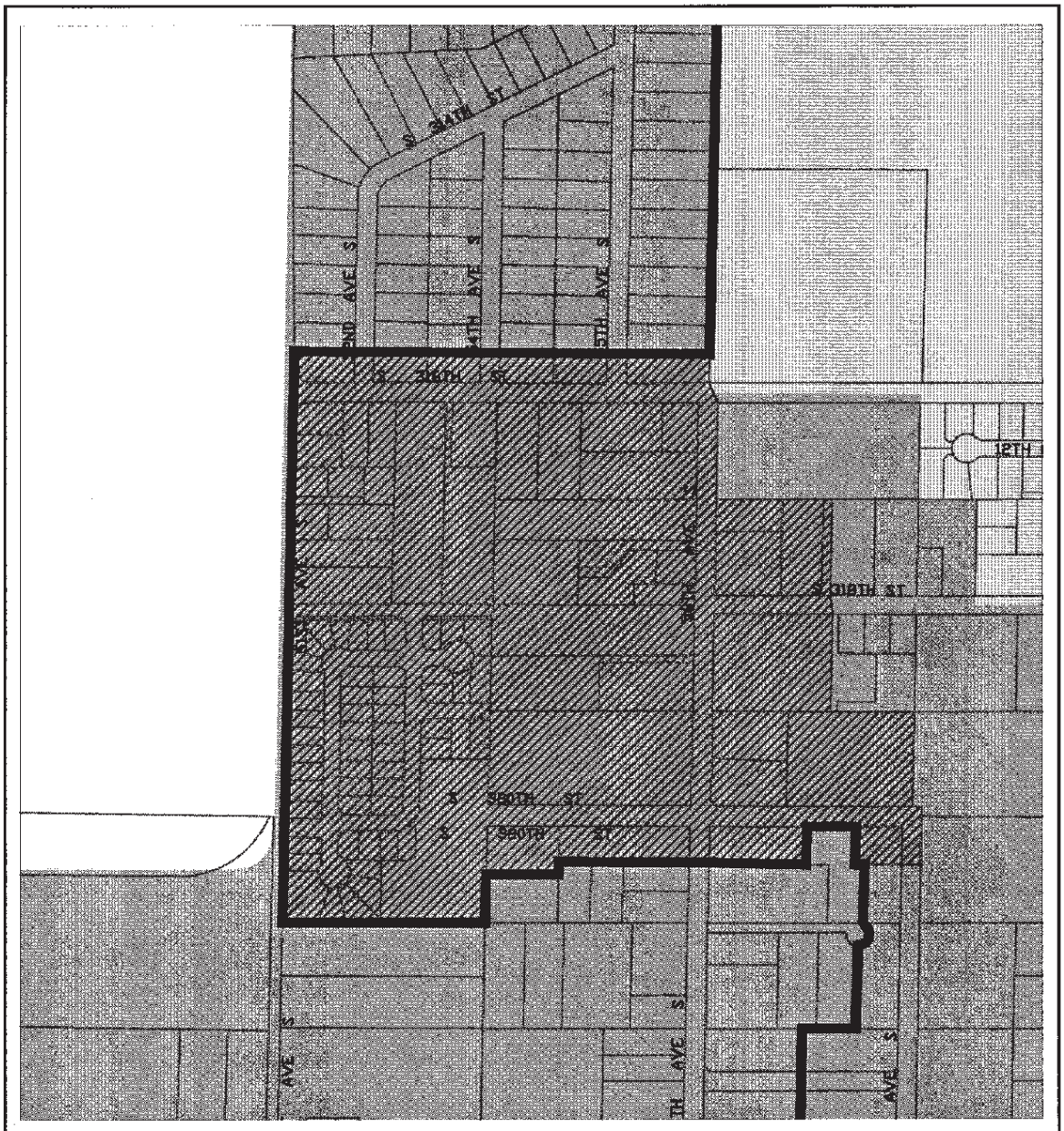
THENCE southerly, along said centerline of 56th Avenue South, to the North margin of State Highway No. 18;

THENCE easterly, along said North margin of State Highway No. 18, to the southerly projection of the centerline of 58th Avenue South;

THENCE southerly, along said centerline of 58th Avenue South, to the centerline of South 344th Street;

THENCE westerly, along said centerline of South 344th Street, to the centerline of 56th Avenue South;

THENCE southerly, along said centerline of 56th Avenue South, to the easterly projection of the South line of Lot 24, Block 27, Jovita Heights, according to the plat thereof recorded in Volume 20 of Plats, Page 12, records of King County, Washington, and the terminus of this boundary description.



LEGEND

- AUBURN SERVICE AREA THAT MAY BE SERVED BY LAKEHAVEN
- PAA
- AUBURN CITY LIMITS

D:\SEWER\LOGO2.DWG

Attachment 3

Lakehaven - Auburn Interlocal Agreement Establishing Sanitary Sewer Service Boundaries

Dec 2003

PAGE 1 /1

RESOLUTION NO. 3824

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, AUTHORIZING THE MAYOR TO EXECUTE AN INTERLOCAL AGREEMENT WITH THE LAKEHAVEN UTILITY DISTRICT FOR THE PURPOSE OF PROVIDING SANITARY SEWER SERVICE FROM AUBURN TO PROPERTY LOCATED WITHIN THE LAKEHAVEN UTILITY DISTRICT'S SANITARY SEWER SERVICE AREA

WHEREAS, pursuant to RCW 35A.11.040 Auburn has the legal authority to exercise its powers and perform any of its functions as set forth in RCW 39.34; and

WHEREAS, in January 2004 the Commissioners of the Lakehaven Utility District adopted Resolution No. 2004-1006 authorizing the General Manager to execute an interlocal agreement with Auburn, which agreement was subsequently signed by the City of Auburn as authorized under Auburn Resolution No. 3651; and

WHEREAS, the parties recognize the responsibility of public sanitary sewer utilities to provide efficient and reliable service to their customers at reasonable cost; and

WHEREAS, a single family residential development (hereinafter referred to as "Jovita Heights-West Hill") has been proposed that lies within the distinct Sanitary Sewer Service Areas of both Auburn and Lakehaven as established and described in the Original Agreement; and

WHEREAS, portions of the Auburn sanitary sewer system have been sized with sufficient wastewater conveyance capacity and are situated so as to be capable of affording sewer service to those portions of Jovita Heights-West Hill that lie within both the Auburn Sanitary Sewer Service Area and the Lakehaven Sanitary Sewer Service Area; and

WHEREAS, portions of the Lakehaven sanitary sewer system have been sized with sufficient wastewater conveyance capacity and are situated so as to be capable of affording sewer service to those portions of Jovita Heights-West Hill that lie within both the Lakehaven Sanitary Sewer Service Area and the Auburn Sanitary Sewer Service Area; and

WHEREAS, the developer of Jovita Heights - West Hill has requested that Auburn provide sanitary sewer service to the entire development to afford maximum efficiency in its use of existing and future facilities; and

WHEREAS, Auburn has evaluated sanitary sewer service issues relative to the developer's request and determined that it is feasible for Auburn to provide sanitary sewer service to the entire development.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, HEREBY RESOLVES as follows:

Section 1. The Mayor is hereby authorized to execute an Interlocal Agreement with the Lakehaven Utility District in substantial conformity with the

agreement attached hereto, marked as Exhibit "1" and incorporated herein by this reference

Section 2. That the Mayor is authorized to implement such other administrative procedures as may be necessary to carry out the directives of this legislation.

Section 3. That this Resolution shall take effect and be in full force upon passage and signatures hereon.

Dated and Signed this 22nd day of February, 2005.

CITY OF AUBURN

PETER B. LEWIS
MAYOR

ATTEST:

Danielle E. Daskam,
City Clerk

APPROVED AS TO FORM:

Daniel B. Heid,
City Attorney

EXHIBIT 1

AMENDMENT NO. 1
TO THE LAKEHAVEN UTILITY DISTRICT AND CITY OF AUBURN INTERLOCAL AGREEMENT ESTABLISHING SANITARY SEWER SERVICE BOUNDARIES

THIS AGREEMENT, made and entered into this 22nd day of February, 2005, by and between **LAKEHAVEN UTILITY DISTRICT**, a Washington municipal corporation (hereinafter referred to as "Lakehaven"), and the **CITY OF AUBURN**, a Washington municipal corporation, (hereinafter referred to as "Auburn"), both being duly organized and existing under and by virtue of the laws of the State of Washington, as an amendment to the Interlocal Agreement dated February 2, 2004, between the parties and executed on the 8th day of January, 2004, and the 20th day of January, 2004, respectively (hereinafter referred to as "Original Agreement").

WITNESSETH:

WHEREAS, in January 2004 the Commissioners of the Lakehaven Utility District adopted Resolution No. 2004-1006 authorizing the General Manager to execute an interlocal agreement with Auburn, which agreement was subsequently signed by the City of Auburn as authorized under Auburn Resolution No. 3651; and

WHEREAS, the parties recognize the responsibility of public sanitary sewer utilities to provide efficient and reliable service to their customers at reasonable cost; and

WHEREAS, a single family residential development (hereinafter referred to as "Jovita Heights-West Hill") has been proposed that lies within the distinct Sanitary Sewer Service Areas of both Auburn and Lakehaven as established and described in the Original Agreement; and

WHEREAS, portions of the Auburn sanitary sewer system have been sized with sufficient wastewater conveyance capacity and are situated so as to be capable of affording sewer service to those portions of Jovita Heights-West Hill that lie within both the Auburn Sanitary Sewer Service Area and the Lakehaven Sanitary Sewer Service Area; and

WHEREAS, portions of the Lakehaven sanitary sewer system have been sized with sufficient wastewater conveyance capacity and are situated so as to be capable of affording sewer service to those portions of Jovita Heights-West Hill that lie within both the Lakehaven Sanitary Sewer Service Area and the Auburn Sanitary Sewer Service Area; and

WHEREAS, the developer of Jovita Heights-West Hill has requested that Auburn provide sanitary sewer service to the entire development to afford maximum efficiency in its use of existing and future facilities; and

WHEREAS, Auburn has evaluated sanitary sewer service issues relative to the developer's request and determined that it is feasible for Auburn to provide sanitary sewer service to the entire development; and

WHEREAS, Lakehaven has evaluated the request and determined that, conditioned on mitigation of the impacts incident thereto, Lakehaven can transfer to Auburn that portion of its Sanitary Sewer Service Area that lies within Jovita Heights-West Hill so that Auburn can provide sanitary sewer service to the entire development.

NOW, THEREFORE in consideration of their mutual covenants, conditions, and promises, **IT IS HEREBY AGREED** by and between the parties hereto as follows:

ITEM ONE REVISION TO ATTACHMENT 1 OF THE ORIGINAL AGREEMENT, Page 2 of 2:

Attachment 1 of the Original Agreement is a graphical representation of the sanitary sewer service area boundary between Auburn and Lakehaven as established in the Original Agreement. Page Two of Attachment 1, as such Attachment 1 is attached hereto and by this reference incorporated herein, revises the sanitary sewer service area shown in the Original Agreement to reflect the transfer to Auburn of certain sanitary sewer service areas originally granted to Lakehaven; more specifically, those parcels located within the City of Auburn, east of 56th Avenue South between South 336th Street and South 344th Street, together with those parcels located outside the City of Auburn, east of 55th Avenue South between South 340th Street and South 348th Street.

ITEM TWO REVISION TO ATTACHMENT 2 OF THE ORIGINAL AGREEMENT:

The legal description for the sanitary sewer service area boundary is revised to reflect the service area modification described in Item One of this Amendment. Attachment 2 is attached hereto as the legal description of the revised sanitary sewer service area boundary and by this reference is incorporated herein.

ITEM THREE REVISION TO SECTION 1: Sewer Service Area.

Section One of the Original Agreement, entitled "Sewer Service Area," is hereby amended to hereinafter read as follows:

The parties have agreed to a mutual sewer service planning boundary as depicted on the maps attached hereto as Attachment 1 and as legally described in Attachment 2, which are by this reference each incorporated herein. Both parties further agree that, through this designation of the sanitary sewer service boundary, Lakehaven shall provide sanitary sewer service to properties mutually within its revised sanitary sewer service area and Auburn's PAA, also depicted on Attachment 1, while Auburn shall provide sanitary sewer service to properties located within its revised sanitary sewer service area, including portions of Lakehaven's corporate boundary, in accordance with and subject to the terms and conditions of this Agreement.

ITEM FOUR REMAINING TERMS UNCHANGED:

That all other provisions of the Original Agreement not herein amended shall remain in full force and effect.

IN WITNESS WHEREOF the parties hereto have executed this agreement as of the day and year first below written.

LAKEHAVEN UTILITY DISTRICT

Approved by Resolution No. 2005-1038 of the Lakehaven Utility District, Federal Way, Washington, at its regular meeting held on the 10th day of March, 2005.

By:

DONALD T. PERRY, GENERAL MANAGER
Lakehaven Utility District

Approved as to form:

STEVEN H. PRITCHETT, GENERAL COUNSEL
Lakehaven Utility District

CITY OF AUBURN

Approved by Resolution No. 3824 of the City of Auburn, Washington, at its regular meeting held on the 22nd day of February, 2005.

By: _____

PETER B. LEWIS,
Mayor, City of Auburn

Attest:

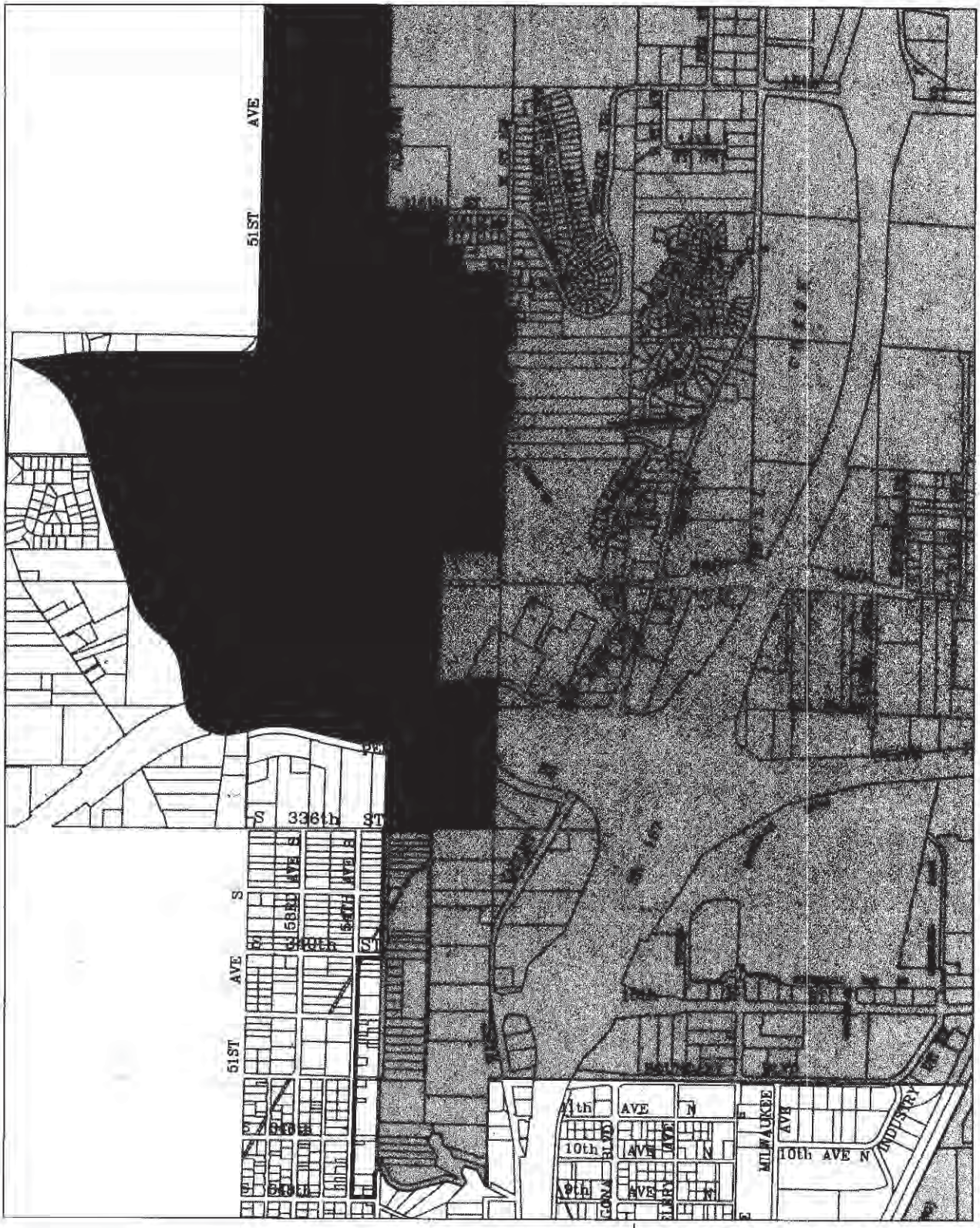
_____

DANIELLE DASKAM,
City Clerk, City of Auburn

Approved as to form:

_____

DANIEL B. HEID,
City Attorney, City of Auburn



LEGEND

- AUBURN CITY LIMITS
- AUBURN PAA
- PROPOSED SEWER SERVICE BOUNDARY

SCALE: 1" = 1500'

Note: Information shown is for general reference purposes only and does not necessarily represent exact geographic or cartographic data as mapped.

(REVISED) ATTACHMENT 1

LAKEHAVEN - AUBURN INTERLOCAL AGREEMENT ESTABLISHING SANITARY SEWER SERVICE BOUNDARIES

PLEASE INITIAL IF APPROVED

Jan 2005

LAKEHAVEN

AUBURN

PAGE 2/2

Q:\sewer\lakmaps.dwg

Attachment 2
(REVISED)

LAKEHAVEN UTILITY DISTRICT and CITY OF AUBURN INTERLOCAL AGREEMENT ESTABLISHING SANITARY SEWER SERVICE BOUNDARIES

BOUNDARY DESCRIPTION

BEGINNING at a point 170 feet east of the Northwest corner of the Southeast quarter of the Southwest quarter of Section 35, Township 22 North, Range 4 East, W.M., in King County, Washington;

THENCE south 662.54 feet, more or less, to the North line of the South half of said subdivision;

THENCE easterly along said North line to a point 300 feet west of the East line of said subdivision;

THENCE south to a point 170 feet north of the South line of said subdivision;

THENCE east 300 feet, more or less, to the East line of said subdivision;

THENCE southerly along said East line to the South line of said Section 35;

THENCE continuing southerly along the West line of the Northeast quarter of Section 2, Township 21 North, Range 4 East, W.M., in King County, Washington, a distance of 221.12 feet;

THENCE easterly, parallel with the North line of said subdivision, 220.20 feet;

THENCE southerly, parallel with the West line of said subdivision, 130 feet;

THENCE easterly, parallel with the North line of said subdivision, 1,304.44 feet;

THENCE southerly, parallel with the West line of said subdivision, 494 feet;

THENCE easterly, parallel with the North line of said subdivision, 680.8 feet;

THENCE southerly, parallel with the West line of said subdivision, 100 feet;

THENCE easterly, parallel with the North line of said subdivision, 428 feet, more or less, to the East line of said subdivision;

THENCE southerly, along said East line to the Northeast corner of the South half of the South half of the Northeast quarter of the Southeast quarter of said Section 2;

THENCE westerly, along the North line of said subdivision, 518.77 feet;

THENCE southerly, parallel with the East line of said subdivision, 328.01 feet;

THENCE westerly, along the South line of said subdivision, 130.02 feet, more or less to the Northeast corner of the West half of the Southeast quarter of the Southeast quarter of said Section 2;

THENCE southerly, along the East line of said subdivision, 964.41 feet;

THENCE westerly, parallel with the North line of said subdivision, 650 feet, more or less, to the East line of the Southwest quarter of the Southeast quarter of said Section 2;

THENCE southerly, along said East line, 328.77 feet, more or less, to the South line of said subdivision;

THENCE westerly, along said South line, to the centerline of 56th Avenue South;

THENCE southerly, along said centerline of 56th Avenue South, to the centerline of South 305th Street in Section 11, Township 21 North, Range 4 East, W.M., in King County, Washington;

THENCE westerly, along said centerline of South 305th Street, to a point of intersection with the northerly projection of the West line of Lot 2, Block 5, Auburn Heights Park Division No. 2, according to the plat thereof recorded in Volume 49, Page 99, records of King County, Washington;

THENCE southerly, 320 feet, more or less, parallel with said West line of Lot 2, to the South line of Lot 4, Block 5, of said plat;

THENCE easterly, along said South line of Lot 4, to the Northwest corner of Lot 5, Block 5 of said plat;

THENCE southerly and southeasterly, along the West lines of Lots 5 and 9, of said plat, to the Northeast corner of Block 7, Auburn Heights Park Division No. 1, according to the plat thereof recorded in Volume 49 of Plats, Page 56, records of King County, Washington;

THENCE southerly, along the East line of Block 7 of said plat, to the Southeast corner of Lot 2, Block 7, of said plat;

THENCE westerly, parallel with the South line of said plat, along the north lines of Lot 19 and Lot 1, Block 6, Lot 15 and Lot 1, Block 5, and Lot 26, Block 4, of said plat, to the centerline of 51st Avenue South;

THENCE southerly, along said centerline of 51st Avenue South, to the Southwest corner of said Section 11;

THENCE continue southerly, along the West line of Section 14, Township 21 North, Range 4 East, W.M., in King County, Washington, 329.57 feet;

THENCE east 30 feet to the Southwest corner of Lot 15, Peasley Ridge, according to the plat thereof recorded in Volume 201, Pages 66-71, records of King County, Washington;

THENCE continue easterly, along the South line of said plat, to the Southeast corner of Tract D Peasley Ridge;

THENCE northerly, along the East line of said Tract D, 150 feet, more or less, to the Northwest corner of Lot 2, King County Short Plat No. 1080026R, as recorded under Recording No. 8106080708, records of King County, Washington;

THENCE easterly, along the North line of said Lot 2, to the West line of Lot 1, King County Short Plat No. 1080027, as recorded under Recording No. 8106080709, records of King County, Washington;

THENCE northerly, along the West line of said Lot 1, to the Northwest corner thereof;

THENCE easterly, along the North lines of Lots 1, 2 and 4, of said short plat, to the Northeast corner of said Lot 4;

THENCE East 60 feet to the West line of Lot 19, West Auburn Five-Acre Tracts, according to the plat thereof recorded in Volume 15, Page 12, records of King County, Washington;

THENCE southerly, along the West line of said Lot 19, 9.43 feet;

THENCE easterly, parallel with the North line of said Lot 19, 294.8 feet;

THENCE northerly, parallel with the West line of said Lot 19, 119.43 feet, more or less, to the South margin of South 320th Street;

THENCE easterly, along said south margin of South 320th Street, 150 feet;

THENCE southerly, parallel with the West line of said Lot 19, 119.43 feet;

THENCE easterly, parallel with the North line of said Lot 19, 9.59 feet;

THENCE southerly, parallel with the West line of said Lot 19, 5 feet;

THENCE easterly, parallel with the North line of said Lot 19, 13.53 feet;

THENCE southerly, parallel with the West line of said Lot 19, 178.866 feet, more or less, to the most Northwesterly corner of Lot 4, King County Short Plat No. 278048, as recorded under Recording No. 8004030782, records of King County, Washington;

THENCE southerly, along the West line of said Lot 4, to the Southwest corner thereof and the North line of Lot 2, King County Short Plat No. 1077053, as recorded under Recording No. 7808100856;

THENCE westerly, along the North line of said Lot 2, to the Northwest corner thereof;

THENCE southerly, along the West lines of Lot 2 and Lot 4 of said short plat, to the North line of Lot 30, West Auburn Five-Acre Tracts, according to the plat thereof recorded in Volume 15, Page 12, records of King County, Washington;

THENCE easterly, along the North line of said Lot 30, 147.35 feet;

THENCE southerly, parallel with the East line of said Lot 30, to the centerline of South 324th Street;

THENCE westerly, along said centerline of South 324th Street, to the centerline of 56th Avenue South;

THENCE southerly, along said centerline of 56th Avenue South, to the North margin of State Highway No. 18;

THENCE easterly, along said North margin of State Highway No. 18, to the southerly projection of the centerline of 58th Avenue South;

THENCE southerly, along said centerline of 58th Avenue South, to the North margin of South 336th Street;

THENCE westerly, along said North margin of South 336th Street to the West margin of 56th Avenue South;

THENCE southerly, along said West margin of 56th Avenue South to the North margin of South 340th Street;

THENCE westerly, along said North margin of South 340th Street to the West margin of 55th Avenue South;

THENCE southerly, along said West margin of 55th Avenue South to the South margin of South 348th Street;

THENCE easterly, along said South margin of South 348th Street to the East margin of 56th Avenue South;

THENCE northerly, along said East margin of 56th Avenue South, to the easterly projection of the South line of Lot 24, Block 27, Jovita Heights, according to the plat thereof recorded in Volume 20 of Plats, Page 12, records of King County, Washington, and the terminus of this boundary description.

LAKEHAVEN UTILITY DISTRICT
King County, Washington

Resolution No. 2005-1038

A RESOLUTION of the Board of Commissioners of the Lakehaven Utility District, King County, Washington, approving an amendment to the sanitary sewer service boundary with the City of Auburn, authorizing the General Manager to execute an agreement reflecting such amendment on behalf of the District and amending District Resolution No. 2004-1006.

WHEREAS, the District is authorized under state law to provide water and sanitary sewer service pursuant to adopted comprehensive plans, and

WHEREAS, under authority of existing regulatory requirements, the District and the City of Auburn have determined to establish, by interlocal agreement, service area boundaries between their respective water and sewer systems, and

WHEREAS, since the adoption of the sewer service area boundary, Auburn and the District have concluded that certain territory within the area designated for sewer service by the District would be better served by Auburn, and

WHEREAS, Auburn and the District have discussed terms for an agreement which would transfer the service jurisdiction for such area to Auburn, and

WHEREAS, the Board believing the transfer of service jurisdiction to be in the best interests of the District

NOW, THEREFORE, **BE IT RESOLVED** as follows:

1. The District hereby approves an amendment to the "Interlocal Agreement Establishing Sanitary Sewer Service Boundaries" with the City of Auburn to provide that the area referenced in Exhibit "A" shall hereinafter be included within the service area jurisdiction of the City of Auburn.
2. The General Manager is hereby directed to execute an agreement with Auburn to provide for such transfer.
3. Resolution No. 2004-1006 is hereby amended in part to reflect the transfer of service jurisdiction herein.
4. This Resolution shall be effective on the date of adoption below.

ADOPTED by the Board of Commissioners of Lakehaven Utility District, King County, Washington, at an open public meeting this 10th day of March, 2005.

ATTEST:

President and Commissioner	Yea	Nay	Abstain
Vice President and Commissioner	Yea	Nay	Abstain
Secretary and Commissioner	Yea	Nay	Abstain
Commissioner	Yea	Nay	Abstain
Commissioner	Yea	Nay	Abstain

Approved as to form:

General Counsel

RESOLUTION NO. 5353

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, AUTHORIZING THE MAYOR TO EXECUTE AN AMENDMENT TO THE INTERLOCAL AGREEMENT WITH THE LAKEHAVEN WATER AND SEWER DISTRICT FOR THE PURPOSE OF MODIFYING THE SEWER DISTRICT'S SANITARY SEWER SERVICE AREA

WHEREAS, pursuant to RCW 35.A.11.040, Auburn has the legal authority to exercise its powers and perform any of its functions as set forth in RCW 39.34; and

WHEREAS, in January 2004 the Commissioners of the Lakehaven Utility District adopted Resolution No. 2004-1006 authorizing the General Manager to execute an interlocal agreement with Auburn, which agreement was subsequently signed by the City of Auburn as authorized under Auburn Resolution No. 3651; and

WHEREAS, in March 2005 the Commissioners of the Lakehaven Utility District adopted Resolution No. 2005-1038 authorizing the General Manager to execute an amendment to the interlocal agreement with Auburn, which amendment subsequently signed by the City of Auburn as authorized under Auburn Resolution No. 3824; and

WHEREAS, the parties recognize the responsibility of public sanitary sewer utilities to provide efficient and reliable service to their customers at reasonable cost; and

WHEREAS, portions of the Auburn sanitary sewer system have been sized with sufficient wastewater conveyance capacity and are situated so as to be capable of affording sewer service to a number of properties that lie within the Lakehaven Sanitary Sewer Service Area and adjacent to Auburn's Sanitary Sewer Service Area; and

WHEREAS, Auburn has evaluated sanitary sewer service issues relative to the adjacent properties and determined that it is feasible for Auburn to provide sanitary sewer service to those properties; and

WHEREAS, Lakehaven has evaluated the request and determined that Lakehaven can transfer to Auburn that portion of its Sanitary Sewer Service Area adjacent to the City of Auburn's infrastructure so that Auburn can provide sanitary sewer service to those properties.

NOW, THEREFORE, THE COUNCIL OF THE CITY OF AUBURN, WASHINGTON, RESOLVES as follows:

Section 1. The Mayor is hereby authorized to execute an amendment to the Interlocal Agreement with Lakehaven Utility District, in substantial conformity with the agreement attached hereto, marked as Exhibit A and incorporated herein by this reference.

Section 2. The Mayor is hereby authorized to implement such administrative procedures as may be necessary to carry out the directions of this legislation.

Section 3. This Resolution shall take effect and be in force upon passage and signatures thereon.

DATED and SIGNED on this 19th day of March, 2018.

CITY OF AUBURN

Nancy Backus

NANCY BACKUS, MAYOR

ATTEST:

Danielle E. Daskam

Danielle E. Daskam, City Clerk

APPROVED AS TO FORM:

Daniel B. Heid, City Attorney

EXHIBIT A TO RESOLUTION 5353

AMENDMENT NO. 2
TO THE LAKEHAVEN WATER AND SEWER DISTRICT AND CITY OF AUBURN
INTERLOCAL AGREEMENT ESTABLISHING
SANITARY SEWER SERVICE BOUNDARIES

AMENDMENT NO. 2
TO THE LAKEHAVEN WATER AND SEWER DISTRICT AND CITY OF AUBURN
INTERLOCAL AGREEMENT ESTABLISHING
SANITARY SEWER SERVICE BOUNDARIES

THIS AGREEMENT, made and entered into this 12th day of April 2018, by and between LAKEHAVEN WATER AND SEWER DISTRICT, a Washington municipal corporation (hereinafter referred to as "Lakehaven"), and the CITY OF AUBURN, a Washington municipal corporation, (hereinafter referred to as "Auburn"), both being duly organized and existing under and by virtue of the laws of the State of Washington, as an amendment to the Interlocal Agreement dated February 2, 2004, between the parties and executed on the 8th day of January, 2004, and the 20th day of January, 2004, respectively (hereinafter referred to as "Original Agreement") as amended by Amendment No. 1 to that agreement, dated February 22, 2005, between the parties and executed on the 10th day of March, and the 22nd day of February, 2005, respectively.

WITNESSETH:

WHEREAS, in January 2004 the Commissioners of the Lakehaven Water and Sewer District adopted Resolution No. 2004-1006 authorizing the General Manager to execute an interlocal agreement with Auburn, which agreement was subsequently signed by the City of Auburn as authorized under Auburn Resolution No. 3651; and

WHEREAS, in March 2005 the Commissioners of the Lakehaven Water and Sewer District adopted Resolution No. 2005-1038 authorizing the General Manager to execute an amendment to the interlocal agreement with Auburn, which amendment subsequently signed by the City of Auburn as authorized under Auburn Resolution No. 3824; and

WHEREAS, the parties recognize the responsibility of public sanitary sewer utilities to provide efficient and reliable service to their customers at reasonable cost; and

WHEREAS, portions of the Auburn sanitary sewer system have been sized with sufficient wastewater conveyance capacity and are situated so as to be capable of affording sewer service to a number of properties that lie within the Lakehaven Sanitary Sewer Service Area and adjacent to Auburn's Sanitary Sewer Service Area; and

WHEREAS, Auburn has evaluated sanitary sewer service issues relative to the adjacent properties and determined that it is feasible for Auburn to provide sanitary sewer service to those properties; and

WHEREAS, Lakehaven has evaluated the request and determined that Lakehaven can transfer to Auburn that portion of its Sanitary Sewer Service Area adjacent to the City of Auburn's infrastructure so that Auburn can provide sanitary sewer service to those properties.

NOW, THEREFORE in consideration of their mutual covenants, conditions, and promises, IT IS HEREBY AGREED by and between the parties hereto as follows:

ITEM ONE REVISION TO SERVICE AREA BOUNDARY

The parties have agreed to modify the mutual sewer service planning boundary as established in the Original Agreement and modified by Amendment No. 1. The properties depicted in Exhibit A and described in Exhibit B are hereby designated to be within the City of Auburn's sanitary sewer service area and no longer within the Lakehaven Water and Sewer District's sanitary sewer service area.

ITEM TWO REMAINING TERMS UNCHANGED:

That all other provisions of the Original Agreement as modified by Amendment No. 1 not herein amended shall remain in full force and effect.

IN WITNESS WHEREOF the parties hereto have executed this agreement as of the day and year first below written.

LAKEHAVEN WATER AND SEWER DISTRICT

Approved by Resolution No. 2018-1306 of the Lakehaven Water and Sewer District, Federal Way, Washington, at its regular meeting held on the 12th day of April, 2018.

By:

Approved as to Form:

CITY OF AUBURN
Approved by Resolution No. 5353 of the City of Auburn, Washington, at its regular meeting held on the 19th day of March, 2018.

By:

Nancy Backus
Nancy Backus, Mayor

Attest:

City Clerk

Approved as to form:

City Attorney

EXHIBIT 'A'

Legal Description for Lakehaven to Auburn Sewer Service Transfer Area

A portion of the southeast quarter of the southwest quarter of Section 14 and the northeast quarter of the northwest quarter of section 23, all in Township 21 North, Range 4 East, W.M., City of Auburn, King County, Washington, said portion described as follows:

Commencing at an angle point in the westerly boundary of the Interlocal Agreement described in City of Auburn Resolution 3824 dated February 22, 2005, said angle point being at the intersection of the north margin of State Highway No. 18 and the southerly projection of the centerline of 58th Avenue South;

Thence southerly along said westerly boundary and said southerly projection of 58th Avenue South to the south margin of the lands conveyed to the City of Auburn from the State of Washington in deed recorded under King County Recording No. 8709221482 and the point of beginning for this boundary description;

Thence continuing southerly along said westerly boundary and said southerly projection of 58th Avenue South to the north margin of South 336th Street;

Thence westerly along said westerly boundary and the north margin of South 336th Street to the west margin of 56th Avenue South;

Thence southerly along said westerly boundary and the west margin of 56th Avenue South to the north margin of South 340th Street;

Thence westerly along said westerly boundary and said north margin of South 340th Street to the east margin of 55th Avenue South;

Thence leaving said westerly boundary of City of Auburn Resolution 3824, northerly along said east margin of 55th Avenue South to the south margin of South 336th Street;

Thence easterly along said south margin of South 336th Street to the southerly projection of the west line of the southeast quarter of the southwest quarter of said Section 14;

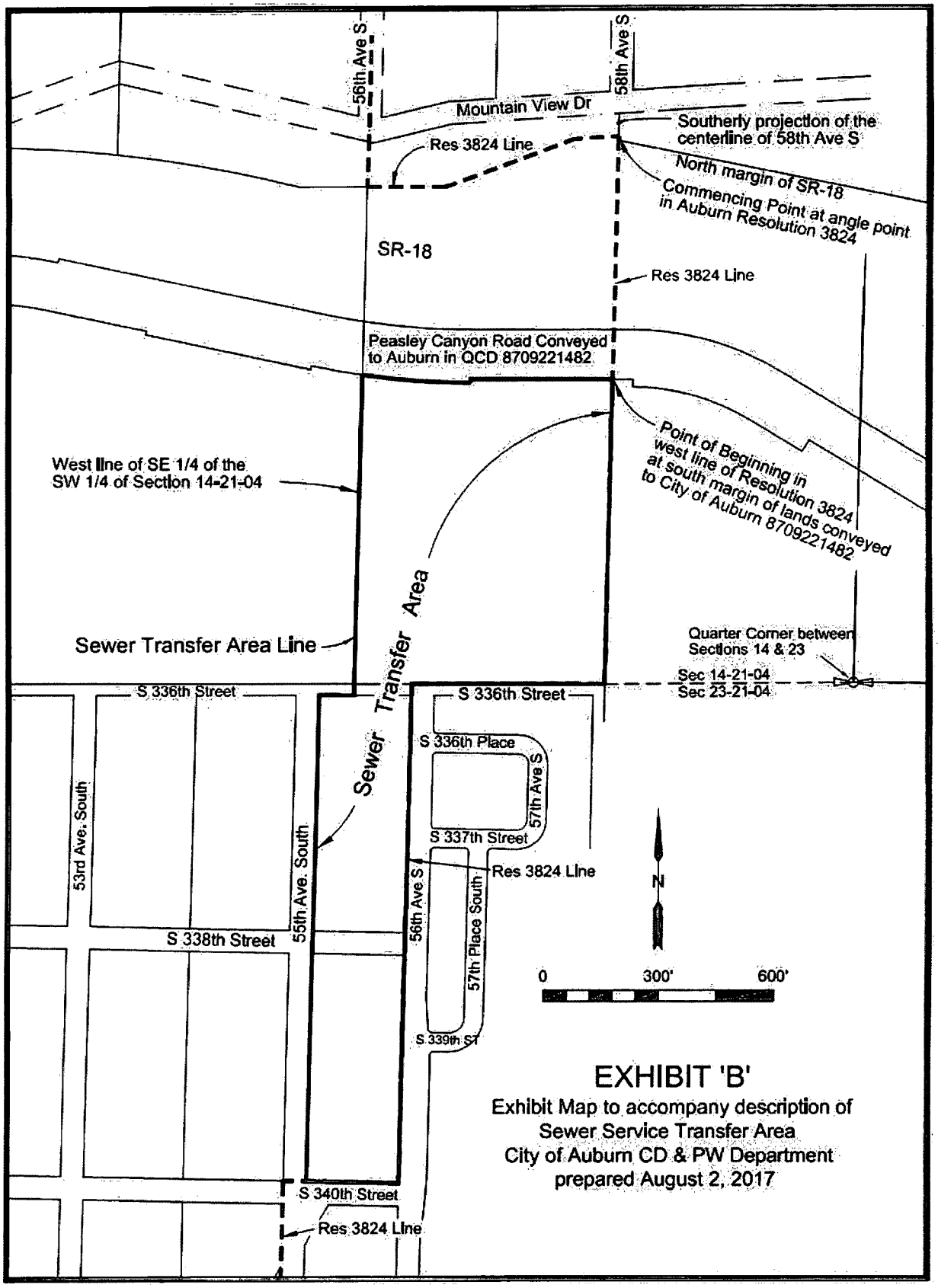
Thence northerly along said west line to said south margin of the lands conveyed to the City of Auburn in deed recorded under King County Recording No. 8709221482;

Thence easterly along said south margin to the point of beginning.

9/11/2017



O:\SURVEY\PROJECTS\ADM431-Sewer\2017 Sewer Franchise Legal - Jovita Hts area\Legal Description Lakehaven to Auburn Sewer Transfer Area.doc 9/11/2017


56th Ave S
58th Ave S
Mountain View Dr
Res 3824 Line
Southerly projection of the centerline of 58th Ave S
North margin of SR-18
Commencing Point at angle point in Auburn Resolution 3824
SR-18
Res 3824 Line
Peasley Canyon Road Conveyed to Auburn in QCD 8709221482
Point of Beginning in west line of Resolution 3824 at south margin of lands conveyed to City of Auburn 8709221482
West line of SE 1/4 of the SW 1/4 of Section 14-21-04
Sewer Transfer Area
Sewer Transfer Area Line
Quarter Corner between Sections 14 & 23
Sec 14-21-04
Sec 23-21-04
S 336th Street
S 336th Street
S 336th Place
57th Ave S
S 337th Street
Res 3824 Line
53rd Ave. South
55th Ave. South
56th Ave S
57th Place South
S 338th Street
S 339th St
N
0
300'
600'
S 340th Street
Res 3824 Line
EXHIBIT 'B'
Exhibit Map to accompany description of
Sewer Service Transfer Area
City of Auburn CD & PW Department
prepared August 2, 2017

LAKEHAVEN WATER AND SEWER DISTRICT
King County, Washington

Resolution No. 2018-1306

A RESOLUTION of the Board of Commissioners of the Lakehaven Water and Sewer District, King County, Washington, approving Amendment No. 2 to the sanitary sewer service boundary with the City of Auburn, authorizing the General Manager to execute an agreement reflecting such amendment on behalf of the District and amending District Resolution No. 2004-1006.

WHEREAS, the District is authorized under state law to provide water and sanitary sewer service pursuant to adopted comprehensive plans, and

WHEREAS, under authority of existing regulatory requirements, the District and the City of Auburn have determined to establish, by interlocal agreement, service area boundaries between their respective water and sewer systems, and

WHEREAS, since the adoption of the sewer service area boundary, Auburn and the District have concluded that certain territory within the area designated for sewer service by the District would be better served by Auburn, and

WHEREAS, the parties have previously executed Amendment No. 1 to the interlocal agreement to transfer service jurisdiction of an area to Auburn, and

WHEREAS, Auburn and the District have discussed terms for a second amendment which would transfer the service jurisdiction for an additional area to Auburn, and

WHEREAS, the Board believing the transfer of service jurisdiction to be in the best interests of the District

NOW, THEREFORE, BE IT RESOLVED as follows:

1. The District hereby approves an Amendment No. 2 to the "Interlocal Agreement Establishing Sanitary Sewer Service Boundaries" with the City of Auburn to provide that the area referenced in Exhibit "A" shall hereinafter be included within the service area jurisdiction of the City of Auburn.

2. The General Manager is hereby directed to execute an agreement with Auburn to provide for such transfer.

3. Resolution No. 2004-1006 is hereby amended in part to reflect the transfer of service jurisdiction herein.

4. This Resolution shall be effective on the date of adoption below.

ADOPTED by the Board of Commissioners of Lakehaven Water and Sewer District, King County, Washington, at an open public meeting this 12th day of April, 2018.

ATTEST:

President and Commissioner	Yea	Nay	Abstain
Vice President and Commissioner	Yea	Nay	Abstain
Secretary and Commissioner	Yea	Nay	Abstain
Commissioner	Yea	Nay	Abstain
Commissioner	Yea	Nay	Abstain

Approved as to form:

General Counsel

Lakehaven
WATER & SEWER DISTRICT

31627 1st Avenue South • P.O. Box 4249 • Federal Way, WA 98063-4249
253-941-1516 Federal Way • 253-927-2922 Tacoma • www.lakehaven.org

RECEIVED
APR 19 2018
City of Auburn
CDPW - Engineering Services

April 17, 2018

Robert Elwell, P.E.
City of Auburn
25 West Main Street
Auburn, Washington 98001-4998

RE: AUBURN-LAKEHAVEN SEWER INTERLOCAL AGREEMENT AMENDMENT (NO. 2)
Revised Sewer Service Area Boundary

Mr. Elwell:

Enclosed is an original signed copy of Lakehaven Resolution 2018-1306, adopted by Lakehaven's Board of Commissioners on 4/12/18, along with an original of the referenced ILA Amendment signed by the Board President & Lakehaven's General Counsel; amending the sewer service area boundary in the vicinity of southeast Peasley Canyon. At this time, Lakehaven will consider the service area boundary amended accordingly. Thanks for your assistance in this matter.

Let me know if there's any questions or if additional information is needed.

Sincerely,

Brian Asbury
Development Engineering Supervisor

Enclosures

APPENDIX A7

CITY OF ANGOLA

- Sewer Service Boundaries (Resolution 3589)
- Water And Sewer Utility Service, Billing, And Collection (Resolution 5505)

RESOLUTION NO. 3589

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, AUTHORIZING THE MAYOR AND CITY CLERK TO EXECUTE AN INTERLOCAL AGREEMENT ESTABLISHING SANITARY SEWER SERVICE BOUNDARIES BETWEEN THE CITY OF AUBURN AND THE CITY OF ALGONA

WHEREAS, pursuant to RCW 35A.11.040 Auburn and Algona have the legal authority to exercise their powers and perform any of their functions as set forth in RCW 39.34; and

WHEREAS, pursuant to RCW 39.34, the Interlocal Cooperation Act, Auburn and Algona have the legal authority to cooperate with other localities on the basis of mutual advantage and provision of services; and

WHEREAS, pursuant to RCW 35A.21.150 Auburn and Algona have the legal authority to maintain a sewerage system.

NOW, THEREFORE, THE COUNCIL OF THE CITY OF AUBURN, WASHINGTON, IN A REGULAR MEETING DULY ASSEMBLED, HEREWITH RESOLVES THAT:

Section 1. The Mayor and City Clerk of the City of Auburn are herewith authorized to execute an Interlocal Agreement establishing sanitary sewer service boundaries between the City of Auburn and the City of Algona in the

form substantially as the agreement attached hereto, marked as Exhibit "1" and incorporated herein by this reference.

Section 2. That the Mayor is hereby authorized to implement such administrative procedures as may be necessary to carry out the directions of this legislation.

Section 3. That this resolution shall be in full force and effect upon passage and signatures hereon.

DATED this 21st day of April, 2003.

CITY OF AUBURN

PETER B. LEWIS
MAYOR

ATTEST:

Danielle E. Daskam, City Clerk

APPROVED AS TO FORM:

Daniel B. Heid, City Attorney

Return Address:
Auburn City Clerk
City of Auburn
25 West Main St.
Auburn, WA 98001

RECORDER'S COVER SHEET

Document Title(s) (or transactions contained therein):

Interlocal Agreement (RES 3589) Sanitary Sewer Boundaries

8/26 PiUT
L-6179

Reference Number(s) of Documents assigned or released:
☐Additional reference #'s on page _____ of document

Grantor(s)/Borrower(s) (Last name first, then first name and initials)
Auburn, City of

Grantee/Assignee/Beneficiary: (Last name first)
1. Algona, City of

Legal Description (abbreviated: i.e. lot, block, plat or section, township, range)

PER RCW 39.34

☐ Additional legal is on page of document.

Assessor's Property Tax Parcel/Account Number

N/A

☐ Assessor Tax # not yet assigned

EXHIBIT 1

INTERLOCAL AGREEMENT
between
CITY OF ALGONA and CITY OF AUBURN
for the
THE ESTABLISHMENT OF SANITARY SEWER SERVICE BOUNDARIES

THIS AGREEMENT, made and entered into this 21st day of April, 2003, by and between the **CITY OF ALGONA**, a Washington municipal corporation (hereinafter referred to as "Algona"), and the **CITY OF AUBURN**, a Washington municipal corporation, (hereinafter referred to as "Auburn"), both being duly organized and existing under and by virtue of the laws of the State of Washington,

WITNESSETH:

WHEREAS, pursuant to RCW 35A.11.040 Auburn and Algona have the legal authority to exercise their powers and perform any of their functions as set forth in RCW 39.34; and

WHEREAS, pursuant to RCW 39.34, the Interlocal Cooperation Act, Auburn and Algona have the legal authority to cooperate with other localities on the basis of mutual advantage and provision of services; and

WHEREAS, pursuant to RCW 35A.21.150 Auburn and Algona have the legal authority to maintain a sewerage system; and

WHEREAS, the parties recognize the responsibility of public sanitary sewer utilities to provide efficient and reliable service to their customers at reasonable cost; and

WHEREAS, portions of the Algona sanitary sewer system have been sized and are situated so as to be capable of affording sewer service to a portion of the Auburn Sanitary Sewer Service Area; and

WHEREAS, Auburn has evaluated and determined it is in Auburn's best interest to allow Algona to provide sewer service to property within Auburn's municipal boundary that lies adjacent to Algona's sanitary sewer infrastructure; and

WHEREAS, Algona has sufficient capacity within their sanitary sewer facilities to support these adjustments to the existing sewer service areas; and

WHEREAS, the parties desire to allow Algona to construct, reconstruct, repair and maintain sewer facilities, and to authorize connections to Algona's sewer system for service to the areas noted in Exhibit A; and

WHEREAS, Algona's delivery of sewer service to these areas will provide the maximum efficiency in the use of existing and future facilities, together with orderly and efficient sanitary sewer planning.

NOW, THEREFORE:

IT IS HEREBY AGREED by and between the parties hereto as follows:

1. **Sewer Service Area.** The parties have agreed to adjust their sewer service area boundary between them. The area to be adjusted is graphically depicted on the map attached hereto as Exhibit "A", which is by this reference incorporated herein. Exhibit "A" represents an increase in Algona's sewer service area and a decrease in Auburn's current sewer service area. Both parties further agree that Algona, in providing sewer service to the additional areas as shown on Exhibit "A", shall be furnishing sewer service to properties within Auburn's water service area and Auburn's municipal jurisdiction in accordance with and subject to the terms and conditions of this Agreement.

2. **Management, Regulation and Control of Sewer System.** Algona shall have the sole responsibility and authority to construct, maintain, manage, conduct and operate its sewerage system as installed within the areas described in Exhibit "A", together with any additions, extensions and betterments thereto. Algona shall also be responsible for obtaining all necessary governmental franchises, approvals, easements and permits for the installation, maintenance, and operation of said sewerage systems as described above.

3. **Rates, Charges, Permits, and Billing Responsibilities.** Through this Agreement Auburn is turning over the responsibility to own, operate, and maintain the sanitary sewer system including private side sewers within the public right of way to Algona. Algona shall be the responsible agency to issue sewer certificates of availability for any development located within the area described by Exhibit "A".

No connection or modification shall be made to Algona's sanitary sewer system and or private side sewer services connected to Algona's sewer system unless the property owner first pays the associated fees and submits the proper information to obtain an Algona sanitary sewer permit. Sanitary sewer permits shall be subject to inspection and approval for compliance with Algona's Sanitary Sewer Standards as adopted at the time the connection is made.

The rates charged to Algona's sanitary sewer customers shall be fixed, altered, regulated and controlled by Algona pursuant to all applicable laws or regulations

promulgated on the subject of rates and charges for sewer service. No surcharge shall be charged to the customers served under this agreement on the sole basis that those customers are outside of Algona's city limits.

To establish a quantitative usage, Algona shall manually read Auburn's water meters servicing those properties described in Exhibit "A". Algona shall also have the ability to annually request water usage data from Auburn for said properties.

4. Boundary Review Board. In the event that implementation of the terms hereof results in permanent sewer service to areas that will be outside the respective service boundaries of Algona or Auburn, the parties will at the time of such service jointly seek approval of the King County Boundary Review Board in accordance with R.C.W. 36.93.090.

5. Comprehensive Sewer Planning. The terms of this Agreement will be included as an element of Auburn and Algona's Comprehensive Sewerage Plans.

6. Reliance. Each party hereto acknowledges that the other will rely upon the terms of this agreement in its comprehensive planning to meet the needs of the service area designated herein.

7. Indemnification. Algona agrees to indemnify and hold Auburn and its agents, employees, and/or officers, harmless from and shall process and defend at its own expense any and all claims, demands, suits, at law or equity, actions, penalties, loses, damages or costs, of whatsoever kind or nature, brought against Auburn arising out of, in connection with, or incident to the execution of this agreement and/or Algona's performance or failure to perform any aspect of this Agreement; provided, however, that if such claims are caused by or result from the concurrent negligence of Auburn, its agents, employees, and/or officers, this indemnity provision shall be valid and enforceable only to the extent of the negligence of Algona; and provided further, that nothing herein shall require Algona to hold harmless or defend Auburn, its agents, employees, and/or officers, from any claims arising from the sole negligence of Auburn, its agents, employees, and/or officers. No liability shall attach to Auburn by reason of entering this agreement except as expressly provided herein.

Auburn agrees to indemnify and hold Algona and its agents, employees, and/or officers, harmless from and shall process and defend at its own expense any and all claims, demands, suits, at law or equity, actions, penalties, loses, damages or costs, of whatsoever king or nature, brought against Algona arising out of, in connection with, or incident to the execution of this agreement and/or Auburn's performance or failure to perform any aspect of this Agreement; provided, however, that if such claims are caused by or result from the concurrent negligence of Algona, its agents, employees, and/or officers, this indemnity provision shall be valid and enforceable only to the extent of the negligence of Auburn; and provided further, that nothing

herein shall require Auburn to hold harmless or defend Algona, its agents, employees, and/or officers, from any claims arising from the sole negligence of Algona, its agents, employees, and/or officers. No liability shall attach to Algona by reason of entering this agreement except as expressly provided herein.

8. Assignment. The parties shall not assign this agreement or any interest, obligation or duty therein without the express written consent of the other party.

9. Attorney's Fees. If either party shall be required to bring any action to enforce any provision of this Agreement, or shall be required to defend any action brought by the other party with respect to this Agreement, and in the further event that one party shall substantially prevail in such action, the losing party shall, in addition to all other payments required therein, pay all of the prevailing party's reasonable costs in connection with such action, including such sums as the court or courts may adjudge reasonable as attorney's fees in trial court and in appellate courts.

10. Government Approvals. The parties will give notice of the adoption of this Agreement to King County's Department of Natural Resources – Wastewater Treatment Division, to the Department of Health, and to any other agency with jurisdiction or mission relevant to the terms hereof, and shall cooperate and assist in all reasonable manner in procuring any necessary approvals hereof by those agencies.

11. Service Amendments. Any changes to the service areas described herein shall be by mutual agreement. Each party may give permission to the other on a case-by-case basis to provide service by one party into the other party's adjacent or nearby service area based upon considerations of economic efficiency for providing the service with mutual consent of Auburn's Director of Public Works and Algona's Director of Public Works.

12. Notices. All notices between the two agencies hereunder may be delivered or mailed. If mailed, they shall be sent to the following respective addresses:

City of Algona
Director of Public Works
402 Wards Street
Algona, WA 98001
253-833-2741

City of Auburn
Director of Public Works
25 west Main Street
Auburn, WA 98001
253-931-3010

or to such other representative as either party may hereafter from time to time designate in writing. All notices and payments mailed by regular post (including first class) shall be deemed to have been given on the second business day following the date of mailing, if properly mailed and addressed. Notices and payments sent by

certified or registered mail shall be deemed to have been given on the day next following the date of mailing, if properly mailed and addressed. For all types of mail, the postmark affixed by the United States Postal Service shall be conclusive evidence of the date of mailing.

13. Alteration, Amendment or Modification. Algona and Auburn hereby reserve the right to alter, amend or modify the terms and conditions of this Agreement upon written agreement of both parties to such alteration, amendment or modification. Such written consent(s) shall be filed with this agreement for future reference.

14. Sanctity of Agreement. This agreement constitutes the entire agreement of the parties regarding the subject matter hereof, and there are no other representations or oral agreements other than those listed herein, which vary the terms of this agreement. Future agreements may occur between the parties to transfer additional or future service areas by mutual agreement.

15. Obligation Intact. Nothing herein shall be construed to alter the rights, responsibilities, liabilities, or obligations of either Algona or Auburn regarding provision of sewer service, except as specifically set forth herein.

16. Miscellaneous.

A. The captions in this agreement are for convenience only and do not in any way limit or amplify the provisions of this agreement.

B. This agreement is established in perpetuity. Modifications can be established upon written agreement between both parties.

C. The purpose of this agreement is to clarify Algona's and Auburn's sanitary sewer responsibilities for providing service and maintaining public sewer facilities.

D. If any term, provision, condition or portion of this Agreement is held to be invalid, or unenforceable by a final decision of any court having jurisdiction on the matter, the remaining of this Agreement or the application of such term or provision to persons or circumstances other then those as to which it is held invalid or unenforceable shall not be affected thereby and shall continue in full force and effect, unless such court determines that invalidity or unenforceability materially interferes with or defeats the purposes hereof, at which time Auburn or Algona shall have the right to terminate the Agreement.

E. No modifications or amendments of this agreement shall be valid or effective unless evidenced by an agreement in writing signed by both parties.

IN WITNESS WHEREOF the parties hereto have executed this agreement as of the day and year first above written.

CITY OF ALGONA
Approved by Resolution No. 70303 of the City of Algona, Washington, at its regular meeting held on the 1st day of April, 2003.

By:

GLENN WILSON,
Mayor, City of Algona

Attest:

DANIELLE STAFFORD,
City Clerk, City of Algona

Approved as to form:

GEORGE KELLEY,
City Attorney, City of Algona

CITY OF AUBURN
Approved by Resolution No. 3589, of the City of Auburn, Washington, at its regular meeting held on the 21st day of April, 2003.

By:

PETER B. LEWIS,
Mayor, City of Auburn

Attest:

DANIELLE DASKAM,
City Clerk, City of Auburn

Approved as to form:

DANIEL B. HEID,
City Attorney, City of Auburn

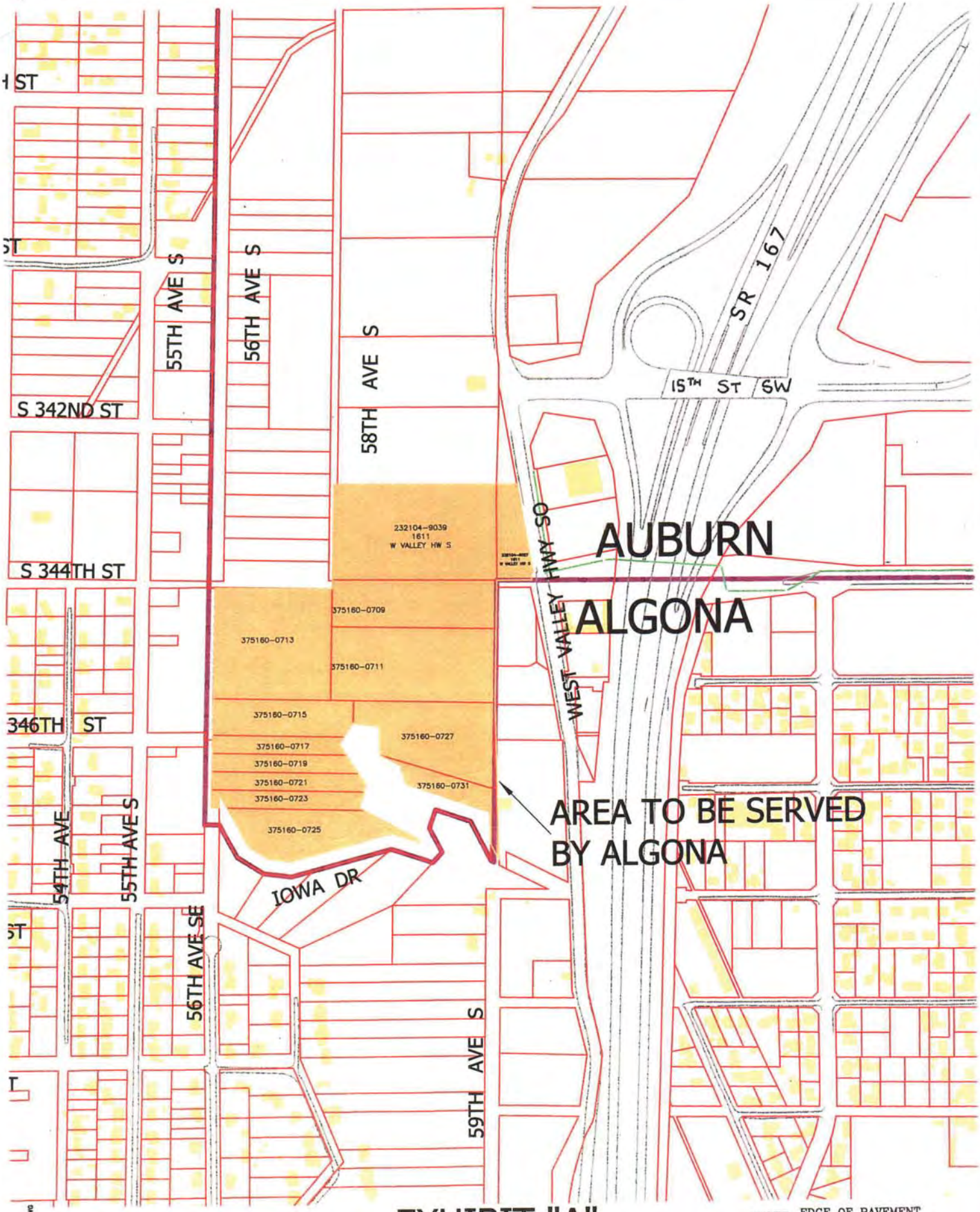


EXHIBIT "A"

Auburn's Sewer Service Area to be Transferred to Algona

EDGE OF PAVEMENT
SEWER
PARCEL/ROW LINE
CITY LIMITS

Exhibit 1
Resolution 3589
Page 7 of 7

PAGE 1 of 1

O:\SEWER\SBFRAN.DWG

RESOLUTION NO. 5505

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, AUTHORIZING THE MAYOR TO EXECUTE AN INTERLOCAL AGREEMENT CONCERNING WATER AND SEWER UTILITY SERVICE, BILLING, AND COLLECTION

WHEREAS, both Algona and Auburn (each a "Party" and collectively "the Parties") are "public agencies" as defined by Chapter 39.34 RCW, and are authorized by that statute to cooperate on a basis of mutual advantage in order to provide for services and facilities;

WHEREAS, Algona owns and operates a water utility ("Algona Water System") and a sanitary sewer utility ("Algona Sewer System"), which collectively provide water and sewer service to customers located within Algona's utility service area(s);

WHEREAS, Auburn owns and operates a water utility ("Auburn Water System") and a sanitary sewer utility ("Auburn Sewer System"), which collectively provide water and sewer service to customers located within Auburn's utility service area(s);

WHEREAS, there are three parcels located within the City limits of Auburn at 1611 West Valley Highway S (APN 2321049039), 1743 West Valley Highway S (APN 3751600709) and 1929 West Valley Highway S (APN 3751600711) (collectively, "West Valley Parcels") that are connected to and served by the Auburn Water System, but are also connected to and served by the Algona Sewer System;

WHEREAS, there are four parcels located within the City limits of Algona at 502 Boundary Boulevard (APN 0301510060), 512 Boundary Boulevard (APN 0301510120), 1196 Industry Drive N (APN 0301510190) and a vacant parcel located between 502 and 512 Boundary Boulevard (APN 0301510100) (collectively, "Boundary Boulevard Parcels")

that are connected to and served by the Algona Water Utility, but are also connected to and served by the Auburn Sewer System;

WHEREAS, the dissociation between the water and sewer service connections for the West Valley Parcels and Boundary Boulevard Parcels is longstanding and of uncertain origin;

WHEREAS, to the best of the Parties' mutual belief and understanding, said dissociation may have resulted from various factors, including without limitation the timing of annexation, development and/or utility connection of the underlying properties;

WHEREAS, the water and sewer utility usage of the West Valley Parcels has historically been roughly equivalent to the water and sewer utility usage of the Boundary Boulevard Parcels;

WHEREAS, each Party's billing and collection for sanitary sewer service usage is based primarily upon water usage, such that each Party may approximately measure, bill and collect for a customer's sewer utility service by measuring the volume of water service provided to that customer;

WHEREAS, the significant expense of connecting the West Valley Parcels to the Auburn Sewer System, and of connecting the Boundary Boulevard Parcels to the Algona Sewer System, would be greatly disproportionate to the practical benefits resulting from such connection, which would be nominal;

WHEREAS, the Parties are currently evaluating permanent options to address the issue of water and sewer utility service for the West Valley Parcels and Boundary Boulevard Parcels and will continue to engage in discussions regarding the same as the

lines require repair or replacement or as development in the respective area(s) occurs; and

WHEREAS, as an interim approach, the Parties mutually desire to simplify the billing relationships and to contractually define their respective rights, obligations costs and liabilities regarding the provision of water and sewer utility service to the West Valley Parcels and the Boundary Boulevard Parcels while a permanent solution is identified and implemented.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, RESOLVES as follows:

Section 1. The Mayor is authorized to execute an interlocal agreement with the City of Algona, in substantial conformity with the agreement attached as Exhibit A.,

Section 2. The Mayor is authorized to implement those administrative procedures necessary to carry out the directives of this legislation.

Section 3. This Resolution will take effect and be in full force on passage and signatures.

Dated and Signed this 6th day of April, 2020.

CITY OF AUBURN

Nancy Backus
NANCY BACKUS, MAYOR

ATTEST:

Shawn Campbell
Shawn Campbell, MMC, City Clerk

APPROVED AS TO FORM:

Kendra Comeau
Kendra Comeau, City Attorney

EXHIBIT A TO RESOLUTION 5505

INTERLOCAL COOPERATION AGREEMENT CONCERNING WATER AND SEWER UTILITY SERVICE, BILLING AND COLLECTION

INTERLOCAL COOPERATION AGREEMENT

Water and Sewer Utility Service, Billing and Collection

THIS INTERLOCAL COOPERATION AGREEMENT ("Agreement") is entered into as of April 9, 2020 ("Effective Date") by and between the City of Algona, Washington ("Algona") and the City of Auburn, Washington ("Auburn"), both municipal corporations organized under the laws of the State of Washington, pursuant to the Interlocal Cooperation Act, Chapter 39.34 RCW.

Recitals

A. Both Algona and Auburn (each a "Party" and collectively "the Parties") are "public agencies" as defined by Chapter 39.34 RCW, and are authorized by that statute to cooperate on a basis of mutual advantage in order to provide for services and facilities.

B. Algona owns and operates a water utility ("Algona Water System") and a sanitary sewer utility ("Algona Sewer System"), which collectively provide water and sewer service to customers located within Algona's utility service area(s).

C. Auburn owns and operates a water utility ("Auburn Water System") and a sanitary sewer utility ("Auburn Sewer System"), which collectively provide water and sewer service to customers located within Auburn's utility service area(s).

D. There are three parcels located within the City limits of Auburn at 1611 West Valley Highway S (APN 2321049039), 1743 West Valley Highway S (APN 3751600709) and 1929 West Valley Highway S (APN 3751600711) (collectively, "West Valley Parcels") that are connected to and served by the Auburn Water System, but are also connected to and served by the Algona Sewer System.

E. There are four parcels located within the City limits of Algona at 502 Boundary Boulevard (APN 0301510060), 512 Boundary Boulevard (APN 0301510120), 1196 Industry Drive N (APN 0301510190) and a vacant parcel located between 502 and 512 Boundary Boulevard (APN 0301510100) (collectively, "Boundary Boulevard Parcels") that are connected to and served by the Algona Water Utility, but are also connected to and served by the Auburn Sewer System.

F. The dissociation between the water and sewer service connections for the West Valley Parcels and Boundary Boulevard Parcels is longstanding and of uncertain origin. To the best of the Parties' mutual belief and understanding, said dissociation may have resulted from various factors, including without limitation the timing of annexation, development and/or utility connection of the underlying properties.

G. The water and sewer utility usage of the West Valley Parcels has historically been roughly equivalent to the water and sewer utility usage of the Boundary Boulevard Parcels.

H. Each Party's billing and collection for sanitary sewer service usage is based primarily upon water usage, such that each Party may approximately measure, bill and collect for a customer's sewer utility service by measuring the volume of water service provided to that customer.

I. The significant expense of connecting the West Valley Parcels to the Auburn Sewer System, and of connecting the Boundary Boulevard Parcels to the Algona Sewer System, would be greatly disproportionate to the practical benefits resulting from such connection, which would be nominal.

J. The Parties are currently evaluating permanent options to address the issue of water and sewer utility service for the West Valley Parcels and Boundary Boulevard Parcels and will continue to engage in discussions regarding the same as the lines require repair or replacement or as development in the respective area(s) occurs.

K. As an interim approach, the Parties mutually desire to simplify the billing relationships and to contractually define their respective rights, obligations costs and liabilities regarding the provision of water and sewer utility service to the West Valley Parcels and the Boundary Boulevard Parcels while a permanent solution is identified and implemented.

NOW, THEREFORE, in consideration of the mutual benefits set forth herein, and other good and sufficient consideration the receipt and sufficiency of which are mutually acknowledged, including without limitation the public interest, the Parties hereby agree as follows:

Terms

Section 1. Authority and Purpose. This Agreement is executed pursuant to Chapter 39.34 RCW as a cooperative endeavor of the Parties. The purpose of this Agreement is to establish a contractual relationship governing the provision of water and sewer utility service for the West Valley Parcels and the Boundary Boulevard Parcels, and to set forth the Parties' respective rights, obligations, costs and liabilities regarding this undertaking. This Agreement shall be reasonably construed in furtherance of said purpose.

Section 2. West Valley Parcels—Connection, Service, Billing and Collection.

2.1 Connection and Service. The West Valley Parcels shall remain connected to and served by the Auburn Water System and the Algona Sewer System.

2.2 Billing and Collection. Auburn shall be exclusively responsible for billing and collecting utility payments from the West Valley Parcels for both water and sewer utility service pursuant to Auburn's adopted utility rate schedule(s). Auburn shall maintain accurate records of water and sewer usage, billing and payments with respect to the West Valley Parcels, but shall not be required to remit any such payments to Algona except as expressly set forth in this Agreement.

Section 3. Boundary Boulevard Parcels—Connection, Service, Billing and Collection.

3.1 Connection and Service. The Boundary Boulevard Parcels shall remain connected to and served by the Algona Water System and the Auburn Sewer System.

3.2 Billing and Collection. Algona shall be exclusively responsible for billing and collecting utility payments from the Boundary Boulevard Parcels for both water and sewer utility service pursuant to Algona's adopted utility rate schedule(s). Algona shall maintain accurate records of water and sewer usage, billing and payments with respect to the Boundary Boulevard Parcels, but shall not be required to remit any such payments to Auburn except as expressly set forth in this Agreement.

Section 4. Inspection Rights; Annual Review.

4.1 Inspection Rights. Each Party shall, upon written request, promptly provide the other Party with access to and copies of its utility billing records for the West Valley Parcels and the Boundary Boulevard Parcels.

4.2 Annual Review. Upon the request of Algona, Auburn shall provide to Algona a written summary of the water and sewer utility billing and collection records of the West Valley Parcels for the preceding year. Upon the request of Auburn, Algona shall provide a written summary of the water and sewer utility billing and collection records of the Boundary Boulevard Parcels for the preceding year. Upon receipt of the above-referenced written summaries, the Parties shall confer as deemed mutually appropriate to determine whether to continue, terminate or amend this Agreement.

Section 5. Ownership, Regulation Operation, Maintenance and Repairs. Except as otherwise expressly provided herein, nothing in this Agreement shall be construed as altering or otherwise modifying the Parties' respective rights, duties, obligations and liabilities concerning their respective water and sewer utility systems. Without limitation of the foregoing: Auburn shall own and remain exclusively responsible for all regulation, operation, maintenance and repairs of the Auburn Water System and the Auburn Sewer System, and (ii) Algona shall own and remain exclusively responsible for all regulation, operation, maintenance and repairs of the Algona Water System and the Algona Sewer System.

Section 6. Meter Removal. Algona may in its sole discretion remove or otherwise decommission Algona's utility service meters for any or all of the West Valley Parcels. Algona agrees to provide at least five business days' notice to Auburn of any meter removal or decommissioning.

Section 7. Term. This Agreement shall be in force as of the Effective Date written above following mutual execution by the Parties, and shall remain in effect for ten (10) years thereafter ("Term"), unless terminated earlier in accordance with Section 8. The Parties may at their option extend the Term for one or more mutually agreed upon periods through a writing signed by both Parties.

Section 8. Termination. Either Party may terminate this Agreement with or without cause by providing the other Party with one hundred and eighty (180) days written notice of its intent to terminate.

Section 9. Administration; No Separate Entity Created. The Algona Public Works Director and the Auburn Public Works Director shall serve as joint administrators of this Agreement. No separate legal entity is formed hereby.

Section 10. Property Acquisition, Retention and Disposition. No joint acquisition of real or personal property is contemplated by this Agreement. Except as provided in this section, any other real or personal property acquired by a Party shall remain within the sole and exclusive ownership and control of that Party following the termination or expiration of this Agreement.

Section 11. Indemnification. Each Party shall defend, indemnify and hold the other Party, its officers, officials, employees and volunteers harmless from and against any and all claims, injuries, damages, losses or suits including attorney fees, arising out of or resulting from the acts, errors or omissions of the first Party in its performance of this Agreement. Without prejudice to the foregoing, it is expressly understood that each Party's obligations under this section shall include exclusive responsibility for any claims, injuries, damages, losses or suits arising out of or otherwise relating to the content and validity of that Party's codes, ordinances and regulations, and that the other Party, its officers, officials, employees and volunteers shall have no liability or responsibility whatsoever therefore.

It is further specially and expressly understood that the indemnification provided herein constitutes each Party's waiver of immunity under industrial insurance, Title 51 RCW, solely for the purposes of this indemnification. This waiver has been mutually negotiated by the Parties.

The provisions of this section shall survive the expiration or termination of this Agreement.

Section 12. Governing Law and Venue; Attorneys' Fees. This Agreement shall be governed by the laws of the State of Washington. The venue for any action arising out of this Agreement shall be the Superior Court for King County, Washington. The substantially prevailing Party in any such action shall be entitled to an award of its reasonable attorneys' fees.

Section 13. No Employment Relationship Created. The Parties agree that nothing in this Agreement shall be construed as creating an employment relationship between Algona and any employee, agent, representative or contractor of Auburn, or between Auburn and any employee, agent, representative or contractor of Algona.

Section 14. Notices. Notices to Algona shall be sent to the following address:

City of Algona
Attn: Public Works Director
200 Washington Blvd.
Algona, WA 98001

Notices to Auburn shall be sent to the following address:

City of Auburn
Attn: Public Works Director
25 W. Main Street
Auburn, WA 98001

Section 15. Duty to File or Post Agreement. Prior to this Agreement's entry into force, Auburn shall, pursuant to RCW 39.34.040, (1) file this Agreement with the King County Auditor's Office, or (2) list this Agreement by subject on Auburn's internet web site.

Section 16. Integration. This document, together with any exhibits thereto, constitutes the entire embodiment of the contract between the Parties, and, unless modified in writing by an amendment signed by the Parties hereto, shall be implemented exclusively as described above. All oral agreements and understandings between the Parties related to the subject matter hereof shall be deemed superseded by this Agreement and shall hereinafter be null and void.

Section 17. No Third-Party Beneficiary Created. This Agreement is executed for the sole and exclusive benefit of the signatory Parties. Nothing in this Agreement, whether expressed or implied, is intended to confer any right, remedy or other entitlement upon any person other than the Parties hereto, nor is anything in this Agreement intended to relieve or discharge the obligation or liability of any third party, nor shall any provision herein give any third party any right of action against any party hereto.

Section 18. Signatory Warranty. Each signatory hereto warrants and represents that he/she has been authorized to execute this Agreement by appropriate action of the legislative body of his/her respective city.

Section 19. Execution in Counterparts. This Agreement may be executed in separate counterparts.

Section 20. Regulatory Authority Reserved. Nothing herein shall be construed as waiving, limiting or otherwise abridging in any manner regulatory authority of either party, which Algona and Auburn each hereby expressly reserve in full.

EXECUTED this 9th day of April, 2020.

CITY OF ALGONA

Dave Hill, Mayor

ATTEST/AUTHENTICATED

Jennifer Garnica, City Clerk

APPROVED AS TO FORM

Algona City Attorney

CITY OF AUBURN

Nancy Backus, Mayor

ATTEST/AUTHENTICATED

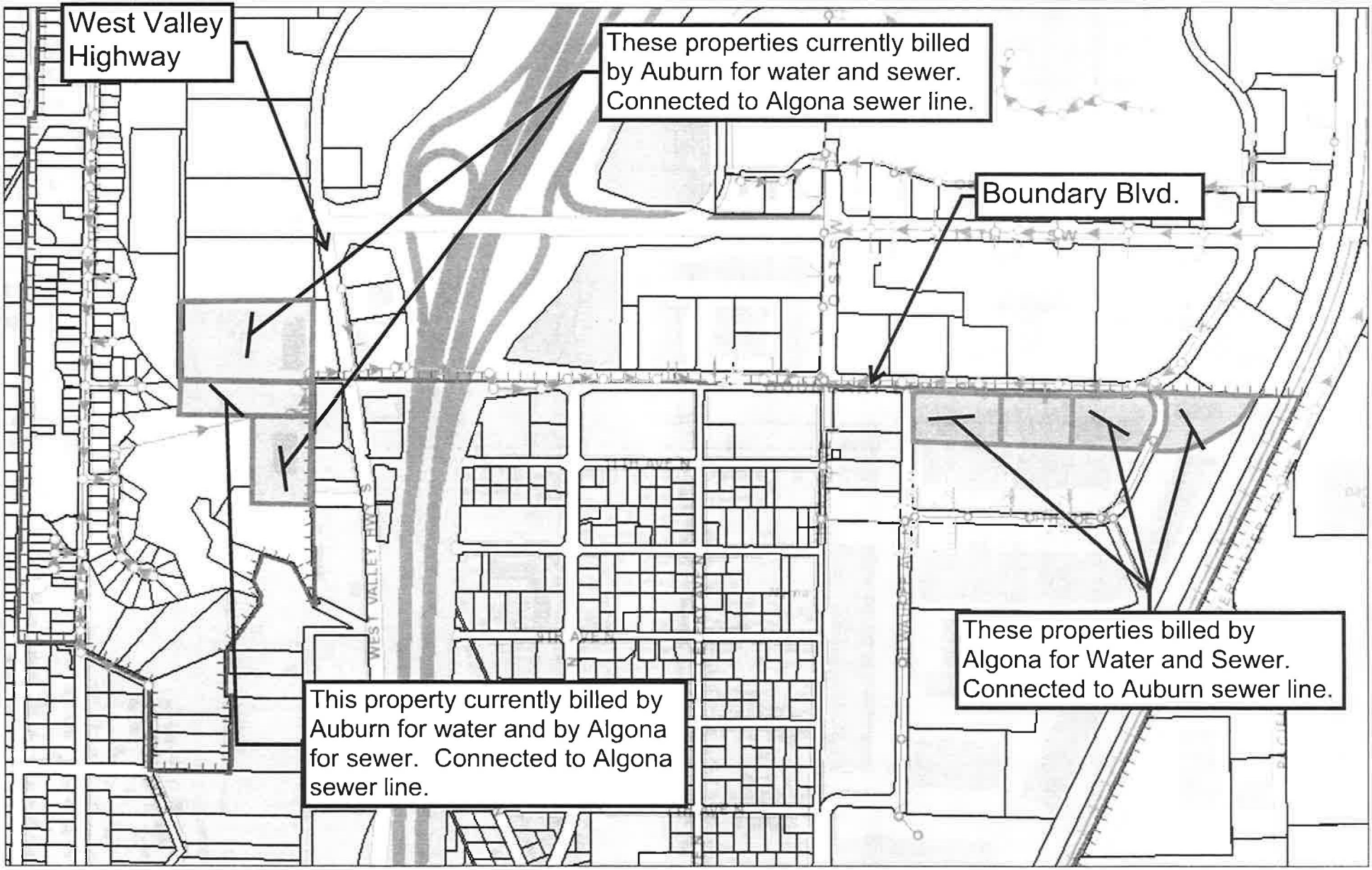
Shawn Campbell, City Clerk

APPROVED AS TO FORM

Auburn City Attorney

Auburn - Algona Utility Agreement

Printed Date: 3/19/2020
Map Created by City of Auburn eGIS
Imagery Date: May 2015



1,333.3 0 666.7 1,333.3 Feet

NAD_1983_StatePlane_Washington_North_FIPS_4601_Feet

1in = 667 ft 1: 8,000

Information shown is for general reference purposes only and does not necessarily represent exact geographic or cartographic data as mapped. The City of Auburn makes no warranty as to its accuracy.

APPENDIX A8

CITY OF BONNEY LAKE

- Sewer Service Boundaries (Resolutions 3760 and 3796)
- Right of Way Use Permits (Resolutions 3873 and 1471)

PNWF W2305-12

1

200508220499 8 PGS
08-22-2005 10:30am $0.00
PIERCE COUNTY, WASHINGTON

Return Address:
Auburn City Clerk
City of Auburn
25 West Main St.
Auburn, WA 98001

RECORDER'S COVER SHEET

Document Title(s) (or transactions contained therein):

Interlocal Agreement (RES 3760)

Reference Number(s) of Documents assigned or released:
☐Additional reference #'s on page _____ of document

Grantor(s)/Borrower(s) (Last name first, then first name and initials)
Auburn, City of

Grantee/Assignee/Beneficiary: (Last name first)
1. Bonney Lake, City of

Legal Description (abbreviated: i.e. lot, block, plat or section, township, range)

PER RCW 39.34

☐ Additional legal is on page of document.

Assessor's Property Tax Parcel/Account Number
N/A

☐ Assessor Tax # not yet assigned

#39

RESOLUTION NO. 3760

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, AUTHORIZING THE MAYOR AND CITY CLERK TO EXECUTE AN ADDENDUM TO AN INTERLOCAL AGREEMENT BETWEEN THE CITY OF AUBURN AND THE CITY OF BONNEY LAKE FOR THE ESTABLISHMENT OF SANITARY SEWER SERVICE BOUNDARIES

WHEREAS, in March of 1998 the City Council of the City of Auburn adopted Resolution No. 2925 authorizing the Mayor and City Clerk to execute a settlement agreement that was subsequently signed by the City of Auburn and the City of Bonney Lake; and

WHEREAS, among other items, that settlement agreement set forth a water service area boundary between the City of Auburn and the City of Bonney Lake; and

WHEREAS, subsequent to approval of the settlement agreement the Potential Annexation Areas (PAA) for the City of Auburn and City of Bonney Lake were amended to coincide with the water service area boundary; and

WHEREAS, since the time of the agreement it has been found that a parcel was divided by the water service area boundary set forth in said settlement agreement, and by the subsequent PAA boundary established based on the water service area boundary, and said parcel lies partially within and partially outside of the Auburn PAA; and

WHEREAS, part of the Lake Tapps Parkway East extension's right-of-way also lies partially within and partially outside of the Auburn water service area boundary established by the settlement agreement, and partially within and partially outside the subsequent PAA boundary established based on the water service area boundary; and

WHEREAS, sound growth management and transportation planning principles are best served by including entire parcels and entire street right-of-ways entirely within a PAA.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, HEREBY RESOLVES as follows:

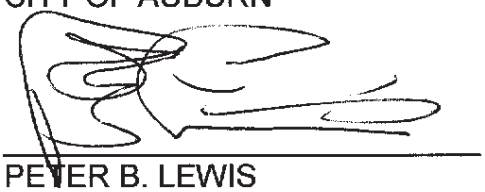
Section 1. The Mayor and City Clerk are hereby authorized to execute Addendum No. 1 to the Settlement Agreement between the City of Auburn and the City of Bonney Lake in substantial conformity with the Addendum attached hereto, marked as Exhibit "A" and incorporated herein by this reference.

Section 2. That the Mayor is authorized to implement such other administrative procedures as may be necessary to carry out the directives of this legislation.

Section 3. That this Resolution shall take effect and be in full force upon passage and signatures hereon.

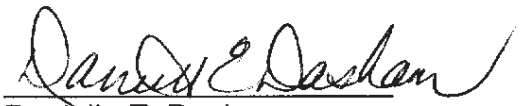
Dated and Signed this 7th day of February, 2005.

CITY OF AUBURN



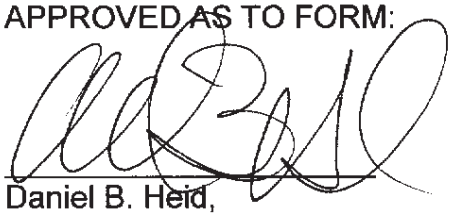
PETER B. LEWIS
MAYOR

ATTEST:



Danielle E. Daskam,
City Clerk

APPROVED AS TO FORM:



Daniel B. Heid,
City Attorney

ADDENDUM NO. 1

ADDENDUM TO SETTLEMENT AGREEMENT BETWEEN THE CITY OF BONNEY LAKE AND THE CITY OF AUBURN RELATING TO WATER SERVICE AREA BOUNDARY

THIS ADDENDUM is made and entered into this 14th day of February, 2005, by and between the **CITY OF BONNEY LAKE**, a municipal corporation of the State of Washington (hereinafter referred to as "Bonney Lake") and the **CITY OF AUBURN**, a municipal corporation of the State of Washington (hereinafter referred to as the "Auburn"), as an addendum to the Settlement Agreement between the parties executed on the 5th day of March, 1998.

W I T N E S S E T H:

WHEREAS, in March 1998 the City Council of the City of Auburn passed Resolution No. 2925 authorizing the Mayor and City Clerk to execute a settlement agreement that was subsequently signed by the City of Auburn and the City of Bonney Lake; and

WHEREAS, among other items, the settlement agreement set forth a water service area boundary between the City of Auburn and the City of Bonney Lake; and

WHEREAS, Exhibit B to the settlement agreement implied that Auburn's Urban Growth Area (UGA) was established to conform with the water service area boundary set forth in the settlement agreement; and

WHEREAS, subsequent to approval of the settlement agreement the Potential Annexation Area (PAA) for the City of Auburn was amended to coincide with the water service area boundary; and

WHEREAS, Exhibit B to the settlement agreement stated that the UGA and water service area boundary was established to follow property lines; and

WHEREAS, since the time of the agreement it has been found that a parcel was divided by the water service area boundary set forth in said settlement agreement, and by the subsequent PAA boundary established based on the water service area boundary, and said parcel lies partially within and partially outside of the Auburn PAA; and

WHEREAS, part of the Lake Tapps Parkway East extension's right-of-way also lies partially within and partially outside of the Auburn water service area boundary established by the settlement agreement, and partially within and partially outside the subsequent PAA boundary established based on the water service area boundary; and

WHEREAS, sound growth management and planning principles are best served by including entire parcels within a PAA.

NOW THEREFORE in consideration of their mutual covenants, conditions and promises, the PARTIES DO HEREBY AGREE as follows:

ITEM ONE: ADDITION OF PROPERTY
The Settlement Agreement is revised to include a portion of Pierce County parcel # 052005-4046, a portion of the Lake Tapps Parkway as it extends from the west boundary of 182nd Ave East west to Auburn's existing Urban Growth Area, and a portion of the natural gas pipe line parcel as noted in the attached Exhibit C. Exhibit C, attached hereto and incorporated by reference as if fully set forth herein, shall provide both a graphical representation and a legal description for the parcels that are to be included in Auburn's UGA for urban services and incorporated into the area that Bonney Lake shall be the water purveyor for within Auburn's UGA as defined in the original settlement agreement between Auburn and Bonney Lake.

ITEM TWO: REMAINING TERMS UNCHANGED:
That all other provisions of the Settlement Agreement between the parties executed on the 5th day of March, 1998, shall remain unchanged, and in full force and effect.

IN WITNESS WHEREOF the parties hereto have executed this Agreement as of the day and year first above written.

CITY OF BONNEY LAKE

ROBERT YOUNG, Mayor

Attest:

Harwood Edvalson, City Clerk

Approved as to form:

James Dionne, City Attorney

CITY OF AUBURN

PETER B. LEWIS, Mayor

Attest:

Danielle E. Daskam. City Clerk

Approved as to form:

Daniel B. Heid, City Attorney

EXHIBIT C

ADDENDUM 1
AUBURN BONNEY LAKE SETTLEMENT AGREEMENT

LEGAL DESCRIPTION OF AREA

THAT PORTION OF SECTION 5, TOWNSHIP 20 NORTH, RANGE 5 EAST, W.M. IN PIERCE COUNTY WASHINGTON, DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHEAST CORNER OF THE WEST HALF OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SAID SECTION 5;

THENCE WESTERLY ALONG THE SOUTH LINE OF THE NORTH HALF OF THE SOUTHEAST QUARTER OF SAID SECTION 5 A DISTANCE OF 1360 FEET, MORE OR LESS, TO THE NORTHWESTERLY LINE OF THE LANDS CONVEYED TO EL PASO NATURAL GAS COMPANY BY DEED RECORDED UNDER PIERCE COUNTY AUDITOR'S NUMBER 2410280;

THENCE NORTHEASTERLY ALONG SAID NORTHWESTERLY LINE A DISTANCE OF 1880 FEET, MORE OR LESS, TO THE NORTH LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 5;

THENCE EASTERLY ALONG THE NORTH LINE OF SAID SOUTHEAST QUARTER A DISTANCE OF 700 FEET, MORE OR LESS, TO THE WEST LINE OF THE LANDS GRANTED TO PIERCE COUNTY FOR 182ND AVENUE EAST DESCRIBED IN DEED RECORDED UNDER PIERCE COUNTY AUDITOR'S NUMBER 2257762;

THENCE SOUTHERLY ALONG THE WEST LINE OF 182ND AVENUE EAST AS DESCRIBED IN SAID INSTRUMENT A DISTANCE OF 40 FEET, MORE OR LESS, TO THE SOUTH LINE OF THE LANDS CONVEYED TO PIERCE COUNTY IN DEED RECORDED UNDER AUDITORS FILE NUMBER 9902110924;

THENCE WESTERLY ALONG LAST SAID SOUTH LINE AND ALONG THE SOUTH LINE OF THE LANDS CONVEYED TO PIERCE COUNTY IN DEED RECORDED UNDER AUDITORS FILE NUMBER 200405180889 AND DEPICTED IN MAP ON FILE IN THE OFFICE OF THE DIRECTOR OF PIERCE COUNTY PUBLIC WORKS AND UTILITIES IN TACOMA, WASHINGTON, ENTITLED "LAKE TAPPS PARKWAY EAST – RIGHT OF WAY PLAN - CRP 5486" AND BEARING APPROVAL DATE OF NOVEMBER 17, 2003, A DISTANCE OF 600 FEET, MORE OR LESS, TO THE EAST LINE OF THE WEST HALF OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SAID SECTION 5;

THENCE SOUTHERLY ALONG THE EAST LINE OF SAID WEST HALF OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SAID SECTION 5 A DISTANCE OF 1220 FEET, MORE OR LESS, TO THE POINT OF BEGINNING.

H:\StaffFiles\WQ\Utility - Sewer\la\Bonney Lake\Addendum Settlement Legal Description.DOC

EXHIBIT C

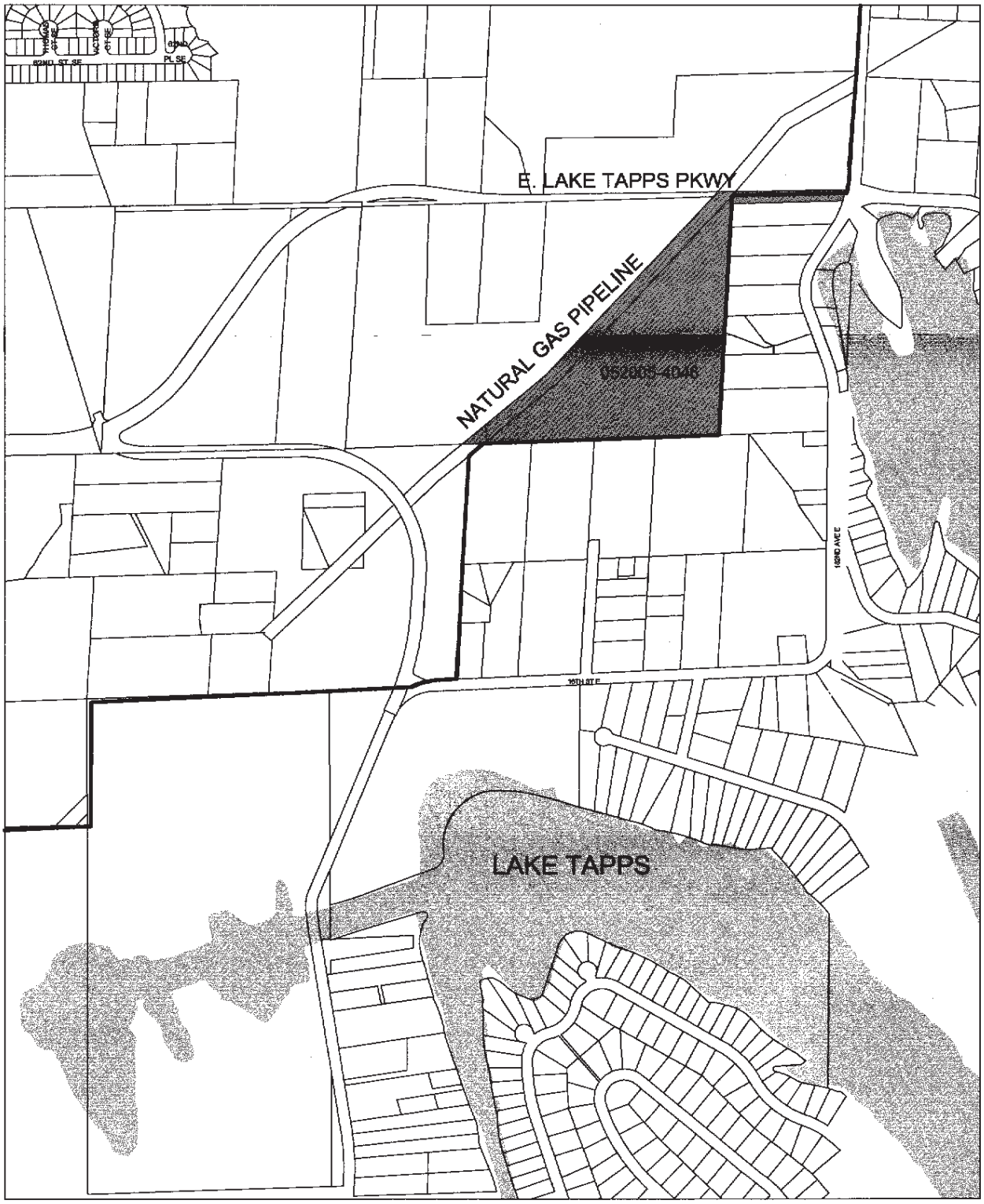


EXHIBIT A
RESOLUTION NO. 3760
PAGE 4 OF 4

EXHIBIT C
ADDENDUM NO. 1 TO THE MARCH 98
AUBURN - BONNEY LAKE
SETTLEMENT AGREEMENT
PAGE 2 OF 2

PNW W2371-13

2

200511100193 14 PGS
11-10-2005 10:49am $0.00
PIERCE COUNTY, WASHINGTON

Return Address:
Auburn City Clerk
City of Auburn
25 West Main St.
Auburn, WA 98001

RECORDER'S COVER SHEET

Document Title(s) (or transactions contained therein):

Interlocal Agreement (Resolution No. 3796)

Reference Number(s) of Documents assigned or released:
☐Additional reference #'s on page _____ of document

Grantor(s)/Borrower(s) (Last name first, then first name and initials)
Auburn, City of

Grantee/Assignee/Beneficiary: (Last name first)
1. Bonney Lake, City of

Legal Description (abbreviated: i.e. lot, block, plat or section, township, range)

PER RCW 39.34

☐ Additional legal is on page of document.

Assessor's Property Tax Parcel/Account Number
N/A

☐ Assessor Tax # not yet assigned

Said document(s) were filed for record by Pacific Northwest Title as accommodation only. It has not been examined as to proper execution or as to its effect upon title.

RESOLUTION NO. 3796

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, AUTHORIZING THE MAYOR TO EXECUTE AN INTERLOCAL AGREEMENT WITH THE CITY OF BONNEY LAKE TO PROVIDE SANITARY SEWER SERVICE FROM AUBURN TO PROPERTY LOCATED WITHIN BONNEY LAKE'S SANITARY SEWER SERVICE AREA

WHEREAS, pursuant to RCW 35A.11.040 Bonney Lake and Auburn have the legal authority to exercise their powers and perform any of their functions as set forth in RCW 39.34; and

WHEREAS, pursuant to RCW 39.34, the Interlocal Cooperation Act, Bonney Lake and Auburn have the legal authority to cooperate with other localities on the basis of mutual advantage and provision of services; and

WHEREAS, pursuant to RCW 35A.21.150 Bonney Lake and Auburn have the legal authority to maintain a sewerage system; and

WHEREAS, the parties recognize the responsibility of public sanitary sewer utilities to provide efficient and reliable service to their customers at reasonable cost; and

WHEREAS, portions of the Auburn sanitary sewer system are sized and are situated so as to be capable of affording sewer service to a portion of the Bonney Lake Sanitary Sewer Service Area; and

WHEREAS, Bonney Lake has evaluated and determined it is in Bonney Lake's best interest to establish this Agreement allowing Auburn to provide sewer service to property within Bonney Lake's sanitary sewer service area that lies in the vicinity of Auburn's sanitary sewer infrastructure; and

WHEREAS, Auburn's delivery of sewer service to these areas will provide the maximum efficiency in the use of existing and future facilities, together with orderly and efficient sanitary sewer planning.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, HEREBY RESOLVES as follows:

Section 1. The Mayor is hereby authorized to execute an Interlocal Agreement with the City of Bonney Lake in substantial conformity with the agreement attached hereto, marked as Exhibit "1" and incorporated herein by this reference.

Section 2. That the Mayor is authorized to implement such other administrative procedures as may be necessary to carry out the directives of this legislation.

Section 3. That this Resolution shall take effect and be in full force upon passage and signatures hereon.

Dated and Signed this 4th day of April, 2005.

CITY OF AUBURN

PETER B. LEWIS
MAYOR

ATTEST:

Danielle E. Daskam,
City Clerk

APPROVED AS TO FORM:

Daniel B. Heid,
City Attorney

EXHIBIT 1

INTERLOCAL AGREEMENT
between
CITY OF AUBURN and CITY OF BONNEY LAKE
for the
THE ESTABLISHMENT OF SANITARY SEWER SERVICE BOUNDARIES

(Fairweather Cove)

Recording # 200511100193

THIS AGREEMENT, made and entered into by and between the **CITY OF AUBURN**, a Washington municipal corporation (hereinafter referred to as "Auburn"), and the **CITY OF BONNEY LAKE**, a Washington municipal corporation, (hereinafter referred to as "Bonney Lake"), both being duly organized and existing under and by virtue of the laws of the State of Washington,

WITNESSETH:

WHEREAS, pursuant to RCW 35A.11.040 Bonney Lake and Auburn have the legal authority to exercise their powers and perform any of their functions as set forth in RCW 39.34; and

WHEREAS, pursuant to RCW 39.34, the Interlocal Cooperation Act, Bonney Lake and Auburn have the legal authority to cooperate with other localities on the basis of mutual advantage and provision of services; and

WHEREAS, pursuant to RCW 35A.21.150 Bonney Lake and Auburn have the legal authority to maintain a sewerage system; and

WHEREAS, the parties recognize the responsibility of public sanitary sewer utilities to provide efficient and reliable service to their customers at reasonable cost; and

WHEREAS, portions of the Auburn sanitary sewer system have been sized and are situated so as to be capable of affording sewer service to a portion of the Bonney Lake Sanitary Sewer Service Area; and

WHEREAS, Bonney Lake has evaluated and determined it is in Bonney Lake's best interest to establish this Agreement allowing property located within Bonney Lake's sewer service area and designated within Pierce County's Urban Growth Area (CUGA), to connect into Auburn's public sanitary sewer facilities; and

WHEREAS, Auburn recognizes the negative impacts septic tanks can have on water quality and the quality of life within and around Lake Tapps; and

WHEREAS, Auburn has sufficient wastewater conveyance capacity within their sanitary sewer facilities to support these adjustments to the existing sewer service areas; and

WHEREAS, Auburn's delivery of sewer service to these areas will provide the maximum efficiency in the use of existing and future facilities, together with orderly and efficient sanitary sewer planning.

NOW, THEREFORE:

IT IS HEREBY AGREED by and between the parties hereto as follows:

1. Sewer Service Area. The parties have agreed that Auburn will provide sanitary sewer service to Bonney Lake for a portion of Bonney Lake's sanitary sewer service area as graphically depicted on the map and legally described as Attachment "A", attached hereto, which is by this reference incorporated herein. Attachment "A" represents Bonney Lake's sewer service area that Bonney Lake has negotiated with Auburn for wastewater conveyance and treatment via Auburn and King County facilities. The actual sewer service provider to the area depicted within Attachment "A" shall remain Bonney Lake. Both parties further agree that Auburn and Bonney Lake shall be subject to the terms and conditions of this Agreement.

2. Management, Regulation and Control of Sewer System. Auburn shall have the sole responsibility and authority to construct, maintain, manage, conduct and operate its sewerage system as installed within Auburn's sanitary sewer service area. Auburn shall be responsible for obtaining and maintaining a franchise from Pierce County for Auburn facilities located in Pierce County right of way.

Bonney Lake shall have the sole responsibility and authority for those facilities that extend outside of the public right of way within the region depicted within Attachment "A". Bonney Lake shall be responsible for obtaining and maintaining a franchise from Pierce County for Bonney Lake facilities located in Pierce County right of way. Bonney Lake shall be responsible for the issuance of side sewer permits and the inspection of facilities located upon private property. Certificates of sewer availability shall be issued from Auburn to Bonney Lake. Bonney Lake shall be responsible for ensuring the conditions of these certificates are met.

3. Rates, Charges, Permits, and Billing Responsibilities. Auburn rates and connection charges (system development charges) shall be billed from Auburn to Bonney Lake in accordance with existing Auburn City Code at the time of service. Bonney Lake shall provide Auburn with the appropriate information so that accurate billings can be established. Auburn and King County shall have the authority to visit sites, upon threat of termination of service, to verify information provided by the property owner and/or Bonney Lake is accurate. King County's capacity charge shall be billed to the property seeking service directly from King County. Bonney Lake may elect to pay the King County capacity charge directly to King County and collect

the costs with the price of the Bonney Lake permit. Auburn shall issue permits to Bonney Lake prior to Bonney Lake's issuing of permits to the property owners. Neither Auburn nor this agreement governs Bonney Lake's rates and fees to be charged to the property owner for the appropriate Bonney Lake side sewer permit.

For Commercial establishments, no additional connections or modification to existing facilities shall be made that would alter the number of plumbing fixtures in the facilities that convey wastewater to Auburn, unless the property owner first pays the associated fees and submits the proper information to obtain a Bonney Lake sanitary sewer permit. Bonney Lake shall in turn seek an Auburn side sewer permit.

Sanitary sewer permits shall be subject to inspection and approval by Bonney Lake. Bonney Lake shall ensure that compliance with Auburn's Sanitary Sewer Standards, as adopted at the time the connection, is made. With this agreement Bonney Lake is providing Auburn with the right to manually read Bonney Lake's water meters for the properties described in Attachment "A"; however, if requested by Auburn, Bonney Lake shall provide water usage information.

The rates and fees charged to Auburn's sanitary sewer customers shall be fixed, altered, regulated and controlled by Auburn pursuant to all applicable laws and regulations promulgated on the subject of rates and charges for sewer service. No surcharge shall be charged to the customers served under this agreement on the sole basis that those customers are outside of Auburn's city limits.

Auburn shall send bills for sanitary sewer service from said property to Bonney Lake's Finance department once every two months.

4. Boundary Review Board. In the event that implementation of the terms hereof results in permanent sewer service to areas that will be outside the respective service boundaries of Auburn or Bonney Lake, the parties will at the time of such service jointly seek approval of the Pierce County Boundary Review Board in accordance with R.C.W. 36.93.090.

5. Comprehensive Sewer Planning. The terms of this Agreement will be included as an element of Bonney Lake and Auburn's Comprehensive Sewerage Plans.

6. Reliance. Each party hereto acknowledges that the other will rely upon the terms of this agreement in its comprehensive planning to meet the needs of the service area designated herein.

7. Indemnification. Auburn agrees to indemnify and hold Bonney Lake and its agents, employees, and/or officers, harmless from and shall process and defend at its own expense any and all claims, demands, suits, at law or equity, actions, penalties, loses, damages or costs, of whatsoever kind or nature, brought against Bonney Lake arising out of, in connection with, or incident to the execution of this

agreement and/or Auburn's performance or failure to perform any aspect of this Agreement; provided, however, that if such claims are caused by or result from the concurrent negligence of Bonney Lake, its agents, employees, and/or officers, this indemnity provision shall be valid and enforceable only to the extent of the negligence of Auburn; and provided further, that nothing herein shall require Auburn to hold harmless or defend Bonney Lake, its agents, employees, and/or officers, from any claims arising from the sole negligence of Bonney Lake, its agents, employees, and/or officers. No liability shall attach to Bonney Lake by reason of entering this agreement except as expressly provided herein.

Bonney Lake agrees to indemnify and hold Auburn and its agents, employees, and/or officers, harmless from and shall process and defend at its own expense any and all claims, demands, suits, at law or equity, actions, penalties, loses, damages or costs, of whatsoever kind or nature, brought against Auburn arising out of, in connection with, or incident to the execution of this agreement and/or Bonney Lake's performance or failure to perform any aspect of this Agreement; provided, however, that if such claims are caused by or result from the concurrent negligence of Auburn, its agents, employees, and/or officers, this indemnity provision shall be valid and enforceable only to the extent of the negligence of Bonney Lake; and provided further, that nothing herein shall require Bonney Lake to hold harmless or defend Auburn, its agents, employees, and/or officers, from any claims arising from the sole negligence of Auburn, its agents, employees, and/or officers. No liability shall attach to Auburn by reason of entering this agreement except as expressly provided herein.

8. Assignment. The parties shall not assign this agreement or any interest, obligation or duty therein without the express written consent of the other party.

9. Attorney's Fees. If either party shall be required to bring any action to enforce any provision of this Agreement, or shall be required to defend any action brought by the other party with respect to this Agreement, and in the further event that one party shall substantially prevail in such action, the losing party shall, in addition to all other payments required therein, pay all of the prevailing party's reasonable costs in connection with such action, including such sums as the court or courts may adjudge reasonable as attorney's fees in trial court and in appellate courts.

10. Government Approvals. The parties will give notice of the adoption of this Agreement to King County's Department of Natural Resources – Wastewater Treatment Division, to the Pierce County Department of Health, and to any other agency with jurisdiction or mission relevant to the terms hereof, and shall cooperate and assist in all reasonable manner in procuring any necessary approvals hereof by those agencies.

11. Service Amendments. Any changes to the service areas described herein shall be by mutual agreement. Each party may give permission to the other on a case-by-case basis to provide service by one party into the other party's adjacent or nearby service area based upon considerations of economic efficiency for providing the service with mutual consent of Bonney Lake's Director of Public Works and Auburn's Director of Public Works.

12. Notices. All notices between the two agencies hereunder may be delivered or mailed. If mailed, they shall be sent to the following respective addresses:

City of Auburn	**City of Bonney Lake**
Director of Public Works	Director of Public Works
25 West Main Street	PO Box 7380
Auburn, WA 98001	19306 Bonney Lake Blvd
	Bonney Lake, WA 98390
253-931-3010	253-862-8602

or to such other representative as either party may hereafter from time to time designate in writing. All notices and payments mailed by regular post (including first class) shall be deemed to have been given on the second business day following the date of mailing, if properly mailed and addressed. Notices and payments sent by certified or registered mail shall be deemed to have been given on the day next following the date of mailing, if properly mailed and addressed. For all types of mail, the postmark affixed by the United States Postal Service shall be conclusive evidence of the date of mailing.

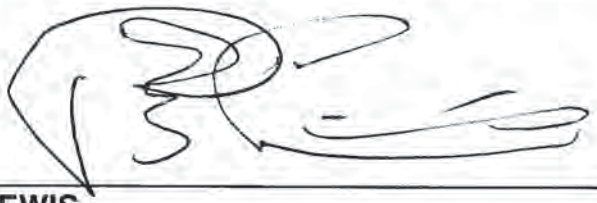
13. Alteration, Amendment or Modification. Auburn and Bonney Lake hereby reserve the right to alter, amend or modify the terms and conditions of this Agreement upon written agreement of both parties to such alteration, amendment or modification. Such written consent(s) shall be filed with this agreement for future reference.

14. Sanctity of Agreement. This agreement constitutes the entire agreement of the parties regarding the subject matter hereof, and there are no other representations or oral agreements other than those listed herein, which vary the terms of this agreement. Future agreements may occur between the parties to transfer additional or future service areas by mutual agreement.

15. Obligation Intact. Nothing herein shall be construed to alter the rights, responsibilities, liabilities, or obligations of either Auburn or Bonney Lake regarding provision of sewer service, except as specifically set forth herein.

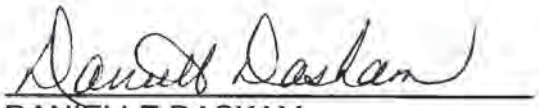
CITY OF AUBURN

Approved by Resolution No. **3796**, of the City of Auburn, Washington, at its regular meeting held on the 4th day of April, 2005.

By: 

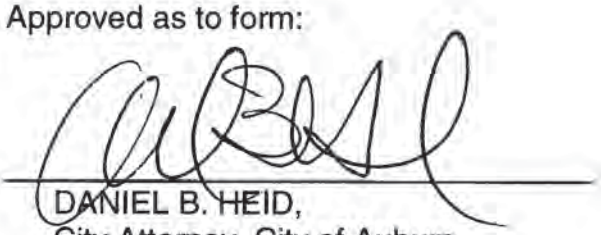
PETER B. LEWIS,
Mayor, City of Auburn

Attest:



DANIELLE DASKAM,
City Clerk, City of Auburn

Approved as to form:



DANIEL B. HEID,
City Attorney, City of Auburn

ATTACHMENT "A"

Legal Description

THAT PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER AND THAT PORTION OF THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 8, TOWNSHIP 20 NORTH, RANGE 5 EAST, LYING EASTERLY OF SUMNER TAPPS HIGHWAY, SOUTHERLY OF NORTH TAPPS ROAD (16^{TH} STREET EAST (FOREST CANYON ROAD)); EASTERLY OF THE PLAT OF LAKE TAPPS TACOMA POINT ADDITION, ACCORDING TO PLAT RECORDED IN BOOK 17 OF PLATS AT PAGES 1 TO 8, INCLUSIVE, AND NORTHERLY OF THE INTAKE CANAL TO LAKE TAPPS, IN PIERCE COUNTY, WASHINGTON. EXCEPT THAT PORTION LYING WITHIN LAKE TAPPS.

AREA DESCRIBED IS APPROXIMATELY $\pm$ 16.7 ACRES.
PARCEL NUMBER 0520081001

SE QUARTER OF SECTION 8, TOWNSHIP 20 N, RANGE 5 E

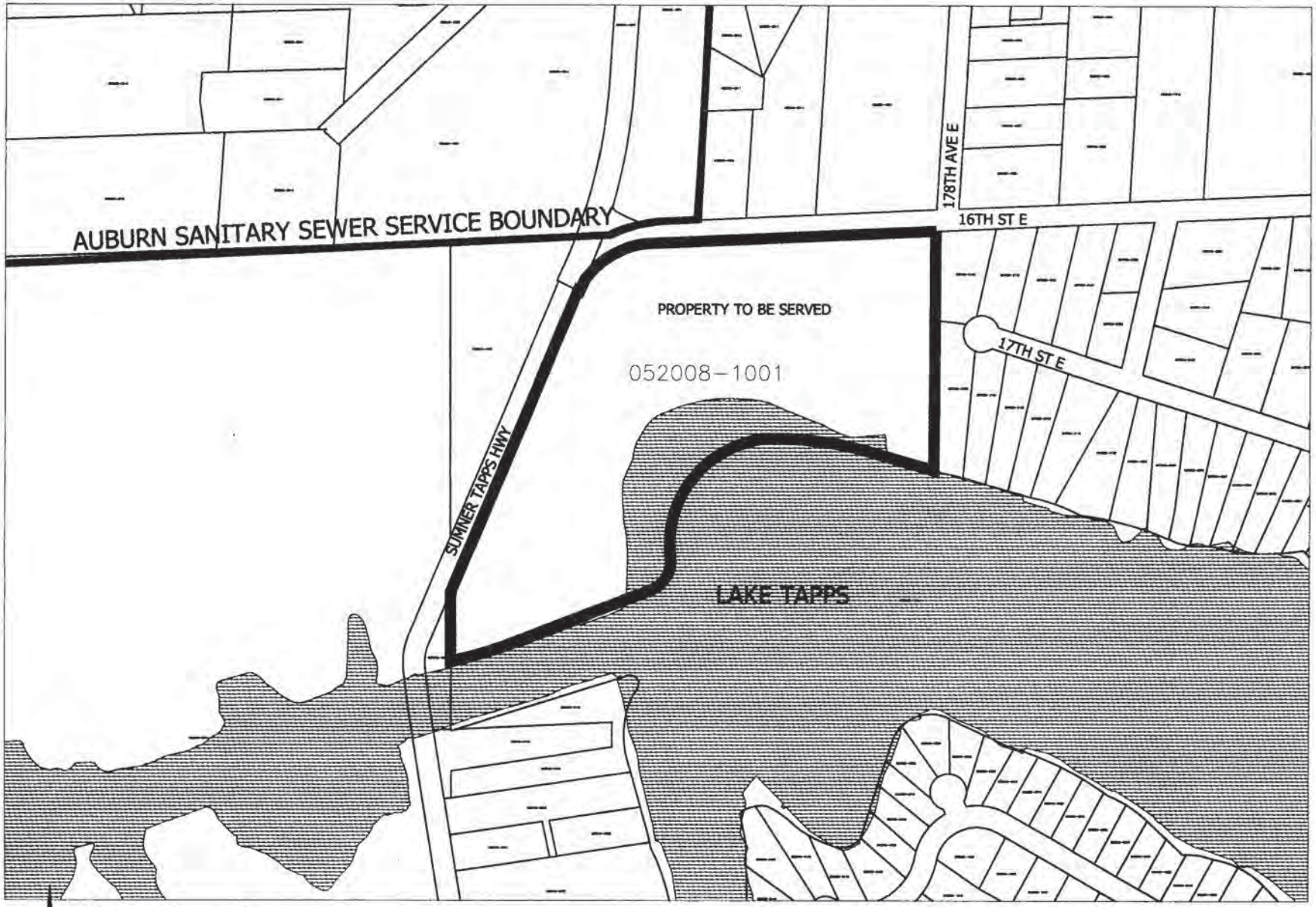


EXHIBIT A
BONNEY LAKE - AUBURN
SANITARY SEWER SERVICE AGREEMENT
FAIRWEATHER COVE

PLOTTED: MARCH 2005

ATTACHMENT "A"
Page 2 of 2

Exhibit 1
Resolution No. 3796
Page 9 of 9

Pierce County Recording
200511100194

RESOLUTION NO. 3873

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, AUTHORIZING THE MAYOR TO EXECUTE AN INTERLOCAL AGREEMENT WITH THE CITY OF BONNEY LAKE FOR THE ESTABLISHMENT OF A RIGHT OF WAY USE PERMIT WITH PIERCE COUNTY

WHEREAS, both Auburn and Bonney Lake are agencies qualified to engage in furnishing sanitary sewer service within their approved service areas; and

WHEREAS, the residential development of "Fairweather Cove" is located within an unincorporated area of Pierce County designated to be serviced with sanitary sewer service from Bonney Lake at approximately 16th Street East and Sumner Tapps Highway,

WHEREAS, Bonney Lake lacks a franchise to operate, maintain, repair, and construct sewer mains and service lines, and appurtenances in, over, along, and under County roads and rights-of-way within the area of Pierce County, Washington in which Fairweather Cove is located; and

WHEREAS, Bonney Lake is in the process of completing an update to its Comprehensive Sewer Plan and intends to thereafter apply for, and receive, a franchise with Pierce County to enable it to provide sewer service to that area of Pierce County in which Fairweather Cove is located; and

WHEREAS, Auburn maintains a franchise agreement with Pierce County, dated July 8, 1996, and expiring on July 8, 2021, covering the area of Pierce County in which Fairweather Cove is located; and

WHEREAS, while service through Auburn's sewer system is available, sewer service to Fairweather Cove is more feasible through Bonney Lake's sewer system; and

WHEREAS, Bonney Lake received a request for sewer service to Fairweather Cove from Harbour Homes, the owner thereof, hereinafter referred to as "Developer", in August 2001; and

WHEREAS, Bonney Lake and Auburn are pursuing a separate agreement between them that would allow for Bonney Lake to convey wastewater from a portion of Bonney Lake's service area into Auburn's wastewater conveyance system for treatment and disposal in an effort to provide for the most efficient sewer service to future customers at a reasonable cost; and

WHEREAS, both Bonney Lake and Auburn agree that Fairweather Cove is best served by Bonney Lake under an interlocal agreement with Auburn; and

WHEREAS, Bonney Lake entered into a Developer Public Facility Extension Agreement ("Extension Agreement"), with the Developer under which the Developer is required to construct necessary public improvements to serve Fairweather Cove; and

WHEREAS, Auburn is willing to accept interim ownership and to assume interim responsibility for operation and maintenance of the Developer's public sewer improvements, subject to the terms, limitations, and conditions of this Agreement; and

WHEREAS, Bonney Lake is willing to accept transfer of ownership and responsibility for operation and maintenance of the Developer's public

sewer improvements upon obtaining a sanitary sewer franchise from Pierce County to serve the area in which Fairweather Cove is located.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF AUBURN, WASHINGTON, HEREBY RESOLVES as follows:

Section 1. The Mayor is hereby authorized to execute an interlocal agreement with the City of Bonney Lake, in substantial conformity with the agreement attached hereto, marked as Exhibit 1 and incorporated herein by this reference.

Section 2. That the Mayor is authorized to implement such other administrative procedures as may be necessary to carry out the directives of this legislation.

Section 3. That this resolution shall take effect and be in full force upon passage and signatures hereon.

DATED and signed this 18th day of July, 2005.

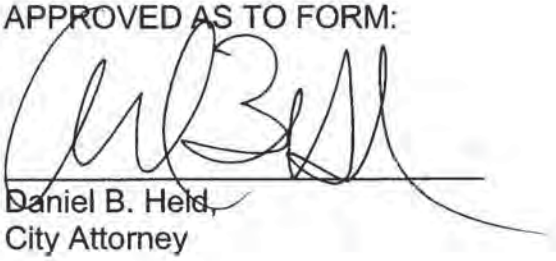
CITY OF AUBURN

PETER B. LEWIS
MAYOR

ATTEST:

Danielle E. Daskam,
City Clerk

APPROVED AS TO FORM:



Daniel B. Held,
City Attorney

EXHIBIT 1

AUBURN – BONNEY LAKE INTERLOCAL AGREEMENT For Pierce County Right of Way Permit

(Fairweather Cove)

This Agreement entered into by and between the City of Bonney Lake, a municipal corporation of the State of Washington (hereinafter "Bonney Lake"), and the City of Auburn, a municipal corporation of the State of Washington (hereinafter "Auburn").

WHEREAS, both Auburn and Bonney Lake are agencies qualified to engage in furnishing sanitary sewer service within their approved service areas; and

WHEREAS, the residential development of "Fairweather Cove" is located within an unincorporated area of Pierce County designated to be serviced with sanitary sewer service from Bonney Lake at approximately 16th Street East and Sumner Tapps Hwy.,

WHEREAS, Bonney Lake lacks a franchise to operate, maintain, repair, and construct sewer mains and service lines, and appurtenances in, over, along, and under County roads and rights-of-way within the area of Pierce County, Washington in which Fairweather Cove is located; and

WHEREAS, Bonney Lake is in the process of completing an update to its Comprehensive Sewer Plan and intends to thereafter apply for, and receive, a franchise with Pierce County to enable it to provide sewer service to that area of Pierce County in which Fairweather Cove is located; and

WHEREAS, Auburn maintains a franchise agreement with Pierce County, dated July 8, 1996, and expiring on July 8, 2021, covering the area of Pierce County in which Fairweather Cove is located; and

WHEREAS, while service through Auburn's sewer system is available, sewer service to Fairweather Cove is more feasible through Bonney Lake's sewer system; and

WHEREAS, Bonney Lake received a request for sewer service to Fairweather Cove from Harbour Homes, the owner thereof, hereinafter referred to as "Developer", in August 2001; and

WHEREAS, Bonney Lake and Auburn are pursuing a separate agreement between them that would allow for Bonney Lake to convey wastewater from a portion of Bonney Lake's service area into Auburn's wastewater conveyance system for treatment and disposal in an effort to provide for the most efficient sewer service to future customers at a reasonable cost; and

WHEREAS, both Bonney Lake and Auburn agree that Fairweather Cove is best served by Bonney Lake under an interlocal agreement with Auburn; and

WHEREAS, Bonney Lake entered into a Developer Public Facility Extension Agreement ("Extension Agreement"), with the Developer under which the Developer is required to construct necessary public improvements to serve Fairweather Cove; and

WHEREAS, Auburn is willing to accept interim ownership and to assume interim responsibility for operation and maintenance of the Developer's public sewer improvements, subject to the terms, limitations, and conditions of this Agreement; and

WHEREAS, Bonney Lake, shall accept transfer of ownership and responsibility for operation and maintenance of the Developer's public sewer improvements upon obtaining a sanitary sewer franchise from Pierce County to serve the area in which Fairweather Cove is located.

NOW, THEREFORE BE IT AGREED AS FOLLOWS:

1. Consistent with the terms of this Agreement and Auburn's sewer franchise agreement with Pierce County, Auburn shall own, operate, and maintain, for the period of time described herein, public sewer improvements for Fairweather Cove, constructed pursuant to the Extension Agreement between Bonney Lake and Developer, to the point of connection of said improvements with Auburn's existing gravity sewer located along the Sumner Lake Tapps Hwy. Auburn shall receive wastewater from Fairweather Cove through these improvements, and shall provide sewer service from this point through Auburn's conveyance system to King County's conveyance system for ultimate disposal at the King County sewer treatment plant located in Renton, Washington.

2. Bonney Lake shall administer all aspects of the Extension Agreement, including the construction of the sewer improvements required to serve Fairweather Cove to Bonney Lake standards. Auburn shall have the right to inspect and approve plans for and construction of the public sewer improvements required to serve Fairweather Cove as necessary to comply with Auburn's sewer franchise with Pierce County. Upon request from Bonney Lake, Auburn shall

apply for the R-O-W permit required from Pierce County for construction of the Developer's public sewer improvements in Pierce County right-of-way.

3. Auburn and Bonney Lake shall work in good faith to review all project plans, and to inspect all project construction, in a timely manner, and, where and when appropriate, to modify Bonney Lake's standards to facilitate compliance with the terms and conditions of Auburn's sewer franchise with Pierce County. Bonney Lake agrees that it shall be responsible to comply with any requirements that may be generated if this Agreement is submitted to the Pierce County Boundary Review Board for approval.

4. Upon Developer's completion of construction of sewer improvements and satisfaction of all terms and conditions of the Extension Agreement Bonney Lake shall transfer temporary ownership to Auburn, for all public sewer improvements in Pierce County required to serve Fairweather Cove.

5. Following satisfactory completion of the sewer improvements, property owners within Fairweather Cove may apply for connection to the sewer system as single-family residential customers of the Bonney Lake Sewer Utility. Connection charges, monthly rates and other charges shall be collected as defined by the Auburn - Bonney Lake Interlocal Agreement for the Establishment of Sanitary Sewer Service Boundaries attached hereto and incorporated herein by this reference as Attachment B (Auburn Resolution No. 3796).

6. In consideration of the receipt of the charges referenced in paragraph 5 above, Bonney Lake agrees to provide the operation, repair and maintenance, both ordinary and extraordinary, of the Auburn-owned public sewer improvements for Fairweather Cove, as referenced in paragraph 4 of this Agreement. If any such operation and maintenance triggers any of the provisions of Auburn's sewer franchise with Pierce County, Bonney Lake shall promptly notify Auburn. Bonney Lake shall abide by any such provisions at the sole discretion of Auburn and at the sole cost of Bonney Lake.

7. Upon Bonney Lake's written notice to Auburn that it has secured a sewer franchise with Pierce County for the area of Pierce County in which the Fairweather Cove development is located, a copy of which franchise shall be provided with the written notice to Auburn, Auburn shall, by bill of sale, immediately thereafter transfer ownership of the facilities temporarily owned by Auburn pursuant to this Agreement, to Bonney Lake.

8. Bonney Lake agrees to reimburse Auburn for all expenses incurred by Auburn, including the cost of time spent by Auburn employees calculated at labor rates used to establish Auburn's fees and charges, in connection with this Agreement and the provision of service to Bonney Lake's customers pursuant to the provisions herein. Auburn agrees to submit to Bonney Lake, no less than

annually, a statement of charges due and Bonney Lake shall pay the same within 45 days of the billing date. The parties agree to work cooperatively to resolve any dispute that may arise with respect to any such billing.

9. This Agreement may be terminated or modified, but only as agreed to in writing by both the parties.

10. Bonney Lake and Auburn agree to indemnify, defend and hold each other harmless from and against any loss, cost, damage, or expense of any kind arising out of injury to person or damage to property in any manner caused by the parties' own negligent conduct in the performance of this interlocal agreement.

11. This Agreement constitutes the only agreement between the parties concerning sewer service to the Fairweather Cove Development and nothing herein shall be construed to alter the rights, responsibilities, liabilities, or obligations of either Bonney Lake or Auburn regarding the provision of sewer service within their respective service areas except as specifically set forth herein.

CITY OF AUBURN

Approved by Resolution No. 3873 of the City of Auburn, Washington, at its regular meeting held on the 18th day of July, 2005.

By:

Peter B. Lewis, Mayor
City of Auburn

Attest:

Danielle Daskam, City Clerk

Approved as to form:

Daniel B. Heid, City Attorney

CITY OF BONNEY LAKE
Approved by Resolution No. 1471 of the City of Bonney Lake, Washington, at its regular meeting held on the 9th day of August 2005.

By: _____

Bob Young, Mayor
City of Bonney Lake

Attest:

_____

Woody Edvalson, City Clerk

Approved as to form:

_____

James Dionne, City Attorney

ATTACHMENT "B"

INTERLOCAL AGREEMENT
between
CITY OF AUBURN and CITY OF BONNEY LAKE
for the
THE ESTABLISHMENT OF SANITARY SEWER SERVICE BOUNDARIES

(Fairweather Cove)

THIS AGREEMENT, made and entered into by and between the **CITY OF AUBURN**, a Washington municipal corporation (hereinafter referred to as "Auburn"), and the **CITY OF BONNEY LAKE**, a Washington municipal corporation, (hereinafter referred to as "Bonney Lake"), both being duly organized and existing under and by virtue of the laws of the State of Washington,

WITNESSETH:

WHEREAS, pursuant to RCW 35A.11.040 Bonney Lake and Auburn have the legal authority to exercise their powers and perform any of their functions as set forth in RCW 39.34; and

WHEREAS, pursuant to RCW 39.34, the Interlocal Cooperation Act, Bonney Lake and Auburn have the legal authority to cooperate with other localities on the basis of mutual advantage and provision of services; and

WHEREAS, pursuant to RCW 35A.21.150 Bonney Lake and Auburn have the legal authority to maintain a sewerage system; and

WHEREAS, the parties recognize the responsibility of public sanitary sewer utilities to provide efficient and reliable service to their customers at reasonable cost; and

WHEREAS, portions of the Auburn sanitary sewer system have been sized and are situated so as to be capable of affording sewer service to a portion of the Bonney Lake Sanitary Sewer Service Area; and

WHEREAS, Bonney Lake has evaluated and determined it is in Bonney Lake's best interest to establish this Agreement allowing property located within Bonney Lake's sewer service area and designated within Pierce County's Urban Growth Area (CUGA), to connect into Auburn's public sanitary sewer facilities; and

WHEREAS, Auburn recognizes the negative impacts septic tanks can have on water quality and the quality of life within and around Lake Tapps; and

ATTACHMENT "B"

WHEREAS, Auburn has sufficient wastewater conveyance capacity within their sanitary sewer facilities to support these adjustments to the existing sewer service areas; and

WHEREAS, Auburn's delivery of sewer service to these areas will provide the maximum efficiency in the use of existing and future facilities, together with orderly and efficient sanitary sewer planning.

NOW, THEREFORE:

IT IS HEREBY AGREED by and between the parties hereto as follows:

1. **Sewer Service Area.** The parties have agreed that Auburn will provide sanitary sewer service to Bonney Lake for a portion of Bonney Lake's sanitary sewer service area as graphically depicted on the map and legally described as Attachment "A", attached hereto, which is by this reference incorporated herein. Attachment "A" represents Bonney Lake's sewer service area that Bonney Lake has negotiated with Auburn for wastewater conveyance and treatment via Auburn and King County facilities. The actual sewer service provider to the area depicted within Attachment "A" shall remain Bonney Lake. Both parties further agree that Auburn and Bonney Lake shall be subject to the terms and conditions of this Agreement.

2. **Management, Regulation and Control of Sewer System.** Auburn shall have the sole responsibility and authority to construct, maintain, manage, conduct and operate its sewerage system as installed within Auburn's sanitary sewer service area. Auburn shall be responsible for obtaining and maintaining a franchise from Pierce County for Auburn facilities located in Pierce County right of way.

Bonney Lake shall have the sole responsibility and authority for those facilities that extend outside of the public right of way within the region depicted within Attachment "A". Bonney Lake shall be responsible for obtaining and maintaining a franchise from Pierce County for Bonney Lake facilities located in Pierce County right of way. Bonney Lake shall be responsible for the issuance of side sewer permits and the inspection of facilities located upon private property. Certificates of sewer availability shall be issued from Auburn to Bonney Lake. Bonney Lake shall be responsible for ensuring the conditions of these certificates are met.

3. **Rates, Charges, Permits, and Billing Responsibilities.** Auburn rates and connection charges (system development charges) shall be billed from Auburn to Bonney Lake in accordance with existing Auburn City Code at the time of service. Bonney Lake shall provide Auburn with the appropriate information so that accurate billings can be established. Auburn and King County shall have the authority to visit sites, upon threat of termination of service, to verify information provided by the

ATTACHMENT "B"

property owner and/or Bonney Lake is accurate. King County's capacity charge shall be billed to the property seeking service directly from King County. Bonney Lake may elect to pay the King County capacity charge directly to King County and collect the costs with the price of the Bonney Lake permit. Auburn shall issue permits to Bonney Lake prior to Bonney Lake's issuing of permits to the property owners. Neither Auburn nor this agreement governs Bonney Lake's rates and fees to be charged to the property owner for the appropriate Bonney Lake side sewer permit.

For Commercial establishments, no additional connections or modification to existing facilities shall be made that would alter the number of plumbing fixtures in the facilities that convey wastewater to Auburn, unless the property owner first pays the associated fees and submits the proper information to obtain a Bonney Lake sanitary sewer permit. Bonney Lake shall in turn seek an Auburn side sewer permit.

Sanitary sewer permits shall be subject to inspection and approval by Bonney Lake. Bonney Lake shall ensure that compliance with Auburn's Sanitary Sewer Standards, as adopted at the time the connection, is made. With this agreement Bonney Lake is providing Auburn with the right to manually read Bonney Lake's water meters for the properties described in Attachment "A"; however, if requested by Auburn, Bonney Lake shall provide water usage information.

The rates and fees charged to Auburn's sanitary sewer customers shall be fixed, altered, regulated and controlled by Auburn pursuant to all applicable laws and regulations promulgated on the subject of rates and charges for sewer service. No surcharge shall be charged to the customers served under this agreement on the sole basis that those customers are outside of Auburn's city limits.

Auburn shall send bills for sanitary sewer service from said property to Bonney Lake's Finance department once every two months.

4. Boundary Review Board. In the event that implementation of the terms hereof results in permanent sewer service to areas that will be outside the respective service boundaries of Auburn or Bonney Lake, the parties will at the time of such service jointly seek approval of the Pierce County Boundary Review Board in accordance with R.C.W. 36.93.090.

5. Comprehensive Sewer Planning. The terms of this Agreement will be included as an element of Bonney Lake and Auburn's Comprehensive Sewerage Plans.

6. Reliance. Each party hereto acknowledges that the other will rely upon the terms of this agreement in its comprehensive planning to meet the needs of the service area designated herein.

ATTACHMENT "B"

7. **Indemnification**. Auburn agrees to indemnify and hold Bonney Lake and its agents, employees, and/or officers, harmless from and shall process and defend at its own expense any and all claims, demands, suits, at law or equity, actions, penalties, loses, damages or costs, of whatsoever kind or nature, brought against Bonney Lake arising out of, in connection with, or incident to the execution of this agreement and/or Auburn's performance or failure to perform any aspect of this Agreement; provided, however, that if such claims are caused by or result from the concurrent negligence of Bonney Lake, its agents, employees, and/or officers, this indemnity provision shall be valid and enforceable only to the extent of the negligence of Auburn; and provided further, that nothing herein shall require Auburn to hold harmless or defend Bonney Lake, its agents, employees, and/or officers, from any claims arising from the sole negligence of Bonney Lake, its agents, employees, and/or officers. No liability shall attach to Bonney Lake by reason of entering this agreement except as expressly provided herein.

Bonney Lake agrees to indemnify and hold Auburn and its agents, employees, and/or officers, harmless from and shall process and defend at its own expense any and all claims, demands, suits, at law or equity, actions, penalties, loses, damages or costs, of whatsoever kind or nature, brought against Auburn arising out of, in connection with, or incident to the execution of this agreement and/or Bonney Lake's performance or failure to perform any aspect of this Agreement; provided, however, that if such claims are caused by or result from the concurrent negligence of Auburn, its agents, employees, and/or officers, this indemnity provision shall be valid and enforceable only to the extent of the negligence of Bonney Lake; and provided further, that nothing herein shall require Bonney Lake to hold harmless or defend Auburn, its agents, employees, and/or officers, from any claims arising from the sole negligence of Auburn, its agents, employees, and/or officers. No liability shall attach to Auburn by reason of entering this agreement except as expressly provided herein.

8. **Assignment.** The parties shall not assign this agreement or any interest, obligation or duty therein without the express written consent of the other party.

9. **Attorney's Fees.** If either party shall be required to bring any action to enforce any provision of this Agreement, or shall be required to defend any action brought by the other party with respect to this Agreement, and in the further event that one party shall substantially prevail in such action, the losing party shall, in addition to all other payments required therein, pay all of the prevailing party's reasonable costs in connection with such action, including such sums as the court or courts may adjudge reasonable as attorney's fees in trial court and in appellate courts.

ATTACHMENT "B"

10. Government Approvals. The parties will give notice of the adoption of this Agreement to King County's Department of Natural Resources – Wastewater Treatment Division, to the Pierce County Department of Health, and to any other agency with jurisdiction or mission relevant to the terms hereof, and shall cooperate and assist in all reasonable manner in procuring any necessary approvals hereof by those agencies.

11. Service Amendments. Any changes to the service areas described herein shall be by mutual agreement. Each party may give permission to the other on a case-by-case basis to provide service by one party into the other party's adjacent or nearby service area based upon considerations of economic efficiency for providing the service with mutual consent of Bonney Lake's Director of Public Works and Auburn's Director of Public Works.

12. Notices. All notices between the two agencies hereunder may be delivered or mailed. If mailed, they shall be sent to the following respective addresses:

City of Auburn
Director of Public Works
25 West Main Street
Auburn, WA 98001

253-931-3010

City of Bonney Lake
Director of Public Works
PO Box 7380
19306 Bonney Lake Blvd
Bonney Lake, WA 98390
253-862-8602

or to such other representative as either party may hereafter from time to time designate in writing. All notices and payments mailed by regular post (including first class) shall be deemed to have been given on the second business day following the date of mailing, if properly mailed and addressed. Notices and payments sent by certified or registered mail shall be deemed to have been given on the day next following the date of mailing, if properly mailed and addressed. For all types of mail, the postmark affixed by the United States Postal Service shall be conclusive evidence of the date of mailing.

13. Alteration, Amendment or Modification. Auburn and Bonney Lake hereby reserve the right to alter, amend or modify the terms and conditions of this Agreement upon written agreement of both parties to such alteration, amendment or modification. Such written consent(s) shall be filed with this agreement for future reference.

14. Sanctity of Agreement. This agreement constitutes the entire agreement of the parties regarding the subject matter hereof, and there are no other representations or oral agreements other than those listed herein, which vary the

terms of this agreement. Future agreements may occur between the parties to transfer additional or future service areas by mutual agreement.

15. Obligation Intact. Nothing herein shall be construed to alter the rights, responsibilities, liabilities, or obligations of either Auburn or Bonney Lake regarding provision of sewer service, except as specifically set forth herein.

16. Miscellaneous.

A. The captions in this agreement are for convenience only and do not in any way limit or amplify the provisions of this agreement.

B. This agreement is established in perpetuity. Modifications can be established upon written agreement between both parties.

C. The purpose of this agreement is to clarify Auburn's and Bonney Lake's sanitary sewer responsibilities for providing service and maintaining public sewer facilities.

D. If any term, provision, condition or portion of this Agreement is held to be invalid, or unenforceable by a final decision of any court having jurisdiction on the matter, the remaining of this Agreement or the application of such term or provision to persons or circumstances other then those as to which it is held invalid or unenforceable shall not be affected thereby and shall continue in full force and effect, unless such court determines that invalidity or unenforceability materially interferes with or defeats the purposes hereof, at which time Bonney Lake or Auburn shall have the right to terminate the Agreement.

E. No modifications or amendments of this agreement shall be valid or effective unless evidenced by an agreement in writing signed by both parties.

IN WITNESS WHEREOF the parties hereto have executed this agreement as of the day and year first above written.

ATTACHMENT "B"

CITY OF BONNEY LAKE
Approved by Resolution No. _____ of the City of Bonney Lake, Washington, at its regular meeting held on the _____ day of _____, 2005.

By:

_____
ROBERT YOUNG,
Mayor, City of Bonney Lake

Attest:

_____
HARWOOD T. EDVALSON
City Clerk, City of Bonney Lake

Approved as to form:

_____
JAMES DIONNE,
City Attorney, City of Bonney Lake

CITY OF AUBURN
Approved by Resolution No. **3796**, of the City of Auburn, Washington, at its regular meeting held on the _____ day of _____, 2005.

By:

_____
PETER B. LEWIS,
Mayor, City of Auburn

Attest:

_____
DANIELLE DASKAM,
City Clerk, City of Auburn

Approved as to form:

_____
DANIEL B. HEID,
City Attorney, City of Auburn

ATTACHMENT "B"

ATTACHMENT "A"

Legal Description

THAT PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER AND THAT PORTION OF THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 8, TOWNSHIP 20 NORTH, RANGE 5 EAST, LYING EASTERLY OF SUMNER TAPPS HIGHWAY, SOUTHERLY OF NORTH TAPPS ROAD (16^{TH} STREET EAST (FOREST CANYON ROAD)); EASTERLY OF THE PLAT OF LAKE TAPPS TACOMA POINT ADDITION, ACCORDING TO PLAT RECORDED IN BOOK 17 OF PLATS AT PAGES 1 TO 8, INCLUSIVE, AND NORTHERLY OF THE INTAKE CANAL TO LAKE TAPPS, IN PIERCE COUNTY, WASHINGTON. EXCEPT THAT PORTION LYING WITHIN LAKE TAPPS.

AREA DESCRIBED IS APPROXIMATELY $\pm$ 16.7 ACRES.
PARCEL NUMBER 0520081001

SE QUARTER OF SECTION 8, TOWNSHIP 20 N, RANGE 5 E

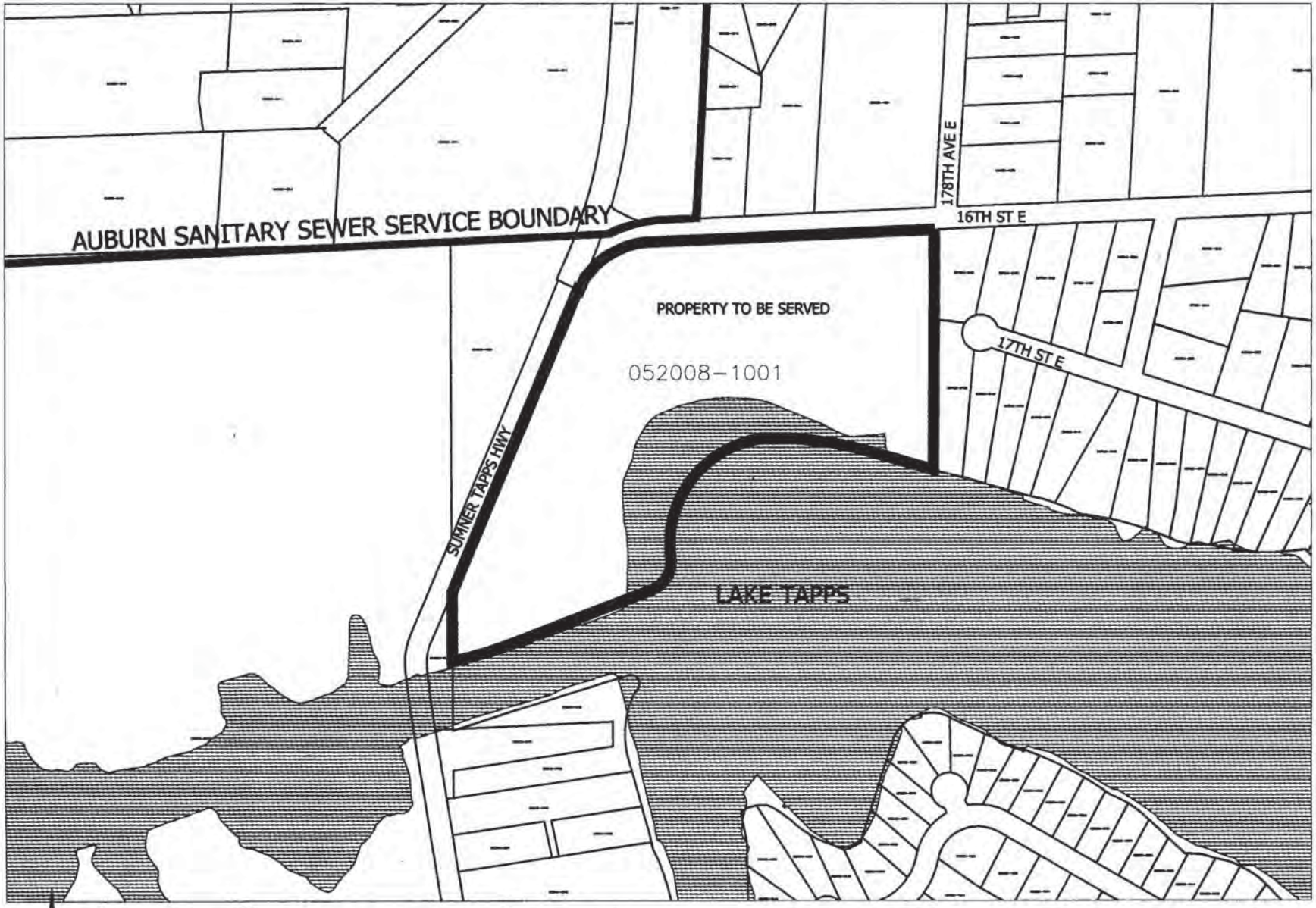


EXHIBIT A
BONNEY LAKE - AUBURN
SANITARY SEWER SERVICE AGREEMENT
FAIRWEATHER COVE

PLOTTED: MARCH 2005

ATTACHMENT "A"
Page 2 of 2

RESOLUTION NO. 1471

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF BONNEY LAKE, PIERCE COUNTY, WASHINGTON, AUTHORIZING AN INTERLOCAL AGREEMENT BETWEEN CITY OF AUBURN AND CITY OF BONNEY LAKE PIERCE COUNTY RIGHT OF WAY PERMIT FOR SEWER SERVICE TO FAIRWEATHER COVE.

The City Council of the City of Bonney Lake, Washington, does hereby resolve that the Mayor is authorized to sign the contract attached hereto and incorporated herein by this reference.

PASSED by the City Council this 9th day of August 2005.

Robert Young, Mayor

ATTEST:

Harwood T. Edvalson, City Clerk

APPROVED AS TO FORM:

James Dionne, City Attorney

APPENDIX B

AGENCY COMMENT LETTERS AND RESPONSES

Robert Elwell

From: Cardwell, Daniel <dcardwell@kingcounty.gov>
Sent: Thursday, July 18, 2024 12:05 PM
To: Robert Elwell
Cc: Wilson, Sean (ECY)
Subject: City of Auburn - 2024 Comprehensive Sewer System Plan Re: King County UTRC Comment Ltr
Attachments: Final King County UTRC Comment Ltr_20240718.pdf

CAUTION: The following message originated from outside the City of Auburn. Be careful opening links and attachments

Good aftrnoon Robert,
The King County UTRC met on July 17 to review the draft 2024 Comprehensive Sewer System Plan for the City of Auburn. I have attached the comment letter approved by the UTRC. Please note that the letter includes a comment that was not in my draft list that we reviewed. The additional comment asks for the urban growth area boundary been shown on two of the figures.

Please let me know if you have any questions.

I look forward to receiving the final plan.

Regards,
Dan

Dan Cardwell
Principal Planner | Utilities Technical Review Committee | School Technical Review Committee
King County Dept. of Local Services
dcardwell@kingcounty.gov

King County
Utilities Technical Review Committee
Department of Local Services
201 S Jackson Street
KSC-LS-0815
Seattle, WA 98104
www.kingcounty.gov

City of Auburn, 2024 Comprehensive Sewer Plan (DRAFT), June 2024

The City of Auburn ("City") submitted a draft 2024 Comprehensive Sewer Plan ("Plan") for review by the King County Utilities Technical Review Committee (UTRC) on June 17, 2024.

Staff has reviewed the Plan for local statutory requirements and impacts on service to residents in the unincorporated county.

On July 17, 2024, the UTRC held a meeting to review the Plan and provide comments to the applicant. The UTRC has the following comments, and requested changes and clarifications:

General Comments

1) Prior to the UTRC acting on a recommendation, a signed checklist and the issued threshold determination must be provided.
2) The City Council must adopt the Plan prior to sending it to King County County for final review and approval.
3) King County Code (13.24.010 H. Water and sewer system comprehensive plans) requires wastewater system plans to identify and describe areas of concern with respect to corrosion and odor control and steps being taken to reduce their occurrence. It does not appear that the Plan addresses odor or corrosion. Please include additional text in the plan document to address odor and corrosion concerns and steps the City plans to take.
4) King County Code (13.24.010 H. Water and sewer system comprehensive plans) requires wastewater system plans to compare amounts of inflow and infiltration (I/I) to the system with King County's 1,100 gallons-per-acre-per-day-standard, and steps being taken to reduce the inflow and infiltration. While the Plan does identify existing and projected I/I and indicates annual projects will be constructed to address needs, the Plan does not compare these with the County's standard. Please include text in the Plan that provides this comparison.
5) The Plan recognizes some existing development within the City's sanitary sewer service area is served by on-site septic systems. How many existing on-site septic systems currently exist within the City's sewer service area? If all these on-site septic systems connected to the City's sewer system, would the system require significant improvements to accommodate the additional wastewater flow?
6) Various figures. The City's Sewer Service Area (SSA) is masked by the City's municipal boundaries on various figures/maps. Can this boundary be shown differently to allow the SSA boundary to be seen more clearly? On various maps there appears to be a fourth area shown as unincorporated King County within the City's SSA which may be an error. This area

includes Parcel Nos. 1721059045, 1721059248, 1721059249, 1721059250. These parcels are owned by the City and shown as within the City's municipal boundaries on King County i-Map.

7) The Plan references and the appendix includes 7 interlocal agreements with neighboring wastewater purveyors agreeing to changes to sewer service areas. It would be beneficial if the Plan included a figure that illustrated these sewer service boundary changes.

Specific Comments/Questions

8) Page 1-7, Figure 1.2 Study Area, and page 3-3, Figure 3.1 City of Auburn Land Use Designations. Please add symbology that identifies the boundary of the urban growth area.

9) Page 2-3, Section 2.3.2 System Planning. Policy 2.5 states, "The Sanitary Sewer Utility does not intend and will not Plan to extend sanitary sewer service to or through King or Pierce County rural zoned property. Exceptions will only be considered for reasons of health, safety, or service to a school in accordance with King or Pierce County policies." Please recognize that the City of Auburn does not have the authority to connect rural zoned to its sewer system without the approval of King County. Please clarify this in the Plan.

10) Page 2-3, Section 2.3.2 System Planning. Policy 2.6 states, "Allow development where sewer is not readily available to be served by individual onsite (septic) systems, if the individual lots are suitable for onsite systems, per the requirements and approval of King County..." For unincorporated urban King County areas within the City's sewer service area, King County Code 13.24.136 only allows on-site septic systems to be permitted for single detached residences, and short sub-divisions on an interim basis it if meets specific criteria. All other development is required to be connected. Please provide clarification for unincorporated King County areas in the Plan.

11) Page 2-3, Section 2.3.2 System Planning. It does not appear that the City has any policy that would encourage or require existing development utilizing an on-site septic system to connect to the City's sewer system. Please provide or clarify the City's policy for existing development connecting to the City's sewer system. Does the City have a proactive strategy to connect existing development to its sewer system? On page 1-4 under the King County Policy reference, text points to Chapter 5 which discusses projects that would serve currently unserved areas; however, it does not appear that there is a strategy to encourage existing development to connect to the new segments of the sewer system. Please clarify in the Plan.

12) Page 3-2, Section 3.3 Land Use. The text describes and Figure 3.1 illustrates the location of designated land uses within the City of Auburn. This section does not include any land use information addressing areas outside of the City's municipal boundary, and within its sewer service area. Please include. It would also be informational to include the total area within the City's service area and percent within unincorporated King County and other neighboring municipalities.

13) Page 4-2, Section 4.1.3 Lea Hill Sewer Basin. The text states that there is a significant unsewered area in the north portion of this sewer basin. Is this area unsewered because it is primarily undeveloped, or is there development that is currently serviced by on-site septic systems? Please clarify in the Plan.

14) Page 4-2, Section 4.1.5 South Hill Sewer Basin. The text states, "The eastern half...of the sewer basin is currently developed as a low-density rural area and is unsewered." The reference to this area as being a rural area is misleading as it is within the designated urban growth area. It would be more appropriate to refer to the area as being a low-density residential area. Please clarify in the Plan.

15) Page 4-13 Section 4.6 Water Reclamation and Reuse. The text mentions the King County Water Reclamation Evaluation Checklist was completed as part of the City's water system plan. Please provide this checklist as an appendix to this Plan. While the Plan identifies potential reclaimed water sources and notes the City will need to determine if it would be feasible source, it would be beneficial if the Plan discussed the type of capital projects that would need to be constructed to obtain reclaimed water from these sources.

16) Page 5-5, Section 5.3.2 Future Conditions Wet Weather Flow Assumptions. The text states, "Figure 5.4 identifies the portion of the collection system that is currently developed with available sewer in yellow,..."; however, the legend for this figure indicates that yellow represents "Developed with Sewer." These two phrases are not same. Please correct as appropriate.

17) Page 5-5, Section 5.3.2 Future conditions Wet Weather Flow Assumptions. The text states that, "It was assumed that all developable parcels would be developed and connected for the 2044 scenario..." Does this assumption include the connection of existing development that is currently served by on-site septic systems? If yes, how many additional connections would be attributed to these types of properties?

18) Page 5-5, Section 5.3.2 Future conditions Wet Weather Flow Assumptions. The text states that, "It was assumed that the I/I of future sewered areas would be 1,500 gallons per acre per day..." What is the basis for this assumption?

19) Page 5-7, Figure 5.4, Future Contributing Areas. The legend for this figure is misleading. Many of the areas identified as "Developable" are already developed utilizing on-site septic systems. Would it be more appropriate to identify these areas as "Developable/Infill"? It would be beneficial to identify the number and location of existing on-site septic systems.

20) Page 5-10, Figure 5.6 Existing System Deficiencies, Page 5-11, Figure 5.7 2044 System Deficiencies, and Page 5-12 2044 Climate Change Design System Deficiencies. The legend on each of these figures shows that only the City's critical sewer system infrastructure was included in the system's model and analysis. Why wasn't the entire system modeled? Please include text in the Plan that describes the extent of the system that was modeled and limitations of the analysis relevant to the entire sewer system.

The King County UTRC thanks you for the opportunity to review and comment. Please contact me at (206)263-3733 or dcardwell@kingcounty.gov if you have any questions.

Dan Cardwell 7/18/24

Dan Cardwell, Chair of the King County Utility Technical Review Committee Date

Robert Elwell

From: Wilson, Sean (ECY) <sewi461@ECY.WA.GOV>
Sent: Friday, August 9, 2024 1:59 PM
To: Robert Elwell
Cc: Cardwell, Daniel
Subject: RE: City of Auburn Sewer Plan
Attachments: 2024 Auburn GSP Comments.xlsx

Bob,

Please find Ecology's comments on the draft Auburn GSP attached. If you have any questions or would like to discuss your planned responses/edits, feel free to give me a call or send me a meeting invite.

Kind regards,

Sean Wilson, P.E.
P: 425.577.4864

From: Robert Elwell <relwell@auburnwa.gov>
Sent: Monday, June 17, 2024 9:00 AM
To: Wilson, Sean (ECY) <sewi461@ECY.WA.GOV>
Subject: City of Auburn Sewer Plan

External Email

I'm using Mimecast to share large files with you. Please see the attached instructions.

Sean,

As we discussed a couple of weeks ago, Auburn is ready to submit our draft Sewer Plan for your review. This is the first time I've used our "Mimecast Large File Send," method of delivering a large file, so please let me know if you encounter any difficulties downloading it. We will be going through our SEPA process simultaneous with your review, so that documentation is not included yet. We are also submitting to the King County UTRC for their review.

Thank you and please let me know if you have any questions.

Bob Elwell
City of Auburn
Sewer Utility Engineer
25 West Main Street, Auburn WA 98001
253-931-4008

General Sewer Plan - Ecology Comment Sheet for City of Auburn

GSP Revision Date: June 1, 2024
GSP Contact: Robert Elwell

Reviewed By: Sean Wilson, P.E.
Review Date: 8/8/2024

Comment No.	Page #	Section	Comment	Ecology Reviewer	GSP Response	GSP Responder	Ecology Acceptance Comments
1	N/A	General	Per RCW 90.48.495 Water conservation measures to be considered in general sewer plans. “The Department of Ecology shall require sewer plans to include a discussion of water conservation measures considered or underway that would reduce flows to the sewerage system and an analysis of their anticipated impact on public sewer service and treatment capacity.” The GSP does not discuss water conservation. If the District has a water conservation program in a related Water System Plan, it merits mentioning in the GSP to help satisfy this requirement.	Wilson			
2	2	General	Please ensure that the final version includes a P.E. stamp and signature.	Wilson			
3	15	1.20	Although Chapter 1.2 references an Appendix D with a SEPA Determination of Non-Significance, that appendix does not appear to be included in the document. A completed SEPA checklist and DNS or EIA is required for Ecology approval.	Wilson			
4	18	1.3.5	Thank you for including the interlocal agreements with King County and other local sewer districts. In this section, please identify the capacity available to the District at the King County facilities for treatment and identify whether any agreements contain capacity constraints that may limit or otherwise constrain the District's ability to provide sewer service. If they exist, please summarize any relevant conditions for King County's acceptance of sewage flows (e.g. flow limits, I/I peaking factor limits, etc.). If no such conditions for acceptance exist in the agreements, please include a statement to that effect.	Wilson			
5	19	1.3.5	Per WAC 173-240-050(3)(f), please include all wastewater treatment facilities within 20 miles. This can be done on Figure 1.1 or any where else that you believe is appropriate.	Wilson			
6	20	Figure 1.2	In accordance with 173-240-050(3)(c), please provide a narrative description or figure showing the expected extent of the district's service area. It is implied that there is expected change but should be stated or shown explicitly.	Wilson			
7	20	Figure 1.2 and Section 1.4	There appears to be at least 5 parcels in the northeast portion of the District's service area which are also included in the adjacent City of Kent service area. It does not seem possible to have service provided by both entities. Please further explanation withing Section or revise the map to accurately reflect service areas.	Wilson			
8	27	2.3.3	WAC 173-240-104 extends to grinder pumps that serve a single residence. Policy 3.5 states that "the City will not install, own, or maintain (outside of emergencies) any part of a private non-gravity system". Please explain what policies, ordnances, or agreements the District has in place to ensure that these non-gravity systems are properly designed and that the District has access rights in the case of emergency to protect public health and water quality?	Wilson			

Comment No.	Page #	Section	Comment	Ecology Reviewer	GSP Response	GSP Responder	Ecology Acceptance Comments
9	27	2.3.3	Policy 3.7 appears to be in conflict with WAC 172-240-104. Please clarify how the District ensures that private systems are property designed and maintained. Are designs reviewed? Are private systems inspected by the District at some frequency? Does the District have rights to access and work on private systems in an emergency? Policy 5.9 appears to commit the District to providing emergency service but does not describe how access rights are granted in emergency cases.	Wilson			
10	41	4.20	Explain what is being done to protect the two wellheads that are within 100ft of an existing sewer line. Is there a plan to relocate those lines either proactively or during the next rehab of those lines?	Wilson			
11	50	4.50	Per WAC 173-240-050(3)(i), please include the quantity and periods of wastewater production for the industrial users presented in Table 4.2. Additionally, please provide additional information about expected future flows from industrial user expansion or including industries.	Wilson			
12	64-65	Figures 5.7 and 8	It is hard to tell from these two figures if the future/planned sewer lines were included in the forward looking models. Can you confirm that the expanded basins (at minimum their flow) was included within these model runs? If they were included, it would be helpful to include the fully built out lines on these two figures to make it clear that future expansion was included.	Wilson			
13	66	5.50	Although not highlighted in red in Table 5-4, the F Street and Ellingson Road lift stations appears to be quite close to its capacity in the 2044 scenario. Why was additional monitoring or planned expansion of these LS not included in the CIP?	Wilson			
14	75	5.8.4.1	Basin A10 also appears to have quite high I/I flow rates and peaking factor. Please explain why additional monitoring is not suggested for this basin.	Wilson			
15	85	6.40	The District is required to immediately report to Ecology all spills to the environment and back-ups of sewage into buildings. Please revise this section to include more information regarding reporting of spills/back-ups to Ecology's ERTS system.	Wilson			
16	93	7.2.2	It is difficult to determine if all areas of deficiency identified in Figure 5.6-8 have associated projects in the CIP. It is suggested that deficiencies identified are given unique IDs and that the deficiency IDs associated with each project in 7.2.2 are added to the project descriptions of 7.2.2. Another method, figure or table could also be used to help with this comparison but additional clarity is needed.	Wilson			

City of Auburn-Comprehensive Sewer Plan				25-Sep-24
Comment Responses				
DOE Comments				
Comment No.	Page #	Section	Comment	Response
1	N/A	General	Per RCW 90.48.495 Water conservation measures to be considered in general sewer plans. "The Department of Ecology shall require sewer plans to include a discussion of water conservation measures considered or underway that would reduce flows to the sewerage system and an analysis of their anticipated impact on public sewer service and treatment capacity." The GSP does not discuss water conservation. If the District has a water conservation program in a related Water System Plan, it merits mentioning in the GSP to help satisfy this requirement.	We added a section (Section 1.3.7) to Chapter 1 which reads: The City of Auburn's Sanitary Sewer Service Area largely overlaps with its Water Service Area, therefore, water conservation efforts undertaken by the City's Water Utility will, by far, be the most likely to affect sewage flows handled by the City's sewage collection system. The Water Utilities program is described in Section 4.3 of the 2024 Water System Plan. The primary effect of such measures on the sewer system would be to reduce the overall wastewater flow, while potentially increasing wastewater strength. Since the City's sewer hydraulic model calibration was based on actual measured flows, the effects of existing conservation measures have been accounted for. Further increased effectiveness of water conservation efforts could result in capacity improvement projects being eliminated or delayed if anticipated flow increases are not realized.
2	2	General	Please ensure that the final version includes a P.E. stamp and signature.	Our consultant, Edward Wicklein of Carollo Engineers, will stamp the plan on a stamp page that has been added as the 2nd page of document.
3	15	1.2	Although Chapter 1.2 references an Appendix D with a SEPA Determination of Non-Significance, that appendix does not appear to be included in the document. A completed SEPA checklist and DNS or EIA is required for Ecology approval.	The Checklist and DNS were added as Appendix D
4	18	1.3.5	Thank you for including the interlocal agreements with King County and other local sewer districts. In this section, please identify the capacity available to the District at the King County facilities for treatment and identify whether any agreements contain capacity constraints that may limit or otherwise constrain the District's ability to provide sewer service. If they exist, please summarize any relevant conditions for King County's acceptance of sewage flows (e.g. flow limits, I/I peaking factor limits, etc.). If no such conditions for acceptance exist in the agreements, please include a statement to that effect.	Added to Section 1.3.5 "Under the current agreement, the City is obligated to deliver all of the sewage and industrial wastes collected or received by the City, and Metro (King County) shall accept the sewage and industrial wastes delivered for treatment. There is currently no limit on the quantity of wastewater delivered by the City to Metro (King County)."
5	19	1.3.5	Per WAC 173-240-050(3)(f), please include all wastewater treatment facilities within 20 miles. This can be done on Figure 1.1 or any where else that you believe is appropriate.	Figure 1.1 has been updated to include the other Treatment Facilities.

DOE Comments

Comment No.	Page #	Section	Comment	Response
6	20	Figure 1.2	In accordance with 173-240-050(3)(c), please provide a narrative description or figure showing the expected extent of the district's service area. It is implied that there is expected change but should be stated or shown explicitly. Response to a request for clarification: I believe what I was referring to the last paragraph of 1.4.1 and the discussion of annexation in 1.4.2. The shaded colors for "Service Area Outside of City Limits" on Figure 1.2 is helpful but there does not appear to be any of those in areas in eastern Algona. If the boundaries of the City of Auburn service area are not expected to change, I suggest refining the labels in the legend of Figure 1.2 to make this clearer or including language in the 1.4 intro to state it more clearly. It might also be helpful to have a different shade for areas inside of Auburn's city limits that are served by adjacent sewer services (but this is not critical).	When the intelocal agreements between Auburn and neighboring agencies established the service area boundaries, those boundaries were primarily based on terrain and minimizing future required pumping, and those boundaries often traversed unsewered areas that were, at the time, part of unincorporated King County. As future extension of public sewer to those areas occurs, it may make sense for one agency to provide service to an area that was originally designated for the other, but it won't be clear until it actually happens. The interlocal agreements between our agencies include provisions for the respective Public Works Directors or General Managers to agree that the other agency may serve parcels that are in the their designated service areas for reasons of efficiency, etc. We have added labels to the map to reflect the locations of letters of agreement, where Auburn may serve several parcels, although, to this point, those developments or connections have not yet been made. When those systems are established and if it makes sense for them to be permanent, the two agencies will apply to the Boundary Review Board to permanently change the boundary. Our original map was potentially misleading as it showed some of these boiundaries as already being changed. We've removed those speculated boundaries and have simply pointed to areas where they may change in the future. We hesitate to draw specific speculative boundaries at this point, as any adjustments would be small and very dependent on the timing of large developments, land use changes, etc. Regarding Algona, there are two agreement between us. The first one was to allow some businesses within Auburn along West Valley Highway to connect to Algona's system. Subsequent development and sewer extensions made it feasible for those developments connected to Algona to, at some point int he future, disconnect from them and connect to Auburn. Also, some subdivision and boundary adjustments in those areas rendered the service responsibilities a bit muddled. Finally, there are several parcels along the northern border of Algona that are currently connected to Auburn's sewer main in Boundary Blvd. Those connections had occurred years earlier. The 2020 agreement between the cities, was our resolution of this unclarity, and established Algona as the service provider for the parcels within the city limits of Algona, and the same for the parcels in Auburn. The result of this agreement is that the city boundaries between Algona and Auburn also serves as the service area boundary.
7	20	Figure 1.2 and Section 1.4	There appears to be at least 5 parcels in the northeast portion of the District's service area which are also included in the adjacent City of Kent service area. It does not seem possible to have service provided by both entities. Please further explanation withing Section or revise the map to accurately reflect service areas.	The interlocal agreements between our agencies include provisions for the respective Public Works Directors or General Managers to agree that the other agency may serve parcels that are in the other's designated service areas for reasons of efficiency, etc. Since these particular adjustments are speculative and have not yet resulted in service to those parcels, we have adjusted the service area boundary to reflect the existing one. We have added labels to the map to reflect the locations of letters of agreement, but have not included definitive boundaries. If and when those systems are established and if it makes sense for them to be permanent, the two agencies will apply to the Boundary Review Board to permanently change the boundary.

DOE Comments

Comment No.	Page #	Section	Comment	Response
8	27	2.3.3	WAC 173-240-104 extends to grinder pumps that serve a single residence. Policy 3.5 states that "the City will not install, own, or maintain (outside of emergencies) any part of a private non-gravity system". Please explain what policies, ordnances, or agreements the District has in place to ensure that these non-gravity systems are properly designed and that the District has access rights in the case of emergency to protect public health and water quality?	All connections to the sewer system require a sewer permit, and in the case of the use of a grinder pump, that permit is designated with the subtype, "grinder pump." Consistent with Policy 3.3 and 3.5 and Auburn City Code 13.20.200, that permit application is reviewed by public works staff to verify that gravity is infeasible and to request design information including pump system specifications, alarm locations (audio and visual), and pressure line location. For your reference, I have included several city code sections related to this practice: Auburn City Code (ACC) 13.20.200 **Permits-Application-Inspection-Fee** An application for any side sewer permit shall be made with the city, which the applicant shall supplement with plans, specifications or other information as deemed necessary by the city. The sewer permit fee shall be imposed based on the fee schedule that is in effect at the time the submitted utility permit application is determined to be complete and shall be payable prior to issuance of the permit. Any work undertaken within a public right-of-way is subject to Chapter 12.66 ACC for work within the city or subject to other applicable permit requirements as specified by the city or county with jurisdiction where the work is being performed. Also, The City has the ability to enter the property for inspections (13.20.500) and to complete repairs (13.20.510) 13.20.500 **Access for inspections.** The city shall have access, subject to the provisions of Chapter 1.20 ACC, to all buildings and premises served by the sewer system for the purpose of inspecting pipes and fixtures. Inspection shall include verification of the manner in which domestic water is being used, and the satisfactory compliance with the provisions of this chapter. 13.20.510 **Inadequate systems – Action to effect compliance.** When any side sewer or private sewage system is constructed, connected or repaired and does not comply with the provision of this chapter, and is a menace to health or is liable to cause damage to public or private property, the city shall give notice thereof to the owner, agent or occupant of the property in which such condition exists. Should the owner, agent or occupant fail to remedy the condition within the time specified in the notice, the city may perform such work as may be necessary to comply with this chapter. The cost of such work shall be collected from the person responsible for the condition or the amount thereof shall become a lien upon the property and shall be collected in the manner provided by
9	27	2.3.3	Policy 3.7 appears to be in conflict with WAC 173-240-104. Please clarify how the District ensures that private systems are property designed and maintained. Are designs reviewed? Are private systems inspected by the District at some frequency? Does the District have rights to access and work on private systems in an emergency? Policy 5.9 appears to commit the District to providing emergency service but does not describe how access rights are granted in emergency cases.	Auburn City Code (13.20.010.W) defines a private sewer as, "sewage conveyance facilities which are owned, operated, maintained and controlled by the property owner served by that system." and it does not include any treatment systems. They are essentially larger versions of side sewer that serve one customer, and their design is reviewed and construction inspected as part of a civil permit (grading, etc.) or the sewer connections permit. Any change to any system requires an additional permit and additional review. Similar to Item 8 (above) City Code (13.20.500, 13.20.510) provides for inspection and repair on private systems. For clarity, we modified Policy 3.7 to read: Allow private sewer conveyance systems, consistent with Washington Administrative Code (WAC) 173-240-104(3)(b), within the SSSA as long as they are designed and operated per City standards and are not part of sewer extensions to

City of Auburn-Comprehensive Sewer Plan				25-Sep-24
Comment Responses				
DOE Comments				
Comment No.	Page #	Section	Comment	Response
10	41	4.2	Explain what is being done to protect the two wellheads that are within 100ft of an existing sewer line. Is there a plan to relocate those lines either proactively or during the next rehab of those lines?	Our consultant performed a more precise analysis of the distances, and found that they are very close to the 100 foot limit. We added a statement indicating that as repair or replacement of those lines occurs, we will establish a more definitive distance and address the location as part of that project. We Modified/Added to 4.2 as follows: "Most of the sewer lines are located more than 100 feet from the wellheads as stipulated for new sewer works by Ecology's CSWD (G2-1.5.3), two well sites are close to 100 feet from existing sanitary sewers in the central part of the system. As part of the sewer inspection activities outlined the Chapter 7 CIP, the distance between wellheads and sewers will be definitively measured at these sites. If sanitary sewers are within 100 feet from the wellheads, based on condition and other projects in the vicinity, the sewer distance can be addressed as part of the Sanitary Sewer Repair and Replacement/System Improvements project summarized in Chapter 7, following the outlined priority methodology.
11	50	4.5	Per WAC 173-240-050(3)(i), please include the quantity and periods of wastewater production for the industrial users presented in Table 4.2. Additionally, please provide additional information about expected future flows from industrial user expansion or including industries.	The permitted daily discharge quantities for each of the industrial users have been added to Table 4.2, and those are the quantities anticipated by the King County Industrial Waste Group. The following text was added following that table: King County Industrial Waste staff have indicated that the overall volume of industrial waste flows has generally been consistent and primarily concentrated during working hours during weekdays. While the City does not limit or prescribe the number or types of industrial businesses in the City, it is assumed that collectively, the amount and quality of future industrial wastewater flows from those businesses will be similar to existing flows.
12	64-65	Figures 5.7 and 8	It is hard to tell from these two figures if the future/planned sewer lines were included in the forward looking models. Can you confirm that the expanded basins (at minimum their flow) was included within these model runs? If they were included, it would be helpful to include the fully built out lines on these two figures to make it clear that future expansion was included.	The future planned sewer lines are not included in these figures, and the future anticipated flows were added to the nearest catchments. They are used to show capacity deficiencies within the existing system that include future flows.
13	66	5.5	Although not highlighted in red in Table 5-4, the F Street and Ellingson Road lift stations appears to be quite close to its capacity in the 2044 scenario. Why was additional monitoring or planned expansion of these LS not included in the CIP?	As currently modelled, the stations will have adequate capacity during this planning period. Two pump station condition assessments are projected to be completed during the 20-year planning period as well as two sewer plans (and hydraulic model) updates. If the projected flow increase is exceeded, specific improvements to those stations will be reprioritized as part of those evaluations.
14	75	5.8.4.1	Basin A10 also appears to have quite high I/I flow rates and peaking factor. Please explain why additional monitoring is not suggested for this basin.	Basin A10 is added to the list for future evaluation
15	85	6.4	The District is required to immediately report to Ecology all spills to the environment and back-ups of sewage into buildings. Please revise this section to include more information regarding reporting of spills/back-ups to Ecology's ERTS system.	Add: to 6.4.1 after bullet points: If any sewage is spilled to the environment or backs up into a building due to problems with the City sewer system staff will immediately report the spill to the Department of Ecology's ERTS System.

City of Auburn-Comprehensive Sewer Plan

25-Sep-24

Comment Responses

DOE Comments				
Comment No.	Page #	Section	Comment	Response
16	93	7.2.2	It is difficult to determine if all areas of deficiency identified in Figure 5.6-8 have associated projects in the CIP. It is suggested that deficiencies identified are given unique IDs and that the deficiency IDs associated with each project in 7.2.2 are added to the project descriptions of 7.2.2. Another method, figure or table could also be used to help with this comparison but additional clarity is needed.	Text in chapter 5 and 7 has been updated to better link deficiency's with CIP's The following text was added to Section 5.8.2: These areas are included withing the CIPs in Chapter 7 with some additional discussion, however not all of them have a specific CIP number associated with them. Area 1 has high I/I and is recommended for continued monitoring with a specific CIP Project 9. Area 4 is a large project with a specific CIP. Areas 2, 3 5 and 6 are all shorter lengths of piping and included within a programmatic CIP. In Tables 7.1 and 7.2, it is shown that the areas where future capacity is an issue are to be included as part of the the programmatic repair and replacement projects generated every two years +/-.
17	64-65	Figures 5.7 and 8	It is hard to tell from these two figures if the future/planned sewer lines were included in the forward looking models. Can you confirm that the expanded basins (at minimum their flow) was included within these model runs? If they were included, it would be helpful to include the fully built out lines on these two figures to make it clear that future expansion was included.	Flows from future projected increases in population/employment were included and added to the existing system at their most likely point of connection. The future planned sewer lines are not included in these figures, which were used to show capacity deficiencies within the existing system including those future flows.

UTRC Comments				
Comment No.	Page #	Section	Comment	Response
1			Prior to the UTRC acting on a recommendation, a signed checklist and the issued threshold determination must be provided.	The Checklist and DNS were added as Appendix D
2			The City Council must adopt the Plan prior to sending it to King County for final review and approval	The adoption is planned for December 2024
3			King County Code (13.24.010 H. Water and sewer system comprehensive plans) requires wastewater system plans to identify and describe areas of concern with respect to corrosion and odor control and steps being taken to reduce their occurrence. It does not appear that the Plan addresses odor or corrosion. Please include additional text in the plan document to address odor and corrosion concerns and steps the City plans to take.	A specific section related to odor control and erosion was added to Chapter 4 (4.5, which renumbered the next two sections) **4.5 Odor Control and Corrosion** Sewer Policy 5.11 commits the City to monitor frequent odor complaints and to act when three per month are documented. City staff investigate all odor complaints to determine their source, persistence, and potential source if it can be identified. Strategies for mitigating odor include sealing sewer manhole lids, adding bioxide to pump station wet wells to minimize the generation of hydrogen sulfide gas, and filtering wet well ventilation at pump stations. These strategies have been effective, and the City currently has no sites where persistent odor has been detected or reported. City staff assess corrosion in the system as part of manhole inspections, CCTV inspections of sewer mains, and pump station wet well maintenance activities. The City has not identified any persistent widespread problems with corrosion, but as specific incidents of corrosion are identified those observations are recorded in the City's CMMS. Strategies for managing corrosion include replacing or lining (using Cured-in-Place Pipe) sewer mains, replacing corroded manhole rings and covers, and coating concrete pump station wet wells.
4			King County Code (13.24.010 H. Water and sewer system comprehensive plans) requires wastewater system plans to compare amounts of inflow and infiltration (I/I) to the system with King County's 1,100 gallons-per-acre-per-day-standard, and steps being taken to reduce the inflow and infiltration. While the Plan does identify existing and projected I/I and indicates annual projects will be constructed to address needs, the Plan does not compare these with the County's standard. Please include text in the Plan that provides this comparison.	Added to section 5.3.2: "This I/I rate is slightly higher than the King County target value of 1,100 gpad, providing a level of conservatism in projecting future peak flows." Also added discussion in section 5.6 before Table 5.5: " King County has a target I/I rate of 1,100 gpad during the design storm. Although some basins exceed the County target, the City average I/I rate is 1,446 gpad during the design storm. "

City of Auburn-Comprehensive Sewer Plan

25-Sep-24

Comment Responses

DOE Comments

Comment No.	Page #	Section	Comment	Response
5			The Plan recognizes some existing development within the City's sanitary sewer service area is served by on-site septic systems. How many existing on-site septic systems currently exist within the City's sewer service area? If all these on-site septic systems connected to the City's sewer system, would the system require significant improvements to accommodate the additional wastewater flow?	The future scenarios assumed the septic had been connected. The system with proposed improvements can convey the flow
6			Various figures. The City's Sewer Service Area (SSA) is masked by the City's municipal boundaries on various figures/maps. Can this boundary be shown differently to allow the SSA boundary to be seen more clearly? On various maps there appears to be a fourth area shown as unincorporated King County within the City's SSA which may be an error. This area includes Parcel Nos. 1721059045, 1721059248, 1721059249, 1721059250. These parcels are owned by the City and shown as within the City's municipal boundaries on King County i-Map.	The maps have been corrected to reflect those parcels being part of the City.
7			The Plan references and the appendix includes 7 interlocal agreements with neighboring wastewater purveyors agreeing to changes to sewer service areas. It would be beneficial if the Plan included a figure that illustrated these sewer service boundary changes.	Figure 1.2 reflects the cumulative effect of those interlocal agreements.
8			Page 1-7, Figure 1.2 Study Area, and page 3-3, Figure 3.1 City of Auburn Land Use Designations. Please add symbology that identifies the boundary of the urban growth area.	The figures have been updated, however the UGA essentially matches our City Limits, except for pockets of unincorporated KC and one pocket of Pierce County .
9			Page 2-3, Section 2.3.2 System Planning. Policy 2.5 states, "The Sanitary Sewer Utility does not intend and will not Plan to extend sanitary sewer service to or through King or Pierce County rural zoned property. Exceptions will only be considered for reasons of health, safety, or service to a school in accordance with King or Pierce County policies." Please recognize that the City of Auburn does not have the authority to connect rural zoned to its sewer system without the approval of King County. Please clarify this in the Plan.	We added the following clarifying statement to the end of Policy 2.5: " ...and with the approval of King or Pierce County."
10			Page 2-3, Section 2.3.2 System Planning. Policy 2.6 states, "Allow development where sewer is not readily available to be served by individual onsite (septic) systems, if the individual lots are suitable for onsite systems, per the requirements and approval of King County..." For unincorporated urban King County areas within the City's sewer service area, King County Code 13.24.136 only allows on-site septic systems to be permitted for single detached residences, and short sub-divisions on an interim basis it if meets specific criteria. All other development is required to be connected. Please provide clarification for unincorporated King County areas in the Plan.	We added the following clarifying words (in red) to Policy 2.6: "...per the requirements and approval of King County or Pierce County Department of Health, and the City's or Counties' development codes. The ..."
11			Page 2-3, Section 2.3.2 System Planning. It does not appear that the City has any policy that would encourage or require existing development utilizing an on-site septic system to connect to the City's sewer system. Please provide or clarify the City's policy for existing development connecting to the City's sewer system. Does the City have a proactive strategy to connect existing development to its sewer system? On page 1-4 under the King County Policy reference, text points to Chapter 5 which discusses projects that would serve currently unserved areas; however, it does not appear that there is a strategy to encourage existing development to connect to the new segments of the sewer system. Please clarify in the Plan.	The reference on page 1-4 referred to our conceptual planning as to how those areas could be served by sewer extensions but do not represent specific capital projects. The Utility/City has not committed to spending funds from existing customers for specific capital projects to extend public sewer to unsewered areas. Policies 6.15 and 6.16 do allow staff some flexibility to construct extensions, pump stations, etc. in some situations. Also, Policy 6.2 provides for the use of alternate funding for infrastructure.

City of Auburn-Comprehensive Sewer Plan

25-Sep-24

Comment Responses

DOE Comments

Comment No.	Page #	Section	Comment	Response
12			Page 3-2, Section 3.3 Land Use. The text describes and Figure 3.1 illustrates the location of designated land uses within the City of Auburn. This section does not include any land use information addressing areas outside of the City's municipal boundary, and within its sewer service area. Please include. It would also be informational to include the total area within the City's service area and percent within unincorporated King County and other neighboring municipalities.	Figure has been updated to include all land within the service boundary and a table showing relative areas of different jurisdictions within the service area.
13			Page 4-2, Section 4.1.3 Lea Hill Sewer Basin. The text states that there is a significant unsewered area in the north portion of this sewer basin. Is this area unsewered because it is primarily undeveloped, or is there development that is currently serviced by on-site septic systems? Please clarify in the Plan.	We added the following text (in red) to that section "...Lea Hill Sewer Basin. The area is substantially developed with single family homes on lots between 1/4 acre and 1 acre that use existing on-site septic systems. The northeast..."
14			Page 4-2, Section 4.1.5 South Hill Sewer Basin. The text states, "The eastern half...of the sewer basin is currently developed as a low-density rural area and is unsewered." The reference to this area as being a rural area is misleading as it is within the designated urban growth area. It would be more appropriate to refer to the area as being a low-density residential area. Please clarify in the Plan.	We changed the word "rural" to "residential"
15			Page 4-13 Section 4.6 Water Reclamation and Reuse. The text mentions the King County Water Reclamation Evaluation Checklist was completed as part of the City's water system plan. Please provide this checklist as an appendix to this Plan. While the Plan identifies potential reclaimed water sources and notes the City will need to determine if it would be feasible source, it would be beneficial if the Plan discussed the type of capital projects that would need to be constructed to obtain reclaimed water from these sources.	The checklist has been added as Appendix E. Noted just under 4.7 (formerly 4.6) just after Checklist ", a copy of which is included as Appendix E, " Added under 4.7.2 (formerly 4.6.2): Receiving water from any of the existing treatment plants would involve the construction of long (7-15 mile) pipelines since none of them are located in or immediately adjacent to Auburn. Also, since reclaimed water cannot be mixed with potable water, all of the options listed below would also require the installation of a separate reclaimed water distribution system to convey that water directly to potential users.
16			Page 5-5, Section 5.3.2 Future Conditions Wet Weather Flow Assumptions. The text states, "Figure 5.4 identifies the portion of the collection system that is currently developed with available sewer in yellow,..."; however, the legend for this figure indicates that yellow represents "Developed with Sewer." These two phrases are not same. Please correct as appropriate.	The figure has been updated.
17			Page 5-5, Section 5.3.2 Future conditions Wet Weather Flow Assumptions. The text states that, "It was assumed that all developable parcels would be developed and connected for the 2044 scenario..." Does this assumption include the connection of existing development that is currently served by on-site septic systems? If yes, how many additional connections would be attributed to these types of properties?	Yes they were accounted for. Specific connections were not tabulated, it was assumed that there may be some redevelopement in this process, so the land use flow factors where combined with the contributing area being connected to generate the flow
18			Page 5-5, Section 5.3.2 Future conditions Wet Weather Flow Assumptions. The text states that, "It was assumed that the I/I of future sewered areas would be 1,500 gallons per acre per day..." What is the basis for this assumption?	This I/I rate is slightly higher than the King County target value of 1,100 gpad, providing a level of conservatism in projecting future peak flows, and closer to the actual level of I/I into the system. - Text has been added to this section.
19			Page 5-7, Figure 5.4, Future Contributing Areas. The legend for this figure is misleading. Many of the areas identified as "Developable" are already developed utilizing on-site septic systems. Would it be more appropriate to identify these areas as "Developable/Infill"? It would be beneficial to identify the number and location of existing on-site septic systems.	The figure has been updated
20			Page 5-10, Figure 5.6 Existing System Deficiencies, Page 5-11, Figure 5.7 2044 System Deficiencies, and Page 5-12 2044 Climate Change Design System Deficiencies. The legend on each of these figures shows that only the City's critical sewer system infrastructure was included in the system's model and analysis. Why wasn't the entire system modeled? Please include text in the Plan that describes the extent of the system that was modeled and limitations of the analysis relevant to the entire sewer system.	The modeling focused on the key conveyance infrastructure, neglecting smaller collector pipes which generally have adequate capacity to convey the flow. This approach reduces the modeling computational effort, while providing necessary conveyance information.

Robert Elwell

From: Cardwell, Daniel <dcardwell@kingcounty.gov>
Sent: Monday, November 4, 2024 3:59 PM
To: Robert Elwell
Subject: RE: City of Auburn Sewer Plan

CAUTION: **The following message originated from outside the City of Auburn. Be careful opening links and attachments**

Bob,
Thank you for reaching back out. I really appreciate your communication in this process.

Regards,
Dan

Dan Cardwell
Principal Planner | Utilities Technical Review Committee | School Technical Review Committee
King County Dept. of Local Services
dcardwell@kingcounty.gov

From: Robert Elwell <relwell@auburnwa.gov>
Sent: Monday, November 4, 2024 3:56 PM
To: Cardwell, Daniel <dcardwell@kingcounty.gov>
Subject: RE: City of Auburn Sewer Plan

[EXTERNAL Email Notice!] External communication is important to us. Be cautious of phishing attempts. Do not click or open suspicious links or attachments.

Dan,

I went back and found the voicemail that I somehow had missed. I'm sure it was my error that marked it "already listened to." I see your point in adding "as appropriate" to the end of Policy 2.5 and after the word "codes" in Policy 2.6. As you said, it's not likely the current wording would ever cause a problem, but it adds small amount of precision. We will plan on making that change in the plan we send to our Council and subsequently to you.

Thanks again for the prompt response to the resubmittal and sorry for missing it.

Bob Elwell
City of Auburn
Sewer Utility Engineer
25 West Main Street, Auburn WA 98001
253-931-4008

From: Cardwell, Daniel <dcardwell@kingcounty.gov>
Sent: Monday, November 4, 2024 3:09 PM
To: Robert Elwell <relwell@auburnwa.gov>
Subject: RE: City of Auburn Sewer Plan

CAUTION: The following message originated from outside the City of Auburn. Be careful opening links and attachments

Hello Bob,
I had left you a voice mail a week or so from receiving the updated plan. I thought I had followed it up with an email…but as I look back it doesn't look like I did. I had a few minor items for clarity purposes; however, they are not substantial enough to delay a positive recommendation from the UTRC.

Dan

Dan Cardwell
Principal Planner | Utilities Technical Review Committee | School Technical Review Committee
King County Dept. of Local Services
dcardwell@kingcounty.gov

From: Robert Elwell <relwell@auburnwa.gov>
Sent: Monday, November 4, 2024 2:37 PM
To: Cardwell, Daniel <dcardwell@kingcounty.gov>
Subject: City of Auburn Sewer Plan

[EXTERNAL Email Notice!] External communication is important to us. Be cautious of phishing attempts. Do not click or open suspicious links or attachments.

Hello Dan,

Our Sewer Plan, along with our overall City Comprehensive Plan (and Water and Storm as well) are scheduled to be adopted by our City Council on December 16, after which we would submit a final copy to you for UTRC, and eventually King County Council, approval. Based on our resubmitted plan and responses to your review comments, do you have any concerns that you think we have not yet addressed? Ideally we would like to resolve any outstanding issues prior to Council adoption to avoid having to amend it later.

Thanks again for your prompt first review and associated discussion.

Bob Elwell
City of Auburn
Sewer Utility Engineer
25 West Main Street, Auburn WA 98001
253-931-4008

The information contained in this electronic communication is personal, privileged and/or confidential information intended only for the use of the individual(s) or entity(ies) to which it has been addressed. If you read this

communication and are not the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication, other than delivery to the intended recipient is strictly prohibited. If you have received this communication in error, please immediately notify the sender by reply e-mail. Thank you.
The information contained in this electronic communication is personal, privileged and/or confidential information intended only for the use of the individual(s) or entity(ies) to which it has been addressed. If you read this communication and are not the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication, other than delivery to the intended recipient is strictly prohibited. If you have received this communication in error, please immediately notify the sender by reply e-mail. Thank you.

Robert Elwell

From: Wilson, Sean (ECY) <sewi461@ECY.WA.GOV>
Sent: Tuesday, November 5, 2024 10:50 AM
To: Robert Elwell
Subject: RE: City of Auburn Sewer Plan

CAUTION: **The following message originated from outside the City of Auburn. Be careful opening links and attachments**

Hi Robert,

Thank you for your patience. Your revised draft came in the day before I was out for a couple of weeks on holiday. So this review took me a bit longer than I hoped. The edits and responses look good to me so we should be ready to approve it once you have Council adoption, signature on the PE stamp, and remove the "Draft" labels.

Let me know if you have any questions for me.
Kind regards,

Sean Wilson, P.E.
P: 425.577.4864

From: Robert Elwell <relwell@auburnwa.gov>
Sent: Monday, November 4, 2024 2:37 PM
To: Wilson, Sean (ECY) <sewi461@ECY.WA.GOV>
Subject: City of Auburn Sewer Plan

External Email

Hello Sean,

Our Sewer Plan, along with our overall City Comprehensive Plan (and Water and Storm as well) are scheduled to be adopted by our City Council on December 16, after which we would submit a final copy to you for approval (ideally). Based on our resubmitted plan and responses to your review comments, do you have any concerns that you think we have not yet addressed? Ideally we would like to resolve any outstanding issues prior to Council adoption to avoid having to amend it later.

Thanks again for your prompt first review and answers to other questions along the way.

Bob Elwell
City of Auburn
Sewer Utility Engineer
25 West Main Street, Auburn WA 98001
253-931-4008

The information contained in this electronic communication is personal, privileged and/or confidential information intended only for the use of the individual(s) or entity(ies) to which it has been addressed. If you read this communication and are not the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication, other than delivery to the intended recipient is strictly prohibited. If you have received this communication in error, please immediately notify the sender by reply e-mail. Thank you.

APPENDIX C

APPROVALS

~ To be included in a future submittal. ~

APPENDIX D

HYDRAULIC MODEL UPDATE, CALIBRATION, AND CAPACITY ANALYSIS

2024 Comprehensive Sewer Plan



TECHNICAL MEMORANDUM 1

Model Calibration Report

FINAL / May 2024

2024 Comprehensive Sewer Plan

TECHNICAL MEMORANDUM 1

Model Calibration Report

FINAL / May 2024



Contents

TM 1 MODEL CALIBRATION REPORT

1.1 Introduction 1-1
1.2 Existing Service Area 1-1
1.3 Sewer Collection Flows 1-3
1.3.1 Dry Weather Flow Components 1-3
1.3.2 Wet Weather Flow Components 1-4
1.4 Flow Monitoring Program 1-7
1.4.1 Program Description 1-7
1.4.2 Flow Monitoring Results 1-11
1.5 Zoning and Land Use Data 1-15
1.5.1 Zoning and Existing Served and Connected Area 1-16
1.5.2 Future Land Use 1-18
1.6 Wastewater Flow Factors 1-20
1.6.1 Flow Factor Development 1-23
1.7 Hydraulic Model Overview 1-24
1.7.1 Selected Hydraulic Modeling Software 1-24
1.7.2 Modeled Collection System and Skeletonization 1-25
1.7.3 Elements of a Hydraulic Model 1-25
1.8 Hydraulic Model Calibration 1-28
1.8.1 Calibration Standards 1-28
1.8.2 DWF Calibration 1-29
1.8.3 Wet Weather Flow Calibration 1-32

Attachments

ATTACHMENT 1A AUBURN WA 2020-21 DRAFT I/I REPORT V1
ATTACHMENT 1B FLOW METER QUALITY REVIEW
ATTACHMENT 1C LAND USE ELEMENTS OF COMPREHENSIVE PLAN
ATTACHMENT 1D FLOW FACTORS
ATTACHMENT 1E DRY WEATHER CALIBRATION SUMMARY SHEETS
ATTACHMENT 1F RDII PARAMETERS
ATTACHMENT 1G WET WEATHER CALIBRATION SUMMARY SHEETS

Tables

Table 1.1	Flow Monitoring Locations	1-8
Table 1.2	ADWF Development Summary	1-13
Table 1.3	Largest Storm Events	1-15
Table 1.4	Existing Zoning and Future Land Use Correlation	1-15
Table 1.5	Existing Zoning Summary	1-16
Table 1.6	Future Land Use Summary	1-18
Table 1.7	Flow Factor Development Summary	1-24
Table 1.8	DWF Calibration Results	1-31
Table 1.9	WWF Calibration Results	1-37

Figures

Figure 1.1	Existing Service Area	1-2
Figure 1.2	Typical Wastewater Flow Components	1-3
Figure 1.3	Typical Sources of I/I	1-5
Figure 1.4	Typical Effects of I/I	1-6
Figure 1.5	Flow Monitoring Locations	1-9
Figure 1.6	Flow Monitoring Schematic	1-10
Figure 1.7	Flow Monitoring Schematic of Meters Chosen for Calibration	1-10
Figure 1.8	Typical Weekday vs Weekend DWF (Meter AUB A-1)	1-12
Figure 1.9	Rainfall Intensity	1-14
Figure 1.10	Cumulative Rainfall	1-14
Figure 1.11	Current Land Use Based Zoning	1-17
Figure 1.12	Future Land Use	1-19
Figure 1.13	Developable Areas	1-21
Figure 1.14	Flow Monitoring Basins	1-22
Figure 1.15	Modeled Subatchments	1-27
Figure 1.16	Example Diurnal Pattern	1-30
Figure 1.17	Example DWF Calibration (Meter AUB A1)	1-32
Figure 1.18	RDI Model Schematic	1-34
Figure 1.19	Example WWF Calibration	1-36

Abbreviations

ADWF	average dry weather flow
BWF	base wastewater flow
City	City of Auburn
CIWEM	Chartered Institution of Water and Environmental Management
du/acre	dwelling units per acre
DWF	dry weather flow
FRC	fast response curve
GIS	geographic information system
gpda	gallons per day per acre
GWI	groundwater infiltration
HGL	hydraulic grade line
I/I	inflow and infiltration
mgd	million gallons per day
RDI	rainfall derived infiltration
RDII	rainfall derived infiltration and inflow
SRC	slow response curve
SSO	sanitary sewer overflow
UDG	Urban Drainage Group
WWF	wet weather flow

TM 1 MODEL CALIBRATION REPORT

1.1 Introduction

Sanitary Sewer collection system models are valuable tools used to assess the performance of collection systems during dry and wet weather conditions, and to plan for future improvements. These models provide a means to simulate the impact of different sized storms on the collection system and determine where system deficiencies are likely to occur. In addition, a well-calibrated model provides an easy way to test alternative improvement scenarios. This Technical Memorandum summarizes the City of Auburn's (City) sewer collection system hydraulic model update and calibration for use in the City's sewer system conveyance planning.

1.2 Existing Service Area

The City's service area is shown in Figure 1.1. The service area contains approximately 17,968 acres. The current service area includes most of the City limits, parts of City of Kent, some unincorporated areas of both King and Pierce County's, and part of the Muckleshoot Indian Reservation.

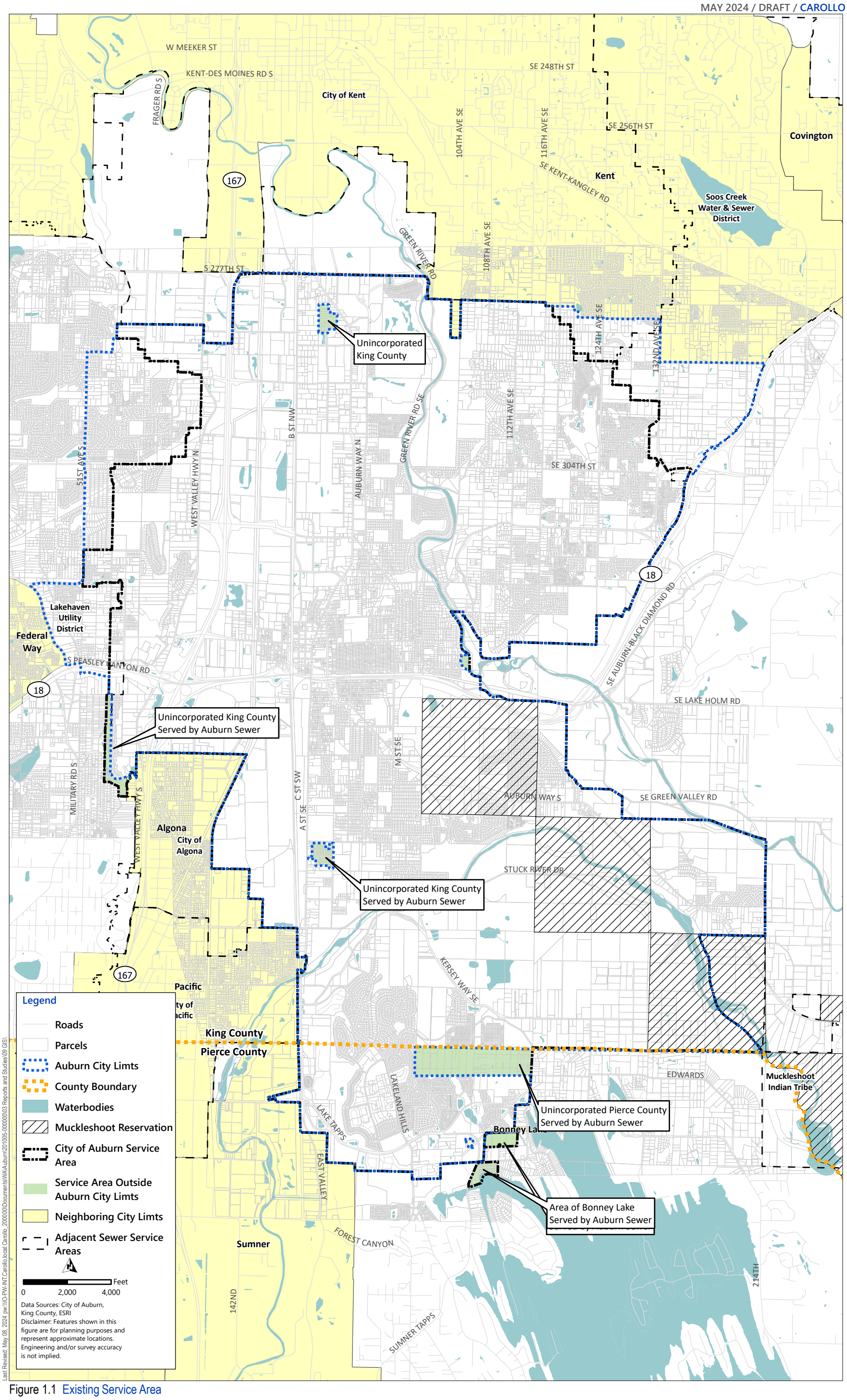


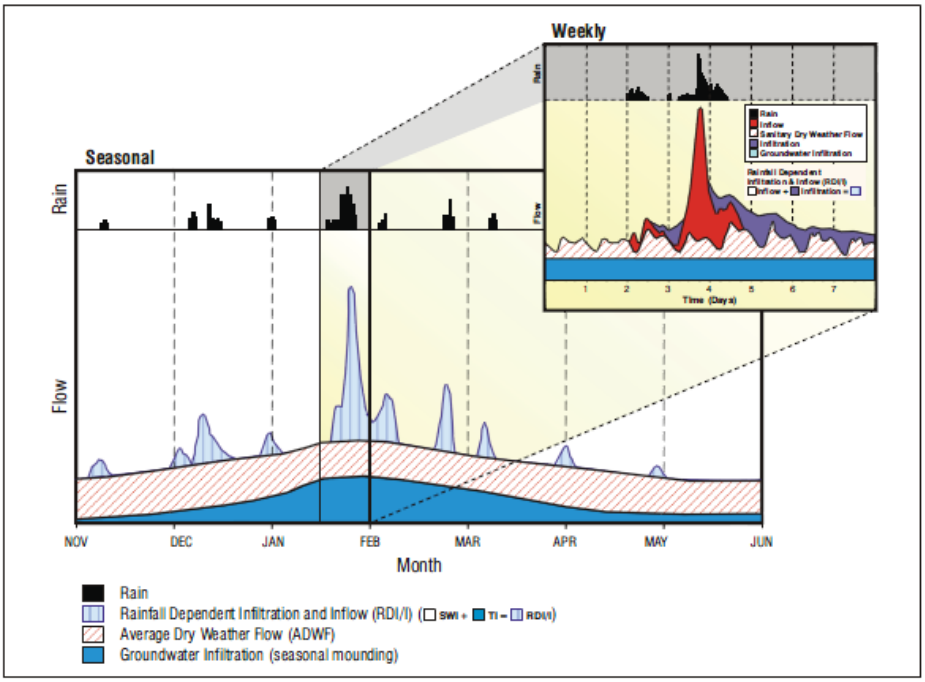
Figure 1.1 Existing Service Area

1.3 Sewer Collection Flows

Sewer collections systems are intended to convey sanitary flows, but frequently have additional flows from other sources. The different flow components are described in the section below and illustrated in Figure 1.2.

1.3.1 Dry Weather Flow Components

Average dry weather flow (ADWF) is the flow that is always entering the collection system on a daily basis. There are two primary components of ADWF, base wastewater flow (BWF) that is the sanitary flow the system is intended to convey, and dry weather ground water infiltration. ADWF was estimated from an average of dry weather flow (DWF) data at each flow meter from 2020 to 2022. Section 1.4 describes the flow monitoring efforts performed by ADS Environmental Services (ADS), which went into determining the ADWFs. The ADWF serves as the baseline flow in the hydraulic model.



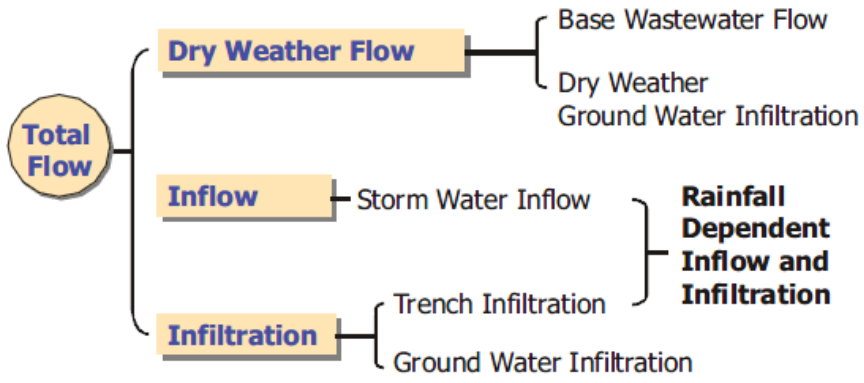


Figure 1.2 Typical Wastewater Flow Components

Note: This figure is not based on flow data specific to the City.

1.3.1.1 Base Wastewater Flow

The BWF is the sanitary flow generated by routine water usage of the collection system service area residential, commercial, and industrial customers. Conveying this flow is the primary function of the collection system. The flow has a diurnal (24-hour) pattern that varies by individual customer's water use patterns. Typically, a residential diurnal pattern has two peaks with the more pronounced peak following the wake-up hours of the day, and a less pronounced peak occurring in the evening. Commercial and industrial patterns, though they vary depending on the type of use, typically have more consistent higher flow patterns during business hours, and lower flows at night. Furthermore, the diurnal flow pattern of a weekend may vary from the diurnal flow experienced during a weekday. Diurnal patterns are applied to ADWFs, and cumulatively make up the flows through the wastewater collection system. The diurnal patterns utilized for the City's collection system basins are developed in Section 1.4.2.1.

1.3.1.2 Dry Weather Groundwater Infiltration

Dry weather groundwater infiltration (GWI) will enter the sewer system when the relative depth of the groundwater table is higher than the depth of the pipeline and the sanitary sewer pipe, allowing infiltration through defects such as cracks, misaligned joints, and broken pipelines. Dry weather GWI (or base infiltration) cannot easily be separated from BWF by flow measurement techniques. Therefore, dry weather GWI is typically grouped with BWF.

1.3.2 Wet Weather Flow Components

Wet weather flow (WWF) includes two components:

- Inflow and infiltration (I/I): The stormwater I/I response in the sewer system to rainfall is seen immediately (inflow) or within hours after the storm (infiltration).
- GWI: Wet weather GWI is not specific to a single rainfall event, but instead from effects of saturated soils on the sewer system over the entire wet weather season. The depth of groundwater rising above the pipe invert elevation causes GWI. Sewer pipes within close proximity to a body of water can also be greatly influenced by groundwater effects.

1.3.2.1 Inflow and Infiltration

I/I are rainfall derived flows in the collection system from specific storm events. Inflow is stormwater that enters the sewer system via a direct connection to the system, such as roof drain and downspout connections, leaky manhole covers, and inappropriate storm drain connections. Infiltration is stormwater that enters the sewer system by percolating through the soil and entering through foundation drains and sumps inappropriately connected to the system, defects in pipelines, manholes, and joints. Some common sources of I/I are shown in Figure 1.3. The adverse effects of I/I entering the sewer system is increases in both flow volume and peak flows such that the sewer system may operate at or above its capacity, as illustrated in Figure 1.4. If too much I/I enter the sewer system, sanitary sewer overflows (SSO) could occur.

1.3.2.2 Groundwater Infiltration

GWI, one of the components of I/I, is associated with extraneous water entering the sewer system through defects in pipes and manholes while the ground is saturated during the wet weather season. GWI is related to the condition of the sewer pipes, manholes, and groundwater levels. GWI may occur throughout the year, although rates are typically higher in the late winter and early spring in the Pacific Northwest.

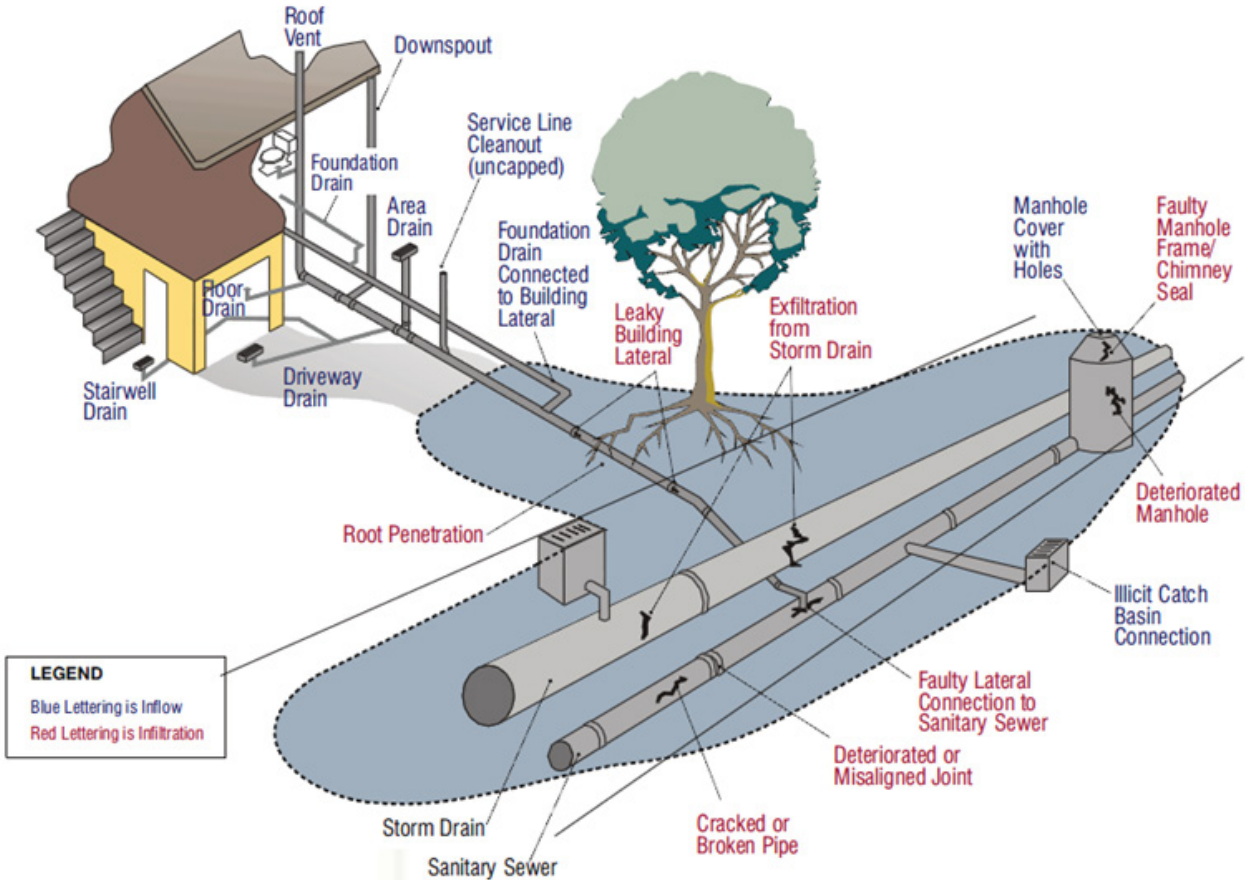


Figure 1.3 Typical Sources of I/I

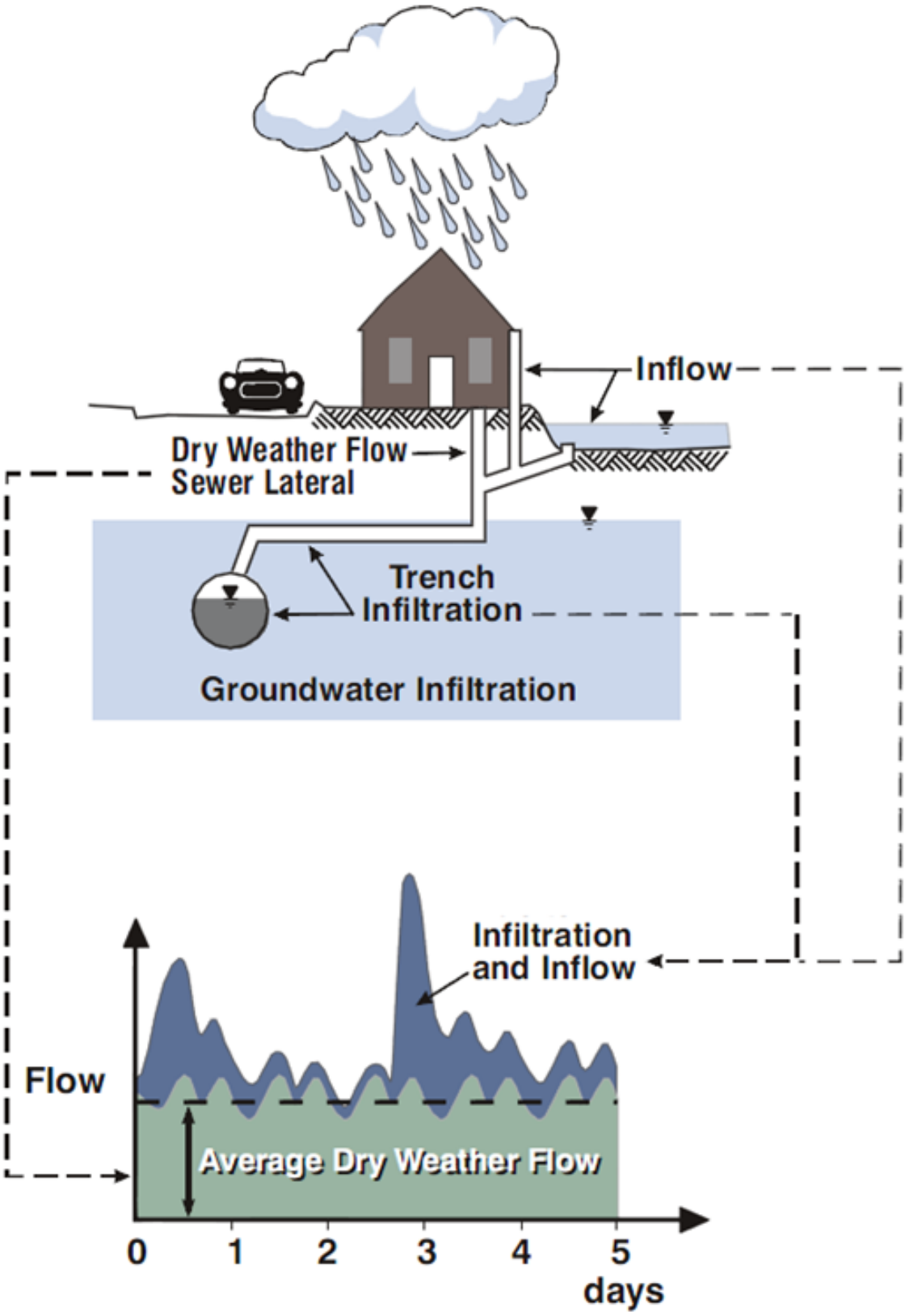


Figure 1.4 Typical Effects of I/I

1.4 Flow Monitoring Program

Prior to the Comprehensive Sewer Planning effort, the City contracted with ADS to conduct a temporary flow monitoring program within the City's sanitary sewer collection system. The City also obtained flow data from meters within the City that are part of King County's larger flow monitoring program. The purposes of the flow monitoring program were to collect data for correlating actual collection system flows to the hydraulic model predicted flows, evaluate the system's capacity, and estimate basin I/I. The flow monitoring data was collected for a period of two years of wet season, monitoring from 2020 to 2022. The "Auburn WA 2020-21 Draft I&I Report v1" prepared by ADS summarizes the flow monitoring program and was submitted to the City as a stand-alone report. The report can be found in Attachment 1A.

1.4.1 Program Description

1.4.1.1 Flow Monitoring Sites and Tributary Areas

A total of 40 sewer basins were monitored during the flow monitoring period from 2020 to 2022 within the service area, and seven King County meters recorded data within the City. A total of 20 of the meters and all seven of the King County meters recorded data over the first wet season from October 2, 2020 to April 15, 2021. Four meters recorded data from 2020 to 2022. The remaining 16 meters were sub-basin monitoring over the 2021-2022 wet weather season.

The remainder of this report will focus on the 22 flow monitoring locations that encompass larger tributary areas and have accurate data for the first wet season period. These meters were selected for calibration and offer the best distribution of data across the collection system and encompass the City's critical sewered areas. These 22-meter locations are identified in Figure 1.5. Table 1.1 lists the flow monitoring locations that were selected for calibration and the diameters for the associated sewers. Figure 1.6 provides a schematic illustrating all 47 flow monitoring locations relationship to help understand how the basins connect and the time data was recorded at each meter site. Figure 1.7 provides the same schematic showing the meters that were selected for model calibration.

Meter data quality was reviewed at all sites and deemed acceptable to use for model calibration. The quality of meter data and other trends in the flow can be determined from scattergraphs, which plot the depth versus velocity as compared to the manning's curve for the pipe segment. Scattergraphs for each site can be found in the Flow Meter Quality Review, Attachment 1B.

Table 1.1 Flow Monitoring Locations

Meter ID	Upstream Pipe ID	Manhole ID	Upstream Pipe Diameter (inch)
A1	308-19	308-20	21
A1c	309-08	309-06	18
A1d	309-11	309-10	18
A3	409-55	409-34	18
A4	508-28	508-17	12
A6	610-30	610-31	12
A7	708-07	707-03	18
A9	710-32	710-31	10
A10	710-152	710-151	24
A11	710-19	710-142	12
A12	710-43	710-42	12
A13	710-130	710-85	8
A14	710-148	710-149	18
A15	809-30	809-30	21
A16	809-44A	809-56	18
Y-1	410-76	410-16	18
Y-2	611-53	611-02	14
Y-3	1012-55	1012-55	24
Y-4	1010-02	1010-02	18
WINT003	508-01	508-02	42
MSTTR02	509-16	509-16	36
AUBRN53	207-02	207-01	72

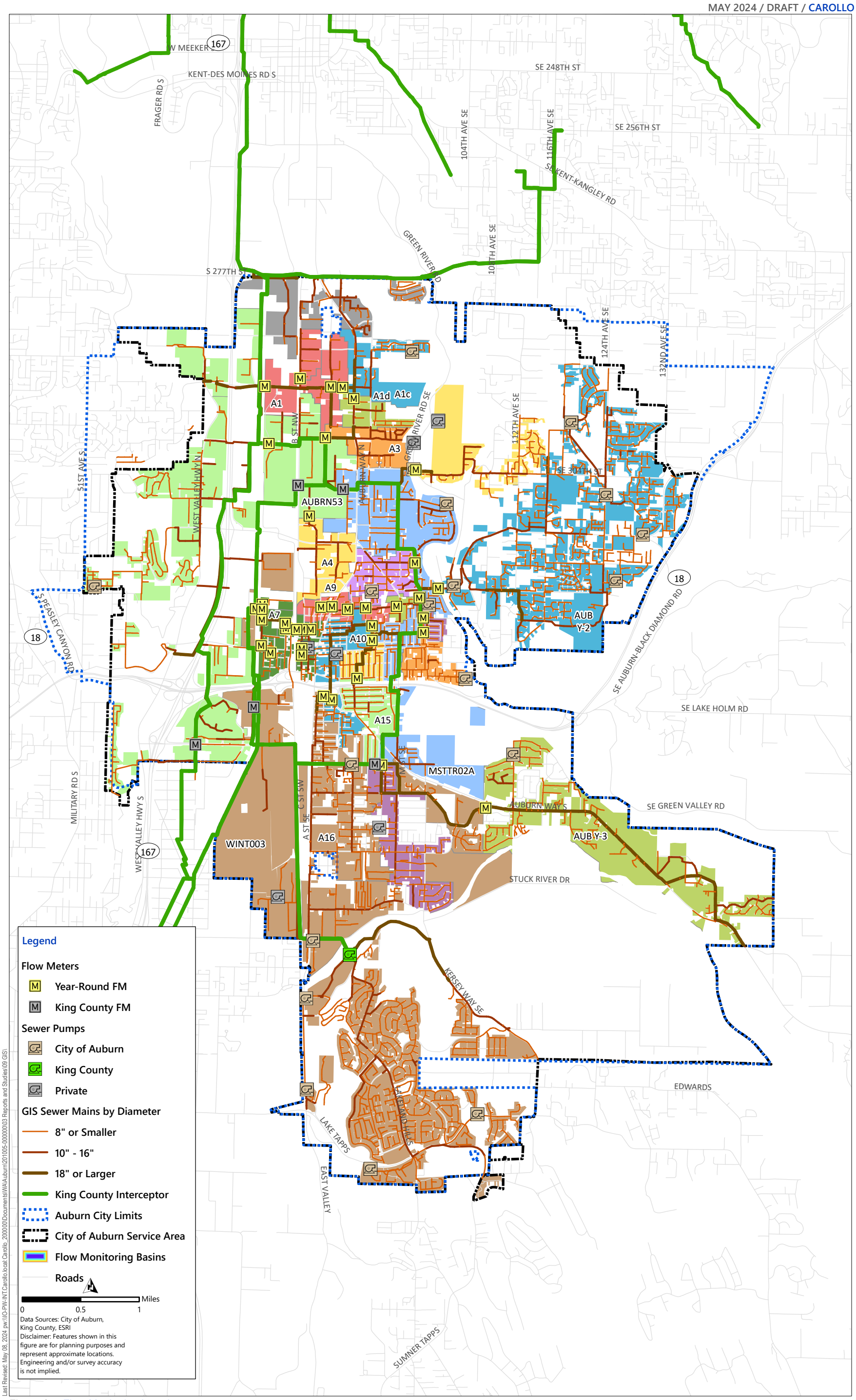


Figure 1.5 Flow Monitoring Locations

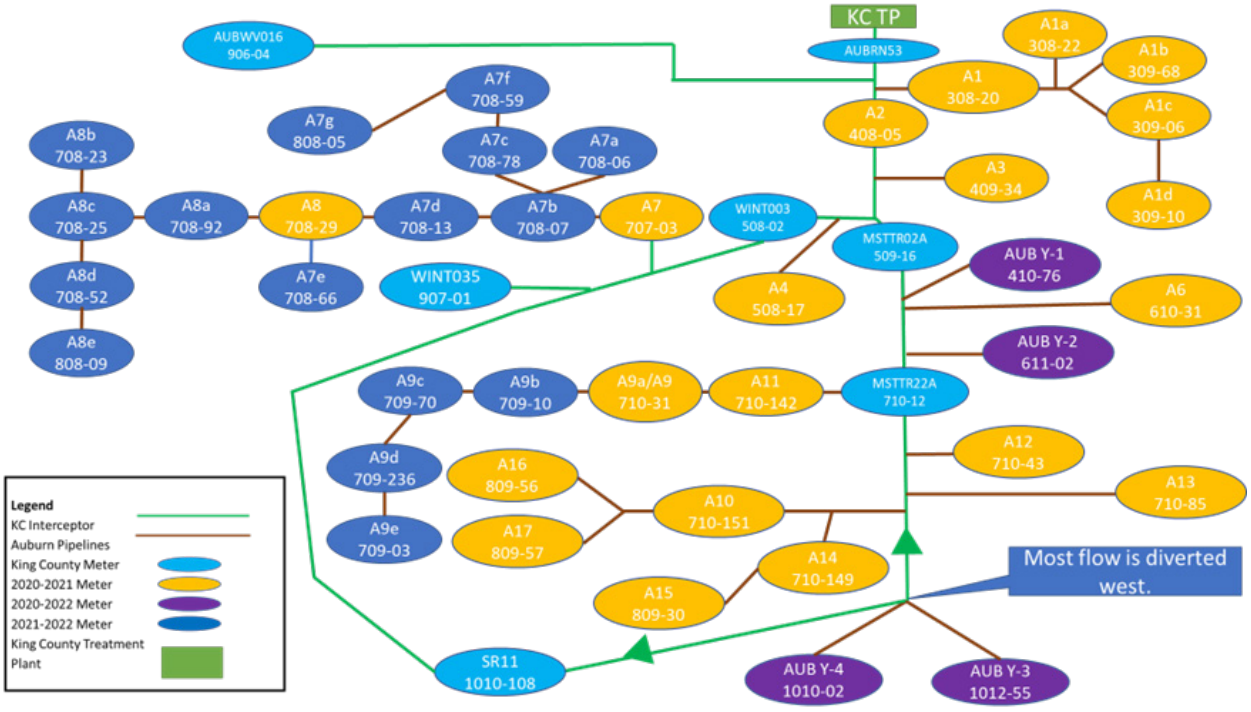


Figure 1.6 Flow Monitoring Schematic



Figure 1.7 Flow Monitoring Schematic of Meters Chosen for Calibration

1.4.1.2 Flow Meter Description

The flow meters used were area velocity meters. The velocity meter measured water with a Doppler signal and the depth measured with either a submerged pressure sensor or level transducer. Level was converted to area based on the pipe diameter. ADS selected the optimal type of flow meter to use on a site-to-site basis based on the hydraulic characteristics at each site, as well as other factors.

ADS conducted an analysis of the data retrieved from each flow meter and made adjustments as needed for calibration based on the field measurements. The flow at each meter was then calculated at 15-minute intervals based on the continuity equation:

$$Q = V \times A$$

Where:

- Q = Pipeline flow rate, cubic feet per second.
- V = Average velocity, feet per second.
- A = Cross sectional flow area, square feet.

1.4.1.3 Rain Gauges

One rain gauge was installed by ADS to record rainfall that occurred throughout the flow monitoring program and six existing king county rain gauges were used. The location of the rain gauge is shown in Figure 1.5.

1.4.2 Flow Monitoring Results

The flow monitoring program data were evaluated by components including DWF, rainfall, and WWF. Data collected from flow meter AUB A-1 is presented throughout this Technical Memorandum as an example of the type of data and the results from the flow monitoring program. Results for all other meters are included in Attachment 1B.

1.4.2.1 DWF Data

Base flow can be estimated for a wastewater collection system by comparing DWF and WWF at the flow monitoring locations. To estimate ADWF for more specific areas, such as individual wastewater basins, DWF's are typically estimated based on the area contributing to flows and flow coefficients developed for each land use type. This method is based on the assumption that areas with similar land uses, such as low-density residential parcels, produce equivalent quantities of wastewater flow on a per area basis. System-wide flows can be compared to known flows at flow monitors to verify accuracy. This method of estimating base flows is an industry standard for planning and provides sufficiently accurate data for planning purposes.

Existing ADWFs for each basin were estimated using data from the flow monitoring program for each of the flow monitoring basins. ADWF was developed using the driest days from the flow monitoring period based on the following set of minimum criteria:

- Less than 0.1 inch of rain in the previous 24 hours.
- In addition, those dry days that exhibited unusual flow patterns were not used to generate net dry day flow values for a basin.

Characteristic dry weather 24-hour diurnal flow patterns for each site were developed from hourly data. The hourly flow data were also used to calibrate the hydraulic model for the observed DWF's during the flow monitoring period. Hourly patterns for weekday and weekend flows vary and were separated to better define DWF. An example of the ADWF from Flow Meter AUB A-1, are shown in Figure 1.8. Both gross and net ADWF are developed for each meter data set. Gross ADWF corresponds to the total measured flow at the meter and includes all upstream areas while net basin flows are those associated only with the basin as monitored by its meter of the same name, and therefore excludes all flow from upstream meters (if any). A summary of the DWFs is outlined in Table 1.2.

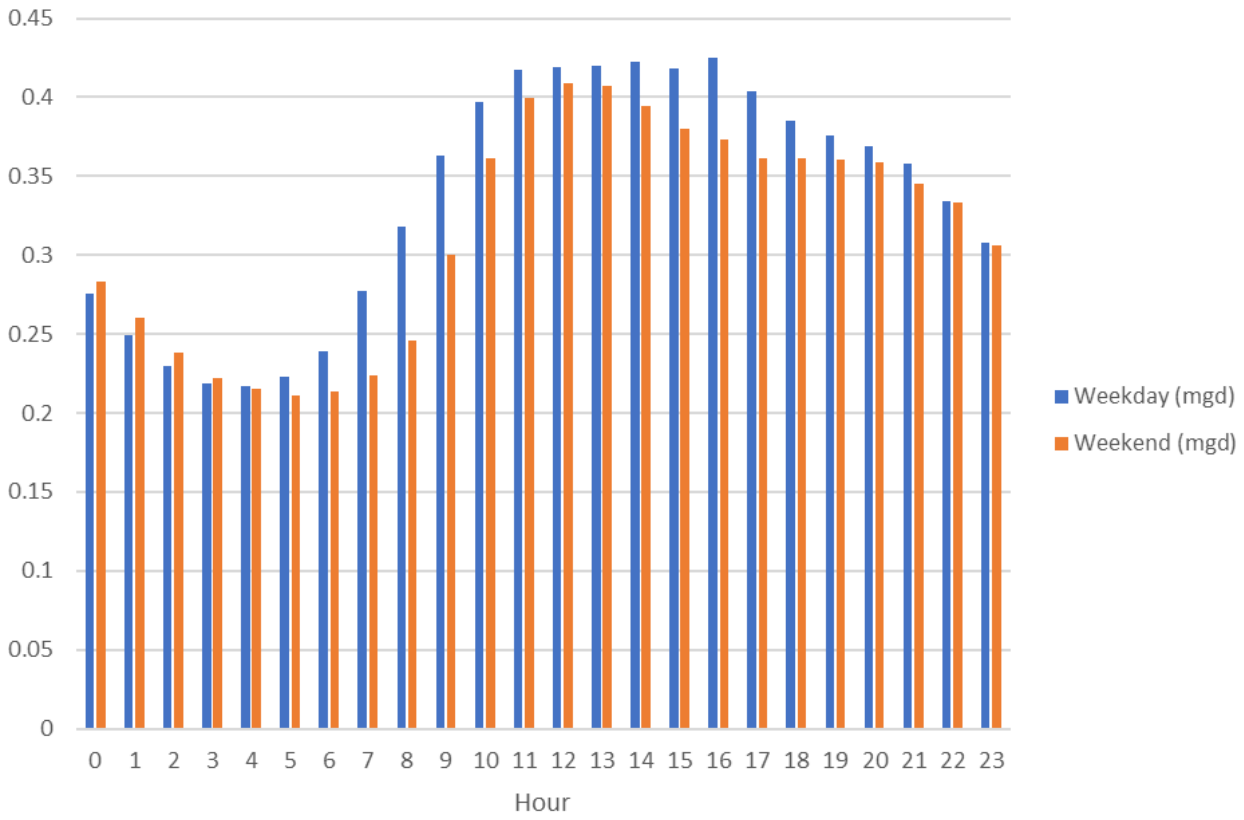


Figure 1.8 Typical Weekday vs Weekend DWF (Meter AUB A-1)

Table 1.2 ADWF Development Summary

Meter ID	Weekday Gross ADWF (mgd)	Weekend Gross ADWF (mgd)	Weekday/Weekend Ratio	Gross ADWF (mgd)	Net ADWF (mgd)
A1	0.336	0.316	1.065	0.330	0.042
A1c	0.229	0.236	0.970	0.231	0.146
A1d	0.085	0.085	1.000	0.085	0.085
A3	0.280	0.284	0.988	0.281	0.281
A4	0.255	0.253	1.010	0.255	0.255
A6	0.091	0.094	0.966	0.092	0.092
A7	0.158	0.112	1.412	0.145	0.003
A9	0.057	0.057	0.998	0.057	0.057
A10	0.286	0.286	1.000	0.286	0.006
A11	0.065	0.066	0.991	0.066	0.008
A12	0.018	0.020	0.872	0.018	0.018
A13	0.044	0.045	0.977	0.044	0.044
A14	0.177	0.181	0.983	0.178	0.122
A15	0.056	0.059	0.953	0.057	0.057
A16	0.239	0.242	0.987	0.240	0.240
Y-1	0.396	0.415	0.954	0.401	0.401
Y-2	1.023	1.060	0.965	1.033	1.033
Y-3	0.658	0.657	1.002	0.657	0.657
Y-4	0.141	0.148	0.955	0.143	0.143
WINT003	3.271	3.258	1.004	3.267	2.321
MSTTR02	0.336	0.316	1.065	0.330	0.661
AUBRN53	7.817	7.800	1.002	7.812	0.949

Abbreviations: mgd - million gallons per day.

1.4.2.2 Rainfall Data

An important part of the flow monitoring program is the collection and analysis of rainfall data. Four significant rainfall events occurred during the course of the flow monitoring period, as well as a few other relatively minor events. The storms recorded during the flow monitoring program generated an I/I response in the collection system and were appropriate for I/I analysis and model calibration purposes. The hourly flow measured at seven different rain gauges recording rainfall over the course of the flow monitoring program are illustrated in Figure 1.9. Figure 1.10 illustrates the total accumulation of rainfall over the course of the flow monitoring period for the gauges including the ADS tipping bucket type rain gauge (RG41Y). Table 1.3 summarizes the four largest events over the total rainfall period, recorded at the RGAUB rain gauge. The RGAUB rain gauge best represented the rainfall distribution between the gauges and was used in the model for WWF calibration.

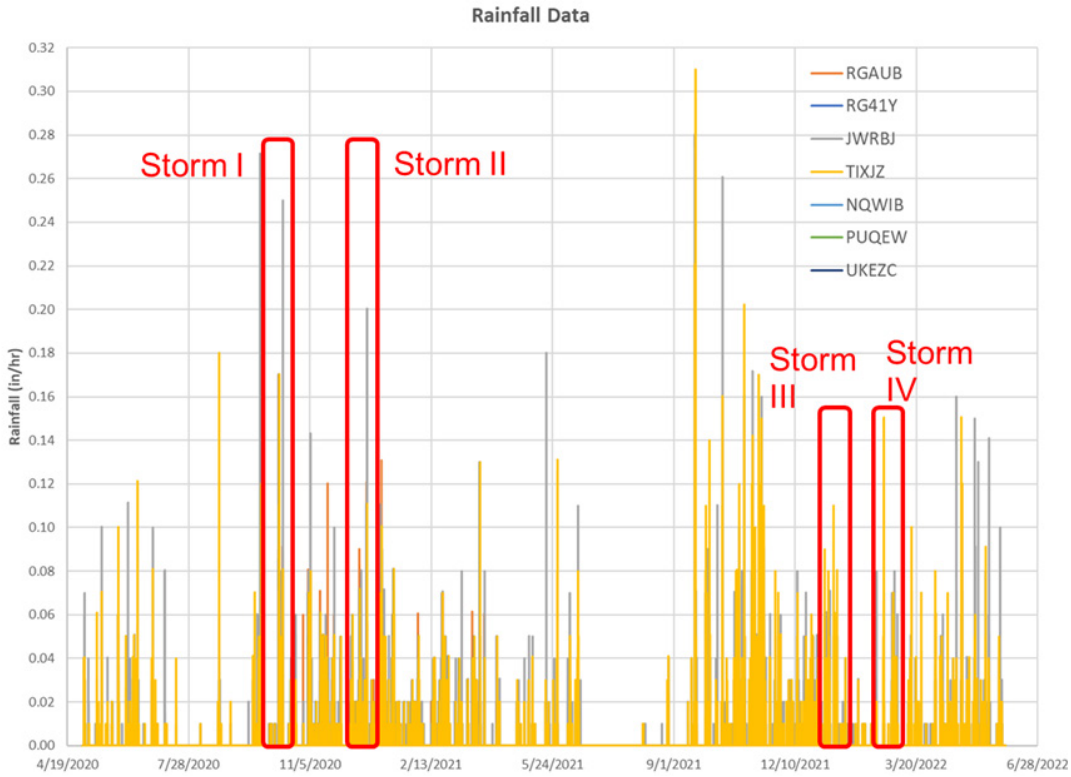


Figure 1.9 Rainfall Intensity

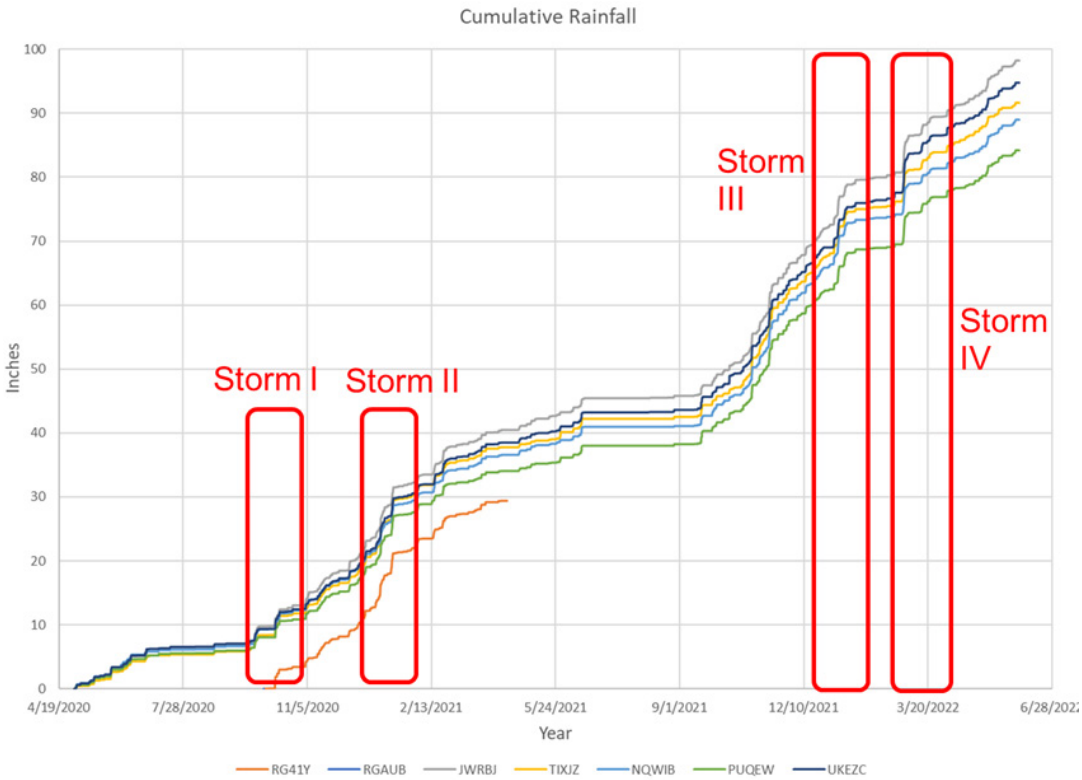


Figure 1.10 Cumulative Rainfall

Table 1.3 Largest Storm Events

Storm Event	Start Date	End Date	Total Event Rainfall (inch)	Max 24-hour Volume (inch)	Peak Intensity (inch/hour)
Storm I	October 6, 2020	October 13, 2020	1.98	1.52	0.17
Storm II	December 30, 2020	January 6, 2021	4.06	1.66	0.13
Storm III	January 8, 2021	January 15, 2021	3.20	2.08	0.06
Storm IV	February 18, 2021	February 25, 2021	1.67	1.31	0.07

1.5 Zoning and Land Use Data

Land use designations and regulations provide important information in evaluating existing sewer system capacity. Land use determines the area available for various types of development including both single-family and multi-family residential development, as well as commercial and industrial uses that provide the economic base necessary to support residential development.

Land use information is an integral component in estimating the amount of wastewater generated within any City. The type of land use in an area will affect the volume of wastewater generated. Additionally, the service area is typically comprised of both sewered and unsewered areas: sewered areas contribute flow to the collection system, while unsewered areas are vacant, undeveloped land, or development such as parks or parking facilities without a wastewater connection and do not currently contribute flow to the collection system.

Future land use designations can be different from the existing zoning designations. A relationship between existing and future designations was developed, based on the Comprehensive Land Use Plan. This relationship was expanded based on the City's geographic information system (GIS) Table 1.4 summarizes the correlation between zoning and land use and was used to develop wastewater flow coefficients.

Table 1.4 Existing Zoning and Future Land Use Correlation

Land Use Designation	Zoning
Residential Conservancy	Residential Conservancy
Single Family	Residential 20, 16, 7, 5, 1 du/Acre, Planned Unit Development District, Lea Hill Overlay
Moderate Density Residential	Residential 10 du/acre
Heavy Commercial	Heavy Commercial District, Mixed Use Commercial
Light Industrial	Light Industrial District, Central Business District
Light Commercial	Light Commercial District, Neighborhood Shopping District
Heavy Industrial	Heavy Industrial District
Multi-Family	Residential Manufactured/Mobile Home Community
Institutional	Institutional Use District, Public Use District, Airport Landing Field District
Downtown Urban Center	Downtown Urban Center
Neighborhood Commercial	Residential Office District, Residential Office District-Hospital
Open Space	Open Space
Parks	Parks

Abbreviations: du/acre – dwelling units

1.5.1 Zoning and Existing Served and Connected Area

The current zoning within the existing service area is shown in Figure 1.11. Right-of-Ways, unbuildable land, open space and parks were removed from this analysis, as these areas are assumed to contribute no sanitary flows to the collection system. Table 1.5 provides a summary of the zoning categories and acreages for the existing service area and connected area from each category.

Table 1.5 Existing Zoning Summary

Zoning	Area (acres)	Percent of Total Area
Airport Landing Field District	110	0.6%
Central Business District	28	0.2%
Downtown Urban Center	91	0.5%
Heavy Commercial District	1,183	6.6%
Heavy Industrial District	776	4.3%
Institutional Use District	1,041	5.8%
Lakeland Hills South Special Plan Area – Planned Unit Development	667	3.7%
Light Commercial District	242	1.3%
Light Industrial District	1,272	7.1%
Mixed Use Commercial	67	0.4%
Neighborhood Shopping District	9	0.0%
Open Space/Parks	1,125	6.3%
Planned Unit Development District	136	0.8%
Public Use District	531	3.0%
Residential 1 du/acre	751	4.2%
Residential 10 du/acre	205	1.1%
Residential 16 du/acre	38	0.2%
Residential 20 du/acre	511	2.8%
Residential 5 du/acre	2,758	15.3%
Residential 7 du/acre	1,617	9.0%
Residential Conservancy	1,245	6.9%
Residential Manufactured/Mobile Home Community	443	2.5%
Residential Office District	75	0.4%
Residential Office District-Hospital	1	0.0%
Terrace View District	50	0.3%
Unclassified Use District	379	2.1%
Unknown(1)	501	2.8%
Right-of-Way	2,116	11.8%
Total	**17,968**	**100.0%**

Notes:
(1) Land Use is based on City's GIS, areas within the service boundary, but outside City limits including the area in Kent, Bonney Lake and unincorporated King and Pierce County are listed as Unknown.

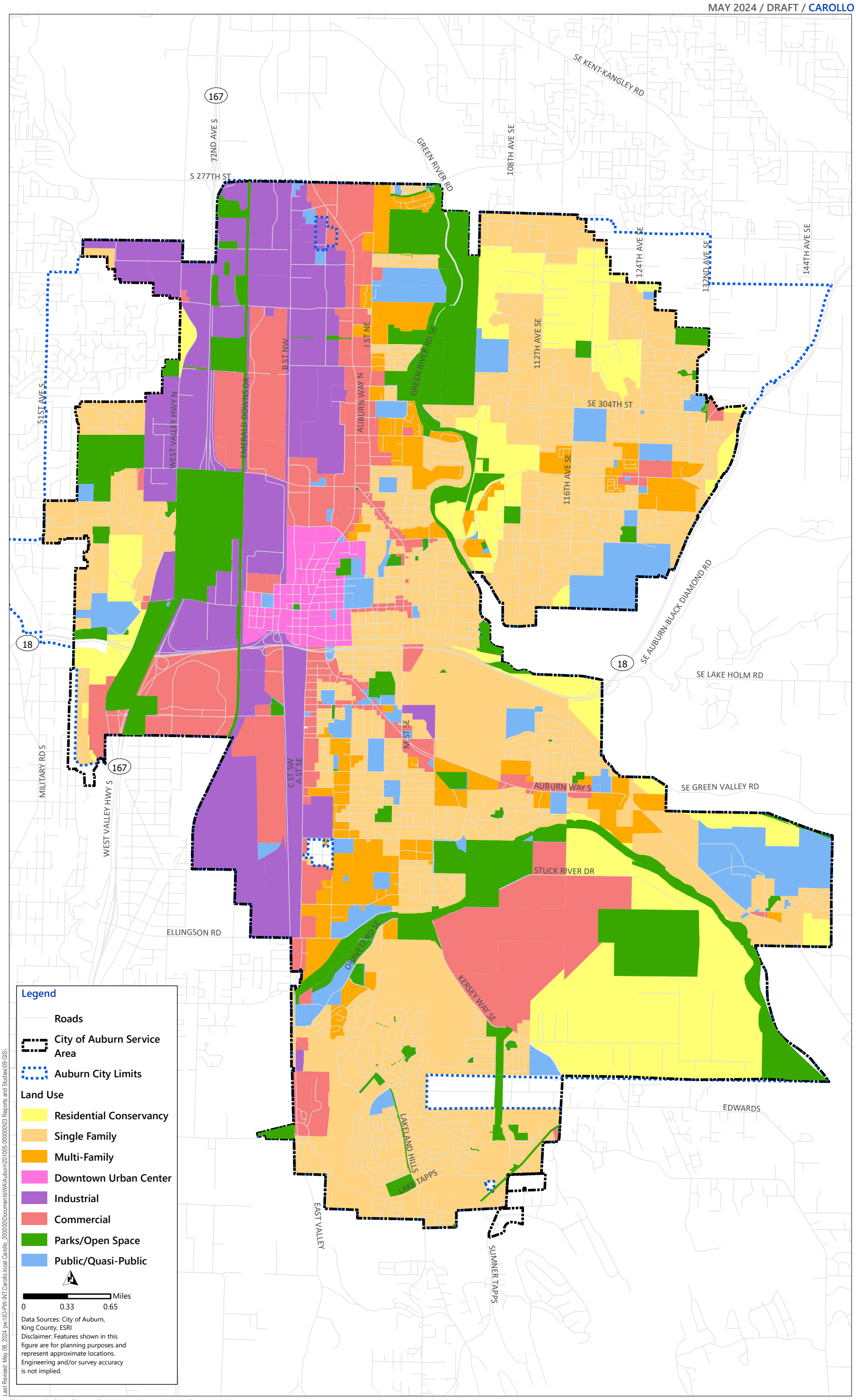


Figure 1.11 City of Auburn Land Use Designations

1.5.2 Future Land Use

Table 1.6 provides land use summary for the existing service area. Open space, parks, unbuildable land, Streets, and Right-of-Way are removed from this analysis and are assumed to contribute zero sanitary sewer flow in the future. The future land use within the existing service area is shown in Figure 1.12. The Land Use elements of the Comprehensive Plan can be found in Attachment 1C.

Table 1.6 Future Land Use Summary

Land Use Designation	Area (acres)	Percent of Total Area
Downtown Urban Center	213	1.2%
Heavy Commercial	1,529	8.5%
Heavy Industrial	753	4.2%
Institutional	2,167	12.1%
Light Commercial	335	1.9%
Light Industrial	1,325	7.4%
Moderate Density Residential	449	2.5%
Multi-family	1,096	6.1%
Neighborhood Commercial	82	0.5%
Neighborhood Commercial Overlay	53	0.3%
Open Space/Parks	1,438	8.0%
Residential Conservancy	1,297	7.2%
Single Family	6,977	38.8%
Unknown(1)	254	1.4%
Total	**17,968**	**100.0%**

Notes:
(1) Land Use was provided from City's GIS. Note it does not cover the entire wastewater service area. The unknown portion is unincorporated areas including the area in Kent, Bonney Lake Areas and unincorporated King County Area.

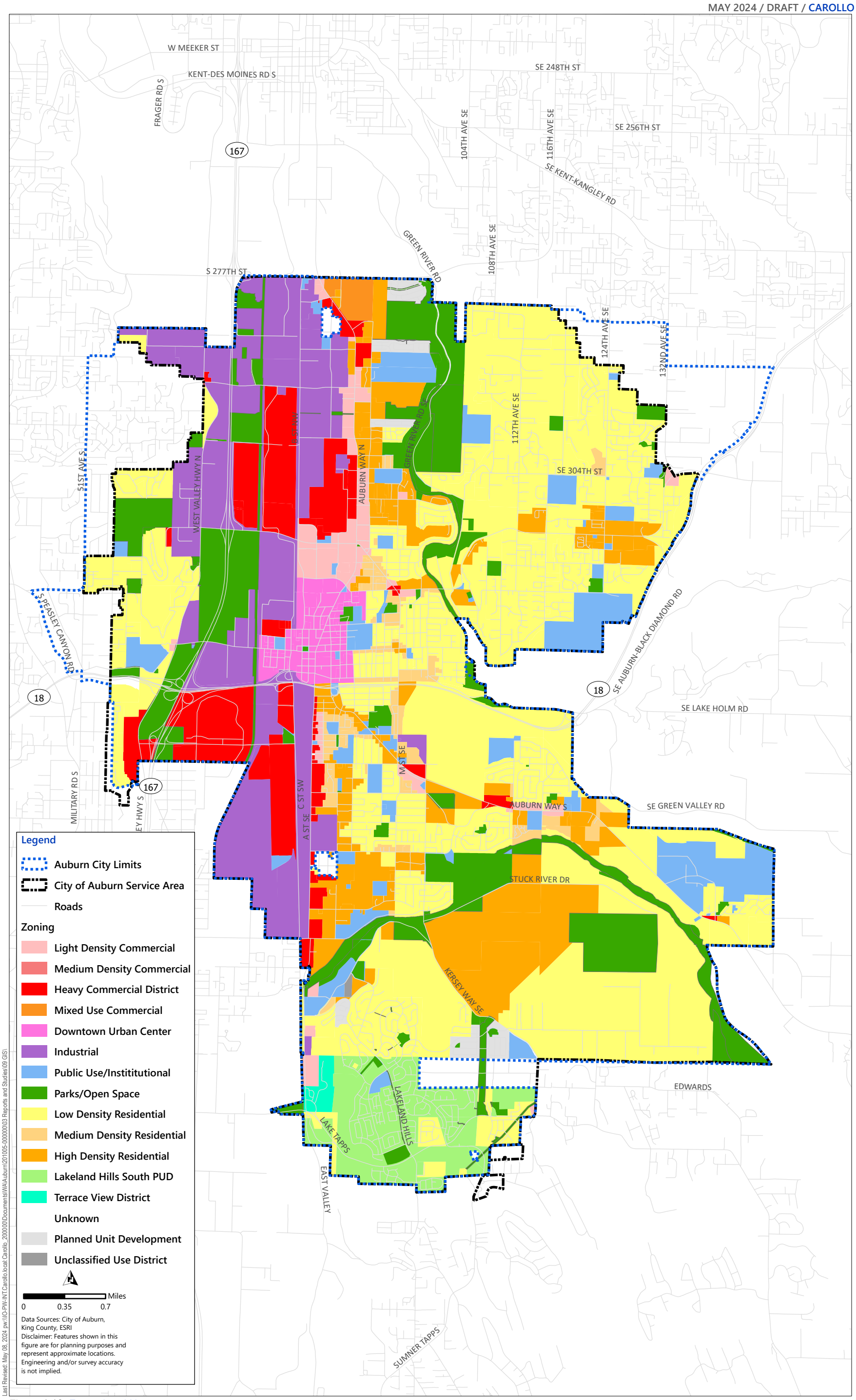


Figure 1.12 Future Land Use
CITY OF AUBURN
2024 COMPREHENSIVE SEWER PLAN

1.6 Wastewater Flow Factors

In order to develop wastewater flow projections and allocate future flows to the collection system, relationships between land use and wastewater generation were developed. These relationships, called wastewater flow factors are established based on the average wastewater flow generated for each existing land use type. The land use flow factors were established to project the estimated ADWF through future development of the City's wastewater collection system and project future flows within the existing service area boundary.

Average wastewater flow coefficients are volume rates, usually expressed in gallons per day per acre (gpda), applied to either gross or net acres to calculate average day flow generated from a particular land use type. A flow coefficient was developed for each of the land use classifications that were discussed previously. The flow coefficient provides a means to transform a land use category from acreage into wastewater flow. The resulting flow is then inputted into the appropriate sewer area in the sewer system model. Wastewater flow coefficients for residential areas typically range between 500 to 3,000 gpda, and commercial and industrial areas might range from 1,000 to 4,000 gpda, with typical values averaging approximately 1,500 gpda. Land uses designated as open space and parks are assumed to generate negligible amounts of sewage flow, and as a result have a flow coefficient of zero.

Figure 1.13 outlines the portion of the system that is currently considered sewered and contributing flows to the collection system. This acreage is assigned to each catchment in the system and used for rainfall runoff routing.

Flow monitoring basins were developed to define the upstream tributary area for each meter selected for calibration, using only connected and developed parcels. Flow factors are applied across these flow monitoring basins to allocate ADWF. Figure 1.14 outlines the flow monitoring basins used for this process.

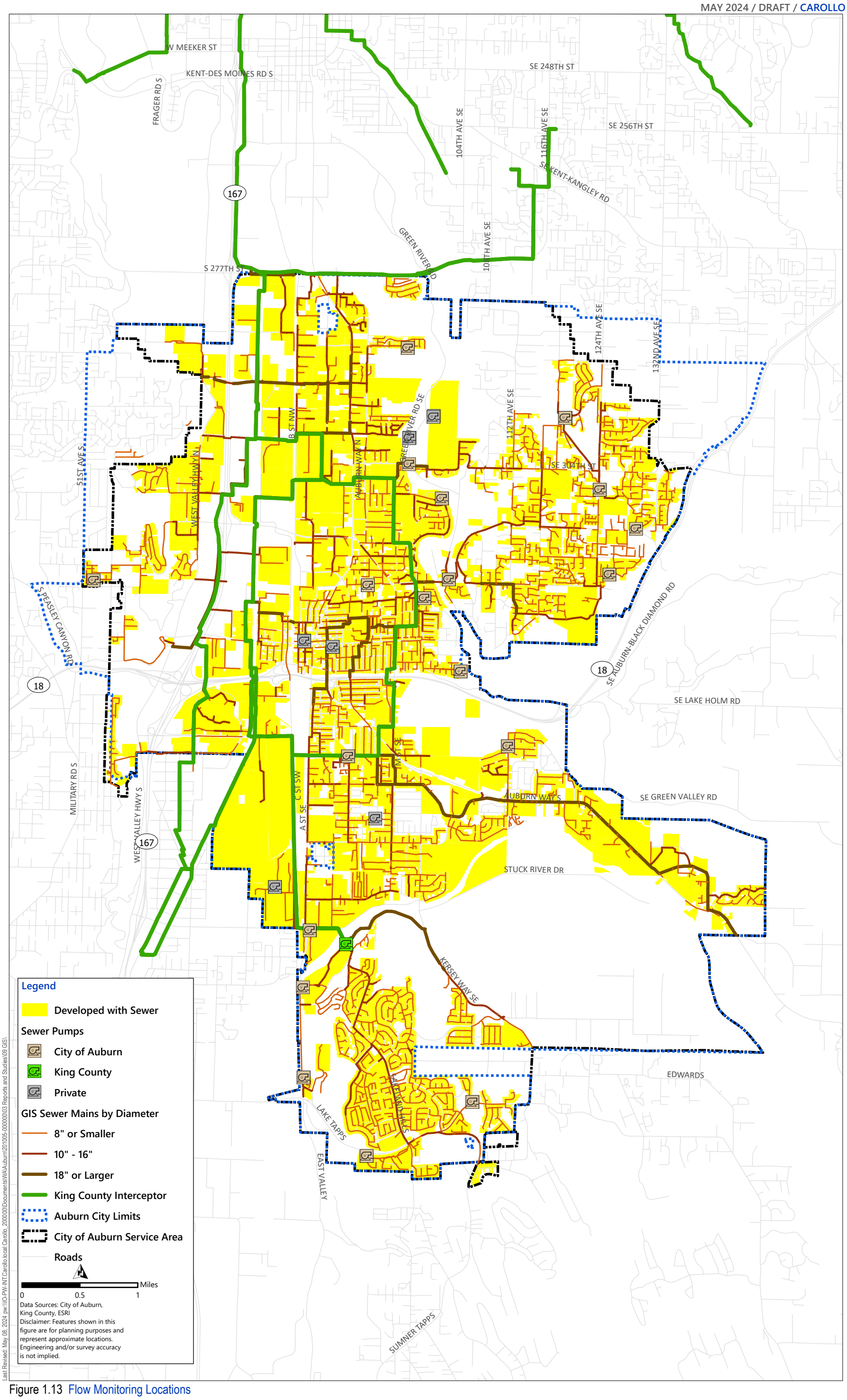


Figure 1.13 Flow Monitoring Locations
CITY OF AUBURN
2024 COMPREHENSIVE SEWER PLAN

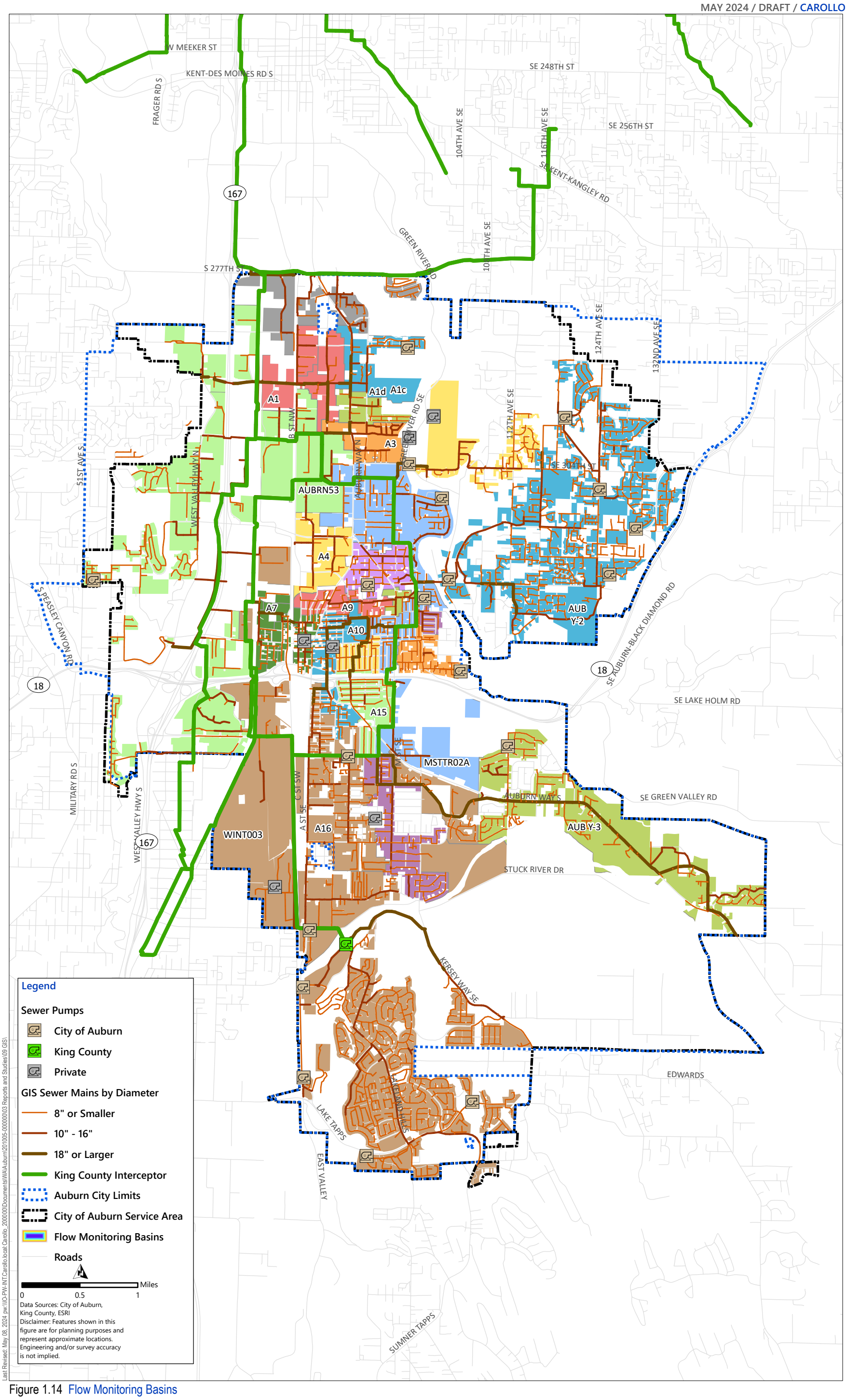


Figure 1.14 Flow Monitoring Basins
CITY OF AUBURN
2024 COMPREHENSIVE SEWER PLAN

1.6.1 Flow Factor Development

The coefficients are developed using the following procedure:

- Average flows for each flow metering tributary area were extracted from the flow-monitoring data (see Section 1.4).
- The acres for each land use type contained in each flow-monitoring tributary area were calculated using GIS data.
- Preliminary coefficients for each land use type were assumed based on typical values, which can be estimated from the approximate number of dwelling units per acre, the assumed per capita wastewater generation rates, and/or the typical number of people per dwelling unit for each land use type.
- The coefficients for each flow metering tributary area are adjusted up or down (balanced) within a reasonable range (based on engineering judgment) until the calculated average flows from each tributary matched flow monitoring period measurements. If the flow coefficients produced average flows that were significantly different from the field measured flows, further investigation was conducted to verify that the tributary basins were delineated correctly and if the collection system configuration was correct.
- Once the coefficients for the 22 flow meter tributary areas are balanced, the weighted average of the coefficients for each land use type is calculated based on the acreage contribution from each metering tributary area.
- The flow coefficients were then adjusted to balance the calculated flows for the overall developed sewer service area, where flow-monitoring data was available.

The weighted wastewater flow coefficients and land use areas that represent existing ADWF are summarized in Table 1.7. The land use coefficients generate an ADWF to the modeled collection system of 7.77 mgd, a -0.5 percent difference from the measured ADWF of 7.81 mgd.

Wastewater flow factors were compared to the Comprehensive Plan, Attachment 1C, to confirm they correspond to the densities and allowable dwelling unit per acre for each land use type. This was done at a flow monitoring basin level such that the flow factors matched the relative densities, however when averaged out across the system some flow factors are smaller or larger than the expected density based on the flow monitoring basin the majority of the land use acreage is within. The detailed flow factors at a flow monitoring basin level are shown in Attachment 1D.

Table 1.7 Flow Factor Development Summary

Land Use Type	Developed Area (acres)	Wastewater Flow Factor (gpda)	Existing ADWF (mgd)
Single Family	2,778	920	2.56
Moderate Density Residential	147	950	0.14
Residential Conservancy	11	800	0.01
Open Space	1	0	0.00
Neighborhood Commercial	64	1,020	0.07
Multi-Family	335	2,440	0.82
Light Industrial	721	530	0.38
Light Commercial	165	640	0.11
Institutional	953	1,230	1.17
Heavy Commercial	861	1,920	1.65
Heavy Industrial	414	1,890	0.78
Downtown Urban Center	58	1,500	0.09
Undeveloped Acreage	3,928		
Total	17,968		
		Total Estimated ADWF	**7.77**
		Measured ADWF	**7.81**
		Percent Difference	**-0.5%**

1.7 Hydraulic Model Overview

A wastewater collection system model is a simplified representation of the real sewer system. Wastewater system models can assess the conveyance capacity of the collection system. The model can be used to size new infrastructure. In addition, sewer system models can perform "what if" scenarios to assess the impacts of future developments and land use changes. The City's collection system hydraulic model was updated and expanded using a multi-step process utilizing data from a variety of sources. This section summarizes the hydraulic model development process, including a description of the modeled collection system, the hydraulic model elements, and the model creation process.

1.7.1 Selected Hydraulic Modeling Software

The City's previous collection system hydraulic model was developed using the Mike Urban hydraulic modeling software package, developed by DHI. This project converted the model from Mike Urban to Mike+, the current DHI collection system product. The hydraulic modeling engine for the Mike+ software package is now 1D, it was previously MOUSE. The model was updated to use the 1D engine, which is widely used throughout the world for planning, analysis, and design related to stormwater runoff, combined sewers, sanitary sewers, and other free surface drainage systems such as streams and rivers.

The latest version (2022) of Mike+ was used for the hydraulic model update. More information about the modeling software can be found in the Mike+ Collection Systems Guide[1].

1.7.2 Modeled Collection System and Skeletonization

The City provided Carollo Engineers, Inc. with an initial skeletonized model. Skeletonization is the process of identifying the key system conveyance components to include in the model. Smaller pipelines not considered essential for the intended analysis purpose are removed from the modeled set. The purpose of skeletonizing a system is to develop a model that accurately simulates the hydraulics of a collection system, while at the same time reducing the complexity as well as computational run times and to simplify data management.

It is common practice in sewer system master planning to exclude small diameter sewers when developing a hydraulic computer model. Key sewers are included in the City's hydraulic model where needed for connectivity, or where it was determined that the pipes in question were considered as primary collectors. The collection system remains skeletonized for this project, with no increase in modeled system coverage. Pipes were updated to reflect projects and changes that occurred since the last plan.

1.7.3 Elements of a Hydraulic Model

The following provides a brief overview of the various elements of the hydraulic model and the required input parameters associated with each:

- **Nodes (Manhole):** Sewer manholes, cleanouts, and other locations where pipes begin, pipe sizes change, or pipelines intersect are represented by junctions in the hydraulic model. Required inputs for junctions include rim elevation, invert elevation, diameter, and surcharge depth (used to represent pressurized systems). Nodes are also used to represent locations where flows are split or divided between two or more downstream links.
- **Pipes:** Gravity sewers and force mains are represented as pipes in the hydraulic model. Input parameters for pipes include length, friction factor (e.g., Manning's n for gravity mains, Hazen Williams C for force mains), invert elevations, diameter, shape, and whether or not the pipe is a force main.
- **Nodes (Basin):** For collection system modeling, basins are typically used to represent pump station wet wells (although other storage basins, etc., can be modeled as basin). Input parameters for basins include invert elevation, wet well depth, and wet well cross section or a depth-area relationship.
- **Pumps:** Pumps are included in the hydraulic model as links. Input parameters for pumps include pump curves and operational controls.
- **Nodes (Outfalls):** Outfalls represent areas where flow can leave the system. For sewer system modeling, an outfall typically represents an overflow point or the connection to the wastewater treatment plant.
- **Boundary Conditions (Rainfall):** Rain gauges are locations where rainfall is input to the hydraulic model for simulation of WWF. The rain can be historical, projected, or theoretical hourly rainfall events.

[1] Mike+ Collection System User Guide, DHI 2022.

- **Catchments:** Catchments represent areas of land whose topography and drainage characteristics direct flow to a single discharge point into the sewer system. Catchments can be used to define sanitary flows or to route a portion of the rainfall runoff into the system. Inflow conditions for the catchments are defined model inputs. Figure 1.15 outlines all the modeled catchments in the collection system model.
- **Inflows:** There are two primary flow sources that enter into the collection system, which are input through individual junctions (and storage nodes) in the model:
  - *Dry Weather. Dry weather inflows simulate base sanitary wastewater flows and represent the average flow. The DWF can be multiplied by up to four patterns that vary the flow by month, day, hour, and day of the week (e.g., weekday or weekend). The dry weather diurnal patterns are adjusted during the dry weather calibration process to match the known typical daily flow fluctuations. Two diurnal patterns were developed for each basin, respectively representing weekday and weekend days (see Section 1.4.2.1).*
  - *Rainfall derived infiltration and inflow (RDII). RDII are flows into the collection system originating from rainfall. Several models are available in Mike Urban to capture these effects. The models have a number of parameters that are adjusted during the wet weather calibration process to model the flows into the collection during different storm events.*

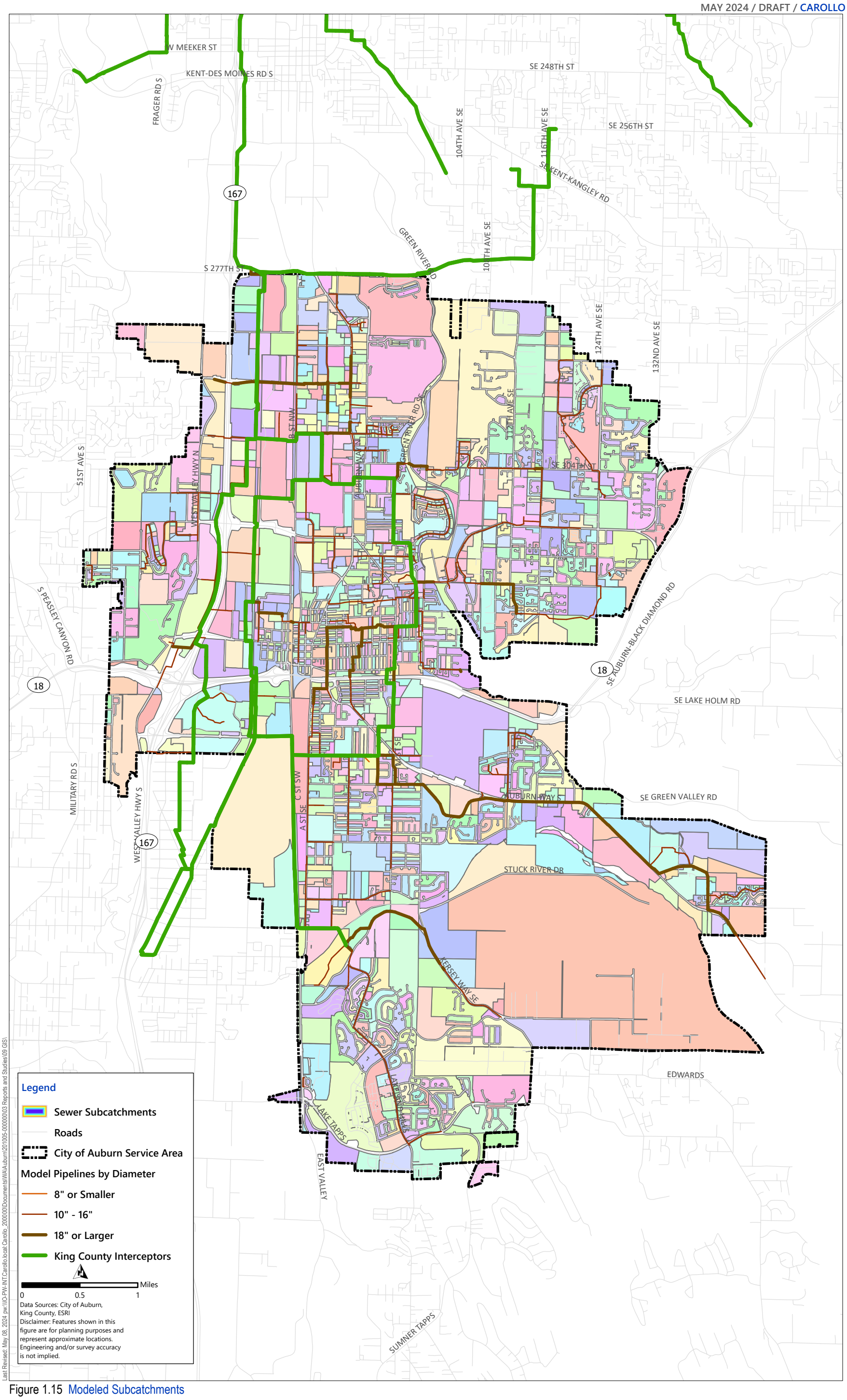


Figure 1.15 Modeled Subcatchments
CITY OF AUBURN
2024 COMPREHENSIVE SEWER PLAN

1.8 Hydraulic Model Calibration

Hydraulic model calibration is a crucial component of the hydraulic modeling effort. Calibrating the model to match data collected during the flow monitoring program ensures the most accurate results possible. The calibration process consists of calibrating to both dry and wet weather conditions.

For this project, both dry and wet weather calibration were conducted at the 22 metering sites presented and discussed in Section 1.4:

- DWF calibration ensures an accurate depiction of ADWF generated within the existing service area, and diurnal fluctuations.
- WWF calibration consists of calibrating the hydraulic model to a specific storm event or events to accurately simulate the peak flow and volume of I/I into the sewer system. The amount of I/I is essentially the difference between the WWF and DWF components.

1.8.1 Calibration Standards

The hydraulic model was calibrated in accordance with international modeling recommendations. The Urban Drainage Group (UDG), formerly known as Wastewater Planning Users Group, a section of the Chartered Institution of Water and Environmental Management (CIWEM), has established generally agreed upon principles for model verification. The dry weather and wet weather calibration focused on meeting the recommendations on model verification contained in the "Code of Practice for the Hydraulic Modeling of Urban Drainage Systems," published by the CIWEM UDG[2], as summarized below.

1.8.1.1 Dry Weather Calibration Standards

Dry weather calibration should be carried out for two dry weather days and the modeled flows and depths should be compared to the field-measured flows and depths. Both the modeled and field-measured flow hydrographs should closely follow each other in both shape and magnitude. In addition to the shape, the flow hydrographs should also meet the following criteria as a general guide:

- The timing of flow peaks and troughs should be within 1 hour.
- The peak flow rate should be within the range of ±10 percent.
- The volume of flow (or the average rate of flow) should be within the range of ±10 percent. If applicable, care should be taken to exclude periods of missing or inaccurate data.
- The unsurcharged depth should be within ±10 percent or ±4 inches, whichever is greater.

[2] UDG, Code of Practice for the Hydraulic Modelling of Urban Drainage Systems, 1st Edition CIWEM 2017 www.ciwem.org.

1.8.1.2 Wet Weather Calibration Standards

For each meter, three separate storms should be simulated with the model. For at least two storms out of the three events from the flow monitoring period, the model-simulated flows and depths should match the field-measured flows and depths within the accepted criteria. The modeled and field flow hydrographs for the calibration storms should closely follow each other in both shape and magnitude, until the flow has substantially returned to DWF rates.

In addition to the shape, the flow hydrographs should also meet the following criteria as a general guide:

- The timing of the peaks and troughs should be similar with regard to the duration of the events.
- The peak flow rates at significant peaks should be in the range of +25 percent to -15 percent and should be generally similar throughout.
- Modeled volume of flow should be within +20 percent to -10 percent of measured volume of flow.
- The depth of surcharge should be in the range of +20-inches to -4-inches.
- The difference between maximum unsurcharged depth should be within the range of ± 4-inches.

The UDG recommends that for wet weather calibration, the use of a single calibration period incorporating a number of rainfall events should be considered whenever possible. In other words, if the flow monitoring program captured several back to back storms, it may be preferable to use the back to back storms events as the calibration storms, as opposed to calibrating to two separate storms that have occurred weeks or months apart. Model calibration simulations should be run for a duration long enough that the RDII response is no longer apparent in the measured data.

1.8.2 DWF Calibration

1.8.2.1 Dry Weather Calibration Process

The DWF calibration process consists of several steps, as outlined below:

- The first step in the calibration process was to divide the City into flowmeter tributary areas. GIS analysis was used to create 22 tributary areas, one for each flowmeter from the flow monitoring program that was selected to be used for calibration. A map showing the locations of each flow monitoring site and their associated tributary area was provided in Section 1.4 and Section 1.6, along with a schematic of the flow meters.
- The next step was to define the flow volumes within each area, which was accomplished by applying the flow factors outlined in Table 1.7 to the catchments proportionally based on the distribution of land use types withing the catchment.

- The last step is to create diurnal patterns to match the temporal distribution of flow. A diurnal curve is a pattern of hourly multipliers that are applied to the base flow to simulate the variation in flow that occurs throughout the day. Two diurnal curves were developed for each flow monitoring tributary area, one representing weekday flow and one representing weekend flow. The diurnal patterns were initially developed based on the flow monitoring data and adjusted as part of the calibration process until the model-simulated flows closely matched the field-measured flows. Figure 1.16 shows the calibrated weekday and weekend diurnal patterns for the area tributary to Meter AUB A1. Similar diurnal curves were developed for each of the meters and its tributary area. These additional curves are available in Attachment 1E.

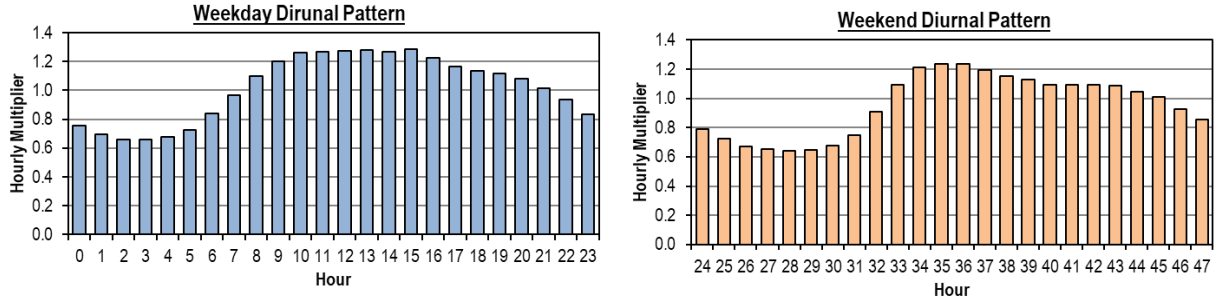


Figure 1.16 Example Diurnal Pattern

1.8.2.2 Dry Weather Calibration Discussion

Table 1.8 provides a summary of the DWF calibration using the average and daily peak flow results for both weekday and weekend conditions. As shown on Table 1.8, the model-simulated average for all sites are within 10 percent. The peak flows for both weekday and weekend DWF were all within 10 percent, except for meters A3, A7, Y-2, and MSTTR02A. Those four meters showed variability between weekday and weekend volume, but still match for the average day DWF.

Attachment 1E contains a detailed DWF calibration summary sheet for each of the 22 metering sites. Each calibration sheet provides plots that compare the model-simulated and field-measured flow data for both weekday and weekend conditions. An example of the dry weather calibration for Meter AUB A1 is shown on Figure 1.17.

There is good overall correlation of the field-measured data to the model output results. A total of 18 of 22 meters meet criteria for both level and velocity, indicating a well calibrated model for DWFs. Manning's n values were adjusted by flow monitoring basin so that modeled levels would better match the measured data. However, even after these changes some levels could not be matched. The Mike 1D engine simulates flow well under these conditions, but level and velocity are less accurate with the Saint-Venant equations meant for free flow conditions.

To account for this, the modeled manhole head losses were adjusted for steep pipes throughout the collection system. For pipes with slopes greater than 0.01 or 1 percent, the head loss was defined as weighted inlet energy with a smaller effective area instead of the default Mouse Classic Engelund. This change ignores inlet expansion losses and assumes the energy level in the manhole equals the inlet pipe. Thus, the manhole level is reduced to better match the field measured data for steep slopes. These

changes moved the levels closer to being in criteria, but the level changes were not significant enough that all these sites could not be moved into calibration criteria.

All 4 meters outside of criteria had higher modeled levels than measured level. Meter A6, A7, Y-2, are all meters located on steep pipe slopes where a hydraulic jump is occurring. These sites are also at points where the pipe size is transitioning. The monitoring at Site A6 was done at a manhole that transitions from a 12-inch to a 30-inch, site A7 was done at a manhole that transitions from an 18-inch to a 36-inch, and Y-2 is where 14-inch transitions to a 24-inch. The modeled levels are exported at the downstream end of the pipe in the monitoring manhole where the hydraulic grade line (HGL) is governed by larger diameter downstream pipe, leading to higher levels than measured. These three sites remained out of criteria for WWF as well.

Site AUBRN53 was also slightly out of criteria but moved into criteria during WWF's so this was deemed less of a concern.

Table 1.8 DWF Calibration Results

Flow Meter ID	Weekday Average Flow Percent Error	Weekday Peak Flow Percent Error	Weekday Max Level Difference (inches)	Weekend Average Flow Percent Error	Weekend Peak Flow Percent Error	Weekday Max Level Difference (inches)	ADWF Percent Error
A1	-3.3%	-4.1%	1.62	2.9%	8.2%	1.55	-1.6%
A1c	4.5%	1.4%	2.50	1.6%	-2.1%	2.69	3.7%
A1d	-5.4%	-5.7%	0.93	-4.7%	-5.2%	0.93	-5.2%
A3	-4.9%	-7.5%	1.56	34.3%	30.9%	1.22	3.7%
A4	-5.4%	-5.6%	0.26	-4.3%	-4.5%	0.29	-5.1%
A6	-3.8%	3.9%	6.67	-7.9%	-0.5%	6.68	-5.0%
A7	-8.7%	-9.6%	11.39	29.0%	28.3%	11.99	-0.4%
A9	-1.8%	-3.2%	0.61	-1.9%	-4.8%	0.71	-1.8%
A10	-1.9%	-9.5%	1.44	-2.0%	-9.7%	1.75	-1.9%
A11	5.9%	4.7%	0.65	4.9%	0.7%	0.78	5.6%
A12	7.2%	2.8%	0.61	-5.7%	-7.6%	0.60	3.2%
A13	-1.1%	-4.0%	0.37	-0.1%	-1.5%	0.30	-0.8%
A14	-6.0%	-3.1%	1.59	-7.4%	-2.0%	1.66	-6.4%
A15	2.0%	1.6%	0.97	-2.4%	-3.1%	1.08	0.7%
A16	-2.0%	-2.7%	1.43	-3.2%	-4.6%	1.45	-2.4%
Y-1	1.6%	0.8%	0.94	-3.0%	-4.0%	1.08	0.2%
Y-2	1.9%	14.1%	5.30	0.1%	15.9%	5.68	1.4%
Y-3	-2.1%	-2.5%	2.83	-1.6%	-4.1%	2.83	-2.0%
Y-4	8.2%	2.7%	3.99	11.1%	1.1%	3.77	9.0%
WINT003	3.6%	-5.3%	3.87	2.9%	-5.1%	3.74	3.4%
MSTTR02A	11.0%	7.5%	2.28	6.3%	6.4%	2.28	9.6%
AUBRN53	6.1%	4.4%	4.29	6.0%	2.9%	4.71	6.0%

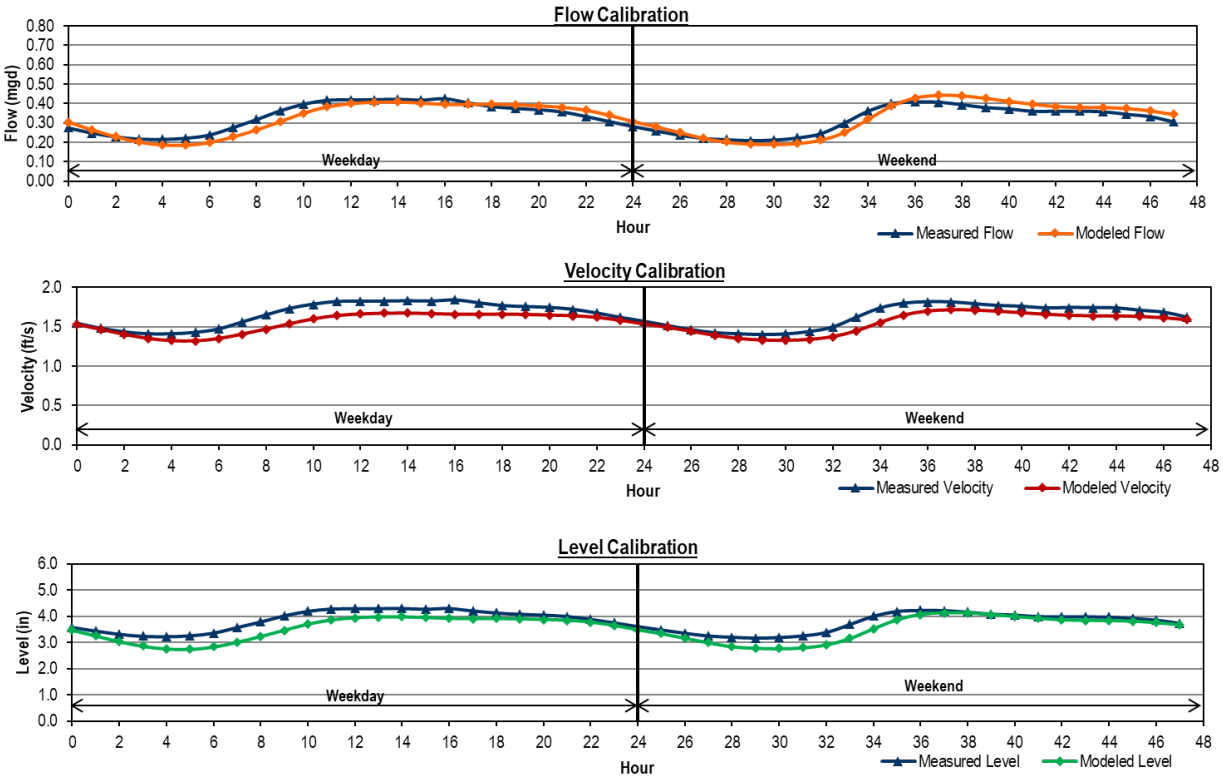


Figure 1.17 Example DWF Calibration (Meter AUB A1)

1.8.3 Wet Weather Flow Calibration

1.8.3.1 Wet Weather Flow Calibration Process

The WWF calibration enables the hydraulic model to accurately simulate RDII entering the collection system during storms. The WWF calibration process consists of running model simulations of historic rainfall events based on data collected as part of a system flow monitoring program. The goal of any WWF monitoring program is to capture and characterize a system's response to a significant rainfall event, preferably during wet antecedent moisture conditions. As outlined below, the WWF calibration process consists of several elements:

- **Identify calibration rainfall events.** The selection of a particular calibration storm or group of storms is based on a review of the flow and rainfall data. There is a good range of different event types available for the different meters. Major rainfall events that were used as calibration rainfall events were identified as part of Section 1.4.2.2. Table 1.3 summarizes the four storms picked for calibration for each of the 2 sites. The use of a single calibration period incorporating a number of rainfall events was considered whenever possible. All meters except for WINT003, MSTR002A, and AUBRN53 used the first three storms, those three used the 4th event due to meter availability. Figure 1.9 illustrated the storms used in the model calibration process.

- **Define RDII tributary areas.** For the WWF calibration, RDII flows are added on top of the DWF. The model calculates two types of response: a slow response corresponding mainly to infiltration, or slow response curve (SRC), and a fast response corresponding mainly to direct inflow, or fast response curve (FRC). Imperviousness is the fraction of the catchment area that is impervious and connected to the collections system, generating the FRC runoff, and rainfall derived infiltration (RDI) Area, which is the fraction of the total catchment area that contributes to the SRC. The imperviousness and RDI runoff component are two major model-specific data in the model calculation of WWFs, and each have a number of subparameter components that are adjusted to tune to response timing. These area values were initially set based on engineering judgment, as well as the previously used values, and then adjusted until the model-simulated wet weather flow volume roughly matched the field-measured flows.
- **Create I/I parameter database and modify to match field-measured flows.** The main step in the WWF calibration process involves adjusting both Model A and RDI parameters for each flow monitoring tributary area. Figure 1.18 provides a schematic of the RDI model used. Attachment 1F summarizes all calibrated parameters by flow monitoring site, for current conditions. As with the dry weather calibration, the wet weather calibration process compared the meter data with the model output. Comparisons were made for average and peak flows as well as the temporal distribution of flow until flows returned to their baseline levels. According to the CIWEM UDG, a hydraulic model is generally considered calibrated to WWF conditions if the modeled peak flows are within +25 percent to -15 percent of the field-measured data, and if the average modeled volumes are within +20 percent to -10 percent of the field-measured data. Calibration was performed for the depth of flow as well, this is considered calibrated when peak depths are with ± 4-inches when unsurcharged, and +20-inches to -4 inches when surcharged.
- **Adjust model variables to match field-measured velocity and flow depths.** Once the model-simulated flows matched the field-measured flows within the acceptable limits, the model-simulated velocity and flow depth were compared to the field-measured velocity and flow depth. Adjustments were made to various model parameters until the modeled and measured velocity and depth closely matched one another. The primary varied parameters for this process are node head losses and pipeline roughness (Manning's n), although other parameters can also be adjusted as calibration results are generated. Sediment buildup and movement in the pipe will also influence the level and depth, but these are very difficult to quantify and can change frequently, therefore they are not included in the calibration.

  Manning's roughness coefficients, or n values, have industry accepted ranges based on a number of variables. Roughness coefficients increase over time depending on the construction methods, installation quality, system maintenance, and other environmental factors. There can be certain factors within the City's collection system that can result in roughness coefficients that differ from the typical range. These could include joint misalignment, cracks, and debris (e.g., root intrusion, etc.) that lead to increased turbulence in a pipe and an increase in the apparent Manning's n factor.

  If the model is unable to reasonably match the field-measured flow depth and velocity within the acceptable range of Manning's roughness coefficients, further investigation should be conducted to help determine the cause of the discrepancy. Some issues that could cause such a discrepancy can include errors in the slope or diameter of a pipeline, downstream blockages, pipeline sags, and, in some cases, influences from downstream pump station operations.

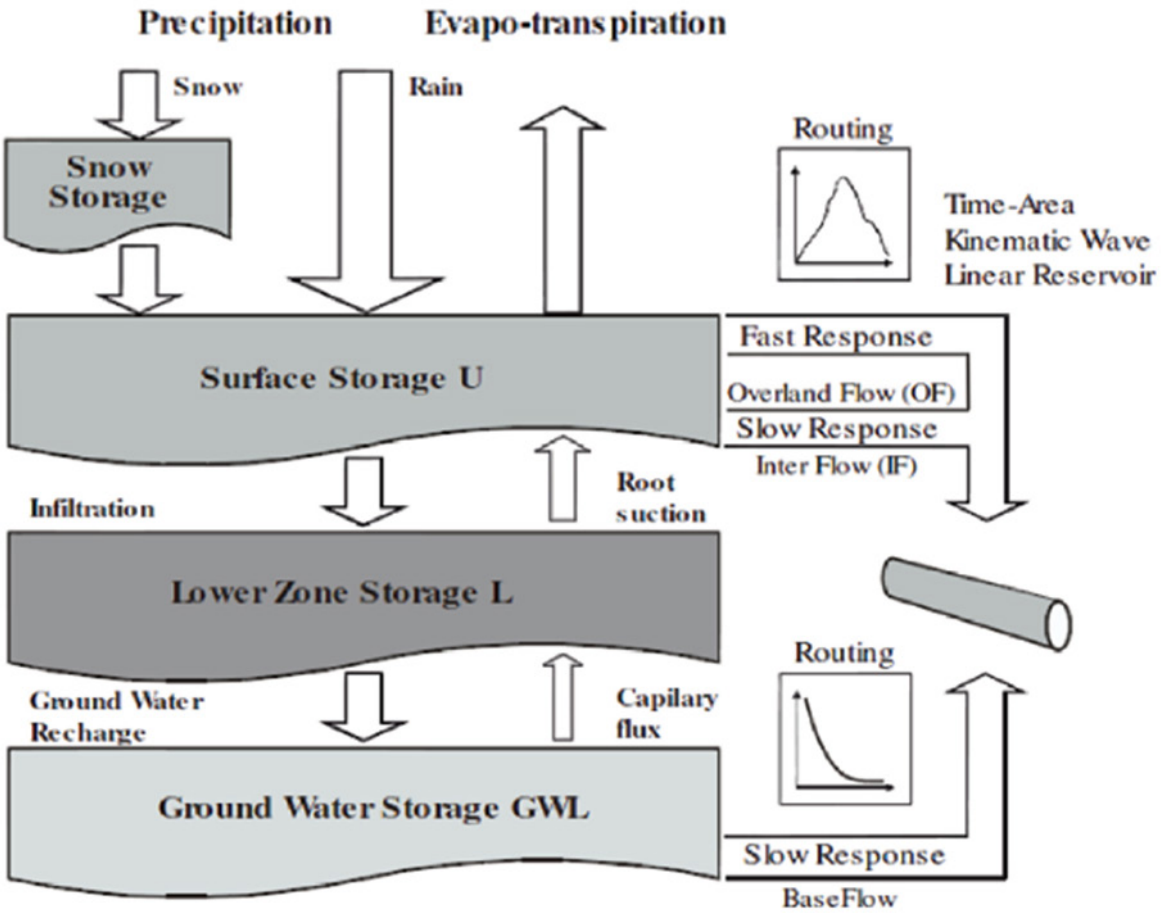


Figure 1.18 RDI Model Schematic

1.8.3.2 Wet Weather Calibration Results

Attachment 1G contains a detailed WWF calibration summary sheet for each of the 22-meter sites. The modeled outputs at each flow meter were compared to the data from three storms recorded during the flow monitoring period for calibration. Each calibration sheet provides plots that compare the model-simulated and field-measured flow, velocity, and level data for the calibration storms. An example of the wet weather calibration for Meter AUB 1A is shown on Figure 1.19.

Table 1.9 provides a summary of the WWF calibration using the total volume and peak flow results. Of the 22 meters, 21 had two or more storm event responses within calibration standards for volume and peak flows. Meter A12 was the only site outside of criteria for volume, peak still matched, and this was due to abnormal DWF data during the WWF calibration period. As shown on Table 1.9, the model-simulated average and peak flows at all other meter sites were within the acceptable tolerances for the calibration storms, and therefore the model was considered calibrated and ready to use for capacity analysis purposes.

As discussed in Section 1.8.1, it is critical that the hydraulic model is not only calibration to volume and peak flow, but also level data. This will ensure accuracy and trust in modeled results when evaluating capacity deficiencies; which are based on a HGL criteria in the collection system.

Modeled data at almost all meters closely matched the recorded level information, of the 22 meters with level data, 18 met the level calibration standard. Meters A6, A7, and Y-2 did not meet the level criteria during DWF either and are discussed in Section 1.8.2. Meter Y-1 fell out of level criteria for WWF. The measured data indicated backwatering and surcharging effects during the latter two storm events, and this surcharging was not replicated in the model. This meter is located right upstream of the Green River Siphon, indicating potential sediment buildup constricting flows in the field, and not replicated in the model.

1.8.3.3 Hydraulic Model Calibration Summary

Calibration of the City's hydraulic model was a multi-step process that involved comparing model-simulated flow to the actual field-measured data for both dry and wet weather conditions. The model met all flow CIWEM standards for ADWF and most standards for level. Results showed the model met CIWEM standards for calculation of flows during peak wet weather flow. The CIWEM level standards were met at 18 of the 22 sites used for model calibration. For the meters outside of level criteria, 3 of the 4 meters were over predicting levels, offering a conservative approach for system analysis. These calibration results provide a high level of confidence in the model's accuracy such that the model can be considered calibrated and ready to use for subsequent capacity analysis.

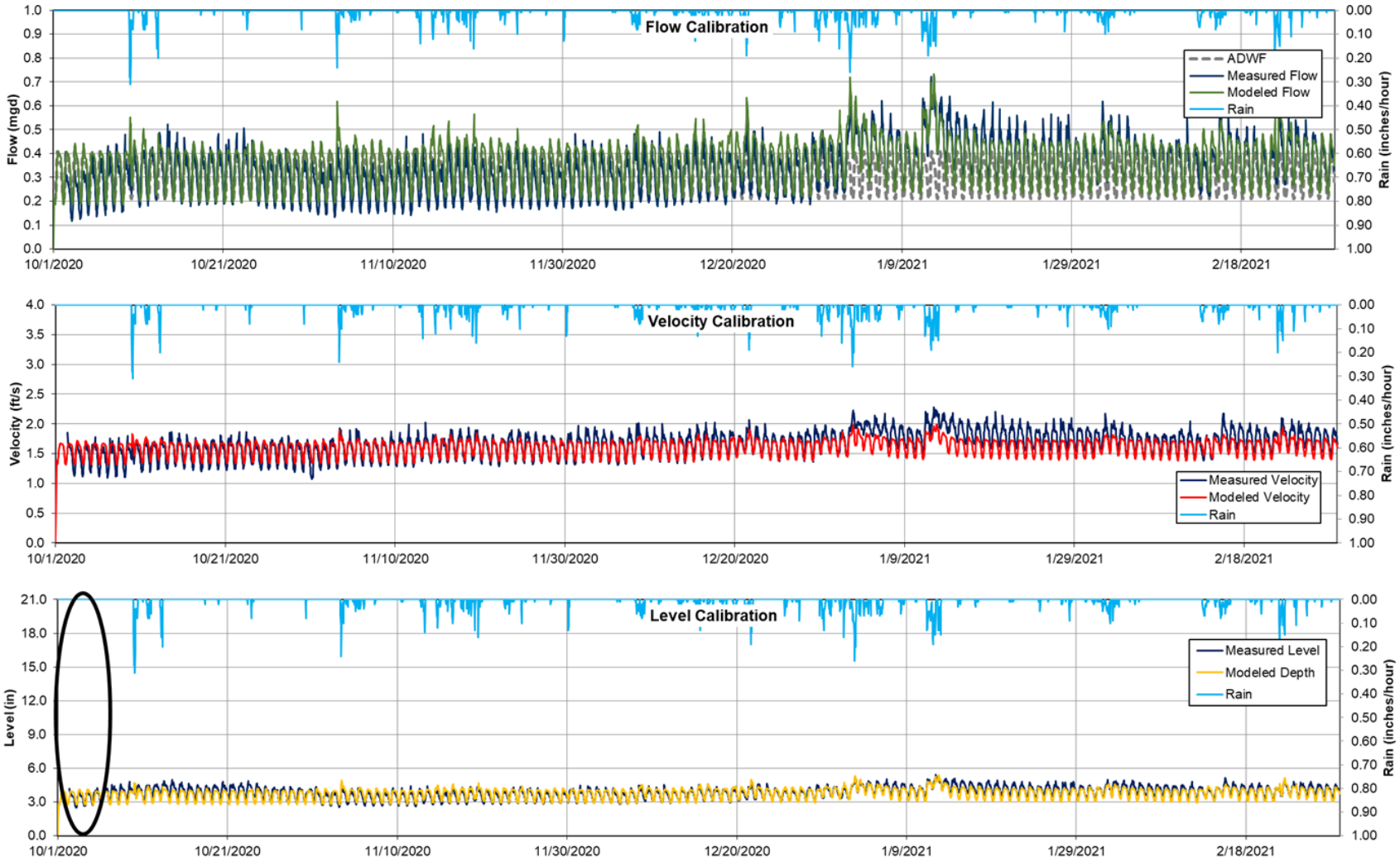


Figure 1.19 Example WWF Calibration

Table 1.9 WWF Calibration Results

Flow Meter ID	Storm 1 Total Volume Percent Err	Storm 1 Peak Flow Percent Error	Storm 1 Max Level Difference (inches)	Storm 2 Total Volume Percent Error	Storm 2 Peak Flow Percent Error	Storm 2 Max Level Difference (inches)	Storm 3 Total Volume Percent Error	Storm 3 Peak Flow Percent Error	Storm 3 Max Level Difference (inches)
A1	-7.0%	2.2%	1.2	-4.5%	-4.4%	0.9	-13.6%	-10.0%	1.1
A1c	-4.2%	0.8%	2.2	-2.8%	-24.6%	2.7	-7.5%	-10.7%	2.1
A1d	26.4%	7.3%	-0.8	-7.4%	-10.4%	-0.9	-0.8%	9.8%	-1.2
A3	-12.2%	2.9%	0.0	-2.5%	-11.5%	0.1	-6.5%	-5.7%	0.0
A4	1.2%	-3.7%	0.3	-9.0%	-10.6%	0.6	-9.2%	-20.8%	1.2
A6	8.3%	0.3%	-8.5	25.4%	5.0%	-8.4	-1.1%	3.1%	-8.0
A7	10.8%	-10.1%	-16.6	9.2%	-14.9%	-14.7	8.9%	-13.7%	-14.0
A9	-5.3%	-6.9%	-1.7	0.3%	-13.9%	0.7	2.7%	-11.6%	0.7
A10	10.8%	-9.4%	1.9	10.0%	-22.0%	2.2	-0.3%	-10.3%	1.7
A11	2.2%	1.8%	-1.8	7.3%	-2.1%	-0.5	9.3%	-4.2%	-0.2
A12	23.3%	-4.2%	0.7	-22.1%	-46.7%	-0.1	20.3%	-20.7%	0.0
A13	-34.8%	-43.7%	-0.6	15.5%	-7.2%	-0.6	15.3%	3.9%	-0.4
A14	-1.7%	-22.0%	1.3	-2.8%	-0.3%	1.5	-8.4%	-14.7%	1.1
A15	-12.7%	-15.7%	1.5	-2.4%	-13.3%	1.2	-6.9%	-6.0%	1.2
A16	-5.7%	-4.4%	-1.6	-1.5%	-23.4%	-1.4	-1.6%	-14.2%	-1.5
Y-1	-3.2%	-5.1%	-1.0	-11.6%	8.2%	11.2	-9.4%	2.6%	15.1
Y-2	18.8%	29.2%	-7.0	-5.1%	-13.8%	-5.9	-6.4%	15.7%	-7.6
Y-3	29.9%	96.9%	-1.0	-8.1%	-4.2%	0.5	-7.7%	14.7%	-0.1
Y-4	2.5%	-4.9%	-0.9	3.8%	-2.9%	0.0	2.0%	-10.2%	1.0
WINT003	4.4%	11.9%	-4.2	7.7%	14.7%	-5.1	10.9%	-4.1%	-3.9
MSTTR02A	-8.9%	11.4%	0.6	0.1%	14.2%	0.9	-11.0%	4.8%	2.2
AUBRN53	-8.8%	0.9%	-3.0	-7.2%	-11.5%	-3.3	-11.9%	-18.8%	-1.2

ATTACHMENT 1A

AUBURN WA 2020-21 DRAFT I/I REPORT V1

RDII Analysis
Auburn, Washington

Draft - 8 June 2021

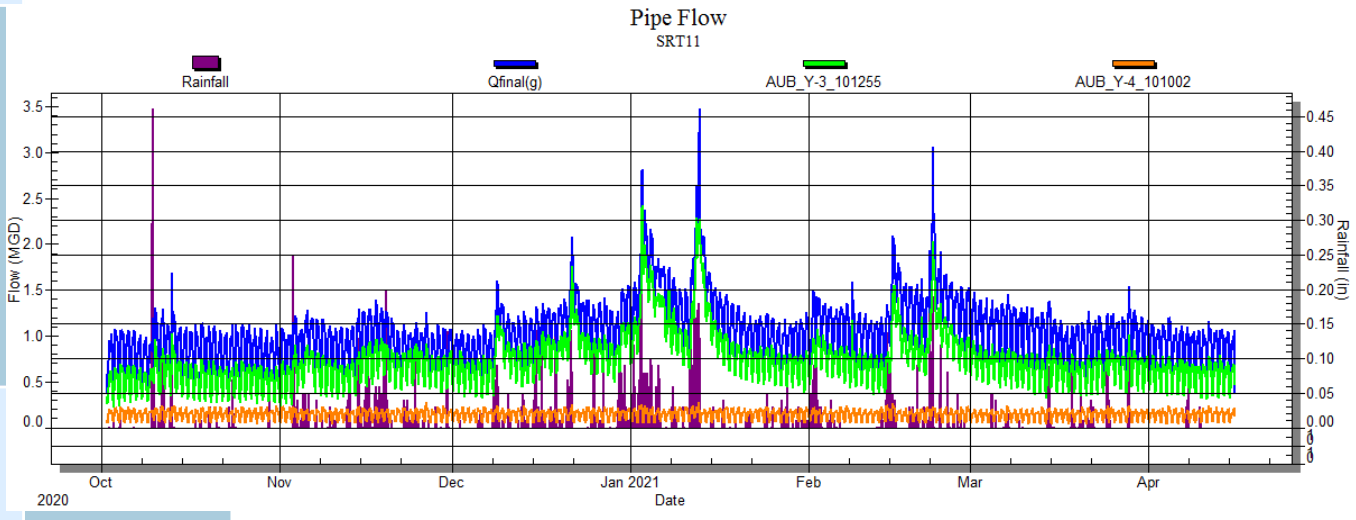


Table of Contents

1.0 – Overview 3
2.0 – Steps of a Wet Weather RDII Analysis 5
2.1 - Basin Size 5
2.2 – Average Dry Day Flow (ADDF) 6
2.3 - Rainfall Analysis 11
2.4 - RDII Volumes 12
2.5 - RDII Severity 14
2.6 - Projected RDII Volumes 17
a) Which sewersheds generate the most RDII volumes? 18
b) Sewersheds ranked on projected RDII - in Gal/LF/Inch 19
3.0 – Operational Capacities 20
4.0 – Subjective Views of Hydrographs 21
5.0 – Conclusions 23
Appendix A – Sewershed Map 24
Appendix B - Sliicer Graphics 24
Appendix C – Q vs i Plots 24

1.0 – Overview

ADS Environmental Services (ADS) was retained by the City of Auburn to conduct a Rainfall Dependent Infiltration Inflow (RDII) analysis of its sanitary sewer system. The scope of the study was to characterize dry weather and wet weather flow conditions at twenty-four (24) temporary flow metering locations and six (6) King County permanent flow meters. One temporary rain gauge and two King County rain gauges were used for rain data.

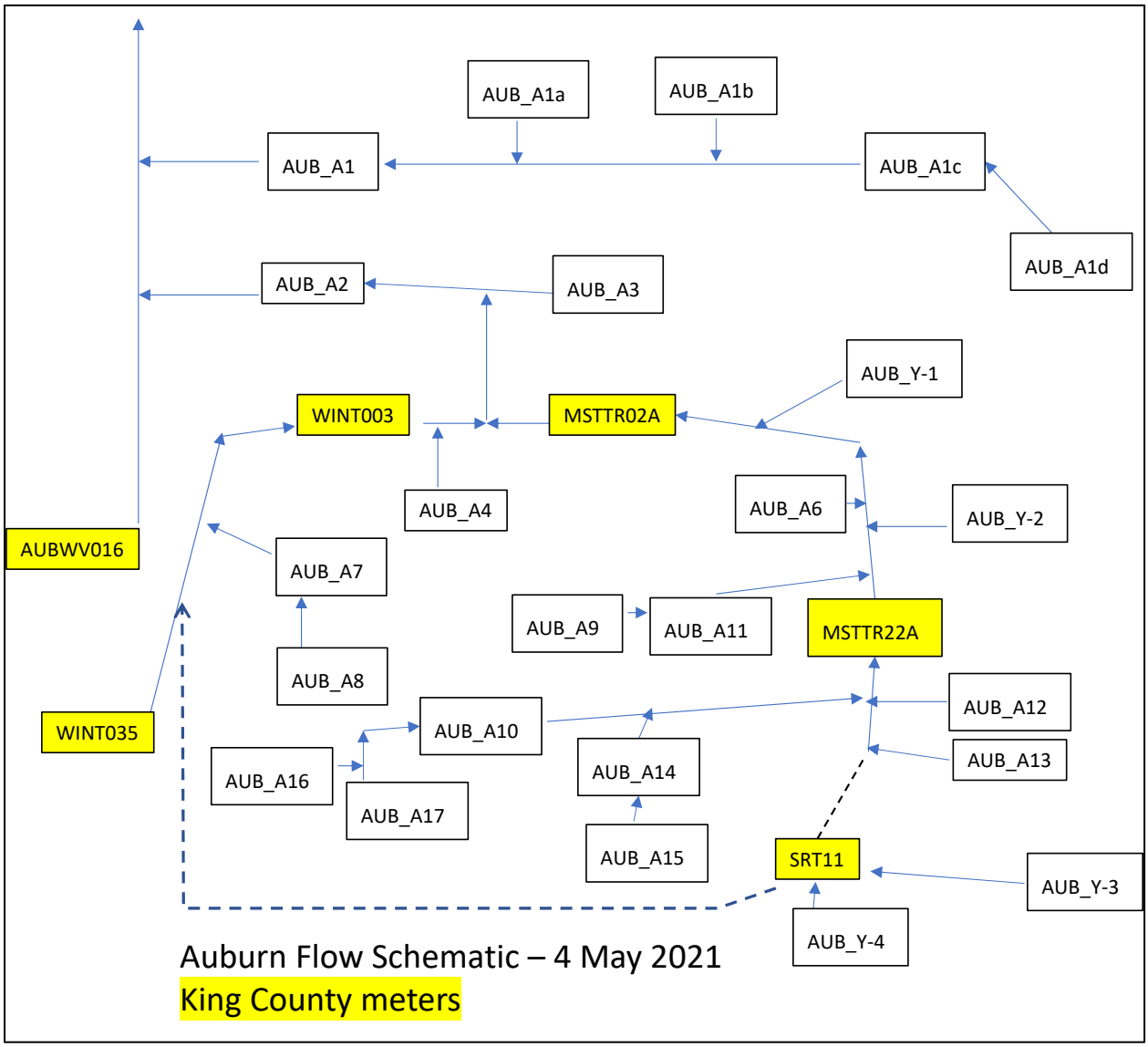
The metering period was from 2 October 2020 through 15 April 2021. This metering period is characterized as a generally dry October following by a rainy winter. A total of 13 storms were analyzed. Two storms on 2 January and 11 January exceeded 3 inches of rainfall, but only one sewer surcharged (Y-1) and the rest of the sewers barely reached half full. It appears that snow melt affected the 14 February storm. Section 2.3 discusses the rainfall in more detail.

When the two sets of flow data were first integrated, there was large flow imbalance between the most downstream Auburn meter (A2) and the four upstream meters, two of which were King County meters. ADS discovered nearly a half-inch difference in the pipe size and King County found a depth sensor offset of over one inch at meter MSTTR02A. After both corrections were made, a small positive balance exists, but it is suspected that the King County meter WINT003 is still reading a bit high.

RDII volumes are normalized two ways in this report; Capture Coefficient (Percent rainfall entering sewers) and Gallons per LF of sewer per inch of rainfall. In a third method basins are ranked by RDII volume expected from a 2.4 -inch storm applied to the Q vs. i relationship generated at each sewershed. Historic King County DDF (Depth Duration Frequency) data indicate that a 5-year, 24-hour storm is 2.4 inches.

Figure 1 is a schematic layout of the metering network including the six King County meters. A diversion exists at SRT11 that conveys all flows to the west and it is believed that all the flow occurring during this metering period followed that path.

FIGURE 1. Meter Schematic for Seventeen Meters.



2.0 – Steps of a Wet Weather RDII Analysis

The following sections address the steps followed to conduct the dry-day and the RDII analyses. These steps include determining the basin size and performing a quality check on the wastewater produced by each basin. Rainfall data are examined and RDII is calculated.

2.1 - Basin Size

The size of each basin in Acres and length (LF) of public sewer was determined using the City's GIS information and the sizes are listed in Table 1. Appendix A is a map showing the basin boundaries used to determine basin sizes. There are two reasons to keep track of basin size. The first use is to 'normalize' the flow measurements by basin size to produce an apples-to-apples comparison of RDII severity. Secondly, the basin size has value in interpreting RDII severity. Large basins will exhibit RDII severity close to the system wide average and small basins will exhibit RDII severity much higher and much lower than the system average. If there are upstream meters, the basin size is the area between the meters, also called the Net basin size.

GIS information was not complete for the King County basins of AUBWV016 and WINT035 and those basin sizes are estimates.

Table 1 Basin Sizes in Linear Feet and Acres

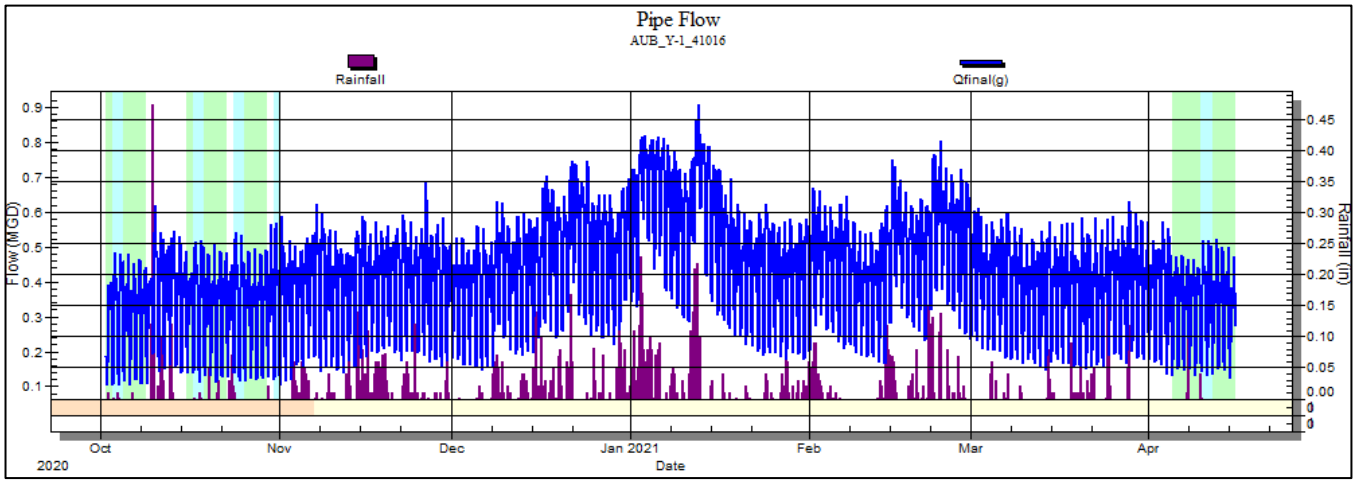
Basin	Area lac)	Length (LF)
AUB_A1_30820	107	6,711
AUB_A10_710151	87	14,315
AUB_A11_710142	28	3,924
AUB_A12_71043	27	5,241
AUB_A13_71085	85	14,999
AUB_A14_710149	84	14,306
AUB_A15_80930	108	19,043
AUB_A16_80956	365	53,970
AUB_A17_80957	68	7,168
AUB_A1a_30822	50	5,248
AUB_A1b_30968	63	4,217
AUB_A1c_30906	174	17,330
AUB_A1d_30910	70	9,130
AUB_A2_40805K	247	22,232
AUB_A3_40834	110	14,345
AUB_A4_50817	152	13,085
AUB_A6_61009K	114	18,987
AUB_A7_70807	94	12,359
AUB_A8_70829	60	11,910
AUB_A9_71031	95	10,851
AUB_Y-1_41016	270	26,267
AUB_Y-2_61102	1,925	205,886
AUB_Y-3_101255	631	84,525
AUB_Y-4_101002	312	33,677
AUBWV016	539	69,999
MSTTR02A	401	51,714
MSTTR22A	223	38,240
SRT11	218	16,918
WINT003	145	22,140
WINT035	1,846	239,999

2.2 – Average Dry Day Flow (ADDF)

A first step in conducting an RDII analysis is to determine Average Dry Day Flow (ADDF) at each metering location and this information is used in two ways. The first is that the ADDF is subtracted from the flow measured during a storm and the difference is RDII. The second is that the shape of the ADDF hydrograph is used to estimate what portion of the ADDF is wastewater production (WWP) and what portion is base infiltration (BI).

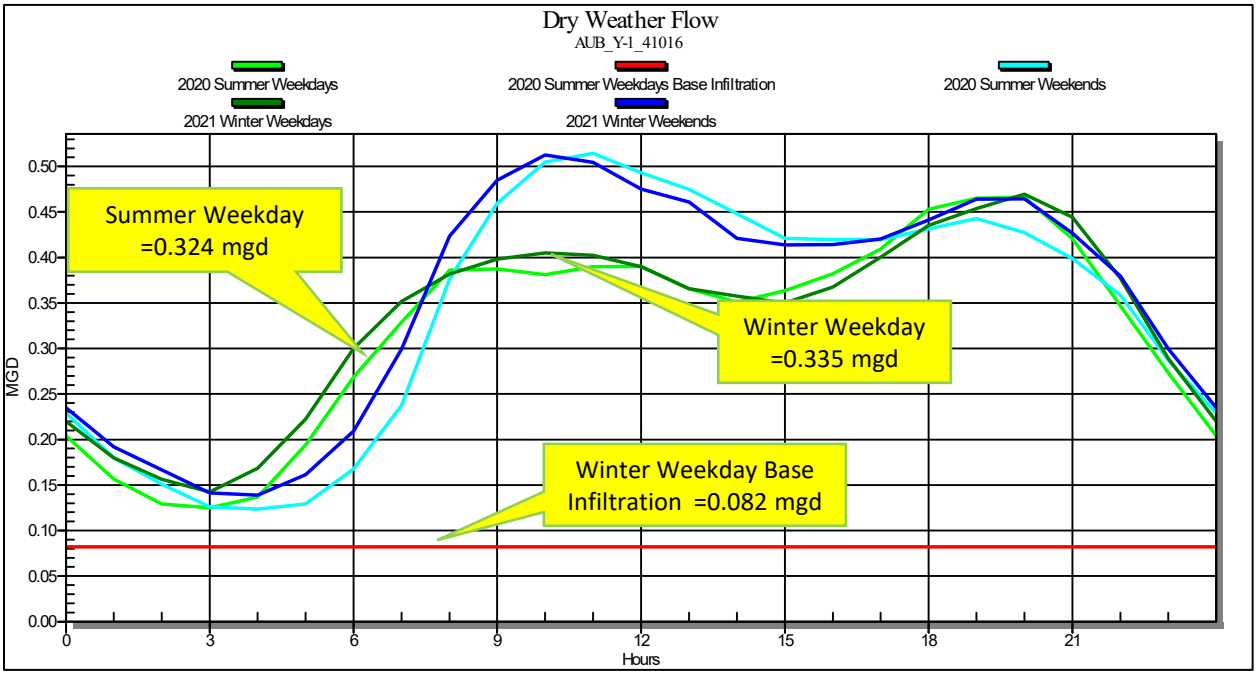
Early in the analysis of RDII data it was observed that there were two distinctly different rain-to-RDII relationships; a Summer season ending 6 November and Winter which is the rest of the metering period. This distinction is common and is a function of vegetation; either actively growing or dormant. Figure 2 shows the hydrograph for the AUB_Y-1 meters with selected dry days shown by the vertical shaded green (weekday) and blue (weekend) bars. Summer days are in October and winter days are in April.

Figure 2 Selected Dry Days are shaded in green (weekday) and blue (weekend).



For each meter the ADDF is decomposed into the two components of wastewater production (WWP) and base infiltration (BI) as shown in Figure 3. In this case the summer weekday value is 0.324 mgd (324,000 gallons per day) and winter weekday is 0.335 mgd. The estimated base infiltration (BI) is based on the shape of the weekday ADDF hydrograph and is shown as the red horizontal line at 0.082 mgd. The percent of base infiltration at this site is 0.082 mgd/0.324 mgd or 25% base infiltration.

Figure 3 Average Dry Day Diurnal Curves for Weekdays and Weekends



Calculating Base Infiltration

Base Infiltration (BI) is a component of I/I that is related to ground water and that could include leaking water lines, leaking plumbing fixtures and springs. It may be a seasonal phenomenon as rainfall affects ground water levels, but generally remains relatively steady over weeks and months. The most rigorous method for determining the quantity of base infiltration originating in a basin is to determine the quantity of potable water flowing into each building within the basin and subtract it from the measured sewer flow coming out of the basin. This is an expensive and sometimes difficult exercise and usually is not done for a short-term flow metering study.

For this analysis an empirical method for estimating base infiltration was used. The method is borrowed from the potable water industry, which has estimated that the rate of residential water usage during the overnight hours is approximately 12% of the daily average use. This empirical method provides an estimate of the average wastewater production (WWP) in a Basin based on the average flow ($Q_{avg\text{-}D}$) and minimum flow ($Q_{min\text{-}D}$) of the average dry day hydrograph.

Subtracting WWP from $Q_{avg\text{-}D}$ provides an estimate of base infiltration (BI). The equations to estimate WWP and BI are listed in Equations BI 1 and BI 2.

Equation BI 1

$$WWP = \frac{(Q_{avg-D} - \mathrm{Q_{min-D}})}{X}$$

Where; X = .88 (from potable water use records)

Equation BI 2

$$Q_{BI} = Q_{avg-D} - WWP$$

In concept, this method generates an estimate of WWP based on the difference between average flow and minimum flow. As base infiltration varies over the year the difference between average and minimum flow (and WWP) is expected to remain constant. This method of estimating is reliable for residential neighborhoods with sewer basin sizes on the order of 20,000 LF.

A refinement to this empirical method, the Stevens/Schutzbach equation, uses a curve fitting technique to increase the reliability of the BI estimation at meters with higher flows. As sewer sheds become larger with longer travel times, the normal dry day hydrograph flattens, which in turn affect the minimum to average relationships. Equation BI 3 is the Stevens/Schutzbach equation that was used to estimate base infiltration in all Basins. $Q_{avg\text{-}D}$ is the average flow and MDF is the minimum flow of the dry day hydrograph.

Equation BI 3

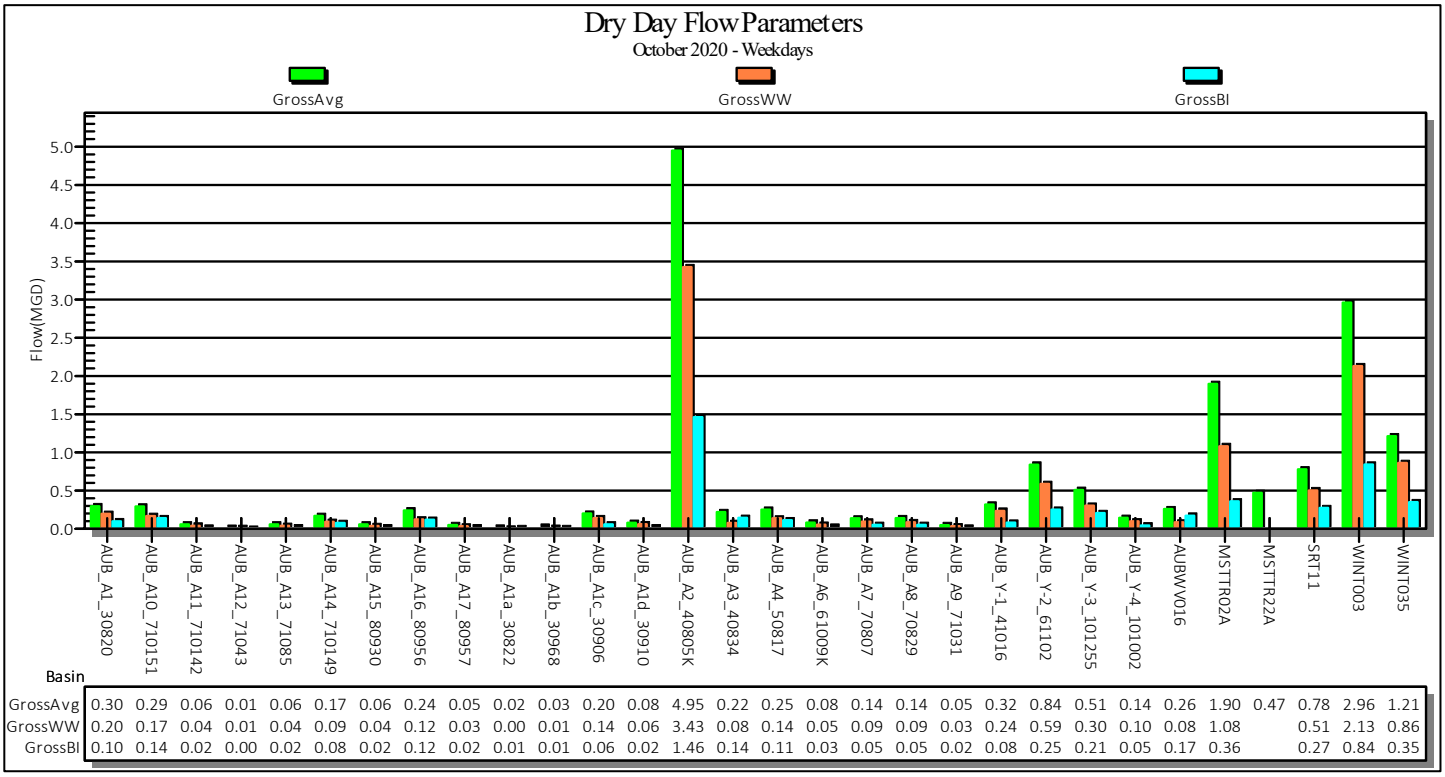
Stevens/Schutzbach Equation

$$\mathrm{Q_{BI}} = \frac{0.4 * \mathrm{Q_{min-D}}}{1 - 0.60(\frac{\mathrm{Q_{min-D}}}{\mathrm{Q_{avg-D}}})^{\mathrm{Q_{avg-D}}^{0.70}}}$$

Equation BI 3 is also dependent on average and minimum flows that occur in traditional residential flow patterns. Reliability decreases in non-residential basins and in basins where the flow meter measures flow from cycling pump stations. Although there are several limitations, this method is considered the best for estimating BI in residential areas using only flow data. In commercial or industrial areas this method can produce unreliable results.

Figure 4 is a graph of the gross average dry day flow (ADDF), the wastewater production and base infiltration at each meter. The term, "gross," refers to the meter measurement prior to any upstream meter subtraction.

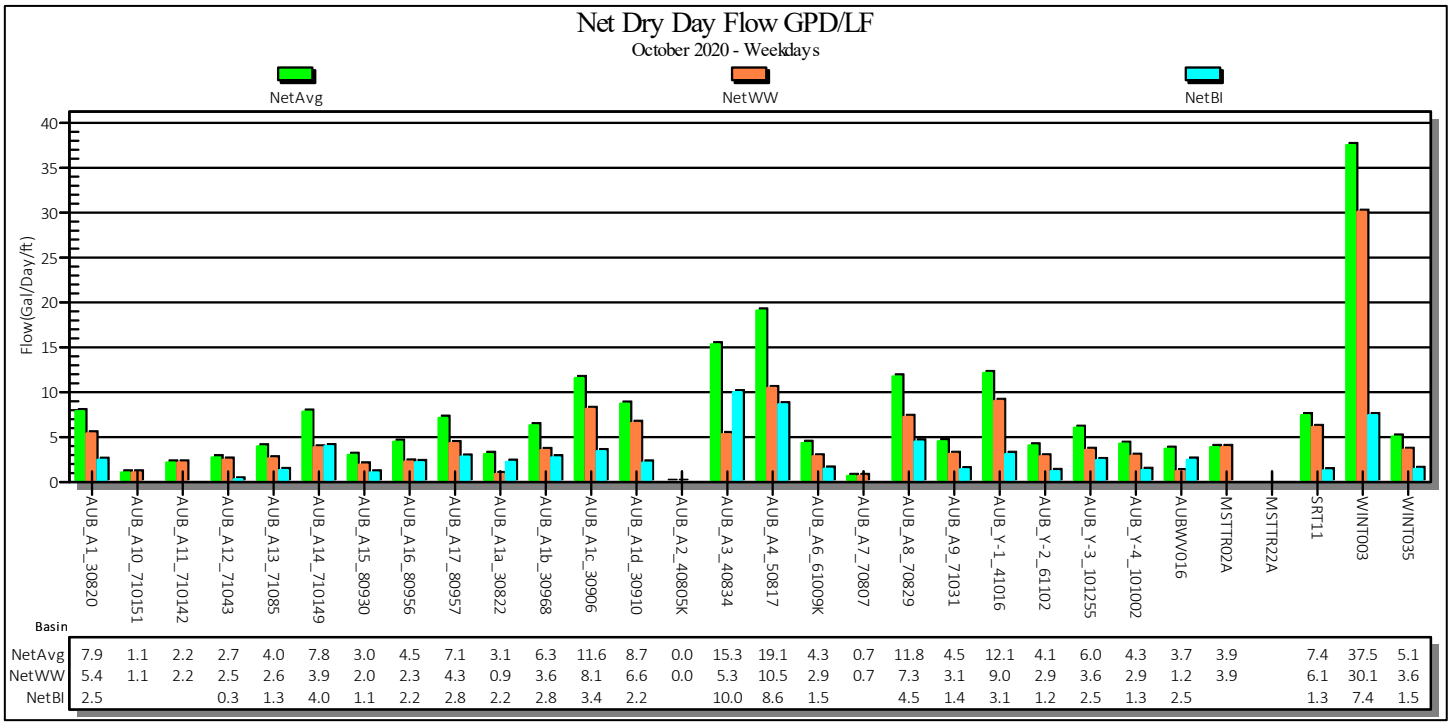
Figure 4 ADDF Wastewater Production and Base Infiltration



Basin	AUB_A1_30820	AUB_A10_710151	AUB_A11_710142	AUB_A12_71043	AUB_A13_71085	AUB_A14_710149	AUB_A15_80930	AUB_A16_80956	AUB_A17_80957	AUB_A1a_30822	AUB_A1b_30968	AUB_A1c_30906	AUB_A1d_30910	AUB_A2_40805K	AUB_A3_40834	AUB_A4_50817	AUB_A6_61009K	AUB_A7_70807	AUB_A8_70829	AUB_A9_71031	AUB_Y-1_41016	AUB_Y-2_61102	AUB_Y-3_101255	AUB_Y-4_101002	AUBWV016	MSTTR02A	MSTTR22A	SRT11	WINT003	WINT035
GrossAvg	0.30	0.29	0.06	0.01	0.06	0.17	0.06	0.24	0.05	0.02	0.03	0.20	0.08	4.95	0.22	0.25	0.08	0.14	0.14	0.05	0.32	0.84	0.51	0.14	0.26	1.90	0.47	0.78	2.96	1.21
GrossWW	0.20	0.17	0.04	0.01	0.04	0.09	0.04	0.12	0.03	0.00	0.01	0.14	0.06	3.43	0.08	0.14	0.05	0.09	0.09	0.03	0.24	0.59	0.30	0.10	0.08	1.08		0.51	2.13	0.86
GrossBI	0.10	0.14	0.02	0.00	0.02	0.08	0.02	0.12	0.02	0.01	0.01	0.06	0.02	1.46	0.14	0.11	0.03	0.05	0.05	0.02	0.08	0.25	0.21	0.05	0.17	0.36		0.27	0.84	0.35

The Net ADDF, Net WWP, and Net BI are normalized by the length of sewer in each basin to obtain an apples-to-apples comparison expressed in GPD/LF of public sewer as shown in Figure 5. The WWP values are a function of land use with WWP in medium-density residential sewer sheds typically being in the range of 2 - 5 gpd/LF. Low density residential areas can produce less than 2 gpd/LF and high density residential (apartments) and business districts can be 5 to 10 gpd/LF range. Basins that have wastewater productions that appear to be outliers are AUB_A2 (imbalance), MSTTR22A and WINT035.

Figure 5 Net ADDF, Wastewater Production and Base Infiltration values in GPD/LF.



2.3 - Rainfall Analysis

This rainfall analysis looks at the total rainfall recorded by each rain gauge for each storm and looks at the maximum return frequency for each rain gauge and each storm. There were thirteen storms that were analyzed. Selecting a storm in King County during the winter is subjective because of the frequent but small amounts of rainfall. Selecting a storm is a balance between seeing a significant flow response to rain followed by a return to normal before the following rain. Table 2 lists the measured rainfall for each of the three rain gauges and thirteen storms. The right side of this table displays the maximum return frequency corresponding duration for each storm. Yellow shaded storms exceeded a one-year return frequency.

Table 2 Rainfall totals and Maximum Return Frequency

	Rainfall (In.)				Maximum Return Frequency		
Storm	AUB_RG	RG41Y	RGAUB		AUB_RG	RG41Y	RGAUB
10/9/2020	1.69	1.84	1.53		16.9-yr;6-hr;1.3-in	12.5-yr;6-hr;1.2-in	10.6-yr;6-hr;1.2-in
10/13/2020	0.6	0.6	0.59		1.1-yr;30-min;0.2-in	8.8-mo;30-min;0.1-in	10.7-mo;30-min;0.2-in
11/3/2020	0.89	0.86	0.83		11.1-mo;1-hr;0.3-in	9.9-mo;1-hr;0.2-in	10.7-mo;1-hr;0.3-in
11/14/2020	1.08	1.08	0.99		6.7-mo;3-hr;0.3-in	6.5-mo;3-hr;0.3-in	5.9-mo;3-hr;0.3-in
12/8/2020	1.03	0.93	0.99		7.2-mo;24-hr;1.0-in	5.9-mo;24-hr;0.8-in	7.0-mo;24-hr;1.0-in
12/15/2020	1.05	0.97	0.9		7.4-mo;15-min;0.1-in	7.6-mo;30-min;0.1-in	8.3-mo;15-min;0.1-in
12/20/2020	1.1	1.15	1.1		11.4-mo;30-min;0.2-in	10.7-mo;30-min;0.2-in	11.4-mo;30-min;0.2-in
1/2/2021	3.54	3.33	2.94		8.7-yr;6-hr;1.2-in	6.5-yr;12-hr;1.6-in	4.0-yr;6-hr;1.0-in
1/11/2021	3.35	3.23	3.09		3.9-yr;24-hr;2.2-in	3.5-yr;24-hr;2.1-in	3.4-yr;24-hr;2.1-in
1/31/2021	1.22	1.2	1.09		6.0-mo;24-hr;0.8-in	5.7-mo;24-hr;0.8-in	5.7-mo;24-hr;0.8-in
2/14/2021	1.56	1.37	0.82		8.6-mo;24-hr;1.2-in	7.7-mo;24-hr;1.1-in	4.5-mo;24-hr;0.6-in
2/21/2021	1.83	1.62	1.63		10.5-mo;18-hr;1.4-in	7.8-mo;18-hr;1.0-in	9.9-mo;18-hr;1.3-in
3/24/2021	0.6	0.69	0.56		6.3-mo;30-min;0.1-in	1.0-yr;15-min;0.1-in	5.1-mo;6-hr;0.4-in

2.4 - RDII Volumes

The rainfall dependent infiltration and inflow (RDII) is determined on both a gross and net flow basis. Figure 6 shows the process for the storm of 2 January 2021 at meter AUB_A8. The blue hydrograph is the gross flow measured by the meter and the gold hydrograph is the gross RDII calculated at the meter. If there is an upstream meter, net RDII is calculated by subtracting two gross RDII hydrographs.

A key observation here is how reflective the RDII hydrograph is to the rainfall. The fact that flow increases are timed almost exactly with the rainfall suggest the RDII sources are likely traditional inflow sources. The hydrographs for the 8 largest storms for all meters are included in Appendix B.

Figure 6 Storm hydrograph showing calculated RDII

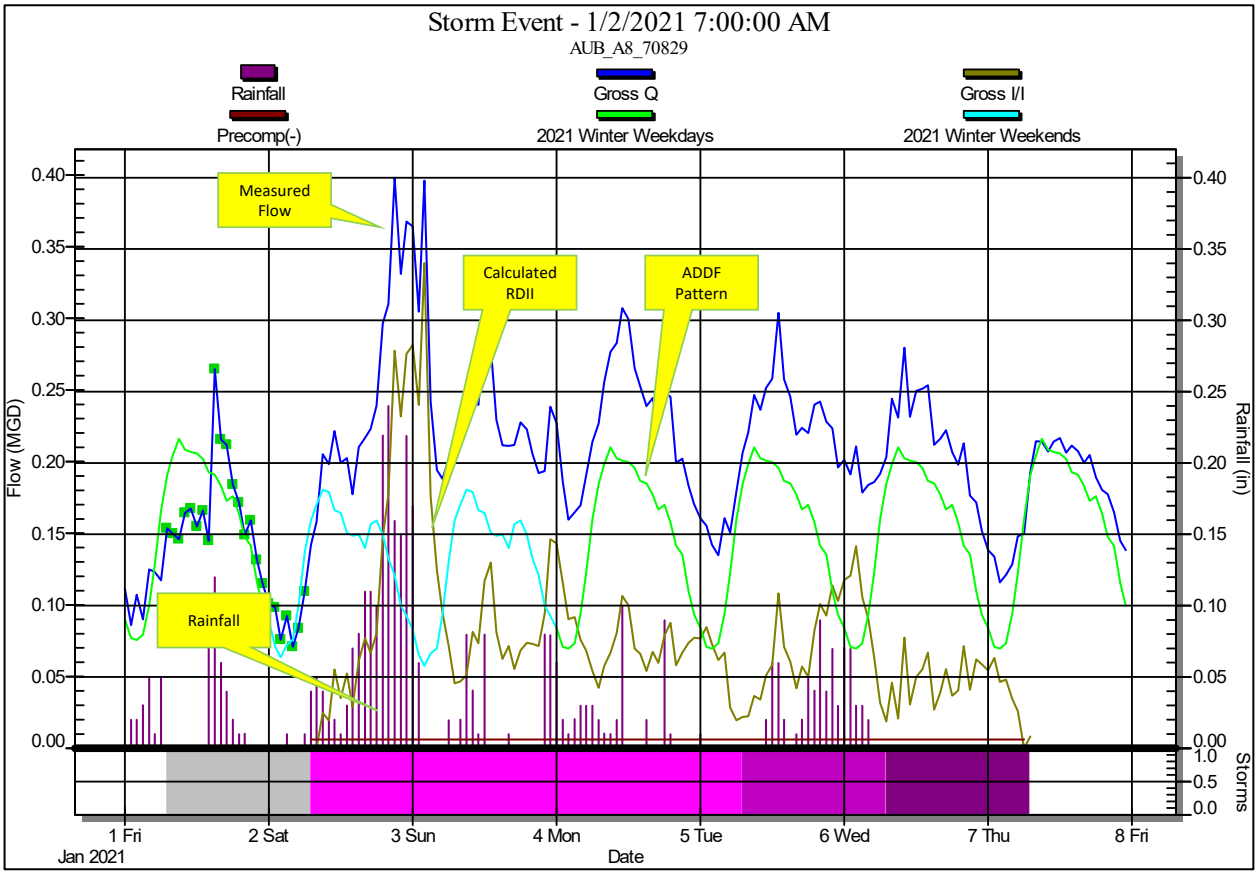


Figure 7 shows the RDII volumes in million gallons from the 6 largest storms. These values are total RDII volume measured during the storm and recovery period.

Figure 7 Gross RDII volume for each meter for the 6 largest storms.

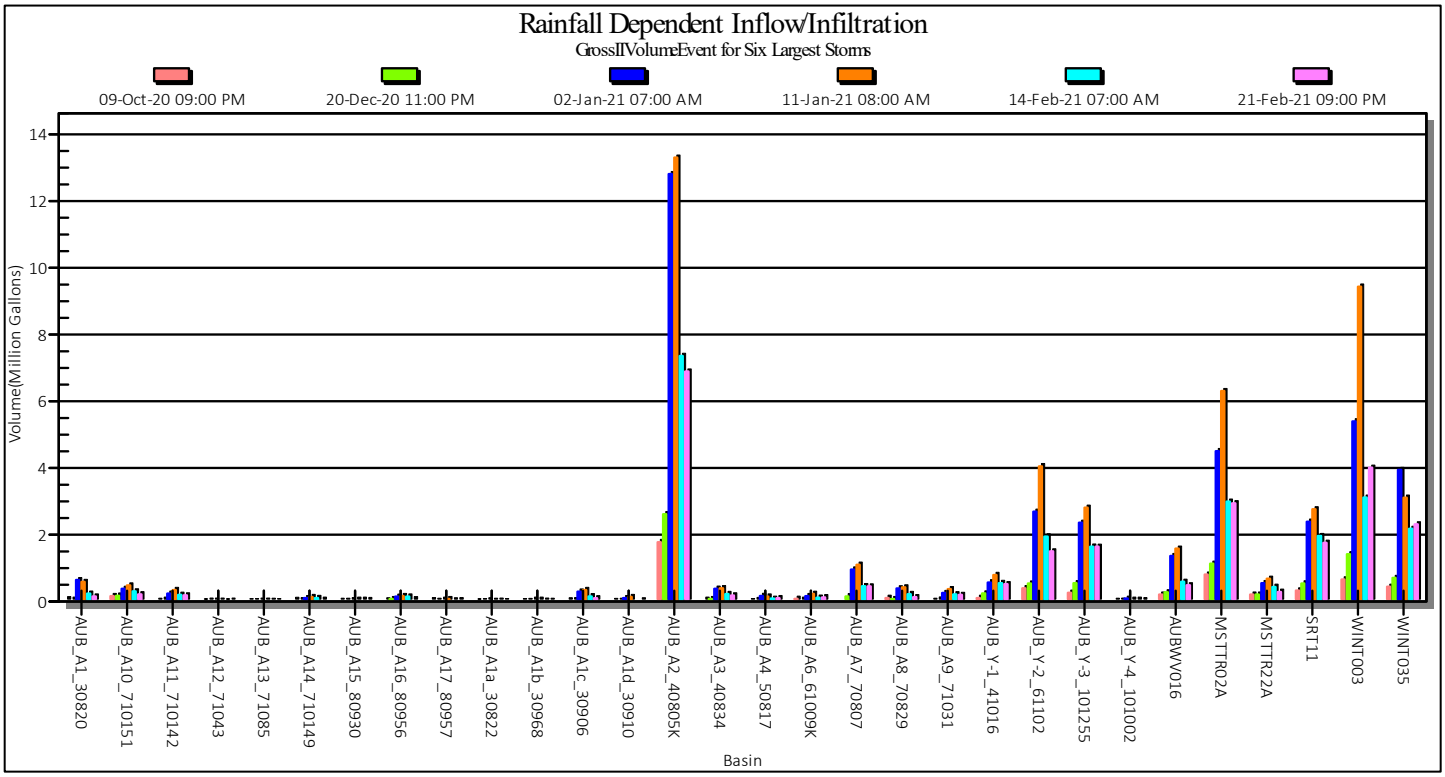
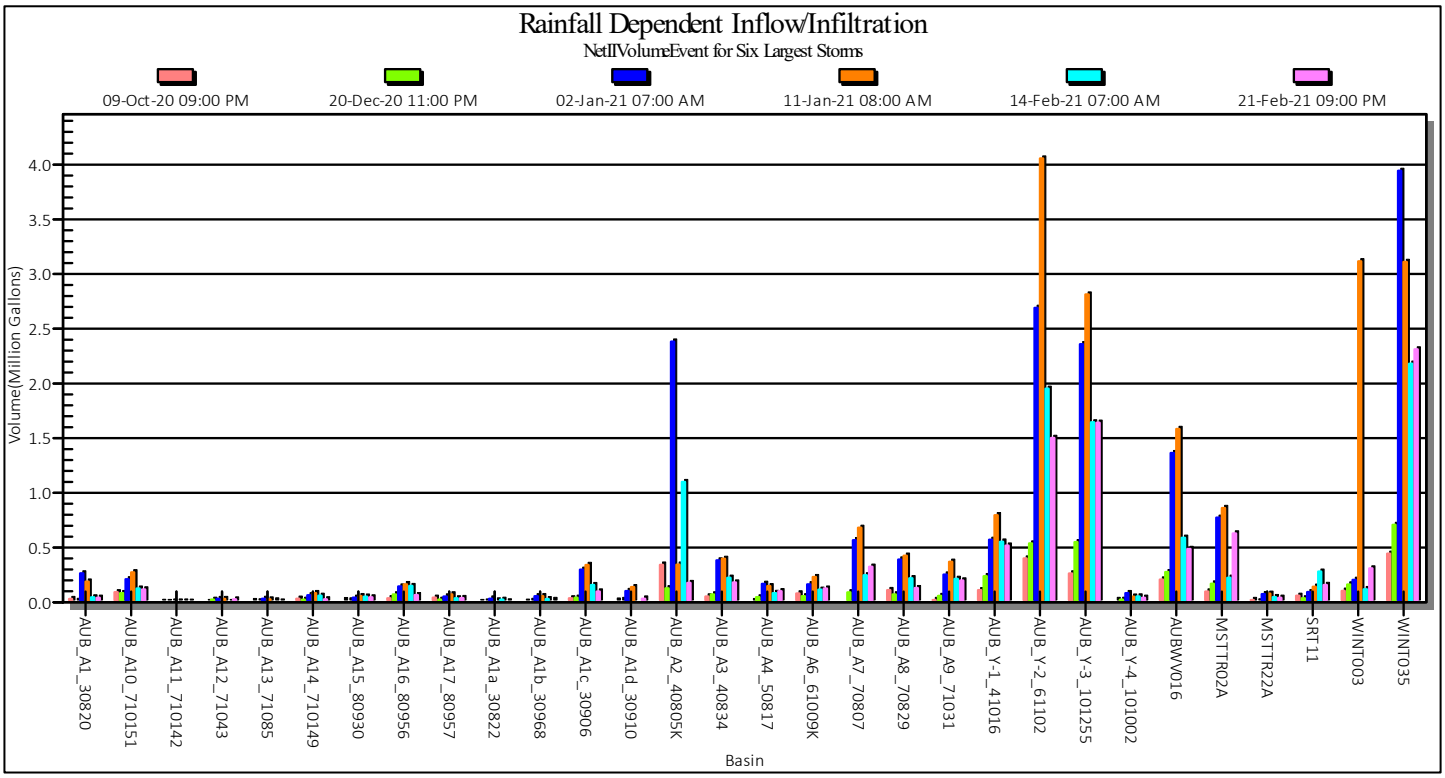


Figure 8 shows the Net Volume of RDII from the 6 largest storms. Net RDII is the volume generated within each sewer shed. Upstream RDII is subtracted from the downstream RDII.

Figure 8 Net RDII volumes from the 6 largest storms.



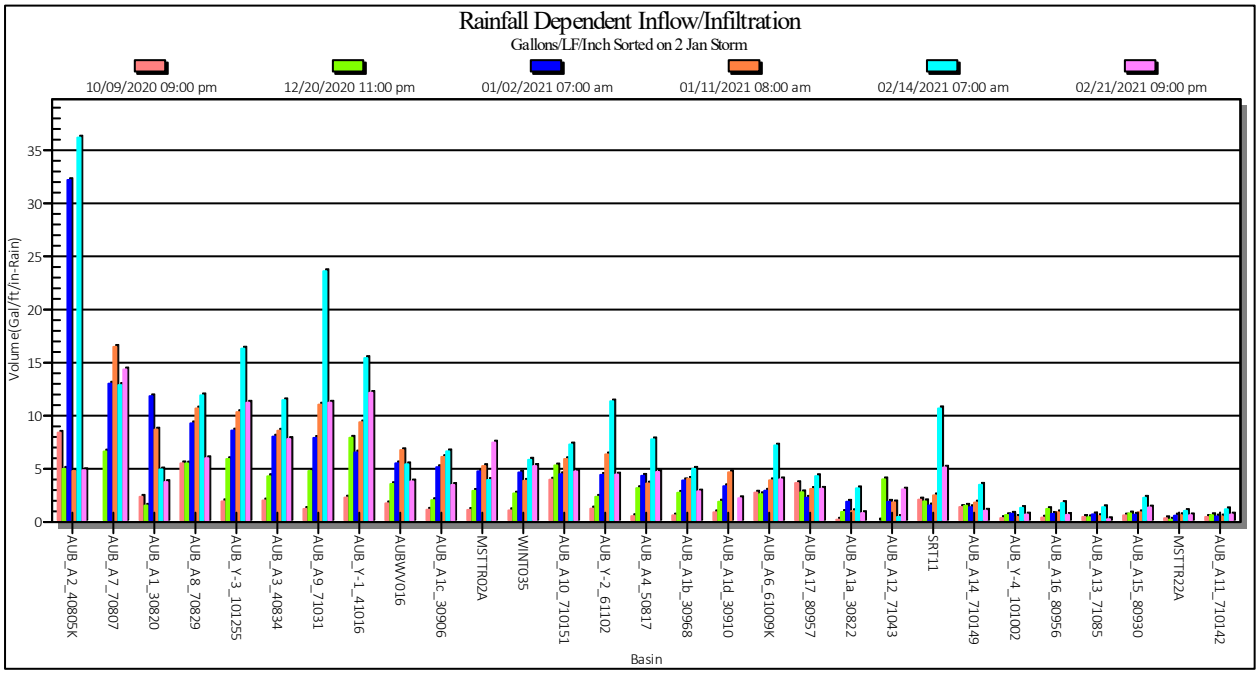
2.5 - RDII Severity

RDII volumes in Sections 2.4 are 'normalized' by dividing the RDII values by both the basin size and inches of rainfall to get an apples-to-apples comparison of RDII severity. The most reliable normalization is by length of sewer (Gallons/LF/Inch of rainfall) in a sewershed and the second method is by acreage (Capture Coefficient or Percent Rainfall entering sewer). Normalizing by LF is more reliable because it better reflects the possible connections on the 'sewer frontage' and does not include non-sewered areas such as parks, school athletic fields, cemeteries etc. Capture coefficient values tend to be biased low because of the unsewered areas.

There is not a published set of standards for RDII severity expressed by either method because the measured value is affected by the antecedent moisture condition of the soil. These threshold levels will be higher in the winter when vegetation is dormant or after a series of rainfall with saturated soil conditions. The threshold values with be lower in the summer and fall when vegetation is actively taking up moisture and after a long dry period with low soil moisture. This study was conducted in both low antecedent moisture conditions in October and November and higher moisture condition later in the metering period.

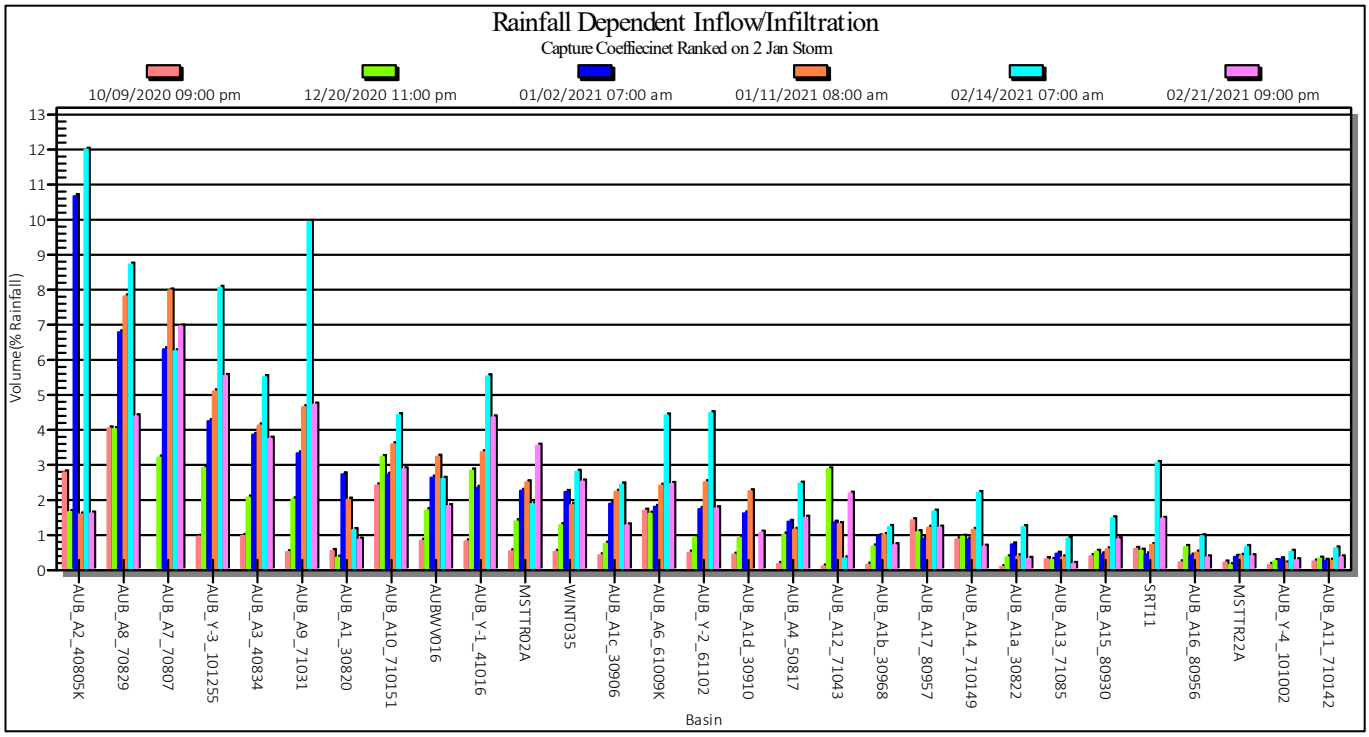
Figure 9 shows RDII normalized by sewer length (Gal/LF/inch) and sorted on the 2 January storm. For severity normalized by length, a general rule of thumb is that sewersheds in the winter/spring with values less than ~10 to 12 Gal/LF/Inch do not have excessive RDII, values up to 20 Gal/LF/Inch are marginal and values over 20 Gal/LF/Inch are considered excessive. In low moisture conditions values greater than 10 Gal/LF/inch may be considered to fall within the 'marginal' range. The AUB_A2 basin should be discounted because of the balancing problem and the 2 Feb storm should be discounted because of the snow melt.

Figure 9 RDII Severity in Gallons/LF/Inch



Although there are no fixed standards for the Capture Coefficient, it is generally considered that values of less than 5% do not have excessive RDII, between 5% and 7% are marginal and values greater than 7% to 10% are severe. These threshold values can be lower in low moisture conditions. Figure 10 shows the Capture Coefficient (percent rainfall entering sewer) for the six largest storms sorted on the 2 January storm. The Capture Coefficient tends to be biased low because it includes non-sewered areas such as parks and athletic fields.

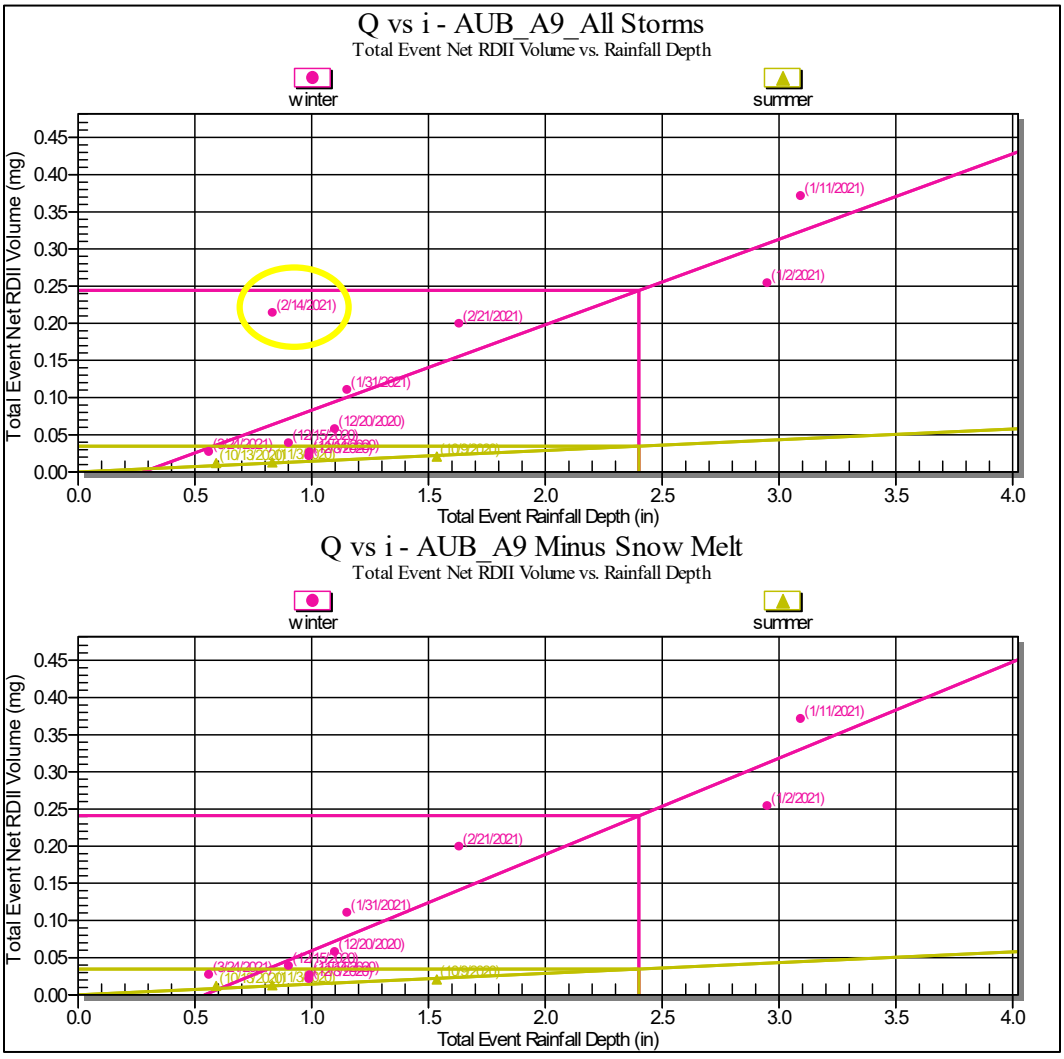
Figure 10 RDII as Capture Coefficient



2.6 - Projected RDII Volumes

A third method is to apply a design storm to the Q vs i plots for each basin. Figure 11 displays the Q vs. i plots of RDII volume vs. rainfall for AUB_A9 for each storm separated into seasons. Each data point on this plot is composed of the RDII volume measured during each storm and the rainfall that fell during the storm. In the top plot a 2.4-inch (5-yr., 24-Hr) storm is applied to the regression line resulting in a predicted RDII volume of just over 0.24 MG. Because the snow melt storm of 14 Feb should not be included here, it was removed to generate the bottom plot. The results did not change much, and the projected RDII volume is 0.24 MG. Appendix C includes this plot minus the 14 Feb snow melt storm for each basin.

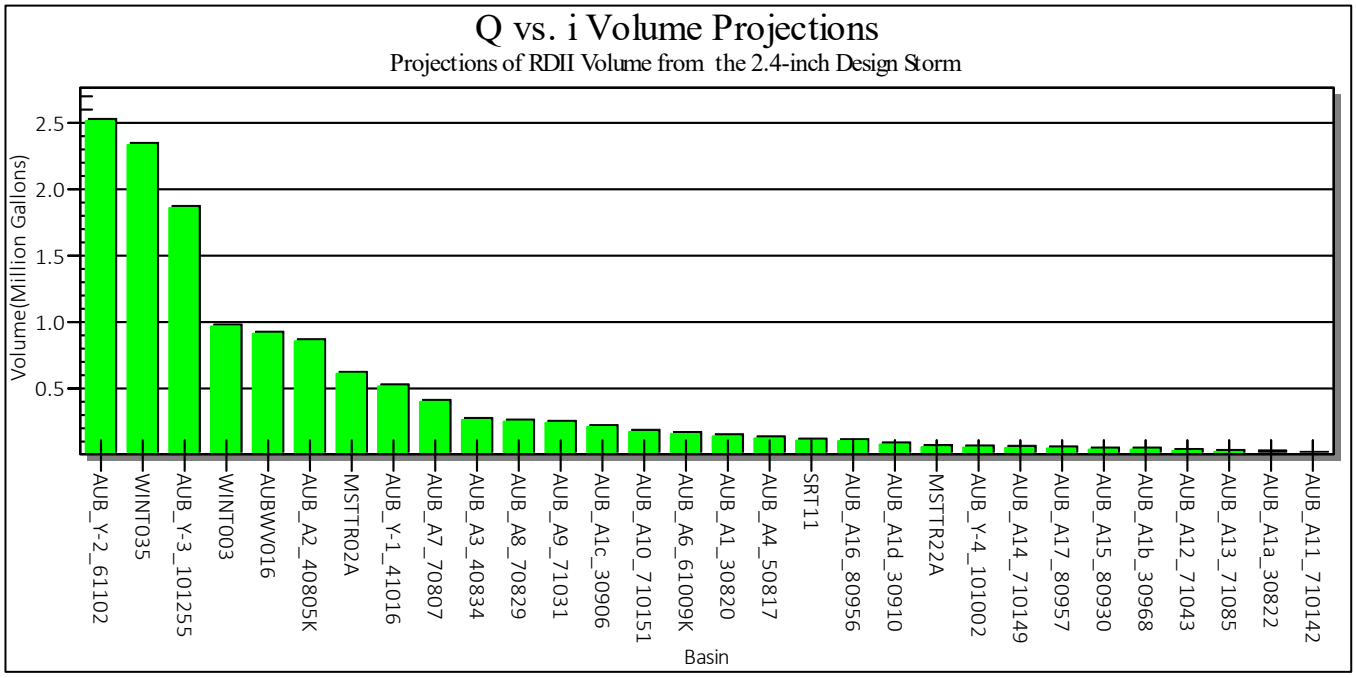
Figure 11 Q vs. i Plots of RDII Volume vs. Rainfall, with and without the snowmelt of 14 Feb 2021.



a) Which sewersheds generate the most RDII volumes?

Figure 12 shows the projected net volumes from each of the sewersheds based on the Q vs i projections. It is not surprising the larger sewersheds produce the greatest volume of RDII. The values from WINT003 and AUB_A2 are treated with less confidence because of the flow balance issues described earlier. Also, WINT035 and AUBWV016 and not considered part of the Auburn system and are included here just for completeness of the data set.

Figure 12 Plot of Net Projected RDII volumes from each sewershed.



b) Sewersheds ranked on projected RDII - in Gal/LF/Inch

The projected RDII volumes from a 2.4-inch design storm are converted to Gallons/LF/Inch in the last column on Table 3 and are ranked. The R^2 column is the correlation coefficient and values less than 0.7 are less reliable and the user should be cautious about using the projected values. Poor correlations can be due to non-uniform rainfall or some data issue. For example, the flow from AUB_A11 was shallow and erratic and the RDII was low.

There is not a definitive way to determine when RDII is 'too much', but a rule of thumb is that values greater that 10 gal/LF/Inch or so are probably in the range that deserves attention. But Keep in mind that larger basins appear to have lower severity than many smaller basins. Basins Y-2 and Y-3 are two largest sewersheds in the Auburn system and generated the most RDII of all the Auburn sewersheds but fall below the rule of thumb for severity.

Table 3 Projected RDII Volume in Millions of Gallons from a 2.4-inch storm.

Net Volume Projected from a 2.4-inch storm applied to Winter Season Q vs I Plot							
Meter	# Storms	R^2	X Intercept	Slope	MG	Gal/LF	Gal/LF/Inch
WINT003	9	0.36	0.6	0.54	0.97	43.7	18.2
AUB_A2_40805K	9	0.53	0.83	0.54	0.86	38.5	16.0
AUB_A7_70807	9	0.95	0.6	0.22	0.4	32.3	13.4
AUB_A9_71031	9	0.9	0.54	0.13	0.24	22.2	9.3
AUB_Y-3_101255	9	0.94	0.42	0.94	1.86	22.0	9.2
AUB_A8_70829	9	0.97	0.63	0.14	0.25	21.0	8.8
AUB_A1_30820	9	0.93	0.84	0.09	0.14	20.9	8.7
AUB_Y-1_41016	9	0.84	0.02	0.22	0.52	19.6	8.2
AUB_A3_40834	9	0.99	0.64	0.15	0.26	18.3	7.6
AUBWV016	9	0.96	0.59	0.5	0.91	13.0	5.4
AUB_Y-2_61102	9	0.93	0.58	1.38	2.51	12.2	5.1
AUB_A10_710151	9	0.94	0.27	0.08	0.17	12.1	5.0
AUB_A1c_30906	9	0.97	0.65	0.12	0.21	12.0	5.0
MSTTR02A	9	0.89	0.5	0.32	0.61	11.8	4.9
WINT035	9	0.94	0.51	1.24	2.33	9.7	4.1
AUB_A4_50817	9	0.87	0.2	0.06	0.12	9.6	4.0
AUB_A1b_30968	9	0.92	0.08	0.02	0.04	9.3	3.9
AUB_A1d_30910	9	0.94	0.63	0.04	0.08	8.6	3.6
AUB_A6_61009K	9	0.94	0.29	0.07	0.16	8.3	3.4
AUB_A17_80957	9	0.88	0	0.02	0.05	6.7	2.8
SRT11	9	0.32	0	0.04	0.11	6.3	2.6
AUB_A12_71043	9	0.31	0	0.01	0.03	5.6	2.3
AUB_A14_710149	9	0.85	0.02	0.02	0.05	3.7	1.5
AUB_A1a_30822	8	0.59	0	0.01	0.02	3.5	1.5
AUB_A15_80930	9	0.8	0	0.02	0.04	2.1	0.9
AUB_A11_710142	9	0.02	0	0	0.01	2.0	0.8
AUB_A16_80956	9	0.92	0.2	0.05	0.1	1.9	0.8
AUB_Y-4_101002	9	0.62	0	0.02	0.06	1.7	0.7
MSTTR22A	9	0.81	0	0.02	0.06	1.5	0.6
AUB_A13_71085	9	0.71	0.13	0.01	0.02	1.5	0.6

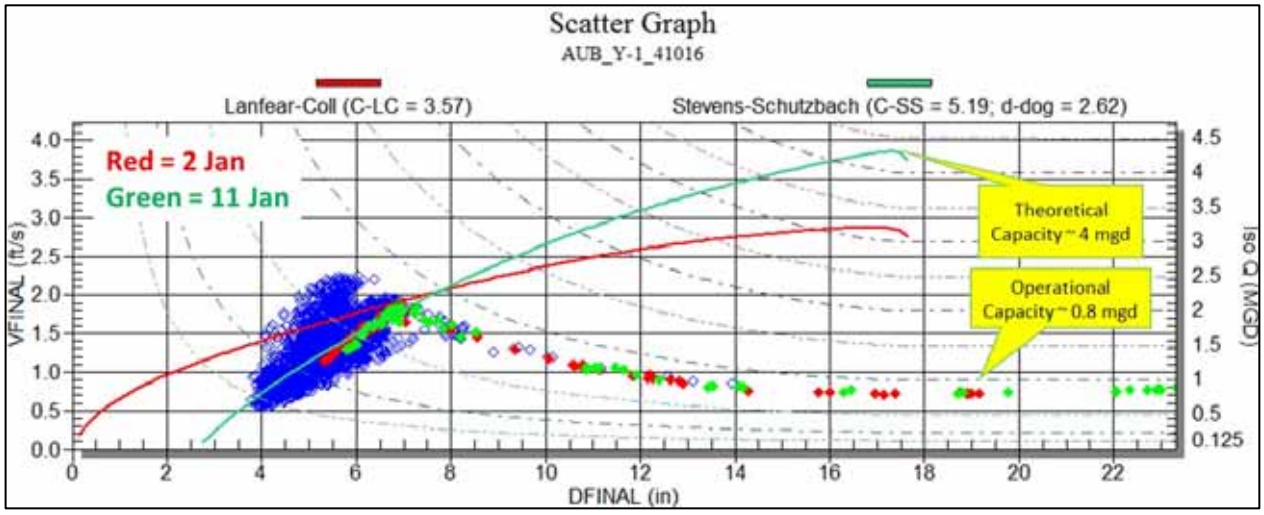
3.0 – Operational Capacities

Operational capacity is the actual flow that a pipe can carry as opposed to the theoretical capacity based on pipe slope and roughness of the pipe section in which the meter is installed. The technique for this analysis is to plot a depth-velocity scattergraph of the meter data upon which are also plotted a pipe curve (Lanfear-Coll [Manning] or Stevens-Schutzbach) and Iso-Q lines. The technique requires that the pipe fill to around 80% full so that hydraulic behavior can be observed. As it turns out only one pipe reached more than 60% full and that was AUB_Y-1 at the Green River siphon and it surcharged to 24 inches. Figure 13 is a scattergraph of meter AUB_Y-1 it shows a Theoretical Capacity of approximately 4 mgd and the Operational Capacity of 0.8 mgd circled in red. It surcharged during the 2 Jan and 11 Jan storms.

In this case both the Lanfear-Coll and the Stevens-Schutzbach curves are plotted. What is observed here is that the theoretical capacity, as established by the Stevens-Schutzbach curve is around 4 mgd in this 17.5-inch pipe. However, the actual data show that the sewer enters backwater at around 7 inches of depth and carries around 0.8 mgd throughout the surcharge to around 24 inches. There is a distinction in hydraulic conditions based on how data behave relative to the Iso-Q lines. Data will adhere to an Iso-Q line if there is a 'Hard restriction' downstream such as an under-sized pipe or a siphon.

GIS data indicated there is a double barrel siphon downstream of this meter with 8-inch and 12-inch barrels. However, the scattergraph pattern reveals that only one barrel is active. Scattergraphs for all sites are included in Appendix B.

Figure 13 Scattergraph reveals both Theoretical and Operation Capacity of the sewer.

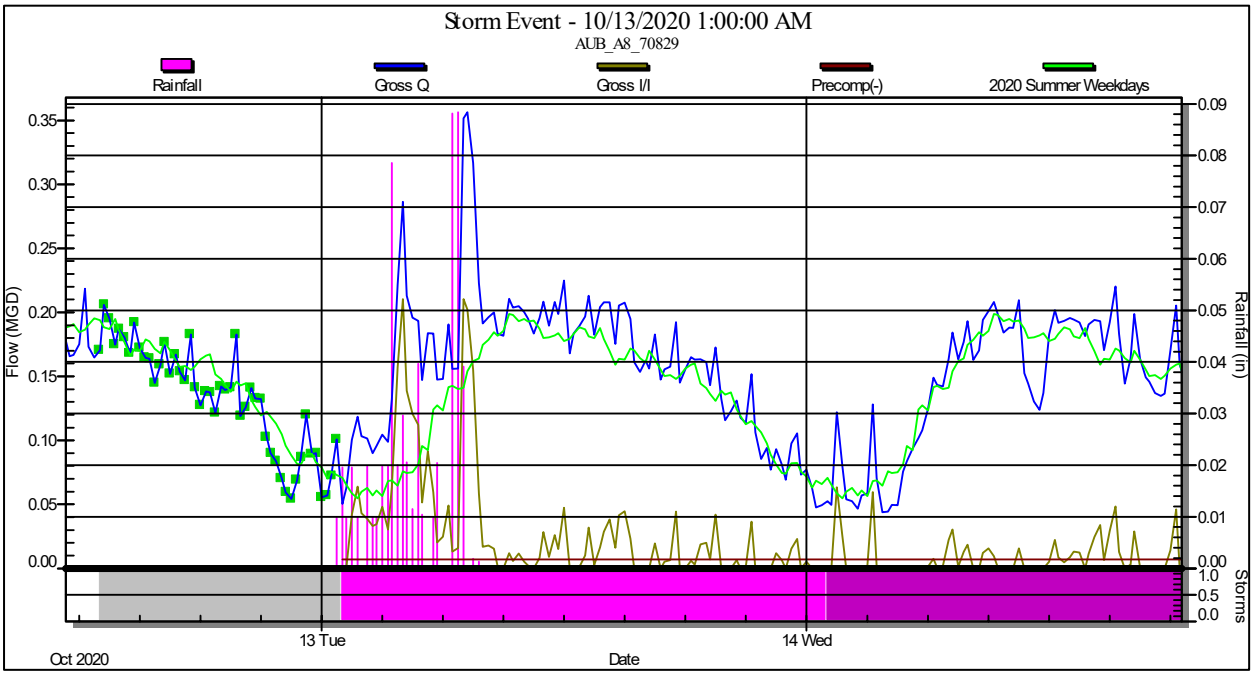


.

4.0 – Subjective Views of Hydrographs

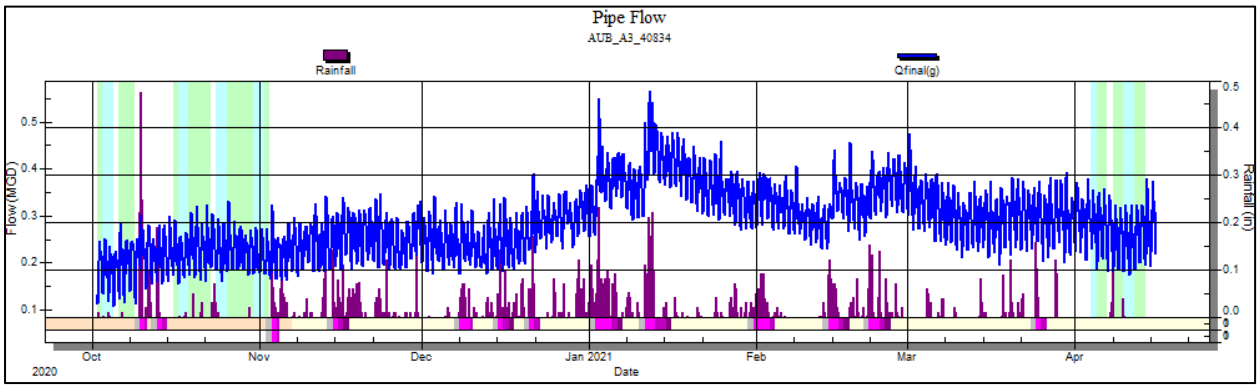
In addition to the numerical analysis in this report we have plotted storm hydrographs for the eight largest storms at each meter in Appendix B. It is noticeable that there appear to be minor sources of Inflow during high intensity storms of October as shown in Figure 14. The gold RDII hydrograph follows the rainfall hyetograph very closely indicating that the RDII is the direct result of rainfall, a classic inflow source such as a roof drain. This hydrograph is in 15-minute time steps, but the observations can easily be made in the 60-minute plots in Appendix B.

Figure 14 Hydrographs in 15-minute time steps showing what appears to be source(s) of Inflow.



On the other hand, the hydrograph from AUB_A2 in Figure 15 reveals a sewershed that does not include many ‘spikes’ from sources of Inflow, but does reflect dramatic influence of base infiltration as the soil moisture increases and declines slowly over the wet season.

Figure 15 Sewershed AUB_A3 experiences RDII more similar to infiltration rather than inflow.



5.0 – Conclusions

1. By design this metering period captured the traditional dry weather period in October and the wet season beginning in November. Five storms recorded a return frequency of at least one year in at least one rain gauge. Two January storms exceeded 3 inches of rainfall.
2. The sewer system handled these storms readily with only one sewer surcharging and that was due to the restricted flow at a downstream siphon. The Green River siphon at AUB_Y1 is shown to have an 8-inch barrel and a 12-inch barrel, but the scattergraph indicates that only one barrel was functioning.
3. The wide range of basin sizes between the larger 'Y' basins and the smaller 'A' basins is what would have been expected. The 'Y' basin generated the most RDII, but RDII severity of the smaller basins was both higher and lower than the 'Y' basin. The intuitive observation about severity should be avoided; "The large basins don't look so bad".
4. Many of the 'A' basins performed well with small RDII contributions, but some 'A' basins experience minor sources of Inflow.
5. The RDII severity calculations are low compared to what is often experienced in other collection systems.

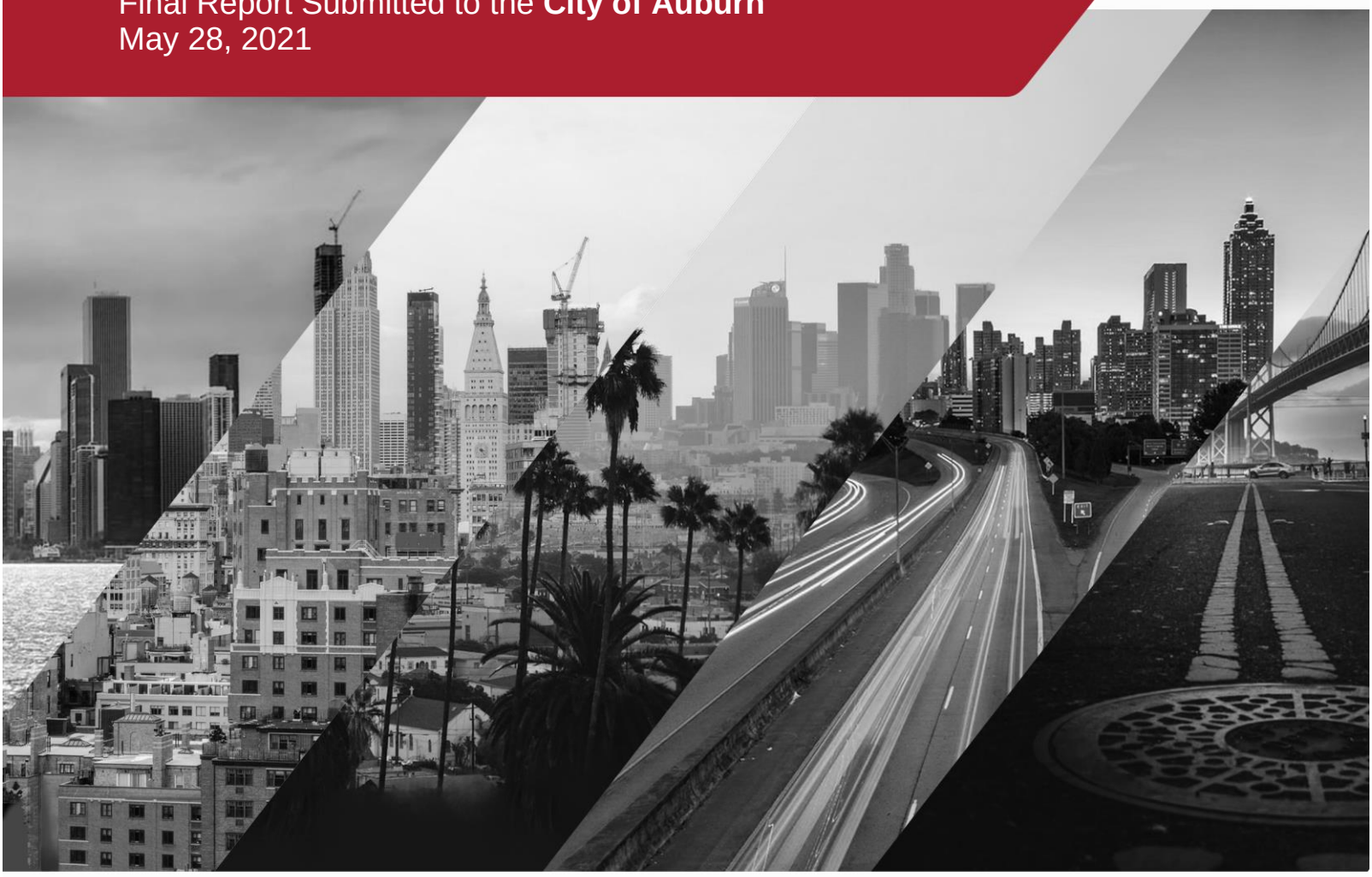
Appendix A – Sewershed Map

Appendix B - Sliicer Graphics

Appendix C – Q vs i Plots

City of Auburn

Final Report Submitted to the **City of Auburn**
May 28, 2021



ADS ENVIRONMENTAL SERVICES

4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

May 28, 2021

Bob Elwell
City of Auburn Sewer Utility Engineer
25 West Main Street
Auburn, WA 98001

SUBJECT: Auburn Temporary Flow Monitoring Report

Dear Bob,

ADS is pleased to submit this temporary flow monitoring report for the city of Auburn. The metering was conducted at twenty-four (24) locations. The study was conducted during the period of Tuesday, September 22, 2020 to Wednesday, April 14, 2021.

The report contains depth, velocity, and quantity hydrographs based on an hourly average as well as daily long tables for the metering period. All data can easily be exported from the PRISM data hosting website.

In addition, we would be happy to further explain any details about the report that may seem unclear. Should you have any questions or comments, you may contact the Project Manager, Shawn Hoglan at 206-571-0130.

It has been our pleasure to be of service to you in the performance of this project. Thank you for choosing ADS products and services to meet your flow monitoring needs.

Sincerely,
ADS ENVIRONMENTAL SERVICES

Tony Locke
Data Analyst III, ADS LLC Huntsville, AL

The City of Auburn
Temporary Flow Monitoring Project

Prepared For:

Bob Elwell
City of Auburn Sewer Utility Engineer
25 West Main Street
Auburn, WA 98001

Prepared By:

ADS, LLC
4455 S. 134th Place
Tukwila, WA 98168

AUB_A1_30820

Site Commentary

SITE INFORMATION

Pipe	Elliptical (21 in H x 21 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	3.87	1.68	0.337
Minimum	2.53	1.08	0.121
Maximum	5.41	2.25	0.713
Min Time	10/03/2020 3:00:00 AM	10/31/2020 5:00:00 AM	10/03/2020 5:00:00 AM
Max Time	01/12/2021 10:00:00 AM	01/12/2021 10:00:00 AM	01/12/2021 10:00:00 AM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

Percent Uptime	
DFINAL (in)	94.934
VFINAL (ft/s)	94.934
QFINAL (MGD - Total MG)	94.934

Hydrograph Report

AUB_A1_30820

Flow Monitor

AUB_A1_30820

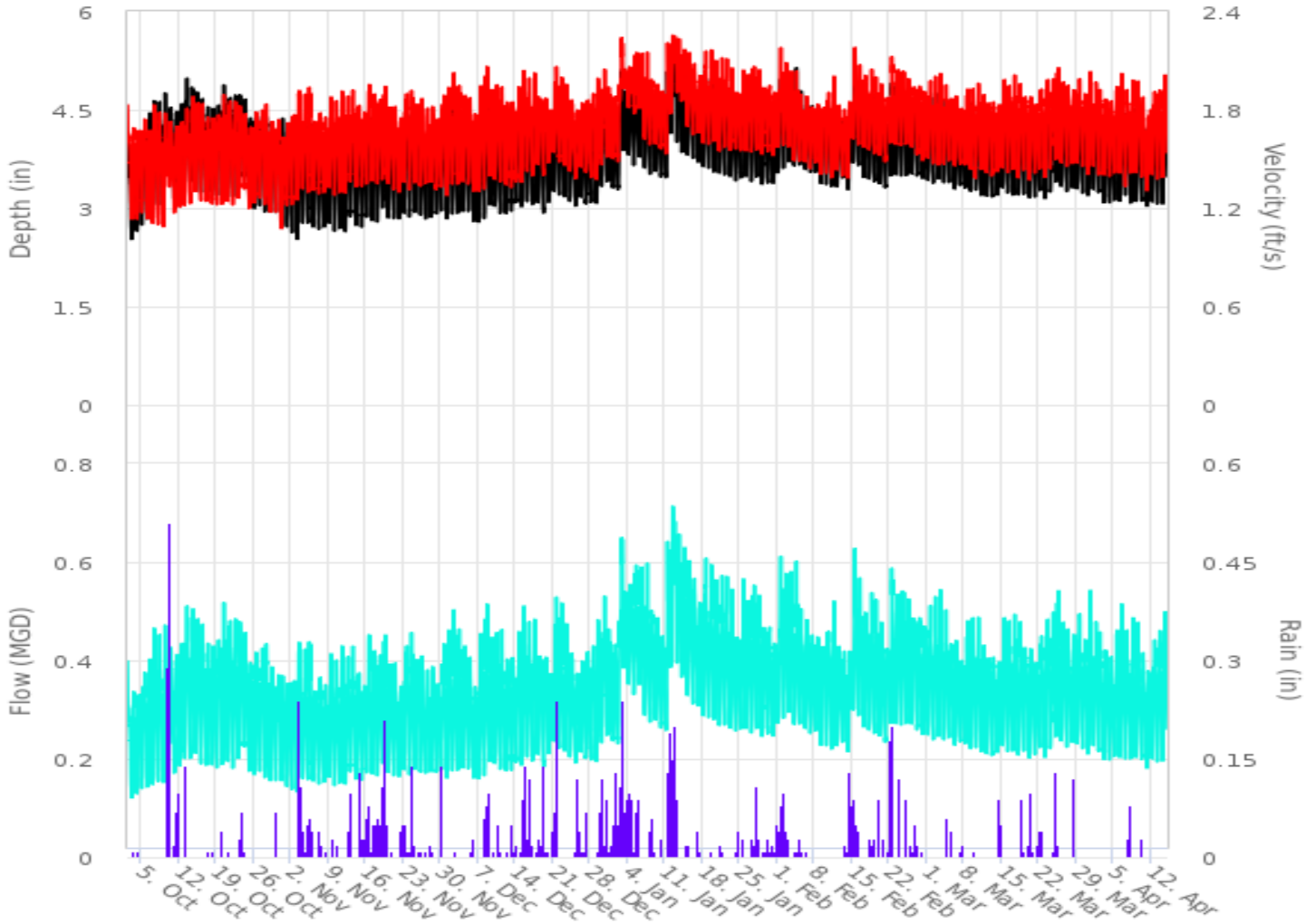
Pipe Height
21.00
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A1_30820

Flow Monitor

AUB_A1_30820

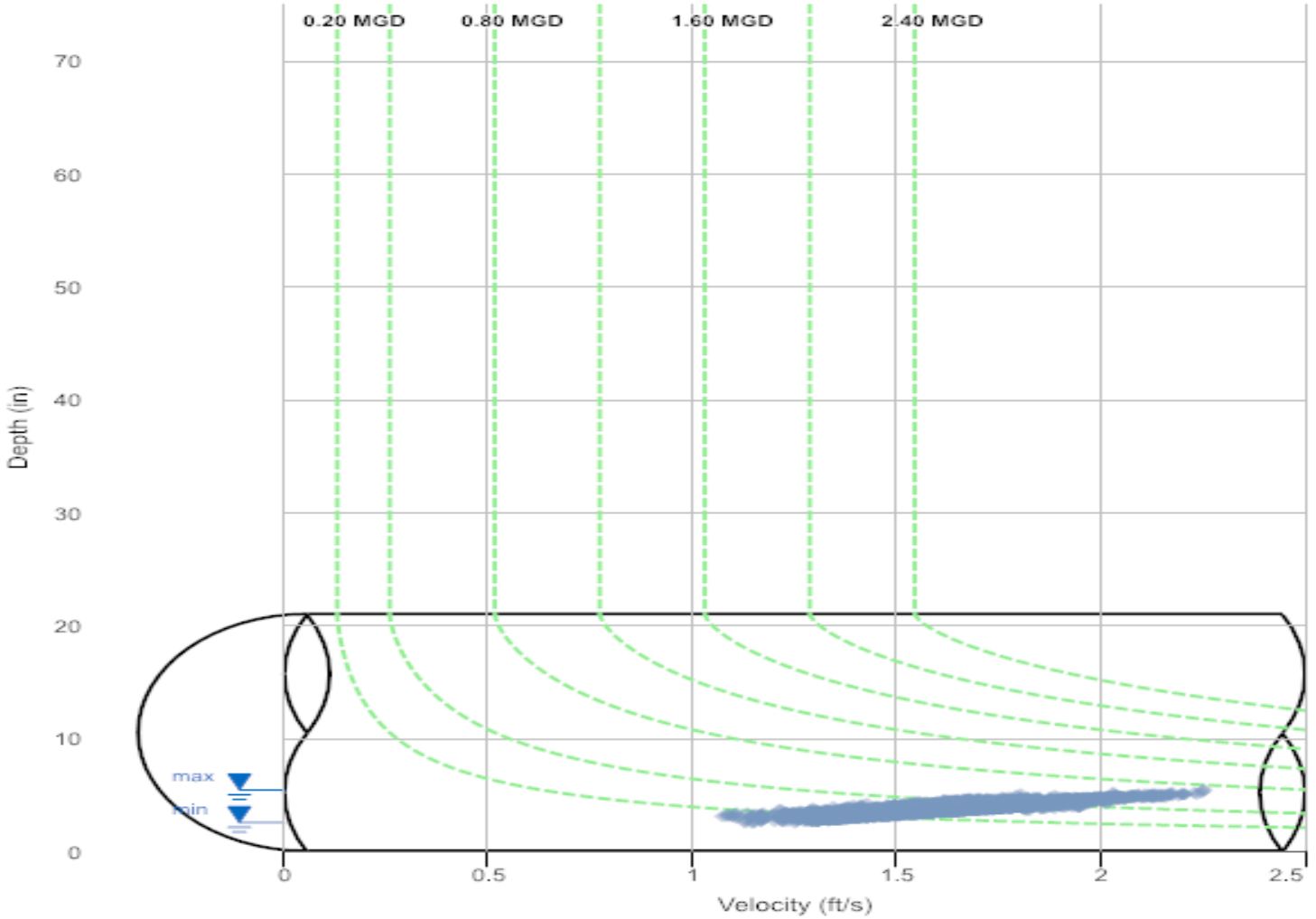
Pipe Height
21.00
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A1_30820Pipe: Elliptical (21 in H x 21 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	04:25	3.27	16:05	4.54	3.80	04:30	1.47	10:50	2.02	1.70	04:30	0.228	16:05	0.486	0.330	0.330	0.51
01/02/2021	04:35	3.24	21:25	5.25	4.12	04:35	1.45	21:45	2.31	1.81	04:35	0.220	21:35	0.698	0.403	0.403	1.69
01/03/2021	05:05	3.77	01:05	5.17	4.43	05:10	1.80	00:30	2.25	2.00	05:10	0.347	00:25	0.663	0.480	0.480	0.65
01/04/2021	03:50	3.64	12:35	5.03	4.38	03:55	1.74	12:35	2.17	1.96	04:10	0.322	12:35	0.622	0.464	0.464	0.48
01/05/2021	03:35	3.54	14:35	5.03	4.30	02:15	1.67	14:35	2.22	1.95	03:55	0.310	14:35	0.635	0.450	0.450	0.52
01/06/2021	05:30	3.65	15:50	5.17	4.31	04:10	1.74	16:05	2.27	1.92	06:20	0.326	15:50	0.667	0.444	0.444	0.22
01/07/2021	04:30	3.54	16:25	5.01	4.22	04:05	1.58	16:20	2.24	1.83	04:25	0.277	16:25	0.634	0.414	0.414	-
01/08/2021	04:35	3.46	12:50	4.68	4.16	03:30	1.54	15:55	2.05	1.81	04:45	0.259	14:05	0.521	0.400	0.400	0.22
01/09/2021	04:25	3.52	14:55	4.62	4.06	03:30	1.52	14:20	2.02	1.78	03:30	0.264	14:30	0.508	0.379	0.379	-
01/10/2021	04:30	3.43	12:20	4.42	3.96	02:55	1.42	12:25	1.97	1.75	02:55	0.238	12:25	0.469	0.360	0.360	0.07
01/11/2021	04:00	3.40	11:35	5.14	4.29	04:00	1.47	11:40	2.30	1.87	04:00	0.241	11:40	0.677	0.437	0.437	1.06
01/12/2021	00:30	4.09	09:55	5.56	4.83	00:30	1.70	10:35	2.33	2.09	00:30	0.362	09:55	0.750	0.570	0.570	2.10
01/13/2021	06:05	3.82	15:50	5.28	4.62	22:35	1.78	11:15	2.33	2.04	05:05	0.367	15:50	0.700	0.520	0.520	0.09
01/14/2021	04:40	3.65	16:00	5.47	4.49	01:35	1.75	16:05	2.24	1.98	04:45	0.334	16:00	0.708	0.485	0.485	0.01
01/15/2021	02:40	3.67	12:15	5.04	4.43	04:35	1.65	12:05	2.27	1.91	04:50	0.309	12:15	0.649	0.461	0.461	0.09
01/16/2021	04:20	3.71	12:15	4.87	4.33	05:05	1.61	12:45	2.14	1.86	04:20	0.302	12:45	0.583	0.434	0.434	-
01/17/2021	05:30	3.63	11:40	4.78	4.25	07:15	1.62	18:00	2.08	1.84	06:30	0.296	11:45	0.544	0.417	0.417	0.10
01/18/2021	03:45	3.54	16:15	5.03	4.31	02:45	1.56	15:55	2.19	1.86	03:50	0.274	16:40	0.619	0.433	0.433	-
01/19/2021	03:50	3.51	16:35	4.99	4.24	03:35	1.55	16:30	2.27	1.85	03:50	0.264	16:35	0.641	0.420	0.420	0.01
01/20/2021	03:15	3.47	12:55	4.97	4.18	04:05	1.55	12:45	2.26	1.83	03:10	0.266	12:45	0.630	0.407	0.407	-
01/21/2021	03:05	3.48	16:10	4.97	4.18	05:00	1.49	16:15	2.18	1.81	05:00	0.255	16:10	0.609	0.404	0.404	0.11
01/22/2021	04:45	3.46	14:05	4.95	4.14	03:05	1.50	13:55	2.20	1.82	03:05	0.255	14:05	0.607	0.400	0.400	-
01/23/2021	06:10	3.43	13:00	4.91	4.06	06:10	1.51	13:05	2.17	1.79	06:10	0.249	13:05	0.599	0.383	0.383	-
01/24/2021	05:25	3.35	11:35	4.46	4.00	04:05	1.50	15:15	2.02	1.77	05:20	0.245	10:35	0.471	0.370	0.370	0.16
01/25/2021	04:10	3.39	16:15	5.02	4.15	05:10	1.51	16:05	2.14	1.76	04:10	0.249	16:15	0.609	0.387	0.387	0.04
01/26/2021	03:30	3.42	13:40	4.93	4.10	03:20	1.52	13:40	2.16	1.79	03:35	0.251	13:40	0.600	0.387	0.387	-
01/27/2021	04:05	3.33	09:50	4.86	4.08	02:50	1.46	09:50	2.16	1.80	02:50	0.236	09:50	0.589	0.389	0.389	0.14
01/28/2021	02:25	3.41	15:40	4.96	4.12	04:35	1.52	15:45	2.14	1.82	03:15	0.251	15:35	0.592	0.398	0.398	0.24
01/29/2021	05:55	3.32	11:40	4.54	3.99	03:35	1.48	11:25	1.97	1.78	03:35	0.236	11:40	0.484	0.372	0.372	0.03
01/30/2021	04:40	3.33	13:55	4.51	3.93	06:40	1.50	13:10	2.01	1.77	06:40	0.238	13:10	0.489	0.361	0.361	0.07
01/31/2021	05:15	3.33	11:10	4.33	3.89	05:20	1.47	13:00	1.95	1.75	05:15	0.235	11:10	0.449	0.351	0.351	0.12
02/01/2021	01:55	3.46	15:45	5.11	4.18	01:55	1.51	16:20	2.22	1.81	01:55	0.253	15:45	0.646	0.405	0.405	0.82
02/02/2021	03:45	3.52	15:55	5.02	4.33	03:50	1.55	15:55	2.16	1.83	03:50	0.267	15:55	0.615	0.430	0.430	0.31
02/03/2021	04:00	3.65	14:20	5.16	4.29	03:30	1.53	14:20	2.11	1.77	04:00	0.280	14:20	0.625	0.408	0.408	0.06
02/04/2021	02:50	3.58	14:05	5.42	4.26	02:50	1.46	14:05	2.21	1.71	04:05	0.256	14:05	0.701	0.393	0.393	0.07
02/05/2021	04:10	3.58	11:25	4.87	4.19	02:50	1.45	11:20	2.00	1.69	04:05	0.258	11:20	0.544	0.376	0.376	0.01
02/06/2021	05:15	3.56	13:10	4.79	4.11	02:55	1.45	13:10	1.98	1.68	02:55	0.254	13:10	0.527	0.364	0.364	0.01
02/07/2021	06:05	3.43	10:35	4.63	4.05	04:35	1.41	10:30	1.88	1.66	06:00	0.239	10:35	0.477	0.353	0.353	-
02/08/2021	04:20	3.48	13:55	4.60	4.11	04:00	1.44	13:10	1.92	1.69	04:20	0.244	13:50	0.474	0.366	0.366	-
02/09/2021	04:55	3.32	13:00	4.53	4.04	03:20	1.36	09:50	1.86	1.68	03:20	0.216	13:00	0.456	0.356	0.356	-
02/10/2021	04:30	3.32	11:25	4.67	4.01	04:25	1.26	14:55	2.00	1.70	04:25	0.199	09:05	0.501	0.358	0.358	-
02/11/2021	04:45	3.30	14:50	4.86	4.00	03:15	1.36	14:40	2.10	1.70	03:15	0.216	14:40	0.568	0.356	0.356	-
02/12/2021	04:55	3.28	13:25	4.45	3.93	02:15	1.40	13:20	1.90	1.64	05:00	0.216	13:20	0.452	0.335	0.335	-
02/13/2021	06:05	3.37	13:40	4.40	3.84	04:50	1.34	13:45	1.89	1.61	05:00	0.217	13:40	0.445	0.317	0.317	0.08
02/14/2021	05:40	3.20	12:05	4.32	3.87	05:25	1.34	11:50	1.88	1.66	05:30	0.205	11:50	0.431	0.334	0.334	0.71
02/15/2021	05:20	3.63	12:35	5.18	4.33	02:55	1.58	14:05	2.22	1.86	03:00	0.286	12:40	0.657	0.437	0.437	0.78
02/16/2021	04:00	3.60	11:15	4.94	4.21	04:05	1.55	11:25	2.15	1.82	04:05	0.275	11:25	0.594	0.407	0.407	0.07
02/17/2021	03:00	3.42	11:55	4.63	4.08	04:10	1.53	10:30	2.07	1.81	04:20	0.253	11:50	0.520	0.389	0.389	-
02/18/2021	04:45	3.40	16:00	4.85	4.05	03:00	1.52	16:00	2.17	1.78	04:45	0.249	16:00	0.588	0.378	0.378	0.09
02/19/2021	05:15	3.31	12:30	5.08	4.04	04:10	1.48	12:30	2.21	1.76	04:10	0.238	12:30	0.642	0.373	0.373	0.17
02/20/2021	03:40	3.31	12:25	4.55	3.92	05:05	1.48	12:15	2.04	1.72	03:40	0.234	12:20	0.498	0.350	0.350	0.07
02/21/2021	06:05	3.24	12:20	4.31	3.87	04:20	1.45	18:05	1.93	1.72	06:05	0.222	12:20	0.441	0.344	0.344	0.42
02/22/2021	04:00	3.45	10:20	5.00	4.19	02:55	1.56	10:25	2.20	1.84	02:55	0.262	10:25	0.624	0.412	0.412	0.98
02/23/2021	02:45	3.46	15:05	5.12	4.16	04:00	1.55	15:00	2.27	1.82	05:05	0.260	15:00	0.666	0.402	0.402	0.27
02/24/2021	04:10	3.44	16:25	4.92	4.16	02:45	1.55	16:20	2.10	1.80	04:05	0.259	16:20	0.577	0.400	0.400	-
02/25/2021	03:35	3.44	14:45	4.90	4.19	03:40	1.53	14:50	2.06	1.80	03:40	0.256	14:45	0.564	0.402	0.402	0.18
02/26/2021	02:25	3.49	11:15	4.67	4.14	04:00	1.53	14:55	1.98	1.79	04:00	0.259	11:20	0.499	0.393	0.393	0.10
02/27/2021	04:55	3.47	15:25	4.85	4.04	07:10	1.48	15:20	2.05	1.73	06:15	0.251	15:25	0.557	0.367	0.367	0.02
02/28/2021	06:10	3.35	13:15	4.73	4.00	05:40	1.41	13:15	2.02	1.72	05:40	0.235	13:15	0.528	0.360	0.360	0.02
03/01/2021	04:00	3.33	15:45	4.85	4.08	03:45	1.46	15:40	2.04	1.74	04:00	0.233	15:45	0.551	0.374	0.374	-
03/02/2021	04:20	3.32	14:10	4.89	4.03	03:45	1.42	14:20	2.07	1.71	04:30	0.227	14:15	0.564	0.362	0.362	-
03/03/2021	04:40	3.36	13:05	4.93	4.04	03:25	1.39	13:00	2.10	1.72	04:40	0.229	13:00	0.582	0.365	0.365	-
03/04/2021	04:40	3.34	14:40	4.85	4.00	02:55	1.42	14:30	2.04	1.71	03:55	0.227	14:35	0.551	0.358	0.358	0.20
03/05/2021	02:50	3.34	13:15	4.45	3.93	04:10	1.44	13:40	1.92	1.70	02:50	0.231	13:15	0.455	0.347	0.347	0.05
03/06/2021	05:45	3.27	11:05	4.40	3.86	05:50	1.43	11:05	1.92	1.69	05:50	0.220	11:05	0.455	0.336	0.336	-
03/07/2021	05:00	3.21	12:45	4.27	3.82	06:10	1.43	12:40	1.87	1.67	04:55	0.217	12:45	0.423	0.326	0.326	0.04
03/08/2021	04:15	3.19	16:00	4.79	3.96	03:10	1.41	16:05	2.05	1.70	04:15	0.212	16:05	0.540	0.351	0.351	-
03/09/2021	04:25	3.15	14:55	4.70	3.96	05:20	1.40	16:10	1.99	1.68	03:10	0.208	14:45	0.511	0.346	0.346	0.01
03/10/2021	03:30	3.18	15:40	4.76	3.92	02:45	1.34	15:25	2.07	1.68	03:30	0.209	15:40	0.541	0.343	0.343	-
03/11/2021	03:20	3.15	15:40	4.52	3.81	03:00	1.38	15:40	2.00	1.70	05:30	0.204	15:40	0.491	0.332	0.332	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	03:10	3.14	12:35	4.24	3.77	01:40	1.37	12:25	1.90	1.67	02:55	0.204	12:25	0.420	0.320	0.320	-
03/13/2021	05:10	3.10	11:20	4.27	3.72	03:20	1.36	11:15	1.90	1.65	05:05	0.197	11:15	0.430	0.312	0.312	-
03/14/2021	04:50	3.14	15:40	4.26	3.75	04:10	1.39	13:10	1.89	1.66	04:50	0.205	15:35	0.421	0.316	0.316	0.30
03/15/2021	03:25	3.25	12:40	4.74	3.90	01:50	1.40	13:00	2.06	1.71	03:25	0.217	12:35	0.532	0.346	0.346	-
03/16/2021	04:20	3.14	09:50	4.63	3.81	03:05	1.38	10:20	2.05	1.70	03:05	0.203	10:20	0.517	0.332	0.332	-
03/17/2021	02:45	3.14	09:30	4.65	3.85	03:45	1.37	09:30	2.05	1.72	03:45	0.202	09:30	0.524	0.342	0.342	-
03/18/2021	03:00	3.14	10:45	4.68	3.87	04:20	1.33	10:40	2.04	1.70	02:45	0.201	10:45	0.528	0.340	0.340	0.11
03/19/2021	03:30	3.15	10:20	4.33	3.81	03:45	1.39	10:25	1.92	1.69	03:45	0.205	10:25	0.440	0.329	0.329	0.03
03/20/2021	04:50	3.15	11:45	4.35	3.78	04:55	1.35	11:45	1.93	1.66	04:55	0.198	11:45	0.449	0.321	0.321	0.17
03/21/2021	05:25	3.15	11:20	4.18	3.73	03:40	1.38	11:20	1.88	1.65	03:40	0.205	11:20	0.414	0.312	0.312	0.07
03/22/2021	02:50	3.17	11:20	4.41	3.87	02:50	1.37	07:40	1.99	1.71	02:50	0.203	10:50	0.467	0.341	0.341	0.11
03/23/2021	02:20	3.11	15:25	4.57	3.88	02:10	1.36	15:30	2.03	1.71	02:10	0.198	15:30	0.506	0.344	0.344	-
03/24/2021	03:55	3.17	15:15	4.76	3.89	01:25	1.38	15:10	2.07	1.72	03:55	0.204	15:10	0.546	0.347	0.347	0.34
03/25/2021	04:05	3.35	15:35	4.89	3.99	04:05	1.45	15:35	2.12	1.77	04:05	0.232	15:35	0.583	0.370	0.370	0.27
03/26/2021	02:40	3.28	13:55	4.71	3.95	04:00	1.43	13:55	2.08	1.76	02:40	0.227	13:55	0.543	0.361	0.361	-
03/27/2021	04:40	3.20	10:20	4.45	3.84	03:25	1.41	10:10	1.97	1.72	03:25	0.214	10:20	0.472	0.340	0.340	-
03/28/2021	05:10	3.21	13:40	4.46	3.87	03:40	1.43	13:30	1.98	1.72	05:05	0.216	13:30	0.474	0.345	0.345	0.37
03/29/2021	02:40	3.23	14:45	4.73	3.93	03:45	1.45	14:45	2.09	1.75	02:40	0.223	14:45	0.548	0.358	0.358	-
03/30/2021	03:30	3.18	15:00	4.46	3.84	03:25	1.42	15:00	1.93	1.71	03:25	0.212	15:00	0.467	0.338	0.338	-
03/31/2021	03:40	3.14	14:15	4.90	3.90	03:25	1.38	14:15	2.09	1.71	03:40	0.204	14:15	0.575	0.346	0.346	-
04/01/2021	04:15	3.20	15:40	4.65	3.87	03:05	1.42	15:30	2.08	1.71	03:05	0.215	15:30	0.527	0.342	0.342	-
04/02/2021	03:55	3.21	10:20	4.47	3.83	02:40	1.36	10:25	1.98	1.69	02:40	0.206	12:15	0.478	0.332	0.332	-
04/03/2021	02:35	3.00	11:30	4.30	3.69	02:35	1.37	11:45	1.89	1.66	02:35	0.187	11:30	0.428	0.310	0.310	-
04/04/2021	02:50	3.05	12:25	4.28	3.63	04:25	1.37	12:25	1.91	1.64	03:50	0.194	12:25	0.433	0.298	0.298	-
04/05/2021	03:55	3.02	15:30	4.54	3.78	02:25	1.37	15:25	2.02	1.70	02:25	0.193	15:25	0.498	0.330	0.330	-
04/06/2021	02:55	3.05	10:55	4.66	3.84	02:40	1.38	11:35	2.04	1.69	03:55	0.194	10:50	0.521	0.336	0.336	-
04/07/2021	03:35	3.16	11:00	4.61	3.79	03:25	1.30	11:15	1.95	1.65	03:25	0.192	10:55	0.486	0.320	0.320	0.22
04/08/2021	02:10	3.05	14:00	4.73	3.78	04:00	1.37	13:50	2.07	1.69	03:30	0.196	14:00	0.537	0.328	0.328	-
04/09/2021	02:40	3.04	12:05	4.62	3.75	04:00	1.39	12:00	2.02	1.68	04:05	0.194	12:10	0.513	0.323	0.323	0.03
04/10/2021	03:00	3.03	10:50	4.32	3.70	04:45	1.36	11:35	1.91	1.61	03:05	0.192	10:50	0.433	0.302	0.302	0.02
04/11/2021	04:00	3.00	10:55	4.25	3.67	04:00	1.28	10:50	1.83	1.59	04:00	0.174	10:50	0.411	0.295	0.295	-
04/12/2021	04:50	3.03	16:00	4.59	3.75	03:30	1.36	16:00	2.04	1.68	04:50	0.192	16:00	0.513	0.321	0.321	-
04/13/2021	02:40	2.99	14:45	4.65	3.76	03:15	1.35	14:45	2.00	1.67	02:40	0.184	14:45	0.511	0.321	0.321	-
04/14/2021	03:35	2.99	14:25	4.63	3.80	04:25	1.36	14:15	2.04	1.69	03:35	0.186	14:25	0.520	0.331	0.330	-
10/01/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/02/2020	23:55	3.06	09:55	4.25	3.57	23:25	1.30	09:45	1.90	1.60	23:55	0.191	09:50	0.426	0.281	0.172	-
10/03/2020	05:35	2.49	13:15	3.94	3.27	03:35	1.10	13:05	1.72	1.44	03:35	0.115	13:05	0.346	0.229	0.229	0.01
10/04/2020	02:50	2.60	14:35	3.97	3.37	04:00	1.09	14:30	1.73	1.45	04:05	0.121	14:30	0.352	0.241	0.241	0.01
10/05/2020	03:05	2.67	15:55	4.40	3.59	03:05	1.13	15:35	1.86	1.50	03:05	0.130	15:40	0.438	0.271	0.271	-
10/06/2020	03:15	2.77	15:05	4.54	3.73	01:40	1.06	15:00	1.74	1.42	03:10	0.131	15:00	0.427	0.272	0.272	-
10/07/2020	02:35	2.85	09:45	4.72	3.80	02:30	1.07	09:40	1.86	1.45	02:30	0.137	09:45	0.484	0.287	0.287	-
10/08/2020	03:35	3.00	10:35	4.71	3.87	02:15	1.08	10:25	1.83	1.44	03:40	0.147	10:30	0.471	0.292	0.292	-
10/09/2020	04:50	3.02	10:25	4.96	3.86	04:40	1.05	10:20	1.86	1.45	04:40	0.146	10:25	0.522	0.292	0.292	0.64
10/10/2020	05:10	3.47	13:05	4.65	4.08	05:10	1.27	13:00	1.77	1.54	05:15	0.213	13:10	0.451	0.331	0.331	1.04
10/11/2020	03:40	3.10	12:05	4.55	3.96	03:40	1.13	17:05	1.74	1.49	03:40	0.162	17:05	0.429	0.310	0.310	0.53
10/12/2020	03:10	3.20	15:30	4.80	4.11	03:00	1.16	15:35	1.82	1.53	03:00	0.175	15:35	0.486	0.335	0.335	-
10/13/2020	02:30	3.35	13:25	5.02	4.25	00:45	1.14	13:20	1.85	1.54	02:25	0.194	13:20	0.527	0.353	0.353	0.61
10/14/2020	03:45	3.38	10:35	5.08	4.17	04:45	1.21	15:50	1.98	1.56	03:45	0.197	10:40	0.557	0.349	0.349	-
10/15/2020	03:10	3.24	10:25	5.08	4.06	01:30	1.26	14:00	2.01	1.57	03:05	0.194	14:05	0.579	0.337	0.337	-
10/16/2020	03:25	3.19	11:00	4.80	3.95	03:25	1.20	11:00	1.91	1.54	03:25	0.179	11:00	0.512	0.319	0.319	-
10/17/2020	03:35	3.17	11:20	4.63	3.92	04:45	1.16	11:15	1.82	1.52	04:45	0.171	11:15	0.461	0.310	0.310	0.01
10/18/2020	04:25	3.17	12:25	4.58	3.91	04:20	1.17	12:20	1.80	1.50	04:20	0.174	12:30	0.451	0.305	0.305	0.03
10/19/2020	03:25	3.14	11:40	4.67	4.01	01:45	1.13	15:20	1.85	1.55	01:45	0.170	11:40	0.470	0.327	0.327	0.05
10/20/2020	02:55	3.17	10:10	5.05	4.03	03:00	1.19	10:10	2.00	1.53	02:55	0.177	10:10	0.577	0.326	0.326	-
10/21/2020	01:55	3.25	15:20	4.86	4.03	02:45	1.19	15:15	1.97	1.55	02:45	0.185	15:20	0.532	0.330	0.330	0.01
10/22/2020	04:00	3.06	14:25	4.88	4.01	00:50	1.16	15:00	1.93	1.54	03:55	0.168	14:30	0.511	0.328	0.328	-
10/23/2020	03:10	3.28	10:40	4.94	4.11	01:45	1.21	10:40	1.94	1.56	03:00	0.191	10:40	0.542	0.342	0.342	0.20
10/24/2020	03:05	3.40	11:20	4.70	4.02	06:20	1.26	11:15	1.82	1.52	06:20	0.207	11:20	0.473	0.321	0.321	0.02
10/25/2020	04:50	3.09	10:30	4.42	3.80	04:55	1.16	11:10	1.75	1.48	04:55	0.166	11:10	0.412	0.289	0.289	-
10/26/2020	03:35	2.98	11:25	4.46	3.76	00:45	1.20	11:30	1.90	1.54	03:45	0.163	11:30	0.455	0.297	0.297	-
10/27/2020	03:00	2.98	15:10	4.54	3.79	01:40	1.23	15:05	1.87	1.56	03:00	0.165	15:05	0.461	0.303	0.303	-
10/28/2020	02:50	2.89	09:30	4.50	3.70	02:35	1.19	09:20	1.86	1.52	02:35	0.156	09:25	0.452	0.287	0.287	-
10/29/2020	04:55	2.88	09:10	4.43	3.73	03:35	1.16	08:55	1.83	1.50	03:45	0.152	09:10	0.431	0.287	0.287	-
10/30/2020	03:15	2.93	17:10	4.23	3.74	03:50	1.16	10:20	1.78	1.49	03:50	0.153	15:55	0.385	0.283	0.283	0.10
10/31/2020	05:05	3.09	10:55	4.51	3.66	05:05	1.06	12:05	1.72	1.42	05:10	0.150	10:55	0.386	0.262	0.262	-
11/01/2020	05:20	2.69	12:50	4.06	3.41	05:35	1.18	12:55	1.79	1.49	05:35	0.137	12:55	0.375	0.250	0.250	-
11/02/2020	04:55	2.56	16:00	4.03	3.45	04:50	1.19	16:10	1.82	1.55	04:50	0.130	16:10	0.381	0.265	0.265	-
11/03/2020	04:35	2.47	13:25	4.47	3.49	04:25	1.21	13:25	2.02	1.61	04:35	0.125	13:25	0.488	0.283	0.283	0.83
11/04/2020	03:10	2.72	15:30	4.35	3.46	03:05	1.28	15:30	1.98	1.57	03:05	0.152	15:30	0.460	0.269	0.269	0.09
11/05/2020	03:45	2.69	16:30	4.47	3.56	03:50	1.26	10:00	2.01	1.62	03:55	0.146	10:15	0.476	0.291	0.291	0.34
11/06/2020	04:50	2.63	15:00	4.01	3.41	03:25	1.27	10:35	1.80	1.56	04:55	0.142	15:05	0.370	0.261	0.261	0.10
11/07/2020	04:05	2.64	15:55	4.15	3.36	02:25	1.27	15:50	1.85	1.54	04:10	0.144	16:00	0.403	0.252	0.252	0.07
11/08/2020	06:10	2.61	10:50	3.95	3.37	06:05	1.25	11:30	1.82	1.55	06:05	0.141	11:30	0.366	0.255	0.255	0.01
11/09/2020	03:55	2.67	11:50	4.35	3.50	05:00	1.26	13:05	1.95	1.59	03:55	0.147	12:00	0.449	0.277	0.277	0.04

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/10/2020	03:45	2.57	13:05	4.35	3.41	04:00	1.25	12:25	1.97	1.57	03:45	0.138	13:05	0.456	0.265	0.265	0.03
11/11/2020	03:55	2.59	13:35	4.60	3.42	03:30	1.27	13:40	2.14	1.58	03:55	0.140	13:40	0.530	0.269	0.269	-
11/12/2020	04:30	2.57	15:45	4.37	3.42	03:55	1.25	15:45	1.97	1.59	03:55	0.138	15:45	0.461	0.269	0.269	0.16
11/13/2020	02:50	2.78	14:10	4.48	3.56	02:35	1.33	13:45	2.08	1.64	02:50	0.162	14:10	0.500	0.291	0.291	0.38
11/14/2020	04:55	2.68	10:50	4.20	3.47	04:35	1.31	10:45	1.92	1.61	05:05	0.151	10:50	0.421	0.277	0.277	0.47
11/15/2020	05:35	2.69	18:45	4.13	3.43	05:10	1.31	18:40	1.94	1.59	05:20	0.153	18:45	0.419	0.267	0.267	0.19
11/16/2020	04:55	2.74	14:10	4.44	3.59	02:25	1.22	16:30	2.01	1.65	02:25	0.158	16:30	0.479	0.299	0.299	0.31
11/17/2020	04:15	2.75	15:55	4.35	3.57	04:35	1.33	15:55	2.00	1.64	04:35	0.160	15:55	0.465	0.295	0.295	0.20
11/18/2020	03:35	2.72	15:45	4.51	3.57	04:55	1.29	15:50	2.04	1.63	04:55	0.154	15:45	0.497	0.292	0.292	0.30
11/19/2020	03:30	2.90	11:00	4.53	3.65	02:10	1.32	16:10	2.05	1.64	03:30	0.177	16:10	0.501	0.303	0.303	0.50
11/20/2020	03:55	2.72	13:25	4.29	3.52	05:15	1.28	13:25	1.93	1.60	03:55	0.153	13:25	0.441	0.279	0.279	0.01
11/21/2020	05:50	2.74	12:15	4.24	3.48	05:55	1.27	12:15	1.88	1.58	05:55	0.152	12:15	0.422	0.273	0.273	-
11/22/2020	06:00	2.72	17:45	3.94	3.48	05:40	1.25	12:50	1.79	1.58	05:50	0.149	17:45	0.360	0.273	0.273	0.21
11/23/2020	05:00	2.86	16:45	4.46	3.68	03:10	1.32	16:25	1.99	1.67	05:05	0.167	16:50	0.475	0.313	0.313	0.14
11/24/2020	03:25	2.83	13:15	4.54	3.66	03:20	1.27	12:45	1.98	1.63	03:25	0.159	13:15	0.487	0.304	0.304	0.21
11/25/2020	05:05	2.84	15:45	4.32	3.64	04:45	1.31	09:00	1.92	1.63	04:55	0.167	15:45	0.435	0.301	0.301	0.05
11/26/2020	04:55	2.77	12:50	4.26	3.48	04:45	1.27	12:40	1.91	1.58	05:00	0.154	13:00	0.431	0.273	0.273	0.02
11/27/2020	04:50	2.71	12:25	4.12	3.47	04:45	1.31	12:25	1.85	1.58	04:50	0.155	12:25	0.397	0.271	0.271	-
11/28/2020	04:40	2.76	11:10	4.13	3.52	04:30	1.33	11:10	1.88	1.59	04:45	0.161	11:10	0.406	0.278	0.278	0.05
11/29/2020	05:55	2.81	12:20	4.04	3.47	06:35	1.28	12:10	1.81	1.55	05:45	0.161	12:15	0.377	0.266	0.266	-
11/30/2020	04:00	2.90	16:30	4.42	3.71	04:05	1.30	16:35	1.96	1.64	04:05	0.169	16:35	0.466	0.310	0.310	0.36
12/01/2020	04:45	2.80	12:45	4.61	3.59	04:10	1.26	12:40	2.03	1.61	04:30	0.157	12:40	0.512	0.292	0.292	-
12/02/2020	04:05	2.81	11:10	4.66	3.65	06:00	1.29	11:10	2.11	1.66	04:05	0.161	11:10	0.540	0.310	0.310	0.01
12/03/2020	04:50	2.86	11:35	4.49	3.62	01:35	1.31	11:45	2.00	1.66	04:55	0.167	11:45	0.487	0.304	0.304	-
12/04/2020	03:15	2.89	13:45	4.48	3.61	03:10	1.31	13:45	1.99	1.64	03:15	0.170	13:45	0.483	0.298	0.298	-
12/05/2020	04:05	2.89	10:55	4.39	3.54	03:50	1.29	10:55	1.92	1.61	06:15	0.167	10:55	0.452	0.284	0.284	0.03
12/06/2020	07:10	2.74	10:50	3.91	3.42	04:55	1.26	11:55	1.84	1.58	05:10	0.154	11:55	0.362	0.265	0.265	0.03
12/07/2020	03:50	2.73	13:25	4.46	3.56	03:45	1.28	13:20	1.98	1.63	03:45	0.153	13:20	0.476	0.292	0.292	-
12/08/2020	05:00	2.77	16:35	4.76	3.71	03:20	1.24	16:20	2.17	1.69	03:20	0.153	16:35	0.566	0.324	0.324	0.87
12/09/2020	05:10	2.98	14:50	4.55	3.68	05:50	1.34	14:50	2.03	1.67	05:10	0.186	14:50	0.503	0.311	0.311	0.17
12/10/2020	03:45	2.96	12:55	4.49	3.64	03:30	1.33	12:50	2.07	1.67	03:35	0.178	12:55	0.497	0.306	0.306	0.07
12/11/2020	04:40	2.86	10:40	4.56	3.60	04:35	1.29	10:35	2.03	1.65	04:40	0.165	11:10	0.507	0.300	0.300	0.02
12/12/2020	05:05	2.87	11:40	4.26	3.56	05:05	1.32	11:50	1.94	1.61	05:05	0.169	11:50	0.437	0.287	0.287	0.01
12/13/2020	05:40	2.93	12:00	4.27	3.62	05:45	1.31	12:00	1.89	1.61	05:40	0.174	12:00	0.428	0.294	0.294	0.24
12/14/2020	03:10	2.97	16:25	4.49	3.73	02:45	1.32	18:30	2.01	1.67	03:10	0.178	16:20	0.477	0.317	0.317	0.05
12/15/2020	03:40	2.98	14:00	4.71	3.77	03:35	1.34	14:05	2.11	1.70	03:35	0.181	14:00	0.548	0.330	0.330	0.58
12/16/2020	04:10	2.98	13:45	4.74	3.80	04:00	1.35	13:50	2.08	1.70	04:00	0.184	13:50	0.540	0.333	0.333	0.39
12/17/2020	04:30	2.99	14:30	4.58	3.75	03:10	1.35	14:40	2.11	1.71	03:10	0.187	14:30	0.525	0.328	0.328	0.08
12/18/2020	02:55	3.02	08:40	4.30	3.70	02:50	1.42	08:25	1.93	1.70	02:50	0.196	08:40	0.443	0.319	0.319	0.25
12/19/2020	06:35	2.90	17:20	4.25	3.68	04:50	1.39	13:55	1.94	1.69	06:30	0.180	17:20	0.427	0.317	0.317	0.37
12/20/2020	05:25	3.03	12:15	4.08	3.63	04:10	1.44	10:30	1.83	1.67	05:25	0.202	12:15	0.387	0.303	0.303	0.04
12/21/2020	05:05	3.19	17:00	4.76	3.94	05:00	1.49	17:00	2.18	1.77	05:10	0.223	17:00	0.577	0.365	0.365	1.07
12/22/2020	04:05	3.18	16:10	4.90	3.88	05:35	1.44	16:05	2.10	1.71	05:35	0.214	16:05	0.577	0.343	0.343	-
12/23/2020	04:05	3.09	13:40	4.76	3.80	02:30	1.38	13:30	2.06	1.68	04:00	0.202	13:35	0.543	0.329	0.329	-
12/24/2020	04:50	3.05	12:35	4.37	3.70	03:00	1.37	12:25	1.92	1.65	04:45	0.198	12:35	0.442	0.309	0.309	-
12/25/2020	06:25	2.99	15:45	4.15	3.64	05:45	1.34	13:05	1.85	1.63	06:30	0.184	15:40	0.400	0.299	0.299	0.49
12/26/2020	06:45	3.15	12:50	4.20	3.65	03:55	1.40	12:55	1.93	1.65	03:55	0.209	12:55	0.423	0.302	0.302	0.02
12/27/2020	05:00	3.00	13:15	4.41	3.67	03:25	1.37	13:05	1.92	1.65	03:25	0.189	13:15	0.455	0.306	0.306	0.13
12/28/2020	04:10	2.98	13:50	4.34	3.79	03:50	1.33	14:10	1.95	1.70	03:55	0.182	13:50	0.447	0.331	0.331	-
12/29/2020	04:35	3.01	10:20	4.61	3.83	04:55	1.34	10:30	2.06	1.70	04:50	0.184	10:20	0.516	0.336	0.336	0.14
12/30/2020	03:50	3.29	16:10	4.78	3.99	03:50	1.42	16:10	2.08	1.75	03:50	0.222	16:10	0.554	0.366	0.366	0.78
12/31/2020	04:30	3.36	11:20	4.57	3.93	04:20	1.49	11:25	1.99	1.74	04:30	0.240	11:25	0.494	0.355	0.355	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			65.672	30.65
Average	3.87	1.68	0.337	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A1_30820

Site Address /Location:	Opposite 627 - 637 37th St NW			Monitor Series	Location Type
				TRITON+	Temporary
Site Access Details:	Park by kerb	Latitude:	47.340149	Pipe Size (H x W)	Pipe Shape
		Longitude:	-122.238708	21.00 X 21.00	Circular



Manhole #	System Characteristics
A130820	Commercial
Access	Traffic
Drive	None







ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519.11.325

Installation Information	
Installation Date:	Installation Type:
Friday, October 2, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi
Installation Confirmation:	
Time	
10:41:00 AM	
Depth of Flow (Wet DOF) (in)	
3.88	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
2.02	N/A
Silt (in)	Silt Type
0	

Manhole / Pipe Information:	
Manhole Depth (Approx. FT):	Manhole Configuration
8	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Concrete	Good
Communication Information:	
Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole
Additional Site Info. / Comments:	

AUB_A10_710151

Site Commentary

SITE INFORMATION

Pipe	Elliptical (23.88 in H x 23.75 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	5.60	0.80	0.297
Minimum	3.67	0.37	0.093
Maximum	10.47	1.32	1.093
Min Time	04/04/2021 5:00:00 AM	11/24/2020 5:00:00 AM	04/04/2021 5:00:00 AM
Max Time	01/02/2021 9:00:00 PM	01/03/2021 12:00:00 AM	01/02/2021 9:00:00 PM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

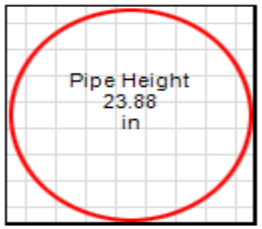
Percent Uptime	
DFINAL (in)	98.75
VFINAL (ft/s)	98.75
QFINAL (MGD - Total MG)	98.75

Hydrograph Report

AUB_A10_710151

Flow Monitor

AUB_A10_710151



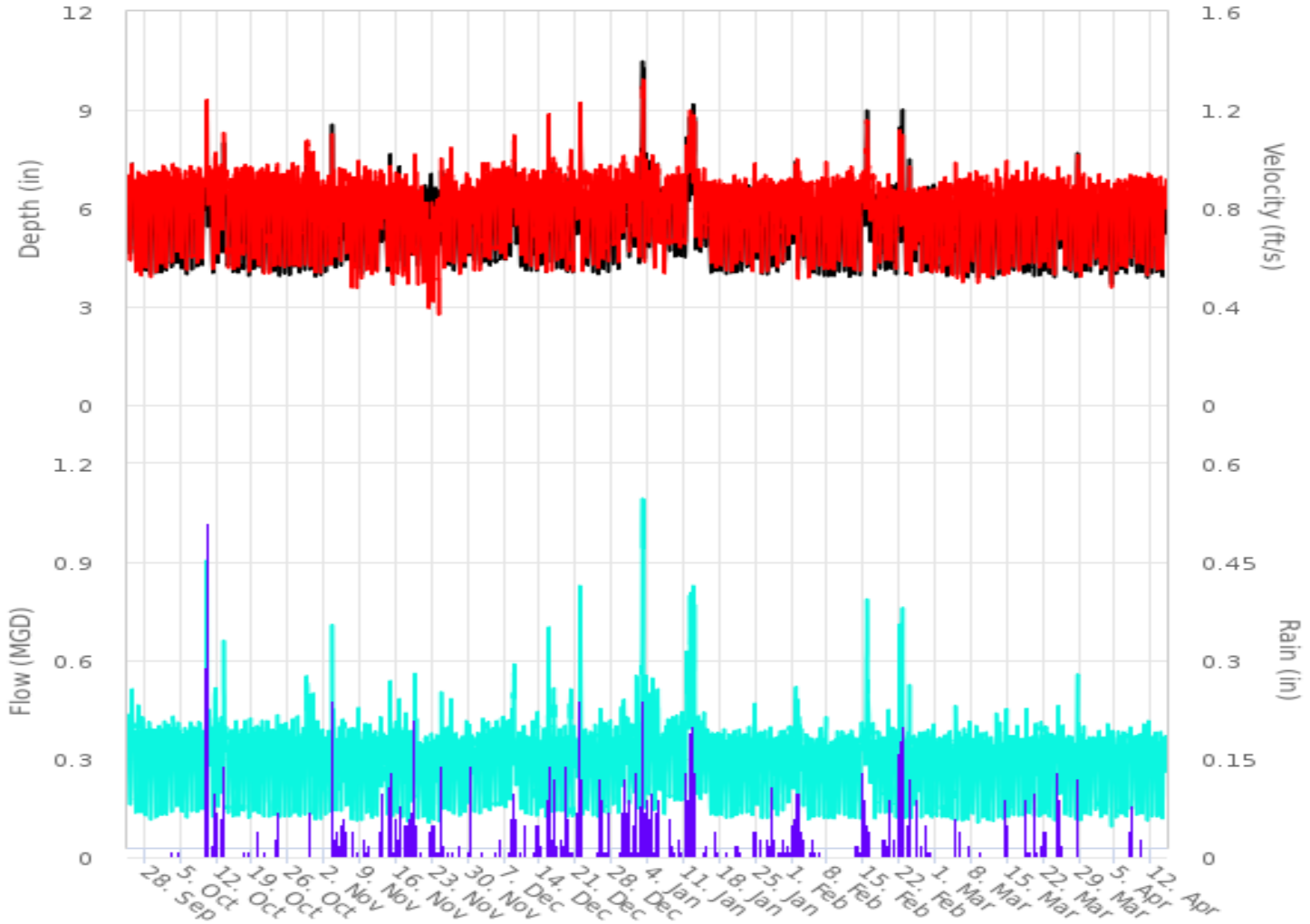
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

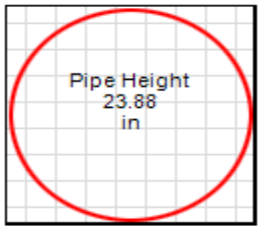
206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A10_710151

Flow Monitor

AUB_A10_710151



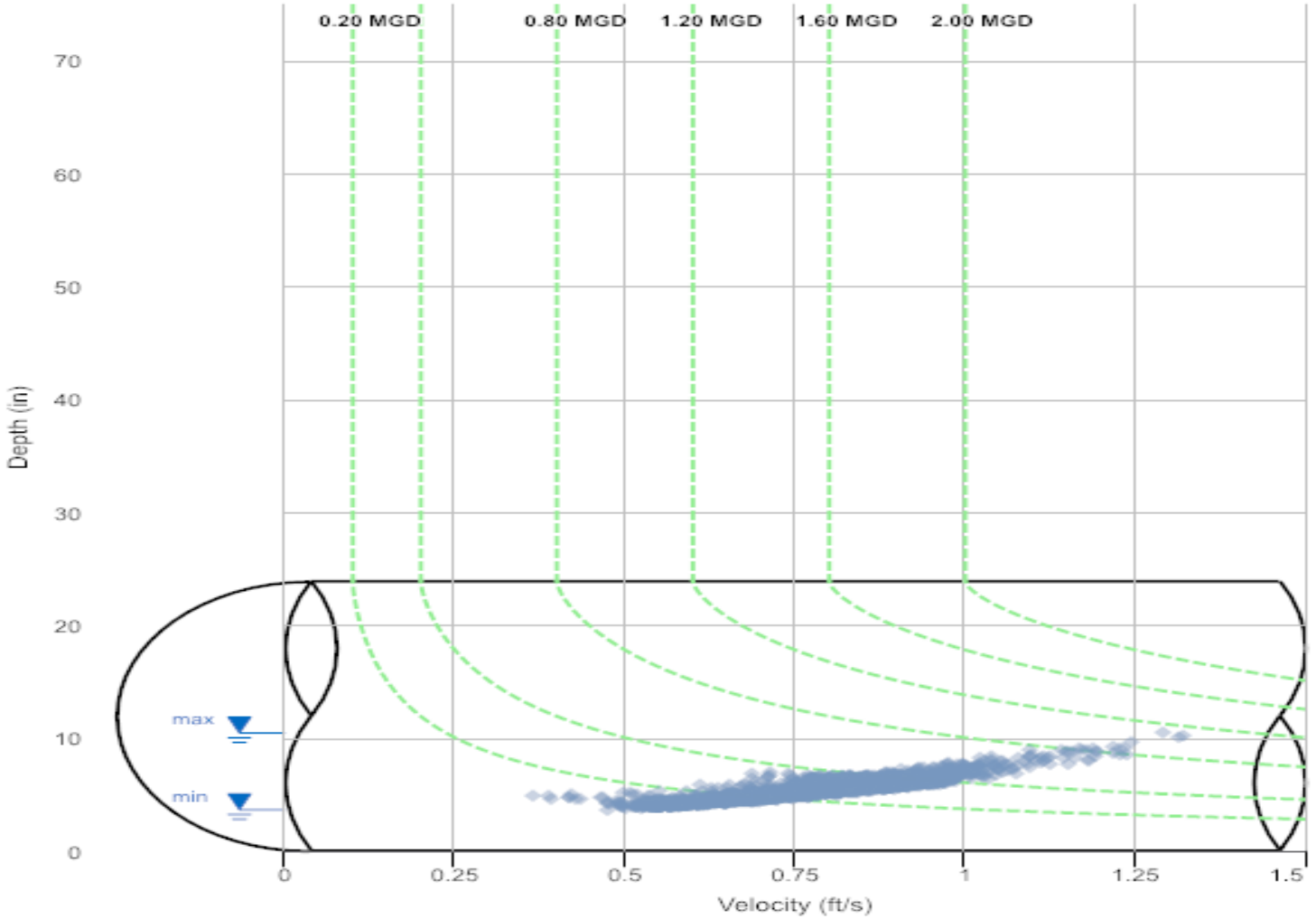
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth





4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A10_710151Pipe: Elliptical (23.88 in H x 23.75 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	06:40	4.69	15:45	8.64	5.80	04:10	0.66	15:40	1.16	0.84	06:40	0.184	15:40	0.753	0.323	0.323	0.51
01/02/2021	06:15	4.28	21:10	11.06	6.65	06:30	0.56	21:25	1.42	0.89	06:30	0.137	21:10	1.246	0.451	0.451	1.69
01/03/2021	06:35	4.39	00:05	10.65	6.44	07:20	0.52	00:15	1.39	0.88	07:20	0.133	00:15	1.193	0.409	0.409	0.65
01/04/2021	03:55	4.75	19:15	7.82	6.14	06:20	0.63	19:10	1.12	0.84	04:00	0.185	19:10	0.629	0.349	0.349	0.48
01/05/2021	04:25	4.41	21:10	7.75	5.97	05:45	0.48	20:55	1.07	0.81	05:45	0.124	20:55	0.600	0.330	0.330	0.52
01/06/2021	06:00	4.97	20:05	6.73	5.96	07:05	0.58	21:25	0.93	0.78	07:05	0.177	20:15	0.401	0.309	0.309	0.22
01/07/2021	04:55	4.26	19:55	6.69	5.78	04:15	0.50	19:55	1.00	0.80	04:15	0.123	19:55	0.458	0.307	0.307	-
01/08/2021	04:05	4.67	17:35	6.92	5.93	06:20	0.60	18:35	1.02	0.83	05:40	0.169	18:35	0.478	0.329	0.329	0.22
01/09/2021	05:30	4.50	13:10	6.83	5.75	06:20	0.58	20:55	1.06	0.84	06:20	0.154	13:35	0.468	0.319	0.319	-
01/10/2021	06:20	4.52	14:15	6.94	5.83	06:25	0.57	14:15	1.03	0.85	06:25	0.149	14:15	0.500	0.327	0.327	0.07
01/11/2021	03:45	4.47	10:55	8.25	6.47	04:40	0.60	12:40	1.14	0.90	04:40	0.157	10:55	0.676	0.414	0.414	1.06
01/12/2021	00:00	6.18	19:05	9.95	7.71	15:35	0.84	18:45	1.33	1.07	00:40	0.362	19:15	0.978	0.605	0.605	2.10
01/13/2021	04:55	4.70	00:35	9.42	6.13	06:15	0.61	00:40	1.27	0.88	06:15	0.177	00:40	0.929	0.369	0.369	0.09
01/14/2021	05:05	4.62	13:10	6.80	5.85	05:00	0.58	21:15	1.04	0.82	05:00	0.158	20:40	0.476	0.320	0.320	0.01
01/15/2021	04:35	4.77	15:50	6.90	5.72	04:15	0.60	15:45	1.07	0.82	04:15	0.174	15:50	0.512	0.306	0.306	0.09
01/16/2021	06:10	3.96	12:20	6.68	5.49	06:10	0.52	19:50	0.96	0.78	06:10	0.114	16:10	0.431	0.281	0.281	-
01/17/2021	07:10	4.02	12:25	6.50	5.49	06:40	0.53	21:20	0.99	0.80	06:15	0.120	12:25	0.413	0.285	0.285	0.10
01/18/2021	04:30	4.04	18:45	6.61	5.53	04:20	0.53	22:05	0.95	0.78	04:20	0.120	18:45	0.424	0.281	0.281	-
01/19/2021	05:05	3.89	17:45	6.42	5.42	04:00	0.52	19:00	0.96	0.77	05:05	0.112	19:50	0.397	0.273	0.273	0.01
01/20/2021	05:15	3.99	18:20	6.37	5.38	04:40	0.50	20:55	1.00	0.77	04:40	0.111	20:10	0.406	0.270	0.270	-
01/21/2021	03:30	3.99	18:40	6.42	5.45	03:35	0.54	16:15	0.97	0.79	03:35	0.120	18:45	0.413	0.278	0.278	0.11
01/22/2021	05:25	4.01	18:55	6.42	5.40	04:35	0.54	16:05	0.98	0.78	04:35	0.123	16:15	0.417	0.273	0.273	-
01/23/2021	05:15	4.13	14:40	6.80	5.54	05:25	0.53	20:10	0.95	0.75	05:25	0.123	14:40	0.429	0.274	0.274	-
01/24/2021	06:50	4.05	18:05	7.08	5.62	07:30	0.50	18:45	1.07	0.80	07:05	0.117	18:45	0.511	0.299	0.299	0.16
01/25/2021	04:25	4.40	13:20	6.39	5.62	03:15	0.56	20:50	0.98	0.80	05:10	0.148	21:35	0.415	0.294	0.294	0.04
01/26/2021	04:05	3.91	13:55	6.29	5.41	05:35	0.47	13:40	0.99	0.77	05:35	0.108	13:40	0.412	0.271	0.271	-
01/27/2021	04:35	3.93	18:55	6.61	5.46	04:35	0.52	18:40	0.99	0.79	04:35	0.111	18:40	0.435	0.279	0.279	0.14
01/28/2021	03:40	4.15	19:30	6.26	5.58	03:45	0.58	12:30	0.97	0.81	03:45	0.136	12:30	0.401	0.292	0.292	0.24
01/29/2021	05:40	3.96	18:40	6.50	5.43	05:25	0.53	18:40	1.00	0.78	05:50	0.116	18:40	0.441	0.276	0.276	0.03
01/30/2021	06:05	4.18	13:00	6.50	5.51	06:05	0.54	17:10	0.98	0.79	06:05	0.128	13:05	0.417	0.286	0.286	0.07
01/31/2021	06:30	4.29	12:15	6.57	5.61	06:25	0.58	14:30	1.00	0.81	06:25	0.144	14:30	0.433	0.296	0.296	0.12
02/01/2021	07:05	4.86	18:50	7.60	6.01	00:40	0.66	19:50	1.05	0.84	07:05	0.196	18:55	0.550	0.340	0.340	0.82
02/02/2021	05:10	4.06	00:00	7.28	5.75	05:00	0.47	13:15	1.03	0.81	05:00	0.108	00:00	0.518	0.310	0.310	0.31
02/03/2021	04:10	4.31	19:15	6.40	5.49	05:55	0.55	19:10	0.96	0.79	05:55	0.140	19:10	0.409	0.279	0.279	0.06
02/04/2021	05:15	3.96	15:40	6.35	5.35	05:15	0.47	15:45	0.97	0.77	05:15	0.102	15:45	0.411	0.267	0.267	0.07
02/05/2021	04:40	3.99	13:40	6.53	5.36	06:25	0.48	22:20	0.98	0.78	06:25	0.108	22:20	0.397	0.270	0.270	0.01
02/06/2021	05:55	3.90	14:50	6.57	5.42	06:05	0.54	14:35	0.97	0.79	05:55	0.118	14:40	0.431	0.279	0.279	0.01
02/07/2021	06:25	3.84	12:10	6.60	5.42	06:20	0.51	15:20	1.05	0.80	06:20	0.107	15:20	0.459	0.285	0.285	-
02/08/2021	04:40	3.87	19:05	6.25	5.35	04:20	0.54	22:00	0.97	0.77	04:35	0.114	19:05	0.386	0.266	0.266	-
02/09/2021	04:20	3.87	20:35	6.36	5.34	04:55	0.53	22:10	0.98	0.78	04:20	0.114	20:30	0.412	0.271	0.271	-
02/10/2021	04:00	4.00	18:45	6.34	5.38	04:50	0.57	18:10	0.97	0.79	04:00	0.127	18:10	0.407	0.276	0.276	-
02/11/2021	05:40	4.02	12:20	6.18	5.37	05:35	0.49	21:40	1.02	0.81	05:35	0.109	18:05	0.414	0.280	0.280	-
02/12/2021	05:40	3.85	13:05	6.53	5.30	06:15	0.50	12:50	1.05	0.79	06:15	0.105	13:00	0.459	0.272	0.272	-
02/13/2021	05:05	3.95	16:55	6.20	5.28	04:55	0.52	15:05	0.97	0.79	04:55	0.115	16:55	0.387	0.269	0.269	0.08
02/14/2021	05:45	3.92	15:15	6.56	5.47	06:10	0.50	14:10	0.97	0.79	06:10	0.109	14:20	0.426	0.283	0.283	0.71
02/15/2021	06:50	5.37	14:05	9.19	6.91	07:10	0.68	14:10	1.23	0.97	07:10	0.234	14:10	0.869	0.477	0.477	0.78
02/16/2021	05:55	4.95	19:25	6.62	5.74	09:15	0.69	19:30	0.97	0.83	06:35	0.220	19:25	0.433	0.309	0.309	0.07
02/17/2021	04:35	3.89	16:25	6.50	5.51	04:30	0.50	19:35	0.94	0.75	04:30	0.106	19:35	0.406	0.270	0.270	-
02/18/2021	03:40	4.11	19:05	6.46	5.51	05:55	0.53	13:30	0.96	0.77	03:35	0.125	13:40	0.414	0.278	0.278	0.09
02/19/2021	05:15	3.99	19:35	7.03	5.51	05:25	0.56	19:55	0.98	0.77	05:25	0.123	19:40	0.479	0.277	0.277	0.17
02/20/2021	05:05	4.11	13:25	6.84	5.56	05:25	0.56	13:20	0.94	0.77	06:40	0.129	13:20	0.439	0.282	0.282	0.07
02/21/2021	06:25	3.94	23:50	8.91	5.76	06:30	0.53	23:50	1.25	0.78	06:30	0.115	23:50	0.847	0.304	0.304	0.42
02/22/2021	05:20	4.93	13:10	9.64	6.61	06:00	0.67	12:55	1.17	0.89	05:35	0.211	13:10	0.888	0.413	0.413	0.98
02/23/2021	05:00	3.93	22:00	8.22	5.68	04:05	0.51	21:55	1.12	0.77	05:00	0.111	21:55	0.682	0.292	0.292	0.27
02/24/2021	05:10	4.00	17:05	6.46	5.54	04:25	0.51	23:50	0.97	0.74	04:25	0.113	17:05	0.403	0.268	0.268	-
02/25/2021	03:00	4.26	18:20	6.52	5.66	03:20	0.59	14:10	0.91	0.78	03:05	0.146	19:25	0.393	0.287	0.287	0.18
02/26/2021	04:00	4.01	18:30	6.57	5.58	04:30	0.50	17:20	0.93	0.77	04:30	0.112	19:55	0.406	0.281	0.281	0.10
02/27/2021	06:25	4.02	12:15	6.75	5.61	06:20	0.54	19:05	0.92	0.77	06:20	0.122	12:15	0.404	0.283	0.283	0.02
02/28/2021	06:40	3.99	14:35	6.82	5.60	07:15	0.49	14:45	0.93	0.75	04:30	0.113	14:45	0.434	0.278	0.278	0.02
03/01/2021	05:10	4.02	18:45	6.34	5.51	05:05	0.45	18:45	0.99	0.77	05:05	0.100	18:45	0.419	0.277	0.277	-
03/02/2021	05:05	3.96	13:35	6.37	5.41	04:55	0.50	20:40	0.99	0.77	05:05	0.111	18:15	0.401	0.271	0.271	-
03/03/2021	04:45	3.90	18:45	6.42	5.40	05:00	0.51	18:05	0.98	0.78	05:00	0.109	18:05	0.421	0.273	0.273	-
03/04/2021	05:20	3.95	19:55	7.23	5.47	05:40	0.49	19:45	1.07	0.77	05:40	0.108	19:55	0.538	0.277	0.277	0.20
03/05/2021	05:10	3.94	13:30	6.34	5.40	04:40	0.47	11:35	0.99	0.78	04:40	0.103	13:20	0.405	0.275	0.275	0.05
03/06/2021	05:10	3.97	12:45	6.51	5.46	04:15	0.46	17:15	1.00	0.78	06:40	0.104	10:55	0.422	0.279	0.279	-
03/07/2021	06:00	3.77	13:00	6.62	5.44	05:55	0.50	12:55	1.04	0.80	05:55	0.102	12:55	0.464	0.286	0.286	0.04
03/08/2021	04:30	3.97	20:15	6.47	5.45	05:00	0.53	19:35	1.01	0.80	05:00	0.118	20:10	0.429	0.283	0.283	-
03/09/2021	05:00	3.80	20:50	6.31	5.37	04:55	0.46	16:20	0.97	0.77	05:10	0.094	20:45	0.406	0.270	0.270	0.01
03/10/2021	05:00	3.97	19:00	6.47	5.47	04:55	0.48	21:45	1.01	0.78	04:55	0.105	19:00	0.418	0.277	0.277	-
03/11/2021	05:15	3.89	12:35	6.30	5.42	05:05	0.49	18:10	1.00	0.77	05:10	0.104	18:10	0.410	0.273	0.273	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	04:35	3.79	18:35	7.48	5.39	04:25	0.50	18:30	1.11	0.77	04:25	0.103	18:40	0.594	0.270	0.270	-
03/13/2021	05:40	3.95	13:50	6.76	5.45	05:00	0.52	13:50	1.00	0.78	05:00	0.114	13:50	0.464	0.277	0.277	-
03/14/2021	05:25	3.94	15:35	7.15	5.63	05:15	0.50	20:05	1.07	0.81	05:30	0.107	20:05	0.518	0.304	0.304	0.30
03/15/2021	04:10	4.04	11:40	6.25	5.40	03:45	0.51	20:55	1.00	0.78	04:05	0.116	20:55	0.410	0.272	0.272	-
03/16/2021	03:50	4.02	19:00	6.42	5.47	03:25	0.54	21:55	1.03	0.78	03:50	0.119	19:00	0.437	0.280	0.280	-
03/17/2021	03:10	3.98	11:35	6.25	5.42	03:10	0.47	21:35	0.98	0.78	03:10	0.103	21:35	0.385	0.275	0.275	-
03/18/2021	03:40	3.95	16:30	7.03	5.47	02:20	0.53	16:35	1.15	0.81	03:40	0.117	16:35	0.566	0.287	0.287	0.11
03/19/2021	03:30	3.94	13:00	6.31	5.35	04:40	0.53	21:20	1.01	0.79	04:40	0.119	13:00	0.408	0.274	0.274	0.03
03/20/2021	05:15	3.85	14:30	6.44	5.47	05:20	0.53	11:00	1.06	0.81	05:20	0.112	11:00	0.440	0.288	0.288	0.17
03/21/2021	05:25	3.90	11:15	6.73	5.42	02:00	0.51	13:55	1.02	0.79	05:05	0.115	11:20	0.448	0.283	0.283	0.07
03/22/2021	02:55	3.93	10:50	6.96	5.52	03:10	0.53	10:45	1.03	0.80	02:50	0.117	10:45	0.495	0.290	0.290	0.11
03/23/2021	05:00	3.94	11:15	6.33	5.42	05:55	0.53	15:50	1.02	0.79	04:55	0.119	15:50	0.428	0.280	0.280	-
03/24/2021	04:00	3.86	20:10	7.09	5.46	03:05	0.49	20:10	1.07	0.79	03:05	0.105	20:10	0.533	0.284	0.284	0.34
03/25/2021	03:10	4.61	18:20	6.55	5.74	02:50	0.63	18:30	0.99	0.82	02:50	0.175	18:30	0.438	0.309	0.309	0.27
03/26/2021	04:35	4.05	11:20	6.27	5.47	03:30	0.53	21:00	0.98	0.80	03:30	0.123	21:00	0.397	0.284	0.284	-
03/27/2021	05:10	3.95	14:15	6.38	5.47	05:50	0.52	12:35	1.01	0.76	05:15	0.116	12:35	0.429	0.271	0.271	-
03/28/2021	06:05	3.80	14:55	8.62	5.62	06:10	0.46	15:00	1.19	0.80	06:10	0.094	15:00	0.769	0.304	0.304	0.37
03/29/2021	04:10	3.85	20:40	6.46	5.44	04:10	0.47	20:45	1.04	0.78	04:10	0.098	20:45	0.452	0.276	0.276	-
03/30/2021	02:50	3.87	12:40	6.24	5.39	02:55	0.51	12:40	0.98	0.77	02:55	0.108	12:40	0.409	0.271	0.271	-
03/31/2021	04:00	4.04	21:10	6.27	5.48	03:35	0.55	19:40	0.94	0.78	03:45	0.123	18:05	0.382	0.276	0.276	-
04/01/2021	03:35	4.25	10:30	6.34	5.57	05:20	0.55	20:40	0.99	0.78	03:55	0.138	20:40	0.412	0.283	0.283	-
04/02/2021	03:30	3.93	15:50	6.24	5.44	03:20	0.54	16:35	0.98	0.78	03:25	0.117	16:35	0.407	0.278	0.278	-
04/03/2021	04:20	4.05	11:40	6.69	5.47	04:00	0.53	13:10	0.98	0.78	04:00	0.120	11:45	0.437	0.279	0.279	-
04/04/2021	05:05	3.64	11:30	6.62	5.37	04:55	0.44	16:20	0.95	0.76	04:55	0.085	11:25	0.422	0.266	0.266	-
04/05/2021	03:20	3.93	12:00	6.41	5.48	03:00	0.50	12:05	0.97	0.79	03:00	0.111	12:05	0.418	0.282	0.282	-
04/06/2021	03:40	4.03	12:35	6.56	5.51	04:20	0.55	21:15	0.98	0.78	04:25	0.126	12:20	0.422	0.280	0.280	-
04/07/2021	03:30	3.97	21:25	6.45	5.52	03:55	0.52	11:25	0.98	0.79	03:55	0.116	21:05	0.417	0.286	0.286	0.22
04/08/2021	03:20	4.14	12:50	6.26	5.51	02:40	0.51	21:15	0.96	0.80	02:40	0.120	16:55	0.389	0.285	0.285	-
04/09/2021	04:25	3.97	13:30	6.20	5.36	03:20	0.55	13:35	0.97	0.78	04:30	0.121	13:35	0.402	0.270	0.270	0.03
04/10/2021	06:10	3.98	12:00	6.62	5.47	06:00	0.55	11:20	0.97	0.80	06:05	0.121	11:25	0.425	0.287	0.287	0.02
04/11/2021	05:10	3.81	09:15	6.75	5.49	04:20	0.48	09:10	1.07	0.79	04:20	0.102	09:10	0.495	0.288	0.288	-
04/12/2021	03:45	3.92	11:35	6.45	5.47	03:55	0.52	20:10	0.96	0.77	03:55	0.112	20:15	0.410	0.273	0.273	-
04/13/2021	02:40	3.97	19:05	6.29	5.42	02:35	0.51	19:20	0.96	0.77	02:35	0.111	20:00	0.398	0.271	0.271	-
04/14/2021	03:40	3.88	18:50	6.39	5.46	03:05	0.53	20:40	0.96	0.78	03:10	0.114	18:45	0.406	0.278	0.277	-
09/24/2020	23:55	5.34	18:40	6.86	6.37	23:25	0.68	18:45	0.97	0.85	23:55	0.233	18:45	0.461	0.365	0.158	-
09/25/2020	03:45	4.57	12:25	7.63	6.04	04:55	0.53	12:10	1.06	0.82	03:50	0.148	12:10	0.565	0.334	0.334	-
09/26/2020	04:45	4.33	15:10	7.40	5.78	06:40	0.49	15:05	1.00	0.78	06:40	0.130	15:15	0.516	0.303	0.303	-
09/27/2020	05:05	4.36	11:30	6.86	5.65	04:55	0.48	14:55	0.98	0.79	04:55	0.121	11:45	0.449	0.297	0.297	-
09/28/2020	03:10	4.07	18:20	6.55	5.52	03:35	0.48	21:00	1.00	0.81	03:35	0.110	18:15	0.441	0.292	0.292	-
09/29/2020	03:10	3.95	17:25	6.35	5.47	03:50	0.45	21:10	1.00	0.80	03:50	0.101	21:10	0.410	0.288	0.288	-
09/30/2020	04:15	3.93	19:10	6.52	5.47	05:15	0.47	20:30	1.01	0.80	05:15	0.114	20:30	0.438	0.285	0.285	-
10/01/2020	04:20	3.92	19:20	6.47	5.50	04:00	0.50	11:10	1.05	0.83	04:00	0.109	19:15	0.433	0.299	0.299	-
10/02/2020	02:50	4.05	11:05	6.43	5.57	04:55	0.48	11:00	1.06	0.80	04:00	0.113	11:00	0.458	0.293	0.293	-
10/03/2020	04:30	4.13	11:35	6.57	5.58	05:25	0.50	12:35	1.03	0.84	05:25	0.121	12:35	0.454	0.310	0.310	0.01
10/04/2020	04:45	4.23	11:25	6.52	5.53	07:20	0.56	12:10	1.02	0.82	06:25	0.140	12:10	0.441	0.297	0.297	0.01
10/05/2020	04:15	4.09	12:25	6.36	5.49	04:05	0.58	21:20	1.02	0.82	04:15	0.132	18:30	0.423	0.294	0.294	-
10/06/2020	04:00	3.86	17:45	6.40	5.47	04:00	0.49	11:05	1.01	0.81	04:00	0.103	20:25	0.426	0.290	0.290	-
10/07/2020	03:20	4.11	18:45	6.45	5.51	04:45	0.54	19:35	1.01	0.81	04:45	0.128	19:35	0.431	0.292	0.292	-
10/08/2020	03:30	4.17	18:35	6.46	5.58	03:20	0.54	18:30	1.02	0.83	03:35	0.127	18:30	0.443	0.306	0.306	-
10/09/2020	03:20	4.22	23:55	10.07	5.76	04:45	0.55	23:55	1.40	0.84	02:35	0.136	23:55	1.125	0.329	0.329	0.64
10/10/2020	05:30	5.24	01:40	11.29	6.46	23:30	0.76	01:30	1.42	0.95	23:30	0.253	01:30	1.291	0.428	0.428	1.04
10/11/2020	05:45	3.98	18:15	7.57	5.74	07:15	0.50	18:10	1.10	0.83	05:40	0.113	18:10	0.596	0.325	0.325	0.53
10/12/2020	02:45	4.29	19:50	6.58	5.58	03:00	0.59	19:40	1.05	0.84	03:00	0.144	19:50	0.466	0.306	0.306	-
10/13/2020	01:30	4.60	07:35	8.80	5.98	00:50	0.68	07:25	1.30	0.89	01:35	0.189	07:25	0.854	0.359	0.359	0.61
10/14/2020	02:35	4.17	20:05	6.42	5.49	04:35	0.50	17:40	1.01	0.80	04:35	0.121	17:40	0.426	0.285	0.285	-
10/15/2020	04:05	3.98	12:15	6.48	5.46	05:25	0.49	20:00	1.02	0.80	04:00	0.113	18:05	0.429	0.287	0.287	-
10/16/2020	03:40	3.96	12:55	6.21	5.40	03:40	0.52	13:05	1.00	0.82	03:40	0.113	13:05	0.408	0.289	0.289	-
10/17/2020	05:25	4.08	12:00	6.41	5.44	03:40	0.58	20:40	1.03	0.83	03:40	0.134	12:05	0.431	0.294	0.294	0.01
10/18/2020	04:35	3.86	13:10	6.60	5.44	05:55	0.47	12:50	1.02	0.82	05:15	0.105	12:50	0.451	0.295	0.295	0.03
10/19/2020	04:20	4.06	19:00	6.46	5.51	05:40	0.56	19:00	0.99	0.81	04:20	0.129	19:00	0.432	0.292	0.292	0.05
10/20/2020	04:05	4.16	19:30	6.44	5.54	04:15	0.54	13:15	1.07	0.81	04:20	0.126	13:15	0.443	0.296	0.296	-
10/21/2020	03:15	4.01	19:35	6.43	5.47	04:25	0.51	18:00	1.05	0.82	04:10	0.117	18:00	0.450	0.294	0.294	0.01
10/22/2020	04:20	4.07	12:05	6.28	5.49	04:25	0.48	18:00	1.05	0.82	04:25	0.109	18:00	0.436	0.295	0.295	-
10/23/2020	03:00	4.03	19:30	6.69	5.50	03:10	0.51	19:30	1.08	0.82	03:10	0.113	19:30	0.493	0.297	0.297	0.20
10/24/2020	05:35	3.86	11:10	6.61	5.49	05:25	0.53	20:40	1.04	0.81	05:35	0.112	11:05	0.453	0.293	0.293	0.02
10/25/2020	04:50	3.94	11:40	6.47	5.46	04:20	0.54	20:10	1.01	0.81	04:25	0.118	12:10	0.433	0.291	0.291	-
10/26/2020	03:10	3.91	19:30	6.51	5.41	04:15	0.54	11:15	1.01	0.81	03:15	0.119	19:30	0.446	0.285	0.285	-
10/27/2020	02:45	4.18	18:50	6.56	5.52	03:30	0.53	16:55	1.02	0.81	03:55	0.126	18:20	0.445	0.293	0.293	-
10/28/2020	03:30	3.96	19:05	6.34	5.42	04:50	0.53	21:45	1.02	0.80	03:35	0.118	19:10	0.408	0.280	0.280	-
10/29/2020	03:25	4.03	13:40	7.39	6.04	03:30	0.53	15:05	1.15	0.89	03:30	0.118	10:45	0.589	0.377	0.377	-
10/30/2020	03:35	4.09	17:10	7.07	5.75	03:25	0.51	17:50	1.10	0.84	03:35	0.116	17:50	0.545	0.325	0.325	0.10
10/31/2020	04:40	3.87	11:15	6.71	5.39	04:50	0.47	10:55	1.02	0.78	04:50	0.100	13:45	0.465	0.276	0.276	-
11/01/2020	05:30	3.93	12:55	6.57	5.40	06:50	0.52	15:30	0.98	0.77	05:35	0.114	15:30	0.420	0.273	0.273	-
11/02/2020	03:35	4.03	19:00	6.31	5.41	04:05	0.52	19:00	0.99	0.79	03:45	0.117	19:00	0.420	0.277	0.277	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/03/2020	05:30	4.19	10:20	8.75	5.92	05:25	0.53	10:20	1.19	0.83	05:25	0.126	10:20	0.792	0.339	0.339	0.83
11/04/2020	04:10	4.11	20:10	6.29	5.46	03:35	0.58	20:05	1.02	0.80	03:35	0.135	20:05	0.428	0.283	0.283	0.09
11/05/2020	05:10	4.13	13:00	6.67	5.68	04:55	0.53	12:55	1.03	0.82	04:55	0.124	12:55	0.467	0.307	0.307	0.34
11/06/2020	05:30	4.31	20:10	6.37	5.56	05:30	0.60	19:55	1.01	0.82	05:30	0.149	20:10	0.430	0.294	0.294	0.10
11/07/2020	05:25	4.19	16:15	6.51	5.49	04:55	0.44	12:45	1.00	0.77	04:55	0.107	12:45	0.432	0.278	0.278	0.07
11/08/2020	06:25	4.11	13:10	6.76	5.57	06:20	0.41	13:05	1.07	0.79	06:20	0.095	13:05	0.497	0.293	0.293	0.01
11/09/2020	04:25	3.96	19:40	6.38	5.41	04:05	0.47	21:05	0.99	0.77	04:05	0.105	21:25	0.422	0.274	0.274	0.04
11/10/2020	04:25	4.11	17:55	6.56	5.46	04:30	0.49	17:55	1.04	0.79	04:30	0.114	17:55	0.463	0.282	0.282	0.03
11/11/2020	05:30	4.00	15:00	6.33	5.41	05:00	0.48	20:00	1.00	0.78	05:15	0.109	20:00	0.409	0.276	0.276	-
11/12/2020	05:05	4.05	20:45	6.64	5.51	05:00	0.46	11:15	1.04	0.80	05:00	0.105	19:55	0.445	0.290	0.290	0.16
11/13/2020	02:05	4.94	06:45	6.85	5.76	02:40	0.66	06:50	1.07	0.83	02:40	0.198	06:50	0.506	0.311	0.311	0.38
11/14/2020	05:55	4.01	18:25	7.82	5.68	08:00	0.52	18:55	1.06	0.76	06:10	0.120	18:30	0.559	0.292	0.292	0.47
11/15/2020	07:05	4.37	13:35	6.60	5.66	07:30	0.43	23:10	1.02	0.76	07:30	0.110	19:45	0.437	0.287	0.287	0.19
11/16/2020	04:25	4.33	13:45	7.46	5.71	05:05	0.51	13:45	1.09	0.78	05:05	0.128	13:45	0.581	0.296	0.296	0.31
11/17/2020	04:55	4.10	19:50	7.31	5.56	04:35	0.48	19:45	1.09	0.76	04:35	0.110	19:45	0.564	0.281	0.281	0.20
11/18/2020	04:30	3.95	18:00	6.90	5.60	05:15	0.45	17:45	1.01	0.76	04:35	0.100	17:45	0.464	0.281	0.281	0.30
11/19/2020	03:05	4.45	13:00	8.23	5.80	07:40	0.52	12:55	1.14	0.80	03:10	0.147	12:55	0.696	0.308	0.308	0.50
11/20/2020	04:35	4.21	12:25	6.22	5.45	04:50	0.45	22:30	0.96	0.73	04:50	0.108	22:30	0.384	0.261	0.261	0.01
11/21/2020	05:55	4.27	13:30	6.80	5.65	05:55	0.45	14:30	0.88	0.70	05:55	0.108	13:35	0.395	0.262	0.262	-
11/22/2020	06:30	4.47	17:55	7.14	5.94	06:25	0.34	19:25	0.86	0.64	06:25	0.090	19:25	0.403	0.261	0.261	0.21
11/23/2020	04:15	4.47	13:25	6.72	5.95	04:00	0.36	12:50	0.91	0.69	04:00	0.094	12:50	0.415	0.275	0.275	0.14
11/24/2020	05:00	4.83	16:15	7.34	5.72	05:15	0.33	16:05	1.10	0.74	05:10	0.097	16:05	0.564	0.281	0.281	0.21
11/25/2020	04:15	4.32	22:10	6.54	5.57	04:50	0.48	22:10	1.09	0.81	04:50	0.120	22:10	0.483	0.294	0.294	0.05
11/26/2020	06:25	4.07	13:05	6.92	5.58	06:50	0.52	14:05	1.10	0.84	06:55	0.119	14:10	0.523	0.309	0.309	0.02
11/27/2020	04:25	3.82	13:55	6.38	5.37	06:05	0.45	16:35	1.01	0.78	04:25	0.095	13:55	0.419	0.271	0.271	-
11/28/2020	06:15	4.00	13:30	6.50	5.46	05:35	0.48	18:35	0.96	0.77	06:05	0.110	13:25	0.404	0.273	0.273	0.05
11/29/2020	06:20	4.04	13:35	6.75	5.50	04:35	0.49	17:55	1.01	0.78	04:35	0.113	13:35	0.435	0.283	0.283	-
11/30/2020	03:40	4.34	04:50	6.69	5.79	03:55	0.54	04:30	1.02	0.80	03:55	0.145	04:50	0.450	0.305	0.305	0.36
12/01/2020	04:25	4.23	19:10	6.37	5.53	04:10	0.48	18:15	0.97	0.76	06:15	0.119	18:15	0.410	0.273	0.273	-
12/02/2020	04:30	4.09	19:30	6.47	5.60	04:25	0.49	19:10	1.02	0.80	04:25	0.115	19:10	0.438	0.295	0.295	0.01
12/03/2020	04:55	4.16	13:20	6.39	5.52	05:40	0.52	18:40	1.04	0.83	05:20	0.125	18:40	0.436	0.297	0.297	-
12/04/2020	04:35	4.04	13:00	6.44	5.54	05:00	0.49	14:15	1.02	0.82	05:00	0.109	14:15	0.441	0.297	0.297	-
12/05/2020	06:20	4.15	15:35	6.67	5.57	06:20	0.54	12:35	1.07	0.82	06:20	0.126	12:35	0.484	0.301	0.301	0.03
12/06/2020	05:45	4.19	17:45	6.72	5.71	05:45	0.53	21:05	1.04	0.85	05:45	0.125	17:45	0.457	0.319	0.319	0.03
12/07/2020	05:10	4.26	18:30	6.52	5.63	04:10	0.50	11:35	1.04	0.83	04:40	0.131	19:40	0.443	0.306	0.306	-
12/08/2020	04:55	4.32	21:35	7.68	6.14	05:15	0.58	21:30	1.20	0.88	05:15	0.150	21:30	0.659	0.370	0.370	0.87
12/09/2020	05:50	4.63	19:10	6.38	5.68	04:55	0.60	16:00	1.00	0.86	04:55	0.171	18:30	0.421	0.315	0.315	0.17
12/10/2020	05:35	4.00	20:45	6.55	5.41	05:35	0.56	20:40	1.04	0.82	05:35	0.124	20:45	0.465	0.286	0.286	0.07
12/11/2020	04:30	3.99	12:45	6.44	5.38	04:50	0.54	12:45	0.99	0.80	05:05	0.120	12:45	0.430	0.278	0.278	0.02
12/12/2020	05:50	3.99	12:35	6.60	5.41	05:00	0.50	13:25	1.04	0.80	05:00	0.112	13:25	0.459	0.282	0.282	0.01
12/13/2020	06:50	3.96	11:50	6.92	5.54	06:25	0.46	11:45	1.03	0.81	06:50	0.106	11:50	0.494	0.294	0.294	0.24
12/14/2020	03:30	4.14	19:30	6.40	5.45	03:30	0.57	20:25	1.02	0.81	03:30	0.133	17:50	0.434	0.286	0.286	0.05
12/15/2020	04:35	3.84	16:10	8.83	5.79	04:30	0.43	16:00	1.34	0.84	04:30	0.090	16:05	0.876	0.330	0.330	0.58
12/16/2020	05:20	4.20	14:50	7.62	5.70	05:15	0.49	14:55	1.10	0.83	05:15	0.116	14:55	0.601	0.316	0.316	0.39
12/17/2020	04:10	4.14	13:00	6.26	5.39	05:10	0.53	19:10	1.01	0.81	05:10	0.123	19:10	0.420	0.279	0.279	0.08
12/18/2020	04:25	4.09	19:25	6.46	5.45	04:25	0.56	19:10	1.01	0.80	04:25	0.128	19:10	0.435	0.281	0.281	0.25
12/19/2020	06:10	3.96	21:25	7.11	5.64	07:20	0.51	21:45	1.09	0.81	06:10	0.112	21:45	0.538	0.309	0.309	0.37
12/20/2020	06:50	3.97	13:25	6.37	5.36	07:20	0.50	13:25	1.01	0.79	07:10	0.114	13:25	0.433	0.275	0.275	0.04
12/21/2020	04:55	4.97	16:40	9.65	6.44	04:50	0.66	16:45	1.37	0.93	04:50	0.203	16:45	1.029	0.427	0.427	1.07
12/22/2020	05:10	4.20	18:55	6.20	5.47	05:20	0.49	19:00	0.97	0.79	05:20	0.116	19:00	0.399	0.282	0.282	-
12/23/2020	05:10	4.22	14:20	6.32	5.41	03:15	0.56	18:30	0.99	0.79	05:45	0.135	18:30	0.414	0.275	0.275	-
12/24/2020	05:50	3.99	14:05	6.49	5.45	05:45	0.56	19:00	1.01	0.81	05:45	0.124	15:55	0.421	0.289	0.289	-
12/25/2020	06:10	3.96	16:50	6.90	5.36	07:15	0.52	16:55	1.13	0.80	07:15	0.114	16:55	0.537	0.279	0.279	0.49
12/26/2020	06:00	4.10	12:55	6.54	5.41	05:35	0.57	12:15	1.04	0.81	05:35	0.132	12:30	0.450	0.284	0.284	0.02
12/27/2020	05:35	4.01	09:35	6.62	5.51	05:35	0.53	15:45	1.07	0.81	05:35	0.118	15:45	0.480	0.293	0.293	0.13
12/28/2020	05:10	4.15	14:35	6.51	5.48	06:40	0.56	22:00	1.01	0.82	05:10	0.144	14:40	0.443	0.290	0.290	-
12/29/2020	04:15	4.14	19:50	7.07	5.46	04:15	0.57	19:55	1.10	0.81	04:20	0.132	19:55	0.541	0.287	0.287	0.14
12/30/2020	01:35	5.00	06:35	6.99	6.06	01:40	0.63	06:30	1.05	0.88	01:40	0.193	06:30	0.510	0.354	0.354	0.78
12/31/2020	06:50	4.45	00:05	6.59	5.64	06:25	0.59	00:05	1.06	0.83	06:25	0.154	00:05	0.475	0.305	0.305	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			60.203	30.65
Average	5.60	0.80	0.297	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A10_710151

Site Address /Location:	1498 Henry Rd		
Site Access Details:	Located within roadway	Latitude:	47.314373°
		Longitude:	-122.209694°

Monitor Series	Location Type
TRITON+	Temporary
Pipe Size (H x W)	Pipe Shape
14.13 x 14.13	Circular
Manhole #	System Characteristics
710-142	Residential
Access	Traffic
Drive	Light









ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519

Installation Information	
Installation Date:	Installation Type:
Wednesday, September 23, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi
Installation Confirmation:	
Time	Pipe Size (HxW)
8:49:00 AM	14.13 x 14.13
Depth of Flow (Wet DOF) (in)	
2.63	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.64	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
1.44	N/A
Silt (in)	Silt Type
0	
Hydraulic Comments:	
Manhole / Pipe Information:	
Manhole Depth (Approx. FT):	Manhole Configuration
9	Common Trench
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
PVC	Good
Communication Information:	
Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole
Additional Site Info. / Comments:	

AUB_A11_710142

Site Commentary

SITE INFORMATION

Pipe	Round (14.13 in H)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	2.41	0.84	0.071
Minimum	1.30	0.37	0.012
Maximum	4.84	1.55	0.330
Min Time	10/23/2020 4:00:00 AM	10/27/2020 4:00:00 AM	10/27/2020 4:00:00 AM
Max Time	01/03/2021 1:00:00 AM	01/03/2021 1:00:00 AM	01/03/2021 1:00:00 AM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

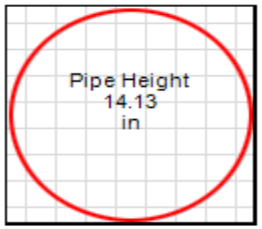
Percent Uptime	
DFINAL (in)	99.217
VFINAL (ft/s)	99.217
QFINAL (MGD - Total MG)	99.217

Hydrograph Report

AUB_A11_710142

Flow Monitor

AUB_A11_710142



Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

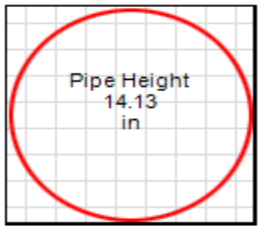
206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A11_710142

Flow Monitor

AUB_A11_710142



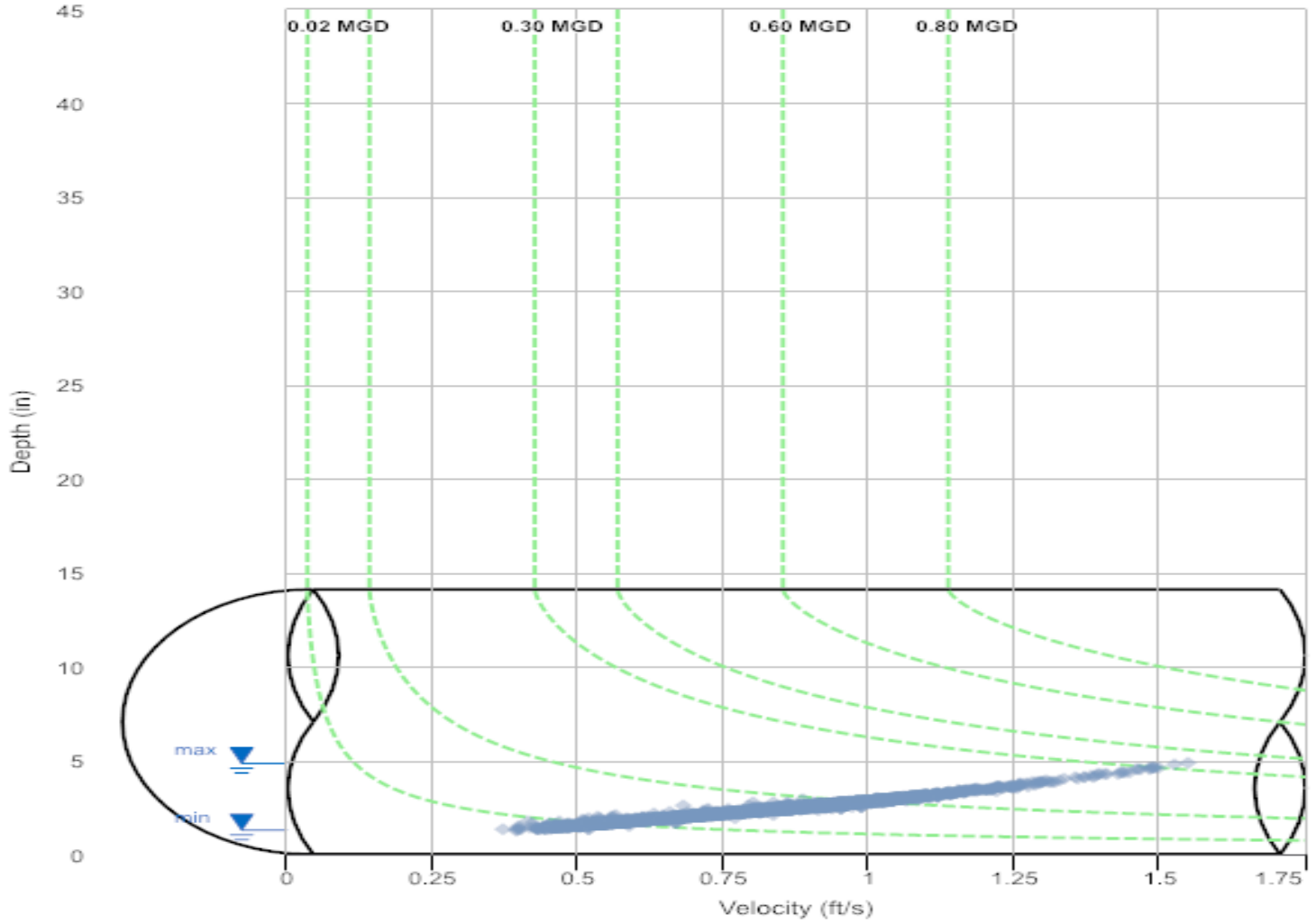
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A11_710142Pipe: Round (14.13 in H), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	04:15	2.04	16:15	3.18	2.66	04:15	0.69	16:15	1.14	0.95	04:15	0.043	16:15	0.135	0.090	0.090	0.51
01/02/2021	05:35	2.09	22:05	4.66	3.06	05:35	0.71	22:10	1.52	1.06	05:35	0.046	22:10	0.308	0.130	0.130	1.69
01/03/2021	23:05	3.12	01:05	4.87	3.71	23:05	1.08	01:10	1.56	1.26	23:05	0.125	01:20	0.336	0.190	0.190	0.65
01/04/2021	04:15	2.83	12:35	3.62	3.23	04:15	0.98	12:35	1.26	1.13	04:15	0.099	12:35	0.179	0.137	0.137	0.48
01/05/2021	03:15	2.45	21:40	3.55	2.99	03:10	0.83	21:35	1.23	1.04	03:10	0.068	21:35	0.170	0.114	0.114	0.52
01/06/2021	23:30	2.68	10:35	3.36	3.12	23:30	0.93	10:40	1.17	1.09	23:30	0.087	10:40	0.150	0.126	0.126	0.22
01/07/2021	05:20	2.20	21:00	3.09	2.71	04:10	0.74	20:55	1.10	0.94	05:20	0.052	20:55	0.124	0.090	0.090	-
01/08/2021	03:35	2.07	13:50	2.99	2.62	03:40	0.69	12:55	1.08	0.91	03:40	0.044	18:10	0.116	0.084	0.084	0.22
01/09/2021	05:15	1.93	12:55	3.25	2.51	07:20	0.63	12:45	1.14	0.87	07:20	0.036	12:50	0.139	0.076	0.076	-
01/10/2021	05:20	1.77	13:45	2.99	2.45	03:30	0.53	13:15	1.08	0.85	03:30	0.028	13:45	0.117	0.073	0.073	0.07
01/11/2021	04:20	1.74	22:05	3.72	2.78	04:05	0.57	21:55	1.26	0.96	04:05	0.029	22:00	0.186	0.103	0.103	1.06
01/12/2021	00:25	3.14	19:40	4.69	4.14	00:15	1.06	19:30	1.52	1.37	01:35	0.124	19:30	0.310	0.238	0.238	2.10
01/13/2021	23:55	2.95	01:10	4.36	3.46	23:50	1.02	01:10	1.44	1.19	23:50	0.109	01:10	0.266	0.160	0.160	0.09
01/14/2021	04:10	2.47	20:50	3.27	2.88	04:15	0.84	16:05	1.13	1.00	04:05	0.070	20:50	0.138	0.104	0.104	0.01
01/15/2021	04:40	2.16	12:55	3.09	2.69	04:35	0.71	10:50	1.09	0.93	04:35	0.048	12:50	0.123	0.088	0.088	0.09
01/16/2021	04:15	2.04	12:30	3.26	2.68	05:00	0.68	12:30	1.14	0.93	04:20	0.043	12:30	0.140	0.088	0.088	-
01/17/2021	04:35	1.99	11:45	3.10	2.61	04:35	0.64	14:25	1.10	0.90	04:35	0.039	11:40	0.124	0.083	0.083	0.10
01/18/2021	04:45	1.86	19:55	2.99	2.55	04:40	0.62	19:55	1.07	0.88	04:45	0.034	19:55	0.116	0.078	0.078	-
01/19/2021	04:15	1.63	21:20	3.16	2.50	04:10	0.48	21:30	1.10	0.86	04:10	0.022	21:25	0.129	0.076	0.076	0.01
01/20/2021	05:05	1.75	18:45	3.03	2.54	05:00	0.57	18:45	1.07	0.88	05:05	0.028	18:45	0.118	0.078	0.078	-
01/21/2021	03:35	1.83	18:45	2.97	2.50	03:25	0.60	18:45	1.06	0.87	03:35	0.032	18:50	0.114	0.075	0.075	0.11
01/22/2021	04:00	1.80	12:45	2.89	2.46	06:10	0.59	19:50	1.05	0.85	04:00	0.031	19:55	0.109	0.072	0.072	-
01/23/2021	04:30	1.70	12:25	3.10	2.45	04:30	0.54	12:20	1.10	0.85	04:30	0.026	12:20	0.126	0.072	0.072	-
01/24/2021	02:50	1.75	12:20	3.13	2.52	02:30	0.57	12:10	1.17	0.87	02:45	0.029	12:15	0.135	0.077	0.077	0.16
01/25/2021	04:55	1.70	14:10	2.93	2.47	04:50	0.57	14:10	1.06	0.85	04:55	0.027	14:10	0.111	0.073	0.073	0.04
01/26/2021	05:35	1.71	14:40	2.84	2.43	05:35	0.55	14:45	1.02	0.85	05:30	0.027	14:45	0.103	0.071	0.071	-
01/27/2021	02:50	1.79	13:10	2.91	2.45	02:55	0.57	10:15	1.03	0.85	02:55	0.030	13:05	0.107	0.072	0.072	0.14
01/28/2021	02:30	1.79	20:25	2.97	2.52	02:30	0.59	20:35	1.07	0.88	02:30	0.031	20:35	0.115	0.077	0.077	0.24
01/29/2021	05:20	1.75	11:45	2.90	2.43	05:10	0.57	11:45	1.03	0.84	05:10	0.029	11:50	0.107	0.070	0.070	0.03
01/30/2021	06:55	1.72	13:30	2.91	2.35	06:30	0.57	13:25	1.05	0.82	06:40	0.028	13:25	0.109	0.065	0.065	0.07
01/31/2021	06:20	1.66	12:55	3.19	2.40	07:00	0.54	12:45	1.15	0.84	06:20	0.025	12:55	0.137	0.070	0.070	0.12
02/01/2021	03:50	1.88	21:05	3.42	2.65	04:00	0.61	19:05	1.19	0.93	04:00	0.034	21:05	0.157	0.089	0.089	0.82
02/02/2021	05:45	2.49	09:00	3.30	2.98	03:15	0.82	13:45	1.17	1.04	03:15	0.070	08:55	0.145	0.114	0.114	0.31
02/03/2021	05:05	2.32	19:15	3.23	2.77	05:10	0.79	19:10	1.13	0.96	05:00	0.060	19:15	0.137	0.095	0.095	0.06
02/04/2021	02:45	2.04	14:50	2.99	2.58	02:45	0.67	14:50	1.07	0.90	02:45	0.042	14:50	0.116	0.081	0.081	0.07
02/05/2021	05:20	1.93	12:25	2.85	2.49	05:15	0.65	12:25	1.02	0.87	05:55	0.037	12:25	0.103	0.074	0.074	0.01
02/06/2021	03:35	1.79	15:20	3.04	2.45	07:10	0.59	15:20	1.11	0.86	03:40	0.031	15:20	0.124	0.072	0.072	0.01
02/07/2021	05:30	1.82	12:00	2.98	2.44	05:00	0.60	12:00	1.07	0.85	05:30	0.032	12:00	0.116	0.072	0.072	-
02/08/2021	05:25	1.65	17:30	2.78	2.35	05:30	0.54	17:20	1.00	0.82	05:25	0.025	17:20	0.097	0.065	0.065	-
02/09/2021	03:15	1.60	11:55	2.80	2.31	03:30	0.50	11:55	1.03	0.80	03:30	0.022	11:55	0.101	0.063	0.063	-
02/10/2021	04:40	1.53	12:00	2.76	2.27	04:20	0.50	12:05	1.01	0.79	04:25	0.021	11:55	0.097	0.060	0.060	-
02/11/2021	03:05	1.55	19:45	2.76	2.30	03:00	0.49	19:40	0.99	0.80	03:00	0.021	19:50	0.096	0.062	0.062	-
02/12/2021	03:50	1.50	16:00	2.75	2.27	03:50	0.48	15:55	1.00	0.78	03:50	0.019	16:00	0.096	0.060	0.060	-
02/13/2021	05:55	1.53	21:30	2.81	2.27	03:35	0.49	21:35	1.00	0.77	03:35	0.021	21:35	0.100	0.059	0.059	0.08
02/14/2021	05:30	1.57	13:15	2.83	2.31	04:25	0.51	13:20	1.02	0.80	05:25	0.022	13:15	0.102	0.063	0.063	0.71
02/15/2021	00:30	2.28	15:30	3.87	3.18	00:30	0.77	15:25	1.34	1.10	00:35	0.056	15:25	0.209	0.136	0.136	0.78
02/16/2021	05:05	2.89	14:15	4.24	3.13	03:10	1.01	14:10	1.40	1.09	03:25	0.105	14:15	0.249	0.128	0.128	0.07
02/17/2021	04:15	2.31	20:35	3.13	2.79	04:20	0.75	20:30	1.10	0.97	04:20	0.057	20:30	0.127	0.096	0.096	-
02/18/2021	05:20	2.03	18:35	3.07	2.65	04:50	0.69	18:35	1.08	0.92	05:00	0.043	18:35	0.121	0.086	0.086	0.09
02/19/2021	02:20	2.19	15:10	3.13	2.65	02:20	0.74	10:35	1.09	0.92	02:30	0.051	15:05	0.126	0.085	0.085	0.17
02/20/2021	05:50	1.89	14:15	3.09	2.55	05:15	0.59	14:20	1.10	0.88	05:15	0.035	14:15	0.125	0.078	0.078	0.07
02/21/2021	05:10	1.86	12:20	3.00	2.51	04:45	0.62	23:55	1.07	0.88	04:55	0.034	12:25	0.116	0.077	0.077	0.42
02/22/2021	05:35	2.66	14:15	4.18	3.36	05:35	0.94	14:20	1.40	1.16	05:35	0.086	14:20	0.244	0.152	0.152	0.98
02/23/2021	04:25	2.61	21:50	3.49	3.06	04:20	0.88	21:50	1.19	1.06	04:25	0.078	21:55	0.162	0.120	0.120	0.27
02/24/2021	04:15	2.39	19:10	3.27	2.91	04:10	0.78	19:05	1.16	1.01	04:10	0.062	19:05	0.142	0.106	0.106	-
02/25/2021	02:50	2.28	19:35	3.18	2.85	02:50	0.73	19:25	1.13	0.99	02:50	0.054	19:25	0.133	0.101	0.101	0.18
02/26/2021	02:05	2.35	19:25	3.11	2.75	02:05	0.78	16:25	1.09	0.96	02:05	0.060	16:30	0.124	0.094	0.094	0.10
02/27/2021	06:20	2.08	13:50	3.11	2.66	06:20	0.69	13:45	1.09	0.93	06:20	0.044	13:50	0.125	0.086	0.086	0.02
02/28/2021	04:55	2.00	13:10	3.12	2.62	02:50	0.65	12:30	1.11	0.91	02:50	0.040	13:10	0.127	0.084	0.084	0.02
03/01/2021	04:40	1.85	18:30	2.96	2.54	04:35	0.61	19:45	1.07	0.89	04:40	0.033	12:40	0.113	0.079	0.079	-
03/02/2021	02:35	1.84	20:35	2.91	2.49	02:35	0.60	20:35	1.06	0.87	02:35	0.032	20:45	0.111	0.075	0.075	-
03/03/2021	04:45	1.74	19:30	2.94	2.50	04:55	0.58	19:20	1.09	0.88	04:45	0.029	19:20	0.115	0.076	0.076	-
03/04/2021	05:45	1.82	19:15	3.01	2.46	05:40	0.60	19:10	1.10	0.86	05:40	0.032	19:15	0.121	0.073	0.073	0.20
03/05/2021	03:45	1.74	19:45	2.89	2.45	05:10	0.56	19:45	1.04	0.85	03:45	0.028	19:45	0.107	0.072	0.072	0.05
03/06/2021	06:15	1.66	12:10	3.00	2.40	06:15	0.53	12:05	1.08	0.84	06:10	0.025	12:10	0.118	0.069	0.069	-
03/07/2021	06:00	1.53	11:30	2.82	2.38	06:20	0.49	12:45	1.03	0.83	06:00	0.020	12:35	0.102	0.068	0.068	0.04
03/08/2021	05:55	1.65	12:00	2.85	2.35	05:55	0.53	12:00	1.03	0.82	05:50	0.025	12:05	0.105	0.066	0.066	-
03/09/2021	05:35	1.68	20:35	2.86	2.34	04:05	0.50	20:35	1.04	0.80	05:35	0.024	20:35	0.106	0.064	0.064	0.01
03/10/2021	03:30	1.66	20:35	2.72	2.34	02:50	0.50	19:00	0.98	0.81	03:00	0.023	20:35	0.093	0.063	0.063	-
03/11/2021	04:40	1.50	19:40	2.80	2.30	04:40	0.48	19:30	1.01	0.80	04:40	0.019	19:35	0.100	0.062	0.062	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	05:00	1.61	09:50	2.73	2.28	05:00	0.53	09:45	0.98	0.79	04:50	0.024	09:50	0.094	0.060	0.060	-
03/13/2021	04:25	1.54	15:00	3.00	2.29	04:20	0.50	15:00	1.08	0.79	04:15	0.021	15:00	0.118	0.061	0.061	-
03/14/2021	05:55	1.69	20:15	2.88	2.39	05:25	0.51	20:10	1.03	0.81	05:30	0.024	20:20	0.107	0.067	0.067	0.30
03/15/2021	04:25	1.55	19:30	2.78	2.31	04:15	0.48	19:20	1.01	0.80	04:25	0.020	19:30	0.099	0.063	0.063	-
03/16/2021	03:35	1.56	19:45	3.02	2.29	03:40	0.50	19:50	1.10	0.81	03:40	0.021	19:50	0.122	0.063	0.063	-
03/17/2021	03:15	1.49	11:55	2.76	2.26	03:25	0.49	12:00	1.02	0.79	03:00	0.020	12:00	0.099	0.060	0.060	-
03/18/2021	02:45	1.48	17:00	2.73	2.26	02:30	0.49	17:05	1.00	0.79	02:40	0.019	17:00	0.095	0.060	0.060	0.11
03/19/2021	03:45	1.43	11:45	2.66	2.22	03:45	0.46	11:35	0.96	0.78	03:45	0.017	11:40	0.088	0.057	0.057	0.03
03/20/2021	03:40	1.43	10:20	2.75	2.27	03:05	0.45	10:20	1.00	0.80	03:25	0.017	10:20	0.096	0.061	0.061	0.17
03/21/2021	04:20	1.37	13:10	2.86	2.23	04:15	0.43	13:10	1.03	0.78	04:00	0.015	13:10	0.105	0.060	0.060	0.07
03/22/2021	03:45	1.54	11:10	2.86	2.35	03:40	0.51	11:10	1.04	0.83	03:40	0.021	11:10	0.106	0.066	0.066	0.11
03/23/2021	03:05	1.50	19:10	2.81	2.28	03:05	0.48	19:10	1.01	0.80	03:05	0.019	19:10	0.100	0.061	0.061	-
03/24/2021	02:35	1.48	19:55	2.89	2.28	02:00	0.48	20:00	1.05	0.80	02:25	0.019	20:00	0.109	0.062	0.062	0.34
03/25/2021	03:10	2.00	20:15	2.97	2.56	03:15	0.69	13:35	1.06	0.90	03:15	0.042	20:20	0.114	0.080	0.080	0.27
03/26/2021	03:10	1.70	11:25	2.76	2.36	02:05	0.56	11:20	0.99	0.83	02:05	0.028	11:25	0.096	0.066	0.066	-
03/27/2021	05:15	1.62	13:25	2.83	2.29	05:05	0.52	13:20	1.03	0.80	05:10	0.023	13:25	0.103	0.062	0.062	-
03/28/2021	04:05	1.49	15:40	3.19	2.39	04:45	0.46	15:35	1.15	0.83	03:20	0.019	15:40	0.137	0.070	0.070	0.37
03/29/2021	04:00	1.70	20:00	2.82	2.35	02:00	0.55	20:00	1.00	0.81	02:15	0.027	19:55	0.099	0.065	0.065	-
03/30/2021	03:55	1.60	20:35	2.80	2.30	03:55	0.52	20:30	1.02	0.80	03:55	0.023	20:35	0.101	0.062	0.062	-
03/31/2021	02:55	1.57	19:00	2.82	2.32	04:25	0.53	18:55	0.98	0.79	02:55	0.023	19:00	0.098	0.062	0.062	-
04/01/2021	03:45	1.52	18:55	2.73	2.26	03:35	0.49	19:00	0.98	0.78	03:35	0.020	18:55	0.093	0.059	0.059	-
04/02/2021	04:05	1.42	18:50	2.62	2.21	04:25	0.44	18:50	0.94	0.77	04:05	0.017	18:50	0.084	0.057	0.057	-
04/03/2021	03:20	1.33	11:55	2.93	2.25	03:15	0.39	12:00	1.06	0.78	03:15	0.013	12:00	0.113	0.060	0.060	-
04/04/2021	04:50	1.51	10:25	2.79	2.25	04:55	0.47	13:10	1.00	0.79	04:50	0.019	10:20	0.096	0.060	0.060	-
04/05/2021	03:35	1.48	20:40	2.79	2.23	03:45	0.47	20:35	1.01	0.78	03:35	0.019	20:35	0.099	0.059	0.059	-
04/06/2021	03:35	1.48	19:55	2.83	2.21	03:45	0.45	20:00	1.02	0.77	02:05	0.019	20:00	0.102	0.057	0.057	-
04/07/2021	02:55	1.46	18:10	2.94	2.30	02:20	0.49	18:05	0.92	0.75	02:55	0.019	18:05	0.097	0.058	0.058	0.22
04/08/2021	04:40	1.57	20:55	2.79	2.34	02:45	0.39	15:00	1.02	0.79	02:15	0.021	15:00	0.099	0.063	0.063	-
04/09/2021	03:50	1.45	20:15	2.81	2.32	03:40	0.45	20:20	1.01	0.81	03:50	0.017	20:15	0.100	0.064	0.064	0.03
04/10/2021	03:40	1.63	12:00	2.79	2.36	03:40	0.54	11:55	1.00	0.83	03:45	0.024	12:00	0.098	0.066	0.066	0.02
04/11/2021	03:25	1.63	11:35	2.98	2.37	03:05	0.52	11:25	1.07	0.83	02:50	0.024	11:25	0.115	0.068	0.068	-
04/12/2021	04:00	1.70	20:35	2.82	2.38	03:45	0.56	20:20	1.01	0.84	03:50	0.027	20:35	0.101	0.068	0.068	-
04/13/2021	03:05	1.54	19:35	2.87	2.35	02:35	0.52	19:35	1.05	0.83	02:55	0.022	19:35	0.108	0.067	0.067	-
04/14/2021	04:20	1.64	21:15	2.83	2.33	04:25	0.55	19:25	1.03	0.82	04:20	0.025	19:30	0.103	0.065	0.065	-
09/23/2020	23:05	2.06	17:45	2.99	2.63	23:05	0.71	17:30	1.08	0.94	23:05	0.045	17:35	0.116	0.086	0.054	-
09/24/2020	03:30	1.39	10:55	2.79	2.26	03:25	0.43	10:50	1.02	0.79	03:10	0.016	10:55	0.100	0.061	0.061	-
09/25/2020	04:15	1.44	12:50	2.86	2.30	03:00	0.45	12:45	1.06	0.81	02:45	0.018	12:50	0.108	0.064	0.064	-
09/26/2020	03:00	1.48	10:35	3.01	2.26	02:55	0.48	10:35	1.10	0.80	02:55	0.019	10:35	0.121	0.061	0.061	-
09/27/2020	03:05	1.70	14:15	2.95	2.32	03:05	0.58	14:10	1.10	0.83	03:00	0.028	14:15	0.117	0.066	0.066	-
09/28/2020	03:55	1.38	20:35	2.78	2.23	03:10	0.45	20:35	1.00	0.78	03:50	0.016	20:35	0.098	0.059	0.059	-
09/29/2020	04:05	1.38	21:05	2.89	2.28	04:10	0.47	11:50	1.02	0.80	03:45	0.017	11:50	0.098	0.062	0.062	-
09/30/2020	04:30	1.54	19:30	2.89	2.32	04:25	0.45	19:20	1.08	0.79	04:25	0.019	19:35	0.112	0.063	0.063	-
10/01/2020	03:45	1.34	20:25	2.74	2.24	04:05	0.39	19:20	1.00	0.79	03:50	0.014	20:15	0.095	0.060	0.060	-
10/02/2020	04:05	1.42	19:15	2.72	2.24	03:45	0.44	19:05	0.98	0.79	03:50	0.016	19:15	0.093	0.059	0.059	-
10/03/2020	04:40	1.53	11:35	2.71	2.25	04:25	0.50	11:30	0.98	0.79	04:35	0.021	11:35	0.093	0.060	0.060	0.01
10/04/2020	04:35	1.36	15:30	2.74	2.25	04:20	0.43	15:30	1.02	0.80	04:20	0.015	15:30	0.097	0.062	0.062	0.01
10/05/2020	03:00	1.43	20:10	2.78	2.27	02:35	0.46	20:10	1.04	0.81	02:45	0.018	20:10	0.102	0.062	0.062	-
10/06/2020	03:10	1.37	20:15	2.67	2.25	03:00	0.41	20:05	0.99	0.80	03:00	0.015	20:05	0.091	0.061	0.061	-
10/07/2020	04:45	1.46	19:30	2.72	2.26	04:30	0.47	19:35	1.01	0.81	04:40	0.018	19:35	0.096	0.062	0.062	-
10/08/2020	02:40	1.39	19:50	2.83	2.23	02:45	0.44	19:50	1.08	0.79	02:30	0.016	19:50	0.108	0.060	0.060	-
10/09/2020	04:30	1.44	23:45	3.10	2.26	03:25	0.39	23:40	1.16	0.78	04:25	0.017	23:45	0.132	0.060	0.060	0.64
10/10/2020	04:30	1.93	02:25	3.09	2.49	04:30	0.64	00:00	1.14	0.88	04:30	0.037	02:20	0.130	0.075	0.075	1.04
10/11/2020	05:15	1.43	14:55	3.07	2.30	05:50	0.47	14:55	1.15	0.82	04:35	0.018	14:55	0.130	0.066	0.066	0.53
10/12/2020	04:30	1.38	20:35	2.82	2.22	04:35	0.43	20:35	1.03	0.79	04:35	0.015	20:35	0.103	0.059	0.059	-
10/13/2020	03:25	1.56	08:05	2.92	2.33	01:55	0.52	07:55	1.10	0.83	03:30	0.022	08:00	0.115	0.066	0.066	0.61
10/14/2020	04:25	1.37	08:35	2.80	2.20	04:35	0.41	08:35	1.04	0.78	04:20	0.015	08:35	0.103	0.058	0.058	-
10/15/2020	03:45	1.47	20:55	2.74	2.28	03:45	0.46	20:55	1.00	0.81	03:45	0.018	20:55	0.096	0.062	0.062	-
10/16/2020	04:15	1.34	16:10	2.62	2.19	02:55	0.44	16:10	0.96	0.77	04:05	0.015	16:10	0.086	0.057	0.057	-
10/17/2020	04:40	1.47	13:00	2.74	2.21	04:30	0.46	13:00	1.00	0.78	04:30	0.018	13:00	0.096	0.058	0.058	0.01
10/18/2020	04:55	1.33	12:25	2.79	2.20	04:35	0.42	12:25	1.02	0.78	04:35	0.014	12:25	0.100	0.059	0.059	0.03
10/19/2020	04:15	1.46	12:15	2.75	2.23	04:20	0.41	11:25	1.00	0.78	04:20	0.016	11:25	0.095	0.058	0.058	0.05
10/20/2020	04:15	1.32	20:00	2.78	2.17	03:10	0.43	20:00	1.03	0.76	04:20	0.014	20:00	0.100	0.056	0.056	-
10/21/2020	04:25	1.34	19:15	2.71	2.17	04:15	0.40	20:50	0.95	0.75	04:10	0.014	19:15	0.088	0.055	0.055	0.01
10/22/2020	02:35	1.45	11:45	2.67	2.18	02:10	0.38	18:20	0.98	0.74	02:10	0.015	18:25	0.090	0.055	0.055	-
10/23/2020	04:00	1.28	20:05	2.68	2.16	02:50	0.38	20:10	0.97	0.76	03:55	0.012	20:10	0.090	0.056	0.056	0.20
10/24/2020	04:30	1.61	10:40	2.75	2.18	04:15	0.53	09:15	1.00	0.77	04:10	0.024	10:45	0.096	0.055	0.055	0.02
10/25/2020	06:15	1.37	14:20	2.73	2.16	06:00	0.43	14:25	0.99	0.76	06:15	0.015	14:20	0.094	0.056	0.056	-
10/26/2020	04:00	1.58	20:30	2.65	2.22	04:15	0.52	20:25	0.98	0.79	04:15	0.022	20:25	0.089	0.059	0.059	-
10/27/2020	04:35	1.30	19:25	2.74	2.15	04:20	0.35	19:25	1.04	0.76	04:10	0.012	19:25	0.100	0.055	0.055	-
10/28/2020	04:20	1.34	18:40	2.67	2.17	04:35	0.35	16:40	0.97	0.76	03:40	0.014	18:40	0.090	0.056	0.056	-
10/29/2020	02:20	1.46	19:50	2.81	2.19	02:40	0.43	19:50	1.05	0.77	02:40	0.017	19:50	0.104	0.057	0.057	-
10/30/2020	04:45	1.45	10:30	2.62	2.22	05:15	0.41	10:30	0.95	0.78	05:15	0.016	10:30	0.085	0.058	0.058	0.10
10/31/2020	03:00	1.44	13:40	2.95	2.26	03:05	0.45	13:35	1.05	0.78	02:55	0.017	13:40	0.112	0.060	0.060	-
11/01/2020	03:45	1.46	10:20	2.87	2.26	03:30	0.44	10:20	1.04	0.78	03:30	0.017	10:20	0.106	0.061	0.061	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/02/2020	05:15	1.38	16:40	2.63	2.19	04:15	0.40	16:50	0.95	0.76	04:40	0.015	16:40	0.085	0.056	0.056	-
11/03/2020	04:15	1.35	10:50	3.05	2.30	03:55	0.41	10:45	1.13	0.80	03:40	0.014	10:45	0.126	0.065	0.065	0.83
11/04/2020	04:15	1.36	18:50	2.71	2.20	04:00	0.42	18:45	0.99	0.77	04:00	0.015	18:50	0.093	0.057	0.057	0.09
11/05/2020	04:55	1.42	20:55	2.82	2.28	04:45	0.44	20:55	1.04	0.80	04:40	0.017	20:55	0.104	0.063	0.063	0.34
11/06/2020	06:05	1.67	11:00	2.69	2.25	06:10	0.53	10:55	1.00	0.78	06:00	0.025	10:55	0.092	0.058	0.058	0.10
11/07/2020	04:00	1.39	15:40	2.78	2.22	03:20	0.44	15:45	1.03	0.78	04:00	0.016	15:45	0.101	0.058	0.058	0.07
11/08/2020	05:50	1.31	12:50	2.75	2.23	05:40	0.36	21:25	1.01	0.78	05:40	0.012	21:25	0.097	0.060	0.060	0.01
11/09/2020	05:35	1.38	20:05	2.74	2.19	05:25	0.41	20:00	1.01	0.76	05:25	0.015	20:00	0.096	0.056	0.056	0.04
11/10/2020	02:50	1.41	21:15	2.67	2.18	02:40	0.43	17:00	0.98	0.77	02:40	0.016	21:15	0.091	0.056	0.056	0.03
11/11/2020	04:05	1.30	16:05	2.60	2.15	03:50	0.38	14:10	1.03	0.79	04:00	0.012	16:05	0.091	0.057	0.057	-
11/12/2020	04:50	1.30	19:40	2.77	2.14	05:10	0.45	19:40	1.01	0.78	05:10	0.015	19:40	0.098	0.056	0.056	0.16
11/13/2020	02:15	1.65	13:25	2.79	2.28	02:10	0.54	13:20	1.10	0.80	02:10	0.025	13:20	0.108	0.060	0.060	0.38
11/14/2020	04:40	1.45	18:55	3.02	2.24	04:40	0.48	18:50	1.13	0.79	04:40	0.018	18:55	0.124	0.060	0.060	0.47
11/15/2020	04:55	1.38	13:15	2.92	2.22	05:05	0.42	13:20	1.08	0.78	04:55	0.015	13:15	0.113	0.059	0.059	0.19
11/16/2020	02:50	1.53	13:55	2.95	2.25	02:50	0.49	13:50	1.10	0.79	02:50	0.020	13:55	0.117	0.061	0.061	0.31
11/17/2020	05:30	1.37	19:25	2.78	2.22	05:35	0.41	19:25	1.01	0.77	05:25	0.015	19:25	0.099	0.058	0.058	0.20
11/18/2020	04:15	1.35	20:10	2.86	2.25	04:30	0.42	18:15	1.05	0.79	03:55	0.015	18:20	0.107	0.061	0.061	0.30
11/19/2020	02:50	1.62	13:25	2.96	2.32	02:50	0.53	13:20	1.09	0.82	02:50	0.024	13:25	0.117	0.064	0.064	0.50
11/20/2020	05:50	1.60	13:20	2.69	2.28	05:05	0.52	13:15	0.98	0.79	05:20	0.023	13:15	0.091	0.060	0.060	0.01
11/21/2020	04:35	1.54	15:05	2.88	2.25	06:20	0.49	14:50	1.06	0.79	06:20	0.021	15:00	0.109	0.060	0.060	-
11/22/2020	06:05	1.35	12:15	2.81	2.26	01:15	0.37	12:10	1.02	0.78	05:55	0.014	12:25	0.102	0.061	0.061	0.21
11/23/2020	05:05	1.52	17:50	2.74	2.30	05:00	0.46	17:50	0.97	0.78	03:40	0.019	17:50	0.093	0.061	0.061	0.14
11/24/2020	05:20	1.49	16:40	2.82	2.25	03:25	0.43	16:30	1.01	0.76	03:25	0.018	16:35	0.101	0.059	0.059	0.21
11/25/2020	05:25	1.48	18:20	2.82	2.28	04:55	0.44	18:20	1.03	0.78	05:25	0.018	18:20	0.103	0.061	0.061	0.05
11/26/2020	06:25	1.60	12:15	2.88	2.24	06:15	0.52	12:20	1.06	0.78	06:20	0.023	12:20	0.109	0.059	0.059	0.02
11/27/2020	05:30	1.41	13:55	2.76	2.22	05:10	0.45	13:50	1.01	0.77	05:05	0.017	13:50	0.097	0.059	0.059	-
11/28/2020	04:50	1.61	12:50	2.87	2.25	04:40	0.51	12:45	1.06	0.78	04:50	0.022	12:50	0.109	0.060	0.060	0.05
11/29/2020	06:00	1.39	13:30	2.79	2.22	06:20	0.44	13:25	1.02	0.78	06:00	0.016	13:30	0.101	0.059	0.059	-
11/30/2020	03:45	1.48	22:05	2.70	2.29	03:35	0.48	19:15	0.99	0.81	03:35	0.019	19:20	0.093	0.062	0.062	0.36
12/01/2020	04:10	1.48	18:00	2.73	2.20	04:00	0.44	18:00	1.02	0.76	04:05	0.017	18:00	0.097	0.056	0.056	-
12/02/2020	04:00	1.31	21:10	2.75	2.19	04:05	0.38	21:15	1.01	0.77	04:00	0.013	21:15	0.097	0.056	0.056	0.01
12/03/2020	04:10	1.41	14:15	2.72	2.17	04:15	0.46	14:15	1.02	0.76	04:10	0.017	14:15	0.097	0.054	0.054	-
12/04/2020	03:20	1.49	19:40	2.62	2.16	03:30	0.45	18:15	0.96	0.76	03:25	0.018	21:25	0.087	0.054	0.054	-
12/05/2020	05:15	1.42	12:45	2.71	2.19	05:20	0.42	12:30	0.99	0.76	05:15	0.016	12:30	0.093	0.056	0.056	0.03
12/06/2020	05:20	1.49	13:20	2.86	2.23	03:30	0.48	13:25	1.06	0.78	03:35	0.019	13:25	0.108	0.059	0.059	0.03
12/07/2020	03:55	1.35	17:45	2.76	2.19	04:00	0.36	17:50	1.00	0.76	04:00	0.012	17:50	0.096	0.055	0.055	-
12/08/2020	04:30	1.42	15:35	2.95	2.35	04:40	0.41	19:00	1.09	0.82	04:35	0.015	15:35	0.114	0.067	0.067	0.87
12/09/2020	04:50	1.67	11:25	2.74	2.34	03:30	0.54	15:40	0.96	0.79	03:30	0.025	11:25	0.091	0.062	0.062	0.17
12/10/2020	02:25	1.40	11:10	2.86	2.21	02:35	0.43	11:15	0.98	0.75	02:15	0.016	11:10	0.099	0.055	0.055	0.07
12/11/2020	01:05	1.38	14:10	2.73	2.21	02:15	0.42	14:10	0.98	0.76	02:15	0.015	14:10	0.093	0.056	0.056	0.02
12/12/2020	03:20	1.43	17:50	2.67	2.18	03:20	0.46	17:55	0.98	0.76	03:20	0.017	17:50	0.090	0.055	0.055	0.01
12/13/2020	23:30	1.52	09:25	2.90	2.29	23:50	0.44	09:15	1.06	0.81	23:45	0.020	09:25	0.110	0.063	0.063	0.24
12/14/2020	02:25	1.57	13:00	2.72	2.28	00:45	0.42	13:00	1.00	0.80	00:25	0.019	13:00	0.095	0.061	0.051	0.05
12/15/2020	04:55	1.45	16:50	3.07	2.37	05:05	0.38	16:45	1.13	0.82	05:05	0.016	16:55	0.128	0.069	0.069	0.58
12/16/2020	04:55	1.80	18:10	2.89	2.43	05:00	0.53	15:25	1.05	0.84	04:55	0.028	15:30	0.108	0.071	0.071	0.39
12/17/2020	04:15	1.73	13:35	2.82	2.35	04:00	0.58	13:35	1.04	0.83	04:00	0.029	13:35	0.104	0.066	0.066	0.08
12/18/2020	03:15	1.73	15:40	2.85	2.33	04:45	0.51	15:40	1.09	0.80	03:40	0.026	15:40	0.111	0.064	0.064	0.25
12/19/2020	07:10	1.64	21:00	2.97	2.39	07:10	0.49	20:55	1.06	0.81	07:15	0.022	21:05	0.114	0.067	0.067	0.37
12/20/2020	05:40	2.01	12:05	2.89	2.48	05:30	0.61	11:50	1.01	0.83	05:40	0.038	12:00	0.104	0.071	0.071	0.04
12/21/2020	02:35	1.92	19:05	3.76	2.76	02:35	0.64	19:05	1.32	0.98	02:35	0.037	19:05	0.199	0.100	0.100	1.07
12/22/2020	05:05	2.36	00:00	3.12	2.73	05:10	0.80	00:00	1.13	0.97	05:10	0.062	00:00	0.130	0.093	0.093	-
12/23/2020	04:00	1.91	13:05	2.89	2.47	03:55	0.63	13:05	1.06	0.86	03:55	0.036	13:05	0.110	0.073	0.073	-
12/24/2020	05:15	1.64	12:50	2.85	2.34	05:15	0.55	12:50	1.04	0.82	05:15	0.025	12:50	0.105	0.065	0.065	-
12/25/2020	04:30	1.61	19:05	2.79	2.28	04:40	0.53	19:00	1.03	0.80	04:25	0.024	19:05	0.102	0.061	0.061	0.49
12/26/2020	06:45	1.68	13:35	2.75	2.29	04:55	0.50	13:00	1.00	0.81	04:55	0.024	13:35	0.096	0.062	0.062	0.02
12/27/2020	05:45	1.44	12:55	2.88	2.32	05:45	0.47	13:00	1.09	0.82	05:40	0.018	12:55	0.112	0.065	0.065	0.13
12/28/2020	05:25	1.64	13:30	2.79	2.29	05:25	0.53	13:25	1.01	0.81	05:25	0.024	13:25	0.099	0.062	0.062	-
12/29/2020	05:45	1.53	20:10	2.85	2.34	05:25	0.50	18:40	1.03	0.82	05:45	0.020	18:40	0.104	0.066	0.066	0.14
12/30/2020	04:35	1.99	14:10	3.14	2.69	04:35	0.68	14:00	1.16	0.96	04:35	0.041	14:00	0.133	0.092	0.092	0.78
12/31/2020	04:20	2.36	14:10	3.16	2.73	04:10	0.81	12:10	1.11	0.96	04:10	0.063	14:10	0.130	0.093	0.093	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			14.520	30.65
Average	2.41	0.84	0.071	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A11_710142

Site Address /Location:	1498 Henry Rd			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	Located within roadway	Latitude:	47.314373°	Pipe Size (H x W): 14.13 x 14.13	Pipe Shape: Circular
		Longitude:	-122.209694°		



Manhole #	System Characteristics
710-142	Residential
Access	Traffic
Drive	Light







ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519

Installation Information

Installation Date:	Installation Type:
Wednesday, September 23, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	Pipe Size (HxW)
8:49:00 AM	14.13 x 14.13
Depth of Flow (Wet DOF) (in)	
2.63	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.64	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
1.44	N/A
Silt (in)	Silt Type
0	

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9	Common Trench
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
PVC	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

AUB_A12_71043

Site Commentary

SITE INFORMATION

Pipe	Elliptical (11.5 in H x 12 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	0.78	1.07	0.018
Minimum	0.10	0.21	0.000
Maximum	1.90	2.60	0.088
Min Time	09/27/2020 2:00:00 AM	11/18/2020 4:00:00 AM	10/14/2020 3:00:00 AM
Max Time	11/14/2020 6:00:00 PM	11/30/2020 11:00:00 AM	02/07/2021 10:00:00 AM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

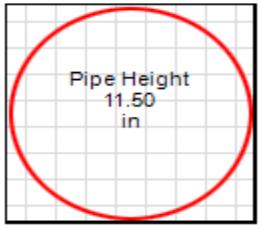
Percent Uptime	
DFINAL (in)	99.319
VFINAL (ft/s)	99.319
QFINAL (MGD - Total MG)	99.319

Hydrograph Report

AUB_A12_71043

Flow Monitor

AUB_A12_71043



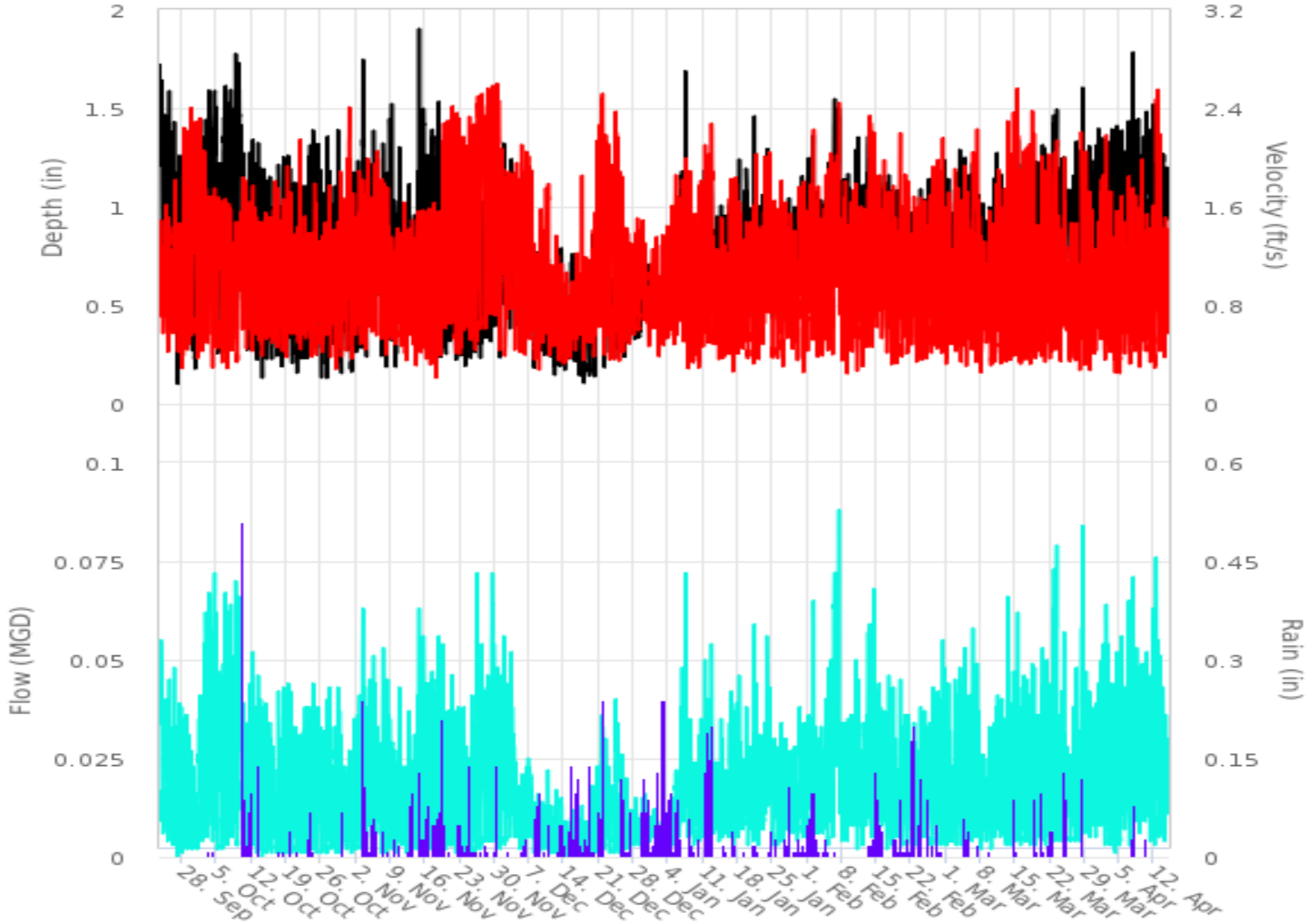
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A12_71043

Flow Monitor

AUB_A12_71043

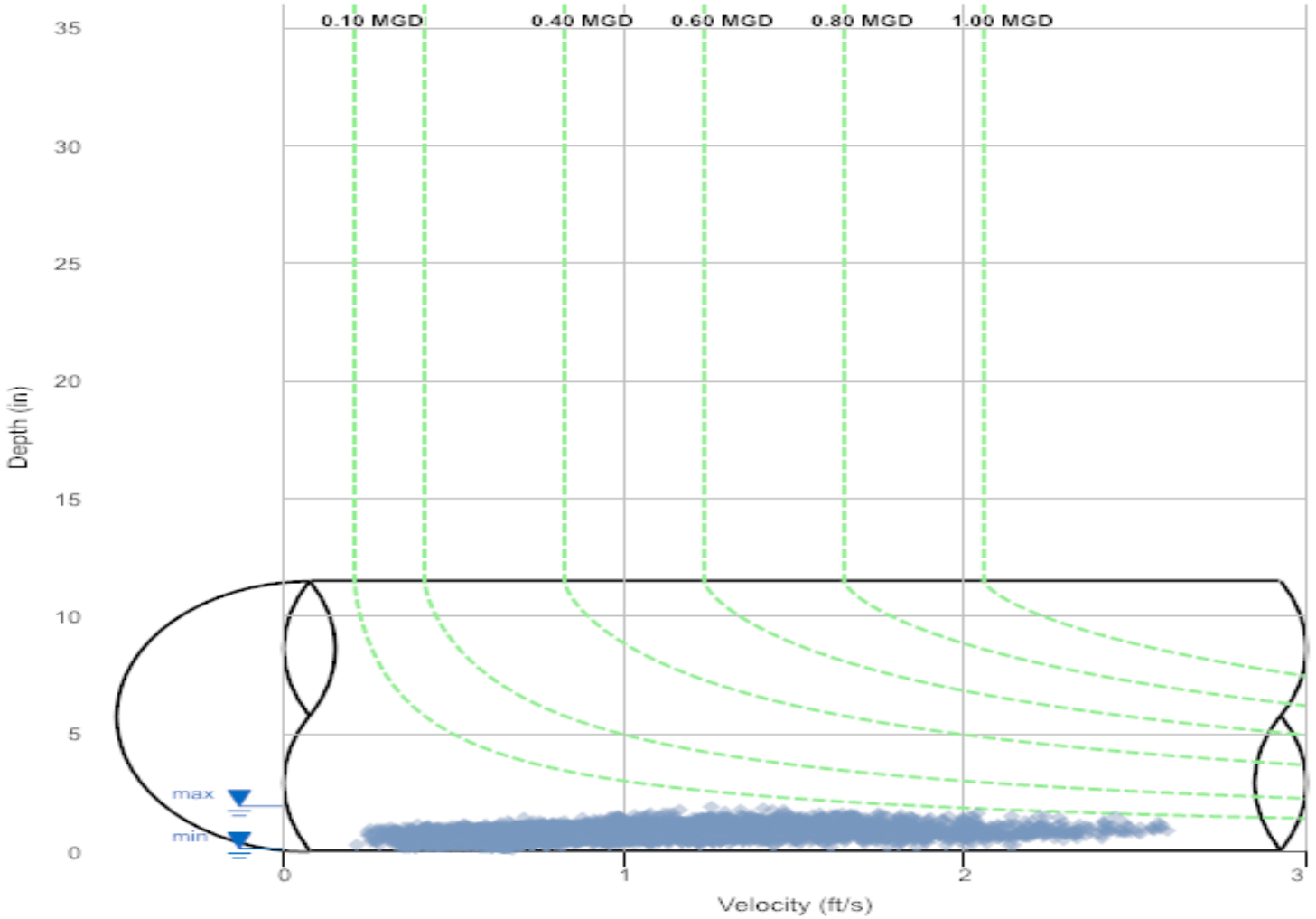
Pipe Height
11.50
in

Report Period

09/22/2020
To
04/14/2021

Legend

DFINAL - VFINAL
Iso-Q™
Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A12_71043Pipe: Elliptical (11.5 in H x 12 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	22:20	0.33	09:45	0.72	0.53	08:30	0.25	15:45	2.83	0.95	22:55	0.002	15:55	0.033	0.008	0.008	0.51
01/02/2021	07:00	0.30	23:25	0.81	0.46	01:00	0.33	21:20	2.31	0.78	07:00	0.001	15:55	0.022	0.005	0.005	1.69
01/03/2021	14:05	0.32	17:10	0.93	0.48	04:50	0.23	09:10	2.31	0.81	06:05	0.001	16:05	0.019	0.006	0.006	0.65
01/04/2021	00:30	0.43	16:10	0.99	0.59	07:05	0.26	18:35	2.35	0.85	00:15	0.002	21:40	0.029	0.008	0.008	0.48
01/05/2021	03:10	0.38	16:10	1.07	0.64	01:30	0.34	12:10	2.49	1.03	00:00	0.003	09:35	0.048	0.012	0.012	0.52
01/06/2021	23:35	0.40	17:05	1.28	0.81	11:35	0.36	21:15	2.57	1.15	04:05	0.004	16:20	0.058	0.019	0.019	0.22
01/07/2021	00:25	0.46	10:05	2.94	0.95	03:50	0.37	16:25	3.67	1.17	00:05	0.005	13:35	0.122	0.024	0.024	-
01/08/2021	04:15	0.39	01:55	1.15	0.78	02:00	0.22	16:55	2.62	0.92	04:15	0.003	16:55	0.046	0.013	0.013	0.22
01/09/2021	04:45	0.39	08:00	1.07	0.73	04:30	0.19	09:15	2.30	0.92	03:40	0.001	09:20	0.045	0.013	0.013	-
01/10/2021	02:05	0.40	22:50	1.21	0.80	04:10	0.20	13:55	2.71	1.09	04:10	0.001	13:55	0.057	0.018	0.018	0.07
01/11/2021	04:50	0.41	09:50	1.46	0.92	01:20	0.23	11:05	2.92	1.21	01:20	0.003	10:00	0.079	0.024	0.024	1.06
01/12/2021	14:40	0.65	16:25	1.39	0.95	14:00	0.33	17:40	2.59	1.42	00:55	0.004	16:25	0.065	0.028	0.028	2.10
01/13/2021	03:30	0.58	19:25	1.16	0.78	14:50	0.12	17:50	2.34	0.89	14:50	0.002	18:30	0.044	0.013	0.013	0.09
01/14/2021	02:00	0.59	15:20	1.30	0.79	04:15	0.12	16:10	3.06	0.94	04:15	0.001	15:25	0.064	0.015	0.015	0.01
01/15/2021	03:05	0.59	09:40	1.34	0.82	02:20	0.20	10:30	2.19	0.83	03:00	0.002	08:50	0.064	0.013	0.013	0.09
01/16/2021	04:20	0.42	17:25	1.32	0.85	04:20	0.21	09:45	2.53	1.09	04:20	0.001	17:25	0.059	0.020	0.020	-
01/17/2021	05:20	0.48	08:20	1.37	0.82	01:15	0.24	19:15	2.66	1.04	04:35	0.002	08:20	0.069	0.018	0.018	0.10
01/18/2021	05:55	0.51	07:15	1.36	0.81	01:40	0.24	07:55	2.34	1.05	01:40	0.003	07:20	0.065	0.018	0.018	-
01/19/2021	06:40	0.58	16:25	1.37	0.88	05:50	0.26	18:10	2.30	0.94	05:50	0.003	17:15	0.065	0.017	0.017	0.01
01/20/2021	02:10	0.38	07:00	1.22	0.80	03:50	0.23	16:00	2.48	0.97	03:45	0.001	07:05	0.055	0.016	0.016	-
01/21/2021	03:35	0.40	09:00	1.73	0.87	04:20	0.20	18:25	2.47	0.96	03:10	0.002	09:00	0.095	0.018	0.018	0.11
01/22/2021	05:05	0.40	07:25	1.31	0.82	03:55	0.26	12:20	2.54	0.97	03:05	0.002	12:20	0.073	0.016	0.016	-
01/23/2021	03:25	0.40	20:05	1.54	0.84	04:50	0.22	20:00	2.61	1.18	04:50	0.003	20:05	0.095	0.021	0.021	-
01/24/2021	03:20	0.47	00:05	1.39	0.88	06:00	0.27	09:50	2.90	1.25	03:15	0.004	00:05	0.072	0.023	0.023	0.16
01/25/2021	03:45	0.38	09:40	1.14	0.77	04:55	0.12	17:25	2.77	1.03	04:55	0.001	17:25	0.046	0.016	0.016	0.04
01/26/2021	03:05	0.42	06:00	1.39	0.76	00:55	0.34	11:55	2.49	0.96	02:25	0.002	06:00	0.051	0.015	0.015	-
01/27/2021	04:45	0.59	17:30	1.19	0.83	02:55	0.25	11:20	2.29	1.02	01:55	0.003	22:20	0.046	0.017	0.017	0.14
01/28/2021	03:45	0.65	08:30	1.17	0.84	02:35	0.34	11:55	2.61	1.07	02:35	0.004	11:55	0.052	0.018	0.018	0.24
01/29/2021	04:50	0.57	10:15	1.27	0.80	05:15	0.23	09:45	2.50	1.00	05:15	0.002	10:15	0.062	0.016	0.016	0.03
01/30/2021	02:05	0.62	10:35	1.21	0.85	02:25	0.19	12:00	2.64	1.06	02:05	0.002	12:00	0.070	0.018	0.018	0.07
01/31/2021	04:30	0.59	00:30	1.30	0.90	02:50	0.24	14:50	2.50	1.04	07:30	0.003	13:15	0.050	0.019	0.019	0.12
02/01/2021	03:35	0.72	07:30	1.37	0.92	01:15	0.38	13:45	3.09	1.08	01:05	0.005	13:45	0.066	0.021	0.021	0.82
02/02/2021	16:20	0.70	06:50	1.53	0.95	03:25	0.24	08:05	2.57	1.20	03:25	0.004	11:00	0.074	0.025	0.025	0.31
02/03/2021	02:30	0.69	08:55	1.48	0.88	04:10	0.28	17:25	2.29	0.97	02:30	0.004	08:55	0.077	0.017	0.017	0.06
02/04/2021	04:15	0.60	17:50	1.32	0.86	02:50	0.10	12:40	2.61	0.94	02:50	0.001	17:50	0.061	0.017	0.017	0.07
02/05/2021	04:00	0.41	18:15	1.38	0.95	04:45	0.22	20:00	2.31	1.19	03:35	0.001	08:30	0.065	0.027	0.027	0.01
02/06/2021	00:30	0.66	09:40	1.88	1.19	07:15	0.33	22:55	2.31	1.42	00:30	0.005	13:20	0.091	0.042	0.042	0.01
02/07/2021	19:35	0.63	11:10	1.78	1.05	19:40	0.25	13:20	2.54	1.27	19:40	0.003	11:10	0.111	0.031	0.031	-
02/08/2021	02:25	0.63	11:15	1.44	0.90	02:55	0.29	13:45	2.69	1.00	02:15	0.003	11:15	0.072	0.019	0.019	-
02/09/2021	23:35	0.59	06:50	1.37	0.93	03:30	0.20	09:35	2.29	0.93	03:20	0.003	12:30	0.060	0.018	0.018	-
02/10/2021	05:10	0.54	20:45	1.50	0.92	02:15	0.22	10:10	2.98	1.04	03:05	0.003	20:45	0.083	0.020	0.020	-
02/11/2021	02:40	0.39	07:00	1.53	0.83	03:00	0.24	08:40	2.38	0.92	02:25	0.001	07:00	0.078	0.017	0.017	-
02/12/2021	04:30	0.49	08:25	1.37	0.85	04:55	0.27	10:10	2.34	0.91	03:20	0.002	12:05	0.063	0.017	0.017	-
02/13/2021	21:35	0.71	11:30	1.61	1.09	03:30	0.22	19:30	2.67	1.59	03:15	0.003	08:45	0.084	0.038	0.038	0.08
02/14/2021	04:00	0.43	10:25	1.62	0.93	06:10	0.41	10:05	2.47	1.28	02:35	0.003	10:25	0.098	0.027	0.027	0.71
02/15/2021	00:00	0.65	19:00	1.38	0.98	23:20	0.46	11:00	3.09	1.21	00:00	0.006	11:00	0.078	0.025	0.025	0.78
02/16/2021	03:20	0.54	20:20	1.50	0.83	02:50	0.24	13:25	2.36	1.10	04:00	0.003	20:20	0.077	0.018	0.018	0.07
02/17/2021	02:10	0.38	11:10	1.56	0.81	04:25	0.10	18:25	2.43	0.93	04:25	0.001	11:10	0.088	0.016	0.016	-
02/18/2021	02:30	0.42	09:30	1.25	0.79	02:15	0.20	10:25	2.55	1.00	02:15	0.001	09:25	0.068	0.017	0.017	0.09
02/19/2021	05:55	0.53	07:30	1.23	0.83	02:40	0.28	11:00	2.97	1.00	05:50	0.003	18:50	0.063	0.017	0.017	0.17
02/20/2021	03:40	0.44	15:45	1.41	0.76	06:10	0.30	10:30	2.57	1.03	02:35	0.002	15:45	0.073	0.016	0.016	0.07
02/21/2021	03:20	0.38	08:35	1.14	0.77	06:25	0.22	09:40	2.42	0.99	02:40	0.001	09:40	0.056	0.015	0.015	0.42
02/22/2021	05:40	0.67	06:15	1.30	0.85	02:55	0.41	12:55	2.70	0.98	01:30	0.005	16:55	0.064	0.017	0.017	0.98
02/23/2021	03:35	0.43	21:35	1.30	0.79	05:30	0.21	20:20	2.66	0.92	01:25	0.002	21:45	0.061	0.015	0.015	0.27
02/24/2021	02:25	0.41	18:15	1.45	0.83	03:50	0.24	20:05	2.55	0.91	02:10	0.003	18:15	0.082	0.015	0.015	-
02/25/2021	23:35	0.67	12:00	1.49	0.87	02:40	0.32	18:30	3.33	0.94	03:50	0.004	12:00	0.089	0.017	0.017	0.18
02/26/2021	04:55	0.39	09:35	1.10	0.79	10:35	0.25	09:30	2.55	1.00	03:05	0.002	09:30	0.060	0.017	0.017	0.10
02/27/2021	04:05	0.38	10:10	1.11	0.81	03:15	0.19	12:10	2.33	1.07	03:15	0.001	10:10	0.053	0.019	0.019	0.02
02/28/2021	04:25	0.39	14:55	1.52	0.82	03:55	0.15	09:40	3.21	0.97	03:55	0.001	09:40	0.095	0.018	0.018	0.02
03/01/2021	02:45	0.41	10:45	1.35	0.80	03:00	0.21	18:30	2.44	0.93	03:00	0.001	11:10	0.072	0.016	0.016	-
03/02/2021	03:40	0.40	19:00	1.31	0.83	04:30	0.27	08:50	2.23	0.94	01:30	0.002	19:00	0.065	0.016	0.016	-
03/03/2021	02:55	0.39	18:15	1.53	0.90	03:25	0.13	10:00	2.46	0.93	03:15	0.001	18:15	0.079	0.019	0.019	-
03/04/2021	01:20	0.40	20:05	1.54	0.89	06:00	0.11	09:05	2.48	0.99	01:20	0.001	19:45	0.088	0.021	0.021	0.20
03/05/2021	03:50	0.38	19:40	1.51	0.79	02:35	0.26	08:10	2.80	0.93	01:00	0.002	19:40	0.082	0.016	0.016	0.05
03/06/2021	02:40	0.53	10:25	1.39	0.90	02:55	0.24	10:40	2.76	1.03	02:55	0.002	10:40	0.084	0.021	0.021	-
03/07/2021	17:00	0.54	08:55	1.39	0.92	05:20	0.22	10:00	2.58	1.11	00:00	0.003	10:00	0.071	0.022	0.022	0.04
03/08/2021	03:25	0.39	10:05	1.11	0.77	03:05	0.22	21:45	2.54	0.82	03:05	0.001	10:05	0.052	0.012	0.012	-
03/09/2021	03:15	0.40	12:30	1.19	0.80	03:20	0.20	11:50	3.40	0.88	03:05	0.001	11:50	0.061	0.014	0.014	0.01
03/10/2021	03:25	0.40	20:30	1.34	0.76	03:25	0.22	11:30	3.16	0.80	03:05	0.001	20:30	0.075	0.013	0.013	-
03/11/2021	14:05	0.53	10:05	1.36	0.91	04:00	0.08	08:10	2.72	1.06	04:00	0.001	10:05	0.069	0.020	0.020	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	05:15	0.44	07:45	1.40	0.87	02:45	0.20	07:45	2.42	0.88	05:10	0.001	07:45	0.082	0.016	0.016	-
03/13/2021	02:55	0.45	10:35	1.57	0.77	01:50	0.28	11:00	2.49	1.01	01:50	0.002	10:35	0.098	0.016	0.016	-
03/14/2021	04:10	0.42	20:10	1.47	0.77	06:15	0.22	20:05	2.73	1.21	01:30	0.002	20:10	0.087	0.020	0.020	0.30
03/15/2021	02:35	0.44	12:10	1.57	0.84	02:35	0.20	18:00	2.78	1.29	02:35	0.001	12:10	0.086	0.023	0.023	-
03/16/2021	02:20	0.46	08:30	1.41	0.83	00:35	0.24	19:05	2.77	0.99	00:00	0.002	08:30	0.075	0.018	0.018	-
03/17/2021	02:10	0.53	19:55	1.14	0.80	01:05	0.19	19:55	3.05	1.00	00:50	0.002	19:55	0.076	0.017	0.017	-
03/18/2021	02:20	0.43	19:40	1.82	0.82	00:55	0.16	07:10	2.77	1.17	00:55	0.001	19:40	0.118	0.021	0.021	0.11
03/19/2021	02:25	0.40	07:25	1.37	0.92	03:25	0.27	10:00	2.64	0.86	01:35	0.002	20:15	0.076	0.018	0.018	0.03
03/20/2021	01:35	0.49	12:05	1.40	0.99	04:00	0.25	21:25	2.77	0.98	01:15	0.002	07:30	0.077	0.023	0.023	0.17
03/21/2021	02:30	0.42	10:20	1.39	0.94	03:15	0.22	15:45	2.63	0.96	03:15	0.001	08:45	0.072	0.021	0.021	0.07
03/22/2021	02:25	0.58	10:55	1.67	1.04	01:20	0.24	08:55	2.42	1.01	00:25	0.004	19:30	0.092	0.026	0.026	0.11
03/23/2021	01:30	0.38	09:35	2.23	0.99	00:55	0.23	09:30	2.38	1.01	00:55	0.001	09:35	0.147	0.025	0.025	-
03/24/2021	00:45	0.41	07:50	1.55	0.95	01:20	0.26	05:50	2.49	1.04	00:25	0.002	07:50	0.072	0.022	0.022	0.34
03/25/2021	02:50	0.64	07:40	1.31	0.95	23:45	0.29	09:40	2.60	0.86	23:40	0.004	07:50	0.072	0.017	0.017	0.27
03/26/2021	01:55	0.47	19:00	1.33	0.87	04:05	0.12	14:35	2.56	0.79	04:05	0.001	18:25	0.063	0.015	0.015	-
03/27/2021	05:40	0.65	08:00	1.74	0.99	23:10	0.22	07:55	2.53	0.83	02:10	0.004	08:00	0.112	0.019	0.019	-
03/28/2021	03:35	0.49	13:45	1.71	1.05	01:25	0.18	08:55	2.52	1.17	00:20	0.003	13:45	0.098	0.031	0.031	0.37
03/29/2021	02:30	0.66	15:00	1.82	1.04	01:05	0.23	07:45	2.57	1.01	02:00	0.003	15:00	0.076	0.024	0.024	-
03/30/2021	02:40	0.64	07:30	1.39	1.00	23:20	0.20	07:50	2.52	0.87	01:00	0.003	07:50	0.084	0.019	0.019	-
03/31/2021	00:25	0.38	09:45	1.64	1.04	05:15	0.29	17:50	2.20	0.82	02:15	0.002	09:45	0.093	0.020	0.020	-
04/01/2021	03:25	0.54	14:00	1.80	1.06	03:30	0.13	08:00	2.35	1.16	03:30	0.001	14:25	0.084	0.029	0.029	-
04/02/2021	00:55	0.48	14:10	1.40	1.06	03:20	0.28	15:00	2.47	1.09	00:55	0.002	15:00	0.072	0.028	0.028	-
04/03/2021	02:05	0.44	05:15	1.96	1.01	03:40	0.25	10:55	2.37	0.84	03:05	0.002	11:00	0.102	0.020	0.020	-
04/04/2021	02:30	0.39	11:40	1.96	0.96	03:50	0.24	09:05	2.47	0.81	02:10	0.001	11:45	0.102	0.020	0.020	-
04/05/2021	04:20	0.51	04:05	1.69	1.08	01:35	0.22	20:00	2.34	0.92	01:25	0.002	23:00	0.079	0.025	0.025	-
04/06/2021	23:55	0.44	20:55	1.52	1.06	04:20	0.30	10:00	2.33	0.84	04:20	0.002	21:00	0.079	0.021	0.021	-
04/07/2021	00:45	0.38	17:10	2.67	1.00	03:05	0.19	17:45	2.39	0.87	04:00	0.001	18:10	0.121	0.023	0.023	0.22
04/08/2021	05:45	0.60	09:55	2.44	1.08	03:45	0.20	09:45	2.63	0.94	02:30	0.004	10:00	0.133	0.023	0.023	-
04/09/2021	03:30	0.52	11:55	2.06	1.06	02:25	0.19	06:05	2.37	0.94	05:05	0.003	11:55	0.096	0.023	0.023	0.03
04/10/2021	02:40	0.57	11:25	2.14	1.17	02:15	0.19	12:50	2.86	1.00	02:30	0.002	08:10	0.130	0.028	0.028	0.02
04/11/2021	03:50	0.68	09:55	1.89	1.12	04:05	0.28	11:10	2.47	0.85	04:00	0.003	09:55	0.115	0.024	0.024	-
04/12/2021	02:05	0.50	08:55	2.00	1.02	02:45	0.21	10:35	2.60	1.52	01:45	0.002	08:55	0.120	0.036	0.036	-
04/13/2021	03:20	0.41	11:55	1.39	1.00	13:30	0.23	17:00	3.48	0.88	03:10	0.002	17:00	0.112	0.020	0.020	-
04/14/2021	02:55	0.49	07:50	1.61	0.98	03:40	0.23	09:00	2.59	0.79	02:55	0.002	07:50	0.074	0.018	0.018	-
09/23/2020	23:45	0.69	11:30	1.90	1.39	21:45	0.36	14:05	1.83	1.05	21:45	0.006	16:45	0.068	0.037	0.022	-
09/24/2020	02:50	0.46	11:20	1.53	1.06	04:05	0.28	03:15	1.97	1.08	02:45	0.002	18:10	0.050	0.025	0.025	-
09/25/2020	01:55	0.43	09:20	1.65	1.10	02:45	0.18	17:15	1.93	0.96	01:35	0.001	09:20	0.054	0.025	0.025	-
09/26/2020	04:30	0.21	05:30	1.96	0.90	00:35	0.22	05:40	1.97	1.18	01:45	0.001	09:15	0.066	0.023	0.023	-
09/27/2020	02:40	0.07	10:15	1.66	0.83	04:40	0.25	20:40	1.81	1.09	02:10	0.000	10:15	0.067	0.021	0.021	-
09/28/2020	04:20	0.15	17:50	1.08	0.58	23:35	0.17	10:05	2.35	1.46	00:20	0.001	17:55	0.049	0.017	0.017	-
09/29/2020	02:10	0.14	08:00	1.41	0.49	00:05	0.12	18:55	2.56	1.51	00:05	0.001	08:00	0.069	0.013	0.013	-
09/30/2020	17:40	0.06	08:55	1.20	0.38	00:40	0.15	19:15	2.73	1.56	10:10	0.000	08:55	0.066	0.008	0.008	-
10/01/2020	01:20	0.28	18:50	1.22	0.69	01:30	0.27	10:55	2.60	1.61	00:45	0.001	18:55	0.062	0.022	0.022	-
10/02/2020	01:25	0.41	11:55	1.55	0.98	01:25	0.29	11:05	2.46	1.40	00:55	0.002	11:55	0.072	0.031	0.031	-
10/03/2020	05:00	0.34	12:15	1.75	1.14	00:00	0.28	19:50	1.85	1.30	00:00	0.002	12:15	0.085	0.037	0.037	0.01
10/04/2020	22:45	0.49	10:40	1.81	1.16	02:50	0.25	10:35	1.93	1.17	22:40	0.002	10:40	0.094	0.037	0.037	0.01
10/05/2020	01:30	0.21	08:10	1.36	0.86	03:20	0.23	08:00	1.91	1.25	00:50	0.001	08:00	0.060	0.025	0.025	-
10/06/2020	00:45	0.28	18:00	1.89	1.06	02:00	0.29	17:05	1.98	1.14	00:45	0.001	18:00	0.097	0.030	0.030	-
10/07/2020	03:45	0.22	10:45	1.67	1.11	23:50	0.21	13:45	1.91	1.13	03:30	0.001	10:45	0.079	0.033	0.033	-
10/08/2020	03:20	0.41	13:40	1.98	1.17	01:05	0.14	13:35	1.83	1.02	01:05	0.001	13:35	0.101	0.031	0.031	-
10/09/2020	01:25	0.33	22:55	1.93	1.19	02:45	0.12	23:00	1.86	1.08	01:25	0.001	22:55	0.093	0.034	0.034	0.64
10/10/2020	01:10	0.32	08:25	1.49	0.84	23:40	0.26	08:05	2.33	1.22	00:55	0.002	01:55	0.054	0.021	0.021	1.04
10/11/2020	05:40	0.20	18:15	1.42	0.76	05:15	0.23	08:00	2.77	1.10	05:15	0.001	18:15	0.052	0.020	0.020	0.53
10/12/2020	23:25	0.24	05:20	1.74	0.81	21:20	0.11	05:15	2.60	1.19	21:20	0.001	05:15	0.084	0.022	0.022	-
10/13/2020	02:25	0.11	07:30	1.55	0.72	03:50	0.29	04:10	2.11	0.96	02:10	0.001	07:30	0.064	0.016	0.016	0.61
10/14/2020	04:35	0.08	10:25	1.56	0.67	06:30	0.26	07:55	2.30	0.95	03:00	0.000	08:45	0.062	0.015	0.015	-
10/15/2020	23:00	0.16	14:50	2.06	0.66	22:05	0.22	18:50	1.93	0.94	01:10	0.001	14:50	0.100	0.014	0.014	-
10/16/2020	01:15	0.21	07:10	1.20	0.58	03:35	0.11	07:00	2.43	1.04	01:00	0.001	08:40	0.041	0.011	0.011	-
10/17/2020	04:50	0.21	10:40	1.75	0.71	19:15	0.28	08:25	2.12	1.04	00:05	0.001	10:40	0.067	0.017	0.017	0.01
10/18/2020	04:10	0.11	11:55	2.01	0.67	05:50	0.31	15:30	2.28	1.07	00:35	0.001	11:55	0.086	0.016	0.016	0.03
10/19/2020	03:45	0.19	08:15	1.81	0.70	13:25	0.31	07:15	2.39	1.09	00:10	0.001	08:15	0.082	0.017	0.017	0.05
10/20/2020	04:00	0.20	23:00	1.45	0.71	01:20	0.18	08:55	1.99	0.91	05:00	0.000	09:00	0.063	0.014	0.014	-
10/21/2020	03:00	0.15	07:00	1.31	0.52	09:45	0.26	17:40	2.29	0.98	00:20	0.001	14:35	0.048	0.011	0.011	0.01
10/22/2020	00:45	0.21	09:10	2.04	0.61	04:30	0.31	15:45	2.42	0.94	00:45	0.001	09:10	0.086	0.013	0.013	-
10/23/2020	04:30	0.13	12:30	1.81	0.73	23:40	0.24	09:45	1.96	0.97	00:15	0.001	12:25	0.076	0.016	0.016	0.20
10/24/2020	01:15	0.26	09:00	1.89	0.80	04:40	0.26	21:20	2.01	1.07	01:35	0.001	08:55	0.069	0.019	0.019	0.02
10/25/2020	04:15	0.20	07:50	1.85	0.77	23:50	0.12	06:55	1.83	0.93	02:00	0.001	17:25	0.061	0.016	0.016	-
10/26/2020	02:05	0.05	07:50	1.44	0.65	04:40	0.20	09:00	2.21	0.93	01:45	0.000	07:55	0.052	0.014	0.014	-
10/27/2020	03:25	0.05	08:45	1.78	0.68	23:50	0.26	10:00	1.98	1.11	00:30	0.000	08:45	0.069	0.015	0.015	-
10/28/2020	01:30	0.20	18:55	1.56	0.70	00:10	0.29	16:50	1.97	1.01	01:30	0.001	07:00	0.062	0.015	0.015	-
10/29/2020	02:15	0.20	09:00	2.04	0.68	03:25	0.23	11:55	2.48	1.01	00:05	0.001	09:00	0.080	0.015	0.015	-
10/30/2020	00:25	0.12	22:40	1.10	0.45	07:10	0.28	13:30	2.70	1.02	00:25	0.000	13:30	0.051	0.008	0.008	0.10
10/31/2020	03:55	0.22	07:55	0.82	0.49	03:50	0.27	16:40	2.44	1.27	00:10	0.001	16:35	0.033	0.011	0.011	-
11/01/2020	00:50	0.11	14:20	1.54	0.60	22:30	0.30	12:00	2.40	1.01	00:50	0.000	15:55	0.047	0.014	0.014	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/02/2020	02:15	0.21	10:10	1.62	0.78	04:15	0.21	15:15	2.00	1.14	02:15	0.001	10:05	0.054	0.020	0.020	-
11/03/2020	03:20	0.27	10:05	1.97	0.88	20:15	0.10	21:30	2.01	1.13	00:35	0.001	10:05	0.077	0.024	0.024	0.83
11/04/2020	04:15	0.18	08:55	1.60	0.78	00:20	0.21	08:50	2.13	1.17	00:20	0.001	18:25	0.067	0.020	0.020	0.09
11/05/2020	06:45	0.37	14:45	1.48	0.98	06:20	0.28	01:45	2.16	1.32	04:45	0.002	20:00	0.059	0.029	0.029	0.34
11/06/2020	23:35	0.28	14:55	1.66	0.73	06:00	0.29	14:50	2.46	1.34	21:05	0.002	14:55	0.066	0.018	0.018	0.10
11/07/2020	05:10	0.12	12:30	1.70	0.77	23:55	0.28	14:25	2.50	1.35	03:55	0.001	12:35	0.074	0.021	0.021	0.07
11/08/2020	02:35	0.13	18:55	1.97	0.81	07:05	0.25	09:15	2.29	0.96	02:25	0.000	18:40	0.060	0.019	0.019	0.01
11/09/2020	04:45	0.22	06:55	2.94	0.74	05:35	0.23	19:45	2.27	0.89	04:40	0.001	19:45	0.066	0.014	0.014	0.04
11/10/2020	01:05	0.13	18:40	1.92	0.68	00:20	0.29	11:50	2.26	0.88	00:55	0.001	18:40	0.078	0.013	0.013	0.03
11/11/2020	23:25	0.34	09:40	1.18	0.62	23:45	0.29	18:00	2.35	0.88	23:25	0.001	09:40	0.055	0.010	0.010	-
11/12/2020	05:00	0.26	19:45	1.89	0.63	04:55	0.30	10:00	2.19	0.87	04:05	0.001	19:45	0.085	0.011	0.011	0.16
11/13/2020	14:05	0.35	20:20	1.82	0.70	23:25	0.27	06:55	2.16	0.90	02:50	0.002	20:20	0.093	0.013	0.013	0.38
11/14/2020	06:25	0.23	18:55	2.11	0.84	04:05	0.31	15:55	2.73	0.97	05:10	0.001	10:35	0.099	0.020	0.020	0.47
11/15/2020	06:30	0.28	09:10	1.77	1.05	02:25	0.14	20:20	1.93	1.14	06:25	0.001	09:10	0.070	0.030	0.030	0.19
11/16/2020	04:35	0.25	09:35	1.56	0.84	04:55	0.22	09:30	2.11	0.88	04:30	0.001	17:50	0.067	0.017	0.017	0.31
11/17/2020	00:00	0.29	09:45	1.83	0.96	05:05	0.21	21:45	2.69	1.01	00:00	0.002	12:45	0.065	0.023	0.023	0.20
11/18/2020	04:50	0.20	17:20	1.65	0.88	02:35	0.19	16:20	2.69	1.01	04:30	0.000	16:20	0.068	0.023	0.023	0.30
11/19/2020	02:20	0.21	11:25	1.38	0.67	23:35	0.25	17:55	2.40	1.21	01:35	0.001	13:10	0.070	0.017	0.017	0.50
11/20/2020	22:50	0.23	10:05	1.42	0.52	11:00	0.13	13:50	2.46	1.37	02:30	0.001	10:05	0.074	0.014	0.014	0.01
11/21/2020	06:15	0.26	09:25	1.47	0.60	02:40	0.24	12:25	2.54	1.63	02:40	0.001	09:25	0.087	0.019	0.019	-
11/22/2020	04:30	0.17	16:20	1.18	0.55	06:45	0.35	11:20	2.67	1.51	03:05	0.001	16:15	0.062	0.017	0.017	0.21
11/23/2020	03:10	0.24	19:20	1.22	0.58	22:30	0.27	09:05	2.43	1.40	01:30	0.001	19:20	0.059	0.016	0.016	0.14
11/24/2020	04:10	0.16	07:10	1.32	0.47	00:05	0.30	08:10	2.57	1.37	00:05	0.001	07:10	0.066	0.011	0.011	0.21
11/25/2020	04:50	0.21	09:25	2.10	0.63	04:55	0.45	09:20	2.78	1.17	01:35	0.001	09:25	0.087	0.014	0.014	0.05
11/26/2020	01:30	0.20	10:55	1.44	0.65	04:15	0.37	15:10	2.66	1.52	01:05	0.001	10:50	0.085	0.023	0.023	0.02
11/27/2020	00:40	0.12	10:20	1.24	0.62	04:55	0.54	10:25	2.67	1.78	00:40	0.001	10:20	0.071	0.022	0.022	-
11/28/2020	22:20	0.21	19:55	1.25	0.65	03:10	0.54	11:35	2.72	1.81	01:50	0.002	11:45	0.063	0.023	0.023	0.05
11/29/2020	01:50	0.19	11:55	1.37	0.74	05:25	0.49	12:40	2.91	1.77	00:25	0.002	11:10	0.082	0.030	0.030	-
11/30/2020	00:05	0.21	22:30	1.97	0.73	23:15	0.37	22:20	2.78	1.82	00:05	0.002	12:05	0.073	0.026	0.026	0.36
12/01/2020	02:45	0.19	20:05	1.46	0.76	03:50	0.34	11:40	2.25	1.52	02:40	0.001	19:15	0.063	0.025	0.025	-
12/02/2020	00:45	0.27	14:55	1.73	0.79	04:50	0.28	20:05	2.10	1.08	00:45	0.001	20:10	0.063	0.018	0.018	0.01
12/03/2020	02:25	0.31	10:10	1.43	0.78	23:10	0.38	18:25	2.05	1.49	00:50	0.003	10:10	0.060	0.023	0.023	-
12/04/2020	08:00	0.32	00:45	0.97	0.59	03:45	0.09	09:25	2.07	1.33	03:45	0.001	07:45	0.034	0.012	0.012	-
12/05/2020	03:30	0.29	01:25	0.96	0.48	03:30	0.33	09:40	2.34	1.39	03:05	0.001	10:20	0.032	0.011	0.011	0.03
12/06/2020	16:00	0.25	18:20	0.90	0.53	06:45	0.36	09:20	2.23	1.41	15:50	0.001	16:40	0.034	0.013	0.013	0.03
12/07/2020	23:55	0.10	01:50	0.92	0.58	16:20	0.29	18:35	2.27	1.14	23:55	0.000	06:05	0.031	0.011	0.011	-
12/08/2020	00:00	0.07	10:00	0.87	0.48	04:30	0.21	06:40	2.36	0.71	00:00	0.000	09:55	0.033	0.006	0.006	0.87
12/09/2020	04:45	0.22	13:15	0.93	0.47	01:40	0.24	13:55	2.19	0.83	01:10	0.001	13:50	0.025	0.006	0.006	0.17
12/10/2020	04:20	0.21	17:05	0.83	0.44	05:45	0.29	20:30	2.58	0.96	02:35	0.001	18:55	0.034	0.007	0.007	0.07
12/11/2020	23:55	0.21	09:15	0.94	0.45	08:50	0.26	11:50	2.08	0.65	00:45	0.001	09:15	0.029	0.005	0.005	0.02
12/12/2020	03:50	0.11	10:10	1.02	0.37	23:30	0.22	10:10	2.42	0.81	00:00	0.001	10:10	0.051	0.005	0.005	0.01
12/13/2020	05:25	0.15	10:30	0.93	0.49	00:00	0.26	11:10	2.36	0.73	00:00	0.001	11:10	0.036	0.006	0.006	0.24
12/14/2020	03:30	0.16	12:30	0.73	0.39	17:35	0.14	12:45	2.09	0.62	03:25	0.000	11:55	0.022	0.004	0.004	0.05
12/15/2020	03:05	0.10	16:45	0.79	0.48	03:50	0.19	09:15	1.89	0.72	03:05	0.000	09:10	0.022	0.006	0.006	0.58
12/16/2020	05:50	0.14	10:40	0.97	0.40	13:45	0.12	08:00	2.01	0.74	00:15	0.001	11:35	0.019	0.005	0.005	0.39
12/17/2020	03:30	0.12	08:15	0.77	0.36	14:20	0.23	15:40	2.43	0.78	00:50	0.000	08:15	0.022	0.004	0.004	0.08
12/18/2020	00:15	0.06	08:45	0.67	0.37	04:10	0.11	07:05	1.97	0.75	00:10	0.000	08:45	0.018	0.004	0.004	0.25
12/19/2020	04:00	0.12	16:55	1.07	0.45	01:05	0.23	22:30	2.39	0.87	00:40	0.001	18:00	0.034	0.007	0.007	0.37
12/20/2020	03:50	0.13	17:30	0.85	0.42	06:20	0.32	17:35	2.48	1.06	00:45	0.001	17:30	0.040	0.007	0.007	0.04
12/21/2020	00:15	0.33	11:30	0.87	0.57	23:10	0.45	16:20	2.75	1.66	00:10	0.002	11:30	0.043	0.017	0.017	1.07
12/22/2020	04:50	0.12	07:00	0.87	0.54	23:25	0.34	19:50	2.48	1.43	03:20	0.000	11:30	0.040	0.013	0.013	-
12/23/2020	03:15	0.19	06:55	0.79	0.52	02:20	0.32	19:50	2.49	1.39	00:25	0.001	19:55	0.031	0.012	0.012	-
12/24/2020	02:55	0.20	17:50	1.77	0.55	23:45	0.22	10:30	2.79	1.29	02:05	0.001	10:40	0.081	0.014	0.014	-
12/25/2020	03:40	0.21	14:55	1.24	0.53	05:25	0.12	16:00	2.34	0.91	00:45	0.001	14:55	0.058	0.009	0.009	0.49
12/26/2020	04:00	0.19	11:55	0.88	0.47	01:45	0.21	12:30	2.32	0.88	00:25	0.001	11:55	0.036	0.007	0.007	0.02
12/27/2020	02:20	0.28	11:10	0.91	0.42	16:15	0.43	09:45	2.18	0.92	00:30	0.002	11:10	0.030	0.006	0.006	0.13
12/28/2020	08:30	0.25	11:20	0.92	0.42	05:20	0.46	19:10	2.09	1.03	00:25	0.002	10:35	0.032	0.006	0.006	-
12/29/2020	02:10	0.33	21:30	0.97	0.45	03:45	0.27	08:45	1.78	0.99	03:40	0.001	21:30	0.029	0.006	0.006	0.14
12/30/2020	15:45	0.39	09:45	1.05	0.58	22:45	0.41	21:35	1.76	0.86	11:30	0.003	09:45	0.035	0.008	0.008	0.78
12/31/2020	10:10	0.37	15:55	0.77	0.54	02:20	0.44	09:55	2.54	0.86	10:10	0.003	11:35	0.018	0.007	0.007	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			3.650	30.65
Average	0.78	1.07	0.018	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A12_71043

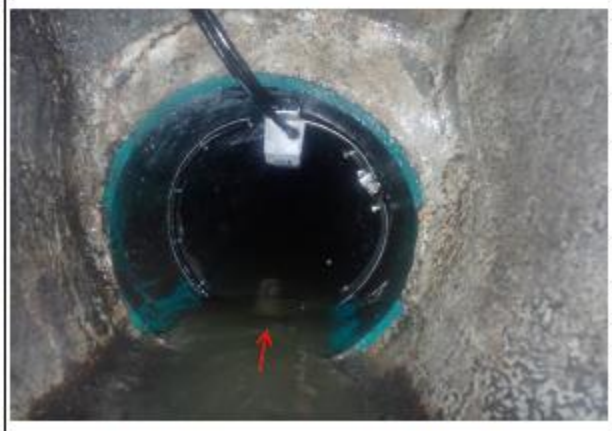
Site Address /Location:	510 4th St NE		
Site Access Details:	located on roadway	Latitude:	47.311779°
		Longitude:	-122.209121°

Monitor Series	Location Type
TRITON+	Temporary
Pipe Size (H x W)	Pipe Shape
11.50 x 12.00	Circular
Manhole #	System Characteristics
710-43	Residential
Access	Traffic
Drive	Light









ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519

Installation Information

Installation Date:	Installation Type:
Wednesday, September 23, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Downstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	Pipe Size (HxW)
9:33:00 AM	16.25x16.38
Depth of Flow (Wet DOF) (in)	
1.50	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
1.44	N/A
Silt (in)	Silt Type
0	

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9	Common Trench
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
PVC	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

AUB_A13_71085

Site Commentary

SITE INFORMATION

Pipe	Round (8 in H)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

This site experienced flow changes and backwater conditions during the monitoring period. An ADS field crew removed debris buildup from the sensors during a site visit on October 30th. A confirmation was taken which verified the sensors are working properly.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	2.05	0.93	0.045
Minimum	0.67	0.22	0.005
Maximum	5.60	1.57	0.129
Min Time	01/23/2021 4:00:00 AM	12/10/2020 4:00:00 AM	01/23/2021 4:00:00 AM
Max Time	12/10/2020 12:00:00 PM	02/11/2021 6:00:00 PM	10/10/2020 11:00:00 AM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

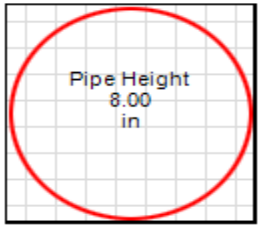
Percent Uptime	
DFINAL (in)	99.284
VFINAL (ft/s)	99.284
QFINAL (MGD - Total MG)	99.284

Hydrograph Report

AUB_A13_71085

Flow Monitor

AUB_A13_71085



Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A13_71085

Flow Monitor

AUB_A13_71085

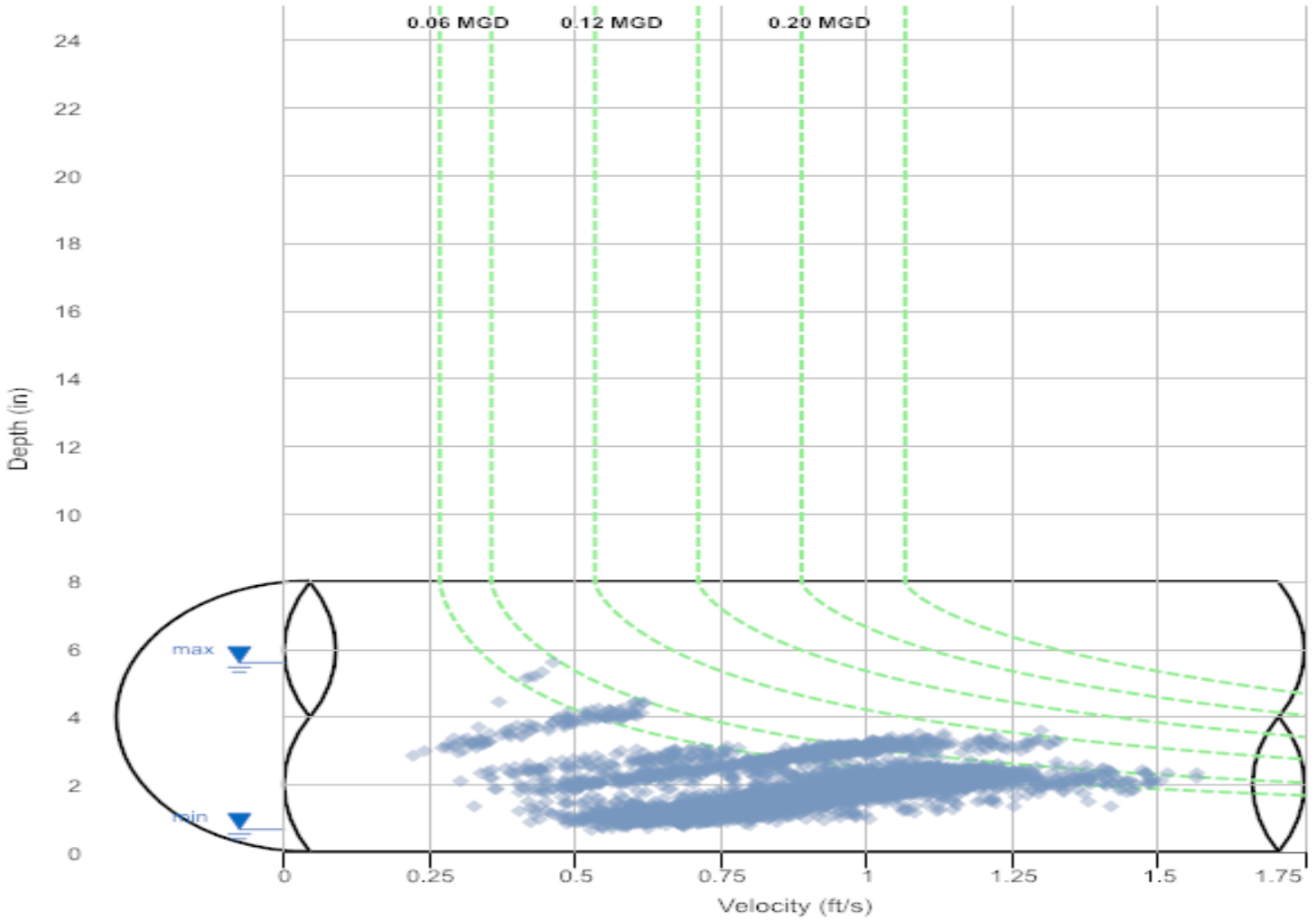
Pipe Height
8.00
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A13_71085Pipe: Round (8 in H), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	05:50	0.76	15:30	2.68	1.82	03:15	0.56	15:30	1.21	0.90	05:50	0.006	15:30	0.080	0.038	0.038	0.51
01/02/2021	04:45	0.68	11:55	2.79	1.88	05:00	0.53	17:30	1.28	0.97	04:40	0.005	17:30	0.088	0.044	0.044	1.69
01/03/2021	04:30	0.65	13:05	2.94	1.85	04:25	0.55	13:05	1.37	0.99	04:20	0.005	13:05	0.103	0.043	0.043	0.65
01/04/2021	03:00	0.86	18:30	2.73	1.86	02:50	0.61	18:30	1.29	1.01	02:50	0.008	18:30	0.087	0.043	0.043	0.48
01/05/2021	04:35	0.67	18:55	2.71	1.76	04:40	0.49	18:55	1.25	0.96	04:40	0.004	18:55	0.084	0.039	0.039	0.52
01/06/2021	02:55	0.82	21:25	2.57	1.79	03:00	0.57	19:10	1.21	0.95	02:55	0.007	14:00	0.073	0.038	0.038	0.22
01/07/2021	03:50	0.88	15:30	2.79	1.98	03:45	0.57	09:30	1.22	0.87	03:40	0.008	09:30	0.084	0.040	0.040	-
01/08/2021	04:00	1.39	17:25	2.94	2.10	03:55	0.35	19:05	1.15	0.79	03:55	0.009	21:45	0.077	0.039	0.039	0.22
01/09/2021	06:10	0.71	12:10	2.87	1.82	05:10	0.54	12:50	1.25	0.92	06:15	0.005	12:10	0.090	0.039	0.039	-
01/10/2021	04:35	0.73	16:20	2.78	1.84	04:45	0.55	14:40	1.20	0.91	04:30	0.006	16:20	0.082	0.039	0.039	0.07
01/11/2021	04:40	1.05	11:00	2.92	2.06	04:00	0.56	11:00	1.20	0.93	04:00	0.010	11:00	0.089	0.046	0.046	1.06
01/12/2021	04:20	1.22	18:25	2.99	2.09	04:25	0.66	18:30	1.24	0.96	04:15	0.015	18:25	0.095	0.047	0.047	2.10
01/13/2021	03:10	1.01	18:45	2.67	1.90	03:55	0.38	18:45	1.16	0.88	03:55	0.008	18:45	0.076	0.039	0.039	0.09
01/14/2021	04:00	1.08	10:20	3.02	1.95	04:00	0.58	10:20	1.34	0.93	03:55	0.011	10:20	0.105	0.042	0.042	0.01
01/15/2021	03:15	0.95	17:00	2.73	1.91	05:40	0.40	17:00	1.21	0.90	03:15	0.006	17:00	0.082	0.040	0.040	0.09
01/16/2021	06:20	0.91	11:25	2.96	1.94	05:10	0.44	11:30	1.29	0.93	05:10	0.007	11:25	0.096	0.043	0.043	-
01/17/2021	06:55	0.91	15:35	2.78	1.85	05:30	0.47	12:55	1.29	0.93	05:20	0.007	12:50	0.088	0.040	0.040	0.10
01/18/2021	04:55	0.49	14:10	2.58	1.81	04:55	0.24	09:35	1.35	0.92	04:55	0.001	09:35	0.081	0.038	0.038	-
01/19/2021	02:55	0.78	19:35	2.84	1.77	02:55	0.55	10:55	1.30	0.97	02:55	0.006	19:35	0.092	0.040	0.040	0.01
01/20/2021	04:15	0.72	20:05	2.71	1.77	04:10	0.55	20:05	1.30	0.97	04:10	0.006	20:05	0.087	0.039	0.039	-
01/21/2021	03:50	0.87	18:25	4.59	1.74	03:10	0.61	18:20	2.16	0.96	03:10	0.008	18:20	0.284	0.038	0.038	0.11
01/22/2021	03:55	0.77	10:25	2.62	1.73	01:55	0.54	18:45	1.27	0.99	03:20	0.007	18:30	0.081	0.038	0.038	-
01/23/2021	04:55	0.64	11:05	2.73	1.76	04:20	0.50	13:25	1.34	1.00	04:15	0.004	11:05	0.087	0.040	0.040	-
01/24/2021	06:05	0.90	11:20	2.73	1.83	05:55	0.62	10:50	1.31	1.03	05:55	0.009	10:50	0.087	0.043	0.043	0.16
01/25/2021	04:05	0.69	18:05	2.90	1.86	04:35	0.54	10:25	1.32	0.96	04:00	0.005	10:25	0.095	0.042	0.042	0.04
01/26/2021	03:55	1.11	08:45	3.07	1.88	04:00	0.46	08:45	1.32	0.90	03:55	0.009	08:45	0.105	0.039	0.039	-
01/27/2021	05:40	1.07	18:55	2.70	1.87	03:20	0.41	19:20	1.26	0.91	03:10	0.009	19:20	0.079	0.039	0.039	0.14
01/28/2021	03:45	1.01	17:45	2.72	1.87	04:05	0.50	19:15	1.27	0.94	02:35	0.010	17:50	0.081	0.040	0.040	0.24
01/29/2021	03:45	0.81	17:35	2.84	1.81	03:15	0.57	11:25	1.23	0.95	03:40	0.007	17:35	0.087	0.039	0.039	0.03
01/30/2021	02:50	0.83	11:10	2.78	1.88	06:10	0.39	16:20	1.29	0.96	02:45	0.008	11:10	0.088	0.042	0.042	0.07
01/31/2021	04:45	0.83	19:45	2.91	1.79	02:45	0.52	11:45	1.31	0.97	02:45	0.007	19:45	0.094	0.041	0.041	0.12
02/01/2021	04:40	0.78	18:55	2.97	1.82	04:35	0.57	18:55	1.39	1.04	04:40	0.006	18:55	0.106	0.043	0.043	0.82
02/02/2021	04:20	0.67	18:40	2.79	1.81	04:20	0.54	18:40	1.40	1.02	04:05	0.005	18:40	0.098	0.042	0.042	0.31
02/03/2021	04:05	0.82	18:05	2.83	1.73	03:45	0.51	19:55	1.43	1.06	03:35	0.007	18:05	0.095	0.041	0.041	0.06
02/04/2021	03:05	0.73	18:10	2.70	1.83	04:20	0.60	20:20	1.39	1.01	03:05	0.006	18:10	0.084	0.043	0.043	0.07
02/05/2021	04:20	0.93	17:10	2.70	1.80	04:20	0.49	20:20	1.28	0.93	04:20	0.007	18:40	0.075	0.038	0.038	0.01
02/06/2021	04:00	0.80	09:45	2.82	1.75	05:00	0.63	12:20	1.39	1.04	03:55	0.008	09:45	0.092	0.041	0.041	0.01
02/07/2021	04:10	0.54	13:45	2.77	1.73	05:40	0.58	12:05	1.34	1.03	04:10	0.005	12:05	0.091	0.041	0.041	-
02/08/2021	04:35	0.81	10:35	2.54	1.71	04:25	0.60	12:15	1.35	1.08	04:25	0.008	10:35	0.081	0.041	0.041	-
02/09/2021	04:45	0.70	18:05	2.55	1.69	04:00	0.63	18:05	1.32	1.06	04:45	0.006	18:05	0.081	0.040	0.040	-
02/10/2021	02:10	0.77	18:20	2.63	1.68	02:10	0.66	18:25	1.34	1.05	02:10	0.007	18:20	0.086	0.039	0.039	-
02/11/2021	04:15	0.73	17:25	2.61	1.67	04:15	0.61	17:25	1.75	1.11	04:15	0.006	17:25	0.112	0.041	0.041	-
02/12/2021	04:30	0.69	18:25	2.80	1.71	02:55	0.68	09:10	1.52	1.18	04:25	0.007	18:25	0.103	0.045	0.045	-
02/13/2021	04:45	0.75	16:45	2.78	1.74	04:05	0.62	16:45	1.50	1.19	04:40	0.007	16:45	0.104	0.048	0.048	0.08
02/14/2021	04:00	0.78	11:30	2.81	1.77	03:20	0.71	19:10	1.51	1.22	03:55	0.008	11:35	0.105	0.050	0.050	0.71
02/15/2021	04:25	1.00	10:50	2.85	1.88	23:55	0.98	13:10	1.58	1.29	04:25	0.017	10:50	0.111	0.054	0.054	0.78
02/16/2021	02:40	0.88	11:10	2.84	1.73	04:20	0.74	20:15	1.57	1.21	04:20	0.010	11:10	0.098	0.046	0.046	0.07
02/17/2021	03:55	0.65	18:50	2.58	1.71	03:40	0.61	20:15	1.34	1.03	03:55	0.005	18:50	0.083	0.039	0.039	-
02/18/2021	03:15	0.91	18:30	2.52	1.79	04:00	0.72	20:10	1.33	1.09	03:15	0.011	20:35	0.079	0.043	0.043	0.09
02/19/2021	04:10	0.77	12:30	2.41	1.69	03:05	0.61	19:10	1.35	1.05	04:10	0.008	19:10	0.076	0.039	0.039	0.17
02/20/2021	03:50	0.74	10:05	2.70	1.70	05:20	0.61	11:40	1.37	1.06	03:30	0.007	10:05	0.088	0.041	0.041	0.07
02/21/2021	04:00	0.77	19:10	2.68	1.81	06:05	0.61	09:25	1.36	1.05	04:00	0.008	19:10	0.090	0.044	0.044	0.42
02/22/2021	03:45	0.82	21:30	2.59	1.78	03:15	0.59	10:50	1.31	1.00	03:45	0.007	10:50	0.080	0.040	0.040	0.98
02/23/2021	04:35	0.84	18:10	2.63	1.82	04:30	0.48	18:10	1.29	1.00	04:30	0.006	18:10	0.083	0.041	0.041	0.27
02/24/2021	03:30	0.73	12:30	2.49	1.72	03:25	0.55	12:30	1.27	1.03	03:25	0.006	12:30	0.076	0.039	0.039	-
02/25/2021	02:05	0.80	19:10	2.47	1.68	02:55	0.57	19:45	1.45	1.05	02:00	0.007	19:10	0.085	0.039	0.039	0.18
02/26/2021	04:00	0.77	17:35	2.48	1.68	04:05	0.59	10:25	1.31	1.03	04:05	0.006	10:25	0.077	0.038	0.038	0.10
02/27/2021	05:25	0.79	20:10	2.92	1.82	03:05	0.56	11:15	1.45	1.01	05:25	0.007	11:15	0.092	0.042	0.042	0.02
02/28/2021	03:40	0.56	20:05	2.68	1.75	04:00	0.53	18:25	1.28	0.98	03:35	0.004	20:05	0.085	0.040	0.040	0.02
03/01/2021	03:30	0.76	19:25	2.57	1.68	04:45	0.49	20:05	1.32	0.98	02:45	0.006	20:10	0.080	0.037	0.037	-
03/02/2021	03:15	0.82	20:15	2.73	1.75	03:20	0.48	19:35	1.32	0.97	03:10	0.006	20:15	0.090	0.038	0.038	-
03/03/2021	01:45	0.85	19:25	2.72	1.79	01:45	0.43	09:35	1.28	0.99	01:45	0.005	19:25	0.086	0.040	0.040	-
03/04/2021	03:10	0.84	20:55	2.97	1.99	05:00	0.52	07:30	1.16	0.87	03:00	0.007	20:55	0.087	0.042	0.042	0.20
03/05/2021	04:10	1.04	11:50	2.66	1.80	03:20	0.43	11:00	1.22	0.89	03:20	0.008	12:20	0.077	0.036	0.036	0.05
03/06/2021	04:40	0.78	11:30	2.77	1.82	04:45	0.40	11:35	1.24	0.95	04:30	0.005	11:30	0.085	0.040	0.040	-
03/07/2021	04:15	0.94	11:55	2.89	1.87	04:30	0.47	12:00	1.31	0.95	04:25	0.007	11:55	0.096	0.042	0.042	0.04
03/08/2021	03:15	0.84	10:50	2.70	1.79	02:30	0.43	18:25	1.27	0.92	03:20	0.005	10:50	0.082	0.038	0.038	-
03/09/2021	04:05	0.89	18:25	3.09	1.85	04:00	0.48	18:25	1.34	0.94	03:25	0.007	18:25	0.108	0.041	0.041	0.01
03/10/2021	04:05	0.96	20:15	2.77	1.89	03:45	0.40	20:15	1.29	0.94	03:20	0.007	20:15	0.090	0.041	0.041	-
03/11/2021	03:35	0.89	18:30	2.80	1.91	03:20	0.45	21:00	1.42	0.96	03:25	0.006	21:00	0.086	0.043	0.043	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	04:20	0.98	12:25	2.76	1.93	04:05	0.52	17:00	1.20	0.91	04:05	0.008	16:55	0.080	0.041	0.041	-
03/13/2021	05:55	0.86	10:40	2.80	1.89	04:05	0.49	10:40	1.22	0.90	06:00	0.006	10:40	0.086	0.040	0.040	-
03/14/2021	06:20	0.98	11:15	2.84	1.96	05:45	0.45	17:05	1.18	0.89	03:10	0.008	11:15	0.082	0.042	0.042	0.30
03/15/2021	02:05	1.06	09:45	2.70	1.91	03:20	0.38	20:15	1.22	0.88	03:20	0.007	09:45	0.079	0.039	0.039	-
03/16/2021	03:10	0.82	19:10	2.94	1.88	03:15	0.46	15:10	1.22	0.90	03:05	0.006	19:10	0.091	0.039	0.039	-
03/17/2021	02:30	0.88	09:15	2.73	1.87	02:20	0.45	17:25	1.17	0.88	02:20	0.007	09:15	0.078	0.038	0.038	-
03/18/2021	03:20	0.84	20:50	2.69	1.86	02:55	0.47	16:30	1.16	0.85	02:55	0.006	16:30	0.076	0.037	0.037	0.11
03/19/2021	03:35	0.92	14:00	2.87	1.96	03:35	0.52	14:00	1.21	0.87	03:30	0.008	14:00	0.088	0.040	0.040	0.03
03/20/2021	05:45	1.20	16:35	2.75	1.94	04:10	0.29	10:05	1.23	0.89	03:10	0.007	10:05	0.083	0.041	0.041	0.17
03/21/2021	04:10	0.84	12:35	2.99	1.93	04:15	0.44	12:35	1.24	0.90	03:55	0.006	12:35	0.096	0.042	0.042	0.07
03/22/2021	02:25	0.90	19:25	2.82	1.90	00:15	0.48	10:55	1.21	0.90	01:40	0.007	19:25	0.086	0.040	0.040	0.11
03/23/2021	02:30	0.93	19:50	2.91	1.94	03:00	0.38	19:50	1.25	0.90	03:05	0.006	19:50	0.093	0.041	0.041	-
03/24/2021	03:20	1.13	19:20	2.81	1.93	03:15	0.53	19:20	1.20	0.90	01:50	0.011	19:20	0.085	0.040	0.040	0.34
03/25/2021	03:00	0.94	09:10	2.73	1.90	03:05	0.56	16:50	1.22	0.90	03:00	0.008	19:40	0.082	0.039	0.039	0.27
03/26/2021	01:55	0.93	10:00	2.59	1.85	01:55	0.51	17:10	1.28	0.89	00:25	0.008	18:30	0.075	0.038	0.038	-
03/27/2021	03:00	0.86	11:20	2.82	1.94	03:05	0.67	12:00	1.34	1.01	02:55	0.009	11:20	0.092	0.046	0.046	-
03/28/2021	03:35	1.00	11:25	2.89	1.96	03:30	0.50	13:40	1.52	1.04	03:30	0.008	13:40	0.110	0.049	0.049	0.37
03/29/2021	02:10	0.81	18:05	2.79	1.84	02:20	0.61	07:25	1.57	1.24	02:15	0.007	18:05	0.110	0.053	0.053	-
03/30/2021	03:30	1.14	17:20	2.83	2.03	02:30	0.64	20:25	1.48	1.03	03:00	0.013	17:20	0.094	0.049	0.049	-
03/31/2021	03:10	1.04	19:30	2.93	2.00	03:15	0.43	19:30	1.27	0.88	03:15	0.007	19:30	0.095	0.042	0.042	-
04/01/2021	03:05	0.92	20:30	2.79	1.94	03:05	0.41	20:30	1.30	0.89	02:40	0.006	20:30	0.091	0.041	0.041	-
04/02/2021	02:20	0.97	13:05	2.61	1.85	03:15	0.47	18:00	1.23	0.91	02:10	0.008	18:00	0.076	0.039	0.039	-
04/03/2021	02:10	0.99	08:35	2.76	1.87	01:10	0.51	08:35	1.33	0.95	03:30	0.008	08:35	0.092	0.041	0.041	-
04/04/2021	04:05	0.96	20:45	2.67	1.84	04:05	0.54	20:45	1.36	0.93	04:05	0.008	20:45	0.089	0.040	0.040	-
04/05/2021	03:15	0.90	19:25	2.94	1.85	03:20	0.47	19:25	1.35	0.94	03:10	0.007	19:25	0.101	0.040	0.040	-
04/06/2021	02:45	0.92	09:00	2.69	1.77	01:05	0.47	09:00	1.25	0.89	01:05	0.008	09:00	0.083	0.036	0.036	-
04/07/2021	02:30	0.90	19:25	2.85	1.81	02:55	0.48	19:25	1.33	0.91	02:25	0.007	19:25	0.096	0.038	0.038	0.22
04/08/2021	03:00	0.89	18:15	2.82	1.79	03:00	0.48	18:15	1.33	0.92	02:55	0.007	18:15	0.094	0.037	0.037	-
04/09/2021	02:00	0.88	13:40	2.54	1.79	02:00	0.50	18:40	1.19	0.90	01:55	0.007	13:40	0.073	0.036	0.036	0.03
04/10/2021	02:25	0.95	08:30	2.81	1.83	02:25	0.42	15:10	1.24	0.91	02:25	0.006	08:30	0.086	0.039	0.039	0.02
04/11/2021	03:40	0.86	10:05	2.95	1.83	03:40	0.46	10:05	1.36	0.93	03:30	0.006	10:05	0.103	0.040	0.040	-
04/12/2021	01:55	0.88	09:40	3.11	1.83	02:00	0.48	09:40	1.22	0.92	01:40	0.007	09:40	0.099	0.039	0.039	-
04/13/2021	02:25	0.94	20:10	2.95	1.85	02:25	0.49	20:15	1.26	0.90	02:25	0.007	20:10	0.094	0.038	0.038	-
04/14/2021	03:00	0.94	19:50	2.72	1.89	02:45	0.45	11:30	1.23	0.91	02:40	0.007	11:30	0.082	0.040	0.040	-
09/23/2020	23:20	2.04	12:35	3.49	2.84	23:20	0.64	12:30	1.27	1.02	23:20	0.029	12:35	0.120	0.075	0.039	-
09/24/2020	03:25	1.61	19:40	3.51	2.71	03:15	0.37	08:55	1.14	0.84	03:15	0.012	08:55	0.104	0.059	0.059	-
09/25/2020	02:55	1.86	13:55	4.30	2.74	03:10	0.33	13:55	1.35	0.82	03:10	0.013	13:55	0.167	0.059	0.059	-
09/26/2020	03:00	1.79	09:40	3.66	2.77	03:05	0.37	09:05	1.09	0.83	03:00	0.014	09:40	0.110	0.060	0.060	-
09/27/2020	04:35	1.89	09:10	3.79	2.83	03:40	0.40	09:55	1.18	0.85	04:35	0.018	09:15	0.123	0.064	0.064	-
09/28/2020	03:05	2.02	19:30	3.66	2.84	01:55	0.49	19:30	1.18	0.87	01:55	0.022	19:30	0.119	0.065	0.065	-
09/29/2020	03:20	1.79	18:30	3.75	2.73	02:20	0.39	18:30	1.21	0.84	02:20	0.015	18:30	0.126	0.060	0.060	-
09/30/2020	02:40	1.70	18:45	3.54	2.71	02:40	0.36	18:45	1.12	0.81	02:40	0.013	18:45	0.108	0.058	0.058	-
10/01/2020	04:00	1.88	18:55	3.62	2.73	02:30	0.34	18:50	1.24	0.84	02:35	0.015	18:50	0.123	0.060	0.060	-
10/02/2020	01:15	1.96	12:15	3.43	2.80	01:15	0.56	12:15	1.17	0.88	01:15	0.024	12:15	0.108	0.063	0.063	-
10/03/2020	05:15	2.12	10:00	3.30	2.76	02:35	0.39	13:30	1.18	0.86	02:35	0.022	17:00	0.104	0.061	0.061	0.01
10/04/2020	04:05	2.06	18:45	3.71	2.84	04:05	0.37	10:50	1.21	0.88	04:05	0.017	18:45	0.122	0.066	0.066	0.01
10/05/2020	02:50	2.02	09:30	3.60	2.76	02:55	0.49	09:30	1.16	0.88	02:55	0.022	09:30	0.114	0.063	0.063	-
10/06/2020	02:05	1.81	19:00	3.69	2.72	01:55	0.31	19:00	1.18	0.83	02:10	0.012	19:00	0.119	0.060	0.060	-
10/07/2020	02:50	1.82	11:35	3.54	2.66	03:10	0.27	10:55	1.10	0.83	03:10	0.011	11:35	0.106	0.057	0.057	-
10/08/2020	01:40	1.73	19:15	3.40	2.62	03:30	0.34	08:45	1.07	0.78	01:30	0.014	19:15	0.096	0.053	0.053	-
10/09/2020	00:50	2.02	14:45	3.68	2.92	00:30	0.40	17:05	1.40	0.98	00:30	0.019	17:05	0.141	0.076	0.076	0.64
10/10/2020	01:05	2.26	11:55	3.92	3.02	01:00	0.68	11:30	1.40	1.04	01:00	0.036	11:50	0.152	0.083	0.083	1.04
10/11/2020	03:25	1.98	10:50	3.72	2.85	03:55	0.45	08:45	1.41	1.00	03:25	0.021	08:45	0.135	0.076	0.076	0.53
10/12/2020	00:55	1.95	20:15	3.63	2.82	02:20	0.48	13:15	1.48	1.04	01:10	0.023	15:20	0.146	0.077	0.077	-
10/13/2020	01:15	1.90	17:00	3.94	2.78	02:35	0.63	17:05	1.49	1.02	01:15	0.029	16:35	0.147	0.073	0.073	0.61
10/14/2020	01:40	1.84	19:15	3.51	2.77	01:25	0.41	19:10	1.13	0.82	01:20	0.017	19:15	0.108	0.059	0.059	-
10/15/2020	03:20	1.83	19:05	3.71	2.79	03:20	0.37	19:05	1.18	0.84	03:20	0.014	19:05	0.121	0.062	0.062	-
10/16/2020	02:55	1.84	10:15	3.44	2.70	02:50	0.40	10:15	1.10	0.80	02:50	0.016	10:15	0.101	0.056	0.056	-
10/17/2020	02:45	1.94	10:40	3.51	2.76	02:40	0.48	09:40	1.22	0.88	02:40	0.020	09:40	0.116	0.064	0.064	0.01
10/18/2020	03:15	1.72	11:50	3.77	2.78	03:10	0.40	11:55	1.26	0.86	03:10	0.014	11:55	0.132	0.064	0.064	0.03
10/19/2020	03:40	1.73	19:00	3.67	2.73	03:35	0.41	19:00	1.22	0.85	03:35	0.015	19:00	0.123	0.061	0.061	0.05
10/20/2020	03:40	1.70	18:00	3.64	2.79	02:45	0.40	18:00	1.11	0.83	02:45	0.014	18:00	0.110	0.061	0.061	-
10/21/2020	02:30	1.75	15:20	3.50	2.72	02:00	0.44	20:10	1.08	0.81	02:00	0.016	15:20	0.100	0.057	0.057	0.01
10/22/2020	03:15	1.89	19:55	3.55	2.76	01:25	0.41	19:55	1.18	0.86	01:25	0.017	19:55	0.114	0.062	0.062	-
10/23/2020	02:25	1.74	20:35	3.52	2.74	03:55	0.37	20:35	1.11	0.82	03:50	0.014	20:35	0.106	0.059	0.059	0.20
10/24/2020	03:35	1.88	13:10	3.73	2.80	04:25	0.45	13:10	1.22	0.85	03:35	0.018	13:10	0.126	0.063	0.063	0.02
10/25/2020	03:10	1.81	14:35	3.14	2.58	05:40	0.37	17:05	0.87	0.63	03:15	0.016	09:30	0.070	0.041	0.041	-
10/26/2020	02:00	2.17	11:25	3.58	2.75	01:50	0.25	20:15	0.89	0.61	01:50	0.013	11:25	0.086	0.043	0.043	-
10/27/2020	02:15	2.28	09:35	3.34	2.70	02:20	0.24	09:35	0.85	0.59	02:20	0.013	09:35	0.076	0.040	0.040	-
10/28/2020	02:50	2.17	05:45	3.32	2.62	02:45	0.24	09:15	0.86	0.58	02:45	0.012	20:00	0.075	0.038	0.038	-
10/29/2020	03:10	1.95	20:40	3.19	2.73	04:00	0.19	11:30	0.80	0.58	03:10	0.009	09:00	0.063	0.040	0.040	-
10/30/2020	23:20	1.14	09:45	3.18	2.26	03:15	0.31	19:55	1.28	0.82	23:20	0.014	09:45	0.091	0.041	0.041	0.10
10/31/2020	04:00	0.69	09:45	2.81	1.76	04:05	0.51	10:20	1.32	0.95	03:55	0.005	11:30	0.092	0.039	0.039	-
11/01/2020	04:45	0.55	09:55	2.88	1.90	04:00	0.45	11:35	1.23	0.92	03:50	0.004	10:40	0.087	0.042	0.042	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/02/2020	03:45	1.00	20:20	2.88	1.93	04:00	0.52	20:25	1.19	0.90	03:15	0.009	20:25	0.087	0.041	0.041	-
11/03/2020	03:40	0.87	10:30	2.90	1.92	04:20	0.35	10:30	1.25	0.89	03:40	0.005	10:30	0.093	0.041	0.041	0.83
11/04/2020	02:45	1.14	09:10	2.81	1.88	02:30	0.60	19:55	1.24	0.93	02:25	0.012	09:10	0.086	0.040	0.040	0.09
11/05/2020	03:35	0.74	12:30	2.81	1.77	02:30	0.54	12:30	1.32	0.93	03:30	0.006	12:30	0.093	0.037	0.037	0.34
11/06/2020	01:45	0.97	19:10	2.72	1.84	01:45	0.60	19:15	1.24	0.95	01:45	0.009	19:10	0.083	0.039	0.039	0.10
11/07/2020	03:00	1.03	11:20	2.95	1.85	03:05	0.51	08:50	1.44	1.03	02:55	0.009	11:20	0.103	0.044	0.044	0.07
11/08/2020	04:00	0.84	13:55	2.89	1.91	05:15	0.35	17:45	1.37	1.03	05:00	0.007	13:55	0.100	0.046	0.046	0.01
11/09/2020	03:50	0.72	11:30	2.80	1.87	03:35	0.47	11:30	1.22	0.91	03:35	0.005	11:30	0.086	0.040	0.040	0.04
11/10/2020	03:35	0.75	09:05	2.61	1.86	03:40	0.50	16:55	1.49	0.95	03:35	0.005	16:55	0.081	0.041	0.041	0.03
11/11/2020	04:10	0.83	20:25	2.79	1.88	04:10	0.52	10:50	1.21	0.88	03:10	0.007	20:25	0.077	0.038	0.038	-
11/12/2020	03:50	1.17	10:05	2.95	2.02	03:50	0.34	19:05	1.63	0.85	03:50	0.007	10:05	0.082	0.040	0.040	0.16
11/13/2020	04:05	0.90	19:00	2.56	1.80	01:35	0.58	18:55	1.28	0.97	04:10	0.008	19:00	0.080	0.039	0.039	0.38
11/14/2020	04:20	0.78	11:20	2.74	1.82	05:05	0.54	17:25	1.30	0.96	04:15	0.006	17:25	0.084	0.041	0.041	0.47
11/15/2020	05:20	0.73	11:05	2.70	1.85	04:00	0.55	11:05	1.34	1.00	04:40	0.006	11:05	0.089	0.044	0.044	0.19
11/16/2020	04:45	0.81	15:45	2.58	1.78	04:45	0.58	12:55	1.26	0.97	04:35	0.007	15:45	0.076	0.039	0.039	0.31
11/17/2020	03:15	0.76	19:05	2.63	1.82	02:50	0.56	16:00	1.32	1.00	02:55	0.006	16:00	0.084	0.042	0.042	0.20
11/18/2020	03:35	0.87	21:00	2.62	1.80	02:15	0.59	17:25	1.35	0.98	02:15	0.008	17:25	0.084	0.041	0.041	0.30
11/19/2020	02:30	1.23	12:35	2.73	1.90	02:30	0.74	21:20	1.26	1.00	02:30	0.016	12:35	0.084	0.043	0.043	0.50
11/20/2020	04:30	0.87	19:40	2.82	1.77	04:25	0.59	19:40	1.35	1.00	04:25	0.008	19:40	0.096	0.040	0.040	0.01
11/21/2020	05:35	0.84	12:45	2.88	1.81	07:35	0.53	10:30	1.42	1.03	03:35	0.008	10:30	0.102	0.043	0.043	-
11/22/2020	05:45	0.69	11:55	2.87	1.87	02:45	0.54	11:55	1.36	0.99	05:45	0.005	11:55	0.099	0.043	0.043	0.21
11/23/2020	04:25	0.68	15:25	2.60	1.82	04:25	0.51	12:55	1.28	0.94	04:20	0.005	15:25	0.075	0.040	0.040	0.14
11/24/2020	04:50	0.67	17:00	2.76	1.81	04:50	0.51	17:50	1.25	0.98	04:40	0.005	17:00	0.085	0.041	0.041	0.21
11/25/2020	03:35	0.71	18:30	2.65	1.82	03:35	0.61	18:30	1.40	1.01	03:35	0.006	18:30	0.091	0.042	0.042	0.05
11/26/2020	05:05	0.84	11:05	2.83	1.82	04:35	0.69	11:10	1.47	1.05	04:25	0.009	11:10	0.105	0.045	0.045	0.02
11/27/2020	04:20	0.63	18:20	2.58	1.74	04:05	0.60	11:30	1.28	1.00	04:05	0.005	18:20	0.078	0.040	0.040	-
11/28/2020	04:45	0.84	12:10	2.63	1.79	02:25	0.64	12:10	1.28	1.00	04:40	0.008	12:10	0.083	0.041	0.041	0.05
11/29/2020	05:00	0.68	14:20	2.79	1.86	05:00	0.50	14:20	1.35	1.02	05:00	0.005	14:20	0.095	0.045	0.045	-
11/30/2020	02:45	0.89	13:35	2.66	1.83	02:40	0.72	13:35	1.30	1.02	02:35	0.010	13:35	0.086	0.042	0.042	0.36
12/01/2020	03:20	0.88	19:10	2.61	1.77	03:05	0.59	19:10	1.28	0.99	03:05	0.008	19:10	0.082	0.039	0.039	-
12/02/2020	04:15	0.73	14:55	2.82	1.74	04:15	0.63	14:55	1.34	1.01	04:20	0.006	14:55	0.095	0.039	0.039	0.01
12/03/2020	04:15	0.72	17:35	2.53	1.77	03:40	0.62	17:35	1.31	1.02	03:40	0.006	17:35	0.080	0.041	0.041	-
12/04/2020	02:50	0.74	11:35	2.62	1.79	04:25	0.53	11:35	1.28	1.00	02:45	0.007	11:35	0.082	0.040	0.040	-
12/05/2020	04:40	0.65	21:40	4.43	2.01	23:40	0.38	11:40	1.32	0.92	04:50	0.004	11:40	0.084	0.041	0.041	0.03
12/06/2020	04:35	2.96	14:35	4.82	3.85	05:05	0.28	14:40	0.71	0.49	02:15	0.022	14:40	0.101	0.054	0.054	0.03
12/07/2020	02:30	2.97	18:35	4.61	3.75	02:30	0.19	18:35	0.75	0.49	02:30	0.014	18:35	0.101	0.053	0.053	-
12/08/2020	03:55	2.93	19:15	4.53	3.77	03:15	0.20	13:05	0.63	0.45	03:15	0.015	13:05	0.079	0.048	0.048	0.87
12/09/2020	04:30	2.88	10:30	4.53	3.72	04:40	0.27	10:30	0.69	0.46	04:40	0.020	10:30	0.091	0.048	0.048	0.17
12/10/2020	23:30	1.40	13:55	6.19	3.30	04:35	0.20	18:55	1.30	0.66	04:35	0.014	11:55	0.097	0.048	0.048	0.07
12/11/2020	03:35	0.70	19:05	2.59	1.73	03:35	0.57	09:25	1.26	0.97	03:35	0.006	09:25	0.076	0.038	0.038	0.02
12/12/2020	05:10	0.92	13:15	2.97	1.95	05:00	0.44	13:15	1.20	0.89	05:10	0.006	13:15	0.091	0.041	0.041	0.01
12/13/2020	04:55	0.96	10:40	2.90	2.03	04:50	0.35	10:40	1.21	0.89	04:50	0.005	10:40	0.089	0.044	0.044	0.24
12/14/2020	02:30	1.31	18:25	2.84	2.09	02:35	0.54	12:55	1.14	0.87	02:30	0.013	12:55	0.079	0.043	0.043	0.05
12/15/2020	03:10	1.08	08:55	2.80	1.97	03:15	0.43	14:25	1.28	0.92	03:10	0.008	10:35	0.084	0.043	0.043	0.58
12/16/2020	05:35	1.05	18:25	2.66	1.88	04:40	0.36	11:35	1.30	0.97	03:25	0.008	11:35	0.082	0.041	0.041	0.39
12/17/2020	04:00	0.77	11:15	2.64	1.81	03:05	0.39	08:00	1.19	0.95	03:05	0.005	11:15	0.075	0.039	0.039	0.08
12/18/2020	03:50	0.74	18:05	2.80	1.81	03:50	0.56	18:05	1.26	0.92	03:50	0.006	18:05	0.088	0.038	0.038	0.25
12/19/2020	03:35	0.91	09:55	2.77	1.93	03:35	0.62	09:10	1.22	0.96	02:40	0.009	09:55	0.084	0.043	0.043	0.37
12/20/2020	04:50	0.70	14:15	2.78	1.88	04:45	0.56	19:55	1.25	0.96	04:30	0.006	14:15	0.086	0.042	0.042	0.04
12/21/2020	04:10	0.86	19:30	2.79	1.93	04:00	0.65	18:05	1.26	0.98	04:00	0.009	19:30	0.085	0.044	0.044	1.07
12/22/2020	04:05	0.88	18:40	2.61	1.84	04:35	0.41	20:35	1.18	0.89	04:30	0.006	20:30	0.074	0.038	0.038	-
12/23/2020	04:25	0.69	13:25	2.72	1.84	04:05	0.57	11:05	1.15	0.90	04:25	0.006	13:25	0.077	0.038	0.038	-
12/24/2020	05:25	0.99	11:35	2.94	1.95	04:55	0.55	18:20	1.46	0.96	04:25	0.009	11:35	0.095	0.044	0.044	-
12/25/2020	04:55	0.71	11:20	2.64	1.84	07:35	0.52	00:10	1.23	0.93	04:55	0.005	12:00	0.076	0.039	0.039	0.49
12/26/2020	06:45	0.80	14:55	2.67	1.78	04:35	0.50	12:15	1.19	0.90	04:35	0.006	12:15	0.077	0.037	0.037	0.02
12/27/2020	02:50	0.95	10:15	2.97	1.88	02:55	0.61	13:10	1.31	0.93	02:50	0.009	10:15	0.097	0.041	0.041	0.13
12/28/2020	03:45	0.77	13:00	2.72	1.81	04:40	0.57	18:40	1.27	0.97	03:45	0.006	13:00	0.085	0.040	0.040	-
12/29/2020	03:45	0.77	12:40	2.74	1.76	03:45	0.54	12:40	1.22	0.92	03:45	0.006	12:40	0.083	0.037	0.037	0.14
12/30/2020	03:10	0.99	12:35	2.64	1.88	03:05	0.56	23:30	1.67	1.12	03:05	0.009	20:25	0.101	0.048	0.048	0.78
12/31/2020	04:50	0.97	17:55	2.79	1.83	07:10	0.67	00:50	1.49	1.04	04:50	0.013	18:30	0.086	0.041	0.041	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			9.089	30.65
Average	2.05	0.93	0.045	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A13_71085

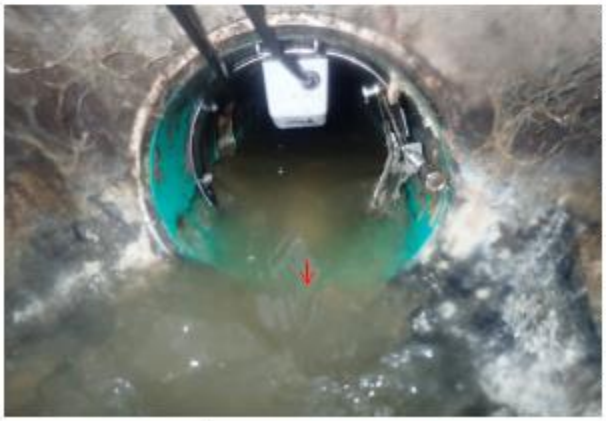
Site Address /Location:	Adjacent 1546 2nd St NE		
Site Access Details:	Inbetween Pike St NE and RSt NE	Latitude:	47.310005
		Longitude:	-122.209035

Monitor Series	Location Type
TRITON+	Temporary
Pipe Size (H x W)	Pipe Shape
8.00 x 8.00	Circular
Manhole #	System Characteristics
A13 710-85	Residential
Access	Traffic
Drive	Light









ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519

Installation Information

Installation Date:	Installation Type:
Wednesday, September 23, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	Pipe Size (HxW)
11:24:00 AM	16.25x16.38
Depth of Flow (Wet DOF) (in)	
2.50	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
0.97	N/A
Silt (in)	Silt Type
0	

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9	Common Trench
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
PVC	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

AUB_A14_710149

Site Commentary

SITE INFORMATION

Pipe	Elliptical (18 in H x 18 in W)
Silt	0.38 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

This site experienced some backwater conditions during the monitoring period.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	4.68	0.79	0.182
Minimum	2.63	0.40	0.068
Maximum	9.24	1.42	0.357
Min Time	11/08/2020 6:00:00 AM	01/03/2021 3:00:00 AM	11/02/2020 3:00:00 AM
Max Time	01/02/2021 9:00:00 PM	11/23/2020 8:00:00 AM	10/09/2020 11:00:00 PM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

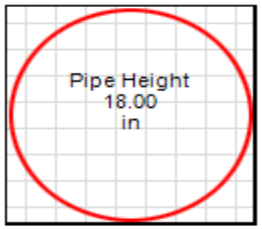
Percent Uptime	
DFINAL (in)	98.74
VFINAL (ft/s)	98.74
QFINAL (MGD - Total MG)	98.74

Hydrograph Report

AUB_A14_710149

Flow Monitor

AUB_A14_710149



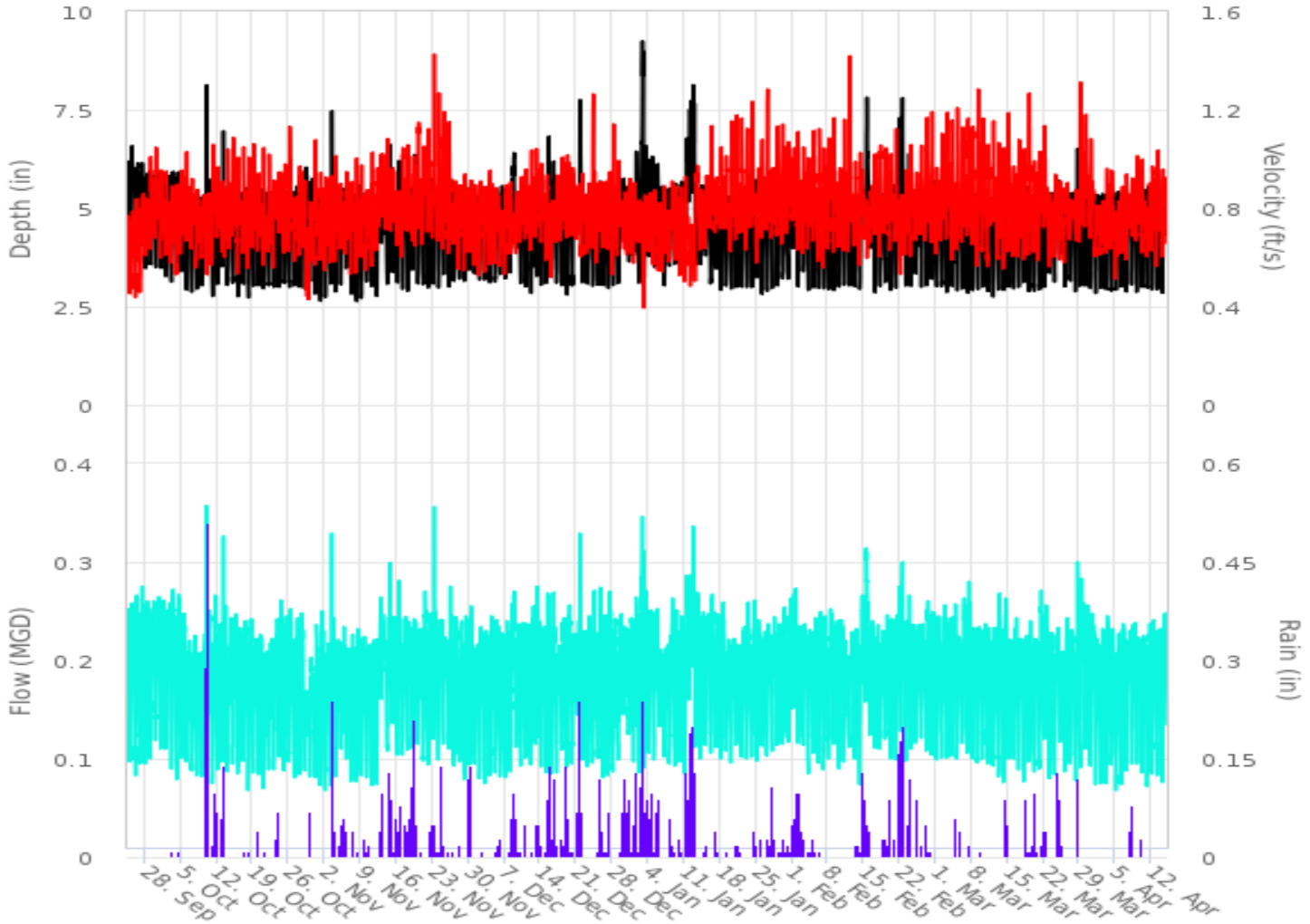
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

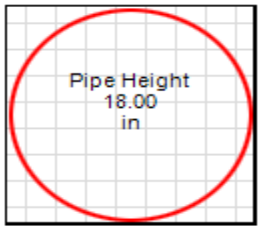
206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A14_710149

Flow Monitor

AUB_A14_710149

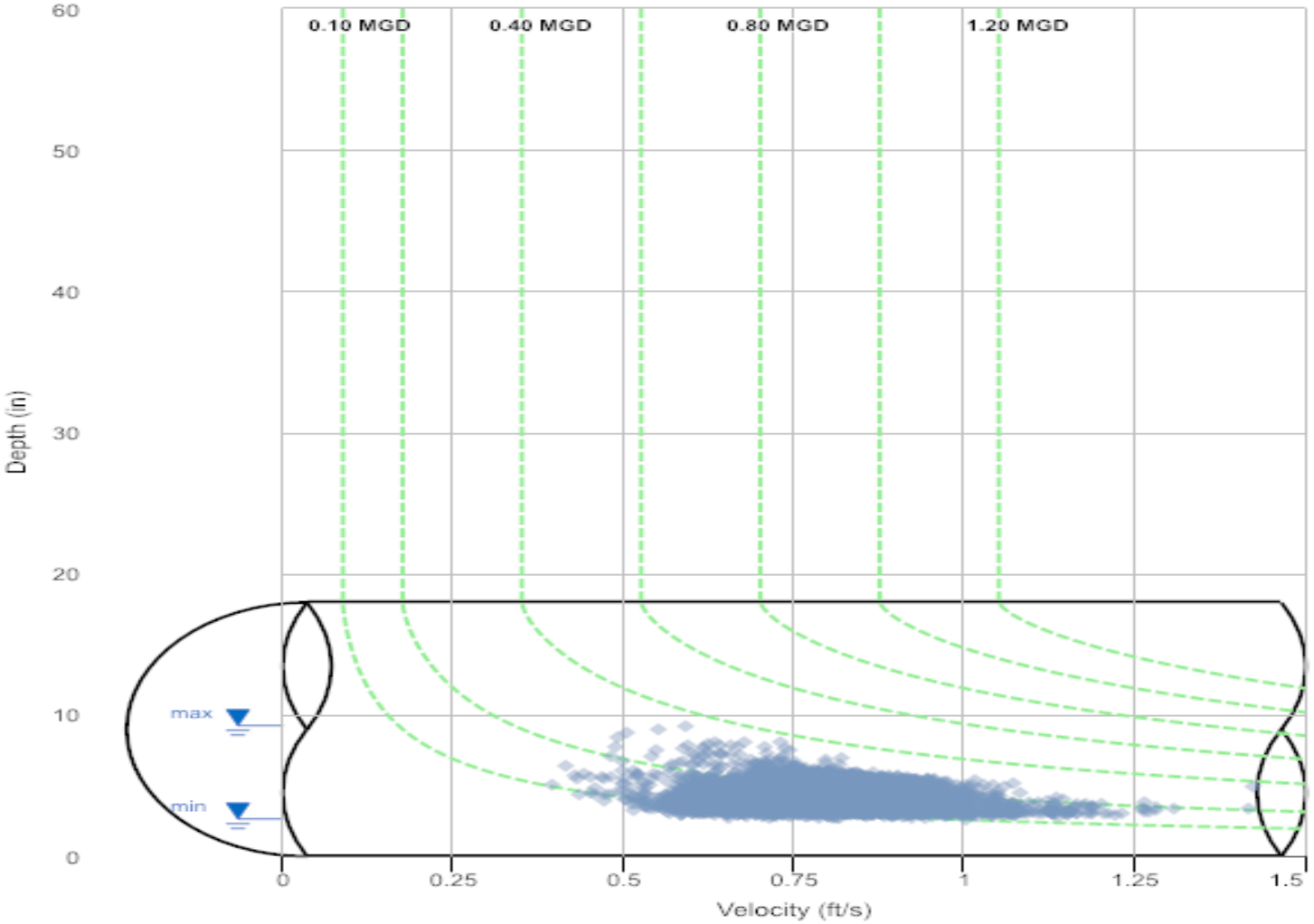


Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A14_710149Pipe: Elliptical (18 in H x 18 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	02:50	3.70	15:45	7.42	4.86	01:00	0.51	09:45	1.00	0.75	03:30	0.088	15:25	0.302	0.183	0.183	0.51
01/02/2021	03:50	2.94	21:15	9.88	5.58	22:05	0.43	07:05	0.95	0.72	04:45	0.077	21:20	0.385	0.209	0.209	1.69
01/03/2021	06:35	2.95	00:05	9.37	5.36	03:10	0.36	08:50	0.94	0.70	06:45	0.079	00:05	0.327	0.194	0.194	0.65
01/04/2021	03:20	3.67	19:15	6.69	5.12	03:30	0.52	10:10	0.97	0.73	03:30	0.089	11:55	0.280	0.190	0.190	0.48
01/05/2021	04:25	3.14	21:00	6.58	4.93	00:15	0.51	06:15	0.97	0.71	02:50	0.089	19:50	0.289	0.177	0.177	0.52
01/06/2021	05:55	3.96	19:55	5.69	4.98	18:50	0.49	07:20	0.86	0.69	04:00	0.118	11:40	0.233	0.174	0.174	0.22
01/07/2021	04:00	2.87	19:55	5.63	4.69	08:15	0.54	05:30	1.01	0.73	03:10	0.087	21:00	0.248	0.168	0.168	-
01/08/2021	04:05	3.36	17:35	5.73	4.87	01:50	0.55	16:45	0.98	0.76	02:45	0.091	17:05	0.288	0.188	0.188	0.22
01/09/2021	04:35	3.28	13:30	5.67	4.78	04:20	0.50	08:30	0.99	0.74	04:30	0.076	12:10	0.268	0.178	0.178	-
01/10/2021	05:40	3.46	14:25	5.77	4.84	02:30	0.46	17:55	0.96	0.74	03:45	0.085	17:55	0.270	0.181	0.181	0.07
01/11/2021	04:05	3.07	13:05	6.88	5.37	01:15	0.48	07:20	0.99	0.70	04:10	0.075	13:20	0.305	0.200	0.200	1.06
01/12/2021	00:40	5.11	19:05	8.91	6.60	05:55	0.45	17:15	0.88	0.62	00:45	0.147	19:10	0.376	0.231	0.231	2.10
01/13/2021	05:05	3.44	00:35	8.27	5.10	02:40	0.48	13:20	1.07	0.82	05:05	0.107	13:25	0.298	0.213	0.213	0.09
01/14/2021	03:50	3.49	13:00	5.70	4.80	02:50	0.54	06:20	0.92	0.78	02:50	0.083	18:45	0.266	0.188	0.188	0.01
01/15/2021	04:05	3.68	15:55	5.59	4.77	02:40	0.60	07:30	1.01	0.82	02:35	0.100	16:05	0.256	0.197	0.197	0.09
01/16/2021	03:35	2.83	12:35	5.63	4.54	00:50	0.64	08:20	1.27	0.87	03:45	0.092	10:50	0.280	0.192	0.192	-
01/17/2021	06:05	3.10	12:25	5.53	4.61	00:15	0.67	08:40	0.99	0.82	06:05	0.094	14:05	0.270	0.187	0.187	0.10
01/18/2021	04:35	2.80	14:50	5.64	4.57	01:30	0.64	06:25	1.19	0.85	02:45	0.083	13:20	0.278	0.190	0.190	-
01/19/2021	03:35	2.86	19:55	5.41	4.51	00:50	0.56	06:00	1.11	0.80	04:30	0.097	15:50	0.237	0.173	0.173	0.01
01/20/2021	04:35	2.89	18:15	5.34	4.43	00:00	0.55	06:25	1.42	0.82	02:45	0.083	14:25	0.256	0.174	0.174	-
01/21/2021	03:40	2.90	18:40	5.31	4.50	00:35	0.63	06:25	1.26	0.84	01:25	0.105	18:55	0.241	0.180	0.180	0.11
01/22/2021	05:25	2.88	19:10	5.38	4.44	23:55	0.57	05:10	1.25	0.86	03:40	0.091	17:35	0.259	0.182	0.182	-
01/23/2021	05:10	2.86	12:05	5.56	4.50	00:00	0.56	06:10	1.18	0.84	03:50	0.090	12:00	0.279	0.181	0.181	-
01/24/2021	05:25	2.88	18:05	5.92	4.53	23:50	0.56	07:05	1.37	0.87	03:00	0.094	18:05	0.289	0.188	0.188	0.16
01/25/2021	05:05	3.15	17:55	5.28	4.55	01:05	0.54	11:55	1.07	0.79	02:40	0.086	11:55	0.269	0.177	0.177	0.04
01/26/2021	04:05	2.74	18:05	5.22	4.37	00:20	0.63	03:50	1.13	0.86	02:00	0.101	21:10	0.257	0.176	0.176	-
01/27/2021	04:30	2.83	18:55	5.38	4.45	01:10	0.53	06:35	1.46	0.89	01:20	0.088	16:20	0.257	0.186	0.186	0.14
01/28/2021	03:20	2.84	12:45	5.25	4.59	17:50	0.65	15:30	1.03	0.84	04:00	0.094	12:55	0.271	0.190	0.190	0.24
01/29/2021	05:35	2.84	18:40	5.37	4.43	22:25	0.58	05:45	1.23	0.86	02:50	0.102	14:05	0.254	0.181	0.181	0.03
01/30/2021	04:40	3.09	12:40	5.43	4.52	23:45	0.65	05:10	1.18	0.86	02:45	0.104	14:20	0.274	0.189	0.189	0.07
01/31/2021	06:35	2.98	12:15	5.55	4.62	02:30	0.61	08:15	1.21	0.87	06:50	0.106	18:05	0.275	0.197	0.197	0.12
02/01/2021	05:10	3.93	18:45	6.52	5.00	23:50	0.63	07:10	1.13	0.85	00:40	0.132	18:55	0.297	0.214	0.214	0.82
02/02/2021	04:55	2.90	00:00	6.00	4.71	00:20	0.60	05:50	1.23	0.82	02:40	0.105	12:10	0.255	0.187	0.187	0.31
02/03/2021	04:10	3.06	19:15	5.38	4.59	01:00	0.54	06:30	1.24	0.82	04:25	0.105	16:05	0.253	0.185	0.185	0.06
02/04/2021	05:10	2.82	15:35	5.35	4.44	00:50	0.58	05:30	1.10	0.82	04:00	0.070	11:10	0.247	0.177	0.177	0.07
02/05/2021	04:20	2.87	13:40	5.54	4.47	23:40	0.51	06:20	1.24	0.83	04:10	0.092	13:40	0.296	0.178	0.178	0.01
02/06/2021	05:05	2.85	15:25	5.61	4.50	00:00	0.58	07:30	1.25	0.85	03:05	0.085	11:25	0.288	0.185	0.185	0.01
02/07/2021	05:25	2.86	13:20	5.63	4.45	02:05	0.49	06:25	1.14	0.80	03:00	0.085	12:35	0.261	0.172	0.172	-
02/08/2021	03:55	2.85	19:10	5.39	4.46	00:00	0.61	06:15	1.15	0.88	02:10	0.093	12:10	0.279	0.190	0.190	-
02/09/2021	04:30	2.77	17:10	5.37	4.46	00:40	0.56	05:10	1.25	0.88	03:55	0.106	11:45	0.272	0.186	0.186	-
02/10/2021	04:05	2.93	17:25	5.32	4.48	00:25	0.58	08:20	1.02	0.82	04:10	0.071	20:30	0.260	0.180	0.180	-
02/11/2021	03:05	3.00	18:05	5.33	4.47	01:00	0.55	06:05	1.39	0.79	02:40	0.077	09:15	0.244	0.169	0.169	-
02/12/2021	04:35	2.96	13:05	5.48	4.43	00:00	0.60	06:10	1.60	0.86	04:10	0.095	21:20	0.239	0.179	0.179	-
02/13/2021	05:50	2.96	12:20	5.29	4.44	01:35	0.60	08:15	1.10	0.81	05:30	0.092	12:05	0.266	0.175	0.175	0.08
02/14/2021	05:20	2.81	14:30	5.57	4.53	03:10	0.45	06:45	1.15	0.82	04:25	0.061	16:25	0.279	0.184	0.184	0.71
02/15/2021	05:55	4.45	14:05	8.03	5.89	14:40	0.56	09:00	0.88	0.72	06:10	0.151	13:25	0.328	0.229	0.229	0.78
02/16/2021	04:00	3.95	19:25	5.65	4.86	03:05	0.57	16:20	1.00	0.77	03:05	0.108	16:20	0.275	0.189	0.189	0.07
02/17/2021	04:05	2.74	16:20	5.62	4.59	14:25	0.63	07:00	1.14	0.83	02:30	0.100	18:55	0.248	0.183	0.183	-
02/18/2021	04:05	2.91	13:45	5.43	4.57	01:20	0.55	06:15	1.20	0.82	03:20	0.103	16:20	0.240	0.181	0.181	0.09
02/19/2021	05:00	2.99	19:35	5.91	4.61	23:55	0.58	07:20	1.16	0.84	05:00	0.104	15:40	0.263	0.189	0.189	0.17
02/20/2021	05:30	2.86	13:35	5.72	4.59	00:00	0.59	07:25	1.19	0.80	04:20	0.082	12:00	0.264	0.179	0.179	0.07
02/21/2021	06:25	2.87	23:50	7.87	4.79	23:50	0.53	07:30	1.21	0.80	05:05	0.086	23:35	0.310	0.189	0.189	0.42
02/22/2021	05:25	4.01	13:10	8.43	5.61	03:45	0.47	06:00	0.91	0.70	03:55	0.114	13:25	0.340	0.209	0.209	0.98
02/23/2021	05:05	2.82	22:00	6.87	4.73	01:30	0.55	08:00	1.06	0.77	05:15	0.086	09:10	0.296	0.182	0.182	0.27
02/24/2021	03:40	2.92	18:10	5.45	4.62	00:10	0.57	05:10	1.12	0.83	03:40	0.099	18:30	0.258	0.187	0.187	-
02/25/2021	02:50	3.05	20:05	5.51	4.76	01:35	0.62	02:00	1.06	0.80	02:50	0.097	19:00	0.261	0.190	0.190	0.18
02/26/2021	04:05	2.58	18:35	5.59	4.63	23:05	0.61	05:55	1.16	0.82	04:05	0.094	13:20	0.258	0.183	0.183	0.10
02/27/2021	04:35	2.94	12:20	5.72	4.66	00:20	0.61	08:00	1.35	0.86	03:30	0.101	11:30	0.274	0.195	0.195	0.02
02/28/2021	03:50	2.77	12:45	5.76	4.67	23:55	0.59	07:00	1.36	0.83	03:40	0.082	20:55	0.272	0.189	0.189	0.02
03/01/2021	05:05	2.92	13:45	5.37	4.61	01:00	0.58	11:20	1.07	0.82	02:45	0.087	11:20	0.294	0.186	0.186	-
03/02/2021	03:55	2.88	18:20	5.39	4.48	00:30	0.63	05:15	1.16	0.84	04:05	0.085	18:40	0.276	0.182	0.182	-
03/03/2021	03:45	2.79	17:50	5.45	4.50	00:05	0.63	06:35	1.25	0.87	02:35	0.089	19:00	0.252	0.188	0.188	-
03/04/2021	04:55	2.92	19:55	6.16	4.54	01:25	0.51	06:20	1.39	0.85	04:10	0.091	13:00	0.289	0.186	0.186	0.20
03/05/2021	04:15	2.53	13:30	5.38	4.48	02:15	0.55	05:25	1.28	0.84	04:15	0.083	14:45	0.266	0.179	0.179	0.05
03/06/2021	06:20	2.90	14:25	5.47	4.51	01:55	0.59	07:00	1.32	0.90	01:55	0.108	12:05	0.284	0.195	0.195	-
03/07/2021	06:35	2.67	13:00	5.55	4.49	23:05	0.64	07:05	1.36	0.90	03:25	0.093	10:30	0.298	0.194	0.194	0.04
03/08/2021	04:40	2.75	20:15	5.45	4.54	23:30	0.53	07:00	1.27	0.82	04:15	0.082	10:30	0.266	0.177	0.177	-
03/09/2021	05:50	2.88	20:55	5.38	4.48	01:20	0.50	07:05	1.36	0.85	01:35	0.077	11:35	0.267	0.183	0.183	0.01
03/10/2021	03:30	2.85	16:50	5.47	4.56	00:25	0.48	05:10	1.28	0.83	02:35	0.089	18:15	0.262	0.181	0.181	-
03/11/2021	04:30	2.78	12:35	5.47	4.53	00:50	0.53	06:10	1.23	0.82	03:25	0.074	09:30	0.249	0.179	0.179	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	04:40	2.40	18:40	6.24	4.46	18:35	0.53	06:15	1.34	0.82	03:40	0.078	17:00	0.250	0.175	0.175	-
03/13/2021	05:20	2.75	13:55	5.64	4.52	04:40	0.52	08:00	1.27	0.81	04:40	0.066	10:35	0.292	0.181	0.181	-
03/14/2021	06:05	2.81	15:40	5.98	4.61	02:30	0.46	06:00	1.11	0.79	04:55	0.064	15:05	0.289	0.182	0.182	0.30
03/15/2021	03:20	2.90	11:40	5.45	4.48	00:55	0.55	04:35	1.22	0.81	02:05	0.082	12:10	0.246	0.172	0.172	-
03/16/2021	04:00	2.83	18:45	5.44	4.54	00:00	0.59	05:20	1.16	0.81	05:05	0.084	16:20	0.266	0.179	0.179	-
03/17/2021	03:05	2.73	11:35	5.43	4.56	00:05	0.56	05:50	1.17	0.78	02:15	0.072	10:15	0.256	0.173	0.173	-
03/18/2021	04:30	2.95	16:35	5.78	4.55	01:25	0.53	05:45	1.10	0.78	02:00	0.067	11:55	0.258	0.172	0.172	0.11
03/19/2021	03:10	2.75	13:00	5.41	4.44	01:15	0.53	05:40	1.36	0.85	01:15	0.083	09:10	0.259	0.176	0.176	0.03
03/20/2021	04:05	2.75	14:45	5.46	4.54	23:05	0.55	05:30	1.22	0.78	04:15	0.063	13:45	0.252	0.172	0.172	0.17
03/21/2021	04:35	2.79	11:15	5.71	4.47	01:10	0.54	06:30	1.11	0.87	04:30	0.082	11:15	0.291	0.190	0.190	0.07
03/22/2021	02:30	2.93	10:45	5.81	4.63	22:45	0.54	04:20	1.22	0.86	23:50	0.111	11:55	0.278	0.192	0.192	0.11
03/23/2021	04:00	3.26	18:45	5.48	4.65	02:55	0.49	07:10	0.92	0.72	02:55	0.072	12:10	0.247	0.168	0.168	-
03/24/2021	03:15	3.05	20:10	5.98	4.63	01:45	0.51	07:10	1.02	0.75	01:45	0.073	20:20	0.245	0.171	0.171	0.34
03/25/2021	03:05	3.60	18:20	5.52	4.88	01:10	0.48	07:40	1.06	0.72	03:50	0.103	07:40	0.245	0.175	0.175	0.27
03/26/2021	04:35	2.95	11:25	5.42	4.59	00:00	0.52	06:05	0.95	0.80	03:40	0.075	11:10	0.267	0.181	0.181	-
03/27/2021	05:00	3.03	10:45	5.46	4.60	01:15	0.61	05:55	0.97	0.78	02:10	0.087	11:00	0.241	0.178	0.178	-
03/28/2021	05:05	2.78	14:55	7.39	4.67	16:25	0.59	08:20	1.03	0.74	04:15	0.073	14:35	0.339	0.172	0.172	0.37
03/29/2021	03:20	2.83	10:45	5.44	4.56	00:50	0.64	05:10	1.42	0.93	03:20	0.076	10:05	0.301	0.206	0.206	-
03/30/2021	05:15	2.84	12:30	5.43	4.51	23:40	0.64	06:20	1.26	0.92	01:35	0.098	17:15	0.282	0.199	0.199	-
03/31/2021	02:50	2.72	11:55	5.40	4.57	23:20	0.57	05:45	1.29	0.84	02:50	0.081	13:15	0.262	0.188	0.188	-
04/01/2021	03:15	2.72	11:40	5.41	4.58	02:00	0.52	10:55	0.89	0.73	02:25	0.066	10:55	0.247	0.165	0.165	-
04/02/2021	03:55	2.91	11:40	5.41	4.56	01:05	0.57	12:10	0.94	0.74	04:50	0.069	17:15	0.251	0.167	0.167	-
04/03/2021	03:15	2.91	11:10	5.59	4.51	05:15	0.52	07:50	1.03	0.76	05:15	0.062	08:50	0.270	0.170	0.170	-
04/04/2021	03:15	2.78	11:20	5.59	4.48	23:40	0.46	07:25	1.07	0.78	05:05	0.077	11:40	0.251	0.167	0.167	-
04/05/2021	02:55	2.86	11:55	5.53	4.59	00:50	0.46	15:35	0.92	0.71	01:50	0.059	15:35	0.246	0.163	0.163	-
04/06/2021	03:45	2.83	13:05	5.47	4.62	02:55	0.50	06:50	1.04	0.76	03:15	0.063	11:15	0.255	0.176	0.176	-
04/07/2021	03:10	2.81	19:05	5.45	4.62	01:15	0.54	04:45	1.03	0.80	03:05	0.077	19:05	0.253	0.182	0.182	0.22
04/08/2021	03:15	2.90	12:30	5.42	4.61	23:35	0.57	10:00	1.06	0.82	04:40	0.085	10:00	0.275	0.187	0.187	-
04/09/2021	02:50	2.67	19:00	5.42	4.47	22:35	0.63	05:50	1.10	0.81	02:10	0.082	13:00	0.255	0.174	0.174	0.03
04/10/2021	03:35	2.93	12:05	5.60	4.53	02:10	0.56	06:25	1.11	0.78	04:10	0.074	09:50	0.271	0.172	0.172	0.02
04/11/2021	03:20	2.89	09:15	5.72	4.56	06:20	0.54	16:30	0.98	0.74	03:25	0.065	16:30	0.262	0.169	0.169	-
04/12/2021	02:25	2.88	11:45	5.50	4.57	23:50	0.51	06:00	1.18	0.80	03:00	0.076	11:40	0.280	0.180	0.180	-
04/13/2021	02:20	2.80	12:05	5.42	4.53	00:00	0.55	06:30	1.14	0.80	02:15	0.072	11:25	0.256	0.179	0.179	-
04/14/2021	03:30	2.66	12:50	5.41	4.58	01:20	0.57	06:35	1.09	0.81	02:25	0.063	15:05	0.273	0.185	0.185	-
09/24/2020	23:45	4.98	18:35	6.21	5.91	22:45	0.52	14:55	0.81	0.69	23:45	0.139	19:25	0.276	0.222	0.091	-
09/25/2020	03:00	4.24	12:25	7.13	5.57	01:55	0.43	15:15	0.82	0.65	03:00	0.086	12:25	0.282	0.197	0.197	-
09/26/2020	04:45	3.74	15:15	6.41	5.34	03:15	0.38	12:30	0.94	0.66	04:25	0.071	12:30	0.300	0.188	0.188	-
09/27/2020	03:55	3.84	11:20	6.18	5.20	01:30	0.40	09:50	0.92	0.70	01:30	0.075	11:45	0.300	0.194	0.194	-
09/28/2020	03:10	3.18	18:15	5.98	5.02	02:50	0.49	06:20	0.91	0.76	03:00	0.077	12:30	0.280	0.196	0.196	-
09/29/2020	04:05	3.38	17:30	5.87	5.01	01:55	0.60	03:45	1.12	0.81	01:50	0.091	14:15	0.284	0.205	0.205	-
09/30/2020	02:55	3.21	19:05	5.98	5.01	23:45	0.58	04:20	1.13	0.82	01:00	0.109	14:50	0.303	0.206	0.206	-
10/01/2020	02:55	3.31	19:20	5.90	5.01	00:20	0.58	05:00	1.10	0.77	02:45	0.097	16:55	0.280	0.195	0.195	-
10/02/2020	02:45	3.21	10:55	5.89	5.01	00:20	0.55	04:30	1.01	0.78	01:45	0.101	16:40	0.288	0.198	0.198	-
10/03/2020	03:25	3.06	11:55	6.01	4.97	00:25	0.53	08:45	1.02	0.76	03:50	0.075	09:00	0.300	0.193	0.193	0.01
10/04/2020	03:10	3.32	11:25	6.01	4.99	04:05	0.47	15:20	1.03	0.73	04:05	0.068	15:20	0.322	0.190	0.190	0.01
10/05/2020	04:10	3.31	12:25	5.70	4.79	21:15	0.58	05:15	1.07	0.79	02:55	0.089	09:05	0.260	0.190	0.190	-
10/06/2020	04:05	2.82	12:40	5.31	4.42	01:10	0.59	04:00	1.12	0.79	01:15	0.089	17:20	0.239	0.167	0.167	-
10/07/2020	02:50	2.85	18:45	5.42	4.39	23:45	0.50	05:10	0.95	0.77	01:30	0.080	19:00	0.234	0.163	0.163	-
10/08/2020	03:30	2.90	18:35	5.40	4.47	00:00	0.55	04:30	0.98	0.72	02:45	0.077	20:05	0.257	0.157	0.157	-
10/09/2020	03:15	2.99	23:55	8.95	4.70	00:40	0.55	15:25	0.96	0.76	02:15	0.078	23:20	0.373	0.180	0.180	0.64
10/10/2020	23:55	4.01	01:40	10.26	5.35	03:15	0.51	10:30	0.97	0.73	23:55	0.110	01:45	0.382	0.201	0.201	1.04
10/11/2020	05:30	2.74	18:15	6.46	4.51	02:35	0.49	07:10	1.15	0.80	02:35	0.061	18:00	0.307	0.178	0.178	0.53
10/12/2020	02:50	3.01	17:55	5.52	4.59	23:10	0.56	05:50	1.03	0.77	03:05	0.077	11:30	0.263	0.174	0.174	-
10/13/2020	01:20	3.21	07:35	7.75	5.03	08:45	0.53	03:50	1.08	0.75	00:55	0.077	07:10	0.361	0.193	0.193	0.61
10/14/2020	01:35	2.83	20:05	5.58	4.64	11:00	0.60	04:35	1.14	0.78	01:20	0.072	19:20	0.287	0.178	0.178	-
10/15/2020	02:40	2.96	18:05	5.66	4.64	23:10	0.54	05:25	1.19	0.80	01:35	0.082	19:55	0.271	0.182	0.182	-
10/16/2020	03:05	2.41	11:45	5.53	4.56	00:40	0.47	04:50	1.08	0.79	01:00	0.071	15:40	0.266	0.175	0.175	-
10/17/2020	03:40	2.86	13:40	5.58	4.58	00:25	0.57	06:55	1.21	0.79	02:45	0.084	13:30	0.268	0.178	0.178	0.01
10/18/2020	04:40	2.66	13:00	5.60	4.48	00:50	0.49	07:10	1.22	0.78	02:15	0.060	13:10	0.264	0.173	0.173	0.03
10/19/2020	03:20	2.81	20:05	5.53	4.58	20:30	0.58	05:35	1.19	0.78	02:55	0.075	14:00	0.251	0.174	0.174	0.05
10/20/2020	04:05	2.82	19:25	5.52	4.60	23:20	0.56	05:15	0.98	0.75	03:05	0.067	20:20	0.268	0.170	0.170	-
10/21/2020	02:30	2.83	19:35	5.53	4.54	01:10	0.53	04:15	1.19	0.74	02:00	0.065	19:25	0.229	0.163	0.163	0.01
10/22/2020	04:00	2.77	12:15	5.46	4.59	22:40	0.53	04:20	1.11	0.76	01:35	0.080	12:15	0.242	0.169	0.169	-
10/23/2020	03:35	2.61	20:10	5.68	4.62	01:15	0.47	04:15	1.08	0.78	01:15	0.066	20:00	0.283	0.179	0.179	0.20
10/24/2020	04:50	2.72	11:30	5.68	4.59	20:35	0.56	08:05	1.03	0.81	04:50	0.081	12:05	0.286	0.182	0.182	0.02
10/25/2020	04:55	2.80	11:55	5.49	4.55	01:10	0.57	06:05	1.10	0.80	02:40	0.078	17:10	0.257	0.179	0.179	-
10/26/2020	03:55	2.89	17:40	5.50	4.55	23:55	0.56	04:30	1.25	0.82	01:15	0.086	09:25	0.269	0.180	0.180	-
10/27/2020	03:40	2.93	18:55	5.68	4.60	01:35	0.56	06:00	0.94	0.76	01:30	0.073	18:55	0.273	0.173	0.173	-
10/28/2020	03:35	2.95	13:10	5.42	4.52	02:10	0.56	04:30	1.04	0.81	01:40	0.077	13:00	0.278	0.180	0.180	-
10/29/2020	02:55	2.90	10:40	6.24	4.90	14:45	0.38	06:20	1.05	0.60	03:45	0.075	11:55	0.199	0.138	0.138	-
10/30/2020	04:35	2.93	16:55	5.80	4.74	23:15	0.50	05:30	1.00	0.67	04:05	0.071	19:35	0.216	0.157	0.157	0.10
10/31/2020	03:45	2.54	11:15	5.67	4.47	01:40	0.52	06:20	1.15	0.76	02:10	0.064	09:20	0.249	0.164	0.164	-
11/01/2020	04:40	2.61	12:50	5.64	4.37	01:20	0.55	06:55	1.09	0.78	03:00	0.061	13:20	0.270	0.166	0.166	-
11/02/2020	03:25	2.70	18:30	5.42	4.44	01:15	0.46	06:05	0.99	0.73	04:10	0.059	18:50	0.233	0.158	0.158	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/03/2020	05:25	2.74	10:20	7.67	4.87	04:00	0.48	06:40	1.02	0.72	04:10	0.056	10:05	0.348	0.178	0.178	0.83
11/04/2020	03:30	2.84	20:10	5.36	4.50	00:15	0.55	05:45	1.12	0.77	02:45	0.077	16:25	0.238	0.167	0.167	0.09
11/05/2020	05:10	2.93	13:40	5.55	4.71	23:55	0.56	04:40	0.98	0.78	04:10	0.103	18:15	0.275	0.180	0.180	0.34
11/06/2020	04:35	3.23	13:20	5.32	4.66	00:00	0.56	06:15	1.07	0.75	04:35	0.086	12:25	0.238	0.171	0.171	0.10
11/07/2020	06:15	2.76	16:20	5.45	4.43	01:40	0.47	08:20	1.08	0.75	01:55	0.067	11:35	0.251	0.161	0.161	0.07
11/08/2020	06:25	2.55	13:10	5.64	4.48	01:00	0.51	06:45	1.08	0.76	02:55	0.073	11:20	0.253	0.166	0.166	0.01
11/09/2020	04:15	2.36	21:30	5.43	4.50	00:35	0.56	06:00	1.10	0.77	03:05	0.066	13:35	0.240	0.166	0.166	0.04
11/10/2020	04:10	2.59	19:15	5.47	4.56	04:50	0.40	08:15	0.97	0.73	04:55	0.061	16:45	0.231	0.165	0.165	0.03
11/11/2020	05:50	2.77	14:50	5.41	4.54	01:15	0.49	08:35	1.18	0.75	04:05	0.057	11:00	0.244	0.167	0.167	-
11/12/2020	04:00	2.50	20:40	5.65	4.56	00:45	0.60	07:25	1.08	0.81	01:40	0.070	21:25	0.274	0.182	0.182	0.16
11/13/2020	02:05	3.87	06:50	5.69	4.91	21:10	0.68	06:25	1.18	0.83	23:55	0.139	06:25	0.310	0.204	0.204	0.38
11/14/2020	03:55	2.72	18:25	6.83	4.68	02:20	0.65	08:05	1.24	0.85	03:55	0.094	18:00	0.325	0.193	0.193	0.47
11/15/2020	07:20	2.94	13:35	5.53	4.71	12:00	0.64	10:30	1.07	0.83	07:30	0.109	10:30	0.271	0.191	0.191	0.19
11/16/2020	05:15	2.91	13:30	6.34	4.74	00:25	0.58	12:25	1.12	0.80	05:15	0.088	12:25	0.382	0.188	0.188	0.31
11/17/2020	04:50	2.87	19:50	6.08	4.59	00:50	0.50	06:45	1.21	0.82	00:50	0.094	19:15	0.257	0.182	0.182	0.20
11/18/2020	04:20	2.84	18:00	5.68	4.67	22:10	0.61	06:50	1.18	0.84	02:45	0.096	10:15	0.257	0.191	0.191	0.30
11/19/2020	02:50	3.10	13:05	6.93	4.87	03:40	0.55	03:10	1.26	0.82	02:50	0.101	12:35	0.291	0.198	0.198	0.50
11/20/2020	04:05	3.04	12:30	5.34	4.53	22:25	0.61	05:45	1.39	0.88	03:05	0.109	13:55	0.258	0.190	0.190	0.01
11/21/2020	02:40	2.90	13:25	5.62	4.52	01:00	0.62	09:10	1.24	0.88	02:40	0.079	13:30	0.293	0.196	0.196	-
11/22/2020	03:55	2.86	18:15	5.83	4.61	01:25	0.57	06:30	1.19	0.82	03:10	0.084	11:10	0.265	0.182	0.182	0.21
11/23/2020	05:05	2.88	13:10	5.48	4.75	23:55	0.60	08:35	1.68	0.89	02:40	0.108	08:35	0.450	0.209	0.209	0.14
11/24/2020	05:00	2.81	16:15	6.22	4.62	23:50	0.56	06:45	1.40	0.86	03:10	0.090	08:55	0.296	0.194	0.194	0.21
11/25/2020	03:35	3.03	22:10	5.46	4.70	00:05	0.53	05:15	1.34	0.83	02:50	0.099	14:05	0.244	0.188	0.188	0.05
11/26/2020	05:05	2.76	11:55	5.80	4.63	01:20	0.51	06:50	1.34	0.82	05:05	0.082	14:50	0.298	0.184	0.184	0.02
11/27/2020	04:55	2.87	12:15	5.49	4.53	03:25	0.52	08:15	1.05	0.78	04:45	0.070	12:30	0.263	0.175	0.175	-
11/28/2020	05:40	2.91	13:25	5.51	4.59	01:20	0.48	03:25	1.06	0.76	05:50	0.076	15:10	0.270	0.172	0.172	0.05
11/29/2020	05:45	2.90	13:35	5.66	4.59	02:35	0.42	08:50	1.11	0.76	02:35	0.067	12:30	0.271	0.174	0.174	-
11/30/2020	03:35	3.06	04:55	5.60	4.92	03:10	0.48	11:25	1.06	0.77	03:10	0.072	11:25	0.286	0.192	0.192	0.36
12/01/2020	04:00	3.08	19:05	5.39	4.65	01:15	0.52	08:15	1.04	0.73	04:35	0.086	12:40	0.241	0.169	0.169	-
12/02/2020	04:30	2.94	19:30	5.43	4.68	01:25	0.45	06:40	1.08	0.76	02:05	0.073	13:30	0.249	0.178	0.178	0.01
12/03/2020	04:55	2.87	13:20	5.40	4.60	01:40	0.42	06:30	1.11	0.75	01:40	0.069	20:15	0.255	0.173	0.173	-
12/04/2020	04:10	3.00	12:55	5.46	4.63	03:05	0.49	04:55	1.07	0.79	03:55	0.076	16:05	0.282	0.180	0.180	-
12/05/2020	03:50	2.90	15:35	5.62	4.60	01:25	0.53	06:15	1.01	0.75	04:20	0.074	10:40	0.259	0.171	0.171	0.03
12/06/2020	03:35	3.08	13:00	5.68	4.73	03:45	0.48	15:50	0.89	0.68	03:35	0.068	12:55	0.267	0.162	0.162	0.03
12/07/2020	05:05	2.99	17:35	5.47	4.67	00:50	0.47	09:40	0.98	0.74	04:35	0.065	13:10	0.262	0.174	0.174	-
12/08/2020	03:15	3.05	21:35	6.68	5.16	03:55	0.55	06:10	1.02	0.72	03:55	0.074	19:40	0.296	0.195	0.195	0.87
12/09/2020	05:50	3.60	18:30	5.56	4.82	04:35	0.53	15:15	0.99	0.76	04:35	0.089	19:00	0.259	0.183	0.183	0.17
12/10/2020	04:20	2.92	20:50	5.51	4.54	02:00	0.55	05:25	1.01	0.80	03:10	0.073	16:20	0.259	0.180	0.180	0.07
12/11/2020	05:00	2.91	12:55	5.42	4.50	01:55	0.58	07:10	1.12	0.84	02:30	0.090	18:50	0.266	0.181	0.181	0.02
12/12/2020	05:25	2.56	12:35	5.62	4.51	01:35	0.55	06:50	1.25	0.83	04:20	0.084	16:20	0.283	0.181	0.181	0.01
12/13/2020	07:05	3.10	11:45	5.79	4.66	00:40	0.58	05:00	1.07	0.84	02:10	0.097	10:30	0.298	0.194	0.194	0.24
12/14/2020	03:25	2.87	17:40	5.45	4.57	01:50	0.57	06:00	1.14	0.81	02:45	0.085	19:40	0.276	0.180	0.180	0.05
12/15/2020	03:40	2.85	16:10	7.63	4.85	01:55	0.48	08:10	1.04	0.78	03:45	0.077	15:50	0.320	0.191	0.191	0.58
12/16/2020	04:30	3.13	14:50	6.58	4.80	02:50	0.42	06:55	0.99	0.75	02:50	0.069	15:30	0.318	0.181	0.181	0.39
12/17/2020	04:25	2.86	13:00	5.36	4.52	01:25	0.61	07:00	1.01	0.79	03:15	0.079	18:05	0.233	0.174	0.174	0.08
12/18/2020	04:15	2.88	19:10	5.40	4.59	00:55	0.63	07:30	1.08	0.85	04:00	0.090	14:30	0.269	0.191	0.191	0.25
12/19/2020	05:45	2.35	21:20	6.08	4.64	02:20	0.62	08:15	1.21	0.82	05:45	0.072	17:20	0.271	0.186	0.186	0.37
12/20/2020	06:55	2.78	14:00	5.45	4.49	22:10	0.58	05:00	1.06	0.82	03:40	0.079	15:45	0.255	0.177	0.177	0.04
12/21/2020	04:50	4.13	16:40	8.47	5.51	20:20	0.54	16:10	0.99	0.73	04:10	0.131	16:50	0.387	0.211	0.211	1.07
12/22/2020	04:50	2.91	12:40	5.40	4.61	22:55	0.57	06:05	1.12	0.77	04:50	0.086	17:00	0.266	0.175	0.175	-
12/23/2020	05:45	3.02	14:25	5.44	4.52	01:10	0.55	11:45	1.02	0.78	02:55	0.084	11:45	0.277	0.173	0.173	-
12/24/2020	05:50	2.87	14:00	5.64	4.52	20:35	0.54	07:40	1.39	0.82	03:55	0.080	14:00	0.306	0.177	0.177	-
12/25/2020	04:45	2.72	17:15	5.79	4.45	01:15	0.57	16:00	1.04	0.80	04:45	0.079	16:10	0.318	0.174	0.174	0.49
12/26/2020	05:10	3.01	12:55	5.57	4.48	02:25	0.56	10:00	1.01	0.78	03:55	0.075	16:50	0.270	0.172	0.172	0.02
12/27/2020	06:50	2.88	12:30	5.75	4.57	02:35	0.59	07:05	1.10	0.81	03:45	0.075	14:15	0.297	0.183	0.183	0.13
12/28/2020	04:50	3.01	14:25	5.58	4.53	01:30	0.50	06:15	1.27	0.79	03:45	0.076	15:45	0.261	0.175	0.175	-
12/29/2020	03:45	2.98	19:45	6.07	4.55	00:15	0.58	06:50	1.12	0.79	03:00	0.094	19:40	0.271	0.174	0.174	0.14
12/30/2020	01:40	4.03	06:35	5.91	5.14	20:15	0.54	10:30	0.92	0.75	03:45	0.132	21:35	0.254	0.197	0.197	0.78
12/31/2020	06:50	3.38	18:15	5.57	4.73	01:20	0.58	11:10	1.03	0.78	03:20	0.115	18:00	0.286	0.183	0.183	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			36.893	30.65
Average	4.68	0.79	0.182	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A14_710149

Site Address /Location:	Auburn High School - I St NE			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	Keys Required	Latitude:	47.309599°	Pipe Size (H x W): 18.00 x 18.00	Pipe Shape: Circular
		Longitude:	-122.218373°		



Manhole #	System Characteristics
710-149	Residential
Access	Traffic
Drive	Medium







ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519

Installation Information

Installation Date:	Installation Type:
Thursday, September 24, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors): Upstream 0-5 FT	Monitor Location: Manhole
Sensors / Devices: Peak Combo (CS4), Smart Depth (CS5)	Pressure Sensor Range (psi): 0 - 5 psi

Installation Confirmation:

Time	Pipe Size (HxW)
2:10:00 PM	18.00 x 18.00
Depth of Flow (Wet DOF) (in): 5.63	
CS5 Physical Offset (in): 1.38	Measurement Confidence (in): 0.25"
Peak Velocity (fps): 0.88	Velocity Sensor Offset (in): N/A
Silt (in): 0.38	Silt Type: Soft / Loose

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
6	Single
Manhole Material: Concrete	Manhole Condition: Good
Manhole Opening Diameter (in): 24	Manhole Diameter (Approx.): 26
Manhole Cover: Steel	Manhole Frame: Normal
Active Connections: Yes, Inside	Air Quality: Normal
Pipe Material: PVC	Pipe Condition: Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

710-149 / 710-151 In Same M/H (710-150)

AUB_A15_80930

Site Commentary

SITE INFORMATION

Pipe	Round (21 in H)
Silt	0.38 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	2.89	0.45	0.058
Minimum	1.84	0.19	0.013
Maximum	3.95	0.72	0.135
Min Time	01/07/2021 3:00:00 AM	03/31/2021 2:00:00 AM	01/07/2021 3:00:00 AM
Max Time	11/23/2020 8:00:00 AM	02/22/2021 1:00:00 PM	11/23/2020 8:00:00 AM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

Percent Uptime	
DFINAL (in)	99.263
VFINAL (ft/s)	99.263
QFINAL (MGD - Total MG)	99.263

Hydrograph Report

AUB_A15_80930

Flow Monitor

AUB_A15_80930

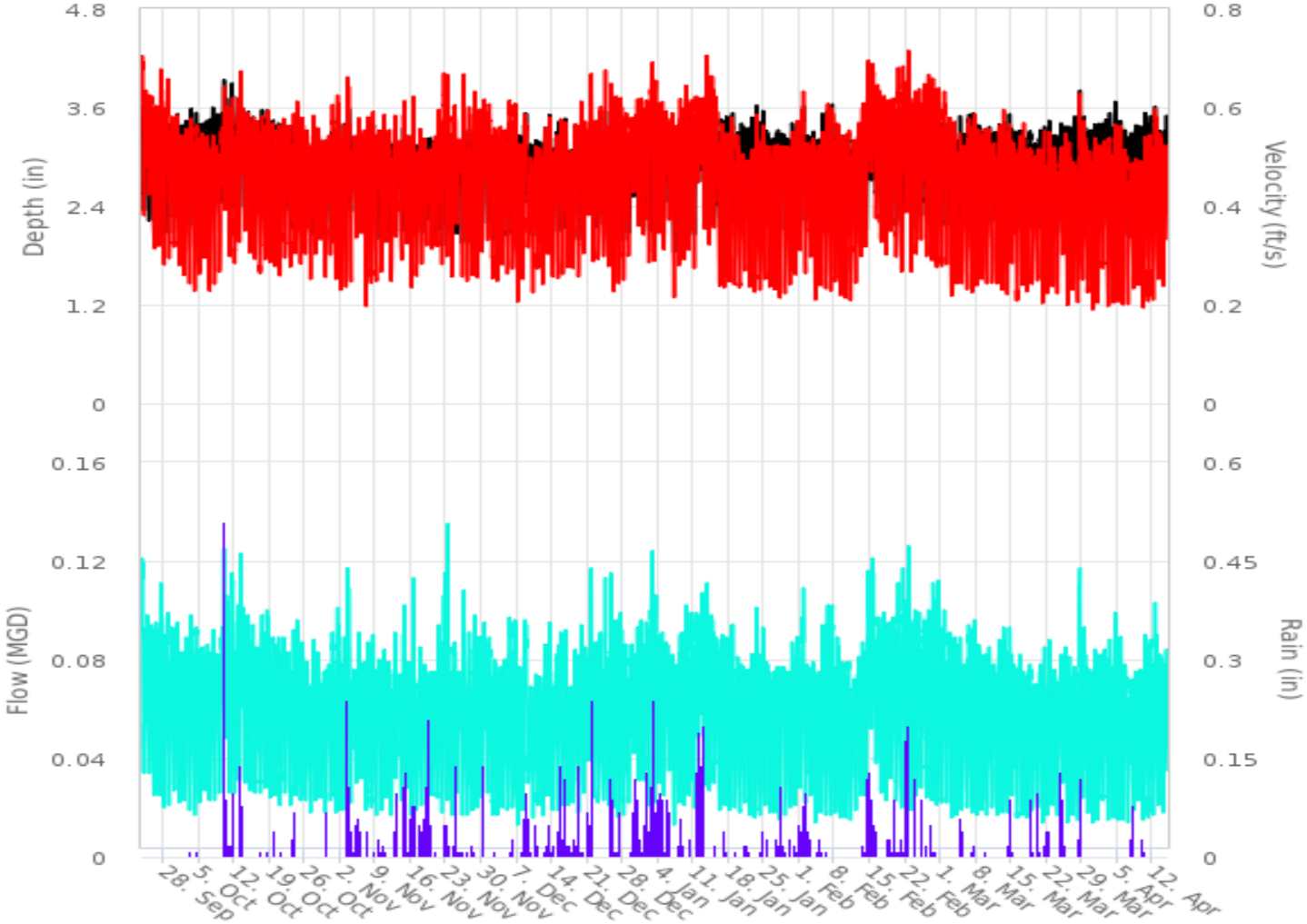
Pipe Height
21.00
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A15_80930

Flow Monitor

AUB_A15_80930

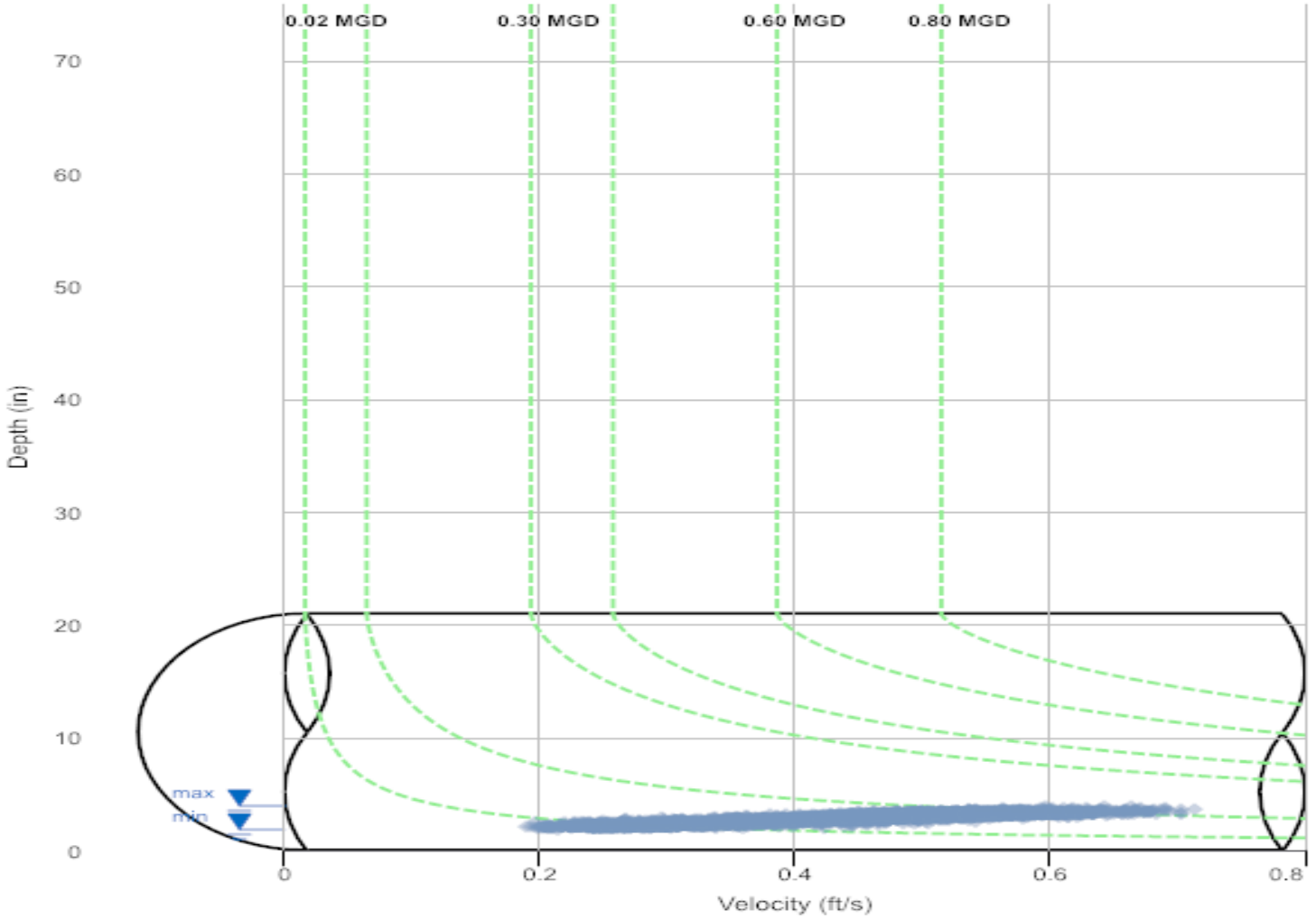
Pipe Height
21.00
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A15_80930Pipe: Round (21 in H), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	03:05	2.23	15:40	3.57	2.89	03:00	0.31	16:10	0.67	0.49	03:00	0.026	15:45	0.112	0.062	0.062	0.51
01/02/2021	04:30	2.06	19:50	3.84	3.01	03:35	0.27	19:50	0.74	0.52	03:35	0.020	19:50	0.139	0.074	0.074	1.69
01/03/2021	06:10	2.07	13:25	3.52	2.91	06:15	0.27	12:55	0.69	0.51	06:10	0.020	13:00	0.113	0.067	0.067	0.65
01/04/2021	03:50	2.28	12:00	3.41	2.93	04:10	0.33	11:55	0.66	0.51	03:40	0.029	11:55	0.103	0.066	0.066	0.48
01/05/2021	03:10	2.16	19:05	3.38	2.82	03:15	0.30	13:25	0.62	0.48	03:10	0.024	19:05	0.096	0.058	0.058	0.52
01/06/2021	04:10	2.40	20:00	3.23	2.82	04:10	0.36	19:55	0.63	0.48	04:20	0.033	20:00	0.091	0.058	0.058	0.22
01/07/2021	03:15	1.78	14:50	3.20	2.67	03:10	0.20	18:10	0.59	0.44	03:15	0.011	18:05	0.083	0.051	0.051	-
01/08/2021	02:50	2.08	16:15	3.40	2.84	03:15	0.27	09:10	0.71	0.48	03:15	0.020	09:10	0.105	0.060	0.060	0.22
01/09/2021	03:40	2.07	22:15	3.90	2.79	03:35	0.28	13:25	0.66	0.47	03:40	0.020	22:15	0.127	0.059	0.059	-
01/10/2021	02:00	2.14	14:10	3.57	2.89	02:00	0.30	11:10	0.63	0.49	02:00	0.023	14:10	0.102	0.064	0.064	0.07
01/11/2021	03:35	2.03	13:00	3.67	2.93	02:50	0.27	11:10	0.63	0.50	02:50	0.019	13:00	0.110	0.067	0.067	1.06
01/12/2021	00:10	2.66	18:50	3.81	3.13	00:10	0.44	18:50	0.65	0.55	00:10	0.047	18:50	0.120	0.078	0.078	2.10
01/13/2021	05:00	2.15	00:25	3.56	2.93	04:55	0.33	16:55	0.73	0.56	05:00	0.025	17:25	0.117	0.073	0.073	0.09
01/14/2021	04:05	2.17	11:05	3.43	2.94	03:00	0.30	11:45	0.71	0.52	03:00	0.026	11:45	0.111	0.068	0.068	0.01
01/15/2021	02:30	2.23	13:25	3.40	2.93	01:55	0.32	10:25	0.66	0.50	01:55	0.027	10:25	0.099	0.065	0.065	0.09
01/16/2021	03:50	2.06	11:40	3.53	2.89	03:55	0.22	15:30	0.58	0.42	03:55	0.016	17:25	0.095	0.056	0.056	-
01/17/2021	06:35	2.13	13:50	3.59	2.96	01:50	0.22	19:00	0.58	0.42	06:30	0.019	13:50	0.096	0.056	0.056	0.10
01/18/2021	03:05	2.10	12:55	3.68	2.89	02:20	0.24	12:50	0.65	0.45	02:20	0.018	12:55	0.115	0.058	0.058	-
01/19/2021	05:05	2.11	17:25	3.40	2.84	02:35	0.23	17:10	0.59	0.41	03:00	0.018	17:25	0.092	0.051	0.051	0.01
01/20/2021	04:15	2.05	20:10	3.46	2.89	02:00	0.21	12:25	0.54	0.40	04:20	0.015	12:25	0.087	0.052	0.052	-
01/21/2021	02:55	2.16	18:05	3.39	2.94	02:55	0.25	14:00	0.52	0.41	02:50	0.020	18:05	0.080	0.053	0.053	0.11
01/22/2021	04:10	2.01	12:00	3.56	2.90	04:10	0.21	17:10	0.56	0.40	04:10	0.015	17:10	0.093	0.053	0.053	-
01/23/2021	03:15	2.02	11:40	3.89	2.86	03:10	0.19	11:45	0.64	0.40	03:10	0.014	11:45	0.122	0.053	0.053	-
01/24/2021	03:05	2.04	17:55	3.75	2.87	02:20	0.22	17:35	0.63	0.40	02:55	0.016	17:40	0.113	0.053	0.053	0.16
01/25/2021	05:15	2.09	11:35	3.38	2.87	03:15	0.23	11:30	0.55	0.41	05:10	0.017	11:30	0.085	0.052	0.052	0.04
01/26/2021	02:55	2.06	19:30	3.29	2.80	02:45	0.22	19:20	0.55	0.40	02:40	0.016	19:20	0.082	0.049	0.049	-
01/27/2021	02:15	2.09	19:00	3.49	2.93	01:55	0.21	21:40	0.62	0.41	01:55	0.016	21:40	0.088	0.054	0.054	0.14
01/28/2021	03:00	1.95	12:45	3.35	2.92	04:00	0.17	12:40	0.56	0.42	04:00	0.012	12:40	0.085	0.055	0.055	0.24
01/29/2021	03:25	2.03	16:15	3.32	2.83	03:15	0.19	16:10	0.58	0.40	03:15	0.014	16:10	0.088	0.050	0.050	0.03
01/30/2021	03:30	2.14	12:25	3.47	2.88	02:30	0.22	12:30	0.58	0.42	03:10	0.018	12:30	0.094	0.054	0.054	0.07
01/31/2021	06:00	2.12	17:40	3.53	2.90	05:25	0.25	11:15	0.60	0.44	05:55	0.019	11:55	0.098	0.058	0.058	0.12
02/01/2021	03:20	2.35	18:50	3.72	3.05	03:10	0.30	18:45	0.67	0.48	03:15	0.027	18:45	0.118	0.066	0.066	0.82
02/02/2021	03:50	2.17	18:05	3.32	2.88	04:00	0.25	10:25	0.58	0.44	04:00	0.020	18:05	0.084	0.056	0.056	0.31
02/03/2021	03:55	2.17	18:45	3.36	2.85	04:05	0.27	11:50	0.57	0.43	04:10	0.021	12:10	0.084	0.054	0.054	0.06
02/04/2021	03:00	1.95	17:45	3.25	2.79	03:05	0.20	10:35	0.55	0.41	03:05	0.013	10:35	0.081	0.051	0.051	0.07
02/05/2021	03:35	2.06	13:15	4.89	2.85	04:00	0.21	13:15	0.67	0.42	03:35	0.016	13:15	0.179	0.054	0.054	0.01
02/06/2021	05:50	2.01	15:00	3.74	2.90	03:30	0.23	14:55	0.65	0.43	05:45	0.016	14:55	0.117	0.057	0.057	0.01
02/07/2021	04:40	2.03	12:45	3.68	2.88	04:10	0.22	11:15	0.62	0.43	04:10	0.016	12:45	0.108	0.057	0.057	-
02/08/2021	02:45	2.07	12:00	3.51	2.87	02:10	0.23	11:55	0.65	0.44	02:10	0.017	12:00	0.105	0.058	0.058	-
02/09/2021	03:40	1.98	11:20	3.40	2.81	03:35	0.20	11:20	0.58	0.43	03:35	0.014	11:20	0.091	0.053	0.053	-
02/10/2021	03:35	2.05	20:10	3.35	2.77	04:05	0.20	20:00	0.62	0.42	03:35	0.015	20:00	0.093	0.051	0.051	-
02/11/2021	03:55	1.92	08:50	3.29	2.74	03:50	0.19	09:00	0.59	0.41	03:55	0.012	09:00	0.085	0.049	0.049	-
02/12/2021	03:55	2.06	17:15	3.27	2.77	04:00	0.22	17:15	0.60	0.44	04:00	0.016	17:15	0.088	0.052	0.052	-
02/13/2021	05:10	2.22	13:05	3.39	2.85	02:05	0.29	21:15	0.65	0.47	02:15	0.024	11:55	0.095	0.059	0.059	0.08
02/14/2021	04:15	1.95	15:55	3.64	2.93	02:35	0.30	15:10	0.73	0.55	02:35	0.022	15:10	0.125	0.073	0.073	0.71
02/15/2021	05:05	2.67	11:35	3.69	3.19	04:00	0.46	11:00	0.71	0.58	04:45	0.050	11:10	0.126	0.084	0.084	0.78
02/16/2021	05:10	2.47	16:45	3.40	2.95	02:50	0.33	15:45	0.76	0.52	02:50	0.035	15:45	0.113	0.067	0.067	0.07
02/17/2021	03:35	2.14	17:25	3.48	2.91	02:00	0.31	17:40	0.66	0.49	04:05	0.024	17:40	0.107	0.064	0.064	-
02/18/2021	03:55	2.06	15:55	3.45	2.86	04:10	0.27	16:05	0.64	0.48	04:10	0.020	15:55	0.102	0.061	0.061	0.09
02/19/2021	04:40	2.32	13:30	3.47	2.95	01:20	0.34	15:35	0.65	0.50	01:20	0.030	13:30	0.103	0.065	0.065	0.17
02/20/2021	03:35	2.07	11:35	3.54	2.92	03:40	0.27	13:45	0.74	0.49	03:35	0.020	13:45	0.120	0.065	0.065	0.07
02/21/2021	04:50	1.97	12:45	3.67	2.97	05:55	0.23	11:40	0.72	0.50	04:50	0.017	11:40	0.124	0.069	0.069	0.42
02/22/2021	04:25	2.39	13:00	3.85	3.10	05:15	0.35	13:25	0.77	0.55	05:15	0.033	13:05	0.142	0.077	0.077	0.98
02/23/2021	04:00	1.99	08:45	3.84	2.90	03:50	0.23	08:45	0.80	0.49	03:50	0.016	08:45	0.150	0.064	0.064	0.27
02/24/2021	03:35	2.21	17:50	3.44	2.93	05:25	0.29	13:40	0.67	0.51	03:05	0.024	17:45	0.106	0.067	0.067	-
02/25/2021	02:25	2.24	18:55	3.34	2.91	02:50	0.32	17:10	0.71	0.52	02:20	0.027	17:10	0.104	0.066	0.066	0.18
02/26/2021	03:20	2.13	14:25	3.38	2.91	04:15	0.27	12:30	0.69	0.51	03:15	0.022	12:55	0.104	0.067	0.067	0.10
02/27/2021	04:35	2.11	11:00	3.66	3.00	04:25	0.28	10:35	0.68	0.51	04:30	0.021	10:35	0.117	0.070	0.070	0.02
02/28/2021	05:55	2.09	13:45	3.73	2.97	04:25	0.27	13:20	0.67	0.48	04:30	0.020	13:35	0.119	0.066	0.066	0.02
03/01/2021	13:05	1.62	13:10	5.17	2.92	13:05	0.10	13:30	1.03	0.48	13:05	0.005	13:30	0.245	0.064	0.064	-
03/02/2021	03:55	2.09	18:20	3.48	2.87	03:15	0.26	16:10	0.64	0.47	03:00	0.020	18:00	0.097	0.059	0.059	-
03/03/2021	04:05	2.07	18:30	3.42	2.89	03:50	0.19	18:25	0.60	0.43	03:50	0.014	18:25	0.094	0.057	0.057	-
03/04/2021	12:15	1.89	12:25	5.64	2.84	12:15	0.19	12:25	0.86	0.43	12:15	0.012	12:25	0.282	0.054	0.054	0.20
03/05/2021	04:05	2.01	11:30	3.40	2.87	03:40	0.22	11:35	0.57	0.41	04:05	0.015	11:35	0.089	0.052	0.052	0.05
03/06/2021	04:25	2.22	14:50	3.64	3.02	04:25	0.21	13:55	0.62	0.43	04:25	0.017	11:45	0.105	0.061	0.061	-
03/07/2021	05:10	2.03	10:00	3.62	2.96	04:40	0.21	15:15	0.63	0.43	05:10	0.015	15:15	0.109	0.059	0.059	0.04
03/08/2021	03:45	1.98	11:00	3.60	2.94	03:15	0.23	11:00	0.60	0.45	03:20	0.016	11:00	0.103	0.060	0.060	-
03/09/2021	03:25	2.06	11:10	3.38	2.85	03:25	0.24	18:40	0.59	0.43	03:25	0.017	18:40	0.091	0.054	0.054	0.01
03/10/2021	03:10	1.99	16:05	3.45	2.86	02:55	0.24	14:20	0.58	0.42	03:10	0.016	14:20	0.090	0.054	0.054	-
03/11/2021	02:30	2.12	13:40	3.37	2.90	03:30	0.23	12:30	0.57	0.42	02:30	0.019	12:30	0.085	0.054	0.054	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	04:00	1.96	13:30	3.50	2.87	04:05	0.20	13:25	0.60	0.42	04:00	0.014	13:25	0.097	0.054	0.054	-
03/13/2021	05:25	2.05	12:40	3.50	2.93	03:50	0.21	09:40	0.62	0.43	05:25	0.015	09:40	0.100	0.057	0.057	-
03/14/2021	05:35	2.13	15:25	3.61	2.91	04:15	0.20	19:45	0.60	0.42	03:55	0.016	15:25	0.101	0.056	0.056	0.30
03/15/2021	01:55	2.30	11:05	3.39	2.91	01:40	0.26	11:00	0.57	0.41	01:40	0.023	11:00	0.088	0.053	0.053	-
03/16/2021	01:30	2.07	19:10	3.37	2.87	03:05	0.19	17:50	0.57	0.41	03:05	0.014	19:10	0.087	0.053	0.053	-
03/17/2021	03:10	1.94	15:50	3.30	2.79	02:55	0.20	10:05	0.61	0.44	03:00	0.013	20:10	0.084	0.053	0.053	-
03/18/2021	01:25	1.99	16:25	3.43	2.79	01:20	0.21	16:25	0.56	0.41	01:25	0.014	16:25	0.089	0.051	0.051	0.11
03/19/2021	03:10	2.07	15:50	3.28	2.77	01:45	0.21	17:25	0.55	0.40	01:45	0.016	15:50	0.079	0.048	0.048	0.03
03/20/2021	04:05	2.02	16:10	3.44	2.84	04:00	0.22	16:10	0.57	0.42	04:00	0.016	16:10	0.091	0.052	0.052	0.17
03/21/2021	04:10	1.91	12:00	3.43	2.81	04:00	0.17	12:05	0.59	0.39	04:00	0.011	12:00	0.093	0.050	0.050	0.07
03/22/2021	02:45	2.05	10:40	3.53	2.90	02:30	0.19	10:45	0.57	0.42	01:55	0.015	10:45	0.094	0.055	0.055	0.11
03/23/2021	02:15	2.17	12:00	3.35	2.86	04:10	0.20	14:25	0.57	0.41	04:05	0.018	14:30	0.084	0.052	0.052	-
03/24/2021	03:25	2.00	20:05	3.50	2.87	00:50	0.20	20:05	0.55	0.39	03:25	0.014	20:05	0.091	0.050	0.050	0.34
03/25/2021	23:45	2.41	15:15	3.43	2.97	03:05	0.27	18:10	0.58	0.43	03:10	0.026	17:40	0.090	0.056	0.056	0.27
03/26/2021	02:10	1.99	10:40	3.45	2.86	02:50	0.18	10:55	0.56	0.39	02:05	0.013	10:45	0.089	0.050	0.050	-
03/27/2021	04:20	1.96	12:40	3.54	2.91	02:20	0.18	08:55	0.56	0.38	04:10	0.013	08:55	0.089	0.051	0.051	-
03/28/2021	04:20	1.95	14:35	3.91	2.95	02:05	0.18	12:30	0.65	0.42	04:15	0.012	14:35	0.125	0.059	0.059	0.37
03/29/2021	04:10	2.33	10:30	3.55	3.03	02:35	0.23	10:15	0.59	0.42	04:05	0.020	10:20	0.099	0.058	0.058	-
03/30/2021	04:15	2.11	16:40	3.41	2.91	01:50	0.21	11:55	0.54	0.40	01:50	0.016	11:55	0.083	0.053	0.053	-
03/31/2021	02:30	2.06	13:40	3.44	2.87	03:05	0.14	13:25	0.56	0.41	03:05	0.010	13:40	0.090	0.053	0.053	-
04/01/2021	02:10	2.07	13:40	3.51	2.91	02:05	0.18	10:25	0.55	0.41	02:05	0.013	13:40	0.088	0.054	0.054	-
04/02/2021	02:15	2.17	16:50	3.53	2.96	04:00	0.24	11:00	0.57	0.42	04:00	0.019	11:00	0.094	0.057	0.057	-
04/03/2021	03:55	2.03	12:05	3.65	2.98	02:50	0.18	12:05	0.57	0.40	03:55	0.013	12:05	0.100	0.055	0.055	-
04/04/2021	04:10	2.15	13:30	3.75	2.96	02:35	0.18	13:15	0.59	0.40	02:35	0.015	13:15	0.106	0.054	0.054	-
04/05/2021	01:25	2.03	10:30	3.55	2.92	01:40	0.19	09:30	0.59	0.42	01:25	0.014	14:50	0.095	0.056	0.056	-
04/06/2021	02:20	2.03	13:55	3.45	2.91	02:15	0.18	17:15	0.53	0.41	02:15	0.013	13:55	0.083	0.054	0.054	-
04/07/2021	02:20	2.01	21:55	3.46	2.87	02:20	0.17	22:05	0.54	0.38	02:20	0.012	22:05	0.086	0.049	0.049	0.22
04/08/2021	04:20	2.10	17:10	3.48	2.94	04:05	0.20	18:55	0.54	0.40	04:05	0.015	17:30	0.085	0.052	0.052	-
04/09/2021	04:00	2.39	12:30	3.48	2.97	01:20	0.21	12:30	0.54	0.37	03:40	0.020	12:30	0.087	0.049	0.049	0.03
04/10/2021	02:55	2.02	10:35	3.64	2.96	03:00	0.17	10:55	0.57	0.40	03:00	0.012	10:40	0.095	0.055	0.055	0.02
04/11/2021	05:05	2.11	13:55	3.58	2.93	04:30	0.19	11:35	0.58	0.42	02:20	0.015	13:50	0.096	0.056	0.056	-
04/12/2021	03:05	2.11	11:10	3.68	2.97	02:55	0.19	11:00	0.62	0.43	02:55	0.014	11:10	0.110	0.059	0.059	-
04/13/2021	02:10	2.13	17:55	3.42	2.90	02:50	0.24	10:55	0.57	0.43	02:15	0.019	17:55	0.090	0.056	0.056	-
04/14/2021	02:10	2.08	17:20	3.57	2.95	02:15	0.22	10:00	0.56	0.42	02:15	0.016	17:20	0.089	0.057	0.057	-
09/23/2020	23:55	2.60	16:55	3.71	3.32	22:30	0.44	17:50	0.74	0.62	23:25	0.048	16:55	0.129	0.095	0.046	-
09/24/2020	03:00	2.30	17:25	3.44	2.96	03:35	0.35	13:50	0.68	0.54	03:35	0.030	15:30	0.102	0.070	0.070	-
09/25/2020	02:10	2.19	12:05	3.46	2.92	23:55	0.31	12:15	0.66	0.53	23:55	0.028	12:15	0.104	0.068	0.068	-
09/26/2020	03:35	1.95	13:30	3.54	2.88	06:00	0.28	13:15	0.69	0.47	02:15	0.023	13:25	0.112	0.060	0.060	-
09/27/2020	03:45	2.03	11:20	3.59	2.92	01:30	0.25	11:55	0.72	0.52	03:40	0.018	11:55	0.121	0.069	0.069	-
09/28/2020	03:35	2.03	18:50	3.47	2.92	03:20	0.26	14:35	0.70	0.52	03:35	0.018	19:40	0.110	0.069	0.069	-
09/29/2020	02:25	2.01	17:15	3.54	2.92	03:35	0.25	16:50	0.63	0.47	01:15	0.019	17:15	0.104	0.061	0.061	-
09/30/2020	02:45	2.23	19:35	3.62	2.97	00:50	0.29	18:30	0.63	0.47	02:55	0.024	18:40	0.105	0.062	0.062	-
10/01/2020	03:30	2.14	19:55	3.90	2.93	03:00	0.27	08:20	0.62	0.44	03:30	0.020	19:55	0.119	0.058	0.058	-
10/02/2020	01:20	2.29	11:00	3.59	3.02	01:15	0.25	11:00	0.62	0.44	01:15	0.021	11:00	0.105	0.060	0.060	-
10/03/2020	03:30	2.14	11:50	3.68	3.01	03:40	0.22	14:00	0.62	0.45	03:40	0.017	12:50	0.104	0.062	0.062	0.01
10/04/2020	03:35	2.05	12:55	3.65	2.97	03:35	0.19	11:35	0.60	0.43	03:35	0.014	12:55	0.104	0.058	0.058	0.01
10/05/2020	02:10	2.14	19:15	3.51	3.01	01:55	0.20	14:40	0.58	0.44	01:55	0.016	14:45	0.093	0.060	0.060	-
10/06/2020	02:55	2.24	16:55	3.56	3.04	03:00	0.28	14:00	0.60	0.43	02:50	0.024	16:55	0.097	0.060	0.060	-
10/07/2020	02:00	2.47	17:10	3.66	3.12	02:15	0.21	20:30	0.62	0.43	02:05	0.021	14:15	0.101	0.061	0.061	-
10/08/2020	01:55	2.40	16:50	3.61	3.13	02:50	0.20	11:15	0.58	0.43	02:50	0.018	11:15	0.092	0.061	0.061	-
10/09/2020	02:05	2.37	23:50	3.98	3.17	02:05	0.20	23:50	0.66	0.46	02:05	0.018	23:50	0.131	0.069	0.069	0.64
10/10/2020	23:40	2.73	00:00	3.94	3.33	23:30	0.36	02:05	0.67	0.52	23:30	0.041	01:35	0.127	0.080	0.080	1.04
10/11/2020	05:10	2.31	13:25	3.96	3.21	03:15	0.28	16:25	0.64	0.48	03:15	0.025	13:05	0.122	0.074	0.074	0.53
10/12/2020	02:45	2.34	16:35	3.59	3.05	02:45	0.27	16:35	0.63	0.46	02:45	0.024	16:35	0.107	0.065	0.065	-
10/13/2020	01:35	2.23	07:15	4.05	3.14	01:35	0.28	07:15	0.75	0.50	01:35	0.023	07:20	0.153	0.072	0.072	0.61
10/14/2020	02:55	2.22	19:15	3.65	3.06	03:10	0.31	17:25	0.62	0.47	03:10	0.025	17:25	0.105	0.065	0.065	-
10/15/2020	03:05	2.29	17:40	3.57	3.02	01:00	0.29	16:25	0.62	0.46	03:10	0.025	17:40	0.103	0.063	0.063	-
10/16/2020	03:30	2.27	15:20	3.43	2.98	01:10	0.24	12:15	0.62	0.45	03:30	0.021	12:15	0.092	0.060	0.060	-
10/17/2020	03:40	2.45	12:00	3.66	3.13	01:15	0.25	12:00	0.63	0.45	03:35	0.025	12:00	0.110	0.065	0.065	0.01
10/18/2020	01:40	2.36	12:45	3.69	3.07	03:40	0.27	12:45	0.63	0.46	01:35	0.026	12:45	0.111	0.064	0.064	0.03
10/19/2020	02:00	2.22	16:30	3.50	3.00	01:55	0.26	16:25	0.60	0.44	01:55	0.021	16:25	0.098	0.059	0.059	0.05
10/20/2020	01:15	2.30	11:15	3.50	2.98	01:10	0.25	10:35	0.62	0.44	01:10	0.022	11:20	0.093	0.059	0.059	-
10/21/2020	02:20	2.08	10:40	3.43	2.94	02:15	0.23	18:25	0.61	0.45	02:15	0.017	18:25	0.096	0.059	0.059	0.01
10/22/2020	01:05	2.29	18:05	3.48	2.91	01:10	0.28	18:00	0.62	0.46	01:10	0.024	18:05	0.101	0.058	0.058	-
10/23/2020	02:25	2.04	19:30	3.51	2.86	02:10	0.24	19:25	0.64	0.45	02:15	0.017	19:25	0.106	0.057	0.057	0.20
10/24/2020	04:05	2.13	13:50	3.59	2.85	03:25	0.29	13:50	0.66	0.47	03:35	0.022	13:50	0.113	0.059	0.059	0.02
10/25/2020	03:30	2.13	10:30	3.42	2.84	04:15	0.27	10:35	0.61	0.46	03:20	0.021	10:30	0.096	0.058	0.058	-
10/26/2020	02:55	2.11	10:35	3.32	2.75	00:30	0.29	10:25	0.59	0.44	02:20	0.022	10:35	0.089	0.052	0.052	-
10/27/2020	01:55	2.00	18:35	3.42	2.76	02:00	0.24	17:35	0.63	0.45	01:55	0.017	18:30	0.097	0.054	0.054	-
10/28/2020	02:35	2.04	12:35	3.57	2.76	04:10	0.26	12:35	0.63	0.45	02:30	0.019	12:35	0.106	0.054	0.054	-
10/29/2020	03:20	2.06	18:20	3.24	2.76	01:50	0.30	18:15	0.57	0.45	03:20	0.023	18:20	0.083	0.053	0.053	-
10/30/2020	02:25	1.99	08:25	3.34	2.83	02:20	0.24	08:25	0.60	0.45	02:25	0.016	08:25	0.092	0.055	0.055	0.10
10/31/2020	02:15	1.99	13:10	3.41	2.76	02:00	0.28	15:30	0.64	0.46	02:00	0.020	11:55	0.096	0.056	0.056	-
11/01/2020	02:25	1.97	11:15	3.57	2.80	03:30	0.24	11:30	0.66	0.46	03:30	0.016	11:30	0.112	0.058	0.058	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/02/2020	03:30	2.14	18:20	3.63	2.85	03:30	0.21	12:00	0.69	0.44	03:30	0.016	12:00	0.117	0.055	0.055	-
11/03/2020	02:50	2.10	10:05	3.79	2.97	03:05	0.23	10:05	0.71	0.47	03:05	0.017	10:05	0.130	0.064	0.064	0.83
11/04/2020	03:25	2.27	17:00	3.31	2.88	02:50	0.21	20:10	0.61	0.44	02:50	0.018	20:10	0.087	0.055	0.055	0.09
11/05/2020	04:40	2.32	17:10	3.51	2.96	04:20	0.33	17:05	0.62	0.47	04:25	0.029	17:10	0.102	0.062	0.062	0.34
11/06/2020	04:25	2.38	16:55	3.28	2.87	04:00	0.32	17:00	0.60	0.46	04:00	0.030	17:00	0.088	0.056	0.056	0.10
11/07/2020	01:00	2.21	11:10	3.42	2.86	03:20	0.18	11:10	0.62	0.42	03:25	0.017	11:15	0.098	0.053	0.053	0.07
11/08/2020	03:10	2.23	14:00	3.44	2.86	03:10	0.24	13:45	0.63	0.44	03:05	0.020	13:45	0.100	0.056	0.056	0.01
11/09/2020	04:00	1.96	16:40	3.30	2.75	04:05	0.22	07:15	0.60	0.46	04:00	0.015	16:40	0.086	0.055	0.055	0.04
11/10/2020	04:00	1.95	18:50	3.25	2.72	03:15	0.25	18:45	0.61	0.45	03:55	0.017	18:45	0.088	0.052	0.052	0.03
11/11/2020	02:40	2.00	14:50	3.25	2.74	01:50	0.29	13:55	0.59	0.46	02:40	0.021	14:55	0.086	0.054	0.054	-
11/12/2020	02:50	1.89	20:50	3.52	2.84	02:50	0.22	20:45	0.61	0.44	02:50	0.014	20:45	0.099	0.055	0.055	0.16
11/13/2020	01:30	2.38	18:20	3.20	2.88	01:25	0.32	09:30	0.64	0.46	01:30	0.029	09:30	0.082	0.057	0.057	0.38
11/14/2020	02:40	2.01	18:05	3.62	2.82	03:05	0.27	17:25	0.66	0.46	02:40	0.020	18:10	0.114	0.058	0.058	0.47
11/15/2020	05:15	2.26	13:45	3.30	2.81	04:15	0.30	13:15	0.58	0.44	05:25	0.025	13:15	0.085	0.053	0.053	0.19
11/16/2020	03:55	2.04	12:05	4.62	2.80	03:15	0.22	12:05	0.90	0.42	03:15	0.016	12:05	0.223	0.052	0.052	0.31
11/17/2020	04:30	2.05	19:55	3.40	2.77	02:50	0.24	19:30	0.57	0.41	02:10	0.018	19:45	0.089	0.050	0.050	0.20
11/18/2020	03:45	2.04	18:35	3.33	2.81	02:50	0.28	18:30	0.57	0.44	02:50	0.020	18:30	0.087	0.054	0.054	0.30
11/19/2020	02:25	2.22	14:10	3.37	2.84	01:50	0.30	14:10	0.57	0.44	01:55	0.024	14:10	0.088	0.054	0.054	0.50
11/20/2020	02:50	2.09	13:25	3.31	2.77	03:15	0.29	13:25	0.59	0.44	02:50	0.023	13:25	0.088	0.053	0.053	0.01
11/21/2020	03:50	2.04	16:00	3.51	2.81	03:05	0.29	12:55	0.64	0.47	03:20	0.021	12:55	0.103	0.059	0.059	-
11/22/2020	03:25	1.90	18:25	3.71	2.85	03:10	0.28	13:30	0.69	0.51	03:10	0.018	18:25	0.120	0.067	0.067	0.21
11/23/2020	04:10	2.08	08:15	4.46	2.92	02:55	0.29	08:05	0.74	0.49	04:10	0.021	08:25	0.174	0.064	0.064	0.14
11/24/2020	03:05	1.92	08:25	3.58	2.78	03:05	0.24	22:00	0.64	0.46	02:55	0.016	16:55	0.090	0.056	0.056	0.21
11/25/2020	02:40	2.02	13:35	3.26	2.81	02:10	0.34	14:20	0.63	0.50	02:15	0.024	14:20	0.084	0.059	0.059	0.05
11/26/2020	04:50	1.91	11:10	3.54	2.77	04:40	0.25	11:10	0.70	0.46	04:45	0.016	11:10	0.116	0.057	0.057	0.02
11/27/2020	03:55	1.93	13:30	3.35	2.73	03:50	0.23	13:15	0.62	0.44	03:50	0.015	13:30	0.095	0.052	0.052	-
11/28/2020	05:50	2.05	14:50	3.45	2.78	05:50	0.25	14:45	0.67	0.46	05:50	0.018	14:45	0.106	0.056	0.056	0.05
11/29/2020	03:15	2.07	12:50	3.41	2.80	04:25	0.24	20:35	0.65	0.47	03:05	0.018	16:10	0.099	0.059	0.059	-
11/30/2020	02:45	2.06	13:05	3.48	2.92	02:40	0.26	09:35	0.68	0.51	02:40	0.019	13:05	0.105	0.065	0.065	0.36
12/01/2020	04:15	2.10	13:50	3.40	2.79	04:05	0.29	13:55	0.66	0.48	04:10	0.022	13:50	0.103	0.058	0.058	-
12/02/2020	04:15	1.94	18:05	3.30	2.76	04:15	0.23	13:40	0.60	0.46	04:15	0.015	13:40	0.089	0.055	0.055	0.01
12/03/2020	02:40	1.90	19:45	3.29	2.69	02:30	0.23	15:05	0.59	0.45	02:40	0.014	19:45	0.089	0.052	0.052	-
12/04/2020	03:55	1.95	11:55	3.30	2.75	03:50	0.25	10:25	0.60	0.45	03:50	0.016	16:00	0.087	0.054	0.054	-
12/05/2020	03:25	1.99	13:35	3.45	2.80	03:35	0.24	13:30	0.67	0.46	03:25	0.017	13:30	0.106	0.057	0.057	0.03
12/06/2020	03:00	2.01	12:30	3.53	2.83	02:55	0.25	12:20	0.67	0.46	02:55	0.017	12:20	0.111	0.058	0.058	0.03
12/07/2020	04:30	1.90	12:00	3.33	2.77	03:05	0.20	12:05	0.58	0.42	03:05	0.013	12:05	0.087	0.051	0.051	-
12/08/2020	02:40	1.98	19:25	3.59	3.07	02:40	0.22	16:15	0.61	0.47	02:40	0.015	19:05	0.102	0.067	0.067	0.87
12/09/2020	05:15	2.35	17:05	3.25	2.84	04:05	0.29	17:30	0.57	0.41	05:10	0.026	17:30	0.077	0.049	0.049	0.17
12/10/2020	03:55	2.00	19:25	3.29	2.75	03:55	0.20	21:20	0.55	0.40	03:55	0.014	17:15	0.078	0.049	0.049	0.07
12/11/2020	05:00	2.08	12:45	3.29	2.73	05:05	0.25	19:05	0.54	0.41	03:20	0.019	13:00	0.079	0.048	0.048	0.02
12/12/2020	04:05	1.94	15:45	3.57	2.73	03:50	0.22	15:45	0.62	0.42	04:05	0.014	15:45	0.104	0.051	0.051	0.01
12/13/2020	06:35	2.18	11:35	3.57	2.87	03:00	0.27	09:10	0.66	0.45	02:55	0.022	11:35	0.100	0.058	0.058	0.24
12/14/2020	03:10	2.06	19:05	3.64	2.80	02:40	0.25	19:10	0.60	0.43	02:45	0.018	19:05	0.101	0.052	0.052	0.05
12/15/2020	03:35	2.07	10:35	3.70	2.90	03:35	0.24	16:00	0.64	0.44	03:15	0.018	16:00	0.108	0.058	0.058	0.58
12/16/2020	02:05	1.95	14:05	3.55	2.81	01:55	0.22	14:05	0.61	0.45	01:55	0.015	14:05	0.103	0.055	0.055	0.39
12/17/2020	04:00	2.06	22:55	3.31	2.75	03:50	0.26	11:15	0.60	0.43	03:40	0.019	22:55	0.082	0.050	0.050	0.08
12/18/2020	03:15	2.03	14:00	3.50	2.84	03:05	0.24	14:00	0.63	0.46	03:05	0.017	14:00	0.104	0.057	0.057	0.25
12/19/2020	05:15	1.89	22:10	3.42	2.80	03:40	0.23	17:05	0.67	0.46	05:15	0.014	17:05	0.105	0.058	0.058	0.37
12/20/2020	03:10	2.12	13:40	3.39	2.84	03:05	0.26	13:35	0.60	0.45	03:05	0.020	13:35	0.094	0.056	0.056	0.04
12/21/2020	03:15	2.51	16:35	3.93	3.04	03:10	0.37	16:35	0.72	0.50	03:15	0.036	16:35	0.140	0.068	0.068	1.07
12/22/2020	04:30	2.21	16:25	3.43	2.82	02:55	0.27	13:50	0.64	0.45	03:00	0.022	16:25	0.098	0.056	0.056	-
12/23/2020	02:10	2.10	11:20	3.78	2.78	02:05	0.27	11:15	0.69	0.46	02:05	0.020	11:20	0.127	0.056	0.056	-
12/24/2020	04:40	2.14	13:40	3.69	2.84	03:10	0.28	13:10	0.72	0.46	04:40	0.022	13:40	0.124	0.058	0.058	-
12/25/2020	05:40	2.05	15:35	4.57	2.86	04:30	0.26	15:35	0.97	0.47	04:40	0.019	15:35	0.236	0.061	0.061	0.49
12/26/2020	03:35	2.24	16:20	3.64	2.87	04:30	0.22	16:20	0.73	0.46	04:30	0.018	16:20	0.126	0.059	0.059	0.02
12/27/2020	05:50	1.91	13:45	3.85	2.85	04:35	0.23	13:45	0.69	0.47	04:30	0.015	13:45	0.131	0.061	0.061	0.13
12/28/2020	03:00	1.95	10:20	4.11	2.75	03:00	0.24	10:20	0.80	0.46	03:00	0.016	10:20	0.167	0.056	0.056	-
12/29/2020	03:10	2.04	19:45	3.35	2.76	02:30	0.28	11:40	0.65	0.47	02:30	0.020	11:40	0.097	0.056	0.056	0.14
12/30/2020	03:20	2.47	21:00	3.53	2.95	03:30	0.40	21:00	0.69	0.53	03:30	0.039	21:00	0.114	0.068	0.068	0.78
12/31/2020	03:35	2.27	16:30	3.47	2.86	03:35	0.35	17:55	0.67	0.50	03:35	0.029	16:30	0.104	0.062	0.062	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			11.870	30.65
Average	2.89	0.45	0.058	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A15_80930

Site Address /Location:	641 4th St SE			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	Park on 4th St SE	Latitude:	47.304257	Pipe Size (H x W): 21.00 x 21.00	Pipe Shape: Circular
		Longitude:	-122.220984		



Manhole #	System Characteristics
809-30	Residential
Access	Traffic
Drive	Medium







ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519

Installation Information

Installation Date:	Installation Type:
Wednesday, September 23, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	Pipe Size (HxW)
12:23:00 PM	16.25x16.38
Depth of Flow (Wet DOF) (in)	
3.50	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
0.61	N/A
Silt (in)	Silt Type
0.38	Soft / Loose

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
6	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Concrete	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

Alternate location for A15 809-02

AUB_A16_80956

Site Commentary

SITE INFORMATION

Pipe	Round (18 in H)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	2.07	3.29	0.243
Minimum	1.56	0.87	0.042
Maximum	3.04	4.51	0.575
Min Time	12/17/2020 3:00:00 AM	12/17/2020 4:00:00 AM	12/17/2020 4:00:00 AM
Max Time	01/02/2021 10:00:00 PM	01/02/2021 10:00:00 PM	01/02/2021 10:00:00 PM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

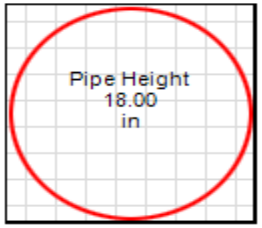
Percent Uptime	
DFINAL (in)	99.761
VFINAL (ft/s)	99.761
QFINAL (MGD - Total MG)	99.761

Hydrograph Report

AUB_A16_80956

Flow Monitor

AUB_A16_80956



Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL





4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A16_80956

Flow Monitor

AUB_A16_80956

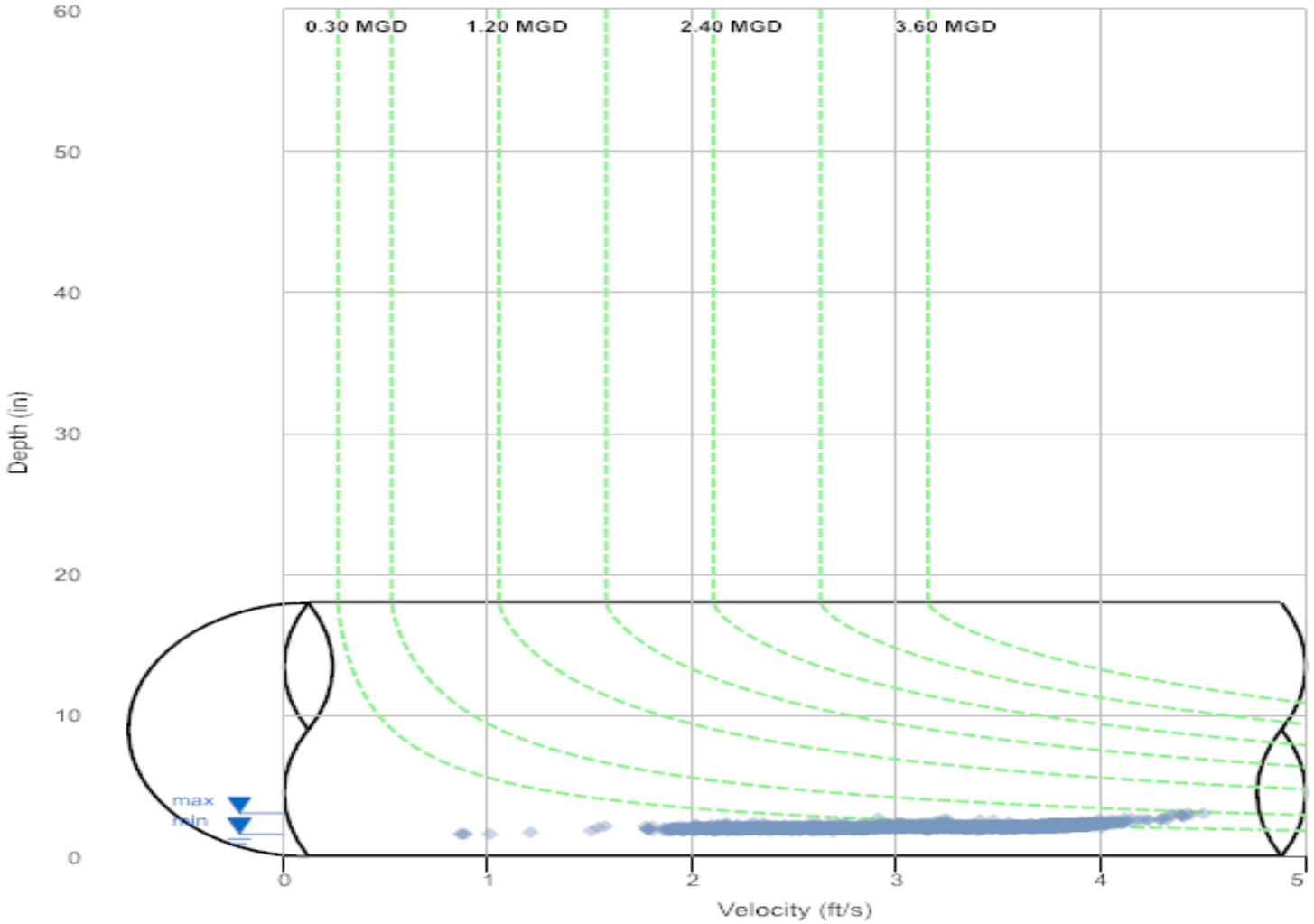
Pipe Height
18.00
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A16_80956Pipe: Round (18 in H), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	05:35	1.87	16:10	2.36	2.10	07:25	2.15	16:05	4.14	3.33	05:50	0.154	16:05	0.364	0.250	0.250	0.51
01/02/2021	02:15	1.82	22:10	3.09	2.22	06:20	2.27	22:00	4.62	3.52	06:00	0.150	22:10	0.594	0.296	0.296	1.69
01/03/2021	08:00	1.89	00:25	3.04	2.24	06:15	1.86	00:25	4.50	3.52	06:15	0.131	00:25	0.574	0.296	0.296	0.65
01/04/2021	05:15	1.82	21:05	2.34	2.10	04:05	1.96	19:10	4.01	3.44	04:05	0.141	21:05	0.348	0.258	0.258	0.48
01/05/2021	02:10	1.83	19:00	2.27	2.09	03:25	2.24	19:00	4.15	3.37	04:05	0.150	19:00	0.347	0.252	0.252	0.52
01/06/2021	05:15	1.87	07:20	2.21	2.06	03:50	2.37	20:10	3.88	3.39	03:50	0.157	20:10	0.301	0.247	0.247	0.22
01/07/2021	05:20	1.77	00:00	2.23	2.03	04:15	2.13	19:05	3.95	3.30	04:15	0.136	19:05	0.319	0.236	0.236	-
01/08/2021	02:00	1.78	16:45	2.24	2.04	02:40	2.08	16:40	4.00	3.33	02:40	0.136	16:45	0.328	0.240	0.240	0.22
01/09/2021	00:40	1.79	10:00	2.59	2.18	03:30	1.97	12:20	4.11	3.24	06:50	0.154	10:20	0.348	0.254	0.254	-
01/10/2021	07:15	1.78	13:30	2.32	2.05	05:40	2.02	16:05	4.07	3.38	05:40	0.127	16:05	0.348	0.247	0.247	0.07
01/11/2021	01:30	1.76	21:45	2.40	2.09	02:20	1.91	14:25	4.09	3.37	02:20	0.124	21:45	0.363	0.253	0.253	1.06
01/12/2021	02:45	1.97	19:25	2.68	2.31	01:35	2.71	19:30	4.40	3.84	01:40	0.192	19:30	0.467	0.332	0.332	2.10
01/13/2021	06:25	1.90	00:55	2.73	2.12	03:55	2.19	00:50	4.46	3.44	03:55	0.156	00:50	0.485	0.263	0.263	0.09
01/14/2021	05:55	1.83	23:55	2.21	2.05	02:35	2.04	20:05	4.11	3.32	02:35	0.145	20:05	0.326	0.241	0.241	0.01
01/15/2021	01:25	1.79	07:35	2.26	2.03	02:20	2.22	18:05	3.88	3.29	04:00	0.143	18:05	0.297	0.235	0.235	0.09
01/16/2021	05:00	1.78	15:20	2.31	2.03	04:55	1.87	15:20	4.05	3.27	05:00	0.110	15:20	0.347	0.236	0.236	-
01/17/2021	07:20	1.72	12:40	2.24	2.02	04:50	1.77	12:05	3.93	3.26	06:05	0.107	12:40	0.321	0.234	0.234	0.10
01/18/2021	01:50	1.80	18:00	2.24	2.03	03:15	1.72	18:05	3.96	3.32	03:15	0.108	18:00	0.322	0.239	0.239	-
01/19/2021	03:55	1.82	19:15	2.19	2.02	03:20	1.53	19:10	3.95	3.20	03:20	0.097	19:15	0.311	0.227	0.227	0.01
01/20/2021	02:20	1.82	09:10	2.32	2.07	05:05	1.50	15:25	3.91	3.18	05:05	0.112	19:35	0.314	0.232	0.232	-
01/21/2021	01:05	1.79	15:20	2.27	2.03	03:15	1.76	15:20	4.19	3.23	04:45	0.113	15:20	0.350	0.231	0.231	0.11
01/22/2021	03:00	1.76	09:50	2.34	2.05	04:20	1.86	15:20	3.94	3.20	04:15	0.112	15:25	0.329	0.234	0.234	-
01/23/2021	02:45	1.88	07:40	2.31	2.12	05:15	1.86	13:35	3.99	3.16	05:15	0.124	13:40	0.334	0.240	0.240	-
01/24/2021	05:30	1.84	18:50	2.46	2.13	05:35	1.86	18:45	4.06	3.30	05:35	0.116	18:50	0.380	0.254	0.254	0.16
01/25/2021	03:00	1.91	04:55	2.32	2.11	03:40	2.29	21:00	4.02	3.40	03:40	0.161	21:00	0.343	0.255	0.255	0.04
01/26/2021	03:00	1.83	08:05	2.25	2.06	04:10	1.70	13:00	3.95	3.18	04:10	0.108	17:45	0.320	0.233	0.233	-
01/27/2021	01:15	1.81	18:10	2.42	2.04	03:25	1.67	18:05	4.13	3.24	03:25	0.104	18:10	0.379	0.234	0.234	0.14
01/28/2021	01:05	1.83	10:05	2.29	2.08	03:50	2.13	11:40	3.84	3.25	02:35	0.140	16:35	0.302	0.241	0.241	0.24
01/29/2021	04:45	1.79	23:40	2.31	2.09	03:15	1.67	17:55	4.00	3.17	04:40	0.100	17:50	0.339	0.237	0.237	0.03
01/30/2021	05:45	1.88	22:10	2.33	2.09	03:30	2.05	12:35	3.97	3.27	03:45	0.137	17:55	0.323	0.244	0.244	0.07
01/31/2021	06:45	1.75	18:00	2.27	2.07	05:40	1.96	11:00	4.06	3.32	05:40	0.130	11:00	0.335	0.244	0.244	0.12
02/01/2021	06:00	1.76	20:00	2.31	2.06	02:55	2.07	20:00	4.09	3.36	03:05	0.133	20:00	0.351	0.246	0.246	0.82
02/02/2021	02:05	1.84	18:45	2.27	2.05	04:10	1.75	18:45	4.06	3.36	04:10	0.116	18:45	0.339	0.243	0.243	0.31
02/03/2021	01:20	1.86	05:55	2.23	2.03	05:35	2.27	18:40	3.95	3.34	04:35	0.152	18:45	0.313	0.239	0.239	0.06
02/04/2021	08:55	1.79	14:55	2.48	2.07	04:10	2.04	14:55	4.11	3.20	04:05	0.134	14:55	0.389	0.235	0.235	0.07
02/05/2021	06:50	1.90	00:00	2.28	2.08	03:35	1.80	13:05	4.02	3.16	03:35	0.124	22:45	0.330	0.235	0.235	0.01
02/06/2021	02:35	1.90	08:50	2.35	2.11	05:55	1.80	11:05	3.99	3.14	05:55	0.120	11:05	0.349	0.239	0.239	0.01
02/07/2021	06:45	1.70	11:20	2.41	2.08	05:25	1.61	11:20	4.07	3.23	05:25	0.095	11:20	0.370	0.241	0.241	-
02/08/2021	01:40	1.78	18:25	2.30	2.03	05:05	1.60	18:25	3.96	3.18	03:20	0.103	18:25	0.338	0.229	0.229	-
02/09/2021	00:45	1.81	19:50	2.29	2.03	02:30	1.78	19:55	3.98	3.22	02:30	0.118	19:55	0.334	0.231	0.231	-
02/10/2021	00:55	1.84	23:50	2.36	2.08	02:50	1.73	18:00	3.99	3.24	02:50	0.116	18:00	0.326	0.239	0.239	-
02/11/2021	01:25	1.90	09:10	2.32	2.09	04:45	1.85	11:30	3.98	3.26	04:45	0.125	17:15	0.326	0.243	0.243	-
02/12/2021	05:00	1.80	09:15	2.36	2.08	05:10	1.82	12:10	4.10	3.20	04:55	0.110	12:10	0.351	0.238	0.238	-
02/13/2021	01:25	1.92	08:45	2.29	2.08	04:40	1.97	11:30	3.94	3.24	04:40	0.133	11:30	0.305	0.240	0.240	0.08
02/14/2021	03:15	1.88	00:05	2.30	2.11	05:05	1.97	10:20	4.06	3.30	05:05	0.133	14:35	0.338	0.250	0.250	0.71
02/15/2021	01:00	2.06	14:35	2.96	2.35	04:40	2.87	14:45	4.49	3.73	04:45	0.210	14:40	0.548	0.334	0.334	0.78
02/16/2021	23:10	2.02	06:25	2.44	2.15	04:00	2.83	18:40	4.12	3.44	04:00	0.200	18:40	0.366	0.264	0.264	0.07
02/17/2021	05:45	1.71	00:00	2.24	2.05	03:45	1.95	20:10	3.96	3.24	03:45	0.126	20:20	0.314	0.236	0.236	-
02/18/2021	05:30	1.83	23:35	2.27	2.06	03:25	1.70	18:25	4.06	3.23	03:25	0.114	18:25	0.338	0.236	0.236	0.09
02/19/2021	05:40	1.77	19:50	2.21	2.05	02:45	1.79	19:55	4.02	3.24	02:50	0.120	19:55	0.323	0.234	0.234	0.17
02/20/2021	04:10	1.82	12:40	2.36	2.07	05:10	1.77	12:40	4.13	3.29	05:10	0.120	12:40	0.366	0.242	0.242	0.07
02/21/2021	02:20	1.78	19:05	2.33	2.09	05:10	1.92	19:05	4.11	3.37	05:10	0.127	19:05	0.357	0.253	0.253	0.42
02/22/2021	04:50	1.95	13:50	2.67	2.20	05:25	2.32	13:45	4.38	3.61	05:20	0.174	13:50	0.461	0.291	0.291	0.98
02/23/2021	04:45	1.85	19:15	2.24	2.05	03:00	1.95	19:15	4.05	3.30	03:00	0.126	19:15	0.332	0.240	0.240	0.27
02/24/2021	03:40	1.82	01:10	2.23	2.04	03:40	1.68	20:50	4.00	3.26	03:40	0.102	20:50	0.325	0.235	0.235	-
02/25/2021	05:25	1.77	23:30	2.31	2.05	03:45	1.82	13:20	3.98	3.27	03:45	0.123	13:20	0.319	0.237	0.237	0.18
02/26/2021	01:55	1.75	19:15	2.21	2.04	03:40	1.81	16:05	4.01	3.30	03:40	0.118	16:05	0.315	0.238	0.238	0.10
02/27/2021	06:45	1.76	23:10	2.27	2.03	05:00	1.89	10:10	3.95	3.31	05:00	0.115	11:35	0.317	0.237	0.237	0.02
02/28/2021	07:50	1.76	13:45	2.32	2.03	05:40	1.79	13:50	4.07	3.31	05:45	0.108	13:50	0.351	0.239	0.239	0.02
03/01/2021	04:55	1.80	21:35	2.25	2.03	02:50	1.84	17:55	4.02	3.31	02:50	0.126	21:35	0.328	0.237	0.237	-
03/02/2021	04:00	1.77	12:50	2.20	2.02	04:05	1.71	20:45	3.93	3.26	04:05	0.099	12:50	0.313	0.231	0.231	-
03/03/2021	01:45	1.78	23:55	2.34	2.04	03:20	1.55	17:35	4.00	3.22	03:20	0.102	17:35	0.326	0.233	0.233	-
03/04/2021	01:20	1.81	00:00	2.37	2.05	04:30	1.78	19:15	4.01	3.26	04:30	0.112	19:15	0.344	0.237	0.237	0.20
03/05/2021	04:10	1.82	23:55	2.31	2.05	04:10	1.79	21:05	3.95	3.29	04:10	0.109	21:05	0.310	0.239	0.239	0.05
03/06/2021	07:10	1.83	10:20	2.32	2.07	03:50	2.04	12:15	4.12	3.33	05:35	0.131	11:55	0.351	0.246	0.246	-
03/07/2021	06:40	1.80	15:50	2.42	2.08	06:05	1.85	12:20	4.12	3.31	06:05	0.116	15:50	0.372	0.248	0.248	0.04
03/08/2021	02:25	1.86	13:10	2.42	2.08	03:20	1.85	19:35	4.05	3.32	03:20	0.125	19:35	0.340	0.247	0.247	-
03/09/2021	01:15	1.81	08:20	2.34	2.07	03:35	1.84	20:05	4.03	3.26	04:05	0.112	20:05	0.336	0.241	0.241	0.01
03/10/2021	01:40	1.85	08:15	2.26	2.08	03:40	1.93	16:00	4.02	3.31	04:10	0.125	16:00	0.328	0.245	0.245	-
03/11/2021	01:10	1.86	07:50	2.32	2.07	04:05	1.86	17:15	3.99	3.23	04:05	0.118	17:20	0.320	0.237	0.237	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	03:25	1.81	18:00	3.12	2.08	03:25	1.80	18:00	4.69	3.19	03:25	0.108	18:00	0.621	0.239	0.239	-
03/13/2021	04:50	1.83	13:00	2.34	2.07	04:05	1.92	13:05	4.19	3.27	04:25	0.123	13:05	0.366	0.242	0.242	-
03/14/2021	04:15	1.86	11:05	2.32	2.09	05:05	1.76	11:05	4.10	3.29	05:05	0.113	11:05	0.354	0.246	0.246	0.30
03/15/2021	02:10	1.85	20:15	2.23	2.04	03:15	1.81	20:10	4.02	3.25	03:15	0.115	20:10	0.326	0.234	0.234	-
03/16/2021	00:10	1.81	21:00	2.33	2.06	02:45	2.01	21:00	4.08	3.31	02:45	0.137	21:00	0.355	0.242	0.242	-
03/17/2021	02:40	1.86	23:55	2.25	2.04	03:20	2.10	10:50	4.08	3.31	03:20	0.137	10:50	0.320	0.238	0.238	-
03/18/2021	04:30	1.75	06:55	2.31	2.05	02:00	2.07	16:30	4.03	3.35	02:40	0.131	16:40	0.334	0.244	0.244	0.11
03/19/2021	03:35	1.73	20:35	3.13	2.03	02:30	1.89	12:00	4.11	3.28	02:30	0.121	20:35	0.435	0.235	0.235	0.03
03/20/2021	05:50	1.77	13:45	2.34	2.03	04:15	2.02	13:40	4.06	3.34	04:15	0.120	13:45	0.355	0.241	0.241	0.17
03/21/2021	01:00	1.77	10:25	2.40	2.05	04:30	1.97	10:30	4.22	3.31	03:55	0.121	10:30	0.381	0.242	0.242	0.07
03/22/2021	03:40	1.77	08:40	2.20	2.02	02:05	2.13	13:20	3.97	3.36	02:05	0.132	13:20	0.311	0.240	0.240	0.11
03/23/2021	02:55	1.75	09:00	2.59	2.04	03:20	1.74	15:05	4.05	3.30	03:20	0.107	15:05	0.341	0.239	0.239	-
03/24/2021	03:30	1.64	19:30	2.29	2.04	02:50	1.99	16:00	4.08	3.28	02:50	0.125	16:00	0.343	0.238	0.238	0.34
03/25/2021	03:25	1.74	17:45	2.36	2.05	02:25	2.13	17:40	4.15	3.41	02:15	0.143	17:45	0.367	0.248	0.248	0.27
03/26/2021	02:55	1.84	11:45	2.22	2.05	03:35	2.16	11:45	3.97	3.34	03:35	0.136	11:45	0.322	0.243	0.243	-
03/27/2021	05:40	1.82	06:45	2.27	2.06	04:00	2.05	12:00	3.95	3.31	04:00	0.133	13:30	0.313	0.242	0.242	-
03/28/2021	04:55	1.80	18:50	2.43	2.08	04:30	1.79	18:45	4.20	3.32	04:30	0.108	18:50	0.385	0.250	0.250	0.37
03/29/2021	23:45	1.81	12:05	2.39	2.10	03:00	1.78	20:00	4.10	3.27	03:00	0.112	12:05	0.365	0.246	0.246	-
03/30/2021	02:05	1.78	08:10	2.19	2.04	04:20	2.06	09:25	3.94	3.32	01:45	0.126	20:30	0.307	0.239	0.239	-
03/31/2021	04:50	1.79	06:45	2.24	2.08	02:55	2.15	10:55	4.14	3.36	02:55	0.144	10:55	0.331	0.249	0.249	-
04/01/2021	03:30	1.83	19:50	2.26	2.04	02:35	1.84	19:50	4.06	3.29	02:35	0.118	19:50	0.337	0.237	0.237	-
04/02/2021	02:25	1.80	18:25	2.25	2.04	02:20	1.84	18:15	3.95	3.28	02:20	0.112	18:25	0.325	0.237	0.237	-
04/03/2021	04:20	1.73	11:00	2.39	2.06	03:25	2.09	10:55	4.20	3.36	03:25	0.137	10:55	0.375	0.247	0.247	-
04/04/2021	03:55	1.74	10:45	2.30	2.02	04:20	1.67	10:45	4.07	3.31	04:20	0.096	10:45	0.345	0.237	0.237	-
04/05/2021	03:20	1.79	11:10	2.25	2.04	02:05	2.01	11:15	4.14	3.40	02:05	0.123	11:10	0.341	0.246	0.246	-
04/06/2021	02:20	1.71	20:25	2.41	2.04	03:20	1.91	20:20	4.17	3.43	03:20	0.128	20:20	0.377	0.248	0.248	-
04/07/2021	01:05	1.78	22:55	2.30	2.05	02:35	2.04	20:25	4.21	3.40	02:35	0.129	20:15	0.329	0.246	0.246	0.22
04/08/2021	07:45	1.82	07:05	2.25	2.08	01:35	2.21	20:45	3.89	3.31	02:05	0.146	20:45	0.317	0.245	0.245	-
04/09/2021	04:40	1.82	06:40	2.30	2.08	02:30	1.93	12:40	3.92	3.24	02:30	0.127	18:05	0.314	0.240	0.240	0.03
04/10/2021	05:05	1.84	12:40	2.34	2.10	02:15	1.75	11:05	4.02	3.26	05:05	0.115	12:45	0.351	0.247	0.247	0.02
04/11/2021	05:25	1.75	08:30	2.49	2.11	02:45	1.67	08:30	4.28	3.30	05:15	0.101	08:30	0.409	0.252	0.252	-
04/12/2021	04:10	1.82	19:45	2.29	2.07	02:45	1.92	19:30	4.23	3.32	02:45	0.123	19:30	0.351	0.244	0.244	-
04/13/2021	01:30	1.58	06:30	2.29	2.06	02:40	2.14	18:15	3.95	3.32	01:40	0.134	18:20	0.323	0.243	0.243	-
04/14/2021	04:10	1.81	23:20	2.23	2.06	02:30	1.83	20:25	3.98	3.35	02:30	0.113	20:25	0.320	0.245	0.244	-
09/22/2020	23:55	1.94	19:20	2.29	2.14	22:40	2.75	19:20	4.08	3.68	23:55	0.185	19:20	0.346	0.283	0.143	-
09/23/2020	23:35	1.77	19:40	2.58	2.15	02:50	1.91	20:15	4.15	3.50	02:25	0.133	16:30	0.392	0.274	0.274	-
09/24/2020	00:20	1.86	23:15	2.33	2.14	03:25	2.08	10:50	4.02	3.40	03:25	0.154	18:20	0.348	0.261	0.261	-
09/25/2020	00:10	1.92	01:40	2.34	2.13	03:30	2.33	16:30	3.99	3.42	03:15	0.173	10:25	0.320	0.261	0.261	-
09/26/2020	00:40	1.90	13:20	2.41	2.13	04:05	2.04	10:55	4.14	3.40	03:20	0.140	13:20	0.374	0.261	0.261	-
09/27/2020	23:55	1.87	12:00	2.39	2.14	04:05	2.07	08:35	4.15	3.34	04:05	0.146	08:45	0.365	0.259	0.259	-
09/28/2020	23:45	1.91	17:40	2.41	2.13	00:30	2.10	11:00	4.15	3.29	01:20	0.143	17:40	0.375	0.252	0.252	-
09/29/2020	05:05	1.89	22:55	2.38	2.13	00:45	2.11	10:10	4.03	3.29	02:25	0.148	10:10	0.328	0.252	0.252	-
09/30/2020	03:00	1.92	07:20	2.34	2.12	00:55	2.12	18:35	4.00	3.26	03:00	0.148	19:40	0.338	0.249	0.249	-
10/01/2020	00:10	1.87	08:30	2.34	2.12	01:45	2.10	19:45	4.08	3.28	03:20	0.140	19:05	0.346	0.250	0.250	-
10/02/2020	00:15	1.87	22:45	2.41	2.11	00:35	2.10	10:20	3.99	3.30	03:35	0.136	10:10	0.326	0.250	0.250	-
10/03/2020	00:35	1.89	23:20	2.33	2.13	03:25	2.12	12:20	4.02	3.36	03:25	0.146	12:20	0.339	0.256	0.256	0.01
10/04/2020	01:45	1.85	10:50	2.32	2.14	03:40	2.11	08:40	4.18	3.36	03:40	0.147	10:50	0.347	0.259	0.259	0.01
10/05/2020	23:25	1.95	05:20	2.38	2.15	01:50	2.13	11:45	3.91	3.27	01:50	0.157	11:45	0.318	0.252	0.252	-
10/06/2020	05:25	1.91	05:05	2.51	2.16	01:25	2.10	17:05	3.96	3.23	00:30	0.157	17:10	0.328	0.250	0.250	-
10/07/2020	00:35	1.85	19:05	2.25	2.11	02:50	2.11	19:10	3.92	3.27	01:55	0.146	19:05	0.323	0.247	0.247	-
10/08/2020	01:15	1.87	23:00	2.26	2.11	02:35	2.20	12:05	3.97	3.37	03:25	0.153	12:05	0.322	0.256	0.256	-
10/09/2020	00:15	1.90	23:45	2.49	2.13	01:35	2.14	23:45	4.16	3.38	04:00	0.146	23:45	0.397	0.258	0.258	0.64
10/10/2020	04:45	1.89	00:00	2.39	2.16	05:45	2.40	10:50	4.07	3.59	04:45	0.165	10:55	0.355	0.280	0.280	1.04
10/11/2020	01:25	1.83	11:50	2.34	2.12	06:00	2.11	08:05	4.14	3.34	04:55	0.136	11:50	0.347	0.256	0.256	0.53
10/12/2020	05:30	1.89	11:55	2.36	2.12	04:25	2.12	18:55	4.04	3.32	04:25	0.155	11:55	0.353	0.253	0.253	-
10/13/2020	02:05	1.81	08:30	2.68	2.10	02:40	2.35	08:10	4.45	3.46	02:45	0.163	08:30	0.467	0.261	0.261	0.61
10/14/2020	04:40	1.83	19:25	2.33	2.06	04:05	2.15	19:30	4.01	3.28	03:30	0.142	19:25	0.347	0.240	0.240	-
10/15/2020	05:40	1.80	07:30	2.29	2.07	04:05	2.16	11:05	4.06	3.24	02:25	0.141	11:05	0.344	0.240	0.240	-
10/16/2020	03:00	1.86	07:05	2.19	2.04	01:00	2.17	17:50	3.96	3.26	03:00	0.137	17:50	0.300	0.235	0.235	-
10/17/2020	01:20	1.79	03:25	2.28	2.06	03:10	2.16	19:45	4.14	3.29	04:00	0.139	19:45	0.325	0.240	0.240	0.01
10/18/2020	00:45	1.81	12:20	2.33	2.06	06:00	2.10	12:35	4.08	3.28	01:25	0.136	12:35	0.352	0.240	0.240	0.03
10/19/2020	00:50	1.81	11:45	2.27	2.05	02:40	2.16	19:15	3.95	3.29	02:20	0.137	11:45	0.328	0.238	0.238	0.05
10/20/2020	02:40	1.82	18:20	2.31	2.06	02:35	2.10	18:20	4.03	3.30	02:30	0.136	18:20	0.345	0.242	0.242	-
10/21/2020	23:20	1.89	23:55	2.27	2.10	04:35	2.11	09:30	4.04	3.22	03:20	0.145	09:30	0.330	0.241	0.241	0.01
10/22/2020	06:35	1.94	06:05	2.45	2.13	04:30	2.10	16:35	3.88	3.22	04:20	0.154	16:35	0.312	0.246	0.246	-
10/23/2020	05:40	1.89	19:50	2.28	2.08	02:50	1.85	19:45	4.06	3.25	01:40	0.129	19:45	0.340	0.240	0.240	0.20
10/24/2020	04:30	1.84	10:30	2.26	2.08	04:25	1.77	15:55	3.96	3.25	04:25	0.110	10:30	0.325	0.242	0.242	0.02
10/25/2020	23:55	1.87	12:45	2.24	2.09	03:35	1.84	18:20	4.06	3.20	03:35	0.120	12:45	0.322	0.238	0.238	-
10/26/2020	05:35	1.86	17:05	2.23	2.07	00:50	1.83	10:20	3.98	3.18	00:50	0.125	17:05	0.320	0.234	0.234	-
10/27/2020	05:55	1.82	17:20	2.26	2.08	02:00	1.85	15:55	3.92	3.24	02:00	0.128	17:20	0.324	0.241	0.241	-
10/28/2020	23:55	1.86	01:10	2.27	2.05	02:15	1.85	16:35	3.89	3.24	03:20	0.122	16:40	0.303	0.234	0.234	-
10/29/2020	00:05	1.80	14:25	2.23	2.07	01:10	1.84	17:35	3.90	3.24	02:30	0.120	18:45	0.315	0.238	0.238	-
10/30/2020	23:25	1.87	06:50	2.28	2.07	01:40	1.82	10:05	3.95	3.27	02:40	0.123	10:05	0.321	0.240	0.240	0.10
10/31/2020	01:10	1.78	10:30	2.42	2.06	02:30	1.83	10:25	4.13	3.20	02:40	0.121	10:30	0.379	0.236	0.236	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/01/2020	06:55	1.76	13:05	2.27	2.05	05:05	1.83	14:45	4.00	3.19	04:45	0.117	14:45	0.332	0.232	0.232	-
11/02/2020	01:10	1.79	23:40	2.21	2.04	02:30	1.83	13:35	3.93	3.22	04:20	0.113	13:35	0.307	0.232	0.232	-
11/03/2020	01:40	1.84	10:35	2.31	2.07	02:25	1.80	10:25	4.03	3.33	03:55	0.118	10:30	0.344	0.246	0.246	0.83
11/04/2020	06:05	1.83	07:50	2.22	2.04	01:55	1.77	12:15	3.92	3.19	02:00	0.121	21:00	0.303	0.229	0.229	0.09
11/05/2020	01:15	1.84	09:25	2.31	2.09	04:05	1.84	16:25	3.94	3.29	03:50	0.123	16:25	0.336	0.244	0.244	0.34
11/06/2020	02:05	1.86	09:00	2.30	2.07	04:20	2.15	20:00	4.03	3.28	04:20	0.152	12:45	0.314	0.241	0.241	0.10
11/07/2020	06:55	1.83	15:20	2.29	2.07	04:30	1.96	15:20	3.98	3.25	04:35	0.132	15:20	0.336	0.238	0.238	0.07
11/08/2020	01:30	1.84	12:25	2.39	2.11	04:45	2.02	12:20	4.04	3.31	04:45	0.137	12:25	0.362	0.251	0.251	0.01
11/09/2020	00:50	1.84	23:30	2.30	2.04	02:35	1.99	20:45	3.98	3.25	04:15	0.132	20:50	0.328	0.234	0.234	0.04
11/10/2020	01:20	1.84	17:10	2.34	2.07	02:30	1.99	17:05	4.07	3.24	02:30	0.133	17:05	0.350	0.239	0.239	0.03
11/11/2020	06:25	1.81	23:50	2.32	2.05	04:15	2.10	14:05	3.99	3.23	04:15	0.135	14:10	0.320	0.234	0.234	-
11/12/2020	01:05	1.84	00:00	2.33	2.07	03:35	2.10	08:50	3.98	3.27	04:35	0.141	10:40	0.318	0.240	0.240	0.16
11/13/2020	01:45	1.87	00:30	2.28	2.08	03:05	2.23	13:50	4.13	3.34	03:05	0.155	18:55	0.333	0.246	0.246	0.38
11/14/2020	01:25	1.90	08:05	2.53	2.11	04:20	1.94	11:30	4.01	3.18	04:25	0.129	16:15	0.345	0.241	0.241	0.47
11/15/2020	04:00	1.75	15:05	2.34	2.06	03:15	2.11	11:10	4.07	3.35	05:00	0.134	15:05	0.354	0.245	0.245	0.19
11/16/2020	05:05	1.82	14:35	2.31	2.04	03:40	2.09	11:25	3.95	3.28	04:00	0.137	14:25	0.329	0.237	0.237	0.31
11/17/2020	00:45	1.88	18:55	2.29	2.05	03:35	2.04	19:00	4.01	3.28	03:35	0.135	18:55	0.337	0.237	0.237	0.20
11/18/2020	03:20	1.83	15:45	2.27	2.04	04:05	1.96	17:45	3.98	3.22	04:00	0.128	15:45	0.330	0.232	0.232	0.30
11/19/2020	00:35	1.84	19:20	2.20	2.05	03:45	2.10	13:10	3.93	3.27	03:45	0.133	19:25	0.311	0.237	0.237	0.50
11/20/2020	00:50	1.81	01:50	2.29	2.01	02:40	2.07	21:45	4.07	3.23	02:40	0.136	21:45	0.340	0.228	0.228	0.01
11/21/2020	01:55	1.76	23:15	2.31	2.04	04:00	1.98	12:35	3.97	3.23	05:25	0.130	12:35	0.329	0.233	0.233	-
11/22/2020	05:30	1.78	13:00	2.29	2.04	03:50	1.97	12:50	3.99	3.23	05:30	0.120	12:45	0.335	0.234	0.234	0.21
11/23/2020	03:15	1.80	08:45	2.18	2.03	02:20	1.86	19:40	3.88	3.19	03:25	0.112	19:45	0.299	0.229	0.229	0.14
11/24/2020	02:30	1.74	00:10	2.19	2.03	03:30	1.86	16:45	3.90	3.17	03:30	0.121	17:50	0.304	0.226	0.226	0.21
11/25/2020	01:40	1.81	21:25	2.43	2.04	02:45	1.86	21:25	4.22	3.24	02:45	0.126	21:25	0.389	0.233	0.233	0.05
11/26/2020	07:15	1.76	13:30	2.39	2.07	05:30	1.95	13:30	4.20	3.35	05:20	0.131	13:30	0.378	0.247	0.247	0.02
11/27/2020	01:20	1.79	00:35	2.19	1.99	05:30	1.86	11:25	3.88	3.18	03:25	0.112	11:35	0.284	0.221	0.221	-
11/28/2020	01:40	1.82	08:40	2.35	2.06	04:50	1.86	19:00	4.03	3.16	04:50	0.126	19:05	0.333	0.230	0.230	0.05
11/29/2020	08:05	1.82	12:40	2.35	2.05	04:55	1.88	12:40	4.13	3.22	04:55	0.122	12:40	0.363	0.235	0.235	-
11/30/2020	02:00	1.80	23:50	2.24	2.03	02:45	1.93	11:35	4.03	3.33	02:50	0.125	11:40	0.321	0.237	0.237	0.36
12/01/2020	01:55	1.78	23:10	2.31	2.03	04:40	1.86	18:40	3.96	3.21	03:20	0.127	18:40	0.301	0.229	0.229	-
12/02/2020	06:05	1.78	08:30	2.33	2.04	01:05	1.86	18:30	3.94	3.19	03:30	0.116	18:30	0.324	0.230	0.230	0.01
12/03/2020	02:25	1.77	17:35	2.35	2.02	03:05	1.81	19:25	3.87	3.17	03:35	0.119	17:35	0.317	0.225	0.225	-
12/04/2020	00:55	1.84	23:20	2.24	2.02	04:05	1.55	20:55	3.92	3.17	04:00	0.099	20:55	0.312	0.226	0.226	-
12/05/2020	01:20	1.83	21:00	2.83	2.16	04:05	1.93	11:45	3.99	3.11	04:05	0.123	19:15	0.383	0.245	0.245	0.03
12/06/2020	01:50	1.86	17:00	2.33	2.07	06:45	2.12	12:55	3.98	3.28	06:35	0.140	17:00	0.344	0.242	0.242	0.03
12/07/2020	01:20	1.88	00:15	2.32	2.04	04:50	1.86	17:45	3.91	3.25	04:50	0.120	17:45	0.321	0.234	0.234	-
12/08/2020	03:35	1.78	17:25	2.29	2.06	04:25	1.79	19:30	4.01	3.31	03:55	0.108	19:35	0.334	0.244	0.244	0.87
12/09/2020	03:10	1.79	07:55	2.23	2.04	02:20	2.40	22:20	3.95	3.32	03:00	0.155	22:20	0.311	0.238	0.238	0.17
12/10/2020	06:35	1.82	23:35	2.23	2.04	03:20	1.64	17:15	3.88	3.15	03:20	0.111	18:25	0.298	0.226	0.226	0.07
12/11/2020	06:20	1.84	08:40	2.22	2.02	02:50	1.86	12:00	3.90	3.14	02:30	0.122	12:10	0.315	0.223	0.223	0.02
12/12/2020	08:50	1.82	23:30	2.30	2.05	02:10	1.87	08:50	3.90	3.08	04:10	0.122	12:40	0.324	0.225	0.225	0.01
12/13/2020	00:50	1.84	08:25	2.26	2.05	05:45	1.69	09:10	3.98	3.08	05:45	0.105	15:30	0.320	0.224	0.224	0.24
12/14/2020	06:15	1.77	18:20	2.20	2.02	03:45	1.85	10:45	3.92	3.18	03:45	0.115	17:05	0.308	0.226	0.226	0.05
12/15/2020	01:00	1.83	16:30	2.22	2.04	02:30	1.82	16:30	3.91	3.21	03:20	0.113	16:30	0.315	0.232	0.232	0.58
12/16/2020	01:35	1.85	18:50	2.68	2.24	04:20	1.99	07:40	3.59	2.87	04:20	0.135	18:50	0.357	0.238	0.238	0.39
12/17/2020	01:55	1.48	12:25	2.41	1.93	03:15	0.77	12:15	3.92	2.55	03:15	0.037	12:20	0.343	0.180	0.180	0.08
12/18/2020	01:05	1.84	11:30	2.31	2.11	03:40	1.34	14:10	4.06	3.11	03:40	0.104	12:50	0.301	0.233	0.233	0.25
12/19/2020	02:00	1.87	22:05	2.28	2.06	04:45	1.66	12:10	3.96	3.27	04:45	0.109	22:05	0.332	0.238	0.238	0.37
12/20/2020	02:25	1.78	12:55	2.24	2.03	06:25	1.90	12:55	3.98	3.24	06:25	0.122	12:55	0.326	0.233	0.233	0.04
12/21/2020	01:10	1.76	19:15	2.99	2.21	04:15	2.18	19:10	4.51	3.51	03:35	0.145	19:05	0.556	0.289	0.289	1.07
12/22/2020	05:55	1.89	09:45	2.25	2.08	04:10	1.88	19:05	3.91	3.25	04:10	0.135	14:50	0.309	0.239	0.239	-
12/23/2020	01:55	1.81	13:30	2.26	2.05	04:10	2.28	13:20	4.00	3.29	04:25	0.144	13:30	0.329	0.238	0.238	-
12/24/2020	05:50	1.74	00:35	2.32	2.07	04:55	2.01	14:20	4.07	3.34	04:55	0.132	14:25	0.347	0.246	0.246	-
12/25/2020	03:05	1.78	00:35	2.24	2.00	04:50	1.87	16:10	4.05	3.28	04:50	0.119	16:10	0.329	0.231	0.231	0.49
12/26/2020	03:05	1.79	11:45	2.29	2.04	06:05	2.18	11:40	4.09	3.37	06:05	0.143	11:40	0.345	0.242	0.242	0.02
12/27/2020	05:25	1.75	15:05	2.39	2.04	06:55	2.18	15:00	4.17	3.32	04:55	0.135	15:00	0.371	0.241	0.241	0.13
12/28/2020	05:25	1.76	13:45	2.36	2.05	03:45	2.18	13:45	4.24	3.39	03:45	0.136	13:45	0.374	0.246	0.246	-
12/29/2020	07:25	1.84	02:15	2.22	2.06	03:15	2.15	20:00	4.15	3.26	03:50	0.146	20:00	0.329	0.238	0.238	0.14
12/30/2020	05:00	1.78	17:20	2.28	2.10	03:35	2.32	17:20	4.03	3.43	03:10	0.153	17:20	0.338	0.257	0.257	0.78
12/31/2020	02:35	1.83	22:45	2.36	2.08	04:10	2.12	17:35	3.94	3.28	06:45	0.144	17:40	0.325	0.244	0.244	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			49.698	30.65
Average	2.07	3.29	0.243	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A16_80956

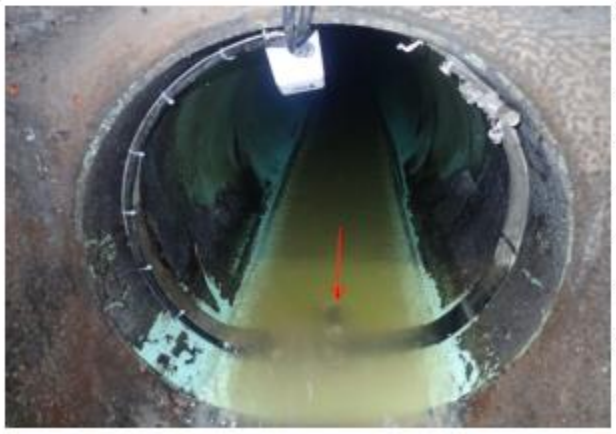
				Monitor Series	Location Type
Site Address /Location:	Opposite 225 6th St SE			TRITON+	Temporary
Site Access Details:	Park in Eastbound lane	Latitude:	47.3019	Pipe Size (H x W)	Pipe Shape
		Longitude:	-122.226958	21.00 X 21.00	Circular



Manhole #	System Characteristics
A130820	Commercial
Access	Traffic
Drive	Heavy







ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519.11.325

Installation Information

Installation Date:	Installation Type:
Monday, September 28, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	
14:26:00 AM	
Depth of Flow (Wet DOF) (in)	
2.50	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
0.58	N/A
Silt (in)	Silt Type
0	

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
8	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
PVC	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

AUB_A17_80957

Site Commentary

SITE INFORMATION

Pipe	Elliptical (9.5 in H x 9.25 in W)
Silt	1.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

This site experienced a flow change on October 25th and backwater conditions April 13th through April 14th. An ADS field crew performed a confirmation on January 27th which verified the sensors are working properly.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	3.07	0.48	0.041
Minimum	1.92	0.15	0.010
Maximum	5.56	1.61	0.218
Min Time	12/10/2020 3:00:00 AM	04/14/2021 4:00:00 AM	04/06/2021 3:00:00 AM
Max Time	04/14/2021 11:00:00 AM	10/09/2020 11:00:00 PM	10/09/2020 11:00:00 PM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

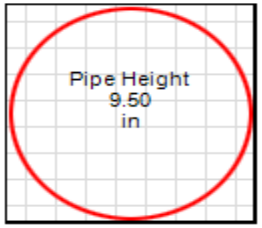
Percent Uptime	
DFINAL (in)	96.773
VFINAL (ft/s)	96.773
QFINAL (MGD - Total MG)	96.773

Hydrograph Report

AUB_A17_80957

Flow Monitor

AUB_A17_80957



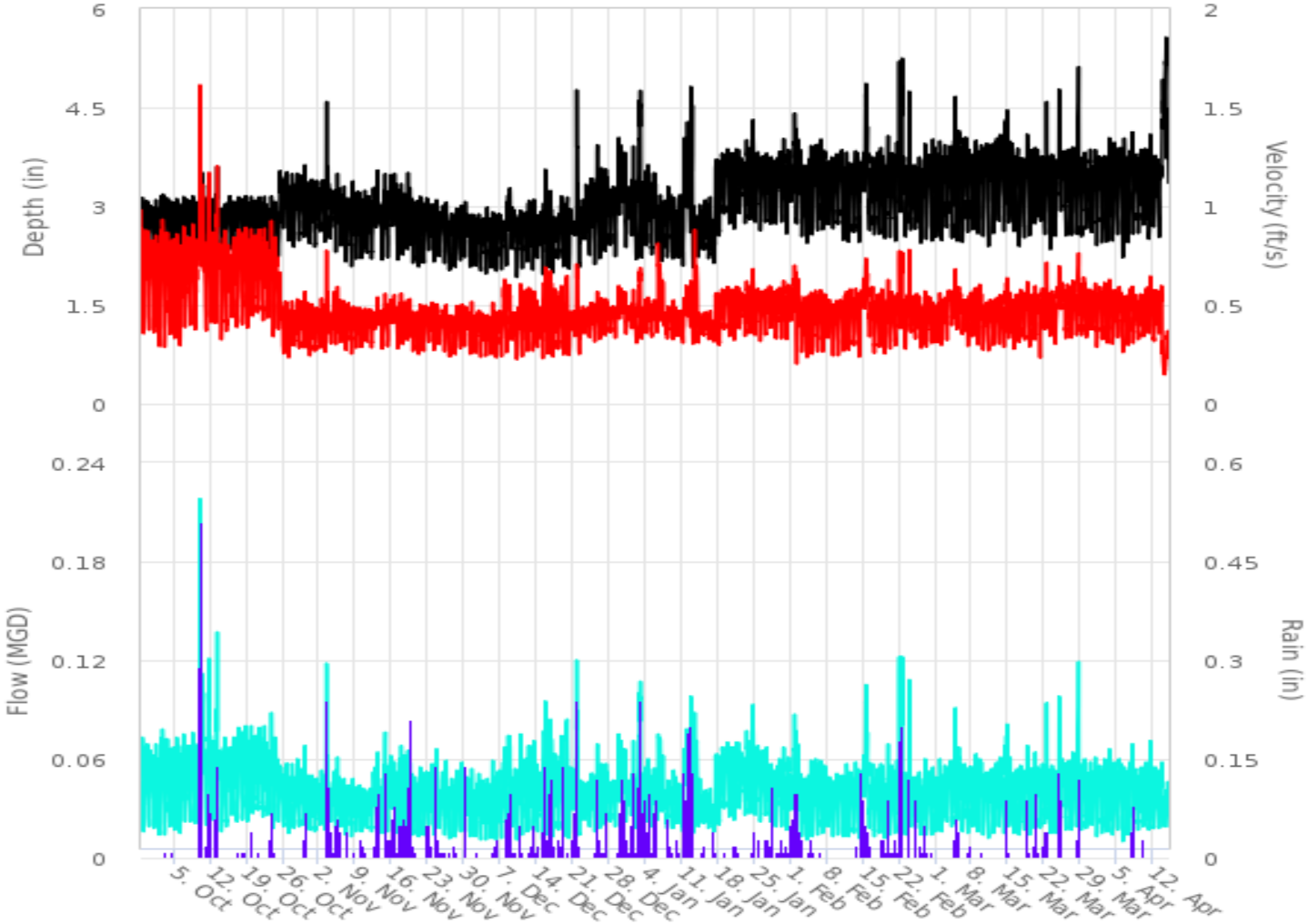
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A17_80957

Flow Monitor

AUB_A17_80957

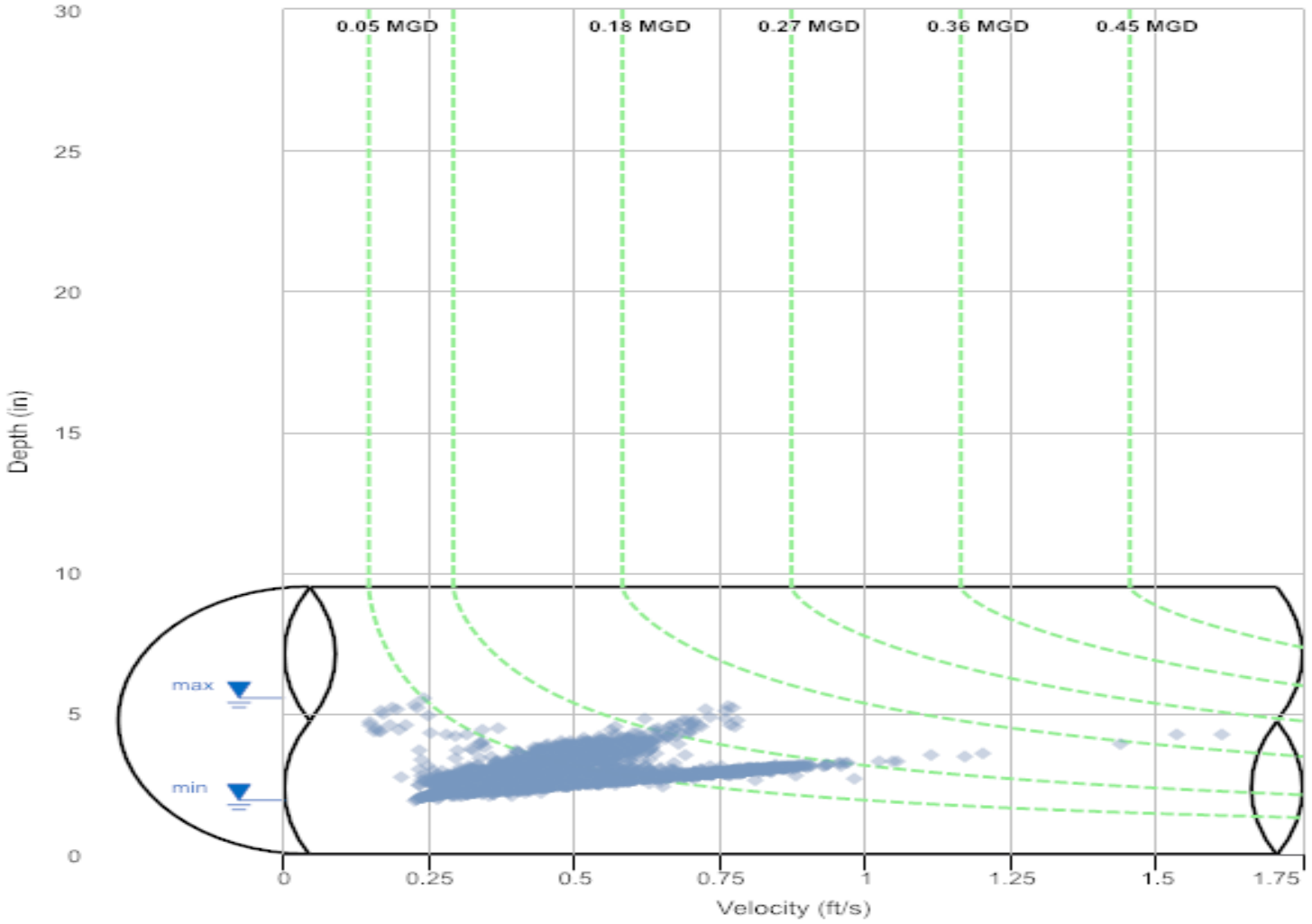
Pipe Height
9.50
in

Report Period

09/22/2020
To
04/14/2021

Legend

DFINAL - VFINAL
Iso-Q™
Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A17_80957Pipe: Elliptical (9.5 in H x 9.25 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	05:35	2.33	15:15	4.91	3.00	21:20	0.25	15:15	0.71	0.45	05:35	0.020	15:15	0.114	0.039	0.039	0.51
01/02/2021	04:10	2.11	20:55	6.19	3.34	06:30	0.26	20:55	0.83	0.49	06:30	0.014	20:55	0.178	0.052	0.052	1.69
01/03/2021	06:15	2.07	00:00	4.95	3.00	06:10	0.30	00:00	0.71	0.45	04:40	0.015	00:00	0.116	0.039	0.039	0.65
01/04/2021	05:40	2.27	11:25	4.20	2.93	03:05	0.34	11:25	0.62	0.44	05:40	0.019	11:25	0.082	0.036	0.036	0.48
01/05/2021	04:15	2.13	20:35	3.87	2.92	04:15	0.32	20:35	0.57	0.44	04:15	0.016	20:35	0.068	0.036	0.036	0.52
01/06/2021	05:50	2.21	00:10	3.51	2.84	05:40	0.33	09:20	0.87	0.57	05:40	0.018	09:20	0.092	0.053	0.053	0.22
01/07/2021	03:05	2.07	09:00	3.56	2.80	12:10	0.30	08:55	0.78	0.46	03:50	0.016	08:55	0.113	0.038	0.038	-
01/08/2021	04:35	1.94	08:50	3.57	2.82	04:35	0.28	08:50	0.53	0.42	04:35	0.013	08:50	0.057	0.033	0.033	0.22
01/09/2021	06:25	2.09	12:45	3.43	2.74	08:10	0.20	22:55	0.60	0.42	03:25	0.015	10:50	0.067	0.037	0.037	-
01/10/2021	06:20	1.99	16:45	3.47	2.74	08:35	0.24	11:10	0.64	0.41	06:15	0.014	11:10	0.070	0.032	0.032	0.07
01/11/2021	05:25	2.04	10:10	4.28	2.96	01:45	0.30	18:35	0.64	0.45	01:45	0.015	20:10	0.088	0.043	0.043	1.06
01/12/2021	15:55	2.45	18:35	5.92	3.53	11:05	0.37	18:40	0.78	0.50	15:55	0.023	18:40	0.147	0.055	0.055	2.10
01/13/2021	04:55	1.99	00:00	7.83	2.71	03:25	0.29	10:40	1.04	0.55	03:20	0.014	00:00	0.173	0.050	0.050	0.09
01/14/2021	04:20	2.03	10:10	4.03	2.66	03:20	0.21	10:10	0.58	0.40	03:20	0.014	10:05	0.072	0.031	0.031	0.01
01/15/2021	06:15	2.09	17:50	3.35	2.73	05:35	0.26	17:50	0.50	0.41	03:50	0.016	17:50	0.049	0.031	0.031	0.09
01/16/2021	03:15	2.10	18:05	3.39	2.67	06:05	0.20	18:05	0.51	0.40	06:05	0.015	18:05	0.050	0.029	0.029	-
01/17/2021	04:15	2.07	20:15	5.62	3.02	04:10	0.30	11:30	0.68	0.45	04:10	0.015	20:15	0.106	0.040	0.040	0.10
01/18/2021	05:35	2.37	20:00	4.23	3.27	05:30	0.25	20:00	0.67	0.46	05:30	0.015	20:00	0.089	0.045	0.045	-
01/19/2021	02:20	2.71	19:15	4.10	3.44	02:20	0.33	19:15	0.64	0.50	02:20	0.024	19:15	0.082	0.051	0.051	0.01
01/20/2021	04:10	2.67	15:10	4.05	3.39	02:55	0.33	15:10	0.63	0.49	04:10	0.023	15:10	0.079	0.050	0.050	-
01/21/2021	03:00	2.58	21:30	4.38	3.42	03:00	0.30	21:30	0.68	0.50	03:00	0.020	21:30	0.094	0.051	0.051	0.11
01/22/2021	02:50	2.76	10:55	4.24	3.38	02:45	0.35	10:55	0.67	0.49	02:45	0.026	10:50	0.089	0.049	0.049	-
01/23/2021	06:55	2.60	15:45	4.23	3.43	04:25	0.31	15:45	0.66	0.50	04:25	0.021	15:45	0.089	0.052	0.052	-
01/24/2021	04:40	2.58	17:15	4.44	3.47	04:40	0.30	17:15	0.71	0.51	04:40	0.021	17:15	0.101	0.054	0.054	0.16
01/25/2021	02:25	2.60	16:35	4.34	3.38	02:25	0.31	16:35	0.69	0.49	02:25	0.021	16:35	0.095	0.049	0.049	0.04
01/26/2021	04:20	2.48	21:15	3.98	3.36	04:20	0.28	21:15	0.62	0.48	04:20	0.018	21:15	0.076	0.049	0.049	-
01/27/2021	05:15	2.60	08:15	4.06	3.30	05:10	0.31	22:55	0.65	0.49	05:15	0.021	08:15	0.080	0.044	0.044	0.14
01/28/2021	03:35	2.61	17:25	4.36	3.41	03:35	0.34	04:50	0.66	0.49	03:35	0.017	17:25	0.080	0.042	0.042	0.24
01/29/2021	03:45	2.69	19:10	4.38	3.41	03:50	0.30	19:10	0.70	0.48	03:40	0.017	19:10	0.085	0.041	0.041	0.03
01/30/2021	05:20	2.65	14:55	4.18	3.41	04:55	0.30	14:35	0.71	0.49	04:55	0.016	14:55	0.076	0.042	0.042	0.07
01/31/2021	05:25	2.50	14:35	4.28	3.36	04:55	0.30	11:40	0.65	0.47	05:25	0.014	14:35	0.074	0.039	0.039	0.12
02/01/2021	00:55	2.92	18:15	4.77	3.63	00:45	0.39	18:15	0.74	0.56	00:50	0.025	18:15	0.102	0.053	0.053	0.82
02/02/2021	02:45	2.55	08:05	4.82	3.38	04:35	0.15	07:55	0.73	0.46	04:35	0.008	08:05	0.103	0.039	0.039	0.31
02/03/2021	03:20	2.48	22:50	3.97	3.24	03:15	0.23	19:15	0.61	0.44	03:15	0.011	22:50	0.063	0.034	0.034	0.06
02/04/2021	04:00	2.39	22:10	4.45	3.28	03:55	0.21	22:05	0.65	0.43	03:55	0.009	22:05	0.081	0.035	0.035	0.07
02/05/2021	03:40	2.51	19:25	4.24	3.36	03:35	0.23	19:20	0.65	0.42	03:35	0.011	19:25	0.075	0.036	0.036	0.01
02/06/2021	03:05	2.54	11:50	4.26	3.45	04:15	0.23	19:10	0.67	0.45	04:15	0.013	20:25	0.076	0.040	0.040	0.01
02/07/2021	04:10	2.58	14:25	4.26	3.31	05:05	0.20	14:25	0.62	0.43	04:05	0.013	14:25	0.073	0.035	0.035	-
02/08/2021	04:55	2.60	20:05	4.06	3.34	03:20	0.29	10:10	0.58	0.45	04:50	0.015	20:05	0.064	0.036	0.036	-
02/09/2021	05:05	2.50	22:15	4.39	3.33	03:40	0.20	22:10	0.62	0.43	03:40	0.010	22:15	0.076	0.035	0.035	-
02/10/2021	03:05	2.51	09:50	4.22	3.38	03:35	0.20	09:50	0.62	0.43	03:35	0.012	09:50	0.072	0.036	0.036	-
02/11/2021	04:30	2.30	11:05	4.06	3.27	04:25	0.23	11:05	0.63	0.45	04:30	0.009	11:05	0.069	0.036	0.036	-
02/12/2021	04:20	2.28	10:10	4.00	3.19	03:20	0.24	12:15	0.64	0.45	04:15	0.010	12:15	0.064	0.035	0.035	-
02/13/2021	04:05	2.41	13:45	4.16	3.28	03:55	0.26	13:45	0.66	0.45	03:55	0.012	13:45	0.074	0.037	0.037	0.08
02/14/2021	04:50	2.36	21:50	3.96	3.28	05:00	0.22	14:40	0.61	0.45	04:20	0.011	17:30	0.061	0.037	0.037	0.71
02/15/2021	05:55	3.04	13:25	5.07	3.92	05:50	0.45	12:50	0.75	0.61	05:50	0.031	13:25	0.113	0.065	0.065	0.78
02/16/2021	05:20	2.52	20:00	4.04	3.24	06:15	0.27	19:30	0.64	0.46	06:10	0.014	19:30	0.067	0.036	0.036	0.07
02/17/2021	03:40	2.27	21:15	4.30	3.24	03:00	0.19	19:10	0.61	0.42	03:35	0.010	21:15	0.071	0.033	0.033	-
02/18/2021	03:10	2.49	10:15	4.04	3.34	05:00	0.24	14:40	0.63	0.45	01:40	0.013	14:40	0.067	0.038	0.038	0.09
02/19/2021	04:30	2.45	19:00	4.62	3.32	03:30	0.21	19:00	0.72	0.44	04:30	0.011	19:00	0.095	0.037	0.037	0.17
02/20/2021	04:15	2.43	16:20	4.16	3.32	05:35	0.22	12:40	0.64	0.45	04:10	0.012	16:20	0.070	0.037	0.037	0.07
02/21/2021	05:25	2.38	22:50	5.83	3.51	06:50	0.24	23:25	0.81	0.47	04:50	0.012	23:35	0.146	0.044	0.044	0.42
02/22/2021	04:15	2.84	12:50	6.66	3.76	05:05	0.34	12:50	0.87	0.55	04:15	0.022	12:50	0.186	0.057	0.057	0.98
02/23/2021	04:10	2.38	21:05	5.43	3.20	04:55	0.24	21:10	0.85	0.47	04:05	0.011	21:10	0.141	0.037	0.037	0.27
02/24/2021	04:15	2.52	20:20	4.27	3.18	03:05	0.30	20:20	0.62	0.45	04:05	0.016	20:20	0.073	0.033	0.033	-
02/25/2021	02:50	2.50	20:45	4.03	3.31	01:55	0.29	04:25	0.62	0.47	01:35	0.014	20:45	0.067	0.038	0.038	0.18
02/26/2021	03:50	2.36	22:30	4.47	3.27	04:15	0.20	22:35	0.62	0.42	04:15	0.011	22:30	0.077	0.034	0.034	0.10
02/27/2021	04:25	2.38	13:00	4.19	3.34	01:25	0.24	15:55	0.59	0.44	04:25	0.011	12:55	0.063	0.037	0.037	0.02
02/28/2021	06:30	2.32	17:55	4.50	3.35	06:25	0.27	11:45	0.58	0.42	06:25	0.011	11:45	0.067	0.035	0.035	0.02
03/01/2021	02:25	2.42	19:00	4.37	3.41	01:30	0.27	22:50	0.63	0.45	01:30	0.013	19:00	0.073	0.038	0.038	-
03/02/2021	04:30	2.37	02:25	4.50	3.39	02:15	0.17	11:10	0.58	0.46	03:20	0.012	19:40	0.068	0.039	0.039	-
03/03/2021	03:05	2.48	18:30	4.13	3.37	05:10	0.18	11:40	0.61	0.51	05:05	0.014	18:30	0.067	0.042	0.042	-
03/04/2021	02:20	2.44	19:20	4.88	3.53	02:15	0.34	19:25	0.73	0.52	02:15	0.016	19:25	0.104	0.047	0.047	0.20
03/05/2021	04:30	2.38	09:40	4.59	3.48	02:30	0.33	10:55	0.64	0.50	02:30	0.018	11:10	0.080	0.043	0.043	0.05
03/06/2021	05:00	2.28	21:45	4.71	3.47	22:30	0.31	13:45	0.59	0.45	04:45	0.013	21:45	0.074	0.040	0.040	-
03/07/2021	05:00	2.52	10:05	4.74	3.40	04:45	0.28	18:20	0.65	0.46	04:50	0.014	18:25	0.082	0.040	0.040	0.04
03/08/2021	03:55	2.54	19:25	4.45	3.41	03:30	0.28	19:25	0.68	0.47	03:50	0.015	19:25	0.085	0.040	0.040	-
03/09/2021	04:05	2.50	12:20	4.65	3.44	03:25	0.25	11:55	0.70	0.45	03:20	0.013	11:15	0.073	0.039	0.039	0.01
03/10/2021	04:00	2.46	18:15	4.30	3.49	03:55	0.23	19:35	0.57	0.42	03:55	0.011	13:55	0.063	0.037	0.037	-
03/11/2021	04:20	2.35	11:45	4.47	3.42	04:20	0.24	15:55	0.60	0.43	04:20	0.010	11:45	0.070	0.038	0.038	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	02:55	2.40	20:45	4.54	3.53	02:50	0.26	20:45	0.61	0.46	02:55	0.011	20:45	0.078	0.041	0.041	-
03/13/2021	05:05	2.63	11:20	4.68	3.53	06:55	0.25	10:05	0.68	0.44	04:20	0.016	11:20	0.088	0.039	0.039	-
03/14/2021	04:20	2.52	19:20	5.45	3.60	04:05	0.24	19:20	0.71	0.46	04:05	0.013	19:20	0.119	0.044	0.044	0.30
03/15/2021	02:50	2.58	19:40	5.49	3.48	05:15	0.26	09:10	0.71	0.45	02:45	0.014	09:10	0.119	0.040	0.040	-
03/16/2021	03:35	2.47	20:25	4.17	3.39	04:30	0.23	18:20	0.63	0.46	02:35	0.012	18:20	0.066	0.039	0.039	-
03/17/2021	03:30	2.21	08:00	4.90	3.23	02:50	0.20	08:00	0.75	0.45	02:50	0.008	08:00	0.108	0.036	0.036	-
03/18/2021	03:15	2.39	15:50	5.95	3.43	04:30	0.25	06:35	0.79	0.49	03:20	0.011	15:50	0.143	0.043	0.043	0.11
03/19/2021	02:40	2.42	17:40	4.45	3.38	02:45	0.20	17:40	0.63	0.46	02:45	0.009	17:40	0.078	0.039	0.039	0.03
03/20/2021	03:05	2.58	05:25	4.79	3.47	03:15	0.26	05:25	0.73	0.48	03:15	0.016	05:25	0.102	0.042	0.042	0.17
03/21/2021	05:20	2.61	04:30	4.49	3.40	04:30	0.16	23:05	0.66	0.47	03:20	0.012	21:30	0.081	0.040	0.040	0.07
03/22/2021	02:45	2.12	10:00	5.61	3.38	02:45	0.29	10:00	0.77	0.50	02:45	0.010	10:00	0.134	0.043	0.043	0.11
03/23/2021	03:20	2.31	08:15	5.37	3.33	02:25	0.30	08:05	0.78	0.47	02:25	0.013	08:15	0.094	0.039	0.039	-
03/24/2021	02:20	2.47	19:20	5.79	3.46	03:40	0.25	19:20	0.77	0.51	02:05	0.014	19:20	0.139	0.046	0.046	0.34
03/25/2021	04:25	2.84	21:25	4.40	3.50	23:50	0.31	12:25	0.68	0.54	23:30	0.020	19:55	0.073	0.047	0.047	0.27
03/26/2021	03:25	2.45	20:00	4.19	3.38	02:30	0.31	10:25	0.67	0.50	02:55	0.015	20:00	0.077	0.042	0.042	-
03/27/2021	03:45	2.42	16:40	4.21	3.35	03:55	0.23	11:50	0.66	0.50	03:55	0.010	11:50	0.075	0.041	0.041	-
03/28/2021	03:05	2.41	14:20	7.36	3.52	04:30	0.28	14:20	0.94	0.53	03:05	0.016	14:20	0.226	0.049	0.049	0.37
03/29/2021	03:00	2.37	17:40	4.46	3.28	01:00	0.26	12:45	0.76	0.51	01:00	0.012	17:40	0.084	0.041	0.041	-
03/30/2021	01:35	2.53	17:30	4.29	3.33	01:50	0.27	10:10	0.75	0.49	01:50	0.014	10:10	0.072	0.040	0.040	-
03/31/2021	03:00	2.48	18:00	4.15	3.32	04:55	0.31	17:55	0.66	0.49	01:50	0.017	18:00	0.073	0.040	0.040	-
04/01/2021	03:30	2.31	07:25	4.15	3.27	01:50	0.24	07:25	0.65	0.48	01:50	0.011	07:25	0.073	0.038	0.038	-
04/02/2021	02:25	2.40	19:15	4.64	3.28	00:50	0.30	19:15	0.66	0.48	02:20	0.013	19:15	0.088	0.039	0.039	-
04/03/2021	01:10	2.35	12:25	4.34	3.33	03:10	0.24	14:00	0.67	0.49	03:10	0.012	12:25	0.079	0.041	0.041	-
04/04/2021	03:45	2.36	12:30	4.48	3.26	02:35	0.26	12:30	0.64	0.46	03:40	0.012	12:30	0.080	0.036	0.036	-
04/05/2021	03:05	2.50	16:40	4.34	3.44	03:00	0.31	12:30	0.66	0.49	03:00	0.015	10:30	0.073	0.043	0.043	-
04/06/2021	02:50	2.13	09:10	4.44	3.29	02:45	0.23	12:30	0.60	0.45	02:45	0.008	10:20	0.070	0.037	0.037	-
04/07/2021	04:05	2.34	23:25	5.48	3.46	04:05	0.27	23:30	0.73	0.48	04:05	0.011	23:25	0.121	0.043	0.043	0.22
04/08/2021	03:00	2.50	17:10	4.28	3.35	02:10	0.23	13:20	0.59	0.46	02:10	0.011	10:35	0.062	0.038	0.038	-
04/09/2021	03:10	2.50	10:15	4.51	3.37	03:00	0.25	10:15	0.66	0.46	03:00	0.012	10:15	0.084	0.039	0.039	0.03
04/10/2021	02:30	2.60	15:10	4.69	3.41	02:40	0.29	11:30	0.70	0.48	02:40	0.015	18:35	0.077	0.041	0.041	0.02
04/11/2021	05:00	2.40	10:50	4.45	3.31	23:35	0.27	10:50	0.70	0.48	03:15	0.016	10:50	0.088	0.040	0.040	-
04/12/2021	02:50	2.44	17:35	4.29	3.33	04:25	0.27	09:40	0.68	0.48	01:50	0.014	09:40	0.080	0.039	0.039	-
04/13/2021	03:00	2.41	20:50	5.25	3.63	23:55	0.16	11:45	0.71	0.41	02:55	0.015	11:50	0.076	0.036	0.036	-
04/14/2021	23:25	3.26	10:50	5.81	4.45	04:45	0.14	18:25	0.44	0.25	23:55	0.015	18:25	0.060	0.030	0.030	-
09/28/2020	23:45	2.33	20:40	3.32	2.91	23:50	0.46	20:40	1.00	0.76	23:50	0.025	19:40	0.087	0.058	0.022	-
09/29/2020	01:55	2.06	20:25	3.41	2.71	02:50	0.33	19:25	1.02	0.67	02:10	0.015	19:25	0.092	0.045	0.045	-
09/30/2020	03:00	2.19	08:25	3.56	2.74	03:15	0.35	08:25	1.11	0.68	03:15	0.017	08:25	0.091	0.046	0.046	-
10/01/2020	01:50	2.07	10:05	3.38	2.72	01:50	0.28	11:50	0.97	0.66	01:50	0.013	21:10	0.083	0.045	0.045	-
10/02/2020	02:45	1.96	15:10	3.58	2.78	02:10	0.26	15:10	1.17	0.69	02:10	0.012	18:20	0.104	0.051	0.051	-
10/03/2020	04:00	2.06	16:05	3.39	2.73	03:15	0.28	10:50	1.04	0.64	03:15	0.013	10:50	0.100	0.047	0.047	0.01
10/04/2020	05:20	2.09	11:25	3.42	2.71	06:50	0.30	11:25	1.03	0.62	06:50	0.015	16:15	0.099	0.045	0.045	0.01
10/05/2020	03:05	2.02	11:30	3.38	2.75	00:55	0.26	11:30	1.11	0.64	01:05	0.013	11:30	0.109	0.048	0.048	-
10/06/2020	03:00	1.93	20:20	3.36	2.73	02:55	0.24	19:10	1.01	0.65	02:50	0.011	19:10	0.099	0.047	0.047	-
10/07/2020	02:10	2.21	12:30	3.45	2.79	02:10	0.29	12:30	1.03	0.66	02:10	0.015	12:30	0.090	0.048	0.048	-
10/08/2020	03:05	2.26	13:05	3.36	2.83	02:10	0.34	20:05	1.00	0.68	02:10	0.018	20:05	0.087	0.051	0.051	-
10/09/2020	02:25	2.27	23:45	5.09	2.92	01:25	0.32	23:45	1.89	0.74	03:00	0.017	23:45	0.319	0.063	0.063	0.64
10/10/2020	04:50	2.48	01:10	4.94	3.09	16:05	0.50	01:10	1.88	0.83	23:30	0.031	01:10	0.306	0.071	0.071	1.04
10/11/2020	04:35	2.26	22:40	3.85	2.90	04:20	0.33	22:40	1.46	0.75	03:15	0.018	22:40	0.172	0.060	0.060	0.53
10/12/2020	04:15	2.26	11:00	3.35	2.76	01:40	0.33	11:00	1.06	0.66	01:40	0.020	11:00	0.103	0.047	0.047	-
10/13/2020	00:45	2.29	07:05	4.90	2.88	00:25	0.37	07:05	1.84	0.75	00:30	0.020	07:05	0.296	0.059	0.059	0.61
10/14/2020	00:30	2.08	17:50	3.18	2.69	03:10	0.26	17:50	0.97	0.64	03:10	0.012	14:45	0.082	0.045	0.045	-
10/15/2020	03:00	2.14	12:00	3.36	2.78	03:20	0.32	12:00	1.03	0.62	02:55	0.016	12:00	0.101	0.047	0.047	-
10/16/2020	02:35	2.21	18:15	3.30	2.82	02:35	0.36	18:15	0.98	0.70	02:35	0.020	18:15	0.094	0.055	0.055	-
10/17/2020	02:00	2.20	11:05	3.42	2.83	02:00	0.36	11:05	1.05	0.71	02:00	0.019	11:05	0.106	0.057	0.057	0.01
10/18/2020	03:00	2.17	10:50	3.32	2.81	04:50	0.30	10:50	0.99	0.70	04:50	0.017	10:50	0.095	0.056	0.056	0.03
10/19/2020	02:55	2.09	20:10	3.28	2.78	02:55	0.29	20:10	0.96	0.68	02:55	0.015	20:10	0.091	0.052	0.052	0.05
10/20/2020	04:15	2.17	13:25	3.25	2.79	04:15	0.29	13:25	0.95	0.69	04:15	0.017	13:25	0.089	0.054	0.054	-
10/21/2020	02:15	2.19	10:35	3.28	2.78	02:15	0.35	10:35	0.96	0.68	02:15	0.019	10:35	0.091	0.053	0.053	0.01
10/22/2020	03:25	2.16	10:35	3.38	2.78	03:25	0.34	10:35	1.03	0.68	03:25	0.018	10:35	0.102	0.052	0.052	-
10/23/2020	02:20	2.15	23:00	4.04	2.73	04:45	0.33	23:00	1.56	0.66	04:45	0.018	23:00	0.204	0.051	0.051	0.20
10/24/2020	04:05	2.03	14:50	3.40	2.70	04:05	0.26	14:50	1.04	0.63	04:05	0.012	14:50	0.103	0.048	0.048	0.02
10/25/2020	01:20	2.12	10:30	3.73	3.01	23:55	0.27	07:20	0.75	0.47	01:20	0.016	11:40	0.070	0.041	0.041	-
10/26/2020	01:55	2.51	18:40	3.75	3.14	05:15	0.19	10:30	0.66	0.40	00:55	0.014	10:30	0.075	0.039	0.039	-
10/27/2020	02:50	2.34	17:55	3.73	3.09	03:55	0.14	19:20	0.61	0.40	02:35	0.011	18:00	0.072	0.038	0.038	-
10/28/2020	02:15	2.22	18:55	3.73	3.04	04:10	0.16	18:55	0.62	0.39	02:35	0.011	18:55	0.074	0.037	0.037	-
10/29/2020	03:10	2.32	15:20	3.67	3.06	02:15	0.19	15:20	0.60	0.41	02:15	0.013	15:20	0.066	0.038	0.038	-
10/30/2020	02:30	2.47	05:20	5.06	3.04	00:45	0.22	05:15	0.91	0.42	03:15	0.015	05:15	0.142	0.037	0.037	0.10
10/31/2020	03:25	2.36	13:30	3.62	2.99	04:15	0.17	12:20	0.56	0.39	04:15	0.011	12:20	0.060	0.034	0.034	-
11/01/2020	03:00	2.31	14:30	4.21	2.98	03:05	0.18	01:50	0.62	0.40	03:05	0.011	14:30	0.075	0.034	0.034	-
11/02/2020	04:20	2.39	17:20	3.78	3.06	02:00	0.22	10:15	0.58	0.41	03:50	0.015	17:20	0.060	0.036	0.036	-
11/03/2020	02:45	2.33	09:45	5.85	3.24	04:25	0.17	09:45	0.94	0.45	04:25	0.010	09:45	0.187	0.045	0.045	0.83
11/04/2020	02:45	2.37	10:40	3.51	2.95	01:40	0.18	19:25	0.69	0.42	01:40	0.013	19:25	0.070	0.035	0.035	0.09
11/05/2020	03:55	2.17	12:20	3.72	2.95	04:40	0.23	01:35	0.78	0.44	03:55	0.015	01:35	0.079	0.038	0.038	0.34
11/06/2020	04:25	2.31	18:30	3.49	2.92	00:05	0.23	02:00	0.61	0.45	00:05	0.015	19:20	0.060	0.037	0.037	0.10

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/07/2020	03:30	1.96	09:15	3.54	2.77	03:30	0.22	09:15	0.64	0.40	03:30	0.010	09:15	0.067	0.031	0.031	0.07
11/08/2020	05:55	1.97	12:15	3.54	2.77	04:10	0.23	18:10	0.57	0.40	04:05	0.011	18:10	0.060	0.031	0.031	0.01
11/09/2020	03:10	2.02	12:10	3.50	2.81	04:20	0.21	11:40	0.52	0.39	03:10	0.011	11:40	0.053	0.031	0.031	0.04
11/10/2020	03:25	1.99	19:30	3.36	2.79	03:25	0.23	11:10	0.58	0.40	03:15	0.011	11:10	0.053	0.031	0.031	0.03
11/11/2020	04:15	2.14	20:45	3.48	2.78	04:15	0.27	20:45	0.56	0.41	04:15	0.014	20:45	0.058	0.032	0.032	-
11/12/2020	04:25	2.06	11:40	3.49	2.84	01:30	0.24	10:35	0.55	0.40	02:15	0.012	17:30	0.066	0.036	0.036	0.16
11/13/2020	21:50	2.52	06:25	4.37	2.92	12:55	0.28	06:25	0.64	0.44	21:50	0.024	06:25	0.089	0.040	0.040	0.38
11/14/2020	03:45	2.05	17:50	4.26	2.85	06:50	0.22	17:45	0.65	0.41	03:45	0.012	17:50	0.087	0.040	0.040	0.47
11/15/2020	06:20	2.05	22:35	4.12	2.92	06:20	0.24	18:20	0.62	0.43	06:20	0.012	18:20	0.083	0.040	0.040	0.19
11/16/2020	23:50	2.51	13:05	4.00	3.02	22:20	0.35	12:30	0.61	0.46	01:45	0.024	08:55	0.086	0.041	0.041	0.31
11/17/2020	04:10	1.98	19:05	4.64	2.78	04:00	0.23	19:05	0.78	0.41	04:00	0.011	19:05	0.116	0.037	0.037	0.20
11/18/2020	03:50	2.13	10:10	3.44	2.80	03:50	0.26	09:55	0.59	0.41	03:50	0.014	10:00	0.080	0.038	0.038	0.30
11/19/2020	02:50	2.15	03:05	4.20	2.83	04:45	0.24	12:35	0.67	0.42	02:50	0.014	12:45	0.090	0.038	0.038	0.50
11/20/2020	02:15	2.06	15:50	3.27	2.66	02:15	0.24	00:25	0.53	0.38	02:15	0.012	11:15	0.066	0.032	0.032	0.01
11/21/2020	03:25	2.01	11:15	3.78	2.67	03:25	0.23	11:25	0.60	0.39	03:25	0.011	11:25	0.074	0.033	0.033	-
11/22/2020	01:25	2.01	17:40	3.43	2.73	01:25	0.23	08:55	0.67	0.41	01:20	0.011	13:10	0.077	0.036	0.036	0.21
11/23/2020	03:55	2.20	13:00	3.29	2.74	04:10	0.21	05:10	0.63	0.41	04:10	0.015	05:10	0.080	0.037	0.037	0.14
11/24/2020	05:40	2.02	15:30	3.58	2.63	05:40	0.23	15:30	0.68	0.39	05:40	0.011	15:30	0.139	0.034	0.034	0.21
11/25/2020	03:05	2.11	18:30	3.22	2.67	02:40	0.25	10:25	0.52	0.40	03:05	0.013	18:25	0.063	0.034	0.034	0.05
11/26/2020	03:50	1.99	11:55	3.22	2.63	03:50	0.23	11:50	0.54	0.39	03:50	0.011	12:20	0.067	0.034	0.034	0.02
11/27/2020	04:20	1.90	19:05	3.08	2.53	02:20	0.21	18:55	0.55	0.36	02:20	0.009	18:55	0.064	0.031	0.031	-
11/28/2020	05:10	1.88	11:30	3.20	2.62	05:10	0.20	11:30	0.63	0.40	05:10	0.009	11:30	0.077	0.037	0.037	0.05
11/29/2020	05:30	2.01	13:50	3.51	2.60	08:40	0.22	13:45	0.70	0.38	05:30	0.011	13:45	0.084	0.032	0.032	-
11/30/2020	02:20	1.95	05:10	3.38	2.66	02:20	0.22	03:40	0.64	0.41	02:20	0.010	03:40	0.089	0.034	0.034	0.36
12/01/2020	02:20	1.96	21:30	3.26	2.58	02:20	0.22	10:35	0.64	0.39	02:20	0.010	10:35	0.076	0.032	0.032	-
12/02/2020	04:00	1.90	10:35	3.18	2.53	04:00	0.20	17:40	0.58	0.38	04:00	0.009	17:50	0.068	0.030	0.030	0.01
12/03/2020	04:05	1.91	18:35	3.17	2.52	02:30	0.21	20:50	0.61	0.38	02:35	0.009	20:50	0.070	0.032	0.032	-
12/04/2020	04:10	1.78	10:05	3.18	2.56	03:05	0.21	15:40	0.65	0.38	03:05	0.009	15:40	0.067	0.031	0.031	-
12/05/2020	02:10	1.89	13:30	3.28	2.54	07:45	0.18	11:00	0.59	0.38	02:10	0.009	11:35	0.073	0.034	0.034	0.03
12/06/2020	04:00	1.91	20:15	3.13	2.56	04:00	0.21	18:45	0.57	0.38	04:00	0.009	18:25	0.069	0.033	0.033	0.03
12/07/2020	03:45	1.86	21:10	3.03	2.52	02:20	0.20	20:20	0.70	0.44	02:15	0.009	21:10	0.080	0.038	0.038	-
12/08/2020	02:30	1.91	19:00	4.01	2.82	03:15	0.24	15:30	0.66	0.49	03:30	0.017	11:45	0.093	0.053	0.053	0.87
12/09/2020	05:50	2.06	02:25	3.59	2.71	05:50	0.25	23:15	0.72	0.40	05:50	0.012	19:40	0.075	0.037	0.037	0.17
12/10/2020	03:35	1.75	17:55	3.23	2.52	02:45	0.20	20:20	0.68	0.41	02:45	0.009	20:15	0.097	0.038	0.038	0.07
12/11/2020	05:15	1.86	12:50	3.21	2.57	05:10	0.20	19:25	0.64	0.44	05:10	0.009	19:25	0.075	0.041	0.041	0.02
12/12/2020	04:55	2.05	12:35	3.43	2.64	04:35	0.19	14:50	0.68	0.46	04:55	0.012	14:50	0.092	0.045	0.045	0.01
12/13/2020	05:15	1.89	08:50	3.62	2.64	05:15	0.20	16:10	0.63	0.45	05:00	0.009	10:55	0.091	0.045	0.045	0.24
12/14/2020	00:20	2.10	13:35	3.17	2.59	01:05	0.23	10:40	0.59	0.40	00:15	0.014	13:35	0.077	0.037	0.037	0.05
12/15/2020	02:35	1.83	15:45	6.49	2.68	02:30	0.21	15:40	1.17	0.46	02:30	0.009	15:45	0.237	0.047	0.047	0.58
12/16/2020	02:55	1.91	14:10	3.56	2.62	02:55	0.21	13:40	0.69	0.45	02:55	0.009	14:10	0.100	0.046	0.046	0.39
12/17/2020	03:30	1.92	12:45	3.30	2.58	03:30	0.21	12:45	0.71	0.45	03:30	0.009	12:45	0.092	0.043	0.043	0.08
12/18/2020	01:20	2.01	18:30	3.40	2.65	04:45	0.20	18:45	0.70	0.42	01:20	0.011	18:50	0.101	0.041	0.041	0.25
12/19/2020	03:25	1.97	21:05	3.51	2.66	03:25	0.22	20:55	0.72	0.46	03:30	0.011	20:55	0.107	0.048	0.048	0.37
12/20/2020	04:55	1.89	10:50	3.20	2.53	03:30	0.16	18:40	0.54	0.38	04:55	0.009	10:50	0.065	0.035	0.035	0.04
12/21/2020	04:05	2.05	16:05	6.72	2.98	04:05	0.24	16:00	0.85	0.46	04:05	0.012	16:05	0.223	0.052	0.052	1.07
12/22/2020	04:00	1.96	21:20	3.33	2.67	03:15	0.22	21:20	0.54	0.39	04:00	0.010	11:15	0.056	0.033	0.033	-
12/23/2020	05:05	2.25	11:35	3.60	2.95	04:00	0.30	09:30	0.60	0.43	05:05	0.017	11:35	0.058	0.036	0.036	-
12/24/2020	05:30	2.18	15:40	3.99	2.99	05:30	0.32	15:40	0.59	0.45	05:30	0.017	15:40	0.073	0.038	0.038	-
12/25/2020	04:45	2.03	15:10	4.31	2.97	04:40	0.30	15:10	0.63	0.44	04:45	0.014	15:10	0.086	0.038	0.038	0.49
12/26/2020	03:15	2.17	17:45	4.09	2.93	03:15	0.32	17:45	0.60	0.44	03:15	0.017	17:45	0.077	0.037	0.037	0.02
12/27/2020	05:55	2.22	08:55	3.97	2.99	05:05	0.33	08:55	0.59	0.45	05:55	0.018	08:55	0.072	0.039	0.039	0.13
12/28/2020	04:05	2.16	12:00	3.75	2.95	03:30	0.32	12:00	0.56	0.44	03:30	0.017	12:00	0.063	0.037	0.037	-
12/29/2020	02:50	2.19	19:25	4.45	2.99	02:50	0.32	19:25	0.65	0.45	02:55	0.017	19:25	0.093	0.038	0.038	0.14
12/30/2020	00:00	2.69	05:50	4.37	3.31	00:00	0.40	05:45	0.64	0.49	00:00	0.029	05:45	0.089	0.048	0.048	0.78
12/31/2020	05:45	2.18	01:45	3.82	2.99	05:45	0.32	01:45	0.57	0.45	05:45	0.017	01:45	0.066	0.038	0.038	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			8.143	30.65
Average	3.07	0.48	0.041	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A17_80957

Site Address /Location:	619 Auburn Way S			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	Drive	Latitude:	47.301528	Pipe Size (H x W): 9.50 X 9.50	Pipe Shape: Circular
		Longitude:	-122.225463		



Manhole #	System Characteristics
A1780957	Commercial
Access	Traffic
Drive	Light



Site Sketch Profile View or Photo

Installation Information

Installation Date:	Installation Type:
Thursday, September 24, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	
14:59:00 AM	
Depth of Flow (Wet DOF) (in)	
2.63	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
0.94	N/A
Silt (in)	Silt Type
0	

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
6	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Concrete	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519.11.325

AUB_A1a_30822

Site Commentary

SITE INFORMATION

Pipe	Elliptical (10 in H x 9.88 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	1.73	0.71	0.029
Minimum	1.14	0.25	0.008
Maximum	3.27	2.37	0.113
Min Time	12/31/2020 4:00:00 AM	01/20/2021 9:00:00 PM	11/03/2020 2:00:00 AM
Max Time	04/02/2021 7:00:00 PM	12/11/2020 12:00:00 PM	12/10/2020 6:00:00 PM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

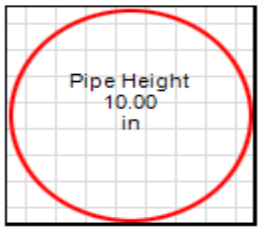
Percent Uptime	
DFINAL (in)	99.842
VFINAL (ft/s)	99.842
QFINAL (MGD - Total MG)	99.842

Hydrograph Report

AUB_A1a_30822

Flow Monitor

AUB_A1a_30822



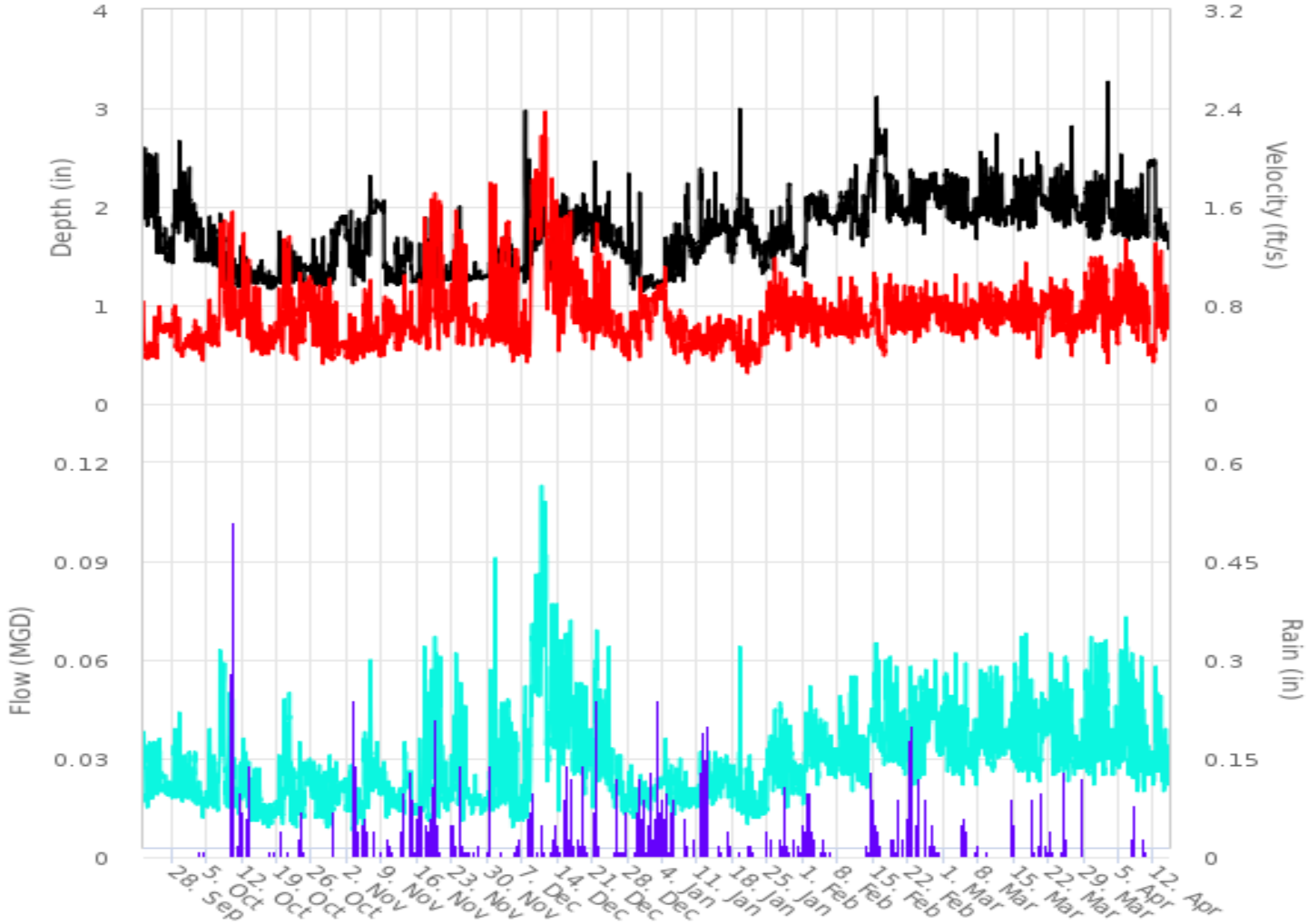
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A1a_30822

Flow Monitor

AUB_A1a_30822

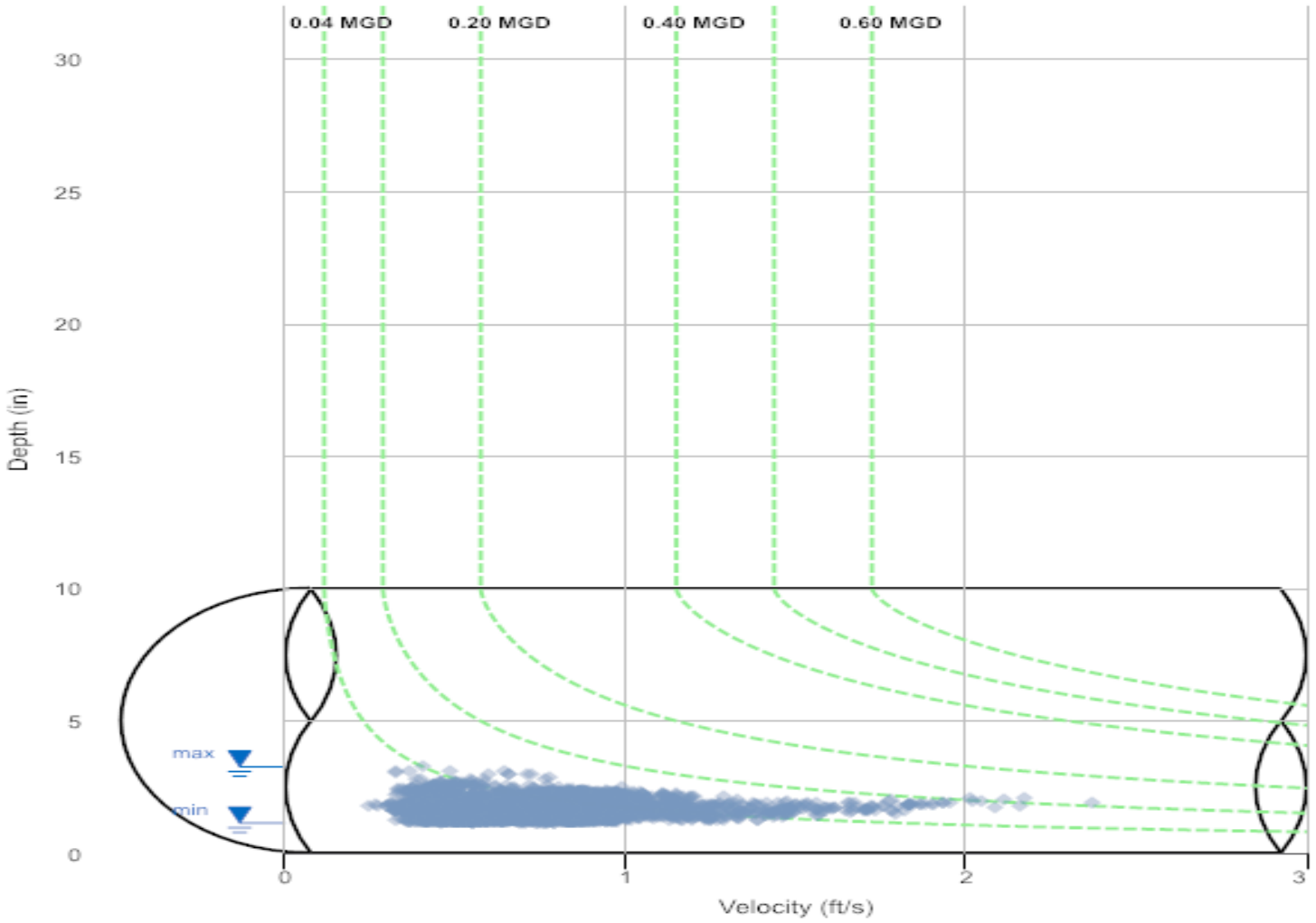
Pipe Height
10.00
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A1a_30822Pipe: Elliptical (10 in H x 9.88 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	18:55	1.17	10:45	1.35	1.25	11:30	0.48	20:20	0.92	0.70	11:20	0.013	18:10	0.023	0.018	0.018	0.51
01/02/2021	00:20	1.16	04:25	1.33	1.21	10:55	0.70	21:05	0.99	0.84	11:00	0.017	20:40	0.025	0.020	0.020	1.69
01/03/2021	07:55	1.19	19:45	1.30	1.23	13:50	0.78	00:00	1.00	0.91	13:50	0.019	19:45	0.026	0.022	0.022	0.65
01/04/2021	00:40	1.24	22:00	1.78	1.46	19:05	0.52	08:30	1.25	0.81	19:05	0.015	12:05	0.043	0.025	0.025	0.48
01/05/2021	00:45	1.12	16:50	1.83	1.45	23:10	0.42	09:25	0.97	0.61	21:20	0.011	09:25	0.033	0.019	0.019	0.52
01/06/2021	05:20	1.18	11:50	2.18	1.49	11:20	0.31	16:50	0.79	0.55	04:25	0.012	14:05	0.031	0.018	0.018	0.22
01/07/2021	23:20	1.21	08:30	1.94	1.47	12:20	0.33	10:30	1.04	0.61	19:30	0.013	10:30	0.042	0.019	0.019	-
01/08/2021	00:05	1.24	18:05	2.82	1.71	15:20	0.30	07:15	0.81	0.53	00:05	0.014	18:55	0.033	0.020	0.020	0.22
01/09/2021	16:25	1.44	00:40	1.95	1.62	00:15	0.36	12:25	0.66	0.47	07:00	0.013	13:00	0.026	0.017	0.017	-
01/10/2021	18:00	1.34	08:25	1.77	1.54	17:05	0.34	12:20	0.70	0.53	17:05	0.012	07:55	0.023	0.018	0.018	0.07
01/11/2021	03:05	1.42	11:55	2.55	1.72	20:25	0.38	02:15	0.68	0.52	23:10	0.012	11:00	0.042	0.021	0.021	1.06
01/12/2021	22:15	1.48	23:20	1.94	1.69	11:00	0.30	23:00	0.84	0.50	00:25	0.012	23:20	0.040	0.019	0.019	2.10
01/13/2021	07:05	1.52	04:35	2.36	1.80	18:10	0.30	12:50	0.81	0.52	18:10	0.013	03:10	0.038	0.022	0.022	0.09
01/14/2021	05:45	1.63	08:25	2.49	1.82	13:55	0.28	10:25	0.82	0.54	07:15	0.013	10:25	0.052	0.023	0.023	0.01
01/15/2021	09:05	1.64	17:05	2.35	1.82	14:25	0.25	14:30	0.82	0.56	01:15	0.013	14:30	0.046	0.024	0.024	0.09
01/16/2021	22:30	1.52	19:40	2.30	1.79	11:05	0.37	20:00	0.96	0.60	22:25	0.016	20:00	0.041	0.025	0.025	-
01/17/2021	19:30	1.39	10:35	2.10	1.67	19:40	0.38	13:20	0.90	0.58	19:40	0.012	10:35	0.034	0.022	0.022	0.10
01/18/2021	01:25	1.46	19:25	2.41	1.77	23:35	0.30	06:30	0.81	0.50	19:45	0.012	02:40	0.035	0.021	0.021	-
01/19/2021	16:20	1.61	07:50	3.38	1.99	23:25	0.24	07:50	0.81	0.47	19:10	0.011	07:50	0.084	0.024	0.024	0.01
01/20/2021	14:00	1.64	16:25	2.43	1.86	20:55	0.22	15:05	1.01	0.37	03:20	0.010	15:05	0.048	0.017	0.017	-
01/21/2021	20:45	1.47	13:10	2.26	1.76	04:50	0.19	16:15	0.94	0.43	04:50	0.007	08:45	0.043	0.018	0.018	0.11
01/22/2021	07:20	1.46	13:45	2.08	1.64	21:30	0.22	11:00	1.03	0.39	01:10	0.008	11:00	0.038	0.015	0.015	-
01/23/2021	19:30	1.30	03:25	1.70	1.48	02:40	0.20	12:00	0.83	0.49	02:40	0.007	12:00	0.026	0.016	0.016	-
01/24/2021	06:25	1.33	11:25	2.01	1.45	19:10	0.32	11:35	1.15	0.57	19:10	0.009	11:35	0.042	0.018	0.018	0.16
01/25/2021	12:25	1.35	18:35	2.28	1.61	18:20	0.44	13:45	1.22	0.82	17:45	0.016	20:20	0.053	0.030	0.030	0.04
01/26/2021	06:25	1.36	01:25	1.93	1.65	17:00	0.53	08:10	1.32	0.82	18:50	0.020	09:15	0.053	0.031	0.031	-
01/27/2021	01:50	1.52	08:30	2.38	1.70	23:50	0.53	11:30	1.37	0.83	01:50	0.018	12:45	0.060	0.033	0.033	0.14
01/28/2021	01:55	1.49	23:15	2.11	1.72	18:30	0.38	15:00	1.29	0.73	18:25	0.013	15:00	0.055	0.029	0.029	0.24
01/29/2021	23:10	1.41	08:35	2.41	1.81	19:00	0.35	12:05	1.27	0.72	19:00	0.012	08:40	0.051	0.030	0.030	0.03
01/30/2021	10:50	1.36	14:20	1.64	1.45	14:45	0.54	14:00	1.10	0.80	21:30	0.016	14:00	0.035	0.025	0.025	0.07
01/31/2021	18:50	1.32	18:25	1.69	1.48	15:20	0.39	20:35	1.03	0.73	22:05	0.012	20:35	0.034	0.024	0.024	0.12
02/01/2021	05:40	1.28	09:00	2.23	1.71	01:15	0.48	12:10	1.30	0.73	05:00	0.015	12:10	0.056	0.029	0.029	0.82
02/02/2021	01:45	1.85	09:35	2.26	2.03	19:50	0.40	10:30	1.23	0.74	19:50	0.021	10:30	0.066	0.037	0.037	0.31
02/03/2021	05:10	1.76	12:30	2.14	2.00	19:25	0.36	08:30	1.05	0.69	19:25	0.017	08:30	0.053	0.034	0.034	0.06
02/04/2021	05:55	1.75	11:20	2.22	1.95	00:10	0.38	07:55	0.99	0.71	00:10	0.017	07:55	0.051	0.034	0.034	0.07
02/05/2021	08:10	1.84	10:25	2.16	1.94	17:25	0.46	07:15	0.98	0.69	12:35	0.022	10:35	0.050	0.033	0.033	0.01
02/06/2021	15:25	1.81	02:20	2.18	1.86	02:05	0.48	13:25	0.85	0.64	02:05	0.021	13:30	0.039	0.028	0.028	0.01
02/07/2021	09:00	1.72	14:15	2.09	1.85	12:55	0.41	15:55	1.06	0.66	12:55	0.017	15:55	0.050	0.029	0.029	-
02/08/2021	21:35	1.73	17:45	2.30	1.98	13:40	0.42	07:55	1.16	0.71	21:35	0.019	08:00	0.057	0.035	0.035	-
02/09/2021	02:05	1.81	17:45	2.28	1.99	21:05	0.42	12:40	0.99	0.66	23:20	0.020	12:40	0.055	0.033	0.033	-
02/10/2021	16:55	1.59	10:05	2.62	1.99	03:50	0.42	13:10	1.21	0.67	18:20	0.018	13:10	0.066	0.034	0.034	-
02/11/2021	22:30	1.69	12:25	2.51	1.91	19:50	0.46	12:50	1.10	0.69	19:50	0.020	08:55	0.069	0.032	0.032	-
02/12/2021	19:10	1.54	09:30	2.10	1.77	01:15	0.49	10:00	1.19	0.69	18:35	0.019	09:55	0.052	0.029	0.029	-
02/13/2021	05:25	1.69	18:15	2.70	1.93	12:45	0.45	18:25	0.92	0.61	12:10	0.018	18:15	0.055	0.029	0.029	0.08
02/14/2021	19:30	1.81	13:55	2.63	2.29	11:00	0.57	19:15	1.13	0.66	18:55	0.031	19:15	0.080	0.040	0.040	0.71
02/15/2021	01:50	1.80	17:00	3.23	2.48	18:15	0.49	09:40	1.21	0.77	05:55	0.031	09:40	0.087	0.051	0.051	0.78
02/16/2021	14:15	2.50	16:40	2.91	2.61	17:30	0.35	01:50	0.67	0.50	17:30	0.024	06:10	0.047	0.036	0.036	0.07
02/17/2021	20:20	1.76	10:10	3.10	2.36	03:40	0.35	11:25	1.33	0.65	03:40	0.025	11:25	0.085	0.040	0.040	-
02/18/2021	01:00	1.80	10:05	2.52	2.08	20:40	0.48	09:10	1.39	0.78	20:40	0.024	08:45	0.088	0.041	0.041	0.09
02/19/2021	20:35	1.77	12:30	2.40	2.06	04:20	0.47	12:05	1.41	0.74	21:55	0.023	12:05	0.088	0.039	0.039	0.17
02/20/2021	13:55	1.75	16:00	2.37	1.95	04:50	0.49	14:05	1.20	0.71	04:50	0.022	14:05	0.063	0.034	0.034	0.07
02/21/2021	13:05	1.56	13:40	2.17	1.90	00:25	0.44	05:05	1.07	0.77	00:25	0.019	13:40	0.055	0.035	0.035	0.42
02/22/2021	22:35	1.84	14:20	2.65	2.12	02:45	0.47	09:20	1.43	0.77	02:45	0.023	09:20	0.088	0.042	0.042	0.98
02/23/2021	04:45	1.82	11:35	2.39	2.07	03:25	0.38	08:05	1.18	0.70	04:45	0.016	08:05	0.071	0.037	0.037	0.27
02/24/2021	23:05	1.69	11:10	2.57	2.05	18:35	0.50	11:10	1.31	0.73	22:15	0.021	11:10	0.092	0.038	0.038	-
02/25/2021	00:05	1.62	07:25	2.41	2.10	01:20	0.43	10:10	1.22	0.76	01:45	0.016	10:10	0.070	0.041	0.041	0.18
02/26/2021	11:05	2.05	11:20	2.62	2.21	15:40	0.58	07:05	1.26	0.77	00:05	0.032	07:05	0.069	0.044	0.044	0.10
02/27/2021	19:20	1.98	10:50	2.65	2.14	17:45	0.64	08:15	1.01	0.78	19:20	0.031	10:50	0.075	0.043	0.043	0.02
02/28/2021	09:30	1.96	16:00	2.69	2.06	14:55	0.48	16:00	1.10	0.70	14:05	0.025	16:00	0.083	0.037	0.037	0.02
03/01/2021	19:15	1.86	11:00	2.75	2.13	19:15	0.56	14:10	1.43	0.73	18:55	0.025	14:10	0.100	0.040	0.040	-
03/02/2021	21:20	1.75	15:25	2.61	2.04	21:20	0.48	15:20	1.06	0.68	19:55	0.020	15:20	0.066	0.035	0.035	-
03/03/2021	20:30	1.59	16:10	2.51	2.05	20:30	0.37	09:20	1.40	0.73	20:30	0.013	09:20	0.085	0.038	0.038	-
03/04/2021	21:00	1.63	15:40	2.46	2.04	21:00	0.39	08:30	1.05	0.66	21:00	0.015	08:30	0.063	0.034	0.034	0.20
03/05/2021	18:50	1.66	13:15	2.39	2.03	18:50	0.41	10:35	1.13	0.71	18:50	0.016	10:35	0.070	0.036	0.036	0.05
03/06/2021	15:20	1.65	14:35	2.20	1.90	03:05	0.42	15:55	0.93	0.68	03:05	0.016	14:35	0.050	0.031	0.031	-
03/07/2021	10:15	1.63	05:40	2.65	1.91	14:30	0.40	05:20	1.15	0.66	14:30	0.015	05:20	0.063	0.031	0.031	0.04
03/08/2021	00:05	1.77	09:45	3.04	2.09	09:40	0.46	08:25	1.11	0.81	23:30	0.030	09:15	0.083	0.043	0.043	-
03/09/2021	21:05	1.82	10:30	2.74	2.09	10:20	0.45	13:30	1.15	0.76	23:20	0.024	13:30	0.073	0.041	0.041	0.01
03/10/2021	22:05	1.74	16:55	2.59	2.09	22:05	0.49	08:55	1.14	0.74	22:05	0.020	08:55	0.069	0.040	0.040	-
03/11/2021	06:40	1.76	12:40	2.93	2.10	12:30	0.47	07:55	1.16	0.76	01:00	0.024	07:55	0.067	0.041	0.041	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	23:40	1.67	15:10	2.97	2.03	18:05	0.56	15:10	1.09	0.78	23:40	0.025	15:10	0.094	0.040	0.040	-
03/13/2021	00:00	1.65	20:10	2.02	1.91	22:20	0.64	13:25	0.88	0.76	00:00	0.026	10:15	0.040	0.035	0.035	-
03/14/2021	16:00	1.78	17:20	2.22	1.96	14:05	0.56	17:25	1.31	0.75	22:30	0.026	17:20	0.070	0.036	0.036	0.30
03/15/2021	23:50	1.64	07:25	2.47	2.05	22:30	0.50	07:20	1.26	0.74	23:00	0.020	07:20	0.080	0.039	0.039	-
03/16/2021	05:10	1.67	13:00	2.70	2.07	22:00	0.48	13:30	1.24	0.77	22:00	0.020	12:50	0.082	0.041	0.041	-
03/17/2021	23:15	1.75	12:00	2.43	2.04	21:30	0.48	09:35	1.25	0.75	00:30	0.021	09:35	0.075	0.039	0.039	-
03/18/2021	22:15	1.64	13:45	2.74	2.00	23:15	0.50	07:55	1.05	0.71	00:05	0.022	13:45	0.078	0.036	0.036	0.11
03/19/2021	06:30	1.76	15:25	2.67	2.19	19:50	0.32	11:45	0.94	0.60	19:50	0.021	11:45	0.058	0.033	0.033	0.03
03/20/2021	12:10	1.81	08:50	2.52	2.20	00:10	0.33	13:05	1.15	0.60	00:05	0.020	13:10	0.067	0.033	0.033	0.17
03/21/2021	15:45	1.95	16:35	2.18	2.04	00:55	0.69	12:15	1.05	0.83	00:55	0.034	12:15	0.058	0.043	0.043	0.07
03/22/2021	18:00	1.69	08:35	2.54	2.08	21:25	0.43	08:05	1.21	0.78	20:10	0.019	08:05	0.078	0.041	0.041	0.11
03/23/2021	22:45	1.69	09:50	2.50	2.05	10:00	0.44	09:30	1.24	0.71	22:50	0.020	09:30	0.080	0.037	0.037	-
03/24/2021	20:50	1.81	11:55	2.67	2.05	11:55	0.43	07:10	1.12	0.72	21:25	0.020	09:50	0.072	0.038	0.038	0.34
03/25/2021	03:55	1.78	14:00	2.54	2.05	20:35	0.33	08:05	1.24	0.75	20:35	0.016	08:05	0.079	0.039	0.039	0.27
03/26/2021	02:20	1.80	14:00	2.89	2.13	14:25	0.36	11:25	1.20	0.70	02:15	0.023	11:25	0.067	0.037	0.037	-
03/27/2021	16:25	1.85	09:50	2.34	1.95	07:20	0.42	09:50	0.96	0.61	10:20	0.020	09:50	0.059	0.029	0.029	-
03/28/2021	05:15	1.83	16:40	2.20	1.90	17:45	0.43	08:45	1.02	0.70	17:45	0.020	08:45	0.052	0.032	0.032	0.37
03/29/2021	22:30	1.69	13:45	2.44	1.97	18:20	0.45	07:35	1.22	0.80	19:50	0.018	13:40	0.072	0.040	0.040	-
03/30/2021	23:50	1.66	12:25	2.37	1.92	22:45	0.51	10:05	1.48	0.84	22:45	0.020	10:05	0.090	0.040	0.040	-
03/31/2021	01:00	1.66	07:55	2.63	1.91	07:50	0.52	09:05	1.36	0.85	00:00	0.020	09:05	0.085	0.040	0.040	-
04/01/2021	00:00	1.66	14:10	2.61	2.03	17:05	0.38	07:10	1.58	0.83	18:15	0.020	14:10	0.107	0.042	0.042	-
04/02/2021	06:45	1.85	20:30	3.37	2.38	16:20	0.30	11:20	1.47	0.68	04:25	0.023	13:25	0.085	0.041	0.041	-
04/03/2021	22:10	1.69	17:40	2.13	1.87	17:45	0.45	17:50	1.12	0.74	19:05	0.019	17:50	0.061	0.033	0.033	-
04/04/2021	10:10	1.67	20:55	2.38	1.94	19:45	0.42	12:25	1.33	0.74	19:45	0.024	12:25	0.060	0.034	0.034	-
04/05/2021	18:25	1.63	14:10	2.79	1.97	00:35	0.53	09:50	1.56	0.87	18:15	0.021	09:50	0.112	0.043	0.043	-
04/06/2021	05:40	1.64	10:10	2.39	1.91	17:10	0.52	10:10	1.55	0.95	21:05	0.021	10:10	0.099	0.045	0.045	-
04/07/2021	02:15	1.66	08:25	2.42	1.90	19:15	0.44	14:20	1.63	0.85	19:15	0.017	10:35	0.100	0.040	0.040	0.22
04/08/2021	17:35	1.63	11:30	2.36	1.88	19:30	0.38	15:30	1.39	0.78	19:30	0.015	13:35	0.081	0.036	0.036	-
04/09/2021	04:15	1.67	10:20	2.54	1.91	22:05	0.39	14:30	1.31	0.79	22:05	0.015	10:20	0.083	0.037	0.037	0.03
04/10/2021	17:15	1.66	23:05	2.48	1.87	20:05	0.36	15:40	1.15	0.69	15:45	0.018	12:35	0.049	0.030	0.030	0.02
04/11/2021	12:40	2.28	02:45	2.55	2.44	20:50	0.31	02:45	0.60	0.43	20:50	0.020	02:45	0.042	0.028	0.028	-
04/12/2021	11:35	1.62	01:30	2.56	1.98	00:40	0.33	08:05	1.69	0.76	18:40	0.019	08:05	0.079	0.035	0.035	-
04/13/2021	23:50	1.63	02:10	2.00	1.78	21:40	0.41	08:25	1.51	0.77	21:40	0.016	08:25	0.065	0.032	0.032	-
04/14/2021	21:40	1.55	05:20	1.88	1.68	00:20	0.44	07:15	1.11	0.73	00:20	0.017	07:15	0.047	0.028	0.028	-
09/22/2020	22:50	1.79	13:40	2.79	2.19	18:30	0.35	08:05	0.86	0.45	22:40	0.015	08:05	0.041	0.026	0.017	-
09/23/2020	01:05	1.80	10:00	2.73	2.15	00:45	0.36	09:55	0.55	0.42	00:45	0.015	09:55	0.042	0.024	0.024	-
09/24/2020	23:20	1.53	19:50	2.78	2.04	23:00	0.26	10:25	0.94	0.50	23:00	0.015	20:35	0.068	0.025	0.025	-
09/25/2020	00:05	1.52	10:25	2.17	1.68	18:10	0.50	14:55	0.90	0.65	00:00	0.019	08:10	0.048	0.025	0.025	-
09/26/2020	21:45	1.44	15:45	2.62	1.54	15:40	0.47	15:55	0.84	0.60	06:50	0.018	15:55	0.041	0.020	0.020	-
09/27/2020	23:25	1.43	12:45	1.98	1.53	15:20	0.46	11:25	0.75	0.60	23:40	0.017	12:45	0.032	0.020	0.020	-
09/28/2020	05:10	1.39	15:55	2.25	1.76	22:25	0.43	13:50	0.85	0.61	03:25	0.017	13:50	0.044	0.025	0.025	-
09/29/2020	07:15	1.63	10:10	2.77	2.04	13:10	0.38	09:30	0.81	0.47	23:55	0.017	10:05	0.050	0.024	0.024	-
09/30/2020	22:35	1.64	08:40	2.64	2.01	07:40	0.37	17:25	0.60	0.46	00:00	0.017	08:40	0.040	0.023	0.023	-
10/01/2020	01:35	1.64	12:25	2.65	1.87	11:50	0.30	10:15	0.81	0.51	01:40	0.017	12:40	0.047	0.023	0.023	-
10/02/2020	16:10	1.33	13:45	2.55	1.73	17:05	0.26	13:45	1.04	0.53	17:05	0.008	13:45	0.073	0.022	0.022	-
10/03/2020	21:00	1.43	23:20	2.07	1.58	23:50	0.32	10:30	0.69	0.51	23:45	0.014	15:40	0.028	0.018	0.018	0.01
10/04/2020	16:45	1.38	06:15	1.89	1.51	16:45	0.30	17:35	0.68	0.49	16:45	0.009	06:20	0.030	0.016	0.016	0.01
10/05/2020	07:05	1.29	11:10	2.05	1.59	10:40	0.23	07:10	0.97	0.61	07:25	0.009	11:10	0.046	0.023	0.023	-
10/06/2020	03:50	1.39	07:45	1.93	1.59	12:05	0.32	07:45	0.85	0.59	12:05	0.009	07:45	0.040	0.021	0.021	-
10/07/2020	01:15	1.39	13:15	2.19	1.59	03:45	0.45	13:45	1.61	0.85	02:30	0.013	13:15	0.081	0.031	0.031	-
10/08/2020	17:25	1.15	07:25	1.86	1.43	17:25	0.57	11:00	1.83	1.05	17:25	0.013	10:25	0.073	0.033	0.033	-
10/09/2020	23:50	1.16	14:55	1.61	1.32	05:05	0.53	15:00	1.91	0.92	05:05	0.013	15:00	0.069	0.026	0.026	0.64
10/10/2020	19:55	1.21	01:55	1.68	1.35	00:45	0.57	02:50	1.80	0.79	20:20	0.014	01:55	0.064	0.022	0.022	1.04
10/11/2020	06:50	1.18	22:10	1.82	1.29	08:35	0.48	11:25	1.38	0.72	08:35	0.011	22:15	0.045	0.019	0.019	0.53
10/12/2020	09:20	1.21	06:10	1.74	1.30	16:40	0.52	08:05	1.87	0.90	16:40	0.014	07:55	0.051	0.024	0.024	-
10/13/2020	11:00	1.18	16:15	1.93	1.28	23:05	0.41	08:30	1.66	0.71	22:20	0.010	16:15	0.073	0.019	0.019	0.61
10/14/2020	07:00	1.20	09:10	1.47	1.27	00:10	0.43	10:45	1.08	0.63	00:00	0.011	12:00	0.031	0.016	0.016	-
10/15/2020	02:35	1.19	14:15	1.62	1.33	23:10	0.36	09:05	1.07	0.59	02:25	0.010	09:05	0.034	0.016	0.016	-
10/16/2020	13:45	1.19	10:20	1.44	1.27	01:05	0.38	10:20	1.00	0.50	03:00	0.010	10:20	0.031	0.013	0.013	-
10/17/2020	07:35	1.14	08:10	1.51	1.23	04:30	0.39	14:25	0.85	0.50	03:10	0.009	10:15	0.023	0.012	0.012	0.01
10/18/2020	10:35	1.16	15:50	1.49	1.25	05:05	0.43	15:50	0.99	0.54	04:50	0.011	15:50	0.032	0.014	0.014	0.03
10/19/2020	05:55	1.20	11:35	2.72	1.31	11:25	0.38	11:20	1.16	0.62	01:20	0.011	11:20	0.051	0.017	0.017	0.05
10/20/2020	04:10	1.18	10:35	1.72	1.35	02:50	0.39	10:35	1.91	0.74	03:05	0.009	10:35	0.076	0.022	0.022	-
10/21/2020	20:30	1.22	10:20	1.74	1.42	20:45	0.34	06:40	1.64	0.87	20:30	0.008	09:50	0.060	0.027	0.027	0.01
10/22/2020	03:20	1.21	09:15	1.67	1.34	19:55	0.29	10:20	1.01	0.55	18:45	0.008	10:20	0.035	0.016	0.016	-
10/23/2020	21:35	1.15	12:15	1.75	1.30	00:00	0.36	11:05	1.54	0.68	00:00	0.009	11:05	0.053	0.019	0.019	0.20
10/24/2020	06:55	1.16	14:55	1.50	1.31	02:15	0.46	09:25	1.18	0.73	02:10	0.011	14:50	0.035	0.020	0.020	0.02
10/25/2020	16:20	1.30	19:05	1.43	1.36	20:55	0.52	15:15	1.19	0.85	20:55	0.015	12:45	0.036	0.024	0.024	-
10/26/2020	16:45	1.19	14:50	1.80	1.36	03:10	0.44	13:20	1.46	0.69	17:40	0.011	08:25	0.046	0.020	0.020	-
10/27/2020	16:10	1.18	05:55	1.92	1.27	01:50	0.42	09:20	1.33	0.62	00:10	0.011	09:20	0.045	0.016	0.016	-
10/28/2020	10:35	1.19	06:30	1.78	1.35	01:50	0.30	11:10	1.37	0.56	18:10	0.009	11:15	0.045	0.015	0.015	-
10/29/2020	02:40	1.18	21:35	1.83	1.35	07:45	0.33	11:55	1.32	0.58	00:50	0.008	12:00	0.042	0.016	0.016	-
10/30/2020	08:30	1.22	11:25	2.10	1.56	17:55	0.31	17:40	1.36	0.62	17:55	0.012	17:40	0.069	0.021	0.021	0.10
10/31/2020	00:10	1.30	20:05	1.93	1.80	00:10	0.38	20:05	0.52	0.45	00:10	0.010	20:00	0.024	0.019	0.019	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/01/2020	22:50	1.65	15:35	2.04	1.80	22:40	0.36	15:30	0.61	0.44	17:55	0.014	15:30	0.031	0.019	0.019	-
11/02/2020	17:50	1.23	16:25	2.50	1.63	08:55	0.24	13:20	1.00	0.48	08:55	0.007	16:30	0.049	0.018	0.018	-
11/03/2020	19:10	1.18	19:50	1.85	1.42	01:40	0.27	09:55	1.36	0.43	01:35	0.007	10:10	0.047	0.013	0.013	0.83
11/04/2020	10:40	1.23	01:20	2.11	1.51	00:05	0.35	14:50	0.96	0.46	09:00	0.009	10:30	0.036	0.015	0.015	0.09
11/05/2020	00:50	1.21	09:15	2.56	1.55	03:35	0.35	11:25	1.44	0.63	01:10	0.009	11:25	0.061	0.023	0.023	0.34
11/06/2020	08:30	1.28	10:00	2.88	1.91	09:20	0.26	08:55	1.54	0.66	01:00	0.013	13:00	0.090	0.032	0.032	0.10
11/07/2020	03:35	1.93	15:35	2.14	1.98	14:35	0.37	14:05	0.77	0.52	02:35	0.018	14:05	0.039	0.025	0.025	0.07
11/08/2020	20:55	1.95	16:55	2.11	1.99	14:00	0.32	17:15	0.83	0.48	11:05	0.016	17:15	0.042	0.024	0.024	0.01
11/09/2020	19:05	1.20	08:00	2.53	1.55	05:15	0.36	08:25	1.52	0.57	08:10	0.011	07:50	0.076	0.019	0.019	0.04
11/10/2020	07:50	1.19	14:00	1.65	1.29	10:50	0.42	07:00	1.27	0.65	08:20	0.011	07:20	0.036	0.017	0.017	0.03
11/11/2020	07:35	1.17	20:50	2.14	1.35	20:00	0.34	06:55	1.19	0.64	19:55	0.012	06:55	0.030	0.018	0.018	-
11/12/2020	17:25	1.16	12:50	2.00	1.31	12:10	0.35	20:45	0.96	0.59	07:55	0.011	12:50	0.038	0.016	0.016	0.16
11/13/2020	04:55	1.15	10:30	1.84	1.42	01:25	0.46	10:40	1.47	0.72	06:05	0.012	10:40	0.057	0.022	0.022	0.38
11/14/2020	21:05	1.22	05:10	1.77	1.45	14:55	0.50	16:40	1.26	0.70	22:00	0.012	16:40	0.038	0.022	0.022	0.47
11/15/2020	16:50	1.21	16:00	1.37	1.26	12:10	0.47	00:45	0.88	0.57	11:40	0.012	00:45	0.023	0.015	0.015	0.19
11/16/2020	21:15	1.16	09:25	1.84	1.30	07:25	0.43	10:00	2.38	0.62	07:25	0.011	10:00	0.074	0.017	0.017	0.31
11/17/2020	00:45	1.13	16:55	2.62	1.52	18:40	0.39	09:45	1.99	0.90	00:45	0.012	09:35	0.092	0.032	0.032	0.20
11/18/2020	02:00	1.22	08:05	1.67	1.38	00:15	0.41	17:00	1.84	0.89	02:20	0.010	16:15	0.066	0.027	0.027	0.30
11/19/2020	06:55	1.21	11:20	1.77	1.37	16:30	0.47	11:20	1.94	1.10	22:20	0.014	11:20	0.081	0.032	0.032	0.50
11/20/2020	20:40	1.25	14:20	2.88	1.40	06:40	0.41	09:35	1.99	1.00	06:40	0.011	09:35	0.079	0.031	0.031	0.01
11/21/2020	02:25	1.24	17:45	1.66	1.28	09:05	0.42	17:40	1.71	0.67	09:05	0.011	17:40	0.063	0.018	0.018	-
11/22/2020	21:40	1.23	17:10	1.60	1.31	02:25	0.50	16:30	1.61	0.73	02:25	0.013	17:10	0.056	0.020	0.020	0.21
11/23/2020	02:45	1.31	14:20	1.90	1.49	23:25	0.41	07:25	1.81	0.93	23:20	0.014	14:50	0.078	0.031	0.031	0.14
11/24/2020	21:50	1.20	11:05	2.25	1.45	02:55	0.39	12:40	2.31	0.83	20:50	0.011	14:25	0.082	0.027	0.027	0.21
11/25/2020	05:40	1.18	08:20	1.77	1.34	00:10	0.46	12:10	2.34	0.78	00:05	0.011	12:10	0.087	0.022	0.022	0.05
11/26/2020	06:40	1.24	00:00	1.31	1.27	19:15	0.39	00:40	0.80	0.66	19:15	0.010	00:40	0.021	0.017	0.017	0.02
11/27/2020	18:20	1.26	12:15	1.47	1.32	10:15	0.48	12:40	1.06	0.68	03:10	0.013	12:40	0.033	0.018	0.018	-
11/28/2020	19:00	1.25	11:35	1.36	1.31	15:45	0.40	13:45	0.76	0.60	15:35	0.011	13:45	0.021	0.016	0.016	0.05
11/29/2020	00:00	1.26	12:40	1.32	1.29	11:10	0.44	17:50	0.77	0.63	11:10	0.012	17:50	0.020	0.016	0.016	-
11/30/2020	00:00	1.29	17:25	2.40	1.41	20:40	0.40	13:25	2.46	0.80	07:15	0.012	17:25	0.120	0.024	0.024	0.36
12/01/2020	22:45	1.39	14:10	2.47	1.57	14:50	0.38	08:40	2.58	0.95	14:50	0.013	12:50	0.112	0.036	0.036	-
12/02/2020	05:05	1.38	09:10	1.85	1.50	23:55	0.37	11:25	2.52	0.86	01:10	0.012	11:20	0.089	0.029	0.029	0.01
12/03/2020	22:10	1.43	10:55	2.21	1.54	08:55	0.35	15:15	2.12	0.94	09:55	0.012	11:00	0.077	0.032	0.032	-
12/04/2020	23:55	1.29	08:30	1.88	1.48	23:45	0.32	16:25	1.89	0.86	22:30	0.009	08:30	0.085	0.028	0.028	-
12/05/2020	00:00	1.30	18:10	1.61	1.38	00:05	0.32	19:55	1.66	0.75	00:05	0.008	11:35	0.050	0.022	0.022	0.03
12/06/2020	00:00	1.34	13:05	1.41	1.36	01:10	0.37	21:40	0.94	0.50	01:10	0.010	21:40	0.027	0.014	0.014	0.03
12/07/2020	07:45	1.18	14:20	3.18	1.76	21:05	0.23	10:40	1.34	0.53	07:35	0.009	10:40	0.094	0.022	0.022	-
12/08/2020	17:40	1.22	08:30	2.67	1.86	05:20	0.24	23:25	2.13	0.91	12:10	0.011	22:20	0.086	0.039	0.039	0.87
12/09/2020	10:35	1.50	13:45	2.58	1.67	10:35	1.31	13:40	2.50	1.63	10:35	0.043	13:45	0.167	0.063	0.063	0.17
12/10/2020	03:25	1.60	18:25	2.22	1.77	09:10	1.29	18:25	2.25	1.67	09:10	0.046	18:25	0.130	0.071	0.071	0.07
12/11/2020	18:45	1.31	10:25	2.37	1.72	21:20	0.53	12:35	2.56	1.63	21:20	0.015	13:40	0.139	0.068	0.068	0.02
12/12/2020	12:10	1.32	23:35	2.26	1.51	04:00	0.79	19:25	2.11	1.33	01:45	0.023	19:10	0.093	0.045	0.045	0.01
12/13/2020	14:50	1.53	06:15	2.09	1.81	08:25	0.66	18:35	1.90	1.12	08:25	0.024	18:35	0.096	0.048	0.048	0.24
12/14/2020	04:15	1.41	20:00	2.30	1.83	04:05	0.38	14:55	1.73	1.02	04:05	0.012	14:55	0.079	0.045	0.045	0.05
12/15/2020	20:35	1.57	00:50	2.25	1.86	03:30	0.48	15:40	2.06	1.00	01:25	0.023	10:25	0.092	0.044	0.044	0.58
12/16/2020	02:15	1.59	13:05	2.15	1.78	03:15	0.72	10:40	2.31	1.12	03:15	0.026	10:40	0.104	0.047	0.047	0.39
12/17/2020	00:05	1.61	18:10	2.35	1.81	15:50	0.55	13:00	1.88	0.80	01:15	0.023	13:00	0.089	0.035	0.035	0.08
12/18/2020	18:00	1.68	12:00	2.29	1.87	18:00	0.41	10:15	1.51	0.77	18:00	0.016	13:40	0.065	0.035	0.035	0.25
12/19/2020	06:30	1.63	00:25	2.15	1.82	10:25	0.37	15:30	1.13	0.68	10:25	0.014	15:30	0.061	0.030	0.030	0.37
12/20/2020	22:20	1.51	17:05	2.13	1.83	23:40	0.42	21:25	1.35	0.71	22:20	0.014	21:25	0.064	0.031	0.031	0.04
12/21/2020	01:00	1.51	10:05	2.56	1.79	00:15	0.40	13:45	1.80	0.81	00:15	0.013	17:15	0.092	0.035	0.035	1.07
12/22/2020	12:45	1.63	07:00	2.17	1.76	00:20	0.38	17:25	1.68	0.84	00:20	0.015	07:00	0.065	0.035	0.035	-
12/23/2020	07:00	1.42	08:15	2.17	1.80	09:35	0.37	14:05	1.36	0.83	09:05	0.015	19:05	0.061	0.036	0.036	-
12/24/2020	22:40	1.46	05:30	2.20	1.78	08:25	0.33	05:30	1.22	0.72	08:25	0.012	05:30	0.069	0.031	0.031	-
12/25/2020	07:25	1.51	16:30	1.78	1.59	07:25	0.45	16:30	0.73	0.53	03:40	0.015	16:30	0.031	0.019	0.019	0.49
12/26/2020	19:00	1.35	00:10	2.03	1.63	18:00	0.29	01:10	1.00	0.57	18:00	0.008	01:10	0.051	0.022	0.022	0.02
12/27/2020	17:45	1.39	00:10	1.90	1.50	08:10	0.37	00:10	0.87	0.48	06:30	0.013	00:10	0.040	0.016	0.016	0.13
12/28/2020	18:25	1.18	13:45	2.50	1.62	06:10	0.24	14:50	1.06	0.55	19:15	0.012	13:45	0.044	0.020	0.020	-
12/29/2020	01:40	1.14	08:05	1.71	1.35	23:40	0.39	11:10	0.96	0.56	05:45	0.011	10:55	0.028	0.016	0.016	0.14
12/30/2020	22:35	1.12	08:05	2.64	1.30	07:55	0.25	13:05	1.13	0.72	00:00	0.012	08:05	0.043	0.018	0.018	0.78
12/31/2020	00:40	1.13	16:15	1.80	1.21	16:15	0.47	08:35	0.98	0.79	17:50	0.014	11:05	0.026	0.019	0.019	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			5.890	30.65
Average	1.73	0.71	0.029	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A1a_30822

Site Address /Location:	3802 B St NW			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	located in road	Latitude:	47.341163	Pipe Size (H x W): 10.00 X 9.88	Pipe Shape: Circular
		Longitude:	-122.232272		



Manhole #	System Characteristics
A1a30822	Commercial
Access	Traffic
Drive	Medium







ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519.11.325

Installation Information

Installation Date:	Installation Type:
Tuesday, September 22, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	
7:57:00 AM	
Depth of Flow (Wet DOF) (in)	
1.88	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
0.97	N/A
Silt (in)	Silt Type
0	

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
PVC	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

AUB_A1b_30968

Site Commentary

SITE INFORMATION

Pipe	Round (11.88 in H)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

This site experienced flow changes during the monitoring period.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	2.62	0.32	0.029
Minimum	1.44	0.05	0.003
Maximum	5.65	1.57	0.214
Min Time	11/08/2020 10:00:00 PM	04/13/2021 12:00:00 AM	04/13/2021 12:00:00 AM
Max Time	03/01/2021 12:00:00 PM	11/13/2020 1:00:00 PM	11/13/2020 1:00:00 PM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

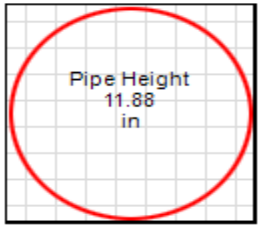
Percent Uptime	
DFINAL (in)	99.827
VFINAL (ft/s)	99.827
QFINAL (MGD - Total MG)	99.827

Hydrograph Report

AUB_A1b_30968

Flow Monitor

AUB_A1b_30968



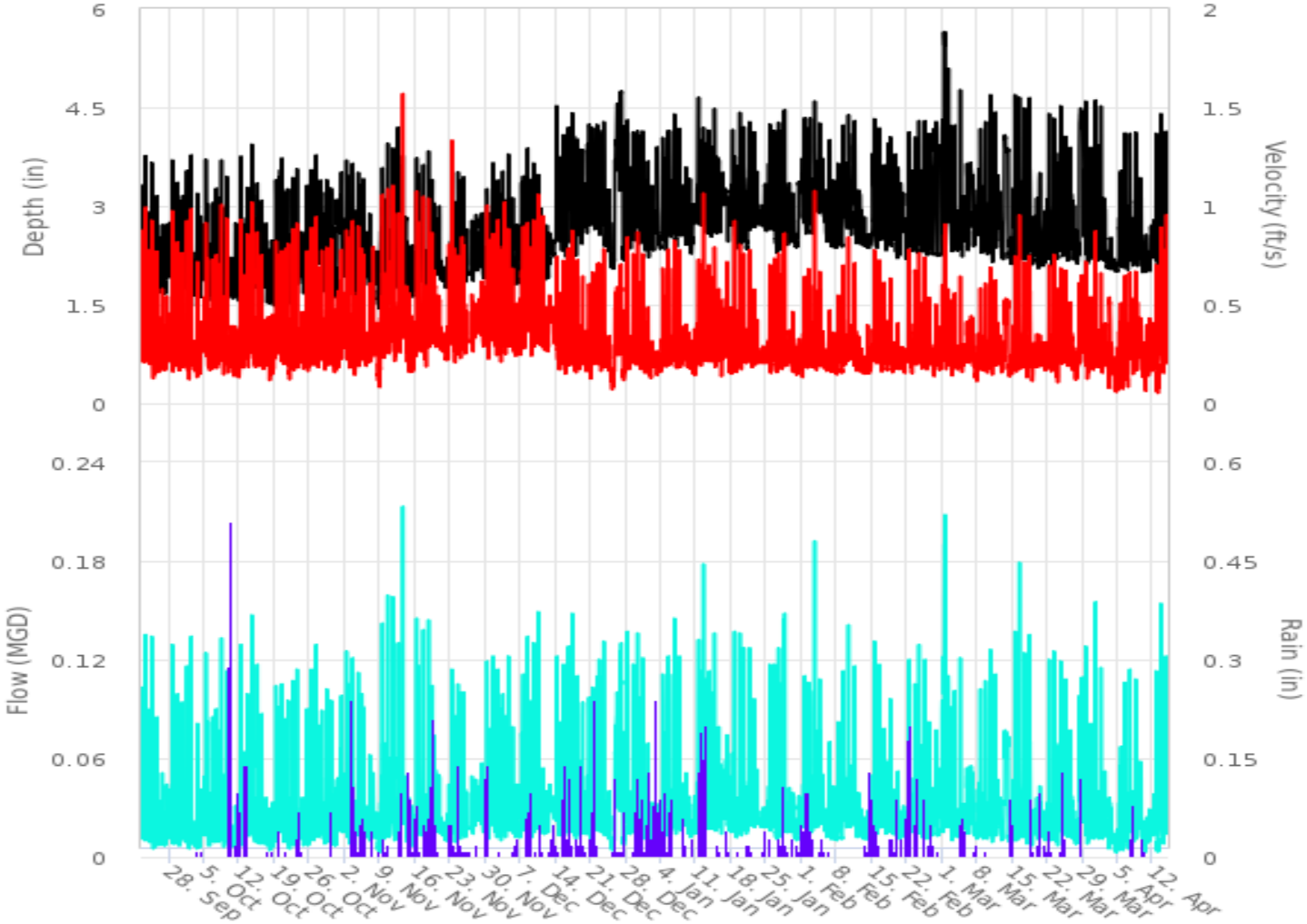
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A1b_30968

Flow Monitor

AUB_A1b_30968

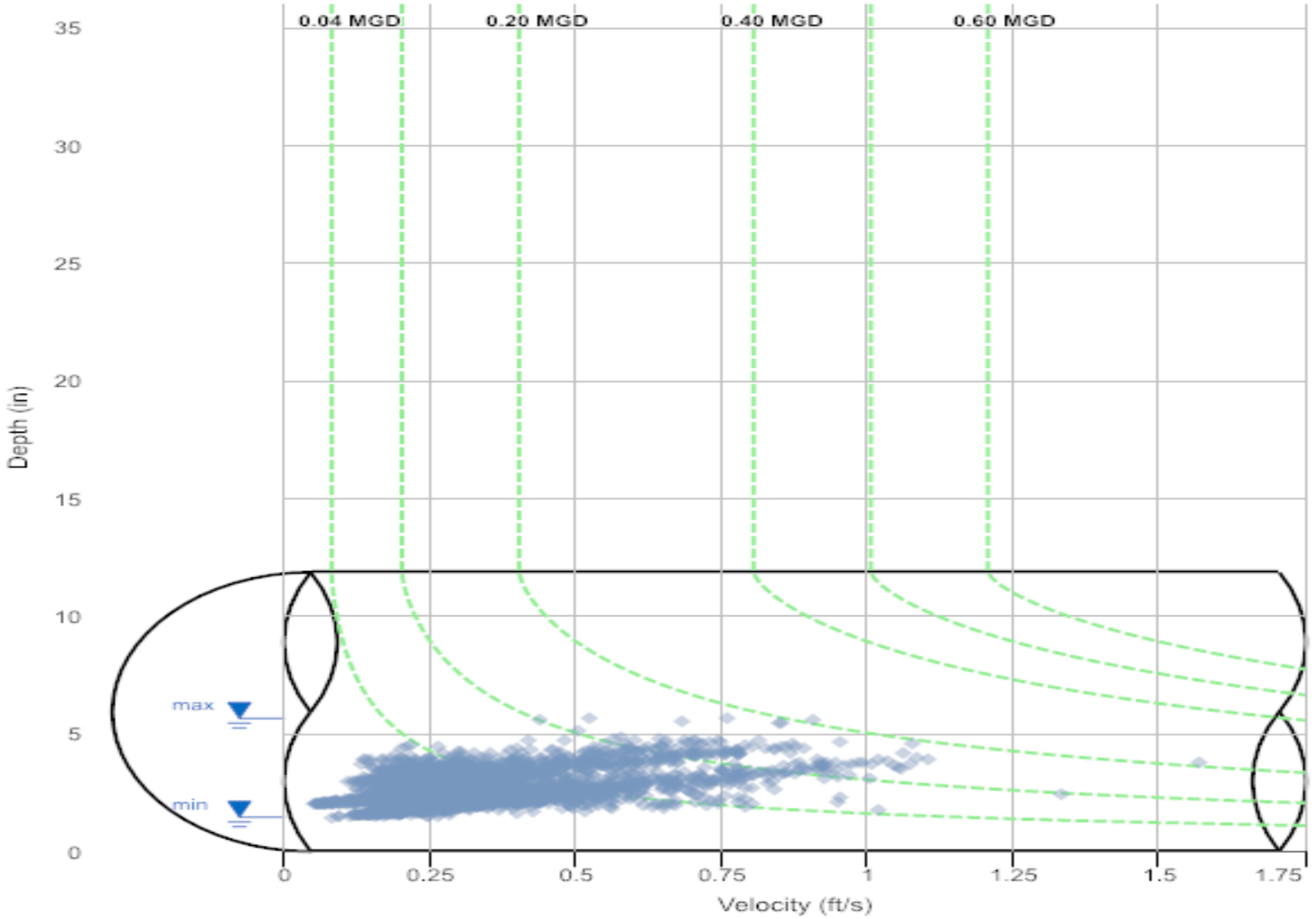
Pipe Height
11.88
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A1b_30968Pipe: Round (11.88 in H), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	12:45	2.19	10:20	4.21	2.77	13:00	0.10	10:20	0.73	0.21	12:35	0.007	10:20	0.115	0.020	0.020	0.51
01/02/2021	12:40	2.23	08:55	3.62	2.73	07:35	0.09	06:30	0.61	0.23	00:00	0.010	05:00	0.059	0.020	0.020	1.69
01/03/2021	19:25	2.34	04:50	3.97	2.72	07:15	0.11	04:40	0.51	0.20	18:30	0.011	04:40	0.070	0.017	0.017	0.65
01/04/2021	05:00	2.31	07:50	4.51	2.95	06:00	0.10	08:00	1.15	0.30	03:15	0.011	08:00	0.183	0.032	0.032	0.48
01/05/2021	01:35	2.32	15:40	4.75	2.92	04:50	0.16	10:45	0.93	0.32	00:00	0.012	10:45	0.161	0.036	0.036	0.52
01/06/2021	23:50	2.37	15:25	4.95	2.87	06:15	0.16	15:25	1.05	0.28	22:20	0.012	15:25	0.206	0.029	0.029	0.22
01/07/2021	01:50	2.27	15:35	4.48	3.02	10:50	0.10	15:45	0.92	0.29	00:55	0.013	15:45	0.151	0.032	0.032	-
01/08/2021	04:35	2.36	14:50	4.17	2.93	02:40	0.09	16:50	0.98	0.27	02:40	0.010	16:50	0.109	0.026	0.026	0.22
01/09/2021	21:25	2.25	17:50	4.25	2.82	17:50	0.10	09:30	0.64	0.27	18:25	0.009	08:10	0.076	0.025	0.025	-
01/10/2021	00:55	2.26	04:50	3.20	2.74	15:40	0.08	18:10	0.95	0.21	15:40	0.008	18:10	0.093	0.019	0.019	0.07
01/11/2021	05:40	2.41	11:05	4.77	3.20	05:10	0.13	09:25	1.01	0.33	05:35	0.012	10:35	0.171	0.041	0.041	1.06
01/12/2021	00:00	2.72	10:20	4.59	3.12	08:00	0.15	10:20	1.98	0.33	00:00	0.015	10:20	0.351	0.039	0.039	2.10
01/13/2021	02:10	2.53	15:25	4.80	3.17	06:50	0.15	08:10	1.24	0.34	20:50	0.014	15:20	0.178	0.040	0.040	0.09
01/14/2021	03:00	2.51	15:35	5.02	3.13	04:10	0.14	15:35	0.94	0.33	17:50	0.014	15:35	0.187	0.040	0.040	0.01
01/15/2021	05:40	2.52	11:45	4.20	3.00	23:55	0.12	12:05	0.86	0.30	21:10	0.013	12:05	0.130	0.032	0.032	0.09
01/16/2021	07:30	2.76	07:20	4.26	3.17	00:00	0.13	17:25	0.70	0.35	00:00	0.013	07:20	0.098	0.038	0.038	-
01/17/2021	09:20	2.36	06:25	4.19	3.01	09:30	0.12	06:05	0.84	0.34	09:30	0.010	06:25	0.093	0.034	0.034	0.10
01/18/2021	22:10	2.25	14:30	4.55	3.03	07:00	0.11	16:15	1.93	0.33	21:50	0.010	16:15	0.301	0.037	0.037	-
01/19/2021	05:15	2.30	16:10	4.50	2.92	19:40	0.10	16:20	1.09	0.28	19:40	0.010	16:20	0.188	0.030	0.030	0.01
01/20/2021	03:25	2.21	12:35	4.54	2.92	04:05	0.10	12:20	0.91	0.29	04:05	0.009	12:30	0.159	0.030	0.030	-
01/21/2021	05:25	2.31	15:20	4.65	2.96	12:30	0.14	15:10	1.00	0.31	00:05	0.010	15:20	0.163	0.033	0.033	0.11
01/22/2021	19:20	2.48	13:30	4.57	3.20	02:00	0.15	13:35	0.90	0.29	15:15	0.014	13:35	0.158	0.033	0.033	-
01/23/2021	11:20	2.55	04:55	4.20	2.93	00:40	0.18	04:55	0.60	0.24	22:55	0.017	04:55	0.094	0.023	0.023	-
01/24/2021	20:30	2.62	08:15	4.00	2.87	14:35	0.14	14:25	0.71	0.23	10:55	0.017	08:20	0.078	0.021	0.021	0.16
01/25/2021	20:50	2.42	15:20	4.64	3.07	21:05	0.11	15:20	0.86	0.27	21:05	0.010	15:20	0.155	0.030	0.030	0.04
01/26/2021	19:55	2.28	13:10	4.47	2.93	00:55	0.12	13:20	0.89	0.27	23:45	0.009	13:10	0.148	0.028	0.028	-
01/27/2021	02:15	2.21	15:45	4.86	2.95	01:30	0.12	15:45	0.99	0.30	01:30	0.008	15:45	0.190	0.034	0.034	0.14
01/28/2021	02:05	2.31	15:00	4.91	3.06	18:45	0.11	15:25	1.40	0.32	23:25	0.010	15:25	0.243	0.039	0.039	0.24
01/29/2021	04:55	2.36	12:55	3.64	2.84	23:05	0.13	13:30	0.49	0.25	04:40	0.012	13:25	0.056	0.023	0.023	0.03
01/30/2021	18:20	2.26	10:55	3.68	2.67	01:25	0.10	10:45	1.03	0.23	12:00	0.009	10:45	0.113	0.019	0.019	0.07
01/31/2021	01:05	2.36	08:30	3.78	3.01	00:50	0.11	08:25	0.45	0.21	00:10	0.008	08:25	0.056	0.022	0.022	0.12
02/01/2021	07:05	2.52	15:35	4.72	3.16	04:20	0.12	16:00	1.23	0.28	21:45	0.013	16:00	0.216	0.032	0.032	0.82
02/02/2021	23:35	2.55	15:25	4.72	3.20	04:40	0.16	15:40	0.88	0.30	23:15	0.014	15:25	0.153	0.036	0.036	0.31
02/03/2021	02:10	2.46	14:00	4.73	3.17	22:10	0.13	14:10	2.13	0.32	03:15	0.013	14:10	0.392	0.038	0.038	0.06
02/04/2021	02:10	2.67	13:40	6.61	3.28	23:20	0.13	10:20	1.91	0.30	02:10	0.014	13:40	0.539	0.037	0.037	0.07
02/05/2021	23:25	2.44	06:25	4.18	2.97	18:15	0.12	06:25	0.59	0.24	23:15	0.011	06:25	0.092	0.024	0.024	0.01
02/06/2021	05:10	2.29	15:55	4.33	2.91	08:45	0.08	15:55	0.62	0.23	19:35	0.008	15:55	0.102	0.024	0.024	0.01
02/07/2021	22:15	2.36	08:10	3.53	2.47	07:00	0.12	19:40	0.51	0.18	19:55	0.008	07:50	0.056	0.014	0.014	-
02/08/2021	00:35	2.37	07:25	4.32	2.80	22:00	0.10	07:25	0.87	0.26	22:00	0.008	07:25	0.142	0.025	0.025	-
02/09/2021	01:15	2.36	07:10	4.57	3.06	06:50	0.11	09:35	0.95	0.28	00:15	0.010	07:10	0.137	0.032	0.032	-
02/10/2021	22:00	2.41	08:05	4.57	3.07	19:15	0.10	08:00	1.54	0.30	19:15	0.009	08:00	0.270	0.034	0.034	-
02/11/2021	23:55	2.41	07:45	4.96	3.31	09:55	0.09	14:05	0.85	0.31	21:30	0.011	14:05	0.142	0.037	0.037	-
02/12/2021	23:25	2.29	22:15	3.89	2.79	02:20	0.11	22:10	0.51	0.23	02:20	0.009	22:10	0.070	0.021	0.021	-
02/13/2021	16:35	2.21	13:20	3.66	2.44	15:45	0.11	20:35	0.54	0.18	15:45	0.007	13:20	0.062	0.013	0.013	0.08
02/14/2021	08:45	2.30	08:15	2.88	2.44	07:30	0.14	08:25	0.65	0.19	08:40	0.009	08:25	0.049	0.014	0.014	0.71
02/15/2021	19:40	2.36	12:05	4.66	2.93	08:20	0.11	12:15	0.91	0.29	19:55	0.014	12:15	0.156	0.031	0.031	0.78
02/16/2021	03:20	2.28	10:40	4.62	2.86	21:45	0.14	10:45	0.90	0.28	02:20	0.013	10:55	0.162	0.028	0.028	0.07
02/17/2021	20:45	2.27	04:20	5.14	2.97	01:30	0.12	10:15	0.99	0.29	18:55	0.009	04:20	0.177	0.031	0.031	-
02/18/2021	20:55	2.30	15:35	4.45	3.12	06:35	0.14	15:25	0.82	0.28	19:00	0.014	15:25	0.134	0.031	0.031	0.09
02/19/2021	23:15	2.23	15:55	4.13	2.83	22:20	0.09	15:50	0.56	0.23	23:15	0.008	15:50	0.084	0.021	0.021	0.17
02/20/2021	02:10	2.15	09:20	3.73	2.75	09:10	0.10	06:00	0.48	0.23	02:25	0.007	05:55	0.062	0.021	0.021	0.07
02/21/2021	18:20	2.17	08:10	4.12	2.69	19:40	0.10	07:10	0.47	0.22	19:40	0.006	07:10	0.062	0.019	0.019	0.42
02/22/2021	05:55	2.14	09:50	4.42	2.95	05:55	0.09	10:00	0.88	0.29	05:55	0.005	10:05	0.148	0.030	0.030	0.98
02/23/2021	03:25	2.25	13:45	4.64	2.98	09:10	0.11	13:40	0.91	0.29	03:20	0.008	13:45	0.162	0.031	0.031	0.27
02/24/2021	04:10	2.21	09:25	4.60	2.90	05:15	0.12	09:20	0.92	0.30	22:35	0.010	09:20	0.163	0.033	0.033	-
02/25/2021	23:35	2.24	14:05	4.50	2.75	23:30	0.12	14:00	1.15	0.26	23:30	0.008	14:00	0.198	0.026	0.026	0.18
02/26/2021	01:45	2.23	11:15	4.51	2.92	01:00	0.12	11:10	0.64	0.26	01:00	0.008	11:10	0.106	0.027	0.027	0.10
02/27/2021	03:20	2.17	20:05	4.93	3.35	08:25	0.11	20:05	0.81	0.26	00:30	0.012	20:05	0.159	0.032	0.032	0.02
02/28/2021	06:25	2.14	23:35	4.23	3.34	18:40	0.11	23:25	0.60	0.26	00:05	0.012	23:45	0.096	0.031	0.031	0.02
03/01/2021	03:30	2.23	08:30	6.06	3.98	04:40	0.13	15:15	1.11	0.47	03:55	0.013	08:25	0.257	0.081	0.081	-
03/02/2021	23:55	2.29	05:35	5.41	3.21	01:20	0.12	05:35	0.91	0.31	23:50	0.009	05:35	0.200	0.039	0.039	-
03/03/2021	04:30	2.12	12:45	5.15	2.73	07:50	0.12	12:45	0.80	0.26	00:00	0.009	12:45	0.165	0.026	0.026	-
03/04/2021	23:35	2.21	14:00	5.01	2.73	01:05	0.12	14:00	0.77	0.26	00:55	0.008	14:00	0.153	0.026	0.026	0.20
03/05/2021	02:10	2.11	08:05	3.74	2.78	02:10	0.08	17:45	0.56	0.26	02:10	0.005	21:45	0.065	0.024	0.024	0.05
03/06/2021	03:45	2.21	02:55	4.48	3.17	18:10	0.12	02:55	0.66	0.34	05:20	0.009	02:55	0.113	0.038	0.038	-
03/07/2021	10:25	2.08	05:25	4.18	2.97	10:25	0.07	05:25	0.59	0.21	10:25	0.004	05:25	0.092	0.022	0.022	0.04
03/08/2021	04:35	2.21	15:30	4.81	2.87	00:45	0.11	15:25	0.74	0.26	20:30	0.010	15:30	0.140	0.027	0.027	-
03/09/2021	04:05	2.21	14:25	4.86	2.74	07:05	0.08	14:15	0.76	0.27	04:05	0.007	14:25	0.144	0.027	0.027	0.01
03/10/2021	04:30	2.10	14:55	4.94	2.74	01:20	0.09	15:25	1.30	0.27	04:25	0.005	15:25	0.239	0.027	0.027	-
03/11/2021	02:05	2.08	15:10	5.32	2.76	23:50	0.11	17:20	0.97	0.29	20:35	0.010	15:10	0.200	0.028	0.028	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	20:15	2.09	10:40	3.97	2.81	20:15	0.08	04:55	0.67	0.26	20:15	0.004	04:55	0.066	0.024	0.024	-
03/13/2021	04:40	2.02	12:00	4.12	3.34	02:25	0.10	12:30	0.58	0.37	03:35	0.006	12:35	0.089	0.046	0.046	-
03/14/2021	16:05	2.11	03:20	3.89	2.66	23:00	0.09	14:55	0.54	0.27	10:30	0.006	03:25	0.075	0.028	0.028	0.30
03/15/2021	02:00	2.11	12:00	5.25	2.69	20:55	0.09	12:00	0.93	0.28	20:55	0.006	12:00	0.197	0.027	0.027	-
03/16/2021	00:35	2.08	09:05	5.17	2.78	00:45	0.08	09:20	1.43	0.29	00:45	0.004	09:20	0.283	0.031	0.031	-
03/17/2021	19:20	1.95	08:50	4.79	2.73	02:45	0.09	08:50	0.83	0.28	02:40	0.006	08:50	0.157	0.028	0.028	-
03/18/2021	00:45	2.09	10:10	4.81	2.74	00:45	0.08	12:10	0.84	0.29	00:40	0.005	11:05	0.149	0.029	0.029	0.11
03/19/2021	03:05	2.04	10:30	3.56	2.50	00:05	0.08	04:30	0.48	0.24	00:10	0.004	10:30	0.057	0.019	0.019	0.03
03/20/2021	04:30	2.01	10:40	3.68	2.55	09:10	0.11	08:50	0.45	0.22	01:20	0.009	08:50	0.056	0.018	0.018	0.17
03/21/2021	00:10	2.06	14:55	3.46	2.55	06:45	0.08	10:55	0.44	0.22	06:45	0.009	14:55	0.052	0.017	0.017	0.07
03/22/2021	18:50	2.10	06:50	4.91	2.67	18:50	0.08	07:00	0.84	0.27	18:45	0.005	06:50	0.162	0.026	0.026	0.11
03/23/2021	20:40	2.02	05:35	4.72	2.73	20:35	0.06	06:25	1.63	0.30	20:35	0.004	06:25	0.279	0.031	0.031	-
03/24/2021	20:55	2.07	14:10	4.75	2.91	01:25	0.10	07:15	2.21	0.33	01:25	0.006	07:15	0.281	0.036	0.036	0.34
03/25/2021	22:40	2.17	08:35	4.64	2.71	20:05	0.13	08:35	1.62	0.32	20:05	0.008	08:35	0.292	0.032	0.032	0.27
03/26/2021	03:10	2.09	13:20	4.44	2.83	01:05	0.08	08:45	1.27	0.28	01:05	0.005	08:45	0.136	0.026	0.026	-
03/27/2021	11:50	2.03	14:15	3.95	2.36	11:50	0.06	06:10	0.54	0.19	11:50	0.003	01:25	0.063	0.014	0.014	-
03/28/2021	02:15	2.02	14:45	4.57	3.66	02:15	0.06	21:30	0.66	0.38	02:15	0.003	18:40	0.112	0.056	0.056	0.37
03/29/2021	23:40	2.09	14:25	4.88	3.02	23:55	0.08	04:45	1.26	0.34	23:30	0.005	14:25	0.152	0.040	0.040	-
03/30/2021	00:25	2.04	14:30	4.65	2.67	03:20	0.09	14:35	0.68	0.28	02:30	0.006	14:30	0.119	0.025	0.025	-
03/31/2021	02:15	2.07	13:50	5.18	2.69	03:20	0.10	14:55	1.17	0.29	03:20	0.006	14:55	0.191	0.029	0.029	-
04/01/2021	03:35	2.06	15:05	4.76	2.83	10:00	0.08	15:05	0.91	0.27	00:00	0.006	15:05	0.169	0.027	0.027	-
04/02/2021	22:35	2.02	11:50	5.23	2.46	01:15	0.11	11:45	0.96	0.28	01:15	0.007	11:50	0.193	0.022	0.022	-
04/03/2021	06:30	1.84	13:25	3.96	2.17	05:50	0.05	20:30	0.62	0.29	05:50	0.003	13:25	0.079	0.019	0.019	-
04/04/2021	11:55	1.99	07:10	2.42	2.06	09:45	0.05	07:10	0.34	0.12	08:55	0.003	07:10	0.024	0.007	0.007	-
04/05/2021	00:50	2.02	05:40	4.46	2.44	00:45	0.06	14:45	0.76	0.23	00:45	0.003	14:45	0.130	0.020	0.020	-
04/06/2021	23:55	1.99	10:20	4.55	2.50	23:45	0.05	10:25	0.82	0.30	02:50	0.003	10:25	0.143	0.027	0.027	-
04/07/2021	19:40	1.84	10:25	4.75	2.57	00:05	0.05	13:45	0.93	0.30	00:05	0.003	10:25	0.163	0.027	0.027	0.22
04/08/2021	01:15	1.95	13:35	4.58	2.58	01:00	0.06	00:40	1.26	0.36	01:00	0.003	13:35	0.145	0.031	0.031	-
04/09/2021	15:50	1.91	16:15	4.67	2.49	22:35	0.05	16:15	0.70	0.28	22:35	0.003	16:15	0.127	0.023	0.023	0.03
04/10/2021	14:40	1.90	06:05	3.34	2.20	13:30	0.05	19:05	0.48	0.23	14:50	0.002	06:05	0.046	0.015	0.015	0.02
04/11/2021	09:30	1.89	08:10	3.28	2.41	09:00	0.05	08:10	0.54	0.21	08:45	0.003	08:10	0.061	0.016	0.016	-
04/12/2021	22:10	1.99	15:05	4.73	2.52	22:00	0.05	15:20	0.88	0.28	20:20	0.003	15:10	0.154	0.025	0.025	-
04/13/2021	00:35	1.99	14:20	5.04	2.54	00:10	0.05	14:25	1.05	0.34	00:00	0.003	14:25	0.209	0.031	0.031	-
04/14/2021	02:25	1.85	10:05	4.62	2.64	20:20	0.08	13:25	1.12	0.40	20:20	0.005	14:00	0.161	0.038	0.038	-
09/22/2020	11:00	1.65	12:30	3.74	2.28	23:05	0.10	12:40	1.03	0.40	23:15	0.006	12:35	0.136	0.031	0.020	-
09/23/2020	03:30	1.65	06:00	3.98	2.25	02:50	0.10	14:40	1.89	0.35	03:30	0.005	14:40	0.273	0.028	0.028	-
09/24/2020	21:55	1.48	11:50	4.33	2.11	20:20	0.08	11:55	1.16	0.33	19:30	0.004	11:55	0.188	0.025	0.025	-
09/25/2020	01:40	1.47	09:35	3.90	2.05	01:10	0.10	09:45	1.06	0.34	01:20	0.003	09:45	0.150	0.025	0.025	-
09/26/2020	22:45	1.65	14:00	3.10	2.05	02:45	0.09	13:30	0.76	0.30	02:45	0.005	14:00	0.075	0.019	0.019	-
09/27/2020	00:20	1.58	11:10	2.81	2.13	23:30	0.08	17:15	1.14	0.33	01:40	0.005	17:15	0.077	0.021	0.021	-
09/28/2020	09:30	1.82	14:20	4.02	2.29	02:20	0.08	14:25	1.05	0.32	02:20	0.005	14:20	0.155	0.024	0.024	-
09/29/2020	20:45	1.43	14:50	4.05	2.08	06:40	0.09	14:45	1.03	0.30	21:50	0.004	14:45	0.150	0.021	0.021	-
09/30/2020	05:15	1.52	12:30	3.84	2.15	00:55	0.10	12:20	1.05	0.32	00:55	0.004	12:25	0.141	0.023	0.023	-
10/01/2020	23:30	1.44	11:45	3.98	2.12	23:25	0.08	11:40	1.08	0.32	18:50	0.003	11:40	0.155	0.023	0.023	-
10/02/2020	03:40	1.44	09:00	4.03	2.13	03:35	0.08	09:05	1.03	0.30	03:30	0.003	09:00	0.149	0.022	0.022	-
10/03/2020	11:05	1.32	13:40	3.51	1.87	11:55	0.09	13:40	0.82	0.24	11:55	0.003	13:40	0.101	0.015	0.015	0.01
10/04/2020	07:30	1.55	07:00	3.61	1.93	07:30	0.13	07:00	0.85	0.28	07:30	0.005	07:00	0.109	0.015	0.015	0.01
10/05/2020	18:55	1.47	06:05	3.95	2.28	21:55	0.08	15:15	1.02	0.37	18:55	0.003	06:05	0.142	0.029	0.029	-
10/06/2020	02:40	1.58	14:35	3.81	2.17	16:25	0.08	09:45	1.18	0.31	02:40	0.005	14:35	0.144	0.022	0.022	-
10/07/2020	16:40	1.58	06:35	4.10	2.35	00:40	0.10	08:45	1.03	0.35	00:40	0.005	08:40	0.154	0.028	0.028	-
10/08/2020	19:15	1.45	09:05	3.88	2.07	03:30	0.09	14:40	1.26	0.33	19:10	0.003	09:05	0.149	0.023	0.023	-
10/09/2020	20:15	1.49	09:50	3.77	2.10	00:05	0.09	10:10	1.01	0.31	00:05	0.004	09:50	0.134	0.021	0.021	0.64
10/10/2020	18:45	1.41	17:20	2.68	1.82	18:35	0.08	11:15	1.15	0.22	18:35	0.003	11:15	0.056	0.011	0.011	1.04
10/11/2020	21:50	1.55	17:50	3.14	2.06	01:30	0.11	00:05	0.84	0.23	01:30	0.005	17:55	0.062	0.014	0.014	0.53
10/12/2020	00:10	1.55	06:20	4.02	2.35	19:55	0.08	06:20	1.03	0.36	00:10	0.005	06:25	0.153	0.030	0.030	-
10/13/2020	02:25	1.59	12:30	3.89	2.25	21:40	0.08	02:00	1.30	0.35	02:30	0.006	12:30	0.150	0.026	0.026	0.61
10/14/2020	13:10	1.64	10:15	4.13	2.31	01:00	0.13	15:40	2.80	0.40	23:55	0.007	15:40	0.372	0.033	0.033	-
10/15/2020	22:25	1.48	13:40	4.37	2.10	00:50	0.12	13:40	1.20	0.34	03:05	0.005	13:40	0.200	0.025	0.025	-
10/16/2020	04:15	1.54	10:20	3.75	2.07	14:05	0.09	10:25	0.96	0.31	01:00	0.006	10:25	0.128	0.020	0.020	-
10/17/2020	11:35	1.47	07:00	3.06	2.10	04:55	0.10	06:20	0.62	0.32	11:30	0.003	06:20	0.057	0.020	0.020	0.01
10/18/2020	22:20	1.47	08:35	2.75	1.84	08:50	0.09	08:35	0.58	0.25	00:00	0.004	08:35	0.051	0.013	0.013	0.03
10/19/2020	13:35	1.64	14:45	4.15	2.43	16:40	0.10	14:45	1.28	0.39	18:55	0.007	14:45	0.198	0.034	0.034	0.05
10/20/2020	22:35	1.67	10:05	4.13	2.72	01:30	0.07	03:10	0.89	0.41	21:40	0.005	10:05	0.137	0.040	0.040	-
10/21/2020	23:55	1.49	07:40	3.82	2.32	06:40	0.09	14:45	1.23	0.35	20:30	0.004	14:45	0.168	0.031	0.031	0.01
10/22/2020	01:30	1.46	14:00	3.82	2.04	01:25	0.09	14:00	1.05	0.30	01:25	0.003	14:00	0.145	0.021	0.021	-
10/23/2020	16:50	1.62	10:05	3.92	2.07	01:30	0.12	09:55	1.00	0.28	01:30	0.005	09:55	0.142	0.019	0.019	0.20
10/24/2020	17:15	1.59	14:45	3.12	2.06	15:10	0.09	14:45	0.70	0.27	20:20	0.005	14:45	0.073	0.016	0.016	0.02
10/25/2020	16:20	1.62	11:45	3.56	2.11	08:35	0.08	11:45	0.84	0.31	14:35	0.004	11:45	0.105	0.022	0.022	-
10/26/2020	16:55	1.68	06:45	4.00	2.31	01:20	0.11	06:45	1.06	0.32	01:45	0.006	06:45	0.157	0.025	0.025	-
10/27/2020	01:50	1.84	05:55	4.16	2.55	16:45	0.10	05:55	1.02	0.40	16:45	0.006	05:55	0.159	0.035	0.035	-
10/28/2020	22:55	1.60	08:45	4.09	2.48	01:20	0.12	08:40	1.03	0.35	23:45	0.005	08:45	0.155	0.030	0.030	-
10/29/2020	20:05	1.56	08:25	4.05	2.14	05:05	0.09	08:40	1.03	0.32	19:00	0.005	08:25	0.153	0.023	0.023	-
10/30/2020	18:15	1.52	05:45	4.05	2.23	21:50	0.08	05:45	1.07	0.33	17:00	0.005	05:45	0.161	0.025	0.025	0.10
10/31/2020	04:05	1.57	08:45	3.35	2.48	04:00	0.10	07:50	1.10	0.35	04:00	0.004	07:50	0.098	0.028	0.028	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/01/2020	08:45	1.91	08:25	4.00	2.48	03:55	0.11	08:25	0.97	0.41	09:25	0.008	08:25	0.142	0.034	0.034	-
11/02/2020	23:15	1.58	07:30	4.24	2.29	04:10	0.09	07:30	1.18	0.37	21:40	0.005	07:30	0.188	0.030	0.030	-
11/03/2020	21:35	1.58	12:55	3.98	2.14	03:45	0.08	22:30	1.24	0.35	20:45	0.005	12:55	0.151	0.025	0.025	0.83
11/04/2020	01:15	1.56	14:50	3.94	2.33	23:40	0.11	21:55	1.13	0.32	00:00	0.005	15:10	0.143	0.024	0.024	0.09
11/05/2020	06:05	1.56	15:55	3.94	2.48	02:15	0.11	01:20	1.17	0.41	06:00	0.005	09:30	0.139	0.035	0.035	0.34
11/06/2020	23:30	1.67	15:00	4.38	2.20	00:40	0.12	01:55	1.32	0.28	20:10	0.006	15:00	0.178	0.019	0.019	0.10
11/07/2020	03:45	1.69	10:05	3.00	1.96	06:15	0.15	16:25	1.31	0.36	02:45	0.008	15:50	0.071	0.020	0.020	0.07
11/08/2020	15:45	1.41	08:25	2.95	1.78	22:45	0.07	10:00	0.63	0.22	22:45	0.002	10:00	0.059	0.012	0.012	0.01
11/09/2020	00:35	1.46	11:10	4.02	2.35	00:35	0.09	11:30	1.43	0.44	00:30	0.003	11:30	0.198	0.035	0.035	0.04
11/10/2020	17:55	1.63	12:05	4.51	2.32	08:55	0.15	12:05	1.21	0.45	17:45	0.007	12:05	0.210	0.036	0.036	0.03
11/11/2020	23:25	1.36	13:15	4.45	2.28	23:20	0.13	13:15	1.29	0.42	23:20	0.005	13:15	0.220	0.032	0.032	-
11/12/2020	01:20	1.41	14:10	4.92	2.43	01:15	0.12	16:35	1.83	0.43	01:15	0.005	15:25	0.259	0.034	0.034	0.16
11/13/2020	04:00	1.61	13:00	3.99	2.26	00:55	0.17	13:05	2.49	0.49	00:55	0.007	13:05	0.362	0.036	0.036	0.38
11/14/2020	20:10	1.61	04:45	3.25	2.12	19:30	0.09	17:15	1.03	0.36	19:30	0.004	04:45	0.081	0.023	0.023	0.47
11/15/2020	11:25	1.59	09:40	2.79	1.85	08:45	0.13	22:40	0.74	0.25	11:00	0.006	08:50	0.051	0.013	0.013	0.19
11/16/2020	10:55	1.73	07:10	4.02	2.34	04:50	0.08	16:30	1.89	0.47	04:50	0.007	07:10	0.273	0.039	0.039	0.31
11/17/2020	23:35	1.19	15:25	3.90	2.20	17:35	0.09	15:30	1.37	0.42	17:35	0.003	15:30	0.192	0.032	0.032	0.20
11/18/2020	07:05	1.43	15:00	4.00	2.18	07:10	0.09	05:20	1.79	0.43	07:00	0.003	15:10	0.176	0.031	0.031	0.30
11/19/2020	13:50	1.90	15:35	3.97	2.44	08:30	0.15	18:10	1.20	0.49	19:15	0.009	15:35	0.144	0.039	0.039	0.50
11/20/2020	00:35	1.45	12:45	3.75	2.39	00:35	0.08	12:50	0.89	0.38	00:35	0.003	12:45	0.116	0.029	0.029	0.01
11/21/2020	23:45	1.79	05:45	2.56	1.98	23:45	0.21	05:45	0.52	0.32	23:45	0.010	05:45	0.041	0.017	0.017	-
11/22/2020	14:30	1.73	08:50	3.17	1.89	07:25	0.21	17:15	1.71	0.35	01:40	0.010	17:15	0.088	0.018	0.018	0.21
11/23/2020	15:20	1.62	06:35	4.05	2.25	03:45	0.10	08:10	2.34	0.49	03:45	0.006	08:00	0.202	0.036	0.036	0.14
11/24/2020	19:40	1.60	12:25	4.16	2.24	06:05	0.14	14:45	1.24	0.43	19:35	0.006	12:20	0.152	0.031	0.031	0.21
11/25/2020	04:35	1.67	15:10	3.90	2.30	06:55	0.13	07:50	0.96	0.38	04:35	0.007	07:50	0.135	0.030	0.030	0.05
11/26/2020	01:15	1.80	07:15	2.88	2.04	08:15	0.13	07:05	0.62	0.33	08:15	0.008	07:15	0.058	0.019	0.019	0.02
11/27/2020	15:55	1.49	12:30	3.72	2.20	15:55	0.10	12:25	1.49	0.38	15:55	0.004	12:25	0.153	0.025	0.025	-
11/28/2020	07:40	1.29	06:05	3.28	2.42	15:30	0.17	06:05	0.75	0.45	15:30	0.007	06:05	0.084	0.034	0.034	0.05
11/29/2020	04:35	1.59	09:00	3.37	2.23	04:35	0.14	09:00	0.78	0.40	04:35	0.006	09:00	0.090	0.028	0.028	-
11/30/2020	14:15	1.70	07:20	3.85	2.34	09:45	0.15	07:30	1.41	0.46	14:15	0.008	07:30	0.190	0.036	0.036	0.36
12/01/2020	18:15	1.88	12:20	4.09	2.60	09:05	0.21	06:40	1.33	0.56	12:05	0.012	12:20	0.156	0.048	0.048	-
12/02/2020	03:45	1.69	10:30	4.24	2.41	18:45	0.09	10:45	1.14	0.44	18:45	0.005	10:45	0.176	0.037	0.037	0.01
12/03/2020	02:35	1.64	10:45	4.19	2.31	03:15	0.13	22:40	1.26	0.45	02:35	0.007	10:45	0.150	0.034	0.034	-
12/04/2020	01:10	1.78	13:00	4.07	2.39	04:40	0.11	08:50	1.08	0.43	04:40	0.008	13:00	0.147	0.033	0.033	-
12/05/2020	18:30	1.56	10:15	3.70	2.18	08:45	0.11	10:15	0.88	0.35	18:30	0.005	10:15	0.116	0.024	0.024	0.03
12/06/2020	00:00	1.80	08:15	3.19	2.00	06:55	0.09	08:20	0.69	0.30	06:35	0.008	08:20	0.071	0.018	0.018	0.03
12/07/2020	19:00	1.76	06:45	4.16	2.63	08:10	0.11	12:05	1.60	0.50	18:20	0.010	12:55	0.162	0.046	0.046	-
12/08/2020	06:25	1.94	15:40	4.57	2.69	23:15	0.12	15:55	1.63	0.57	14:15	0.011	15:55	0.264	0.052	0.052	0.87
12/09/2020	04:10	1.73	14:20	4.08	2.37	06:05	0.14	02:20	1.34	0.46	06:05	0.007	14:25	0.171	0.037	0.037	0.17
12/10/2020	23:15	1.83	12:20	4.18	2.39	06:10	0.10	12:25	2.04	0.47	06:10	0.010	12:25	0.314	0.038	0.038	0.07
12/11/2020	04:00	1.73	02:35	3.34	2.14	02:55	0.11	12:50	1.20	0.49	04:55	0.006	02:35	0.088	0.030	0.030	0.02
12/12/2020	15:40	1.78	04:40	3.19	2.28	20:40	0.10	16:00	1.66	0.39	04:47	0.007	16:00	0.145	0.028	0.028	0.01
12/13/2020	06:40	2.18	02:40	2.93	2.37	23:50	0.17	06:15	1.00	0.42	23:50	0.013	06:15	0.085	0.030	0.030	0.24
12/14/2020	19:40	2.25	04:50	4.72	3.17	23:00	0.10	15:35	0.92	0.35	01:10	0.010	15:35	0.168	0.043	0.043	0.05
12/15/2020	06:15	2.20	13:35	4.59	2.95	01:35	0.09	13:40	1.12	0.30	06:20	0.010	13:40	0.197	0.033	0.033	0.58
12/16/2020	03:00	2.05	13:10	4.59	3.37	03:00	0.07	07:30	1.31	0.31	02:55	0.004	07:30	0.195	0.038	0.038	0.39
12/17/2020	01:10	2.07	07:10	4.77	3.11	01:05	0.08	07:10	1.01	0.33	01:05	0.004	07:10	0.188	0.040	0.040	0.08
12/18/2020	22:50	2.01	18:35	4.61	2.99	22:50	0.05	07:45	0.90	0.30	22:45	0.003	07:45	0.152	0.033	0.033	0.25
12/19/2020	05:20	2.13	08:40	4.48	3.12	11:40	0.08	08:40	0.94	0.29	05:20	0.005	08:40	0.161	0.032	0.032	0.37
12/20/2020	07:05	2.55	08:25	4.46	3.10	08:05	0.08	08:25	0.66	0.30	00:00	0.009	08:25	0.112	0.033	0.033	0.04
12/21/2020	19:40	2.44	07:50	4.68	3.21	00:00	0.12	06:45	1.09	0.31	00:00	0.010	08:40	0.161	0.038	0.038	1.07
12/22/2020	19:15	2.40	15:45	5.12	3.35	04:35	0.12	15:45	1.10	0.33	18:45	0.011	15:45	0.226	0.043	0.043	-
12/23/2020	20:55	2.22	05:25	4.68	3.00	04:35	0.09	13:05	0.90	0.27	20:55	0.007	13:15	0.156	0.030	0.030	-
12/24/2020	22:00	2.10	15:20	3.87	2.70	03:00	0.08	15:50	0.71	0.25	21:50	0.005	15:20	0.073	0.022	0.022	-
12/25/2020	02:20	1.97	21:50	4.22	2.52	02:00	0.06	22:05	0.57	0.20	02:00	0.003	22:05	0.085	0.021	0.021	0.49
12/26/2020	18:00	2.97	06:45	5.08	4.01	09:45	0.07	06:45	0.84	0.46	09:45	0.009	06:45	0.171	0.071	0.071	0.02
12/27/2020	15:55	2.14	09:00	5.03	3.09	12:30	0.09	09:00	0.83	0.32	15:55	0.005	09:00	0.167	0.041	0.041	0.13
12/28/2020	05:25	2.15	07:05	4.44	2.95	04:40	0.11	06:55	0.90	0.30	22:45	0.008	07:05	0.152	0.032	0.032	-
12/29/2020	06:10	2.23	09:40	4.55	3.16	04:15	0.10	09:00	1.15	0.33	03:40	0.009	09:00	0.164	0.038	0.038	0.14
12/30/2020	20:05	2.30	03:25	4.62	3.19	04:50	0.08	08:55	1.52	0.33	18:55	0.009	06:55	0.255	0.040	0.040	0.78
12/31/2020	19:35	2.21	08:10	4.47	2.97	19:25	0.11	08:20	0.90	0.30	19:25	0.007	08:20	0.154	0.032	0.032	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			5.885	30.65
Average	2.62	0.32	0.029	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A1b_30968

				Monitor Series	Location Type
Site Address /Location:	Cnr 37th St and C St NE			TRITON+	Temporary
Site Access Details:	Located on road edge	Latitude:	47.340252	Pipe Size (H x W)	Pipe Shape
		Longitude:	-122.226663	11.88 X 11.88	Circular



Manhole #	System Characteristics
A1b30968	Commercial
Access	Traffic
Drive	Light





Installation Information	
Installation Date:	Installation Type:
Tuesday, September 22, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi
Installation Confirmation:	
Time	
8:35:00 AM	
Depth of Flow (Wet DOF) (in)	
1.75	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
0.35	N/A
Silt (in)	Silt Type
0	



Manhole / Pipe Information:	
Manhole Depth (Approx. FT):	Manhole Configuration
7	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
PVC	Good
Communication Information:	
Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole
Additional Site Info. / Comments:	

ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519.11.325

AUB_A1c_30906

Site Commentary

SITE INFORMATION

Pipe	Round (18 in H)
Silt	2.50 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	7.27	0.67	0.234
Minimum	5.45	0.31	0.064
Maximum	9.70	1.04	0.555
Min Time	10/01/2020 2:00:00 AM	10/19/2020 2:00:00 AM	10/09/2020 2:00:00 AM
Max Time	01/02/2021 9:00:00 PM	01/02/2021 9:00:00 PM	01/02/2021 9:00:00 PM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

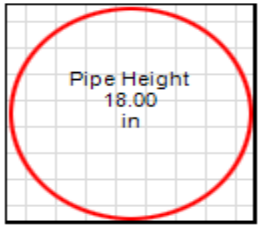
Percent Uptime	
DFINAL (in)	99.334
VFINAL (ft/s)	99.324
QFINAL (MGD - Total MG)	99.324

Hydrograph Report

AUB_A1c_30906

Flow Monitor

AUB_A1c_30906



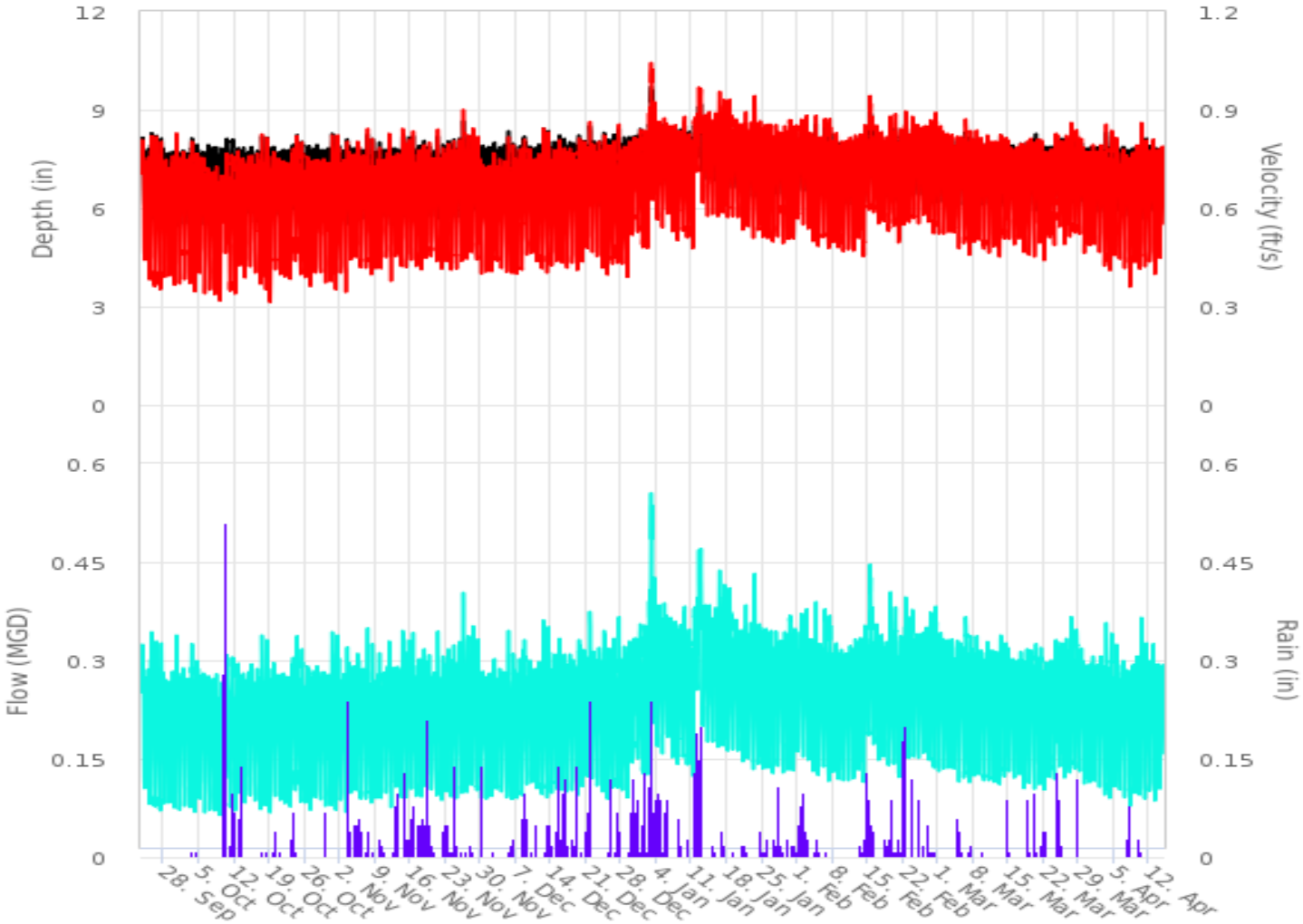
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

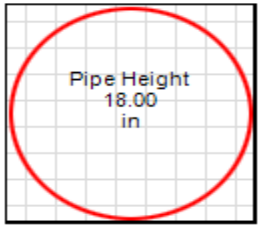
206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A1c_30906

Flow Monitor

AUB_A1c_30906

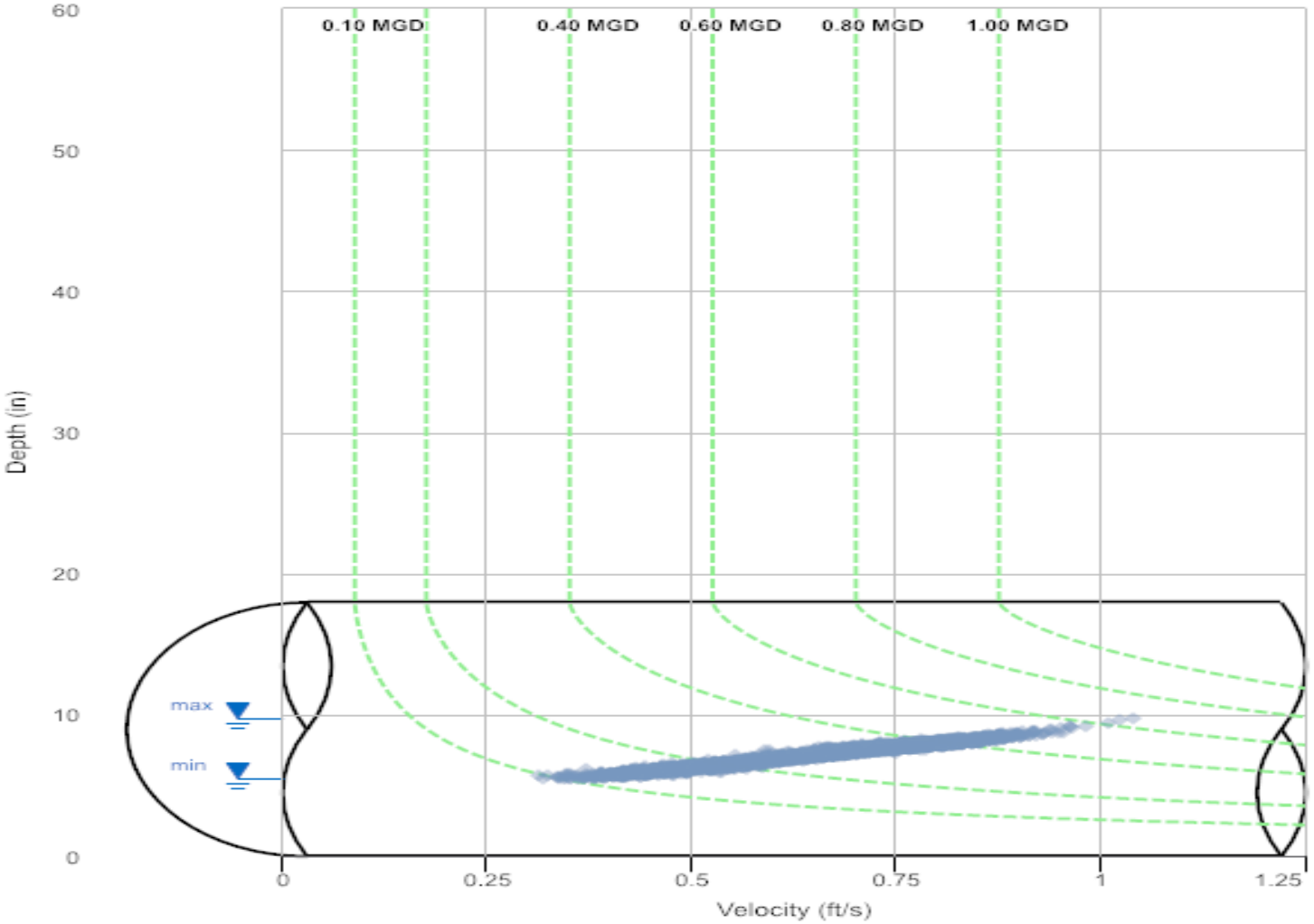


Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A1c_30906Pipe: Round (18 in H), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	05:10	6.23	15:40	8.53	7.36	07:55	0.44	15:35	0.87	0.67	06:05	0.115	15:40	0.382	0.238	0.238	0.51
01/02/2021	04:15	6.08	21:15	9.98	7.94	04:10	0.42	21:05	1.07	0.77	04:15	0.103	21:10	0.593	0.317	0.317	1.69
01/03/2021	04:55	7.00	00:00	9.77	8.17	04:35	0.60	00:05	1.05	0.80	04:45	0.189	00:00	0.560	0.332	0.332	0.65
01/04/2021	03:40	6.70	10:35	8.78	7.84	03:20	0.55	10:35	0.89	0.74	03:25	0.160	10:35	0.405	0.288	0.288	0.48
01/05/2021	03:20	6.52	13:40	9.20	7.76	02:55	0.51	13:40	1.00	0.73	03:25	0.140	13:40	0.489	0.280	0.280	0.52
01/06/2021	05:00	6.80	17:35	8.60	7.76	05:00	0.54	17:30	0.89	0.74	05:00	0.161	17:35	0.394	0.280	0.280	0.22
01/07/2021	04:05	6.47	16:00	8.48	7.60	03:05	0.49	16:00	0.87	0.71	03:05	0.136	16:00	0.375	0.262	0.262	-
01/08/2021	04:10	6.31	17:40	8.59	7.57	01:40	0.47	13:30	0.86	0.70	04:15	0.123	17:45	0.378	0.257	0.257	0.22
01/09/2021	03:55	6.42	14:10	8.62	7.60	03:40	0.49	14:00	0.90	0.71	03:55	0.132	13:55	0.396	0.265	0.265	-
01/10/2021	05:25	6.32	12:00	8.40	7.50	02:20	0.45	10:45	0.85	0.70	05:25	0.119	10:45	0.355	0.253	0.253	0.07
01/11/2021	03:30	6.10	15:00	8.80	7.74	03:25	0.41	11:10	0.92	0.74	03:25	0.102	11:10	0.422	0.286	0.286	1.06
01/12/2021	01:15	7.40	19:00	9.37	8.46	00:05	0.68	18:55	1.00	0.86	00:05	0.236	19:00	0.506	0.375	0.375	2.10
01/13/2021	04:45	6.90	00:35	8.76	7.98	03:45	0.59	00:35	0.92	0.79	04:40	0.181	00:35	0.419	0.313	0.313	0.09
01/14/2021	04:10	6.66	12:55	8.91	7.82	03:10	0.53	12:55	1.00	0.76	03:15	0.155	12:55	0.466	0.294	0.294	0.01
01/15/2021	04:20	6.63	17:15	8.54	7.79	03:10	0.51	17:15	0.92	0.77	03:10	0.149	17:15	0.401	0.297	0.297	0.09
01/16/2021	03:55	6.55	12:00	8.87	7.80	03:30	0.52	12:00	0.97	0.78	04:50	0.148	12:00	0.449	0.303	0.303	-
01/17/2021	05:00	6.52	11:10	8.86	7.72	05:00	0.55	11:10	0.98	0.78	05:00	0.152	11:10	0.456	0.295	0.295	0.10
01/18/2021	03:25	6.42	13:05	8.79	7.70	03:25	0.52	13:25	1.02	0.78	03:25	0.140	13:25	0.446	0.295	0.295	-
01/19/2021	03:15	6.49	18:50	8.46	7.62	01:20	0.54	18:50	0.91	0.76	03:20	0.151	18:50	0.391	0.279	0.279	0.01
01/20/2021	03:35	6.38	18:15	8.25	7.57	03:30	0.52	15:30	0.91	0.76	03:30	0.139	15:30	0.378	0.277	0.277	-
01/21/2021	03:40	6.31	18:05	8.77	7.55	03:30	0.48	18:00	0.95	0.75	03:30	0.126	18:05	0.434	0.274	0.274	0.11
01/22/2021	04:10	6.27	18:30	8.39	7.52	01:45	0.50	18:30	0.88	0.74	04:00	0.129	18:30	0.374	0.268	0.268	-
01/23/2021	03:35	6.22	12:30	9.37	7.54	05:45	0.44	12:30	1.06	0.74	05:45	0.112	12:30	0.535	0.272	0.272	-
01/24/2021	05:00	6.13	11:00	8.36	7.48	04:45	0.49	14:30	0.93	0.73	04:45	0.122	14:30	0.375	0.263	0.263	0.16
01/25/2021	03:40	6.13	17:50	8.51	7.46	03:30	0.47	17:45	0.91	0.73	03:30	0.118	17:50	0.395	0.262	0.262	0.04
01/26/2021	03:05	6.09	18:15	8.48	7.42	02:30	0.43	18:05	0.90	0.73	03:05	0.110	18:10	0.391	0.259	0.259	-
01/27/2021	03:35	6.10	17:45	8.23	7.39	03:15	0.46	17:45	0.89	0.72	03:35	0.112	17:45	0.367	0.254	0.254	0.14
01/28/2021	04:05	6.22	09:50	8.32	7.47	02:45	0.43	09:45	0.88	0.73	02:45	0.113	09:50	0.369	0.261	0.261	0.24
01/29/2021	03:05	6.12	11:10	8.29	7.43	04:05	0.45	11:10	0.88	0.72	04:05	0.113	11:10	0.369	0.257	0.257	0.03
01/30/2021	05:15	6.13	13:30	8.47	7.46	04:00	0.47	11:40	0.89	0.72	05:10	0.117	12:35	0.381	0.262	0.262	0.07
01/31/2021	04:55	6.09	10:40	8.36	7.44	05:45	0.47	18:00	0.89	0.72	05:50	0.118	10:55	0.370	0.258	0.258	0.12
02/01/2021	03:05	6.36	18:55	8.49	7.57	03:05	0.51	14:25	0.89	0.74	03:05	0.134	18:55	0.387	0.273	0.273	0.82
02/02/2021	03:25	6.32	20:15	8.78	7.65	03:15	0.51	20:10	0.92	0.75	03:25	0.136	20:10	0.422	0.281	0.281	0.31
02/03/2021	03:40	6.39	13:55	8.27	7.54	03:35	0.51	13:55	0.86	0.73	03:35	0.137	13:55	0.359	0.266	0.266	0.06
02/04/2021	03:35	6.12	17:10	9.07	7.41	02:20	0.45	17:05	0.95	0.70	03:35	0.114	17:10	0.459	0.250	0.250	0.07
02/05/2021	03:45	6.15	10:50	8.35	7.40	03:25	0.46	10:45	0.87	0.70	03:30	0.116	10:50	0.369	0.248	0.248	0.01
02/06/2021	06:00	6.20	12:45	9.01	7.44	05:45	0.46	12:45	0.95	0.71	05:45	0.118	12:45	0.451	0.256	0.256	0.01
02/07/2021	05:35	5.94	10:10	8.56	7.35	03:05	0.44	10:05	0.91	0.70	04:15	0.105	10:10	0.398	0.247	0.247	-
02/08/2021	03:55	6.01	15:55	8.17	7.36	03:45	0.43	18:25	0.91	0.70	03:55	0.103	18:25	0.365	0.246	0.246	-
02/09/2021	03:15	5.95	12:25	8.15	7.28	04:20	0.44	18:25	0.84	0.68	04:20	0.104	18:25	0.337	0.236	0.236	-
02/10/2021	04:05	5.92	12:10	8.11	7.27	04:00	0.42	11:25	0.84	0.68	04:00	0.098	12:10	0.337	0.237	0.237	-
02/11/2021	03:15	5.89	12:15	8.16	7.32	02:55	0.43	12:15	0.84	0.68	03:20	0.098	12:15	0.341	0.238	0.238	-
02/12/2021	04:30	5.98	12:55	8.69	7.30	02:35	0.43	13:05	0.88	0.68	03:25	0.102	12:55	0.388	0.237	0.237	-
02/13/2021	04:30	6.11	13:15	8.43	7.28	05:35	0.45	13:10	0.87	0.68	05:35	0.110	13:15	0.374	0.235	0.235	0.08
02/14/2021	05:20	5.94	11:40	8.34	7.42	04:55	0.40	11:35	0.88	0.69	04:55	0.097	11:40	0.369	0.249	0.249	0.71
02/15/2021	02:35	6.73	13:45	9.08	7.89	06:00	0.52	13:40	0.98	0.77	06:10	0.157	13:45	0.469	0.305	0.305	0.78
02/16/2021	03:35	6.52	17:05	8.40	7.58	01:50	0.55	15:45	0.90	0.73	03:15	0.158	17:05	0.371	0.267	0.267	0.07
02/17/2021	03:55	6.16	16:00	8.40	7.48	06:35	0.49	20:00	0.91	0.71	03:55	0.129	16:00	0.373	0.257	0.257	-
02/18/2021	04:20	6.21	17:30	8.57	7.44	02:35	0.45	17:20	0.89	0.71	02:35	0.116	17:30	0.386	0.252	0.252	0.09
02/19/2021	02:55	6.18	12:05	9.76	7.47	03:20	0.46	12:00	1.08	0.71	03:20	0.123	12:05	0.580	0.257	0.257	0.17
02/20/2021	04:35	6.06	12:00	8.56	7.40	04:30	0.50	13:05	0.93	0.72	04:35	0.121	13:05	0.406	0.256	0.256	0.07
02/21/2021	05:30	5.95	13:35	8.20	7.37	07:00	0.46	13:35	0.89	0.71	07:00	0.111	13:35	0.364	0.252	0.252	0.42
02/22/2021	04:30	6.32	12:30	8.78	7.60	03:20	0.51	13:00	0.94	0.74	03:20	0.135	13:00	0.426	0.273	0.273	0.98
02/23/2021	03:35	6.21	14:35	10.04	7.51	02:05	0.47	14:40	0.93	0.73	02:05	0.129	14:40	0.507	0.267	0.267	0.27
02/24/2021	02:30	6.27	20:00	8.20	7.49	02:00	0.49	19:55	0.88	0.74	04:50	0.136	19:55	0.360	0.265	0.265	-
02/25/2021	03:15	6.18	20:25	8.26	7.49	03:10	0.52	11:55	0.90	0.74	03:15	0.130	12:05	0.363	0.268	0.268	0.18
02/26/2021	03:45	6.24	10:55	8.44	7.54	03:45	0.53	17:45	0.90	0.75	03:45	0.135	10:55	0.378	0.273	0.273	0.10
02/27/2021	03:20	6.17	15:00	9.22	7.47	02:35	0.49	14:55	0.98	0.73	02:35	0.130	14:55	0.483	0.265	0.265	0.02
02/28/2021	05:35	6.04	12:55	8.68	7.42	02:20	0.46	12:50	0.95	0.73	04:05	0.122	12:50	0.424	0.261	0.261	0.02
03/01/2021	03:35	6.02	12:55	8.24	7.41	01:50	0.47	17:05	0.89	0.72	03:35	0.116	17:05	0.359	0.256	0.255	-
03/02/2021	04:05	6.04	17:55	8.26	7.39	02:15	0.46	13:50	0.88	0.71	02:15	0.120	13:50	0.362	0.252	0.252	-
03/03/2021	03:50	5.94	17:25	8.22	7.37	04:00	0.47	12:15	0.88	0.70	04:00	0.112	12:15	0.361	0.247	0.247	-
03/04/2021	03:25	6.01	18:00	8.22	7.33	03:25	0.47	17:25	0.87	0.70	03:25	0.113	18:05	0.346	0.243	0.243	0.20
03/05/2021	03:50	5.94	16:00	8.17	7.30	03:10	0.43	12:00	0.86	0.69	03:15	0.105	12:00	0.348	0.239	0.239	0.05
03/06/2021	05:25	5.97	15:55	8.57	7.36	03:35	0.47	11:40	0.89	0.71	05:25	0.109	12:40	0.375	0.250	0.250	-
03/07/2021	04:25	5.95	12:20	8.28	7.30	05:15	0.42	11:05	0.87	0.69	05:20	0.102	11:05	0.357	0.242	0.242	0.04
03/08/2021	03:40	5.96	17:15	8.22	7.29	03:20	0.46	16:50	0.85	0.70	03:45	0.108	17:15	0.352	0.243	0.243	-
03/09/2021	02:45	5.93	18:00	8.09	7.26	02:40	0.46	12:45	0.84	0.69	02:45	0.106	17:55	0.327	0.236	0.236	0.01
03/10/2021	02:55	5.88	19:20	8.15	7.29	02:35	0.44	19:20	0.85	0.69	02:50	0.102	19:20	0.344	0.238	0.238	-
03/11/2021	04:05	5.84	17:30	8.24	7.23	02:40	0.43	17:30	0.86	0.68	04:05	0.097	17:30	0.354	0.231	0.231	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	03:05	5.87	12:15	8.07	7.19	05:20	0.43	12:00	0.82	0.67	03:05	0.103	12:15	0.326	0.228	0.228	-
03/13/2021	04:40	5.81	10:50	8.39	7.25	05:50	0.39	09:25	0.90	0.68	05:50	0.089	11:55	0.369	0.236	0.236	-
03/14/2021	06:10	5.88	15:10	8.32	7.28	04:35	0.46	20:15	0.84	0.69	04:35	0.106	15:10	0.347	0.239	0.239	0.30
03/15/2021	02:55	6.11	20:35	8.11	7.31	02:35	0.45	10:15	0.82	0.69	02:35	0.114	20:35	0.330	0.240	0.240	-
03/16/2021	02:35	5.89	19:25	8.04	7.18	02:30	0.41	19:15	0.85	0.66	02:30	0.095	19:20	0.332	0.223	0.223	-
03/17/2021	02:05	5.80	10:25	8.32	7.21	03:20	0.46	16:25	0.88	0.67	02:05	0.105	10:25	0.361	0.229	0.229	-
03/18/2021	02:50	5.82	16:10	8.17	7.19	02:00	0.45	12:00	0.84	0.67	02:30	0.100	12:00	0.341	0.228	0.228	0.11
03/19/2021	03:15	5.84	10:50	8.10	7.23	01:35	0.40	11:05	0.85	0.68	01:35	0.095	10:45	0.338	0.233	0.233	0.03
03/20/2021	04:10	5.75	11:20	8.41	7.23	04:00	0.41	09:50	0.85	0.67	04:00	0.090	09:55	0.351	0.232	0.232	0.17
03/21/2021	03:20	5.72	15:05	8.19	7.15	03:05	0.45	09:15	0.85	0.67	05:15	0.098	11:35	0.336	0.227	0.227	0.07
03/22/2021	02:40	5.78	11:20	8.08	7.20	02:35	0.38	11:15	0.81	0.66	02:35	0.085	11:20	0.325	0.224	0.224	0.11
03/23/2021	01:45	5.74	11:15	8.06	7.16	01:40	0.47	13:10	0.81	0.68	01:40	0.103	11:15	0.319	0.227	0.227	-
03/24/2021	02:15	5.91	11:15	8.52	7.27	03:00	0.40	11:15	0.90	0.69	03:00	0.097	11:15	0.394	0.238	0.238	0.34
03/25/2021	03:15	6.07	15:10	8.32	7.35	03:15	0.49	15:05	0.83	0.69	03:20	0.118	15:10	0.350	0.240	0.240	0.27
03/26/2021	02:15	5.98	16:50	8.35	7.34	03:35	0.47	11:50	0.85	0.70	03:35	0.115	16:45	0.353	0.245	0.245	-
03/27/2021	04:35	5.90	11:10	8.51	7.34	04:30	0.46	11:10	0.89	0.71	04:30	0.106	11:10	0.387	0.249	0.249	-
03/28/2021	04:45	5.99	13:00	8.47	7.37	01:50	0.43	16:35	0.90	0.71	01:50	0.110	12:55	0.374	0.252	0.252	0.37
03/29/2021	02:05	6.02	12:55	8.10	7.30	03:15	0.48	12:25	0.83	0.70	03:25	0.117	12:25	0.329	0.241	0.241	-
03/30/2021	03:10	5.86	19:20	8.19	7.18	01:30	0.43	15:50	0.84	0.67	01:35	0.100	15:55	0.332	0.226	0.226	-
03/31/2021	01:25	5.67	13:50	8.02	7.19	01:15	0.44	12:00	0.82	0.68	03:10	0.098	19:40	0.321	0.228	0.228	-
04/01/2021	02:45	5.78	16:10	7.97	7.20	02:20	0.46	09:55	0.83	0.67	02:40	0.102	15:45	0.310	0.228	0.228	-
04/02/2021	02:35	5.75	09:55	8.08	7.17	02:05	0.41	09:30	0.82	0.66	02:05	0.092	09:55	0.329	0.224	0.224	-
04/03/2021	03:45	5.64	11:05	8.45	7.19	01:55	0.37	11:05	0.89	0.65	01:55	0.082	11:05	0.385	0.226	0.226	-
04/04/2021	03:55	5.62	11:05	8.71	7.11	03:55	0.37	11:50	0.88	0.64	03:55	0.077	11:55	0.388	0.217	0.217	-
04/05/2021	02:05	5.78	11:45	8.22	7.19	00:05	0.42	11:45	0.86	0.67	02:00	0.092	11:45	0.355	0.227	0.226	-
04/06/2021	02:00	5.72	20:20	7.95	7.16	01:00	0.36	09:20	0.80	0.64	02:00	0.078	20:40	0.308	0.217	0.217	-
04/07/2021	02:40	5.68	12:45	8.06	7.11	02:50	0.35	12:45	0.83	0.64	02:55	0.074	12:45	0.330	0.215	0.215	0.22
04/08/2021	02:10	5.66	13:25	7.99	7.14	03:35	0.35	15:10	0.83	0.65	03:40	0.075	13:30	0.318	0.219	0.219	-
04/09/2021	03:05	5.73	16:20	8.16	7.16	02:00	0.40	16:15	0.84	0.67	03:15	0.091	16:15	0.342	0.225	0.225	0.03
04/10/2021	04:25	5.67	10:25	8.58	7.15	02:20	0.39	10:25	0.89	0.66	02:25	0.087	10:25	0.392	0.225	0.225	0.02
04/11/2021	04:30	5.61	10:20	8.33	7.13	02:10	0.38	10:20	0.85	0.65	04:30	0.080	10:20	0.356	0.220	0.220	-
04/12/2021	03:00	5.73	20:10	8.31	7.15	01:35	0.41	20:00	0.84	0.66	03:15	0.090	20:10	0.354	0.222	0.222	-
04/13/2021	02:40	5.62	11:40	7.94	7.11	02:00	0.39	18:25	0.81	0.65	02:45	0.080	18:30	0.315	0.218	0.218	-
04/14/2021	03:00	5.66	12:40	7.99	7.16	02:50	0.40	15:40	0.84	0.67	02:55	0.085	15:40	0.321	0.225	0.225	-
09/23/2020	23:40	6.25	16:50	8.47	7.68	23:40	0.48	16:50	0.85	0.74	23:40	0.124	16:55	0.369	0.274	0.185	-
09/24/2020	02:15	5.84	19:35	7.86	7.06	02:15	0.39	19:15	0.79	0.63	02:15	0.088	19:40	0.300	0.207	0.207	-
09/25/2020	03:50	5.54	12:10	8.56	7.11	03:40	0.35	12:05	0.86	0.64	03:40	0.073	12:10	0.380	0.216	0.216	-
09/26/2020	03:45	5.60	11:15	8.29	7.07	03:50	0.33	11:10	0.86	0.63	03:50	0.068	11:15	0.353	0.211	0.211	-
09/27/2020	04:10	5.33	11:20	8.22	7.03	04:00	0.31	10:25	0.82	0.62	04:00	0.059	11:15	0.338	0.207	0.207	-
09/28/2020	02:40	5.38	19:00	7.95	6.92	02:35	0.32	10:40	0.78	0.61	02:35	0.062	10:40	0.293	0.195	0.195	-
09/29/2020	03:15	5.43	13:15	8.06	6.95	02:00	0.34	17:25	0.79	0.63	02:00	0.068	13:15	0.308	0.202	0.202	-
09/30/2020	03:15	5.31	11:10	8.63	7.01	01:35	0.33	11:05	0.91	0.64	03:10	0.062	11:10	0.404	0.210	0.210	-
10/01/2020	03:05	5.34	11:10	7.91	6.96	02:25	0.33	19:05	0.80	0.63	02:35	0.062	11:10	0.301	0.204	0.204	-
10/02/2020	03:05	5.35	20:10	7.78	6.98	02:40	0.31	12:45	0.80	0.64	02:45	0.059	12:55	0.295	0.207	0.207	-
10/03/2020	03:00	5.43	11:45	8.32	6.99	02:55	0.34	11:40	0.84	0.62	03:00	0.066	11:40	0.351	0.204	0.204	0.01
10/04/2020	03:40	5.39	12:50	8.13	7.02	02:10	0.33	13:55	0.82	0.63	03:40	0.064	14:05	0.331	0.209	0.209	0.01
10/05/2020	02:30	5.50	11:05	7.75	6.98	02:15	0.35	13:40	0.78	0.63	02:20	0.071	10:05	0.287	0.203	0.203	-
10/06/2020	02:40	5.40	16:00	8.09	6.95	02:25	0.32	15:55	0.77	0.59	02:25	0.062	19:15	0.309	0.192	0.192	-
10/07/2020	02:10	5.43	19:25	8.01	6.99	02:05	0.30	10:35	0.75	0.58	02:05	0.059	19:20	0.293	0.188	0.188	-
10/08/2020	01:40	5.45	10:15	7.98	6.92	01:40	0.30	10:20	0.77	0.56	01:40	0.059	10:20	0.301	0.181	0.181	-
10/09/2020	04:15	5.44	23:25	8.05	7.04	02:15	0.28	09:50	0.74	0.58	02:10	0.057	23:20	0.293	0.194	0.194	0.64
10/10/2020	04:40	6.14	12:30	8.27	7.34	04:35	0.44	10:35	0.80	0.63	04:40	0.110	10:35	0.330	0.220	0.220	1.04
10/11/2020	03:00	5.47	13:20	8.29	7.16	05:00	0.29	09:40	0.79	0.61	03:05	0.061	13:20	0.325	0.211	0.211	0.53
10/12/2020	02:35	5.48	18:40	8.00	7.01	02:25	0.31	19:10	0.81	0.61	02:25	0.061	19:10	0.314	0.199	0.199	-
10/13/2020	02:55	5.63	19:05	7.98	7.15	02:00	0.37	19:00	0.80	0.65	02:00	0.078	19:00	0.311	0.220	0.220	0.61
10/14/2020	03:10	5.56	15:50	7.93	7.04	01:20	0.36	12:45	0.78	0.63	02:35	0.075	14:20	0.303	0.209	0.209	-
10/15/2020	02:35	5.72	09:55	8.95	7.06	02:25	0.39	09:55	0.90	0.63	02:30	0.084	09:55	0.425	0.209	0.209	-
10/16/2020	02:55	5.45	12:45	7.96	6.98	02:55	0.33	13:00	0.82	0.63	02:55	0.064	13:00	0.313	0.203	0.203	-
10/17/2020	04:00	5.38	10:55	8.35	7.02	02:50	0.33	10:40	0.87	0.63	02:55	0.065	10:40	0.362	0.208	0.208	0.01
10/18/2020	03:50	5.38	11:45	8.32	7.06	06:40	0.31	11:45	0.86	0.63	03:35	0.068	11:55	0.362	0.211	0.211	0.03
10/19/2020	02:55	5.46	11:10	8.14	7.06	02:55	0.27	18:15	0.80	0.59	02:55	0.053	18:15	0.309	0.198	0.198	0.05
10/20/2020	04:05	5.55	18:35	7.80	7.01	03:15	0.36	11:30	0.77	0.64	03:15	0.073	18:30	0.291	0.207	0.207	-
10/21/2020	03:55	5.55	10:50	8.07	7.01	02:30	0.35	10:45	0.80	0.62	02:30	0.074	10:50	0.322	0.204	0.204	0.01
10/22/2020	03:15	5.36	12:05	7.88	7.01	02:05	0.34	12:00	0.78	0.62	03:10	0.065	12:00	0.296	0.205	0.205	-
10/23/2020	02:50	5.45	11:25	8.32	7.07	02:45	0.34	11:25	0.87	0.64	02:45	0.066	11:25	0.364	0.212	0.212	0.20
10/24/2020	06:50	5.83	11:00	8.28	7.13	02:40	0.40	11:00	0.85	0.65	02:40	0.092	11:00	0.353	0.219	0.219	0.02
10/25/2020	04:15	5.35	10:45	8.11	7.02	04:15	0.33	09:55	0.81	0.63	04:15	0.063	10:45	0.325	0.207	0.207	-
10/26/2020	03:05	5.51	12:25	8.09	7.04	02:50	0.35	12:20	0.81	0.62	03:05	0.069	12:25	0.325	0.205	0.205	-
10/27/2020	02:20	5.46	19:15	7.93	7.03	01:10	0.33	12:45	0.82	0.62	01:10	0.069	19:15	0.303	0.205	0.205	-
10/28/2020	03:20	5.55	10:50	8.60	7.01	02:05	0.35	10:50	0.80	0.61	02:05	0.073	10:50	0.354	0.200	0.200	-
10/29/2020	03:15	5.40	11:45	8.08	7.04	03:10	0.34	16:50	0.79	0.62	03:15	0.065	11:45	0.312	0.204	0.204	-
10/30/2020	03:00	5.45	19:00	8.00	7.02	02:30	0.33	18:40	0.79	0.62	02:35	0.066	19:00	0.310	0.203	0.203	0.10
10/31/2020	04:25	5.62	10:25	8.47	7.11	04:10	0.37	10:35	0.87	0.64	04:30	0.076	10:25	0.370	0.216	0.216	-
11/01/2020	05:00	5.42	12:20	8.26	7.05	04:55	0.32	12:15	0.84	0.63	04:55	0.063	12:15	0.349	0.211	0.211	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/02/2020	04:15	5.31	12:35	7.81	6.99	04:10	0.32	12:35	0.78	0.62	04:10	0.060	12:35	0.295	0.201	0.201	-
11/03/2020	04:00	5.36	16:30	8.46	7.10	04:00	0.31	20:00	0.89	0.64	04:00	0.059	16:30	0.360	0.215	0.215	0.83
11/04/2020	02:40	5.61	18:00	7.99	7.02	02:15	0.39	20:30	0.83	0.64	02:15	0.084	20:30	0.308	0.209	0.209	0.09
11/05/2020	03:15	5.65	12:40	8.12	7.13	03:20	0.40	12:35	0.86	0.67	03:20	0.085	12:40	0.348	0.223	0.223	0.34
11/06/2020	02:50	5.50	14:25	8.19	6.99	00:40	0.38	14:20	0.84	0.63	03:55	0.077	14:25	0.342	0.205	0.205	0.10
11/07/2020	03:15	5.59	12:05	8.49	6.98	03:10	0.38	12:05	0.89	0.63	05:20	0.078	12:05	0.385	0.206	0.206	0.07
11/08/2020	05:35	5.41	10:15	8.22	7.01	05:30	0.35	10:15	0.84	0.62	05:30	0.067	10:15	0.347	0.206	0.206	0.01
11/09/2020	03:15	5.48	20:05	8.31	7.01	03:10	0.36	20:05	0.84	0.64	03:10	0.072	20:05	0.352	0.208	0.208	0.04
11/10/2020	03:25	5.52	12:45	7.97	6.96	02:55	0.36	12:40	0.78	0.63	02:55	0.073	12:40	0.306	0.201	0.201	0.03
11/11/2020	03:20	5.56	18:30	8.29	7.03	02:55	0.40	18:15	0.92	0.64	02:55	0.083	18:15	0.371	0.212	0.212	-
11/12/2020	03:20	5.46	21:45	7.95	7.01	03:05	0.33	12:10	0.79	0.64	03:10	0.066	12:15	0.309	0.209	0.209	0.16
11/13/2020	02:20	5.82	10:25	7.96	7.16	01:55	0.40	10:25	0.79	0.66	01:55	0.092	10:25	0.310	0.221	0.221	0.38
11/14/2020	04:30	5.47	10:20	8.68	7.19	04:10	0.39	10:15	0.93	0.66	04:30	0.078	10:20	0.416	0.230	0.230	0.47
11/15/2020	05:00	5.54	18:10	8.68	7.15	04:55	0.37	18:05	0.87	0.66	04:55	0.075	18:10	0.392	0.223	0.223	0.19
11/16/2020	04:20	5.64	13:45	8.37	7.14	04:15	0.37	13:40	0.85	0.65	04:15	0.078	13:45	0.363	0.218	0.218	0.31
11/17/2020	04:00	5.57	12:35	8.14	7.07	01:50	0.40	12:15	0.85	0.64	03:55	0.081	12:15	0.339	0.212	0.212	0.20
11/18/2020	04:25	5.56	18:20	8.15	7.10	04:20	0.37	12:05	0.85	0.64	04:25	0.075	12:05	0.341	0.216	0.216	0.30
11/19/2020	02:55	5.70	10:30	8.19	7.13	01:40	0.39	12:45	0.84	0.66	02:55	0.085	10:30	0.339	0.220	0.220	0.50
11/20/2020	03:25	5.57	17:20	8.01	6.97	03:00	0.41	17:20	0.84	0.64	03:00	0.088	17:20	0.331	0.207	0.207	0.01
11/21/2020	05:10	5.49	11:50	8.38	7.04	05:05	0.40	11:45	0.87	0.66	05:05	0.081	11:45	0.368	0.217	0.217	-
11/22/2020	05:35	5.52	12:15	8.05	7.07	05:30	0.39	12:15	0.81	0.65	05:30	0.078	12:15	0.323	0.217	0.217	0.21
11/23/2020	04:30	5.71	13:45	8.39	7.17	04:15	0.40	13:40	0.86	0.65	04:15	0.088	13:40	0.367	0.222	0.222	0.14
11/24/2020	02:55	5.57	13:40	8.47	7.13	02:40	0.38	09:30	0.88	0.65	02:45	0.078	13:40	0.377	0.218	0.218	0.21
11/25/2020	04:30	5.59	18:25	8.68	7.15	04:30	0.39	18:20	0.90	0.66	04:30	0.081	18:25	0.404	0.224	0.224	0.05
11/26/2020	07:00	5.66	12:25	8.76	7.23	05:05	0.40	12:25	0.93	0.68	06:55	0.086	12:25	0.422	0.237	0.237	0.02
11/27/2020	04:10	5.58	11:50	8.39	7.16	01:50	0.40	13:40	0.86	0.66	04:10	0.081	13:45	0.365	0.223	0.223	-
11/28/2020	04:10	5.61	10:40	8.45	7.23	04:00	0.40	10:45	0.88	0.67	04:00	0.083	10:45	0.378	0.231	0.231	0.05
11/29/2020	05:20	5.70	11:40	8.30	7.12	05:05	0.40	11:50	0.85	0.65	05:20	0.085	11:50	0.354	0.217	0.217	-
11/30/2020	03:35	5.72	13:40	8.15	7.22	03:15	0.38	13:40	0.80	0.63	03:30	0.082	13:40	0.326	0.215	0.215	0.36
12/01/2020	04:15	5.62	15:25	8.51	7.09	04:05	0.35	15:20	0.82	0.60	04:05	0.074	15:20	0.355	0.201	0.201	-
12/02/2020	03:30	5.61	10:45	8.24	7.16	03:25	0.37	13:05	0.81	0.63	03:25	0.077	16:30	0.327	0.214	0.214	0.01
12/03/2020	04:20	5.74	12:05	7.96	7.15	04:10	0.40	19:30	0.77	0.62	04:15	0.086	19:35	0.300	0.210	0.210	-
12/04/2020	02:50	5.85	14:55	8.20	7.15	02:40	0.38	14:50	0.79	0.62	02:50	0.085	14:50	0.324	0.208	0.208	-
12/05/2020	03:35	5.69	12:00	8.57	7.15	03:15	0.37	12:00	0.84	0.64	03:15	0.080	12:00	0.368	0.216	0.216	0.03
12/06/2020	06:30	5.66	10:25	8.05	7.07	06:35	0.35	10:05	0.83	0.63	06:35	0.074	10:05	0.327	0.210	0.210	0.03
12/07/2020	03:20	5.69	17:35	8.05	7.08	03:25	0.34	17:25	0.82	0.63	03:25	0.073	17:30	0.328	0.210	0.210	-
12/08/2020	04:25	5.65	16:10	8.33	7.26	02:40	0.37	16:20	0.86	0.65	04:15	0.078	16:20	0.358	0.228	0.228	0.87
12/09/2020	04:35	5.88	18:55	8.04	7.18	05:05	0.42	18:25	0.82	0.65	04:35	0.100	18:30	0.321	0.220	0.220	0.17
12/10/2020	03:15	5.88	08:35	8.11	7.15	02:50	0.42	08:35	0.79	0.63	03:15	0.095	08:35	0.320	0.213	0.213	0.07
12/11/2020	03:55	5.84	16:20	8.16	7.20	03:55	0.40	12:00	0.80	0.64	03:55	0.091	16:20	0.327	0.218	0.218	0.02
12/12/2020	04:40	5.80	11:15	8.59	7.24	04:40	0.39	11:15	0.87	0.65	04:40	0.087	11:15	0.382	0.225	0.225	0.01
12/13/2020	05:00	5.74	11:30	8.45	7.21	04:50	0.38	11:10	0.86	0.64	05:00	0.083	11:30	0.364	0.221	0.221	0.24
12/14/2020	02:40	5.68	18:00	8.94	7.15	02:40	0.39	17:55	0.98	0.64	02:40	0.084	18:00	0.460	0.215	0.215	0.05
12/15/2020	04:05	5.80	16:10	8.41	7.25	02:45	0.39	16:05	0.83	0.65	02:45	0.088	16:10	0.348	0.225	0.225	0.58
12/16/2020	03:35	5.80	15:15	8.69	7.28	02:00	0.40	09:15	0.82	0.65	03:30	0.092	15:10	0.357	0.228	0.228	0.39
12/17/2020	03:55	5.78	17:45	8.12	7.18	04:45	0.36	17:25	0.82	0.64	04:45	0.083	17:25	0.327	0.218	0.218	0.08
12/18/2020	04:00	5.87	12:50	8.33	7.21	02:30	0.39	12:45	0.83	0.64	02:30	0.089	12:45	0.347	0.217	0.217	0.25
12/19/2020	04:20	5.80	16:50	8.42	7.31	04:40	0.38	16:45	0.90	0.65	04:40	0.087	16:50	0.380	0.232	0.232	0.37
12/20/2020	04:55	5.88	11:45	8.28	7.27	05:00	0.35	12:35	0.86	0.65	05:00	0.081	11:40	0.344	0.226	0.226	0.04
12/21/2020	04:50	6.21	17:00	8.73	7.51	02:50	0.44	17:00	0.91	0.70	03:25	0.114	17:00	0.411	0.256	0.256	1.07
12/22/2020	03:45	6.07	09:35	8.36	7.33	04:55	0.39	15:25	0.86	0.67	04:55	0.096	09:35	0.354	0.234	0.234	-
12/23/2020	03:35	5.92	12:55	8.33	7.29	01:55	0.41	12:55	0.85	0.66	03:25	0.098	13:00	0.359	0.229	0.229	-
12/24/2020	04:15	5.89	12:05	8.63	7.28	04:15	0.39	12:00	0.87	0.65	04:15	0.090	12:05	0.386	0.227	0.227	-
12/25/2020	05:30	5.80	15:10	8.29	7.18	06:00	0.37	11:35	0.83	0.63	06:00	0.082	15:05	0.334	0.214	0.214	0.49
12/26/2020	04:40	5.92	12:20	8.38	7.21	04:40	0.39	12:00	0.85	0.64	04:40	0.091	12:20	0.359	0.219	0.219	0.02
12/27/2020	04:30	5.78	12:40	8.68	7.25	05:40	0.40	12:40	0.91	0.65	04:20	0.097	12:40	0.407	0.228	0.228	0.13
12/28/2020	03:35	5.85	13:05	8.28	7.29	03:30	0.37	13:00	0.83	0.64	03:30	0.084	13:05	0.344	0.224	0.224	-
12/29/2020	04:45	5.89	14:25	8.78	7.32	04:25	0.37	14:25	0.89	0.65	04:10	0.086	14:25	0.406	0.231	0.231	0.14
12/30/2020	03:15	6.24	14:25	8.37	7.51	04:15	0.46	14:20	0.85	0.70	03:15	0.123	14:20	0.357	0.255	0.255	0.78
12/31/2020	04:05	6.42	17:35	8.53	7.51	05:10	0.48	10:45	0.87	0.70	05:10	0.133	18:20	0.380	0.254	0.254	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			47.749	30.65
Average	7.27	0.67	0.234	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A1c_30906

Site Address /Location:	184 37th St NE			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	located in middle lane on yellow lines	Latitude:	47.340141	Pipe Size (H x W): 18.00 X 18.00	Pipe Shape: Circular
		Longitude:	-122.224548		



Manhole #	System Characteristics
A1c30906	Residential
Access	Traffic
Drive	Medium







ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519.11.325

Installation Information	
Installation Date: Wednesday, September 23, 2020	Installation Type: Doppler Standard Ring and Crank
Monitoring Location (Sensors): Upstream 0-5 FT	Monitor Location: Manhole
Sensors / Devices: Peak Combo (CS4), Smart Depth (CS5)	Pressure Sensor Range (psi): 0 - 5 psi
Installation Confirmation:	
Time: 7:50:00 AM	
Depth of Flow (Wet DOF) (in): 7.00	
CS5 Physical Offset (in): 1.38	Measurement Confidence (in): 0.25"
Peak Velocity (fps): 0.81	Velocity Sensor Offset (in): N/A
Silt (in): 2.5	Silt Type
Hydraulic Comments:	
Manhole / Pipe Information:	
Manhole Depth (Approx. FT): 8	Manhole Configuration: Single
Manhole Material: Concrete	Manhole Condition: Good
Manhole Opening Diameter (in): 24	Manhole Diameter (Approx.): 26
Manhole Cover: Steel	Manhole Frame: Normal
Active Connections: No	Air Quality: Normal
Pipe Material: Concrete	Pipe Condition: Good
Communication Information:	
Communication Type: Wireless	Antenna Location: Manhole Pick / Vent Hole
Additional Site Info. / Comments:	

AUB_A1d_30910

Site Commentary

SITE INFORMATION

Pipe	Elliptical (18.13 in H x 18 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

Data are not available from February 15th through February 19th due to a monitor problem. The monitor was replaced on February 19th to resolve the problem.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	1.81	1.41	0.087
Minimum	0.63	0.55	0.012
Maximum	2.94	2.27	0.190
Min Time	11/02/2020 3:00:00 AM	12/20/2020 3:00:00 AM	11/01/2020 4:00:00 AM
Max Time	01/02/2021 1:00:00 PM	11/01/2020 11:00:00 AM	01/03/2021 12:00:00 PM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

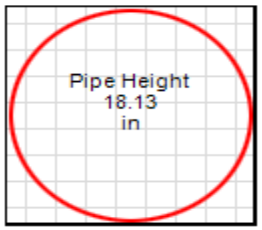
Percent Uptime	
DFINAL (in)	97.749
VFINAL (ft/s)	97.749
QFINAL (MGD - Total MG)	97.749

Hydrograph Report

AUB_A1d_30910

Flow Monitor

AUB_A1d_30910



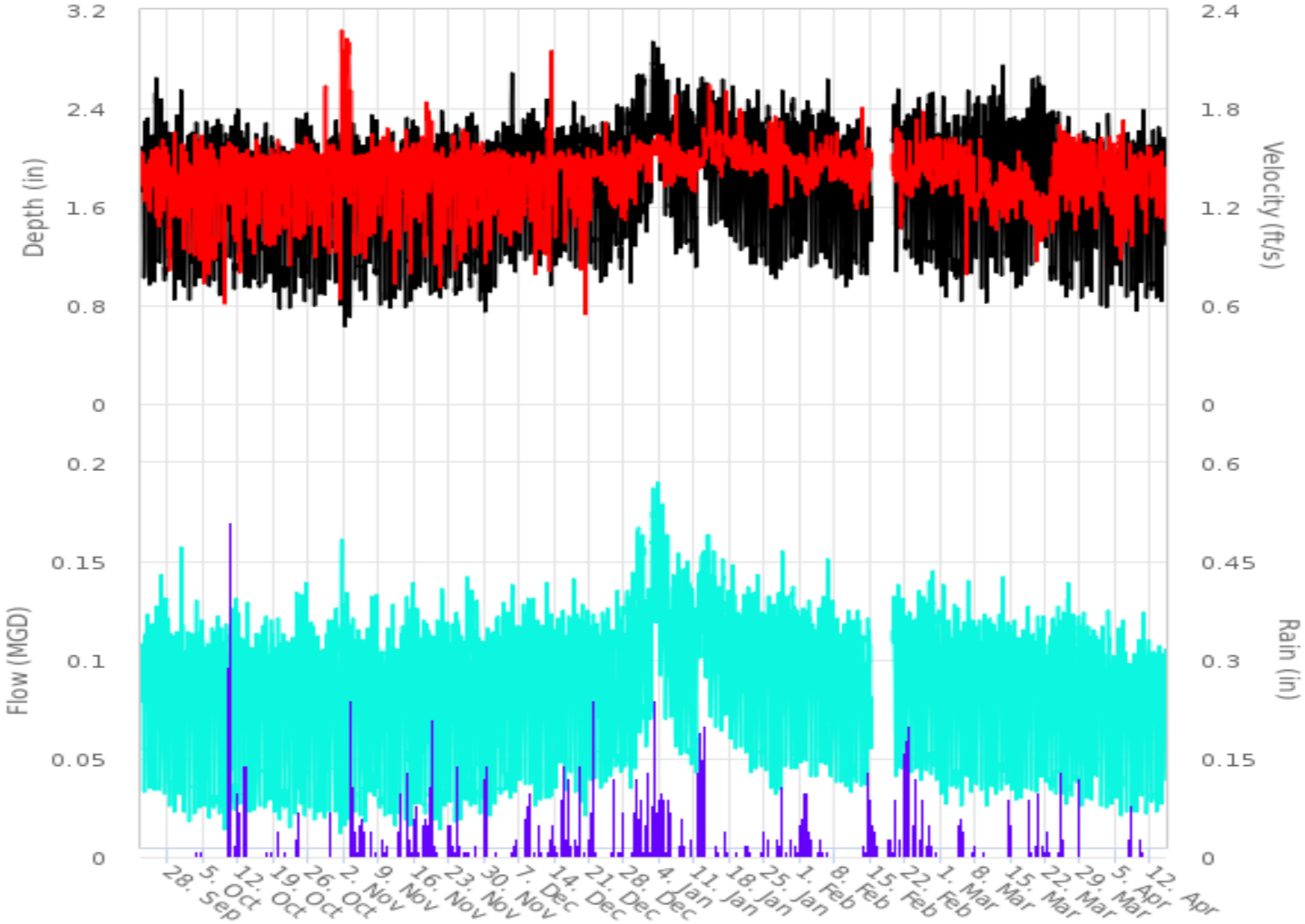
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A1d_30910

Flow Monitor

AUB_A1d_30910

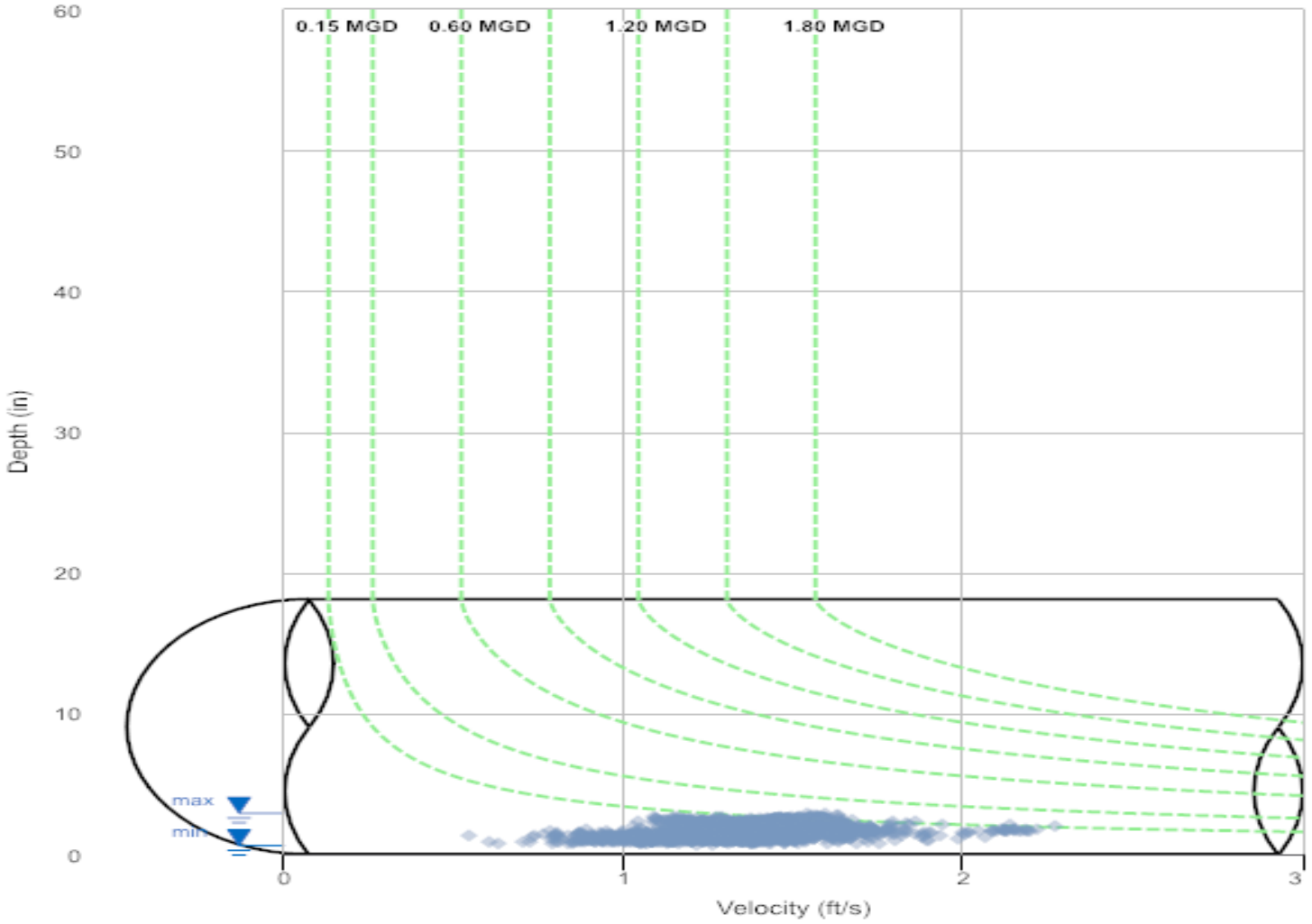
Pipe Height
18.13
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A1d_30910Pipe: Elliptical (18.13 in H x 18 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	07:40	1.17	16:55	2.50	1.93	03:45	1.29	08:20	1.87	1.50	05:00	0.045	16:55	0.150	0.100	0.100	0.51
01/02/2021	01:50	1.43	13:20	3.01	2.32	02:50	1.25	20:45	1.70	1.51	01:50	0.059	13:15	0.200	0.132	0.132	1.69
01/03/2021	23:50	1.92	13:40	3.04	2.45	21:30	1.42	10:55	1.79	1.55	23:55	0.100	12:20	0.211	0.145	0.145	0.65
01/04/2021	03:40	1.71	12:00	2.88	2.30	22:45	1.26	12:45	1.79	1.53	03:10	0.085	12:45	0.202	0.130	0.130	0.48
01/05/2021	03:25	1.44	14:45	2.84	2.14	04:35	1.17	12:45	1.87	1.48	03:25	0.064	13:30	0.186	0.114	0.114	0.52
01/06/2021	04:30	1.48	13:20	2.52	1.98	07:30	1.21	13:15	1.76	1.48	04:25	0.068	13:15	0.163	0.102	0.102	0.22
01/07/2021	03:25	1.04	16:55	2.76	2.03	05:55	1.35	05:35	1.96	1.52	03:25	0.043	16:55	0.167	0.108	0.108	-
01/08/2021	03:50	1.15	16:10	2.61	2.00	05:50	1.30	04:35	1.64	1.46	04:15	0.044	16:05	0.153	0.103	0.103	0.22
01/09/2021	03:45	1.16	12:35	2.70	2.00	07:55	1.30	08:25	1.74	1.47	03:45	0.047	12:35	0.160	0.104	0.104	-
01/10/2021	04:25	1.13	11:40	2.48	1.85	07:25	1.15	15:35	1.65	1.45	04:35	0.042	14:05	0.148	0.092	0.092	0.07
01/11/2021	04:45	0.97	20:20	2.63	2.04	05:50	1.21	07:20	1.82	1.44	04:45	0.037	20:20	0.157	0.105	0.105	1.06
01/12/2021	01:40	1.85	09:50	2.84	2.36	01:50	1.37	18:25	1.72	1.50	01:35	0.090	09:45	0.172	0.133	0.133	2.10
01/13/2021	23:25	1.62	09:30	2.70	2.16	11:30	1.44	19:55	1.99	1.65	04:25	0.085	17:15	0.186	0.128	0.128	0.09
01/14/2021	04:10	1.41	12:35	2.68	2.04	11:55	1.38	08:35	1.92	1.61	04:10	0.068	15:15	0.163	0.114	0.114	0.01
01/15/2021	03:45	1.39	12:25	2.55	2.07	10:20	1.37	20:10	1.74	1.50	04:05	0.062	17:30	0.147	0.110	0.110	0.09
01/16/2021	02:40	1.41	11:55	2.79	2.07	08:15	1.26	19:35	1.79	1.48	02:40	0.058	11:55	0.166	0.109	0.109	-
01/17/2021	06:30	1.37	17:15	2.44	1.91	02:35	1.40	03:45	1.94	1.62	01:45	0.062	17:30	0.141	0.104	0.104	0.10
01/18/2021	03:50	1.32	13:25	2.67	2.01	17:15	1.36	19:05	1.75	1.53	05:05	0.055	15:35	0.157	0.107	0.107	-
01/19/2021	03:55	1.23	08:20	2.44	1.81	14:50	1.31	16:30	1.96	1.59	03:45	0.049	16:40	0.146	0.095	0.095	0.01
01/20/2021	03:50	1.09	11:35	2.52	1.95	16:45	1.35	05:35	1.91	1.54	03:50	0.046	11:30	0.144	0.102	0.102	-
01/21/2021	03:45	1.15	13:45	2.55	1.96	05:05	1.34	06:20	1.78	1.50	03:40	0.047	12:55	0.143	0.101	0.101	0.11
01/22/2021	03:30	1.09	14:45	2.50	1.94	04:35	1.33	23:20	1.68	1.47	03:30	0.040	17:25	0.142	0.099	0.099	-
01/23/2021	03:40	0.98	10:55	2.68	1.90	06:45	1.31	00:25	1.69	1.47	03:40	0.035	10:55	0.155	0.096	0.096	-
01/24/2021	05:05	1.04	13:10	2.42	1.82	07:35	1.26	08:10	1.68	1.48	05:05	0.039	19:15	0.136	0.091	0.091	0.16
01/25/2021	03:10	1.06	13:25	2.57	1.90	09:00	1.28	22:45	1.83	1.51	03:20	0.040	14:20	0.150	0.098	0.098	0.04
01/26/2021	03:45	1.01	08:45	2.41	1.75	02:55	0.96	15:25	1.86	1.58	02:55	0.030	08:40	0.144	0.093	0.093	-
01/27/2021	04:30	0.92	17:25	2.53	1.74	23:50	1.06	15:45	1.89	1.60	02:55	0.026	17:30	0.149	0.092	0.092	0.14
01/28/2021	03:40	0.92	09:25	3.09	1.87	02:15	0.94	09:20	2.14	1.47	02:15	0.026	09:20	0.228	0.095	0.095	0.24
01/29/2021	02:50	1.07	17:00	2.52	1.88	22:50	1.35	10:15	1.70	1.50	02:50	0.041	10:20	0.148	0.097	0.097	0.03
01/30/2021	04:15	1.09	10:30	2.57	1.89	06:35	1.18	00:00	1.65	1.44	04:00	0.040	09:55	0.144	0.094	0.094	0.07
01/31/2021	03:45	1.09	10:30	2.51	1.82	06:30	1.28	09:55	1.66	1.45	03:45	0.039	10:25	0.145	0.090	0.090	0.12
02/01/2021	03:45	1.14	15:00	2.48	1.93	08:10	1.26	01:15	1.71	1.43	02:30	0.045	13:25	0.137	0.095	0.095	0.82
02/02/2021	02:00	1.19	10:10	2.61	2.01	04:00	1.19	18:45	1.57	1.38	02:00	0.043	18:50	0.146	0.098	0.098	0.31
02/03/2021	03:15	1.08	12:25	2.54	1.90	12:25	1.19	05:35	1.76	1.44	03:15	0.039	08:40	0.129	0.093	0.093	0.06
02/04/2021	02:55	1.08	12:05	2.50	1.85	06:00	1.25	22:35	1.65	1.43	02:55	0.038	17:40	0.138	0.090	0.090	0.07
02/05/2021	02:50	1.00	09:35	2.52	1.90	05:55	1.25	22:15	1.72	1.49	02:50	0.036	17:35	0.141	0.096	0.096	0.01
02/06/2021	03:05	0.97	10:50	2.91	1.87	03:15	1.26	00:00	1.72	1.50	03:05	0.034	10:50	0.174	0.096	0.096	0.01
02/07/2021	02:30	1.01	10:00	2.69	1.76	01:55	1.29	05:00	1.70	1.46	01:25	0.036	10:00	0.157	0.084	0.084	-
02/08/2021	04:05	0.87	09:55	2.42	1.80	01:40	1.20	05:55	1.89	1.45	04:05	0.028	09:50	0.134	0.087	0.087	-
02/09/2021	03:20	0.96	16:20	2.32	1.78	01:15	1.21	18:10	1.70	1.42	03:20	0.034	18:25	0.130	0.084	0.084	-
02/10/2021	03:35	0.75	15:35	2.55	1.76	05:45	1.22	05:35	1.76	1.47	03:35	0.025	15:35	0.154	0.086	0.086	-
02/11/2021	03:45	0.96	14:55	2.42	1.80	03:55	1.08	06:40	1.63	1.41	03:55	0.029	19:25	0.138	0.086	0.086	-
02/12/2021	02:20	1.01	12:35	2.43	1.74	05:15	0.73	15:00	1.74	1.42	05:15	0.025	16:50	0.135	0.083	0.083	-
02/13/2021	03:00	1.00	11:25	2.32	1.67	01:40	1.03	08:45	2.07	1.45	05:20	0.031	11:25	0.135	0.078	0.078	0.08
02/14/2021	04:10	0.94	14:30	2.38	1.74	02:20	0.88	09:10	1.65	1.43	02:20	0.027	11:15	0.135	0.084	0.084	0.71
02/15/2021	03:30	1.14	00:35	1.75	1.49	02:50	1.35	03:55	1.57	1.48	03:35	0.044	04:00	0.087	0.067	0.012	0.78
02/16/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07
02/17/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/18/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09
02/19/2021	23:15	1.33	15:50	2.52	2.11	21:05	1.31	11:15	1.65	1.43	23:15	0.058	15:50	0.140	0.107	0.062	0.17
02/20/2021	04:45	0.85	11:40	2.64	1.80	00:40	1.24	07:30	1.80	1.51	04:45	0.034	11:40	0.147	0.091	0.091	0.07
02/21/2021	01:30	1.32	11:15	2.48	1.86	03:45	0.97	11:35	1.71	1.38	03:05	0.040	11:15	0.152	0.088	0.088	0.42
02/22/2021	02:25	0.98	16:30	2.55	1.94	05:25	1.17	18:35	1.72	1.40	02:25	0.033	18:35	0.151	0.094	0.094	0.98
02/23/2021	03:35	1.08	10:05	2.60	1.97	08:05	1.13	10:30	1.64	1.36	03:35	0.037	10:05	0.142	0.094	0.094	0.27
02/24/2021	02:45	1.00	17:20	2.71	1.95	10:30	1.25	05:10	1.79	1.45	02:45	0.038	17:25	0.153	0.097	0.097	-
02/25/2021	02:15	0.80	17:20	2.53	1.88	11:20	1.34	11:05	1.91	1.51	02:15	0.026	08:20	0.148	0.097	0.097	0.18
02/26/2021	03:35	1.00	17:40	2.61	1.91	02:00	1.27	23:35	1.77	1.48	03:35	0.037	17:40	0.148	0.097	0.097	0.10
02/27/2021	02:50	0.96	12:20	2.68	1.84	06:00	1.18	07:50	1.76	1.48	02:50	0.031	11:30	0.154	0.093	0.093	0.02
02/28/2021	02:20	0.92	11:40	2.47	1.69	06:05	1.20	08:40	1.86	1.52	02:20	0.031	10:45	0.146	0.085	0.085	0.02
03/01/2021	01:20	0.89	16:45	2.70	1.82	08:50	1.21	04:40	1.69	1.45	01:40	0.028	16:45	0.153	0.089	0.089	-
03/02/2021	02:45	0.76	17:40	2.44	1.74	00:35	1.24	05:40	1.67	1.48	02:45	0.023	17:40	0.135	0.085	0.085	-
03/03/2021	03:25	0.84	17:15	2.62	1.76	05:30	1.18	20:05	1.70	1.47	03:25	0.024	17:10	0.149	0.086	0.086	-
03/04/2021	04:35	0.88	12:35	2.57	1.73	04:25	1.19	05:35	1.83	1.48	03:05	0.028	12:35	0.143	0.085	0.085	0.20
03/05/2021	02:00	0.73	14:40	2.53	1.73	03:40	1.16	05:40	1.75	1.43	02:00	0.021	14:40	0.134	0.082	0.082	0.05
03/06/2021	02:40	1.22	11:45	2.65	1.85	05:15	0.68	19:55	1.65	1.34	05:15	0.032	11:40	0.152	0.085	0.085	-
03/07/2021	04:10	0.90	10:55	2.55	1.85	19:40	1.08	11:25	1.57	1.30	02:45	0.027	10:50	0.141	0.083	0.083	0.04
03/08/2021	04:35	1.02	16:40	2.93	1.93	02:45	1.07	19:45	1.68	1.30	04:35	0.031	16:40	0.163	0.087	0.087	-
03/09/2021	02:35	0.80	17:45	2.59	1.73	01:40	1.11	08:25	1.59	1.40	02:35	0.024	17:25	0.132	0.079	0.079	0.01
03/10/2021	03:10	0.72	11:45	2.57	1.86	16:15	1.11	04:45	1.56	1.33	03:10	0.021	12:50	0.141	0.085	0.085	-
03/11/2021	04:20	1.07	16:35	2.78	2.01	02:50	1.00	22:55	1.41	1.21	04:20	0.032	16:30	0.136	0.086	0.086	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	02:35	1.02	17:30	2.65	1.89	04:10	0.98	19:55	1.52	1.26	02:35	0.030	17:35	0.133	0.083	0.083	-
03/13/2021	04:10	0.86	10:10	2.88	1.85	06:05	1.06	05:40	1.54	1.32	04:10	0.027	10:10	0.160	0.084	0.084	-
03/14/2021	03:10	1.08	11:10	2.45	1.81	05:45	1.02	12:20	1.50	1.32	04:20	0.034	20:05	0.133	0.081	0.081	0.30
03/15/2021	03:20	0.91	15:15	2.69	1.84	04:30	1.12	18:55	1.50	1.32	03:20	0.028	15:15	0.142	0.083	0.083	-
03/16/2021	01:15	0.84	10:55	2.50	1.77	03:00	1.07	14:50	1.67	1.34	01:15	0.024	14:55	0.138	0.080	0.080	-
03/17/2021	01:50	0.84	08:40	2.48	1.78	23:15	1.09	18:55	1.52	1.34	01:45	0.025	12:35	0.130	0.080	0.080	-
03/18/2021	02:45	0.95	11:45	2.59	1.83	22:20	0.90	12:05	1.57	1.32	01:45	0.031	11:45	0.144	0.082	0.082	0.11
03/19/2021	02:35	1.08	10:35	2.77	2.04	23:45	0.96	07:30	1.43	1.17	02:35	0.030	08:35	0.128	0.085	0.085	0.03
03/20/2021	01:05	1.24	10:55	2.80	2.03	03:05	0.79	09:15	1.46	1.12	01:50	0.029	10:55	0.143	0.083	0.083	0.17
03/21/2021	23:25	1.09	11:20	2.79	2.01	00:30	0.88	08:20	1.42	1.16	23:25	0.032	08:25	0.139	0.083	0.083	0.07
03/22/2021	01:55	1.16	12:55	2.65	1.98	03:20	0.97	07:25	1.41	1.17	01:50	0.035	19:05	0.133	0.081	0.081	0.11
03/23/2021	01:30	0.92	11:05	3.04	1.79	07:50	0.99	19:00	1.69	1.34	03:05	0.030	11:05	0.146	0.080	0.080	-
03/24/2021	00:50	0.90	11:35	2.66	1.80	21:25	0.97	15:30	1.76	1.41	00:05	0.028	14:30	0.151	0.086	0.086	0.34
03/25/2021	03:20	0.81	12:15	2.31	1.65	22:50	1.00	13:20	1.76	1.48	03:25	0.026	12:10	0.146	0.081	0.081	0.27
03/26/2021	02:10	0.73	07:55	2.50	1.74	19:50	1.04	07:20	1.69	1.48	02:10	0.021	07:55	0.152	0.088	0.088	-
03/27/2021	04:30	0.79	11:00	2.39	1.65	21:35	0.92	14:45	1.72	1.43	04:30	0.024	11:00	0.145	0.078	0.078	-
03/28/2021	02:55	0.96	12:20	2.33	1.67	06:35	0.89	14:10	1.74	1.44	02:55	0.028	12:20	0.137	0.080	0.080	0.37
03/29/2021	02:30	0.70	12:15	2.48	1.71	21:45	1.14	19:15	1.66	1.47	02:30	0.018	12:15	0.142	0.084	0.084	-
03/30/2021	02:30	0.71	09:30	2.33	1.71	22:20	1.10	17:15	1.74	1.45	02:30	0.019	09:20	0.129	0.083	0.083	-
03/31/2021	01:30	0.85	11:55	2.26	1.70	23:55	1.03	19:10	1.77	1.45	01:25	0.027	19:10	0.136	0.082	0.082	-
04/01/2021	23:55	1.05	11:55	2.53	1.85	00:10	1.00	18:50	1.71	1.35	23:55	0.035	15:45	0.131	0.085	0.085	-
04/02/2021	01:00	0.56	07:20	2.35	1.65	23:05	1.13	03:35	1.72	1.46	01:00	0.014	07:20	0.129	0.078	0.078	-
04/03/2021	02:40	0.67	10:55	2.54	1.62	00:20	1.06	16:50	1.76	1.43	02:40	0.021	10:55	0.150	0.076	0.076	-
04/04/2021	02:00	0.66	21:25	2.13	1.56	23:25	0.90	09:20	1.68	1.37	02:00	0.017	11:10	0.123	0.068	0.068	-
04/05/2021	23:50	1.01	13:15	2.31	1.73	02:50	0.82	16:10	1.72	1.36	23:55	0.021	13:25	0.143	0.080	0.080	-
04/06/2021	01:40	0.82	12:15	2.36	1.70	01:15	0.70	10:55	1.88	1.36	00:45	0.016	11:10	0.136	0.077	0.077	-
04/07/2021	02:40	0.75	09:35	2.49	1.68	01:10	0.53	20:35	1.72	1.31	01:10	0.012	16:20	0.114	0.072	0.072	0.22
04/08/2021	02:45	0.71	15:00	2.33	1.70	03:10	0.73	18:40	1.60	1.31	02:45	0.018	13:20	0.125	0.074	0.074	-
04/09/2021	01:45	0.66	10:10	2.33	1.67	00:00	1.14	03:20	1.72	1.42	01:45	0.019	13:45	0.117	0.077	0.077	0.03
04/10/2021	02:45	0.86	09:50	2.57	1.70	05:15	0.97	06:10	1.69	1.39	05:15	0.022	09:50	0.135	0.078	0.078	0.02
04/11/2021	02:50	0.80	11:25	2.18	1.53	01:45	0.81	06:15	1.69	1.44	01:10	0.017	09:50	0.114	0.071	0.071	-
04/12/2021	01:45	0.84	10:50	2.35	1.70	01:50	0.97	22:55	1.57	1.38	01:50	0.020	19:30	0.121	0.077	0.077	-
04/13/2021	01:50	0.77	11:25	2.43	1.73	00:55	0.86	06:55	1.63	1.30	03:05	0.017	17:45	0.122	0.076	0.076	-
04/14/2021	02:00	0.72	12:00	2.44	1.71	23:20	0.87	04:45	1.65	1.34	01:30	0.021	12:00	0.125	0.075	0.075	-
09/22/2020	23:55	1.21	20:10	2.23	1.91	23:15	0.97	16:10	1.76	1.45	23:15	0.047	20:10	0.127	0.094	0.057	-
09/23/2020	03:00	0.88	10:55	2.52	1.87	02:40	1.01	00:30	1.76	1.34	02:20	0.026	18:45	0.138	0.086	0.086	-
09/24/2020	03:55	0.85	08:40	2.38	1.74	05:25	1.05	15:00	1.87	1.41	01:35	0.025	12:55	0.138	0.082	0.082	-
09/25/2020	02:30	0.85	11:55	2.89	1.85	09:55	0.98	07:25	1.91	1.37	03:35	0.025	07:25	0.196	0.086	0.086	-
09/26/2020	02:35	0.95	11:25	2.52	1.80	02:30	0.76	18:10	1.96	1.38	02:35	0.020	18:10	0.182	0.087	0.087	-
09/27/2020	03:50	0.79	10:30	2.43	1.78	23:40	0.79	10:25	1.75	1.37	03:50	0.023	10:30	0.158	0.083	0.083	-
09/28/2020	02:10	1.06	10:25	2.36	1.84	02:55	0.65	10:05	1.58	1.26	02:55	0.018	10:20	0.130	0.080	0.080	-
09/29/2020	02:25	0.69	15:50	2.48	1.80	02:20	0.72	04:40	1.83	1.32	02:20	0.012	19:05	0.137	0.080	0.080	-
09/30/2020	02:35	0.91	10:50	3.47	1.82	23:45	0.92	13:55	1.72	1.41	02:25	0.029	10:50	0.247	0.088	0.088	-
10/01/2020	02:05	0.82	18:55	2.31	1.74	02:05	0.64	10:25	1.74	1.35	02:05	0.012	10:30	0.133	0.079	0.079	-
10/02/2020	02:20	0.79	09:10	2.40	1.78	02:15	0.77	03:35	1.65	1.31	02:15	0.014	15:55	0.129	0.081	0.081	-
10/03/2020	04:20	0.70	11:05	2.57	1.72	06:40	0.70	05:05	1.76	1.40	00:40	0.016	11:30	0.142	0.081	0.081	0.01
10/04/2020	02:30	0.91	13:00	2.30	1.76	02:15	0.54	11:35	1.72	1.35	02:15	0.013	13:00	0.143	0.082	0.082	0.01
10/05/2020	01:20	1.08	09:55	2.56	1.84	00:10	0.67	16:30	1.70	1.27	00:25	0.021	16:40	0.135	0.080	0.080	-
10/06/2020	23:15	0.84	15:40	2.57	1.75	01:20	0.55	06:15	1.72	1.30	01:25	0.012	18:50	0.151	0.079	0.079	-
10/07/2020	01:25	0.89	15:40	2.60	1.83	00:10	0.61	13:25	1.85	1.28	01:35	0.016	19:05	0.139	0.082	0.082	-
10/08/2020	03:40	0.57	10:10	2.61	1.72	01:35	0.56	14:40	1.80	1.36	01:35	0.007	10:05	0.130	0.079	0.079	-
10/09/2020	04:10	0.58	09:15	2.40	1.69	01:35	0.37	13:25	1.74	1.37	01:30	0.007	09:35	0.131	0.079	0.079	0.64
10/10/2020	04:00	1.05	11:10	2.52	1.78	23:10	0.84	00:40	1.89	1.45	23:10	0.028	10:45	0.144	0.087	0.087	1.04
10/11/2020	02:40	0.73	16:25	2.52	1.81	02:30	0.53	08:35	1.66	1.33	02:35	0.009	11:15	0.149	0.085	0.085	0.53
10/12/2020	23:55	0.95	12:20	2.48	1.79	04:55	0.67	07:30	1.76	1.27	00:50	0.019	18:20	0.144	0.079	0.079	-
10/13/2020	03:10	0.85	10:05	2.37	1.79	01:50	0.82	03:40	1.73	1.42	01:35	0.019	18:45	0.139	0.087	0.087	0.61
10/14/2020	02:00	0.74	12:20	2.29	1.70	03:20	0.84	15:05	1.68	1.37	03:30	0.017	20:05	0.125	0.078	0.078	-
10/15/2020	03:40	0.79	09:45	2.34	1.70	00:10	0.69	11:40	1.74	1.40	01:10	0.017	11:40	0.127	0.079	0.079	-
10/16/2020	03:00	0.85	08:50	2.41	1.70	03:00	0.83	04:25	1.77	1.39	03:00	0.016	16:25	0.132	0.079	0.079	-
10/17/2020	04:50	0.71	10:15	2.50	1.70	05:50	0.58	03:50	1.66	1.35	04:50	0.011	10:10	0.139	0.078	0.078	0.01
10/18/2020	02:05	0.83	12:00	2.35	1.71	02:00	0.59	12:00	1.74	1.35	02:05	0.011	12:00	0.152	0.079	0.079	0.03
10/19/2020	01:15	0.62	09:15	2.30	1.69	02:20	0.60	04:15	1.83	1.41	01:15	0.009	18:50	0.144	0.079	0.079	0.05
10/20/2020	03:35	0.57	09:05	2.28	1.70	01:40	0.48	19:40	1.71	1.37	03:35	0.007	19:05	0.135	0.079	0.079	-
10/21/2020	01:50	0.77	15:45	2.27	1.67	01:45	0.60	12:15	1.67	1.36	01:50	0.010	15:40	0.131	0.076	0.076	0.01
10/22/2020	02:05	0.66	11:55	2.28	1.67	02:00	0.49	18:15	1.78	1.38	02:00	0.007	16:10	0.134	0.077	0.077	-
10/23/2020	02:05	0.79	11:10	3.29	1.69	02:20	0.86	11:05	1.98	1.41	02:05	0.015	11:10	0.228	0.080	0.080	0.20
10/24/2020	00:20	0.88	10:35	2.47	1.73	00:15	0.63	14:20	1.89	1.37	00:15	0.013	10:30	0.151	0.082	0.082	0.02
10/25/2020	03:00	0.67	09:35	2.66	1.71	03:10	0.84	07:55	1.86	1.41	03:00	0.012	09:35	0.180	0.081	0.081	-
10/26/2020	01:35	0.66	10:10	2.65	1.74	01:35	0.44	18:25	1.91	1.39	01:35	0.006	18:30	0.142	0.082	0.082	-
10/27/2020	01:50	0.64	11:10	2.36	1.67	04:10	0.49	10:00	1.92	1.38	01:35	0.011	11:10	0.128	0.077	0.077	-
10/28/2020	04:15	0.73	19:20	2.20	1.65	03:10	0.60	04:20	1.77	1.39	03:15	0.010	19:15	0.125	0.076	0.076	-
10/29/2020	03:50	0.78	12:20	2.39	1.67	03:20	0.82	05:25	2.05	1.45	04:00	0.015	19:10	0.154	0.080	0.080	-
10/30/2020	03:35	0.90	16:05	2.32	1.71	00:25	0.79	06:55	1.83	1.39	03:30	0.018	06:55	0.139	0.080	0.080	0.10
10/31/2020	05:25	0.84	09:20	2.50	1.69	04:15	0.61	20:30	1.84	1.36	04:10	0.015	09:15	0.140	0.078	0.078	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/01/2020	05:20	0.66	10:15	2.30	1.53	04:35	0.48	11:45	2.38	1.67	04:35	0.007	10:45	0.172	0.087	0.087	-
11/02/2020	04:00	0.54	08:35	2.13	1.43	04:10	0.94	08:30	2.39	2.00	03:55	0.010	08:35	0.170	0.091	0.091	-
11/03/2020	03:00	0.61	06:55	2.51	1.71	03:15	0.52	06:40	2.16	1.47	03:15	0.006	17:15	0.136	0.082	0.082	0.83
11/04/2020	03:30	0.97	06:55	2.43	1.74	02:50	0.67	18:50	1.89	1.33	03:20	0.018	06:55	0.141	0.079	0.079	0.09
11/05/2020	03:45	0.87	14:30	2.32	1.75	03:30	0.55	05:40	1.79	1.38	03:30	0.012	14:25	0.121	0.082	0.082	0.34
11/06/2020	02:40	0.78	08:40	2.40	1.68	03:45	0.52	04:50	1.72	1.38	03:20	0.010	17:00	0.138	0.077	0.077	0.10
11/07/2020	03:50	1.05	11:50	2.52	1.68	02:50	0.78	15:10	1.76	1.35	02:50	0.022	11:50	0.145	0.076	0.076	0.07
11/08/2020	06:30	0.89	10:45	2.47	1.67	02:45	0.86	06:45	1.67	1.39	06:25	0.020	10:45	0.153	0.077	0.077	0.01
11/09/2020	04:00	0.67	13:35	2.19	1.59	02:45	0.81	18:00	1.95	1.46	02:45	0.016	14:10	0.117	0.074	0.074	0.04
11/10/2020	03:10	0.69	12:35	2.27	1.60	04:10	0.59	14:00	1.85	1.42	03:10	0.014	19:20	0.144	0.075	0.075	0.03
11/11/2020	03:45	0.59	12:50	2.62	1.65	03:55	0.73	08:40	1.80	1.38	03:55	0.008	18:15	0.164	0.076	0.076	-
11/12/2020	04:50	0.58	21:40	2.29	1.62	04:40	0.52	07:40	1.82	1.33	04:45	0.006	21:40	0.132	0.072	0.072	0.16
11/13/2020	03:00	0.81	15:10	2.93	1.70	03:05	0.57	12:55	1.73	1.38	03:05	0.011	15:10	0.174	0.079	0.079	0.38
11/14/2020	04:10	0.62	12:35	2.68	1.63	04:20	0.60	07:45	1.95	1.45	04:10	0.008	12:30	0.169	0.078	0.078	0.47
11/15/2020	04:10	0.74	17:55	3.70	1.69	04:25	0.38	17:50	2.48	1.36	04:20	0.006	17:55	0.351	0.080	0.080	0.19
11/16/2020	04:05	0.83	11:05	2.46	1.68	04:00	0.80	17:55	1.70	1.39	04:00	0.016	11:05	0.151	0.078	0.078	0.31
11/17/2020	03:55	0.86	12:25	2.34	1.69	04:00	0.71	08:15	1.84	1.42	04:00	0.015	19:55	0.134	0.080	0.080	0.20
11/18/2020	03:05	0.85	12:50	2.20	1.58	03:05	0.60	15:50	2.20	1.53	03:05	0.012	12:15	0.140	0.080	0.080	0.30
11/19/2020	04:30	0.62	15:25	2.71	1.63	04:25	0.79	15:20	2.35	1.50	04:30	0.010	15:25	0.138	0.079	0.079	0.50
11/20/2020	04:10	0.78	12:50	2.38	1.67	04:10	0.48	08:20	2.03	1.33	04:10	0.008	12:45	0.140	0.075	0.075	0.01
11/21/2020	03:00	0.74	10:50	2.55	1.70	04:45	0.52	08:35	1.74	1.31	03:00	0.010	10:40	0.156	0.078	0.078	-
11/22/2020	07:10	0.75	12:30	2.31	1.66	05:30	0.79	07:10	1.80	1.35	05:30	0.014	12:20	0.134	0.075	0.075	0.21
11/23/2020	02:25	0.92	13:40	2.33	1.75	02:20	0.75	15:25	1.70	1.40	02:25	0.017	13:30	0.128	0.083	0.083	0.14
11/24/2020	04:35	0.79	13:30	4.03	1.73	02:30	0.64	12:15	2.17	1.36	02:30	0.012	13:30	0.286	0.081	0.081	0.21
11/25/2020	03:45	0.84	09:20	2.18	1.64	03:40	0.60	13:50	1.86	1.42	03:40	0.013	17:15	0.132	0.078	0.078	0.05
11/26/2020	06:35	1.03	13:45	2.51	1.72	06:40	0.41	07:45	1.86	1.36	06:40	0.011	13:45	0.168	0.080	0.080	0.02
11/27/2020	05:50	0.80	11:35	2.51	1.68	03:55	0.62	07:55	1.86	1.39	05:45	0.013	11:25	0.151	0.079	0.079	-
11/28/2020	01:45	0.79	11:40	2.38	1.69	01:35	0.66	11:10	1.66	1.38	01:40	0.014	11:30	0.143	0.079	0.079	0.05
11/29/2020	05:05	0.70	19:05	2.19	1.58	02:35	0.65	05:40	1.84	1.40	02:30	0.012	19:05	0.123	0.072	0.072	-
11/30/2020	03:35	0.63	11:25	2.32	1.73	02:15	0.69	00:55	1.98	1.38	02:35	0.010	11:25	0.129	0.081	0.081	0.36
12/01/2020	03:15	0.84	16:45	2.39	1.72	04:30	0.61	17:35	1.64	1.35	04:30	0.013	16:45	0.144	0.079	0.079	-
12/02/2020	02:25	0.87	16:20	2.47	1.75	06:45	0.73	08:15	1.67	1.38	06:45	0.018	16:15	0.147	0.083	0.083	0.01
12/03/2020	03:00	0.97	18:30	2.42	1.80	03:00	0.73	22:30	1.93	1.38	03:00	0.017	18:25	0.148	0.085	0.085	-
12/04/2020	04:55	1.10	15:15	2.34	1.86	01:30	0.79	07:25	1.88	1.35	03:25	0.028	15:10	0.131	0.087	0.087	-
12/05/2020	01:30	1.10	11:00	2.82	1.92	04:45	0.64	18:45	1.62	1.29	04:50	0.020	12:25	0.150	0.088	0.088	0.03
12/06/2020	04:15	0.87	19:00	2.32	1.75	06:55	0.69	11:10	1.76	1.34	02:25	0.021	11:10	0.146	0.080	0.080	0.03
12/07/2020	03:30	1.11	17:25	2.46	1.84	03:00	0.74	19:50	1.71	1.34	02:35	0.027	17:20	0.140	0.085	0.085	-
12/08/2020	04:10	0.95	16:05	2.53	1.90	01:45	0.93	06:35	1.70	1.39	04:00	0.026	16:05	0.147	0.093	0.093	0.87
12/09/2020	02:55	1.01	18:35	2.61	1.93	02:45	0.92	09:40	1.59	1.30	02:45	0.024	18:30	0.155	0.088	0.088	0.17
12/10/2020	01:35	1.06	12:00	2.73	1.84	03:05	0.57	18:20	1.74	1.29	03:05	0.019	12:00	0.145	0.083	0.083	0.07
12/11/2020	03:35	0.85	13:50	2.36	1.80	03:25	0.62	08:15	1.59	1.35	03:25	0.014	13:45	0.131	0.084	0.084	0.02
12/12/2020	05:55	1.12	10:45	2.54	1.75	04:45	0.60	21:45	2.01	1.40	02:45	0.019	10:40	0.148	0.084	0.084	0.01
12/13/2020	04:50	0.90	09:50	2.36	1.75	00:35	0.69	09:45	2.37	1.44	00:35	0.023	10:35	0.141	0.085	0.085	0.24
12/14/2020	04:15	0.87	16:15	2.34	1.80	04:15	0.77	12:00	1.61	1.38	04:15	0.015	16:40	0.130	0.085	0.085	0.05
12/15/2020	03:50	1.08	16:20	2.41	1.84	23:35	1.17	07:35	1.76	1.46	02:40	0.043	16:45	0.142	0.091	0.091	0.58
12/16/2020	03:25	1.10	18:35	2.41	1.85	03:20	0.72	18:25	1.68	1.35	03:20	0.021	18:40	0.144	0.087	0.087	0.39
12/17/2020	02:30	1.11	17:30	2.55	1.85	23:30	0.89	12:55	1.80	1.41	01:25	0.038	17:30	0.151	0.089	0.089	0.08
12/18/2020	03:25	1.04	10:40	2.35	1.81	03:00	0.64	09:10	1.65	1.38	03:00	0.021	13:50	0.136	0.086	0.086	0.25
12/19/2020	02:20	1.07	13:10	2.49	1.85	03:10	0.59	09:40	1.63	1.30	03:10	0.019	13:05	0.146	0.085	0.085	0.37
12/20/2020	04:10	1.07	20:25	2.43	1.86	03:35	0.45	20:20	1.75	1.23	04:05	0.013	20:20	0.155	0.082	0.082	0.04
12/21/2020	04:20	1.04	16:20	2.48	1.87	03:30	0.95	17:25	1.72	1.41	03:35	0.030	16:20	0.142	0.091	0.091	1.07
12/22/2020	03:55	0.98	10:05	2.36	1.84	04:35	1.24	07:25	1.67	1.45	03:55	0.035	10:05	0.136	0.090	0.090	-
12/23/2020	02:50	0.94	14:25	2.44	1.82	05:25	1.19	07:00	1.64	1.43	02:50	0.032	12:50	0.141	0.088	0.088	-
12/24/2020	02:35	1.00	09:50	2.50	1.78	06:50	1.10	05:55	1.77	1.43	03:10	0.035	09:45	0.139	0.085	0.085	-
12/25/2020	06:15	1.06	11:10	2.27	1.74	02:35	0.99	18:50	1.70	1.34	03:40	0.037	12:10	0.130	0.076	0.076	0.49
12/26/2020	04:55	1.12	12:20	2.62	1.88	23:55	1.08	17:15	1.64	1.34	04:55	0.041	12:20	0.150	0.087	0.087	0.02
12/27/2020	04:55	0.98	11:50	2.55	1.83	07:55	1.04	05:00	1.98	1.38	05:50	0.037	12:00	0.140	0.085	0.085	0.13
12/28/2020	03:25	1.25	11:35	2.58	1.91	01:05	0.92	18:00	1.64	1.37	00:50	0.039	11:35	0.151	0.092	0.092	-
12/29/2020	03:15	0.79	11:25	2.59	1.89	06:00	1.10	18:10	1.71	1.48	03:15	0.025	13:25	0.160	0.097	0.097	0.14
12/30/2020	05:10	1.20	12:35	2.86	2.08	01:45	0.99	05:25	1.74	1.49	01:45	0.037	17:10	0.187	0.113	0.113	0.78
12/31/2020	02:05	1.26	11:10	2.85	2.11	11:10	1.24	07:15	1.81	1.51	02:50	0.051	14:20	0.177	0.115	0.115	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			17.381	30.65
Average	1.81	1.41	0.087	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES	AUB_A1D_30910

Site Address /Location:	35th St NE			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	Right lane closure needed	Latitude:	47°20'19.65"N	Pipe Size (H x W): 18.13 X 18.00	Pipe Shape: Circular
		Longitude:	122°13'20.72"W		



Manhole #	System Characteristics
A1D30910	Residential
Access	Traffic
Drive	Heavy







ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519.11.325

Installation Information

Installation Date:	Installation Type:
Tuesday, September 22, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Downstream 5-10 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	
9:25:00 AM	
Depth of Flow (Wet DOF) (in)	
2.25	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
1.57	N/A
Silt (in)	Silt Type
0	

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
10	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Concrete	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

AUB_A2_40805K

Site Commentary

SITE INFORMATION

Pipe	Elliptical (71.5 in H x 70 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	15.12	2.00	5.587
Minimum	9.17	1.29	1.708
Maximum	25.82	2.57	14.268
Min Time	10/04/2020 5:00:00 AM	10/04/2020 5:00:00 AM	10/04/2020 5:00:00 AM
Max Time	01/12/2021 8:00:00 PM	01/13/2021 2:00:00 AM	01/12/2021 9:00:00 PM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

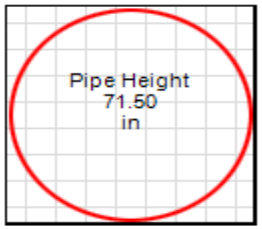
Percent Uptime	
DFINAL (in)	95.015
VFINAL (ft/s)	95.015
QFINAL (MGD - Total MG)	95.015

Hydrograph Report

AUB_A2_40805K

Flow Monitor

AUB_A2_40805K



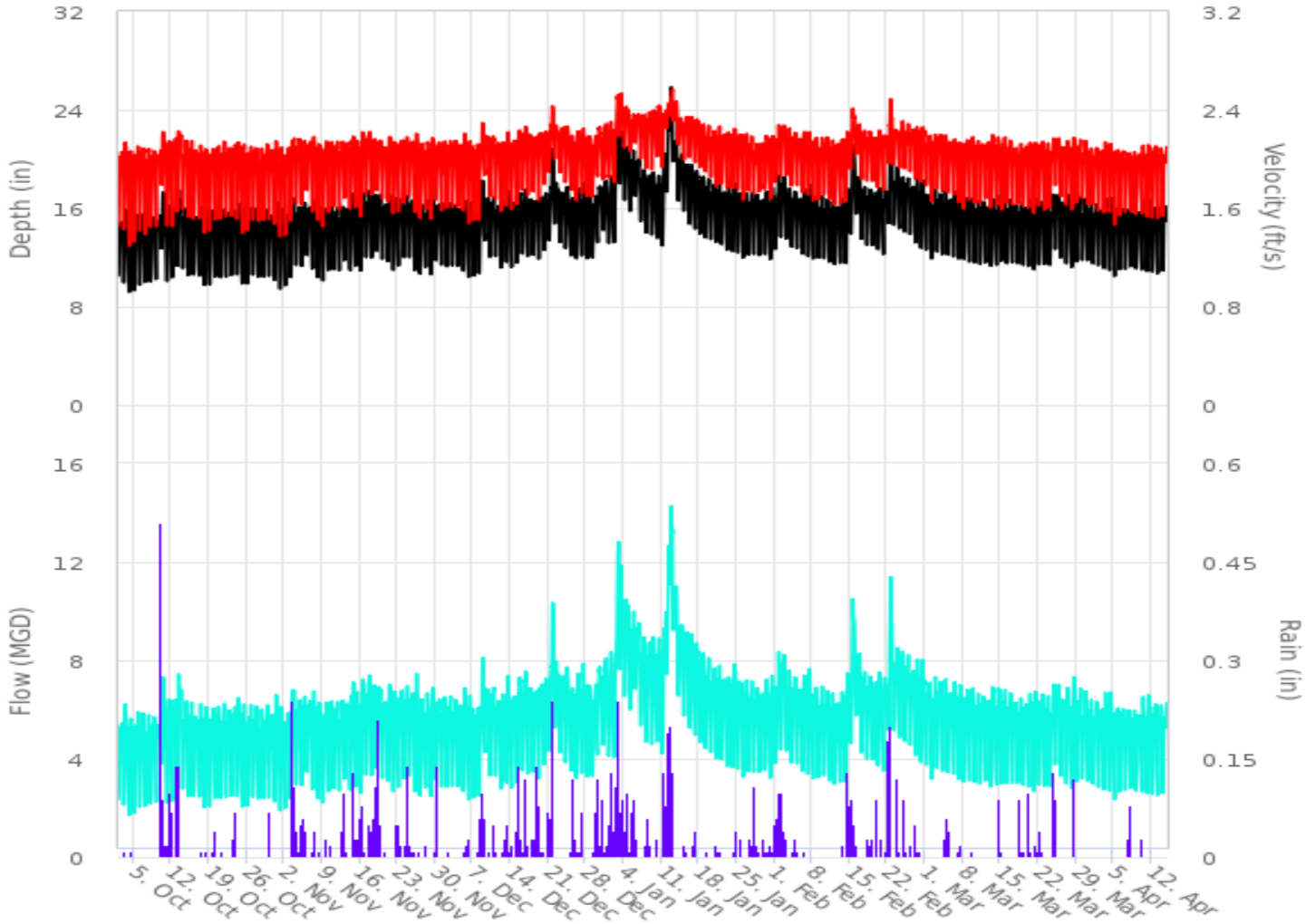
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A2_40805K

Flow Monitor

AUB_A2_40805K

Pipe Height
71.50
in

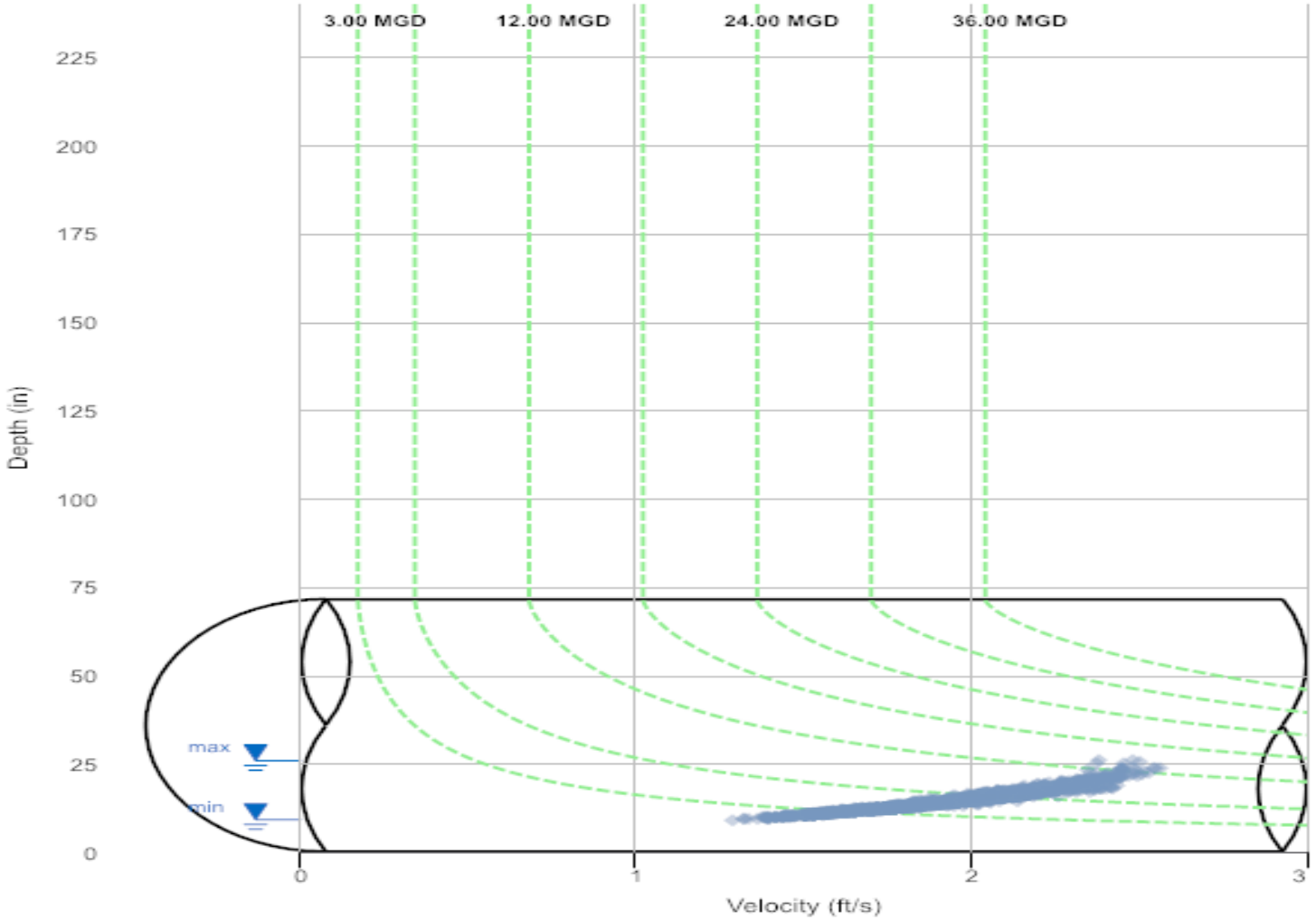
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A2_40805KPipe: Elliptical (71.5 in H x 70 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	06:10	13.03	17:35	18.67	15.91	07:10	1.80	16:45	2.34	2.09	07:10	3.987	17:25	8.558	6.223	6.223	0.51
01/02/2021	06:30	13.08	23:55	22.98	17.22	05:40	1.77	22:00	2.57	2.14	07:20	3.968	23:55	12.470	7.234	7.234	1.69
01/03/2021	08:40	17.90	01:50	24.01	20.81	06:35	2.12	14:45	2.58	2.36	08:35	7.539	01:50	13.050	10.145	10.145	0.65
01/04/2021	05:05	16.56	13:45	21.20	19.33	04:30	2.04	13:35	2.45	2.29	05:05	6.416	13:50	10.710	8.884	8.884	0.48
01/05/2021	05:20	15.64	22:15	20.81	18.39	03:30	2.02	22:05	2.42	2.24	04:45	5.784	22:05	10.300	8.089	8.089	0.52
01/06/2021	05:45	16.92	20:00	20.06	18.87	05:15	2.10	13:15	2.40	2.28	05:15	6.725	19:55	9.718	8.512	8.512	0.22
01/07/2021	05:40	14.84	20:20	19.20	17.45	05:00	1.96	19:55	2.41	2.21	05:00	5.245	19:55	9.089	7.410	7.410	-
01/08/2021	06:00	13.87	19:40	18.78	16.98	04:30	1.90	19:50	2.42	2.20	05:55	4.584	19:50	8.928	7.124	7.124	0.22
01/09/2021	06:10	13.72	14:15	18.94	16.66	05:55	1.86	20:20	2.43	2.22	06:00	4.446	14:15	9.000	7.024	7.024	-
01/10/2021	06:55	13.42	14:45	18.73	16.43	06:50	1.95	12:10	2.48	2.26	06:55	4.467	14:45	9.088	7.013	7.013	0.07
01/11/2021	05:50	12.78	22:10	20.54	17.20	05:35	1.87	21:45	2.40	2.22	05:45	4.081	22:10	10.050	7.404	7.404	1.06
01/12/2021	02:35	17.23	20:55	25.96	22.11	02:15	2.25	22:50	2.55	2.40	02:35	7.359	21:25	14.490	11.194	11.194	2.10
01/13/2021	06:30	19.73	00:00	24.52	21.20	04:30	2.23	02:05	2.62	2.42	07:10	9.008	02:05	13.850	10.623	10.623	0.09
01/14/2021	05:50	16.52	20:00	20.39	18.82	03:50	2.07	15:15	2.37	2.25	03:50	6.481	19:35	9.614	8.370	8.370	0.01
01/15/2021	05:10	15.71	19:20	19.61	18.22	04:35	1.97	20:05	2.38	2.21	04:35	5.693	15:20	9.284	7.883	7.883	0.09
01/16/2021	06:00	14.58	13:55	19.74	17.41	06:40	1.95	13:15	2.38	2.21	06:40	5.103	14:00	9.304	7.398	7.398	-
01/17/2021	07:30	14.19	15:00	19.11	17.06	04:15	1.90	14:20	2.36	2.18	08:15	4.824	14:20	8.878	7.111	7.111	0.10
01/18/2021	05:55	13.84	20:35	18.62	16.73	05:55	1.90	21:30	2.32	2.14	05:55	4.554	21:30	8.460	6.806	6.806	-
01/19/2021	05:15	13.43	21:30	18.41	16.44	05:00	1.86	20:15	2.30	2.10	05:10	4.290	20:15	8.208	6.509	6.509	0.01
01/20/2021	06:10	13.29	20:30	18.02	16.14	05:05	1.81	21:20	2.27	2.08	06:10	4.100	20:30	7.895	6.285	6.285	-
01/21/2021	05:00	13.14	21:15	17.92	16.12	04:40	1.71	20:50	2.29	2.07	04:40	3.875	21:20	7.922	6.233	6.233	0.11
01/22/2021	05:20	12.92	21:15	17.30	15.83	04:20	1.74	20:05	2.22	2.05	04:20	3.854	20:05	7.304	6.032	6.032	-
01/23/2021	05:55	12.36	13:20	17.64	15.55	05:00	1.70	12:05	2.25	2.04	05:50	3.501	13:10	7.522	5.860	5.860	-
01/24/2021	05:35	12.33	14:10	18.07	15.71	06:25	1.72	13:45	2.28	2.07	06:25	3.535	13:45	7.941	6.062	6.062	0.16
01/25/2021	05:40	12.17	14:15	17.24	15.51	05:25	1.73	19:35	2.24	2.06	05:40	3.469	19:35	7.227	5.887	5.887	0.04
01/26/2021	05:05	11.70	21:35	17.24	15.21	05:05	1.62	21:25	2.23	2.01	05:05	3.051	21:25	7.267	5.615	5.615	-
01/27/2021	05:40	12.02	20:50	17.30	15.28	05:20	1.72	20:40	2.22	2.02	05:35	3.390	20:40	7.315	5.645	5.645	0.14
01/28/2021	05:20	11.99	21:15	17.13	15.38	04:15	1.69	20:40	2.16	1.97	05:20	3.309	20:40	6.997	5.562	5.562	0.24
01/29/2021	05:25	11.98	20:20	16.76	15.12	05:00	1.70	10:50	2.17	2.00	05:25	3.336	20:15	6.746	5.508	5.508	0.03
01/30/2021	07:05	12.01	14:15	17.38	15.12	06:55	1.72	13:55	2.23	2.02	07:00	3.382	14:15	7.397	5.586	5.586	0.07
01/31/2021	06:40	11.65	14:15	17.75	15.19	06:40	1.64	14:00	2.23	2.00	06:40	3.067	14:00	7.595	5.602	5.602	0.12
02/01/2021	05:15	12.51	20:40	18.75	15.78	04:05	1.78	20:35	2.32	2.04	04:15	3.686	20:35	8.545	5.983	5.983	0.82
02/02/2021	05:50	13.45	21:05	18.61	16.71	05:50	1.79	13:55	2.34	2.13	05:50	4.109	21:05	8.484	6.760	6.760	0.31
02/03/2021	05:45	13.41	21:00	17.71	16.13	04:50	1.84	20:45	2.27	2.07	05:10	4.247	21:00	7.711	6.233	6.233	0.06
02/04/2021	05:40	12.72	20:40	17.42	15.61	04:40	1.73	21:40	2.25	2.05	04:40	3.719	21:00	7.422	5.913	5.913	0.07
02/05/2021	05:10	12.56	20:20	16.81	15.39	04:45	1.70	12:35	2.21	2.03	06:05	3.612	19:55	6.892	5.722	5.722	0.01
02/06/2021	06:35	12.04	13:35	17.62	15.39	05:30	1.69	16:35	2.26	2.03	06:35	3.342	13:40	7.479	5.763	5.763	0.01
02/07/2021	07:05	11.88	14:25	17.95	15.30	05:45	1.65	13:00	2.26	2.01	05:45	3.194	13:05	7.785	5.673	5.673	-
02/08/2021	05:20	11.64	20:55	17.01	15.09	05:10	1.62	20:10	2.19	1.97	05:10	3.064	20:55	7.029	5.428	5.428	-
02/09/2021	05:00	11.60	22:05	16.98	14.87	05:00	1.63	21:10	2.22	1.96	05:00	3.039	21:10	7.095	5.297	5.297	-
02/10/2021	04:55	11.72	21:05	16.76	14.79	04:50	1.68	20:25	2.21	1.99	04:55	3.182	21:00	6.887	5.328	5.328	-
02/11/2021	05:20	11.50	21:05	16.68	14.70	05:25	1.63	20:55	2.19	1.98	05:25	2.993	21:00	6.841	5.251	5.251	-
02/12/2021	05:35	11.14	20:50	16.13	14.56	05:30	1.57	15:10	2.17	1.96	05:35	2.769	15:10	6.360	5.143	5.143	-
02/13/2021	05:35	11.33	15:25	16.84	14.54	05:25	1.59	14:55	2.23	1.95	05:30	2.860	14:55	6.882	5.119	5.119	0.08
02/14/2021	07:15	11.14	14:30	17.67	14.91	05:55	1.61	14:45	2.26	1.98	07:10	2.856	14:45	7.605	5.430	5.430	0.71
02/15/2021	06:15	13.82	15:20	21.16	17.71	07:40	1.84	15:05	2.43	2.19	06:00	4.501	15:15	10.610	7.624	7.624	0.78
02/16/2021	05:35	15.50	00:00	19.03	17.50	06:05	1.99	14:25	2.34	2.18	06:05	5.630	00:00	8.677	7.339	7.339	0.07
02/17/2021	05:00	13.19	20:10	17.73	16.16	04:05	1.78	19:40	2.28	2.09	04:50	4.059	21:10	7.691	6.323	6.323	-
02/18/2021	05:30	12.74	21:45	17.62	15.85	03:35	1.76	19:05	2.28	2.07	05:30	3.854	21:50	7.504	6.068	6.068	0.09
02/19/2021	06:10	12.70	20:55	17.40	15.68	05:55	1.79	12:25	2.22	2.06	06:10	3.791	21:00	7.251	5.944	5.944	0.17
02/20/2021	07:10	12.50	13:45	17.67	15.50	06:00	1.72	13:30	2.27	2.05	07:00	3.600	13:40	7.662	5.872	5.872	0.07
02/21/2021	06:40	12.03	13:30	17.49	15.36	05:30	1.72	20:40	2.26	2.03	06:35	3.373	13:40	7.357	5.750	5.750	0.42
02/22/2021	06:05	14.40	14:55	22.12	18.47	06:00	1.89	14:45	2.54	2.22	06:00	4.851	14:45	11.770	8.137	8.137	0.98
02/23/2021	05:50	14.56	23:20	19.53	17.30	03:35	1.92	14:45	2.29	2.14	05:30	5.035	23:20	8.682	7.110	7.110	0.27
02/24/2021	05:30	14.16	00:00	18.88	17.00	05:25	1.90	21:55	2.37	2.15	05:30	4.704	21:55	8.636	6.947	6.947	-
02/25/2021	05:05	13.98	20:50	18.57	16.91	05:00	1.84	21:40	2.32	2.13	05:00	4.484	20:55	8.388	6.856	6.856	0.18
02/26/2021	06:00	13.70	20:35	17.76	16.44	05:20	1.84	21:30	2.30	2.13	05:20	4.422	21:30	7.735	6.568	6.568	0.10
02/27/2021	05:30	13.07	13:05	18.42	16.16	03:45	1.79	12:20	2.33	2.09	05:30	4.046	12:20	8.260	6.344	6.344	0.02
02/28/2021	06:35	12.53	13:40	18.31	15.87	06:25	1.80	13:50	2.32	2.10	06:35	3.740	13:50	8.267	6.207	6.207	0.02
03/01/2021	05:40	12.51	21:40	17.21	15.50	04:15	1.74	19:40	2.22	2.03	05:35	3.647	21:30	7.218	5.796	5.796	-
03/02/2021	05:40	11.69	21:25	17.53	15.13	05:25	1.63	20:55	2.24	2.00	05:40	3.084	21:25	7.434	5.540	5.540	-
03/03/2021	05:20	12.34	20:55	17.16	15.47	05:35	1.72	20:45	2.22	2.05	05:35	3.504	22:35	7.216	5.837	5.837	-
03/04/2021	05:45	12.00	21:30	17.49	15.24	05:45	1.71	21:45	2.22	2.02	05:45	3.345	21:30	7.378	5.639	5.639	0.20
03/05/2021	05:25	12.14	20:30	16.79	15.23	04:30	1.71	13:30	2.17	2.01	05:35	3.408	20:30	6.775	5.589	5.589	0.05
03/06/2021	05:50	11.79	14:10	17.35	15.16	07:15	1.65	13:25	2.21	2.00	07:15	3.158	13:25	7.283	5.540	5.540	-
03/07/2021	06:10	11.77	13:05	17.45	15.13	06:30	1.60	12:00	2.17	1.96	06:30	3.048	13:20	7.177	5.428	5.428	0.04
03/08/2021	05:55	11.64	21:40	16.91	14.94	04:50	1.54	21:00	2.21	1.96	04:50	2.933	21:00	6.918	5.346	5.346	-
03/09/2021	06:10	11.23	21:50	16.83	14.78	04:55	1.62	22:10	2.22	1.99	06:10	2.893	22:10	7.025	5.317	5.317	0.01
03/10/2021	05:35	11.41	21:20	16.62	14.76	05:00	1.59	21:10	2.18	1.99	05:15	2.948	21:10	6.762	5.309	5.309	-
03/11/2021	05:05	11.22	21:10	16.58	14.70	05:00	1.60	22:00	2.16	1.97	05:05	2.831	21:10	6.642	5.229	5.229	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	05:20	11.41	20:40	16.19	14.56	04:00	1.59	20:40	2.18	1.97	05:15	2.994	20:40	6.531	5.156	5.156	-
03/13/2021	05:40	11.03	14:05	16.85	14.56	05:20	1.58	13:25	2.29	1.97	05:40	2.744	13:25	7.181	5.186	5.186	-
03/14/2021	07:25	11.12	21:35	17.07	14.82	07:15	1.58	14:40	2.25	1.97	07:25	2.765	14:40	7.112	5.332	5.332	0.30
03/15/2021	04:05	11.40	21:25	16.75	14.80	04:00	1.53	19:20	2.22	1.95	04:00	2.808	21:25	6.922	5.257	5.257	-
03/16/2021	03:50	11.30	21:40	16.70	14.67	03:30	1.60	20:45	2.20	1.97	03:50	2.864	20:45	6.863	5.210	5.210	-
03/17/2021	05:05	11.18	21:45	16.32	14.56	04:55	1.56	21:45	2.12	1.94	05:05	2.756	21:45	6.419	5.070	5.070	-
03/18/2021	05:00	11.25	20:30	16.44	14.50	03:30	1.58	20:00	2.15	1.93	05:05	2.861	20:40	6.554	5.017	5.017	0.11
03/19/2021	05:10	11.00	19:50	16.06	14.49	05:05	1.55	19:30	2.16	1.94	05:10	2.694	19:30	6.375	5.050	5.050	0.03
03/20/2021	04:45	10.98	13:05	16.71	14.54	04:30	1.55	11:15	2.16	1.95	04:35	2.689	12:15	6.743	5.118	5.118	0.17
03/21/2021	06:10	10.83	12:50	16.92	14.53	06:00	1.52	12:20	2.18	1.94	06:10	2.567	13:55	6.862	5.109	5.109	0.07
03/22/2021	05:05	11.04	21:20	16.60	14.60	05:10	1.54	20:30	2.17	1.96	05:10	2.669	21:20	6.736	5.158	5.158	0.11
03/23/2021	03:45	11.25	21:05	16.62	14.54	04:25	1.55	21:00	2.16	1.94	04:50	2.775	21:05	6.715	5.075	5.075	-
03/24/2021	03:50	11.10	21:40	17.30	14.62	03:50	1.57	21:35	2.22	1.94	03:50	2.740	21:35	7.303	5.122	5.122	0.34
03/25/2021	04:55	12.42	20:55	17.17	15.41	04:50	1.74	11:30	2.19	2.01	04:55	3.573	20:55	7.138	5.675	5.675	0.27
03/26/2021	04:05	11.72	12:40	16.52	14.97	04:05	1.63	13:30	2.15	1.97	04:05	3.079	12:40	6.532	5.347	5.347	-
03/27/2021	05:35	11.29	12:05	17.15	14.76	05:25	1.58	11:30	2.20	1.96	05:30	2.834	11:40	7.086	5.241	5.241	-
03/28/2021	05:15	11.07	16:35	17.63	14.90	05:10	1.55	16:10	2.22	1.94	05:15	2.709	16:10	7.464	5.326	5.326	0.37
03/29/2021	04:25	11.44	21:20	16.96	14.93	04:20	1.62	21:10	2.18	1.96	04:25	2.952	21:20	6.974	5.326	5.326	-
03/30/2021	04:50	11.60	21:40	16.83	14.61	04:30	1.63	21:25	2.18	1.95	04:30	3.059	21:25	6.885	5.128	5.128	-
03/31/2021	04:45	11.60	22:00	16.52	14.76	04:45	1.60	21:00	2.12	1.94	04:45	2.977	21:35	6.510	5.181	5.181	-
04/01/2021	04:10	11.30	22:05	16.36	14.50	04:00	1.56	22:10	2.15	1.93	04:00	2.807	22:10	6.527	5.010	5.010	-
04/02/2021	04:35	11.18	20:45	15.97	14.36	04:10	1.55	20:05	2.10	1.91	04:35	2.731	20:45	6.085	4.894	4.894	-
04/03/2021	05:55	10.77	12:25	16.86	14.40	05:50	1.51	11:10	2.18	1.92	05:50	2.539	11:20	6.824	4.981	4.981	-
04/04/2021	06:20	10.76	13:10	16.87	14.28	06:15	1.53	11:00	2.15	1.91	06:20	2.560	12:55	6.813	4.902	4.902	-
04/05/2021	04:35	10.24	21:40	16.04	14.14	04:45	1.41	20:30	2.09	1.88	04:45	2.208	21:25	6.148	4.761	4.761	-
04/06/2021	04:30	10.92	21:35	15.96	14.26	04:40	1.52	19:35	2.11	1.90	04:40	2.593	12:35	6.099	4.844	4.844	-
04/07/2021	05:00	10.81	19:35	15.90	14.13	05:20	1.53	21:40	2.09	1.89	04:55	2.591	20:30	6.085	4.747	4.747	0.22
04/08/2021	04:55	10.94	22:00	15.88	14.24	04:45	1.50	21:25	2.09	1.88	05:00	2.572	22:00	6.095	4.766	4.766	-
04/09/2021	04:20	10.96	11:55	15.75	14.14	04:25	1.51	11:35	2.07	1.89	04:30	2.588	11:35	5.958	4.742	4.742	0.03
04/10/2021	07:00	10.81	13:15	16.58	14.20	06:50	1.50	12:20	2.16	1.90	06:50	2.531	12:25	6.696	4.815	4.815	0.02
04/11/2021	05:55	10.47	12:25	16.83	14.27	05:45	1.46	11:50	2.18	1.90	05:50	2.353	11:50	6.848	4.882	4.882	-
04/12/2021	04:35	10.70	20:45	16.06	14.16	04:40	1.47	20:35	2.13	1.90	04:40	2.446	20:35	6.291	4.801	4.801	-
04/13/2021	04:25	10.45	21:55	16.21	14.15	04:10	1.47	22:15	2.19	1.89	04:25	2.348	22:15	6.512	4.780	4.780	-
04/14/2021	04:45	10.68	22:20	16.41	14.25	04:50	1.47	22:20	2.17	1.90	04:50	2.430	22:20	6.640	4.842	4.829	-
10/01/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/02/2020	06:10	10.36	12:20	14.87	13.90	05:45	1.43	20:45	2.08	1.92	06:00	2.308	20:45	5.511	4.692	3.633	-
10/03/2020	05:55	9.55	12:30	15.94	13.30	05:55	1.37	12:45	2.18	1.86	06:00	1.923	13:05	6.362	4.353	4.353	0.01
10/04/2020	06:50	8.86	11:45	15.29	12.91	05:00	1.25	13:20	2.14	1.79	05:30	1.623	13:20	5.804	4.067	4.067	0.01
10/05/2020	04:35	9.06	20:25	15.52	13.25	03:55	1.27	19:55	2.15	1.85	04:35	1.677	20:15	5.954	4.300	4.300	-
10/06/2020	04:40	9.51	21:15	15.69	13.31	04:35	1.38	19:55	2.12	1.85	04:40	1.921	21:05	6.064	4.320	4.320	-
10/07/2020	05:00	9.68	20:40	15.41	13.24	04:25	1.27	21:25	2.13	1.85	04:25	1.921	21:25	5.927	4.269	4.269	-
10/08/2020	05:10	9.84	20:20	15.27	13.38	05:05	1.38	20:20	2.10	1.85	05:05	2.023	20:20	5.793	4.335	4.335	-
10/09/2020	04:10	10.04	20:00	14.98	13.35	05:20	1.41	13:45	2.09	1.84	05:20	2.144	13:45	5.569	4.291	4.291	0.64
10/10/2020	05:25	12.47	13:10	17.36	15.27	06:20	1.75	11:35	2.25	2.04	05:25	3.652	13:00	7.415	5.669	5.669	1.04
10/11/2020	06:50	9.72	14:35	16.32	13.82	06:45	1.39	19:40	2.18	1.89	06:45	2.016	14:20	6.555	4.680	4.680	0.53
10/12/2020	04:40	10.16	11:00	16.74	14.06	04:35	1.40	11:00	2.27	1.92	04:35	2.160	11:00	7.124	4.841	4.841	-
10/13/2020	04:05	10.98	09:20	17.83	14.88	03:40	1.54	09:05	2.28	2.00	04:05	2.710	09:15	7.813	5.426	5.426	0.61
10/14/2020	05:00	10.86	21:05	16.11	14.10	03:35	1.55	21:05	2.19	1.94	04:55	2.646	21:05	6.534	4.856	4.856	-
10/15/2020	04:40	10.36	21:10	16.03	13.96	04:10	1.47	20:20	2.16	1.93	04:40	2.376	21:00	6.381	4.791	4.791	-
10/16/2020	04:40	10.41	14:05	15.32	13.77	04:30	1.47	13:05	2.12	1.89	04:35	2.338	13:05	5.820	4.601	4.601	-
10/17/2020	06:20	10.29	12:55	16.18	13.75	05:05	1.48	13:45	2.17	1.88	06:20	2.306	13:45	6.416	4.591	4.591	0.01
10/18/2020	05:30	9.55	13:00	16.00	13.42	05:05	1.34	11:50	2.13	1.83	05:20	1.908	12:55	6.275	4.349	4.349	0.03
10/19/2020	04:50	9.50	20:20	15.84	13.59	04:50	1.37	20:45	2.12	1.86	04:50	1.909	20:45	6.172	4.481	4.481	0.05
10/20/2020	04:40	10.29	20:50	15.97	13.83	04:05	1.44	19:40	2.15	1.90	04:30	2.316	20:40	6.257	4.664	4.664	-
10/21/2020	05:30	10.14	20:50	15.99	13.79	04:05	1.44	20:35	2.19	1.90	04:05	2.272	20:35	6.385	4.646	4.646	0.01
10/22/2020	05:15	10.21	21:05	15.82	13.59	04:55	1.47	20:40	2.14	1.89	05:00	2.289	21:10	6.204	4.511	4.511	-
10/23/2020	05:05	10.24	21:15	15.91	13.82	05:10	1.45	21:05	2.19	1.91	05:10	2.260	21:05	6.351	4.676	4.676	0.20
10/24/2020	05:55	10.22	12:30	16.44	13.88	05:55	1.46	11:20	2.18	1.90	05:55	2.254	12:25	6.654	4.710	4.710	0.02
10/25/2020	06:00	9.57	13:40	16.00	13.43	05:50	1.34	13:45	2.16	1.84	05:50	1.892	13:45	6.373	4.388	4.388	-
10/26/2020	05:10	9.51	20:50	16.07	13.65	04:55	1.36	19:35	2.13	1.86	04:55	1.908	20:55	6.268	4.525	4.525	-
10/27/2020	04:30	10.39	21:00	16.09	13.84	04:15	1.46	19:20	2.15	1.89	04:25	2.314	20:55	6.316	4.640	4.640	-
10/28/2020	04:20	10.18	20:05	15.82	13.48	04:10	1.44	19:30	2.14	1.85	04:10	2.226	19:50	6.167	4.373	4.373	-
10/29/2020	04:40	10.19	21:10	16.02	13.81	04:45	1.47	21:20	2.16	1.89	04:45	2.279	21:20	6.339	4.630	4.630	-
10/30/2020	04:50	10.23	20:15	15.51	13.82	05:00	1.42	14:25	2.11	1.90	05:00	2.223	19:40	5.947	4.648	4.648	0.10
10/31/2020	05:40	9.99	12:25	16.54	13.57	05:40	1.43	12:35	2.20	1.87	05:40	2.143	12:35	6.774	4.478	4.478	-
11/01/2020	06:05	9.24	13:30	16.03	13.22	06:15	1.23	12:10	2.14	1.81	06:15	1.655	13:40	6.192	4.240	4.240	-
11/02/2020	04:50	9.16	20:20	15.55	13.45	04:45	1.32	20:15	2.11	1.84	04:45	1.754	20:15	5.954	4.371	4.371	-
11/03/2020	06:15	10.06	12:40	16.87	14.32	04:55	1.41	18:00	2.22	1.94	04:55	2.147	12:50	6.964	5.053	5.053	0.83
11/04/2020	05:25	11.11	21:00	16.21	14.44	05:25	1.60	20:30	2.19	1.98	05:25	2.801	21:00	6.521	5.124	5.124	0.09
11/05/2020	05:55	11.15	21:35	16.49	14.36	06:55	1.55	21:20	2.23	1.95	06:55	2.742	21:20	6.828	5.024	5.024	0.34
11/06/2020	06:10	11.93	20:45	16.19	14.68	04:05	1.70	10:45	2.18	1.99	05:10	3.349	20:35	6.492	5.255	5.255	0.10
11/07/2020	05:25	10.91	13:30	16.58	14.28	05:20	1.53	18:00	2.22	1.94	05:20	2.624	13:30	6.871	4.991	4.991	0.07
11/08/2020	07:30	10.11	12:45	16.18	13.89	06:10	1.45	15:10	2.16	1.90	07:25	2.233	12:35	6.444	4.703	4.703	0.01
11/09/2020	05:20	9.92	21:15	16.04	13.85	05:15	1.40	20:20	2.17	1.89	05:20	2.080	21:15	6.404	4.665	4.665	0.04

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/10/2020	06:00	10.77	20:35	16.09	14.12	04:45	1.47	20:35	2.16	1.93	04:45	2.488	20:35	6.429	4.852	4.852	0.03
11/11/2020	05:10	10.76	21:50	16.04	14.14	04:25	1.53	20:35	2.18	1.95	06:10	2.633	20:40	6.389	4.916	4.916	-
11/12/2020	06:25	10.81	21:35	16.16	14.09	06:05	1.56	21:05	2.18	1.94	06:30	2.653	21:05	6.455	4.867	4.867	0.16
11/13/2020	04:35	11.55	19:55	16.00	14.61	04:30	1.64	12:10	2.17	1.98	04:30	3.035	12:15	6.359	5.205	5.205	0.38
11/14/2020	07:20	10.71	20:15	17.29	14.57	06:00	1.54	19:50	2.25	1.96	07:25	2.575	19:50	7.364	5.187	5.187	0.47
11/15/2020	07:10	11.02	14:05	16.68	14.50	04:45	1.50	14:25	2.20	1.94	07:05	2.727	14:25	6.876	5.070	5.070	0.19
11/16/2020	05:50	10.67	15:05	17.42	14.91	05:10	1.50	14:30	2.31	1.97	05:45	2.491	14:45	7.607	5.391	5.391	0.31
11/17/2020	05:10	11.84	21:30	17.46	15.12	04:50	1.67	21:30	2.25	2.02	05:10	3.199	21:30	7.515	5.588	5.588	0.20
11/18/2020	05:50	11.69	20:55	17.15	15.18	05:50	1.63	18:50	2.23	2.01	05:50	3.067	20:25	7.174	5.585	5.585	0.30
11/19/2020	04:05	12.40	14:50	17.15	15.21	04:50	1.62	13:55	2.19	2.00	04:50	3.372	14:30	7.047	5.554	5.554	0.50
11/20/2020	05:35	11.63	19:50	16.47	14.88	05:35	1.65	13:35	2.14	1.97	05:35	3.087	20:00	6.471	5.296	5.296	0.01
11/21/2020	06:20	11.47	13:10	17.12	14.87	07:25	1.59	13:20	2.21	1.98	06:20	2.937	13:20	7.129	5.381	5.381	-
11/22/2020	07:05	10.67	13:30	16.91	14.44	07:20	1.50	12:40	2.20	1.92	07:20	2.479	13:15	6.862	5.025	5.025	0.21
11/23/2020	05:35	11.20	21:25	16.82	14.88	04:20	1.52	20:20	2.19	1.96	04:25	2.739	21:25	6.946	5.306	5.306	0.14
11/24/2020	05:45	11.73	21:05	17.02	15.05	05:15	1.55	21:00	2.26	1.99	05:25	3.088	21:00	7.247	5.479	5.479	0.21
11/25/2020	05:50	11.73	21:00	16.65	15.02	04:35	1.64	20:05	2.21	2.00	05:50	3.168	20:05	6.856	5.466	5.466	0.05
11/26/2020	06:10	10.77	13:55	17.74	14.44	06:00	1.51	14:50	2.27	1.94	06:00	2.549	14:50	7.671	5.081	5.081	0.02
11/27/2020	06:00	10.44	13:25	16.34	14.03	06:25	1.47	13:55	2.17	1.90	06:00	2.392	13:55	6.531	4.751	4.751	-
11/28/2020	06:50	10.98	14:40	16.69	14.29	05:35	1.53	14:00	2.18	1.92	06:50	2.671	14:40	6.836	4.941	4.941	0.05
11/29/2020	05:55	10.45	14:40	16.95	14.35	05:50	1.48	20:00	2.24	1.93	05:50	2.379	14:40	6.986	5.026	5.026	-
11/30/2020	05:00	11.50	20:35	16.33	14.78	05:00	1.62	19:00	2.17	1.98	05:00	2.979	20:50	6.568	5.275	5.275	0.36
12/01/2020	05:55	11.03	11:45	16.63	14.38	04:35	1.52	20:20	2.21	1.93	04:35	2.683	20:45	6.729	4.976	4.976	-
12/02/2020	05:35	11.03	21:45	16.47	14.49	05:20	1.57	14:00	2.17	1.96	05:35	2.734	21:40	6.654	5.105	5.105	0.01
12/03/2020	05:55	11.10	12:25	17.40	14.44	05:30	1.58	20:05	2.19	1.95	05:55	2.749	20:05	6.499	5.058	5.058	-
12/04/2020	05:50	11.06	21:20	15.98	14.38	05:40	1.58	13:10	2.12	1.96	05:50	2.742	21:20	6.239	5.044	5.044	-
12/05/2020	06:20	10.64	14:30	16.66	14.31	06:15	1.54	14:00	2.25	1.96	06:15	2.551	14:00	6.989	5.062	5.062	0.03
12/06/2020	06:15	10.17	14:05	16.49	13.92	06:05	1.42	13:20	2.20	1.90	06:15	2.199	13:20	6.728	4.736	4.736	0.03
12/07/2020	05:05	10.23	21:00	15.70	13.80	04:55	1.42	15:05	2.15	1.90	05:00	2.231	20:55	6.143	4.633	4.633	-
12/08/2020	05:05	10.45	21:15	18.27	14.69	04:55	1.44	21:00	2.34	1.97	05:05	2.320	21:00	8.274	5.324	5.324	0.87
12/09/2020	06:00	13.19	00:00	16.92	15.67	05:55	1.85	14:05	2.24	2.08	05:55	4.156	21:05	7.047	6.010	6.010	0.17
12/10/2020	04:40	11.79	22:20	16.94	15.10	05:25	1.65	19:45	2.23	2.02	04:40	3.180	19:45	7.103	5.572	5.572	0.07
12/11/2020	06:20	11.83	20:15	16.23	14.78	05:20	1.62	17:30	2.18	1.98	05:20	3.139	19:00	6.488	5.269	5.269	0.02
12/12/2020	06:45	10.99	14:15	16.70	14.43	05:35	1.54	16:05	2.20	1.95	06:45	2.648	14:00	6.820	5.072	5.072	0.01
12/13/2020	07:00	11.36	14:40	17.46	14.70	05:35	1.59	12:40	2.26	1.98	07:00	2.883	14:35	7.472	5.294	5.294	0.24
12/14/2020	05:05	10.98	21:05	16.48	14.61	04:00	1.52	22:05	2.20	1.96	05:00	2.643	20:20	6.687	5.193	5.193	0.05
12/15/2020	05:15	11.34	18:05	17.41	15.17	05:15	1.59	18:05	2.27	2.02	05:15	2.859	18:05	7.559	5.649	5.649	0.58
12/16/2020	05:20	12.13	19:20	17.56	15.43	05:15	1.70	19:20	2.31	2.05	05:15	3.383	19:20	7.757	5.851	5.851	0.39
12/17/2020	05:00	11.97	21:00	16.83	15.23	04:20	1.64	21:20	2.26	2.04	05:00	3.221	21:20	7.025	5.695	5.695	0.08
12/18/2020	05:55	12.07	20:30	16.67	15.10	05:50	1.69	20:25	2.24	2.04	05:50	3.344	20:25	6.966	5.605	5.605	0.25
12/19/2020	06:45	11.75	23:05	16.97	14.97	06:35	1.63	12:15	2.25	2.02	06:35	3.108	22:55	7.177	5.517	5.517	0.37
12/20/2020	07:15	12.35	15:05	17.34	15.39	05:30	1.69	14:50	2.27	2.07	06:05	3.586	15:05	7.497	5.840	5.840	0.04
12/21/2020	05:50	13.24	20:40	20.90	16.91	05:50	1.82	19:50	2.47	2.18	05:50	4.093	20:25	10.510	7.096	7.096	1.07
12/22/2020	06:20	14.63	00:00	19.43	16.91	05:55	1.93	00:00	2.39	2.17	05:55	5.040	00:00	9.283	6.948	6.948	-
12/23/2020	05:20	13.11	13:30	17.30	15.91	05:15	1.83	20:15	2.29	2.11	05:20	4.091	13:30	7.467	6.237	6.237	-
12/24/2020	06:10	12.51	13:50	17.80	15.61	05:05	1.80	13:15	2.32	2.09	06:10	3.770	13:15	7.880	6.040	6.040	-
12/25/2020	07:00	11.89	14:15	16.83	14.97	08:30	1.71	14:10	2.24	2.01	07:05	3.332	14:10	7.078	5.461	5.461	0.49
12/26/2020	07:15	11.74	14:30	17.66	15.18	07:15	1.62	15:40	2.28	2.02	07:15	3.073	13:55	7.676	5.642	5.642	0.02
12/27/2020	07:25	11.99	14:10	18.14	15.40	06:10	1.71	14:00	2.26	2.03	07:25	3.329	14:10	7.975	5.789	5.789	0.13
12/28/2020	06:20	11.70	13:50	17.22	15.08	06:20	1.67	13:35	2.27	2.01	06:20	3.150	13:40	7.327	5.544	5.544	-
12/29/2020	05:50	11.72	21:10	17.06	14.94	05:45	1.64	20:55	2.22	1.99	05:45	3.113	21:00	7.115	5.408	5.408	0.14
12/30/2020	05:20	13.03	15:40	17.85	16.24	03:30	1.80	12:50	2.30	2.11	05:15	3.981	15:15	7.838	6.413	6.413	0.78
12/31/2020	06:35	14.05	19:20	18.26	16.52	04:55	1.80	19:10	2.33	2.08	06:35	4.403	19:10	8.258	6.476	6.476	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			1088.339	30.65
Average	15.13	2.00	5.588	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A2_40805K

Site Address /Location:	29th St Nw and Emerald downs Dr			Monitor Series	Location Type
				TRITON+	Temporary
Site Access Details:	Outside of Emerald Downs Racetrack	Latitude:	47.333005	Pipe Size (H x W)	Pipe Shape
		Longitude:	-122.237737	71.50 X 70.00	Circular



Manhole #	System Characteristics
A240805K	Commercial
Access	Traffic
Drive	Light







ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519.11.325

Installation Information	
Installation Date:	Installation Type:
Friday, October 2, 2020	Doppler Special Installation
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi
Installation Confirmation:	
Time	
05:24AM	
Depth of Flow (Wet DOF) (in)	
10.50	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
1.6	N/A
Silt (in)	Silt Type
0	
Hydraulic Comments:	
Manhole / Pipe Information:	
Manhole Depth (Approx. FT):	Manhole Configuration
12	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
Yes, Inside	Normal
Pipe Material	Pipe Condition:
Concrete	Good
Communication Information:	
Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole
Additional Site Info. / Comments:	

AUB_A3_40834

Site Commentary

SITE INFORMATION

Pipe	Round (18 in H)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	2.17	3.55	0.282
Minimum	1.43	2.13	0.096
Maximum	3.13	4.25	0.566
Min Time	09/27/2020 2:00:00 AM	10/02/2020 3:00:00 AM	09/25/2020 2:00:00 AM
Max Time	01/12/2021 9:00:00 AM	01/12/2021 9:00:00 AM	01/12/2021 9:00:00 AM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

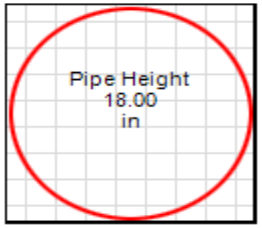
Percent Uptime	
DFINAL (in)	99.782
VFINAL (ft/s)	99.782
QFINAL (MGD - Total MG)	99.782

Hydrograph Report

AUB_A3_40834

Flow Monitor

AUB_A3_40834

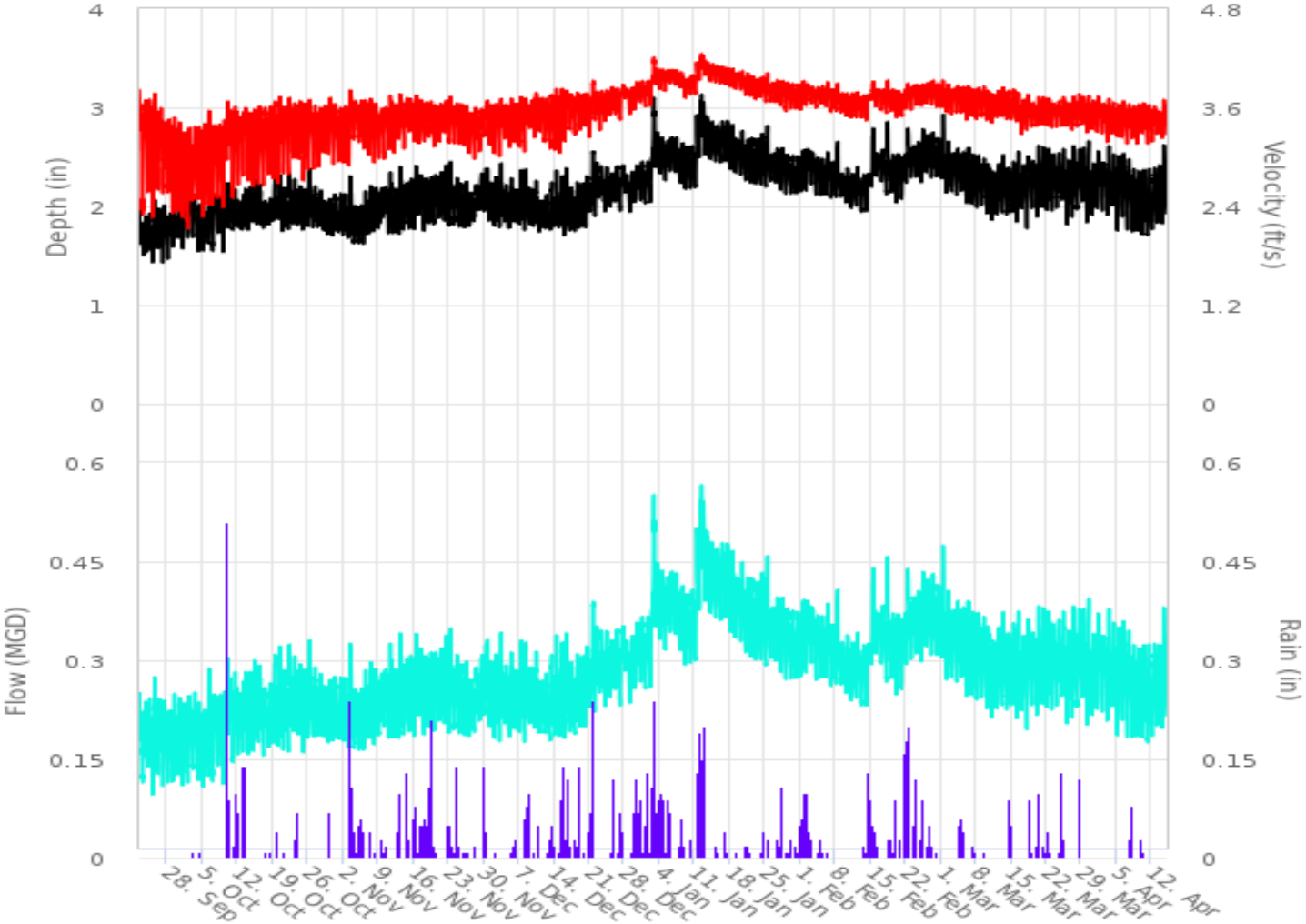


Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A3_40834

Flow Monitor

AUB_A3_40834

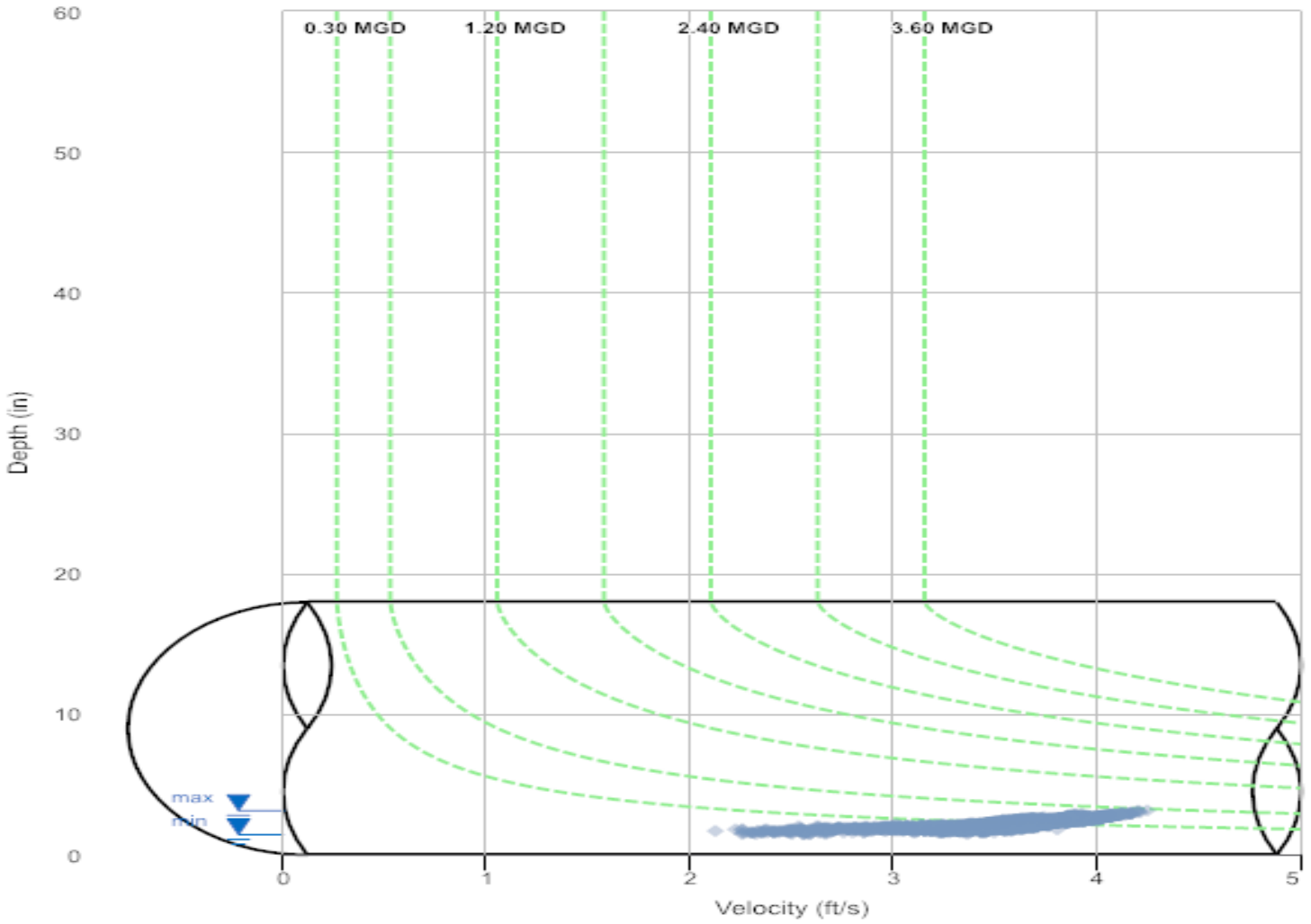
Pipe Height
18.00
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A3_40834Pipe: Round (18 in H), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	05:35	2.01	15:25	2.56	2.24	02:35	3.60	15:30	3.99	3.77	05:35	0.252	15:30	0.398	0.309	0.309	0.51
01/02/2021	04:35	2.02	20:50	3.21	2.47	04:35	3.60	20:50	4.29	3.89	04:35	0.254	20:50	0.592	0.372	0.372	1.69
01/03/2021	04:45	2.37	00:05	3.01	2.56	23:25	3.82	00:05	4.20	3.98	05:00	0.346	00:05	0.529	0.396	0.396	0.65
01/04/2021	03:05	2.31	11:55	2.74	2.49	02:35	3.79	07:40	4.11	3.96	03:05	0.328	11:55	0.449	0.379	0.379	0.48
01/05/2021	03:00	2.24	14:05	2.69	2.46	04:25	3.77	20:45	4.10	3.95	03:00	0.309	20:45	0.438	0.372	0.372	0.52
01/06/2021	02:50	2.33	18:50	2.74	2.54	03:10	3.82	10:40	4.10	3.99	03:50	0.337	18:50	0.446	0.394	0.394	0.22
01/07/2021	23:45	2.30	09:00	2.75	2.47	23:35	3.77	10:05	4.09	3.96	23:35	0.327	09:00	0.447	0.375	0.375	-
01/08/2021	04:30	2.19	17:20	2.68	2.42	23:10	3.74	09:15	4.09	3.91	23:45	0.300	09:15	0.425	0.360	0.360	0.22
01/09/2021	02:35	2.16	10:40	2.67	2.39	01:10	3.68	11:15	3.98	3.85	02:35	0.287	10:40	0.417	0.347	0.347	-
01/10/2021	04:35	2.17	09:35	2.67	2.41	04:10	3.72	14:05	4.05	3.88	04:10	0.292	14:05	0.425	0.354	0.354	0.07
01/11/2021	00:55	2.19	10:20	2.98	2.53	04:45	3.74	10:15	4.19	3.96	04:35	0.297	10:20	0.518	0.391	0.391	1.06
01/12/2021	00:00	2.49	18:55	3.20	2.86	00:35	3.91	18:55	4.32	4.13	00:00	0.379	18:55	0.593	0.483	0.483	2.10
01/13/2021	04:05	2.51	00:35	2.97	2.75	21:40	3.94	00:30	4.21	4.08	04:55	0.386	00:35	0.519	0.450	0.450	0.09
01/14/2021	03:35	2.46	12:50	2.92	2.65	03:05	3.90	12:55	4.18	4.03	03:45	0.369	12:50	0.500	0.421	0.421	0.01
01/15/2021	04:35	2.43	13:00	2.86	2.65	03:15	3.88	13:05	4.14	4.02	04:35	0.361	13:05	0.484	0.420	0.420	0.09
01/16/2021	03:20	2.43	13:10	2.95	2.65	07:15	3.82	12:10	4.12	4.00	04:40	0.356	13:05	0.502	0.420	0.420	-
01/17/2021	05:15	2.44	12:55	2.92	2.64	04:00	3.79	11:20	4.11	3.98	05:20	0.360	12:50	0.489	0.414	0.414	0.10
01/18/2021	02:15	2.36	13:25	2.85	2.61	02:50	3.83	12:15	4.10	3.98	03:25	0.339	13:30	0.474	0.408	0.408	-
01/19/2021	02:00	2.32	09:50	2.70	2.54	03:05	3.80	15:20	4.04	3.95	03:05	0.331	15:40	0.434	0.390	0.390	0.01
01/20/2021	03:00	2.30	12:25	2.80	2.50	03:15	3.79	12:25	4.08	3.92	02:05	0.325	12:30	0.463	0.378	0.378	-
01/21/2021	03:10	2.25	13:20	2.69	2.46	03:50	3.72	13:45	4.04	3.89	03:10	0.310	13:45	0.430	0.366	0.366	0.11
01/22/2021	01:45	2.23	08:10	2.74	2.47	03:35	3.72	10:45	4.02	3.87	01:45	0.303	08:10	0.436	0.365	0.365	-
01/23/2021	03:05	2.22	14:00	2.78	2.43	03:05	3.67	14:00	3.99	3.84	03:05	0.297	14:00	0.447	0.355	0.355	-
01/24/2021	04:40	2.21	11:45	2.81	2.45	03:20	3.67	12:00	4.02	3.85	03:20	0.299	12:00	0.455	0.359	0.359	0.16
01/25/2021	01:55	2.19	12:50	2.86	2.44	04:40	3.62	12:55	4.11	3.83	04:35	0.288	12:55	0.478	0.357	0.357	0.04
01/26/2021	04:05	2.24	22:30	2.70	2.42	04:20	3.63	22:30	3.95	3.82	04:10	0.298	22:30	0.424	0.350	0.350	-
01/27/2021	02:20	2.23	12:40	2.65	2.40	01:55	3.63	10:35	3.97	3.81	03:15	0.296	12:45	0.412	0.346	0.346	0.14
01/28/2021	04:30	2.13	10:00	2.65	2.38	04:00	3.59	13:30	3.99	3.79	04:30	0.273	13:30	0.412	0.341	0.341	0.24
01/29/2021	03:30	2.10	09:55	2.56	2.35	04:10	3.50	10:25	3.93	3.76	04:10	0.265	10:00	0.390	0.331	0.331	0.03
01/30/2021	05:15	2.10	10:45	2.55	2.33	04:55	3.55	13:50	3.93	3.74	05:10	0.267	10:45	0.388	0.325	0.325	0.07
01/31/2021	05:00	2.11	14:40	2.54	2.31	05:10	3.54	12:40	3.91	3.74	05:10	0.265	12:35	0.381	0.322	0.322	0.12
02/01/2021	03:05	2.12	18:25	2.64	2.38	02:00	3.51	11:30	3.96	3.79	00:30	0.270	18:25	0.411	0.340	0.340	0.82
02/02/2021	04:25	2.14	12:45	2.66	2.43	02:45	3.58	11:00	3.92	3.78	04:20	0.279	12:45	0.411	0.351	0.351	0.31
02/03/2021	04:25	2.21	10:30	2.57	2.41	04:40	3.58	09:45	3.90	3.76	04:40	0.287	11:25	0.389	0.342	0.342	0.06
02/04/2021	02:45	2.10	13:40	2.52	2.34	03:55	3.58	13:55	3.88	3.74	03:45	0.267	13:50	0.376	0.326	0.326	0.07
02/05/2021	03:00	2.08	11:25	2.55	2.31	04:50	3.61	11:20	3.93	3.74	02:55	0.267	11:25	0.387	0.321	0.321	0.01
02/06/2021	05:15	2.08	11:15	2.58	2.33	03:55	3.60	11:20	3.93	3.76	05:15	0.265	11:20	0.395	0.328	0.328	0.01
02/07/2021	02:40	2.08	11:45	2.51	2.29	03:30	3.52	11:50	3.88	3.71	03:30	0.259	11:45	0.374	0.314	0.314	-
02/08/2021	04:15	2.08	12:05	2.75	2.30	04:25	3.52	09:55	3.95	3.72	04:25	0.259	12:10	0.434	0.318	0.318	-
02/09/2021	03:35	2.08	11:45	2.36	2.21	00:55	3.51	11:35	3.82	3.66	03:35	0.260	11:50	0.335	0.295	0.295	-
02/10/2021	01:55	2.02	09:30	2.44	2.22	02:35	3.47	08:00	3.82	3.65	04:25	0.245	09:30	0.352	0.295	0.295	-
02/11/2021	04:25	1.97	12:35	2.38	2.16	02:10	3.43	12:40	3.81	3.63	04:45	0.234	12:35	0.338	0.282	0.282	-
02/12/2021	04:05	2.00	12:10	2.45	2.18	04:05	3.45	09:20	3.82	3.64	04:05	0.240	12:10	0.353	0.288	0.288	-
02/13/2021	05:05	1.91	17:20	2.39	2.15	03:00	3.46	17:20	3.83	3.62	05:05	0.224	17:20	0.345	0.279	0.279	0.08
02/14/2021	04:50	1.92	14:05	2.36	2.19	02:00	3.42	18:00	3.79	3.63	04:50	0.226	14:05	0.330	0.289	0.289	0.71
02/15/2021	02:20	2.17	15:05	2.88	2.47	05:25	3.60	15:10	4.00	3.80	05:25	0.282	15:05	0.472	0.361	0.361	0.78
02/16/2021	02:30	2.28	10:00	2.55	2.43	02:25	3.57	09:40	3.89	3.74	02:30	0.302	09:40	0.381	0.345	0.345	0.07
02/17/2021	02:35	2.24	12:35	2.60	2.40	02:25	3.54	12:35	3.88	3.71	02:25	0.291	12:35	0.395	0.336	0.336	-
02/18/2021	02:35	2.11	10:15	2.93	2.41	00:45	3.45	10:05	3.96	3.73	02:35	0.265	10:15	0.477	0.341	0.341	0.09
02/19/2021	04:45	2.06	12:15	2.56	2.37	05:05	3.49	09:55	3.85	3.71	04:45	0.257	12:20	0.381	0.329	0.329	0.17
02/20/2021	04:05	2.02	13:00	2.57	2.32	01:20	3.44	11:30	3.84	3.65	04:10	0.243	13:00	0.381	0.317	0.317	0.07
02/21/2021	06:20	2.03	23:35	2.59	2.31	03:35	3.45	22:55	3.85	3.65	04:40	0.250	23:35	0.388	0.314	0.314	0.42
02/22/2021	04:30	2.22	12:50	2.89	2.51	03:50	3.56	12:30	3.92	3.76	04:35	0.288	12:50	0.465	0.364	0.364	0.98
02/23/2021	04:55	2.25	15:40	2.70	2.46	02:10	3.53	20:25	3.91	3.75	04:50	0.295	20:30	0.420	0.353	0.353	0.27
02/24/2021	02:45	2.26	12:10	2.70	2.47	01:15	3.59	12:55	3.90	3.77	03:15	0.301	12:15	0.418	0.356	0.356	-
02/25/2021	02:45	2.21	11:10	2.82	2.52	02:40	3.58	10:55	3.96	3.78	02:50	0.288	11:10	0.447	0.370	0.370	0.18
02/26/2021	03:00	2.29	12:15	2.78	2.52	02:00	3.62	14:00	3.99	3.79	03:00	0.312	12:05	0.438	0.370	0.370	0.10
02/27/2021	02:30	2.25	11:07	2.76	2.50	04:45	3.60	13:45	3.96	3.78	02:30	0.299	11:10	0.438	0.363	0.363	0.02
02/28/2021	05:25	2.27	19:50	2.96	2.47	04:15	3.50	19:50	3.93	3.76	04:15	0.301	19:50	0.482	0.356	0.356	0.02
03/01/2021	23:40	2.24	10:30	3.01	2.50	03:10	3.56	10:35	3.96	3.75	23:40	0.296	10:35	0.496	0.361	0.361	-
03/02/2021	02:40	2.11	12:40	2.70	2.40	04:05	3.51	11:50	3.92	3.71	02:40	0.267	12:40	0.418	0.337	0.337	-
03/03/2021	04:05	2.12	18:10	2.60	2.37	03:05	3.50	12:45	3.87	3.71	04:15	0.267	18:10	0.389	0.332	0.332	-
03/04/2021	04:40	2.09	11:05	2.64	2.37	01:05	3.50	11:15	3.90	3.72	04:35	0.260	11:15	0.404	0.332	0.332	0.20
03/05/2021	04:35	2.12	12:35	2.64	2.36	01:10	3.51	11:05	3.89	3.70	03:10	0.269	12:35	0.404	0.328	0.328	0.05
03/06/2021	03:35	2.00	12:15	2.71	2.32	03:35	3.43	11:15	3.89	3.68	03:35	0.238	12:15	0.419	0.318	0.318	-
03/07/2021	03:55	2.00	11:00	2.64	2.28	23:15	3.42	10:35	3.88	3.65	04:05	0.244	11:00	0.401	0.309	0.309	0.04
03/08/2021	03:40	1.97	12:50	2.57	2.25	00:30	3.42	13:00	3.90	3.65	03:40	0.236	13:00	0.388	0.303	0.303	-
03/09/2021	01:25	1.98	14:20	2.53	2.25	02:15	3.44	14:15	3.91	3.67	02:25	0.238	14:30	0.379	0.304	0.304	0.01
03/10/2021	04:05	1.90	10:30	2.47	2.19	03:05	3.38	12:20	3.85	3.61	02:45	0.222	10:25	0.359	0.287	0.287	-
03/11/2021	04:15	1.84	13:50	2.40	2.17	04:15	3.40	10:35	3.88	3.63	04:25	0.208	10:35	0.344	0.286	0.286	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	03:05	1.87	16:15	2.50	2.20	01:35	3.43	15:25	3.85	3.65	03:05	0.219	16:15	0.364	0.294	0.294	-
03/13/2021	04:00	1.89	10:30	2.60	2.22	05:00	3.43	13:55	3.92	3.66	04:00	0.226	10:30	0.393	0.297	0.297	-
03/14/2021	02:40	1.86	09:30	2.44	2.19	23:50	3.42	14:45	3.86	3.63	02:40	0.217	09:30	0.353	0.289	0.289	0.30
03/15/2021	03:15	1.89	10:55	2.60	2.22	00:05	3.40	10:50	3.89	3.65	03:15	0.221	10:50	0.394	0.296	0.296	-
03/16/2021	02:15	1.80	10:30	2.67	2.19	23:30	3.33	10:25	3.85	3.56	01:35	0.206	10:30	0.405	0.284	0.284	-
03/17/2021	02:10	1.95	11:45	2.46	2.20	01:30	3.21	12:10	3.80	3.53	02:10	0.215	11:45	0.351	0.282	0.282	-
03/18/2021	03:25	1.75	12:15	3.08	2.24	02:05	3.23	12:15	3.87	3.55	03:25	0.189	12:15	0.502	0.294	0.294	0.11
03/19/2021	03:30	1.95	09:15	2.48	2.28	02:10	3.31	08:40	3.71	3.53	03:35	0.226	10:25	0.348	0.298	0.298	0.03
03/20/2021	02:55	1.85	11:25	2.67	2.30	22:40	3.30	11:20	3.81	3.55	02:55	0.209	11:20	0.401	0.304	0.304	0.17
03/21/2021	03:35	1.95	10:30	2.66	2.30	00:30	3.36	10:25	3.79	3.55	03:35	0.226	10:25	0.397	0.302	0.302	0.07
03/22/2021	02:10	1.93	11:15	2.64	2.29	01:05	3.31	16:35	3.78	3.54	02:35	0.221	11:15	0.391	0.302	0.302	0.11
03/23/2021	03:30	1.92	12:10	2.60	2.28	03:35	3.26	08:45	3.73	3.53	03:35	0.212	12:10	0.375	0.297	0.297	-
03/24/2021	02:40	1.93	12:00	2.62	2.28	01:05	3.30	11:50	3.78	3.54	02:35	0.219	12:00	0.384	0.299	0.299	0.34
03/25/2021	23:55	1.99	10:20	2.61	2.30	23:55	3.32	10:10	3.80	3.55	23:55	0.228	10:20	0.384	0.303	0.303	0.27
03/26/2021	03:30	1.79	10:35	2.51	2.22	00:50	3.28	10:30	3.71	3.53	03:30	0.199	10:30	0.357	0.286	0.286	-
03/27/2021	03:35	1.86	10:00	2.65	2.27	03:20	3.24	10:45	3.79	3.55	03:20	0.207	10:05	0.390	0.298	0.298	-
03/28/2021	01:40	1.90	13:10	2.66	2.27	05:20	3.31	13:05	3.83	3.56	01:40	0.218	13:10	0.403	0.299	0.299	0.37
03/29/2021	23:45	1.99	10:30	2.62	2.29	23:40	3.27	09:40	3.79	3.56	23:40	0.226	09:40	0.387	0.302	0.302	-
03/30/2021	02:15	1.79	10:25	2.74	2.24	03:40	3.22	10:20	3.82	3.54	02:15	0.191	10:20	0.416	0.292	0.292	-
03/31/2021	03:45	1.88	10:10	2.47	2.23	03:10	3.27	09:50	3.72	3.53	03:00	0.213	10:10	0.346	0.288	0.288	-
04/01/2021	02:20	1.96	07:35	2.59	2.30	02:25	3.24	07:50	3.83	3.55	02:20	0.222	07:50	0.386	0.304	0.304	-
04/02/2021	03:50	1.93	13:55	2.52	2.27	02:05	3.22	11:50	3.72	3.51	03:15	0.218	13:55	0.360	0.296	0.296	-
04/03/2021	04:05	1.85	11:10	2.63	2.26	03:40	3.11	10:25	3.77	3.47	02:40	0.196	11:15	0.384	0.290	0.290	-
04/04/2021	01:50	1.96	10:10	2.57	2.25	01:45	3.22	21:50	3.73	3.48	01:50	0.221	10:10	0.369	0.288	0.288	-
04/05/2021	03:30	1.73	13:35	2.54	2.22	02:55	3.15	10:55	3.72	3.48	02:55	0.180	10:55	0.359	0.284	0.284	-
04/06/2021	03:50	1.81	10:35	2.57	2.21	01:25	3.17	09:15	3.73	3.45	03:50	0.198	10:40	0.373	0.279	0.279	-
04/07/2021	02:55	1.75	11:30	2.53	2.16	01:10	3.11	11:10	3.71	3.44	03:00	0.179	11:30	0.358	0.270	0.270	0.22
04/08/2021	01:50	1.72	11:30	2.49	2.05	02:25	3.18	11:20	3.69	3.43	01:50	0.180	11:25	0.349	0.247	0.247	-
04/09/2021	23:45	1.73	11:35	2.42	2.06	01:05	3.07	11:35	3.73	3.45	01:05	0.178	11:35	0.341	0.252	0.252	0.03
04/10/2021	03:50	1.69	11:00	2.58	2.05	23:05	3.21	10:55	3.73	3.47	01:45	0.178	11:00	0.372	0.251	0.251	0.02
04/11/2021	01:10	1.68	12:15	2.44	2.01	04:10	3.11	13:00	3.81	3.42	04:35	0.171	12:15	0.339	0.241	0.241	-
04/12/2021	00:47	1.74	14:05	2.43	2.09	02:45	3.14	08:40	3.64	3.43	02:45	0.181	14:05	0.333	0.255	0.255	-
04/13/2021	02:30	1.82	12:25	2.45	2.16	02:40	3.18	08:35	3.63	3.45	02:40	0.192	08:35	0.337	0.269	0.269	-
04/14/2021	02:15	1.79	09:45	2.70	2.16	00:35	3.16	09:45	3.78	3.46	02:15	0.189	09:45	0.405	0.270	0.270	-
09/22/2020	20:40	1.52	11:10	2.02	1.74	23:55	2.37	10:55	3.81	3.36	23:55	0.125	11:10	0.266	0.190	0.104	-
09/23/2020	07:50	1.47	16:40	2.01	1.70	01:35	2.15	16:45	3.82	3.27	03:50	0.104	16:45	0.267	0.180	0.180	-
09/24/2020	20:20	1.49	12:25	2.04	1.71	02:45	2.32	12:20	3.79	3.27	23:55	0.119	12:25	0.271	0.182	0.182	-
09/25/2020	02:10	1.40	12:00	2.12	1.72	02:35	2.14	11:55	3.85	3.25	02:20	0.090	12:00	0.291	0.186	0.186	-
09/26/2020	02:25	1.51	10:55	2.03	1.73	04:15	2.44	18:00	3.76	3.23	04:15	0.117	09:35	0.253	0.183	0.183	-
09/27/2020	04:00	1.30	10:15	2.05	1.72	03:25	2.35	16:55	3.59	3.07	04:00	0.095	10:15	0.255	0.173	0.173	-
09/28/2020	02:45	1.41	09:45	1.99	1.76	02:45	2.41	09:40	3.55	3.05	02:45	0.100	09:40	0.242	0.178	0.178	-
09/29/2020	03:45	1.54	10:35	2.11	1.78	01:25	2.25	10:35	3.51	2.99	01:25	0.110	10:40	0.264	0.177	0.177	-
09/30/2020	03:50	1.63	11:40	2.11	1.88	00:40	2.23	11:40	3.48	2.99	02:20	0.120	11:40	0.261	0.191	0.191	-
10/01/2020	02:00	1.54	11:25	2.10	1.86	03:40	2.17	18:05	3.43	2.85	02:15	0.103	11:25	0.252	0.180	0.180	-
10/02/2020	03:30	1.63	10:10	2.13	1.95	03:30	2.08	09:45	3.46	2.81	03:30	0.107	10:10	0.259	0.190	0.190	-
10/03/2020	02:55	1.61	11:10	2.15	1.90	02:50	2.28	11:05	3.43	2.96	02:50	0.119	11:10	0.264	0.192	0.192	0.01
10/04/2020	04:30	1.51	09:00	2.14	1.85	02:05	2.27	08:55	3.48	2.94	04:25	0.114	08:55	0.265	0.184	0.184	0.01
10/05/2020	03:40	1.51	11:25	2.02	1.83	03:00	2.22	12:25	3.51	3.00	03:00	0.105	11:25	0.247	0.184	0.184	-
10/06/2020	02:35	1.59	08:55	2.34	1.89	02:35	2.32	08:45	3.64	3.01	02:35	0.115	08:55	0.309	0.195	0.195	-
10/07/2020	01:20	1.51	11:15	2.17	1.93	00:05	2.27	11:15	3.51	2.99	00:05	0.111	11:15	0.274	0.199	0.199	-
10/08/2020	22:55	1.70	07:50	2.15	1.98	02:00	2.40	07:45	3.50	3.06	03:25	0.136	07:45	0.269	0.211	0.211	-
10/09/2020	02:55	1.50	23:15	2.23	1.94	03:45	2.31	23:25	3.60	3.03	03:05	0.108	23:15	0.288	0.204	0.204	0.64
10/10/2020	18:50	1.70	02:05	2.60	1.98	23:45	2.74	02:05	3.97	3.35	23:45	0.167	02:05	0.404	0.230	0.230	1.04
10/11/2020	01:20	1.71	14:40	2.21	1.93	02:05	2.42	14:40	3.69	3.21	01:20	0.139	14:40	0.296	0.214	0.214	0.53
10/12/2020	15:55	1.73	11:20	2.12	1.90	03:50	2.60	11:20	3.57	3.25	03:50	0.151	11:20	0.270	0.209	0.209	-
10/13/2020	00:20	1.75	14:35	2.23	1.94	01:50	2.74	14:35	3.63	3.31	02:00	0.158	14:35	0.295	0.222	0.222	0.61
10/14/2020	02:55	1.73	13:25	2.22	1.98	02:50	2.66	09:25	3.59	3.23	02:50	0.150	09:25	0.288	0.223	0.223	-
10/15/2020	21:30	1.78	09:10	2.37	1.99	02:20	2.59	09:15	3.69	3.19	02:20	0.156	09:15	0.329	0.221	0.221	-
10/16/2020	21:15	1.77	11:20	2.28	2.00	03:35	2.61	09:55	3.67	3.24	03:35	0.169	10:00	0.306	0.227	0.227	-
10/17/2020	03:40	1.75	12:45	2.08	1.91	01:30	2.58	11:50	3.64	3.23	03:40	0.150	11:35	0.264	0.211	0.211	0.01
10/18/2020	20:40	1.77	12:05	2.10	1.94	02:00	2.68	12:55	3.64	3.27	02:05	0.160	12:00	0.269	0.218	0.218	0.03
10/19/2020	01:35	1.83	11:10	2.42	2.03	03:40	2.67	11:05	3.76	3.29	02:05	0.167	11:10	0.344	0.235	0.235	0.05
10/20/2020	22:45	1.67	11:50	2.43	2.00	01:15	2.59	11:40	3.81	3.33	03:50	0.165	11:50	0.350	0.233	0.233	-
10/21/2020	23:00	1.72	09:25	2.25	1.94	02:25	2.72	08:45	3.67	3.34	02:30	0.158	09:25	0.301	0.222	0.222	0.01
10/22/2020	03:10	1.74	09:35	2.49	1.97	03:30	2.73	09:30	3.83	3.34	03:30	0.154	09:35	0.366	0.229	0.229	-
10/23/2020	21:55	1.76	09:40	2.32	2.01	04:00	2.88	09:45	3.71	3.41	03:10	0.188	09:40	0.318	0.240	0.240	0.20
10/24/2020	21:50	1.70	10:00	2.29	1.97	04:10	2.93	09:55	3.77	3.35	22:05	0.176	10:00	0.317	0.230	0.230	0.02
10/25/2020	02:45	1.77	11:45	2.20	1.97	02:50	2.63	11:50	3.69	3.29	02:50	0.153	11:45	0.292	0.225	0.225	-
10/26/2020	23:25	1.76	09:10	2.53	2.03	02:45	2.72	09:10	3.83	3.34	00:00	0.176	09:10	0.373	0.239	0.239	-
10/27/2020	22:10	1.75	10:30	2.22	1.98	04:05	2.77	11:00	3.66	3.35	23:20	0.179	11:00	0.295	0.231	0.231	-
10/28/2020	23:05	1.75	09:05	2.20	1.98	03:35	2.83	13:40	3.66	3.36	04:00	0.181	14:10	0.290	0.231	0.231	-
10/29/2020	21:45	1.69	10:05	2.07	1.89	03:05	3.04	18:00	3.71	3.43	04:45	0.179	18:00	0.267	0.219	0.219	-
10/30/2020	21:50	1.65	11:40	2.12	1.90	02:25	3.01	11:40	3.77	3.43	02:20	0.168	11:40	0.285	0.223	0.223	0.10
10/31/2020	19:40	1.72	09:25	2.19	1.90	00:30	2.88	09:25	3.71	3.32	00:30	0.176	09:25	0.293	0.215	0.215	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/01/2020	22:35	1.67	12:30	2.17	1.91	04:20	2.84	13:15	3.72	3.35	22:50	0.173	13:15	0.287	0.219	0.219	-
11/02/2020	23:35	1.65	10:05	2.14	1.87	03:35	2.88	11:30	3.68	3.38	23:35	0.168	10:05	0.280	0.214	0.214	-
11/03/2020	00:10	1.65	10:30	2.36	1.93	04:40	2.82	11:30	3.85	3.44	04:40	0.158	10:30	0.338	0.229	0.229	0.83
11/04/2020	01:35	1.58	09:45	2.11	1.83	03:10	3.13	09:50	3.71	3.50	02:35	0.158	09:45	0.277	0.214	0.214	0.09
11/05/2020	02:40	1.53	15:00	2.11	1.84	04:55	3.13	16:05	3.72	3.49	02:40	0.154	15:00	0.278	0.217	0.217	0.34
11/06/2020	01:20	1.59	11:45	2.21	1.90	04:55	3.05	09:45	3.73	3.46	01:25	0.160	11:45	0.298	0.224	0.224	0.10
11/07/2020	00:25	1.70	11:45	2.32	1.95	04:55	2.99	12:30	3.75	3.41	00:25	0.178	11:45	0.321	0.230	0.230	0.07
11/08/2020	00:35	1.72	11:55	2.28	1.97	04:25	2.89	13:10	3.71	3.36	04:30	0.167	11:50	0.309	0.231	0.231	0.01
11/09/2020	00:15	1.75	09:50	2.30	2.00	04:05	2.92	17:50	3.70	3.36	03:25	0.179	17:50	0.313	0.234	0.234	0.04
11/10/2020	23:55	1.76	11:55	2.25	2.05	04:25	2.88	11:45	3.67	3.40	04:25	0.188	11:55	0.302	0.246	0.246	0.03
11/11/2020	00:30	1.69	11:00	2.47	2.02	04:00	3.05	10:55	3.81	3.46	02:20	0.176	11:00	0.359	0.246	0.246	-
11/12/2020	00:50	1.70	12:30	2.25	1.93	05:05	2.93	12:20	3.69	3.40	05:05	0.173	12:30	0.304	0.225	0.225	0.16
11/13/2020	03:10	1.67	09:45	2.65	2.03	01:50	3.14	09:50	3.90	3.50	03:10	0.172	09:45	0.405	0.250	0.250	0.38
11/14/2020	00:55	1.72	13:35	2.30	2.03	03:15	3.04	17:05	3.77	3.46	00:55	0.180	13:35	0.317	0.248	0.248	0.47
11/15/2020	04:30	1.73	15:05	2.37	2.03	04:55	3.27	11:35	3.74	3.49	04:30	0.185	15:10	0.330	0.249	0.249	0.19
11/16/2020	04:15	1.74	13:20	2.47	2.10	04:40	3.09	12:55	3.81	3.52	04:40	0.180	16:25	0.358	0.266	0.266	0.31
11/17/2020	00:50	1.84	11:35	2.38	2.12	02:15	3.14	11:30	3.74	3.49	06:55	0.204	11:35	0.334	0.264	0.264	0.20
11/18/2020	02:30	1.72	13:05	2.33	2.07	04:40	3.14	17:30	3.74	3.49	02:30	0.182	17:30	0.324	0.257	0.257	0.30
11/19/2020	01:15	1.81	12:25	2.42	2.08	02:25	3.19	13:25	3.76	3.48	01:05	0.196	12:25	0.341	0.258	0.258	0.50
11/20/2020	00:55	1.79	10:35	2.42	2.10	03:10	3.08	10:40	3.70	3.44	03:30	0.189	10:35	0.337	0.258	0.258	0.01
11/21/2020	02:20	1.86	16:10	2.37	2.12	04:30	3.14	11:20	3.70	3.44	02:40	0.204	11:25	0.327	0.262	0.262	-
11/22/2020	04:50	1.82	15:40	2.64	2.11	02:50	3.26	15:40	3.82	3.48	05:40	0.199	15:40	0.396	0.262	0.262	0.21
11/23/2020	02:05	1.77	10:55	2.52	2.10	04:45	3.11	09:45	3.82	3.48	04:45	0.184	11:05	0.367	0.262	0.262	0.14
11/24/2020	00:25	1.79	16:20	2.37	2.05	04:15	3.09	15:45	3.73	3.45	02:15	0.190	16:25	0.328	0.250	0.250	0.21
11/25/2020	03:00	1.76	11:05	2.31	2.04	04:35	3.12	14:30	3.73	3.47	03:25	0.183	12:30	0.311	0.250	0.250	0.05
11/26/2020	04:55	1.76	14:30	2.39	1.96	05:10	3.06	14:40	3.68	3.38	05:35	0.177	14:30	0.329	0.230	0.230	0.02
11/27/2020	00:35	1.76	12:05	2.21	1.97	04:25	2.96	10:30	3.64	3.36	04:25	0.179	10:30	0.283	0.230	0.230	-
11/28/2020	02:45	1.82	13:30	2.29	2.04	04:25	2.84	10:35	3.65	3.35	04:55	0.179	13:30	0.306	0.242	0.242	0.05
11/29/2020	01:00	1.93	14:10	2.37	2.13	05:10	3.01	10:35	3.66	3.39	03:45	0.201	18:45	0.317	0.260	0.260	-
11/30/2020	02:10	1.91	11:55	2.59	2.20	02:15	3.22	19:50	3.78	3.51	02:10	0.210	11:55	0.374	0.281	0.281	0.36
12/01/2020	23:40	1.81	12:20	2.33	2.03	04:30	3.11	12:30	3.71	3.43	04:40	0.195	12:35	0.321	0.244	0.244	-
12/02/2020	02:50	1.77	14:20	2.40	2.04	05:05	2.99	12:20	3.71	3.41	04:45	0.175	12:20	0.332	0.246	0.246	0.01
12/03/2020	04:25	1.76	12:15	2.55	2.04	03:10	2.95	12:25	3.76	3.43	04:25	0.172	12:20	0.369	0.246	0.246	-
12/04/2020	23:35	1.73	12:40	2.25	2.00	05:00	3.18	10:10	3.71	3.46	06:45	0.190	12:40	0.298	0.241	0.241	-
12/05/2020	04:55	1.76	12:55	2.41	1.99	04:35	3.10	12:45	3.77	3.45	04:55	0.180	12:55	0.341	0.239	0.239	0.03
12/06/2020	21:10	1.80	13:10	2.23	1.98	03:15	3.13	13:15	3.71	3.45	03:20	0.192	13:15	0.300	0.237	0.237	0.03
12/07/2020	03:35	1.80	12:10	2.47	1.99	04:50	3.09	10:35	3.80	3.44	01:50	0.188	10:45	0.354	0.238	0.238	-
12/08/2020	03:40	1.73	09:45	2.52	2.03	05:00	2.99	09:45	3.79	3.46	05:00	0.170	09:45	0.368	0.248	0.248	0.87
12/09/2020	21:10	1.77	13:20	2.25	1.94	04:50	3.15	14:05	3.71	3.50	04:50	0.195	13:20	0.305	0.232	0.232	0.17
12/10/2020	23:35	1.72	10:25	2.41	1.99	02:40	3.19	10:25	3.85	3.55	05:00	0.192	10:25	0.350	0.246	0.246	0.07
12/11/2020	01:25	1.72	10:20	2.14	1.90	05:00	3.27	14:05	3.77	3.53	01:30	0.185	10:20	0.288	0.227	0.227	0.02
12/12/2020	07:30	1.75	13:45	2.23	1.88	02:45	3.12	13:40	3.83	3.45	05:40	0.184	13:45	0.308	0.220	0.220	0.01
12/13/2020	03:20	1.74	13:00	2.40	1.94	05:10	2.97	09:50	3.87	3.49	05:10	0.169	13:00	0.348	0.234	0.234	0.24
12/14/2020	23:00	1.75	12:05	2.44	1.94	03:15	2.94	11:30	3.89	3.53	03:15	0.175	12:05	0.355	0.236	0.236	0.05
12/15/2020	23:05	1.70	15:55	2.52	1.98	01:40	2.87	15:55	3.96	3.56	02:00	0.176	15:55	0.385	0.245	0.245	0.58
12/16/2020	00:55	1.67	10:15	2.47	2.02	03:30	3.00	11:35	3.86	3.62	03:30	0.173	10:15	0.363	0.258	0.258	0.39
12/17/2020	04:20	1.73	14:45	2.26	1.94	02:05	3.29	10:50	3.82	3.58	04:45	0.187	11:05	0.313	0.240	0.240	0.08
12/18/2020	01:50	1.71	14:40	2.32	1.96	01:55	3.21	15:35	3.83	3.58	04:25	0.178	14:40	0.326	0.244	0.244	0.25
12/19/2020	00:45	1.72	20:50	2.32	2.02	04:05	3.28	16:25	3.80	3.60	00:50	0.189	20:45	0.323	0.256	0.256	0.37
12/20/2020	08:25	1.73	12:45	2.33	2.00	23:55	3.31	12:35	3.80	3.59	04:50	0.193	12:45	0.327	0.251	0.251	0.04
12/21/2020	04:45	1.87	17:00	2.77	2.20	00:25	3.12	19:05	4.02	3.65	00:25	0.216	17:00	0.445	0.293	0.293	1.07
12/22/2020	01:40	1.88	14:25	2.49	2.16	04:30	3.37	09:55	3.89	3.65	03:55	0.217	14:50	0.363	0.285	0.285	-
12/23/2020	22:20	2.02	12:40	2.43	2.21	03:20	3.25	12:35	3.85	3.61	03:20	0.240	12:40	0.355	0.290	0.290	-
12/24/2020	04:35	1.91	11:10	2.42	2.16	04:25	3.36	12:25	3.88	3.65	04:35	0.222	12:40	0.356	0.284	0.284	-
12/25/2020	03:45	1.93	13:35	2.40	2.16	01:20	3.42	14:00	4.01	3.68	04:50	0.229	13:30	0.347	0.287	0.287	0.49
12/26/2020	22:10	1.98	14:10	2.44	2.19	05:05	3.46	14:05	3.89	3.68	22:10	0.242	14:10	0.361	0.291	0.291	0.02
12/27/2020	04:20	1.91	18:00	2.47	2.23	04:15	3.42	19:25	3.94	3.71	04:15	0.223	17:55	0.368	0.304	0.304	0.13
12/28/2020	23:05	2.05	12:30	2.39	2.20	23:10	3.59	12:30	3.90	3.76	23:05	0.260	12:30	0.350	0.301	0.301	-
12/29/2020	02:50	1.91	15:35	2.41	2.15	04:30	3.44	14:40	3.90	3.71	02:50	0.229	15:30	0.351	0.287	0.287	0.14
12/30/2020	01:20	2.00	23:50	2.54	2.26	00:35	3.48	23:45	3.96	3.78	01:20	0.248	23:50	0.388	0.315	0.315	0.78
12/31/2020	04:40	2.05	14:05	2.49	2.27	03:15	3.54	00:00	3.95	3.80	03:15	0.259	14:15	0.378	0.318	0.318	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			57.723	30.65
Average	2.17	3.55	0.282	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A3_40834

Site Address /Location:	221 30th St NE			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	located in middle lane on yellow line. Small traffic diverson	Latitude:	47.333897	Pipe Size (H x W): 18.00 X 18.00	Pipe Shape: Circular
		Longitude:	-122.227492		



Manhole #	System Characteristics
A340834	Industrial
Access	Traffic
Drive	Medium







ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519.11.325

Installation Information

Installation Date:	Installation Type:
Tuesday, September 22, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	
10:58:00 AM	
Depth of Flow (Wet DOF) (in)	
2.00	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
4.48	N/A
	Silt Type
0	

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Concrete	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

AUB_A4_50817

Site Commentary

SITE INFORMATION

Pipe	Elliptical (12 in H x 11.75 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

This site experienced flow changes during the monitoring period.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	3.65	2.02	0.259
Minimum	1.66	0.71	0.030
Maximum	6.66	2.57	0.593
Min Time	02/13/2021 10:00:00 AM	02/13/2021 10:00:00 AM	02/13/2021 10:00:00 AM
Max Time	02/13/2021 3:00:00 PM	10/09/2020 8:00:00 AM	02/13/2021 3:00:00 PM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

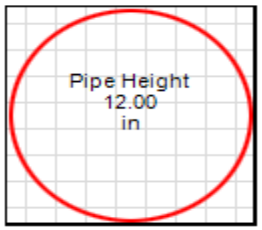
Percent Uptime	
DFINAL (in)	94.975
VFINAL (ft/s)	94.975
QFINAL (MGD - Total MG)	94.975

Hydrograph Report

AUB_A4_50817

Flow Monitor

AUB_A4_50817



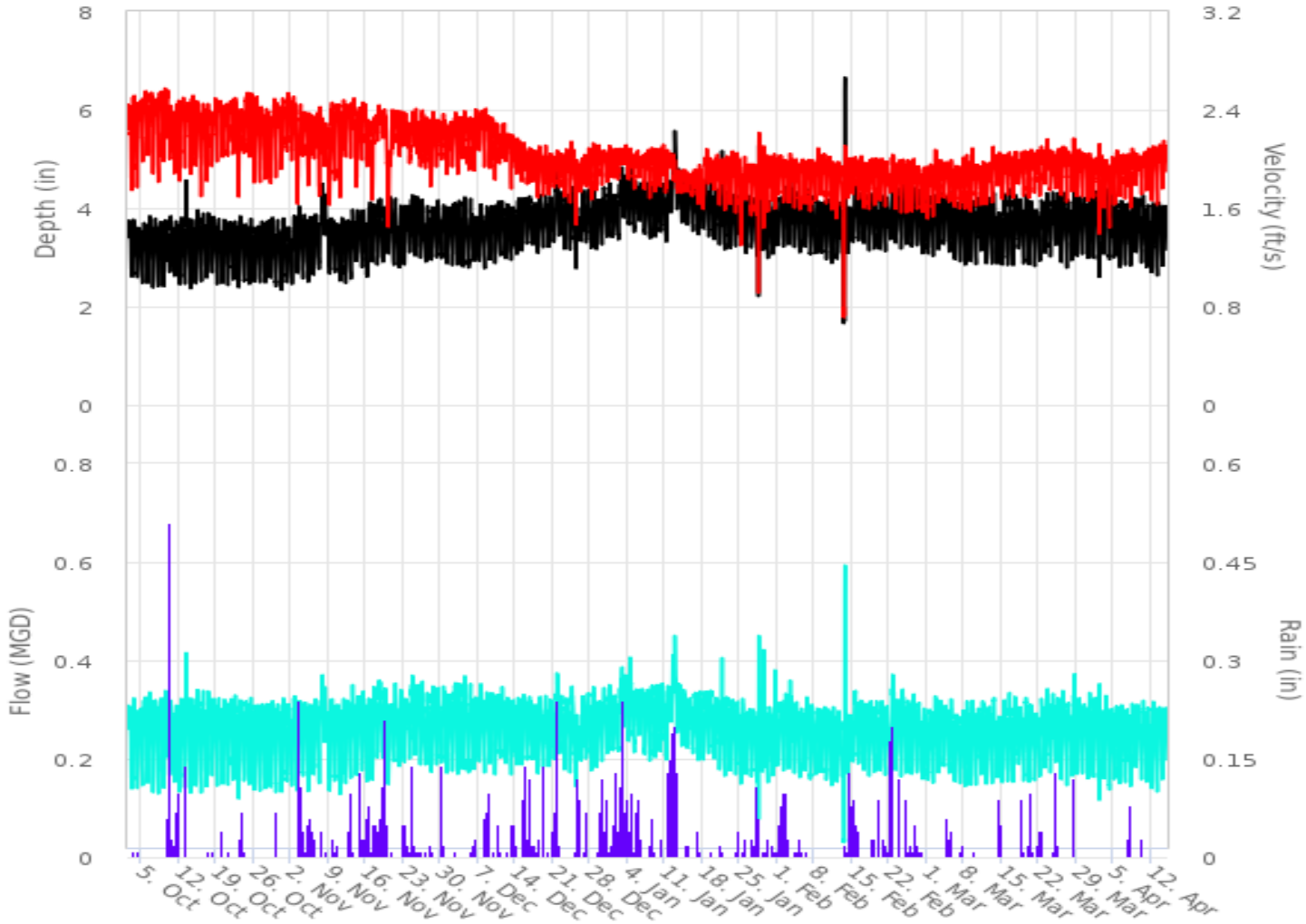
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A4_50817

Flow Monitor

AUB_A4_50817

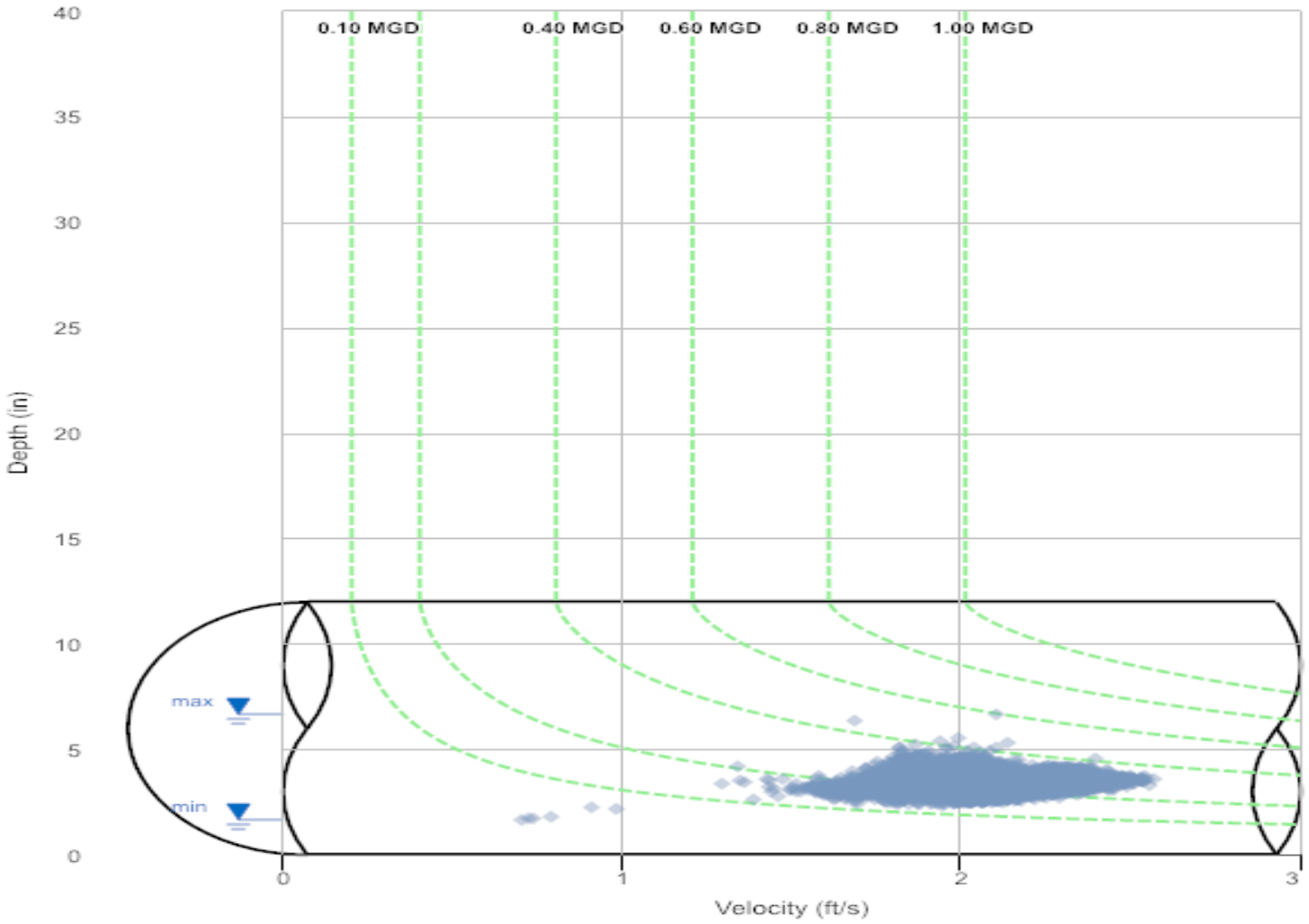
Pipe Height
12.00
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A4_50817Pipe: Elliptical (12 in H x 11.75 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	03:40	3.32	15:40	4.37	3.89	04:25	1.60	21:50	2.23	1.97	04:25	0.186	13:40	0.356	0.276	0.276	0.51
01/02/2021	05:20	3.29	22:25	4.88	4.07	03:55	1.64	16:15	2.32	1.98	03:55	0.194	18:05	0.409	0.297	0.297	1.69
01/03/2021	06:05	3.74	13:35	4.72	4.33	05:00	1.70	16:25	2.30	2.03	06:05	0.244	12:35	0.389	0.328	0.328	0.65
01/04/2021	06:05	3.59	10:25	5.26	4.20	01:00	1.70	15:10	2.26	1.98	03:15	0.220	10:25	0.447	0.309	0.309	0.48
01/05/2021	03:55	3.38	12:25	4.56	4.10	04:10	1.62	22:10	2.27	1.95	04:10	0.193	17:25	0.372	0.295	0.295	0.52
01/06/2021	03:20	3.64	15:15	4.59	4.15	06:25	1.71	22:15	2.28	1.96	06:25	0.223	15:15	0.377	0.299	0.299	0.22
01/07/2021	04:10	3.36	14:45	4.55	4.05	04:10	1.58	06:50	2.27	1.94	04:10	0.181	15:10	0.365	0.288	0.288	-
01/08/2021	02:40	3.30	15:00	4.52	3.99	02:30	1.56	20:45	2.35	1.96	02:40	0.176	15:00	0.388	0.285	0.285	0.22
01/09/2021	03:40	3.34	12:15	4.57	4.00	03:25	1.56	21:30	2.27	1.97	03:25	0.179	12:15	0.376	0.287	0.287	-
01/10/2021	01:55	3.43	11:15	4.57	4.00	01:30	1.66	15:20	2.31	1.96	01:30	0.198	11:30	0.375	0.285	0.285	0.07
01/11/2021	04:40	3.28	14:00	4.62	4.07	00:40	1.56	10:20	2.23	1.93	00:40	0.184	11:30	0.382	0.289	0.289	1.06
01/12/2021	01:00	3.89	18:30	5.75	4.74	16:25	1.64	00:15	2.19	1.93	02:05	0.251	18:30	0.481	0.352	0.352	2.10
01/13/2021	04:50	3.94	13:20	4.89	4.46	23:00	1.62	13:20	2.08	1.83	05:55	0.233	13:20	0.396	0.310	0.310	0.09
01/14/2021	05:00	3.63	11:50	4.76	4.28	03:25	1.58	13:00	2.08	1.84	03:25	0.213	11:35	0.358	0.293	0.293	0.01
01/15/2021	02:15	3.58	12:05	4.62	4.17	02:45	1.56	14:55	2.08	1.82	02:45	0.198	14:55	0.358	0.280	0.280	0.09
01/16/2021	04:45	3.49	21:05	4.85	4.17	00:50	1.55	21:20	2.08	1.82	04:45	0.192	21:20	0.368	0.280	0.280	-
01/17/2021	05:25	3.39	12:10	4.76	4.11	02:40	1.51	09:20	2.19	1.79	04:50	0.181	10:40	0.361	0.271	0.271	0.10
01/18/2021	03:10	3.55	10:30	4.70	4.09	03:50	1.48	18:05	2.26	1.87	03:50	0.184	18:05	0.370	0.281	0.281	-
01/19/2021	03:45	3.28	12:35	4.64	4.03	08:10	1.65	13:15	2.22	1.92	03:40	0.195	13:15	0.372	0.282	0.282	0.01
01/20/2021	04:05	3.28	12:50	4.53	3.93	00:25	1.67	16:10	2.35	1.90	04:05	0.184	16:10	0.363	0.271	0.271	-
01/21/2021	03:35	3.19	15:20	5.29	3.92	03:45	1.50	13:30	2.34	1.88	03:45	0.161	15:20	0.432	0.268	0.268	0.11
01/22/2021	05:05	3.10	11:40	4.45	3.83	02:55	1.49	21:10	2.26	1.85	02:55	0.155	15:00	0.348	0.257	0.257	-
01/23/2021	04:35	3.08	15:05	4.37	3.82	03:00	1.57	14:30	2.30	1.86	03:40	0.167	14:30	0.356	0.256	0.256	-
01/24/2021	04:40	3.20	12:55	4.33	3.77	03:05	1.40	11:00	2.17	1.85	03:05	0.149	11:00	0.334	0.250	0.250	0.16
01/25/2021	03:40	3.29	11:25	4.62	3.94	03:10	1.17	21:35	2.16	1.72	03:25	0.134	11:25	0.346	0.248	0.248	0.04
01/26/2021	03:20	3.03	19:30	4.32	3.80	04:05	1.53	18:30	2.18	1.85	04:05	0.156	18:30	0.326	0.252	0.252	-
01/27/2021	02:15	3.14	11:15	4.24	3.78	02:20	1.41	21:20	2.13	1.81	02:20	0.146	10:40	0.323	0.245	0.245	0.14
01/28/2021	10:30	1.57	11:35	7.62	3.76	10:35	0.57	13:15	2.34	1.82	10:30	0.022	11:40	0.637	0.254	0.254	0.24
01/29/2021	08:45	2.14	09:50	7.58	3.70	08:45	0.98	13:45	2.29	1.86	08:45	0.059	09:50	0.692	0.248	0.248	0.03
01/30/2021	06:05	2.89	11:05	4.85	3.64	04:05	1.41	12:55	2.18	1.85	06:05	0.134	11:05	0.409	0.240	0.240	0.07
01/31/2021	13:00	2.41	13:25	6.38	3.66	13:00	1.17	13:20	2.40	1.84	13:00	0.083	13:20	0.581	0.241	0.241	0.12
02/01/2021	04:10	3.19	09:30	4.31	3.85	05:30	1.54	12:35	2.15	1.89	04:55	0.171	12:35	0.339	0.263	0.263	0.82
02/02/2021	03:20	3.16	13:50	4.60	3.95	02:40	1.55	21:25	2.20	1.87	03:15	0.168	21:25	0.384	0.269	0.269	0.31
02/03/2021	03:50	3.20	09:05	5.28	3.96	03:25	1.57	18:10	2.25	1.86	03:25	0.172	09:05	0.456	0.269	0.269	0.06
02/04/2021	04:00	3.18	13:45	4.34	3.84	04:05	1.53	10:45	2.20	1.85	04:05	0.161	13:45	0.347	0.256	0.256	0.07
02/05/2021	04:05	3.04	12:45	4.28	3.76	04:30	1.50	09:20	2.13	1.85	04:05	0.153	12:45	0.324	0.250	0.250	0.01
02/06/2021	05:10	3.08	12:40	4.48	3.83	03:25	1.45	19:30	2.11	1.86	03:25	0.156	12:30	0.352	0.257	0.257	0.01
02/07/2021	05:10	2.95	13:30	4.33	3.67	02:45	1.45	14:25	2.14	1.84	03:30	0.146	13:10	0.329	0.240	0.240	-
02/08/2021	03:30	3.04	19:55	4.58	3.72	02:35	1.52	15:45	2.32	1.89	02:35	0.158	19:55	0.378	0.251	0.251	-
02/09/2021	03:20	3.00	09:35	4.48	3.71	06:00	1.40	09:30	2.29	1.89	06:00	0.143	09:30	0.384	0.250	0.250	-
02/10/2021	03:15	2.93	12:25	4.31	3.63	04:05	1.47	17:45	2.23	1.88	04:05	0.139	14:05	0.333	0.242	0.242	-
02/11/2021	04:10	2.80	11:10	4.27	3.66	03:55	1.37	09:05	2.16	1.80	03:55	0.127	11:45	0.318	0.233	0.233	-
02/12/2021	04:35	2.90	11:05	4.14	3.62	00:50	1.39	10:55	2.20	1.81	03:35	0.141	10:55	0.324	0.232	0.232	-
02/13/2021	10:05	1.61	14:20	8.84	3.42	10:00	0.64	22:00	2.28	1.62	10:00	0.026	14:20	0.775	0.215	0.215	0.08
02/14/2021	06:50	3.04	12:40	4.21	3.65	03:10	1.48	12:40	2.28	1.88	03:10	0.151	12:40	0.355	0.242	0.242	0.71
02/15/2021	04:15	3.23	13:35	4.62	3.96	03:50	1.61	13:30	2.24	1.90	03:05	0.181	13:30	0.385	0.275	0.275	0.78
02/16/2021	04:25	3.28	18:20	4.42	3.93	04:00	1.56	11:00	2.26	1.86	04:00	0.181	11:00	0.369	0.265	0.265	0.07
02/17/2021	04:15	3.23	12:45	4.38	3.85	04:25	1.45	21:25	2.18	1.83	04:25	0.156	12:50	0.339	0.255	0.255	-
02/18/2021	04:00	3.04	13:10	4.41	3.83	03:25	1.47	20:55	2.21	1.84	04:00	0.152	20:55	0.345	0.254	0.254	0.09
02/19/2021	04:25	3.10	13:40	4.34	3.77	05:45	1.49	18:55	2.19	1.86	05:45	0.155	13:30	0.334	0.252	0.252	0.17
02/20/2021	04:45	3.09	13:15	4.43	3.73	03:35	1.54	10:20	2.10	1.84	04:50	0.159	13:15	0.344	0.245	0.245	0.07
02/21/2021	04:45	3.04	12:05	4.29	3.69	04:40	1.53	11:20	2.13	1.81	04:45	0.151	11:20	0.330	0.237	0.237	0.42
02/22/2021	03:55	3.29	16:50	4.95	4.06	01:10	1.55	15:10	2.14	1.88	06:15	0.181	13:55	0.400	0.281	0.281	0.98
02/23/2021	03:35	3.24	10:55	4.46	3.94	03:35	1.49	15:10	2.21	1.84	03:35	0.162	15:10	0.366	0.264	0.264	0.27
02/24/2021	03:40	3.07	11:35	4.68	3.92	03:15	1.50	10:35	2.24	1.82	03:35	0.156	10:35	0.379	0.260	0.260	-
02/25/2021	03:40	3.22	11:20	4.45	3.91	03:30	1.44	10:00	2.17	1.83	03:30	0.162	10:00	0.345	0.259	0.259	0.18
02/26/2021	03:55	3.13	13:30	4.49	3.89	03:55	1.38	15:50	2.27	1.81	03:55	0.142	15:50	0.354	0.256	0.256	0.10
02/27/2021	03:05	3.22	11:55	4.44	3.81	03:40	1.49	18:05	2.09	1.80	03:40	0.161	12:05	0.336	0.246	0.246	0.02
02/28/2021	03:55	2.95	11:35	4.32	3.66	02:35	1.45	12:55	2.06	1.78	02:35	0.145	12:55	0.323	0.231	0.231	0.02
03/01/2021	04:10	2.95	11:50	4.44	3.77	03:25	1.29	21:55	2.16	1.81	03:25	0.135	13:00	0.337	0.246	0.246	-
03/02/2021	03:25	2.94	11:30	4.36	3.80	03:25	1.36	13:45	2.38	1.84	03:25	0.128	13:45	0.366	0.252	0.252	-
03/03/2021	04:30	3.10	14:30	4.44	3.80	02:40	1.51	14:30	2.14	1.85	02:55	0.164	14:30	0.357	0.252	0.252	-
03/04/2021	04:55	3.22	11:05	4.31	3.83	03:25	1.48	12:10	2.15	1.86	03:25	0.166	12:10	0.341	0.255	0.255	0.20
03/05/2021	04:00	3.01	12:40	4.51	3.75	01:20	1.52	12:35	2.15	1.83	04:00	0.156	12:35	0.362	0.245	0.245	0.05
03/06/2021	04:55	2.91	12:55	4.28	3.67	06:05	1.39	11:15	2.18	1.79	06:05	0.136	13:00	0.338	0.233	0.233	-
03/07/2021	05:30	2.85	19:30	4.23	3.60	03:10	1.51	10:25	2.36	1.81	05:30	0.140	19:45	0.341	0.230	0.230	0.04
03/08/2021	03:30	2.75	12:05	4.42	3.68	04:15	1.53	11:00	2.18	1.85	03:30	0.132	11:50	0.343	0.242	0.242	-
03/09/2021	03:05	2.87	12:35	4.29	3.63	06:00	1.48	11:35	2.25	1.85	03:10	0.142	11:35	0.335	0.238	0.238	0.01
03/10/2021	04:10	2.80	15:10	4.25	3.64	04:25	1.53	08:30	2.11	1.83	04:15	0.138	16:15	0.323	0.236	0.236	-
03/11/2021	03:45	3.06	10:50	4.51	3.77	02:55	1.55	13:50	2.14	1.86	03:35	0.158	10:35	0.337	0.251	0.251	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	02:40	2.85	15:50	4.32	3.65	04:15	1.53	20:50	2.18	1.85	02:15	0.144	15:20	0.338	0.239	0.239	-
03/13/2021	04:55	2.81	13:00	4.48	3.63	04:05	1.49	13:00	2.26	1.91	04:05	0.137	13:00	0.383	0.245	0.245	-
03/14/2021	06:05	2.80	14:00	4.12	3.50	21:50	1.59	13:10	2.17	1.92	05:25	0.152	14:10	0.315	0.233	0.233	0.30
03/15/2021	02:30	2.73	12:35	4.39	3.57	02:30	1.49	11:25	2.26	1.92	02:30	0.127	11:25	0.341	0.241	0.241	-
03/16/2021	03:55	2.78	11:25	4.47	3.62	01:15	1.52	19:45	2.16	1.91	03:55	0.144	10:45	0.353	0.243	0.243	-
03/17/2021	03:10	2.75	11:40	4.47	3.66	01:40	1.48	11:00	2.32	1.91	01:55	0.138	11:00	0.353	0.249	0.249	-
03/18/2021	23:55	3.00	10:20	4.33	3.65	03:45	1.65	19:35	2.18	1.92	23:55	0.167	10:15	0.337	0.246	0.246	0.11
03/19/2021	02:35	2.83	12:05	4.38	3.68	04:25	1.56	08:25	2.23	1.93	04:25	0.141	11:05	0.349	0.253	0.253	0.03
03/20/2021	02:50	2.80	13:15	4.25	3.59	02:45	1.52	12:00	2.28	1.94	02:45	0.136	09:55	0.341	0.246	0.246	0.17
03/21/2021	02:55	2.68	09:55	4.18	3.52	02:50	1.52	11:15	2.28	1.94	02:50	0.128	09:55	0.328	0.238	0.238	0.07
03/22/2021	03:05	2.87	11:15	4.34	3.69	05:50	1.48	09:20	2.33	1.98	02:30	0.147	14:00	0.360	0.259	0.259	0.11
03/23/2021	03:10	3.02	10:55	4.45	3.72	03:10	1.62	13:35	2.38	1.97	03:10	0.159	13:35	0.379	0.260	0.260	-
03/24/2021	04:05	2.90	14:05	4.47	3.74	04:10	1.56	16:35	2.26	1.93	04:10	0.147	14:10	0.358	0.258	0.258	0.34
03/25/2021	03:50	3.14	11:55	4.36	3.88	03:45	1.53	17:05	2.29	1.95	03:45	0.163	11:50	0.352	0.273	0.273	0.27
03/26/2021	03:05	2.84	10:45	4.49	3.71	02:40	1.49	12:35	2.27	1.97	02:40	0.145	10:40	0.361	0.260	0.260	-
03/27/2021	03:40	2.74	10:30	4.28	3.62	05:20	1.52	06:40	2.31	1.93	04:15	0.135	10:20	0.333	0.247	0.247	-
03/28/2021	02:35	2.86	15:15	5.07	3.67	04:55	1.61	10:10	2.51	1.95	02:25	0.154	15:15	0.446	0.254	0.254	0.37
03/29/2021	02:40	2.94	10:55	4.28	3.70	01:00	1.61	20:35	2.32	1.94	02:45	0.155	07:25	0.348	0.255	0.255	-
03/30/2021	02:35	2.95	10:40	4.34	3.73	02:35	1.59	09:50	2.25	1.93	02:35	0.151	09:50	0.344	0.256	0.256	-
03/31/2021	01:30	2.94	12:05	4.52	3.71	00:45	1.43	09:45	2.29	1.88	02:50	0.143	10:05	0.365	0.249	0.249	-
04/01/2021	03:25	2.93	12:20	4.47	3.74	03:20	1.55	09:35	2.26	1.89	03:20	0.146	11:55	0.346	0.252	0.252	-
04/02/2021	06:50	2.15	07:00	6.24	3.70	06:45	1.08	07:55	2.26	1.87	06:45	0.066	07:00	0.540	0.248	0.248	-
04/03/2021	03:35	3.00	10:35	4.46	3.78	03:20	1.40	19:30	2.19	1.84	03:55	0.140	12:35	0.343	0.249	0.249	-
04/04/2021	04:15	2.89	10:50	4.40	3.62	02:00	1.35	16:25	2.23	1.75	04:10	0.126	16:25	0.346	0.225	0.225	-
04/05/2021	01:45	2.88	09:45	4.40	3.66	04:00	1.54	20:10	2.31	1.89	04:00	0.146	14:15	0.331	0.245	0.245	-
04/06/2021	02:50	2.74	10:05	4.30	3.56	01:10	1.54	10:40	2.19	1.91	01:10	0.136	10:40	0.338	0.239	0.239	-
04/07/2021	03:15	2.78	12:10	4.17	3.57	02:35	1.57	18:10	2.23	1.88	03:10	0.143	12:35	0.327	0.236	0.236	0.22
04/08/2021	02:45	2.64	10:25	4.28	3.65	02:45	1.47	09:35	2.29	1.92	02:45	0.120	10:20	0.348	0.249	0.249	-
04/09/2021	02:15	3.00	10:45	4.48	3.65	02:20	1.54	08:00	2.22	1.94	02:20	0.150	10:45	0.346	0.249	0.249	0.03
04/10/2021	03:55	2.81	12:10	4.40	3.61	02:50	1.50	16:00	2.28	1.95	03:45	0.139	12:10	0.355	0.248	0.248	0.02
04/11/2021	02:35	2.72	10:55	4.25	3.49	03:35	1.59	08:15	2.28	1.96	03:35	0.139	10:45	0.345	0.238	0.238	-
04/12/2021	03:10	2.57	09:25	4.32	3.49	02:30	1.59	20:30	2.29	1.94	01:40	0.128	09:25	0.360	0.238	0.238	-
04/13/2021	03:10	2.55	10:50	4.30	3.52	02:15	1.48	19:45	2.41	1.96	02:15	0.116	10:50	0.337	0.242	0.242	-
04/14/2021	02:20	2.74	14:30	4.16	3.55	03:40	1.58	18:50	2.38	1.99	02:20	0.138	14:30	0.338	0.248	0.247	-
10/01/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/02/2020	23:50	2.86	16:30	3.91	3.54	23:30	1.89	15:10	2.70	2.29	23:55	0.172	15:10	0.347	0.282	0.195	-
10/03/2020	03:20	2.53	10:45	3.84	3.28	03:05	1.66	12:30	2.69	2.23	03:20	0.131	12:30	0.351	0.251	0.251	0.01
10/04/2020	03:35	2.54	11:05	3.81	3.12	03:35	1.65	14:40	2.68	2.27	03:35	0.127	11:05	0.350	0.237	0.237	0.01
10/05/2020	03:00	2.40	10:20	3.90	3.23	03:05	1.82	18:20	2.70	2.37	03:05	0.130	11:30	0.350	0.259	0.259	-
10/06/2020	03:15	2.39	12:35	3.99	3.25	03:05	1.75	15:30	2.81	2.35	03:05	0.125	11:50	0.361	0.259	0.259	-
10/07/2020	02:50	2.33	13:35	4.00	3.21	02:20	1.73	09:40	2.68	2.32	02:20	0.121	13:35	0.346	0.252	0.252	-
10/08/2020	01:05	2.37	16:35	3.88	3.22	02:25	1.68	08:05	2.71	2.34	02:25	0.117	16:25	0.359	0.257	0.257	-
10/09/2020	02:35	2.38	10:20	3.82	3.20	01:25	1.88	08:05	2.84	2.39	02:45	0.135	10:55	0.352	0.259	0.259	0.64
10/10/2020	05:05	2.60	09:10	4.04	3.33	04:50	1.74	08:15	2.66	2.28	04:50	0.141	09:10	0.357	0.259	0.259	1.04
10/11/2020	03:20	2.59	09:55	3.93	3.24	02:00	1.76	13:05	2.64	2.27	03:00	0.143	09:55	0.369	0.250	0.250	0.53
10/12/2020	02:50	2.41	10:00	4.20	3.21	02:45	1.61	18:30	2.63	2.30	02:50	0.116	10:00	0.376	0.250	0.250	-
10/13/2020	02:40	2.28	07:45	5.09	3.33	03:00	1.59	13:50	2.62	2.30	03:00	0.109	07:45	0.486	0.263	0.263	0.61
10/14/2020	03:10	2.23	10:25	4.07	3.20	03:10	1.69	11:05	2.70	2.33	03:10	0.108	10:25	0.367	0.251	0.251	-
10/15/2020	02:35	2.39	11:20	4.20	3.30	02:00	1.72	10:20	2.74	2.24	02:00	0.129	10:20	0.373	0.252	0.252	-
10/16/2020	03:25	2.37	12:35	3.99	3.31	03:45	1.60	11:15	2.70	2.19	03:25	0.119	12:35	0.361	0.249	0.249	-
10/17/2020	02:40	2.49	10:15	4.12	3.35	02:35	1.70	09:40	2.63	2.24	02:40	0.127	10:15	0.372	0.259	0.259	0.01
10/18/2020	03:20	2.63	10:50	4.05	3.31	02:35	1.82	18:40	2.61	2.28	03:15	0.152	12:55	0.367	0.257	0.257	0.03
10/19/2020	03:00	2.35	10:10	3.93	3.20	02:55	1.75	15:00	2.71	2.33	02:55	0.121	10:10	0.350	0.252	0.252	0.05
10/20/2020	03:15	2.32	17:45	4.11	3.22	02:40	1.85	15:20	2.65	2.30	03:15	0.132	17:40	0.351	0.250	0.250	-
10/21/2020	03:00	2.27	10:45	3.94	3.22	02:50	1.86	09:05	2.79	2.33	03:00	0.124	09:05	0.352	0.255	0.255	0.01
10/22/2020	02:45	2.45	10:05	3.82	3.24	03:10	1.84	13:45	2.83	2.32	03:10	0.135	09:50	0.366	0.253	0.253	-
10/23/2020	03:40	2.32	10:20	3.95	3.24	03:35	1.54	09:20	2.61	2.21	03:40	0.106	10:30	0.347	0.244	0.244	0.20
10/24/2020	03:55	2.47	11:55	3.83	3.21	04:30	1.76	19:40	2.85	2.33	04:30	0.134	19:40	0.364	0.252	0.252	0.02
10/25/2020	03:10	2.41	10:00	3.97	3.15	04:15	1.84	12:45	2.72	2.31	03:15	0.136	10:05	0.357	0.244	0.244	-
10/26/2020	01:40	2.45	10:45	3.81	3.18	04:00	1.61	07:00	2.76	2.23	04:00	0.119	13:05	0.345	0.240	0.240	-
10/27/2020	03:10	2.45	11:55	4.01	3.24	00:00	1.44	14:40	2.57	2.20	02:20	0.128	11:55	0.356	0.243	0.243	-
10/28/2020	03:00	2.42	14:50	4.01	3.30	03:10	1.59	08:25	2.53	2.20	03:10	0.117	14:50	0.359	0.249	0.249	-
10/29/2020	03:10	2.45	11:20	3.94	3.21	00:15	1.51	11:30	2.59	2.25	03:15	0.117	11:30	0.352	0.243	0.243	-
10/30/2020	03:10	2.29	12:20	4.01	3.19	02:20	1.70	14:55	2.56	2.26	03:10	0.117	11:30	0.340	0.242	0.242	0.10
10/31/2020	04:15	2.23	13:00	3.91	3.11	04:10	1.80	09:05	2.77	2.29	04:20	0.117	14:10	0.342	0.239	0.239	-
11/01/2020	03:00	2.41	10:30	3.70	3.08	05:15	1.91	14:10	2.81	2.31	05:15	0.141	14:10	0.330	0.237	0.237	-
11/02/2020	01:50	2.38	11:55	3.89	3.27	04:45	1.83	09:20	2.61	2.28	02:45	0.131	15:20	0.346	0.254	0.254	-
11/03/2020	04:10	2.59	11:20	4.06	3.40	03:45	1.43	16:50	2.63	2.12	03:45	0.120	14:10	0.336	0.250	0.250	0.83
11/04/2020	03:35	2.51	12:50	3.97	3.35	03:30	1.85	16:55	2.50	2.23	03:30	0.142	12:50	0.337	0.256	0.256	0.09
11/05/2020	03:20	2.44	14:55	3.99	3.35	03:15	1.64	21:35	2.55	2.21	03:15	0.123	14:50	0.344	0.254	0.254	0.34
11/06/2020	02:40	2.56	12:30	4.08	3.36	06:20	1.79	22:20	2.50	2.22	02:30	0.148	13:10	0.346	0.255	0.255	0.10
11/07/2020	04:00	2.70	20:30	4.59	3.52	05:50	1.52	10:30	2.68	2.16	05:50	0.135	20:35	0.380	0.267	0.267	0.07
11/08/2020	06:00	2.64	06:05	5.10	3.70	05:50	1.35	20:25	2.47	2.14	05:55	0.111	06:05	0.454	0.280	0.280	0.01
11/09/2020	04:40	2.61	10:20	4.56	3.33	04:00	1.48	10:45	2.75	2.16	04:00	0.120	10:20	0.425	0.247	0.247	0.04

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/10/2020	04:20	2.57	20:15	3.89	3.26	03:25	1.60	12:55	2.86	2.25	03:25	0.136	12:55	0.356	0.249	0.249	0.03
11/11/2020	03:30	2.46	11:10	3.92	3.28	04:20	1.50	19:00	2.79	2.21	04:10	0.112	19:00	0.343	0.247	0.247	-
11/12/2020	04:15	2.36	17:35	3.88	3.28	04:10	1.74	14:30	2.78	2.30	04:10	0.121	14:30	0.359	0.257	0.257	0.16
11/13/2020	02:45	2.51	11:05	4.39	3.33	02:25	1.70	17:10	2.59	2.30	02:25	0.142	11:00	0.410	0.262	0.262	0.38
11/14/2020	02:10	2.74	09:50	4.16	3.47	04:50	1.60	20:30	2.56	2.20	04:50	0.148	11:20	0.368	0.264	0.264	0.47
11/15/2020	06:25	2.67	11:40	4.11	3.33	03:50	1.74	21:50	2.65	2.31	04:50	0.157	09:50	0.358	0.262	0.262	0.19
11/16/2020	02:15	2.53	12:10	4.20	3.49	04:10	1.74	14:35	2.47	2.14	04:05	0.137	11:15	0.364	0.260	0.260	0.31
11/17/2020	04:05	2.81	10:45	4.35	3.57	03:50	1.49	15:50	2.63	2.14	03:50	0.138	10:45	0.409	0.269	0.269	0.20
11/18/2020	02:35	2.76	15:55	4.38	3.58	04:25	1.98	08:20	2.65	2.31	02:35	0.181	10:10	0.394	0.289	0.289	0.30
11/19/2020	04:10	2.81	13:15	4.25	3.54	23:40	1.73	09:25	2.59	2.23	04:05	0.175	13:15	0.384	0.274	0.274	0.50
11/20/2020	04:15	2.97	13:50	4.35	3.64	03:45	1.30	22:50	2.52	1.95	04:15	0.129	10:05	0.350	0.252	0.252	0.01
11/21/2020	05:35	2.79	12:45	4.32	3.47	03:40	1.86	09:25	2.56	2.27	03:40	0.172	13:10	0.389	0.272	0.272	-
11/22/2020	03:15	2.73	11:40	4.17	3.40	06:20	1.82	16:15	2.59	2.23	06:20	0.165	12:30	0.369	0.260	0.260	0.21
11/23/2020	03:50	2.72	09:30	4.26	3.58	18:10	1.90	08:00	2.50	2.21	03:50	0.178	09:25	0.379	0.275	0.275	0.14
11/24/2020	03:55	2.99	15:55	5.12	3.75	03:05	1.72	15:40	2.50	2.20	03:05	0.170	15:55	0.480	0.295	0.295	0.21
11/25/2020	03:35	2.97	13:10	4.38	3.65	01:25	1.85	19:35	2.69	2.21	01:25	0.191	15:35	0.378	0.283	0.283	0.05
11/26/2020	03:30	2.90	11:30	4.32	3.50	04:20	1.73	14:25	2.50	2.15	04:20	0.162	11:30	0.384	0.262	0.262	0.02
11/27/2020	05:05	2.83	10:40	4.14	3.50	02:45	1.74	14:30	2.45	2.17	02:45	0.172	10:40	0.368	0.265	0.265	-
11/28/2020	05:10	2.91	17:00	4.14	3.58	01:30	1.57	12:30	2.49	2.10	01:30	0.158	12:35	0.372	0.265	0.265	0.05
11/29/2020	04:55	2.88	11:35	4.40	3.51	04:35	1.78	15:25	2.69	2.19	04:35	0.176	11:35	0.375	0.266	0.266	-
11/30/2020	02:35	2.84	12:00	4.28	3.61	03:00	1.65	11:25	2.51	2.19	03:00	0.168	12:00	0.388	0.278	0.278	0.36
12/01/2020	03:15	2.80	11:50	4.20	3.57	05:00	1.75	14:35	2.47	2.15	03:20	0.158	12:35	0.359	0.269	0.269	-
12/02/2020	03:35	2.74	15:30	4.24	3.58	02:15	1.72	18:25	2.56	2.19	02:15	0.155	18:25	0.393	0.275	0.275	0.01
12/03/2020	02:15	2.81	11:45	4.25	3.54	03:00	1.70	11:25	2.53	2.18	03:00	0.155	11:25	0.380	0.271	0.271	-
12/04/2020	04:00	2.70	11:05	4.27	3.52	00:40	1.74	10:20	2.52	2.22	04:15	0.159	11:30	0.395	0.274	0.274	-
12/05/2020	07:55	2.33	08:20	5.29	3.51	07:55	1.45	10:45	2.55	2.17	07:55	0.098	08:20	0.470	0.267	0.267	0.03
12/06/2020	05:30	2.82	13:00	4.04	3.44	04:15	1.77	12:00	2.55	2.22	05:30	0.158	13:05	0.358	0.263	0.263	0.03
12/07/2020	04:25	2.87	11:55	4.24	3.51	00:50	1.83	21:05	2.64	2.25	04:25	0.177	12:35	0.395	0.275	0.275	-
12/08/2020	04:10	2.73	14:45	4.19	3.50	04:15	1.75	10:40	2.56	2.23	04:15	0.150	14:35	0.371	0.272	0.272	0.87
12/09/2020	04:25	2.88	18:15	4.67	3.61	03:15	1.79	18:25	3.20	2.18	03:15	0.174	18:10	0.404	0.277	0.277	0.17
12/10/2020	04:15	2.81	20:30	4.36	3.61	03:15	1.66	16:25	2.48	2.12	03:15	0.150	20:25	0.380	0.269	0.269	0.07
12/11/2020	04:35	2.97	11:55	4.21	3.63	22:45	1.83	20:15	2.45	2.15	02:10	0.184	12:10	0.364	0.274	0.274	0.02
12/12/2020	03:15	2.88	11:20	4.16	3.61	05:15	1.74	20:30	2.42	2.12	03:15	0.160	11:25	0.344	0.267	0.267	0.01
12/13/2020	03:40	2.81	10:35	4.06	3.61	03:40	1.54	06:15	2.44	2.04	03:40	0.136	12:20	0.333	0.260	0.260	0.24
12/14/2020	04:55	3.02	16:35	4.26	3.70	05:55	1.65	11:20	2.35	2.05	05:55	0.170	11:20	0.362	0.269	0.269	0.05
12/15/2020	03:05	3.05	16:45	4.30	3.81	02:55	1.53	12:00	2.32	2.00	02:55	0.154	13:35	0.353	0.272	0.272	0.58
12/16/2020	08:25	2.97	08:55	4.63	3.83	03:40	1.60	08:40	2.41	1.97	08:30	0.163	08:40	0.397	0.271	0.271	0.39
12/17/2020	03:55	3.13	15:55	4.19	3.75	04:50	1.66	13:10	2.24	1.95	03:50	0.176	13:10	0.336	0.260	0.260	0.08
12/18/2020	03:55	3.02	13:35	4.34	3.75	03:55	1.51	10:45	2.33	1.93	03:55	0.148	10:30	0.354	0.259	0.259	0.25
12/19/2020	03:55	3.13	13:15	4.30	3.79	03:00	1.59	14:40	2.26	1.92	04:00	0.171	14:00	0.353	0.261	0.261	0.37
12/20/2020	03:55	3.10	12:15	4.27	3.79	05:10	1.52	12:35	2.25	1.91	05:10	0.163	12:35	0.354	0.259	0.259	0.04
12/21/2020	03:35	3.23	19:55	4.87	4.07	02:50	1.59	19:30	2.19	1.93	02:50	0.179	20:00	0.408	0.289	0.289	1.07
12/22/2020	03:30	3.37	11:35	4.39	3.95	06:35	1.59	14:15	2.23	1.92	05:40	0.193	14:15	0.356	0.275	0.275	-
12/23/2020	03:25	3.05	13:00	4.31	3.83	05:10	1.54	12:40	2.23	1.90	03:25	0.164	12:45	0.353	0.263	0.263	-
12/24/2020	03:55	3.05	13:05	4.47	3.80	04:35	1.51	10:10	2.31	1.93	04:25	0.157	13:25	0.373	0.264	0.264	-
12/25/2020	07:55	1.59	08:25	4.92	3.60	07:50	0.68	10:45	2.35	1.83	07:55	0.027	08:20	0.426	0.234	0.234	0.49
12/26/2020	04:50	3.21	12:45	4.66	3.79	06:00	1.56	19:25	2.17	1.90	04:45	0.173	12:45	0.376	0.258	0.258	0.02
12/27/2020	03:35	3.25	12:00	4.40	3.84	08:30	1.63	20:35	2.35	1.92	03:35	0.185	12:00	0.347	0.264	0.264	0.13
12/28/2020	03:45	3.05	13:15	4.46	3.85	04:25	1.54	12:50	2.38	1.96	03:50	0.164	13:10	0.383	0.273	0.273	-
12/29/2020	03:45	3.08	11:00	4.25	3.78	02:55	1.64	22:10	2.23	1.97	03:40	0.168	12:40	0.339	0.267	0.267	0.14
12/30/2020	03:30	3.16	11:30	4.50	3.97	03:50	1.71	15:50	2.28	1.98	03:30	0.183	15:50	0.371	0.286	0.286	0.78
12/31/2020	02:55	3.36	15:05	4.56	3.93	04:10	1.66	18:50	2.29	1.97	04:10	0.193	15:10	0.371	0.281	0.281	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			50.442	30.65
Average	3.65	2.02	0.259	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A4_50817

Site Address /Location:	1704 B St, NW			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	Back of parking lot	Latitude:	47.324355°	Pipe Size (H x W): 12 X 11.75	Pipe Shape: Circular
		Longitude:	-122.230253		



Manhole #	System Characteristics
A450817	Commercial
Access	Traffic
Walk (Commercial)	None







ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519.11.325

Installation Information	
Installation Date:	Installation Type:
Friday, October 2, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi
Installation Confirmation:	
Time	
7:20:00 AM	
Depth of Flow (Wet DOF) (in)	
3.25	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
2.24	N/A
Silt (in)	Silt Type
0	
Hydraulic Comments:	
Manhole / Pipe Information:	
Manhole Depth (Approx. FT):	Manhole Configuration
9	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Concrete	Good
Communication Information:	
Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole
Additional Site Info. / Comments:	

AUB_A6_61009K

Site Commentary

SITE INFORMATION

Pipe	Elliptical (11.75 in H x 12 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	4.88	0.47	0.096
Minimum	3.28	0.21	0.025
Maximum	10.05	1.32	0.400
Min Time	04/14/2021 2:00:00 AM	12/15/2020 3:00:00 AM	12/15/2020 3:00:00 AM
Max Time	01/12/2021 7:00:00 PM	01/21/2021 1:00:00 PM	01/02/2021 9:00:00 PM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

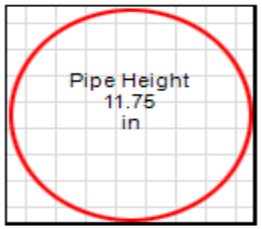
Percent Uptime	
DFINAL (in)	99.741
VFINAL (ft/s)	99.741
QFINAL (MGD - Total MG)	99.741

Hydrograph Report

AUB_A6_61009K

Flow Monitor

AUB_A6_61009K



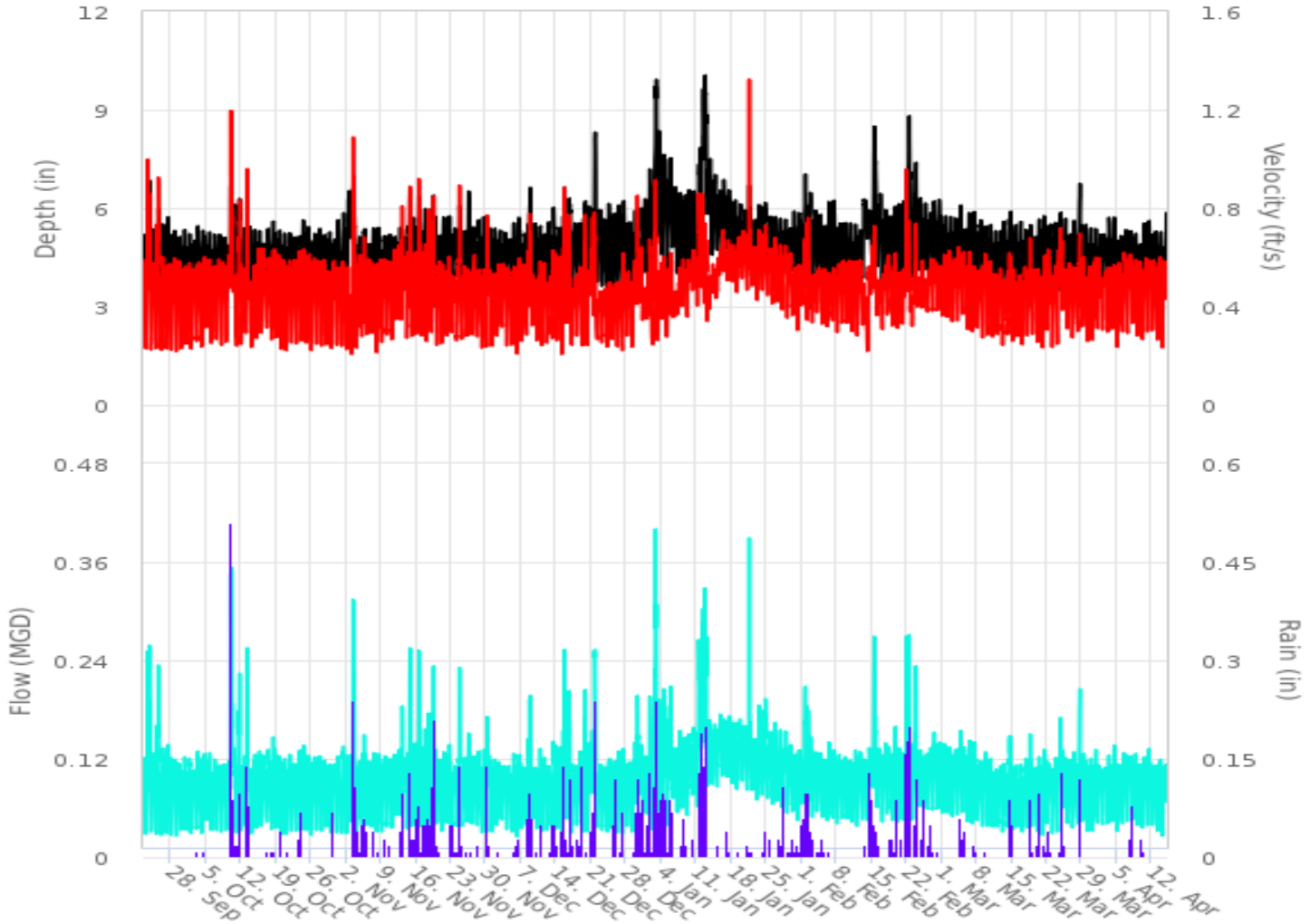
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A6_61009K

Flow Monitor

AUB_A6_61009K

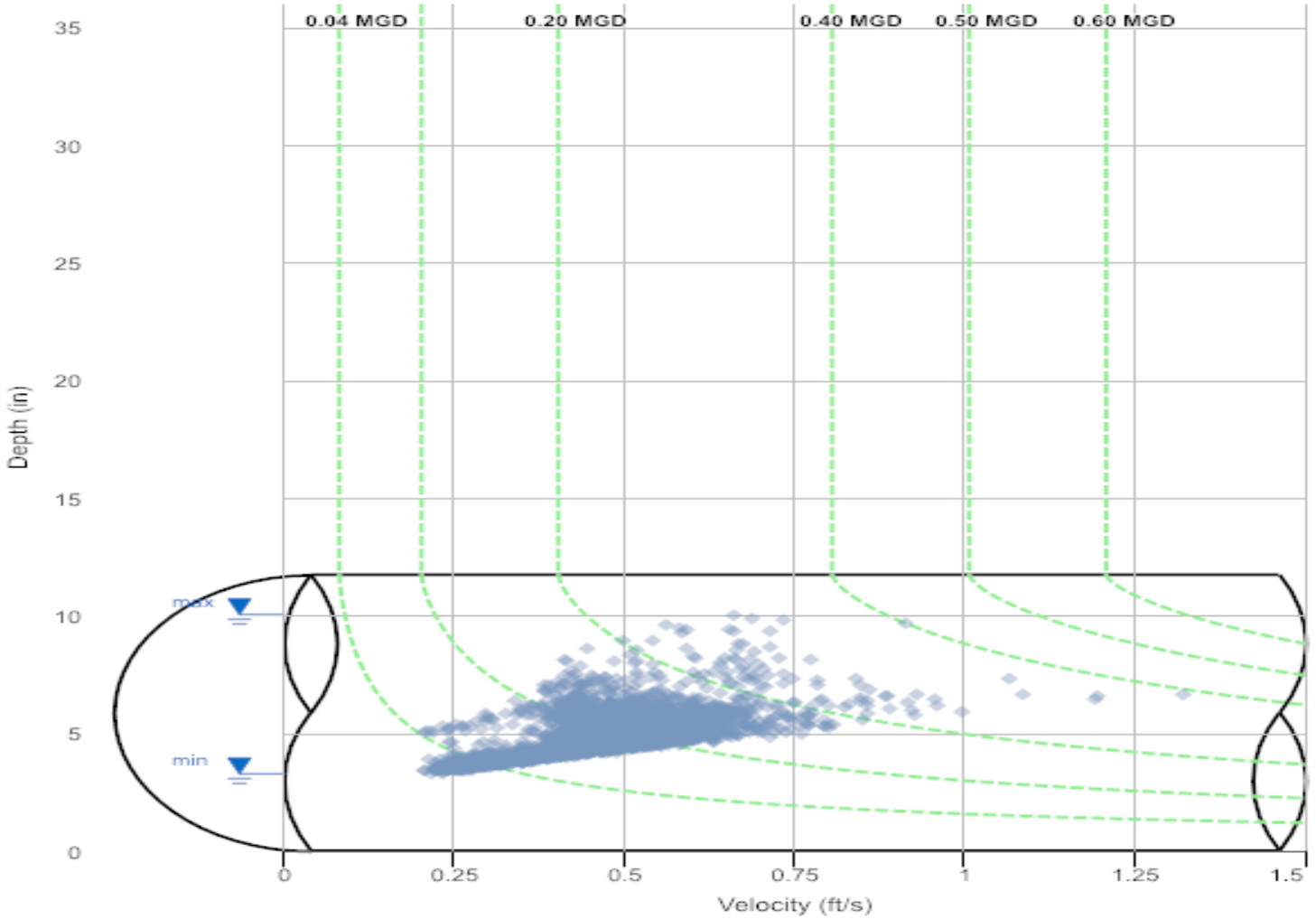
Pipe Height
11.75
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A6_61009KPipe: Elliptical (11.75 in H x 12 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	06:40	3.84	16:10	7.40	5.23	01:10	0.30	15:40	0.93	0.46	04:00	0.045	15:40	0.270	0.102	0.102	0.51
01/02/2021	04:35	3.54	21:45	10.03	6.23	07:05	0.18	21:05	1.17	0.50	05:15	0.025	21:05	0.489	0.150	0.150	1.69
01/03/2021	06:25	5.08	00:20	10.00	7.08	05:25	0.23	00:20	0.74	0.42	06:10	0.049	00:20	0.334	0.138	0.138	0.65
01/04/2021	04:15	4.40	12:35	7.81	6.29	03:20	0.29	12:00	0.73	0.45	03:20	0.054	12:10	0.239	0.123	0.123	0.48
01/05/2021	04:45	3.73	21:30	7.66	5.72	02:05	0.23	20:50	0.73	0.43	03:05	0.032	20:50	0.239	0.110	0.110	0.52
01/06/2021	04:20	4.68	18:55	6.76	5.90	11:50	0.29	02:35	0.63	0.43	06:30	0.060	01:05	0.147	0.108	0.108	0.22
01/07/2021	04:50	3.90	19:25	6.59	5.36	05:55	0.34	17:25	0.65	0.45	04:50	0.050	18:50	0.177	0.102	0.102	-
01/08/2021	03:35	3.89	18:00	6.60	5.29	03:40	0.37	09:05	0.67	0.49	03:40	0.053	17:25	0.159	0.108	0.108	0.22
01/09/2021	05:25	3.79	13:35	6.59	5.27	04:20	0.32	08:45	0.66	0.52	05:20	0.046	10:35	0.164	0.113	0.113	-
01/10/2021	05:10	4.20	12:30	6.60	5.34	10:45	0.43	09:40	0.73	0.54	04:00	0.072	12:40	0.170	0.121	0.121	0.07
01/11/2021	04:50	4.05	21:00	7.97	6.04	04:00	0.38	10:30	0.94	0.61	04:55	0.058	11:35	0.278	0.164	0.164	1.06
01/12/2021	01:20	5.63	19:25	10.23	8.21	13:15	0.37	02:35	0.94	0.61	00:00	0.112	19:05	0.386	0.225	0.225	2.10
01/13/2021	04:50	5.71	01:00	9.20	7.01	03:10	0.31	00:20	0.72	0.45	04:40	0.075	00:40	0.288	0.142	0.142	0.09
01/14/2021	04:40	4.51	18:45	7.17	6.03	21:40	0.37	07:35	0.63	0.51	04:55	0.081	09:30	0.176	0.130	0.130	0.01
01/15/2021	04:15	4.67	18:55	6.61	5.72	05:40	0.41	21:45	0.69	0.55	04:00	0.079	18:25	0.182	0.133	0.133	0.09
01/16/2021	04:35	4.57	12:35	7.02	5.67	12:30	0.46	09:25	0.77	0.60	04:25	0.095	18:20	0.185	0.142	0.142	-
01/17/2021	02:45	4.69	12:05	6.66	5.62	05:50	0.47	09:20	0.73	0.60	05:50	0.091	11:05	0.189	0.142	0.142	0.10
01/18/2021	04:25	4.54	19:05	6.28	5.47	19:35	0.47	09:35	0.73	0.57	04:25	0.086	15:05	0.177	0.130	0.130	-
01/19/2021	04:05	4.55	18:30	6.23	5.36	02:55	0.44	13:55	0.74	0.59	03:45	0.079	17:35	0.178	0.131	0.131	0.01
01/20/2021	02:15	4.53	18:50	6.10	5.25	02:10	0.50	15:40	0.77	0.60	02:20	0.088	15:40	0.183	0.130	0.130	-
01/21/2021	03:20	4.41	13:35	7.09	5.25	03:25	0.44	13:35	1.53	0.63	03:25	0.075	13:35	0.479	0.139	0.139	0.11
01/22/2021	03:35	4.35	19:20	5.73	5.02	03:00	0.46	09:55	0.69	0.58	03:00	0.078	12:35	0.159	0.118	0.118	-
01/23/2021	05:20	4.20	12:35	6.21	5.10	04:10	0.40	12:35	0.75	0.57	04:10	0.065	12:35	0.199	0.121	0.121	-
01/24/2021	04:35	4.20	18:30	6.25	5.24	04:25	0.44	18:30	0.76	0.60	04:30	0.070	18:30	0.205	0.131	0.131	0.16
01/25/2021	04:30	4.17	18:40	5.85	5.01	04:30	0.42	18:30	0.65	0.56	04:30	0.067	18:40	0.161	0.114	0.114	0.04
01/26/2021	04:55	4.06	19:10	5.85	4.96	04:40	0.37	19:25	0.75	0.55	04:50	0.056	19:25	0.180	0.111	0.111	-
01/27/2021	04:20	4.18	19:50	5.83	4.96	03:40	0.39	19:25	0.66	0.55	04:20	0.062	19:45	0.163	0.111	0.111	0.14
01/28/2021	03:30	4.10	19:25	5.74	4.99	03:30	0.36	19:25	0.66	0.55	03:30	0.056	18:55	0.158	0.113	0.113	0.24
01/29/2021	04:15	3.95	19:00	5.52	4.81	04:15	0.31	17:25	0.63	0.52	04:15	0.046	19:00	0.146	0.102	0.102	0.03
01/30/2021	05:50	3.96	13:25	5.98	4.93	05:50	0.32	17:20	0.60	0.47	05:50	0.047	17:25	0.138	0.095	0.095	0.07
01/31/2021	05:15	3.92	12:55	5.97	5.01	05:00	0.29	10:10	0.67	0.47	05:05	0.042	11:25	0.153	0.096	0.096	0.12
02/01/2021	03:15	4.05	19:20	7.17	5.33	01:00	0.38	23:55	0.83	0.54	03:15	0.057	19:00	0.233	0.122	0.122	0.82
02/02/2021	04:15	3.87	19:05	6.58	5.44	03:30	0.31	08:30	0.88	0.50	03:30	0.045	00:00	0.226	0.115	0.115	0.31
02/03/2021	04:20	3.85	19:45	6.06	5.04	03:25	0.28	17:05	0.58	0.46	03:25	0.041	19:05	0.141	0.094	0.094	0.06
02/04/2021	03:20	3.91	20:50	5.97	4.89	01:20	0.34	13:15	0.61	0.49	01:20	0.051	20:55	0.145	0.097	0.097	0.07
02/05/2021	04:20	3.83	17:35	5.59	4.78	03:05	0.30	17:45	0.60	0.46	04:15	0.042	17:45	0.139	0.089	0.089	0.01
02/06/2021	03:40	3.74	12:10	6.28	4.96	05:40	0.29	08:45	0.59	0.45	03:30	0.041	12:15	0.156	0.092	0.092	0.01
02/07/2021	06:00	3.71	13:45	6.34	4.92	06:00	0.29	09:10	0.59	0.46	06:00	0.039	11:30	0.148	0.092	0.092	-
02/08/2021	04:05	3.66	19:30	5.64	4.74	03:15	0.26	18:00	0.64	0.46	04:10	0.034	18:00	0.139	0.089	0.089	-
02/09/2021	04:45	3.79	19:35	5.62	4.70	04:55	0.30	13:15	0.66	0.48	04:55	0.042	18:00	0.144	0.092	0.092	-
02/10/2021	02:05	3.73	20:10	5.63	4.66	04:50	0.30	11:35	0.66	0.48	04:50	0.041	14:00	0.135	0.091	0.091	-
02/11/2021	03:15	3.73	19:55	5.58	4.64	03:30	0.26	14:10	0.70	0.47	03:30	0.036	14:10	0.146	0.089	0.089	-
02/12/2021	04:05	3.62	18:35	5.45	4.63	04:05	0.25	09:00	0.73	0.48	04:05	0.033	09:00	0.151	0.089	0.089	-
02/13/2021	04:20	3.77	13:45	6.37	5.31	04:15	0.30	09:30	0.61	0.40	04:35	0.041	13:40	0.126	0.089	0.089	0.08
02/14/2021	23:45	4.66	09:30	6.38	5.47	04:45	0.19	09:35	0.78	0.42	03:25	0.041	09:35	0.163	0.096	0.096	0.71
02/15/2021	05:45	4.36	14:10	8.60	6.35	22:50	0.41	13:05	0.77	0.58	05:45	0.081	14:15	0.284	0.161	0.161	0.78
02/16/2021	04:15	4.10	19:55	6.52	5.48	02:40	0.30	13:55	0.56	0.44	02:40	0.052	13:55	0.147	0.101	0.101	0.07
02/17/2021	04:05	3.75	19:15	6.06	5.00	04:00	0.28	18:10	0.69	0.47	04:00	0.038	18:10	0.164	0.096	0.096	-
02/18/2021	04:20	3.81	18:50	5.90	4.92	02:20	0.34	11:35	0.68	0.49	04:20	0.048	11:35	0.149	0.099	0.099	0.09
02/19/2021	04:25	3.76	19:45	6.15	4.89	04:20	0.30	19:15	0.67	0.47	04:25	0.040	19:20	0.176	0.093	0.093	0.17
02/20/2021	05:35	3.67	12:45	6.21	4.96	05:25	0.29	23:25	0.61	0.45	05:30	0.038	12:10	0.148	0.092	0.092	0.07
02/21/2021	06:30	3.68	23:40	6.77	5.08	02:55	0.29	23:10	1.00	0.47	02:55	0.040	23:40	0.291	0.102	0.102	0.42
02/22/2021	05:35	4.33	13:30	8.93	6.38	22:55	0.31	00:00	0.93	0.56	05:35	0.079	13:05	0.322	0.153	0.153	0.98
02/23/2021	03:55	3.81	22:10	7.57	5.52	02:40	0.28	21:15	0.79	0.46	02:40	0.041	21:25	0.246	0.111	0.111	0.27
02/24/2021	04:00	4.00	20:00	6.40	5.30	04:05	0.37	07:05	0.59	0.47	04:00	0.056	18:40	0.155	0.103	0.103	-
02/25/2021	03:05	4.08	19:45	6.27	5.24	02:00	0.37	05:05	0.64	0.48	03:10	0.056	19:10	0.141	0.103	0.103	0.18
02/26/2021	04:15	4.03	19:20	5.97	5.07	04:10	0.35	22:25	0.66	0.50	04:10	0.054	20:05	0.147	0.105	0.105	0.10
02/27/2021	05:10	3.97	11:45	6.34	5.10	05:10	0.36	08:45	0.69	0.51	05:10	0.053	13:15	0.180	0.108	0.108	0.02
02/28/2021	04:05	3.98	13:05	6.39	5.17	03:35	0.35	18:15	0.64	0.50	03:35	0.053	15:05	0.163	0.107	0.107	0.02
03/01/2021	03:15	3.93	20:25	5.95	4.96	03:10	0.34	12:00	0.66	0.52	03:10	0.050	18:35	0.157	0.105	0.105	-
03/02/2021	04:20	3.99	19:55	6.04	4.87	04:05	0.31	13:10	0.66	0.50	04:05	0.047	13:10	0.143	0.100	0.100	-
03/03/2021	02:40	3.85	19:20	5.87	4.83	02:35	0.31	15:55	0.65	0.50	02:35	0.044	21:20	0.146	0.098	0.098	-
03/04/2021	03:30	3.89	20:25	6.26	4.83	03:35	0.30	10:05	0.69	0.51	03:30	0.044	19:35	0.175	0.100	0.100	0.20
03/05/2021	04:30	3.87	19:20	5.48	4.78	04:30	0.32	11:45	0.70	0.50	04:30	0.046	11:45	0.154	0.096	0.096	0.05
03/06/2021	05:10	3.70	13:20	6.10	4.85	04:55	0.28	15:15	0.67	0.48	05:00	0.038	15:15	0.155	0.096	0.096	-
03/07/2021	04:25	3.68	12:15	5.98	4.90	04:20	0.27	12:20	0.63	0.46	04:20	0.036	12:20	0.157	0.094	0.094	0.04
03/08/2021	03:20	3.76	20:40	5.81	4.74	03:15	0.29	10:20	0.61	0.46	03:15	0.040	20:40	0.136	0.088	0.088	-
03/09/2021	03:55	3.70	21:20	5.54	4.68	03:10	0.26	16:25	0.65	0.48	03:50	0.035	19:10	0.137	0.090	0.090	0.01
03/10/2021	03:00	3.61	19:40	5.58	4.58	03:25	0.27	17:20	0.63	0.46	03:25	0.035	20:45	0.135	0.084	0.084	-
03/11/2021	04:05	3.53	20:20	5.38	4.55	04:00	0.23	12:15	0.61	0.45	04:00	0.029	17:30	0.122	0.082	0.082	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	04:00	3.52	19:20	5.56	4.51	03:25	0.26	18:55	0.62	0.44	04:00	0.032	18:55	0.127	0.079	0.079	-
03/13/2021	04:40	3.39	11:50	5.71	4.60	04:35	0.21	08:50	0.61	0.43	04:35	0.025	10:50	0.136	0.080	0.080	-
03/14/2021	04:25	3.41	20:00	6.05	4.80	02:25	0.25	13:30	0.83	0.45	02:25	0.030	13:30	0.204	0.090	0.090	0.30
03/15/2021	02:30	3.39	19:45	5.61	4.63	02:30	0.21	10:35	0.59	0.44	02:30	0.025	19:40	0.120	0.083	0.083	-
03/16/2021	01:15	3.55	19:40	5.75	4.59	02:20	0.24	13:00	0.61	0.42	01:15	0.032	19:40	0.131	0.078	0.078	-
03/17/2021	03:35	3.35	20:00	5.44	4.51	03:25	0.21	18:20	0.70	0.44	03:25	0.025	18:20	0.145	0.080	0.080	-
03/18/2021	02:15	3.51	19:20	5.56	4.54	03:15	0.25	16:20	0.89	0.45	03:15	0.031	16:20	0.202	0.082	0.082	0.11
03/19/2021	03:20	3.51	19:50	5.27	4.51	03:15	0.26	13:10	0.69	0.46	03:15	0.032	19:55	0.140	0.083	0.083	0.03
03/20/2021	04:55	3.31	12:40	5.72	4.72	04:55	0.20	06:00	0.66	0.44	04:55	0.023	11:45	0.132	0.085	0.085	0.17
03/21/2021	04:20	3.29	11:40	5.92	4.66	04:50	0.21	16:35	0.76	0.44	04:55	0.024	16:35	0.168	0.084	0.084	0.07
03/22/2021	02:00	3.58	20:15	5.67	4.75	01:55	0.27	07:45	0.68	0.45	02:00	0.034	12:05	0.130	0.087	0.087	0.11
03/23/2021	02:30	3.38	19:10	5.63	4.57	02:15	0.21	15:05	0.65	0.45	02:30	0.024	16:40	0.131	0.083	0.083	-
03/24/2021	03:20	3.32	20:10	6.05	4.60	03:05	0.21	19:35	0.89	0.50	03:05	0.025	19:35	0.219	0.093	0.093	0.34
03/25/2021	03:00	3.96	20:10	5.86	4.87	03:05	0.34	01:00	0.75	0.49	03:05	0.051	01:00	0.154	0.097	0.097	0.27
03/26/2021	03:00	3.55	18:55	5.41	4.59	02:55	0.28	17:15	0.65	0.47	02:55	0.035	17:15	0.136	0.087	0.087	-
03/27/2021	05:00	3.49	11:30	5.83	4.66	02:25	0.24	10:00	0.61	0.45	02:25	0.030	10:30	0.142	0.087	0.087	-
03/28/2021	05:40	3.58	15:25	6.97	4.97	05:40	0.26	14:50	0.87	0.48	05:40	0.034	14:50	0.252	0.102	0.102	0.37
03/29/2021	03:20	3.64	20:10	5.70	4.65	01:45	0.29	10:25	0.64	0.45	01:50	0.038	11:10	0.134	0.085	0.085	-
03/30/2021	03:45	3.32	19:15	5.51	4.49	03:45	0.23	15:30	0.69	0.44	03:45	0.026	15:30	0.141	0.079	0.079	-
03/31/2021	03:40	3.30	19:50	5.48	4.52	03:40	0.23	14:00	0.69	0.48	03:40	0.026	19:15	0.142	0.087	0.087	-
04/01/2021	03:15	3.57	19:50	5.34	4.52	03:15	0.28	09:10	0.68	0.46	03:15	0.036	09:10	0.130	0.083	0.083	-
04/02/2021	03:15	3.50	11:20	5.34	4.60	03:10	0.26	23:35	0.63	0.47	03:10	0.032	21:00	0.122	0.087	0.087	-
04/03/2021	03:55	3.71	10:50	5.91	4.73	03:50	0.27	18:35	0.61	0.46	03:50	0.036	10:45	0.138	0.088	0.088	-
04/04/2021	02:35	3.79	11:55	6.00	4.70	02:35	0.27	10:25	0.63	0.46	02:35	0.037	12:00	0.148	0.089	0.089	-
04/05/2021	02:50	3.63	20:45	5.34	4.56	02:45	0.20	09:15	0.62	0.45	02:50	0.026	19:55	0.120	0.083	0.083	-
04/06/2021	03:05	3.65	19:55	5.43	4.62	01:50	0.27	12:30	0.69	0.49	01:55	0.035	18:25	0.142	0.091	0.091	-
04/07/2021	03:10	3.91	18:35	5.40	4.69	00:35	0.26	23:50	0.72	0.49	03:10	0.037	23:50	0.146	0.092	0.092	0.22
04/08/2021	02:55	3.61	20:05	5.33	4.59	02:45	0.29	00:00	0.69	0.49	02:50	0.038	19:35	0.139	0.089	0.089	-
04/09/2021	04:15	3.66	19:05	5.02	4.47	02:35	0.26	10:20	0.63	0.48	03:00	0.035	10:20	0.124	0.084	0.084	0.03
04/10/2021	04:00	3.55	11:45	5.65	4.60	01:45	0.23	20:00	0.67	0.46	03:55	0.029	12:45	0.138	0.085	0.085	0.02
04/11/2021	03:35	3.53	10:25	5.76	4.66	03:00	0.27	16:30	0.65	0.48	03:00	0.034	11:20	0.146	0.090	0.090	-
04/12/2021	02:05	3.41	19:35	5.47	4.50	02:00	0.27	08:30	0.66	0.47	02:00	0.032	08:30	0.124	0.085	0.085	-
04/13/2021	03:45	3.26	19:40	5.45	4.42	03:50	0.24	08:15	0.66	0.46	03:40	0.028	19:25	0.127	0.082	0.082	-
04/14/2021	02:10	3.13	21:10	6.48	4.41	02:00	0.21	10:40	0.65	0.46	02:05	0.022	10:40	0.127	0.080	0.080	-
09/22/2020	23:35	3.79	19:35	5.29	4.64	23:35	0.32	19:05	0.61	0.52	23:35	0.044	19:35	0.132	0.096	0.045	-
09/23/2020	02:35	3.30	17:30	7.04	4.97	02:30	0.20	11:25	1.19	0.56	02:35	0.023	16:55	0.338	0.121	0.121	-
09/24/2020	01:30	3.66	19:10	5.52	4.55	01:10	0.20	19:00	0.65	0.45	01:15	0.026	19:00	0.141	0.082	0.082	-
09/25/2020	02:40	3.31	12:15	6.07	4.69	02:45	0.19	12:15	1.06	0.51	02:45	0.022	12:15	0.275	0.101	0.101	-
09/26/2020	03:30	3.32	10:45	5.68	4.54	03:10	0.19	09:15	0.69	0.44	03:10	0.024	10:30	0.148	0.082	0.082	-
09/27/2020	05:05	3.37	11:55	5.84	4.58	02:55	0.20	08:55	0.64	0.43	02:55	0.024	10:55	0.149	0.082	0.082	-
09/28/2020	01:55	3.28	19:35	5.43	4.47	01:45	0.20	15:50	0.63	0.44	01:50	0.022	10:10	0.127	0.079	0.079	-
09/29/2020	02:30	3.20	19:50	5.31	4.43	00:45	0.18	11:05	0.68	0.45	02:25	0.021	11:05	0.143	0.080	0.080	-
09/30/2020	03:10	3.78	20:00	5.45	4.53	03:20	0.15	20:05	0.62	0.44	03:20	0.025	20:05	0.136	0.080	0.080	-
10/01/2020	03:20	3.50	20:05	5.40	4.49	02:30	0.22	18:20	0.62	0.45	03:15	0.028	19:55	0.131	0.081	0.081	-
10/02/2020	02:30	3.46	19:30	5.10	4.47	02:25	0.19	10:05	0.65	0.44	02:25	0.024	10:05	0.129	0.079	0.079	-
10/03/2020	05:25	3.38	11:30	5.53	4.48	04:15	0.21	10:50	0.64	0.45	04:15	0.026	10:50	0.143	0.082	0.082	0.01
10/04/2020	04:10	3.27	11:20	5.48	4.49	04:05	0.20	20:20	0.70	0.46	04:05	0.023	20:20	0.150	0.085	0.085	0.01
10/05/2020	23:55	3.64	19:15	5.37	4.51	23:55	0.28	17:40	0.67	0.47	23:55	0.037	19:20	0.140	0.085	0.085	-
10/06/2020	01:45	3.42	19:00	5.28	4.43	01:40	0.22	19:40	0.65	0.45	01:40	0.027	19:40	0.140	0.081	0.081	-
10/07/2020	03:40	3.37	20:25	5.35	4.41	02:05	0.23	12:05	0.62	0.46	02:05	0.027	20:25	0.129	0.082	0.082	-
10/08/2020	03:10	3.32	19:25	5.23	4.37	04:40	0.20	17:30	0.63	0.45	03:10	0.026	19:15	0.127	0.078	0.078	-
10/09/2020	03:10	3.46	23:55	7.00	4.52	02:35	0.22	23:20	1.34	0.50	03:10	0.027	23:20	0.386	0.095	0.095	0.64
10/10/2020	23:55	3.95	02:15	8.04	5.48	23:20	0.33	01:40	1.66	0.61	23:55	0.048	01:40	0.539	0.146	0.146	1.04
10/11/2020	04:15	3.32	15:00	6.40	4.91	04:15	0.20	18:00	0.99	0.48	04:15	0.023	18:00	0.259	0.103	0.103	0.53
10/12/2020	02:10	3.53	18:00	5.44	4.55	01:45	0.23	16:55	0.60	0.43	01:45	0.029	18:00	0.135	0.079	0.079	-
10/13/2020	00:55	3.52	07:55	6.86	4.89	00:50	0.26	07:30	1.16	0.51	00:55	0.032	07:30	0.316	0.104	0.104	0.61
10/14/2020	04:20	3.30	20:05	5.46	4.47	02:10	0.21	17:50	0.64	0.44	02:15	0.025	20:10	0.143	0.080	0.080	-
10/15/2020	03:15	3.45	18:40	5.45	4.52	02:55	0.25	15:20	0.68	0.48	03:05	0.031	18:00	0.138	0.087	0.087	-
10/16/2020	02:35	3.49	11:45	5.03	4.43	02:35	0.27	11:45	0.70	0.48	02:35	0.034	11:45	0.142	0.084	0.084	-
10/17/2020	04:40	3.62	12:05	5.46	4.53	04:15	0.29	12:15	0.67	0.48	04:15	0.038	12:10	0.149	0.088	0.088	0.01
10/18/2020	03:50	3.44	12:25	5.72	4.62	03:50	0.23	18:25	0.68	0.48	03:50	0.028	11:50	0.154	0.092	0.092	0.03
10/19/2020	03:20	3.46	19:00	5.46	4.52	03:15	0.23	16:05	0.68	0.48	03:10	0.029	16:05	0.141	0.087	0.087	0.05
10/20/2020	03:10	3.42	18:35	5.37	4.48	01:55	0.22	18:10	0.63	0.45	03:05	0.026	18:10	0.130	0.082	0.082	-
10/21/2020	01:50	3.41	18:45	5.34	4.47	01:45	0.20	18:00	0.65	0.45	01:50	0.024	18:00	0.138	0.082	0.082	0.01
10/22/2020	02:50	3.39	20:35	5.23	4.39	02:45	0.23	16:20	0.66	0.45	02:40	0.028	20:35	0.129	0.079	0.079	-
10/23/2020	03:15	3.31	20:15	5.27	4.40	02:15	0.20	19:15	0.66	0.46	02:15	0.023	19:50	0.138	0.082	0.082	0.20
10/24/2020	05:00	3.32	11:30	5.71	4.53	05:10	0.21	14:25	0.76	0.45	05:10	0.025	14:30	0.171	0.082	0.082	0.02
10/25/2020	03:25	3.49	12:10	5.53	4.55	03:25	0.22	11:00	0.68	0.46	03:25	0.027	11:00	0.153	0.085	0.085	-
10/26/2020	02:35	3.27	19:30	5.40	4.44	02:35	0.19	16:10	0.67	0.47	02:30	0.022	12:00	0.135	0.083	0.083	-
10/27/2020	03:10	3.54	19:05	5.45	4.47	03:20	0.22	20:00	0.68	0.46	03:20	0.028	20:00	0.152	0.083	0.083	-
10/28/2020	01:45	3.40	18:55	5.36	4.42	02:40	0.20	12:15	0.64	0.46	02:35	0.025	18:55	0.130	0.082	0.082	-
10/29/2020	04:15	3.67	19:35	5.39	4.60	02:05	0.22	16:30	0.61	0.43	02:05	0.032	18:25	0.125	0.079	0.079	-
10/30/2020	02:35	3.52	13:55	5.28	4.49	02:35	0.21	05:50	0.67	0.45	02:20	0.027	05:50	0.136	0.082	0.082	0.10
10/31/2020	03:30	3.38	11:45	5.88	4.44	05:10	0.21	14:00	0.64	0.44	04:30	0.027	10:40	0.140	0.079	0.079	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/01/2020	04:00	3.25	13:20	6.08	4.68	02:25	0.17	12:55	0.70	0.43	02:25	0.022	12:55	0.167	0.085	0.085	-
11/02/2020	03:40	3.42	17:15	6.64	5.38	02:50	0.20	10:15	0.69	0.38	02:50	0.025	10:15	0.148	0.088	0.088	-
11/03/2020	23:35	4.21	10:35	7.00	5.43	02:35	0.20	10:05	1.23	0.52	04:05	0.039	10:10	0.334	0.119	0.119	0.83
11/04/2020	03:30	3.32	19:25	5.27	4.46	03:00	0.19	16:55	0.67	0.46	03:30	0.024	16:55	0.132	0.083	0.083	0.09
11/05/2020	04:35	3.69	18:10	5.46	4.70	04:40	0.26	15:25	0.77	0.48	04:40	0.035	15:30	0.170	0.092	0.092	0.34
11/06/2020	05:15	3.54	17:30	5.03	4.49	05:05	0.26	12:15	0.66	0.46	05:15	0.032	12:15	0.131	0.083	0.083	0.10
11/07/2020	05:15	3.38	13:30	5.48	4.54	05:10	0.26	10:15	0.64	0.46	05:15	0.031	13:45	0.142	0.085	0.085	0.07
11/08/2020	06:10	3.53	12:30	5.47	4.62	04:10	0.21	19:25	0.65	0.45	04:50	0.029	12:40	0.140	0.086	0.086	0.01
11/09/2020	04:25	3.40	20:05	5.29	4.42	04:25	0.23	13:50	0.69	0.47	04:25	0.027	13:50	0.135	0.084	0.084	0.04
11/10/2020	03:05	3.42	19:00	5.30	4.41	03:10	0.25	17:35	0.66	0.46	03:05	0.031	17:35	0.132	0.080	0.080	0.03
11/11/2020	04:20	3.57	19:30	5.28	4.48	04:10	0.22	16:50	0.68	0.46	04:10	0.029	19:35	0.141	0.084	0.084	-
11/12/2020	02:25	3.77	20:20	5.52	4.66	02:15	0.30	17:20	0.70	0.51	02:15	0.041	17:00	0.142	0.096	0.096	0.16
11/13/2020	01:15	3.84	06:45	5.93	4.78	01:15	0.31	06:45	1.05	0.54	01:15	0.044	06:45	0.263	0.104	0.104	0.38
11/14/2020	04:45	3.55	19:05	6.79	4.90	04:45	0.25	18:10	0.94	0.53	04:45	0.032	18:20	0.266	0.112	0.112	0.47
11/15/2020	05:30	3.58	13:35	5.78	4.81	05:20	0.26	20:15	0.70	0.47	05:30	0.033	20:15	0.160	0.093	0.093	0.19
11/16/2020	04:20	3.58	13:50	6.62	4.86	04:20	0.26	13:35	1.03	0.52	04:20	0.033	13:50	0.292	0.107	0.107	0.31
11/17/2020	03:10	3.55	20:10	6.20	4.70	05:25	0.19	08:55	0.94	0.48	05:25	0.031	08:55	0.225	0.093	0.093	0.20
11/18/2020	03:35	3.42	18:30	6.07	4.73	03:30	0.24	17:35	0.93	0.48	03:35	0.029	17:45	0.225	0.095	0.095	0.30
11/19/2020	02:40	3.49	13:25	6.53	4.94	02:40	0.25	12:55	1.21	0.52	02:40	0.032	13:00	0.329	0.107	0.107	0.50
11/20/2020	01:35	3.85	18:50	5.47	4.73	02:25	0.17	15:20	0.66	0.43	02:25	0.031	16:20	0.144	0.081	0.081	0.01
11/21/2020	04:00	3.45	13:10	5.83	4.71	01:55	0.21	09:25	0.63	0.44	03:50	0.028	15:05	0.146	0.086	0.086	-
11/22/2020	04:05	3.86	12:55	5.85	4.94	04:05	0.24	16:25	0.72	0.45	04:05	0.034	16:25	0.158	0.093	0.093	0.21
11/23/2020	05:00	3.41	20:00	5.58	4.69	05:00	0.24	10:40	0.58	0.44	05:00	0.029	18:15	0.118	0.083	0.083	0.14
11/24/2020	01:55	3.67	16:35	6.30	4.77	01:55	0.22	15:55	1.02	0.49	01:55	0.029	16:10	0.259	0.097	0.097	0.21
11/25/2020	02:05	3.73	20:25	5.44	4.68	02:55	0.25	20:25	0.62	0.46	03:00	0.034	20:25	0.139	0.087	0.087	0.05
11/26/2020	04:25	3.93	12:20	6.67	4.94	04:25	0.25	10:35	0.59	0.44	04:25	0.037	12:55	0.164	0.091	0.091	0.02
11/27/2020	03:35	3.71	13:25	5.56	4.59	03:35	0.25	17:30	0.70	0.45	03:35	0.034	17:30	0.138	0.083	0.083	-
11/28/2020	06:00	3.69	12:20	5.74	4.66	06:00	0.25	18:50	0.58	0.43	06:00	0.033	12:20	0.131	0.081	0.081	0.05
11/29/2020	05:10	3.51	14:00	5.83	4.69	05:15	0.20	09:55	0.58	0.44	05:15	0.025	12:35	0.132	0.086	0.086	-
11/30/2020	03:20	3.48	18:15	5.54	4.83	03:20	0.20	05:00	0.82	0.48	03:20	0.024	05:00	0.188	0.095	0.095	0.36
12/01/2020	03:40	3.45	18:45	5.51	4.60	04:15	0.19	12:55	0.59	0.43	04:15	0.024	18:45	0.134	0.080	0.080	-
12/02/2020	04:15	3.61	20:35	5.41	4.60	05:45	0.23	17:35	0.62	0.42	04:15	0.032	12:50	0.129	0.078	0.078	0.01
12/03/2020	04:15	3.77	19:20	5.39	4.62	04:10	0.29	13:15	0.62	0.47	04:10	0.040	13:15	0.122	0.088	0.088	-
12/04/2020	01:30	3.66	18:20	5.13	4.54	03:45	0.21	22:10	0.65	0.43	03:35	0.029	22:10	0.127	0.079	0.079	-
12/05/2020	05:35	3.32	13:15	5.65	4.60	00:30	0.21	15:50	0.64	0.43	05:40	0.024	12:30	0.146	0.080	0.080	0.03
12/06/2020	05:50	3.37	13:30	5.84	4.67	03:40	0.18	17:25	0.63	0.42	05:50	0.022	17:20	0.130	0.082	0.082	0.03
12/07/2020	04:20	3.45	19:40	5.32	4.53	04:15	0.22	10:00	0.68	0.44	04:20	0.027	10:00	0.127	0.080	0.080	-
12/08/2020	04:20	3.62	20:10	6.68	5.09	03:50	0.26	16:25	0.88	0.52	03:55	0.034	16:20	0.221	0.114	0.114	0.87
12/09/2020	05:05	3.73	19:55	5.65	4.82	05:05	0.28	03:00	0.57	0.45	05:05	0.038	12:35	0.119	0.088	0.088	0.17
12/10/2020	03:25	3.53	21:00	5.63	4.61	03:20	0.23	20:30	0.66	0.44	03:20	0.029	20:30	0.152	0.082	0.082	0.07
12/11/2020	04:00	3.49	18:00	5.38	4.53	03:45	0.23	17:30	0.62	0.43	03:50	0.029	17:55	0.130	0.078	0.078	0.02
12/12/2020	04:25	3.49	13:10	5.72	4.62	03:15	0.22	21:45	0.58	0.41	04:25	0.027	11:45	0.127	0.077	0.077	0.01
12/13/2020	06:10	3.38	12:55	6.14	4.80	06:05	0.21	09:40	0.68	0.47	06:10	0.024	10:40	0.165	0.094	0.094	0.24
12/14/2020	03:05	3.55	19:05	5.55	4.63	04:10	0.23	19:00	0.62	0.47	03:05	0.030	19:00	0.143	0.089	0.089	0.05
12/15/2020	03:40	3.31	16:35	6.96	4.94	03:40	0.17	16:05	1.14	0.44	03:35	0.020	16:10	0.320	0.094	0.094	0.58
12/16/2020	01:30	3.66	15:15	6.41	4.93	01:30	0.28	15:00	0.88	0.47	01:30	0.037	15:00	0.235	0.098	0.098	0.39
12/17/2020	03:30	3.45	19:20	5.65	4.70	03:45	0.22	17:50	0.61	0.42	03:45	0.027	17:50	0.138	0.080	0.080	0.08
12/18/2020	03:10	3.59	19:40	5.64	4.72	03:05	0.24	19:20	0.60	0.44	03:05	0.032	19:25	0.140	0.084	0.084	0.25
12/19/2020	03:45	3.40	18:15	6.29	5.01	03:45	0.21	20:40	0.81	0.48	03:45	0.025	20:40	0.218	0.103	0.103	0.37
12/20/2020	05:15	3.52	14:20	6.23	4.92	05:05	0.21	18:45	0.60	0.44	05:15	0.026	14:15	0.156	0.090	0.090	0.04
12/21/2020	02:05	4.12	18:50	8.58	5.93	10:55	0.31	16:30	1.04	0.54	02:05	0.068	16:35	0.328	0.137	0.137	1.07
12/22/2020	04:20	3.67	20:55	6.12	5.18	02:40	0.23	20:55	0.74	0.38	04:15	0.032	20:55	0.192	0.083	0.083	-
12/23/2020	04:20	3.43	12:30	5.83	4.84	02:55	0.22	19:45	0.51	0.39	03:00	0.027	19:45	0.118	0.078	0.078	-
12/24/2020	04:35	3.48	12:20	6.20	4.91	05:15	0.20	17:15	0.55	0.41	05:15	0.026	12:35	0.133	0.083	0.083	-
12/25/2020	05:35	3.47	17:35	5.96	4.77	05:30	0.23	21:40	0.54	0.41	05:35	0.028	18:35	0.127	0.080	0.080	0.49
12/26/2020	05:25	3.39	13:25	6.17	4.77	05:05	0.21	11:40	0.57	0.40	05:05	0.025	13:35	0.144	0.079	0.079	0.02
12/27/2020	06:30	3.47	13:00	6.33	4.91	05:50	0.19	09:50	0.69	0.40	05:50	0.023	09:50	0.165	0.083	0.083	0.13
12/28/2020	03:35	3.51	14:55	5.70	4.75	03:25	0.24	11:00	0.62	0.44	03:25	0.031	14:40	0.143	0.085	0.085	-
12/29/2020	03:50	3.49	20:25	6.05	4.68	03:50	0.20	19:45	0.72	0.43	03:50	0.025	19:45	0.175	0.083	0.083	0.14
12/30/2020	01:25	4.09	18:05	6.12	5.49	01:00	0.36	06:35	0.88	0.53	01:00	0.057	06:50	0.208	0.120	0.120	0.78
12/31/2020	05:50	3.94	18:55	6.34	5.21	05:50	0.30	00:00	0.71	0.44	05:50	0.044	00:05	0.166	0.095	0.095	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			19.631	30.65
Average	4.88	0.47	0.096	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A6_61009K

Site Address /Location:	12th St NE + Pike St NE			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	located in residental road, light traffic	Latitude:	47.318639	Pipe Size (H x W): 11.75 X 12.00	Pipe Shape: Circular
		Longitude:	-122.210787		



Manhole #	System Characteristics
A661009k	Residential
Access	Traffic
Drive	Light







ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519.11.325

Installation Information

Installation Date:	Installation Type:
Tuesday, September 22, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	
12:47:00 PM	
Depth of Flow (Wet DOF) (in)	
4.75	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
0.9	N/A
Silt (in)	Silt Type
0	

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
5	Single
6	Manhole Condition:
PVC	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	28
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Concrete	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

AUB_A7_70807

Site Commentary

SITE INFORMATION

Pipe	Elliptical (18 in H x 18 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

This site experienced some backwater conditions during the monitoring period.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	3.15	1.15	0.166
Minimum	1.65	0.40	0.030
Maximum	6.64	2.37	0.908
Min Time	11/01/2020 3:00:00 AM	11/29/2020 5:00:00 AM	11/01/2020 4:00:00 AM
Max Time	01/12/2021 9:00:00 AM	01/12/2021 9:00:00 AM	01/12/2021 9:00:00 AM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

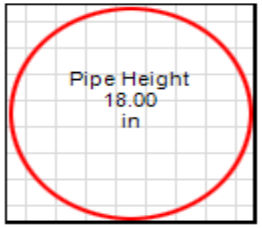
Percent Uptime	
DFINAL (in)	89.609
VFINAL (ft/s)	89.609
QFINAL (MGD - Total MG)	89.609

Hydrograph Report

AUB_A7_70807

Flow Monitor

AUB_A7_70807



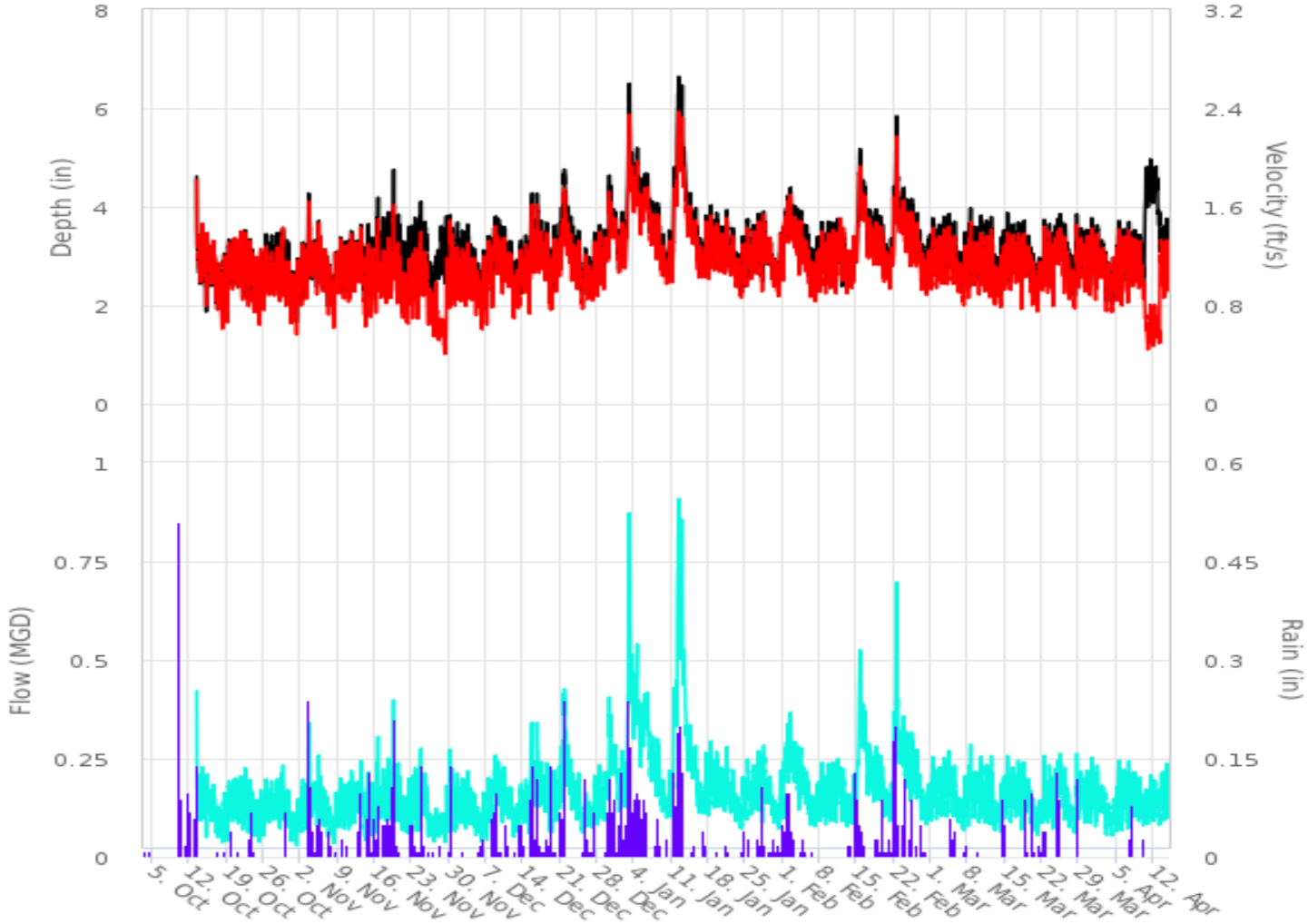
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL





4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A7_70807

Flow Monitor

AUB_A7_70807

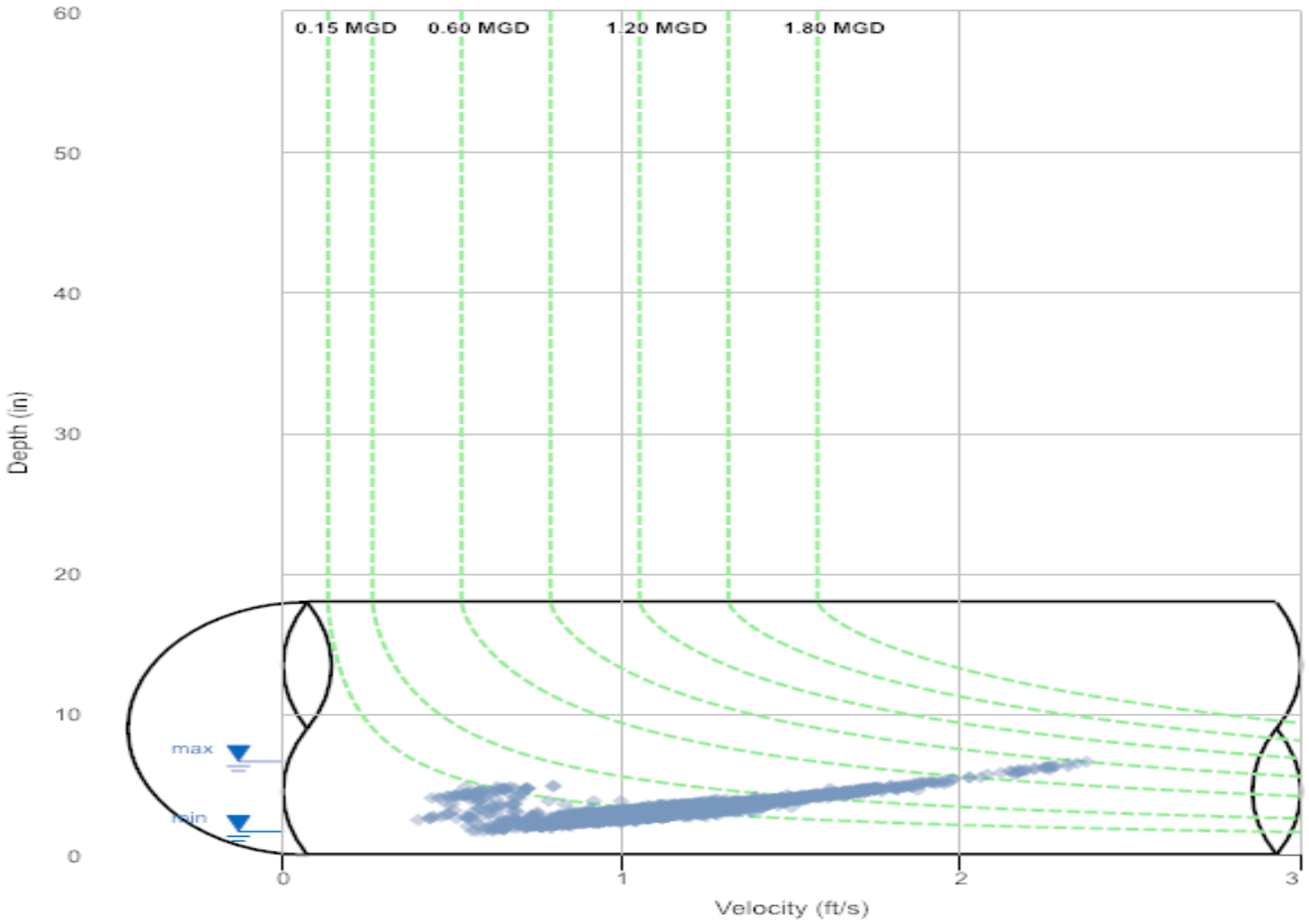
Pipe Height
18.00
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A7_70807Pipe: Elliptical (18 in H x 18 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	01:50	2.58	15:40	4.63	3.27	01:30	1.00	15:40	1.76	1.25	01:50	0.100	15:40	0.409	0.182	0.182	0.51
01/02/2021	04:40	2.82	21:15	6.82	3.91	04:25	1.08	21:15	2.40	1.48	04:25	0.125	21:15	0.952	0.300	0.300	1.69
01/03/2021	22:25	3.98	00:20	6.62	4.85	22:25	1.50	00:20	2.40	1.85	22:25	0.282	00:20	0.913	0.471	0.471	0.65
01/04/2021	23:45	3.85	08:35	5.98	4.53	23:45	1.42	08:35	2.16	1.72	23:45	0.255	08:35	0.718	0.391	0.391	0.48
01/05/2021	03:35	3.58	21:10	5.14	4.20	06:00	1.34	21:05	1.94	1.57	06:00	0.216	21:05	0.520	0.321	0.321	0.52
01/06/2021	23:30	3.45	12:35	5.49	4.29	23:30	1.31	12:35	2.07	1.61	23:30	0.200	12:35	0.610	0.341	0.341	0.22
01/07/2021	04:35	3.22	11:50	4.96	3.69	03:05	1.20	11:50	1.88	1.40	04:35	0.168	11:50	0.481	0.239	0.239	-
01/08/2021	04:50	2.92	08:40	4.52	3.48	04:50	1.09	08:40	1.70	1.32	04:50	0.131	08:40	0.383	0.208	0.208	0.22
01/09/2021	05:40	2.73	11:15	3.60	3.00	22:55	1.01	11:20	1.35	1.12	22:55	0.110	11:20	0.219	0.142	0.142	-
01/10/2021	02:35	2.55	13:45	4.69	2.96	01:25	0.95	13:45	1.76	1.11	02:35	0.094	13:45	0.418	0.139	0.139	0.07
01/11/2021	04:50	2.47	12:35	5.20	3.94	04:55	0.91	21:15	1.99	1.47	04:50	0.086	21:20	0.538	0.292	0.292	1.06
01/12/2021	00:35	4.30	09:40	7.02	5.83	00:30	1.63	09:40	2.47	2.13	00:35	0.341	09:40	1.019	0.690	0.690	2.10
01/13/2021	23:25	3.69	00:45	6.57	4.83	23:10	1.37	00:40	2.38	1.78	23:10	0.232	00:45	0.893	0.452	0.452	0.09
01/14/2021	21:15	3.33	13:40	4.89	3.90	21:15	1.24	13:40	1.87	1.47	21:15	0.180	13:40	0.468	0.271	0.271	0.01
01/15/2021	23:55	2.94	14:25	4.64	3.58	23:55	1.11	14:25	1.76	1.35	23:55	0.135	14:25	0.411	0.221	0.221	0.09
01/16/2021	05:20	2.71	08:10	3.71	3.08	03:35	1.00	01:00	1.45	1.17	03:35	0.109	01:00	0.245	0.153	0.153	-
01/17/2021	01:20	2.63	16:40	4.62	3.08	01:25	0.99	16:40	1.81	1.19	01:25	0.102	16:40	0.418	0.158	0.158	0.10
01/18/2021	02:25	2.58	06:55	4.58	3.28	04:45	0.98	06:55	1.77	1.26	02:25	0.099	06:55	0.404	0.184	0.184	-
01/19/2021	06:10	2.56	12:55	4.59	3.32	06:10	0.99	12:55	1.68	1.26	06:10	0.098	12:55	0.385	0.187	0.187	0.01
01/20/2021	03:00	2.51	07:40	4.35	3.27	03:00	0.93	07:40	1.66	1.25	03:00	0.090	07:40	0.353	0.181	0.181	-
01/21/2021	02:00	2.49	13:15	4.47	3.26	01:55	0.96	13:15	1.67	1.26	01:55	0.092	13:15	0.370	0.181	0.181	0.11
01/22/2021	03:35	2.52	23:40	4.06	3.09	03:35	0.97	23:40	1.62	1.19	03:35	0.094	23:40	0.312	0.158	0.158	-
01/23/2021	02:50	2.28	03:10	3.64	2.75	02:55	0.85	03:10	1.42	1.06	02:50	0.072	03:10	0.236	0.119	0.119	-
01/24/2021	05:25	2.22	11:40	4.37	2.81	03:30	0.84	11:35	1.69	1.07	05:20	0.068	11:35	0.360	0.126	0.126	0.16
01/25/2021	03:20	2.38	10:40	4.50	3.19	03:25	0.89	10:35	1.71	1.21	03:20	0.080	10:35	0.380	0.172	0.172	0.04
01/26/2021	04:10	2.41	11:45	4.12	3.16	04:05	0.91	12:35	1.60	1.21	04:10	0.083	12:35	0.309	0.167	0.167	-
01/27/2021	00:15	2.52	11:40	4.61	3.27	01:45	0.94	11:40	1.79	1.24	00:20	0.092	11:40	0.415	0.182	0.182	0.14
01/28/2021	04:05	2.29	09:55	4.65	3.26	04:05	0.81	09:55	1.82	1.27	04:05	0.069	09:55	0.426	0.186	0.186	0.24
01/29/2021	01:55	2.43	13:25	4.02	3.08	23:50	0.93	13:25	1.66	1.23	23:55	0.085	13:25	0.315	0.163	0.163	0.03
01/30/2021	02:35	2.32	00:55	3.50	2.73	02:35	0.88	00:50	1.45	1.08	02:35	0.076	00:55	0.227	0.119	0.119	0.07
01/31/2021	05:15	2.23	13:00	4.39	2.76	04:40	0.86	13:00	1.75	1.09	04:50	0.070	13:00	0.378	0.126	0.126	0.12
02/01/2021	01:45	2.42	17:35	4.55	3.54	01:40	0.96	07:25	1.85	1.40	01:50	0.088	07:25	0.416	0.228	0.228	0.82
02/02/2021	04:15	3.06	12:05	5.02	3.87	04:10	1.21	12:05	1.95	1.49	04:15	0.156	12:05	0.508	0.274	0.274	0.31
02/03/2021	23:55	3.04	08:50	4.78	3.65	23:35	1.13	14:25	1.86	1.36	23:55	0.144	14:25	0.445	0.230	0.230	0.06
02/04/2021	02:40	2.64	08:35	4.92	3.47	02:35	0.98	08:35	1.94	1.28	02:40	0.101	08:35	0.490	0.203	0.203	0.07
02/05/2021	03:55	2.69	03:05	4.57	3.29	03:55	0.96	03:05	1.68	1.19	03:55	0.103	03:05	0.383	0.174	0.174	0.01
02/06/2021	05:20	2.41	01:20	3.68	2.90	05:30	0.83	01:20	1.38	1.04	05:25	0.077	01:20	0.231	0.126	0.126	0.01
02/07/2021	05:30	2.37	09:50	4.32	2.91	05:30	0.79	09:50	1.63	1.04	05:30	0.070	09:50	0.344	0.128	0.128	-
02/08/2021	04:15	2.40	08:55	4.82	3.14	04:20	0.83	08:55	1.78	1.17	04:15	0.076	08:55	0.437	0.163	0.163	-
02/09/2021	02:50	2.34	15:10	4.27	3.12	05:55	0.84	13:50	1.62	1.17	02:50	0.075	13:50	0.333	0.159	0.159	-
02/10/2021	04:20	2.28	11:05	4.28	3.21	04:20	0.84	12:20	1.66	1.19	04:20	0.070	11:05	0.341	0.168	0.168	-
02/11/2021	02:55	2.38	11:00	4.72	3.18	02:50	0.84	23:05	1.77	1.24	02:55	0.075	11:00	0.419	0.175	0.175	-
02/12/2021	04:00	2.28	11:45	4.06	2.95	04:00	0.92	11:45	1.68	1.23	04:00	0.077	11:45	0.323	0.155	0.155	-
02/13/2021	03:55	2.28	01:20	3.59	2.71	03:40	0.83	23:55	1.54	1.09	03:40	0.071	01:20	0.249	0.120	0.120	0.08
02/14/2021	04:00	2.26	10:05	4.16	2.83	01:50	0.87	10:00	1.76	1.13	04:00	0.072	10:00	0.349	0.133	0.133	0.71
02/15/2021	00:00	2.92	14:10	5.65	4.26	00:00	1.16	14:10	2.08	1.64	00:00	0.140	14:10	0.639	0.349	0.349	0.78
02/16/2021	23:30	3.47	07:30	5.29	4.12	23:55	1.31	10:45	1.97	1.57	23:30	0.203	07:30	0.542	0.312	0.312	0.07
02/17/2021	03:00	3.07	06:40	5.03	3.62	02:05	1.16	06:40	1.97	1.36	03:05	0.150	06:40	0.514	0.226	0.226	-
02/18/2021	04:50	2.80	15:10	4.85	3.49	03:15	1.05	15:10	1.83	1.30	03:20	0.120	15:10	0.455	0.206	0.206	0.09
02/19/2021	04:30	2.72	13:10	4.37	3.36	04:30	1.00	13:10	1.68	1.27	04:30	0.109	13:10	0.360	0.191	0.191	0.17
02/20/2021	04:50	2.54	00:25	3.86	2.97	04:40	0.95	00:25	1.50	1.13	04:50	0.093	00:25	0.270	0.141	0.141	0.07
02/21/2021	04:35	2.48	23:50	4.95	3.05	04:35	0.91	23:45	1.88	1.14	04:35	0.087	23:50	0.479	0.152	0.152	0.42
02/22/2021	05:15	3.53	13:10	6.13	4.46	05:05	1.34	13:35	2.25	1.67	05:10	0.213	13:10	0.766	0.378	0.378	0.98
02/23/2021	04:50	3.31	21:35	5.27	3.91	04:55	1.25	21:35	1.97	1.47	04:55	0.180	21:35	0.550	0.272	0.272	0.27
02/24/2021	05:55	3.12	12:00	4.76	3.69	05:55	1.18	12:05	1.83	1.38	05:55	0.156	12:05	0.442	0.236	0.236	-
02/25/2021	02:50	2.88	09:15	4.92	3.68	02:40	1.06	17:15	1.87	1.36	02:50	0.125	09:15	0.464	0.234	0.234	0.18
02/26/2021	04:50	2.82	10:45	4.74	3.44	04:35	1.01	10:45	1.85	1.28	04:50	0.116	10:45	0.445	0.198	0.198	0.10
02/27/2021	05:35	2.54	00:00	3.87	2.96	05:00	0.84	00:00	1.50	1.09	05:00	0.085	00:00	0.270	0.135	0.135	0.02
02/28/2021	04:10	2.43	22:20	4.00	2.91	04:05	0.87	12:45	1.54	1.04	04:05	0.080	22:20	0.291	0.128	0.128	0.02
03/01/2021	02:45	2.43	08:20	4.68	3.23	02:40	0.86	08:20	1.79	1.20	02:40	0.080	08:20	0.422	0.173	0.173	-
03/02/2021	05:10	2.42	08:35	4.77	3.22	02:55	0.85	08:35	1.77	1.20	02:55	0.079	08:35	0.428	0.170	0.170	-
03/03/2021	02:20	2.50	09:20	4.58	3.27	03:20	0.89	09:20	1.76	1.19	02:20	0.086	09:20	0.404	0.174	0.174	-
03/04/2021	05:35	2.44	11:10	4.94	3.27	03:00	0.87	11:10	1.85	1.20	05:35	0.080	11:10	0.472	0.176	0.176	0.20
03/05/2021	05:30	2.52	06:05	4.67	3.16	02:45	0.92	06:00	1.79	1.17	05:30	0.090	06:00	0.415	0.162	0.162	0.05
03/06/2021	03:20	2.38	00:55	3.66	2.83	06:20	0.85	00:55	1.35	1.04	03:20	0.077	00:55	0.225	0.121	0.121	-
03/07/2021	04:20	2.23	11:30	4.56	2.79	04:15	0.77	11:30	1.73	1.02	04:15	0.063	11:30	0.393	0.118	0.118	0.04
03/08/2021	04:30	2.33	12:25	4.89	3.20	04:20	0.83	12:25	1.86	1.17	04:25	0.072	12:25	0.466	0.168	0.168	-
03/09/2021	02:50	2.37	11:30	4.44	3.13	03:15	0.84	11:30	1.67	1.15	03:15	0.075	11:30	0.367	0.157	0.157	0.01
03/10/2021	03:05	2.26	12:25	4.69	3.17	03:05	0.79	13:25	1.68	1.17	03:05	0.066	12:30	0.384	0.165	0.165	-
03/11/2021	03:55	2.21	12:45	4.55	3.15	03:55	0.80	12:45	1.68	1.17	03:55	0.064	12:45	0.381	0.163	0.163	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	03:35	2.18	09:05	4.75	3.04	03:35	0.75	09:05	1.82	1.12	03:35	0.059	09:05	0.440	0.148	0.148	-
03/13/2021	03:55	2.16	00:20	3.55	2.73	03:45	0.75	00:20	1.36	0.98	03:45	0.059	00:20	0.217	0.108	0.108	-
03/14/2021	03:55	2.18	09:00	4.39	2.83	03:50	0.76	09:00	1.55	1.02	03:55	0.059	09:00	0.333	0.122	0.122	0.30
03/15/2021	02:55	2.48	10:20	4.79	3.25	02:55	0.84	10:20	1.77	1.16	02:55	0.080	10:20	0.431	0.166	0.166	-
03/16/2021	02:45	2.28	12:30	3.84	3.11	03:25	0.84	12:25	1.46	1.16	02:40	0.072	12:30	0.261	0.157	0.157	-
03/17/2021	02:25	2.43	11:15	4.95	3.20	22:55	0.86	11:15	1.83	1.16	02:25	0.082	11:15	0.468	0.165	0.165	-
03/18/2021	02:55	2.27	08:35	4.77	3.13	02:50	0.71	08:35	1.81	1.14	02:50	0.060	08:35	0.437	0.158	0.158	0.11
03/19/2021	02:10	2.30	10:35	4.22	2.97	02:00	0.86	10:35	1.59	1.12	02:05	0.074	10:35	0.324	0.142	0.142	0.03
03/20/2021	03:50	2.05	06:00	3.38	2.66	03:50	0.70	06:00	1.27	0.99	03:50	0.050	06:00	0.189	0.106	0.106	0.17
03/21/2021	02:45	2.05	21:35	3.57	2.62	02:45	0.71	21:30	1.43	1.00	02:40	0.052	21:30	0.228	0.106	0.106	0.07
03/22/2021	01:50	2.27	02:30	4.56	3.00	01:50	0.85	02:30	1.77	1.16	01:50	0.071	02:30	0.402	0.149	0.149	0.11
03/23/2021	02:45	2.21	11:20	4.61	3.07	01:50	0.79	11:20	1.77	1.14	02:45	0.064	11:20	0.409	0.152	0.152	-
03/24/2021	02:05	2.20	13:15	4.28	3.17	02:00	0.72	13:15	1.62	1.17	02:00	0.058	13:15	0.336	0.164	0.164	0.34
03/25/2021	23:55	2.87	09:30	4.82	3.45	02:35	1.02	09:30	1.82	1.27	23:55	0.120	09:30	0.447	0.198	0.198	0.27
03/26/2021	03:45	2.47	04:05	4.42	3.15	03:45	0.83	04:05	1.67	1.16	03:45	0.079	04:05	0.363	0.159	0.159	-
03/27/2021	04:00	2.28	09:50	3.15	2.68	03:55	0.80	15:00	1.25	0.97	04:00	0.067	15:00	0.160	0.104	0.104	-
03/28/2021	03:40	2.17	14:55	4.58	2.88	04:35	0.76	14:55	1.74	1.07	03:40	0.060	14:55	0.398	0.134	0.134	0.37
03/29/2021	03:05	2.31	13:30	4.17	3.11	03:05	0.85	05:30	1.62	1.16	03:05	0.073	05:30	0.321	0.157	0.157	-
03/30/2021	03:05	2.26	10:45	4.08	3.10	02:50	0.83	10:45	1.60	1.18	02:55	0.069	10:45	0.311	0.159	0.159	-
03/31/2021	02:35	2.37	09:35	4.48	3.13	02:35	0.81	09:35	1.72	1.18	02:35	0.072	09:35	0.382	0.162	0.162	-
04/01/2021	02:05	2.32	10:25	4.53	3.11	02:05	0.79	10:25	1.74	1.17	02:05	0.068	10:25	0.392	0.159	0.159	-
04/02/2021	23:15	2.35	20:00	4.02	2.96	02:25	0.83	19:55	1.63	1.14	02:25	0.073	20:00	0.310	0.143	0.143	-
04/03/2021	03:15	2.02	06:40	3.24	2.53	03:10	0.72	06:40	1.35	0.97	03:20	0.050	06:40	0.189	0.097	0.097	-
04/04/2021	03:15	2.02	12:35	3.30	2.53	03:15	0.72	12:35	1.33	0.99	03:15	0.051	12:35	0.191	0.100	0.100	-
04/05/2021	02:15	2.04	13:45	4.39	3.01	02:10	0.77	13:45	1.71	1.17	02:10	0.055	13:45	0.368	0.153	0.153	-
04/06/2021	03:10	2.11	11:45	4.50	3.03	03:10	0.71	11:45	1.74	1.16	03:05	0.054	11:45	0.388	0.152	0.152	-
04/07/2021	02:20	2.18	10:05	4.65	3.04	02:20	0.74	10:05	1.79	1.16	02:20	0.058	10:05	0.417	0.154	0.154	0.22
04/08/2021	02:55	2.16	12:15	4.34	3.09	02:55	0.76	12:15	1.63	1.17	02:55	0.059	12:15	0.347	0.158	0.158	-
04/09/2021	02:00	2.33	11:50	4.20	3.02	02:00	0.84	06:20	1.65	1.11	02:00	0.073	11:50	0.333	0.145	0.145	0.03
04/10/2021	02:10	2.34	18:30	5.19	3.66	23:15	0.39	00:35	1.24	0.74	02:10	0.070	18:30	0.234	0.119	0.119	0.02
04/11/2021	16:05	3.75	11:20	5.40	4.38	23:15	0.37	11:20	1.13	0.57	23:15	0.066	11:20	0.324	0.124	0.124	-
04/12/2021	23:10	3.63	12:55	5.32	4.41	00:25	0.40	06:15	1.06	0.63	02:10	0.077	04:35	0.261	0.137	0.137	-
04/13/2021	22:40	2.59	05:35	4.55	3.39	04:35	0.45	05:35	1.89	1.02	04:35	0.070	05:35	0.429	0.151	0.151	-
04/14/2021	04:20	2.49	12:10	4.79	3.21	00:55	0.77	12:10	1.72	1.11	04:20	0.074	12:10	0.420	0.159	0.158	-
10/01/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/02/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/03/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
10/04/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
10/05/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/06/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/08/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/09/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.64
10/10/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.04
10/11/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.53
10/12/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/13/2020	23:45	2.18	07:45	4.85	3.08	23:40	0.88	07:45	1.88	1.25	23:45	0.069	07:45	0.466	0.169	0.116	0.61
10/14/2020	04:20	2.01	09:55	4.21	2.85	04:20	0.83	09:55	1.74	1.21	04:20	0.058	09:55	0.354	0.147	0.147	-
10/15/2020	02:40	1.83	08:10	4.27	2.80	02:30	0.76	06:15	1.72	1.17	02:30	0.047	08:10	0.358	0.138	0.138	-
10/16/2020	03:05	1.90	03:55	4.18	2.76	03:00	0.74	03:55	1.73	1.14	03:05	0.047	03:55	0.348	0.132	0.132	-
10/17/2020	03:00	1.79	20:25	3.51	2.38	04:10	0.71	20:25	1.44	0.96	03:00	0.043	20:25	0.227	0.088	0.088	0.01
10/18/2020	03:10	1.81	12:30	4.06	2.43	03:20	0.58	12:30	1.60	0.92	03:20	0.035	12:30	0.308	0.091	0.091	0.03
10/19/2020	03:40	1.79	07:55	4.55	2.80	03:25	0.63	07:55	1.72	1.11	03:40	0.037	07:55	0.391	0.132	0.132	0.05
10/20/2020	02:55	1.98	15:15	4.52	2.86	02:50	0.70	15:20	1.73	1.17	02:50	0.050	15:15	0.383	0.142	0.142	-
10/21/2020	01:25	1.94	13:05	4.01	2.88	23:45	0.72	11:20	1.66	1.18	23:45	0.048	11:20	0.313	0.145	0.145	0.01
10/22/2020	02:55	2.01	10:50	4.39	2.90	02:55	0.77	10:15	1.68	1.16	02:55	0.054	10:50	0.354	0.143	0.143	-
10/23/2020	03:05	1.92	06:50	4.34	2.82	02:50	0.70	06:50	1.70	1.11	02:55	0.046	06:50	0.360	0.133	0.133	0.20
10/24/2020	02:55	1.86	20:30	3.55	2.46	02:45	0.66	13:55	1.45	0.99	02:50	0.041	13:55	0.230	0.096	0.096	0.02
10/25/2020	04:30	1.75	09:30	3.78	2.50	04:25	0.60	09:25	1.58	0.97	04:25	0.035	09:25	0.274	0.098	0.098	-
10/26/2020	03:35	1.83	06:30	4.70	2.94	03:35	0.67	06:30	1.73	1.07	03:35	0.041	06:30	0.411	0.137	0.137	-
10/27/2020	02:30	1.94	11:45	4.33	2.98	02:35	0.67	11:45	1.61	1.05	02:30	0.045	11:45	0.339	0.136	0.136	-
10/28/2020	02:20	2.03	10:30	4.12	3.03	02:20	0.71	11:55	1.54	1.08	02:20	0.051	12:00	0.299	0.143	0.143	-
10/29/2020	02:35	1.94	05:05	4.31	3.01	23:25	0.70	14:15	1.73	1.10	02:35	0.047	14:15	0.349	0.145	0.145	-
10/30/2020	03:50	2.07	04:00	4.08	2.92	03:45	0.68	05:45	1.47	1.01	03:45	0.050	04:00	0.281	0.126	0.126	0.10
10/31/2020	04:05	1.69	00:10	3.00	2.31	04:00	0.57	00:10	1.24	0.89	04:00	0.031	00:10	0.155	0.078	0.078	-
11/01/2020	02:55	1.62	12:10	3.80	2.31	04:20	0.55	12:10	1.54	0.89	04:20	0.028	12:10	0.270	0.082	0.082	-
11/02/2020	02:40	1.79	09:40	4.46	2.77	02:30	0.64	14:25	1.72	1.08	02:30	0.038	09:35	0.374	0.127	0.127	-
11/03/2020	03:40	1.81	03:50	4.81	3.07	03:40	0.64	03:50	1.85	1.20	03:35	0.039	03:50	0.453	0.167	0.167	0.83
11/04/2020	02:35	2.22	12:00	4.03	2.97	03:15	0.88	12:00	1.59	1.19	02:35	0.072	12:00	0.304	0.150	0.150	0.09
11/05/2020	04:05	2.14	09:05	4.72	2.91	04:05	0.77	09:05	1.81	1.15	04:05	0.059	09:05	0.432	0.143	0.143	0.34
11/06/2020	06:30	2.16	02:35	4.59	2.85	23:25	0.80	02:30	1.79	1.13	23:25	0.062	02:30	0.398	0.137	0.137	0.10
11/07/2020	04:20	1.92	01:10	3.50	2.41	04:25	0.68	01:10	1.42	0.94	04:20	0.045	01:10	0.222	0.088	0.088	0.07
11/08/2020	03:45	1.70	12:00	3.76	2.41	03:30	0.60	12:00	1.51	0.94	03:40	0.033	12:00	0.262	0.091	0.091	0.01
11/09/2020	03:20	1.89	13:25	4.10	2.86	03:10	0.70	08:40	1.61	1.13	03:10	0.046	13:25	0.315	0.139	0.139	0.04

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/10/2020	04:10	2.01	08:40	3.99	2.88	02:30	0.74	08:40	1.62	1.12	04:10	0.052	08:40	0.304	0.137	0.137	0.03
11/11/2020	03:05	1.92	13:00	4.17	2.91	03:00	0.65	13:00	1.62	1.12	03:05	0.042	13:00	0.326	0.141	0.141	-
11/12/2020	02:30	2.05	07:55	4.09	2.92	03:20	0.72	15:00	1.67	1.14	02:30	0.052	15:00	0.325	0.143	0.143	0.16
11/13/2020	23:20	2.15	07:00	5.00	2.99	23:20	0.73	07:00	1.96	1.13	23:20	0.056	07:00	0.507	0.147	0.147	0.38
11/14/2020	04:45	1.80	18:30	3.74	2.60	04:45	0.54	18:30	1.34	0.92	04:45	0.032	18:30	0.229	0.099	0.099	0.47
11/15/2020	05:40	2.13	23:30	3.96	2.69	05:25	0.69	23:30	1.49	0.97	05:45	0.052	23:30	0.278	0.107	0.107	0.19
11/16/2020	03:20	2.13	09:05	4.85	3.17	03:20	0.67	09:05	1.81	1.08	03:20	0.051	09:05	0.449	0.157	0.157	0.31
11/17/2020	04:35	2.31	13:25	4.69	3.26	04:35	0.65	13:25	1.64	1.05	04:35	0.055	13:25	0.389	0.153	0.153	0.20
11/18/2020	02:25	2.36	17:50	4.81	3.27	02:25	0.62	17:45	1.72	1.07	02:25	0.055	17:45	0.413	0.158	0.158	0.30
11/19/2020	02:50	2.40	13:00	5.59	3.47	02:50	0.73	13:15	1.91	1.15	02:50	0.066	13:00	0.560	0.184	0.184	0.50
11/20/2020	04:55	2.50	10:40	4.54	3.26	04:50	0.70	10:40	1.61	1.04	04:50	0.068	10:40	0.365	0.152	0.152	0.01
11/21/2020	04:35	2.30	11:00	3.80	2.87	06:45	0.61	01:00	1.32	0.86	04:35	0.054	01:00	0.230	0.103	0.103	-
11/22/2020	04:55	2.32	12:10	4.60	2.90	05:30	0.60	12:10	1.63	0.88	04:55	0.052	12:10	0.376	0.109	0.109	0.21
11/23/2020	03:05	2.26	06:30	4.63	3.25	03:00	0.61	06:30	1.63	1.04	03:05	0.050	06:30	0.378	0.153	0.153	0.14
11/24/2020	03:05	2.28	12:40	4.58	3.26	03:00	0.62	12:40	1.66	1.05	03:05	0.052	12:40	0.380	0.157	0.157	0.21
11/25/2020	05:20	2.34	13:30	4.48	3.15	05:20	0.68	13:25	1.57	1.02	05:20	0.060	13:30	0.348	0.141	0.141	0.05
11/26/2020	01:55	2.15	00:20	3.27	2.56	01:55	0.60	02:05	1.11	0.79	01:55	0.046	00:20	0.156	0.080	0.080	0.02
11/27/2020	04:30	2.01	21:45	3.28	2.64	23:40	0.51	11:15	1.04	0.73	04:30	0.037	11:05	0.136	0.079	0.079	-
11/28/2020	04:00	2.40	12:30	3.71	3.09	23:55	0.45	02:35	0.95	0.60	01:50	0.044	02:40	0.154	0.081	0.081	0.05
11/29/2020	22:50	2.29	11:40	4.45	2.84	05:30	0.39	11:40	1.74	0.77	05:25	0.036	11:40	0.382	0.091	0.091	-
11/30/2020	02:35	2.03	05:25	4.84	3.01	02:40	0.68	05:25	1.88	1.15	02:40	0.048	05:25	0.464	0.152	0.152	0.36
12/01/2020	04:30	1.98	13:00	4.74	2.97	04:30	0.67	12:55	1.73	1.07	04:30	0.046	13:00	0.409	0.139	0.139	-
12/02/2020	04:55	2.07	16:00	4.41	3.05	04:50	0.64	16:00	1.61	1.06	04:50	0.047	16:00	0.349	0.142	0.142	0.01
12/03/2020	04:15	2.03	10:05	4.30	2.96	02:50	0.65	10:05	1.61	1.03	04:20	0.046	10:05	0.336	0.132	0.132	-
12/04/2020	05:10	1.93	02:15	4.51	2.84	05:05	0.61	02:15	1.63	1.02	05:10	0.040	02:15	0.364	0.123	0.123	-
12/05/2020	01:55	2.09	00:10	3.31	2.50	01:00	0.70	00:10	1.28	0.91	01:00	0.052	00:10	0.185	0.089	0.089	0.03
12/06/2020	05:45	1.85	11:45	3.96	2.46	05:45	0.58	11:45	1.57	0.90	05:45	0.036	11:45	0.292	0.089	0.089	0.03
12/07/2020	03:40	1.89	08:55	4.13	2.84	03:40	0.60	08:55	1.66	1.07	03:40	0.038	08:55	0.327	0.129	0.129	-
12/08/2020	03:35	2.11	19:10	4.44	3.24	04:00	0.73	15:05	1.69	1.22	04:00	0.055	19:10	0.370	0.178	0.178	0.87
12/09/2020	23:45	2.52	08:05	5.08	3.30	22:00	0.91	08:05	1.87	1.20	23:45	0.089	08:05	0.494	0.177	0.177	0.17
12/10/2020	03:30	2.24	06:30	4.60	3.11	03:25	0.79	06:30	1.76	1.16	03:25	0.065	06:30	0.404	0.157	0.157	0.07
12/11/2020	05:35	2.15	02:35	3.92	2.96	05:35	0.75	03:20	1.55	1.09	05:35	0.058	02:30	0.276	0.137	0.137	0.02
12/12/2020	04:55	2.01	19:35	3.54	2.54	04:55	0.65	19:35	1.39	0.91	04:45	0.046	19:35	0.221	0.091	0.091	0.01
12/13/2020	06:15	2.12	13:20	4.00	2.71	06:15	0.72	13:20	1.57	1.00	06:15	0.055	13:20	0.297	0.113	0.113	0.24
12/14/2020	02:35	2.16	02:45	4.07	2.99	02:30	0.75	02:45	1.61	1.12	02:30	0.059	02:45	0.312	0.143	0.143	0.05
12/15/2020	04:40	1.99	14:45	4.86	3.25	04:25	0.65	14:45	1.86	1.21	04:35	0.045	14:45	0.464	0.181	0.181	0.58
12/16/2020	04:15	2.49	14:20	4.93	3.39	04:00	0.92	14:20	1.91	1.27	04:05	0.088	14:20	0.486	0.197	0.197	0.39
12/17/2020	02:45	2.57	01:10	4.40	3.26	02:50	0.93	10:50	1.70	1.22	02:50	0.093	10:50	0.362	0.178	0.178	0.08
12/18/2020	04:20	2.36	10:00	4.52	3.11	04:20	0.80	10:00	1.74	1.16	04:20	0.070	10:00	0.391	0.159	0.159	0.25
12/19/2020	04:15	2.17	01:15	3.70	2.83	04:20	0.71	00:15	1.46	1.04	04:20	0.056	00:15	0.244	0.126	0.126	0.37
12/20/2020	04:20	2.57	20:40	4.63	3.01	04:10	0.90	20:35	1.71	1.09	04:20	0.090	20:40	0.394	0.140	0.140	0.04
12/21/2020	00:40	2.78	16:50	5.61	3.90	00:35	1.00	16:45	2.07	1.43	00:40	0.112	16:50	0.620	0.271	0.271	1.07
12/22/2020	23:50	3.11	01:55	5.14	3.68	22:50	1.08	01:55	1.87	1.33	23:50	0.143	01:55	0.504	0.227	0.227	-
12/23/2020	04:20	2.71	00:25	4.60	3.27	04:10	0.93	00:30	1.78	1.19	04:20	0.101	00:30	0.410	0.171	0.171	-
12/24/2020	23:55	2.40	09:55	4.57	2.88	02:40	0.84	09:55	1.75	1.07	02:40	0.077	09:55	0.400	0.129	0.129	-
12/25/2020	04:35	2.17	16:45	3.27	2.65	00:50	0.72	16:40	1.27	0.97	04:35	0.058	16:40	0.179	0.104	0.104	0.49
12/26/2020	04:45	2.37	11:15	3.11	2.69	04:10	0.84	11:15	1.18	0.98	04:45	0.074	11:15	0.155	0.106	0.106	0.02
12/27/2020	04:05	2.28	11:35	3.81	2.89	02:35	0.81	11:35	1.43	1.08	04:00	0.069	11:35	0.252	0.133	0.133	0.13
12/28/2020	01:35	2.41	13:30	4.24	3.08	01:40	0.84	13:30	1.65	1.16	01:35	0.077	13:30	0.339	0.157	0.157	-
12/29/2020	05:35	2.31	10:20	4.37	3.16	02:10	0.80	10:20	1.68	1.20	02:15	0.070	10:20	0.360	0.167	0.167	0.14
12/30/2020	00:25	2.82	10:35	5.29	3.80	01:15	1.07	09:20	1.95	1.45	01:10	0.124	10:35	0.534	0.261	0.261	0.78
12/31/2020	23:30	2.87	07:30	4.84	3.53	23:25	1.08	07:30	1.87	1.36	23:25	0.127	07:30	0.462	0.219	0.219	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			30.413	30.65
Average	3.15	1.15	0.166	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A7_70807

Site Address /Location:	Opposite 420 H St NW			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	Located on Interurban trail	Latitude:	47.3125628	Pipe Size (H x W): 18.00 X 18.00	Pipe Shape: Circular
		Longitude:	-122.2394872		



Manhole #	System Characteristics
A770807	Residential
Access	Traffic
Drive	Light







Installation Information	
Installation Date:	Installation Type:
Tuesday, October 13, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi
Installation Confirmation:	
Time	
7:25:00 PM	
Depth of Flow (Wet DOF) (in)	
4.63	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
2.13	N/A
Silt (in)	Silt Type
0	
Manhole / Pipe Information:	
Manhole Depth (Approx. FT):	Manhole Configuration
5	Single
Pipe Material	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	28
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Concrete	Good
Communication Information:	
Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole
Additional Site Info. / Comments:	
King County M/H	

ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519.11.325

AUB_A8_70829

Site Commentary

SITE INFORMATION

Pipe	Elliptical (15 in H x 15 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

This site experienced backwater conditions from October 9th through October 12th.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	1.77	2.72	0.148
Minimum	1.30	0.47	0.047
Maximum	7.85	4.27	0.458
Min Time	12/06/2020 2:00:00 AM	10/10/2020 12:00:00 AM	11/11/2020 2:00:00 AM
Max Time	10/10/2020 1:00:00 AM	01/12/2021 9:00:00 AM	01/12/2021 9:00:00 AM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

Percent Uptime	
DFINAL (in)	97.749
VFINAL (ft/s)	97.749
QFINAL (MGD - Total MG)	97.749

Hydrograph Report

AUB_A8_70829

Flow Monitor

AUB_A8_70829

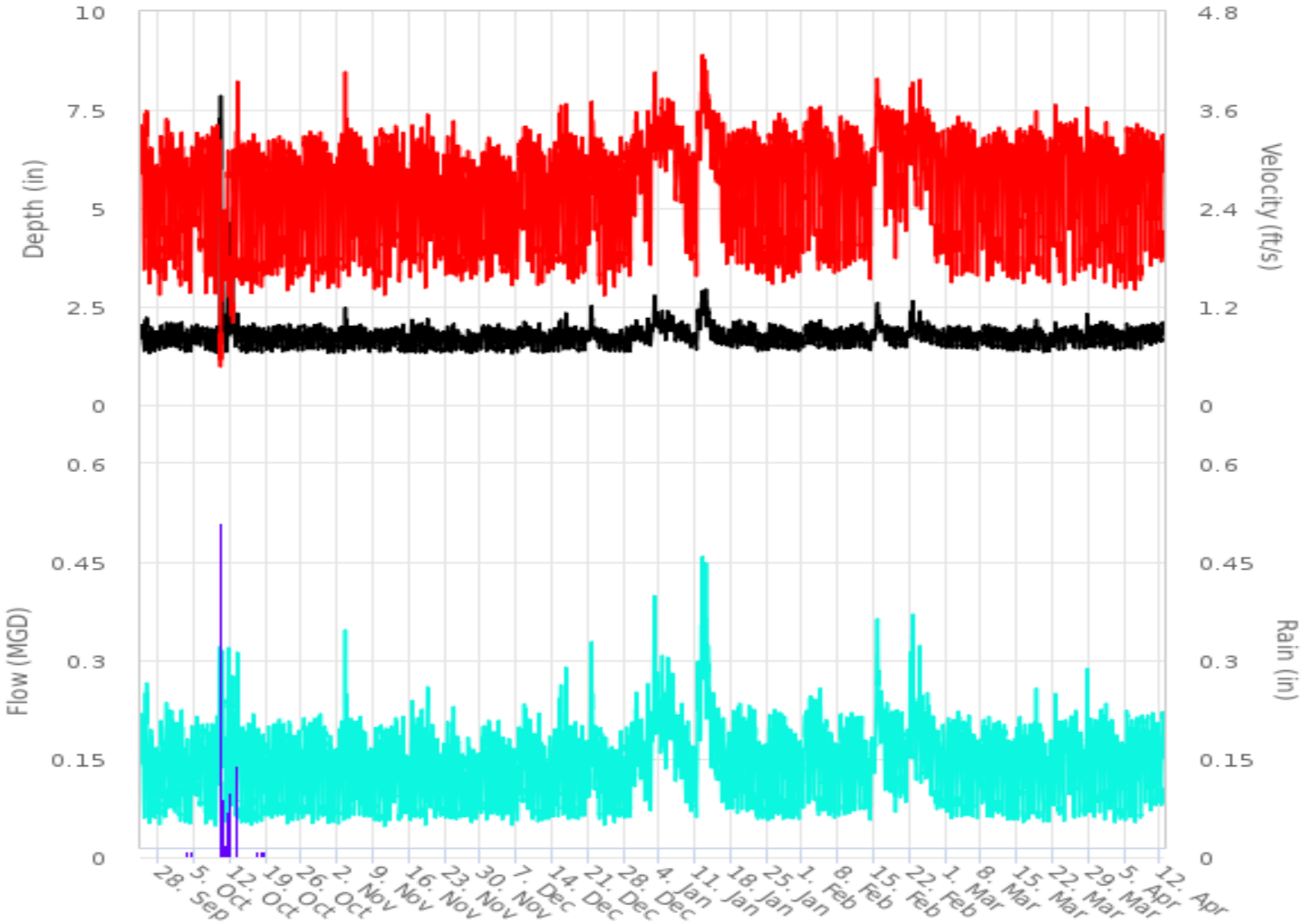
Pipe Height
15.00
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A8_70829

Flow Monitor

AUB_A8_70829

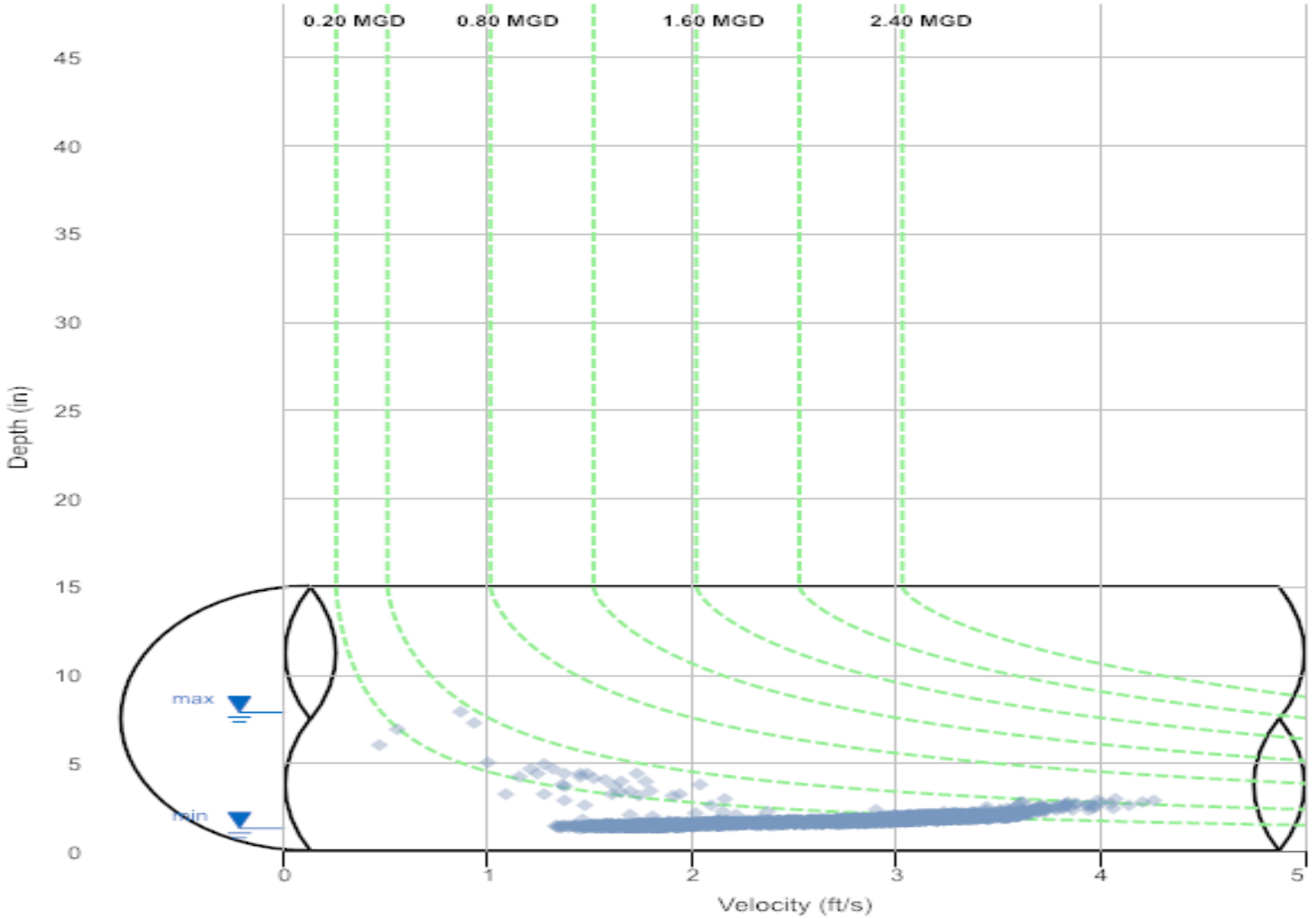
Pipe Height
15.00
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A8_70829Pipe: Elliptical (15 in H x 15 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	01:35	1.50	15:35	2.51	1.75	01:00	1.64	15:30	4.02	2.85	01:00	0.071	15:35	0.348	0.150	0.150	-
01/02/2021	04:45	1.48	23:35	3.02	1.97	04:45	1.51	21:10	4.38	2.99	04:45	0.061	21:10	0.455	0.197	0.197	-
01/03/2021	22:25	1.88	00:05	2.93	2.18	04:55	2.85	02:40	4.53	3.32	22:35	0.169	02:50	0.490	0.239	0.239	-
01/04/2021	02:55	1.72	11:50	2.70	2.07	02:45	2.80	11:45	4.11	3.38	02:55	0.141	11:50	0.398	0.226	0.226	-
01/05/2021	03:30	1.62	13:55	2.61	2.00	01:20	2.71	13:55	3.94	3.33	03:30	0.131	13:55	0.364	0.212	0.212	-
01/06/2021	23:45	1.66	12:00	2.62	1.98	23:15	2.77	10:20	3.90	3.36	23:45	0.135	12:00	0.360	0.210	0.210	-
01/07/2021	03:40	1.59	08:55	2.35	1.87	04:20	2.30	08:55	3.70	3.05	04:20	0.105	08:55	0.294	0.176	0.176	-
01/08/2021	02:55	1.56	08:25	2.33	1.86	01:20	1.87	08:25	3.65	2.86	04:05	0.086	08:25	0.287	0.165	0.165	-
01/09/2021	04:00	1.55	10:55	2.50	1.74	06:15	1.70	10:50	3.76	2.56	06:15	0.076	10:55	0.324	0.134	0.134	-
01/10/2021	02:35	1.43	13:45	1.99	1.68	01:05	1.57	19:40	3.40	2.60	01:05	0.062	13:50	0.211	0.130	0.130	-
01/11/2021	04:20	1.37	11:00	2.63	1.95	02:25	1.37	10:55	3.73	2.94	04:45	0.051	11:00	0.348	0.189	0.189	-
01/12/2021	00:25	1.82	09:15	3.04	2.53	00:25	2.96	18:55	4.53	3.78	00:25	0.163	09:15	0.492	0.337	0.337	-
01/13/2021	22:40	1.73	00:40	3.06	2.18	22:50	2.97	00:35	4.21	3.56	22:40	0.156	00:40	0.488	0.257	0.257	-
01/14/2021	23:45	1.57	09:05	2.49	1.88	02:55	2.72	09:00	3.88	3.29	03:40	0.123	16:05	0.329	0.193	0.193	-
01/15/2021	03:25	1.50	11:10	2.36	1.80	23:25	2.29	11:05	3.91	3.19	23:25	0.099	11:10	0.305	0.175	0.175	-
01/16/2021	02:45	1.48	09:05	2.25	1.70	03:25	1.64	09:05	3.80	2.91	03:25	0.067	09:05	0.284	0.147	0.147	-
01/17/2021	05:20	1.46	17:40	2.23	1.71	04:30	1.53	08:40	3.69	2.76	02:05	0.064	17:40	0.268	0.141	0.141	-
01/18/2021	03:10	1.39	11:05	2.34	1.81	03:00	1.43	11:05	3.60	2.72	03:00	0.054	11:05	0.285	0.155	0.155	-
01/19/2021	04:15	1.42	14:05	2.50	1.82	05:40	1.53	14:05	3.67	2.79	05:40	0.059	14:05	0.319	0.158	0.158	-
01/20/2021	02:50	1.50	11:15	2.32	1.81	02:50	1.60	11:15	3.74	2.86	02:50	0.066	11:15	0.292	0.159	0.159	-
01/21/2021	02:50	1.44	11:00	2.43	1.85	02:55	1.41	10:55	3.76	2.80	02:55	0.055	11:00	0.312	0.163	0.163	-
01/22/2021	02:15	1.47	09:50	2.29	1.79	02:30	1.23	09:50	3.73	2.88	02:30	0.049	09:50	0.286	0.158	0.158	-
01/23/2021	04:35	1.34	13:15	1.93	1.62	02:25	1.28	21:45	3.69	2.64	02:25	0.046	10:00	0.210	0.126	0.126	-
01/24/2021	04:10	1.34	14:35	1.88	1.62	01:30	1.46	08:35	3.49	2.60	01:30	0.053	14:35	0.200	0.125	0.125	-
01/25/2021	02:50	1.37	11:20	2.38	1.75	03:15	1.36	11:20	3.82	2.72	03:00	0.051	11:20	0.309	0.146	0.146	-
01/26/2021	01:35	1.36	11:05	2.28	1.76	02:50	1.25	11:25	3.82	2.80	01:30	0.046	11:05	0.286	0.152	0.152	-
01/27/2021	02:15	1.38	16:35	2.31	1.77	02:10	1.51	08:40	3.84	2.93	02:10	0.056	16:35	0.298	0.160	0.160	-
01/28/2021	02:20	1.35	13:55	2.17	1.73	02:25	1.24	17:40	3.86	2.92	02:25	0.045	13:55	0.270	0.153	0.153	-
01/29/2021	00:35	1.38	11:00	2.08	1.68	01:30	1.30	12:55	3.81	2.71	01:30	0.049	12:55	0.253	0.137	0.137	-
01/30/2021	02:25	1.36	12:50	1.94	1.64	04:45	1.28	12:50	3.66	2.63	04:50	0.048	12:50	0.220	0.127	0.127	-
01/31/2021	03:10	1.34	13:05	1.94	1.62	00:55	1.41	13:05	3.53	2.63	00:55	0.051	13:05	0.212	0.126	0.126	-
02/01/2021	01:30	1.36	17:15	2.23	1.81	01:35	1.43	23:55	3.90	3.04	01:30	0.052	23:55	0.279	0.169	0.169	-
02/02/2021	03:45	1.50	09:40	2.52	1.86	03:40	1.64	12:20	4.11	3.14	03:40	0.068	09:40	0.358	0.183	0.183	-
02/03/2021	04:30	1.48	10:30	2.21	1.80	04:10	1.77	10:30	3.78	3.12	04:35	0.073	10:30	0.275	0.172	0.172	-
02/04/2021	02:35	1.41	09:40	2.39	1.79	02:25	1.58	09:40	3.92	2.95	02:25	0.062	09:40	0.319	0.163	0.163	-
02/05/2021	03:05	1.43	13:25	2.09	1.74	03:05	1.52	13:25	3.62	2.88	03:05	0.059	13:25	0.242	0.151	0.151	-
02/06/2021	04:40	1.38	19:35	2.00	1.67	04:40	1.46	19:35	3.46	2.68	04:40	0.053	19:35	0.218	0.133	0.133	-
02/07/2021	04:50	1.37	11:50	2.01	1.71	05:10	1.48	08:20	3.34	2.53	04:55	0.055	11:50	0.194	0.130	0.130	-
02/08/2021	02:25	1.41	11:35	2.07	1.74	01:50	1.33	11:35	3.72	2.85	01:50	0.054	11:35	0.246	0.150	0.150	-
02/09/2021	02:40	1.37	14:45	2.35	1.71	02:15	1.49	14:45	4.03	2.82	02:40	0.057	14:45	0.321	0.147	0.147	-
02/10/2021	01:35	1.39	13:05	2.26	1.77	03:30	1.43	13:00	3.80	2.87	03:45	0.054	13:00	0.280	0.157	0.157	-
02/11/2021	02:35	1.42	15:05	2.17	1.76	04:15	1.51	15:05	3.60	2.78	02:40	0.058	15:05	0.254	0.149	0.149	-
02/12/2021	04:45	1.42	13:25	2.13	1.77	04:55	1.56	08:40	3.45	2.71	04:45	0.060	13:35	0.230	0.148	0.148	-
02/13/2021	04:40	1.39	11:35	1.97	1.66	01:15	1.35	08:40	3.25	2.57	01:15	0.054	11:35	0.197	0.125	0.125	-
02/14/2021	03:30	1.36	14:20	1.98	1.69	02:25	1.25	13:15	3.34	2.63	02:25	0.048	16:20	0.205	0.133	0.133	-
02/15/2021	00:10	1.63	15:10	2.65	2.10	00:05	2.27	13:00	4.05	3.50	00:10	0.108	15:10	0.375	0.243	0.243	-
02/16/2021	23:55	1.66	10:25	2.19	1.95	23:55	2.82	12:40	3.76	3.40	23:55	0.135	10:25	0.268	0.206	0.206	-
02/17/2021	01:20	1.59	11:45	2.25	1.79	02:10	1.71	11:45	3.85	3.18	02:10	0.078	11:45	0.287	0.173	0.173	-
02/18/2021	04:30	1.47	11:30	2.24	1.77	04:25	1.72	07:30	3.88	3.18	04:25	0.070	13:10	0.282	0.170	0.170	-
02/19/2021	03:55	1.37	11:10	2.33	1.76	03:50	1.61	11:05	3.92	3.11	03:50	0.059	11:10	0.301	0.167	0.167	-
02/20/2021	04:15	1.44	10:40	2.12	1.70	04:25	1.80	10:30	3.80	3.07	04:25	0.070	10:40	0.258	0.154	0.154	-
02/21/2021	04:55	1.42	23:35	2.52	1.74	02:10	1.82	23:40	4.12	3.06	03:40	0.074	23:40	0.361	0.161	0.161	-
02/22/2021	04:30	1.70	13:05	2.76	2.11	23:05	2.77	13:00	4.27	3.34	03:35	0.142	13:05	0.422	0.232	0.232	-
02/23/2021	05:50	1.64	21:45	2.48	1.93	04:15	1.82	21:15	4.06	3.27	04:15	0.088	21:30	0.342	0.198	0.198	-
02/24/2021	05:20	1.57	10:30	2.30	1.84	02:30	1.93	10:30	3.83	3.17	02:30	0.087	10:30	0.295	0.180	0.180	-
02/25/2021	02:25	1.58	12:35	2.32	1.87	02:40	2.42	12:35	3.96	3.21	02:40	0.108	12:35	0.308	0.186	0.186	-
02/26/2021	04:15	1.52	09:30	2.17	1.82	04:15	1.83	09:30	3.71	3.05	04:15	0.077	09:30	0.263	0.169	0.169	-
02/27/2021	06:05	1.46	11:55	1.95	1.72	06:05	1.54	09:15	3.48	2.75	06:05	0.061	09:15	0.209	0.142	0.142	-
02/28/2021	03:45	1.41	10:35	2.11	1.69	04:30	1.47	10:30	3.69	2.69	03:45	0.056	10:30	0.249	0.136	0.136	-
03/01/2021	02:15	1.40	17:15	2.27	1.78	02:00	1.45	07:30	3.72	2.85	02:00	0.055	17:15	0.277	0.156	0.156	-
03/02/2021	02:45	1.41	13:25	2.34	1.73	02:50	1.21	13:25	3.87	2.85	02:50	0.046	13:25	0.304	0.150	0.150	-
03/03/2021	02:25	1.41	15:00	2.26	1.76	02:25	1.34	15:00	3.74	2.91	02:25	0.051	15:00	0.280	0.157	0.157	-
03/04/2021	02:30	1.41	10:55	2.07	1.77	02:20	1.24	14:15	3.61	2.91	02:20	0.047	14:15	0.239	0.158	0.158	-
03/05/2021	02:30	1.40	11:40	2.11	1.73	02:30	1.35	10:35	3.58	2.78	02:30	0.050	11:40	0.243	0.146	0.146	-
03/06/2021	04:20	1.41	11:20	1.96	1.68	02:50	1.42	11:20	3.60	2.77	04:35	0.056	11:20	0.219	0.138	0.138	-
03/07/2021	03:45	1.38	12:25	1.98	1.68	03:30	1.38	16:05	3.41	2.62	03:30	0.052	16:05	0.210	0.131	0.131	-
03/08/2021	04:20	1.48	10:45	2.12	1.81	03:15	1.60	10:40	3.48	2.78	03:15	0.067	10:45	0.237	0.155	0.155	-
03/09/2021	02:55	1.44	09:10	2.16	1.78	04:45	1.23	09:05	3.55	2.72	02:55	0.050	09:10	0.248	0.149	0.149	-
03/10/2021	02:05	1.39	09:10	2.09	1.76	01:45	1.31	09:10	3.61	2.80	01:50	0.050	09:10	0.241	0.152	0.152	-
03/11/2021	02:50	1.40	09:10	2.04	1.75	02:45	1.49	09:10	3.57	2.83	02:45	0.057	09:10	0.230	0.151	0.151	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	02:40	1.37	13:00	2.03	1.71	04:00	1.35	10:45	3.51	2.75	04:00	0.049	13:00	0.224	0.142	0.142	-
03/13/2021	02:25	1.36	09:50	1.91	1.66	02:40	1.48	16:10	3.52	2.66	02:00	0.054	16:10	0.202	0.131	0.131	-
03/14/2021	01:50	1.32	19:40	2.03	1.66	03:05	1.25	19:40	3.60	2.57	03:05	0.044	19:40	0.232	0.128	0.128	-
03/15/2021	01:25	1.33	10:35	2.10	1.73	03:20	1.34	10:30	3.64	2.75	01:30	0.048	10:30	0.245	0.146	0.146	-
03/16/2021	02:55	1.34	09:20	2.07	1.72	02:55	1.25	09:20	3.57	2.78	02:55	0.044	09:20	0.235	0.146	0.146	-
03/17/2021	00:55	1.32	11:50	2.04	1.71	00:40	1.27	11:50	3.68	2.79	00:55	0.044	11:50	0.238	0.145	0.145	-
03/18/2021	01:55	1.37	16:05	2.47	1.76	01:55	1.35	16:10	4.09	2.78	01:55	0.049	16:10	0.345	0.150	0.150	-
03/19/2021	04:30	1.34	08:15	2.05	1.71	03:10	1.18	10:10	3.54	2.72	03:10	0.042	10:10	0.227	0.141	0.141	-
03/20/2021	02:15	1.32	05:40	2.07	1.60	02:05	1.22	05:40	3.73	2.65	02:15	0.042	05:40	0.246	0.125	0.125	-
03/21/2021	02:05	1.33	07:30	1.90	1.62	02:15	1.23	09:30	3.53	2.57	02:15	0.042	09:30	0.206	0.122	0.122	-
03/22/2021	00:35	1.40	10:10	2.33	1.71	00:25	1.44	10:00	4.16	2.77	00:25	0.055	10:05	0.314	0.143	0.143	-
03/23/2021	02:55	1.36	14:55	2.28	1.74	04:15	1.24	14:55	3.79	2.80	04:15	0.048	14:55	0.287	0.149	0.149	-
03/24/2021	01:30	1.35	09:45	2.32	1.75	01:20	1.26	09:45	3.77	2.89	01:20	0.046	09:45	0.294	0.155	0.155	-
03/25/2021	02:55	1.51	10:00	2.16	1.81	02:45	1.72	08:40	3.75	3.03	02:45	0.074	10:00	0.258	0.168	0.168	-
03/26/2021	03:00	1.42	09:55	2.22	1.76	03:10	1.36	09:55	3.71	2.81	03:15	0.052	09:55	0.272	0.152	0.152	-
03/27/2021	02:30	1.40	09:25	2.05	1.67	02:25	1.52	09:25	3.51	2.66	02:25	0.057	09:25	0.229	0.132	0.132	-
03/28/2021	02:05	1.39	14:45	2.67	1.75	01:05	1.39	14:35	4.28	2.64	01:05	0.054	14:40	0.396	0.144	0.144	-
03/29/2021	02:30	1.46	09:35	2.10	1.80	02:45	1.36	09:35	3.52	2.83	02:45	0.055	09:35	0.237	0.156	0.156	-
03/30/2021	02:50	1.43	10:20	2.12	1.81	02:35	1.42	08:15	3.53	2.76	02:35	0.056	08:15	0.238	0.155	0.155	-
03/31/2021	03:00	1.43	09:10	2.22	1.81	03:00	1.40	09:15	3.45	2.74	03:00	0.054	09:10	0.251	0.155	0.155	-
04/01/2021	01:50	1.40	09:50	2.28	1.82	01:55	1.27	09:50	3.58	2.82	01:55	0.047	09:50	0.272	0.160	0.160	-
04/02/2021	01:50	1.48	09:30	2.13	1.79	01:20	1.48	09:25	3.51	2.75	01:20	0.062	09:25	0.235	0.152	0.152	-
04/03/2021	02:55	1.34	08:55	2.00	1.69	03:05	1.18	11:45	3.43	2.59	03:05	0.042	08:25	0.212	0.132	0.132	-
04/04/2021	03:50	1.38	10:25	2.01	1.67	01:05	1.20	18:25	3.38	2.51	01:05	0.045	10:25	0.208	0.125	0.125	-
04/05/2021	02:50	1.39	10:30	2.17	1.79	02:35	1.19	10:30	3.59	2.75	02:55	0.046	10:30	0.255	0.152	0.152	-
04/06/2021	02:50	1.39	08:50	2.08	1.75	03:15	1.25	08:50	3.56	2.76	03:15	0.046	08:50	0.237	0.148	0.148	-
04/07/2021	01:55	1.36	23:30	2.32	1.77	02:00	1.26	23:30	3.77	2.81	01:55	0.045	23:30	0.294	0.153	0.153	-
04/08/2021	02:05	1.38	10:05	2.14	1.79	03:50	1.21	09:20	3.55	2.78	03:50	0.044	10:05	0.240	0.155	0.155	-
04/09/2021	01:30	1.53	12:45	2.27	1.82	00:45	1.59	12:45	3.69	2.91	00:45	0.070	12:45	0.278	0.162	0.162	-
04/10/2021	02:15	1.49	12:45	2.24	1.79	02:15	1.56	15:10	3.49	2.78	02:15	0.064	12:45	0.245	0.153	0.153	-
04/11/2021	03:50	1.53	10:10	2.11	1.80	01:30	1.63	18:40	3.43	2.72	03:50	0.070	18:40	0.228	0.149	0.149	-
04/12/2021	00:40	1.56	09:35	2.23	1.88	00:40	1.56	13:05	3.50	2.82	00:40	0.068	09:35	0.253	0.167	0.120	-
09/24/2020	23:20	1.49	08:30	2.30	1.84	23:50	1.56	09:40	3.74	3.00	23:50	0.066	09:45	0.277	0.170	0.113	-
09/25/2020	01:55	1.36	12:55	2.45	1.77	02:20	1.36	12:00	4.05	2.77	02:20	0.049	12:00	0.337	0.154	0.154	-
09/26/2020	02:30	1.29	09:35	2.02	1.64	01:10	1.26	17:30	3.39	2.46	01:10	0.043	10:35	0.209	0.121	0.121	-
09/27/2020	03:35	1.34	08:25	2.00	1.66	03:10	1.34	16:10	3.37	2.40	03:10	0.049	16:10	0.210	0.119	0.119	-
09/28/2020	02:50	1.35	09:55	2.33	1.74	02:35	1.11	09:55	3.73	2.63	02:35	0.040	09:55	0.292	0.140	0.140	-
09/29/2020	02:55	1.34	10:25	2.33	1.78	02:30	1.14	08:05	3.79	2.81	02:30	0.043	10:25	0.285	0.155	0.155	-
09/30/2020	03:35	1.44	09:40	2.25	1.79	00:55	1.59	09:40	3.66	2.78	00:55	0.064	09:40	0.274	0.154	0.154	-
10/01/2020	02:55	1.34	08:40	2.16	1.78	02:50	1.11	13:50	3.53	2.61	02:50	0.039	13:50	0.247	0.144	0.144	-
10/02/2020	00:55	1.36	09:20	2.33	1.74	02:55	1.13	10:40	3.81	2.57	02:55	0.042	10:40	0.290	0.137	0.137	-
10/03/2020	03:00	1.28	10:20	2.05	1.65	01:00	1.22	10:10	3.44	2.44	03:10	0.042	10:15	0.219	0.120	0.120	0.01
10/04/2020	04:45	1.29	09:55	2.12	1.68	03:00	1.01	09:55	3.52	2.52	03:05	0.037	09:55	0.241	0.127	0.127	0.01
10/05/2020	01:50	1.45	08:55	2.17	1.79	23:45	1.63	08:55	3.58	2.77	02:25	0.070	08:55	0.253	0.151	0.151	-
10/06/2020	02:05	1.43	11:45	2.05	1.75	02:45	1.35	13:50	3.57	2.71	02:45	0.054	11:40	0.228	0.144	0.144	-
10/07/2020	03:05	1.38	10:30	2.07	1.71	02:15	1.23	10:25	3.65	2.65	02:15	0.046	10:25	0.240	0.138	0.138	-
10/08/2020	03:00	1.33	09:20	2.06	1.68	02:40	1.00	13:55	3.64	2.64	02:40	0.038	13:55	0.236	0.134	0.134	-
10/09/2020	02:30	1.29	23:55	9.60	1.93	23:35	0.57	10:20	3.89	2.62	00:25	0.037	23:00	0.584	0.148	0.148	0.64
10/10/2020	22:35	1.45	01:35	10.66	3.53	00:55	0.30	18:15	3.06	1.71	00:55	0.052	01:15	0.446	0.207	0.207	1.04
10/11/2020	02:30	1.33	14:35	5.92	2.68	16:40	0.57	11:55	3.55	1.92	04:50	0.039	13:35	0.445	0.174	0.174	0.53
10/12/2020	02:25	1.40	08:25	5.78	2.45	08:25	0.49	10:00	3.59	2.13	22:20	0.052	09:55	0.413	0.157	0.157	-
10/13/2020	01:10	1.42	07:30	2.48	1.82	01:05	1.18	07:05	4.34	2.83	01:05	0.046	07:10	0.365	0.161	0.161	0.61
10/14/2020	02:50	1.32	15:10	2.25	1.72	03:55	1.04	15:10	3.63	2.53	03:55	0.038	15:10	0.270	0.133	0.133	-
10/15/2020	01:50	1.31	15:20	2.31	1.72	00:45	1.15	15:15	3.73	2.57	00:45	0.042	15:20	0.288	0.137	0.137	-
10/16/2020	02:50	1.34	10:45	2.25	1.72	01:10	1.18	10:45	3.66	2.54	04:15	0.044	10:45	0.273	0.134	0.134	-
10/17/2020	04:05	1.31	10:10	2.04	1.65	02:45	1.19	08:50	3.47	2.48	02:45	0.041	10:10	0.223	0.123	0.123	0.01
10/18/2020	02:20	1.30	09:05	2.05	1.67	00:15	1.17	09:00	3.48	2.44	00:15	0.044	09:05	0.224	0.121	0.121	0.03
10/19/2020	02:55	1.34	10:35	2.13	1.73	01:25	1.30	10:35	3.68	2.61	02:50	0.047	10:35	0.253	0.137	0.137	-
10/20/2020	02:25	1.33	11:45	2.19	1.72	01:25	1.29	14:00	3.62	2.61	01:25	0.049	11:45	0.253	0.138	0.138	-
10/21/2020	00:50	1.40	10:10	2.20	1.76	03:15	1.24	08:00	3.55	2.62	03:15	0.049	10:10	0.253	0.142	0.142	-
10/22/2020	03:55	1.33	10:15	2.06	1.72	01:50	1.16	08:00	3.51	2.62	01:50	0.043	10:15	0.223	0.137	0.137	-
10/23/2020	01:55	1.37	09:15	2.25	1.77	02:15	1.21	10:40	3.60	2.63	02:15	0.045	09:15	0.260	0.144	0.144	-
10/24/2020	04:45	1.36	11:45	2.07	1.68	02:20	1.08	16:30	3.46	2.43	02:20	0.040	11:45	0.221	0.123	0.123	-
10/25/2020	00:30	1.36	09:30	2.10	1.69	03:45	1.24	08:35	3.34	2.39	00:35	0.045	09:30	0.210	0.122	0.122	-
10/26/2020	03:00	1.34	09:50	2.09	1.75	00:45	1.24	13:20	3.55	2.68	02:40	0.048	13:20	0.230	0.144	0.144	-
10/27/2020	03:30	1.40	08:30	2.07	1.74	01:35	1.29	13:45	3.55	2.68	01:35	0.054	18:10	0.231	0.142	0.142	-
10/28/2020	01:20	1.37	12:45	2.14	1.75	01:10	1.23	08:30	3.64	2.66	01:10	0.045	12:45	0.245	0.143	0.143	-
10/29/2020	02:10	1.34	09:45	2.20	1.76	03:40	1.25	09:45	3.56	2.64	02:20	0.046	09:45	0.257	0.144	0.144	-
10/30/2020	23:55	1.34	05:35	2.40	1.73	01:20	1.29	05:30	3.97	2.64	23:40	0.053	05:35	0.318	0.139	0.139	-
10/31/2020	00:20	1.31	10:10	2.06	1.63	00:10	1.23	10:10	3.58	2.39	00:10	0.042	10:10	0.234	0.117	0.117	-
11/01/2020	03:05	1.31	10:45	2.05	1.63	02:15	1.18	10:45	3.45	2.40	02:15	0.042	10:45	0.224	0.115	0.115	-
11/02/2020	03:45	1.32	15:55	2.09	1.71	02:25	1.17	15:55	3.60	2.57	02:25	0.040	15:55	0.242	0.134	0.134	-
11/03/2020	03:15	1.30	16:05	2.57	1.80	02:50	1.13	10:15	4.31	2.76	02:50	0.039	10:15	0.364	0.161	0.161	-
11/04/2020	03:20	1.41	12:30	2.25	1.75	02:30	1.26	12:30	3.85	2.75	02:30	0.049	12:30	0.288	0.147	0.147	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/05/2020	03:20	1.36	08:40	2.24	1.74	05:10	1.28	08:40	3.75	2.70	05:10	0.049	08:40	0.277	0.144	0.144	-
11/06/2020	05:00	1.37	09:05	2.32	1.77	23:55	1.38	09:05	3.84	2.66	04:45	0.052	09:05	0.300	0.144	0.144	-
11/07/2020	03:05	1.42	09:25	2.03	1.68	03:45	1.30	09:20	3.35	2.41	03:45	0.052	09:25	0.216	0.121	0.121	-
11/08/2020	02:50	1.33	10:05	2.01	1.64	00:55	1.27	10:00	3.41	2.42	00:55	0.046	10:05	0.210	0.117	0.117	-
11/09/2020	02:40	1.42	10:50	2.14	1.72	03:55	1.23	10:45	3.75	2.64	01:50	0.049	10:50	0.255	0.138	0.138	-
11/10/2020	03:30	1.33	16:20	2.20	1.68	02:50	1.17	10:10	3.78	2.69	02:50	0.042	16:20	0.270	0.138	0.138	-
11/11/2020	02:40	1.31	10:15	2.09	1.69	02:15	1.25	18:15	3.75	2.67	02:45	0.043	18:15	0.249	0.137	0.137	-
11/12/2020	02:30	1.34	10:05	2.13	1.72	03:35	1.23	10:05	3.66	2.69	03:35	0.044	10:05	0.252	0.140	0.140	-
11/13/2020	23:55	1.40	06:30	2.22	1.78	23:55	1.37	13:55	3.79	2.75	23:55	0.051	06:35	0.273	0.150	0.150	-
11/14/2020	05:55	1.30	18:05	2.12	1.66	01:45	1.12	18:05	3.59	2.46	01:45	0.041	18:05	0.247	0.124	0.124	-
11/15/2020	03:40	1.31	23:00	1.92	1.63	02:30	1.33	23:05	3.43	2.41	02:30	0.050	23:05	0.202	0.115	0.115	-
11/16/2020	03:45	1.28	12:25	2.43	1.74	04:20	1.18	13:25	3.68	2.53	04:20	0.042	12:25	0.304	0.138	0.138	-
11/17/2020	04:20	1.31	14:10	2.17	1.73	01:45	1.15	10:40	3.63	2.63	01:45	0.044	14:10	0.251	0.141	0.141	-
11/18/2020	02:30	1.30	10:40	2.14	1.74	00:35	1.32	18:25	3.54	2.58	00:35	0.050	10:35	0.242	0.138	0.138	-
11/19/2020	02:40	1.30	13:00	2.58	1.78	02:25	1.08	12:45	4.48	2.72	02:25	0.037	12:45	0.388	0.152	0.152	-
11/20/2020	23:50	1.35	10:35	2.07	1.71	03:00	1.41	10:30	3.66	2.61	03:00	0.057	10:30	0.240	0.136	0.136	-
11/21/2020	03:00	1.33	10:10	1.98	1.63	00:40	1.34	10:10	3.43	2.33	02:15	0.051	10:10	0.212	0.112	0.112	-
11/22/2020	04:10	1.32	09:10	1.97	1.64	06:05	1.36	18:45	3.47	2.37	01:55	0.050	18:45	0.211	0.115	0.115	-
11/23/2020	02:40	1.34	09:35	2.08	1.73	01:30	1.31	11:05	3.62	2.58	01:20	0.052	11:05	0.241	0.136	0.136	-
11/24/2020	05:25	1.31	15:45	2.39	1.71	02:15	1.14	15:45	3.92	2.58	02:15	0.042	15:45	0.319	0.136	0.136	-
11/25/2020	03:10	1.33	13:10	2.03	1.68	03:35	1.28	17:35	3.64	2.58	03:35	0.045	13:10	0.223	0.131	0.131	-
11/26/2020	05:00	1.34	10:55	1.84	1.56	03:45	1.33	09:45	3.39	2.30	01:25	0.053	09:45	0.182	0.103	0.103	-
11/27/2020	03:50	1.32	10:40	2.00	1.62	06:40	1.27	10:40	3.42	2.36	00:20	0.046	10:40	0.215	0.113	0.113	-
11/28/2020	05:00	1.30	09:20	2.07	1.58	02:55	1.10	09:20	3.42	2.27	02:55	0.039	09:20	0.226	0.106	0.106	-
11/29/2020	04:50	1.31	09:50	1.95	1.60	03:20	1.32	09:45	3.27	2.28	03:20	0.048	09:45	0.194	0.107	0.107	-
11/30/2020	01:45	1.33	11:15	2.33	1.76	01:00	1.29	14:05	3.50	2.61	03:05	0.048	11:15	0.273	0.141	0.141	-
12/01/2020	02:35	1.33	11:15	2.17	1.73	01:05	1.21	11:15	3.64	2.53	01:35	0.046	11:15	0.258	0.135	0.135	-
12/02/2020	05:10	1.38	11:50	2.07	1.71	01:00	1.17	19:00	3.48	2.56	01:00	0.049	14:35	0.226	0.134	0.134	-
12/03/2020	02:20	1.29	11:55	2.17	1.69	01:25	1.39	13:55	3.53	2.53	01:25	0.053	11:55	0.239	0.130	0.130	-
12/04/2020	04:15	1.31	10:30	2.09	1.70	02:20	1.26	09:05	3.49	2.49	03:35	0.045	09:05	0.230	0.128	0.128	-
12/05/2020	23:50	1.34	11:15	2.12	1.64	02:00	1.26	11:15	3.49	2.35	02:00	0.047	11:15	0.239	0.115	0.115	-
12/06/2020	02:15	1.28	11:30	2.06	1.62	02:20	1.20	11:25	3.33	2.27	02:20	0.039	11:25	0.204	0.108	0.108	-
12/07/2020	03:05	1.31	10:05	2.16	1.70	01:40	1.03	11:25	3.74	2.60	01:40	0.037	11:25	0.263	0.135	0.135	-
12/08/2020	01:45	1.38	11:50	2.41	1.82	02:50	1.62	11:45	3.97	2.92	02:50	0.066	11:45	0.319	0.165	0.165	-
12/09/2020	04:50	1.44	10:55	2.13	1.72	04:20	1.50	13:50	3.59	2.71	04:20	0.061	10:55	0.246	0.140	0.140	-
12/10/2020	02:25	1.34	13:25	2.08	1.69	02:35	1.16	10:20	3.66	2.59	02:35	0.041	10:20	0.240	0.132	0.132	-
12/11/2020	01:25	1.31	10:15	2.32	1.68	03:30	1.24	10:15	3.64	2.54	03:30	0.043	10:15	0.284	0.130	0.130	-
12/12/2020	04:15	1.31	10:55	2.03	1.60	04:05	1.15	12:40	3.40	2.30	04:05	0.039	10:55	0.216	0.108	0.108	-
12/13/2020	05:55	1.31	10:30	2.06	1.60	02:10	1.11	10:30	3.54	2.40	02:10	0.041	10:30	0.232	0.113	0.113	-
12/14/2020	01:35	1.33	12:30	2.10	1.68	23:50	1.28	19:05	3.52	2.54	03:45	0.049	12:30	0.235	0.130	0.130	-
12/15/2020	03:00	1.34	15:55	2.50	1.77	00:25	1.20	15:55	4.49	2.78	04:50	0.048	15:55	0.389	0.154	0.154	-
12/16/2020	03:40	1.37	14:05	2.47	1.76	01:50	1.32	14:00	3.85	2.79	03:40	0.049	14:05	0.323	0.152	0.152	-
12/17/2020	04:10	1.37	12:30	2.17	1.73	02:15	1.18	15:10	3.77	2.67	04:05	0.043	12:30	0.248	0.140	0.140	-
12/18/2020	02:45	1.38	10:20	2.14	1.74	01:50	1.28	10:20	3.57	2.66	01:50	0.048	10:20	0.247	0.141	0.141	-
12/19/2020	03:35	1.33	17:05	2.17	1.67	04:25	1.34	17:05	3.59	2.51	04:55	0.049	17:05	0.254	0.126	0.126	-
12/20/2020	03:45	1.37	16:25	2.10	1.64	00:40	1.38	16:20	3.61	2.39	04:05	0.052	16:20	0.240	0.116	0.116	-
12/21/2020	02:00	1.53	16:35	2.78	1.94	01:40	1.44	16:15	4.08	2.97	01:40	0.062	16:35	0.383	0.184	0.184	-
12/22/2020	23:10	1.58	02:00	2.53	1.82	23:00	1.85	02:00	4.37	2.83	23:00	0.085	02:00	0.387	0.158	0.158	-
12/23/2020	01:45	1.42	13:00	2.12	1.72	02:25	1.14	10:25	3.60	2.65	02:25	0.045	10:25	0.244	0.138	0.138	-
12/24/2020	03:50	1.37	08:45	2.02	1.66	02:10	1.14	08:45	3.54	2.48	02:10	0.042	08:45	0.225	0.123	0.123	-
12/25/2020	04:00	1.34	16:20	1.90	1.58	02:50	1.30	16:15	3.45	2.37	02:50	0.049	16:20	0.199	0.108	0.108	-
12/26/2020	04:10	1.35	10:35	1.90	1.59	03:30	1.26	10:30	3.43	2.39	03:30	0.046	10:35	0.197	0.111	0.111	-
12/27/2020	03:35	1.33	09:05	1.96	1.61	01:05	1.28	09:15	3.41	2.45	01:05	0.051	09:10	0.207	0.116	0.116	-
12/28/2020	03:20	1.33	11:15	2.08	1.68	04:40	1.21	11:15	3.61	2.56	04:40	0.043	11:15	0.241	0.130	0.130	-
12/29/2020	02:25	1.34	09:25	2.14	1.74	01:50	1.19	09:25	3.65	2.65	01:50	0.043	09:25	0.254	0.142	0.142	-
12/30/2020	03:55	1.58	09:15	2.43	1.89	01:25	1.84	09:15	3.88	3.11	03:35	0.085	09:15	0.323	0.183	0.183	-
12/31/2020	02:55	1.60	11:45	2.14	1.78	03:30	2.18	07:50	3.65	3.00	03:30	0.100	12:35	0.247	0.162	0.162	-

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			29.674	2.88
Average	1.77	2.72	0.148	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A8_70829

Site Address /Location:	3rd St NW			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	Located in parking area next to driveway	Latitude:	47.310238	Pipe Size (H x W): 15.00 X 15.00	Pipe Shape: Circular
		Longitude:	122.234096		



Manhole #	System Characteristics
AUB_A8_70829	Commercial
Access	Traffic
Walk (Commercial)	Light







ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519.11.325

Installation Information

Installation Date:	Installation Type:
Thursday, September 24, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	
8:06:00 AM	
Depth of Flow (Wet DOF) (in)	
2.13	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
4.14	N/A
Silt (in)	Silt Type
0	

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
6	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Concrete	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

AUB_A9_71031

Site Commentary

SITE INFORMATION

Pipe	Round (10 in H)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	2.73	0.76	0.063
Minimum	1.39	0.33	0.011
Maximum	6.15	1.48	0.336
Min Time	12/07/2020 3:00:00 AM	04/03/2021 2:00:00 AM	12/07/2020 3:00:00 AM
Max Time	01/03/2021 12:00:00 AM	01/03/2021 12:00:00 AM	01/03/2021 12:00:00 AM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

Percent Uptime	
DFINAL (in)	98.801
VFINAL (ft/s)	98.801
QFINAL (MGD - Total MG)	98.801

Hydrograph Report

AUB_A9_71031

Flow Monitor

AUB_A9_71031

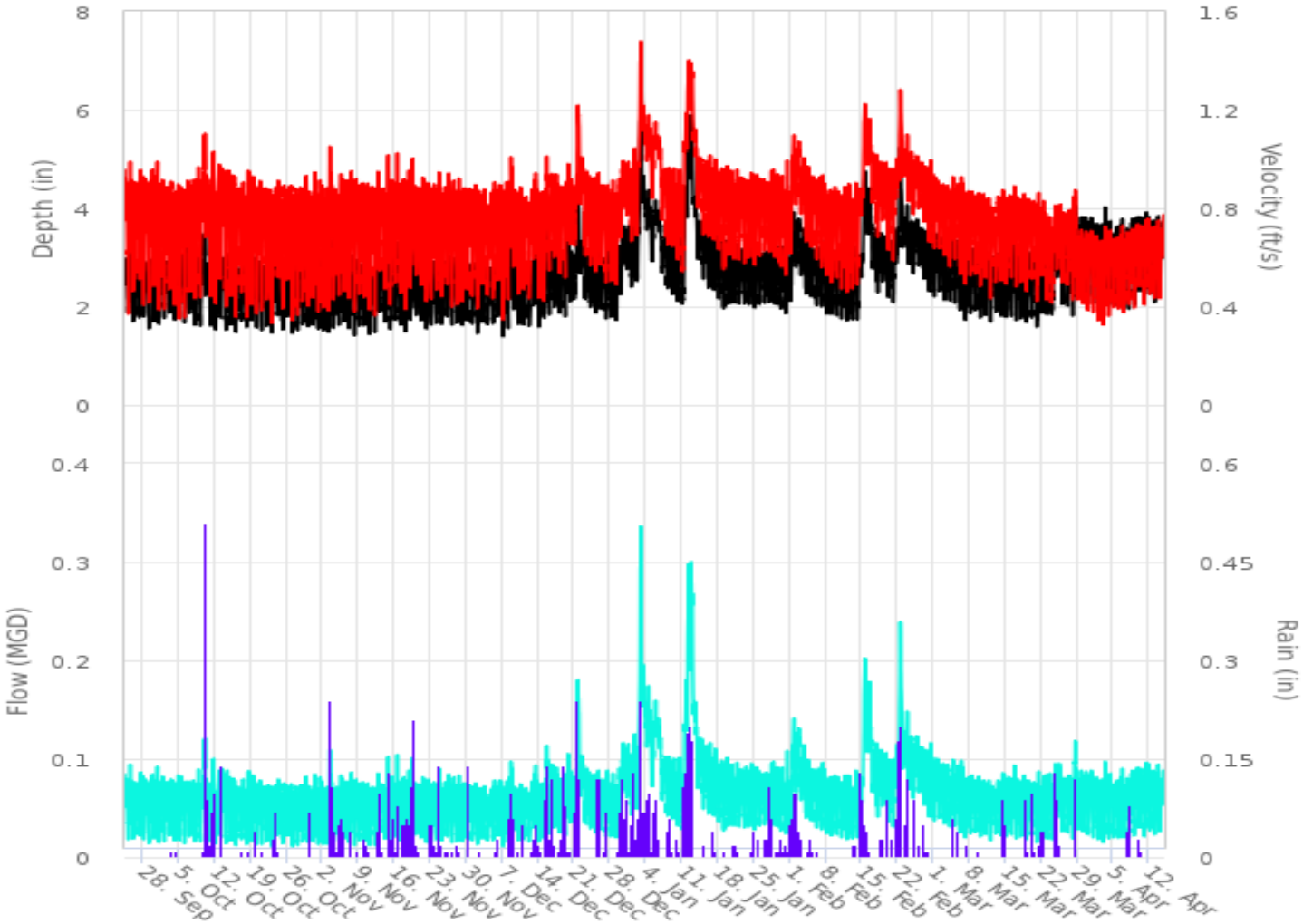
Pipe Height
10.00
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_A9_71031

Flow Monitor

AUB_A9_71031

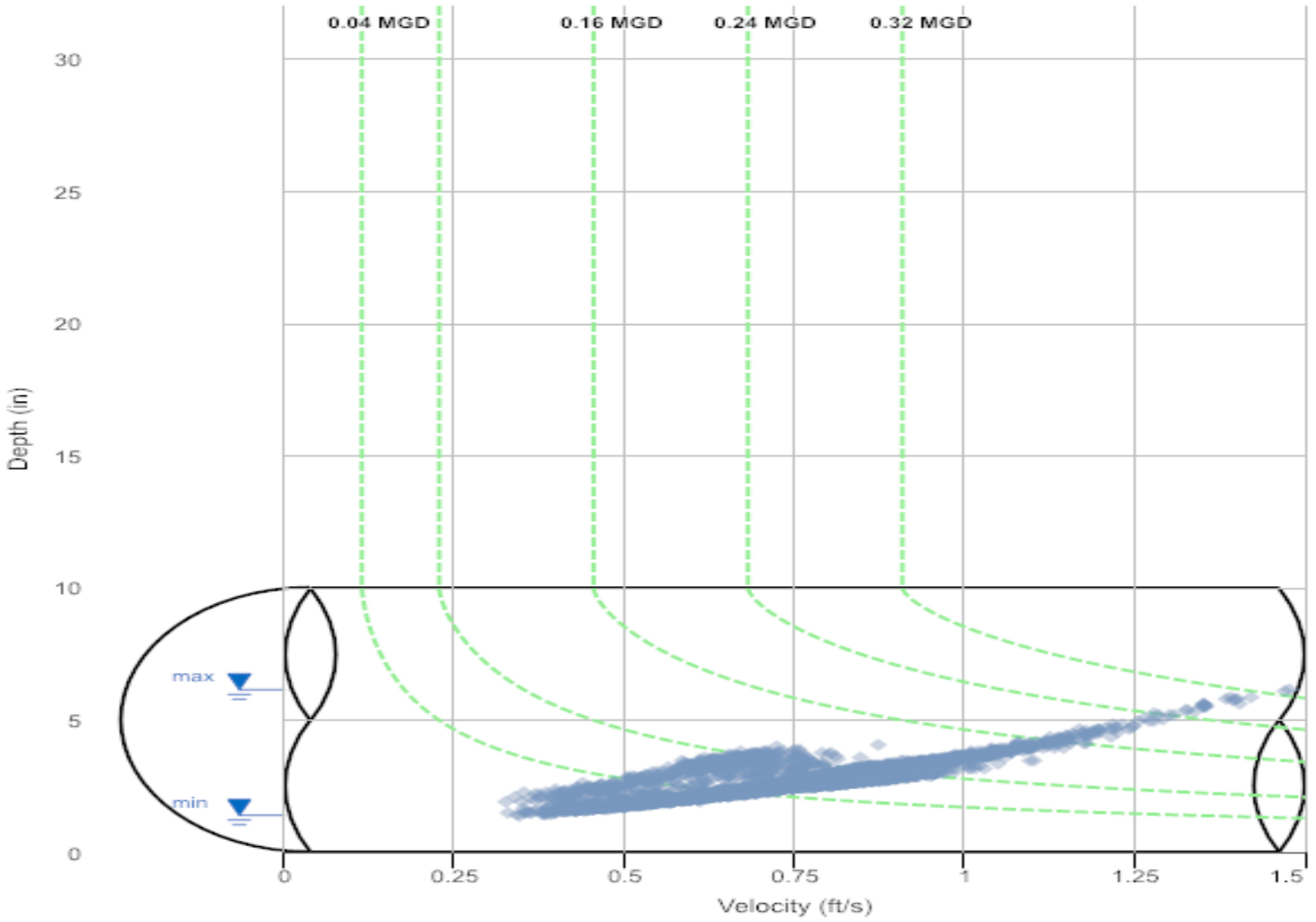
Pipe Height
10.00
in

Report Period

09/22/2020
To
04/14/2021

Legend

DFINAL - VFINAL
Iso-Q™
Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_A9_71031Pipe: Round (10 in H), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	03:55	2.27	15:55	3.91	3.12	03:50	0.63	15:55	1.08	0.87	03:50	0.038	15:55	0.138	0.085	0.085	0.51
01/02/2021	05:00	2.35	23:55	5.98	3.68	05:05	0.63	23:50	1.45	0.99	05:05	0.040	23:55	0.319	0.127	0.127	1.69
01/03/2021	22:40	3.63	00:55	6.23	4.51	22:40	1.00	00:50	1.50	1.19	22:40	0.116	00:55	0.346	0.187	0.187	0.65
01/04/2021	03:55	3.37	12:15	4.43	3.85	03:50	0.95	12:50	1.21	1.07	03:50	0.100	12:15	0.180	0.134	0.134	0.48
01/05/2021	02:50	2.81	21:20	4.25	3.50	02:35	0.79	21:15	1.18	0.99	02:50	0.064	21:25	0.169	0.111	0.111	0.52
01/06/2021	23:10	2.98	10:10	4.13	3.69	23:10	0.83	10:15	1.17	1.03	23:10	0.073	10:15	0.161	0.123	0.123	0.22
01/07/2021	05:05	2.46	20:35	3.66	3.10	03:45	0.69	20:35	1.03	0.88	05:05	0.046	20:35	0.121	0.083	0.083	-
01/08/2021	03:10	2.30	17:45	3.59	2.99	03:20	0.63	17:55	1.02	0.85	03:10	0.039	17:55	0.116	0.077	0.077	0.22
01/09/2021	04:35	2.12	12:35	3.58	2.83	07:00	0.55	11:05	1.05	0.81	07:00	0.031	12:35	0.116	0.068	0.068	-
01/10/2021	04:50	1.99	11:50	3.47	2.75	04:50	0.55	11:45	0.99	0.78	04:50	0.027	11:45	0.107	0.064	0.064	0.07
01/11/2021	03:55	1.96	21:45	4.60	3.28	05:15	0.49	21:25	1.20	0.89	03:55	0.025	21:45	0.190	0.099	0.099	1.06
01/12/2021	00:05	3.69	09:35	6.03	5.15	00:00	1.00	09:30	1.44	1.29	00:05	0.118	09:30	0.317	0.238	0.238	2.10
01/13/2021	23:55	3.37	01:00	5.60	4.17	23:55	0.88	01:00	1.38	1.11	23:55	0.092	01:00	0.280	0.156	0.156	0.09
01/14/2021	23:55	2.87	20:30	4.00	3.37	23:55	0.77	20:30	1.07	0.92	23:55	0.065	20:30	0.140	0.097	0.097	0.01
01/15/2021	04:15	2.47	12:40	3.86	3.15	04:05	0.66	12:35	1.07	0.86	04:05	0.045	12:35	0.133	0.083	0.083	0.09
01/16/2021	03:55	2.25	12:15	4.01	3.04	01:35	0.43	12:15	1.12	0.87	03:55	0.038	12:15	0.148	0.081	0.081	-
01/17/2021	04:10	2.17	11:35	3.59	2.91	04:00	0.60	15:15	1.04	0.85	03:55	0.035	15:15	0.118	0.074	0.074	0.10
01/18/2021	04:25	1.94	19:35	3.54	2.80	04:25	0.56	19:30	1.02	0.82	04:25	0.027	19:30	0.113	0.068	0.068	-
01/19/2021	03:35	1.75	12:50	3.80	2.79	03:45	0.46	12:50	1.11	0.82	03:45	0.019	12:50	0.136	0.068	0.068	0.01
01/20/2021	04:35	1.89	18:25	3.60	2.76	05:35	0.54	18:20	1.05	0.81	04:35	0.026	18:20	0.119	0.067	0.067	-
01/21/2021	03:05	1.84	14:45	3.50	2.73	03:05	0.51	14:40	1.02	0.80	03:05	0.023	18:25	0.111	0.065	0.065	0.11
01/22/2021	03:35	1.84	19:35	3.48	2.70	03:35	0.52	19:35	1.01	0.80	03:35	0.023	19:35	0.110	0.063	0.063	-
01/23/2021	04:05	1.80	12:05	3.69	2.68	04:00	0.46	12:00	1.05	0.78	04:00	0.020	12:05	0.123	0.062	0.062	-
01/24/2021	02:30	1.88	13:15	3.72	2.78	02:25	0.54	12:05	1.06	0.81	02:25	0.025	13:15	0.126	0.067	0.067	0.16
01/25/2021	04:25	1.79	13:45	3.50	2.69	04:25	0.51	13:40	1.02	0.79	04:25	0.022	13:45	0.112	0.063	0.063	0.04
01/26/2021	02:35	1.81	14:15	3.40	2.68	05:10	0.46	11:50	1.00	0.79	05:10	0.020	14:15	0.105	0.062	0.062	-
01/27/2021	04:45	1.90	12:40	3.48	2.69	04:45	0.54	12:45	1.01	0.79	04:45	0.025	12:45	0.110	0.063	0.063	0.14
01/28/2021	02:05	1.93	18:05	3.54	2.81	02:00	0.55	12:50	1.01	0.83	02:00	0.027	18:05	0.113	0.069	0.069	0.24
01/29/2021	05:00	1.88	16:25	3.37	2.66	04:40	0.54	13:15	0.99	0.79	04:40	0.025	13:15	0.102	0.061	0.061	0.03
01/30/2021	06:30	1.90	13:05	3.43	2.60	05:50	0.52	13:05	0.99	0.76	04:40	0.026	13:05	0.106	0.058	0.058	0.07
01/31/2021	05:40	1.76	12:35	3.72	2.62	05:40	0.49	12:40	1.05	0.77	05:35	0.021	12:35	0.125	0.059	0.059	0.12
02/01/2021	01:15	2.06	19:00	4.14	3.04	01:00	0.59	19:05	1.15	0.87	01:10	0.031	19:05	0.156	0.083	0.083	0.82
02/02/2021	05:15	2.76	08:35	4.03	3.45	05:20	0.79	08:30	1.12	0.98	05:20	0.063	08:35	0.149	0.107	0.107	0.31
02/03/2021	04:45	2.59	18:50	3.89	3.16	04:40	0.74	18:50	1.09	0.92	04:40	0.054	18:50	0.139	0.088	0.088	0.06
02/04/2021	02:30	2.15	17:00	3.60	2.89	02:05	0.60	14:30	1.03	0.85	02:30	0.034	17:00	0.117	0.073	0.073	0.07
02/05/2021	04:55	2.15	18:15	3.39	2.77	04:50	0.59	09:55	1.02	0.81	04:50	0.033	09:55	0.107	0.066	0.066	0.01
02/06/2021	03:10	1.98	15:00	3.65	2.69	03:10	0.56	14:55	1.05	0.79	03:10	0.028	14:55	0.121	0.063	0.063	0.01
02/07/2021	05:10	1.98	11:40	3.53	2.71	04:25	0.53	11:25	1.00	0.77	04:25	0.027	11:30	0.111	0.061	0.061	-
02/08/2021	05:00	1.83	19:55	3.25	2.60	05:45	0.49	20:35	0.93	0.74	05:45	0.022	19:50	0.090	0.056	0.056	-
02/09/2021	02:55	1.74	11:25	3.41	2.58	02:55	0.43	11:30	0.95	0.73	02:50	0.018	11:30	0.101	0.055	0.055	-
02/10/2021	04:15	1.74	11:35	3.38	2.55	04:10	0.47	11:30	0.94	0.72	04:05	0.020	11:30	0.098	0.053	0.053	-
02/11/2021	02:25	1.70	18:10	3.28	2.55	02:40	0.42	19:20	0.92	0.73	02:40	0.016	18:15	0.091	0.054	0.054	-
02/12/2021	03:05	1.68	15:40	3.30	2.48	03:50	0.41	15:35	0.96	0.72	03:50	0.016	15:35	0.097	0.052	0.052	-
02/13/2021	05:05	1.70	21:15	3.38	2.45	05:05	0.44	21:15	0.95	0.71	05:05	0.017	21:15	0.099	0.050	0.050	0.08
02/14/2021	04:00	1.67	12:30	3.14	2.52	03:50	0.47	12:20	0.90	0.73	03:55	0.018	12:30	0.086	0.054	0.054	0.71
02/15/2021	00:05	2.42	17:00	4.86	3.83	00:00	0.71	15:05	1.23	1.04	00:00	0.047	17:00	0.210	0.134	0.134	0.78
02/16/2021	22:45	3.33	13:55	5.69	3.70	03:45	0.92	13:55	1.39	1.03	22:50	0.096	13:55	0.287	0.123	0.123	0.07
02/17/2021	03:45	2.59	00:00	3.74	3.17	03:40	0.75	12:40	1.09	0.92	03:40	0.055	12:40	0.129	0.089	0.089	-
02/18/2021	04:10	2.27	18:05	3.62	2.97	03:40	0.66	17:55	1.01	0.87	03:40	0.041	18:05	0.116	0.078	0.078	0.09
02/19/2021	01:55	2.40	14:45	3.89	2.99	02:05	0.69	14:45	1.11	0.87	01:50	0.046	14:45	0.141	0.078	0.078	0.17
02/20/2021	05:00	2.12	14:05	3.55	2.84	05:15	0.59	13:55	1.02	0.83	05:15	0.032	14:00	0.114	0.070	0.070	0.07
02/21/2021	04:55	2.05	23:50	3.83	2.82	04:40	0.55	23:50	1.08	0.82	04:40	0.029	23:50	0.134	0.069	0.069	0.42
02/22/2021	05:15	3.09	14:10	5.37	4.09	05:10	0.88	14:00	1.31	1.09	05:10	0.082	14:10	0.253	0.151	0.151	0.98
02/23/2021	04:00	2.98	21:30	4.34	3.60	04:00	0.84	21:40	1.15	1.00	04:00	0.074	21:30	0.167	0.115	0.115	0.27
02/24/2021	04:00	2.68	16:15	4.03	3.39	04:05	0.76	18:40	1.09	0.95	04:05	0.058	16:10	0.144	0.101	0.101	-
02/25/2021	02:30	2.43	16:50	3.90	3.33	03:25	0.70	10:50	1.04	0.92	02:30	0.048	16:45	0.131	0.096	0.096	0.18
02/26/2021	00:45	2.62	19:05	3.94	3.21	05:50	0.74	19:05	1.05	0.90	00:40	0.056	19:05	0.135	0.089	0.089	0.10
02/27/2021	06:00	2.23	13:30	3.81	3.05	06:00	0.63	15:30	1.10	0.86	06:00	0.037	13:25	0.128	0.080	0.080	0.02
02/28/2021	02:30	2.14	12:55	3.86	3.01	04:30	0.60	12:15	1.03	0.84	02:30	0.034	12:50	0.129	0.077	0.077	0.02
03/01/2021	05:15	1.95	18:10	3.78	2.94	05:20	0.55	18:10	0.99	0.81	05:15	0.027	18:10	0.121	0.072	0.072	-
03/02/2021	04:05	2.01	19:05	3.62	2.90	02:15	0.54	19:05	0.96	0.78	02:15	0.028	19:05	0.110	0.068	0.068	-
03/03/2021	04:25	1.93	15:25	3.66	2.91	04:20	0.55	18:55	0.97	0.78	04:20	0.027	15:25	0.112	0.069	0.069	-
03/04/2021	05:15	1.99	18:50	3.81	2.80	05:15	0.49	18:50	1.03	0.77	05:15	0.024	18:50	0.127	0.064	0.064	0.20
03/05/2021	03:20	1.93	19:20	3.56	2.78	03:20	0.53	19:15	0.94	0.78	03:20	0.025	19:20	0.106	0.064	0.064	0.05
03/06/2021	04:50	1.76	19:05	3.70	2.73	04:50	0.49	19:05	1.02	0.77	04:50	0.020	19:05	0.120	0.063	0.063	-
03/07/2021	05:45	1.66	11:05	3.32	2.62	05:35	0.45	10:55	0.93	0.74	05:35	0.018	11:00	0.095	0.057	0.057	0.04
03/08/2021	05:15	1.83	11:30	3.31	2.63	05:15	0.49	18:25	0.92	0.74	05:15	0.022	11:35	0.093	0.057	0.057	-
03/09/2021	02:55	1.84	20:05	3.39	2.57	05:10	0.51	20:05	0.93	0.73	02:55	0.023	20:05	0.097	0.054	0.054	0.01
03/10/2021	02:35	1.73	10:50	3.24	2.56	02:50	0.42	18:30	0.92	0.73	02:50	0.017	18:25	0.090	0.054	0.054	-
03/11/2021	04:10	1.65	19:20	3.26	2.55	04:20	0.44	10:20	0.88	0.72	04:05	0.017	19:15	0.087	0.053	0.053	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	04:45	1.65	09:25	3.16	2.57	04:20	0.41	09:20	0.87	0.68	04:20	0.016	09:30	0.083	0.051	0.051	-
03/13/2021	03:50	1.77	14:40	3.34	2.58	03:45	0.44	14:45	0.93	0.71	03:45	0.019	14:45	0.096	0.053	0.053	-
03/14/2021	05:05	1.79	16:55	3.42	2.63	02:45	0.49	16:40	0.92	0.73	05:40	0.021	16:55	0.097	0.057	0.057	0.30
03/15/2021	04:00	1.69	13:05	3.41	2.62	03:45	0.46	13:05	0.90	0.72	04:00	0.018	13:05	0.095	0.055	0.055	-
03/16/2021	05:10	1.72	19:25	3.65	2.56	01:25	0.49	19:25	0.98	0.72	01:25	0.020	19:25	0.114	0.053	0.053	-
03/17/2021	02:40	1.66	11:30	3.44	2.54	02:50	0.45	11:30	0.93	0.70	02:35	0.018	11:30	0.100	0.052	0.052	-
03/18/2021	02:25	1.69	16:45	3.29	2.55	02:25	0.43	15:50	0.88	0.71	02:25	0.017	16:40	0.089	0.053	0.053	0.11
03/19/2021	03:20	1.63	11:10	3.28	2.53	03:15	0.43	11:10	0.89	0.70	03:15	0.016	11:10	0.090	0.051	0.051	0.03
03/20/2021	02:55	1.56	10:00	3.29	2.56	03:00	0.42	09:55	0.90	0.71	03:00	0.015	09:55	0.090	0.053	0.053	0.17
03/21/2021	03:45	1.55	11:55	3.46	2.53	03:40	0.40	11:55	0.90	0.69	03:40	0.014	11:55	0.098	0.051	0.051	0.07
03/22/2021	03:10	1.72	18:30	3.72	2.79	03:10	0.47	10:55	0.89	0.69	03:10	0.019	18:30	0.100	0.057	0.057	0.11
03/23/2021	02:40	1.80	11:10	3.82	2.86	02:35	0.39	11:10	0.84	0.63	02:35	0.017	11:10	0.104	0.054	0.054	-
03/24/2021	01:30	1.80	19:30	3.82	2.85	01:40	0.40	19:20	0.84	0.63	01:40	0.017	19:25	0.103	0.055	0.055	0.34
03/25/2021	02:45	2.47	14:10	3.98	3.20	02:35	0.53	13:20	0.89	0.71	02:40	0.036	13:20	0.111	0.070	0.070	0.27
03/26/2021	03:00	2.00	11:10	3.60	2.88	02:35	0.45	11:05	0.84	0.68	02:35	0.023	11:10	0.095	0.059	0.059	-
03/27/2021	04:00	1.98	13:05	3.69	2.79	02:00	0.45	13:00	0.89	0.66	02:00	0.023	13:00	0.105	0.055	0.055	-
03/28/2021	04:20	1.74	15:15	4.34	3.04	04:10	0.38	15:15	0.95	0.66	04:05	0.016	15:15	0.139	0.064	0.064	0.37
03/29/2021	02:05	2.35	19:40	3.99	3.24	02:00	0.39	19:40	0.77	0.59	02:00	0.025	19:40	0.101	0.060	0.060	-
03/30/2021	03:40	2.18	20:15	4.12	3.17	03:25	0.38	20:15	0.79	0.57	03:30	0.022	20:15	0.108	0.057	0.057	-
03/31/2021	04:05	2.14	18:35	4.09	3.17	02:35	0.32	18:30	0.78	0.58	02:35	0.018	18:30	0.105	0.058	0.058	-
04/01/2021	03:45	2.02	18:30	3.84	3.07	03:25	0.34	18:25	0.72	0.57	03:25	0.018	18:25	0.090	0.055	0.055	-
04/02/2021	03:40	2.03	20:10	3.85	3.04	03:45	0.31	20:05	0.72	0.55	03:45	0.016	20:10	0.091	0.052	0.052	-
04/03/2021	03:00	1.84	11:35	4.30	3.10	05:20	0.27	11:25	0.82	0.56	02:25	0.014	11:30	0.117	0.055	0.055	-
04/04/2021	04:45	1.94	12:45	3.87	3.03	04:25	0.35	09:55	0.74	0.57	04:35	0.017	12:45	0.092	0.054	0.054	-
04/05/2021	03:15	1.87	20:20	3.89	2.98	01:15	0.34	18:00	0.75	0.58	03:15	0.016	20:20	0.092	0.053	0.053	-
04/06/2021	03:15	1.87	19:30	4.13	2.96	03:05	0.35	19:30	0.81	0.58	03:05	0.016	19:30	0.112	0.053	0.053	-
04/07/2021	01:50	1.93	17:35	3.84	2.98	02:35	0.31	17:30	0.77	0.58	01:45	0.018	17:35	0.096	0.053	0.053	0.22
04/08/2021	02:05	1.87	14:35	3.99	3.06	04:10	0.35	14:35	0.78	0.58	01:50	0.018	14:35	0.103	0.055	0.055	-
04/09/2021	03:00	1.99	12:00	4.03	3.14	03:05	0.37	18:50	0.81	0.61	03:00	0.019	19:50	0.103	0.060	0.060	0.03
04/10/2021	03:10	2.16	11:30	3.92	3.15	03:05	0.44	20:10	0.76	0.62	03:05	0.025	11:25	0.096	0.061	0.061	0.02
04/11/2021	03:20	1.97	20:25	4.19	3.10	02:20	0.38	20:20	0.86	0.62	01:55	0.020	20:25	0.121	0.060	0.060	-
04/12/2021	03:10	2.24	11:50	3.83	3.15	05:20	0.42	12:40	0.76	0.61	03:00	0.026	19:55	0.093	0.060	0.060	-
04/13/2021	02:30	2.03	19:15	4.14	3.13	02:05	0.42	19:15	0.82	0.62	02:30	0.021	19:15	0.113	0.061	0.061	-
04/14/2021	02:30	2.16	17:30	4.43	3.10	02:25	0.38	20:45	0.85	0.62	02:25	0.021	20:50	0.107	0.060	0.060	-
09/24/2020	23:55	2.08	13:05	3.17	2.71	23:55	0.57	13:00	1.02	0.83	23:55	0.030	13:00	0.096	0.065	0.035	-
09/25/2020	02:00	1.81	12:30	3.28	2.55	03:55	0.32	12:25	1.03	0.76	03:45	0.016	12:30	0.104	0.057	0.057	-
09/26/2020	02:40	1.62	21:55	3.01	2.43	02:35	0.43	21:55	0.96	0.75	02:35	0.016	21:55	0.086	0.052	0.052	-
09/27/2020	06:35	1.70	13:50	3.74	2.49	06:35	0.47	13:45	1.19	0.77	06:35	0.019	13:50	0.143	0.056	0.056	-
09/28/2020	04:30	1.70	11:25	3.19	2.43	03:25	0.35	11:20	1.02	0.73	03:35	0.014	11:25	0.099	0.051	0.051	-
09/29/2020	03:30	1.50	20:20	3.10	2.47	03:40	0.40	20:15	1.03	0.76	03:30	0.013	20:15	0.096	0.054	0.054	-
09/30/2020	03:35	1.63	19:05	3.32	2.45	03:25	0.45	19:10	1.06	0.76	03:25	0.017	19:05	0.108	0.054	0.054	-
10/01/2020	02:15	1.60	19:00	3.18	2.52	03:10	0.36	19:00	0.99	0.72	03:25	0.013	19:00	0.095	0.053	0.053	-
10/02/2020	03:05	1.74	17:15	3.15	2.50	03:20	0.37	11:20	0.97	0.71	03:25	0.015	17:15	0.092	0.052	0.052	-
10/03/2020	02:05	1.70	11:15	3.10	2.50	04:10	0.38	11:10	0.96	0.73	04:05	0.016	11:15	0.089	0.052	0.052	0.01
10/04/2020	04:10	1.63	15:00	3.23	2.55	04:05	0.35	08:30	0.97	0.71	04:05	0.013	15:00	0.093	0.054	0.054	0.01
10/05/2020	02:15	1.91	13:40	3.21	2.62	02:25	0.32	19:55	0.99	0.70	02:25	0.015	19:55	0.096	0.054	0.054	-
10/06/2020	02:40	1.61	15:40	3.50	2.56	02:35	0.33	21:45	0.99	0.71	02:35	0.012	21:45	0.090	0.053	0.053	-
10/07/2020	02:10	1.72	16:40	3.10	2.47	04:00	0.37	10:55	1.07	0.74	02:05	0.016	14:55	0.093	0.052	0.052	-
10/08/2020	02:05	1.54	19:25	3.26	2.41	02:00	0.39	19:25	1.02	0.74	02:00	0.013	19:25	0.102	0.052	0.052	-
10/09/2020	04:15	1.47	23:20	3.65	2.44	04:15	0.37	23:20	1.18	0.76	04:15	0.012	23:20	0.137	0.054	0.054	0.64
10/10/2020	04:05	2.03	01:50	3.68	2.68	23:55	0.61	01:45	1.16	0.85	04:00	0.032	01:45	0.136	0.066	0.066	1.04
10/11/2020	04:15	1.59	14:35	3.42	2.47	05:05	0.41	14:30	1.09	0.77	05:00	0.015	14:35	0.116	0.057	0.057	0.53
10/12/2020	05:10	1.45	20:10	3.25	2.40	03:55	0.37	20:15	1.05	0.75	03:55	0.012	20:10	0.104	0.052	0.052	-
10/13/2020	01:20	1.71	07:40	3.48	2.52	01:20	0.47	07:40	1.13	0.79	01:15	0.019	07:40	0.124	0.058	0.058	0.61
10/14/2020	04:10	1.43	10:00	3.71	2.39	04:10	0.35	10:05	1.12	0.74	04:05	0.011	10:05	0.128	0.051	0.051	-
10/15/2020	03:30	1.50	12:30	3.14	2.47	03:25	0.38	20:30	1.01	0.77	03:25	0.013	12:30	0.094	0.055	0.055	-
10/16/2020	03:35	1.45	13:10	2.94	2.36	03:25	0.33	14:40	0.94	0.72	03:30	0.010	13:05	0.080	0.049	0.049	-
10/17/2020	04:10	1.64	12:35	3.11	2.43	04:05	0.43	10:00	0.97	0.72	04:05	0.016	12:35	0.090	0.051	0.051	0.01
10/18/2020	04:10	1.56	18:15	3.23	2.49	04:25	0.30	18:10	1.00	0.71	04:25	0.011	18:10	0.098	0.053	0.053	0.03
10/19/2020	03:50	1.64	12:00	3.17	2.46	03:55	0.39	11:55	1.02	0.72	03:50	0.015	11:55	0.097	0.051	0.051	0.05
10/20/2020	03:35	1.53	19:40	3.14	2.38	04:20	0.34	19:40	1.02	0.71	03:30	0.012	19:40	0.097	0.049	0.049	-
10/21/2020	02:05	1.46	18:55	3.04	2.33	02:10	0.35	18:55	0.97	0.70	02:05	0.011	18:55	0.088	0.047	0.047	0.01
10/22/2020	03:45	1.47	11:25	2.98	2.33	02:05	0.38	11:35	0.94	0.70	03:45	0.012	11:35	0.082	0.046	0.046	-
10/23/2020	03:30	1.44	12:50	3.07	2.36	02:10	0.30	19:50	0.96	0.70	02:05	0.010	19:50	0.086	0.047	0.047	0.20
10/24/2020	06:45	1.73	09:05	3.07	2.36	06:35	0.47	09:10	0.99	0.71	06:45	0.019	09:10	0.091	0.047	0.047	0.02
10/25/2020	05:55	1.45	12:20	3.10	2.35	04:30	0.34	09:00	0.99	0.69	05:25	0.011	09:00	0.090	0.047	0.047	-
10/26/2020	01:20	1.78	12:50	3.06	2.41	00:45	0.49	12:50	1.02	0.74	00:50	0.021	12:50	0.093	0.051	0.051	-
10/27/2020	04:00	1.34	19:05	3.04	2.30	03:45	0.31	19:05	0.98	0.68	03:35	0.009	19:05	0.089	0.045	0.045	-
10/28/2020	03:35	1.50	16:15	3.02	2.33	03:30	0.32	16:15	0.99	0.69	03:30	0.011	16:15	0.089	0.046	0.046	-
10/29/2020	02:15	1.58	19:25	3.19	2.37	02:15	0.37	19:25	1.02	0.70	02:15	0.013	19:25	0.099	0.048	0.048	-
10/30/2020	04:30	1.55	10:10	3.00	2.41	02:35	0.38	18:35	0.96	0.72	04:30	0.013	18:35	0.084	0.049	0.049	0.10
10/31/2020	02:20	1.58	13:10	3.27	2.40	02:30	0.41	13:10	1.01	0.72	02:15	0.015	13:10	0.101	0.050	0.050	-
11/01/2020	03:45	1.45	19:10	3.23	2.38	03:20	0.28	19:10	0.99	0.71	03:50	0.011	19:10	0.097	0.050	0.050	-
11/02/2020	04:05	1.48	17:45	3.00	2.32	03:15	0.36	13:40	0.96	0.70	03:45	0.012	17:45	0.085	0.046	0.046	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/03/2020	03:50	1.44	10:30	3.46	2.47	03:45	0.35	10:30	1.08	0.76	03:45	0.011	10:30	0.117	0.056	0.056	0.83
11/04/2020	03:45	1.47	12:55	3.18	2.34	03:50	0.38	12:50	1.02	0.70	03:50	0.012	12:50	0.097	0.047	0.047	0.09
11/05/2020	04:30	1.53	13:10	3.09	2.42	04:35	0.39	13:10	0.98	0.74	04:35	0.013	13:10	0.091	0.052	0.052	0.34
11/06/2020	05:45	1.65	10:35	3.04	2.35	05:15	0.45	10:35	0.98	0.72	04:50	0.018	10:35	0.089	0.047	0.047	0.10
11/07/2020	03:35	1.49	15:20	3.15	2.38	03:20	0.40	15:10	0.98	0.73	03:15	0.014	15:15	0.093	0.049	0.049	0.07
11/08/2020	05:15	1.36	21:05	3.17	2.38	05:15	0.36	21:00	1.01	0.72	05:20	0.010	21:00	0.096	0.050	0.050	0.01
11/09/2020	05:15	1.39	19:45	3.10	2.32	05:15	0.35	19:45	1.00	0.71	05:15	0.010	19:45	0.093	0.047	0.047	0.04
11/10/2020	03:15	1.41	09:25	3.11	2.34	02:10	0.33	09:20	0.97	0.71	03:15	0.010	09:25	0.091	0.047	0.047	0.03
11/11/2020	03:45	1.41	15:45	3.02	2.32	03:15	0.37	15:45	0.96	0.71	03:25	0.011	15:45	0.086	0.047	0.047	-
11/12/2020	05:35	1.40	11:45	3.13	2.32	04:05	0.31	11:40	1.00	0.71	05:35	0.010	11:45	0.095	0.047	0.047	0.16
11/13/2020	01:55	1.67	13:05	3.38	2.44	01:55	0.47	13:00	1.04	0.75	01:55	0.018	13:00	0.108	0.051	0.051	0.38
11/14/2020	04:10	1.56	18:45	3.47	2.42	04:15	0.40	18:40	1.08	0.73	04:10	0.014	18:40	0.117	0.052	0.052	0.47
11/15/2020	08:20	1.45	12:50	3.39	2.39	06:10	0.36	12:50	1.05	0.73	04:25	0.012	12:50	0.110	0.051	0.051	0.19
11/16/2020	02:30	1.65	13:30	3.43	2.41	03:50	0.46	13:20	1.07	0.74	02:25	0.018	13:25	0.114	0.051	0.051	0.31
11/17/2020	05:05	1.44	16:20	3.18	2.40	04:55	0.41	19:05	1.00	0.73	05:00	0.013	19:05	0.096	0.050	0.050	0.20
11/18/2020	03:45	1.46	17:50	3.23	2.42	03:50	0.37	11:35	1.00	0.73	03:35	0.012	17:50	0.099	0.052	0.052	0.30
11/19/2020	02:30	1.64	13:05	3.49	2.48	02:25	0.44	13:00	1.09	0.75	02:20	0.017	13:00	0.119	0.054	0.054	0.50
11/20/2020	05:10	1.80	16:20	2.98	2.44	05:25	0.50	11:00	0.94	0.74	05:05	0.022	11:00	0.081	0.051	0.051	0.01
11/21/2020	01:55	1.58	12:25	3.13	2.41	01:55	0.45	12:15	0.98	0.73	01:55	0.016	12:20	0.091	0.051	0.051	-
11/22/2020	05:45	1.52	13:05	3.17	2.41	03:30	0.41	13:10	0.99	0.72	05:15	0.014	13:10	0.094	0.050	0.050	0.21
11/23/2020	04:40	1.45	17:30	3.03	2.42	04:40	0.35	17:30	0.93	0.73	04:40	0.011	17:30	0.084	0.050	0.050	0.14
11/24/2020	05:05	1.59	16:15	3.24	2.41	05:00	0.44	16:10	0.99	0.72	04:55	0.016	16:15	0.098	0.050	0.050	0.21
11/25/2020	04:30	1.59	20:15	3.03	2.39	04:25	0.42	20:20	0.93	0.71	04:25	0.015	20:15	0.083	0.048	0.048	0.05
11/26/2020	05:55	1.71	13:15	3.14	2.38	05:45	0.39	13:10	0.98	0.70	05:45	0.016	13:15	0.093	0.048	0.048	0.02
11/27/2020	05:05	1.62	13:30	3.15	2.43	05:05	0.39	13:25	0.97	0.69	05:05	0.014	13:30	0.092	0.048	0.048	-
11/28/2020	05:55	1.63	13:15	3.19	2.40	05:35	0.39	13:10	1.00	0.69	05:30	0.015	13:10	0.096	0.047	0.047	0.05
11/29/2020	05:40	1.59	13:05	3.04	2.42	05:55	0.40	15:20	0.95	0.70	04:30	0.015	15:20	0.085	0.049	0.049	-
11/30/2020	03:05	1.63	14:25	3.01	2.47	03:15	0.43	21:40	0.94	0.74	03:15	0.016	18:55	0.083	0.052	0.052	0.36
12/01/2020	01:35	1.46	17:30	3.05	2.33	01:30	0.36	19:35	0.98	0.70	01:35	0.011	17:35	0.087	0.046	0.046	-
12/02/2020	03:45	1.25	20:50	3.06	2.33	03:40	0.33	20:50	0.96	0.69	03:35	0.009	20:50	0.088	0.046	0.046	0.01
12/03/2020	03:45	1.48	13:50	3.09	2.33	03:45	0.43	13:45	1.00	0.69	03:45	0.014	13:50	0.092	0.045	0.045	-
12/04/2020	03:55	1.59	20:55	2.96	2.30	03:50	0.42	19:25	0.92	0.69	03:50	0.015	20:55	0.080	0.044	0.044	-
12/05/2020	03:50	1.55	12:05	3.03	2.33	03:50	0.41	12:10	0.96	0.70	03:50	0.014	12:10	0.086	0.046	0.046	0.03
12/06/2020	03:15	1.53	13:10	3.50	2.40	03:15	0.41	12:50	1.02	0.72	03:15	0.014	13:10	0.113	0.050	0.050	0.03
12/07/2020	03:25	1.25	19:50	3.12	2.34	03:20	0.25	13:10	1.02	0.70	03:20	0.007	13:10	0.094	0.047	0.047	-
12/08/2020	04:55	1.50	19:55	3.37	2.54	04:55	0.40	19:50	1.06	0.77	04:55	0.013	19:55	0.110	0.058	0.058	0.87
12/09/2020	06:05	1.47	12:50	3.06	2.48	06:05	0.40	12:50	0.97	0.76	06:05	0.013	12:50	0.088	0.053	0.053	0.17
12/10/2020	04:00	1.49	23:25	3.46	2.41	03:55	0.40	13:05	1.05	0.69	04:00	0.013	23:20	0.110	0.048	0.048	0.07
12/11/2020	04:20	1.28	16:30	3.08	2.39	04:15	0.29	11:00	0.92	0.71	04:15	0.008	11:00	0.084	0.048	0.048	0.02
12/12/2020	05:50	1.44	20:40	3.45	2.35	05:50	0.37	20:40	1.02	0.69	05:45	0.012	20:40	0.110	0.046	0.046	0.01
12/13/2020	05:10	1.95	12:20	3.37	2.52	03:30	0.53	12:15	0.99	0.75	03:30	0.027	12:15	0.103	0.054	0.054	0.24
12/14/2020	03:50	1.56	12:40	3.15	2.37	03:25	0.42	12:30	0.95	0.70	03:15	0.015	12:40	0.091	0.047	0.047	0.05
12/15/2020	05:10	1.64	16:30	3.73	2.60	03:25	0.36	16:30	1.07	0.75	03:45	0.016	16:30	0.128	0.058	0.058	0.58
12/16/2020	04:50	1.79	17:35	3.39	2.66	04:30	0.53	17:30	0.98	0.77	04:30	0.023	17:40	0.103	0.061	0.061	0.39
12/17/2020	03:55	1.92	13:05	3.37	2.59	03:45	0.56	13:00	0.99	0.77	03:45	0.027	13:05	0.104	0.058	0.058	0.08
12/18/2020	03:05	1.76	19:40	3.32	2.53	03:20	0.51	19:30	0.97	0.75	03:20	0.021	19:40	0.099	0.054	0.054	0.25
12/19/2020	06:50	1.73	20:35	3.52	2.63	06:55	0.48	20:35	1.00	0.77	06:45	0.020	20:35	0.110	0.060	0.060	0.37
12/20/2020	05:40	2.05	11:30	3.36	2.66	05:45	0.61	12:45	1.02	0.79	05:40	0.032	12:45	0.103	0.061	0.061	0.04
12/21/2020	02:10	2.05	18:45	4.66	3.18	02:10	0.60	18:35	1.26	0.93	02:10	0.031	18:45	0.202	0.095	0.095	1.07
12/22/2020	23:10	2.59	00:00	3.52	3.05	21:45	0.78	13:10	1.05	0.92	23:10	0.056	13:15	0.114	0.084	0.084	-
12/23/2020	05:15	2.11	12:40	3.32	2.71	05:25	0.58	12:40	1.05	0.81	05:10	0.032	12:40	0.107	0.064	0.064	-
12/24/2020	04:45	1.69	12:25	3.22	2.55	04:45	0.41	12:25	1.00	0.76	04:45	0.016	12:25	0.098	0.056	0.056	-
12/25/2020	04:00	1.76	18:35	3.27	2.52	03:45	0.50	18:35	1.00	0.76	03:50	0.021	18:35	0.100	0.055	0.055	0.49
12/26/2020	04:25	1.90	13:10	3.12	2.53	06:30	0.53	12:05	0.97	0.76	06:30	0.025	12:05	0.091	0.055	0.055	0.02
12/27/2020	05:10	1.60	12:30	3.48	2.59	05:10	0.43	12:30	0.98	0.74	05:10	0.015	12:30	0.107	0.057	0.057	0.13
12/28/2020	05:00	1.71	13:05	3.24	2.50	05:00	0.48	12:55	0.95	0.74	05:00	0.019	13:05	0.094	0.053	0.053	-
12/29/2020	05:20	1.54	19:10	3.30	2.54	05:20	0.43	19:10	0.95	0.75	05:20	0.015	19:10	0.096	0.056	0.056	0.14
12/30/2020	01:05	2.20	13:40	3.92	3.15	02:10	0.64	17:25	1.08	0.88	01:05	0.038	13:40	0.136	0.087	0.087	0.78
12/31/2020	07:00	2.71	12:50	3.75	3.18	21:10	0.74	11:55	1.07	0.89	06:25	0.058	11:55	0.128	0.086	0.086	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			12.854	30.65
Average	2.73	0.76	0.063	

Auburn.TFM.WA20-22		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	AUB_A9_71031

Site Address /Location:	Frank Fulmer Park			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	Entrance on 5th St NE	Latitude:	47.313160°	Pipe Size (H x W): 10 x 10	Pipe Shape: Circular
		Longitude:	-122.214022°		



Manhole #	System Characteristics
710-31	Residential
Access	Traffic
Drive	None







Installation Information

Installation Date:	Installation Type:
Thursday, September 24, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	Pipe Size (HxW)
10:46:00 AM	10 x 10
Depth of Flow (Wet DOF) (in)	
3.13	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.64	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
1.15	N/A
Silt (in)	Silt Type
0	

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
PVC	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

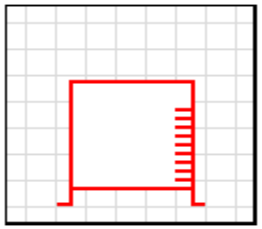
ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519

Hydrograph Report

AUB_RG

Rain Gauge

AUB_RG



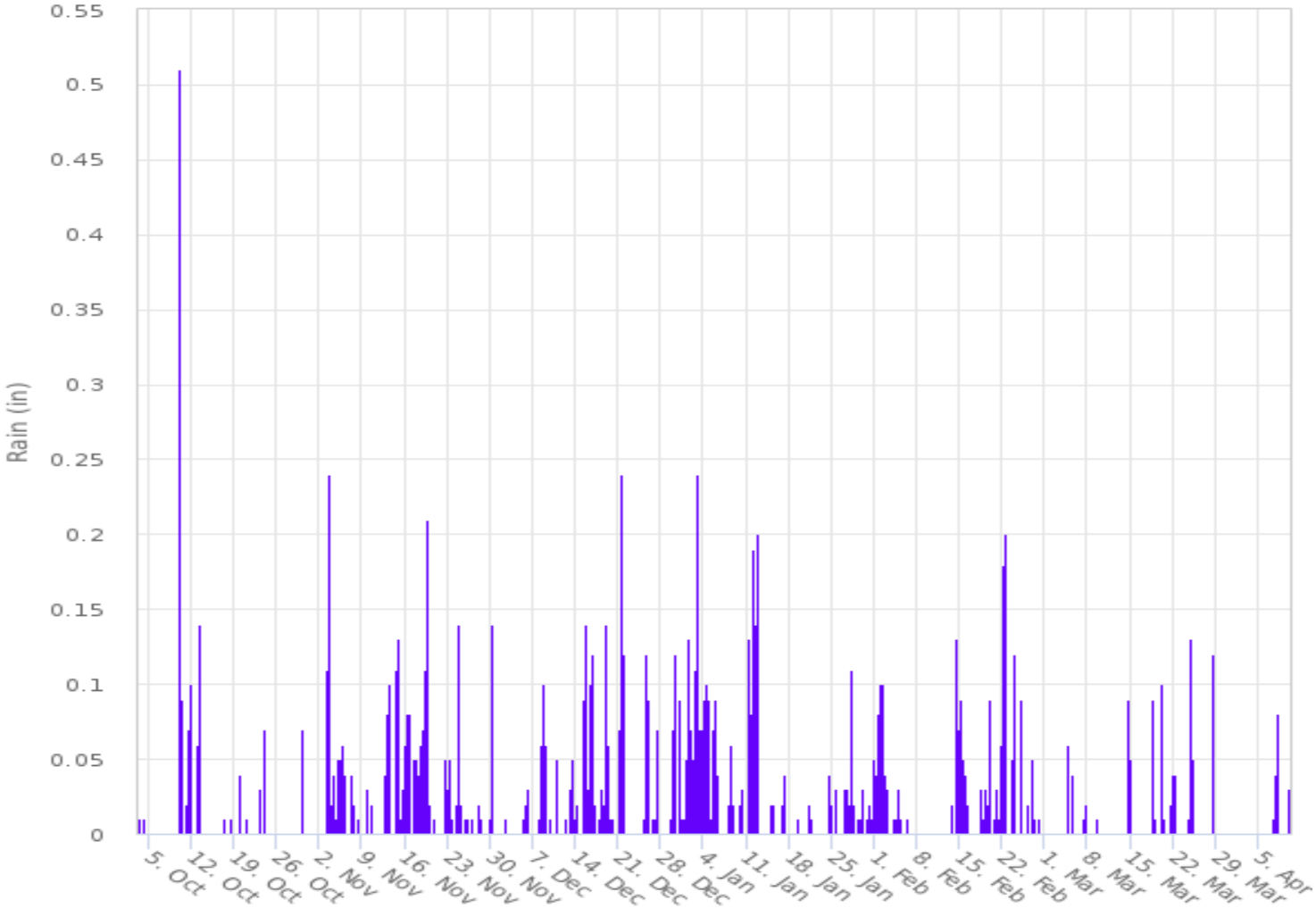
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

AUB_Y-1_41016

Site Commentary

SITE INFORMATION

Pipe	Elliptical (17.63 in H x 18 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

This site experienced surcharge events during the month of January.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	5.58	1.36	0.421
Minimum	3.79	0.49	0.088
Maximum	23.30	2.25	0.907
Min Time	10/21/2020 3:00:00 AM	09/22/2020 3:00:00 AM	09/22/2020 3:00:00 AM
Max Time	01/12/2021 9:00:00 PM	02/23/2021 10:00:00 PM	01/12/2021 9:00:00 PM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

Hydrograph Report

AUB_Y-1_41016

Flow Monitor

AUB_Y-1_41016

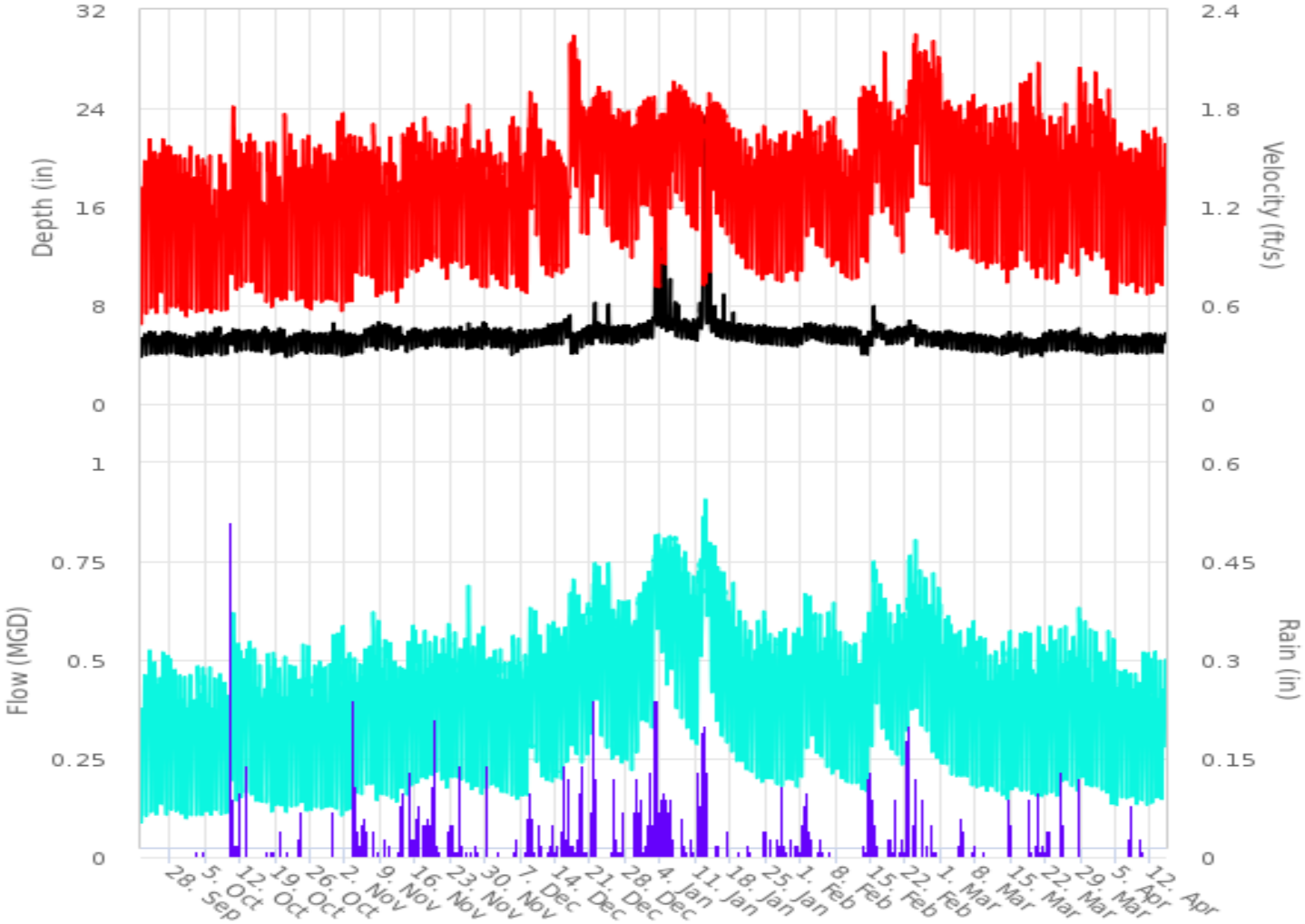
Pipe Height
17.63
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_Y-1_41016

Flow Monitor

AUB_Y-1_41016

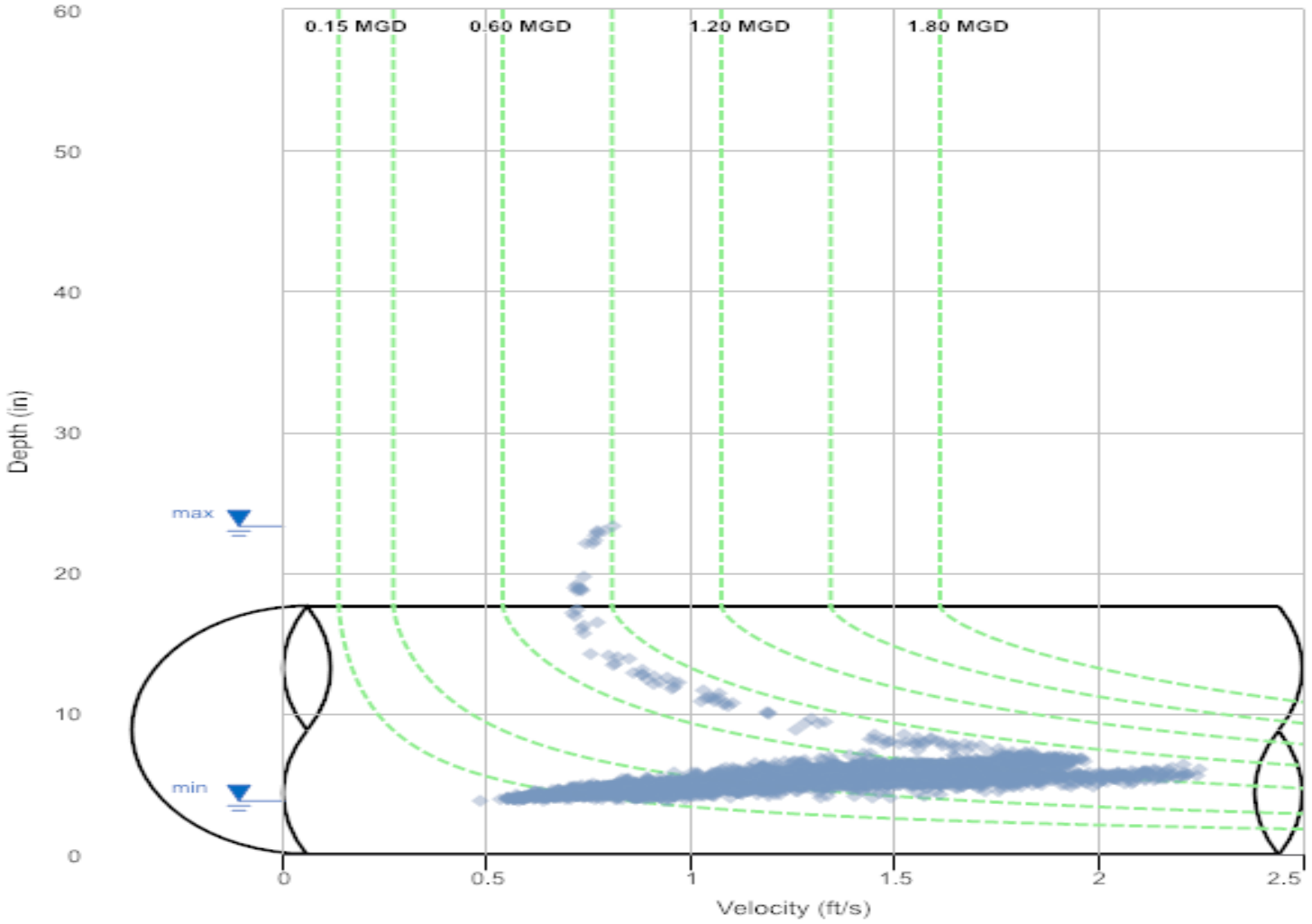
Pipe Height
17.63
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_Y-1_41016Pipe: Elliptical (17.63 in H x 18 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	06:20	5.13	16:20	6.86	6.12	04:50	0.98	12:10	1.92	1.60	04:50	0.269	13:25	0.762	0.563	0.563	0.51
01/02/2021	05:35	5.13	22:35	19.58	8.24	23:30	0.70	15:05	1.92	1.40	05:35	0.265	22:40	0.817	0.615	0.615	1.69
01/03/2021	06:30	6.30	14:15	19.43	12.12	12:05	0.69	08:55	1.86	1.10	06:40	0.550	13:15	0.829	0.738	0.738	0.65
01/04/2021	03:55	5.97	20:50	14.44	9.23	20:50	0.82	00:55	1.86	1.31	03:55	0.461	17:30	0.832	0.719	0.719	0.48
01/05/2021	04:10	5.71	21:10	10.60	6.99	21:10	1.14	17:00	1.97	1.64	04:45	0.376	19:35	0.841	0.674	0.674	0.52
01/06/2021	04:10	5.86	21:10	9.15	6.79	03:45	1.29	12:15	2.04	1.73	03:25	0.427	18:15	0.854	0.688	0.688	0.22
01/07/2021	05:00	5.29	10:50	8.69	6.36	04:45	1.14	18:35	1.97	1.69	05:00	0.321	10:15	0.833	0.621	0.621	-
01/08/2021	04:45	5.13	18:45	7.08	6.14	04:45	1.02	18:25	1.98	1.66	04:45	0.276	18:25	0.808	0.585	0.585	0.22
01/09/2021	04:55	5.05	12:25	6.80	6.08	04:55	0.96	11:10	1.91	1.57	04:55	0.256	11:40	0.755	0.546	0.546	-
01/10/2021	06:00	5.00	12:55	7.21	6.06	04:50	0.91	11:25	1.87	1.53	06:00	0.237	12:35	0.736	0.532	0.532	0.07
01/11/2021	03:30	4.89	19:00	8.74	6.40	03:30	0.88	15:20	1.88	1.53	03:30	0.224	21:40	0.789	0.577	0.577	1.06
01/12/2021	02:20	5.95	20:55	23.57	14.73	14:50	0.70	07:30	1.88	1.08	02:40	0.459	21:00	0.933	0.748	0.748	2.10
01/13/2021	04:05	6.46	00:00	18.48	9.23	00:10	0.72	15:10	1.96	1.42	05:30	0.593	18:05	0.865	0.736	0.736	0.09
01/14/2021	04:40	5.67	19:25	8.79	6.67	04:25	1.17	18:50	1.92	1.63	04:25	0.367	18:50	0.818	0.638	0.638	0.01
01/15/2021	03:50	5.34	19:50	7.13	6.27	04:05	0.98	19:25	1.92	1.57	04:05	0.284	19:45	0.760	0.569	0.569	0.09
01/16/2021	05:50	5.10	13:45	9.14	6.32	05:50	0.93	17:35	1.86	1.44	05:50	0.249	12:25	0.754	0.528	0.528	-
01/17/2021	05:30	5.04	11:45	6.70	6.03	05:30	0.85	11:45	1.80	1.43	05:30	0.225	11:45	0.701	0.492	0.492	0.10
01/18/2021	04:35	4.96	12:30	7.76	6.06	03:55	0.83	11:40	1.80	1.40	04:35	0.214	12:05	0.730	0.488	0.488	-
01/19/2021	04:00	4.83	17:25	6.57	5.98	04:00	0.74	11:25	1.76	1.37	04:00	0.185	17:50	0.655	0.470	0.470	0.01
01/20/2021	05:00	4.93	20:55	6.53	5.91	05:00	0.75	19:55	1.66	1.31	05:00	0.192	20:55	0.623	0.437	0.437	-
01/21/2021	04:20	4.90	21:00	6.49	5.92	03:10	0.67	19:15	1.62	1.29	03:10	0.170	20:55	0.598	0.433	0.433	0.11
01/22/2021	04:15	4.83	20:25	6.40	5.78	04:15	0.68	20:25	1.72	1.26	05:05	0.169	20:25	0.629	0.409	0.409	-
01/23/2021	05:10	4.57	11:25	6.42	5.78	05:10	0.58	11:25	1.70	1.29	05:10	0.135	11:25	0.624	0.423	0.423	-
01/24/2021	04:35	4.59	13:20	6.54	5.81	04:35	0.61	14:00	1.78	1.34	05:25	0.140	13:20	0.666	0.447	0.447	0.16
01/25/2021	04:35	4.65	20:10	6.32	5.72	04:35	0.63	20:10	1.71	1.31	04:35	0.148	20:10	0.617	0.420	0.420	0.04
01/26/2021	04:20	4.46	20:25	6.30	5.65	03:50	0.59	20:25	1.71	1.27	03:50	0.131	20:25	0.613	0.402	0.402	-
01/27/2021	04:30	4.56	18:40	6.45	5.64	04:30	0.61	18:40	1.82	1.29	04:30	0.141	18:40	0.673	0.405	0.405	0.14
01/28/2021	03:55	4.42	20:35	6.29	5.60	03:25	0.56	21:15	1.75	1.30	03:25	0.124	21:15	0.628	0.405	0.405	0.24
01/29/2021	04:10	4.41	11:55	6.06	5.56	04:10	0.61	13:25	1.62	1.28	04:10	0.133	13:25	0.549	0.396	0.396	0.03
01/30/2021	06:20	4.36	12:50	6.23	5.59	05:00	0.59	10:15	1.74	1.31	05:00	0.128	12:35	0.599	0.413	0.413	0.07
01/31/2021	05:35	4.38	11:25	6.32	5.64	05:35	0.58	11:25	1.77	1.32	05:35	0.126	11:25	0.640	0.422	0.422	0.12
02/01/2021	03:10	4.53	19:45	6.55	5.74	03:10	0.65	19:00	1.86	1.38	03:10	0.148	19:00	0.695	0.450	0.450	0.82
02/02/2021	04:10	4.95	21:30	6.64	6.00	04:10	0.88	20:50	1.79	1.48	04:10	0.228	20:50	0.684	0.504	0.504	0.31
02/03/2021	03:15	5.15	21:10	6.54	5.99	04:20	0.89	21:50	1.71	1.42	03:15	0.245	21:50	0.645	0.482	0.482	0.06
02/04/2021	03:20	5.00	20:15	6.50	5.87	03:20	0.80	20:55	1.80	1.38	03:55	0.209	20:55	0.664	0.455	0.455	0.07
02/05/2021	03:55	4.82	18:55	6.30	5.75	03:55	0.70	18:30	1.66	1.36	03:55	0.173	18:55	0.597	0.437	0.437	0.01
02/06/2021	05:40	4.69	11:55	6.42	5.75	04:35	0.72	13:50	1.76	1.39	05:40	0.172	14:00	0.644	0.451	0.451	0.01
02/07/2021	05:20	4.61	12:40	6.51	5.75	05:20	0.65	12:40	1.78	1.37	05:20	0.151	12:40	0.668	0.447	0.447	-
02/08/2021	04:05	4.65	19:35	6.33	5.71	03:25	0.70	20:35	1.64	1.31	03:25	0.166	20:00	0.589	0.419	0.419	-
02/09/2021	03:25	4.52	20:55	6.37	5.63	03:25	0.65	19:40	1.63	1.25	03:25	0.147	20:55	0.595	0.393	0.393	-
02/10/2021	04:10	4.48	19:35	6.33	5.66	04:10	0.59	19:30	1.56	1.22	04:10	0.133	19:35	0.563	0.385	0.385	-
02/11/2021	04:15	4.46	20:45	6.28	5.62	04:15	0.59	20:45	1.65	1.22	04:15	0.131	20:45	0.590	0.381	0.381	-
02/12/2021	04:15	4.40	19:50	6.12	5.40	04:15	0.56	20:15	1.99	1.28	04:15	0.122	19:55	0.541	0.374	0.374	-
02/13/2021	05:05	3.82	19:05	5.75	4.92	04:35	0.72	21:20	2.08	1.54	05:05	0.128	13:35	0.607	0.408	0.408	0.08
02/14/2021	05:55	3.74	13:20	5.96	5.11	06:25	0.65	13:20	1.97	1.49	06:25	0.114	13:20	0.656	0.420	0.420	0.71
02/15/2021	04:00	4.50	14:15	8.37	6.00	04:00	0.88	12:25	2.00	1.61	04:00	0.199	21:45	0.787	0.560	0.560	0.78
02/16/2021	04:00	5.19	20:30	6.64	6.04	03:45	1.16	20:15	1.88	1.65	03:45	0.322	20:30	0.723	0.562	0.562	0.07
02/17/2021	14:45	5.06	13:45	6.53	5.76	03:30	0.98	14:35	2.21	1.62	03:30	0.260	20:50	0.707	0.514	0.514	-
02/18/2021	04:10	4.51	21:05	6.15	5.51	04:10	0.92	21:05	1.97	1.60	04:10	0.208	21:05	0.683	0.484	0.484	0.09
02/19/2021	04:50	4.61	19:55	6.19	5.59	04:50	0.89	19:50	1.82	1.49	04:50	0.208	19:55	0.636	0.462	0.462	0.17
02/20/2021	05:00	4.67	12:40	6.36	5.69	06:00	0.81	10:50	1.85	1.45	06:00	0.193	12:40	0.670	0.463	0.463	0.07
02/21/2021	05:10	4.63	11:25	6.29	5.72	04:05	0.74	11:15	1.82	1.45	05:10	0.175	13:30	0.648	0.469	0.469	0.42
02/22/2021	03:40	4.93	13:55	7.02	6.08	03:20	0.96	19:25	2.01	1.65	03:20	0.252	20:45	0.799	0.578	0.578	0.98
02/23/2021	16:00	5.27	21:15	6.72	5.85	02:40	1.07	20:40	2.32	1.81	02:55	0.306	21:05	0.865	0.589	0.589	0.27
02/24/2021	03:15	4.50	19:50	6.14	5.48	03:15	1.27	10:20	2.24	1.94	03:15	0.286	19:50	0.760	0.582	0.582	-
02/25/2021	03:50	4.65	17:55	6.15	5.53	02:45	1.13	18:45	2.27	1.79	03:50	0.267	19:10	0.753	0.542	0.542	0.18
02/26/2021	04:20	4.49	09:15	5.88	5.34	04:20	1.08	09:35	2.20	1.79	04:20	0.243	09:15	0.698	0.519	0.519	0.10
02/27/2021	04:35	4.49	11:45	6.01	5.38	05:45	0.98	11:40	2.31	1.74	05:45	0.220	11:40	0.772	0.514	0.514	0.02
02/28/2021	05:00	4.50	11:30	6.03	5.40	05:00	0.81	11:30	2.19	1.70	05:00	0.183	11:30	0.740	0.504	0.504	0.02
03/01/2021	03:50	4.19	20:10	6.06	5.27	03:50	0.83	20:10	1.96	1.55	03:50	0.170	20:10	0.667	0.443	0.443	-
03/02/2021	02:45	4.27	10:05	6.28	5.29	02:45	0.83	10:05	1.99	1.51	02:45	0.173	10:05	0.713	0.435	0.435	-
03/03/2021	04:00	4.15	18:45	5.88	5.24	04:00	0.69	21:20	1.89	1.45	04:00	0.139	19:10	0.613	0.411	0.411	-
03/04/2021	04:00	4.15	19:40	6.02	5.17	04:00	0.66	20:00	1.97	1.47	04:00	0.132	19:40	0.662	0.410	0.410	0.20
03/05/2021	03:50	4.12	19:55	5.82	5.17	03:50	0.73	18:55	1.86	1.47	03:50	0.145	20:25	0.580	0.412	0.412	0.05
03/06/2021	06:20	4.10	10:15	5.93	5.17	05:30	0.73	10:15	2.01	1.50	05:30	0.144	10:15	0.665	0.423	0.423	-
03/07/2021	06:00	3.98	10:50	5.88	5.16	04:40	0.67	11:35	2.01	1.50	04:40	0.127	11:35	0.654	0.424	0.424	0.04
03/08/2021	04:25	3.99	19:50	5.87	5.07	04:25	0.68	20:15	1.94	1.43	04:25	0.130	20:40	0.631	0.392	0.392	-
03/09/2021	04:10	3.97	19:45	5.70	5.03	04:10	0.65	09:00	1.96	1.43	04:10	0.122	09:00	0.605	0.385	0.385	0.01
03/10/2021	04:20	3.92	19:40	5.63	4.99	04:20	0.60	19:40	1.91	1.37	04:20	0.110	19:40	0.588	0.365	0.365	-
03/11/2021	04:10	3.96	19:35	5.57	4.95	04:10	0.63	21:30	1.98	1.41	04:10	0.119	21:30	0.589	0.372	0.372	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	04:20	3.73	20:00	5.55	4.85	04:20	0.59	19:05	1.96	1.44	04:20	0.101	20:00	0.591	0.370	0.370	-
03/13/2021	05:15	3.72	11:10	5.71	4.89	04:40	0.61	14:40	2.02	1.45	04:40	0.105	11:10	0.625	0.381	0.381	-
03/14/2021	04:40	3.85	13:00	6.03	5.22	04:40	0.59	20:00	1.99	1.38	04:40	0.106	19:35	0.643	0.399	0.399	0.30
03/15/2021	03:00	3.98	20:20	5.78	5.09	02:55	0.63	20:20	1.89	1.36	02:55	0.119	20:20	0.601	0.374	0.374	-
03/16/2021	03:05	4.04	20:10	5.94	5.15	03:05	0.62	20:30	2.18	1.37	03:05	0.120	20:30	0.683	0.381	0.381	-
03/17/2021	02:45	3.54	19:45	5.51	4.76	02:15	0.67	20:50	2.09	1.52	02:15	0.110	20:50	0.625	0.382	0.382	-
03/18/2021	03:05	3.80	15:50	5.44	4.83	03:05	0.65	19:05	2.16	1.49	03:05	0.116	19:05	0.634	0.380	0.380	0.11
03/19/2021	02:30	3.79	16:50	5.62	4.79	02:30	0.61	11:30	1.95	1.45	02:30	0.107	16:50	0.553	0.367	0.367	0.03
03/20/2021	03:55	3.84	11:30	5.43	4.86	04:25	0.53	10:35	2.27	1.52	04:25	0.096	10:45	0.648	0.394	0.394	0.17
03/21/2021	03:45	3.65	19:45	5.88	5.07	03:45	0.63	10:25	1.87	1.38	03:45	0.106	13:10	0.606	0.384	0.384	0.07
03/22/2021	03:00	4.00	20:05	6.08	5.22	03:55	0.58	20:05	1.82	1.30	03:55	0.112	20:05	0.621	0.371	0.371	0.11
03/23/2021	03:30	4.01	20:25	5.91	5.13	02:55	0.53	20:00	1.79	1.28	02:55	0.102	20:25	0.589	0.355	0.355	-
03/24/2021	02:25	3.99	20:40	6.05	5.15	02:25	0.54	20:40	1.84	1.29	02:25	0.102	20:40	0.625	0.362	0.362	0.34
03/25/2021	02:35	4.25	19:35	6.10	5.42	03:20	0.65	20:40	1.92	1.37	03:20	0.137	20:40	0.623	0.407	0.407	0.27
03/26/2021	02:25	4.10	18:45	5.96	5.28	02:25	0.74	11:30	1.84	1.40	02:25	0.146	11:30	0.591	0.402	0.402	-
03/27/2021	03:20	4.11	11:40	6.03	5.34	03:20	0.62	11:40	1.80	1.36	03:20	0.122	11:40	0.607	0.400	0.400	-
03/28/2021	04:25	3.98	13:05	6.34	5.26	04:25	0.58	13:30	2.27	1.52	04:25	0.109	13:30	0.753	0.440	0.440	0.37
03/29/2021	03:30	4.04	19:55	5.77	5.00	03:30	0.73	20:45	2.06	1.57	03:30	0.141	19:55	0.649	0.419	0.419	-
03/30/2021	03:35	3.86	20:20	5.87	5.02	03:35	0.67	07:50	1.99	1.45	03:35	0.121	20:20	0.637	0.391	0.391	-
03/31/2021	03:15	3.88	16:55	5.70	4.98	02:45	0.61	19:40	2.16	1.44	02:45	0.113	19:40	0.631	0.383	0.383	-
04/01/2021	03:25	3.73	21:15	5.37	4.81	02:50	0.67	14:55	1.99	1.49	03:25	0.116	21:15	0.568	0.377	0.377	-
04/02/2021	03:15	3.75	20:25	5.46	4.86	02:45	0.66	18:00	1.95	1.46	02:45	0.115	18:00	0.553	0.376	0.376	-
04/03/2021	03:55	3.89	09:35	5.78	5.03	03:00	0.63	10:10	2.03	1.41	03:55	0.116	10:10	0.634	0.385	0.385	-
04/04/2021	03:20	3.81	13:05	5.92	5.12	03:20	0.48	09:55	1.87	1.31	03:20	0.085	10:00	0.609	0.369	0.369	-
04/05/2021	03:55	3.82	21:45	5.60	5.01	03:55	0.51	20:50	1.69	1.25	03:55	0.090	20:50	0.511	0.336	0.336	-
04/06/2021	03:35	3.91	20:25	5.72	5.08	03:35	0.55	08:50	1.66	1.25	03:35	0.102	20:05	0.504	0.341	0.341	-
04/07/2021	02:35	3.93	20:00	5.64	5.01	02:35	0.55	18:10	1.74	1.23	02:35	0.102	18:10	0.534	0.330	0.330	0.22
04/08/2021	02:55	3.93	20:05	5.71	5.01	02:55	0.54	20:05	1.69	1.24	02:55	0.101	20:05	0.530	0.335	0.335	-
04/09/2021	03:10	3.81	11:05	5.50	4.98	03:45	0.51	18:00	1.69	1.25	03:45	0.091	18:00	0.501	0.333	0.333	0.03
04/10/2021	03:55	3.84	11:10	5.83	5.03	04:25	0.54	10:35	1.78	1.28	04:25	0.097	10:35	0.573	0.348	0.348	0.02
04/11/2021	03:15	3.76	09:45	5.84	5.13	04:20	0.49	13:40	1.73	1.29	04:20	0.087	09:45	0.557	0.364	0.364	-
04/12/2021	03:40	3.82	20:35	5.79	5.07	03:05	0.50	20:30	1.79	1.25	03:05	0.090	20:35	0.570	0.342	0.342	-
04/13/2021	03:10	3.79	19:00	5.74	5.01	03:10	0.54	18:30	1.73	1.23	03:10	0.095	19:25	0.542	0.332	0.332	-
04/14/2021	02:40	3.80	20:50	5.85	5.11	02:40	0.51	19:30	1.71	1.22	02:40	0.090	20:25	0.550	0.338	0.337	-
09/22/2020	04:00	3.51	20:00	5.79	4.98	03:55	0.35	20:55	1.56	1.12	04:00	0.055	20:55	0.498	0.304	0.304	-
09/23/2020	02:45	3.57	20:05	6.01	5.09	03:25	0.37	19:15	1.72	1.19	03:25	0.060	19:15	0.573	0.334	0.334	-
09/24/2020	03:00	3.69	20:15	5.94	5.15	03:00	0.41	18:55	1.64	1.16	03:00	0.070	18:55	0.537	0.328	0.328	-
09/25/2020	04:00	3.72	19:55	5.73	5.07	02:40	0.42	19:55	1.66	1.24	02:40	0.073	19:55	0.524	0.340	0.340	-
09/26/2020	04:05	3.86	10:05	5.93	5.13	04:05	0.51	10:05	1.71	1.24	04:35	0.092	10:05	0.566	0.349	0.349	-
09/27/2020	03:45	3.77	11:40	6.02	5.17	03:45	0.42	09:25	1.70	1.20	03:45	0.074	09:25	0.569	0.344	0.344	-
09/28/2020	03:05	3.76	20:10	5.82	5.07	03:05	0.41	20:10	1.60	1.14	03:05	0.071	20:10	0.514	0.314	0.314	-
09/29/2020	02:30	3.76	20:20	5.65	4.96	02:25	0.43	08:00	1.61	1.15	02:30	0.075	21:50	0.495	0.308	0.308	-
09/30/2020	03:00	3.62	20:15	5.71	4.96	03:00	0.39	11:30	1.60	1.16	03:00	0.064	11:30	0.493	0.311	0.311	-
10/01/2020	03:05	3.61	21:00	5.61	4.86	03:50	0.38	20:05	1.69	1.16	03:50	0.063	20:05	0.511	0.302	0.302	-
10/02/2020	02:50	3.44	08:45	5.56	4.92	02:50	0.40	20:00	1.52	1.14	02:50	0.061	20:00	0.458	0.302	0.302	-
10/03/2020	04:35	3.52	10:35	5.89	5.07	04:35	0.37	10:25	1.58	1.13	04:35	0.059	10:35	0.513	0.315	0.315	0.01
10/04/2020	04:45	3.49	11:50	5.92	5.14	04:45	0.37	14:20	1.59	1.15	04:45	0.058	14:20	0.521	0.330	0.330	0.01
10/05/2020	02:30	3.75	20:10	5.86	5.10	02:30	0.41	20:10	1.66	1.12	02:30	0.071	20:10	0.539	0.312	0.312	-
10/06/2020	02:20	3.69	20:00	6.32	5.28	02:20	0.42	19:15	1.39	1.01	02:20	0.071	20:25	0.489	0.296	0.296	-
10/07/2020	02:55	3.71	19:20	6.59	5.34	02:55	0.41	20:15	1.69	1.02	02:55	0.070	20:15	0.552	0.302	0.302	-
10/08/2020	02:55	3.53	20:00	5.72	4.95	02:55	0.38	21:15	1.63	1.12	02:55	0.061	21:15	0.511	0.301	0.301	-
10/09/2020	02:35	3.69	17:50	5.97	5.20	03:45	0.39	17:50	1.46	1.08	03:45	0.067	17:50	0.487	0.308	0.308	0.64
10/10/2020	04:40	4.46	10:50	6.18	5.51	04:40	0.66	10:50	1.91	1.38	04:40	0.147	10:50	0.668	0.421	0.421	1.04
10/11/2020	04:05	3.92	10:55	6.12	5.38	04:35	0.55	10:55	1.75	1.29	04:35	0.103	10:55	0.605	0.388	0.388	0.53
10/12/2020	03:15	4.00	19:05	6.14	5.32	02:45	0.58	19:05	1.66	1.24	02:45	0.111	19:05	0.576	0.364	0.364	-
10/13/2020	01:55	3.95	07:55	6.09	5.39	02:45	0.43	07:55	1.79	1.31	02:45	0.082	07:55	0.612	0.393	0.393	0.61
10/14/2020	03:10	4.00	19:20	6.02	5.28	02:40	0.58	18:55	1.66	1.25	03:10	0.110	18:55	0.561	0.361	0.361	-
10/15/2020	02:50	3.87	19:45	5.88	5.20	02:50	0.50	19:45	1.59	1.21	02:50	0.092	19:55	0.520	0.344	0.344	-
10/16/2020	03:40	3.91	19:30	6.45	5.52	02:05	0.50	08:15	1.33	1.06	02:05	0.093	19:35	0.462	0.327	0.327	-
10/17/2020	03:35	4.07	08:45	6.38	5.32	03:35	0.50	10:25	1.66	1.18	03:35	0.097	10:25	0.543	0.348	0.348	0.01
10/18/2020	04:50	3.75	11:10	5.97	5.17	04:10	0.44	13:00	1.73	1.22	04:10	0.079	11:10	0.571	0.351	0.351	0.03
10/19/2020	02:40	3.80	18:35	6.46	5.38	02:40	0.47	18:35	1.51	1.11	02:40	0.084	18:35	0.561	0.332	0.332	0.05
10/20/2020	03:10	3.79	16:50	6.59	5.23	03:10	0.45	18:20	1.94	1.16	03:10	0.080	18:20	0.558	0.330	0.330	-
10/21/2020	03:15	3.59	20:05	5.76	4.81	03:15	0.49	20:00	1.78	1.29	03:15	0.080	20:00	0.563	0.331	0.331	0.01
10/22/2020	03:40	3.60	20:00	5.82	4.91	02:30	0.47	20:00	1.69	1.22	03:40	0.077	20:00	0.546	0.323	0.323	-
10/23/2020	02:50	3.76	19:35	5.92	5.19	02:50	0.45	19:35	1.61	1.15	02:50	0.079	19:35	0.530	0.327	0.327	0.20
10/24/2020	04:35	3.88	11:15	6.06	5.28	04:35	0.45	10:00	1.69	1.19	04:35	0.082	10:00	0.568	0.351	0.351	0.02
10/25/2020	04:05	3.67	11:35	6.00	5.21	04:05	0.40	11:25	1.72	1.18	04:05	0.067	11:35	0.570	0.344	0.344	-
10/26/2020	04:15	3.88	18:35	5.84	5.11	02:25	0.42	18:35	1.67	1.18	02:25	0.078	18:35	0.539	0.329	0.329	-
10/27/2020	02:40	3.75	20:10	5.91	5.06	02:40	0.48	18:50	1.64	1.18	02:40	0.083	20:10	0.533	0.325	0.325	-
10/28/2020	02:45	3.73	20:05	5.85	5.09	02:45	0.43	20:05	1.59	1.18	02:45	0.074	20:05	0.514	0.328	0.328	-
10/29/2020	03:40	3.74	19:35	5.94	5.09	03:40	0.43	19:35	1.67	1.17	03:40	0.075	19:35	0.553	0.324	0.324	-
10/30/2020	03:15	3.77	13:45	8.61	5.16	03:15	0.46	13:35	1.93	1.21	03:15	0.081	13:35	0.803	0.343	0.343	0.10
10/31/2020	03:50	3.71	11:30	6.03	5.11	03:50	0.44	10:15	1.80	1.27	03:50	0.076	11:30	0.606	0.359	0.359	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/01/2020	04:55	3.54	10:05	6.05	5.13	04:55	0.38	11:15	1.93	1.29	04:55	0.062	11:15	0.655	0.371	0.371	-
11/02/2020	03:45	3.55	19:45	5.83	5.05	03:45	0.39	19:00	1.71	1.27	03:45	0.063	20:10	0.541	0.351	0.351	-
11/03/2020	03:55	3.70	18:15	5.87	5.08	03:55	0.44	19:20	1.75	1.31	03:55	0.074	18:15	0.559	0.363	0.363	0.83
11/04/2020	03:35	3.91	21:10	5.71	5.05	03:35	0.56	21:10	1.70	1.32	03:35	0.103	21:10	0.533	0.359	0.359	0.09
11/05/2020	04:10	3.76	21:05	6.14	5.23	04:10	0.52	10:15	1.70	1.29	04:10	0.092	21:50	0.571	0.371	0.371	0.34
11/06/2020	04:10	4.36	20:50	6.26	5.60	04:05	0.61	09:45	1.64	1.27	04:05	0.131	09:45	0.581	0.398	0.398	0.10
11/07/2020	05:25	4.24	10:40	6.48	5.66	04:50	0.54	13:15	1.83	1.29	04:50	0.114	13:15	0.681	0.415	0.415	0.07
11/08/2020	05:45	3.95	11:00	6.71	5.84	05:45	0.47	10:55	1.65	1.24	05:45	0.089	10:55	0.637	0.419	0.419	0.01
11/09/2020	05:00	4.14	21:20	6.60	5.82	03:55	0.48	21:00	1.54	1.15	03:55	0.097	21:00	0.586	0.386	0.386	0.04
11/10/2020	04:20	3.92	18:10	6.89	5.70	03:20	0.46	20:15	1.76	1.15	03:20	0.086	20:15	0.602	0.370	0.370	0.03
11/11/2020	04:50	4.07	21:05	6.41	5.45	03:45	0.52	12:45	1.58	1.21	03:45	0.103	21:05	0.568	0.369	0.369	-
11/12/2020	03:20	3.99	09:45	6.39	5.65	03:20	0.44	22:00	1.44	1.08	03:20	0.084	22:00	0.520	0.345	0.345	0.16
11/13/2020	03:15	4.45	07:35	6.46	5.24	03:10	0.57	09:25	1.77	1.32	03:10	0.128	07:35	0.612	0.370	0.370	0.38
11/14/2020	06:50	4.00	10:30	5.99	5.27	06:20	0.60	11:55	1.78	1.35	06:50	0.115	11:55	0.595	0.395	0.395	0.47
11/15/2020	05:40	4.22	12:05	6.21	5.50	05:10	0.66	12:50	1.79	1.37	05:40	0.135	12:50	0.620	0.424	0.424	0.19
11/16/2020	03:50	4.30	20:00	6.11	5.46	03:50	0.61	19:45	1.69	1.28	03:50	0.128	19:45	0.575	0.389	0.389	0.31
11/17/2020	04:05	4.42	20:05	5.99	5.33	04:05	0.63	20:05	1.79	1.37	04:05	0.139	20:05	0.599	0.399	0.399	0.20
11/18/2020	04:10	4.23	19:30	6.06	5.39	04:10	0.69	19:30	1.77	1.38	04:10	0.141	19:30	0.602	0.409	0.409	0.30
11/19/2020	03:55	4.45	22:10	6.20	5.58	02:45	0.73	22:10	1.67	1.32	02:50	0.164	22:10	0.586	0.411	0.411	0.50
11/20/2020	03:40	4.55	18:50	6.10	5.59	03:20	0.75	18:50	1.60	1.31	03:20	0.174	18:50	0.551	0.406	0.406	0.01
11/21/2020	04:35	4.26	11:25	6.24	5.58	04:35	0.62	12:55	1.66	1.31	04:35	0.129	13:20	0.585	0.410	0.410	-
11/22/2020	06:00	4.21	13:25	6.26	5.60	04:15	0.61	14:05	1.75	1.34	06:00	0.125	12:45	0.618	0.426	0.426	0.21
11/23/2020	03:25	4.27	19:30	6.15	5.52	03:25	0.65	19:30	1.76	1.36	03:25	0.137	19:30	0.613	0.417	0.417	0.14
11/24/2020	04:05	4.26	19:40	6.40	5.59	02:40	0.69	21:30	1.57	1.28	04:05	0.143	21:30	0.574	0.401	0.401	0.21
11/25/2020	04:05	4.29	08:55	6.24	5.46	05:15	0.61	11:35	1.78	1.38	05:15	0.130	08:55	0.625	0.416	0.416	0.05
11/26/2020	05:25	4.19	12:35	6.68	5.60	03:25	0.65	12:25	1.89	1.40	05:25	0.132	12:30	0.726	0.446	0.446	0.02
11/27/2020	05:45	4.22	13:15	6.23	5.47	05:45	0.61	12:00	1.62	1.24	05:45	0.125	12:00	0.561	0.378	0.378	-
11/28/2020	04:15	4.21	13:55	6.34	5.54	04:15	0.61	13:55	1.67	1.26	04:15	0.125	13:55	0.606	0.392	0.392	0.05
11/29/2020	05:50	4.13	13:10	6.68	5.82	05:50	0.55	12:55	1.56	1.19	05:50	0.110	12:45	0.601	0.399	0.399	-
11/30/2020	03:25	4.42	08:25	6.35	5.51	03:25	0.59	09:05	1.93	1.29	03:25	0.130	09:05	0.658	0.391	0.391	0.36
12/01/2020	04:15	4.19	20:55	6.25	5.49	04:15	0.59	21:35	1.60	1.24	04:15	0.120	20:55	0.562	0.377	0.377	-
12/02/2020	03:50	4.17	21:25	6.20	5.51	03:50	0.56	21:20	1.57	1.21	03:50	0.113	21:25	0.552	0.369	0.369	0.01
12/03/2020	04:45	4.16	21:15	6.14	5.47	05:10	0.54	21:15	1.62	1.19	05:10	0.112	21:15	0.560	0.361	0.361	-
12/04/2020	04:25	4.10	20:05	6.54	5.50	04:25	0.54	20:35	1.89	1.19	04:25	0.106	13:00	0.555	0.360	0.360	-
12/05/2020	04:15	3.79	11:55	5.90	5.11	04:15	0.60	11:35	1.81	1.38	04:15	0.105	11:55	0.587	0.385	0.385	0.03
12/06/2020	05:55	3.95	14:05	6.07	5.34	05:55	0.54	11:35	1.76	1.30	05:55	0.100	12:25	0.596	0.387	0.387	0.03
12/07/2020	04:10	4.26	20:30	6.11	5.42	03:45	0.52	20:30	1.62	1.19	03:45	0.108	20:30	0.557	0.358	0.358	-
12/08/2020	04:35	4.30	09:10	6.39	5.30	03:10	0.52	20:05	1.99	1.41	03:10	0.110	20:30	0.671	0.410	0.410	0.87
12/09/2020	03:55	4.41	20:30	6.15	5.43	04:25	0.93	20:30	1.90	1.56	04:25	0.208	20:30	0.659	0.464	0.464	0.17
12/10/2020	03:40	4.46	18:30	6.13	5.47	04:40	0.84	20:45	1.77	1.45	04:40	0.189	20:45	0.609	0.438	0.438	0.07
12/11/2020	04:05	4.46	18:20	6.20	5.64	04:05	0.67	20:15	1.59	1.29	04:05	0.149	20:15	0.555	0.404	0.404	0.02
12/12/2020	04:35	4.52	11:00	6.63	5.75	04:35	0.59	10:25	1.66	1.28	04:35	0.134	11:00	0.635	0.418	0.418	0.01
12/13/2020	05:30	4.46	11:40	6.62	5.81	06:10	0.61	11:40	1.67	1.28	05:30	0.138	11:40	0.639	0.424	0.424	0.24
12/14/2020	03:55	4.52	13:40	6.70	5.90	03:30	0.62	11:00	1.66	1.27	03:30	0.142	11:05	0.646	0.429	0.429	0.05
12/15/2020	03:50	4.42	20:10	6.97	6.05	03:50	0.62	09:50	1.52	1.22	03:50	0.135	20:05	0.616	0.428	0.428	0.58
12/16/2020	23:55	4.89	20:35	7.28	6.24	04:00	0.71	21:20	2.36	1.29	04:00	0.187	21:05	0.755	0.457	0.457	0.39
12/17/2020	03:20	3.83	09:45	5.91	5.09	04:35	1.16	12:50	2.32	2.00	04:35	0.211	11:20	0.748	0.546	0.546	0.08
12/18/2020	04:05	3.86	13:20	6.02	5.19	04:25	1.03	09:00	2.14	1.76	04:05	0.190	13:20	0.700	0.493	0.493	0.25
12/19/2020	04:10	4.34	18:20	6.19	5.52	05:10	0.82	11:25	1.89	1.51	05:10	0.175	11:30	0.653	0.465	0.465	0.37
12/20/2020	06:05	4.69	11:10	6.42	5.72	04:50	0.87	21:00	1.88	1.52	04:50	0.210	11:10	0.673	0.489	0.489	0.04
12/21/2020	04:30	4.60	21:20	8.94	6.15	04:30	1.06	22:45	1.98	1.62	04:30	0.246	21:55	0.776	0.571	0.571	1.07
12/22/2020	04:15	5.19	12:05	6.74	6.03	04:15	1.29	12:45	2.05	1.76	04:15	0.356	12:45	0.775	0.601	0.601	-
12/23/2020	04:00	4.83	11:50	6.50	5.86	04:00	1.05	15:45	1.95	1.67	04:00	0.261	11:50	0.715	0.551	0.551	-
12/24/2020	05:05	4.73	13:10	8.31	6.05	05:05	0.90	11:20	1.95	1.55	05:05	0.218	11:40	0.809	0.537	0.537	-
12/25/2020	05:35	4.63	12:35	6.37	5.76	05:35	0.75	11:50	1.83	1.49	05:35	0.175	12:35	0.647	0.484	0.484	0.49
12/26/2020	05:35	4.73	11:55	6.45	5.77	05:55	0.81	13:25	1.88	1.46	05:55	0.197	13:25	0.696	0.474	0.474	0.02
12/27/2020	05:40	4.62	13:25	6.44	5.79	05:40	0.76	15:25	1.89	1.46	05:40	0.178	15:25	0.697	0.480	0.480	0.13
12/28/2020	03:35	4.75	12:05	6.44	5.78	03:15	0.79	12:00	1.84	1.45	03:15	0.193	12:05	0.679	0.472	0.472	-
12/29/2020	04:25	4.59	20:10	6.30	5.64	04:25	0.73	11:35	1.76	1.38	04:25	0.169	20:10	0.618	0.434	0.434	0.14
12/30/2020	03:55	4.67	12:55	6.55	5.93	03:55	0.75	12:55	1.84	1.52	03:55	0.178	12:55	0.697	0.513	0.513	0.78
12/31/2020	03:55	5.15	17:20	6.67	6.06	03:55	1.10	11:45	1.95	1.60	03:55	0.298	17:15	0.744	0.552	0.552	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			86.275	30.65
Average	5.58	1.36	0.421	

Auburn.TFM.WA20-22

Flow Monitoring Site Report

ADS ENVIRONMENTAL SERVICES®

Site Name

AUB_Y-1_41016

Site Address /Location:	Green River Rd SE		
Site Access Details:	Park at Pump Station Along Green River	Latitude:	47.330137°
		Longitude:	-122.210973°

Monitor Series	Location Type
TRITON+	Temporary
Pipe Size (H x W)	Pipe Shape
17.63 x 18.00	Circular
Manhole #	System Characteristics
Y-1 (410-16)	Residential
Access	Traffic
Drive	None









ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519.22.325

Installation Information

Installation Date:	Installation Type:
Thursday, May 14, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW)
14:04:00 PM	17.63 x 18.00
Depth of Flow (Wet DOF) (in)	
4.63"	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
1.69	0"
Silt (in)	Silt Type
0.00"	

Hydraulic Comments:

Screen structure downstream

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
3	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
26	
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
PVC	Fair

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

Green River Siphon Downstream

AUB_Y-2_61102

Site Commentary

SITE INFORMATION

Pipe	Elliptical (14.25 in H x 14.5 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	3.10	9.02	1.095
Minimum	1.93	6.02	0.362
Maximum	5.82	11.70	2.995
Min Time	10/03/2020 3:00:00 AM	11/10/2020 4:00:00 AM	11/01/2020 4:00:00 AM
Max Time	01/03/2021 12:00:00 AM	01/12/2021 11:00:00 AM	01/03/2021 12:00:00 AM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

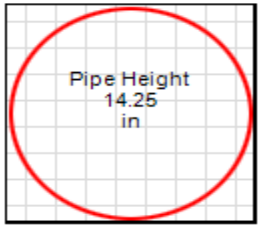
Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

Hydrograph Report

AUB_Y-2_61102

Flow Monitor

AUB_Y-2_61102



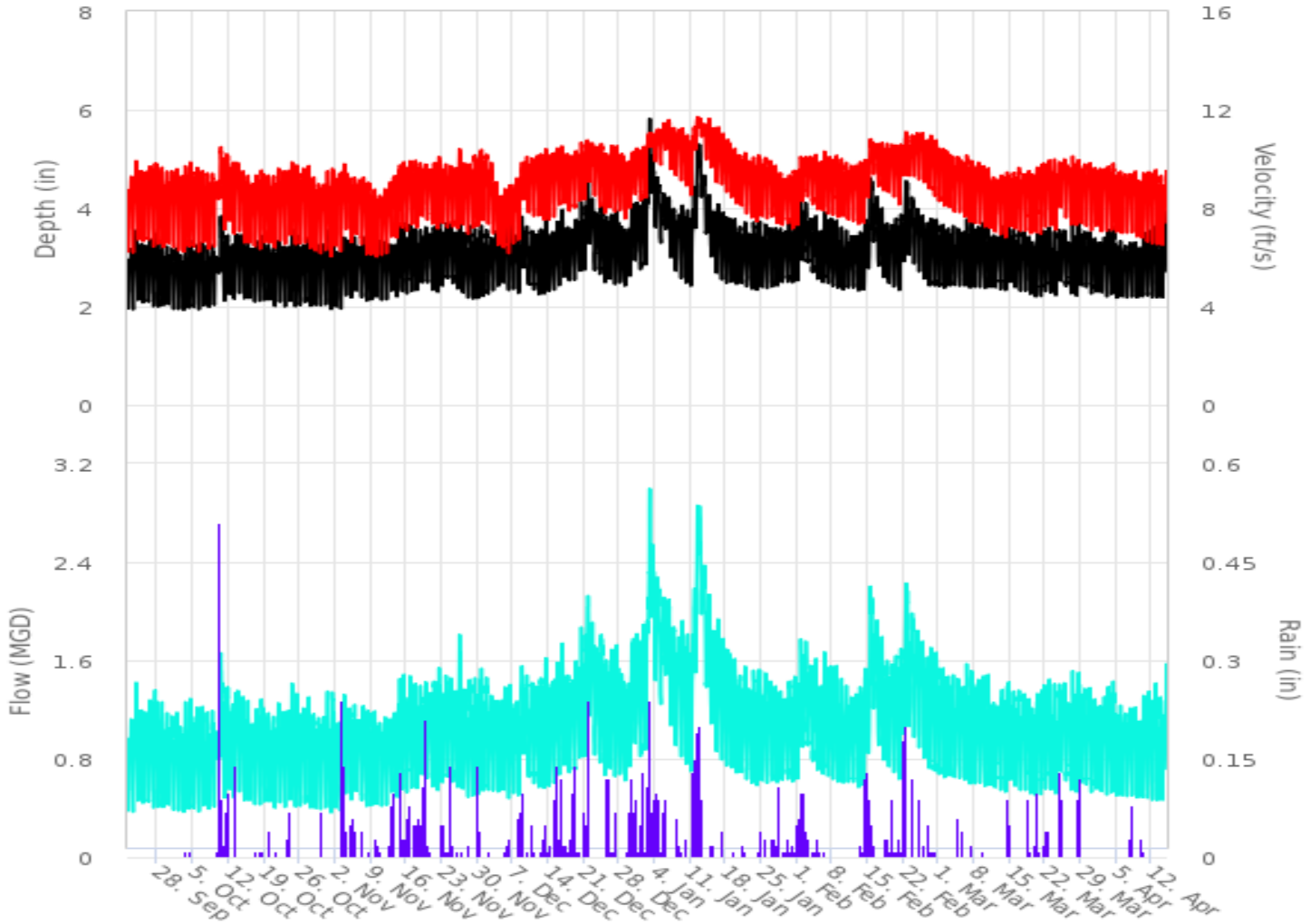
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

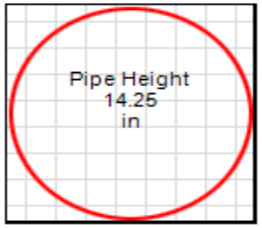
206-762-5070
www.adsenv.com

Scattergraph Report

AUB_Y-2_61102

Flow Monitor

AUB_Y-2_61102



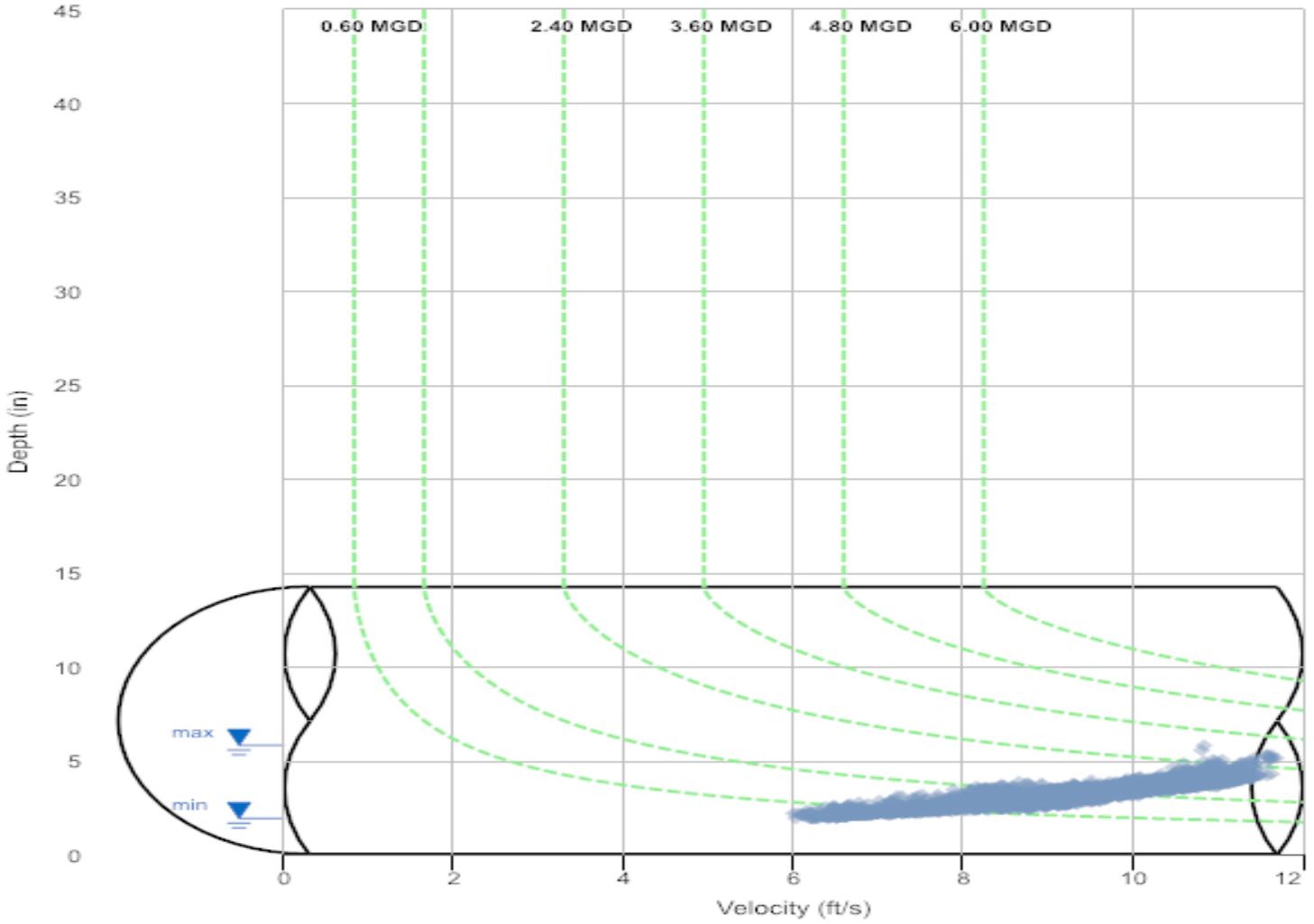
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_Y-2_61102Pipe: Elliptical (14.25 in H x 14.5 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	04:30	2.68	18:10	4.76	3.53	04:30	7.91	11:15	11.29	9.61	04:30	0.751	18:10	2.369	1.380	1.380	0.51
01/02/2021	04:05	2.78	23:55	7.63	3.87	04:05	8.11	21:25	11.52	9.97	04:05	0.812	23:55	3.936	1.641	1.641	1.69
01/03/2021	05:15	4.15	00:10	8.06	4.71	00:10	9.89	01:00	11.42	10.83	05:15	1.826	00:10	4.199	2.280	2.280	0.65
01/04/2021	03:50	3.43	17:55	5.11	4.23	03:50	9.69	15:25	11.49	10.75	03:50	1.306	13:35	2.664	1.955	1.955	0.48
01/05/2021	05:05	3.09	13:20	4.59	3.86	05:05	9.30	23:30	11.81	10.74	05:05	1.081	13:20	2.375	1.723	1.723	0.52
01/06/2021	02:05	3.50	19:45	4.61	3.95	02:35	10.10	18:00	11.93	11.10	03:20	1.428	18:00	2.422	1.835	1.835	0.22
01/07/2021	04:20	2.69	20:30	4.53	3.63	04:20	9.31	18:50	11.67	10.68	04:20	0.890	20:30	2.316	1.577	1.577	-
01/08/2021	02:05	2.58	18:15	4.34	3.45	02:05	8.98	14:40	11.64	10.49	02:05	0.810	18:15	2.152	1.444	1.444	0.22
01/09/2021	04:40	2.47	11:55	4.41	3.43	02:25	8.66	11:35	11.70	10.33	04:40	0.756	10:20	2.233	1.421	1.421	-
01/10/2021	04:35	2.42	12:20	4.47	3.32	05:40	8.58	15:35	11.51	10.10	05:40	0.707	12:20	2.248	1.329	1.329	0.07
01/11/2021	03:10	2.30	21:40	4.84	3.51	03:55	8.15	11:15	11.58	10.20	03:10	0.637	20:50	2.474	1.468	1.468	1.06
01/12/2021	02:15	3.51	19:45	6.03	4.71	01:10	10.26	09:05	12.03	11.28	02:15	1.441	19:45	3.461	2.392	2.392	2.10
01/13/2021	23:55	3.99	00:55	5.22	4.54	13:45	10.74	01:20	11.89	11.19	23:55	1.798	00:55	2.781	2.239	2.239	0.09
01/14/2021	03:55	3.15	00:15	4.73	3.92	03:40	9.62	18:45	11.95	10.93	03:55	1.169	00:15	2.395	1.791	1.791	0.01
01/15/2021	03:15	2.91	13:35	4.36	3.60	03:15	9.26	16:10	12.12	10.70	03:15	0.990	13:35	2.277	1.559	1.559	0.09
01/16/2021	04:10	2.48	12:05	4.80	3.48	05:45	8.63	10:00	11.97	10.37	04:10	0.760	12:05	2.578	1.456	1.456	-
01/17/2021	05:50	2.44	11:05	4.47	3.35	04:45	8.58	11:05	11.61	10.11	05:50	0.724	11:05	2.271	1.348	1.348	0.10
01/18/2021	04:40	2.22	12:40	4.42	3.29	04:40	8.10	11:15	11.54	9.89	04:40	0.587	12:40	2.199	1.287	1.287	-
01/19/2021	04:05	2.39	23:00	4.41	3.24	04:45	7.81	20:50	11.11	9.68	04:05	0.640	23:00	2.110	1.227	1.227	0.01
01/20/2021	03:20	2.34	15:55	4.31	3.14	02:55	7.34	17:20	11.49	9.49	03:20	0.604	17:20	2.136	1.148	1.148	-
01/21/2021	02:35	2.36	20:35	4.71	3.14	03:30	7.64	16:50	11.14	9.38	02:30	0.610	20:35	2.308	1.138	1.138	0.11
01/22/2021	03:40	2.28	18:45	4.30	3.07	03:30	7.27	12:15	10.96	9.21	03:40	0.554	18:45	1.956	1.082	1.082	-
01/23/2021	05:15	2.26	14:20	4.22	3.09	06:00	7.16	09:55	10.95	9.09	05:15	0.544	22:25	1.871	1.087	1.087	-
01/24/2021	04:10	2.13	20:20	4.33	3.17	04:10	6.35	10:20	10.94	9.17	04:10	0.432	10:20	2.017	1.144	1.144	0.16
01/25/2021	02:45	2.27	14:15	4.41	3.07	02:05	7.02	15:40	10.82	9.17	02:05	0.528	20:55	1.999	1.080	1.080	0.04
01/26/2021	04:25	2.23	20:55	4.48	3.05	04:25	7.13	20:55	10.83	9.05	04:25	0.520	20:55	2.125	1.054	1.054	-
01/27/2021	04:10	2.30	16:45	4.59	3.05	03:00	6.91	16:45	10.61	8.92	04:10	0.537	16:45	2.152	1.039	1.039	0.14
01/28/2021	04:50	2.34	13:40	4.58	3.15	04:50	6.96	12:20	10.47	8.76	04:50	0.545	13:40	2.092	1.067	1.067	0.24
01/29/2021	03:45	2.34	11:05	4.41	3.16	04:25	6.57	09:05	10.26	8.61	03:45	0.543	11:05	1.905	1.049	1.049	0.03
01/30/2021	05:05	2.43	12:45	4.44	3.18	05:05	6.92	08:40	9.85	8.61	05:05	0.569	12:45	1.892	1.067	1.067	0.07
01/31/2021	04:20	2.26	21:35	4.79	3.21	06:50	6.37	15:05	10.63	8.71	03:15	0.515	15:05	2.259	1.099	1.099	0.12
02/01/2021	03:45	2.46	21:05	5.04	3.34	03:50	7.06	18:20	10.61	8.99	03:50	0.593	21:05	2.388	1.200	1.200	0.82
02/02/2021	03:35	2.90	19:35	4.77	3.61	04:10	8.10	20:50	10.64	9.49	04:50	0.860	20:50	2.269	1.395	1.395	0.31
02/03/2021	05:10	2.76	10:40	4.47	3.46	04:05	8.22	17:15	10.90	9.53	05:10	0.836	17:40	2.059	1.317	1.317	0.06
02/04/2021	02:00	2.64	19:05	4.42	3.28	05:15	7.90	19:05	11.03	9.37	05:15	0.747	19:05	2.121	1.205	1.205	0.07
02/05/2021	01:10	2.48	15:25	4.30	3.19	03:00	7.60	15:25	10.74	9.29	04:00	0.673	15:25	1.987	1.148	1.148	0.01
02/06/2021	05:00	2.18	12:55	4.77	3.25	05:20	7.33	11:05	10.91	9.30	05:00	0.518	12:55	2.256	1.195	1.195	0.01
02/07/2021	05:50	2.32	11:20	4.53	3.19	05:50	7.27	20:35	10.62	9.20	05:50	0.562	11:20	2.081	1.149	1.149	-
02/08/2021	02:30	2.14	21:20	4.51	3.11	04:05	7.19	15:05	11.10	9.22	02:30	0.509	21:20	2.153	1.107	1.107	-
02/09/2021	03:25	2.31	11:25	4.51	3.03	04:05	7.15	22:00	10.94	9.12	03:25	0.551	11:25	2.046	1.054	1.054	-
02/10/2021	04:05	2.27	15:25	4.36	2.99	04:45	7.02	16:40	10.82	9.01	04:45	0.530	15:25	2.033	1.020	1.020	-
02/11/2021	03:30	2.28	15:55	4.42	2.99	03:30	6.97	15:55	10.86	8.93	03:30	0.525	15:55	2.089	1.010	1.010	-
02/12/2021	04:20	2.21	19:35	4.41	2.99	04:20	6.88	17:55	10.81	8.90	04:20	0.496	19:35	1.989	1.010	1.010	-
02/13/2021	05:55	2.21	12:05	4.22	2.99	05:55	6.44	14:55	10.92	8.89	05:55	0.464	12:05	1.899	1.013	1.013	0.08
02/14/2021	03:35	2.19	14:00	4.74	3.14	03:35	6.73	15:55	10.71	8.94	03:35	0.478	14:00	2.234	1.102	1.102	0.71
02/15/2021	04:00	2.69	13:15	5.08	3.80	04:15	8.07	13:15	11.27	9.90	04:00	0.773	13:15	2.626	1.594	1.594	0.78
02/16/2021	05:10	3.20	14:45	4.88	3.85	03:00	9.13	19:45	11.15	10.17	04:05	1.127	14:45	2.392	1.624	1.624	0.07
02/17/2021	04:20	2.79	20:05	4.69	3.46	03:35	8.67	15:20	11.31	9.95	04:20	0.875	20:05	2.331	1.377	1.377	-
02/18/2021	03:35	2.52	14:10	4.50	3.26	04:15	8.14	20:20	11.44	9.87	04:15	0.724	14:10	2.248	1.258	1.258	0.09
02/19/2021	04:10	2.35	19:20	4.42	3.18	03:45	8.21	20:15	11.41	9.84	04:10	0.649	19:20	2.175	1.213	1.213	0.17
02/20/2021	06:05	2.34	13:10	4.53	3.16	06:05	7.96	19:20	11.47	9.75	06:05	0.623	13:10	2.213	1.200	1.200	0.07
02/21/2021	05:10	2.29	19:25	4.48	3.21	04:10	7.80	09:20	11.33	9.72	05:10	0.599	17:15	2.139	1.229	1.229	0.42
02/22/2021	04:25	2.71	14:00	5.07	3.85	03:25	8.85	12:45	11.56	10.40	03:55	0.864	20:35	2.594	1.685	1.685	0.98
02/23/2021	03:15	2.98	13:10	4.70	3.72	03:10	9.20	22:05	11.45	10.30	03:15	1.016	13:10	2.381	1.576	1.576	0.27
02/24/2021	03:30	2.76	19:35	4.63	3.55	03:20	8.97	17:00	11.58	10.38	03:35	0.913	19:35	2.337	1.485	1.485	-
02/25/2021	02:50	2.51	18:00	4.44	3.43	02:00	8.65	15:55	11.69	10.38	02:50	0.758	18:00	2.263	1.416	1.416	0.18
02/26/2021	04:20	2.44	08:55	4.45	3.27	03:45	8.63	19:00	11.70	10.21	03:45	0.724	08:55	2.266	1.304	1.304	0.10
02/27/2021	04:10	2.39	11:20	4.58	3.26	05:30	8.49	11:20	11.73	10.06	04:10	0.693	11:20	2.370	1.290	1.290	0.02
02/28/2021	05:20	2.33	12:05	4.61	3.23	05:00	8.05	12:05	11.61	9.86	05:00	0.628	12:05	2.371	1.253	1.253	0.02
03/01/2021	04:20	2.33	18:50	4.40	3.12	04:20	7.82	21:20	11.49	9.67	04:20	0.609	18:50	2.163	1.165	1.165	-
03/02/2021	03:05	2.29	12:45	4.26	3.07	03:45	7.48	12:45	11.44	9.50	03:05	0.576	12:45	2.093	1.115	1.115	-
03/03/2021	04:05	2.23	15:55	4.26	3.10	04:00	7.38	21:15	11.27	9.41	04:00	0.541	15:55	1.963	1.121	1.121	-
03/04/2021	04:00	2.31	16:50	4.54	3.02	03:15	7.18	19:05	11.08	9.20	02:50	0.556	16:50	2.166	1.055	1.055	0.20
03/05/2021	03:45	2.35	22:05	4.34	3.08	03:25	7.35	22:05	11.15	9.19	03:45	0.577	22:05	2.090	1.085	1.085	0.05
03/06/2021	03:50	2.35	21:05	4.55	3.11	05:05	7.22	08:30	10.93	9.06	05:05	0.567	21:05	2.184	1.089	1.089	-
03/07/2021	05:30	2.22	14:30	4.48	3.15	05:30	6.86	14:30	10.79	8.99	05:30	0.496	14:30	2.115	1.108	1.108	0.04
03/08/2021	04:10	2.33	20:25	4.68	3.08	04:25	7.03	20:25	10.82	8.93	04:25	0.547	20:25	2.251	1.054	1.054	-
03/09/2021	03:45	2.27	21:25	4.49	3.05	02:10	6.65	13:25	10.62	8.83	03:00	0.520	19:20	2.058	1.028	1.028	0.01
03/10/2021	02:55	2.25	19:40	4.42	3.05	04:25	6.84	17:15	10.59	8.66	04:25	0.505	19:40	1.931	1.010	1.010	-
03/11/2021	04:15	2.15	14:15	4.36	3.04	03:20	6.63	18:20	10.27	8.50	04:15	0.478	14:15	1.937	0.987	0.987	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	05:15	2.28	20:30	4.07	3.05	03:50	6.74	08:40	10.25	8.42	05:15	0.514	20:30	1.622	0.975	0.975	-
03/13/2021	05:15	2.21	12:05	4.68	3.11	04:10	6.31	21:05	10.25	8.44	05:15	0.468	12:05	2.114	1.017	1.017	-
03/14/2021	04:10	2.20	20:15	4.82	3.15	04:10	6.39	15:30	10.27	8.49	04:10	0.455	20:15	2.207	1.044	1.044	0.30
03/15/2021	03:00	2.35	16:30	4.45	3.10	03:20	6.77	15:35	10.39	8.55	03:00	0.538	16:30	1.969	1.017	1.017	-
03/16/2021	01:50	2.27	20:15	4.64	3.03	03:10	6.68	17:20	10.75	8.62	03:10	0.502	20:15	2.134	0.998	0.998	-
03/17/2021	03:15	2.22	21:10	4.56	2.99	02:40	6.77	21:25	10.39	8.60	03:15	0.491	21:10	2.036	0.975	0.975	-
03/18/2021	02:15	2.20	18:40	4.46	2.94	03:10	6.70	09:00	10.41	8.62	03:10	0.484	19:20	2.008	0.952	0.952	0.11
03/19/2021	03:25	2.16	10:05	4.43	2.90	03:25	6.47	10:05	10.62	8.63	03:25	0.450	10:05	2.052	0.937	0.937	0.03
03/20/2021	03:05	2.11	19:05	4.52	2.99	03:00	6.76	20:40	10.86	8.78	03:00	0.458	19:05	2.029	1.004	1.004	0.17
03/21/2021	04:20	2.13	19:45	4.62	2.98	03:50	6.65	15:50	10.76	8.83	03:50	0.455	19:45	2.187	1.009	1.009	0.07
03/22/2021	02:30	2.22	20:50	4.44	2.98	03:50	6.76	18:35	11.03	8.94	03:50	0.497	20:50	2.066	1.016	1.016	0.11
03/23/2021	02:25	2.22	19:00	4.47	2.90	02:50	6.77	15:10	11.09	8.87	02:50	0.491	19:00	2.066	0.966	0.966	-
03/24/2021	02:20	2.13	18:55	4.40	2.90	01:35	6.69	18:55	10.71	8.83	02:20	0.461	18:55	2.047	0.961	0.961	0.34
03/25/2021	03:45	2.37	18:10	4.31	3.13	03:45	7.37	13:50	11.08	9.30	03:45	0.586	18:10	2.024	1.124	1.124	0.27
03/26/2021	03:10	2.34	08:30	4.34	2.98	02:50	6.96	08:30	10.75	9.04	02:50	0.548	08:30	2.017	1.014	1.014	-
03/27/2021	04:15	2.13	10:05	4.65	2.98	04:15	6.78	10:05	10.93	9.04	04:15	0.462	10:05	2.257	1.028	1.028	-
03/28/2021	03:55	2.11	18:55	4.59	3.07	02:35	6.70	14:35	10.71	9.00	03:55	0.469	14:35	2.145	1.070	1.070	0.37
03/29/2021	03:05	2.32	19:20	4.36	3.03	03:25	6.90	10:05	10.88	8.88	03:05	0.540	10:05	2.027	1.027	1.027	-
03/30/2021	02:20	2.26	19:40	4.38	2.95	01:25	6.26	21:15	10.89	8.81	01:25	0.476	19:40	2.014	0.982	0.982	-
03/31/2021	02:40	2.17	18:20	4.25	2.92	02:40	6.60	19:50	10.88	8.74	02:40	0.463	19:50	1.944	0.960	0.960	-
04/01/2021	02:55	2.11	17:50	4.20	2.91	02:55	6.71	08:00	10.73	8.74	02:55	0.452	12:05	1.880	0.953	0.953	-
04/02/2021	03:15	2.15	09:20	4.47	2.93	03:15	6.63	06:55	10.77	8.78	03:15	0.459	21:35	2.053	0.967	0.967	-
04/03/2021	04:00	2.13	16:50	4.33	2.95	05:30	6.54	15:05	10.69	8.68	04:25	0.450	16:50	1.930	0.971	0.971	-
04/04/2021	03:50	2.14	13:10	4.36	2.94	05:20	6.63	08:30	10.89	8.66	05:20	0.459	22:40	1.928	0.969	0.969	-
04/05/2021	03:05	2.03	09:25	4.33	2.84	02:40	6.62	18:35	10.75	8.60	03:05	0.423	09:25	1.991	0.906	0.906	-
04/06/2021	02:55	2.12	16:30	4.09	2.81	01:40	6.55	09:00	10.59	8.55	02:55	0.453	09:00	1.778	0.887	0.887	-
04/07/2021	03:10	2.07	19:45	4.27	2.80	03:10	6.46	19:45	10.66	8.55	03:10	0.423	19:45	1.957	0.885	0.885	0.22
04/08/2021	02:50	2.10	10:25	4.34	2.86	03:55	6.63	06:45	10.71	8.57	02:50	0.446	10:25	2.010	0.915	0.915	-
04/09/2021	03:45	2.10	19:45	4.16	2.83	03:10	6.46	18:25	10.48	8.39	03:45	0.436	19:45	1.836	0.881	0.881	0.03
04/10/2021	03:50	2.10	16:45	4.36	2.97	03:50	6.35	13:35	10.30	8.44	03:50	0.424	16:45	1.941	0.956	0.956	0.02
04/11/2021	06:00	1.95	12:40	4.51	2.98	03:20	6.10	12:05	10.62	8.44	06:00	0.400	12:05	2.053	0.966	0.966	-
04/12/2021	00:50	2.00	19:50	4.66	2.94	03:00	6.08	20:15	10.61	8.41	00:50	0.403	19:50	2.126	0.941	0.941	-
04/13/2021	04:30	2.06	18:55	4.50	2.89	03:10	5.96	06:30	10.40	8.31	03:10	0.391	18:55	2.040	0.901	0.901	-
04/14/2021	03:15	2.09	21:00	4.75	2.90	02:35	6.01	18:10	10.37	8.17	03:45	0.400	21:00	2.111	0.893	0.890	-
09/22/2020	02:20	1.87	17:15	4.11	2.70	02:10	5.73	17:15	10.65	8.13	02:20	0.328	17:15	1.850	0.802	0.802	-
09/23/2020	03:20	1.83	18:35	4.48	2.83	03:15	5.65	18:50	11.05	8.42	03:20	0.308	18:50	2.153	0.899	0.899	-
09/24/2020	03:05	2.03	08:40	4.08	2.82	03:05	6.28	16:10	10.84	8.47	03:05	0.399	08:40	1.821	0.884	0.884	-
09/25/2020	03:10	1.99	13:50	4.32	2.83	02:30	5.96	13:50	10.73	8.54	02:30	0.370	13:50	2.001	0.905	0.905	-
09/26/2020	05:30	1.95	13:45	4.23	2.83	05:30	5.80	13:45	10.90	8.56	05:30	0.349	13:45	1.974	0.909	0.909	-
09/27/2020	04:20	1.94	12:10	4.25	2.84	04:20	5.88	19:45	11.11	8.55	04:20	0.349	19:30	1.968	0.918	0.918	-
09/28/2020	03:00	1.93	09:35	4.12	2.74	03:00	5.90	17:50	10.64	8.42	03:00	0.348	09:35	1.846	0.852	0.852	-
09/29/2020	02:30	1.93	08:05	4.06	2.70	03:35	6.05	16:25	10.47	8.31	02:30	0.360	08:05	1.777	0.819	0.819	-
09/30/2020	03:00	1.90	15:10	3.96	2.72	02:20	6.01	13:30	10.81	8.37	02:50	0.350	21:30	1.682	0.834	0.834	-
10/01/2020	03:35	1.86	19:00	4.29	2.67	03:35	5.63	16:45	10.87	8.33	03:35	0.315	19:00	1.989	0.812	0.812	-
10/02/2020	02:50	1.83	11:15	3.86	2.65	02:30	5.42	15:50	10.75	8.35	02:30	0.311	15:50	1.706	0.801	0.801	-
10/03/2020	02:35	1.80	12:45	4.08	2.67	03:45	5.75	10:45	11.22	8.36	02:35	0.310	12:45	1.890	0.821	0.821	0.01
10/04/2020	03:30	1.87	12:30	4.43	2.72	05:25	5.81	13:15	11.01	8.46	03:30	0.330	12:30	2.115	0.854	0.854	0.01
10/05/2020	02:25	1.89	08:35	4.19	2.72	03:05	6.05	19:25	11.09	8.42	02:25	0.349	16:50	1.931	0.843	0.843	-
10/06/2020	02:55	1.87	18:55	4.08	2.69	02:15	5.81	18:55	11.15	8.32	02:55	0.329	18:55	1.918	0.820	0.820	-
10/07/2020	02:55	1.91	17:05	4.18	2.69	02:55	5.89	17:05	10.99	8.27	02:55	0.344	17:05	1.960	0.815	0.815	-
10/08/2020	03:35	1.77	18:40	4.20	2.69	02:50	5.79	11:30	10.69	8.27	03:35	0.317	18:40	1.900	0.814	0.814	-
10/09/2020	02:25	1.87	09:30	3.98	2.67	02:25	6.07	19:10	10.85	8.25	02:25	0.343	21:00	1.749	0.800	0.800	0.64
10/10/2020	01:05	2.55	14:30	4.46	3.18	03:50	7.79	18:05	11.37	9.49	01:05	0.699	14:30	2.183	1.172	1.172	1.04
10/11/2020	05:50	2.02	16:40	4.26	2.93	05:50	6.14	11:25	11.50	9.09	05:50	0.388	16:40	2.027	1.021	1.021	0.53
10/12/2020	02:40	2.18	21:10	4.23	2.85	05:30	6.99	11:20	11.26	8.97	02:40	0.506	21:10	2.017	0.951	0.951	-
10/13/2020	02:45	2.06	18:55	4.34	2.95	02:00	6.25	18:55	11.08	8.89	02:00	0.409	18:55	2.082	0.994	0.994	0.61
10/14/2020	03:05	2.14	19:45	4.19	2.88	03:05	6.67	19:45	10.74	8.48	03:05	0.459	19:45	1.917	0.910	0.910	-
10/15/2020	02:50	1.85	19:20	4.40	2.88	03:35	5.44	09:10	10.51	8.29	02:50	0.329	19:20	1.993	0.895	0.895	-
10/16/2020	03:00	2.09	12:25	4.28	2.85	01:45	5.96	12:25	10.50	8.21	01:45	0.406	12:25	1.930	0.873	0.873	-
10/17/2020	04:00	2.01	16:05	4.17	2.86	04:00	5.98	16:55	10.39	8.28	04:00	0.375	20:50	1.816	0.893	0.893	0.01
10/18/2020	04:10	2.00	14:55	4.39	2.91	04:10	5.87	13:10	10.70	8.37	04:10	0.365	14:55	2.030	0.926	0.926	0.03
10/19/2020	03:15	2.05	15:25	4.44	2.85	05:00	5.96	19:15	10.75	8.35	03:05	0.412	15:25	2.047	0.892	0.892	0.05
10/20/2020	03:10	1.99	20:05	4.15	2.80	03:10	6.20	12:20	10.35	8.29	03:10	0.383	20:05	1.810	0.857	0.857	-
10/21/2020	02:55	1.92	19:00	4.10	2.76	03:00	5.92	19:55	10.73	8.29	03:00	0.349	09:20	1.793	0.846	0.846	0.01
10/22/2020	02:30	1.98	15:15	4.31	2.71	03:40	6.11	20:50	10.70	8.35	03:40	0.376	15:15	1.982	0.829	0.829	-
10/23/2020	02:50	1.90	17:55	4.21	2.71	01:15	5.92	19:45	10.91	8.40	01:15	0.349	17:55	1.897	0.833	0.833	0.20
10/24/2020	03:00	1.98	11:55	4.29	2.77	03:55	6.39	11:55	10.73	8.59	03:00	0.397	11:55	1.985	0.885	0.885	0.02
10/25/2020	05:10	1.84	09:05	4.31	2.78	05:10	5.71	13:50	10.92	8.53	05:10	0.316	09:05	2.023	0.890	0.890	-
10/26/2020	03:00	1.96	18:50	4.21	2.75	02:15	6.22	18:50	10.77	8.44	02:55	0.379	18:50	1.935	0.858	0.858	-
10/27/2020	02:45	1.94	19:45	4.12	2.76	01:40	5.85	19:45	10.82	8.37	02:45	0.353	19:45	1.890	0.855	0.855	-
10/28/2020	02:45	1.87	12:10	4.05	2.78	02:40	5.44	17:50	10.82	8.24	02:45	0.318	17:50	1.757	0.849	0.849	-
10/29/2020	01:45	1.85	18:55	4.35	2.80	02:55	5.75	18:55	10.29	8.03	02:30	0.347	18:55	1.939	0.832	0.832	-
10/30/2020	03:20	1.92	18:50	4.05	2.82	03:20	5.67	18:50	10.23	8.03	03:20	0.333	18:50	1.742	0.846	0.846	0.10
10/31/2020	04:20	1.97	11:45	4.38	2.81	03:40	5.66	12:55	10.50	8.14	03:40	0.353	11:45	1.984	0.860	0.860	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/01/2020	04:55	1.81	12:20	4.64	2.77	04:55	5.52	11:05	10.87	8.28	04:55	0.297	12:20	2.236	0.862	0.862	-
11/02/2020	03:50	1.94	20:55	4.24	2.69	02:30	6.14	20:55	11.10	8.32	03:50	0.368	20:55	2.014	0.817	0.817	-
11/03/2020	04:00	1.82	18:50	4.27	2.81	04:00	5.55	18:50	11.15	8.56	04:00	0.301	18:50	2.044	0.904	0.904	0.83
11/04/2020	04:40	2.13	23:05	4.25	2.83	03:25	6.83	12:10	10.82	8.61	04:40	0.475	09:55	1.935	0.898	0.898	0.09
11/05/2020	04:10	2.09	18:10	4.32	2.87	03:35	6.22	16:15	10.35	8.29	04:10	0.418	18:10	1.895	0.892	0.892	0.34
11/06/2020	03:00	2.12	17:35	4.19	2.86	03:00	6.07	11:15	10.23	8.34	03:00	0.412	17:35	1.800	0.885	0.885	0.10
11/07/2020	04:05	2.12	14:10	4.31	2.86	05:20	6.10	15:10	10.40	8.23	05:25	0.413	15:10	1.887	0.886	0.886	0.07
11/08/2020	05:50	2.04	20:35	4.31	2.91	05:05	5.67	20:35	10.04	8.07	05:05	0.369	20:35	1.865	0.890	0.890	0.01
11/09/2020	03:25	2.00	16:05	4.03	2.92	04:45	5.52	18:35	9.70	7.76	04:45	0.351	16:05	1.624	0.855	0.855	0.04
11/10/2020	04:25	2.08	13:35	3.79	2.92	04:20	5.10	13:35	9.38	7.61	04:25	0.342	13:35	1.454	0.835	0.835	0.03
11/11/2020	04:25	2.05	22:00	4.31	2.87	03:45	5.63	18:30	9.77	7.74	03:45	0.367	18:30	1.798	0.833	0.833	-
11/12/2020	03:25	2.05	18:20	4.12	2.80	03:20	5.69	21:50	10.11	7.93	03:25	0.367	18:20	1.653	0.823	0.823	0.16
11/13/2020	03:15	2.20	14:00	4.19	2.92	03:15	6.49	14:00	10.45	8.46	03:15	0.465	14:00	1.869	0.925	0.925	0.38
11/14/2020	05:05	2.05	18:55	4.41	2.94	05:05	6.25	18:55	10.79	8.58	05:05	0.404	18:55	2.067	0.963	0.963	0.47
11/15/2020	05:40	2.23	15:50	4.49	3.01	05:40	6.93	15:50	10.93	8.85	05:40	0.505	15:50	2.149	1.022	1.022	0.19
11/16/2020	03:25	2.17	20:45	4.46	3.03	04:35	6.67	20:45	10.71	8.85	04:35	0.479	20:45	2.085	1.028	1.028	0.31
11/17/2020	04:05	2.21	17:25	4.33	2.98	03:10	7.03	20:45	10.75	8.85	04:05	0.515	17:25	1.970	1.001	1.001	0.20
11/18/2020	03:05	2.25	20:00	4.29	3.00	02:15	6.42	14:40	10.84	8.88	02:15	0.489	14:40	1.949	1.013	1.013	0.30
11/19/2020	03:10	2.29	15:35	4.40	3.10	03:30	6.92	10:25	10.71	9.04	03:30	0.530	15:35	2.050	1.078	1.078	0.50
11/20/2020	04:25	2.36	20:40	4.48	3.04	04:25	6.99	10:55	10.74	8.88	04:25	0.553	20:40	2.053	1.026	1.026	0.01
11/21/2020	05:00	2.29	11:15	4.31	3.06	03:50	6.83	18:05	10.93	8.94	03:50	0.525	11:15	1.995	1.054	1.054	-
11/22/2020	05:10	2.21	11:50	4.53	3.06	04:15	6.84	14:10	11.07	8.92	06:05	0.500	11:50	2.135	1.058	1.058	0.21
11/23/2020	03:30	2.36	20:15	4.66	3.13	03:00	7.00	19:20	10.90	8.87	03:00	0.565	20:15	2.236	1.071	1.071	0.14
11/24/2020	03:25	2.35	18:45	4.66	3.15	03:25	6.74	18:05	10.91	8.61	03:25	0.528	18:45	2.178	1.050	1.050	0.21
11/25/2020	05:10	2.35	18:45	4.56	3.10	05:10	6.09	20:45	10.73	8.69	05:10	0.478	18:45	2.071	1.034	1.034	0.05
11/26/2020	04:35	2.28	10:45	4.62	3.14	04:15	6.73	14:25	10.83	8.92	03:30	0.512	12:20	2.177	1.103	1.103	0.02
11/27/2020	04:05	2.19	17:50	4.19	2.89	04:05	6.54	11:00	10.94	8.75	04:05	0.464	11:00	1.888	0.947	0.947	-
11/28/2020	05:00	2.09	12:50	4.48	2.93	05:20	6.32	23:00	10.97	8.73	05:00	0.430	12:50	2.048	0.974	0.974	0.05
11/29/2020	05:55	2.09	16:20	4.33	2.96	05:55	6.75	16:20	11.30	9.06	05:55	0.447	16:20	2.115	1.027	1.027	-
11/30/2020	03:20	2.12	20:00	4.30	3.02	03:05	6.61	20:30	11.75	9.26	03:05	0.449	20:00	2.088	1.073	1.073	0.36
12/01/2020	03:50	2.16	20:15	4.25	2.92	05:00	7.10	18:50	11.58	9.18	03:50	0.499	20:15	2.037	1.012	1.012	-
12/02/2020	03:05	2.10	17:45	4.31	2.93	04:20	6.87	11:30	11.12	8.86	03:05	0.461	17:45	2.022	0.979	0.979	0.01
12/03/2020	04:50	2.26	17:55	4.26	3.04	04:50	6.57	14:40	10.54	8.29	04:50	0.488	17:55	1.852	0.960	0.960	-
12/04/2020	03:55	2.33	19:25	4.37	3.20	03:25	5.96	10:20	9.63	7.78	03:25	0.483	08:25	1.818	0.972	0.972	-
12/05/2020	04:50	2.35	13:35	4.65	3.26	04:50	5.85	12:50	9.57	7.77	04:50	0.461	13:35	1.954	1.003	1.003	0.03
12/06/2020	04:30	2.17	13:20	4.53	3.16	06:00	5.66	13:20	9.97	7.88	04:30	0.401	13:20	1.988	0.978	0.978	0.03
12/07/2020	04:15	2.19	20:30	4.35	3.02	04:15	6.05	20:30	10.52	8.16	04:15	0.428	20:30	1.982	0.937	0.937	-
12/08/2020	03:40	2.18	18:10	4.54	3.07	03:40	6.28	21:50	10.74	8.57	03:40	0.443	18:10	2.117	1.020	1.020	0.87
12/09/2020	02:55	2.73	21:15	4.47	3.22	02:55	8.03	09:55	10.95	9.40	02:55	0.784	21:15	2.111	1.170	1.170	0.17
12/10/2020	04:05	2.35	14:25	4.29	3.01	05:35	7.06	20:45	11.53	9.15	05:35	0.577	14:25	2.052	1.042	1.042	0.07
12/11/2020	04:10	2.26	17:35	4.19	2.99	04:10	7.22	19:50	11.37	9.22	04:10	0.535	17:35	1.993	1.043	1.043	0.02
12/12/2020	03:55	2.15	18:30	4.21	2.98	03:35	6.94	18:30	11.24	9.22	03:55	0.490	18:30	2.025	1.050	1.050	0.01
12/13/2020	04:25	2.18	13:30	4.48	3.05	06:15	6.56	13:30	11.56	9.27	06:15	0.474	13:30	2.267	1.095	1.095	0.24
12/14/2020	04:45	2.19	19:45	4.27	3.01	04:40	6.51	14:50	11.45	9.33	04:40	0.478	19:45	2.028	1.071	1.071	0.05
12/15/2020	04:40	2.06	21:20	4.44	3.10	03:50	7.08	21:20	11.54	9.44	04:40	0.461	21:20	2.235	1.139	1.139	0.58
12/16/2020	04:15	2.32	19:35	4.46	3.22	04:15	7.75	12:10	11.36	9.60	04:15	0.597	17:00	2.197	1.211	1.211	0.39
12/17/2020	04:50	2.52	22:05	4.48	3.26	04:50	7.80	14:20	11.05	9.53	04:50	0.678	22:05	2.134	1.216	1.216	0.08
12/18/2020	03:35	2.42	11:55	4.40	3.18	03:35	7.56	15:20	11.45	9.36	03:35	0.618	15:20	2.151	1.155	1.155	0.25
12/19/2020	03:50	2.39	19:35	4.57	3.29	04:55	7.30	10:10	11.28	9.47	04:55	0.596	19:35	2.227	1.236	1.236	0.37
12/20/2020	03:55	2.63	13:45	4.81	3.43	04:50	8.00	13:45	11.45	9.68	06:50	0.770	13:45	2.478	1.333	1.333	0.04
12/21/2020	03:15	2.71	21:45	5.11	3.72	03:40	8.12	14:30	11.62	9.95	03:25	0.800	21:45	2.592	1.546	1.546	1.07
12/22/2020	04:05	3.12	17:35	4.76	3.77	03:30	8.89	20:10	11.24	10.03	04:05	1.057	17:35	2.279	1.557	1.557	-
12/23/2020	04:40	2.65	11:50	4.63	3.45	03:20	8.29	15:45	11.52	9.82	04:40	0.793	15:45	2.301	1.356	1.356	-
12/24/2020	04:25	2.54	13:10	4.70	3.40	04:20	7.54	09:35	11.36	9.59	04:20	0.670	13:10	2.374	1.309	1.309	-
12/25/2020	05:40	2.36	22:15	4.52	3.25	05:40	7.36	21:40	11.08	9.30	05:40	0.583	22:15	2.197	1.191	1.191	0.49
12/26/2020	04:20	2.47	20:05	4.51	3.24	04:20	7.63	12:25	11.15	9.40	04:20	0.645	20:05	2.154	1.199	1.199	0.02
12/27/2020	04:45	2.32	11:50	4.64	3.24	05:20	7.15	11:50	11.26	9.38	05:20	0.564	11:50	2.318	1.198	1.198	0.13
12/28/2020	03:35	2.42	19:05	4.37	3.16	03:00	7.61	18:25	11.39	9.33	03:35	0.630	21:20	2.041	1.144	1.144	-
12/29/2020	04:35	2.33	21:45	4.37	3.06	05:15	7.20	12:00	10.80	9.00	05:15	0.565	21:45	2.006	1.053	1.053	0.14
12/30/2020	01:20	2.51	23:25	4.70	3.48	02:00	7.03	11:25	10.88	9.45	02:00	0.641	23:25	2.271	1.335	1.335	0.78
12/31/2020	05:10	2.86	13:25	4.67	3.61	05:10	8.37	10:55	11.12	9.68	05:10	0.874	13:25	2.227	1.424	1.424	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			224.444	30.65
Average	3.10	9.02	1.095	

Auburn.TFM.WA20-22

Flow Monitoring Site Report

ADS ENVIRONMENTAL SERVICES®

Site Name

AUB_Y-2_61102

Site Address /Location:	1608 8th St NE, Auburn WA			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	Site within West bound lane control required	Traffic	Latitude: 47.315348° Longitude: -122.206507°	Pipe Size (H x W): 14.25 x 14.50	Pipe Shape: Circular
				Manhole #: AUB Y-2(611-02)	System Characteristics: Residential
				Access: Drive	Traffic: Heavy









ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519.22.325

Installation Information

Installation Date:	Installation Type:
Thursday, May 14, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW)
7:49:00 PM	14.25 x 14.50
Depth of Flow (Wet DOF) (in)	
2.63"	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.38"
Peak Velocity (fps)	Velocity Sensor Offset (in)
11.15	0"
Silt (in)	Silt Type
0.00"	

Hydraulic Comments:

Fast Flow, 0.25 Ripples

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
6	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
26	
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Vitrified Clay Pipe	Fair

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

Siphon Upstream

AUB_Y-3_101255

Site Commentary

SITE INFORMATION

Pipe	Elliptical (23 in H x 23.5 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	2.79	5.27	0.722
Minimum	1.82	3.21	0.231
Maximum	5.34	7.28	2.420
Min Time	11/01/2020 4:00:00 AM	10/03/2020 3:00:00 AM	10/03/2020 3:00:00 AM
Max Time	01/03/2021 1:00:00 AM	01/12/2021 10:00:00 AM	01/03/2021 1:00:00 AM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

Hydrograph Report

AUB_Y-3_101255

Flow Monitor

AUB_Y-3_101255

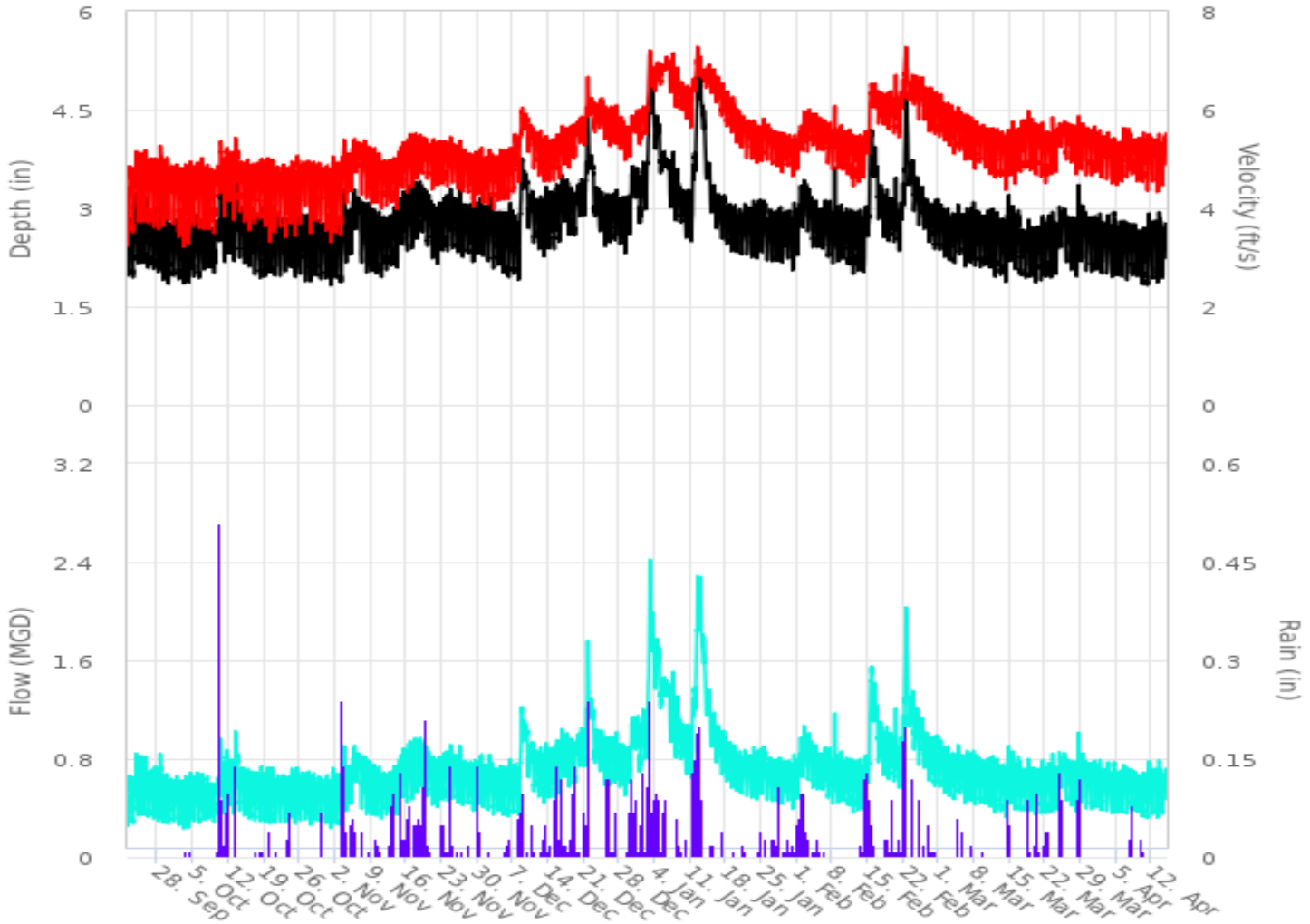
Pipe Height
23.00
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_Y-3_101255

Flow Monitor

AUB_Y-3_101255

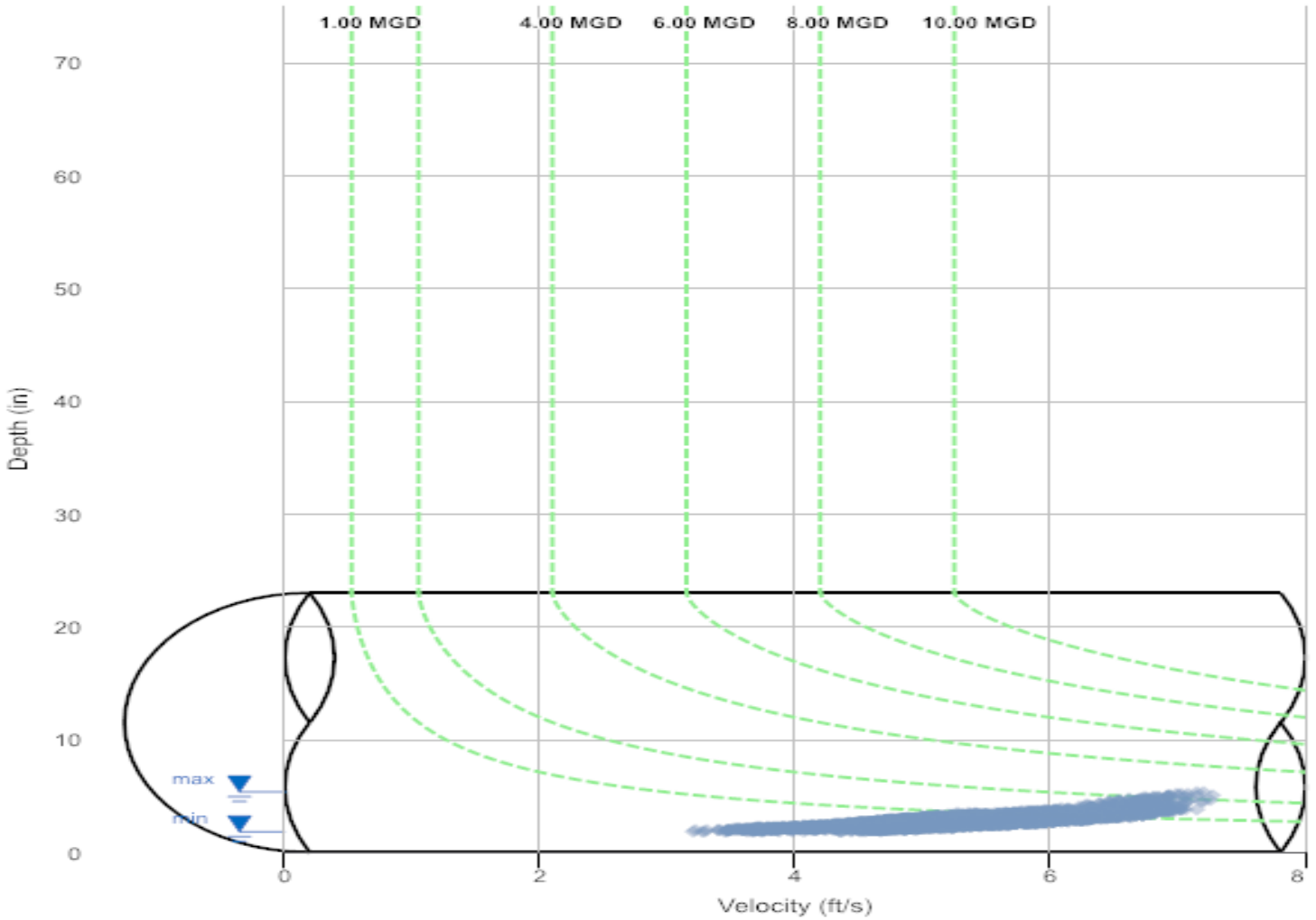
Pipe Height
23.00
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_Y-3_101255Pipe: Elliptical (23 in H x 23.5 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	01:25	2.62	15:20	3.98	3.28	01:20	4.94	17:55	6.50	5.79	01:25	0.599	17:55	1.421	0.974	0.974	0.51
01/02/2021	05:50	2.76	23:40	5.07	3.67	01:45	5.21	23:30	7.14	6.01	05:50	0.678	23:40	2.217	1.203	1.203	1.69
01/03/2021	22:05	4.01	00:45	5.50	4.63	07:35	6.12	01:05	7.37	6.70	22:05	1.393	00:55	2.530	1.843	1.843	0.65
01/04/2021	04:00	3.57	10:55	4.67	4.17	04:00	6.10	18:45	7.18	6.74	04:00	1.150	10:55	1.965	1.590	1.590	0.48
01/05/2021	04:10	3.21	00:10	4.14	3.75	05:30	6.07	19:10	7.21	6.77	04:10	0.990	00:10	1.628	1.371	1.371	0.52
01/06/2021	23:15	3.17	05:55	4.05	3.66	23:15	6.33	21:05	7.33	6.93	23:15	1.003	05:55	1.653	1.358	1.358	0.22
01/07/2021	04:20	2.68	16:45	4.05	3.30	04:20	5.78	16:45	7.30	6.62	04:20	0.718	16:45	1.648	1.118	1.118	-
01/08/2021	02:35	2.50	13:20	3.69	3.16	04:40	5.37	10:15	7.03	6.44	02:35	0.626	13:20	1.383	1.023	1.023	0.22
01/09/2021	04:45	2.39	18:10	3.51	3.05	01:50	5.51	12:35	6.92	6.29	04:45	0.581	18:10	1.267	0.949	0.949	-
01/10/2021	05:15	2.26	14:15	3.49	2.94	06:40	5.33	10:25	6.83	6.14	05:15	0.516	14:15	1.217	0.882	0.882	0.07
01/11/2021	03:05	2.24	21:25	4.16	3.19	04:20	5.04	11:40	6.89	6.25	03:05	0.490	21:25	1.593	1.022	1.022	1.06
01/12/2021	01:05	3.18	19:35	5.21	4.61	00:10	6.07	10:15	7.44	6.87	01:05	0.968	10:15	2.390	1.884	1.884	2.10
01/13/2021	22:10	3.68	00:30	5.32	4.47	21:30	6.37	00:30	7.27	6.72	22:10	1.264	00:30	2.429	1.756	1.756	0.09
01/14/2021	23:40	3.03	00:40	4.06	3.59	01:35	6.14	12:55	7.19	6.70	23:40	0.939	12:55	1.553	1.271	1.271	0.01
01/15/2021	04:25	2.70	11:30	3.61	3.16	04:25	5.88	11:30	7.19	6.62	04:25	0.737	11:30	1.378	1.050	1.050	0.09
01/16/2021	06:35	2.46	16:05	3.40	2.98	05:50	5.63	10:30	7.00	6.39	05:50	0.625	16:05	1.192	0.930	0.930	-
01/17/2021	05:25	2.30	14:05	3.39	2.92	05:25	5.45	11:00	6.77	6.21	05:25	0.540	14:05	1.180	0.879	0.879	0.10
01/18/2021	05:00	2.29	13:30	3.30	2.81	01:45	5.32	08:40	6.71	6.06	05:00	0.529	13:30	1.113	0.810	0.810	-
01/19/2021	03:45	2.18	20:05	3.20	2.76	02:45	5.05	10:55	6.55	5.91	03:45	0.481	20:00	1.018	0.770	0.770	0.01
01/20/2021	04:30	2.20	18:40	3.10	2.69	04:30	4.98	10:30	6.36	5.77	04:30	0.464	18:40	0.942	0.726	0.726	-
01/21/2021	03:45	2.13	19:50	3.23	2.73	02:15	4.77	11:40	6.20	5.63	02:50	0.428	19:50	0.980	0.724	0.724	0.11
01/22/2021	03:50	2.12	17:25	3.25	2.74	03:50	4.55	08:30	6.07	5.50	03:50	0.401	17:25	0.984	0.710	0.710	-
01/23/2021	04:45	2.05	12:00	3.31	2.71	03:20	4.59	12:00	6.29	5.45	03:20	0.396	12:00	1.064	0.696	0.696	-
01/24/2021	05:55	2.07	19:20	3.30	2.76	04:15	4.58	09:25	6.10	5.41	04:15	0.403	19:20	1.014	0.709	0.709	0.16
01/25/2021	04:20	2.17	13:55	3.18	2.75	02:45	4.62	18:55	6.03	5.45	04:20	0.429	18:55	0.958	0.710	0.710	0.04
01/26/2021	03:20	2.10	18:45	3.12	2.66	03:10	4.63	11:25	6.02	5.42	03:20	0.402	18:45	0.901	0.671	0.671	-
01/27/2021	04:25	1.91	17:55	3.13	2.63	03:20	4.43	07:40	6.01	5.32	04:25	0.336	21:30	0.922	0.648	0.648	0.14
01/28/2021	04:20	2.00	20:00	3.18	2.69	02:35	4.47	08:10	5.92	5.28	04:20	0.374	20:00	0.935	0.665	0.665	0.24
01/29/2021	04:45	2.00	19:40	3.11	2.68	04:45	4.09	10:50	5.90	5.24	04:45	0.329	10:50	0.898	0.656	0.656	0.03
01/30/2021	04:40	2.01	13:55	3.17	2.67	05:10	4.26	09:45	5.85	5.22	05:10	0.348	15:50	0.917	0.649	0.649	0.07
01/31/2021	06:30	1.93	12:55	3.21	2.67	04:00	4.33	11:10	5.88	5.19	06:30	0.339	15:40	0.930	0.652	0.652	0.12
02/01/2021	01:25	2.08	20:45	3.47	2.84	01:25	4.26	22:30	5.85	5.33	01:25	0.365	20:45	1.048	0.729	0.729	0.82
02/02/2021	04:40	2.51	11:30	4.28	3.14	04:35	4.78	11:30	6.50	5.57	04:40	0.540	11:30	1.591	0.880	0.880	0.31
02/03/2021	03:55	2.36	17:40	3.43	2.97	03:10	4.69	19:30	6.41	5.64	03:10	0.487	19:30	1.115	0.821	0.821	0.06
02/04/2021	04:20	2.12	18:35	3.45	2.82	04:20	4.74	17:45	6.50	5.67	04:20	0.418	17:45	1.132	0.767	0.767	0.07
02/05/2021	03:35	2.15	17:20	3.41	2.76	03:35	4.78	07:55	6.26	5.57	03:35	0.430	17:20	1.095	0.729	0.729	0.01
02/06/2021	05:45	2.05	19:25	3.38	2.77	03:20	4.72	08:25	6.33	5.49	05:45	0.396	19:25	1.089	0.724	0.724	0.01
02/07/2021	05:10	1.97	13:45	3.39	2.73	02:30	4.42	13:45	6.13	5.38	03:25	0.358	13:45	1.071	0.695	0.695	-
02/08/2021	03:55	1.92	13:05	3.71	2.72	03:00	4.31	13:20	6.33	5.36	03:00	0.335	13:20	1.261	0.694	0.694	-
02/09/2021	04:20	1.90	19:10	3.25	2.67	01:50	4.32	19:05	6.16	5.32	04:20	0.332	19:05	0.996	0.666	0.666	-
02/10/2021	03:55	1.88	18:45	3.22	2.65	03:45	4.29	10:45	6.11	5.27	03:55	0.323	18:45	0.952	0.652	0.652	-
02/11/2021	03:20	1.84	18:15	3.28	2.63	03:20	4.07	12:50	6.18	5.23	03:20	0.291	21:40	1.006	0.642	0.642	-
02/12/2021	04:25	1.77	20:45	3.24	2.56	04:25	4.02	13:05	6.04	5.13	04:25	0.271	17:00	0.973	0.609	0.609	-
02/13/2021	04:55	1.75	12:15	3.25	2.56	04:55	4.01	11:15	5.98	5.12	04:55	0.266	12:15	0.970	0.606	0.606	0.08
02/14/2021	05:50	1.74	15:30	3.32	2.62	03:50	4.11	09:50	6.15	5.20	05:50	0.277	16:10	1.012	0.639	0.639	0.71
02/15/2021	01:20	2.30	20:25	4.39	3.50	01:20	4.61	17:00	6.75	5.99	01:20	0.456	16:00	1.698	1.133	1.133	0.78
02/16/2021	23:55	2.94	13:40	4.15	3.60	02:55	5.57	12:05	6.74	6.27	23:50	0.816	12:05	1.562	1.201	1.201	0.07
02/17/2021	02:15	2.59	13:00	3.69	3.11	04:25	5.33	11:25	6.75	6.13	04:25	0.633	13:00	1.329	0.954	0.954	-
02/18/2021	04:35	2.31	19:40	3.56	2.95	05:25	5.26	16:45	6.67	6.06	04:35	0.528	19:40	1.230	0.873	0.873	0.09
02/19/2021	03:50	2.26	19:25	3.39	2.86	05:15	5.18	08:35	6.70	6.00	03:50	0.504	12:10	1.141	0.829	0.829	0.17
02/20/2021	03:35	2.20	13:30	3.57	2.80	04:20	4.96	13:15	6.96	5.97	04:20	0.464	13:20	1.301	0.800	0.800	0.07
02/21/2021	03:55	2.10	23:20	3.72	2.80	03:55	4.92	23:20	6.90	6.02	03:55	0.428	23:20	1.378	0.808	0.808	0.42
02/22/2021	01:45	2.80	13:10	4.73	3.92	01:45	5.91	13:05	7.35	6.79	01:45	0.780	13:10	2.068	1.484	1.484	0.98
02/23/2021	06:15	2.99	21:25	3.95	3.50	06:15	5.73	21:15	6.96	6.39	06:15	0.835	21:25	1.512	1.175	1.175	0.27
02/24/2021	04:45	2.63	18:30	3.66	3.26	07:20	5.62	17:25	6.89	6.39	04:45	0.697	18:30	1.326	1.061	1.061	-
02/25/2021	03:00	2.47	09:40	3.50	3.12	02:45	4.98	18:05	6.93	6.38	02:15	0.579	09:40	1.261	0.995	0.995	0.18
02/26/2021	05:25	2.40	13:25	3.37	2.96	03:55	5.03	21:05	6.89	6.22	05:25	0.532	22:05	1.166	0.899	0.899	0.10
02/27/2021	06:10	2.26	11:35	3.38	2.83	03:40	4.95	09:10	6.83	6.10	03:40	0.488	11:35	1.187	0.830	0.830	0.02
02/28/2021	05:30	2.12	14:10	3.42	2.80	05:30	4.95	15:40	6.73	6.00	05:30	0.436	14:05	1.158	0.806	0.806	0.02
03/01/2021	04:20	2.05	19:25	3.34	2.74	04:20	4.92	07:40	6.62	5.92	04:20	0.413	19:25	1.102	0.768	0.768	-
03/02/2021	03:30	1.99	19:00	3.32	2.66	03:30	4.85	10:10	6.61	5.83	03:30	0.390	18:55	1.080	0.724	0.724	-
03/03/2021	03:40	1.91	18:05	3.27	2.62	05:15	4.56	07:45	6.56	5.74	05:15	0.354	18:00	1.066	0.698	0.698	-
03/04/2021	02:30	1.91	19:20	3.28	2.60	02:30	4.41	08:00	6.42	5.66	02:30	0.332	19:20	1.034	0.683	0.683	0.20
03/05/2021	04:30	1.92	19:50	3.21	2.65	03:35	4.59	11:55	6.38	5.64	04:30	0.351	19:50	0.997	0.698	0.698	0.05
03/06/2021	05:40	1.87	20:30	3.25	2.61	05:40	4.45	11:20	6.34	5.54	05:40	0.325	20:30	1.038	0.670	0.670	-
03/07/2021	03:25	1.85	13:50	3.29	2.66	05:15	4.36	11:40	6.22	5.45	03:25	0.316	12:20	1.014	0.680	0.680	0.04
03/08/2021	04:45	1.89	13:00	3.29	2.63	04:25	4.30	13:40	6.20	5.39	04:45	0.327	13:00	1.017	0.663	0.663	-
03/09/2021	05:10	1.83	20:40	3.23	2.56	03:30	4.11	11:10	6.17	5.39	03:35	0.301	20:40	0.971	0.637	0.637	0.01
03/10/2021	04:05	1.78	20:30	3.27	2.59	04:05	4.19	08:45	6.18	5.33	04:05	0.285	20:25	0.983	0.640	0.640	-
03/11/2021	03:10	1.78	20:15	3.25	2.61	03:10	3.89	11:50	6.13	5.31	03:10	0.264	20:15	0.974	0.645	0.645	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	03:35	1.75	14:05	3.17	2.53	02:30	4.13	10:00	6.19	5.24	04:20	0.280	14:05	0.944	0.611	0.611	-
03/13/2021	06:15	1.69	15:20	3.16	2.49	05:00	3.99	11:15	6.10	5.17	05:00	0.263	15:20	0.930	0.588	0.588	-
03/14/2021	04:50	1.62	19:15	3.46	2.59	04:50	3.76	12:00	5.96	5.18	04:50	0.222	19:15	1.058	0.629	0.629	0.30
03/15/2021	03:35	1.78	18:55	3.26	2.65	03:20	4.05	15:45	6.05	5.22	03:35	0.275	15:45	0.991	0.649	0.649	-
03/16/2021	04:20	1.76	17:15	3.64	2.56	04:20	3.87	17:15	6.26	5.21	04:20	0.259	17:15	1.210	0.618	0.618	-
03/17/2021	02:45	1.73	20:20	3.02	2.42	04:40	4.10	20:20	6.39	5.44	02:45	0.276	20:20	0.946	0.592	0.592	-
03/18/2021	03:15	1.68	18:05	3.15	2.39	03:15	4.25	18:00	6.36	5.46	03:15	0.267	18:05	0.995	0.585	0.585	0.11
03/19/2021	02:00	1.72	13:55	3.02	2.43	02:00	4.24	17:45	6.37	5.43	02:00	0.273	17:45	0.902	0.593	0.593	0.03
03/20/2021	04:25	1.63	16:05	3.01	2.42	04:20	3.96	12:25	6.16	5.34	04:25	0.244	16:00	0.891	0.582	0.582	0.17
03/21/2021	04:45	1.64	13:20	3.22	2.47	04:45	4.11	08:15	6.27	5.27	04:45	0.249	13:15	0.990	0.594	0.594	0.07
03/22/2021	02:40	1.73	16:55	3.14	2.52	02:40	4.08	13:50	6.04	5.22	02:40	0.267	16:50	0.916	0.604	0.604	0.11
03/23/2021	03:45	1.70	10:35	3.34	2.52	01:25	4.14	10:35	6.29	5.33	03:40	0.265	10:35	1.074	0.617	0.617	-
03/24/2021	03:25	1.72	19:15	3.41	2.50	03:25	4.14	15:00	6.13	5.34	03:25	0.268	19:15	1.077	0.612	0.612	0.34
03/25/2021	01:05	2.12	19:50	3.28	2.75	02:35	4.73	18:55	6.18	5.53	01:05	0.419	19:50	1.008	0.719	0.719	0.27
03/26/2021	02:40	1.89	14:55	3.19	2.62	02:40	4.29	11:45	6.21	5.46	02:40	0.320	10:25	0.978	0.665	0.665	-
03/27/2021	04:50	1.82	10:55	3.17	2.53	03:05	4.42	08:25	6.24	5.39	04:50	0.315	17:50	0.962	0.627	0.627	-
03/28/2021	04:50	1.72	15:30	3.51	2.67	03:40	4.31	13:55	6.20	5.38	03:40	0.284	14:00	1.119	0.682	0.682	0.37
03/29/2021	02:45	1.84	12:55	3.30	2.67	02:40	4.31	06:35	6.15	5.36	02:45	0.311	12:50	0.999	0.674	0.674	-
03/30/2021	02:15	1.79	16:30	3.15	2.58	02:10	4.09	13:20	6.13	5.31	02:15	0.281	16:30	0.962	0.636	0.636	-
03/31/2021	02:00	1.76	19:50	3.26	2.55	01:50	4.24	12:45	6.08	5.30	02:00	0.285	19:50	1.001	0.621	0.621	-
04/01/2021	03:10	1.74	20:40	3.23	2.52	02:20	4.00	15:35	6.10	5.27	02:20	0.267	20:40	0.969	0.609	0.609	-
04/02/2021	02:35	1.72	14:15	3.04	2.48	02:35	3.98	08:20	6.00	5.17	02:35	0.258	14:05	0.877	0.582	0.582	-
04/03/2021	03:05	1.68	12:40	3.22	2.50	04:55	3.87	10:45	5.90	5.09	05:00	0.243	10:50	0.950	0.584	0.584	-
04/04/2021	03:20	1.74	13:20	3.35	2.56	03:10	3.99	09:50	5.93	5.06	04:15	0.263	13:20	0.992	0.601	0.601	-
04/05/2021	02:30	1.69	19:25	3.15	2.48	02:30	3.87	19:20	6.02	5.09	02:30	0.245	19:25	0.939	0.574	0.574	-
04/06/2021	02:50	1.70	10:20	2.98	2.44	02:50	4.06	13:05	6.13	5.20	02:50	0.258	20:10	0.871	0.575	0.575	-
04/07/2021	02:10	1.62	20:30	3.08	2.40	03:55	4.12	07:55	6.15	5.21	02:10	0.247	19:25	0.918	0.564	0.564	0.22
04/08/2021	03:30	1.75	12:10	3.17	2.48	02:25	4.22	21:05	5.96	5.11	03:30	0.283	12:10	0.932	0.576	0.576	-
04/09/2021	04:10	1.67	15:25	3.04	2.40	02:15	3.96	19:00	6.00	5.13	04:10	0.247	19:00	0.874	0.553	0.553	0.03
04/10/2021	05:35	1.63	19:50	3.09	2.41	02:30	3.93	19:50	6.14	5.12	05:35	0.238	19:50	0.939	0.556	0.556	0.02
04/11/2021	04:30	1.57	12:45	3.22	2.46	04:30	3.50	08:00	6.09	5.08	04:30	0.198	12:45	0.952	0.571	0.571	-
04/12/2021	03:30	1.60	13:30	3.15	2.46	03:25	3.73	06:50	5.87	5.06	03:25	0.220	13:30	0.907	0.567	0.567	-
04/13/2021	02:40	1.64	10:10	3.21	2.48	00:35	3.85	10:10	5.82	4.98	02:40	0.235	10:10	0.937	0.568	0.568	-
04/14/2021	02:20	1.61	19:20	3.03	2.42	02:20	3.85	14:35	6.11	5.13	02:20	0.225	19:20	0.877	0.560	0.558	-
09/22/2020	03:30	1.92	10:50	3.23	2.45	02:50	2.80	10:50	5.41	4.34	02:50	0.217	10:50	0.882	0.486	0.486	-
09/23/2020	01:55	1.90	20:00	3.53	2.63	00:55	3.08	20:00	5.80	4.53	01:05	0.235	20:00	1.074	0.565	0.565	-
09/24/2020	03:50	1.96	15:45	3.46	2.74	02:05	3.32	14:15	5.67	4.62	03:45	0.266	15:45	1.009	0.610	0.610	-
09/25/2020	03:05	1.94	14:55	3.50	2.73	03:05	3.12	14:50	5.71	4.62	03:05	0.242	14:50	1.035	0.604	0.604	-
09/26/2020	05:40	1.91	17:55	3.23	2.61	05:35	3.11	16:00	5.47	4.53	05:35	0.238	17:55	0.876	0.555	0.555	-
09/27/2020	04:15	1.90	11:20	3.23	2.60	04:05	3.02	16:45	5.48	4.51	04:05	0.231	11:20	0.887	0.552	0.552	-
09/28/2020	02:15	1.93	12:10	3.43	2.58	02:15	3.02	12:05	5.64	4.57	02:15	0.232	12:10	0.993	0.553	0.553	-
09/29/2020	01:50	1.74	13:20	3.23	2.47	03:05	3.05	13:15	5.58	4.54	03:05	0.206	13:15	0.906	0.513	0.513	-
09/30/2020	04:25	1.63	17:10	3.13	2.42	01:45	3.18	12:35	5.45	4.51	04:20	0.204	12:35	0.845	0.495	0.495	-
10/01/2020	01:10	1.80	18:30	3.10	2.46	02:55	3.17	18:25	5.39	4.44	01:10	0.222	18:25	0.823	0.497	0.497	-
10/02/2020	03:25	1.84	14:40	3.06	2.43	03:50	3.00	14:40	5.34	4.38	03:50	0.220	14:40	0.802	0.483	0.483	-
10/03/2020	03:35	1.83	11:00	3.11	2.44	03:20	2.89	21:10	5.53	4.40	03:45	0.210	21:10	0.818	0.489	0.489	0.01
10/04/2020	03:40	1.81	11:25	3.19	2.48	05:35	2.80	11:25	5.46	4.42	03:50	0.197	11:25	0.876	0.506	0.506	0.01
10/05/2020	01:55	1.87	20:15	3.24	2.52	03:05	3.03	20:15	5.53	4.44	02:00	0.223	20:15	0.907	0.516	0.516	-
10/06/2020	03:25	1.87	18:45	3.13	2.49	01:45	3.12	18:40	5.55	4.47	04:35	0.236	18:45	0.856	0.512	0.512	-
10/07/2020	03:40	1.95	20:05	3.11	2.49	01:50	3.06	20:05	5.43	4.38	02:05	0.258	20:05	0.836	0.496	0.496	-
10/08/2020	03:10	1.90	09:20	3.00	2.45	03:00	3.33	16:35	5.28	4.37	03:10	0.250	09:20	0.766	0.486	0.486	-
10/09/2020	03:35	1.91	12:05	3.00	2.48	03:35	3.17	14:55	5.26	4.35	03:35	0.239	14:55	0.765	0.492	0.492	0.64
10/10/2020	05:10	2.21	10:50	3.70	2.91	04:40	3.82	10:50	5.86	4.83	04:45	0.366	10:50	1.160	0.686	0.686	1.04
10/11/2020	02:10	2.04	19:25	3.72	2.76	03:40	3.36	17:35	5.82	4.68	03:40	0.288	19:25	1.158	0.625	0.625	0.53
10/12/2020	02:30	2.12	13:05	3.44	2.76	04:15	3.54	13:05	5.67	4.72	04:15	0.314	13:05	1.012	0.620	0.620	-
10/13/2020	00:40	2.10	09:40	3.75	2.95	02:45	3.34	17:30	5.78	4.83	02:40	0.293	07:35	1.138	0.708	0.708	0.61
10/14/2020	03:15	2.03	18:40	3.18	2.71	03:10	3.41	18:40	5.25	4.61	03:15	0.287	18:40	0.838	0.589	0.589	-
10/15/2020	04:35	2.06	17:20	3.13	2.64	01:15	3.28	19:40	5.26	4.52	01:15	0.285	17:15	0.797	0.559	0.559	-
10/16/2020	03:25	2.04	11:45	3.17	2.57	03:25	3.22	17:35	5.39	4.45	03:25	0.269	11:45	0.804	0.529	0.529	-
10/17/2020	05:00	1.92	10:40	3.34	2.53	05:05	3.19	10:40	5.37	4.46	05:05	0.242	10:40	0.921	0.521	0.521	0.01
10/18/2020	05:35	1.80	10:55	3.17	2.55	02:45	3.16	11:55	5.52	4.55	02:45	0.224	11:55	0.863	0.540	0.540	0.03
10/19/2020	03:35	1.87	18:00	3.13	2.53	03:50	3.28	17:00	5.38	4.52	03:50	0.239	18:00	0.831	0.528	0.528	0.05
10/20/2020	03:35	1.95	13:55	3.39	2.55	03:45	3.09	18:15	5.53	4.50	03:35	0.245	13:55	0.950	0.535	0.535	-
10/21/2020	05:20	1.90	18:00	3.10	2.50	02:40	2.88	11:55	5.36	4.44	02:40	0.221	09:55	0.816	0.509	0.509	0.01
10/22/2020	03:25	1.84	19:00	3.16	2.50	03:10	3.04	18:55	5.45	4.43	03:25	0.219	19:00	0.851	0.507	0.507	-
10/23/2020	05:30	1.94	18:55	3.06	2.50	03:50	3.03	17:00	5.31	4.37	03:55	0.237	17:00	0.793	0.502	0.502	0.20
10/24/2020	05:20	1.92	10:55	3.30	2.56	05:15	3.00	10:50	5.46	4.48	05:15	0.231	10:55	0.914	0.532	0.532	0.02
10/25/2020	02:50	1.88	12:00	3.21	2.53	03:00	2.81	20:15	5.54	4.46	03:00	0.207	20:15	0.889	0.527	0.527	-
10/26/2020	03:10	1.88	21:00	3.17	2.55	03:20	3.07	20:55	5.51	4.51	03:20	0.232	20:55	0.870	0.532	0.532	-
10/27/2020	03:15	1.61	19:15	3.15	2.49	02:55	3.48	10:05	5.52	4.61	03:10	0.211	10:05	0.861	0.525	0.525	-
10/28/2020	03:15	1.76	10:35	3.25	2.49	03:30	2.88	19:20	5.63	4.49	03:25	0.196	19:20	0.910	0.515	0.515	-
10/29/2020	04:15	1.81	19:10	3.06	2.46	03:00	3.17	19:05	5.47	4.47	03:05	0.226	19:10	0.819	0.499	0.499	-
10/30/2020	04:30	1.75	16:55	3.09	2.43	02:55	3.00	17:50	5.37	4.44	02:55	0.203	16:55	0.813	0.490	0.490	0.10
10/31/2020	05:50	1.79	10:40	3.15	2.42	04:25	2.97	20:10	5.42	4.37	04:25	0.206	10:40	0.828	0.481	0.481	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/01/2020	03:05	1.75	13:10	3.20	2.42	04:45	2.76	13:05	5.46	4.41	04:45	0.186	13:05	0.872	0.489	0.489	-
11/02/2020	02:30	1.87	12:55	3.13	2.47	01:35	3.17	12:50	5.53	4.47	01:35	0.234	12:55	0.862	0.506	0.506	-
11/03/2020	03:30	1.77	17:25	3.54	2.64	03:30	2.92	20:00	5.81	4.65	03:30	0.198	20:00	1.074	0.594	0.594	0.83
11/04/2020	02:50	1.97	20:20	3.31	2.68	02:50	3.79	20:20	5.74	4.78	02:50	0.299	20:20	0.968	0.603	0.603	0.09
11/05/2020	02:10	2.00	16:10	3.59	2.88	01:10	3.92	16:05	5.95	4.97	03:35	0.316	16:05	1.125	0.700	0.700	0.34
11/06/2020	01:45	2.35	16:55	3.51	2.97	03:05	4.22	12:30	5.83	5.11	01:45	0.437	14:15	1.028	0.746	0.746	0.10
11/07/2020	05:40	1.93	14:35	3.32	2.71	05:40	3.78	19:35	5.75	4.96	05:40	0.289	19:40	0.954	0.637	0.637	0.07
11/08/2020	04:55	1.77	19:15	3.32	2.65	04:50	3.88	19:15	5.75	4.89	04:55	0.261	19:15	0.975	0.610	0.610	0.01
11/09/2020	03:55	1.80	18:55	3.24	2.59	03:55	3.70	18:50	5.74	4.79	03:55	0.255	18:50	0.933	0.579	0.579	0.04
11/10/2020	02:20	1.78	17:10	3.44	2.55	02:15	3.57	17:10	5.72	4.72	02:20	0.246	17:10	1.020	0.557	0.557	0.03
11/11/2020	02:25	1.78	19:00	3.17	2.52	02:25	3.56	14:15	5.50	4.64	02:25	0.242	13:25	0.853	0.539	0.539	-
11/12/2020	04:15	1.76	10:50	3.17	2.54	04:15	3.41	10:50	5.61	4.59	04:15	0.229	10:50	0.889	0.537	0.537	0.16
11/13/2020	02:55	1.90	17:35	3.32	2.66	02:55	3.73	21:00	5.53	4.68	02:55	0.279	17:35	0.915	0.585	0.585	0.38
11/14/2020	04:45	1.86	21:00	3.46	2.71	04:45	3.48	22:30	5.76	4.72	04:45	0.253	22:30	1.024	0.611	0.611	0.47
11/15/2020	05:30	2.11	13:05	3.58	2.93	05:30	3.83	20:40	5.82	4.98	05:30	0.334	13:05	1.086	0.715	0.715	0.19
11/16/2020	03:20	2.07	19:05	3.58	2.91	03:15	3.92	19:00	5.92	5.01	03:20	0.334	19:05	1.093	0.715	0.715	0.31
11/17/2020	03:10	2.17	21:30	3.70	2.99	02:55	3.92	18:05	6.01	5.10	03:00	0.363	21:30	1.157	0.755	0.755	0.20
11/18/2020	04:00	2.29	15:25	3.66	3.05	03:10	4.22	13:55	6.01	5.15	03:10	0.425	13:55	1.147	0.782	0.782	0.30
11/19/2020	03:35	2.28	11:15	3.57	2.99	02:00	4.19	13:55	5.96	5.12	03:35	0.414	11:15	1.099	0.754	0.754	0.50
11/20/2020	03:45	2.17	13:35	3.47	2.84	04:45	4.05	15:55	5.79	5.00	03:45	0.371	12:45	1.024	0.684	0.684	0.01
11/21/2020	03:55	1.96	12:35	3.44	2.71	04:45	3.87	10:40	5.86	4.99	04:50	0.305	12:35	1.033	0.639	0.639	-
11/22/2020	04:05	1.88	13:45	3.36	2.72	05:50	4.08	10:05	5.85	5.02	04:05	0.304	10:05	0.992	0.652	0.652	0.21
11/23/2020	04:15	2.02	13:30	3.46	2.85	04:15	4.08	18:25	5.76	5.04	04:15	0.334	13:30	1.031	0.693	0.693	0.14
11/24/2020	03:20	2.08	17:15	3.62	2.88	03:10	4.01	21:25	5.89	5.01	04:10	0.349	17:15	1.123	0.706	0.706	0.21
11/25/2020	03:20	2.13	17:40	3.57	2.87	03:15	4.01	19:45	5.83	5.01	03:20	0.357	17:40	1.093	0.697	0.697	0.05
11/26/2020	05:45	2.03	13:20	3.65	2.84	05:45	3.90	16:10	5.81	4.96	05:45	0.322	13:20	1.112	0.686	0.686	0.02
11/27/2020	04:45	1.95	14:50	3.31	2.72	04:45	3.84	14:50	5.62	4.84	04:45	0.298	14:50	0.950	0.623	0.623	-
11/28/2020	04:20	2.04	15:25	3.42	2.74	02:45	3.90	15:25	5.63	4.80	04:20	0.325	15:25	0.996	0.627	0.627	0.05
11/29/2020	05:20	1.92	14:35	3.47	2.72	05:15	3.55	14:30	5.87	4.73	05:20	0.270	14:30	1.054	0.614	0.614	-
11/30/2020	02:15	2.03	21:35	3.56	2.83	03:10	3.78	14:35	5.80	4.83	02:15	0.313	21:35	1.061	0.659	0.659	0.36
12/01/2020	04:00	2.00	15:50	3.40	2.73	04:00	3.53	20:30	5.54	4.71	04:00	0.285	15:50	0.960	0.612	0.612	-
12/02/2020	04:20	1.96	16:05	3.87	2.72	04:05	3.55	16:05	5.86	4.70	04:05	0.280	16:05	1.242	0.609	0.609	0.01
12/03/2020	04:55	1.85	19:05	3.25	2.65	04:55	3.51	14:55	5.54	4.74	04:55	0.254	12:50	0.894	0.590	0.590	-
12/04/2020	04:30	1.82	14:45	3.28	2.60	04:30	3.57	13:20	5.64	4.78	04:30	0.251	13:20	0.921	0.580	0.580	-
12/05/2020	06:30	1.81	12:05	3.34	2.60	06:20	3.79	10:30	5.74	4.84	06:30	0.272	12:05	0.963	0.586	0.586	0.03
12/06/2020	05:15	1.76	11:55	3.43	2.60	03:20	3.81	13:15	5.83	4.84	05:15	0.261	11:55	1.024	0.591	0.591	0.03
12/07/2020	05:25	1.71	13:05	3.21	2.51	03:30	3.84	20:20	5.94	5.03	03:30	0.256	13:05	0.927	0.578	0.578	-
12/08/2020	04:05	1.68	19:10	3.99	2.89	04:00	4.06	21:55	6.38	5.40	04:05	0.255	21:55	1.380	0.784	0.784	0.87
12/09/2020	23:30	2.93	07:25	3.78	3.42	23:20	5.07	08:00	6.29	5.78	23:20	0.722	13:10	1.266	1.028	1.028	0.17
12/10/2020	03:55	2.31	18:55	3.54	3.03	03:10	4.76	17:15	6.26	5.49	03:55	0.482	17:15	1.130	0.822	0.822	0.07
12/11/2020	04:00	2.07	13:45	3.37	2.90	04:00	4.14	17:00	6.04	5.28	04:00	0.353	17:00	1.038	0.743	0.743	0.02
12/12/2020	03:30	1.98	15:45	3.43	2.83	03:30	4.12	12:35	5.96	5.17	03:30	0.327	20:45	1.055	0.705	0.705	0.01
12/13/2020	04:35	1.97	14:00	3.61	2.84	02:10	4.01	19:00	5.94	5.07	04:35	0.331	14:00	1.114	0.701	0.701	0.24
12/14/2020	03:00	2.04	20:05	3.54	2.88	03:50	4.08	21:35	5.74	5.07	03:50	0.339	20:05	1.060	0.712	0.712	0.05
12/15/2020	02:35	2.04	18:15	3.64	2.95	03:55	3.95	18:10	5.93	5.11	03:55	0.331	18:10	1.142	0.746	0.746	0.58
12/16/2020	04:05	2.16	19:20	3.73	3.06	02:30	4.17	14:40	6.16	5.21	04:05	0.383	14:40	1.219	0.799	0.799	0.39
12/17/2020	04:25	2.40	16:30	3.68	3.17	04:25	4.48	16:15	6.10	5.36	04:25	0.472	16:30	1.171	0.856	0.856	0.08
12/18/2020	05:30	2.25	11:55	3.61	3.03	01:45	4.44	11:55	6.18	5.38	05:30	0.432	11:55	1.184	0.808	0.808	0.25
12/19/2020	04:00	2.23	20:10	3.64	3.02	05:55	4.59	19:20	6.24	5.49	05:15	0.440	20:10	1.202	0.820	0.820	0.37
12/20/2020	06:30	2.56	17:15	3.72	3.20	06:30	4.92	17:15	6.25	5.61	06:30	0.571	17:15	1.248	0.907	0.907	0.04
12/21/2020	01:30	2.49	18:35	4.67	3.61	01:30	4.78	20:55	6.91	5.93	01:30	0.534	20:55	1.901	1.163	1.163	1.07
12/22/2020	23:05	3.14	00:20	4.19	3.68	05:35	5.44	14:45	6.49	6.07	23:05	0.893	00:25	1.515	1.197	1.197	-
12/23/2020	23:55	2.68	11:30	3.68	3.16	04:30	5.14	20:55	6.47	5.93	03:05	0.644	11:30	1.259	0.943	0.943	-
12/24/2020	05:35	2.36	15:00	3.59	2.96	04:45	5.13	12:10	6.59	5.95	04:45	0.533	14:50	1.225	0.860	0.860	-
12/25/2020	03:55	2.18	16:35	3.53	2.86	04:30	4.90	11:35	6.35	5.77	03:55	0.451	16:35	1.170	0.795	0.795	0.49
12/26/2020	05:45	2.23	14:50	3.46	2.93	05:05	4.83	09:40	6.51	5.73	05:05	0.465	14:50	1.134	0.818	0.818	0.02
12/27/2020	05:00	2.13	12:40	3.54	2.92	05:00	4.84	11:05	6.42	5.72	05:00	0.427	12:40	1.166	0.815	0.815	0.13
12/28/2020	03:20	2.16	18:45	3.46	2.85	03:20	4.70	10:50	6.27	5.58	03:20	0.426	18:45	1.117	0.764	0.764	-
12/29/2020	04:05	2.09	17:35	3.45	2.82	03:20	4.58	11:00	6.13	5.41	03:20	0.399	17:35	1.075	0.731	0.731	0.14
12/30/2020	03:05	2.27	19:10	3.92	3.28	03:00	4.67	17:30	6.22	5.61	03:05	0.458	19:10	1.330	0.946	0.946	0.78
12/31/2020	04:20	2.80	17:00	3.94	3.39	02:35	5.10	16:50	6.34	5.77	04:20	0.681	17:00	1.374	1.013	1.013	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			148.023	30.65
Average	2.79	5.27	0.722	

Auburn.TFM.WA20-22

Flow Monitoring Site Report

ADS ENVIRONMENTAL SERVICES®

Site Name

AUB_Y-3_101255

Site Address /Location:	2272 Riverwalk Dr SE		
Site Access Details:	Park next to M/H	Latitude:	47.288431°
		Longitude:	-122.197152°

Monitor Series	Location Type
TRITON+	Temporary
Pipe Size (H x W)	Pipe Shape
23.00 x 23.50	Circular
Manhole #	System Characteristics
Y-3(101-255)	Residential
Access	Traffic
Drive	None









Installation Information

Installation Date:	Installation Type:
Thursday, May 14, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW)
12:46:00 PM	23.00 x 23.50
Depth of Flow (Wet DOF) (in)	
2.63"	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.38"
Peak Velocity (fps)	Velocity Sensor Offset (in)
5.4	0"
Silt (in)	Silt Type
0.00"	

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
26	
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
PVC	Fair

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519.22.325

AUB_Y-4_101002

Site Commentary

SITE INFORMATION

Pipe	Elliptical (18 in H x 18 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021**, along with observed minimum and maximum data, are provided in the following table.

This site experienced backwater conditions during the month of January.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	2.77	1.25	0.145
Minimum	1.72	0.48	0.044
Maximum	5.91	1.65	0.274
Min Time	11/10/2020 4:00:00 AM	01/13/2021 4:00:00 AM	04/04/2021 4:00:00 AM
Max Time	01/12/2021 7:00:00 PM	11/26/2020 11:00:00 AM	01/12/2021 7:00:00 PM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Tuesday, September 22, 2020 to Wednesday, April 14, 2021** is provided in the following table:

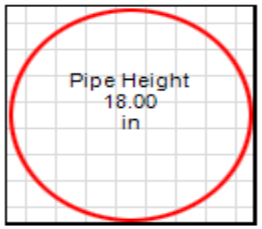
Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

Hydrograph Report

AUB_Y-4_101002

Flow Monitor

AUB_Y-4_101002



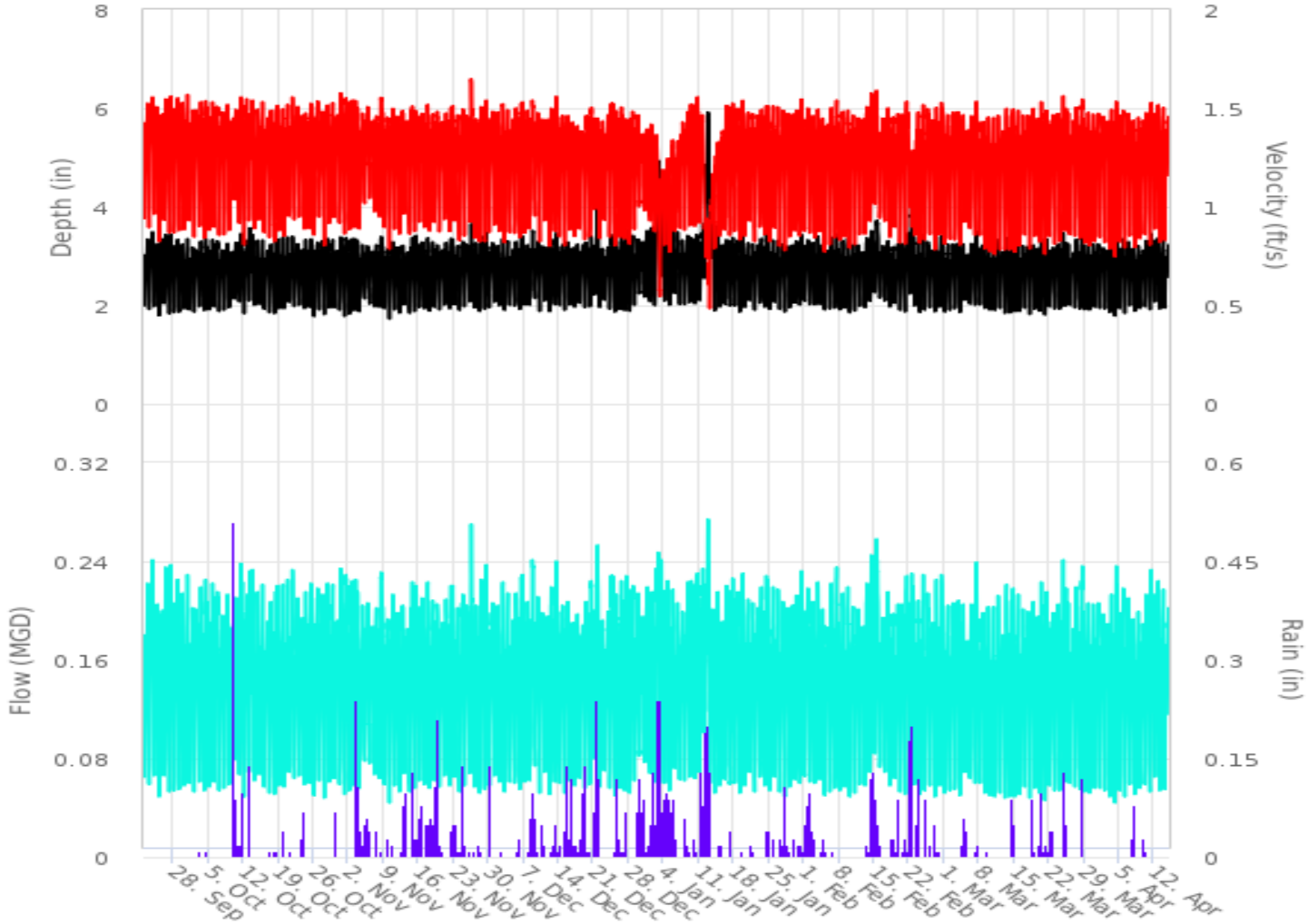
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Scattergraph Report

AUB_Y-4_101002

Flow Monitor

AUB_Y-4_101002

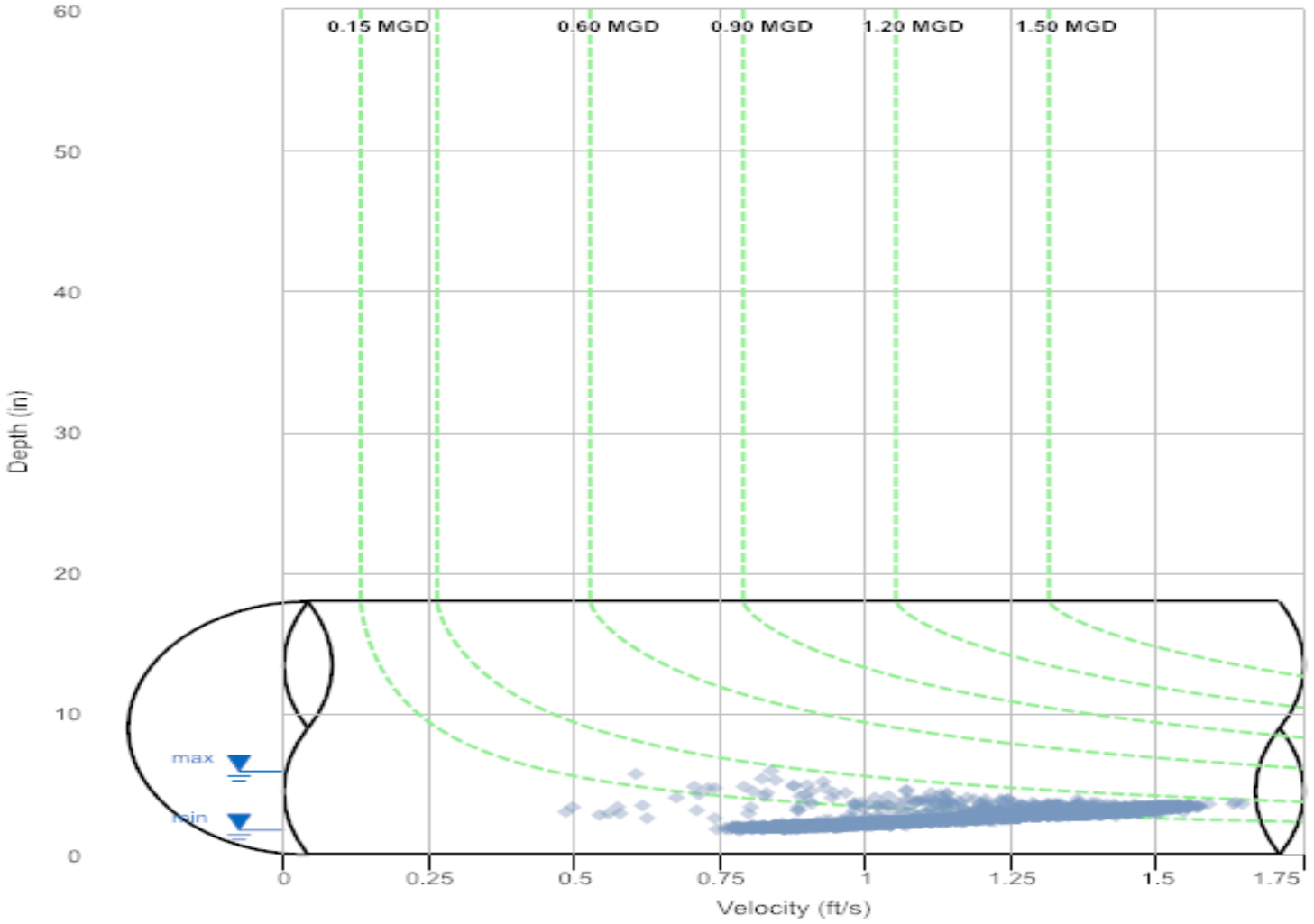
Pipe Height
18.00
in

Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
AUB_Y-4_101002Pipe: Elliptical (18 in H x 18 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	07:30	2.01	16:15	3.88	2.85	07:25	0.89	11:40	1.45	1.17	07:25	0.063	16:15	0.254	0.141	0.141	0.51
01/02/2021	03:20	1.98	21:55	4.91	3.25	03:15	0.84	12:20	1.44	1.14	03:20	0.058	21:50	0.295	0.167	0.167	1.69
01/03/2021	07:05	2.44	00:45	5.20	3.71	05:20	0.48	11:55	1.25	0.95	05:20	0.056	12:00	0.269	0.166	0.166	0.65
01/04/2021	04:20	2.06	12:20	4.13	3.19	04:50	0.70	19:50	1.38	1.07	04:50	0.055	19:40	0.239	0.150	0.150	0.48
01/05/2021	03:00	1.95	19:45	3.77	2.93	04:05	0.67	19:15	1.46	1.14	04:15	0.048	19:15	0.229	0.144	0.144	0.52
01/06/2021	05:00	2.15	18:25	3.68	2.91	06:00	0.79	19:50	1.51	1.16	04:55	0.066	18:20	0.222	0.142	0.142	0.22
01/07/2021	04:30	1.99	16:55	3.48	2.77	04:20	0.87	19:00	1.49	1.23	04:25	0.060	19:00	0.220	0.141	0.141	-
01/08/2021	03:50	1.97	18:15	3.55	2.76	03:50	0.84	18:15	1.57	1.25	03:50	0.057	18:15	0.250	0.143	0.143	0.22
01/09/2021	05:45	2.03	11:25	3.43	2.82	04:25	0.89	14:35	1.58	1.29	05:45	0.063	14:35	0.240	0.154	0.154	-
01/10/2021	04:45	2.02	13:30	3.47	2.84	04:45	0.88	18:15	1.60	1.29	04:45	0.062	18:50	0.245	0.157	0.157	0.07
01/11/2021	04:00	2.07	21:05	3.70	2.96	03:15	0.90	18:15	1.53	1.26	03:55	0.066	21:15	0.250	0.161	0.161	1.06
01/12/2021	01:30	2.43	19:10	6.26	4.19	11:40	0.65	00:00	1.19	0.89	02:05	0.093	19:15	0.292	0.178	0.178	2.10
01/13/2021	23:50	2.68	00:35	6.06	3.58	04:10	0.42	19:50	1.27	0.91	04:10	0.056	00:50	0.222	0.146	0.146	0.09
01/14/2021	04:00	1.79	18:35	3.82	2.90	03:50	0.71	18:25	1.47	1.13	03:50	0.042	20:05	0.232	0.141	0.141	0.01
01/15/2021	04:30	1.93	17:50	3.31	2.77	05:05	0.82	20:50	1.43	1.20	04:30	0.054	21:00	0.205	0.139	0.139	0.09
01/16/2021	05:20	1.95	12:55	3.46	2.76	05:20	0.83	17:40	1.59	1.26	05:20	0.056	12:55	0.241	0.146	0.146	-
01/17/2021	04:40	1.97	18:15	3.44	2.79	04:45	0.82	18:05	1.55	1.27	04:40	0.056	18:15	0.236	0.151	0.151	0.10
01/18/2021	05:00	1.90	18:25	3.38	2.78	05:00	0.83	18:20	1.56	1.28	05:00	0.053	18:25	0.232	0.151	0.151	-
01/19/2021	03:55	1.84	20:05	3.49	2.73	03:55	0.82	18:40	1.63	1.27	03:55	0.050	20:05	0.245	0.144	0.144	0.01
01/20/2021	04:30	1.93	21:25	3.36	2.72	04:30	0.83	21:20	1.52	1.25	04:30	0.055	21:20	0.224	0.141	0.141	-
01/21/2021	04:15	2.05	19:25	3.34	2.75	04:05	0.90	19:15	1.51	1.26	04:05	0.065	19:20	0.220	0.143	0.143	0.11
01/22/2021	04:50	1.88	20:05	3.28	2.72	04:25	0.81	20:05	1.50	1.24	04:25	0.052	20:05	0.214	0.140	0.140	-
01/23/2021	04:50	2.02	12:10	3.45	2.76	04:40	0.87	12:10	1.52	1.26	04:40	0.062	12:10	0.233	0.146	0.146	-
01/24/2021	05:30	1.94	11:30	3.49	2.82	05:20	0.84	11:30	1.55	1.27	05:20	0.056	11:30	0.241	0.154	0.154	0.16
01/25/2021	04:45	1.86	20:45	3.44	2.74	04:45	0.78	20:45	1.56	1.25	04:45	0.049	20:45	0.237	0.143	0.143	0.04
01/26/2021	04:10	2.04	20:10	3.42	2.76	04:05	0.87	19:50	1.54	1.26	04:10	0.062	20:00	0.231	0.145	0.145	-
01/27/2021	03:50	1.88	18:20	3.34	2.72	03:50	0.78	18:15	1.54	1.24	03:50	0.050	18:20	0.225	0.139	0.139	0.14
01/28/2021	04:20	1.77	18:55	3.31	2.70	03:50	0.71	18:55	1.50	1.23	04:20	0.041	18:55	0.217	0.138	0.138	0.24
01/29/2021	03:40	1.91	19:45	3.38	2.70	03:30	0.83	19:35	1.53	1.24	03:35	0.054	19:45	0.227	0.138	0.138	0.03
01/30/2021	05:55	1.99	10:55	3.38	2.75	05:55	0.83	10:50	1.52	1.25	05:55	0.057	10:55	0.226	0.144	0.144	0.07
01/31/2021	04:20	1.99	14:05	3.46	2.82	03:45	0.82	12:10	1.60	1.26	03:50	0.057	11:25	0.240	0.152	0.152	0.12
02/01/2021	03:55	2.05	20:05	3.45	2.81	02:15	0.86	18:55	1.55	1.26	04:00	0.062	20:05	0.238	0.149	0.149	0.82
02/02/2021	05:05	1.97	08:25	3.41	2.78	04:05	0.85	08:20	1.55	1.25	05:00	0.058	08:25	0.234	0.144	0.144	0.31
02/03/2021	03:45	1.97	19:45	3.48	2.77	03:45	0.81	20:45	1.54	1.24	03:45	0.055	19:40	0.234	0.144	0.144	0.06
02/04/2021	04:10	1.96	18:40	3.35	2.76	03:30	0.84	14:20	1.50	1.24	04:05	0.057	14:20	0.219	0.142	0.142	0.07
02/05/2021	04:15	1.89	17:30	3.15	2.72	04:10	0.75	17:30	1.46	1.20	04:15	0.048	17:30	0.196	0.135	0.135	0.01
02/06/2021	04:35	1.89	11:40	3.57	2.76	04:20	0.78	11:30	1.60	1.23	04:35	0.050	11:40	0.255	0.144	0.144	0.01
02/07/2021	04:55	1.88	13:50	3.50	2.80	04:45	0.81	12:10	1.59	1.26	04:55	0.051	12:10	0.242	0.152	0.152	-
02/08/2021	04:30	1.88	19:10	3.40	2.74	04:25	0.82	21:05	1.52	1.23	04:30	0.052	19:10	0.226	0.141	0.141	-
02/09/2021	05:05	1.87	19:50	3.42	2.73	04:55	0.81	19:15	1.53	1.24	05:00	0.051	19:50	0.228	0.140	0.140	-
02/10/2021	04:45	1.83	20:10	3.34	2.70	04:05	0.77	20:10	1.52	1.22	04:05	0.047	20:10	0.222	0.137	0.137	-
02/11/2021	04:10	1.88	20:25	3.32	2.70	03:40	0.78	20:30	1.51	1.22	04:20	0.050	20:30	0.219	0.137	0.137	-
02/12/2021	03:35	1.94	18:00	3.24	2.73	03:35	0.82	17:55	1.48	1.25	03:35	0.055	18:00	0.207	0.141	0.141	-
02/13/2021	05:30	1.91	14:25	3.45	2.78	05:30	0.82	14:20	1.56	1.26	05:30	0.053	14:25	0.238	0.148	0.148	0.08
02/14/2021	04:20	2.04	12:10	3.53	2.86	04:15	0.88	11:20	1.63	1.29	04:15	0.063	11:20	0.255	0.158	0.158	0.71
02/15/2021	04:50	2.23	14:10	3.87	3.04	05:00	0.98	10:50	1.64	1.28	05:00	0.079	12:40	0.275	0.169	0.169	0.78
02/16/2021	03:50	2.13	19:05	3.32	2.78	03:50	0.93	20:35	1.55	1.24	03:50	0.071	19:05	0.211	0.143	0.143	0.07
02/17/2021	03:45	2.07	20:15	3.41	2.74	04:15	0.90	20:10	1.56	1.25	04:15	0.066	20:15	0.233	0.141	0.141	-
02/18/2021	05:00	1.92	21:15	3.23	2.74	05:00	0.81	16:55	1.48	1.25	05:00	0.053	21:20	0.204	0.141	0.141	0.09
02/19/2021	04:25	2.00	19:10	3.35	2.70	04:15	0.88	19:00	1.53	1.23	04:25	0.061	19:00	0.223	0.136	0.136	0.17
02/20/2021	05:00	1.82	12:45	3.32	2.73	04:55	0.77	18:25	1.55	1.25	05:00	0.046	13:20	0.217	0.144	0.144	0.07
02/21/2021	05:30	1.85	23:40	3.84	2.81	05:05	0.80	13:20	1.56	1.26	05:20	0.050	12:35	0.233	0.152	0.152	0.42
02/22/2021	04:45	2.18	13:20	5.10	3.34	13:10	0.83	19:35	1.36	1.14	04:45	0.076	19:40	0.246	0.166	0.166	0.98
02/23/2021	04:50	1.96	21:45	3.78	2.76	03:10	0.84	20:50	1.53	1.23	04:50	0.057	20:50	0.221	0.141	0.141	0.27
02/24/2021	04:10	1.85	20:20	3.53	2.73	04:35	0.79	20:20	1.65	1.24	04:35	0.049	20:20	0.260	0.141	0.141	-
02/25/2021	03:30	1.86	18:00	3.38	2.72	03:45	0.80	18:00	1.52	1.24	03:50	0.050	18:00	0.226	0.139	0.139	0.18
02/26/2021	04:00	1.87	16:20	3.16	2.70	04:00	0.81	16:40	1.45	1.24	04:00	0.051	16:20	0.194	0.137	0.137	0.10
02/27/2021	04:25	1.86	11:00	3.45	2.71	05:45	0.76	10:25	1.56	1.23	04:25	0.048	10:55	0.235	0.140	0.140	0.02
02/28/2021	04:30	1.94	11:20	3.47	2.78	04:30	0.83	11:20	1.58	1.27	04:30	0.055	11:20	0.244	0.151	0.151	0.02
03/01/2021	04:00	1.78	20:30	3.35	2.68	03:50	0.77	19:50	1.52	1.23	04:00	0.045	20:30	0.220	0.137	0.137	-
03/02/2021	03:55	1.87	20:50	3.33	2.70	03:45	0.77	21:50	1.54	1.23	03:50	0.049	20:50	0.220	0.137	0.137	-
03/03/2021	03:15	1.88	21:10	3.45	2.69	03:15	0.79	21:05	1.52	1.24	03:15	0.050	21:10	0.233	0.137	0.137	-
03/04/2021	04:35	1.81	20:35	3.36	2.69	04:20	0.79	20:25	1.49	1.23	04:35	0.047	20:30	0.218	0.137	0.137	0.20
03/05/2021	06:00	2.08	13:30	3.14	2.71	03:00	0.91	13:30	1.43	1.23	03:20	0.067	13:30	0.191	0.136	0.136	0.05
03/06/2021	05:25	2.00	12:15	3.37	2.76	03:50	0.87	20:05	1.50	1.25	03:50	0.061	12:10	0.220	0.144	0.144	-
03/07/2021	05:30	1.96	11:15	3.55	2.79	05:30	0.79	10:45	1.59	1.25	05:30	0.053	11:15	0.250	0.149	0.149	0.04
03/08/2021	04:15	1.98	20:05	3.28	2.75	04:15	0.82	19:50	1.46	1.21	04:15	0.056	20:05	0.207	0.139	0.139	-
03/09/2021	04:30	1.91	21:25	3.37	2.73	04:30	0.76	21:15	1.50	1.21	04:30	0.050	21:25	0.221	0.137	0.137	0.01
03/10/2021	04:35	1.87	20:55	3.38	2.72	04:30	0.75	21:00	1.48	1.20	04:35	0.047	20:55	0.219	0.135	0.135	-
03/11/2021	03:30	1.86	19:40	3.40	2.73	03:25	0.74	19:25	1.50	1.20	03:30	0.046	19:45	0.225	0.137	0.137	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/12/2021	04:30	1.90	19:05	3.20	2.71	04:25	0.74	17:50	1.43	1.20	04:25	0.048	19:05	0.195	0.134	0.134	-
03/13/2021	04:05	1.82	11:05	3.42	2.72	04:00	0.76	10:20	1.55	1.22	04:00	0.046	10:20	0.230	0.140	0.140	-
03/14/2021	04:35	1.82	20:25	3.44	2.75	04:30	0.76	20:20	1.54	1.23	04:30	0.046	20:25	0.235	0.145	0.145	0.30
03/15/2021	03:55	1.82	20:05	3.36	2.71	03:35	0.75	20:05	1.52	1.22	03:50	0.046	20:05	0.223	0.137	0.137	-
03/16/2021	02:30	1.83	21:10	3.29	2.69	02:25	0.77	19:45	1.52	1.23	02:25	0.047	21:05	0.213	0.137	0.137	-
03/17/2021	03:40	1.92	20:05	3.33	2.70	02:55	0.84	20:00	1.53	1.24	03:40	0.055	20:05	0.223	0.138	0.138	-
03/18/2021	03:05	1.76	20:40	3.29	2.68	03:05	0.75	20:20	1.56	1.23	03:05	0.043	20:20	0.218	0.137	0.137	0.11
03/19/2021	04:00	1.86	18:15	3.27	2.68	04:05	0.79	18:10	1.49	1.23	04:05	0.049	18:15	0.212	0.136	0.136	0.03
03/20/2021	03:55	1.81	10:10	3.38	2.73	03:50	0.78	10:20	1.62	1.25	03:55	0.046	10:20	0.240	0.143	0.143	0.17
03/21/2021	04:10	1.79	12:45	3.38	2.73	04:05	0.74	10:50	1.55	1.23	04:10	0.044	10:55	0.229	0.143	0.143	0.07
03/22/2021	02:45	1.96	14:20	3.31	2.72	02:20	0.84	14:20	1.51	1.24	02:40	0.057	14:20	0.217	0.140	0.140	0.11
03/23/2021	02:50	1.83	20:40	3.32	2.71	02:50	0.76	18:55	1.51	1.24	02:50	0.046	20:40	0.218	0.139	0.139	-
03/24/2021	02:55	1.87	20:30	3.58	2.75	02:50	0.80	20:25	1.71	1.26	02:55	0.050	20:30	0.275	0.144	0.144	0.34
03/25/2021	03:00	1.88	10:25	4.10	2.76	03:00	0.81	10:25	1.84	1.26	03:00	0.051	10:25	0.360	0.145	0.145	0.27
03/26/2021	03:20	1.98	19:10	3.14	2.68	03:10	0.83	19:15	1.50	1.23	03:15	0.057	19:15	0.199	0.135	0.135	-
03/27/2021	04:40	1.90	10:00	3.39	2.74	04:40	0.79	10:00	1.54	1.24	04:40	0.051	10:00	0.230	0.143	0.143	-
03/28/2021	04:10	1.90	15:05	3.53	2.80	04:05	0.81	14:45	1.57	1.26	04:15	0.052	15:20	0.248	0.152	0.152	0.37
03/29/2021	03:05	1.87	20:15	3.35	2.70	01:35	0.80	20:20	1.55	1.22	03:10	0.050	20:15	0.225	0.138	0.138	-
03/30/2021	02:35	1.85	20:25	3.29	2.69	02:45	0.75	20:25	1.49	1.22	02:45	0.046	20:25	0.213	0.136	0.136	-
03/31/2021	03:55	1.92	10:00	3.30	2.74	03:55	0.79	19:30	1.49	1.24	03:55	0.052	10:00	0.212	0.141	0.141	-
04/01/2021	02:50	1.91	19:45	3.27	2.72	03:25	0.82	18:45	1.51	1.23	03:25	0.053	19:45	0.209	0.138	0.138	-
04/02/2021	03:20	1.91	19:00	3.32	2.74	03:20	0.80	18:55	1.49	1.25	03:20	0.052	19:00	0.216	0.142	0.142	-
04/03/2021	03:10	1.84	11:45	3.43	2.70	03:15	0.77	11:45	1.59	1.22	03:10	0.048	11:45	0.242	0.138	0.138	-
04/04/2021	04:35	1.77	10:45	3.49	2.77	04:35	0.73	10:40	1.57	1.25	04:35	0.042	10:40	0.244	0.148	0.148	-
04/05/2021	02:05	1.91	19:55	3.43	2.76	02:00	0.79	12:05	1.56	1.25	02:05	0.051	12:05	0.236	0.145	0.145	-
04/06/2021	03:25	1.80	19:35	3.40	2.68	03:20	0.77	19:30	1.55	1.21	03:20	0.046	19:30	0.232	0.135	0.135	-
04/07/2021	02:05	1.96	19:45	3.24	2.67	02:05	0.82	17:45	1.46	1.21	02:00	0.056	19:45	0.205	0.132	0.132	0.22
04/08/2021	03:20	1.84	13:10	3.27	2.69	03:20	0.76	13:10	1.49	1.21	03:20	0.047	13:10	0.211	0.134	0.134	-
04/09/2021	03:55	1.90	19:10	3.25	2.71	03:20	0.82	18:40	1.49	1.24	04:00	0.053	18:45	0.207	0.138	0.138	0.03
04/10/2021	03:50	1.92	10:30	3.41	2.76	03:30	0.84	10:35	1.51	1.25	03:45	0.055	10:35	0.226	0.144	0.144	0.02
04/11/2021	04:35	1.89	09:55	3.50	2.83	04:15	0.79	09:50	1.62	1.27	04:45	0.050	09:50	0.252	0.154	0.154	-
04/12/2021	03:05	2.05	20:30	3.46	2.77	03:00	0.87	20:15	1.57	1.25	03:05	0.062	20:30	0.239	0.144	0.144	-
04/13/2021	03:20	1.88	20:10	3.45	2.76	03:20	0.79	20:10	1.55	1.25	03:20	0.050	20:10	0.237	0.144	0.144	-
04/14/2021	03:55	1.90	21:20	3.32	2.74	03:55	0.81	21:20	1.51	1.25	03:55	0.052	21:20	0.219	0.142	0.141	-
09/22/2020	02:55	1.96	19:35	3.42	2.75	02:55	0.89	20:20	1.57	1.29	02:55	0.060	19:35	0.236	0.146	0.146	-
09/23/2020	04:05	1.89	19:30	3.52	2.80	02:05	0.88	19:30	1.61	1.32	03:45	0.057	19:30	0.254	0.155	0.155	-
09/24/2020	04:00	1.95	20:05	3.34	2.73	02:55	0.92	15:35	1.55	1.31	02:45	0.062	19:55	0.217	0.148	0.148	-
09/25/2020	03:30	1.75	16:50	3.41	2.80	03:35	0.79	20:20	1.52	1.27	03:35	0.045	19:45	0.223	0.150	0.150	-
09/26/2020	03:40	2.01	11:20	3.52	2.77	03:40	0.89	11:20	1.61	1.30	03:40	0.063	11:20	0.253	0.150	0.150	-
09/27/2020	04:15	1.79	11:50	3.54	2.74	04:00	0.85	11:20	1.60	1.29	04:15	0.050	11:50	0.254	0.150	0.150	-
09/28/2020	04:00	1.81	20:40	3.38	2.73	04:05	0.83	18:40	1.61	1.31	04:00	0.050	20:35	0.231	0.149	0.149	-
09/29/2020	04:00	1.84	19:45	3.33	2.68	02:30	0.84	19:55	1.57	1.30	03:45	0.053	19:55	0.228	0.144	0.144	-
09/30/2020	03:25	1.91	19:55	3.42	2.70	03:00	0.88	20:00	1.61	1.30	03:25	0.057	19:55	0.242	0.145	0.145	-
10/01/2020	03:25	1.88	19:40	3.22	2.67	03:20	0.90	19:10	1.54	1.29	03:20	0.057	19:10	0.211	0.140	0.140	-
10/02/2020	03:20	1.84	10:40	3.75	2.64	03:20	0.83	10:40	1.76	1.26	03:20	0.051	10:40	0.304	0.136	0.136	-
10/03/2020	04:15	1.95	10:55	3.38	2.74	04:15	0.88	10:55	1.56	1.29	04:10	0.059	10:55	0.232	0.147	0.147	0.01
10/04/2020	04:30	1.87	10:35	3.37	2.75	04:20	0.82	13:30	1.58	1.28	04:20	0.052	13:35	0.228	0.149	0.149	0.01
10/05/2020	04:00	1.85	19:20	3.35	2.70	03:50	0.85	19:25	1.58	1.28	04:05	0.052	19:20	0.231	0.144	0.144	-
10/06/2020	03:15	1.96	19:25	3.34	2.74	03:20	0.88	17:15	1.55	1.30	03:20	0.059	17:20	0.224	0.148	0.148	-
10/07/2020	04:05	1.83	19:15	3.17	2.65	04:10	0.81	19:20	1.50	1.26	04:10	0.049	19:50	0.202	0.137	0.137	-
10/08/2020	04:00	1.82	18:50	3.31	2.71	04:00	0.81	19:55	1.54	1.28	04:00	0.049	18:50	0.220	0.144	0.144	-
10/09/2020	03:50	1.89	19:05	3.24	2.73	03:55	0.85	14:00	1.55	1.29	03:50	0.055	19:05	0.210	0.146	0.146	0.64
10/10/2020	04:25	2.09	13:10	3.31	2.85	04:20	0.98	11:40	1.52	1.33	04:20	0.073	11:40	0.217	0.158	0.158	1.04
10/11/2020	04:45	2.05	12:40	3.52	2.86	03:55	0.90	12:40	1.60	1.30	04:50	0.064	12:40	0.252	0.160	0.160	0.53
10/12/2020	03:25	1.82	19:05	3.41	2.74	03:20	0.78	15:25	1.61	1.28	03:20	0.047	19:05	0.232	0.147	0.147	-
10/13/2020	02:20	2.07	07:30	4.28	2.85	02:15	0.91	07:45	1.71	1.29	02:20	0.066	07:35	0.346	0.155	0.155	0.61
10/14/2020	04:20	1.97	19:10	3.45	2.72	04:20	0.86	18:45	1.55	1.25	04:20	0.059	18:50	0.235	0.141	0.141	-
10/15/2020	03:10	1.99	19:00	3.38	2.73	03:10	0.89	18:55	1.56	1.29	03:10	0.062	19:00	0.231	0.146	0.146	-
10/16/2020	03:15	1.91	18:15	3.18	2.69	03:15	0.85	19:50	1.47	1.25	03:15	0.055	18:20	0.196	0.138	0.138	-
10/17/2020	04:45	1.81	11:35	3.35	2.71	03:35	0.82	11:30	1.55	1.25	04:45	0.049	11:35	0.228	0.140	0.140	0.01
10/18/2020	04:30	1.79	12:15	3.40	2.76	04:30	0.79	19:35	1.54	1.26	04:30	0.047	12:15	0.229	0.148	0.148	0.03
10/19/2020	03:55	1.87	20:00	3.48	2.73	03:55	0.83	20:00	1.56	1.26	03:50	0.053	20:00	0.241	0.143	0.143	0.05
10/20/2020	02:20	1.92	20:00	3.43	2.75	02:15	0.84	19:35	1.54	1.27	02:20	0.055	20:00	0.233	0.146	0.146	-
10/21/2020	02:20	2.00	18:25	3.46	2.73	02:10	0.91	18:20	1.59	1.28	02:15	0.063	18:25	0.245	0.144	0.144	0.01
10/22/2020	03:45	1.91	20:25	3.31	2.70	03:45	0.89	21:05	1.54	1.29	03:45	0.058	20:25	0.220	0.143	0.143	-
10/23/2020	03:10	1.99	19:55	3.24	2.68	03:00	0.89	19:55	1.51	1.27	03:00	0.063	19:55	0.212	0.139	0.139	0.20
10/24/2020	04:25	1.92	10:05	3.43	2.71	04:35	0.87	10:05	1.51	1.26	04:25	0.058	10:05	0.230	0.143	0.143	0.02
10/25/2020	04:50	1.95	11:40	3.40	2.76	04:45	0.86	09:45	1.57	1.28	04:45	0.058	11:40	0.235	0.150	0.150	-
10/26/2020	02:25	1.75	19:15	3.35	2.69	02:20	0.84	19:15	1.59	1.27	02:20	0.048	19:15	0.234	0.143	0.143	-
10/27/2020	03:10	1.88	19:45	3.44	2.73	03:00	0.93	17:10	1.56	1.26	03:05	0.059	19:45	0.233	0.143	0.143	-
10/28/2020	03:35	1.79	19:05	3.42	2.74	02:50	0.79	19:05	1.57	1.26	03:40	0.046	19:05	0.237	0.144	0.144	-
10/29/2020	02:50	1.91	20:35	3.36	2.78	03:20	0.88	20:00	1.57	1.30	03:20	0.057	20:00	0.228	0.151	0.151	-
10/30/2020	02:30	1.92	15:35	3.22	2.74	02:30	0.92	19:45	1.56	1.31	02:30	0.060	15:30	0.206	0.148	0.148	0.10
10/31/2020	04:40	1.87	10:15	3.42	2.74	04:45	0.89	10:20	1.61	1.29	04:40	0.056	10:20	0.242	0.149	0.149	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/01/2020	04:15	1.73	11:25	3.39	2.76	04:10	0.81	13:25	1.60	1.29	04:10	0.046	11:05	0.236	0.154	0.154	-
11/02/2020	04:00	1.79	20:20	3.43	2.72	04:00	0.85	19:35	1.59	1.29	04:00	0.050	19:40	0.240	0.146	0.146	-
11/03/2020	03:25	1.85	10:45	3.37	2.80	03:35	0.86	10:15	1.56	1.30	03:35	0.053	10:15	0.228	0.154	0.154	0.83
11/04/2020	04:10	1.83	19:40	3.29	2.70	04:10	0.84	19:30	1.50	1.26	04:10	0.051	19:40	0.214	0.141	0.141	0.09
11/05/2020	03:55	2.07	19:55	3.25	2.75	03:55	0.98	19:05	1.53	1.30	04:00	0.071	19:55	0.215	0.147	0.147	0.34
11/06/2020	04:50	1.98	18:50	3.23	2.69	04:25	1.02	17:20	1.49	1.31	04:45	0.071	17:25	0.207	0.143	0.143	0.10
11/07/2020	05:40	1.92	13:25	3.29	2.73	05:40	0.92	13:15	1.49	1.29	05:40	0.061	13:15	0.211	0.146	0.146	0.07
11/08/2020	04:35	1.94	12:10	3.43	2.78	04:35	0.93	10:45	1.59	1.31	04:35	0.062	12:20	0.239	0.154	0.154	0.01
11/09/2020	03:45	1.91	19:45	3.18	2.67	03:40	0.87	18:30	1.50	1.26	03:45	0.057	18:30	0.203	0.138	0.138	0.04
11/10/2020	04:20	1.67	20:00	3.35	2.66	03:35	0.75	19:45	1.53	1.24	04:20	0.041	20:00	0.224	0.138	0.138	0.03
11/11/2020	04:20	1.88	19:35	3.29	2.67	04:35	0.86	19:35	1.50	1.26	04:20	0.055	19:35	0.214	0.138	0.138	-
11/12/2020	04:30	1.82	18:45	3.27	2.66	04:30	0.83	18:40	1.53	1.27	04:30	0.050	18:45	0.217	0.139	0.139	0.16
11/13/2020	03:10	1.98	19:40	3.22	2.67	02:45	0.94	19:40	1.49	1.28	03:10	0.064	19:40	0.206	0.139	0.139	0.38
11/14/2020	05:50	1.75	18:55	3.46	2.73	05:50	0.81	18:50	1.61	1.28	05:50	0.046	18:50	0.247	0.147	0.147	0.47
11/15/2020	05:45	1.85	10:55	3.46	2.81	05:35	0.84	10:40	1.53	1.29	05:50	0.052	10:45	0.234	0.153	0.153	0.19
11/16/2020	04:25	1.90	17:50	3.40	2.77	04:25	0.88	17:50	1.56	1.30	04:25	0.057	17:50	0.234	0.150	0.150	0.31
11/17/2020	04:30	1.90	19:55	3.57	2.72	04:30	0.88	19:55	1.64	1.27	04:30	0.057	19:55	0.264	0.144	0.144	0.20
11/18/2020	04:25	1.84	19:00	3.32	2.72	04:30	0.84	18:20	1.49	1.26	04:30	0.051	19:00	0.214	0.143	0.143	0.30
11/19/2020	03:15	1.92	20:05	3.32	2.73	02:15	0.87	17:45	1.52	1.27	03:15	0.058	17:45	0.216	0.144	0.144	0.50
11/20/2020	04:15	1.87	20:15	3.17	2.69	03:25	0.84	10:45	1.46	1.25	03:25	0.053	18:05	0.194	0.139	0.139	0.01
11/21/2020	04:45	1.97	11:15	3.33	2.74	04:35	0.91	11:20	1.49	1.28	04:35	0.062	11:15	0.216	0.145	0.145	-
11/22/2020	05:20	1.88	11:40	3.43	2.81	05:20	0.84	11:40	1.56	1.28	05:20	0.053	11:40	0.236	0.154	0.154	0.21
11/23/2020	05:05	1.90	19:00	3.36	2.72	05:00	0.87	19:00	1.52	1.26	05:00	0.057	19:00	0.225	0.142	0.142	0.14
11/24/2020	05:00	1.84	16:25	3.41	2.75	04:55	0.78	20:20	1.61	1.25	04:55	0.048	16:25	0.231	0.143	0.143	0.21
11/25/2020	03:20	1.94	14:45	3.44	2.76	03:15	0.82	14:45	1.51	1.26	03:15	0.055	14:45	0.230	0.145	0.145	0.05
11/26/2020	06:35	2.05	11:55	3.69	2.89	06:45	0.89	11:30	1.70	1.32	06:45	0.064	11:50	0.283	0.165	0.165	0.02
11/27/2020	05:05	1.90	12:20	3.38	2.68	05:05	0.82	12:35	1.48	1.22	05:05	0.053	12:15	0.217	0.136	0.136	-
11/28/2020	05:55	1.80	12:55	3.49	2.78	05:55	0.78	12:45	1.55	1.26	05:55	0.046	12:55	0.240	0.149	0.149	0.05
11/29/2020	05:15	1.86	12:55	3.53	2.77	06:05	0.78	12:35	1.60	1.25	05:15	0.050	12:35	0.247	0.148	0.148	-
11/30/2020	03:20	1.94	18:45	3.36	2.77	03:10	0.85	19:10	1.52	1.28	03:10	0.056	18:50	0.220	0.147	0.147	0.36
12/01/2020	05:00	1.97	19:55	3.28	2.73	05:00	0.85	19:20	1.52	1.25	05:00	0.058	19:20	0.212	0.141	0.141	-
12/02/2020	03:10	1.96	20:50	3.48	2.74	02:55	0.86	20:45	1.57	1.26	03:00	0.058	20:55	0.244	0.145	0.145	0.01
12/03/2020	04:20	1.88	20:45	3.37	2.74	04:20	0.80	20:40	1.53	1.26	04:20	0.051	20:45	0.226	0.143	0.143	-
12/04/2020	04:30	1.97	19:05	3.26	2.70	04:25	0.85	19:05	1.48	1.25	04:25	0.058	19:05	0.208	0.139	0.139	-
12/05/2020	04:10	1.97	10:55	3.44	2.73	04:25	0.83	10:55	1.55	1.25	04:25	0.057	10:55	0.237	0.144	0.144	0.03
12/06/2020	05:10	1.84	18:25	3.52	2.83	05:05	0.81	18:00	1.57	1.28	05:05	0.050	18:25	0.245	0.156	0.156	0.03
12/07/2020	04:40	1.95	18:45	3.29	2.72	04:35	0.83	18:15	1.50	1.25	04:35	0.056	18:50	0.215	0.141	0.141	-
12/08/2020	04:55	1.96	17:40	3.57	2.88	04:55	0.85	17:50	1.59	1.30	04:55	0.057	17:50	0.254	0.161	0.161	0.87
12/09/2020	05:05	2.05	13:35	3.39	2.78	05:05	0.89	19:20	1.50	1.27	05:05	0.064	13:35	0.221	0.146	0.146	0.17
12/10/2020	04:40	1.86	18:25	3.27	2.72	03:55	0.81	20:55	1.48	1.25	04:40	0.050	18:25	0.208	0.141	0.141	0.07
12/11/2020	04:30	2.04	18:05	3.29	2.76	04:30	0.89	10:00	1.49	1.27	04:30	0.064	18:10	0.211	0.145	0.145	0.02
12/12/2020	04:30	1.85	12:30	3.42	2.74	04:35	0.77	12:20	1.53	1.24	04:30	0.048	12:30	0.230	0.143	0.143	0.01
12/13/2020	06:00	1.99	11:20	3.56	2.80	04:55	0.82	12:20	1.67	1.27	04:55	0.058	12:20	0.262	0.151	0.151	0.24
12/14/2020	04:50	1.95	18:20	3.37	2.74	03:35	0.80	18:15	1.52	1.24	03:35	0.055	18:20	0.225	0.141	0.141	0.05
12/15/2020	04:30	1.89	19:15	3.43	2.77	04:30	0.78	17:50	1.54	1.25	04:30	0.050	19:15	0.230	0.146	0.146	0.58
12/16/2020	05:00	1.98	11:20	3.30	2.77	04:05	0.86	11:20	1.49	1.25	04:05	0.060	11:20	0.214	0.145	0.145	0.39
12/17/2020	04:15	1.91	18:15	3.34	2.75	04:05	0.82	17:20	1.44	1.23	04:15	0.053	18:15	0.210	0.140	0.140	0.08
12/18/2020	05:05	1.98	20:30	3.38	2.78	02:55	0.85	13:00	1.42	1.23	05:05	0.059	20:30	0.202	0.142	0.142	0.25
12/19/2020	06:15	1.93	11:45	3.38	2.76	06:05	0.81	11:50	1.49	1.25	06:15	0.053	11:45	0.219	0.145	0.145	0.37
12/20/2020	05:05	1.89	12:10	3.48	2.79	05:05	0.81	13:05	1.60	1.26	05:00	0.052	11:40	0.239	0.148	0.148	0.04
12/21/2020	04:05	2.16	18:55	4.18	2.98	04:00	0.96	18:30	1.66	1.24	04:05	0.074	18:30	0.295	0.157	0.157	1.07
12/22/2020	04:30	1.90	18:05	3.19	2.75	04:25	0.81	18:10	1.48	1.23	04:25	0.052	18:10	0.201	0.141	0.141	-
12/23/2020	04:10	2.08	20:40	3.26	2.73	03:55	0.92	21:05	1.52	1.25	03:55	0.068	21:05	0.209	0.140	0.140	-
12/24/2020	04:20	1.89	14:40	3.50	2.83	04:30	0.81	14:30	1.58	1.28	04:25	0.052	14:30	0.244	0.155	0.155	-
12/25/2020	06:00	1.80	12:45	3.40	2.70	05:55	0.76	12:35	1.53	1.23	06:00	0.045	12:45	0.225	0.140	0.140	0.49
12/26/2020	06:05	1.91	12:00	3.44	2.76	06:15	0.82	11:50	1.53	1.24	06:15	0.053	11:55	0.232	0.144	0.144	0.02
12/27/2020	04:20	1.84	12:10	3.58	2.81	04:25	0.79	12:40	1.50	1.24	04:25	0.048	12:40	0.238	0.149	0.149	0.13
12/28/2020	04:30	1.86	20:30	3.59	2.77	04:25	0.80	18:20	1.52	1.24	04:30	0.050	20:30	0.242	0.146	0.146	-
12/29/2020	03:50	1.99	20:45	3.46	2.75	03:00	0.88	20:40	1.54	1.25	03:15	0.061	20:45	0.237	0.143	0.143	0.14
12/30/2020	02:00	2.21	18:15	3.38	2.86	02:00	0.96	21:35	1.48	1.25	02:00	0.077	21:35	0.216	0.149	0.149	0.78
12/31/2020	04:55	2.12	17:30	3.63	2.90	04:50	0.94	17:55	1.49	1.24	04:50	0.071	17:55	0.241	0.153	0.153	0.17

09/22/2020 00:00 - 04/14/2021 23:56

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			29.683	30.65
Average	2.77	1.25	0.145	

Auburn.TFM.WA20-22

Flow Monitoring Site Report

ADS ENVIRONMENTAL SERVICES®

Site Name

AUB_Y-4_101002

Site Address /Location:	Cnr K St SE and 17th SE, Auburn			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	Park on K St SE	Latitude:	47.293542°	Pipe Size (H x W): 18.00 x18.00	Pipe Shape: Circular
		Longitude:	-122.216166°		



Manhole #	System Characteristics
Y-4(1010-02)	Residential
Access	Traffic
Drive	None







ADS Project Name:	Auburn.TFM.WA20-22
ADS Project Number:	22519.22.325

Installation Information

Installation Date:	Installation Type:
Thursday, May 14, 2020	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW)
10:08:00 PM	18.00 x 18.00
Depth of Flow (Wet DOF) (in)	
2.88	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.38"
Peak Velocity (fps)	Velocity Sensor Offset (in)
1.42	0"
Silt (in)	Silt Type
0.00"	

Hydraulic Comments:
Slight bend after monitoring point

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
26	
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Vitrified Clay Pipe	Fair

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

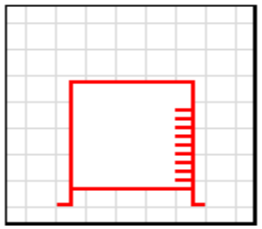
Additional Site Info. / Comments:

Hydrograph Report

RainGage_RG41Y

Rain Gauge

RainGage_RG41Y



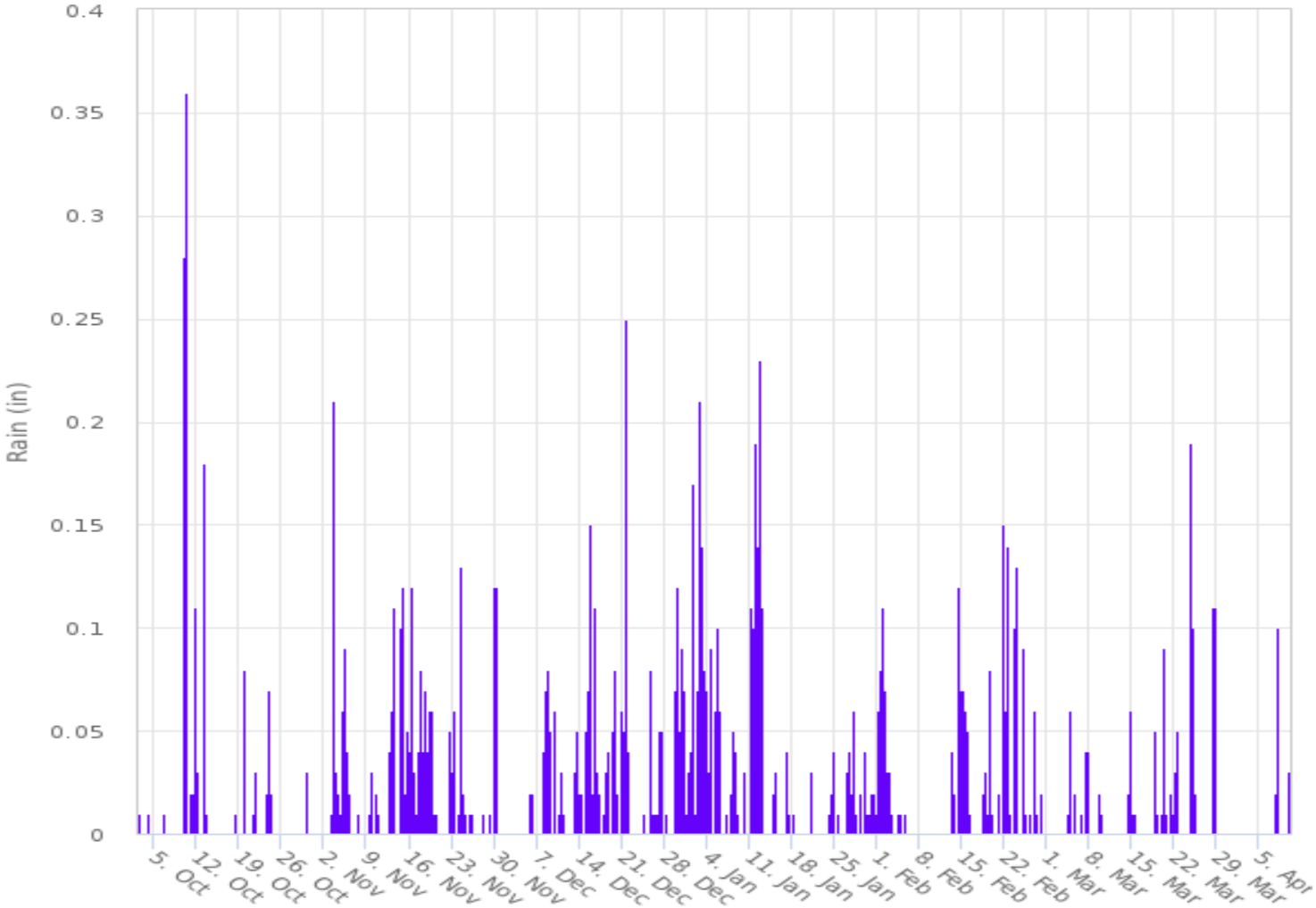
Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
RainGage_RG41YRain Gauge: Rain Gauge (0 H x 0 W), Silt0.00

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.48
01/02/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.64
01/03/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.59
01/04/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.45
01/05/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.47
01/06/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.19
01/07/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
01/08/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.23
01/09/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
01/10/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07
01/11/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.99
01/12/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.04
01/13/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10
01/14/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
01/15/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09
01/16/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01/17/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.08
01/18/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
01/19/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01/20/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01/21/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09
01/22/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01/23/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01/24/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.14
01/25/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
01/26/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01/27/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.16
01/28/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.22
01/29/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04
01/30/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09
01/31/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.13
02/01/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.78
02/02/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.35
02/03/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06
02/04/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03
02/05/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
02/06/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/07/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/08/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/09/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/10/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/11/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/12/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/13/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09
02/14/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.68
02/15/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.65
02/16/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04
02/17/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/18/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09
02/19/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.15
02/20/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04
02/21/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.34
02/22/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.71
02/23/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.39
02/24/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
02/25/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.18
02/26/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.12
02/27/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
02/28/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02
03/01/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/02/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/03/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/04/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.22
03/05/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03
03/06/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
03/07/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.08
03/08/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/09/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02
03/10/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/11/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/12/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/13/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/14/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.23
03/15/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02
03/16/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/17/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/18/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10
03/19/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03
03/20/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.18
03/21/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06
03/22/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10
03/23/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/24/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.33
03/25/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.36
03/26/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/27/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/28/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.40
03/29/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/30/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/31/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/01/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/02/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/03/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/04/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/05/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/06/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/07/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09
04/08/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10
04/09/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/10/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04
04/11/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/12/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/13/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/14/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/01/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/02/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
10/03/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/04/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
10/05/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/06/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
10/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/08/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/09/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.35
10/10/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.47
10/11/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.55
10/12/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/13/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.60
10/14/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/15/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/16/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/17/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/18/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
10/19/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10
10/20/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/21/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04
10/22/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/23/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.20
10/24/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05
10/25/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/26/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/27/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/28/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/29/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/30/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04
10/31/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/01/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/02/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/03/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.81
11/04/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10
11/05/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.39
11/06/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04
11/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
11/08/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/09/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/10/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04
11/11/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/12/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.15
11/13/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.41
11/14/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.46
11/15/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.21
11/16/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.32
11/17/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.19
11/18/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.28
11/19/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.26
11/20/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02
11/21/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/22/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.22
11/23/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.16
11/24/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.17
11/25/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02
11/26/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
11/27/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/28/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03
11/29/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
11/30/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.34
12/01/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12/02/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12/03/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12/04/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12/05/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02
12/06/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02
12/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12/08/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.71
12/09/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.22
12/10/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04
12/11/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
12/12/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12/13/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.21
12/14/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05
12/15/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.52
12/16/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.37
12/17/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06
12/18/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.18
12/19/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.43
12/20/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06
12/21/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.14
12/22/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12/23/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12/24/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
12/25/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.36
12/26/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03
12/27/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.13
12/28/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
12/29/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.17
12/30/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.81
12/31/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.18

09/22/2020 00:00 - 04/14/2021 23:56

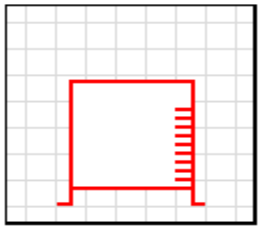
	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total				29.40
Average				

Hydrograph Report

RainGage_RGAUB

Rain Gauge

RainGage_RGAUB

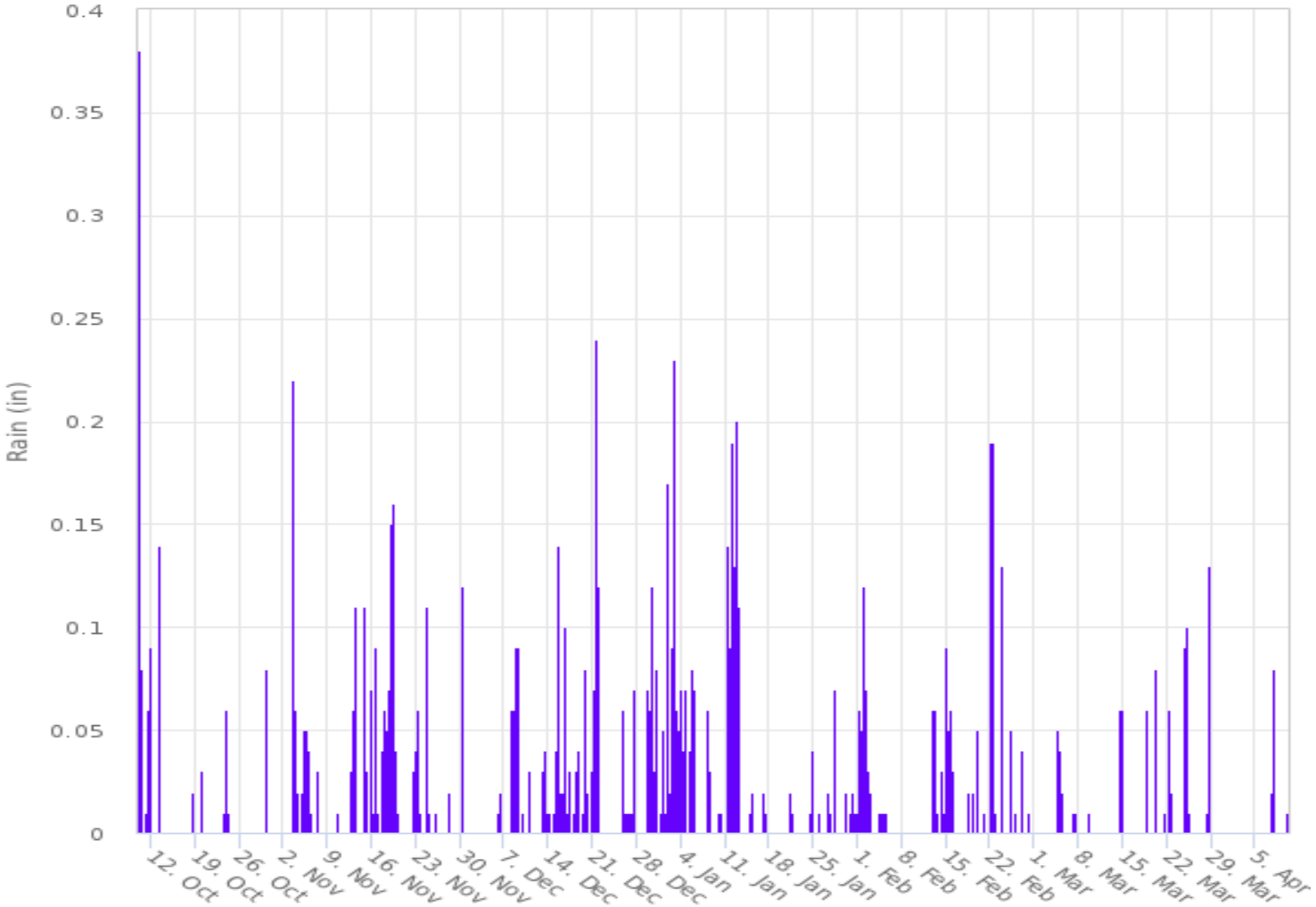


Report Period

09/22/2020
To
04/14/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL



4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Daily Tabular Report

09/22/2020 00:00 - 04/14/2021 23:56
RainGage_RGAUBRain Gauge: Rain Gauge (0 H x 0 W), Silt0.00

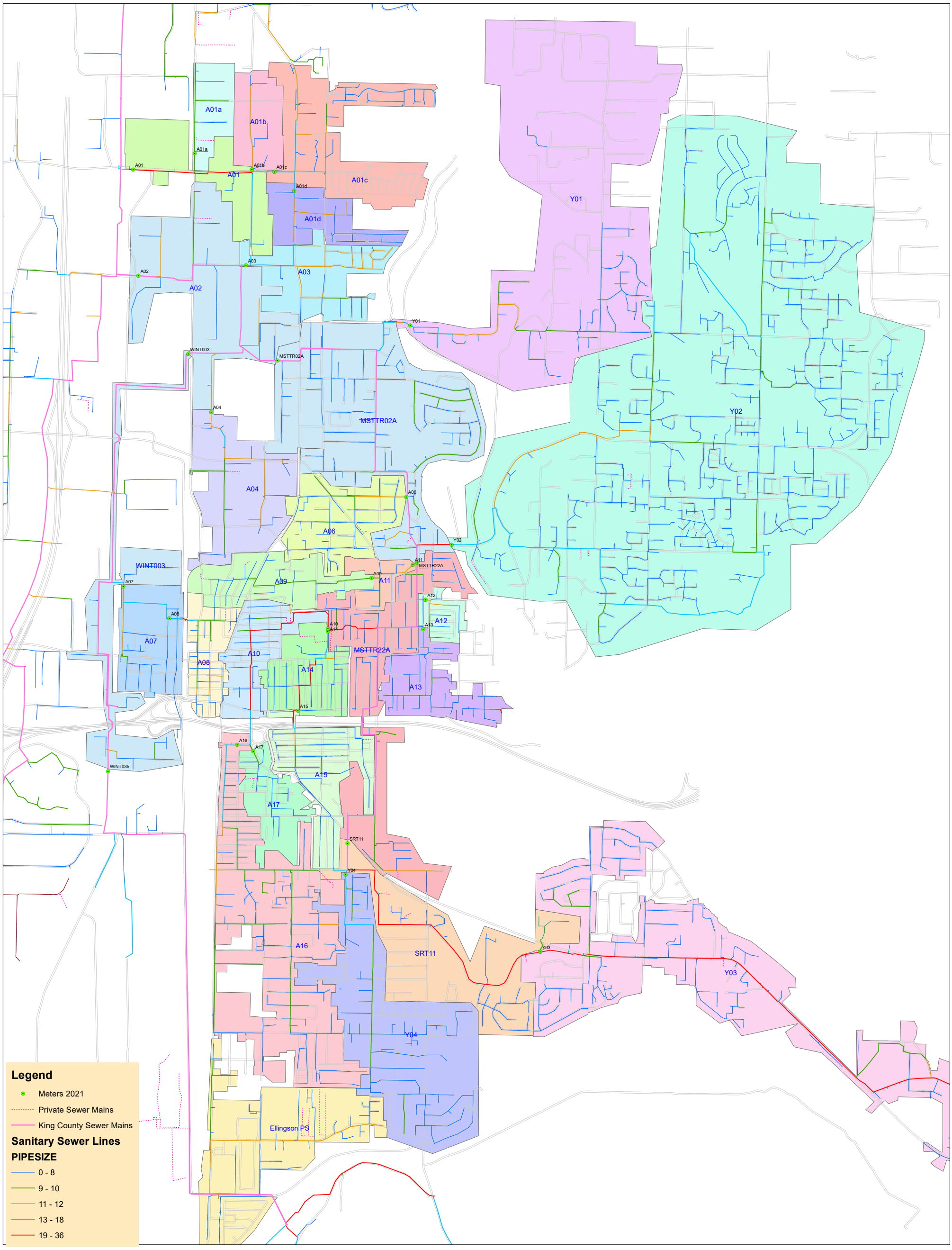
	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
01/01/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.48
01/02/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.40
01/03/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.51
01/04/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.40
01/05/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.41
01/06/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.22
01/07/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01/08/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.17
01/09/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01/10/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03
01/11/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.02
01/12/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.87
01/13/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11
01/14/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01/15/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09
01/16/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01/17/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07
01/18/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01/19/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01/20/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01/21/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05
01/22/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01/23/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01/24/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09
01/25/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
01/26/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01/27/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.08
01/28/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.18
01/29/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01/30/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05
01/31/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10
02/01/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.78
02/02/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.26
02/03/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04
02/04/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03
02/05/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
02/06/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/07/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/08/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/09/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/10/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/11/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/12/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.14
02/13/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.36
02/14/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.19
02/15/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.58
02/16/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05
02/17/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/18/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04
02/19/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10
02/20/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02
02/21/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.37
02/22/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.94
02/23/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.20
02/24/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/25/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.12
02/26/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06
02/27/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/28/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
03/01/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/02/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/03/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/04/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.17
03/05/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03
03/06/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/07/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02
03/08/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/09/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
03/10/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/11/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/12/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/13/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/14/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.22
03/15/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/16/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/17/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/18/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.12
03/19/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/20/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.15
03/21/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03
03/22/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.13
03/23/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/24/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.21
03/25/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.35
03/26/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/27/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/28/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.34
03/29/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/30/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/31/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/01/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/02/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/03/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/04/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/05/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/06/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/07/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10
04/08/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.08
04/09/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/10/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03
04/11/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/12/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/13/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/14/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/01/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/02/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/03/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/04/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/05/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/06/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/08/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/09/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.30
10/10/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.22
10/11/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.46
10/12/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/13/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.59
10/14/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/15/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/16/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/17/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/18/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02
10/19/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04
10/20/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/21/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/22/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/23/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.17
10/24/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
10/25/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/26/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/27/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/28/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/29/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/30/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09
10/31/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/01/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/02/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/03/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.79
11/04/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06
11/05/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.29
11/06/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10
11/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03
11/08/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/09/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

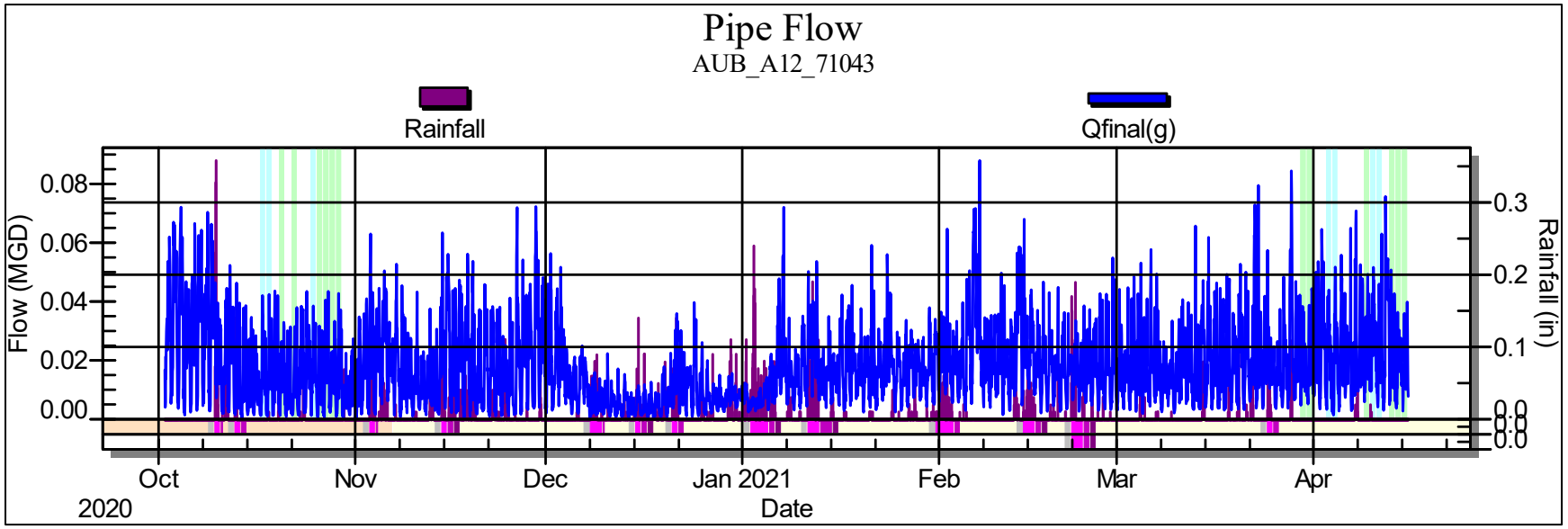
	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
11/10/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02
11/11/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/12/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11
11/13/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.32
11/14/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.40
11/15/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.17
11/16/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.33
11/17/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.15
11/18/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.25
11/19/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.43
11/20/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/21/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/22/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.19
11/23/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11
11/24/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.16
11/25/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02
11/26/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
11/27/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/28/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03
11/29/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/30/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.30
12/01/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12/02/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12/03/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12/04/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12/05/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
12/06/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02
12/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12/08/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.81
12/09/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.19
12/10/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04
12/11/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
12/12/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12/13/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.16
12/14/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04
12/15/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.51
12/16/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.33
12/17/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03
12/18/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.16
12/19/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.41
12/20/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04
12/21/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.07
12/22/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12/23/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12/24/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12/25/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.25
12/26/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02
12/27/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.13
12/28/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12/29/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.13
12/30/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.71
12/31/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.15

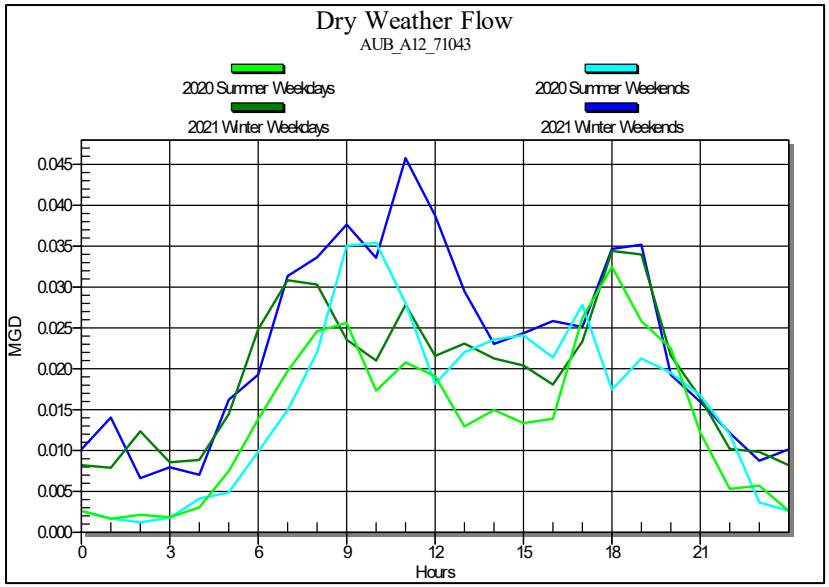
09/22/2020 00:00 - 04/14/2021 23:56

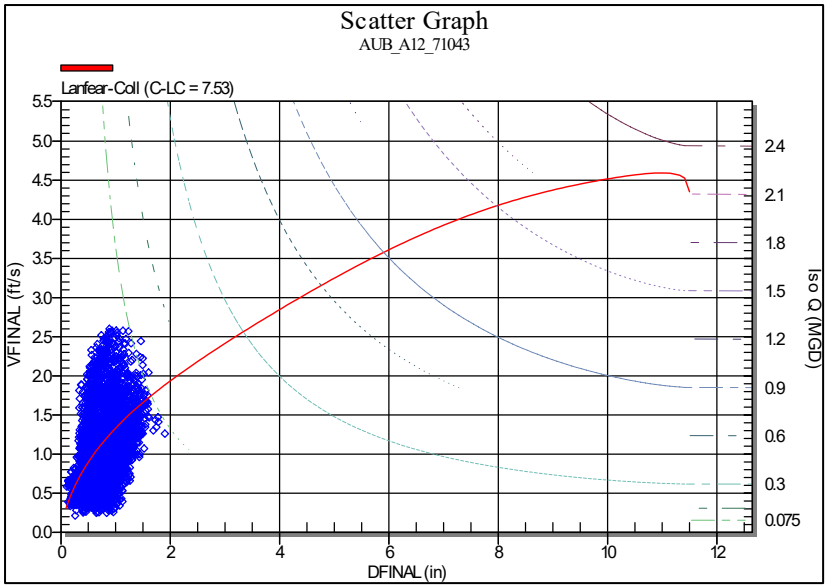
	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total				26.02
Average				

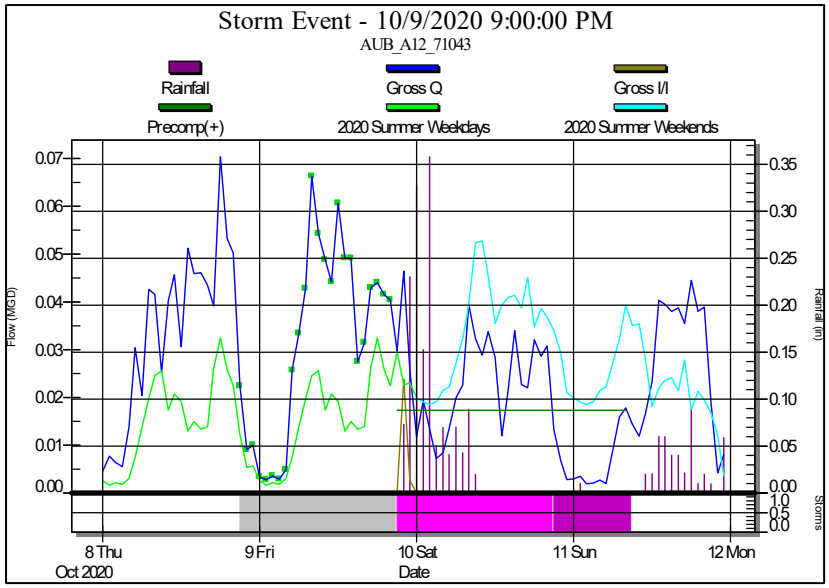


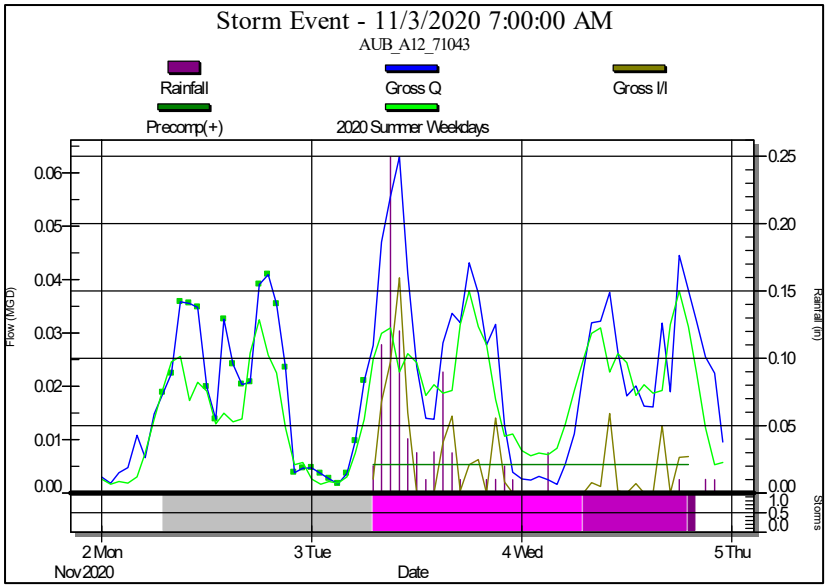
Meter Basins - 29 April 2021

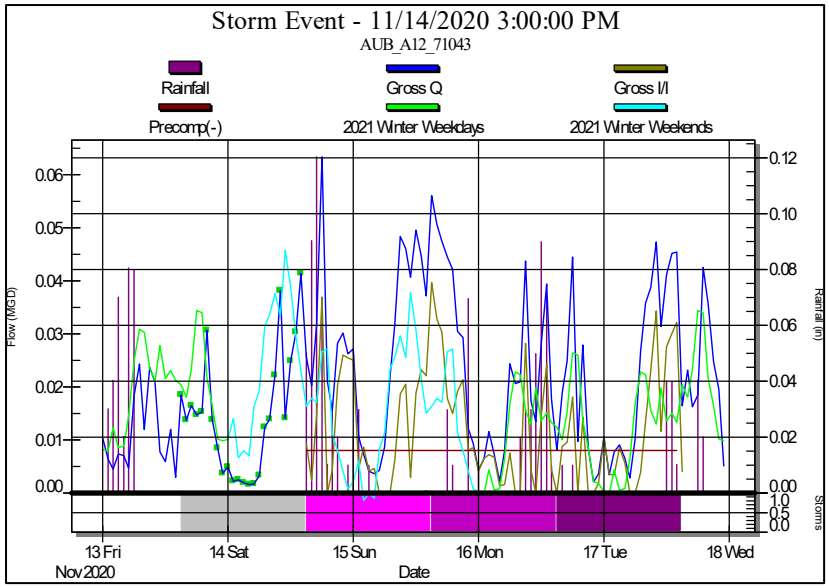

Pipe Flow
AUB_A12_71043
Rainfall
Qfinal(g)
Flow (MGD)
0.08
0.06
0.04
0.02
0.00
0.3
0.2
0.1
0.0
Rainfall (in)
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

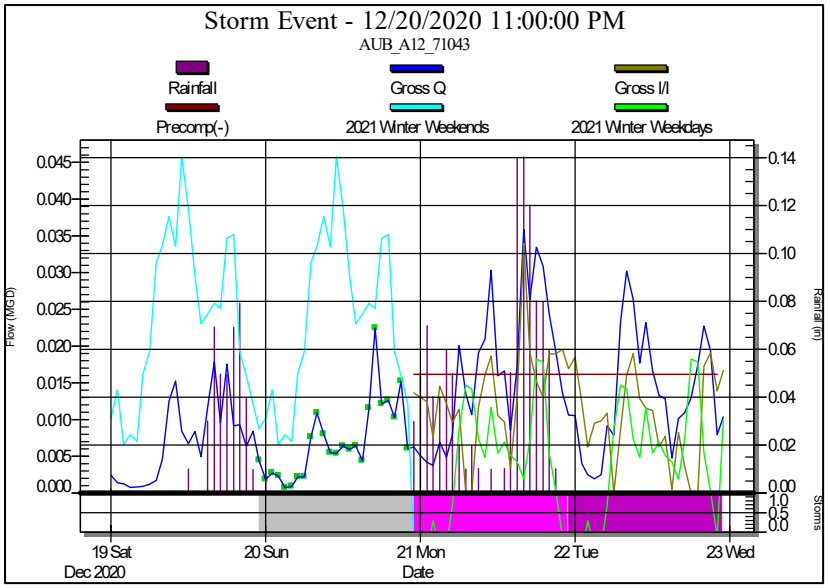

Dry Weather Flow
AUB_A12_71043
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0
3
6
9
12
15
18
21
Hours

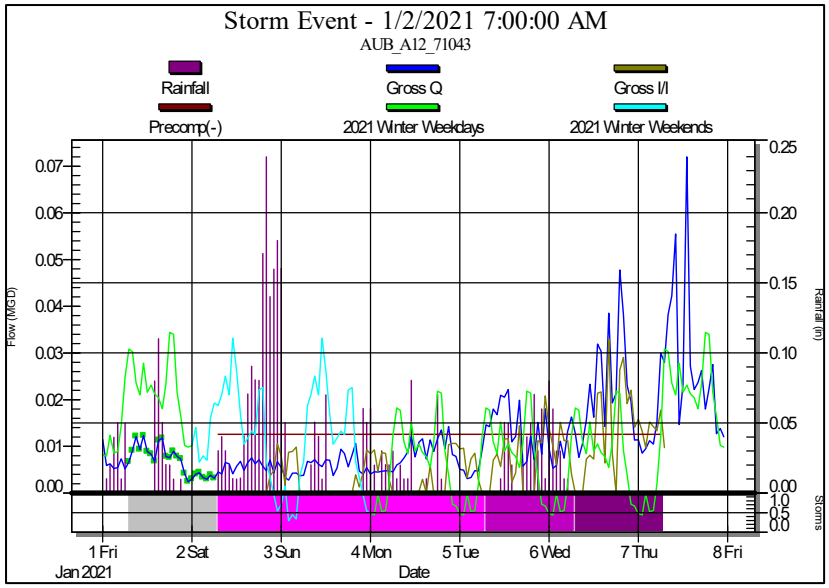

Scatter Graph
AUB_A12_71043
Lanfear-Coll (C-LC = 7.53)
VFINAL (ft/s)
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
2
4
6
8
10
12
DFINAL (in)
Iso Q (MGD)
2.4
2.1
1.8
1.5
1.2
0.9
0.6
0.3
0.075

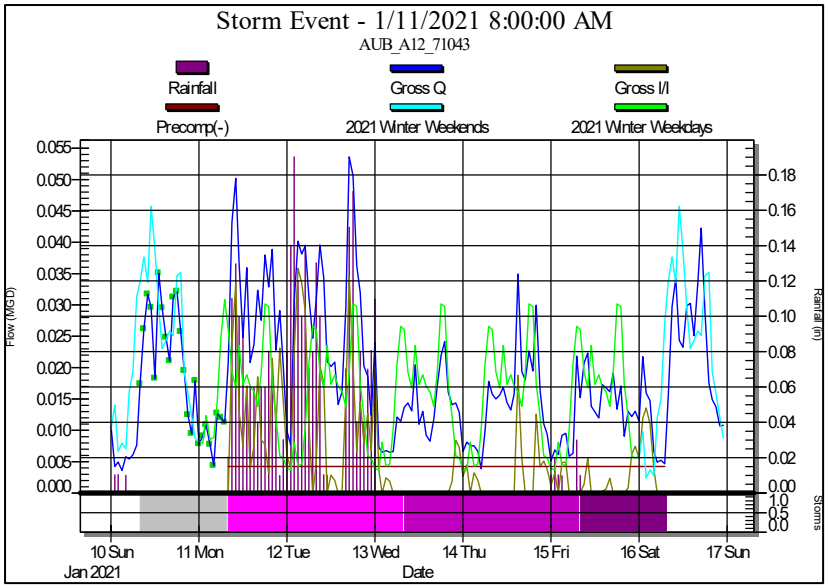

Storm Event - 10/9/2020 9:00:00 PM
AUB_A12_71043
Rainfall
Gross Q
Gross I/I
Precomp(+)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

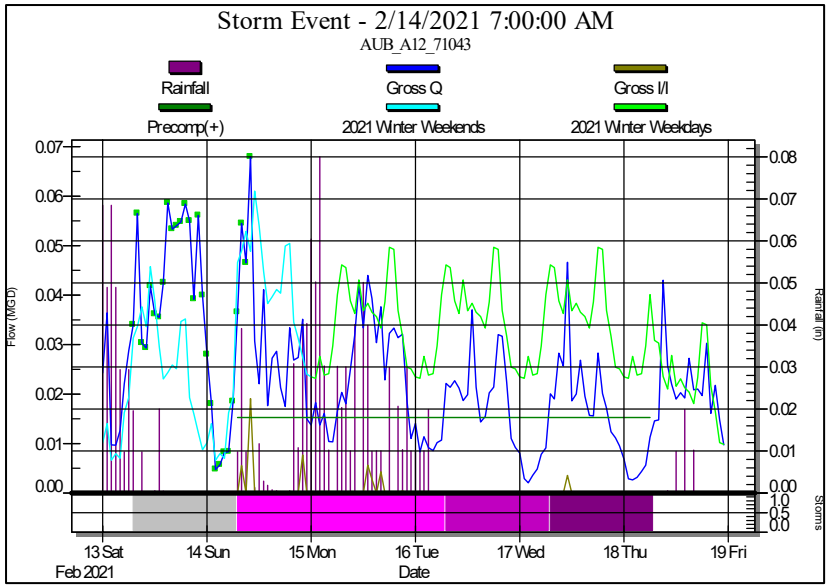

Storm Event - 11/3/2020 7:00:00 AM
AUB_A12_71043
Rainfall
Gross Q
Gross I/I
Precomp(+)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

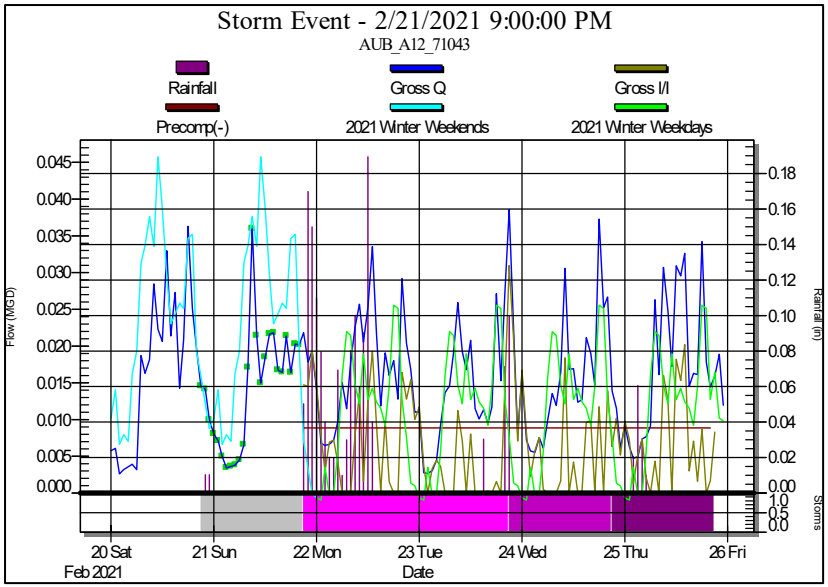

Storm Event - 11/14/2020 3:00:00 PM
AUB_A12_71043
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

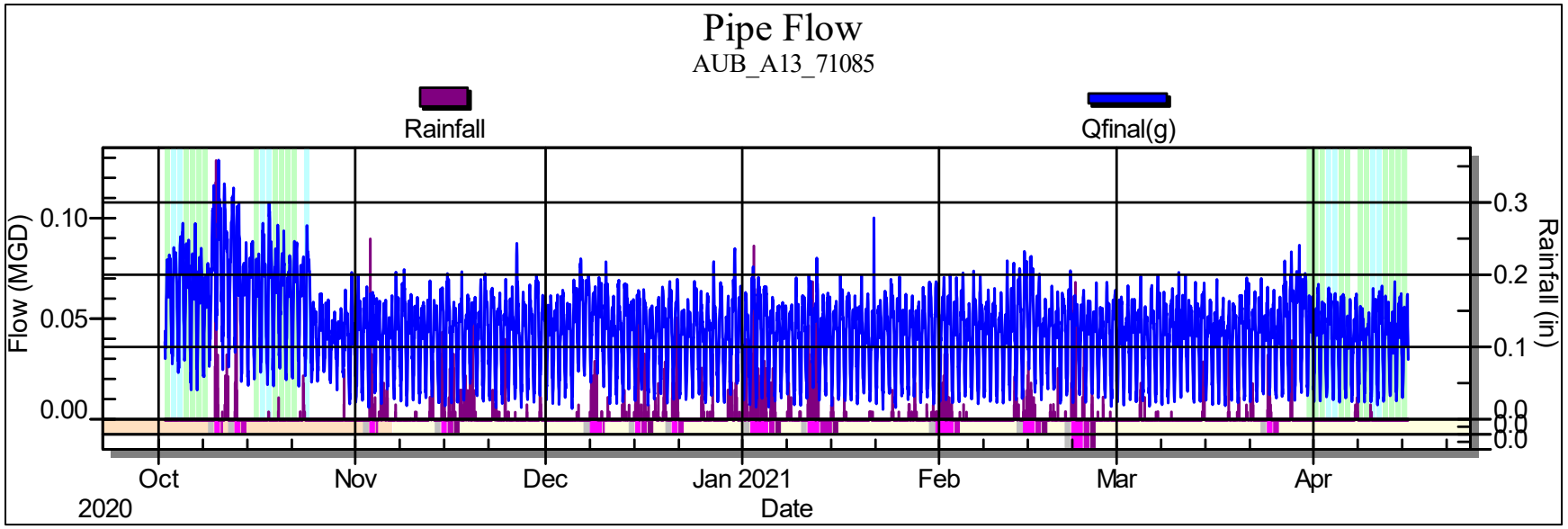

Storm Event - 12/20/2020 11:00:00 PM
AUB_A12_71043
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

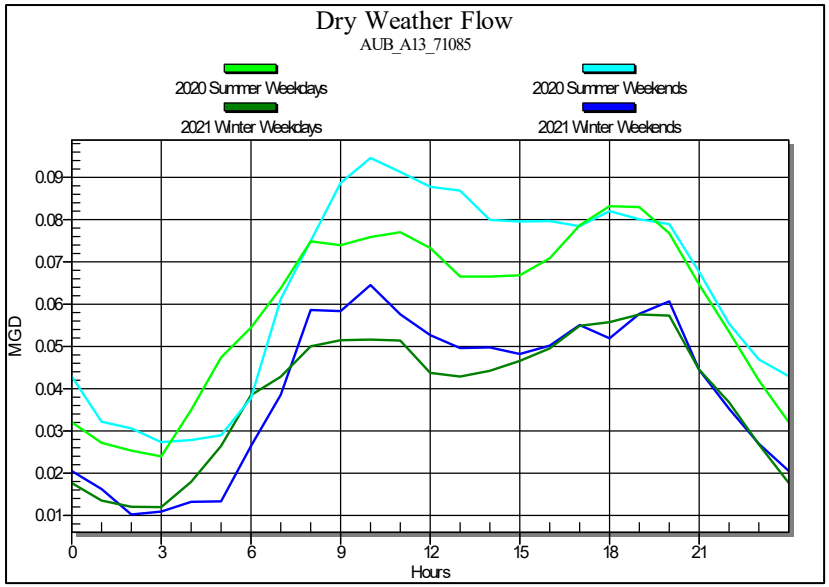

Storm Event - 1/2/2021 7:00:00 AM
AUB_A12_71043
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

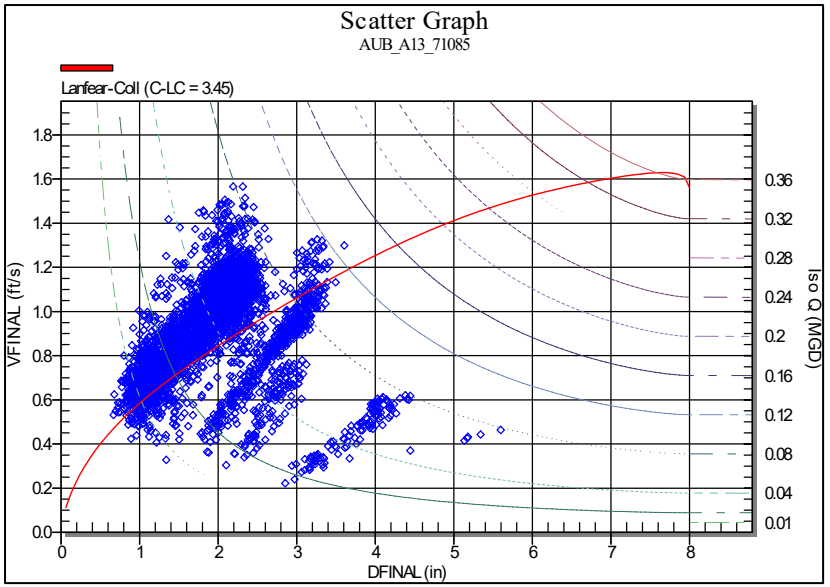

Storm Event - 1/11/2021 8:00:00 AM
AUB_A12_71043
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

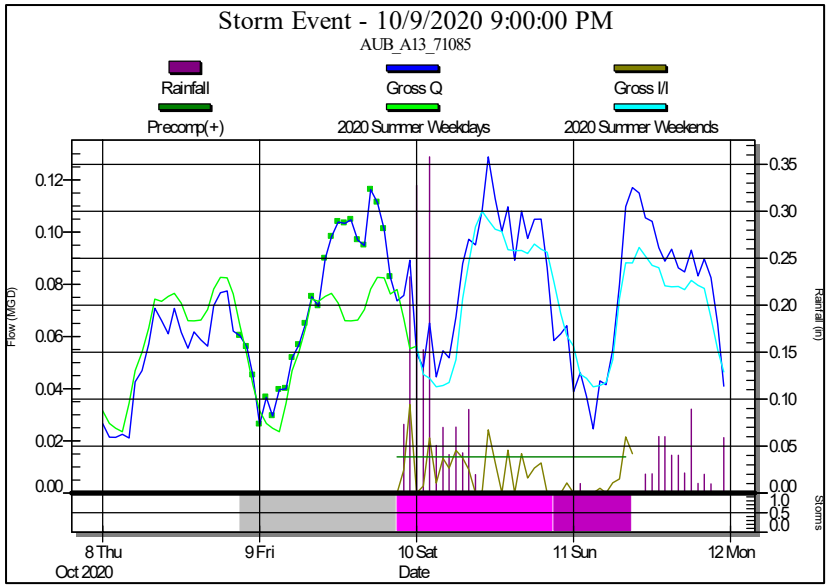

Storm Event - 2/14/2021 7:00:00 AM
AUB_A12_71043
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

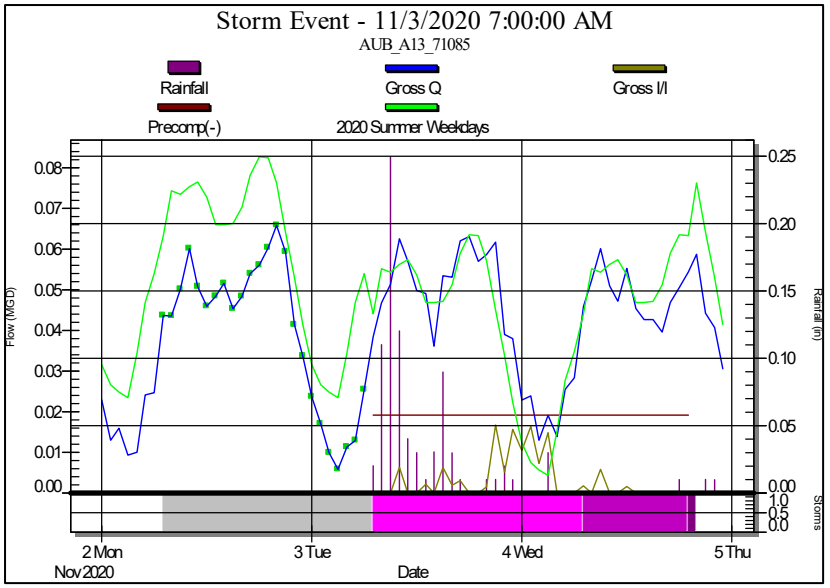

Storm Event - 2/21/2021 9:00:00 PM
AUB_A12_71043
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

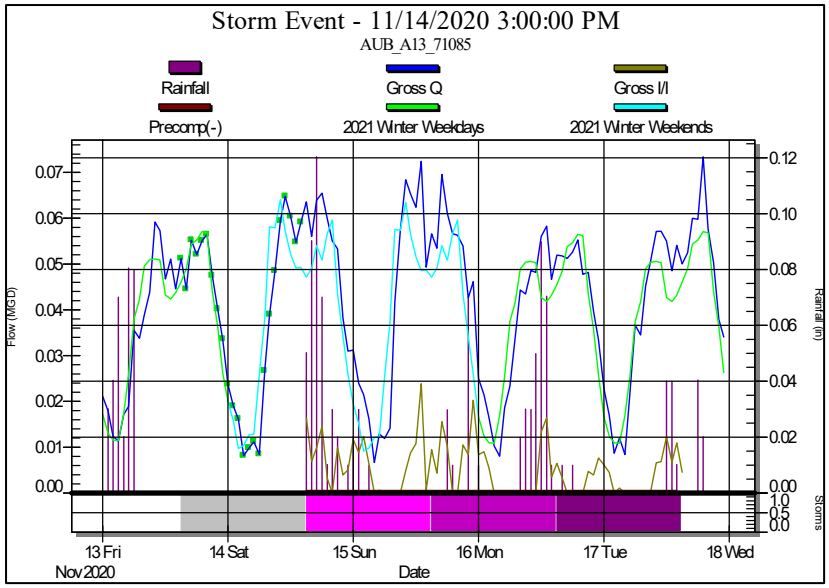

Pipe Flow
AUB_A13_71085
Rainfall
Qfinal(g)
Flow (MGD)
0.10
0.05
0.00
0.3
0.2
0.1
0.0
Rainfall (in)
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

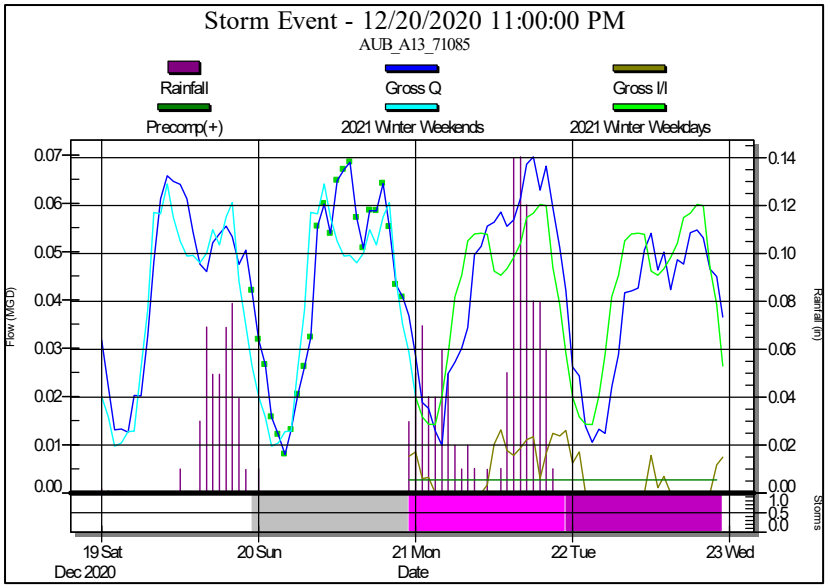

Dry Weather Flow
AUB_A13_71085
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
3
6
9
12
15
18
21
Hours

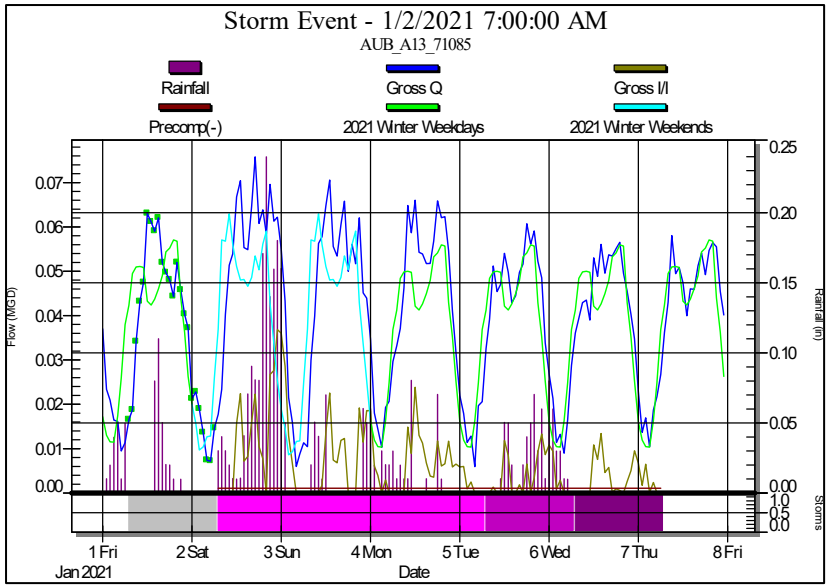

Scatter Graph
AUB_A13_71085
Lanfear-Coll (C-LC = 3.45)
VFINAL (ft/s)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.36
0.32
0.28
0.24
0.2
0.16
0.12
0.08
0.04
0.01
Iso Q (MGD)
0
1
2
3
4
5
6
7
8
DFINAL (in)

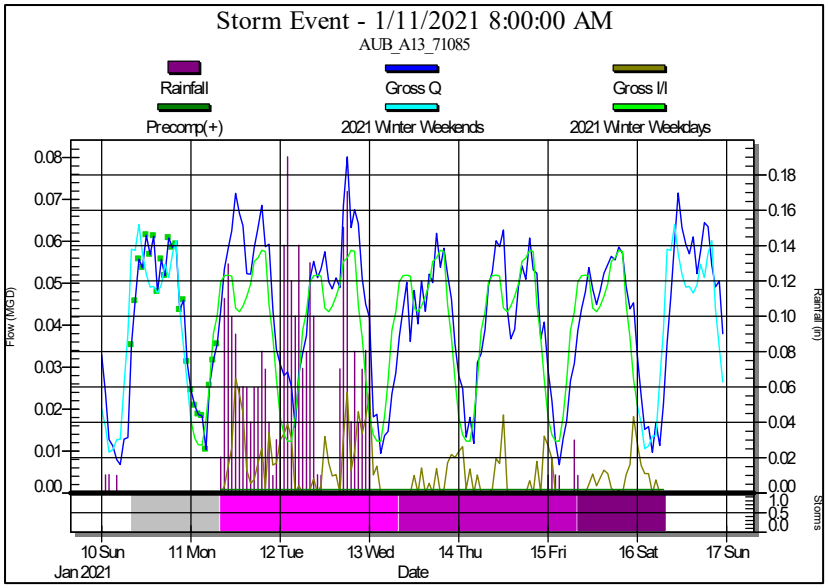

Storm Event - 10/9/2020 9:00:00 PM
AUB_A13_71085
Rainfall
Gross Q
Gross I/I
Precomp(+)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

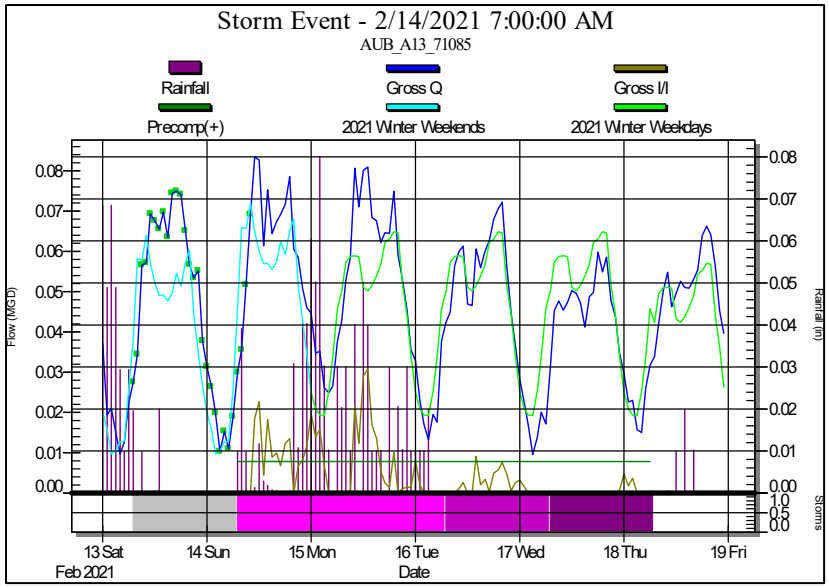

Storm Event - 11/3/2020 7:00:00 AM
AUB_A13_71085
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

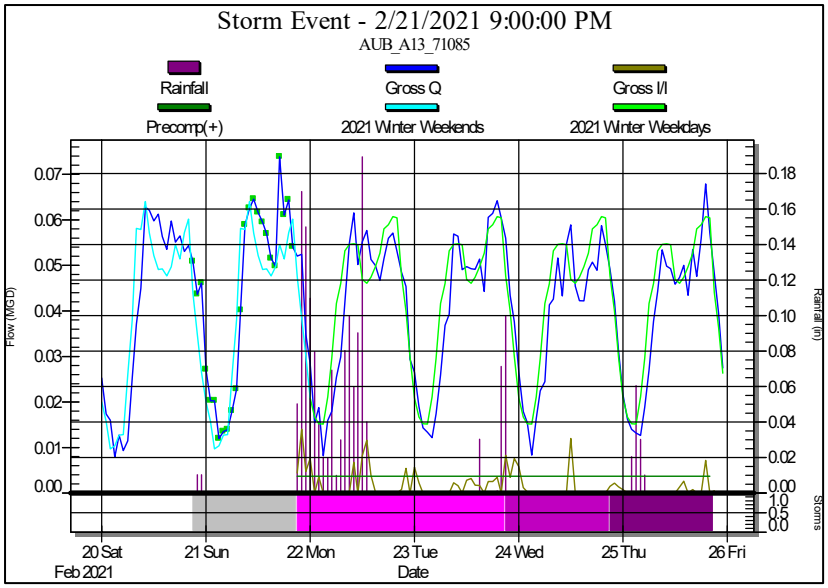

Storm Event - 11/14/2020 3:00:00 PM
AUB_A13_71085
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

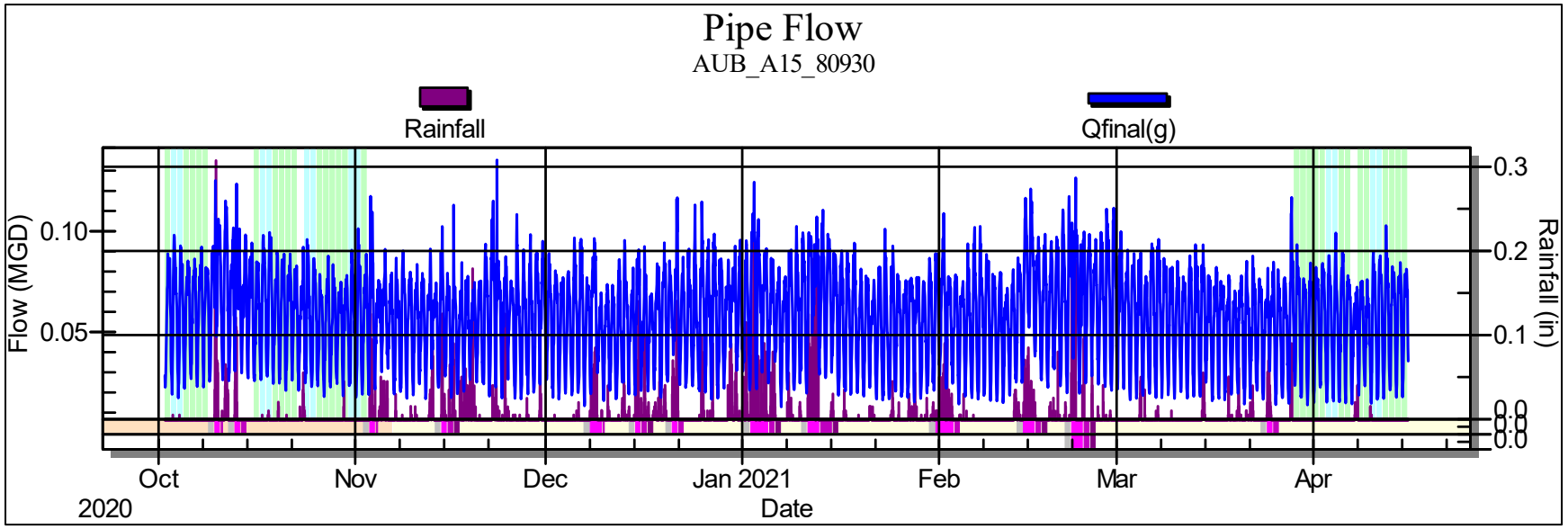

Storm Event - 12/20/2020 11:00:00 PM
AUB_A13_71085
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

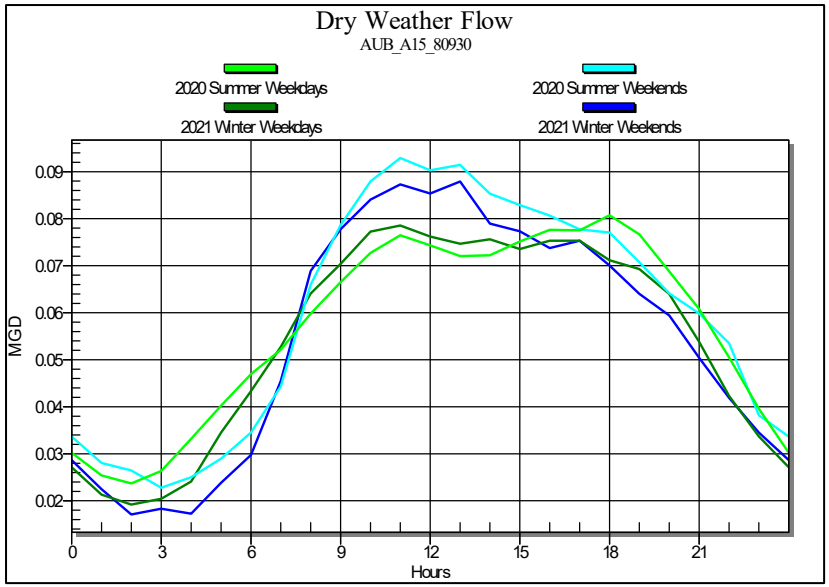

Storm Event - 1/2/2021 7:00:00 AM
AUB_A13_71085
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

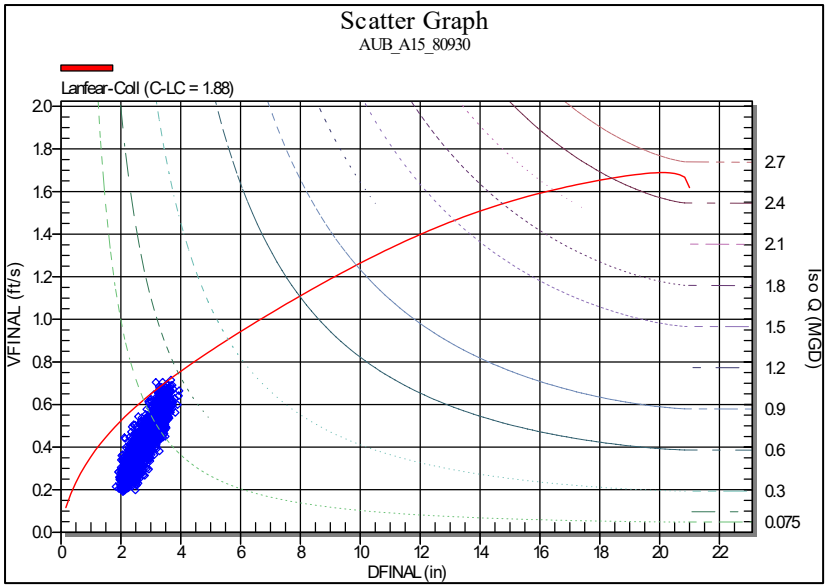

Storm Event - 1/11/2021 8:00:00 AM
AUB_A13_71085
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

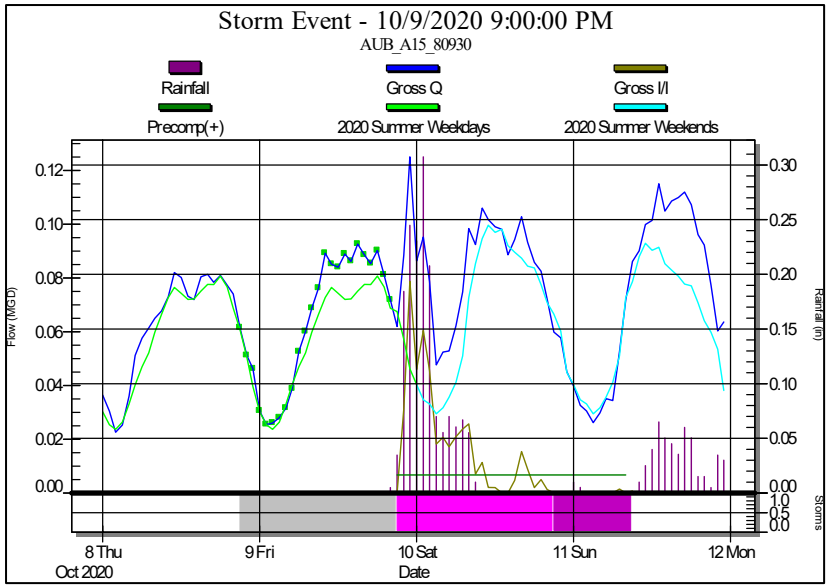

Storm Event - 2/14/2021 7:00:00 AM
AUB_A13_71085
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

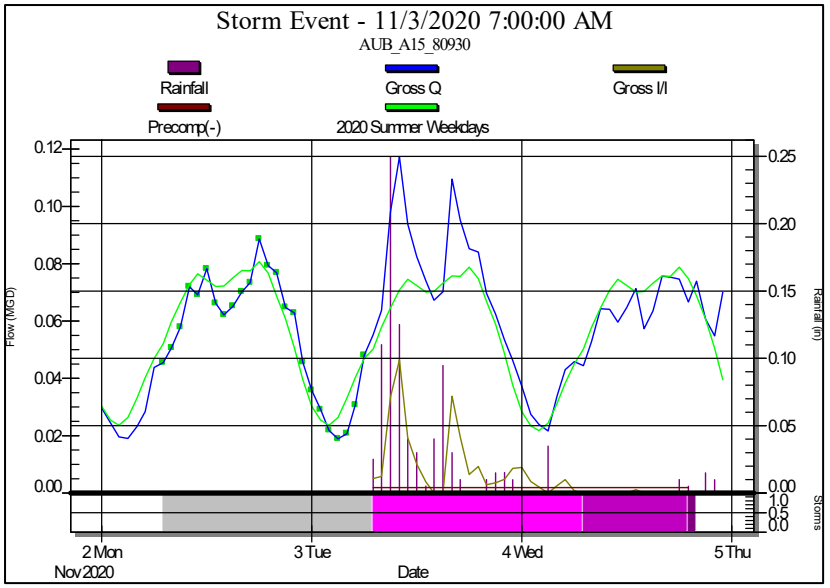

Storm Event - 2/21/2021 9:00:00 PM
AUB_A13_71085
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

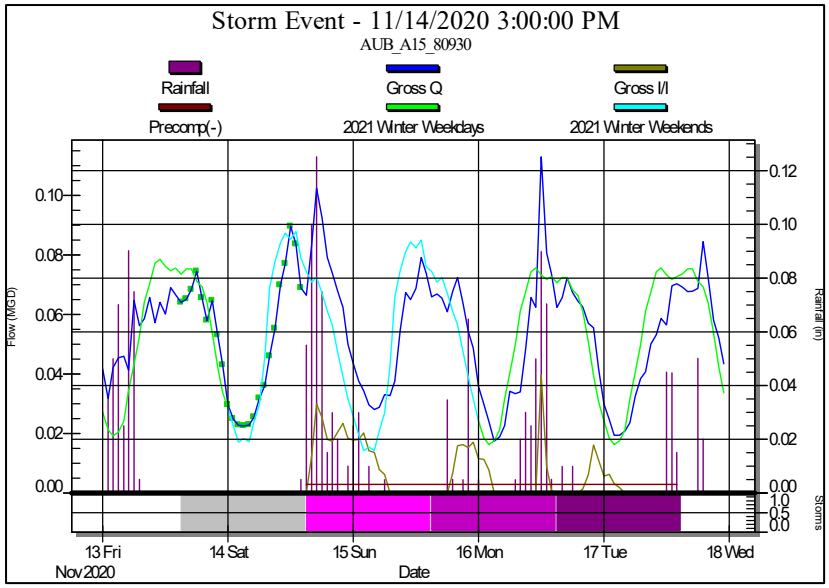

Pipe Flow
AUB_A15_80930
Rainfall
Qfinal(g)
Flow (MGD)
0.10
0.05
0.3
0.2
0.1
0.0
Rainfall (in)
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

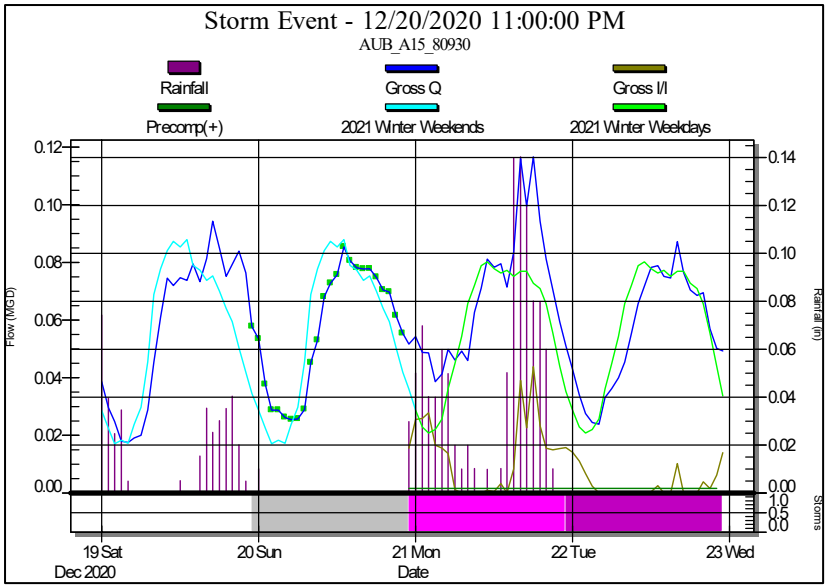

Dry Weather Flow
AUB_A15_80930
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0
3
6
9
12
15
18
21
Hours

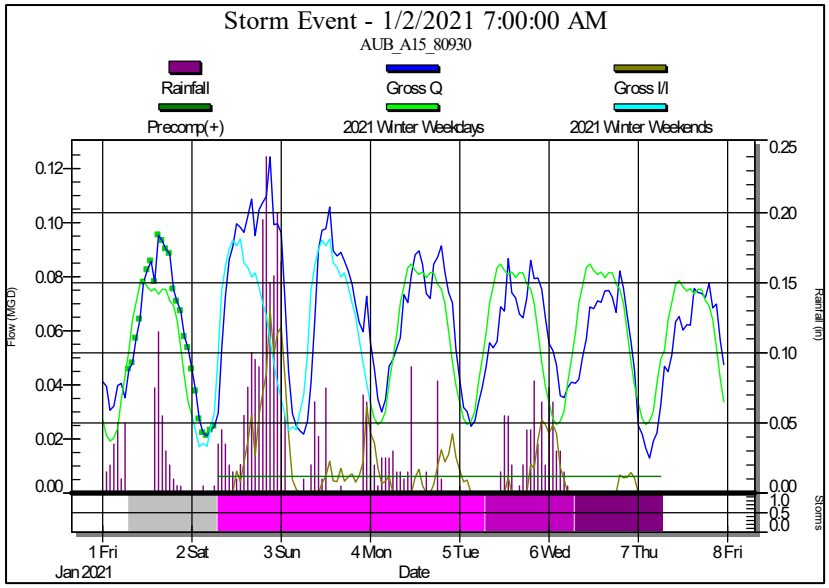

Scatter Graph
AUB_A15_80930
Lanfear-Coll (C-LC = 1.88)
VFINAL (ft/s)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Iso Q (MGD)
2.7
2.4
2.1
1.8
1.5
1.2
0.9
0.6
0.3
0.075
0
2
4
6
8
10
12
14
16
18
20
22
DFINAL (in)

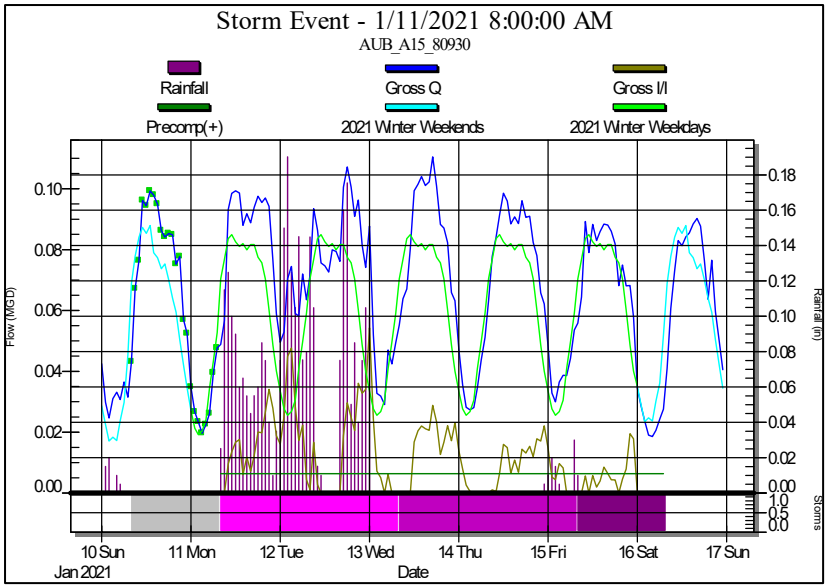

Storm Event - 10/9/2020 9:00:00 PM
AUB_A15_80930
Rainfall
Gross Q
Gross I/I
Precomp(+)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

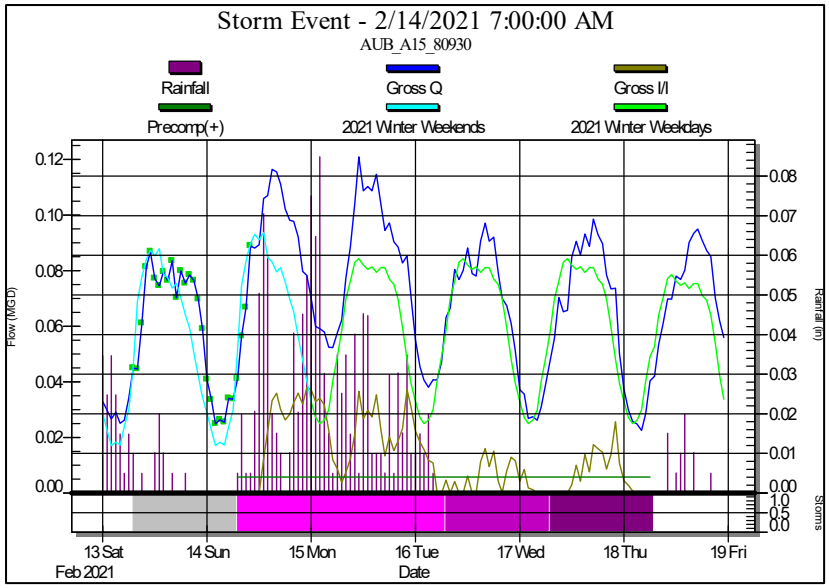

Storm Event - 11/3/2020 7:00:00 AM
AUB_A15_80930
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

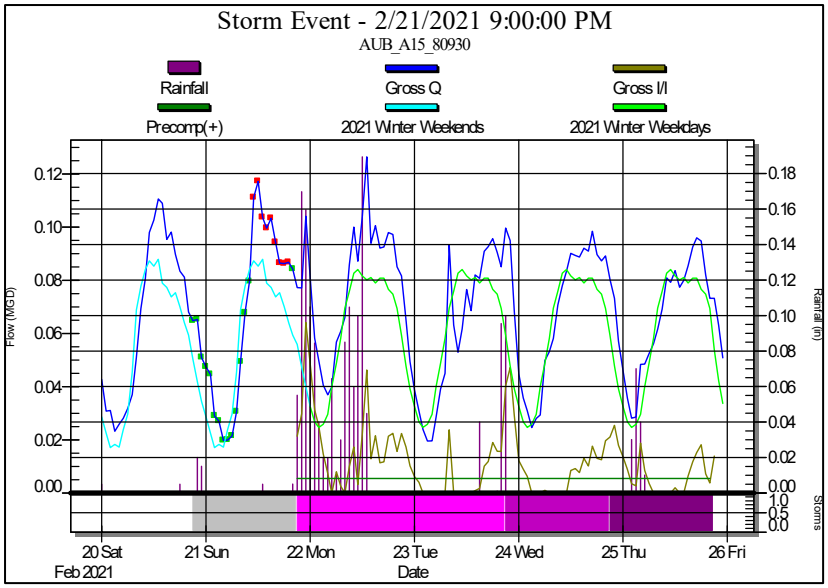

Storm Event - 11/14/2020 3:00:00 PM
AUB_A15_80930
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

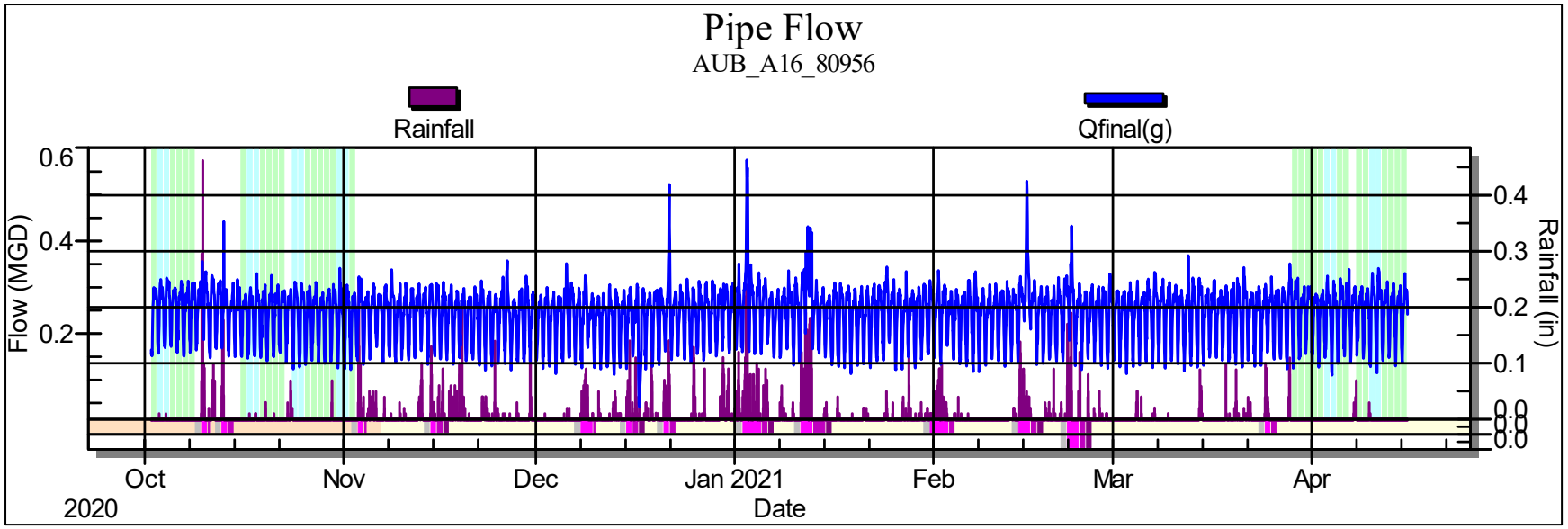

Storm Event - 12/20/2020 11:00:00 PM
AUB_A15_80930
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

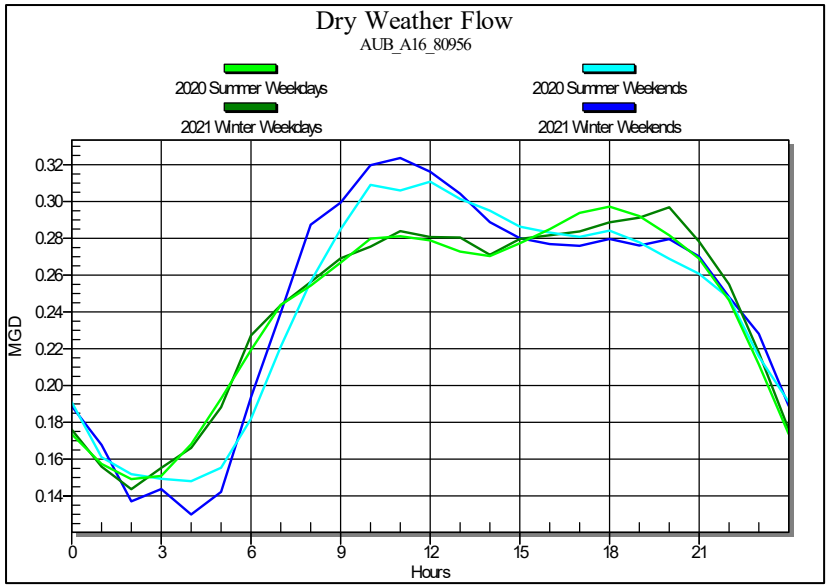

Storm Event - 1/2/2021 7:00:00 AM
AUB_A15_80930
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

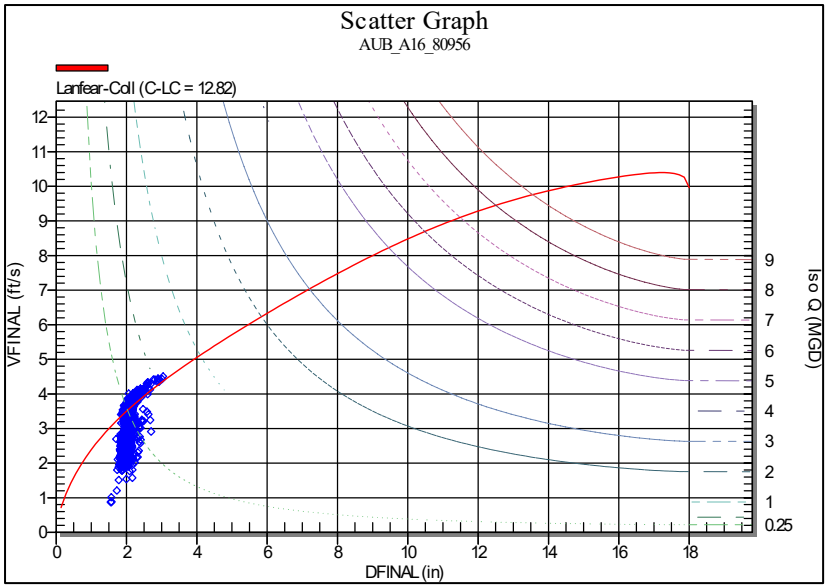

Storm Event - 1/11/2021 8:00:00 AM
AUB_A15_80930
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

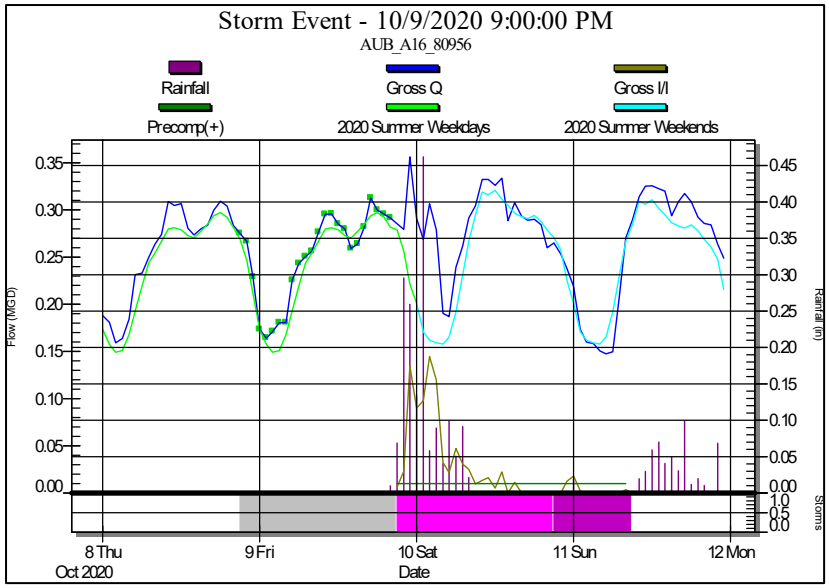

Storm Event - 2/14/2021 7:00:00 AM
AUB_A15_80930
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

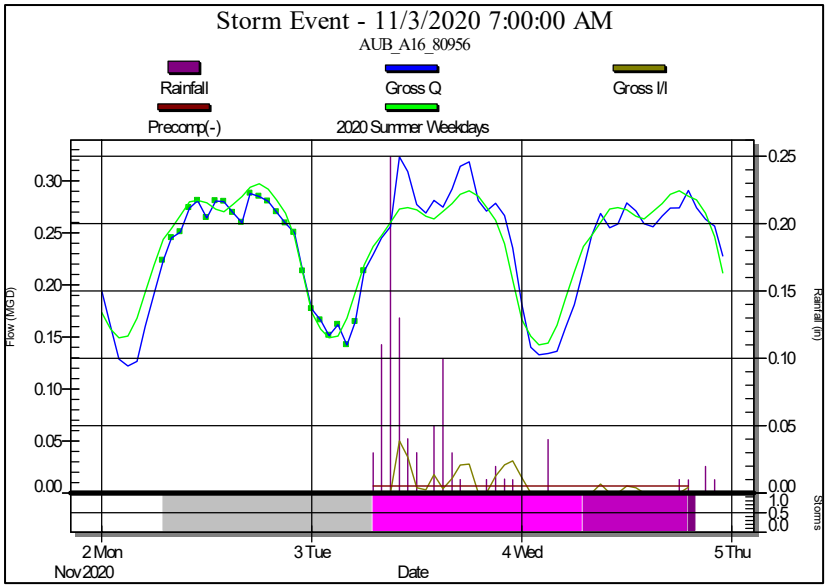

Storm Event - 2/21/2021 9:00:00 PM
AUB_A15_80930
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

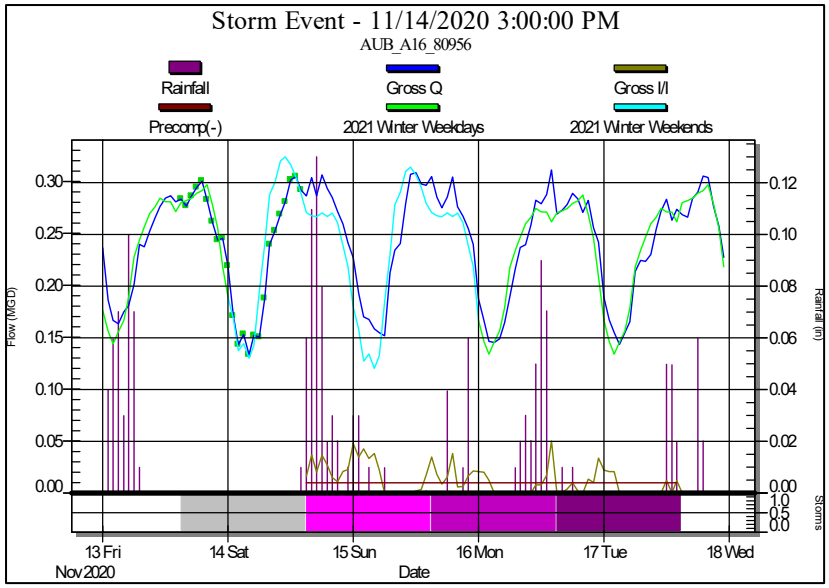

Pipe Flow
AUB_A16_80956
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
0.6
0.4
0.2
0.4
0.3
0.2
0.1
0.0
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

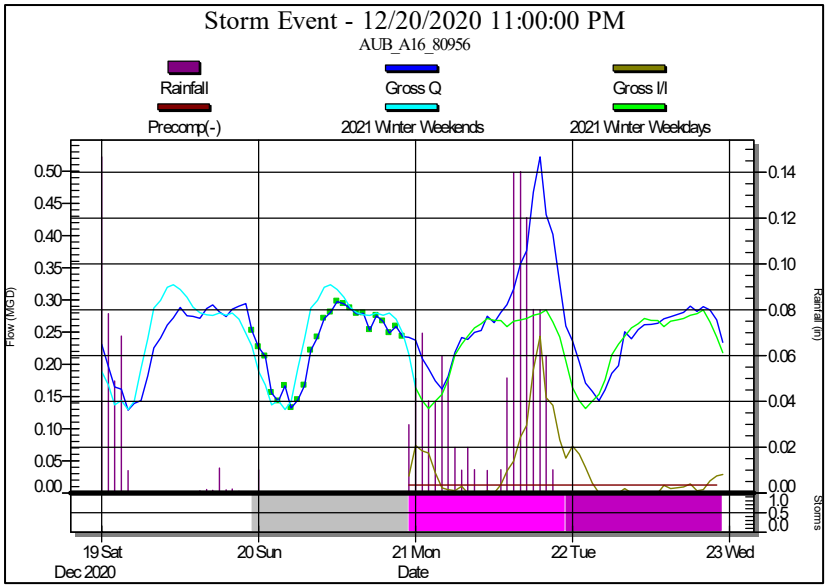

Dry Weather Flow
AUB_A16_80956
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
0.32
0.30
0.28
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0
3
6
9
12
15
18
21
Hours

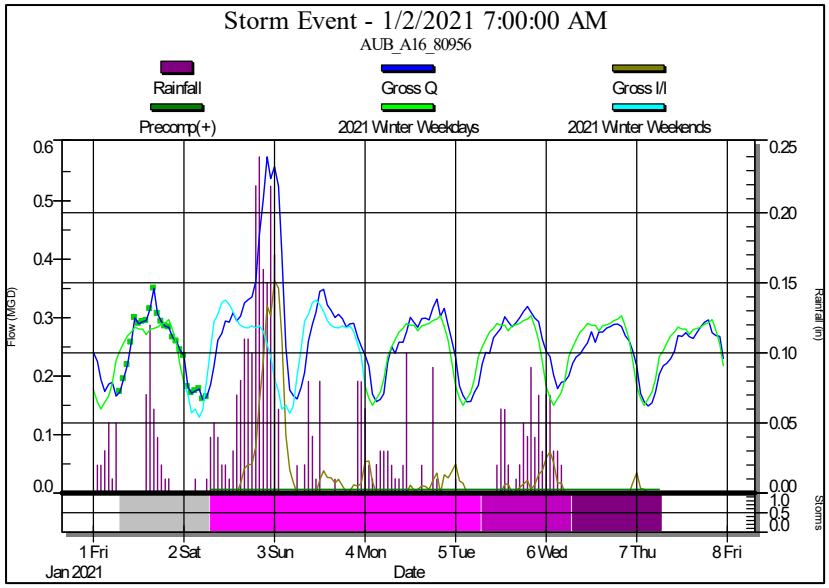

Scatter Graph
AUB_A16_80956
Lanfear-Coll (C-LC = 12.82)
VFINAL (ft/s)
Iso Q (MGD)
12
11
10
9
8
7
6
5
4
3
2
1
0
9
8
7
6
5
4
3
2
1
0.25
0
2
4
6
8
10
12
14
16
18
DFINAL (in)

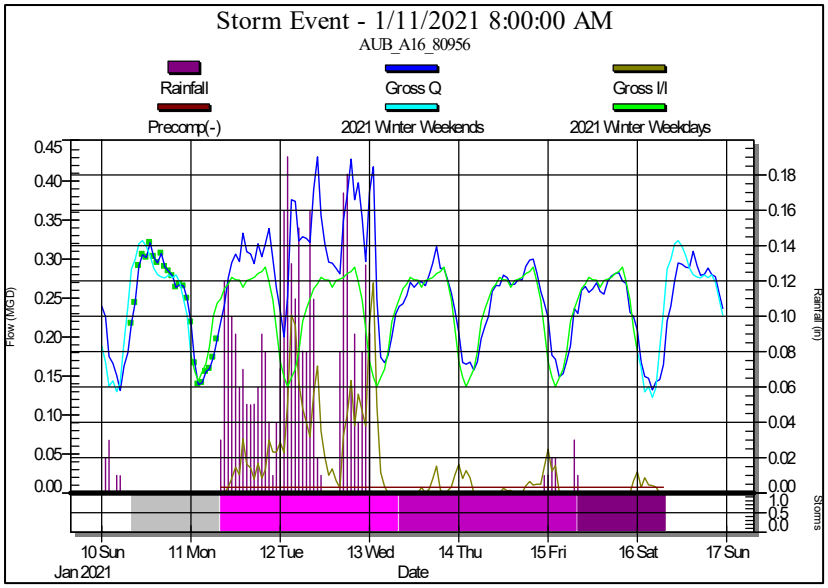

Storm Event - 10/9/2020 9:00:00 PM
AUB_A16_80956
Rainfall
Gross Q
Gross I/I
Precomp(+)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

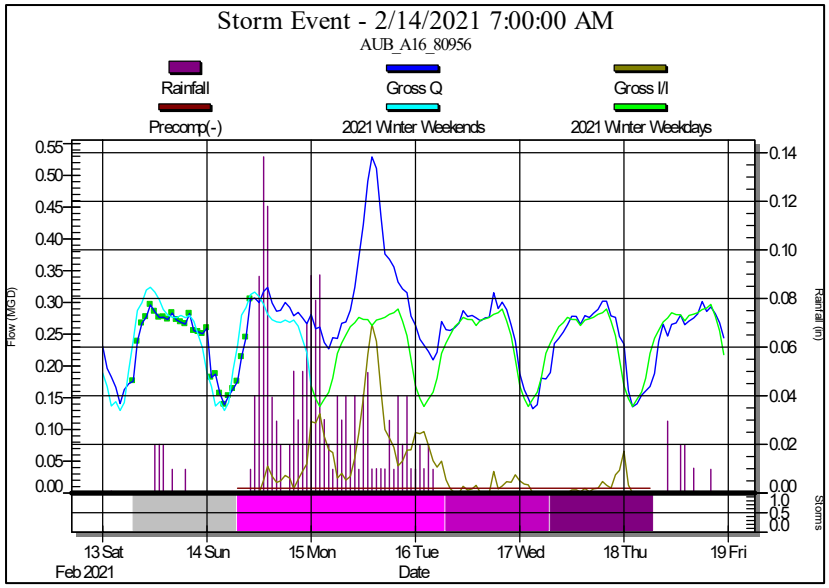

Storm Event - 11/3/2020 7:00:00 AM
AUB_A16_80956
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

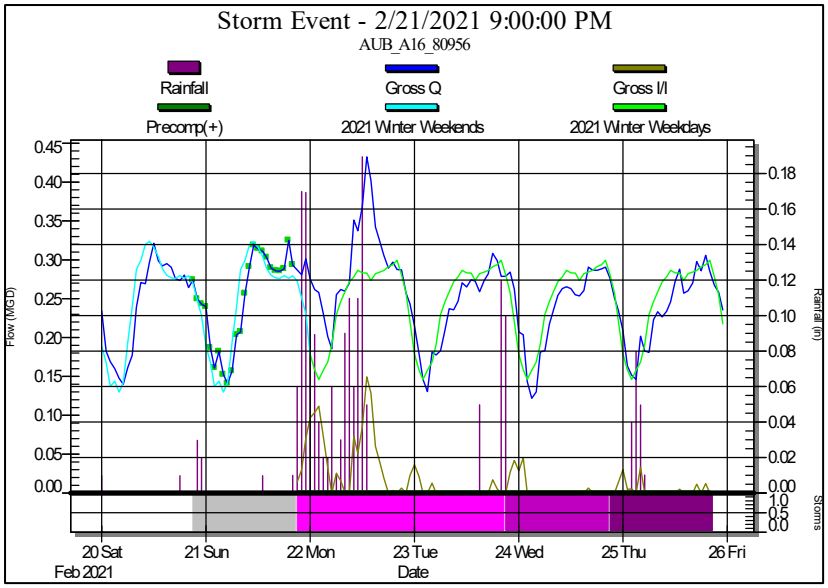

Storm Event - 11/14/2020 3:00:00 PM
AUB_A16_80956
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

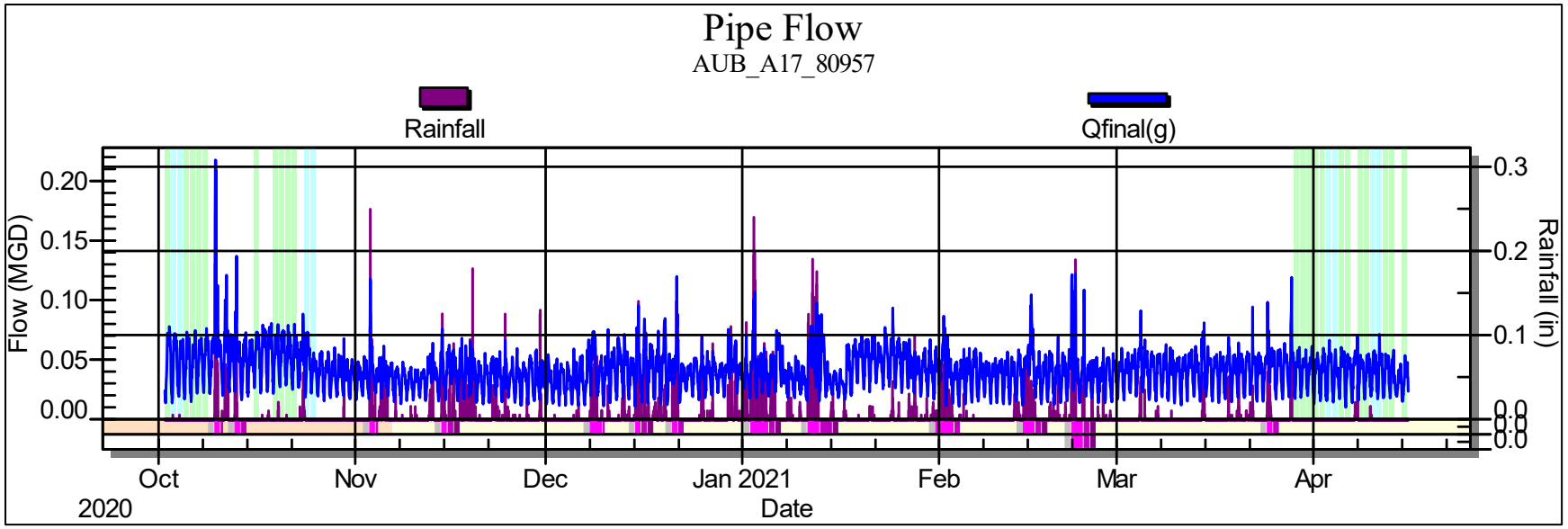

Storm Event - 12/20/2020 11:00:00 PM
AUB_A16_80956
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

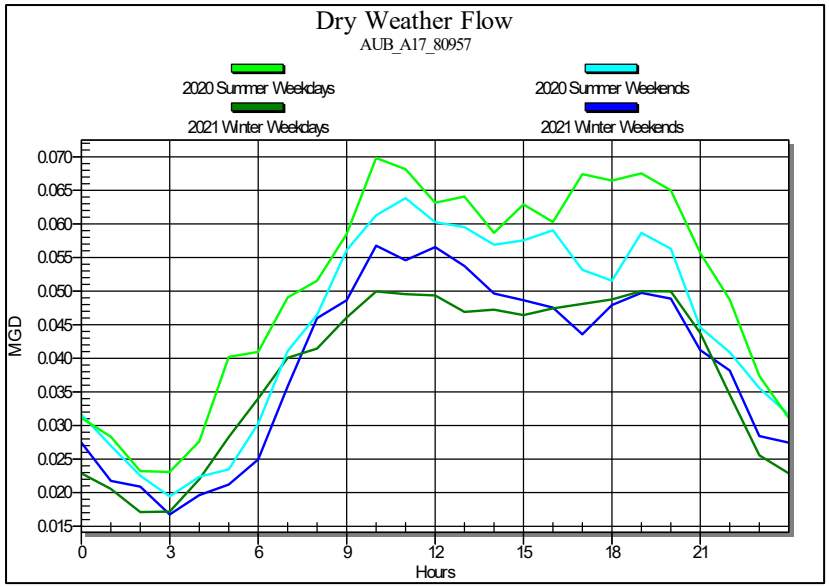

Storm Event - 1/2/2021 7:00:00 AM
AUB_A16_80956
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
Jan 2021
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Date

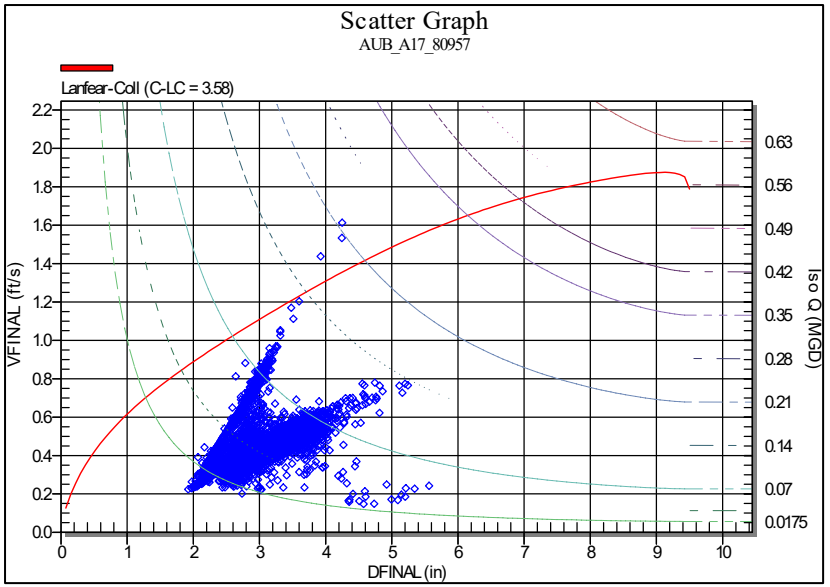

Storm Event - 1/11/2021 8:00:00 AM
AUB_A16_80956
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
Jan 2021
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Date

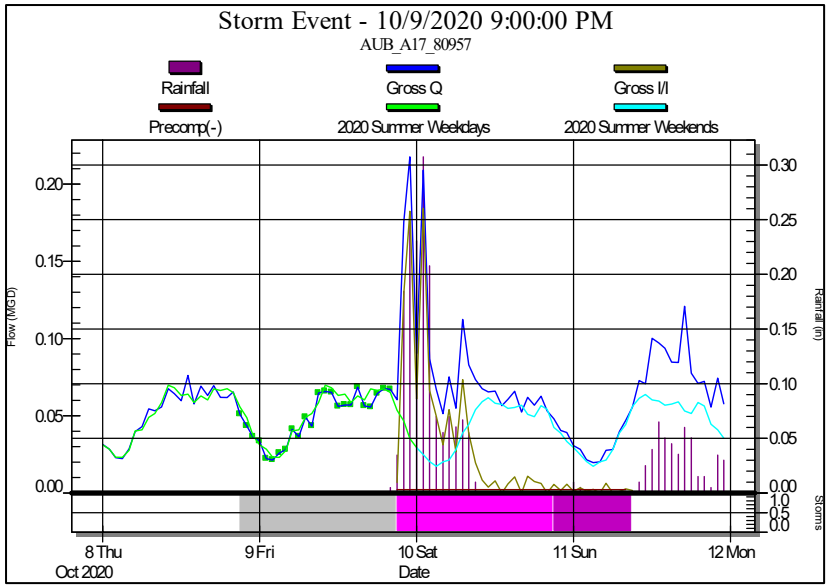

Storm Event - 2/14/2021 7:00:00 AM
AUB_A16_80956
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
Feb 2021
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Date

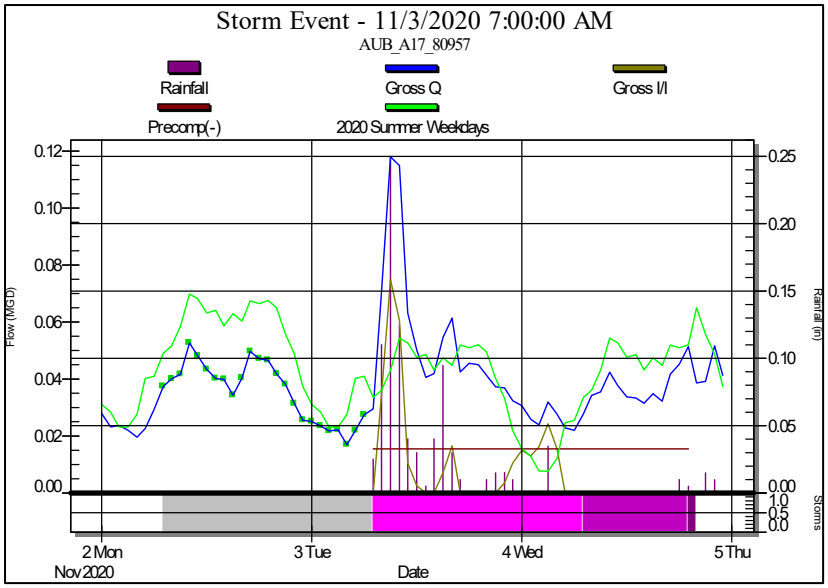

Storm Event - 2/21/2021 9:00:00 PM
AUB_A16_80956
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
Feb 2021
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Date

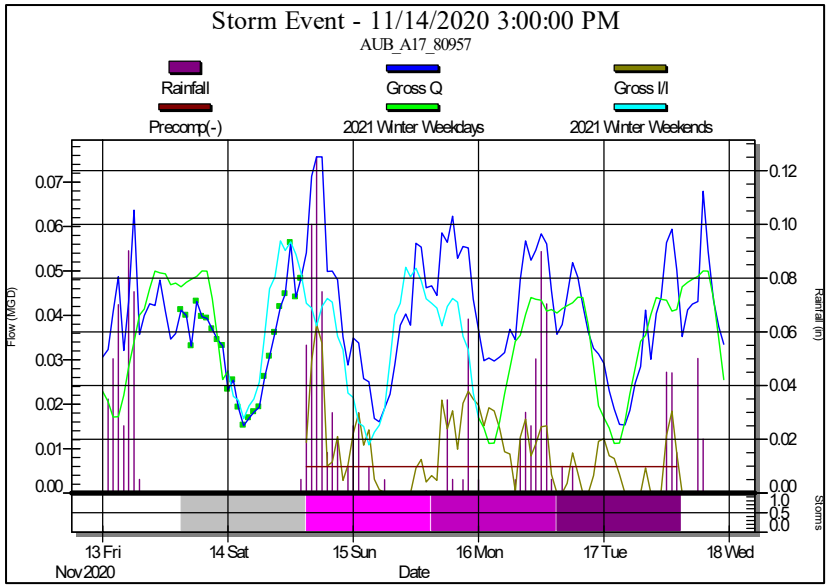

Pipe Flow
AUB_A17_80957
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
0.20
0.15
0.10
0.05
0.00
0.3
0.2
0.1
0.0
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

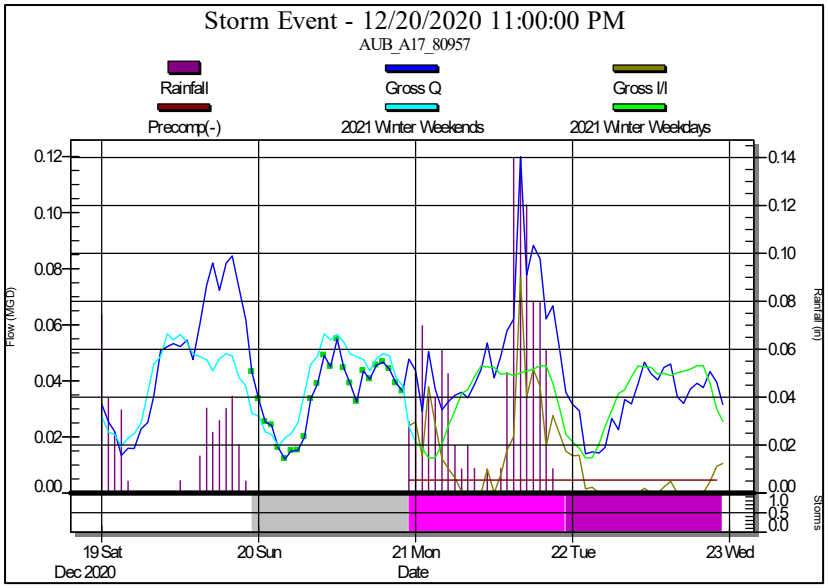

Dry Weather Flow
AUB_A17_80957
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
Hours

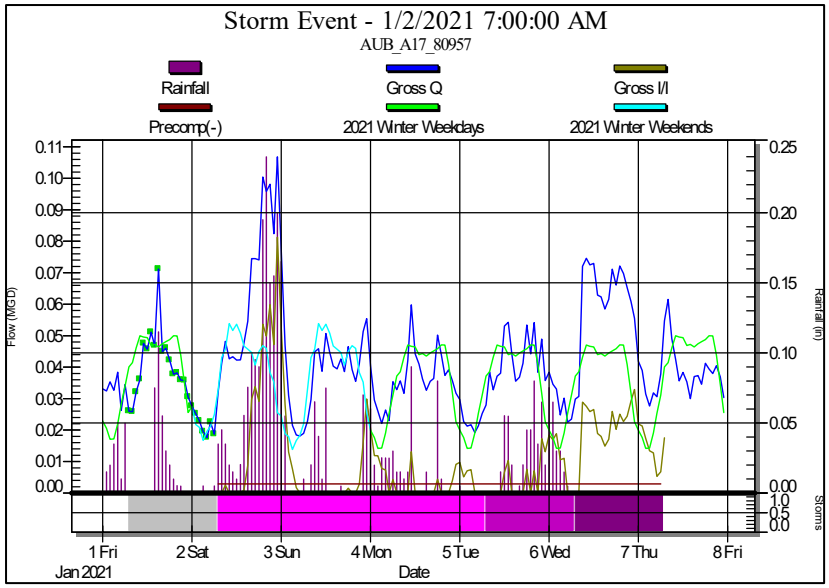

Scatter Graph
AUB_A17_80957
Lanfear-Coll (C-LC = 3.58)
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)

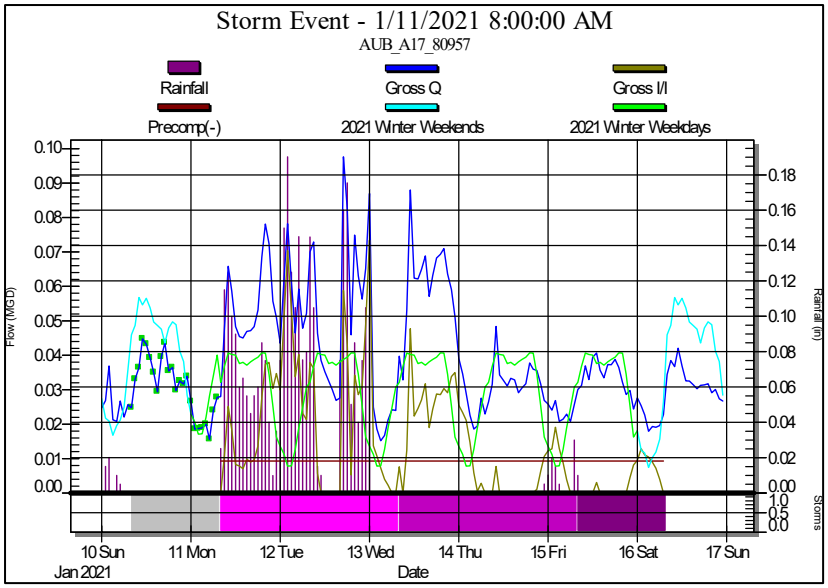

Storm Event - 10/9/2020 9:00:00 PM
AUB_A17_80957
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

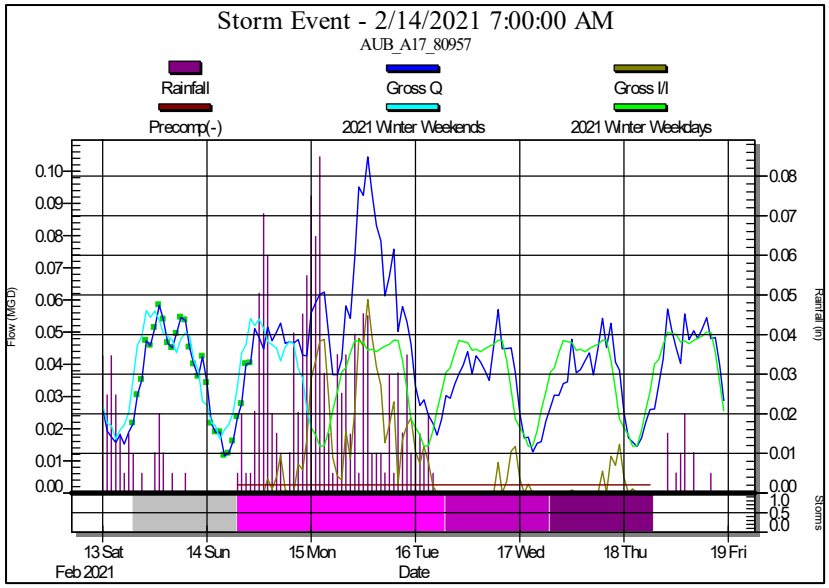

Storm Event - 11/3/2020 7:00:00 AM
AUB_A17_80957
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

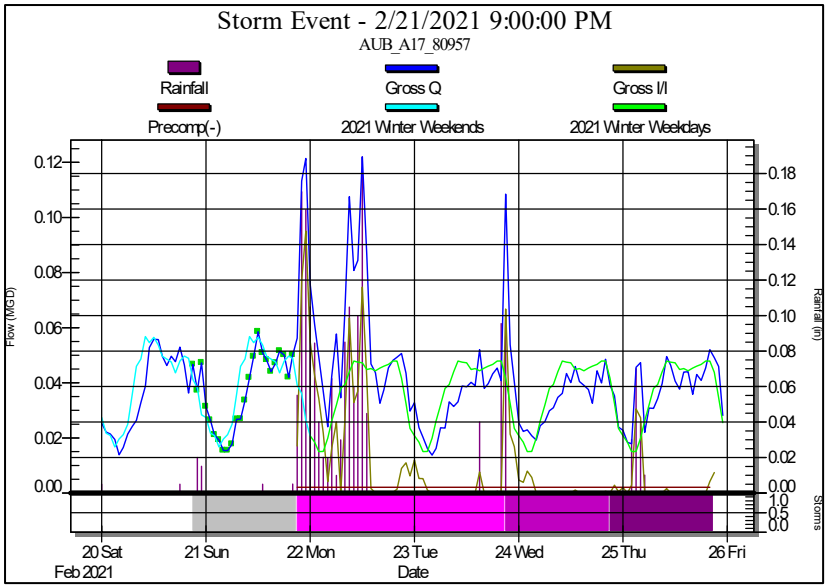

Storm Event - 11/14/2020 3:00:00 PM
AUB_A17_80957
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

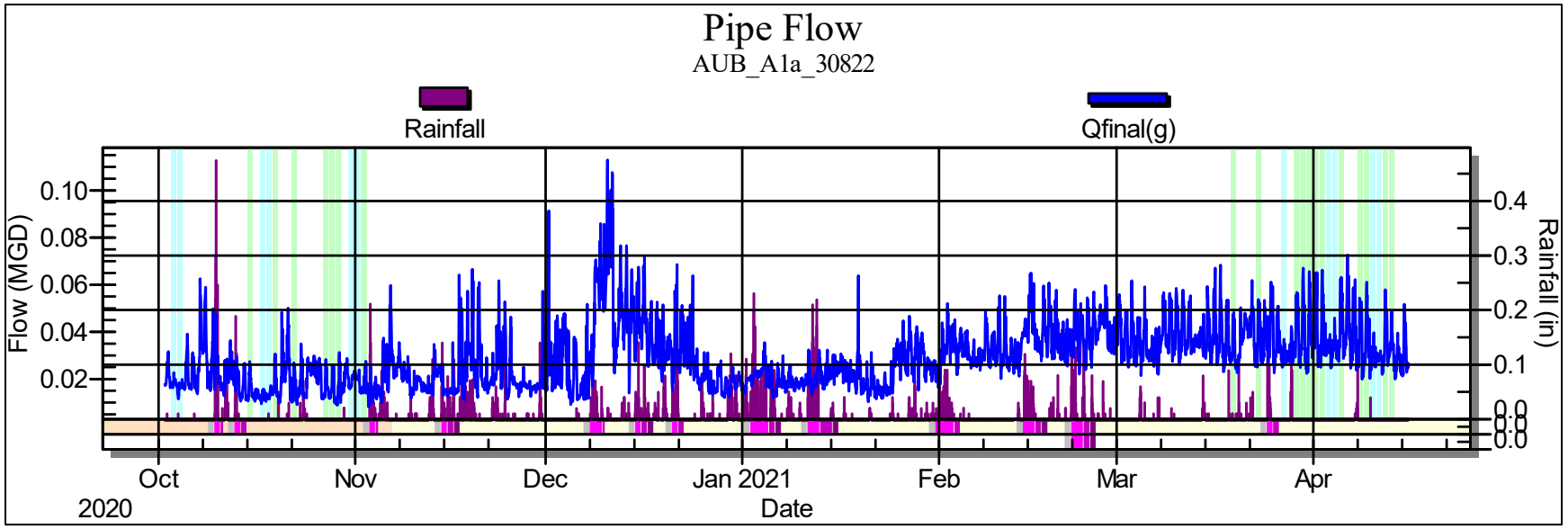

Storm Event - 12/20/2020 11:00:00 PM
AUB_A17_80957
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

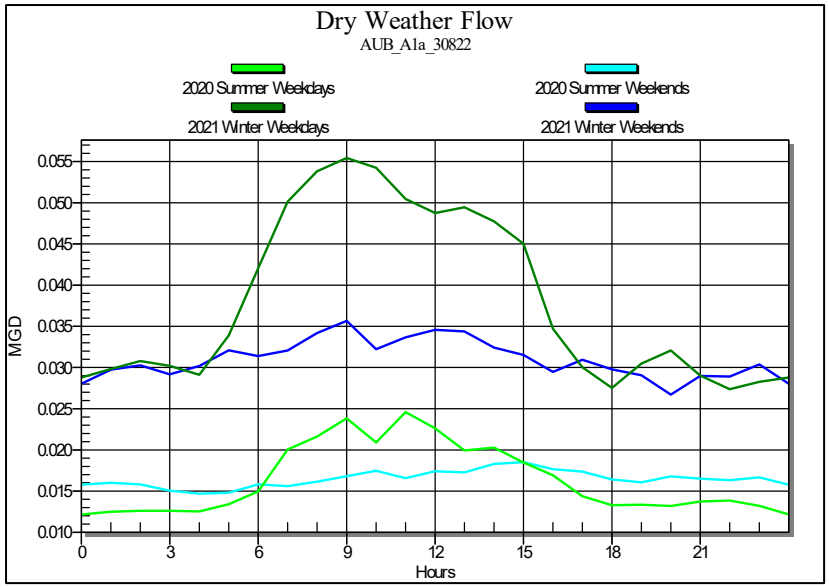

Storm Event - 1/2/2021 7:00:00 AM
AUB_A17_80957
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

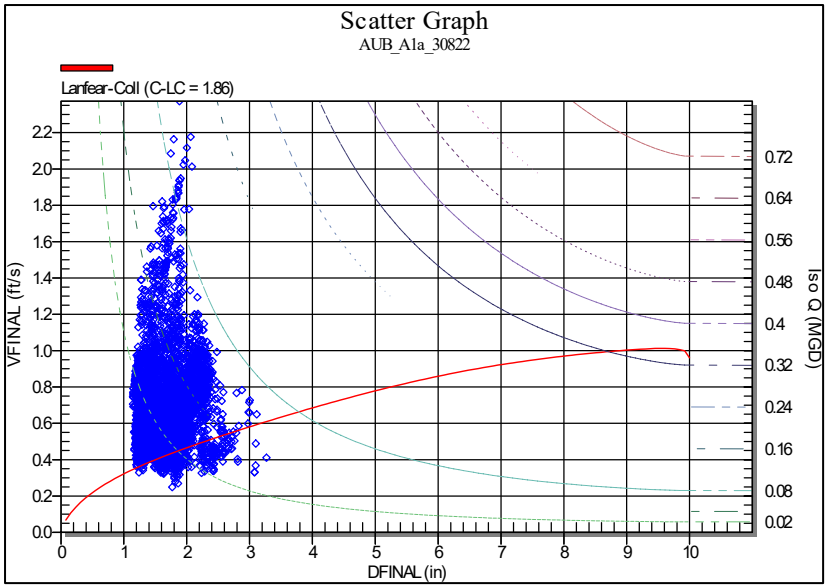

Storm Event - 1/11/2021 8:00:00 AM
AUB_A17_80957
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

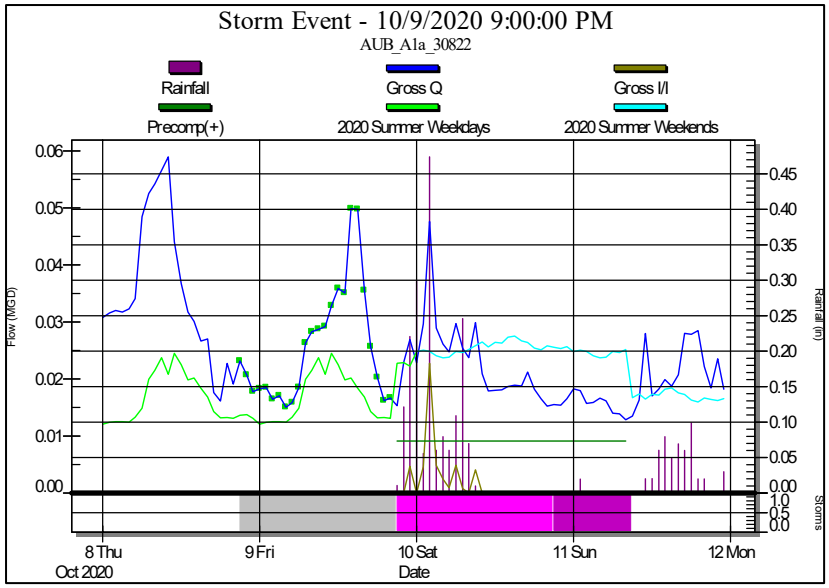

Storm Event - 2/14/2021 7:00:00 AM
AUB_A17_80957
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

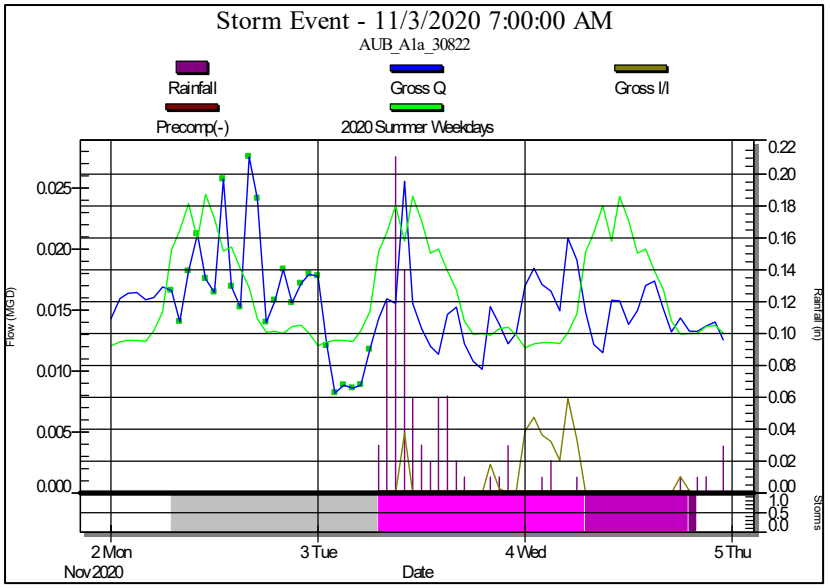

Storm Event - 2/21/2021 9:00:00 PM
AUB_A17_80957
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

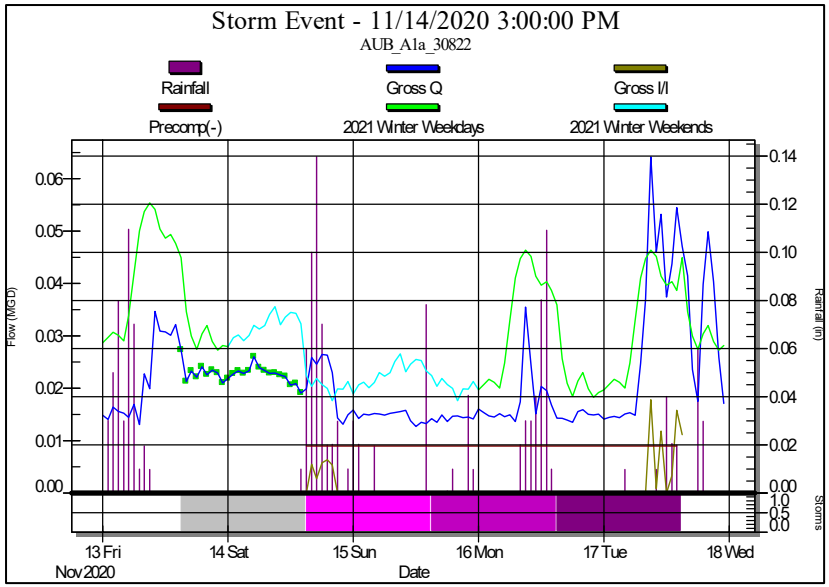

Pipe Flow
AUB_A1a_30822
Rainfall
Qfinal(g)
Flow (MGD)
0.10
0.08
0.06
0.04
0.02
0.4
0.3
0.2
0.1
0.0
Rainfall (in)
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

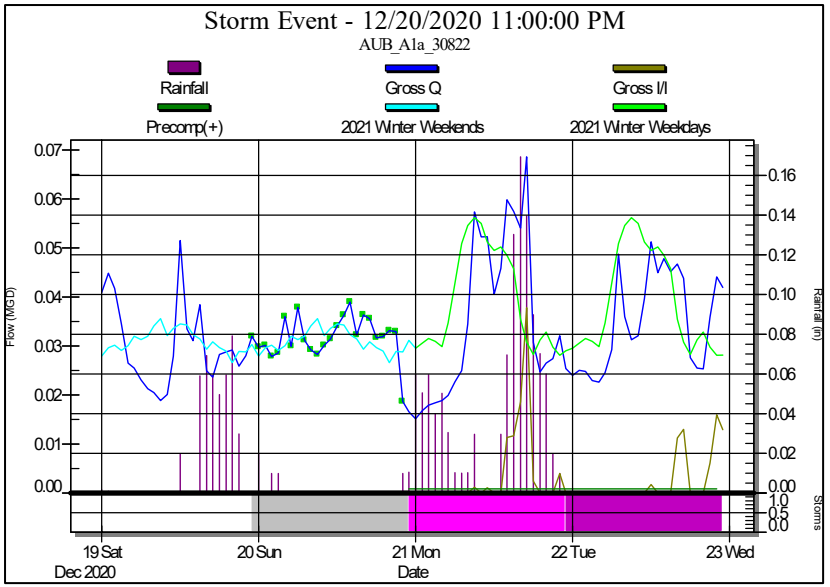

Dry Weather Flow
AUB_A1a_30822
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0
3
6
9
12
15
18
21
Hours

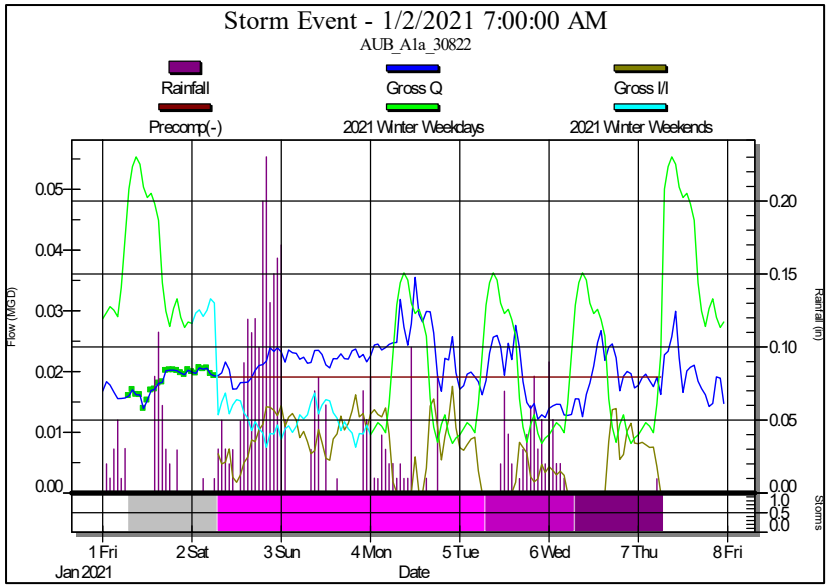

Scatter Graph
AUB_A1a_30822
Lanfear-Coll (C-LC = 1.86)
VFINAL (ft/s)
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
1
2
3
4
5
6
7
8
9
10
DFINAL (in)
0.72
0.64
0.56
0.48
0.4
0.32
0.24
0.16
0.08
0.02
Iso Q (MGD)

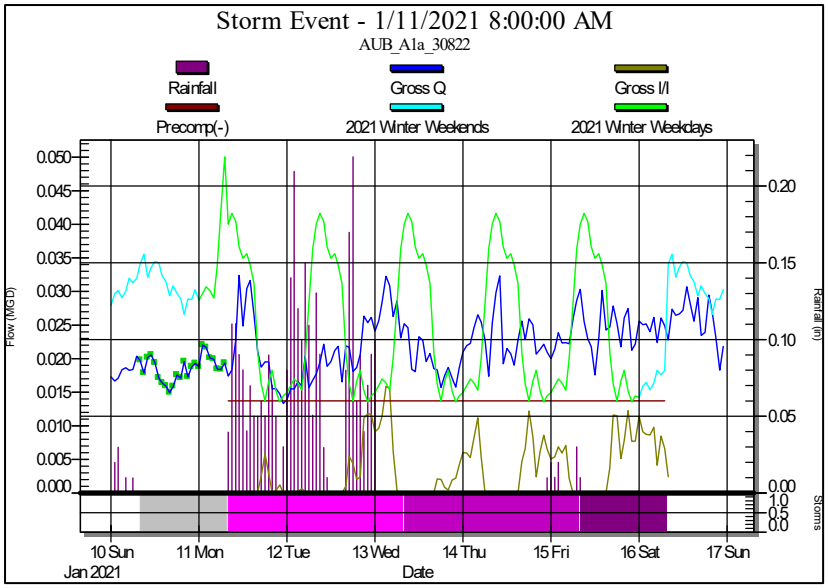

Storm Event - 10/9/2020 9:00:00 PM
AUB_A1a_30822
Rainfall
Gross Q
Gross I/I
Precomp(+)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

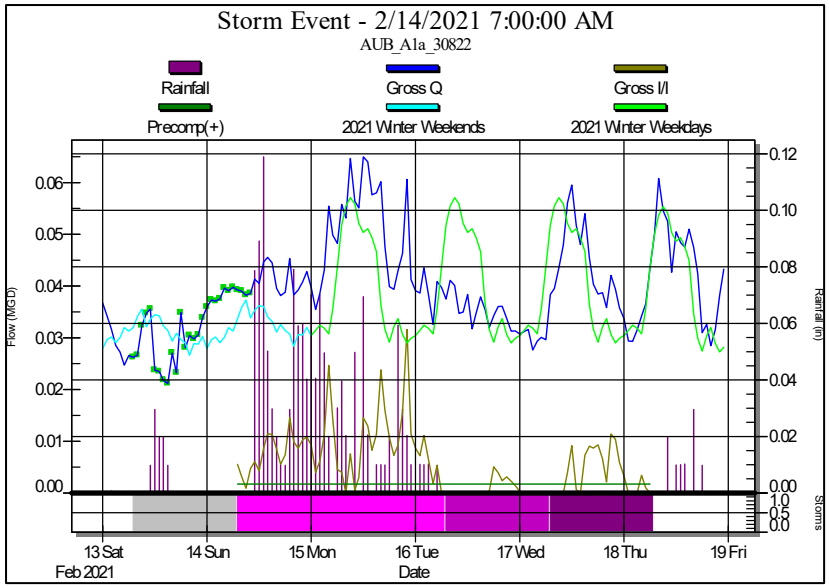

Storm Event - 11/3/2020 7:00:00 AM
AUB_A1a_30822
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

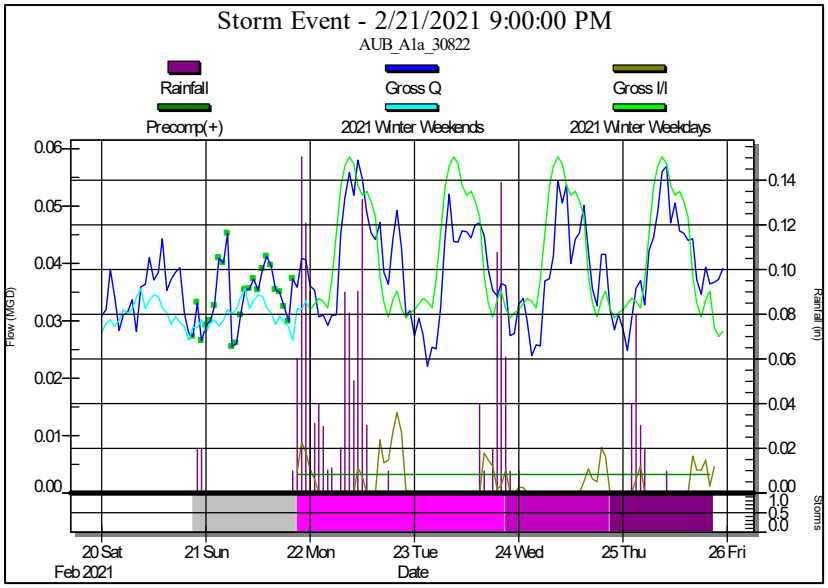

Storm Event - 11/14/2020 3:00:00 PM
AUB_A1a_30822
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

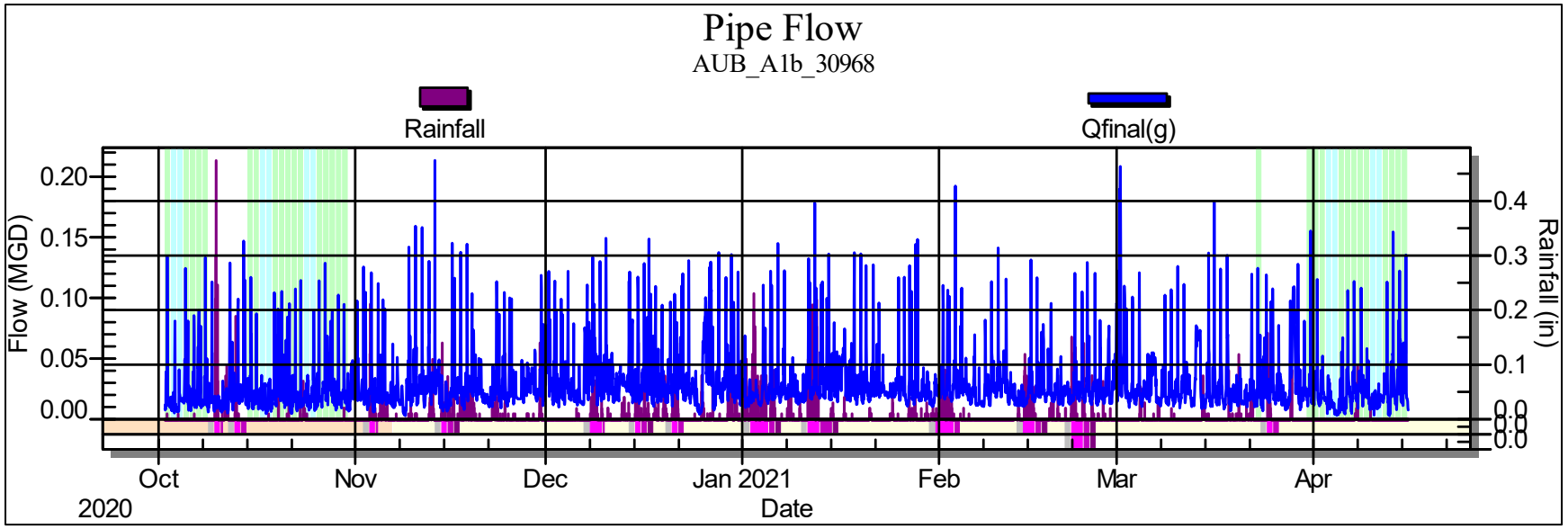

Storm Event - 12/20/2020 11:00:00 PM
AUB_A1a_30822
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

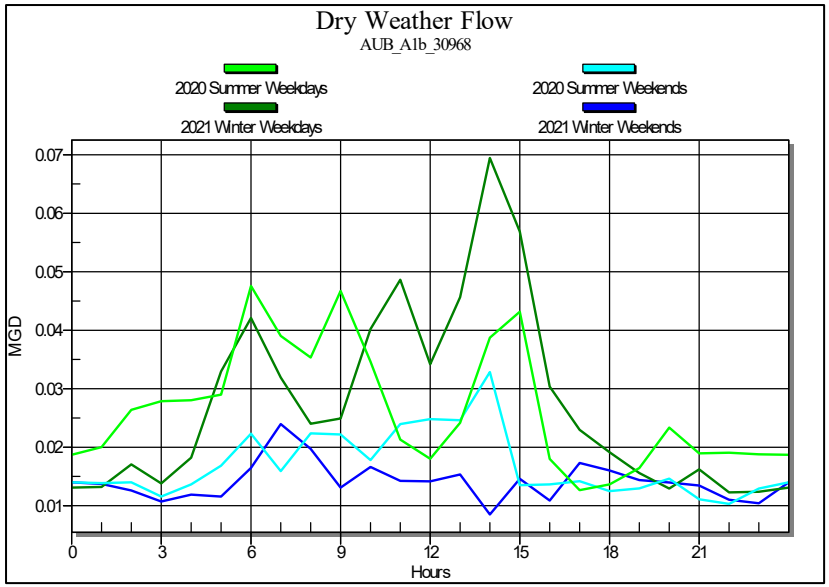

Storm Event - 1/2/2021 7:00:00 AM
AUB_A1a_30822
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
Jan 2021
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Date

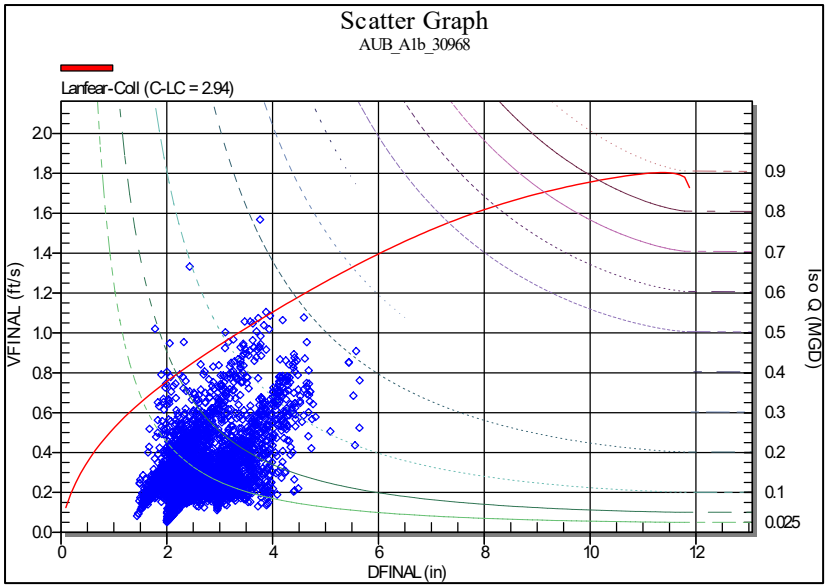

Storm Event - 1/11/2021 8:00:00 AM
AUB_A1a_30822
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
Jan 2021
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Date

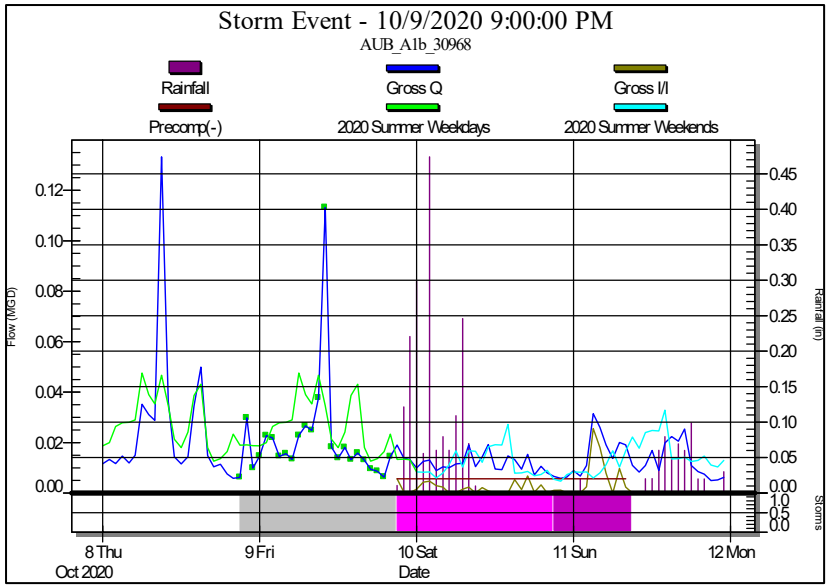

Storm Event - 2/14/2021 7:00:00 AM
AUB_A1a_30822
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
Feb 2021
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Date

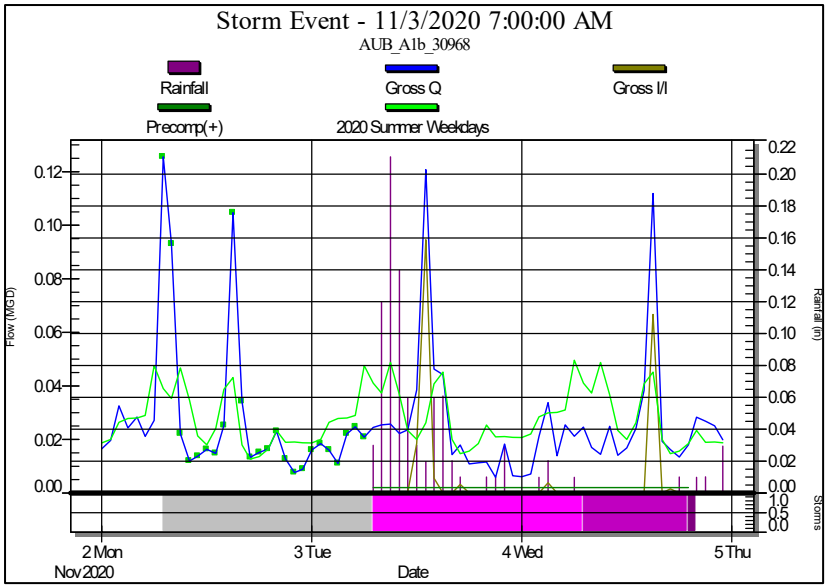

Storm Event - 2/21/2021 9:00:00 PM
AUB_A1a_30822
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
Feb 2021
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Date

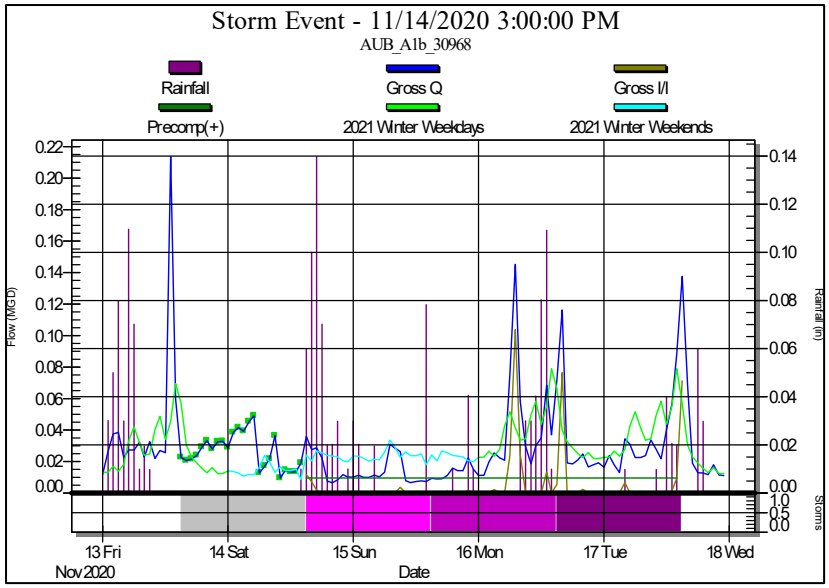

Pipe Flow
AUB_A1b_30968
Rainfall
Qfinal(g)
Flow (MGD)
0.20
0.15
0.10
0.05
0.00
0.4
0.3
0.2
0.1
0.0
Rainfall (in)
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

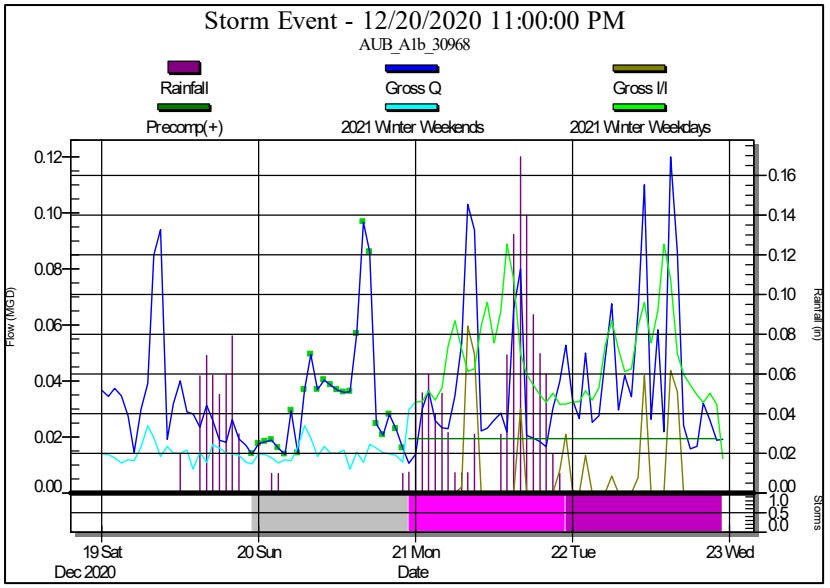

Dry Weather Flow
AUB_A1b_30968
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
3
6
9
12
15
18
21
Hours

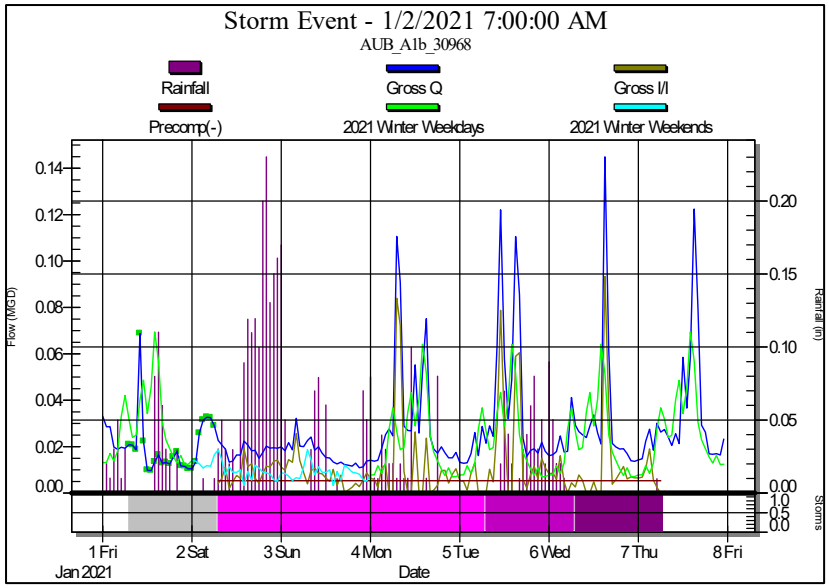

Scatter Graph
AUB_A1b_30968
Lanfear-Coll (C-LC = 2.94)
VFINAL (ft/s)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.025
Iso Q (MGD)
0
2
4
6
8
10
12
DFINAL (in)

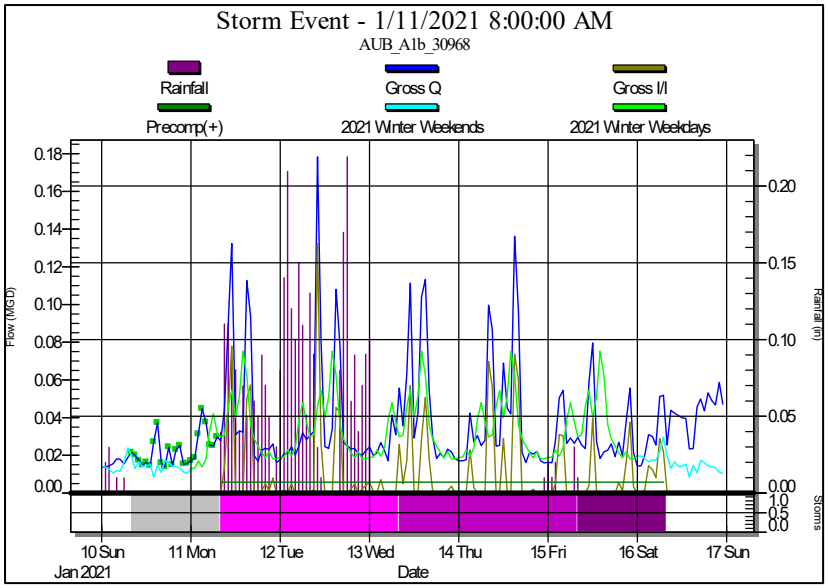

Storm Event - 10/9/2020 9:00:00 PM
AUB_A1b_30968
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

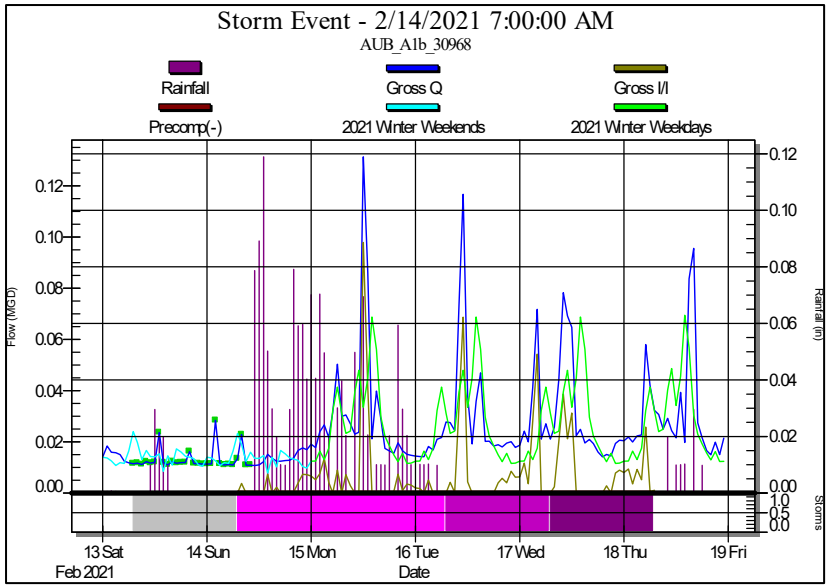

Storm Event - 11/3/2020 7:00:00 AM
AUB_A1b_30968
Rainfall
Gross Q
Gross I/I
Precomp(+)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

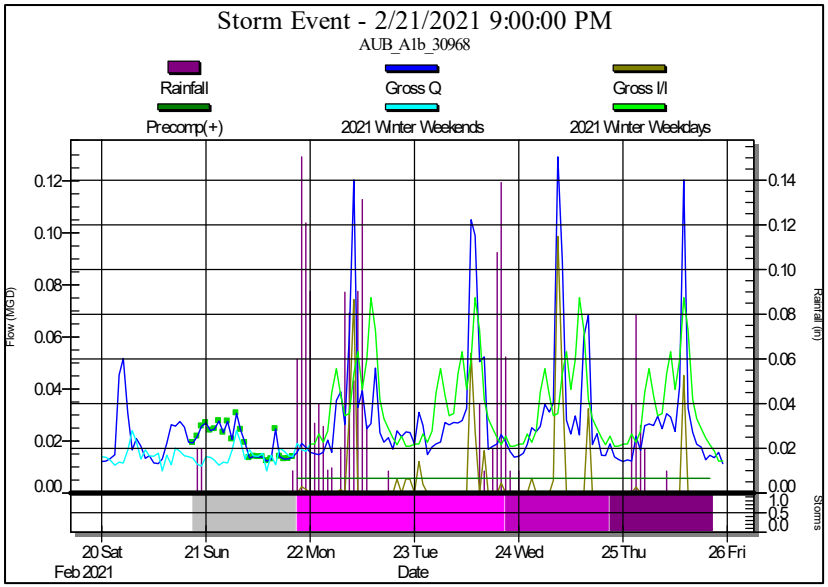

Storm Event - 11/14/2020 3:00:00 PM
AUB_A1b_30968
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

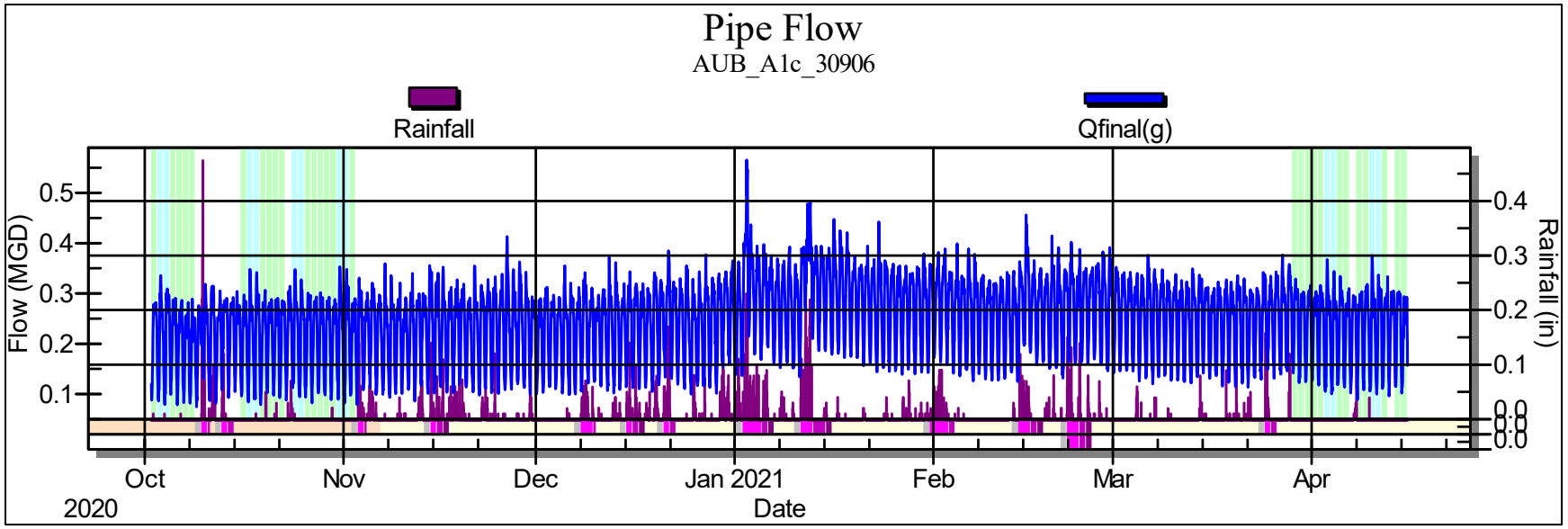

Storm Event - 12/20/2020 11:00:00 PM
AUB_A1b_30968
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

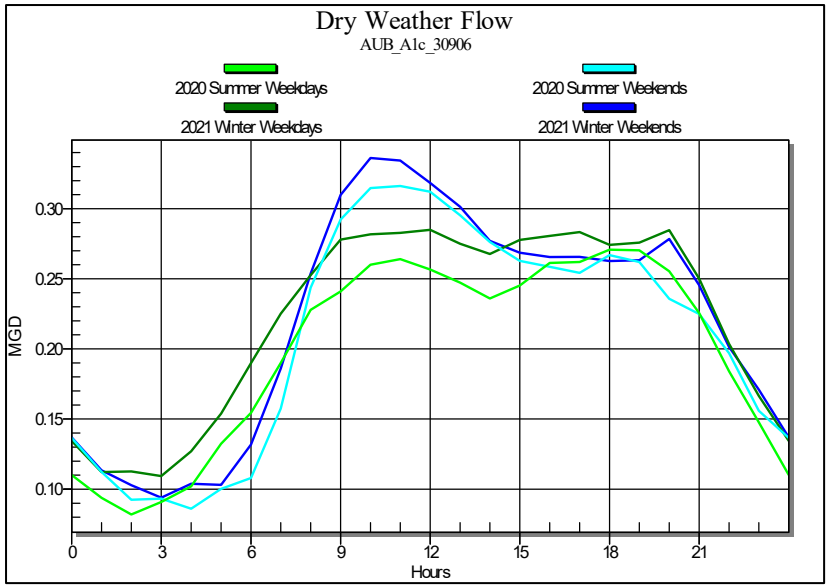

Storm Event - 1/2/2021 7:00:00 AM
AUB_A1b_30968
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

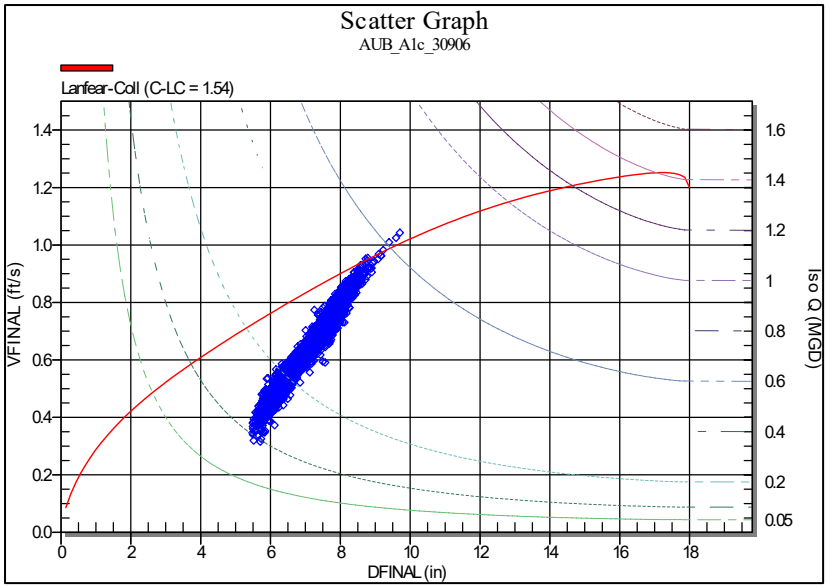

Storm Event - 1/11/2021 8:00:00 AM
AUB_A1b_30968
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

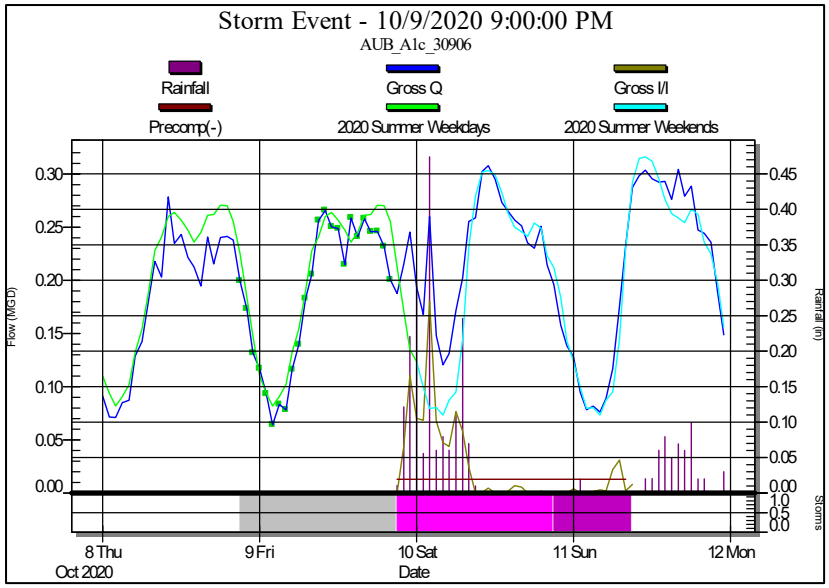

Storm Event - 2/14/2021 7:00:00 AM
AUB_A1b_30968
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

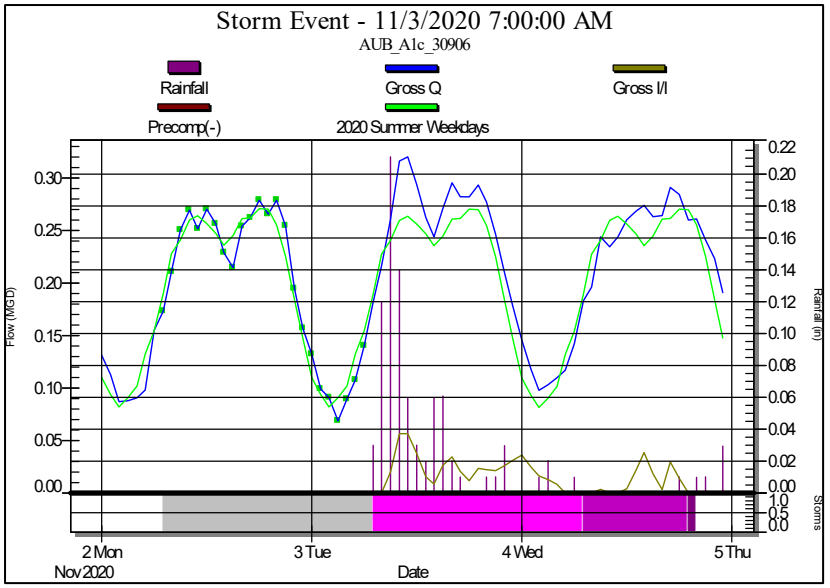

Storm Event - 2/21/2021 9:00:00 PM
AUB_A1b_30968
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

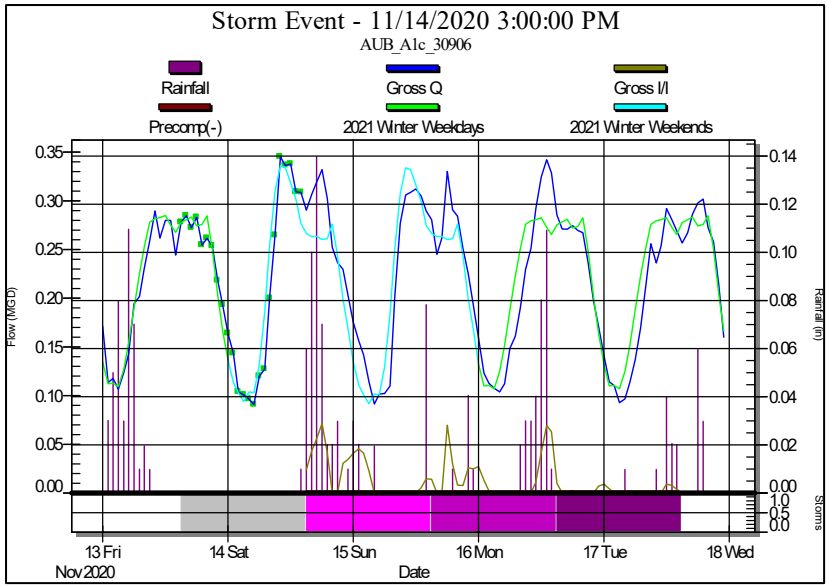

Pipe Flow
AUB_A1c_30906
Rainfall
Qfinal(g)
Flow (MGD)
0.5
0.4
0.3
0.2
0.1
Rainfall (in)
0.4
0.3
0.2
0.1
0.0
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

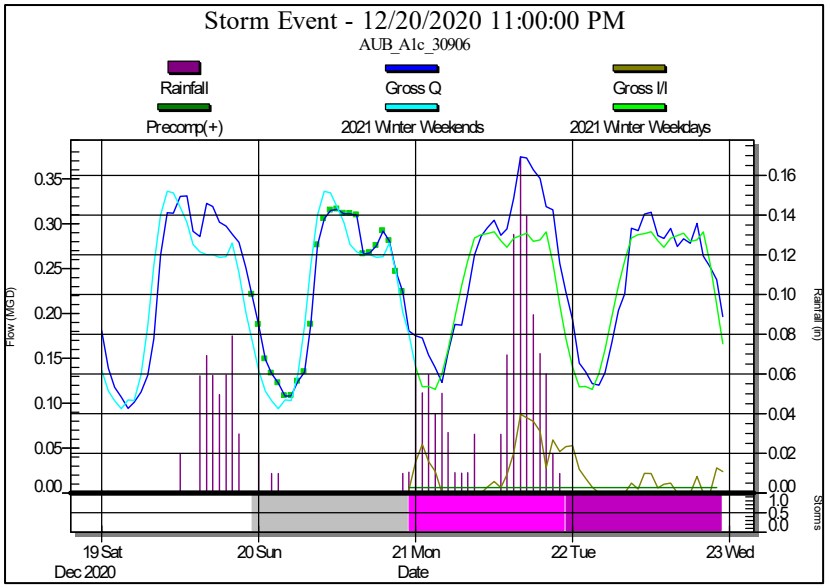

Dry Weather Flow
AUB_A1c_30906
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
0.30
0.25
0.20
0.15
0.10
0
3
6
9
12
15
18
21
Hours

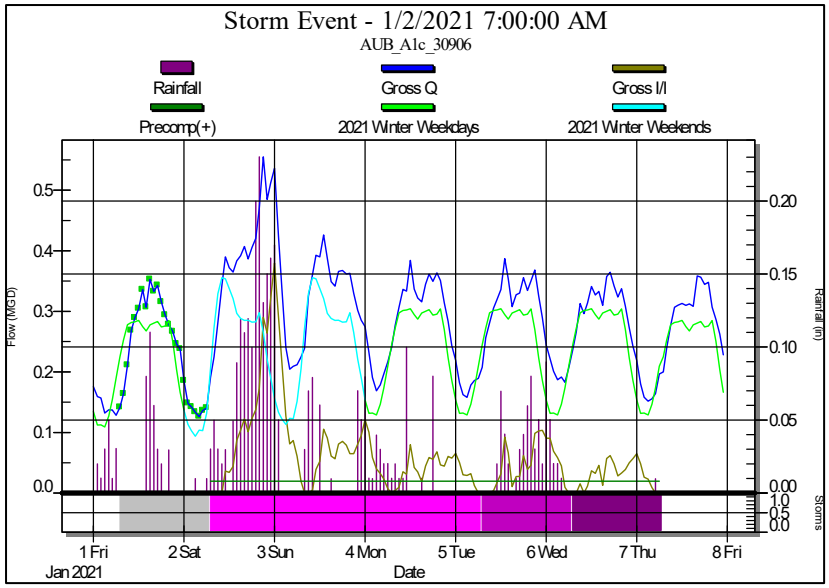

Scatter Graph
AUB_A1c_30906
Lanfear-Coll (C-LC = 1.54)
VFINAL (ft/s)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Iso Q (MGD)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0.05
0
2
4
6
8
10
12
14
16
18
DFINAL (in)

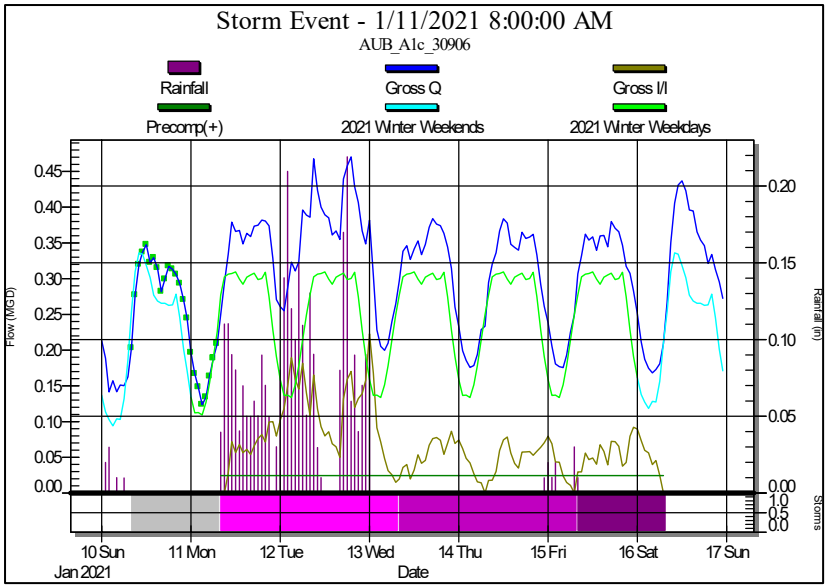

Storm Event - 10/9/2020 9:00:00 PM
AUB_A1c_30906
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

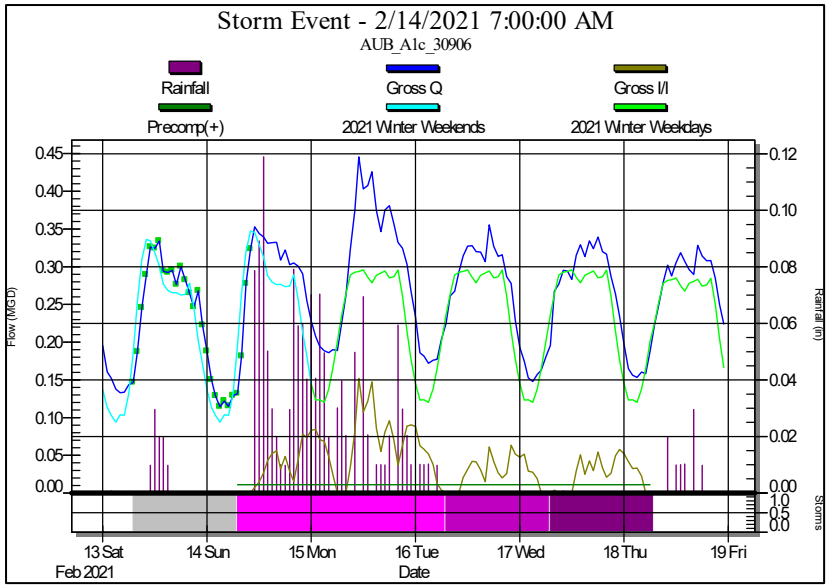

Storm Event - 11/3/2020 7:00:00 AM
AUB_A1c_30906
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

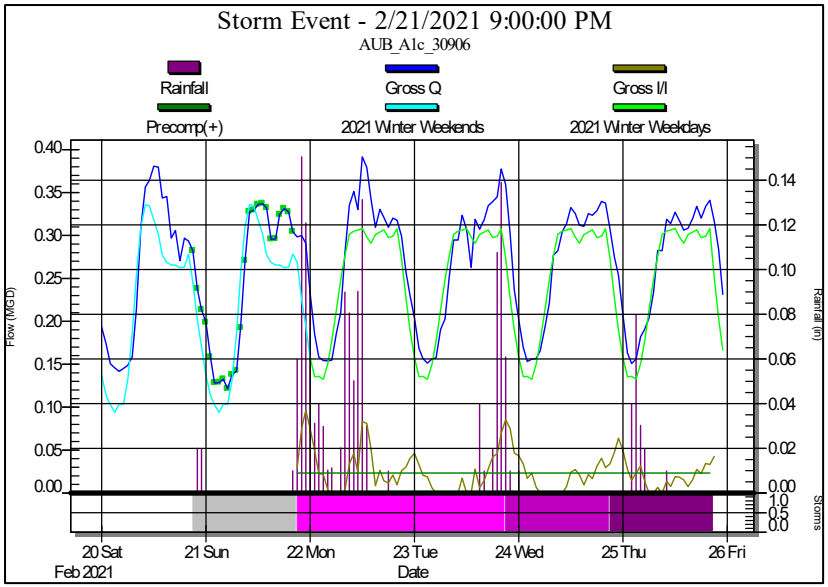

Storm Event - 11/14/2020 3:00:00 PM
AUB_A1c_30906
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

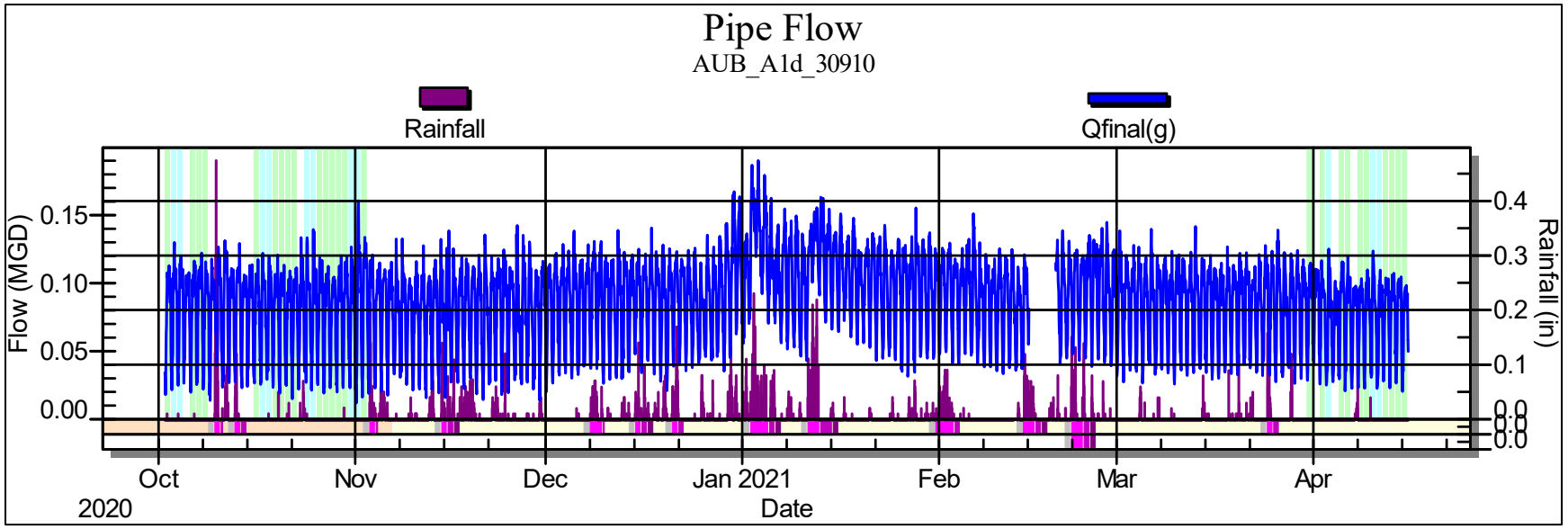

Storm Event - 12/20/2020 11:00:00 PM
AUB_A1c_30906
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

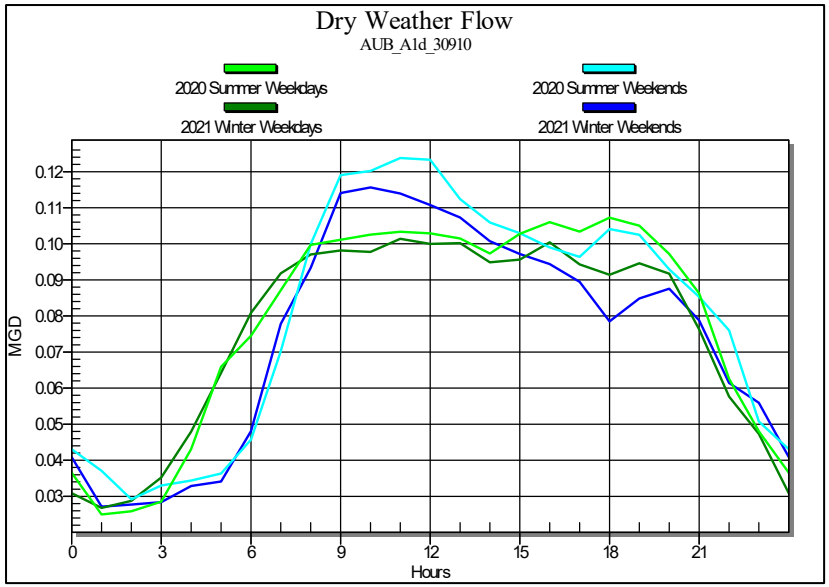

Storm Event - 1/2/2021 7:00:00 AM
AUB_A1c_30906
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
Jan 2021
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Date

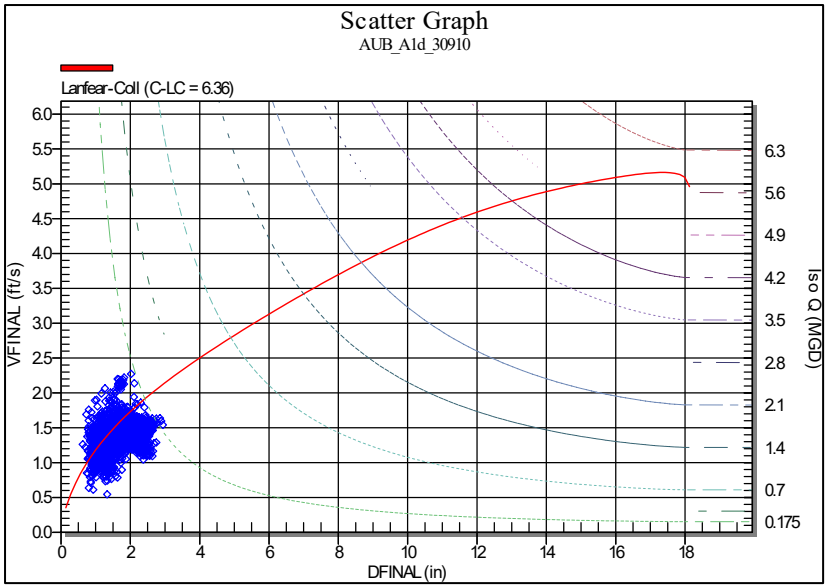

Storm Event - 1/11/2021 8:00:00 AM
AUB_A1c_30906
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
Jan 2021
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Date

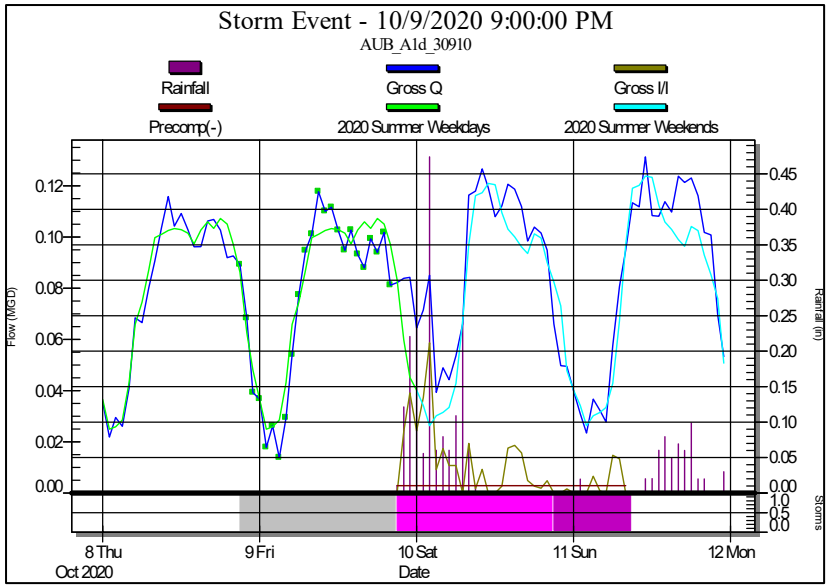

Storm Event - 2/14/2021 7:00:00 AM
AUB_A1c_30906
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
Feb 2021
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Date

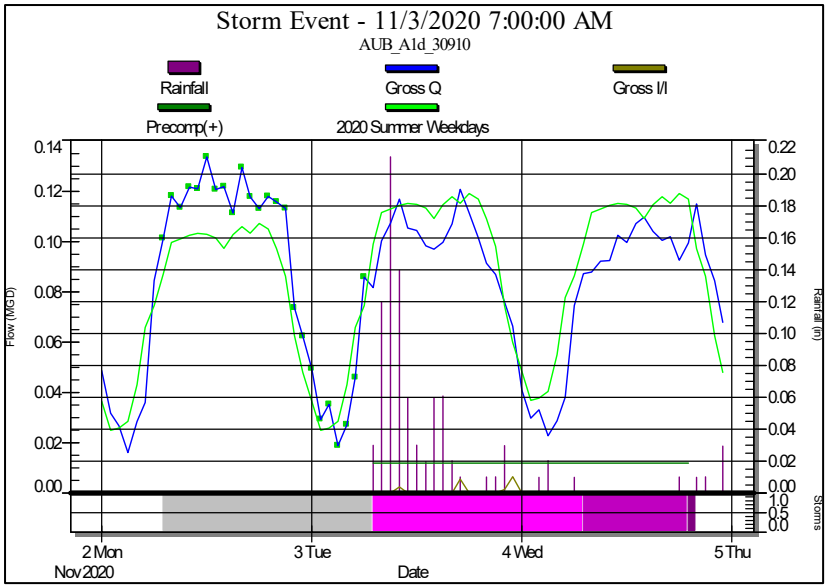

Storm Event - 2/21/2021 9:00:00 PM
AUB_A1c_30906
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
Feb 2021
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Date

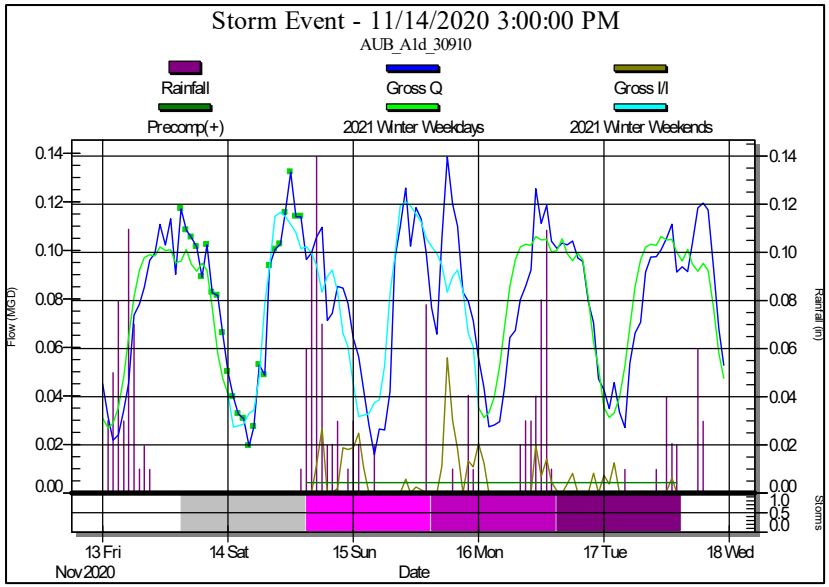

Pipe Flow
AUB_A1d_30910
Rainfall
Qfinal(g)
Flow (MGD)
0.15
0.10
0.05
0.00
0.4
0.3
0.2
0.1
0.0
Rainfall (in)
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

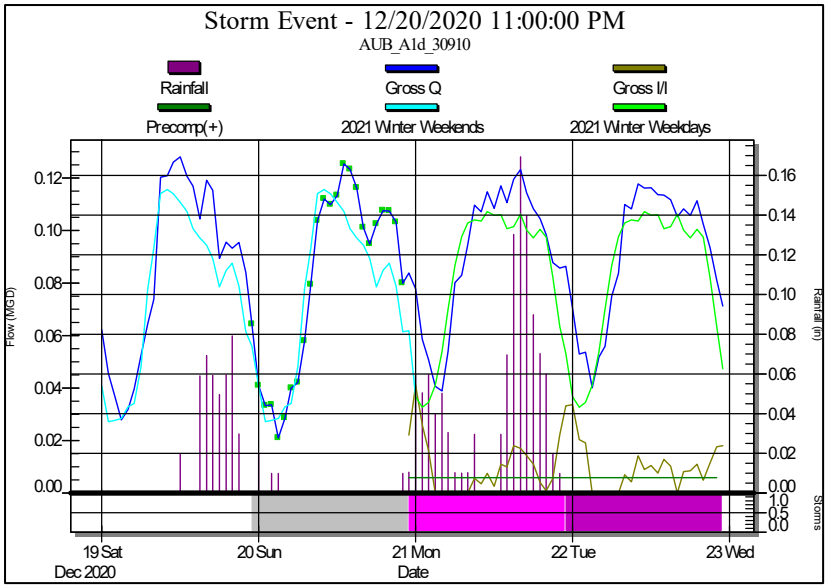

Dry Weather Flow
AUB_A1d_30910
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0
3
6
9
12
15
18
21
Hours

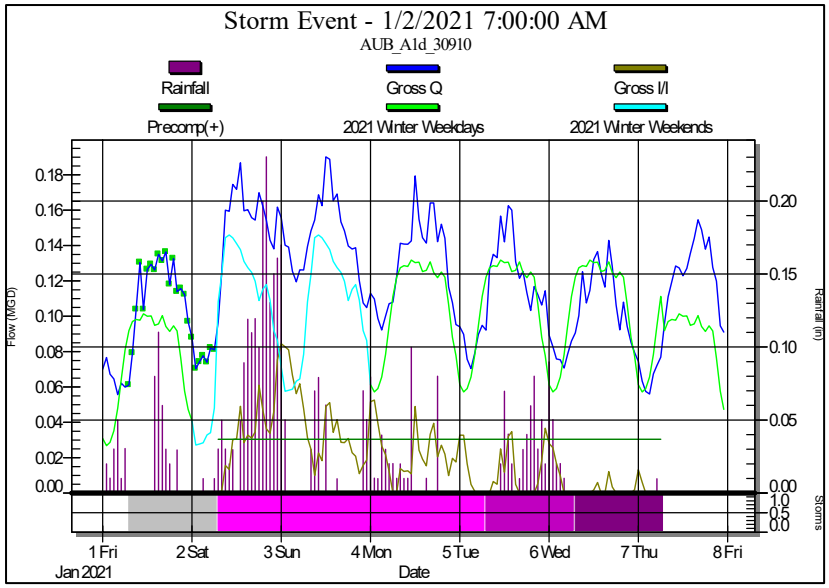

Scatter Graph
AUB_A1d_30910
Lanfear-Coll (C-LC = 6.36)
VFINAL (ft/s)
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
2
4
6
8
10
12
14
16
18
DFINAL (in)
Iso Q (MGD)
6.3
5.6
4.9
4.2
3.5
2.8
2.1
1.4
0.7
0.175

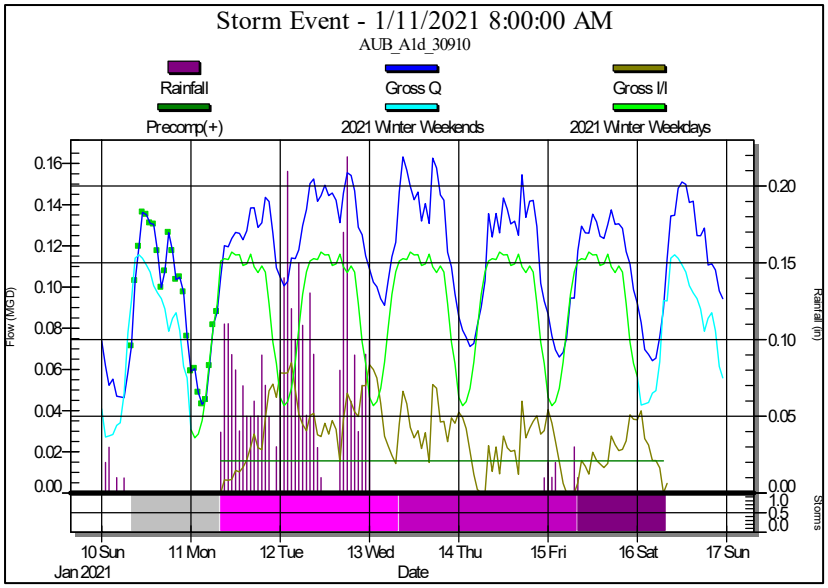

Storm Event - 10/9/2020 9:00:00 PM
AUB_A1d_30910
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

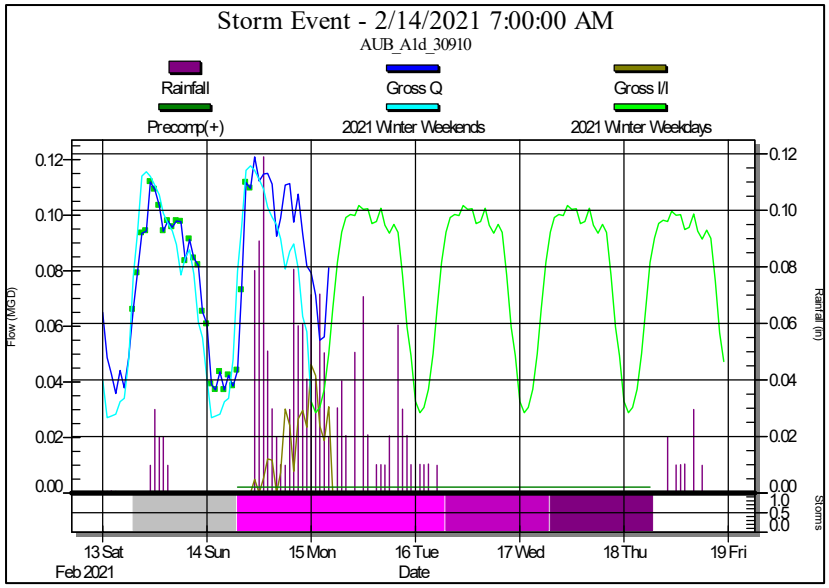

Storm Event - 11/3/2020 7:00:00 AM
AUB_A1d_30910
Rainfall
Gross Q
Gross I/I
Precomp(+)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

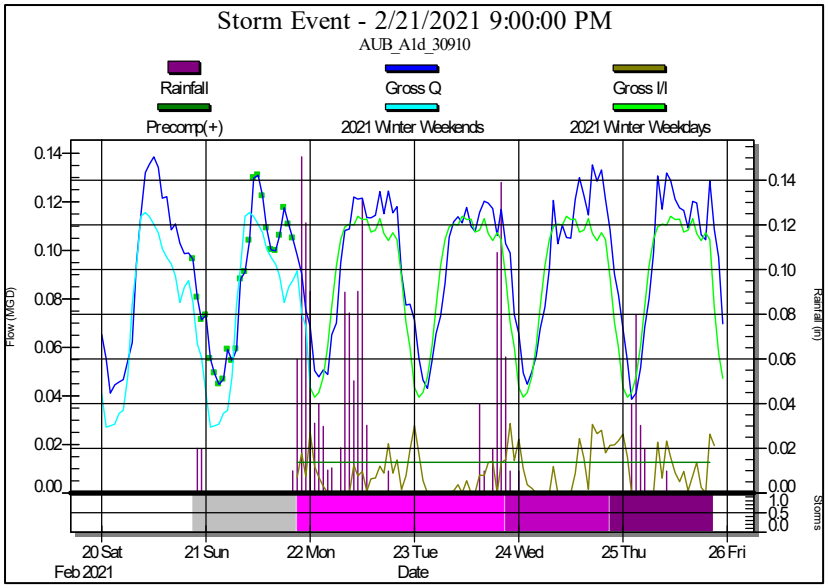

Storm Event - 11/14/2020 3:00:00 PM
AUB_A1d_30910
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

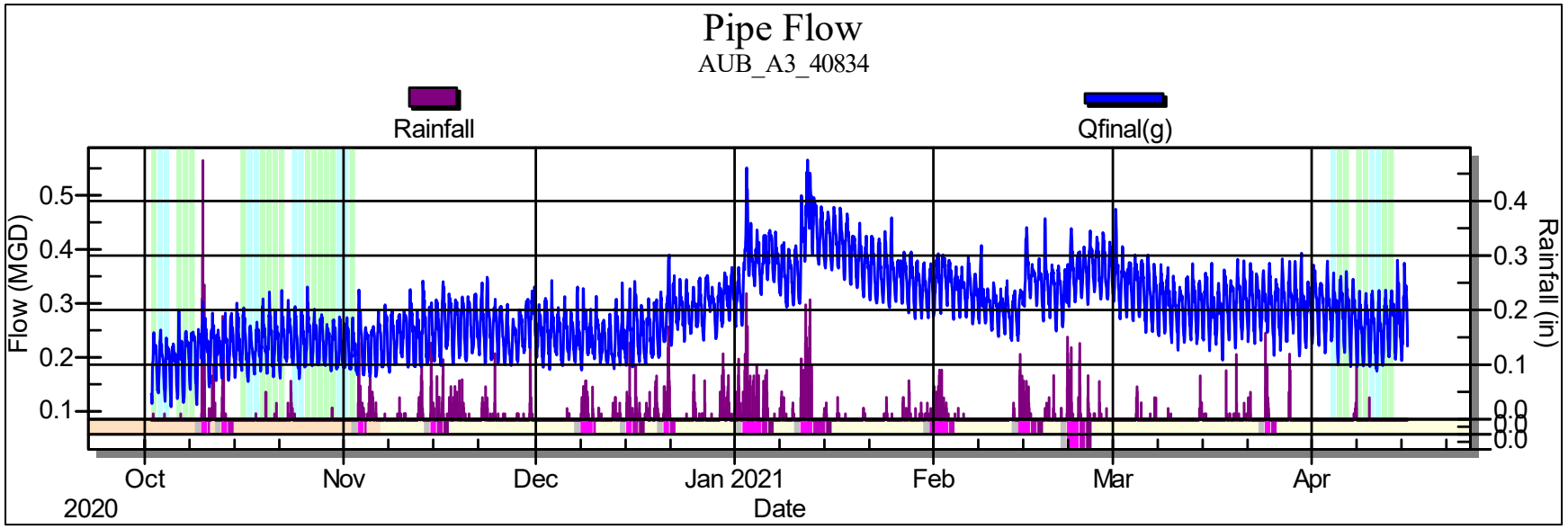

Storm Event - 12/20/2020 11:00:00 PM
AUB_A1d_30910
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

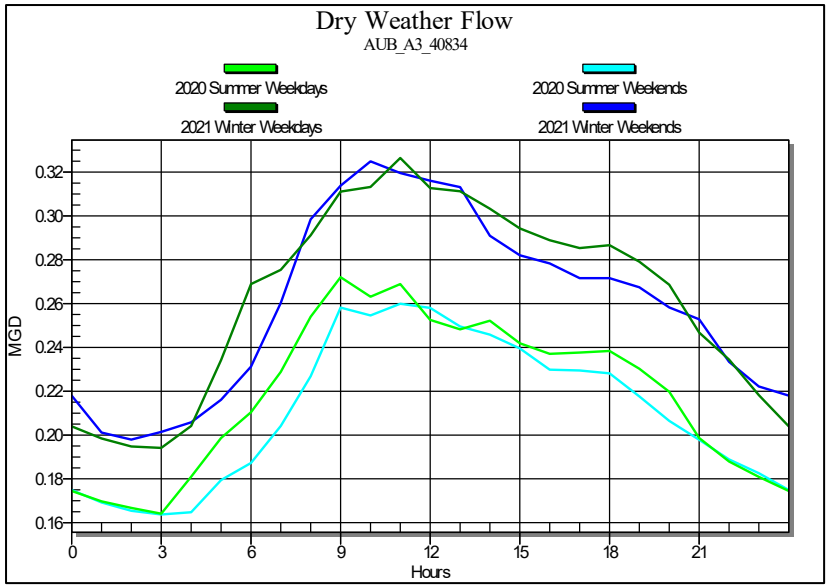

Storm Event - 1/2/2021 7:00:00 AM
AUB_A1d_30910
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

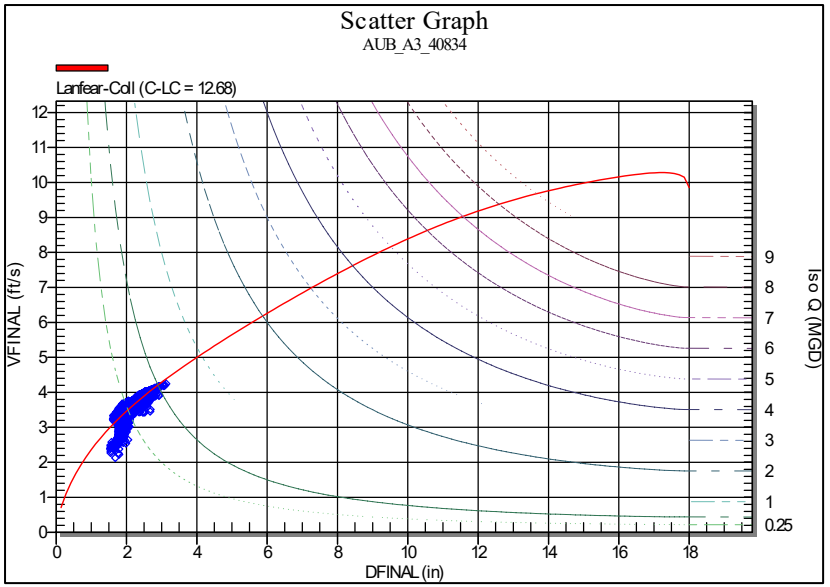

Storm Event - 1/11/2021 8:00:00 AM
AUB_A1d_30910
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

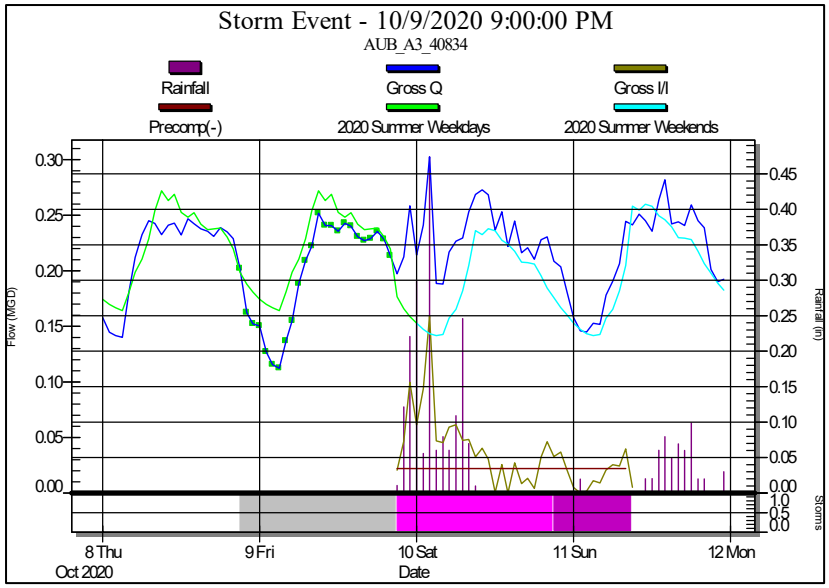

Storm Event - 2/14/2021 7:00:00 AM
AUB_A1d_30910
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

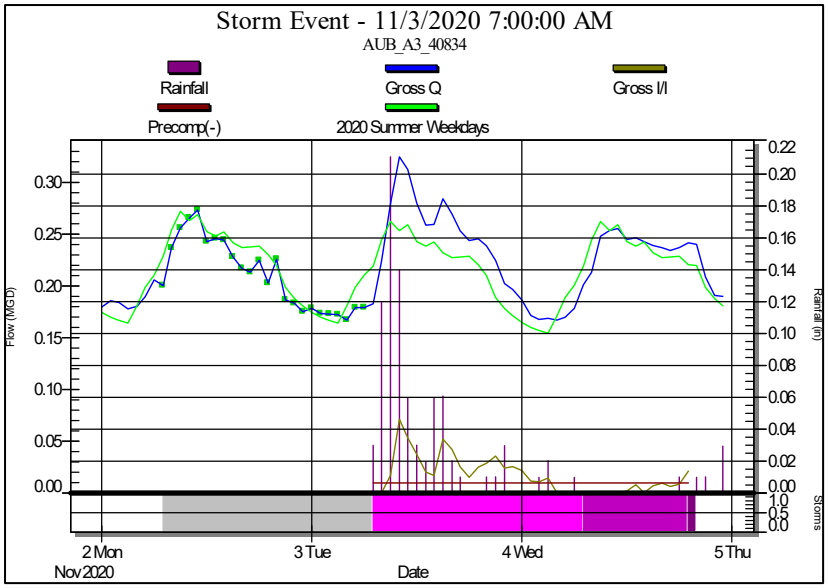

Storm Event - 2/21/2021 9:00:00 PM
AUB_A1d_30910
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

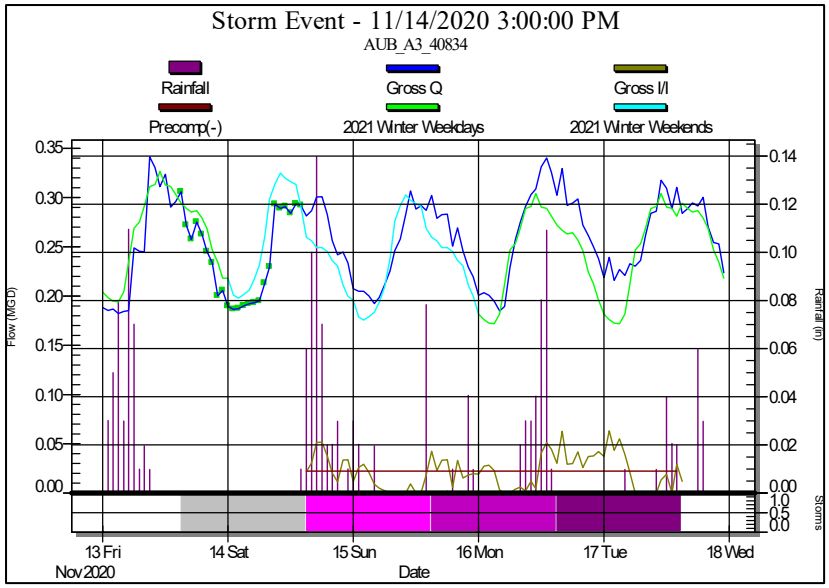

Pipe Flow
AUB_A3_40834
Rainfall
Qfinal(g)
Flow (MGD)
0.5
0.4
0.3
0.2
0.1
Rainfall (in)
0.4
0.3
0.2
0.1
0.0
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

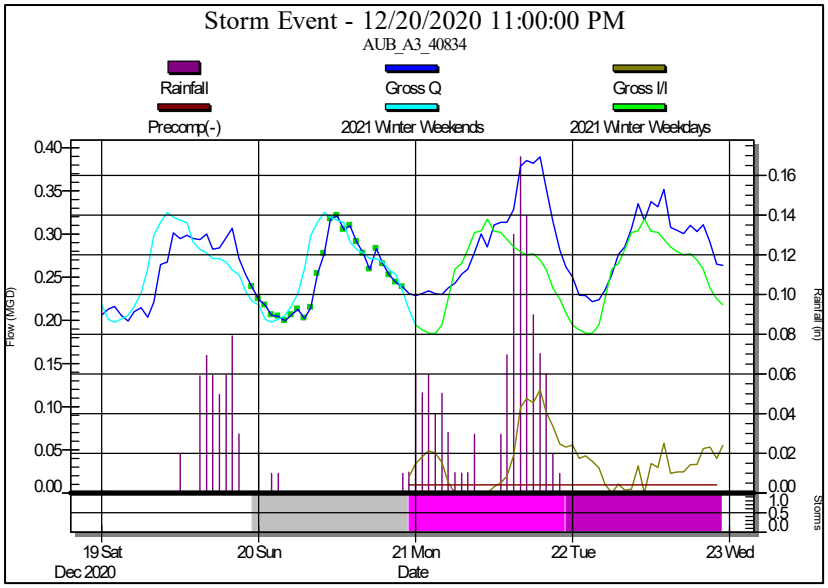

Dry Weather Flow
AUB_A3_40834
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
0.32
0.30
0.28
0.26
0.24
0.22
0.20
0.18
0.16
0
3
6
9
12
15
18
21
Hours

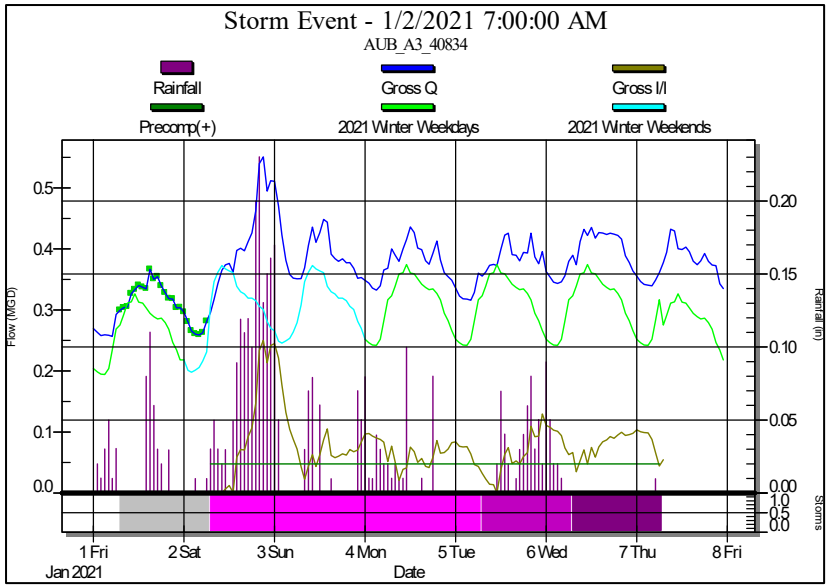

Scatter Graph
AUB_A3_40834
Lanfear-Coll (C-LC = 12.68)
VFINAL (ft/s)
12
11
10
9
8
7
6
5
4
3
2
1
0
Iso Q (MGD)
9
8
7
6
5
4
3
2
1
0.25
0
2
4
6
8
10
12
14
16
18
DFINAL (in)

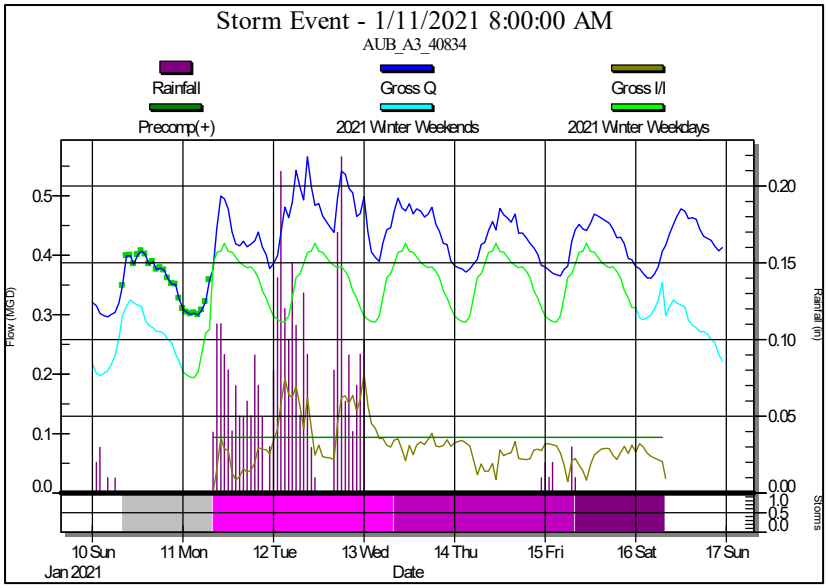

Storm Event - 10/9/2020 9:00:00 PM
AUB_A3_40834
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

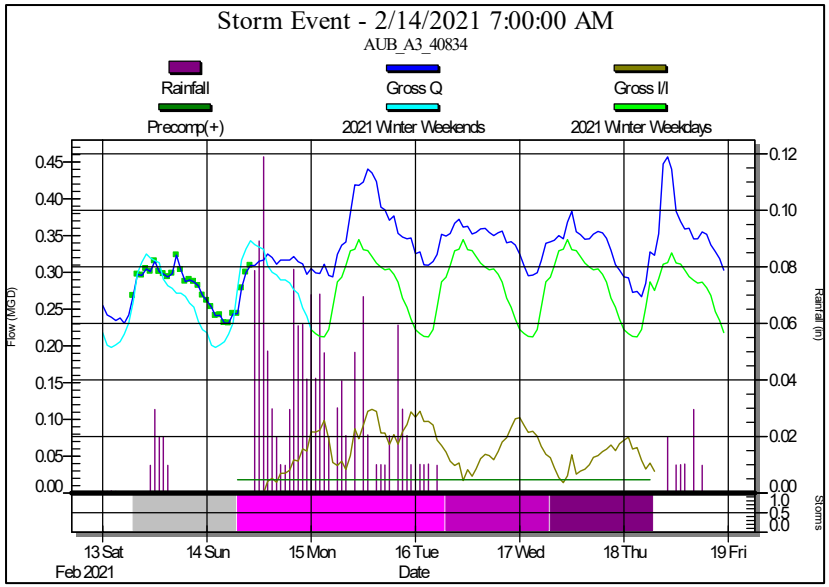

Storm Event - 11/3/2020 7:00:00 AM
AUB_A3_40834
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

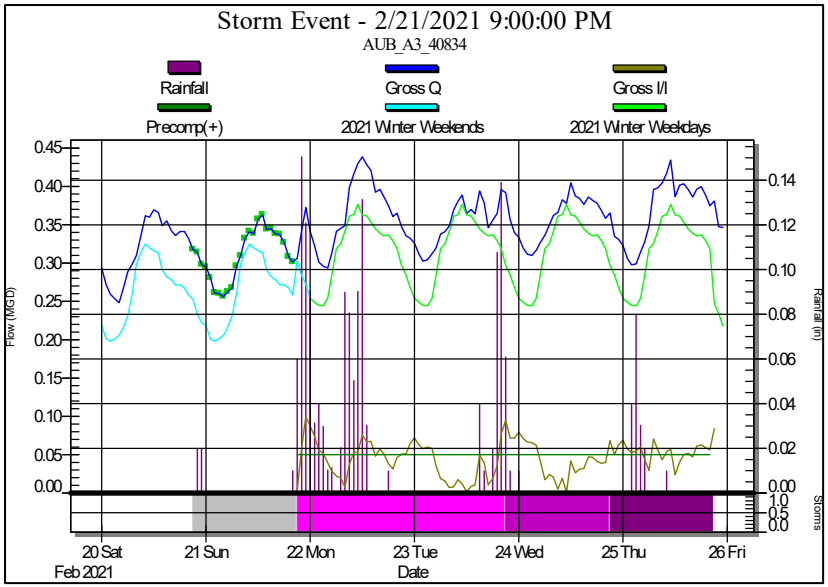

Storm Event - 11/14/2020 3:00:00 PM
AUB_A3_40834
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

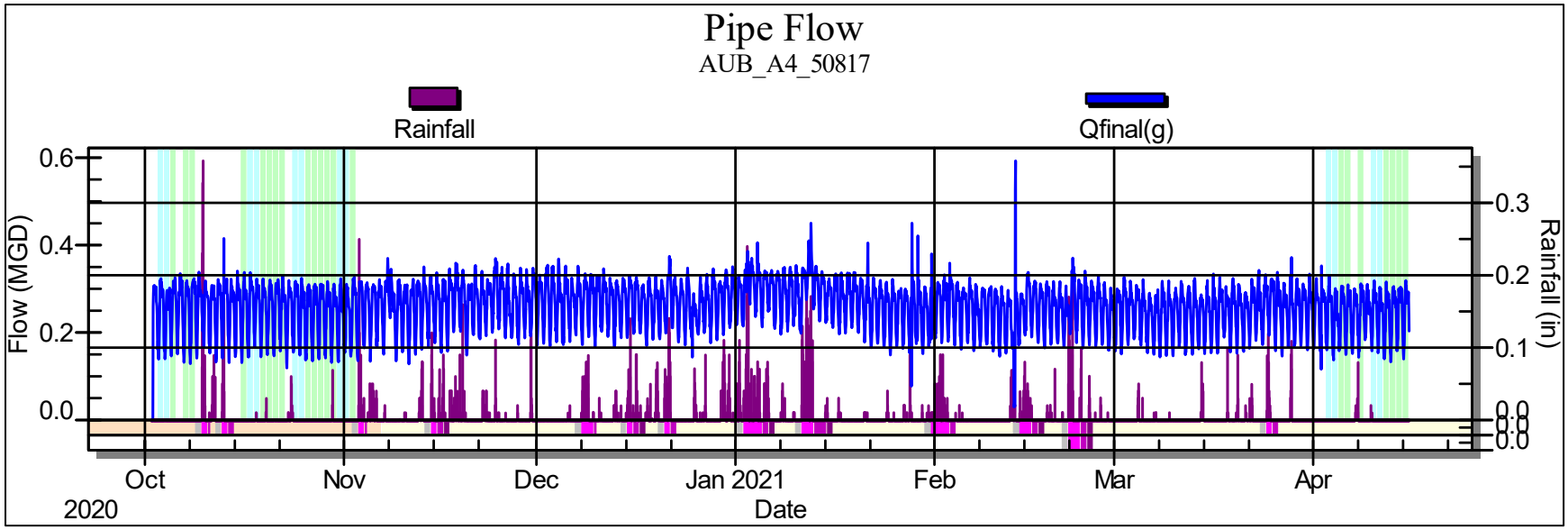

Storm Event - 12/20/2020 11:00:00 PM
AUB_A3_40834
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

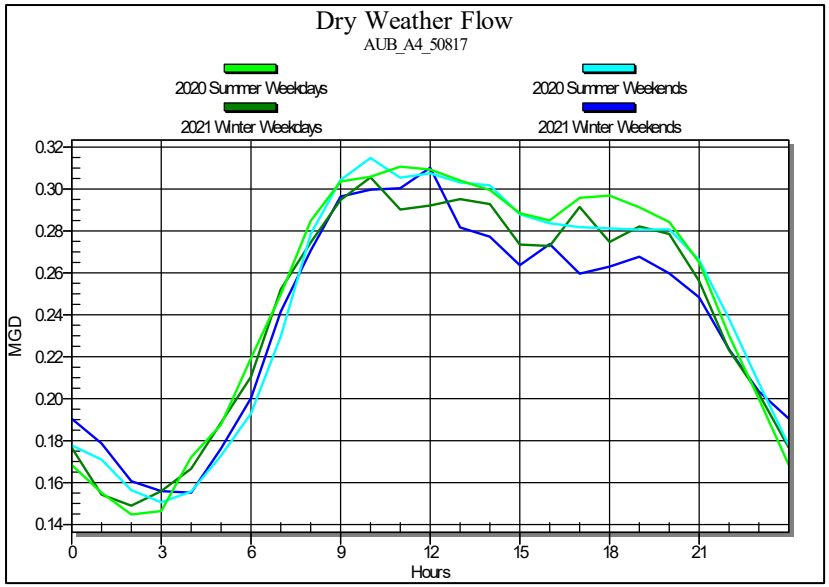

Storm Event - 1/2/2021 7:00:00 AM
AUB_A3_40834
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
Jan 2021
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Date

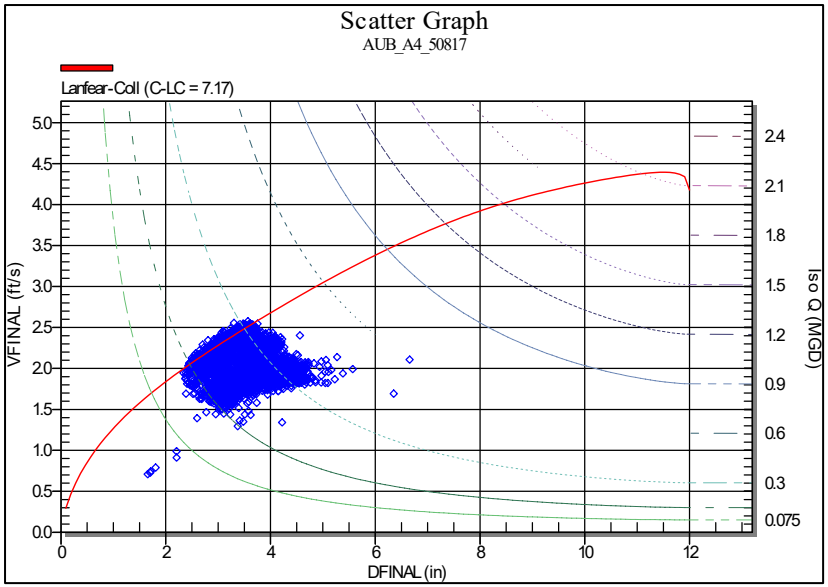

Storm Event - 1/11/2021 8:00:00 AM
AUB_A3_40834
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
Jan 2021
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Date

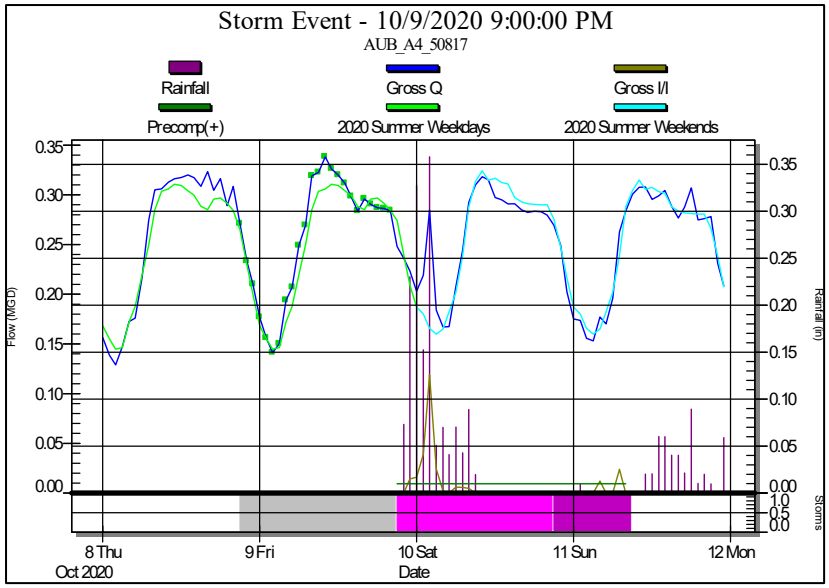

Storm Event - 2/14/2021 7:00:00 AM
AUB_A3_40834
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
Feb 2021
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Date

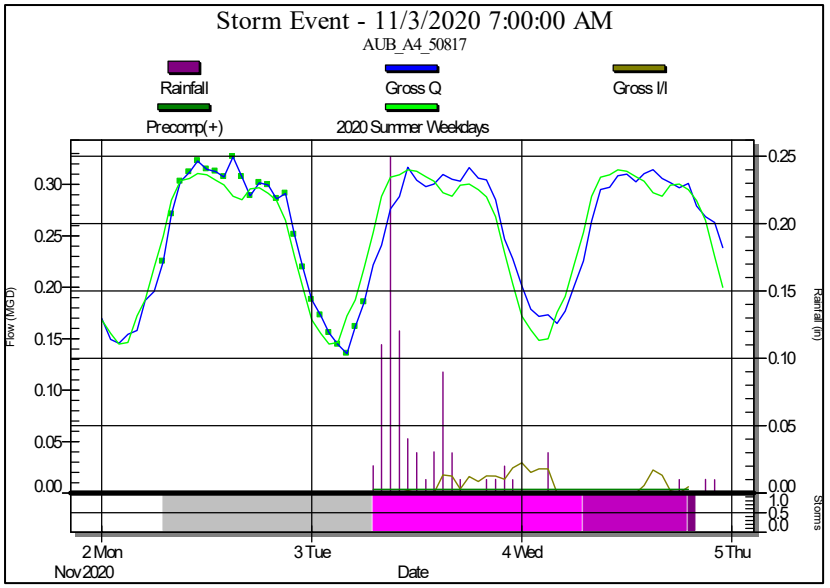

Storm Event - 2/21/2021 9:00:00 PM
AUB_A3_40834
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
Feb 2021
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Date

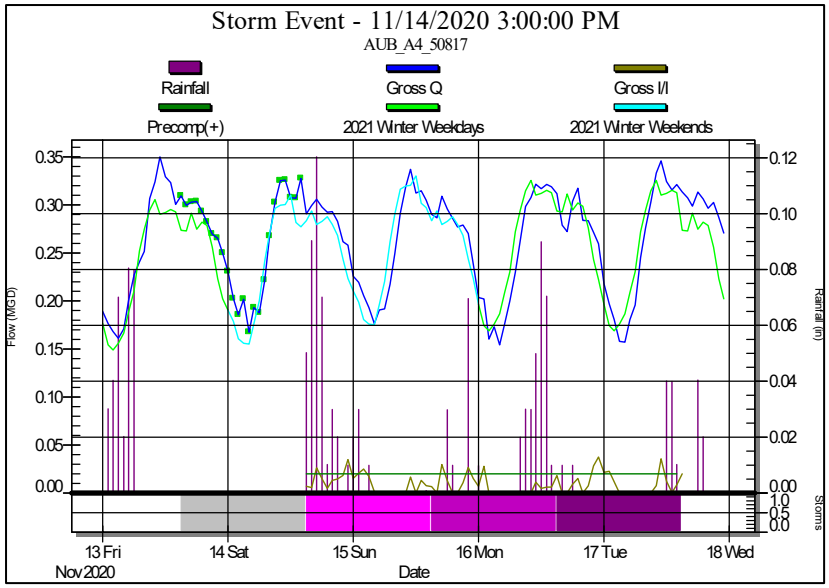

Pipe Flow
AUB_A4_50817
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
0.6
0.4
0.2
0.0
0.3
0.2
0.1
0.0
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

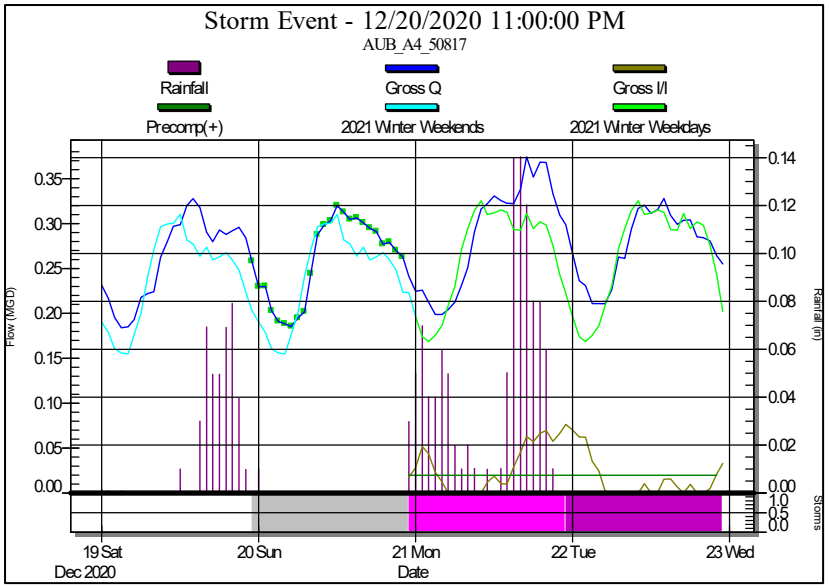

Dry Weather Flow
AUB_A4_50817
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
0.32
0.30
0.28
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0
3
6
9
12
15
18
21
Hours

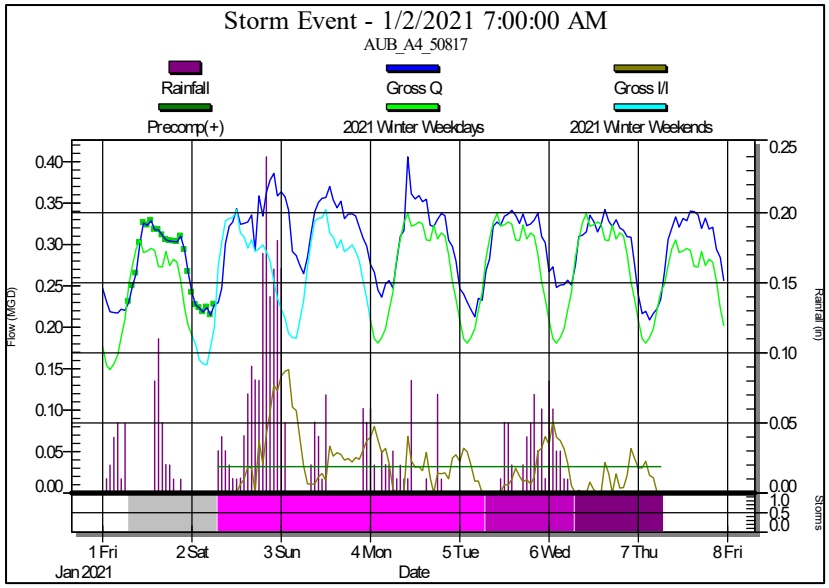

Scatter Graph
AUB_A4_50817
Lanfear-Coll (C-LC = 7.17)
VFINAL (ft/s)
Iso Q (MGD)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
2.4
2.1
1.8
1.5
1.2
0.9
0.6
0.3
0.075
0
2
4
6
8
10
12
DFINAL (in)

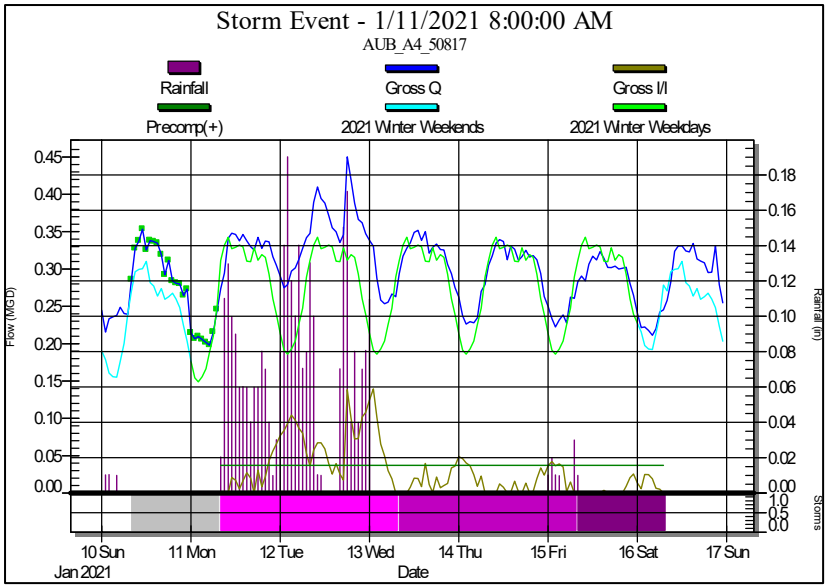

Storm Event - 10/9/2020 9:00:00 PM
AUB_A4_50817
Rainfall
Gross Q
Gross I/I
Precomp(+)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

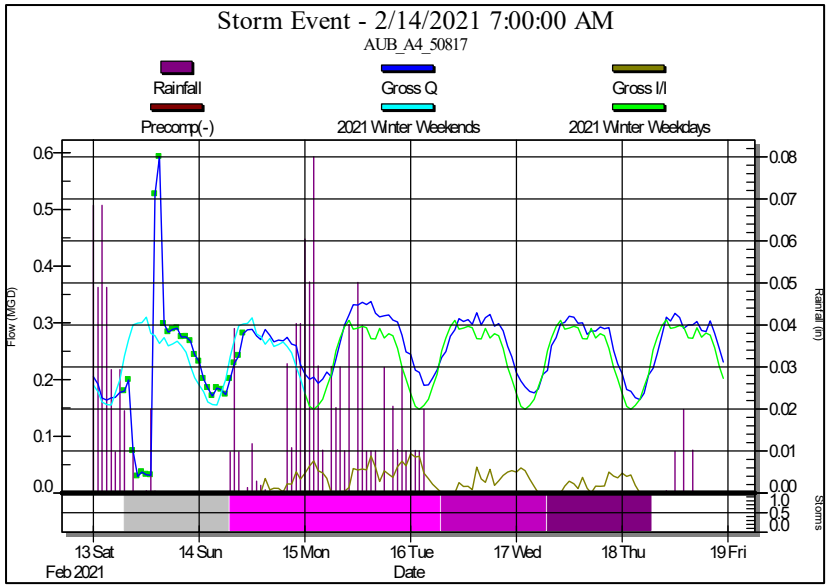

Storm Event - 11/3/2020 7:00:00 AM
AUB_A4_50817
Rainfall
Gross Q
Gross I/I
Precomp(+)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

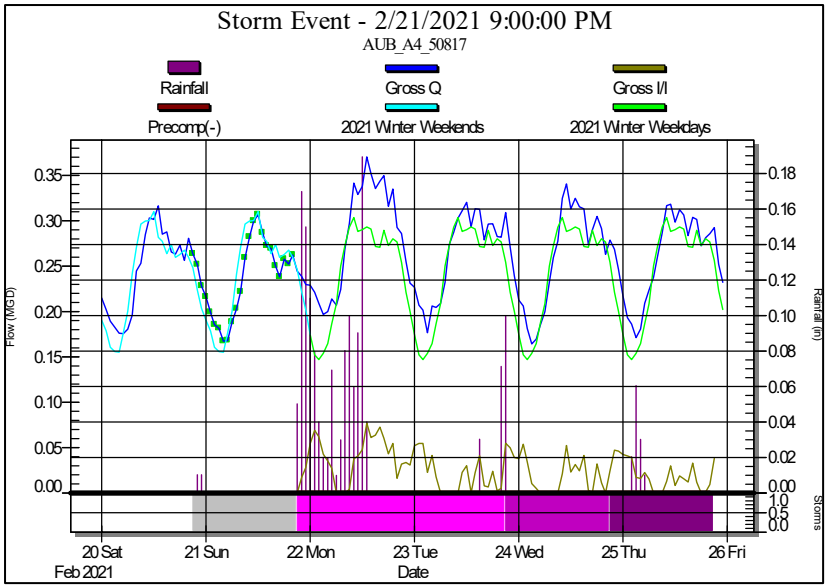

Storm Event - 11/14/2020 3:00:00 PM
AUB_A4_50817
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

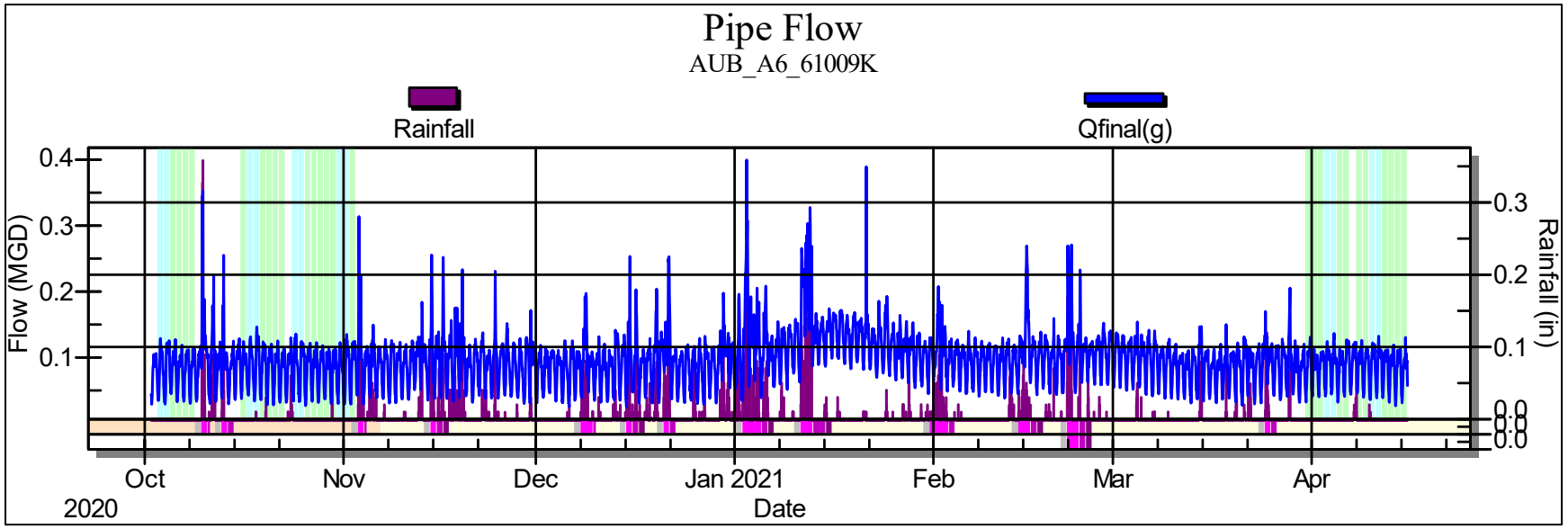

Storm Event - 12/20/2020 11:00:00 PM
AUB_A4_50817
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

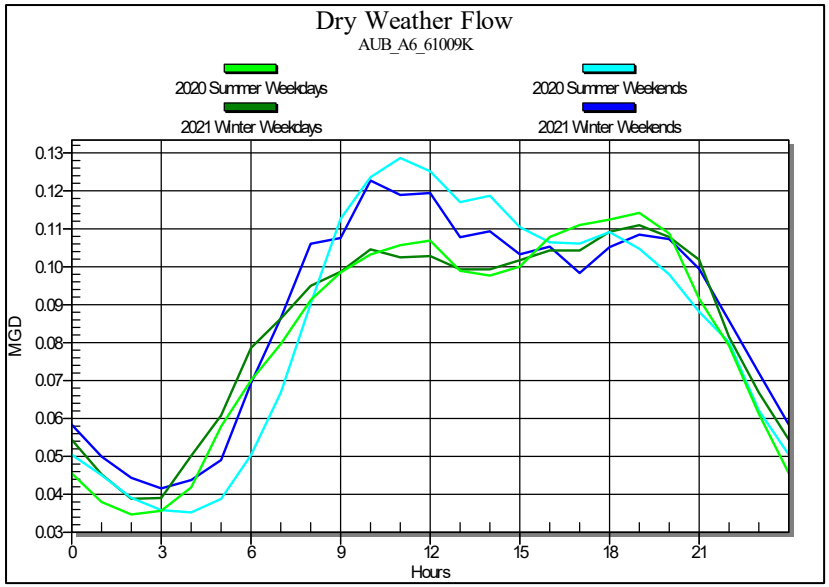

Storm Event - 1/2/2021 7:00:00 AM
AUB_A4_50817
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

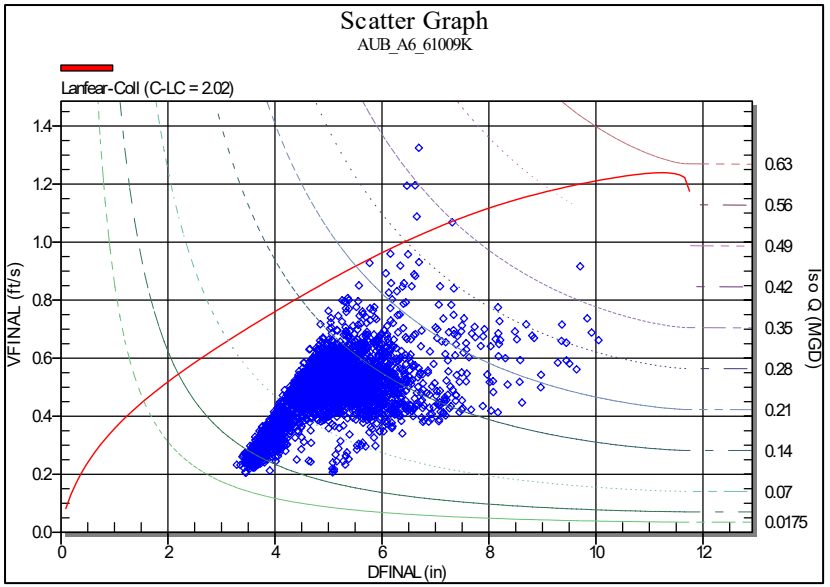

Storm Event - 1/11/2021 8:00:00 AM
AUB_A4_50817
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

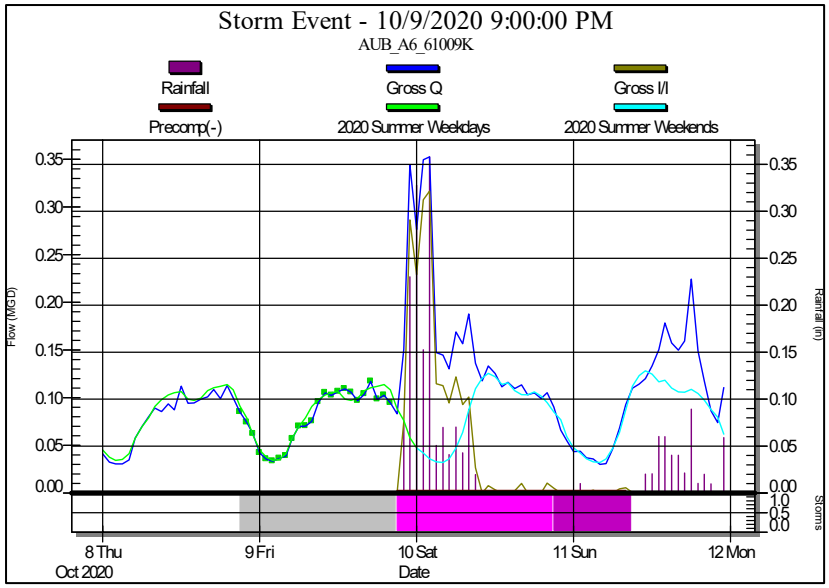

Storm Event - 2/14/2021 7:00:00 AM
AUB_A4_50817
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

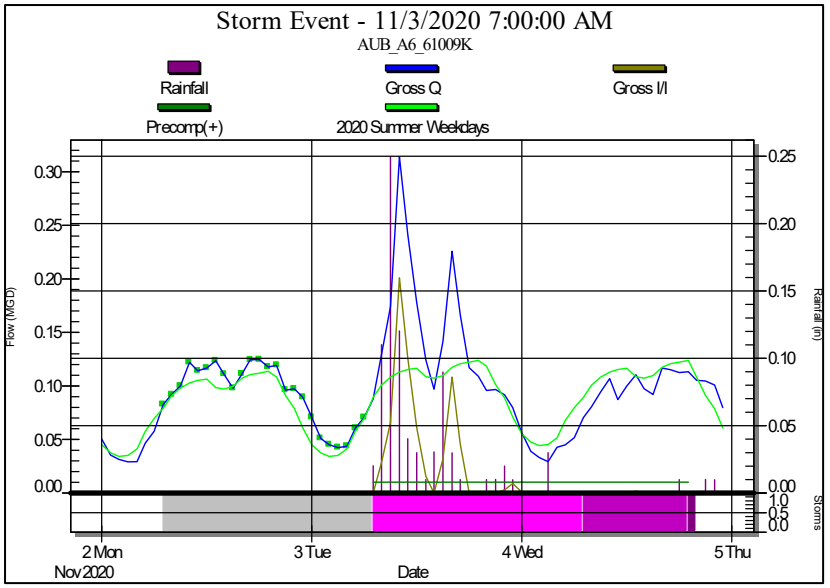

Storm Event - 2/21/2021 9:00:00 PM
AUB_A4_50817
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

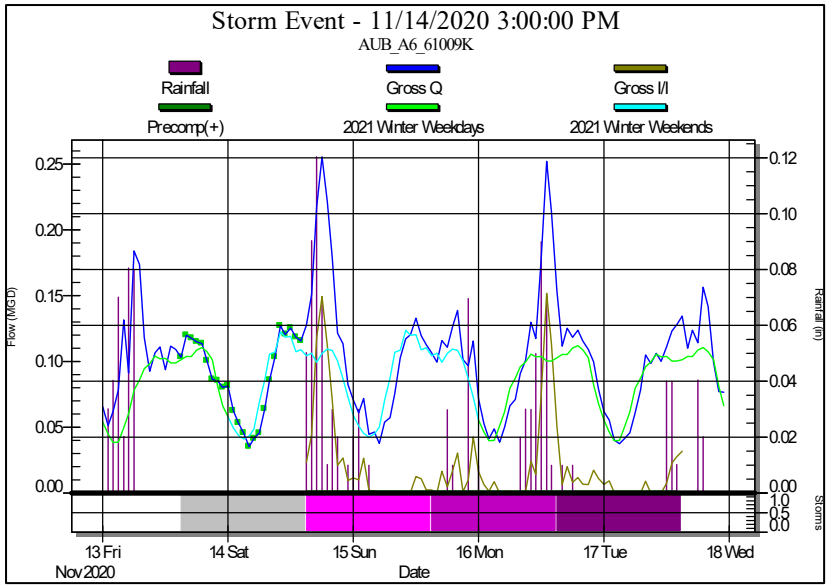

Pipe Flow
AUB_A6_61009K
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
0.4
0.3
0.2
0.1
0.0
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

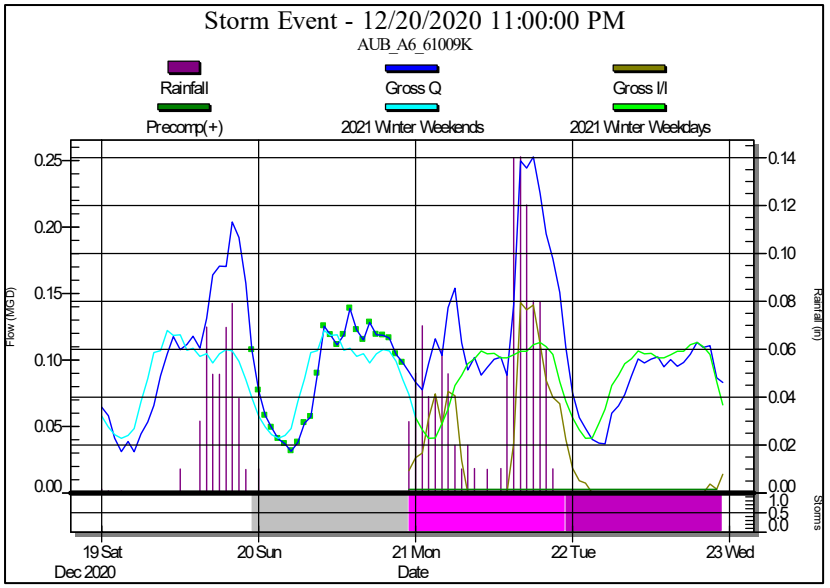

Dry Weather Flow
AUB_A6_61009K
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
Hours

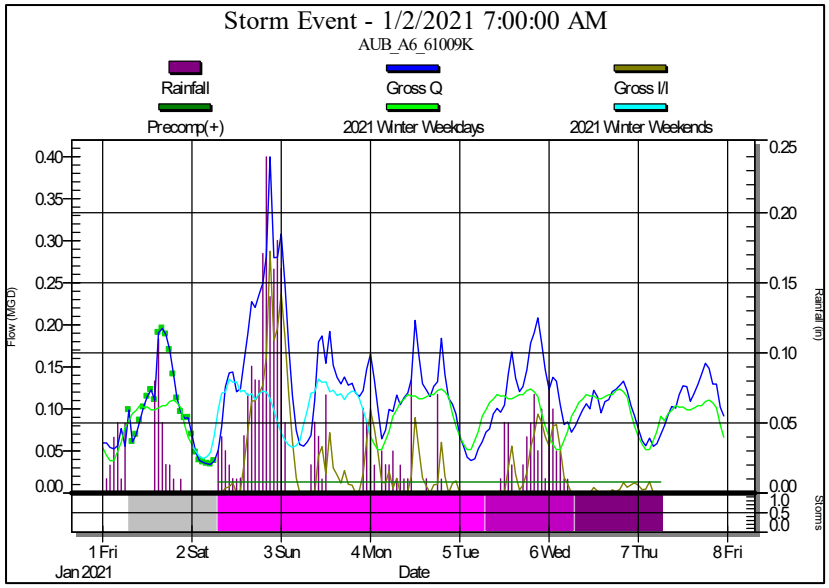

Scatter Graph
AUB_A6_61009K
Lanfear-Coll (C-LC = 2.02)
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)

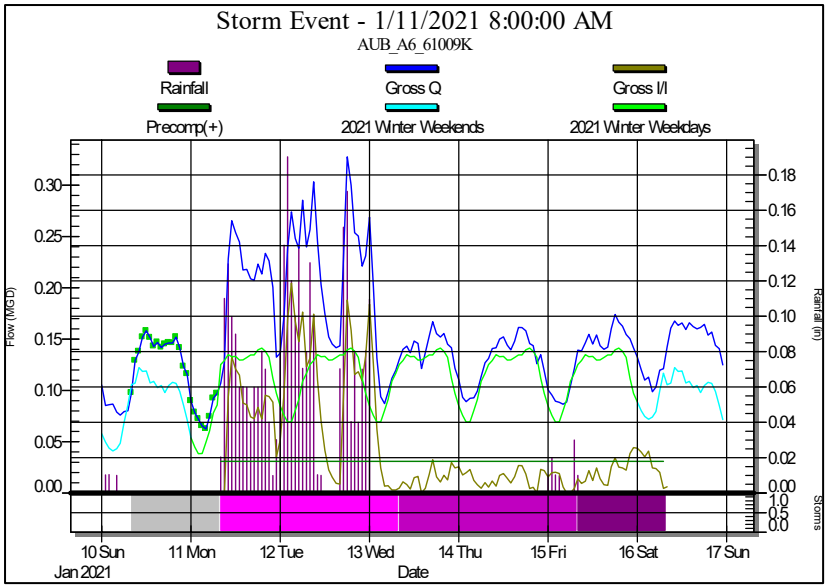

Storm Event - 10/9/2020 9:00:00 PM
AUB_A6_61009K
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

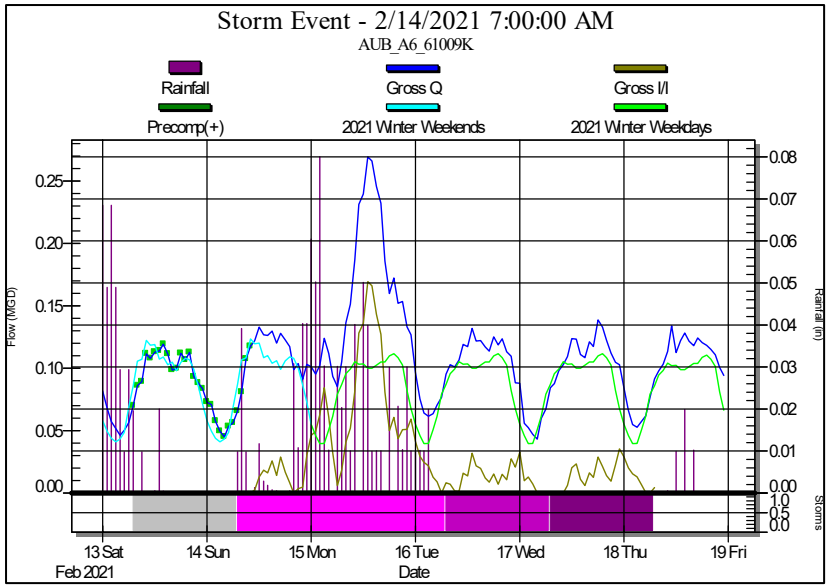

Storm Event - 11/3/2020 7:00:00 AM
AUB_A6_61009K
Rainfall
Gross Q
Gross I/I
Precomp(+)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

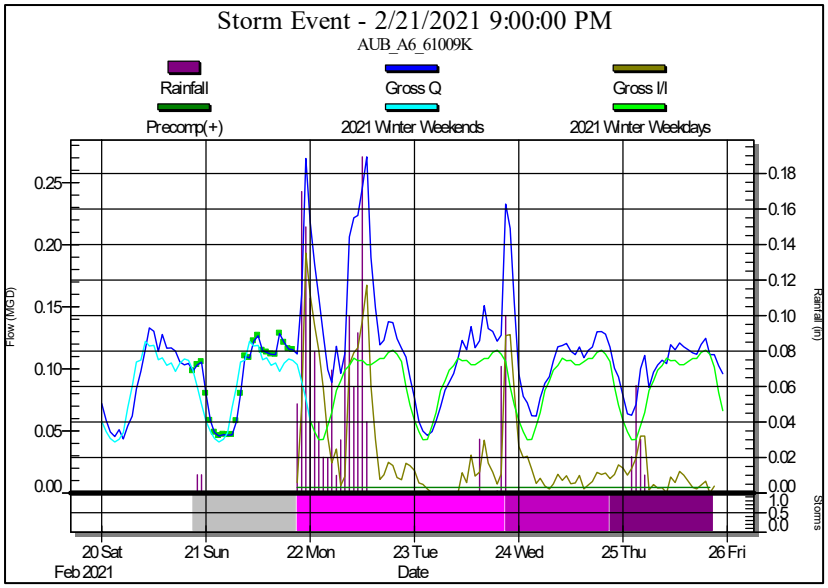

Storm Event - 11/14/2020 3:00:00 PM
AUB_A6_61009K
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

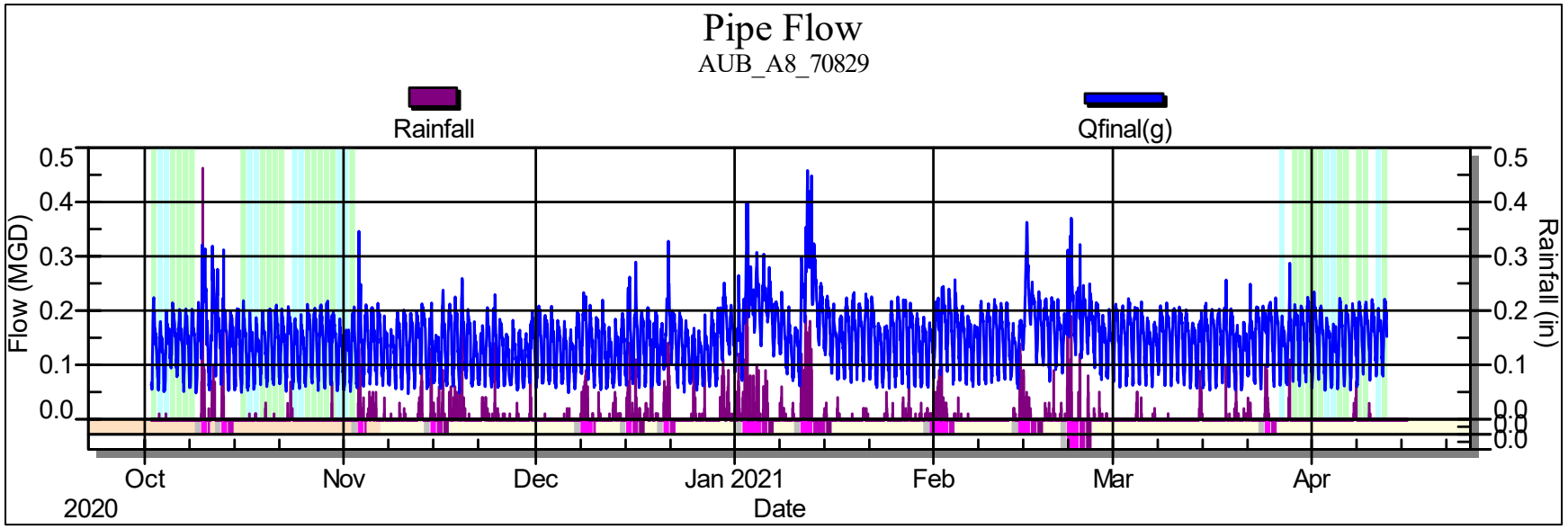

Storm Event - 12/20/2020 11:00:00 PM
AUB_A6_61009K
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

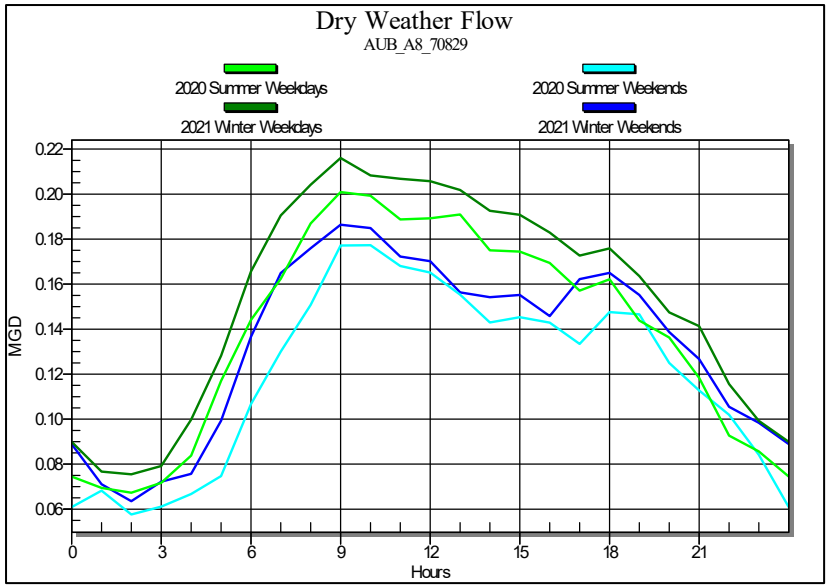

Storm Event - 1/2/2021 7:00:00 AM
AUB_A6_61009K
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

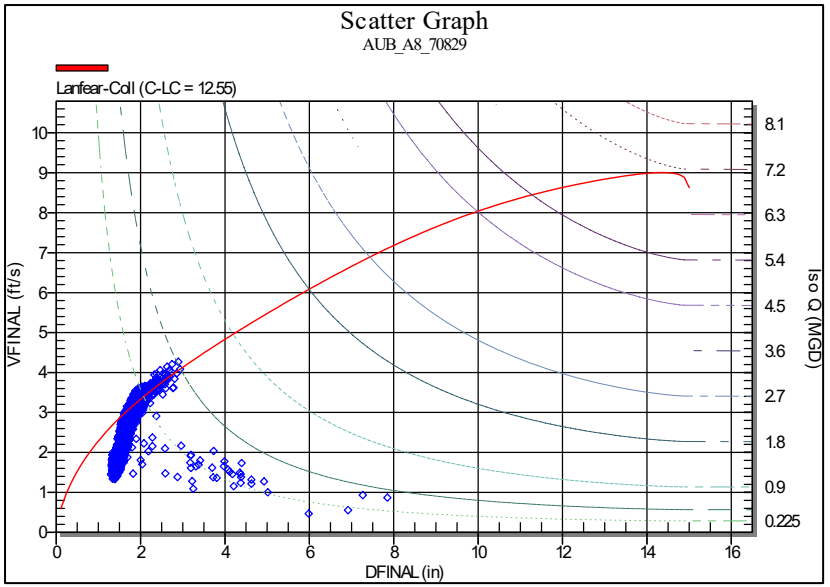

Storm Event - 1/11/2021 8:00:00 AM
AUB_A6_61009K
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

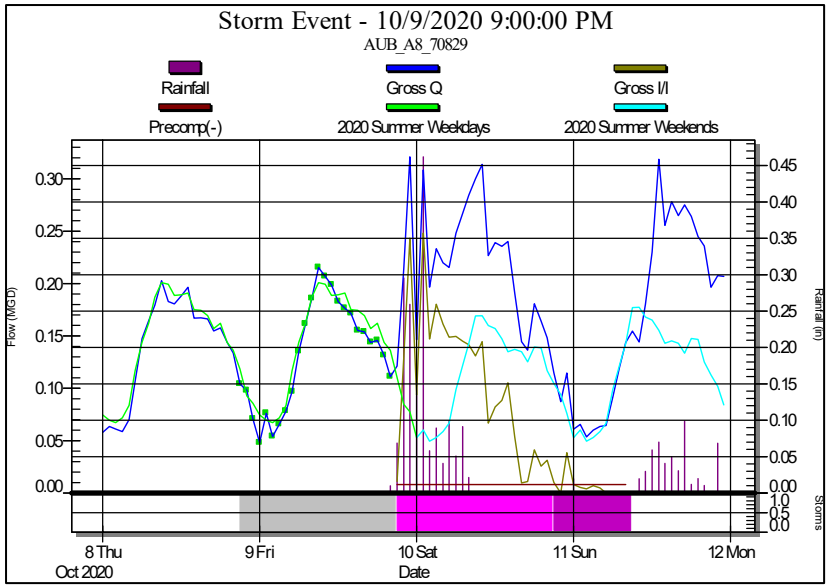

Storm Event - 2/14/2021 7:00:00 AM
AUB_A6_61009K
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

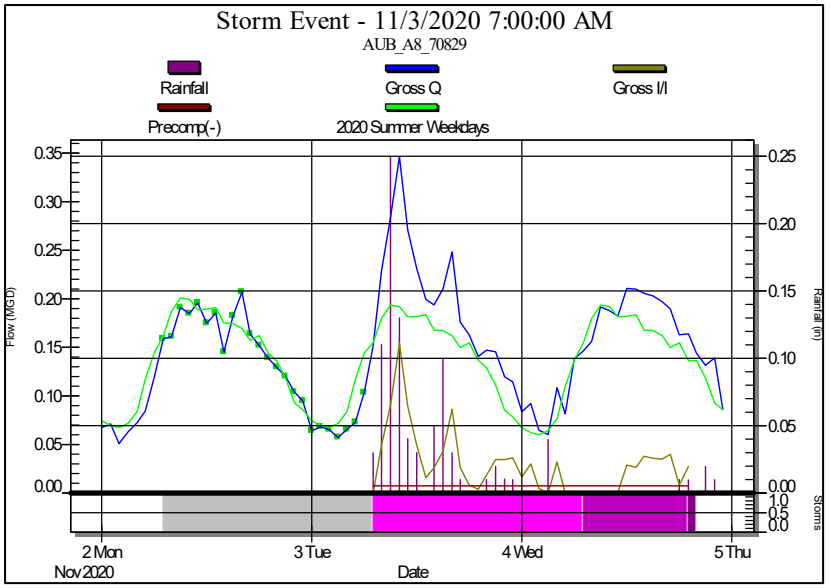

Storm Event - 2/21/2021 9:00:00 PM
AUB_A6_61009K
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

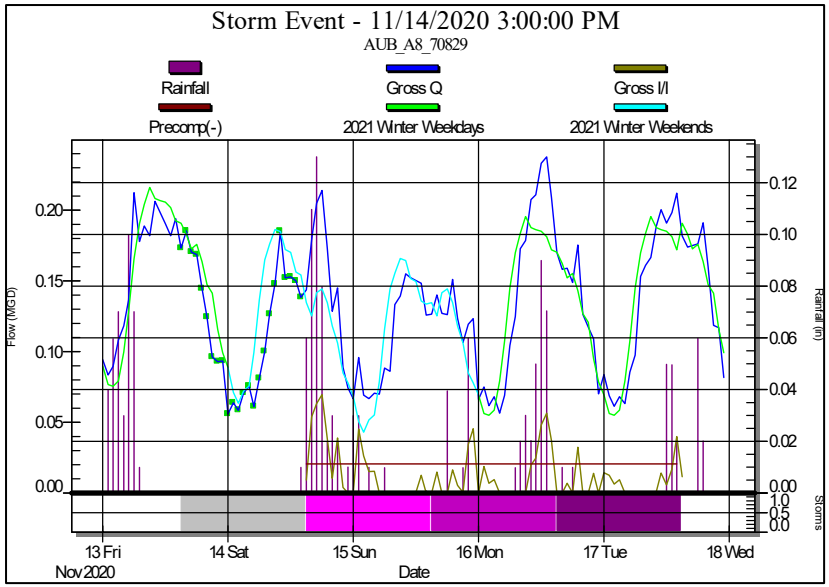

Pipe Flow
AUB_A8_70829
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
0.5
0.4
0.3
0.2
0.1
0.0
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

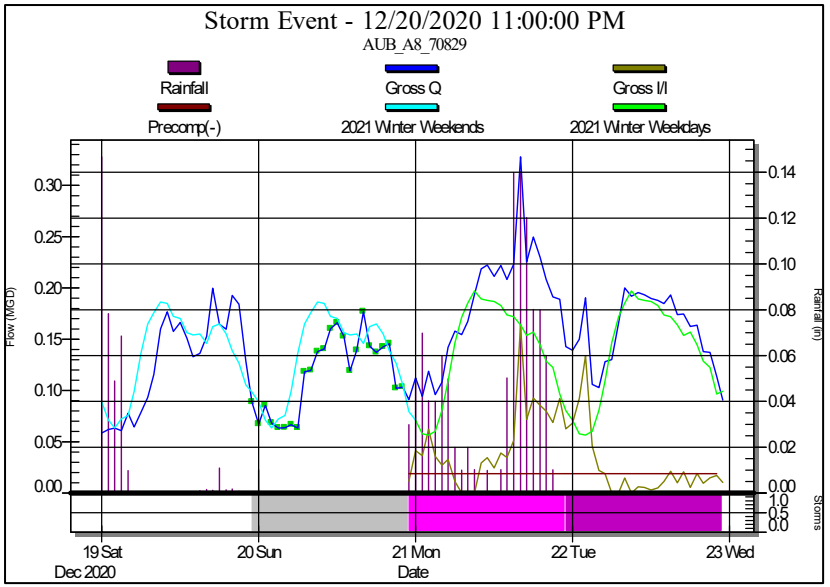

Dry Weather Flow
AUB_A8_70829
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0
3
6
9
12
15
18
21
Hours

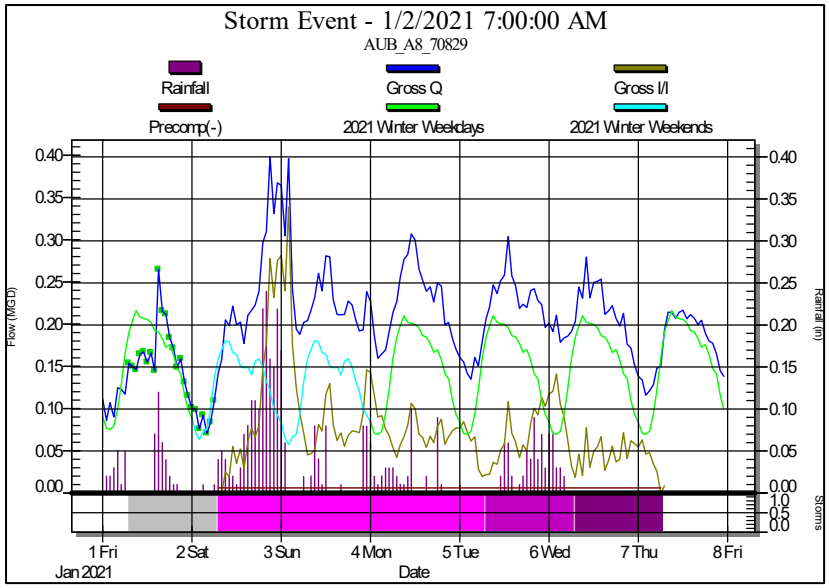

Scatter Graph
AUB_A8_70829
Lanfear-Coll (C-LC = 12.55)
VFINAL (ft/s)
Iso Q (MGD)
10
9
8
7
6
5
4
3
2
1
0
8.1
7.2
6.3
5.4
4.5
3.6
2.7
1.8
0.9
0.225
0
2
4
6
8
10
12
14
16
DFINAL (in)

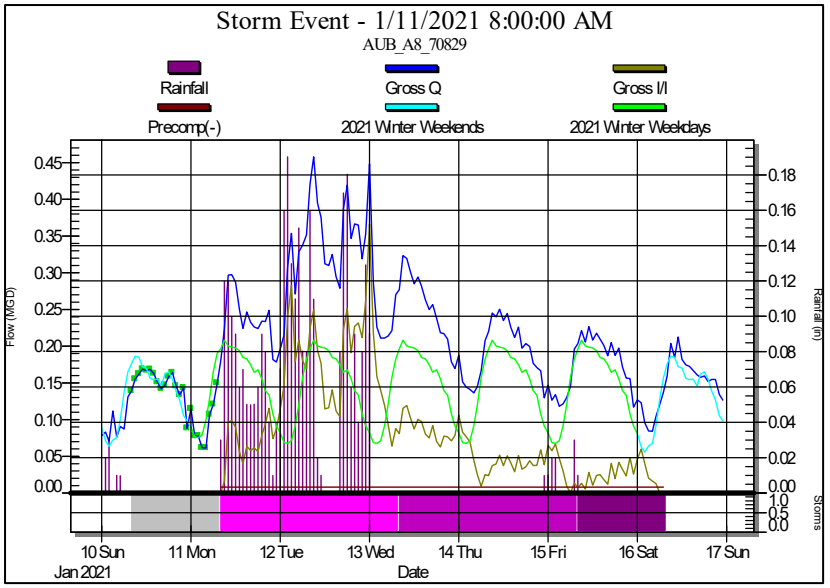

Storm Event - 10/9/2020 9:00:00 PM
AUB_A8_70829
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

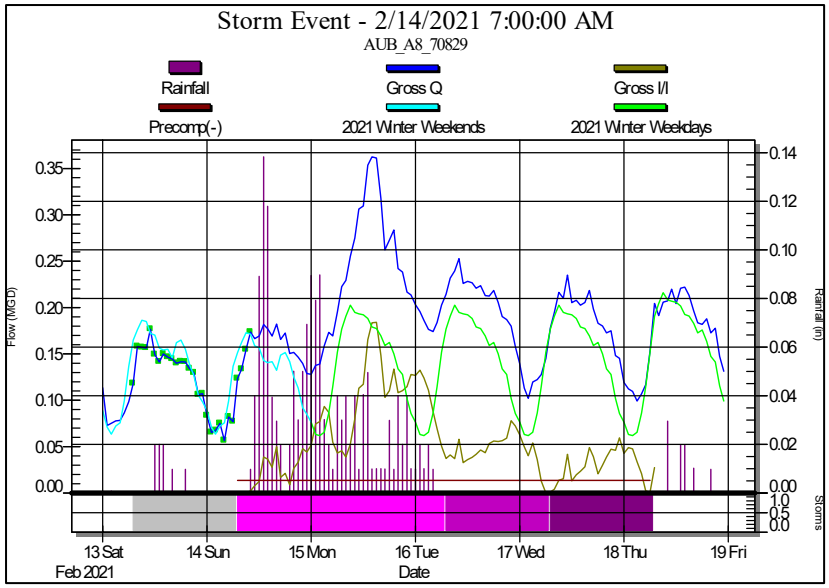

Storm Event - 11/3/2020 7:00:00 AM
AUB_A8_70829
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

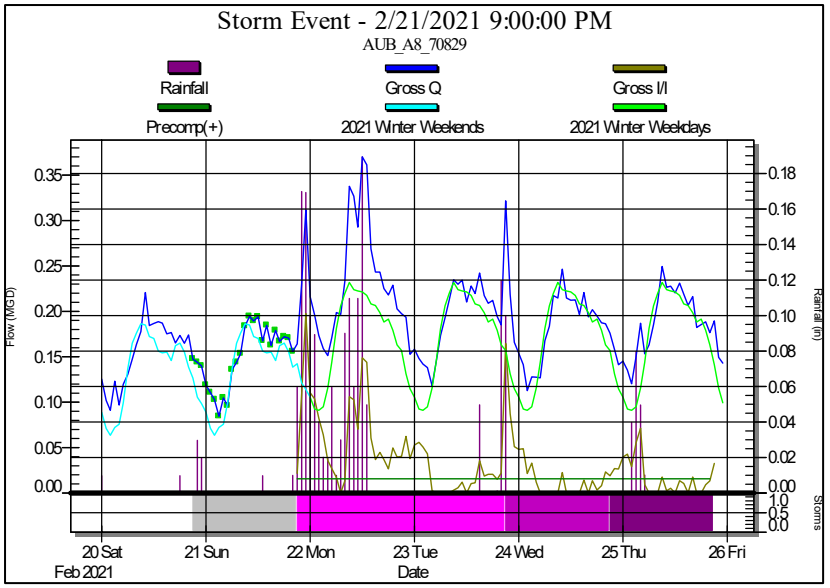

Storm Event - 11/14/2020 3:00:00 PM
AUB_A8_70829
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

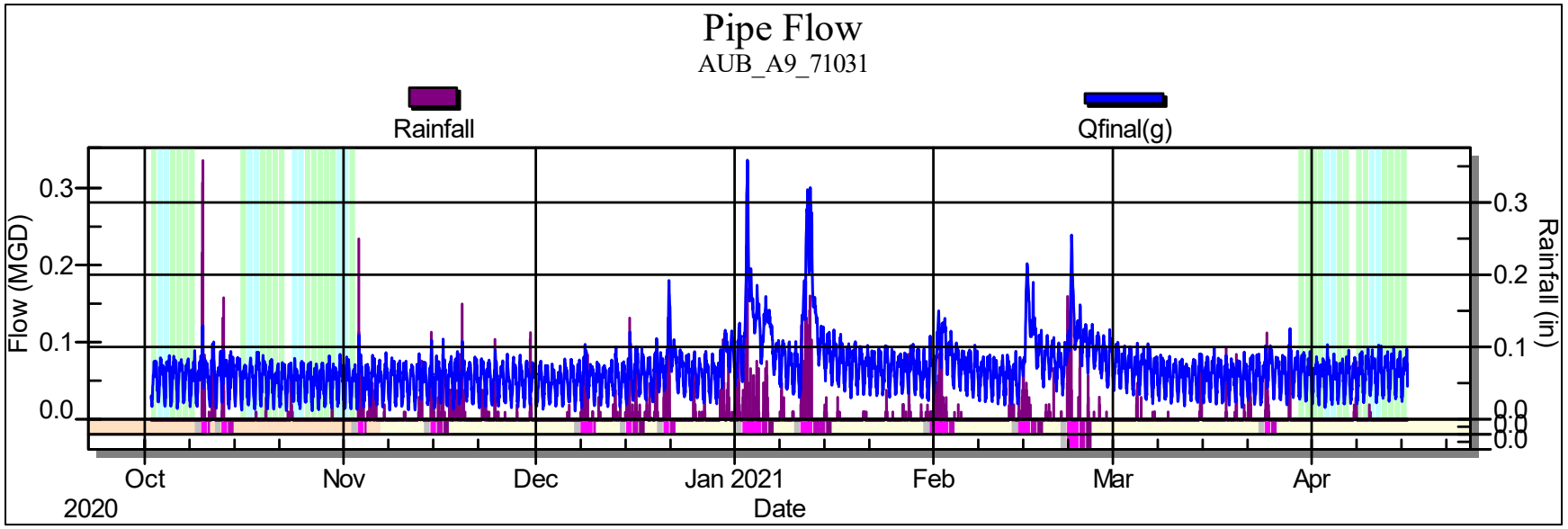

Storm Event - 12/20/2020 11:00:00 PM
AUB_A8_70829
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

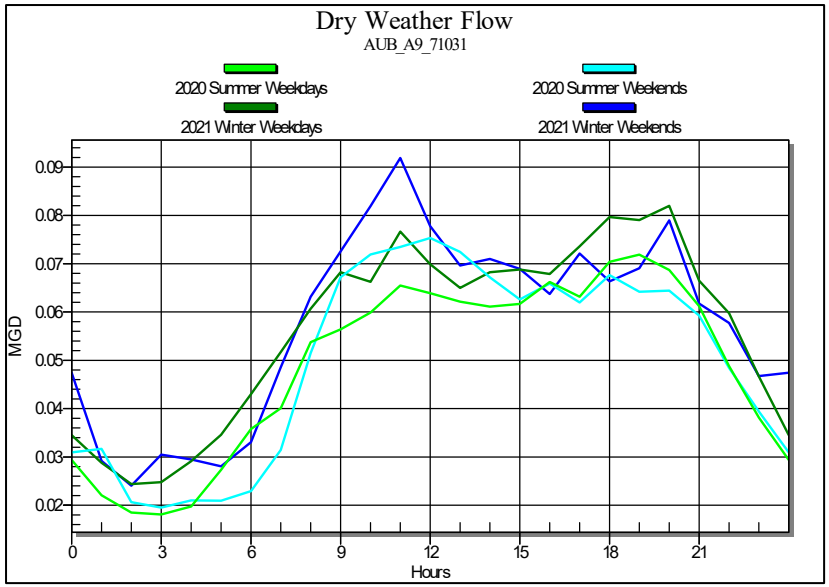

Storm Event - 1/2/2021 7:00:00 AM
AUB_A8_70829
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

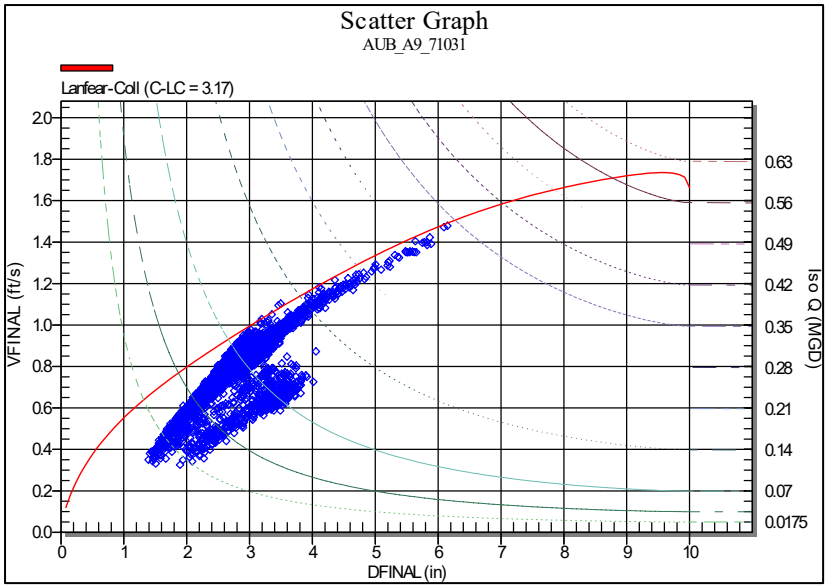

Storm Event - 1/11/2021 8:00:00 AM
AUB_A8_70829
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

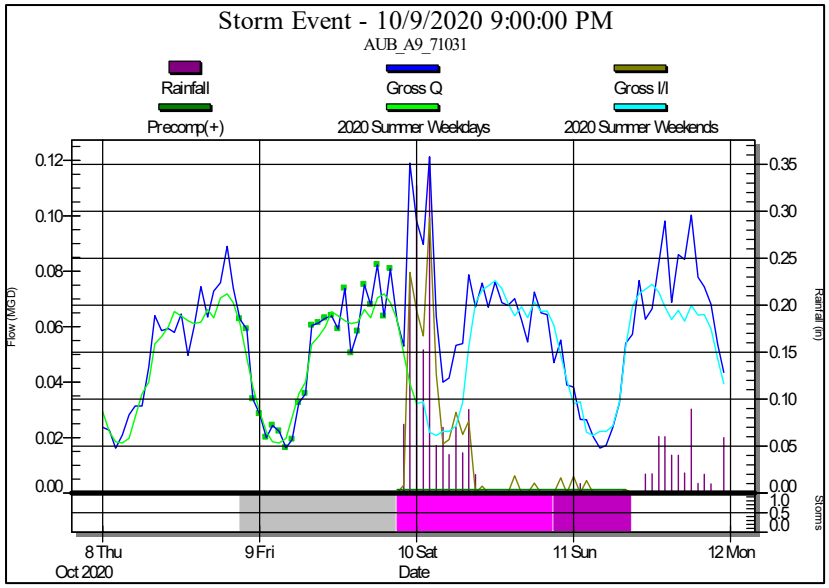

Storm Event - 2/14/2021 7:00:00 AM
AUB_A8_70829
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

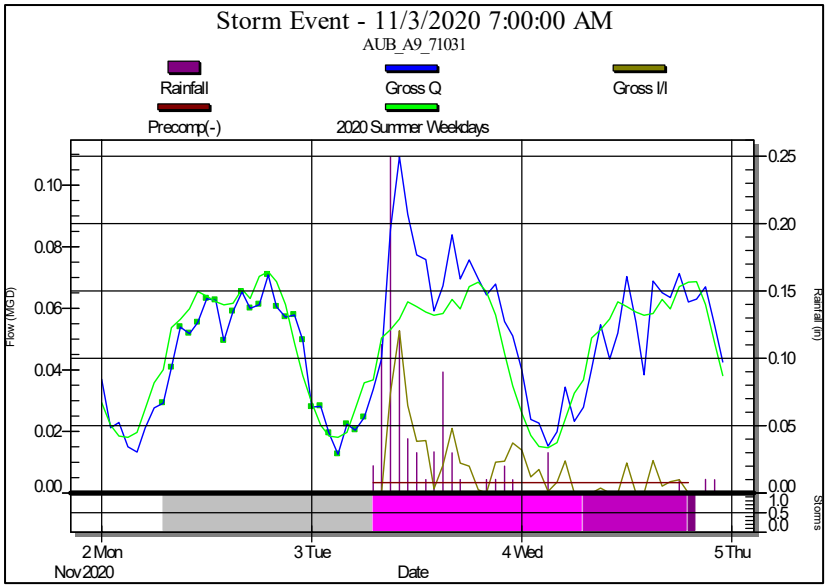

Storm Event - 2/21/2021 9:00:00 PM
AUB_A8_70829
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

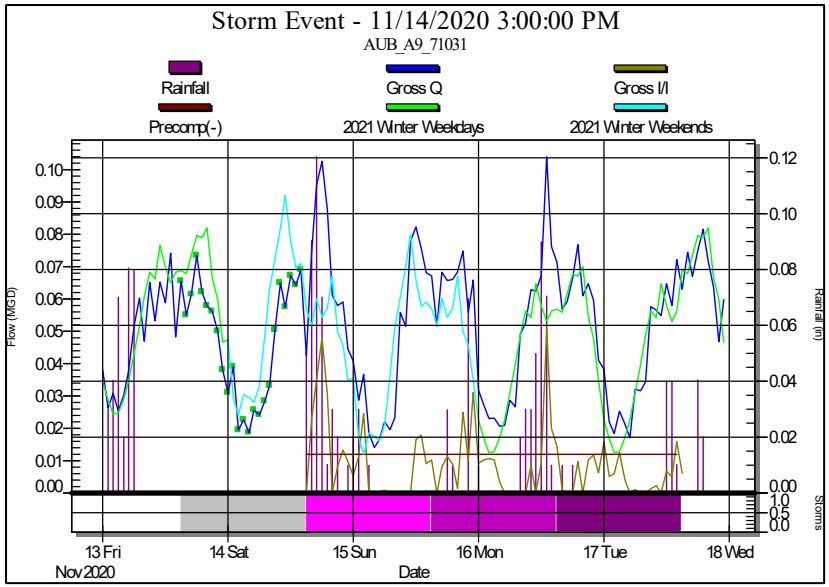

Pipe Flow
AUB_A9_71031
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
0.3
0.2
0.1
0.0
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

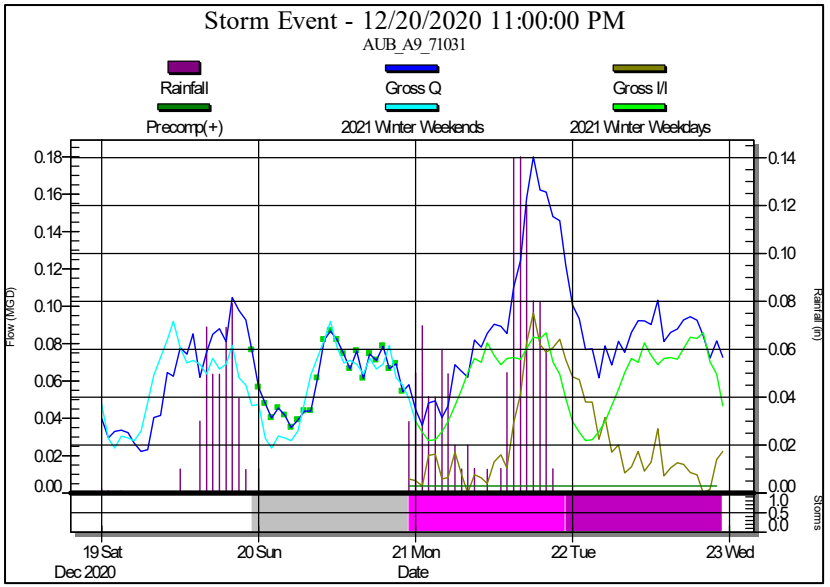

Dry Weather Flow
AUB_A9_71031
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
Hours

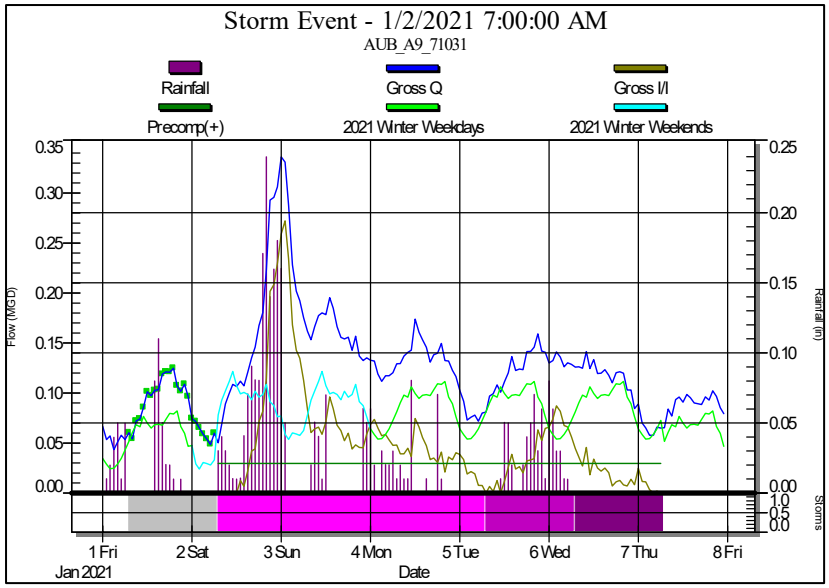

Scatter Graph
AUB_A9_71031
Lanfear-Coll (C-LC = 3.17)
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)

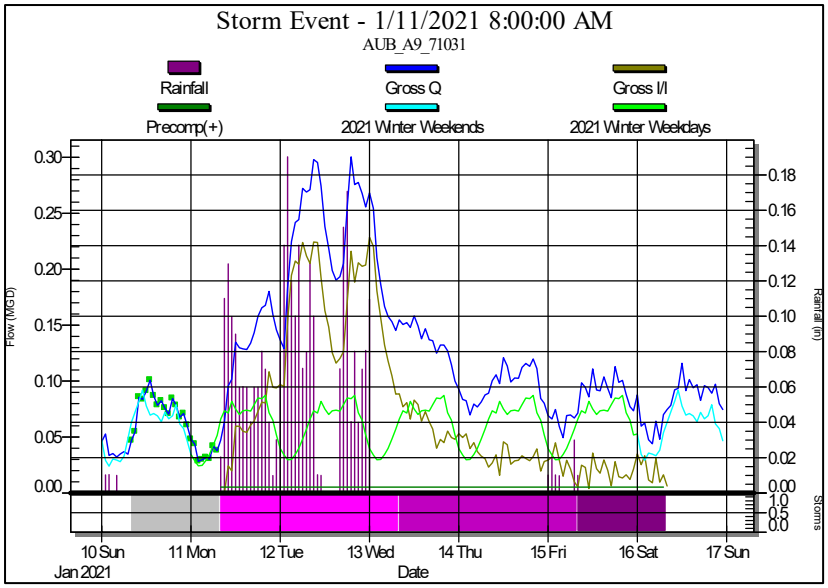

Storm Event - 10/9/2020 9:00:00 PM
AUB_A9_71031
Rainfall
Gross Q
Gross I/I
Precomp(+)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

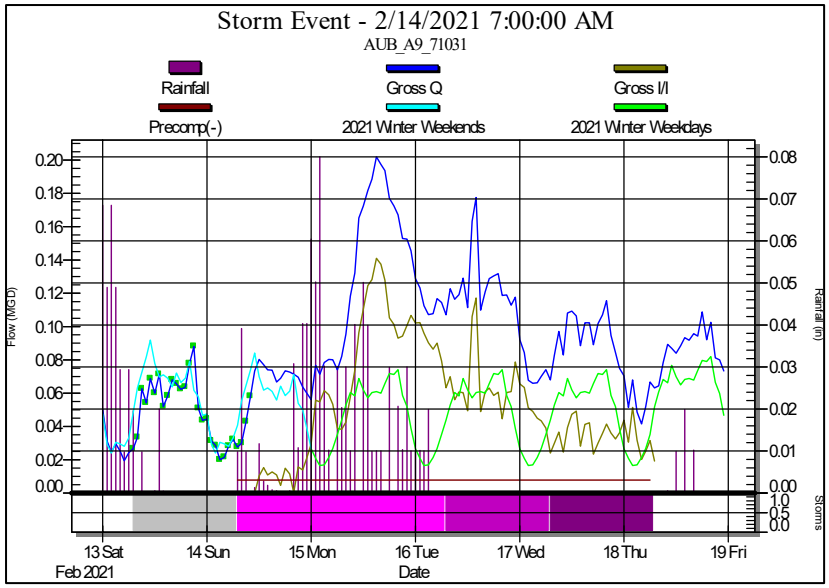

Storm Event - 11/3/2020 7:00:00 AM
AUB_A9_71031
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

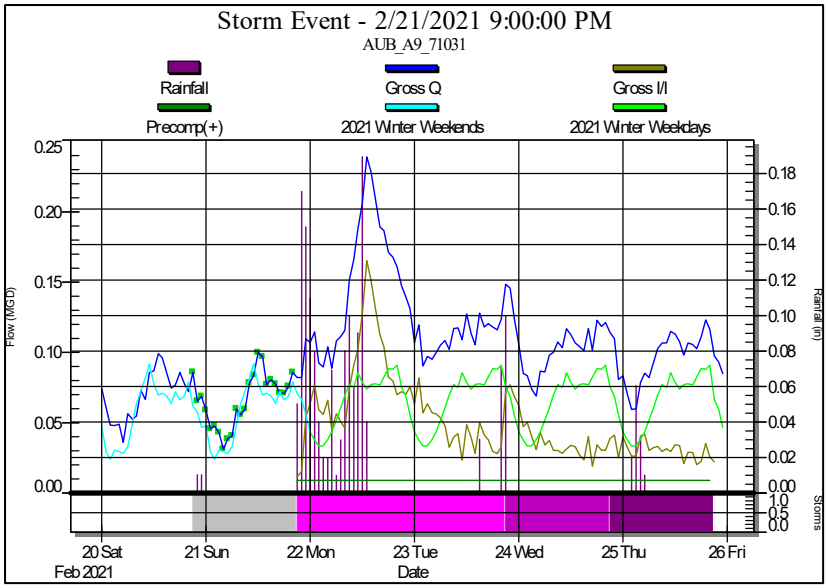

Storm Event - 11/14/2020 3:00:00 PM
AUB_A9_71031
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

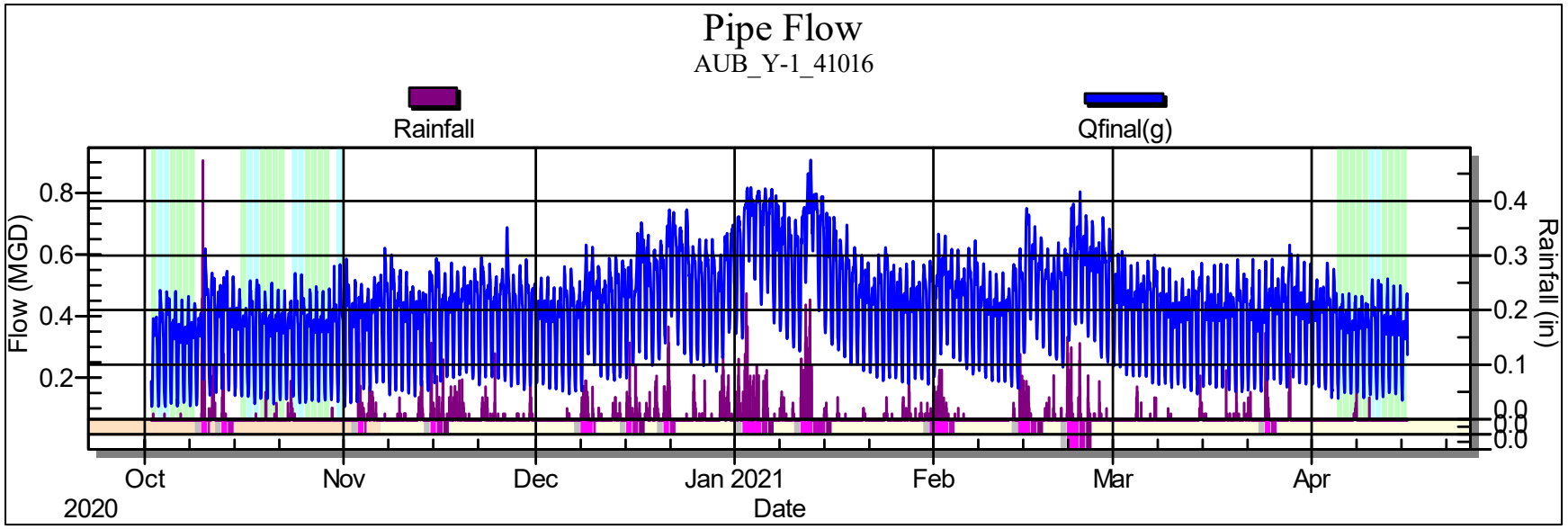

Storm Event - 12/20/2020 11:00:00 PM
AUB_A9_71031
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

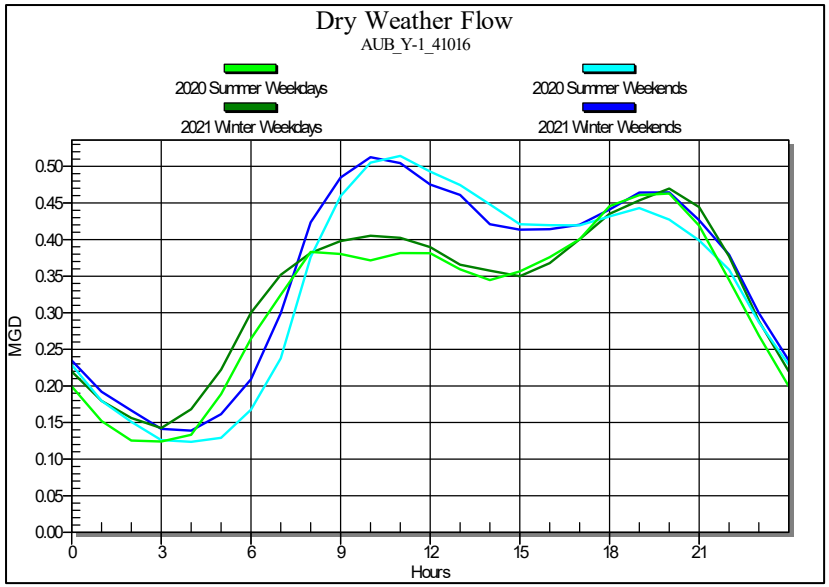

Storm Event - 1/2/2021 7:00:00 AM
AUB_A9_71031
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

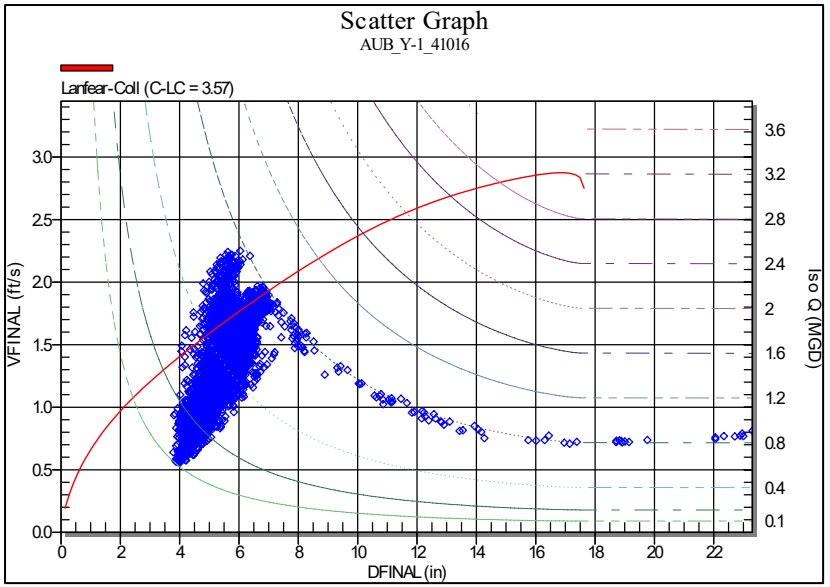

Storm Event - 1/11/2021 8:00:00 AM
AUB_A9_71031
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

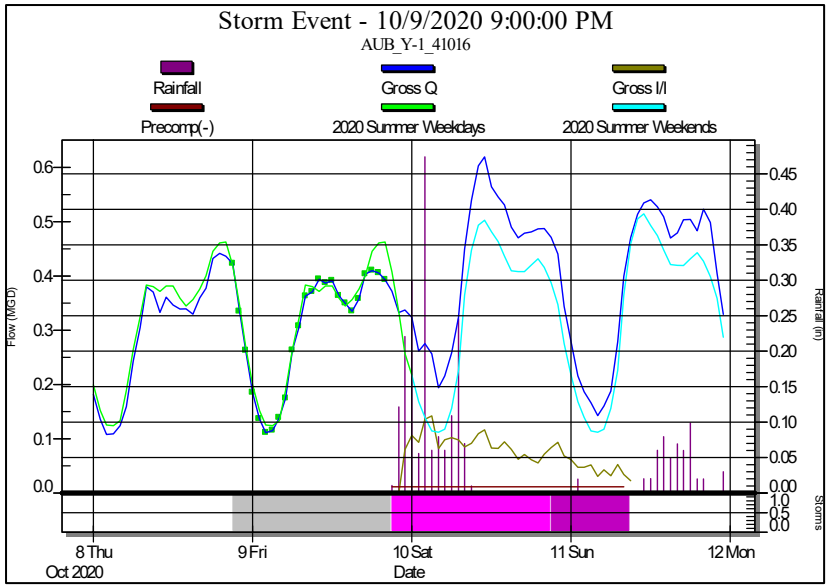

Storm Event - 2/14/2021 7:00:00 AM
AUB_A9_71031
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

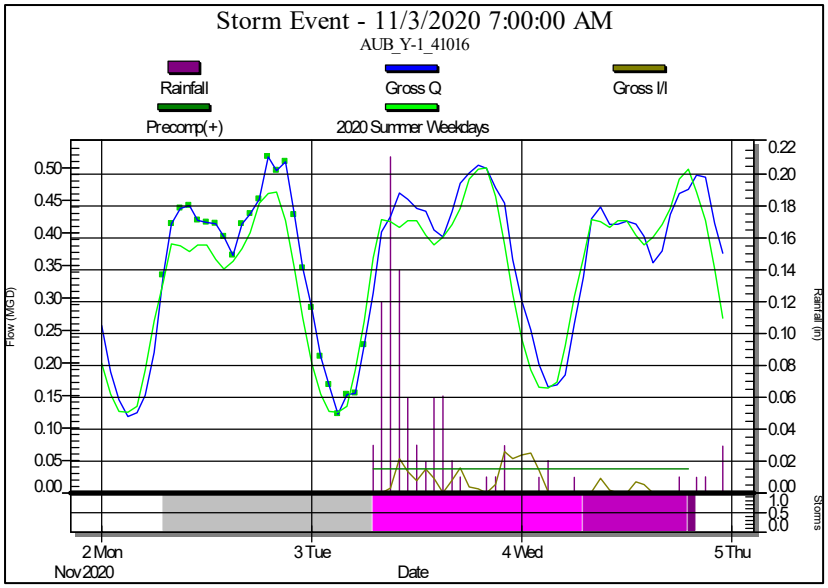

Storm Event - 2/21/2021 9:00:00 PM
AUB_A9_71031
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

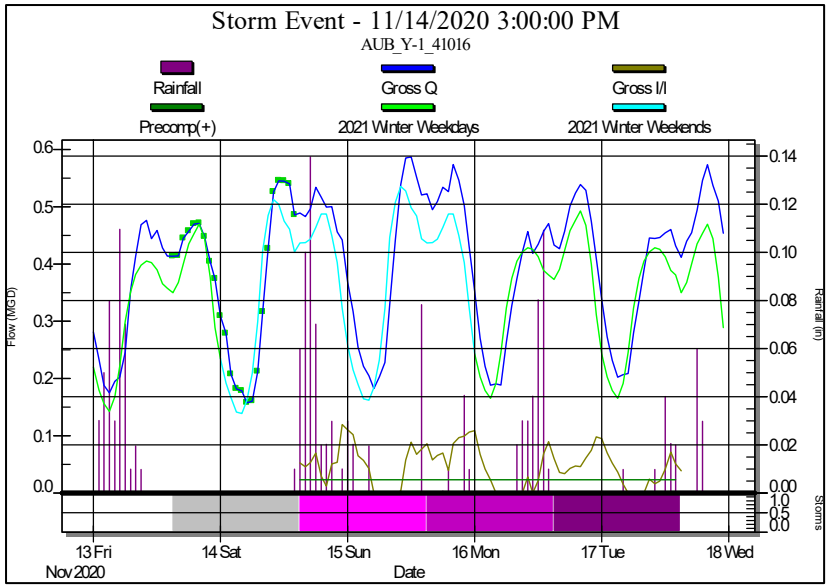

Pipe Flow
AUB_Y-1_41016
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
0.8
0.6
0.4
0.2
0.4
0.3
0.2
0.1
0.0
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

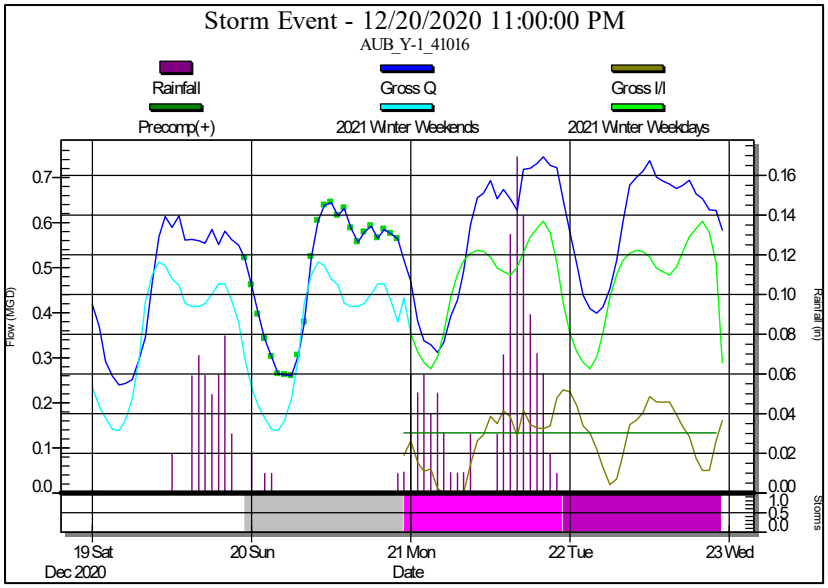

Dry Weather Flow
AUB_Y-1_41016
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0
3
6
9
12
15
18
21
Hours

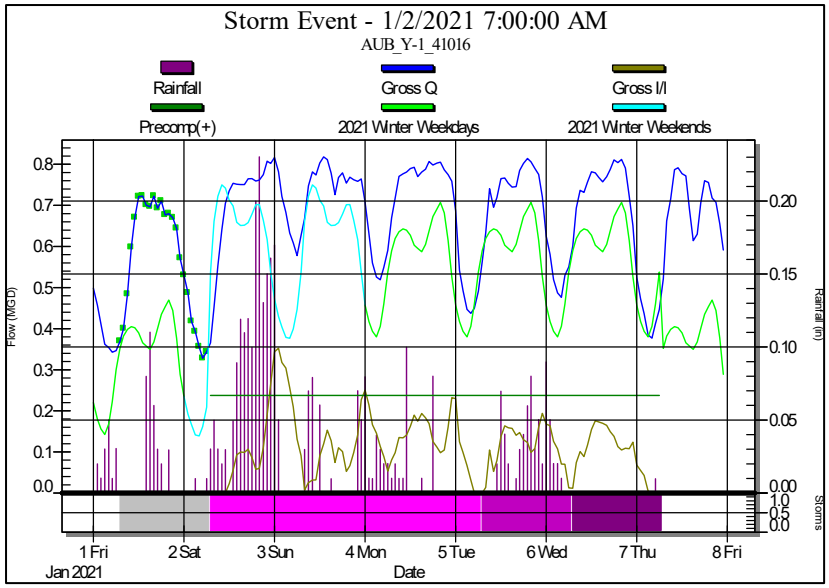

Scatter Graph
AUB_Y-1_41016
Lanfear-Coll (C-LC = 3.57)
VFINAL (ft/s)
Iso Q (MGD)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
3.6
3.2
2.8
2.4
2
1.6
1.2
0.8
0.4
0.1
0
2
4
6
8
10
12
14
16
18
20
22
DFINAL (in)

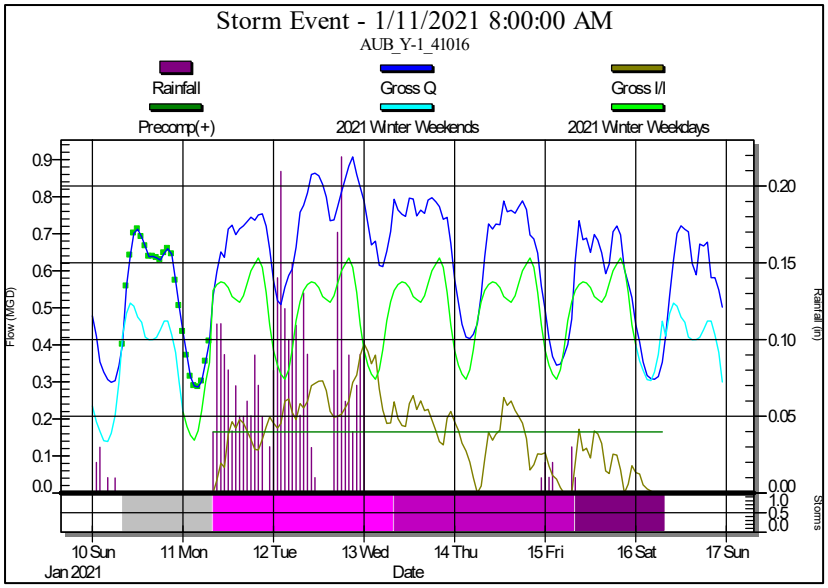

Storm Event - 10/9/2020 9:00:00 PM
AUB_Y-1_41016
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

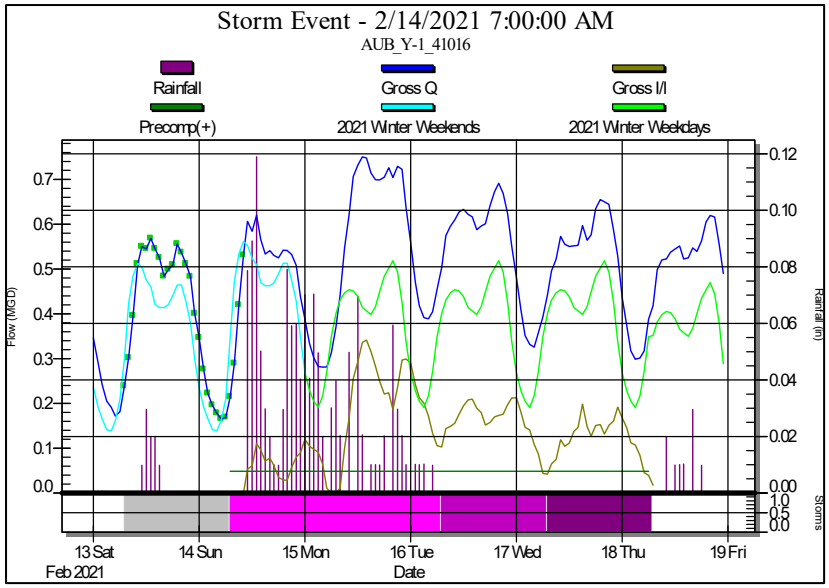

Storm Event - 11/3/2020 7:00:00 AM
AUB_Y-1_41016
Rainfall
Gross Q
Gross I/I
Precomp(+)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

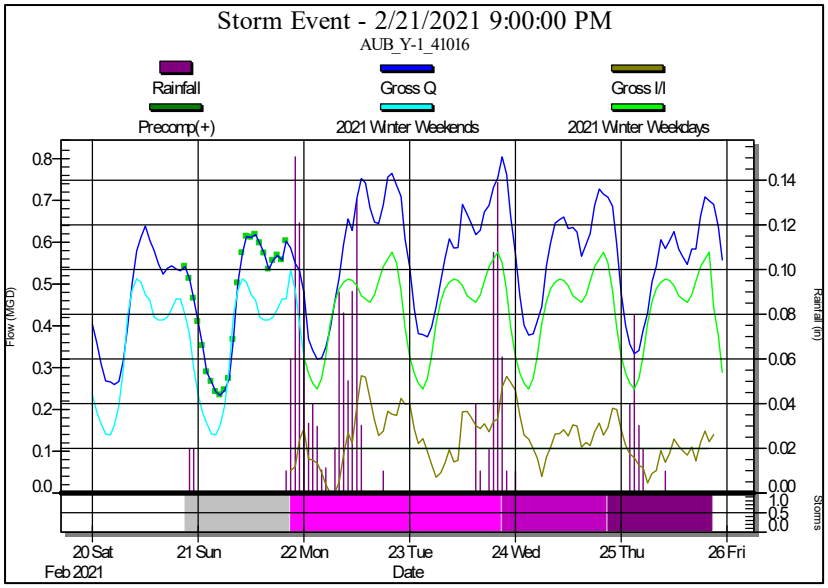

Storm Event - 11/14/2020 3:00:00 PM
AUB_Y-1_41016
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

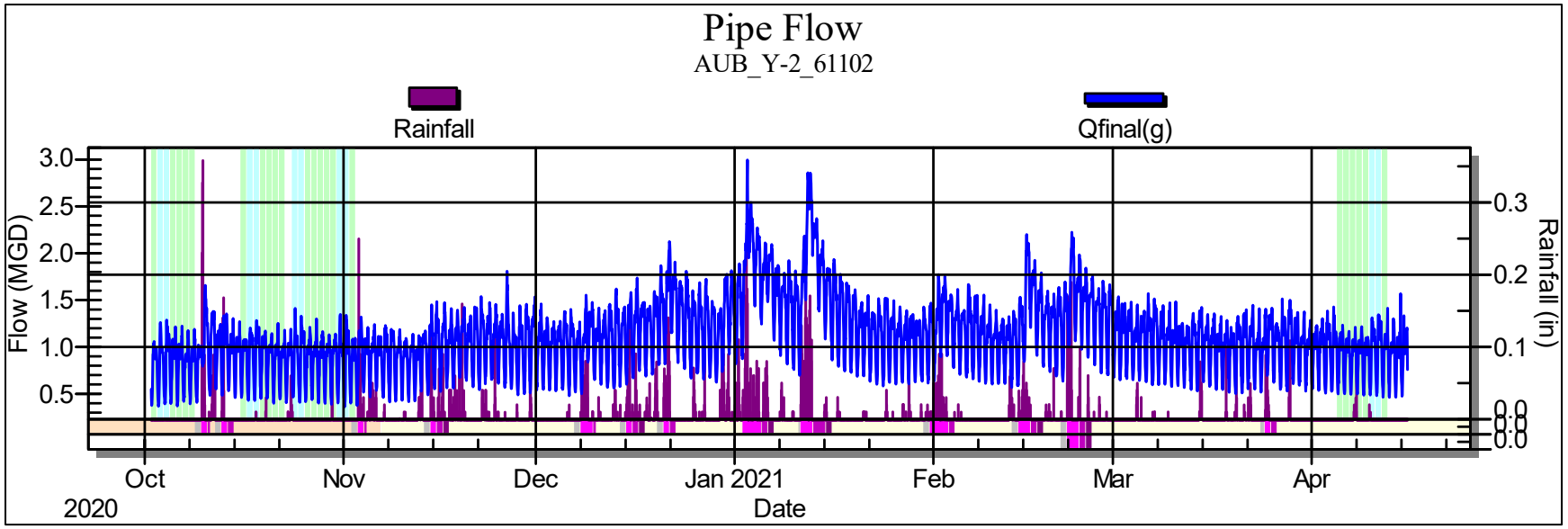

Storm Event - 12/20/2020 11:00:00 PM
AUB_Y-1_41016
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

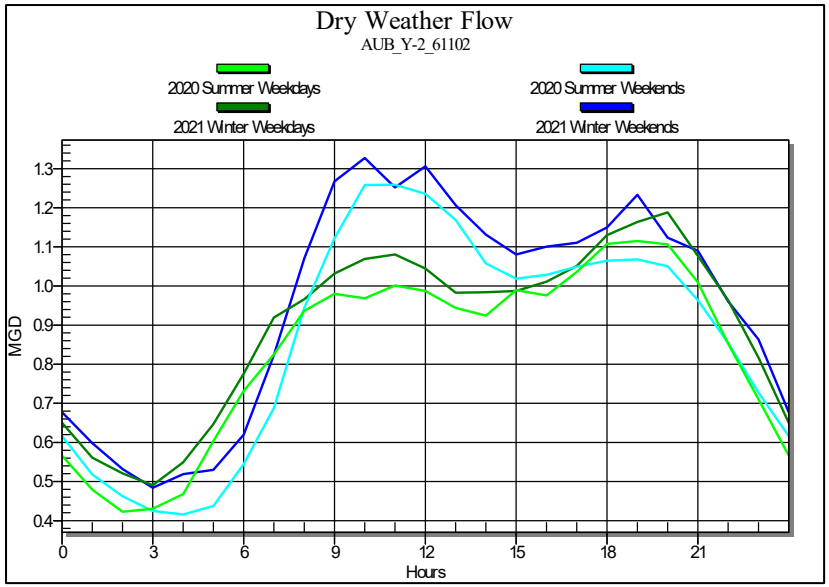

Storm Event - 1/2/2021 7:00:00 AM
AUB_Y-1_41016
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
Jan 2021
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Date

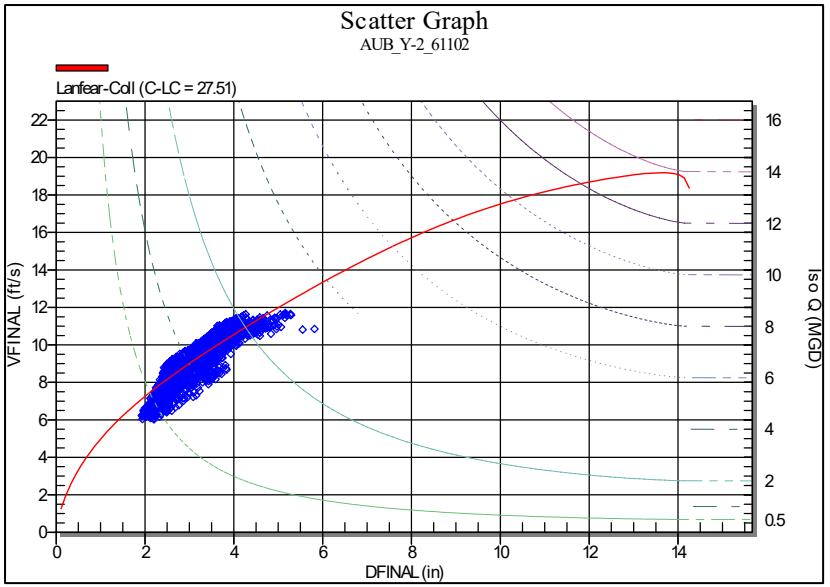

Storm Event - 1/11/2021 8:00:00 AM
AUB_Y-1_41016
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
Jan 2021
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Date

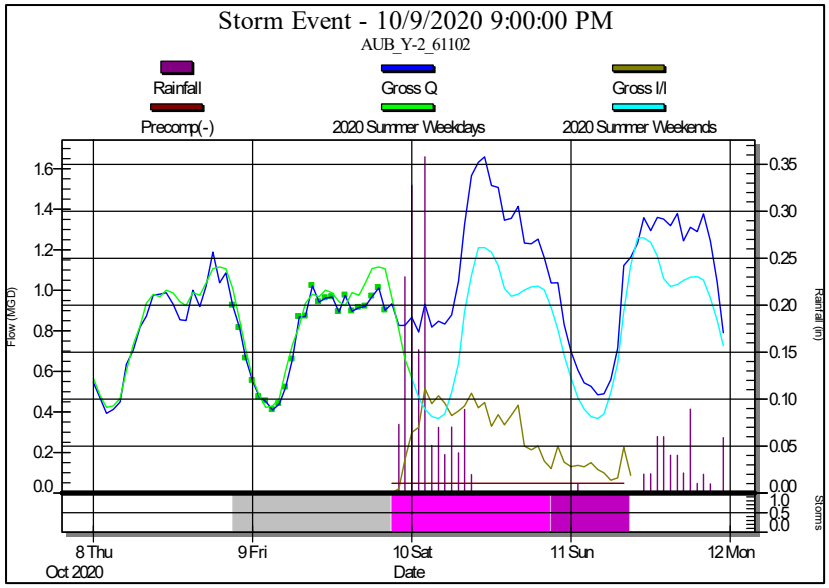

Storm Event - 2/14/2021 7:00:00 AM
AUB_Y-1_41016
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
Feb 2021
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Date

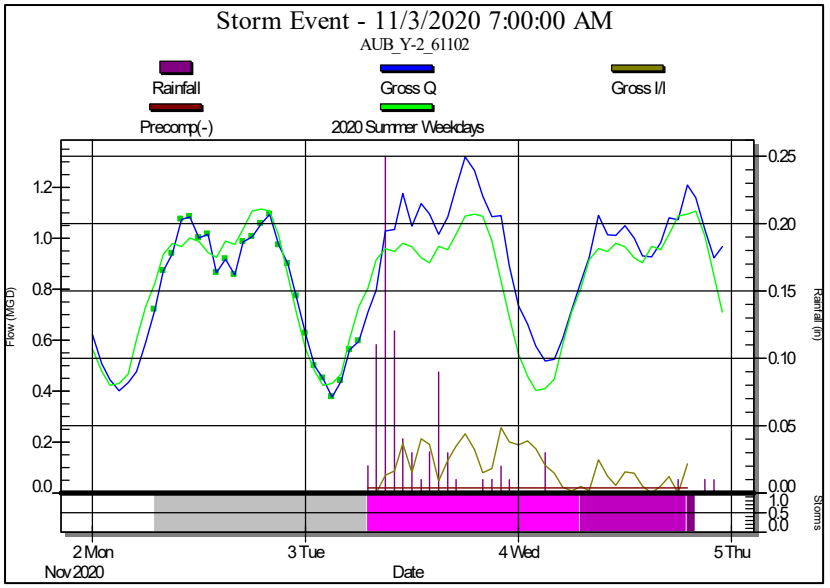

Storm Event - 2/21/2021 9:00:00 PM
AUB_Y-1_41016
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
Feb 2021
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Date

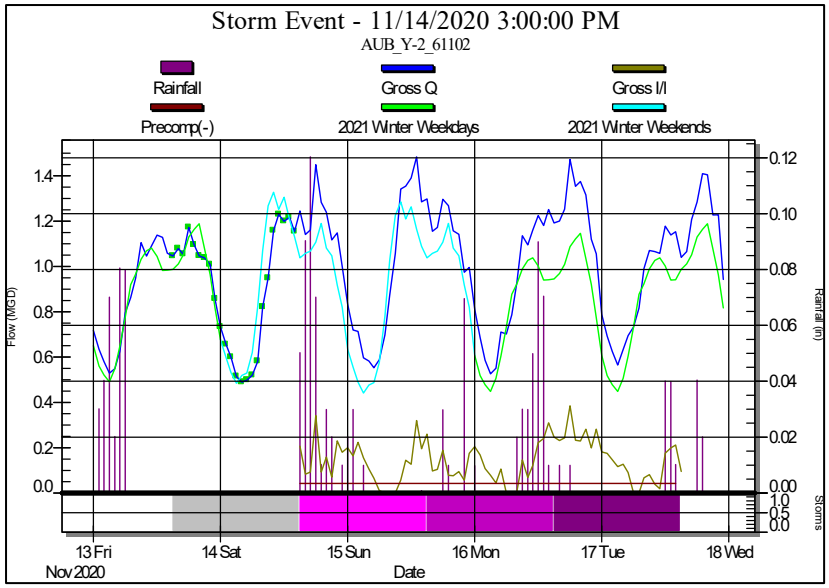

Pipe Flow
AUB_Y-2_61102
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
3.0
2.5
2.0
1.5
1.0
0.5
0.3
0.2
0.1
0.0
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

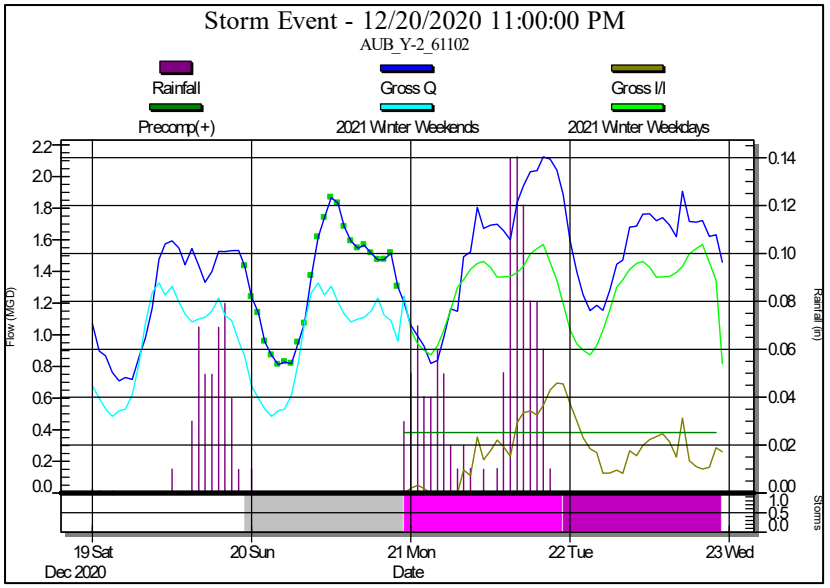

Dry Weather Flow
AUB_Y-2_61102
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0
3
6
9
12
15
18
21
Hours

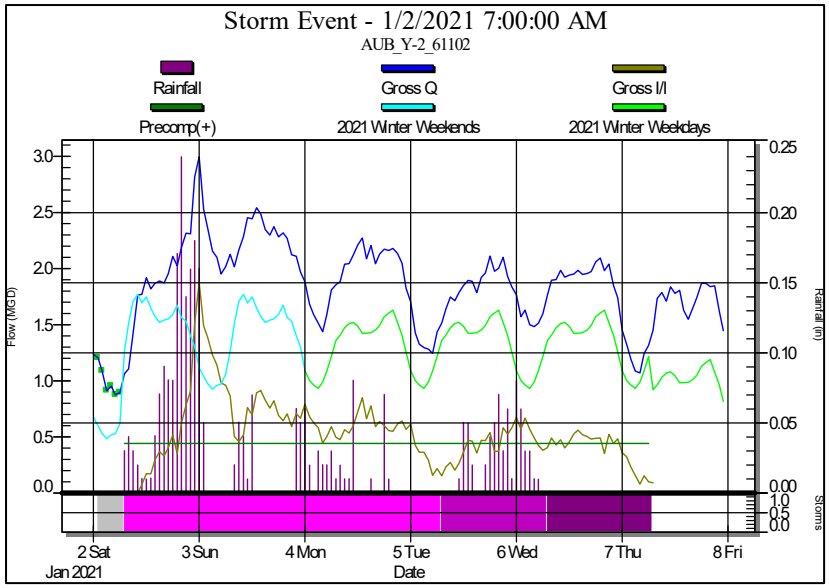

Scatter Graph
AUB_Y-2_61102
Lanfear-Coll (C-LC = 27.51)
VFINAL (ft/s)
Iso Q (MGD)
22
20
18
16
14
12
10
8
6
4
2
0
16
14
12
10
8
6
4
2
0.5
0
2
4
6
8
10
12
14
DFINAL (in)

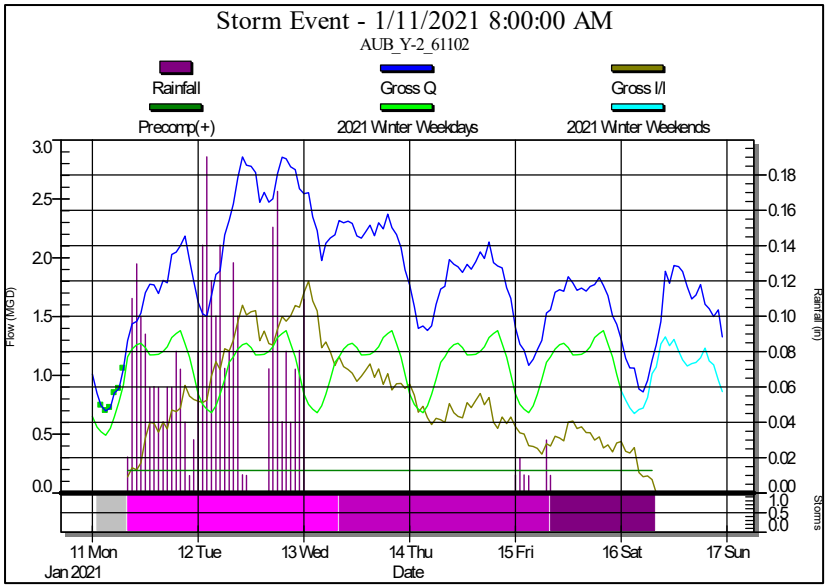

Storm Event - 10/9/2020 9:00:00 PM
AUB_Y-2_61102
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

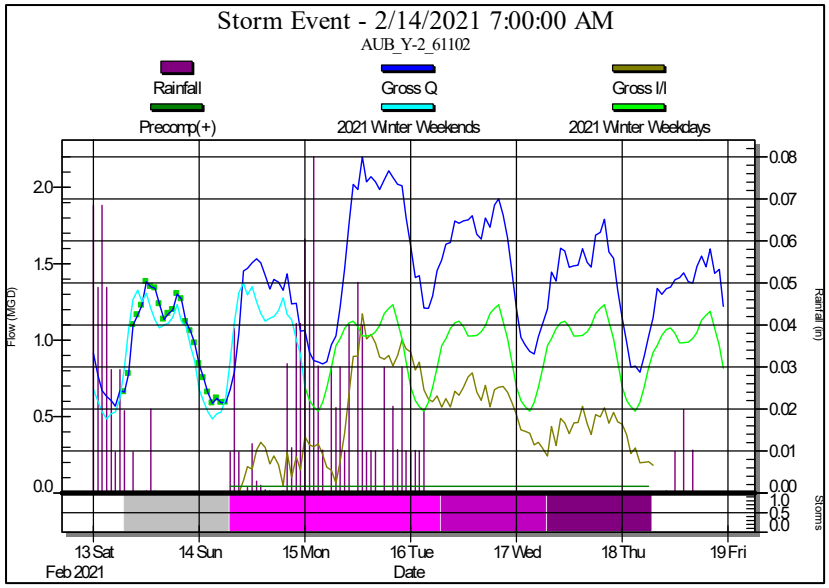

Storm Event - 11/3/2020 7:00:00 AM
AUB_Y-2_61102
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

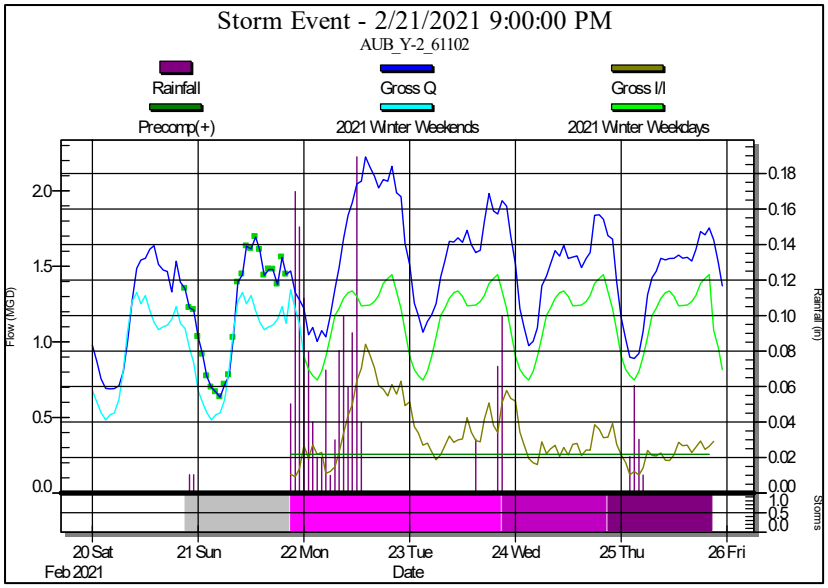

Storm Event - 11/14/2020 3:00:00 PM
AUB_Y-2_61102
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

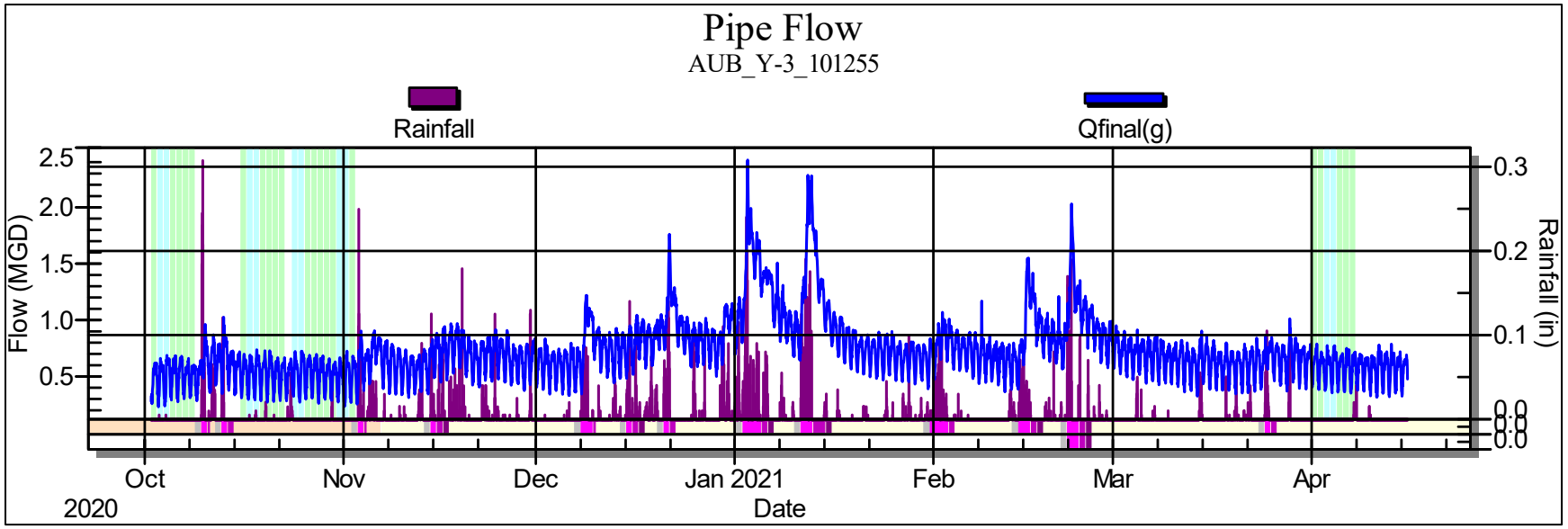

Storm Event - 12/20/2020 11:00:00 PM
AUB_Y-2_61102
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

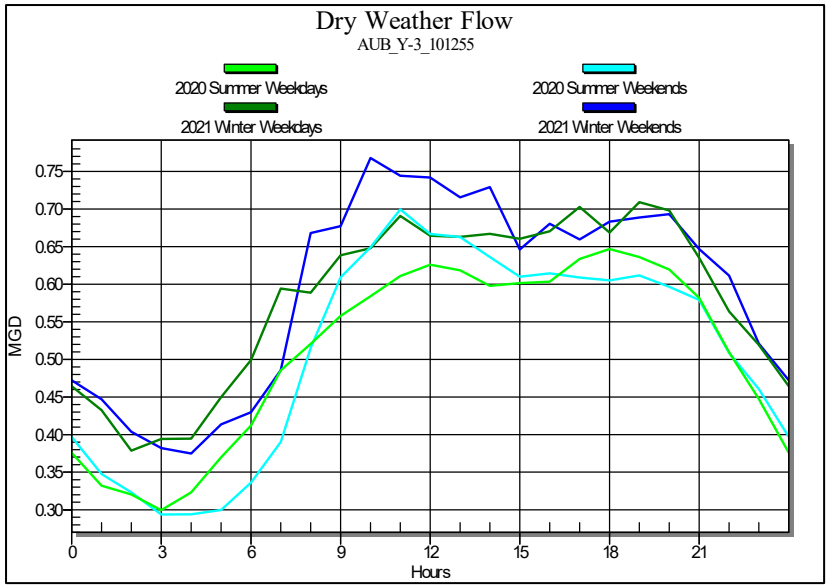

Storm Event - 1/2/2021 7:00:00 AM
AUB_Y-2_61102
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Sat
Jan 2021
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Date

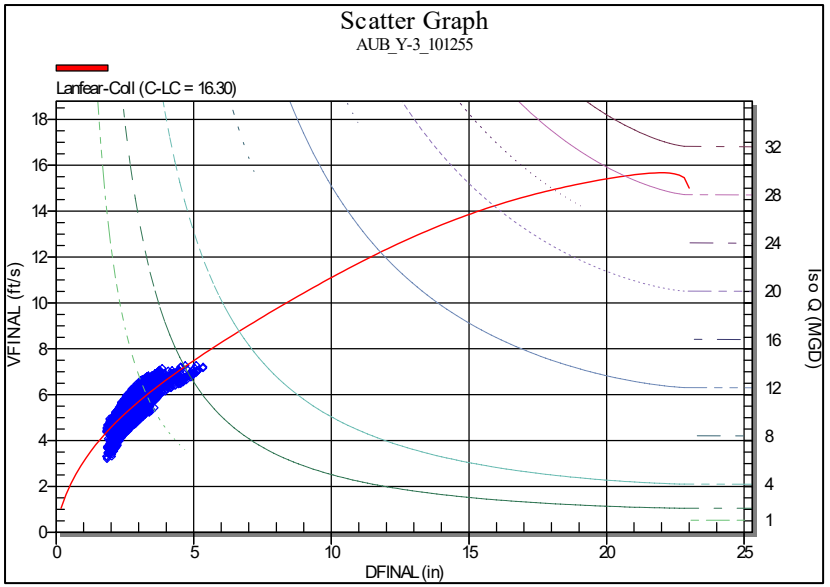

Storm Event - 1/11/2021 8:00:00 AM
AUB_Y-2_61102
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
11 Mon
Jan 2021
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Date

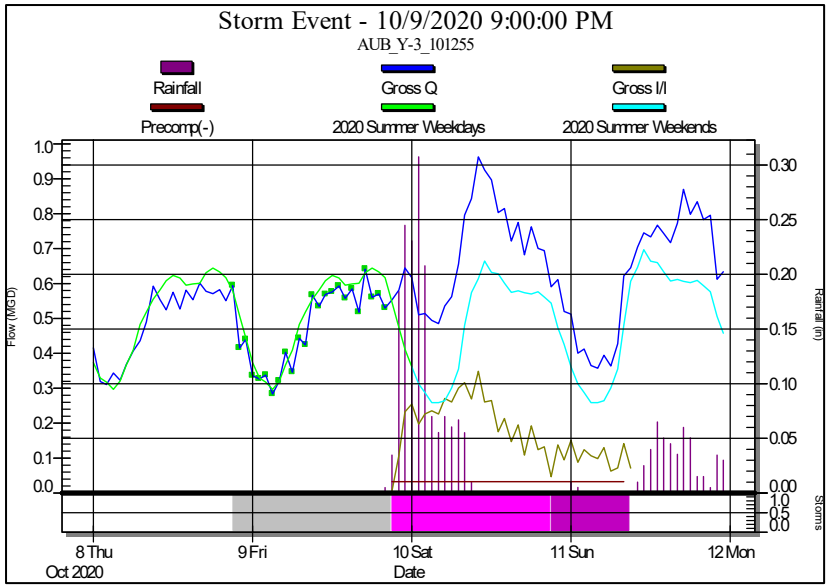

Storm Event - 2/14/2021 7:00:00 AM
AUB_Y-2_61102
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
Feb 2021
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Date

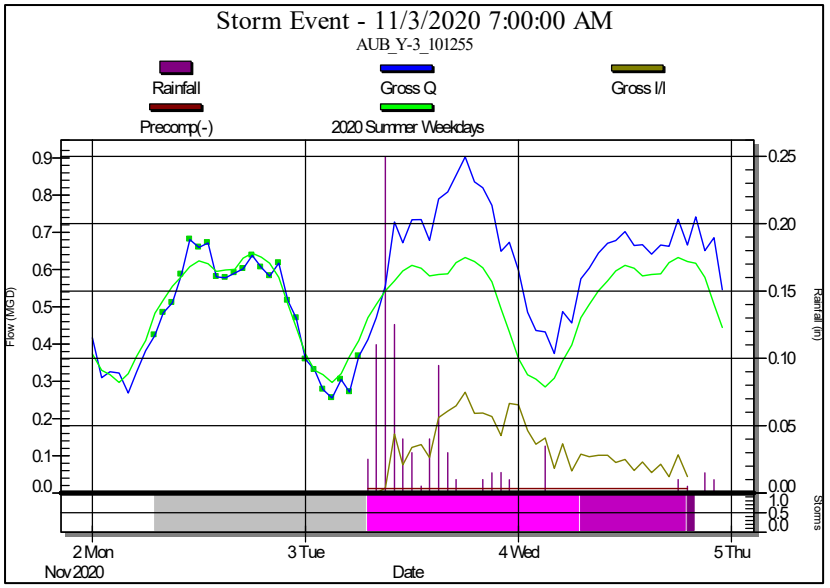

Storm Event - 2/21/2021 9:00:00 PM
AUB_Y-2_61102
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
Feb 2021
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Date

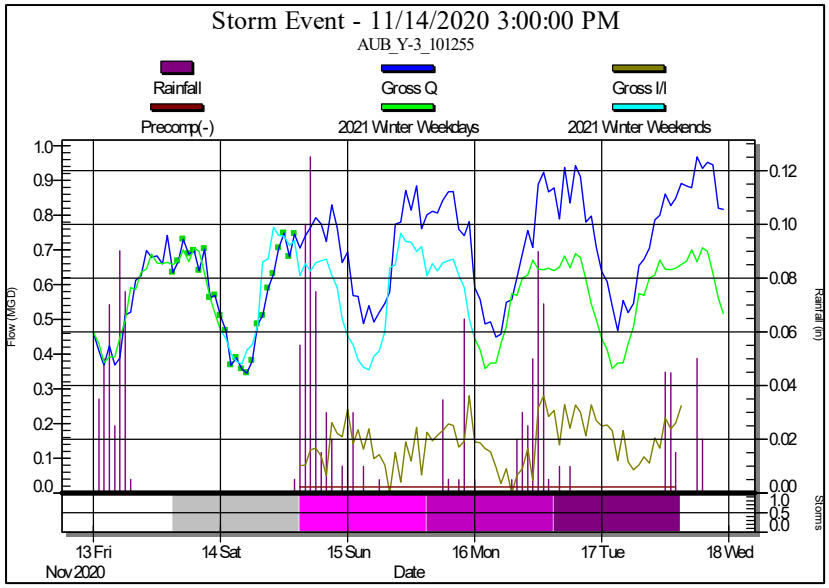

Pipe Flow
AUB_Y-3_101255
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
2.5
2.0
1.5
1.0
0.5
0.3
0.2
0.1
0.0
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

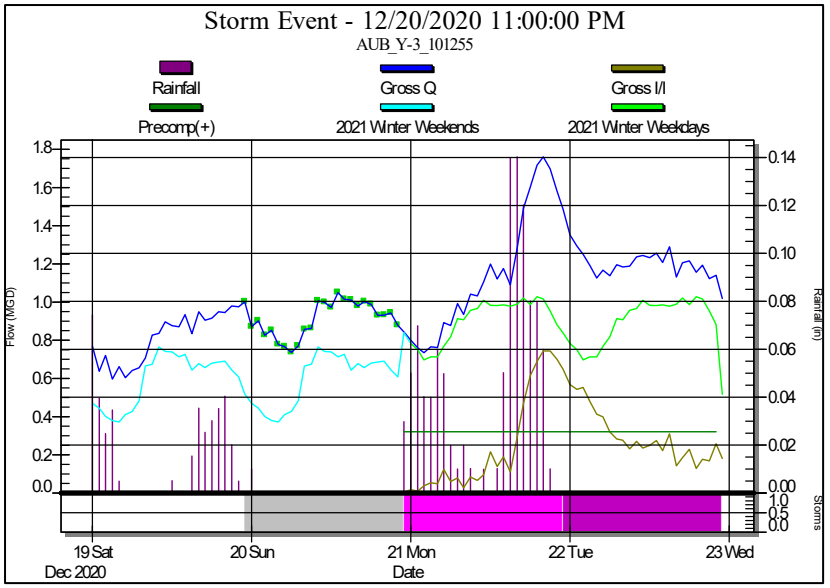

Dry Weather Flow
AUB_Y-3_101255
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0
3
6
9
12
15
18
21
Hours

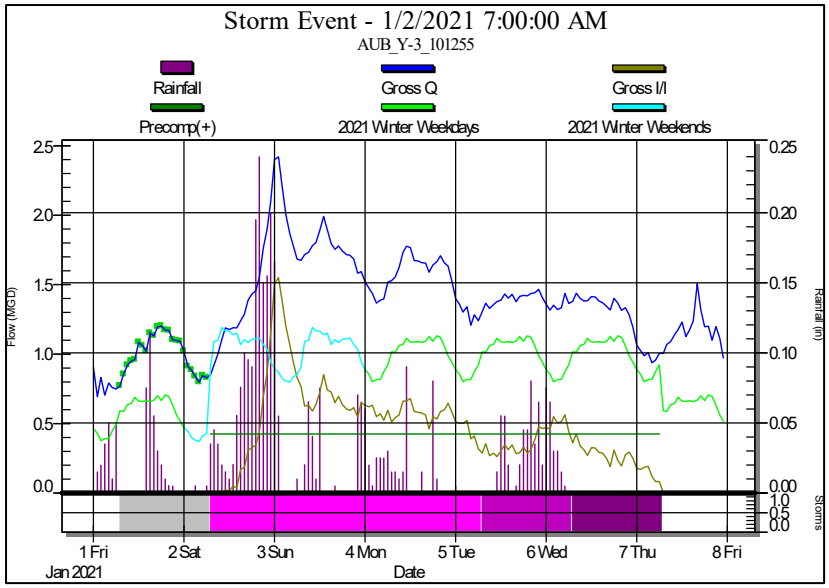

Scatter Graph
AUB_Y-3_101255
Lanfear-Coll (C-LC = 16.30)
VFINAL (ft/s)
Iso Q (MGD)
18
16
14
12
10
8
6
4
2
0
32
28
24
20
16
12
8
4
1
0
5
10
15
20
25
DFINAL (in)

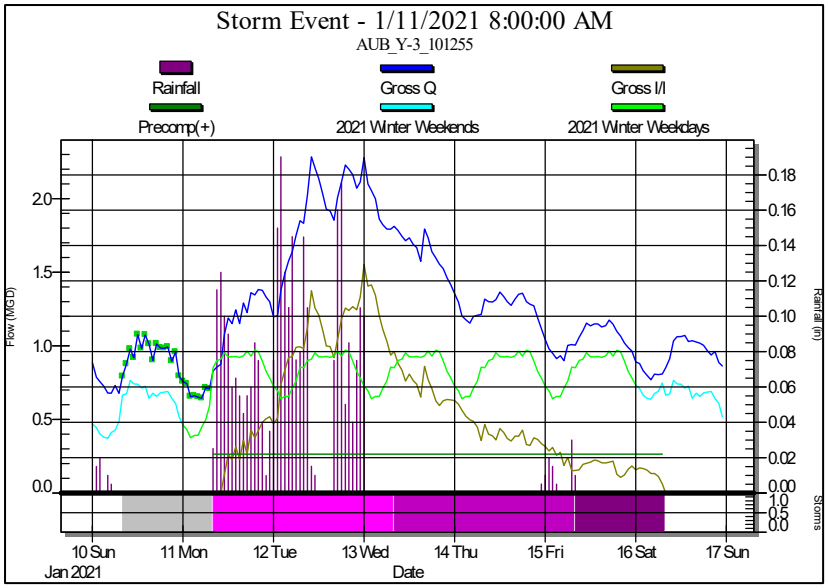

Storm Event - 10/9/2020 9:00:00 PM
AUB_Y-3_101255
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

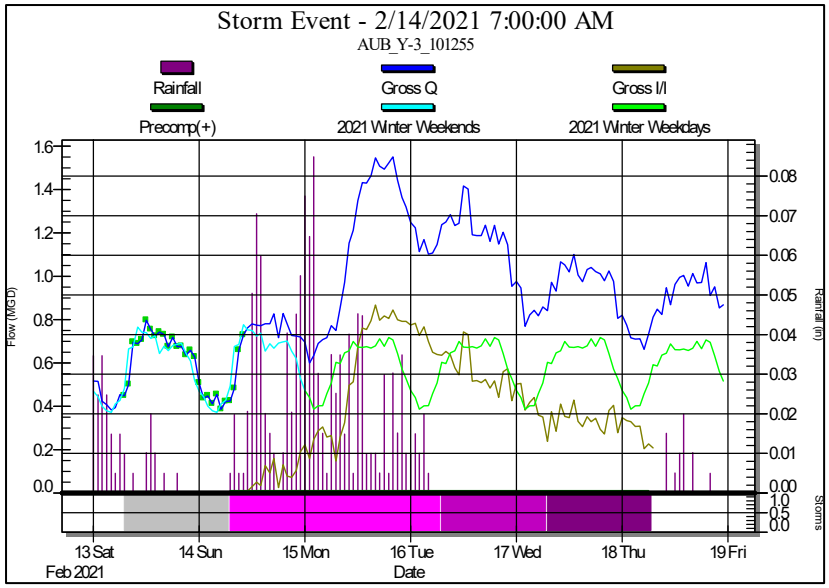

Storm Event - 11/3/2020 7:00:00 AM
AUB_Y-3_101255
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

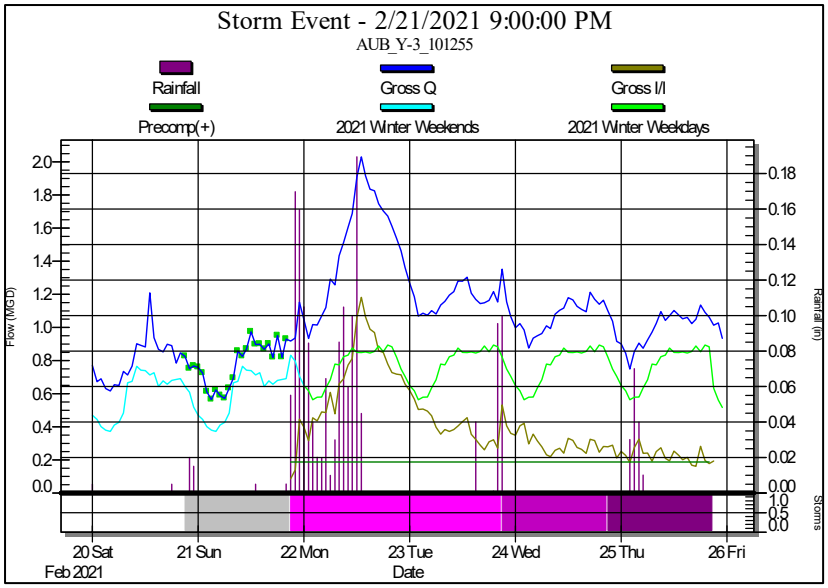

Storm Event - 11/14/2020 3:00:00 PM
AUB_Y-3_101255
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

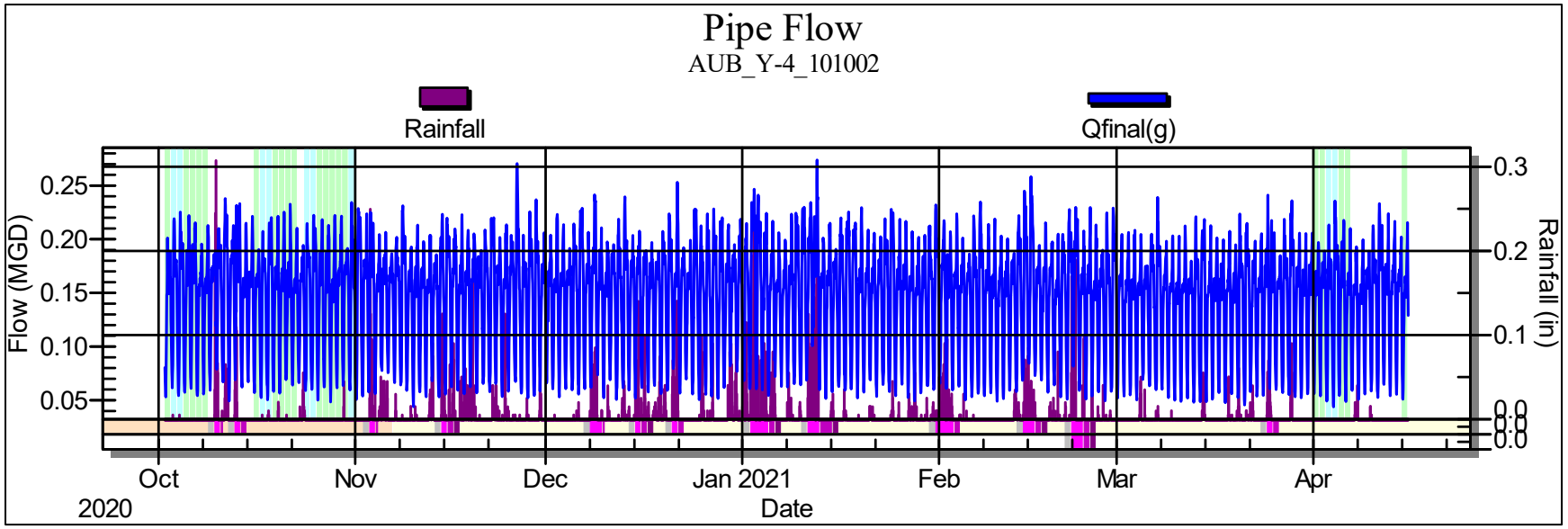

Storm Event - 12/20/2020 11:00:00 PM
AUB_Y-3_101255
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

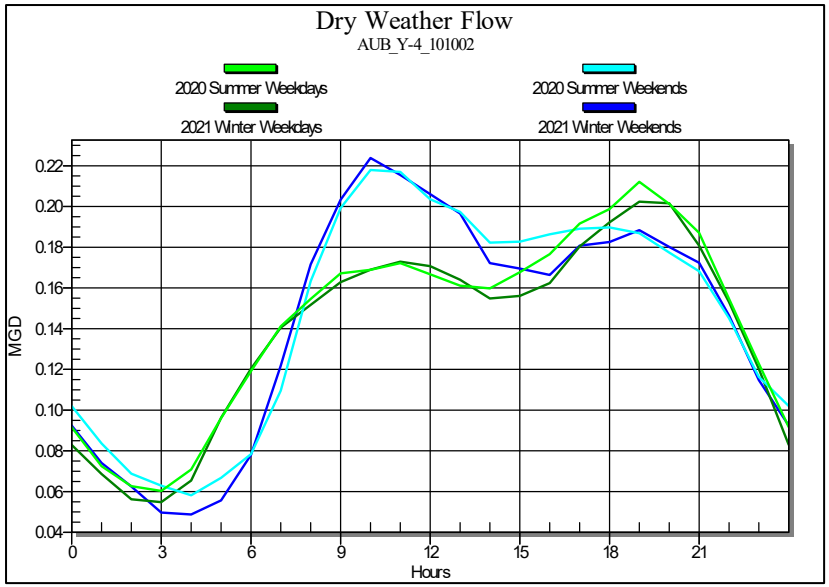

Storm Event - 1/2/2021 7:00:00 AM
AUB_Y-3_101255
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

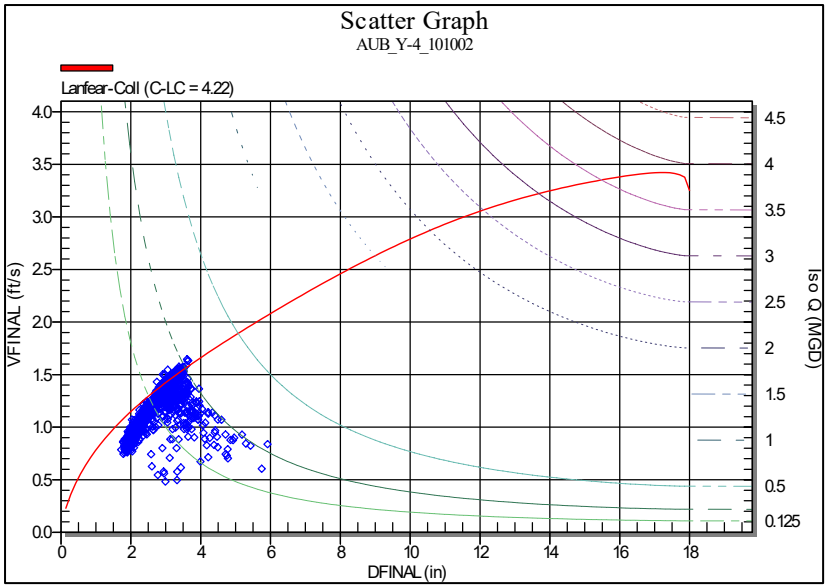

Storm Event - 1/11/2021 8:00:00 AM
AUB_Y-3_101255
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

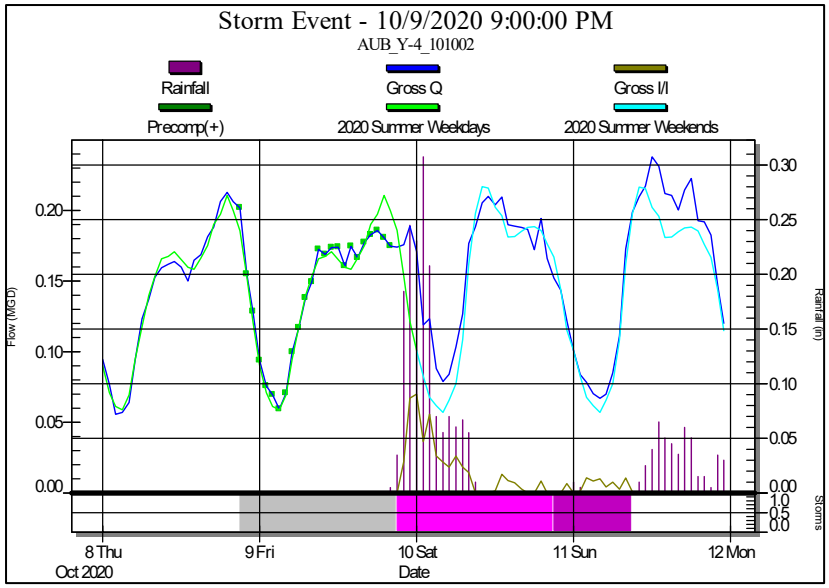

Storm Event - 2/14/2021 7:00:00 AM
AUB_Y-3_101255
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

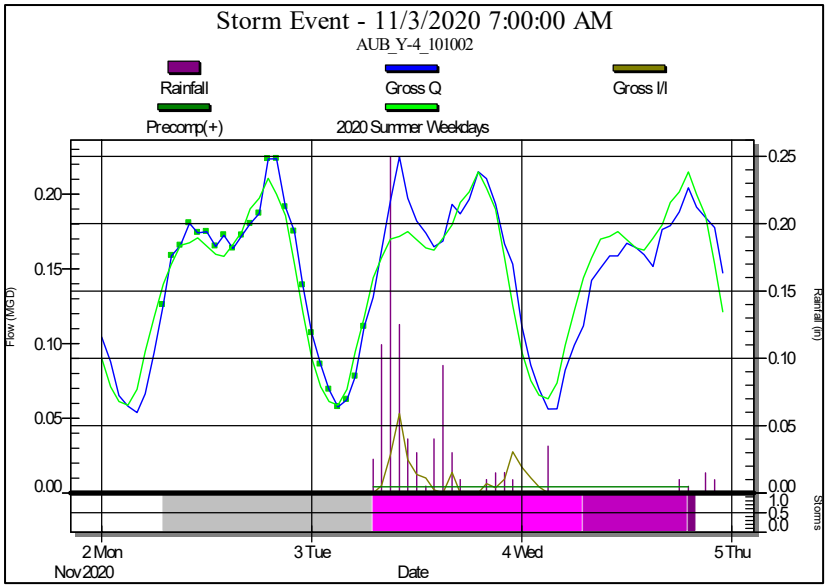

Storm Event - 2/21/2021 9:00:00 PM
AUB_Y-3_101255
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

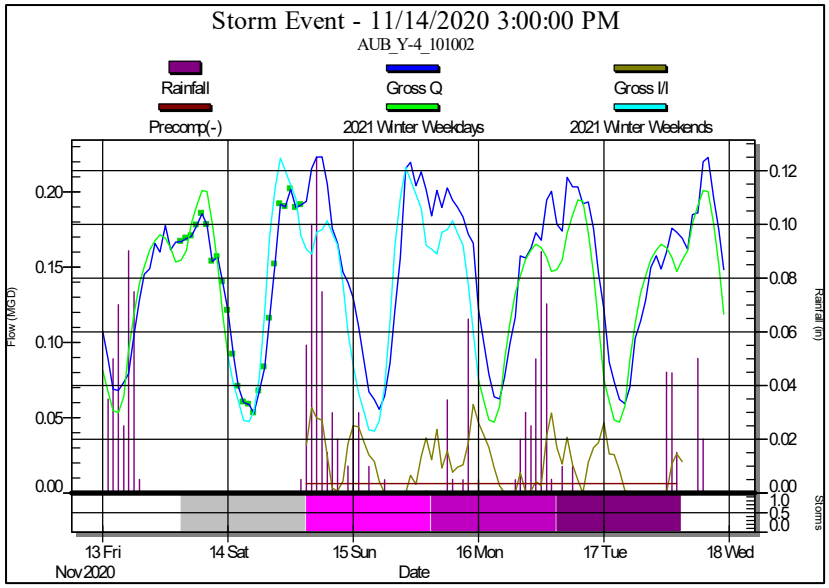

Pipe Flow
AUB_Y-4_101002
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
0.25
0.20
0.15
0.10
0.05
0.3
0.2
0.1
0.0
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

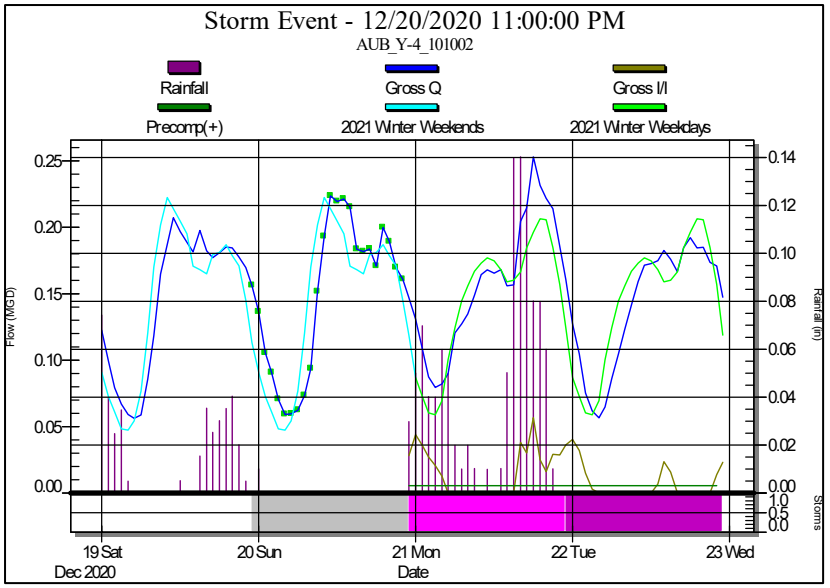

Dry Weather Flow
AUB_Y-4_101002
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
Hours

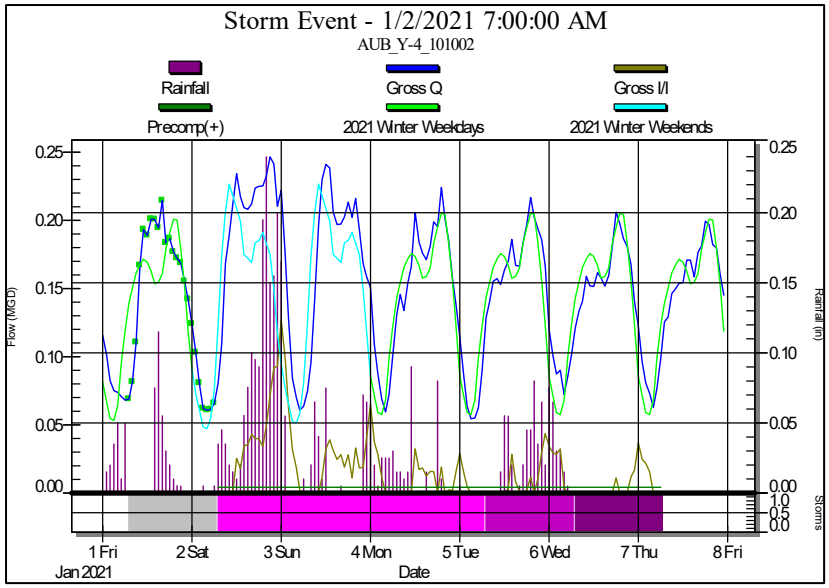

Scatter Graph
AUB_Y-4_101002
Lanfear-Coll (C-LC = 4.22)
VFINAL (ft/s)
Iso Q (MGD)
DFINAL (in)

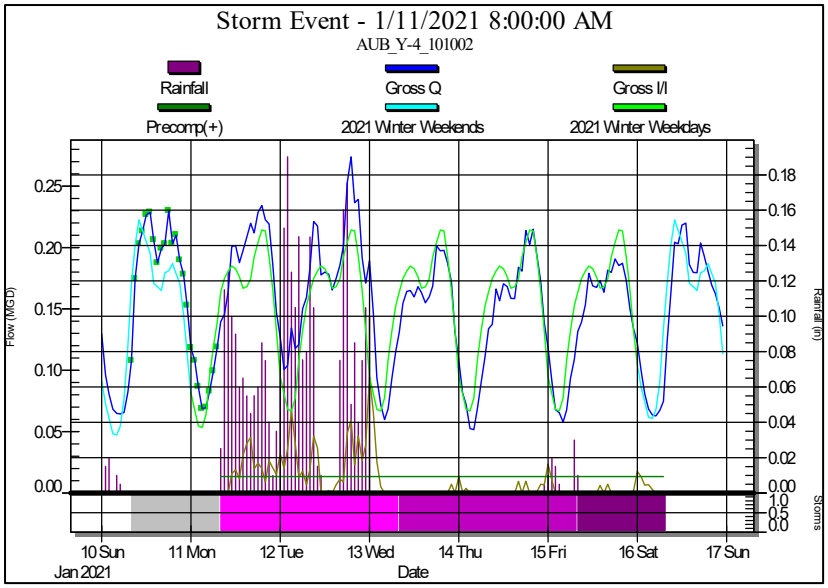

Storm Event - 10/9/2020 9:00:00 PM
AUB_Y-4_101002
Rainfall
Gross Q
Gross I/I
Precomp(+)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

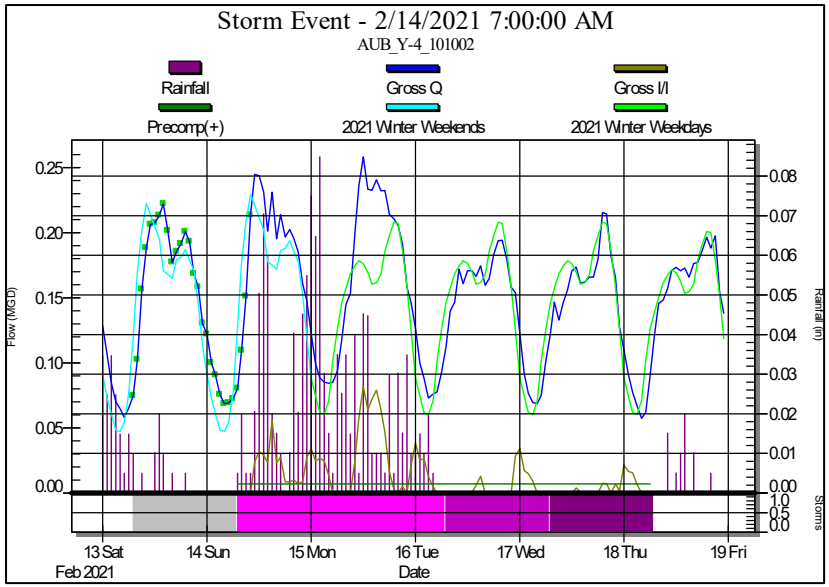

Storm Event - 11/3/2020 7:00:00 AM
AUB_Y-4_101002
Rainfall
Gross Q
Gross I/I
Precomp(+)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

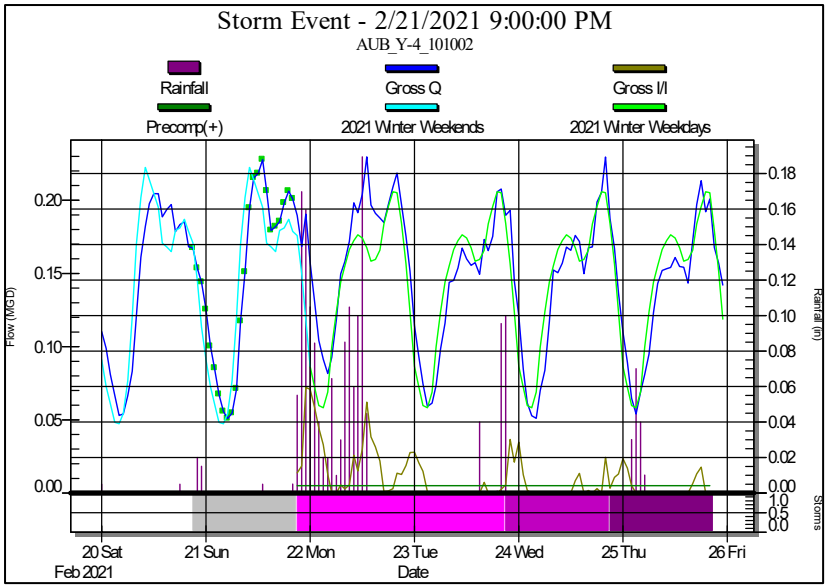

Storm Event - 11/14/2020 3:00:00 PM
AUB_Y-4_101002
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

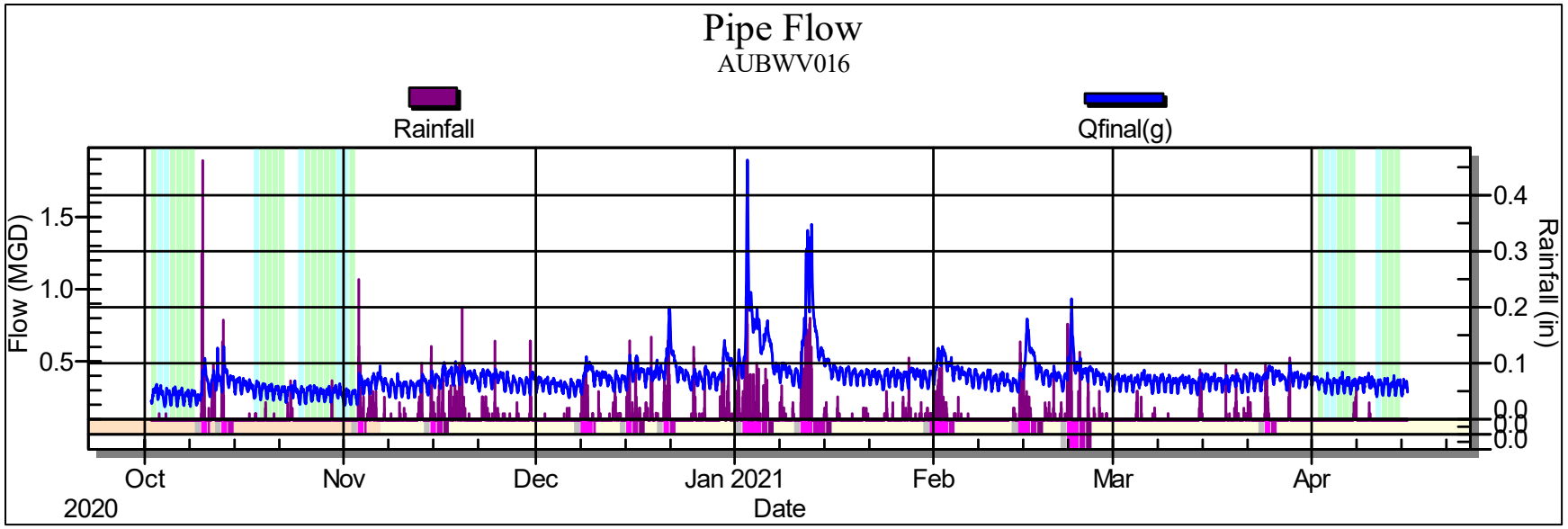

Storm Event - 12/20/2020 11:00:00 PM
AUB_Y-4_101002
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

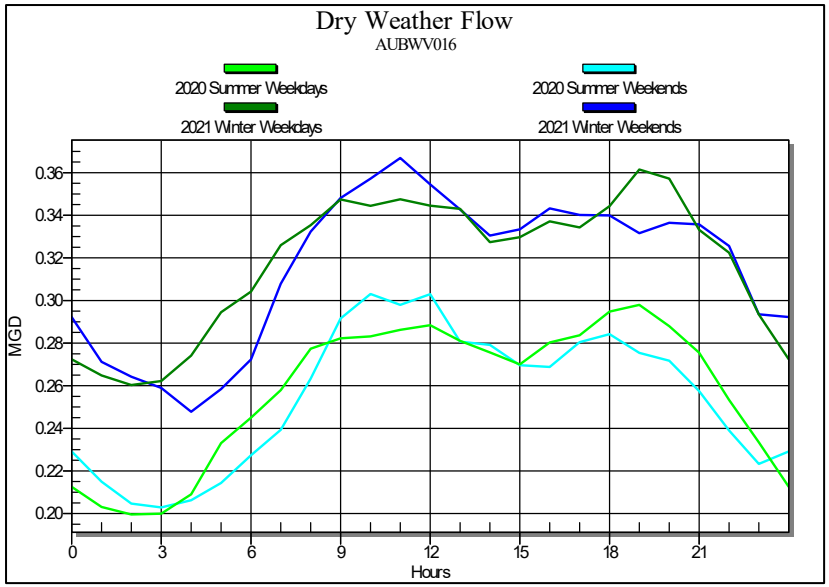

Storm Event - 1/2/2021 7:00:00 AM
AUB_Y-4_101002
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
Jan 2021
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Date

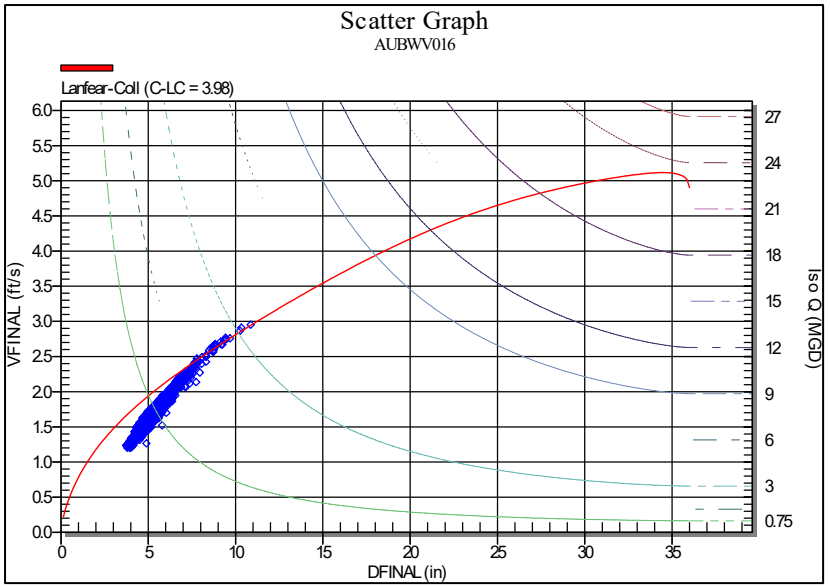

Storm Event - 1/11/2021 8:00:00 AM
AUB_Y-4_101002
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
Jan 2021
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Date

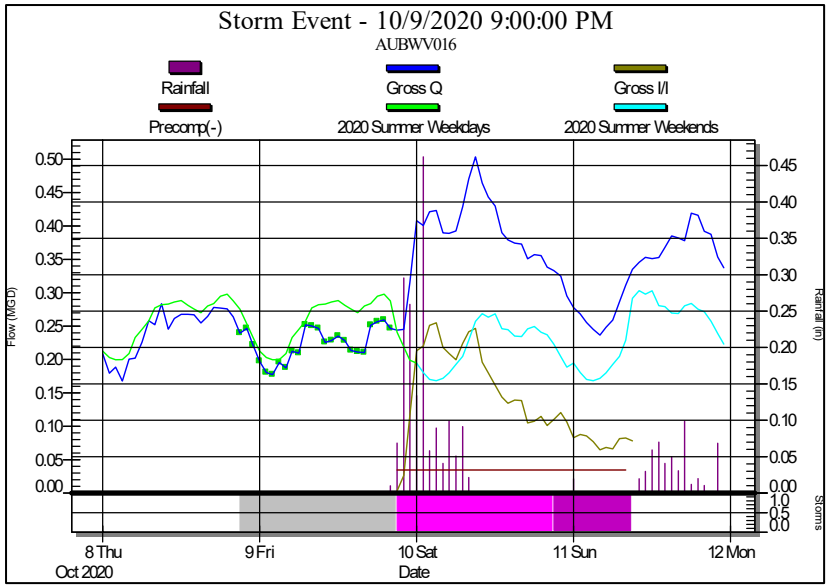

Storm Event - 2/14/2021 7:00:00 AM
AUB_Y-4_101002
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
Feb 2021
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Date

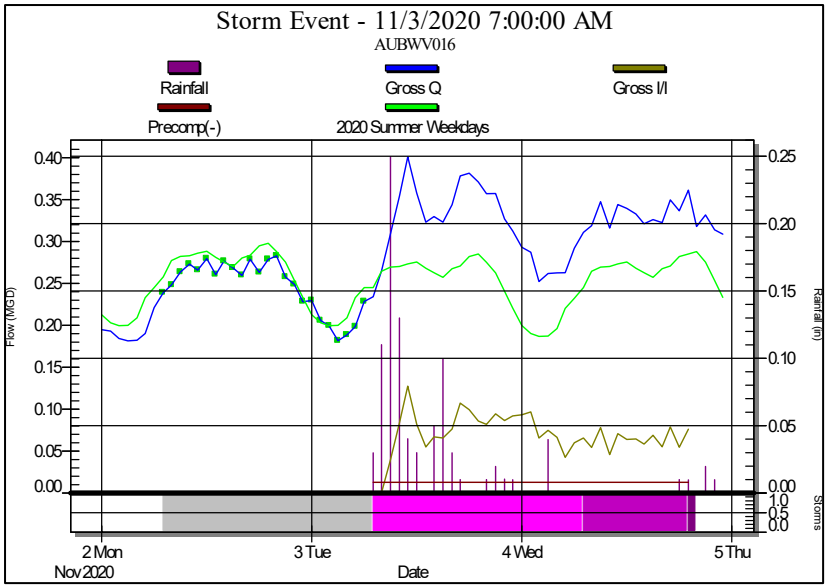

Storm Event - 2/21/2021 9:00:00 PM
AUB_Y-4_101002
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
Feb 2021
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Date

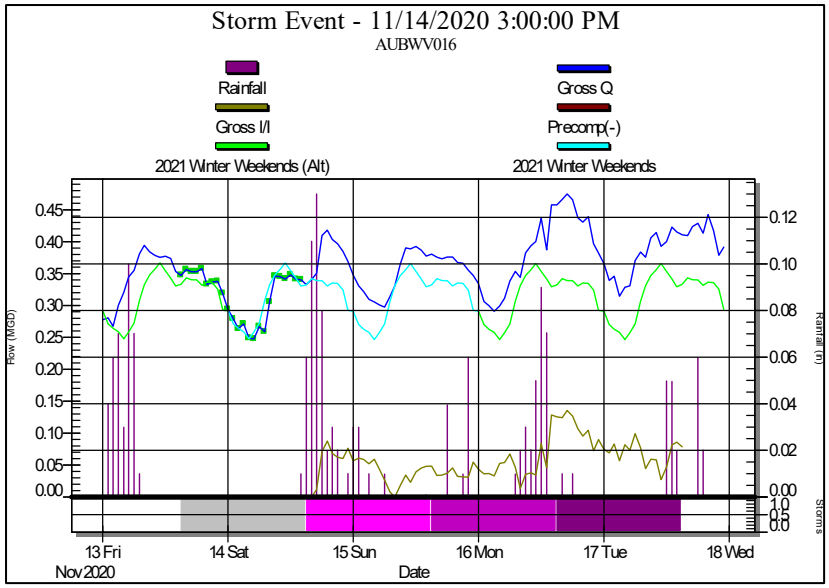

Pipe Flow
AUBWV016
Rainfall
Qfinal(g)
Flow (MGD)
1.5
1.0
0.5
0.4
0.3
0.2
0.1
0.0
Rainfall (in)
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

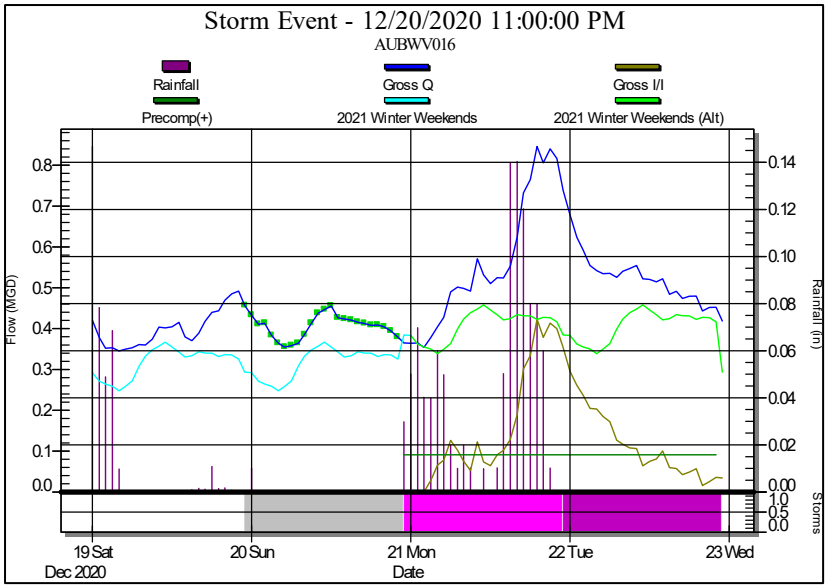

Dry Weather Flow
AUBWV016
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
0.36
0.34
0.32
0.30
0.28
0.26
0.24
0.22
0.20
0
3
6
9
12
15
18
21
Hours

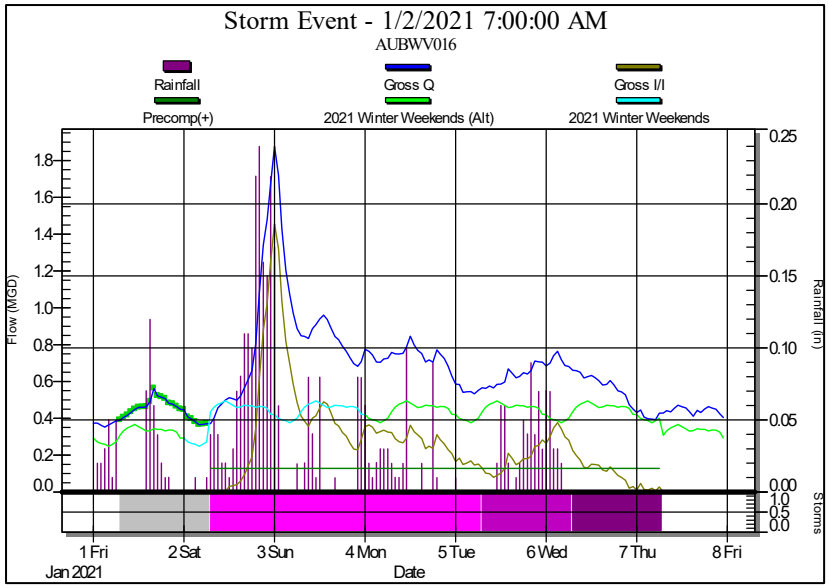

Scatter Graph
AUBWV016
Lanfear-Coll (C-LC = 3.98)
VFINAL (ft/s)
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Iso Q (MGD)
27
24
21
18
15
12
9
6
3
0.75
0
5
10
15
20
25
30
35
DFINAL (in)

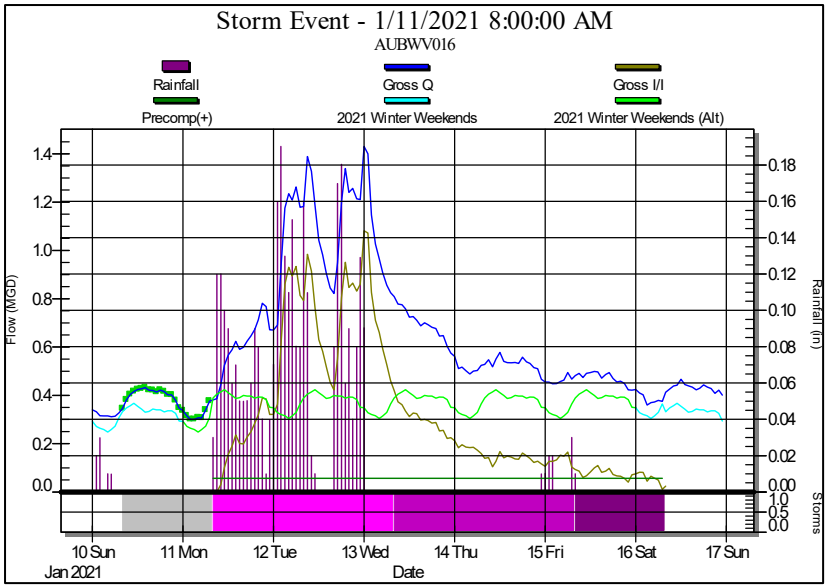

Storm Event - 10/9/2020 9:00:00 PM
AUBWV016
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

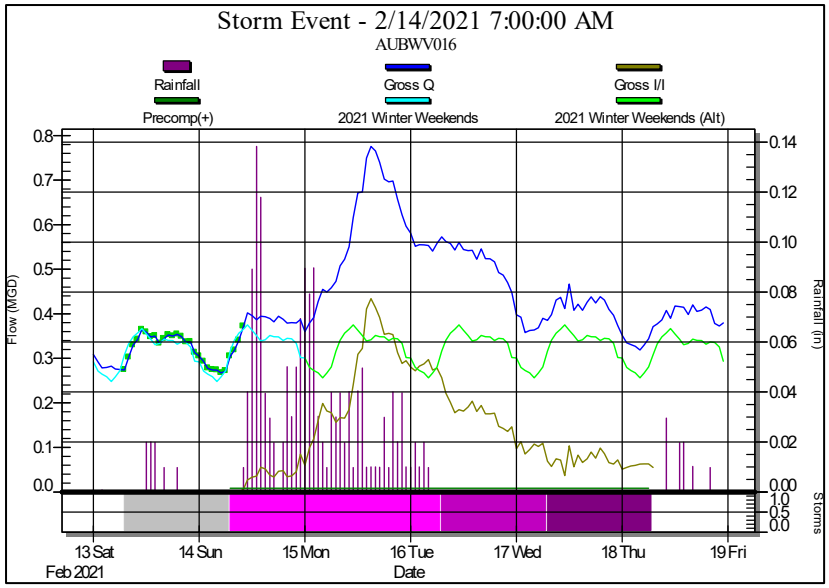

Storm Event - 11/3/2020 7:00:00 AM
AUBWV016
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

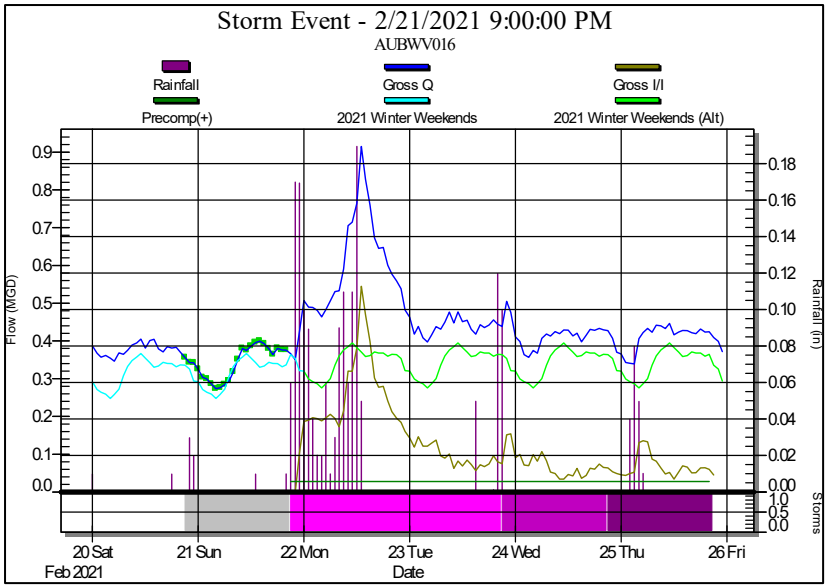

Storm Event - 11/14/2020 3:00:00 PM
AUBWV016
Rainfall
Gross Q
Gross I/I
Precomp(-)
2021 Winter Weekends (Alt)
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

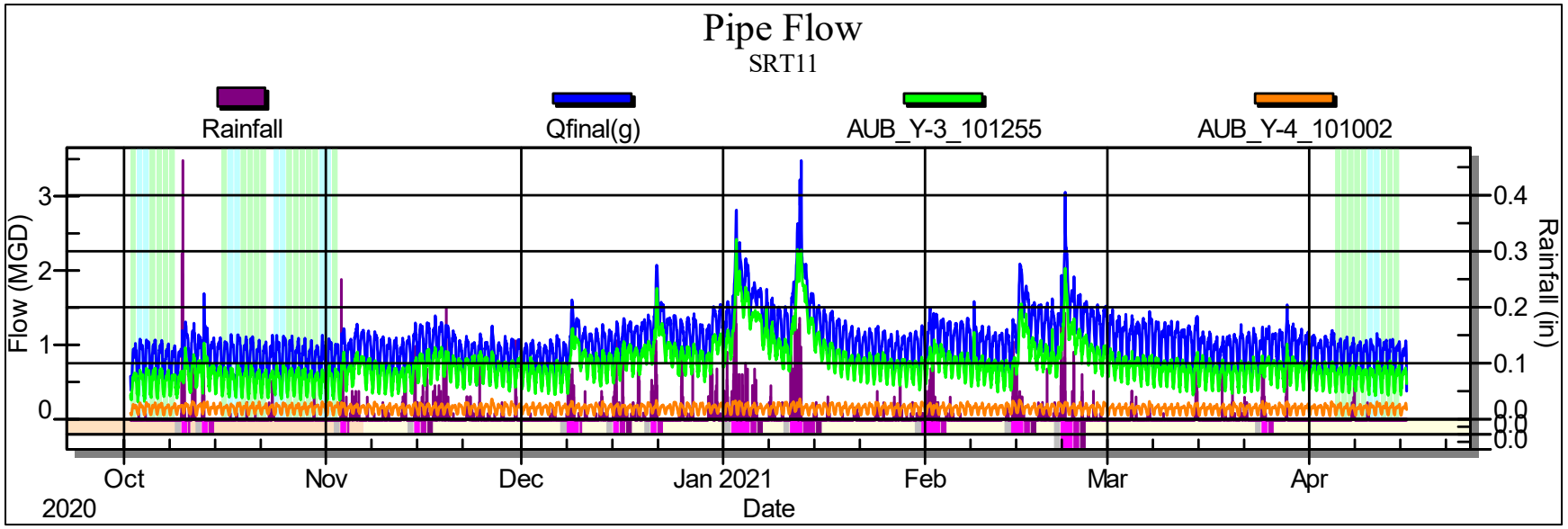

Storm Event - 12/20/2020 11:00:00 PM
AUBWV016
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekends (Alt)
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

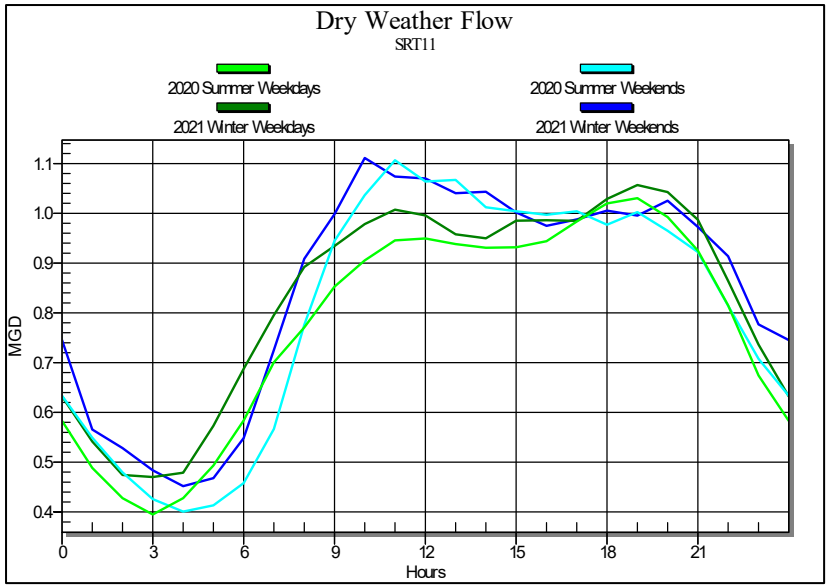

Storm Event - 1/2/2021 7:00:00 AM
AUBWV016
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends (Alt)
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

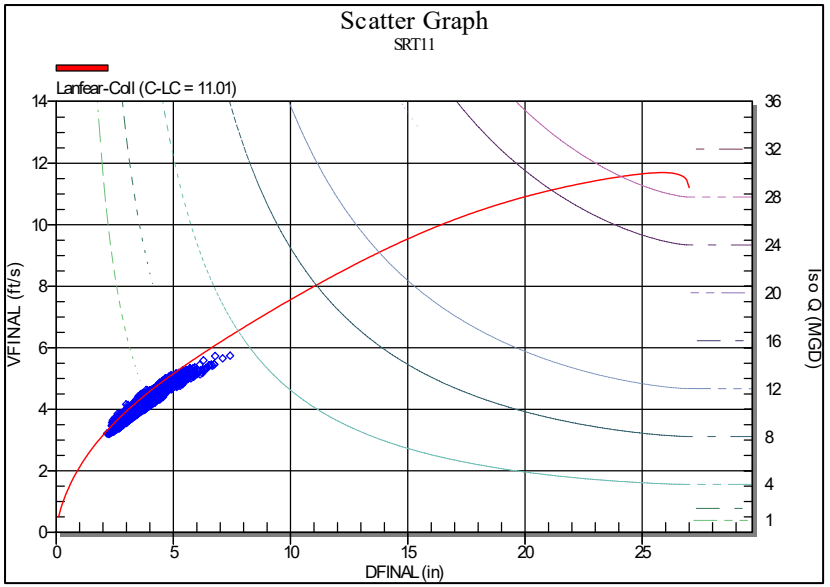

Storm Event - 1/11/2021 8:00:00 AM
AUBWV016
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekends (Alt)
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

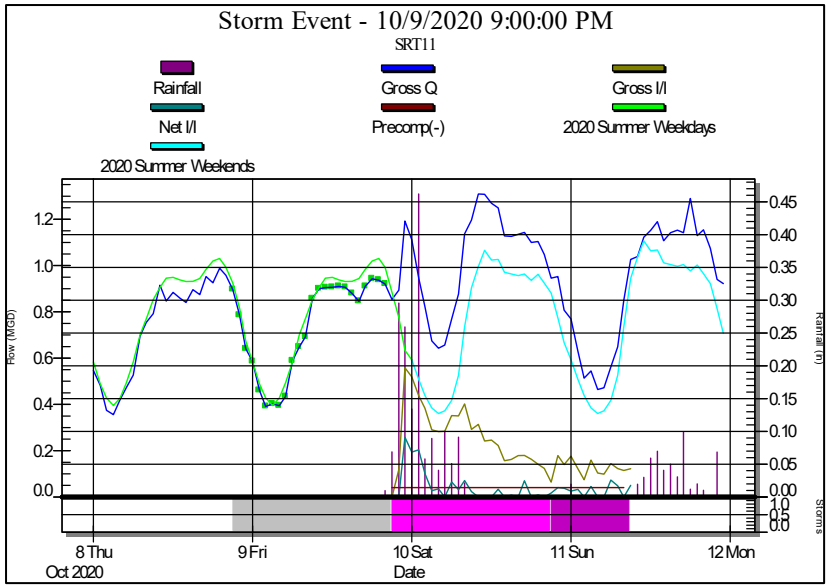

Storm Event - 2/14/2021 7:00:00 AM
AUBWV016
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekends (Alt)
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

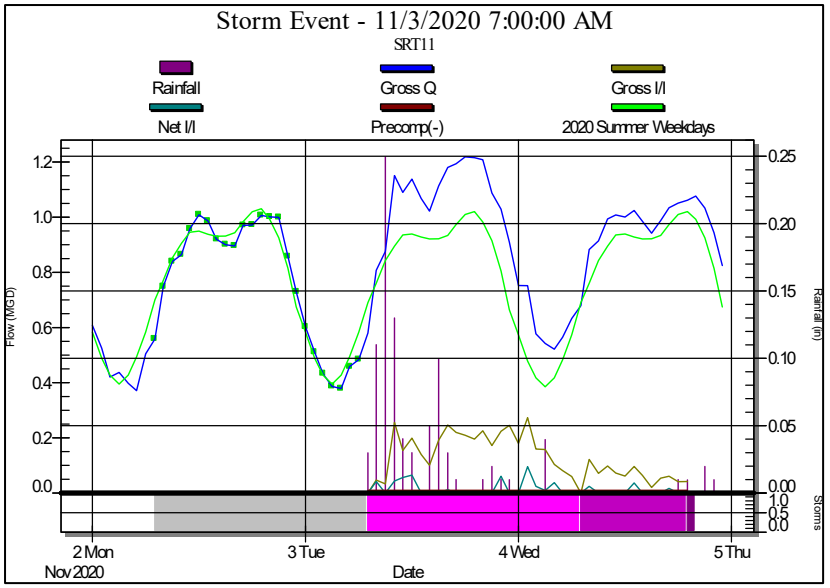

Storm Event - 2/21/2021 9:00:00 PM
AUBWV016
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekends (Alt)
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

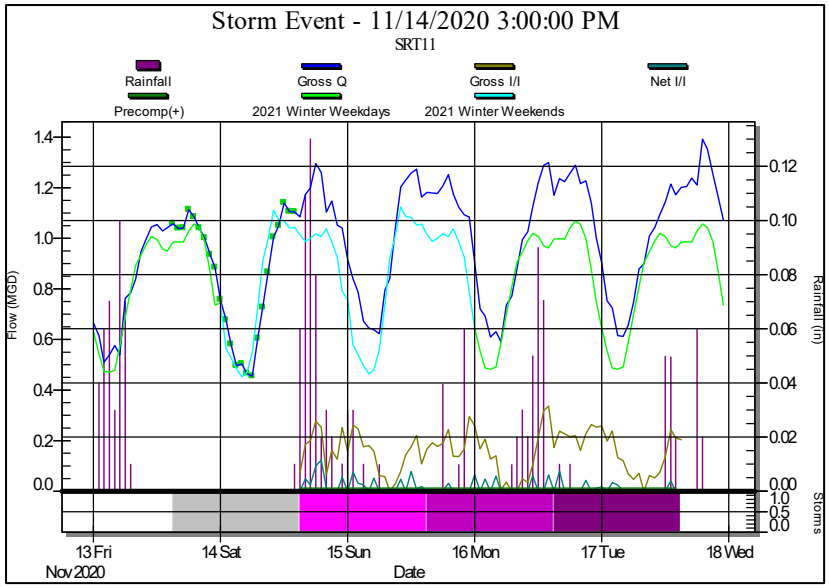

Pipe Flow
SRT11
Rainfall
Qfinal(g)
AUB_Y-3_101255
AUB_Y-4_101002
Flow (MGD)
Rainfall (in)
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

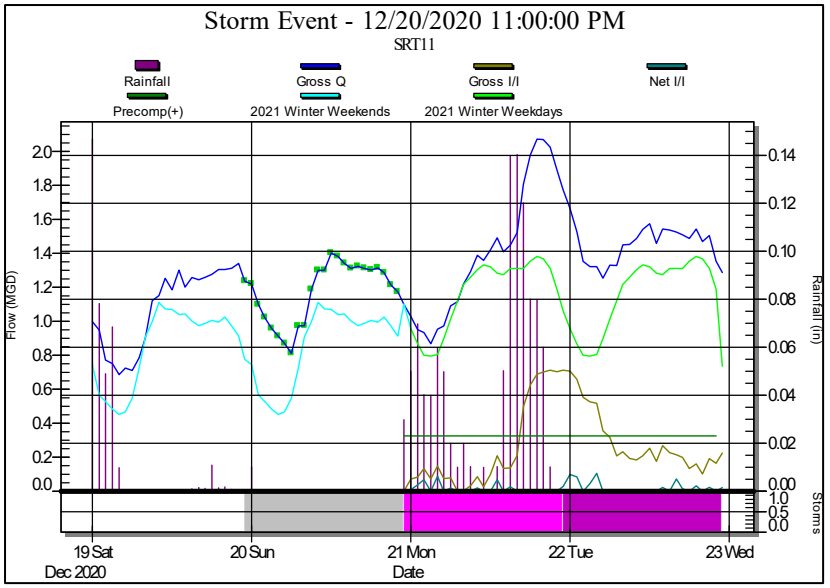

Dry Weather Flow
SRT11
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
Hours

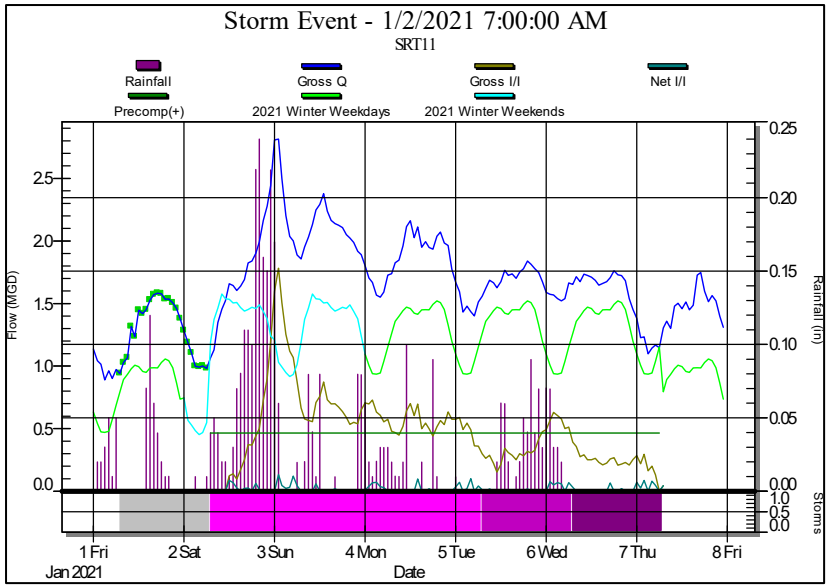

Scatter Graph
SRT11
Lanfear-Coll (C-LC = 11.01)
VFINAL (ft/s)
Iso Q (MGD)
DFINAL (in)

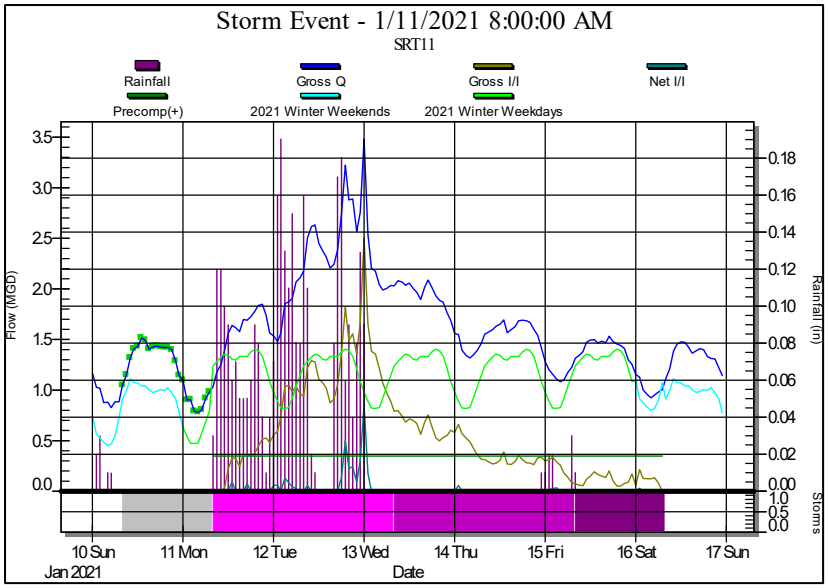

Storm Event - 10/9/2020 9:00:00 PM
SRT11
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

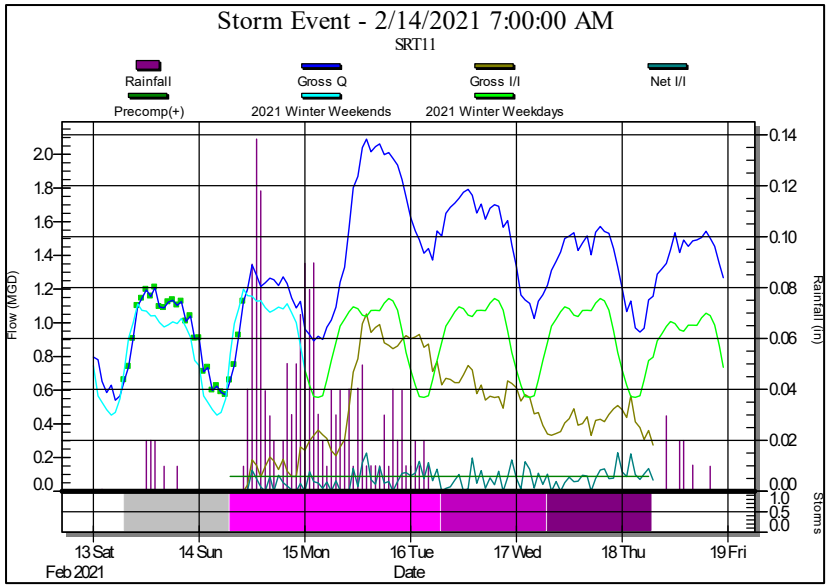

Storm Event - 11/3/2020 7:00:00 AM
SRT11
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

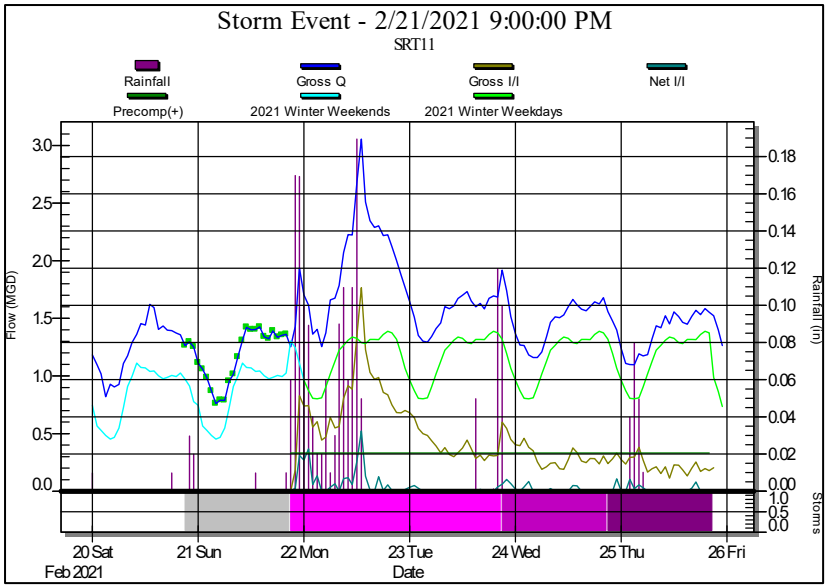

Storm Event - 11/14/2020 3:00:00 PM
SRT11
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

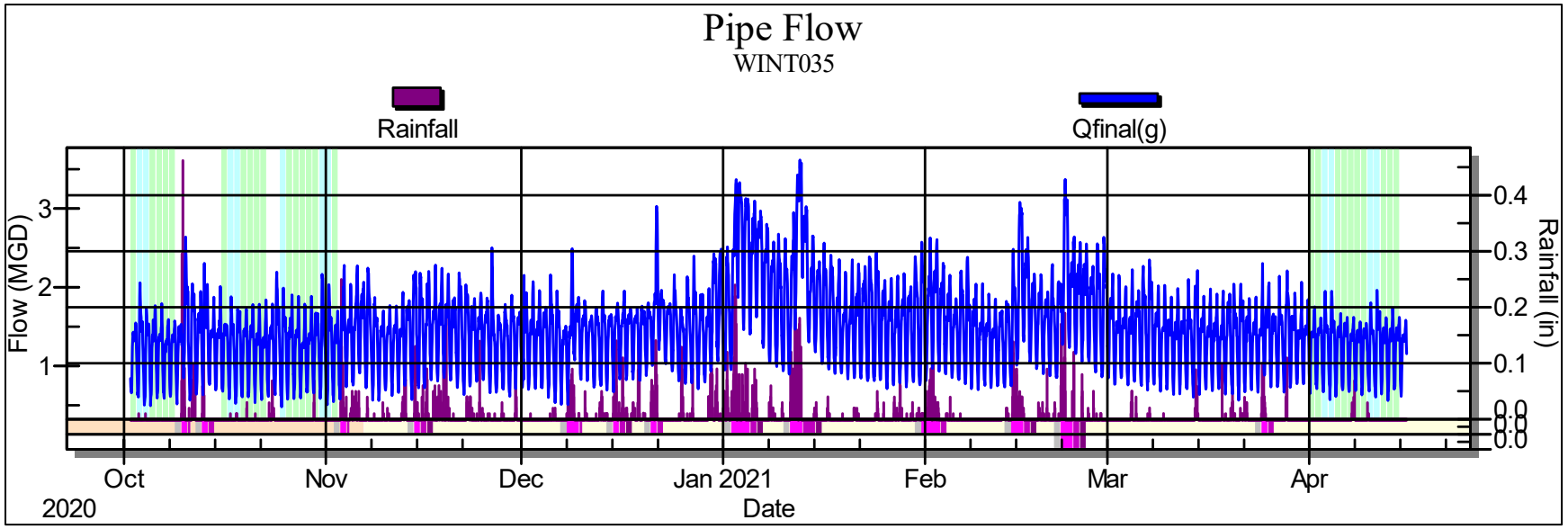

Storm Event - 12/20/2020 11:00:00 PM
SRT11
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

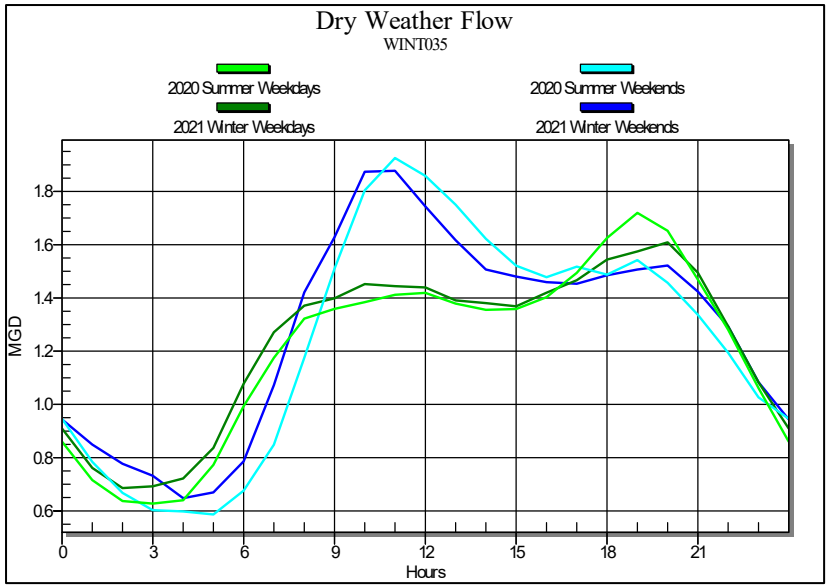

Storm Event - 1/2/2021 7:00:00 AM
SRT11
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

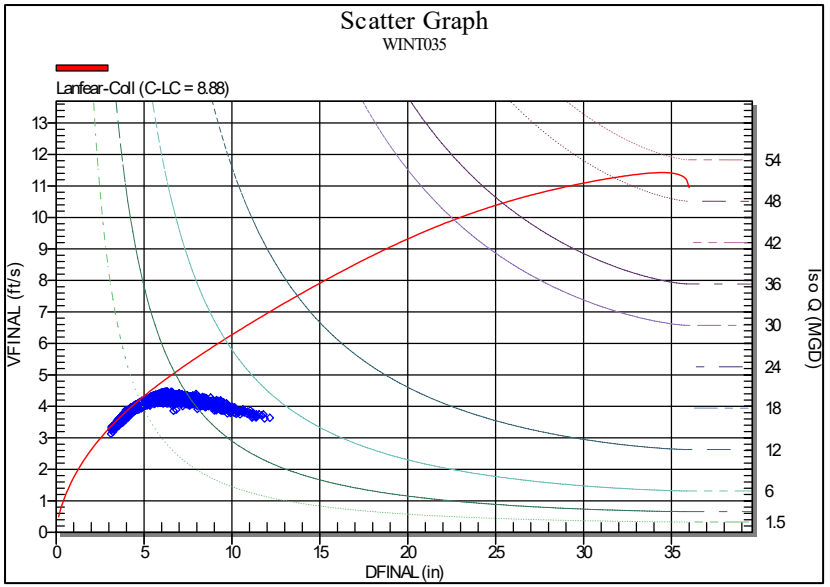

Storm Event - 1/11/2021 8:00:00 AM
SRT11
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

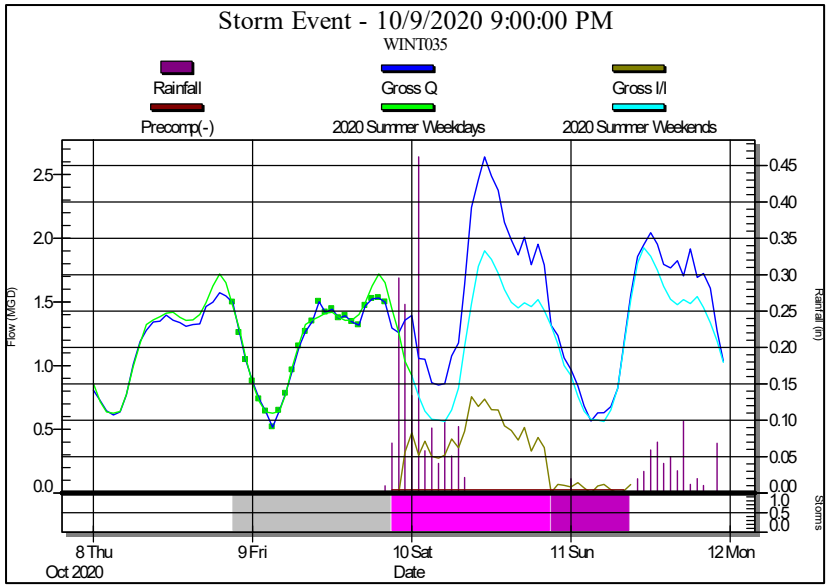

Storm Event - 2/14/2021 7:00:00 AM
SRT11
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

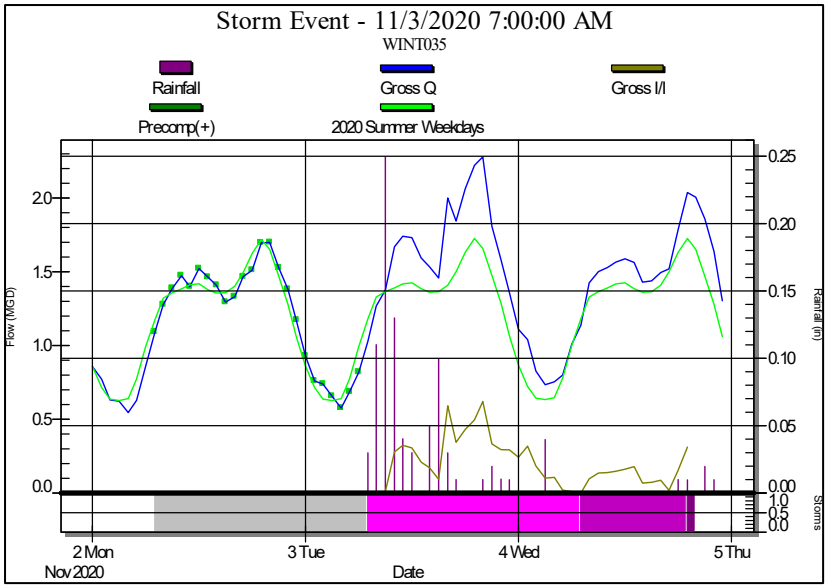

Storm Event - 2/21/2021 9:00:00 PM
SRT11
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

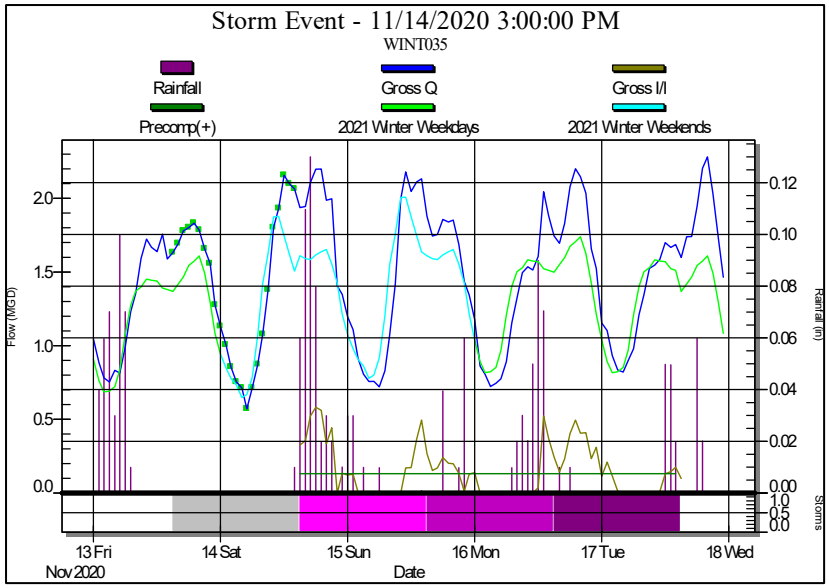

Pipe Flow
WINT035
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
3
2
1
0.4
0.3
0.2
0.1
0.0
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

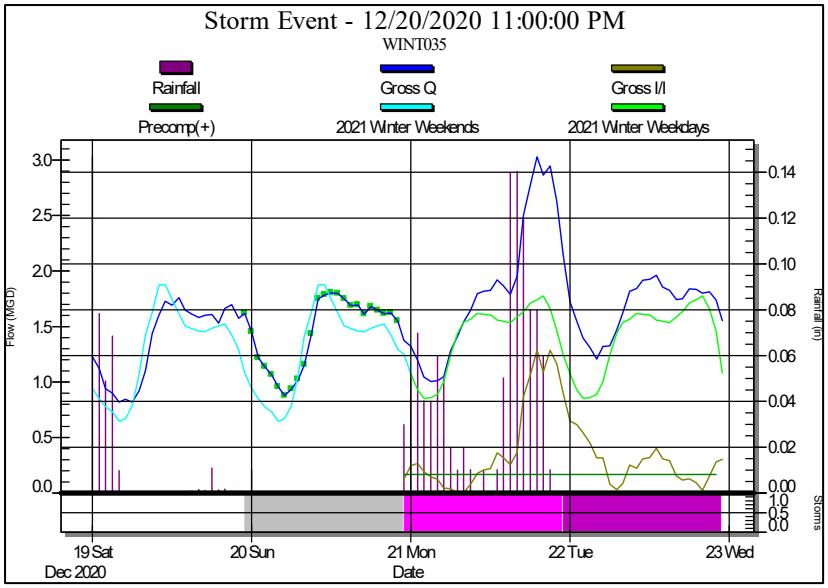

Dry Weather Flow
WINT035
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0
3
6
9
12
15
18
21
Hours

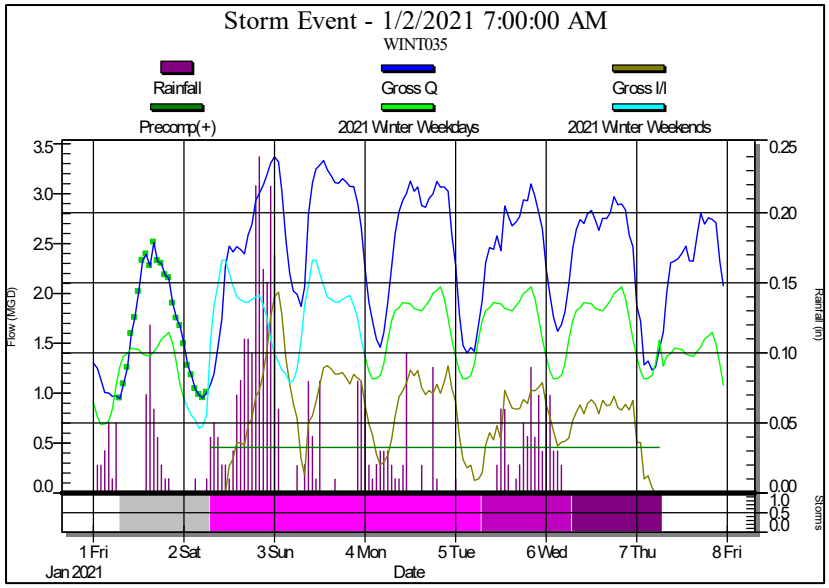

Scatter Graph
WINT035
Lanfear-Coll (C-LC = 8.88)
VFINAL (ft/s)
Iso Q (MGD)
13
12
11
10
9
8
7
6
5
4
3
2
1
0
54
48
42
36
30
24
18
12
6
1.5
0
5
10
15
20
25
30
35
DFINAL (in)

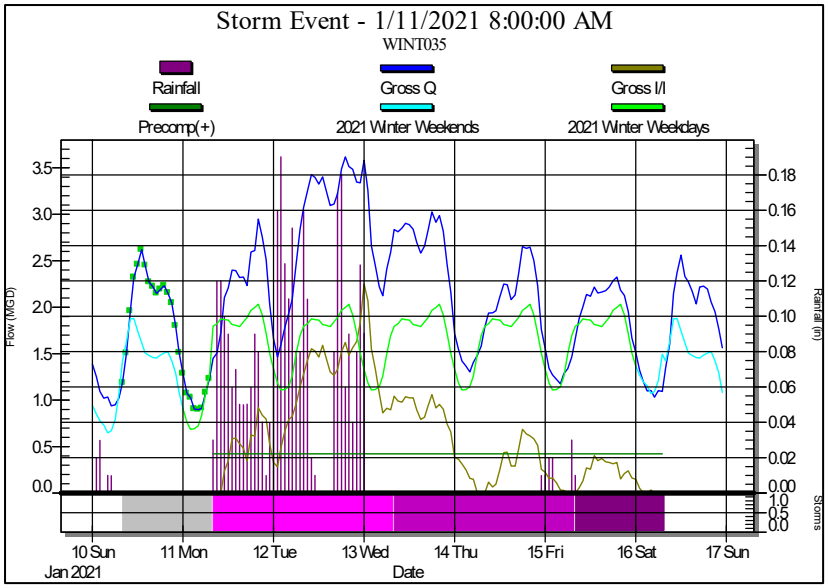

Storm Event - 10/9/2020 9:00:00 PM
WINT035
Rainfall
Gross Q
Gross I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

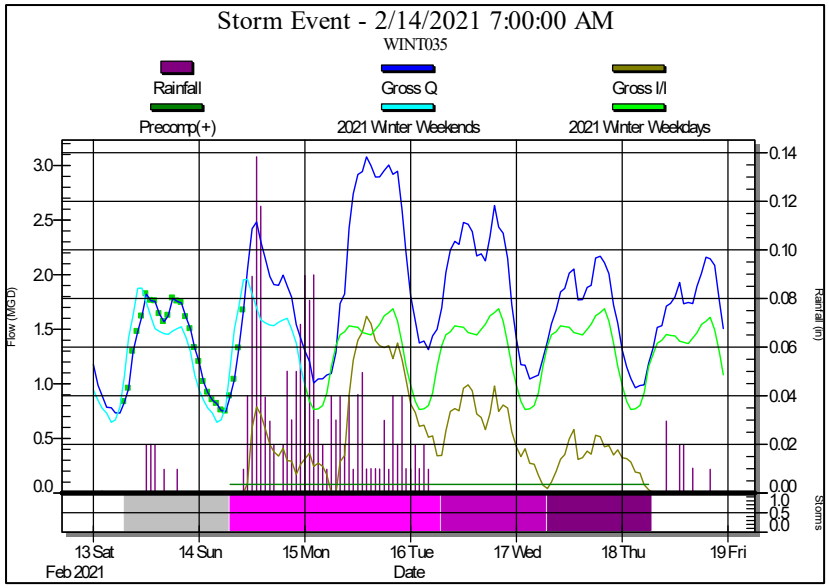

Storm Event - 11/3/2020 7:00:00 AM
WINT035
Rainfall
Gross Q
Gross I/I
Precomp(+)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

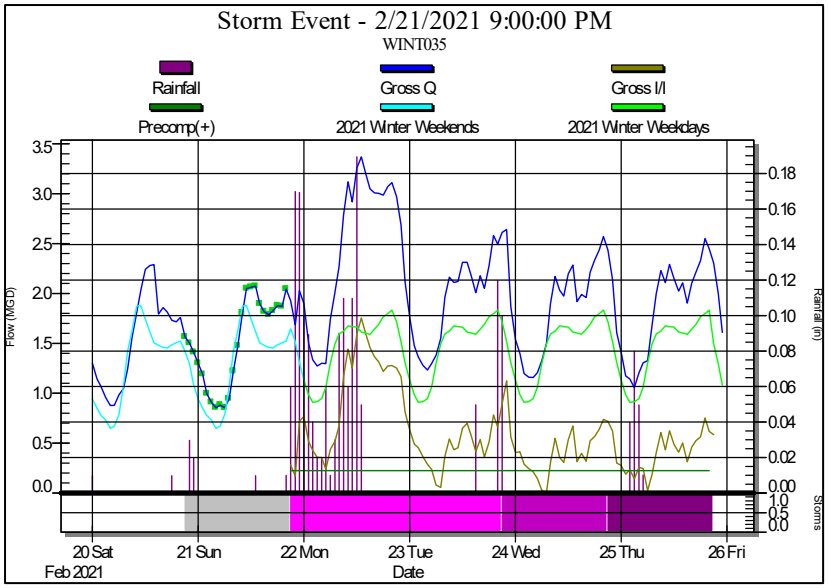

Storm Event - 11/14/2020 3:00:00 PM
WINT035
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

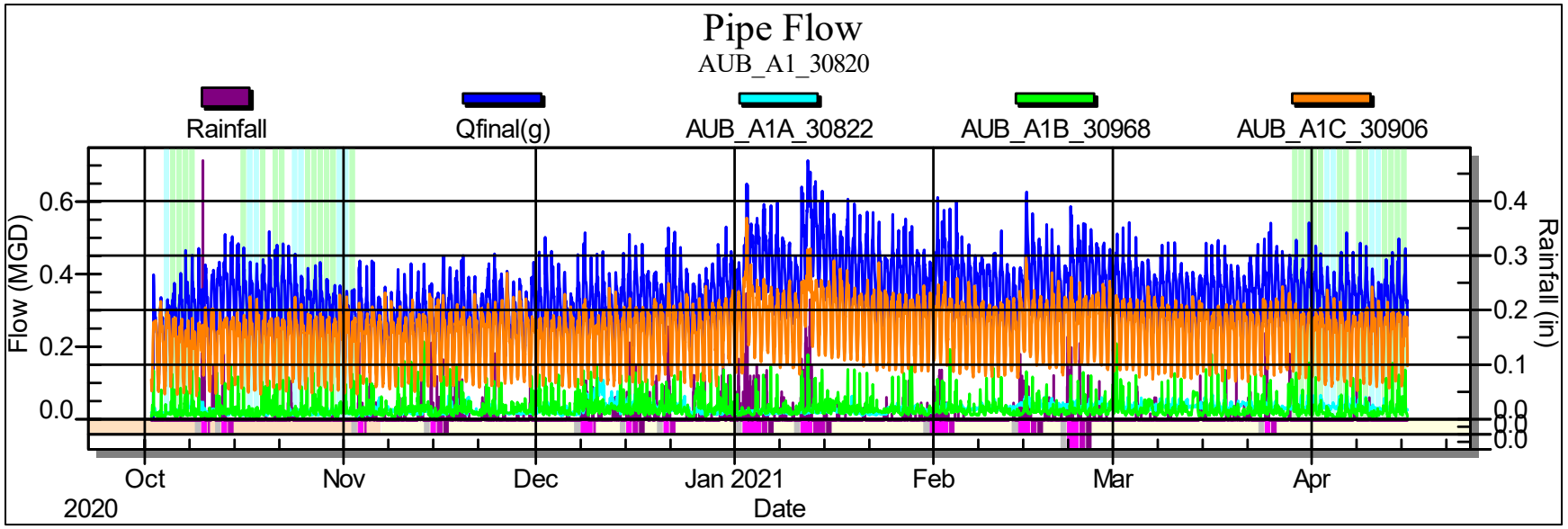

Storm Event - 12/20/2020 11:00:00 PM
WINT035
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

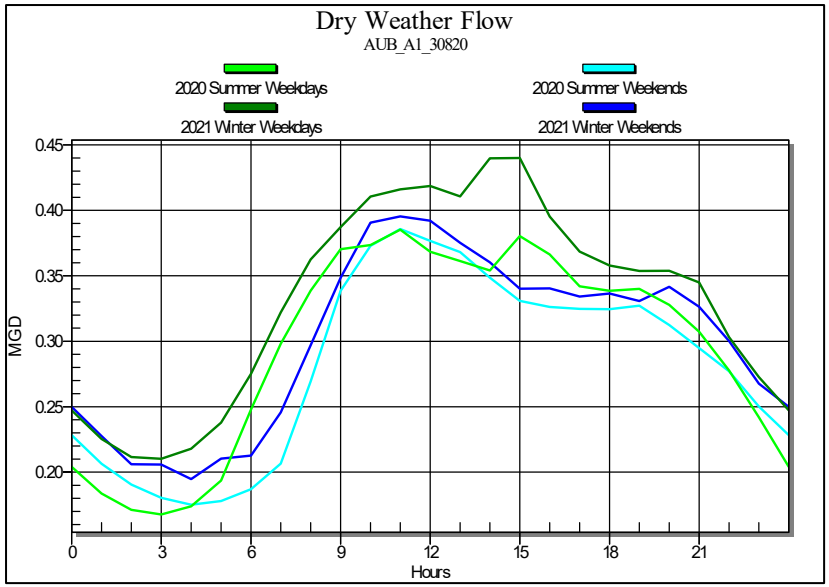

Storm Event - 1/2/2021 7:00:00 AM
WINT035
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
Jan 2021
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Date

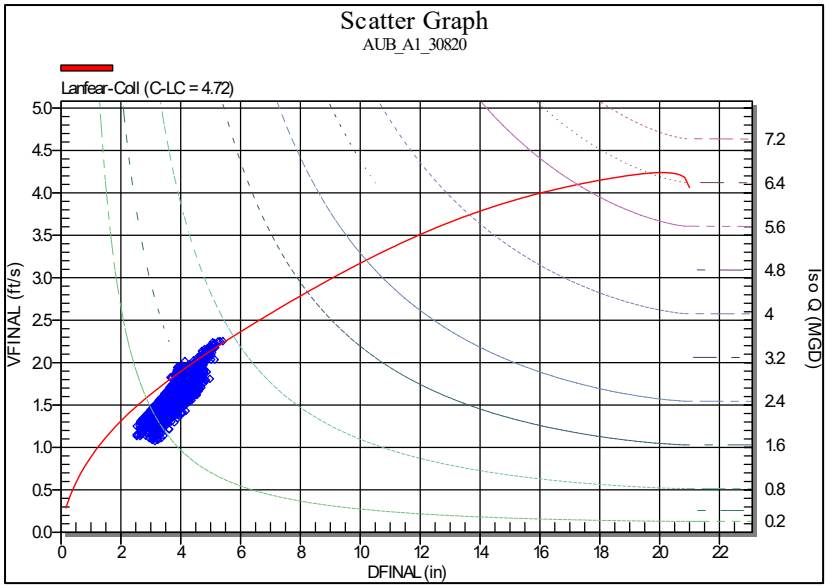

Storm Event - 1/11/2021 8:00:00 AM
WINT035
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
Jan 2021
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Date

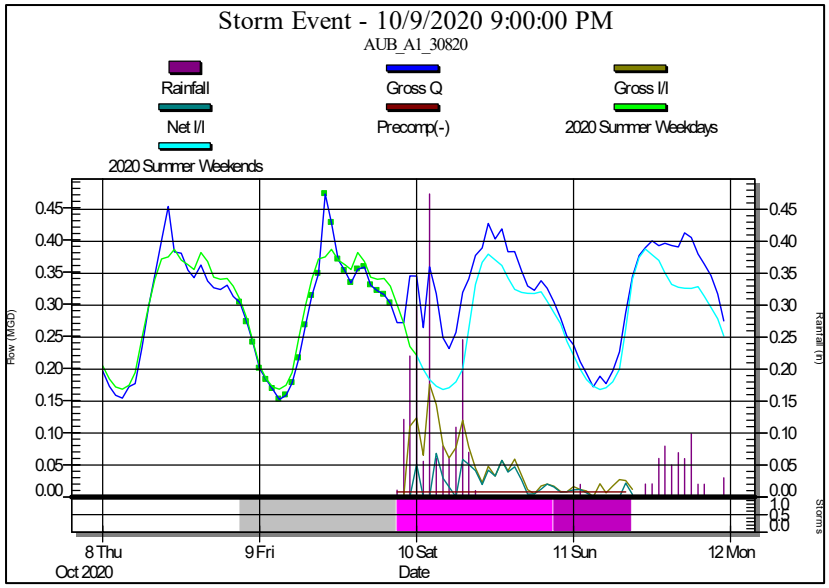

Storm Event - 2/14/2021 7:00:00 AM
WINT035
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
Feb 2021
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Date

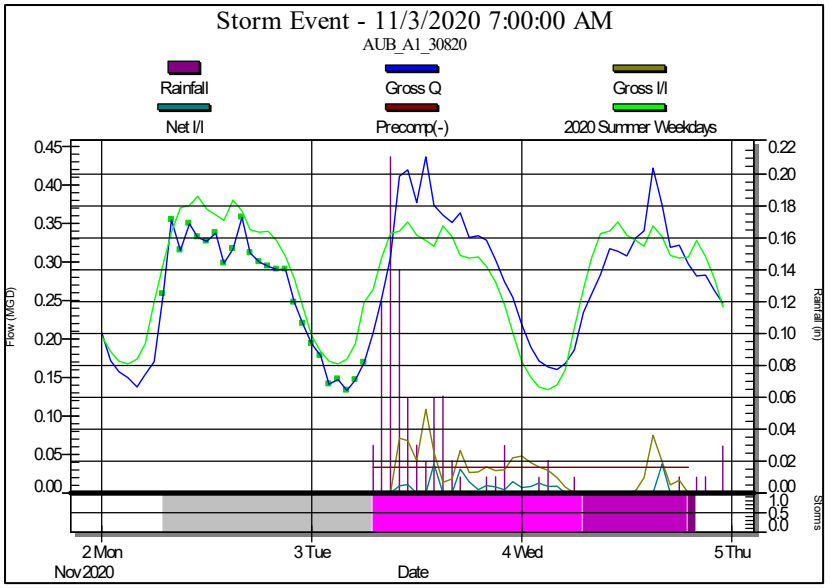

Storm Event - 2/21/2021 9:00:00 PM
WINT035
Rainfall
Gross Q
Gross I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
Feb 2021
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Date

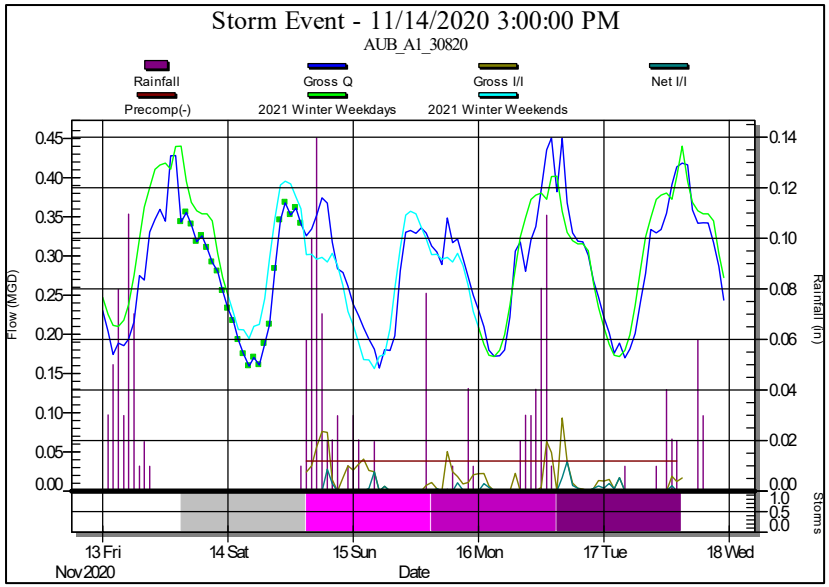

Pipe Flow
AUB_A1_30820
Rainfall
Qfinal(g)
AUB_A1A_30822
AUB_A1B_30968
AUB_A1C_30906
Flow (MGD)
0.6
0.4
0.2
0.0
Rainfall (in)
0.4
0.3
0.2
0.1
0.0
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

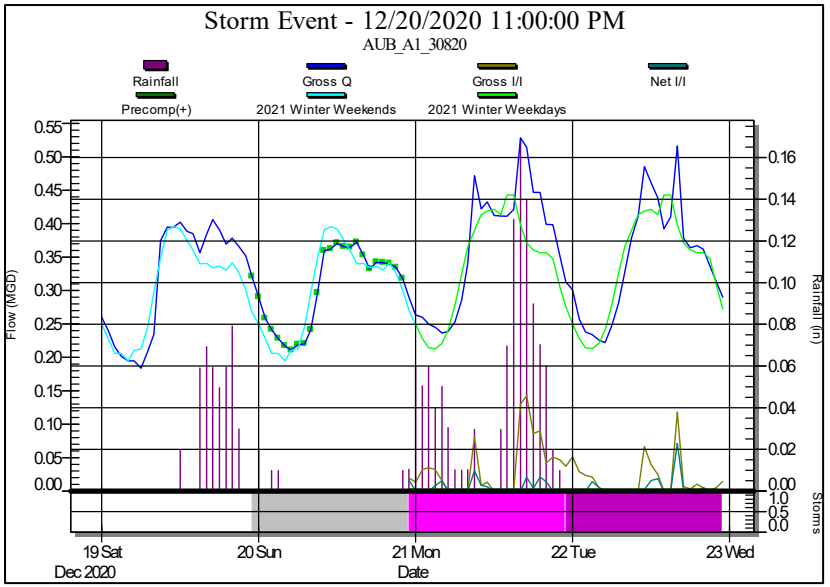

Dry Weather Flow
AUB_A1_30820
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
0.45
0.40
0.35
0.30
0.25
0.20
0
3
6
9
12
15
18
21
Hours

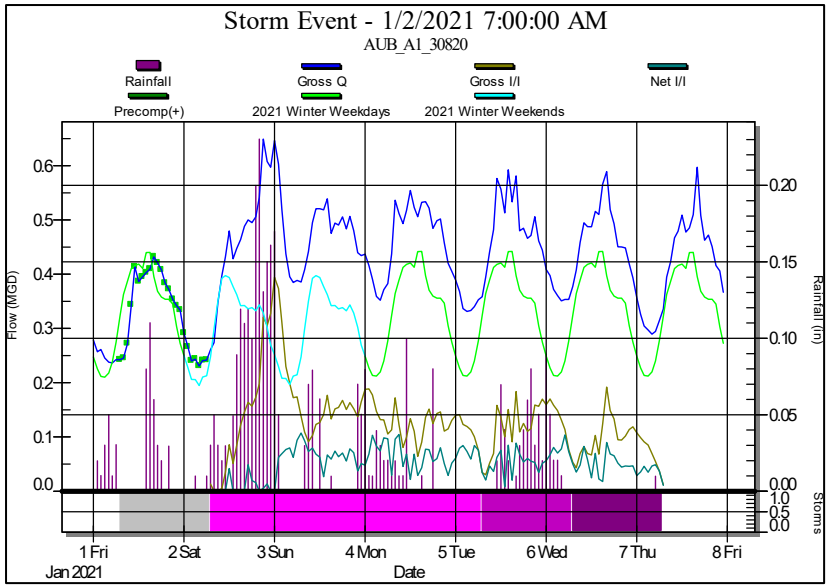

Scatter Graph
AUB_A1_30820
Lanfear-Coll (C-LC = 4.72)
VFINAL (ft/s)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Iso Q (MGD)
7.2
6.4
5.6
4.8
4
3.2
2.4
1.6
0.8
0.2
0
2
4
6
8
10
12
14
16
18
20
22
DFINAL (in)

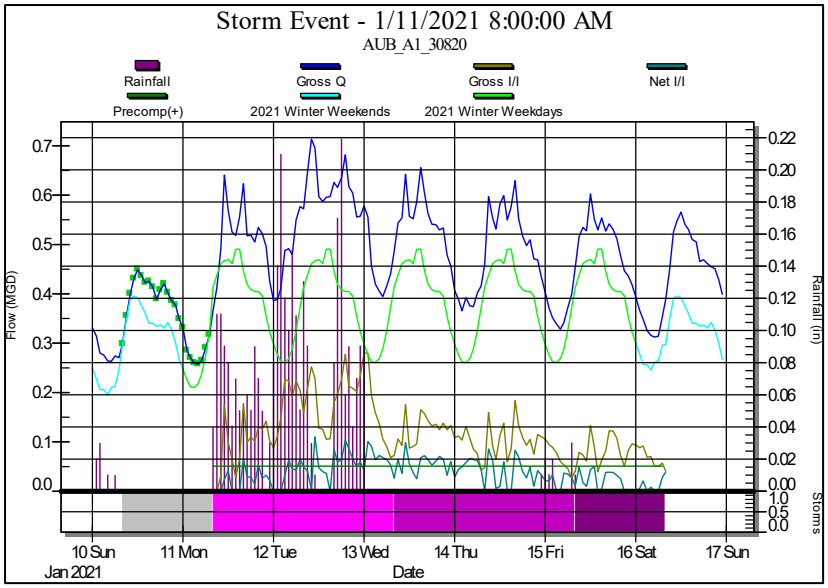

Storm Event - 10/9/2020 9:00:00 PM
AUB_A1_30820
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
9 Fri
10 Sat
11 Sun
12 Mon
Oct 2020
Date

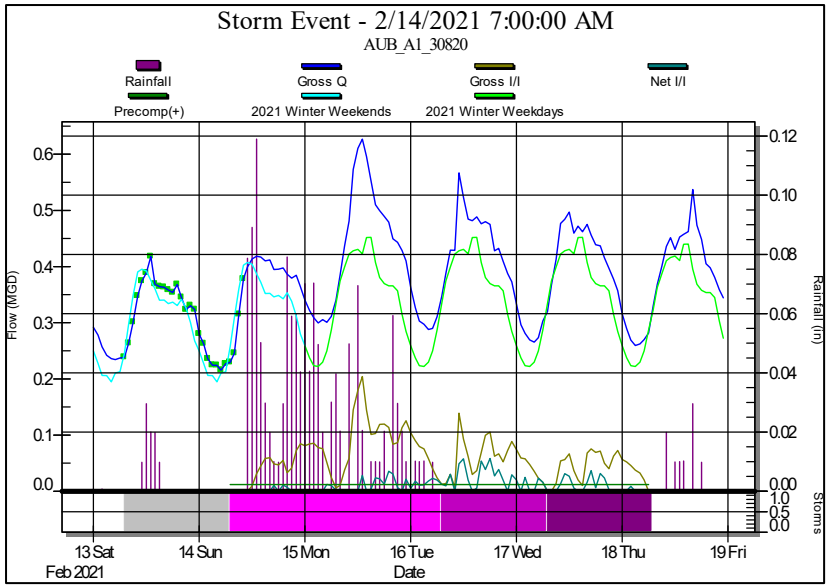

Storm Event - 11/3/2020 7:00:00 AM
AUB_A1_30820
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
3 Tue
4 Wed
5 Thu
Nov 2020
Date

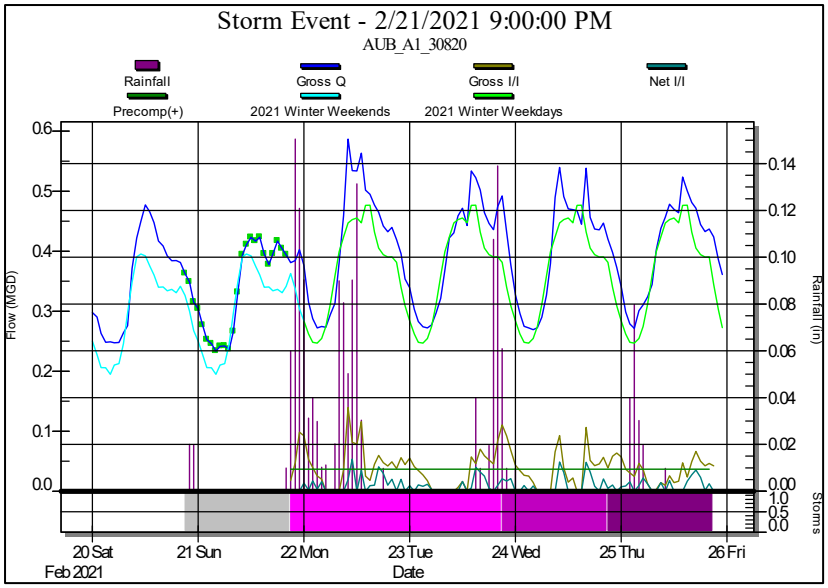

Storm Event - 11/14/2020 3:00:00 PM
AUB_A1_30820
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Nov 2020
Date

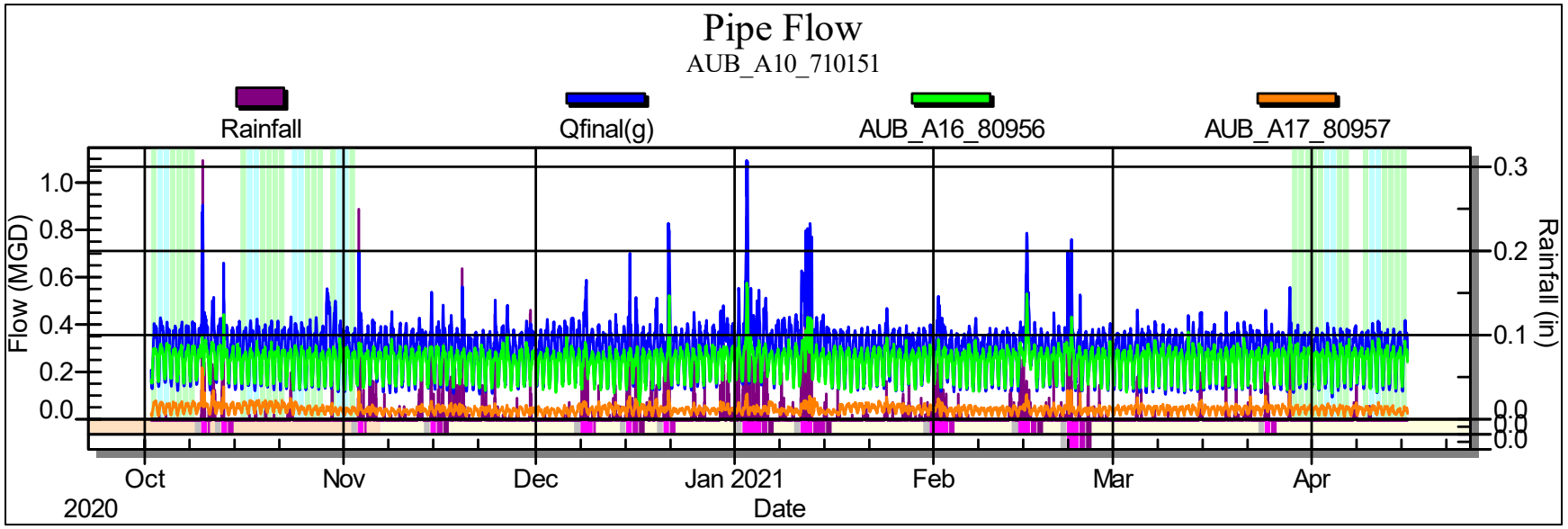

Storm Event - 12/20/2020 11:00:00 PM
AUB_A1_30820
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
20 Sun
21 Mon
22 Tue
23 Wed
Dec 2020
Date

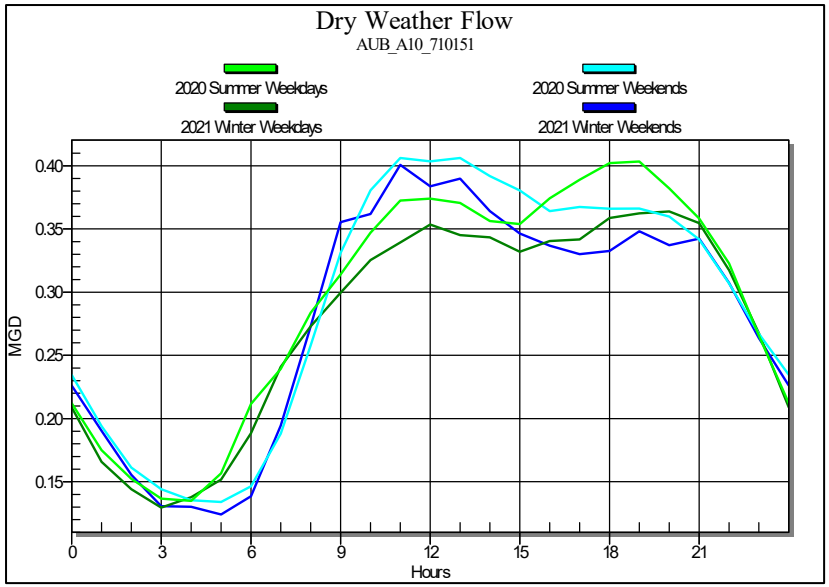

Storm Event - 1/2/2021 7:00:00 AM
AUB_A1_30820
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

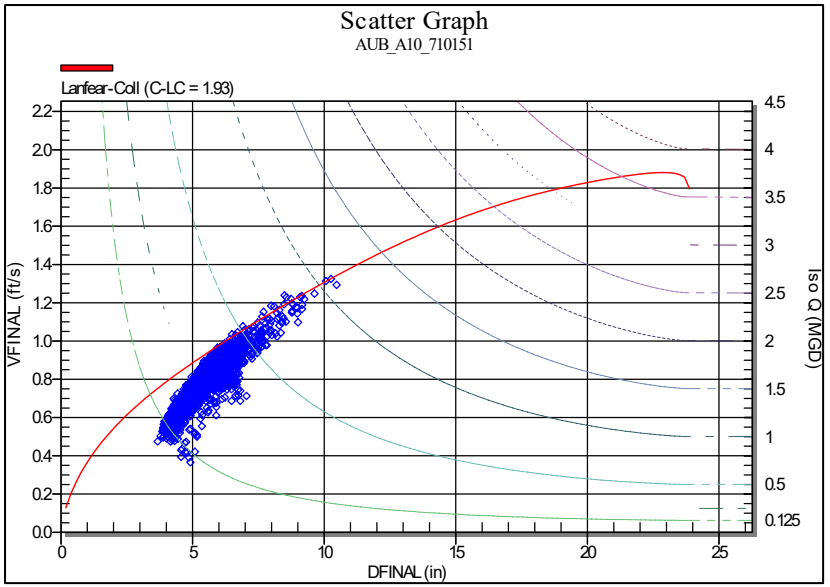

Storm Event - 1/11/2021 8:00:00 AM
AUB_A1_30820
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

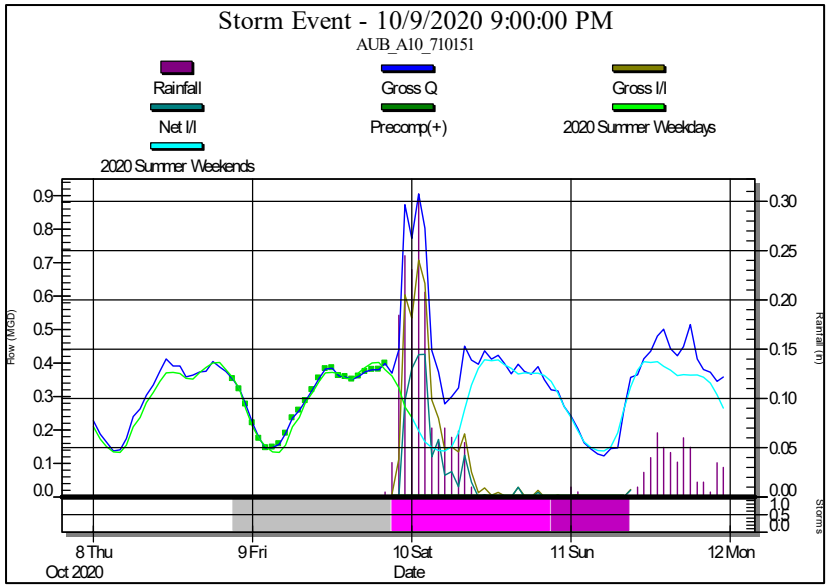

Storm Event - 2/14/2021 7:00:00 AM
AUB_A1_30820
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

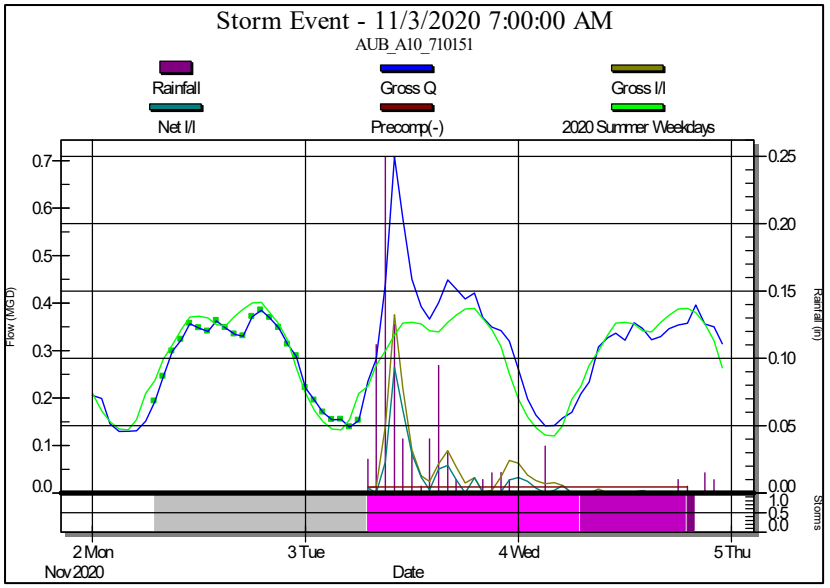

Storm Event - 2/21/2021 9:00:00 PM
AUB_A1_30820
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

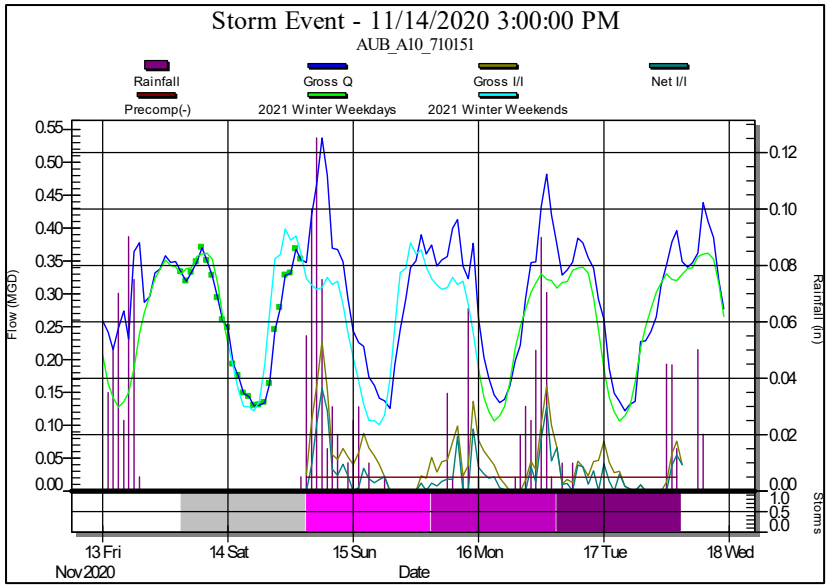

Pipe Flow
AUB_A10_710151
Rainfall
Qfinal(g)
AUB_A16_80956
AUB_A17_80957
Flow (MGD)
1.0
0.8
0.6
0.4
0.2
0.0
0.3
0.2
0.1
0.0
Rainfall (in)
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

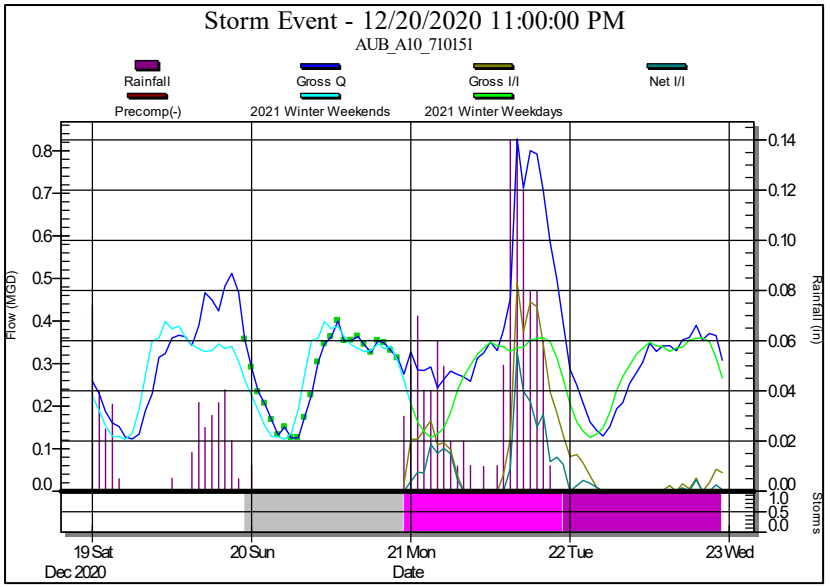

Dry Weather Flow
AUB_A10_710151
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
0.40
0.35
0.30
0.25
0.20
0.15
0
3
6
9
12
15
18
21
Hours

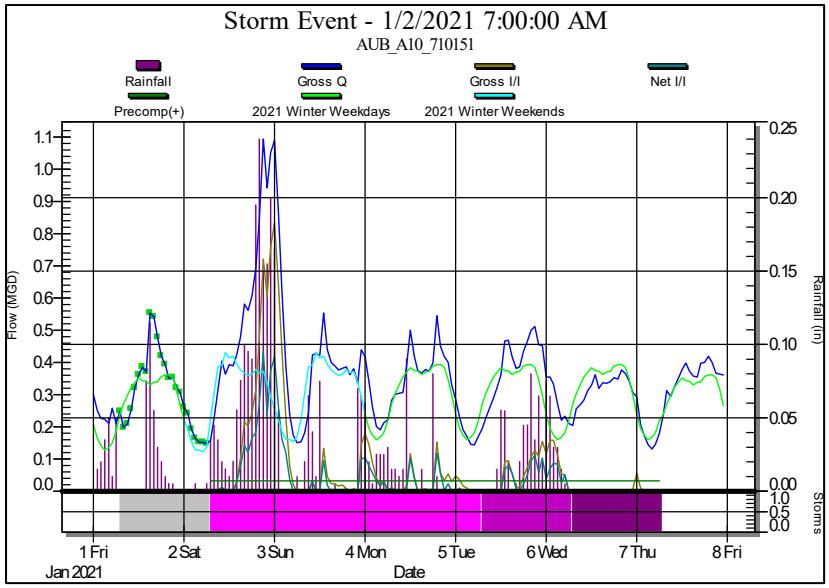

Scatter Graph
AUB_A10_710151
Lanfear-Coll (C-LC = 1.93)
VFINAL (ft/s)
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0.125
Iso Q (MGD)
0
5
10
15
20
25
DFINAL (in)

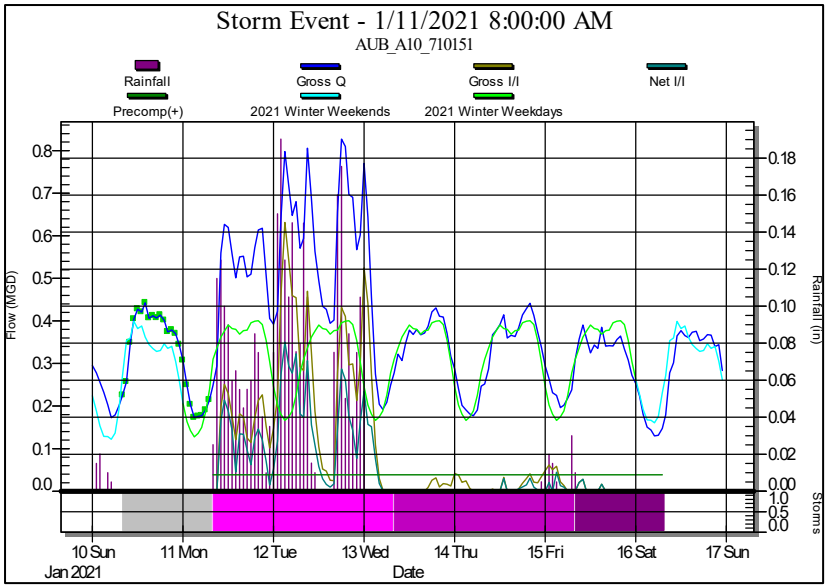

Storm Event - 10/9/2020 9:00:00 PM
AUB_A10_710151
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

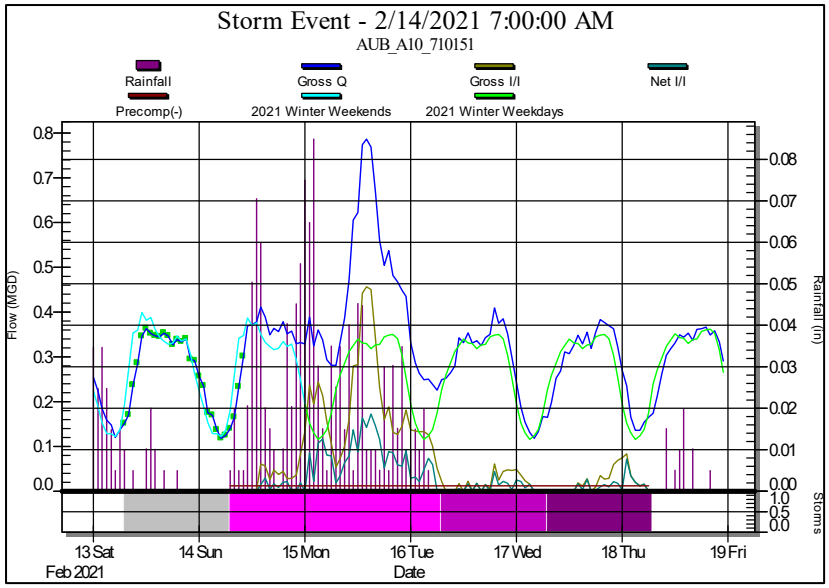

Storm Event - 11/3/2020 7:00:00 AM
AUB_A10_710151
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

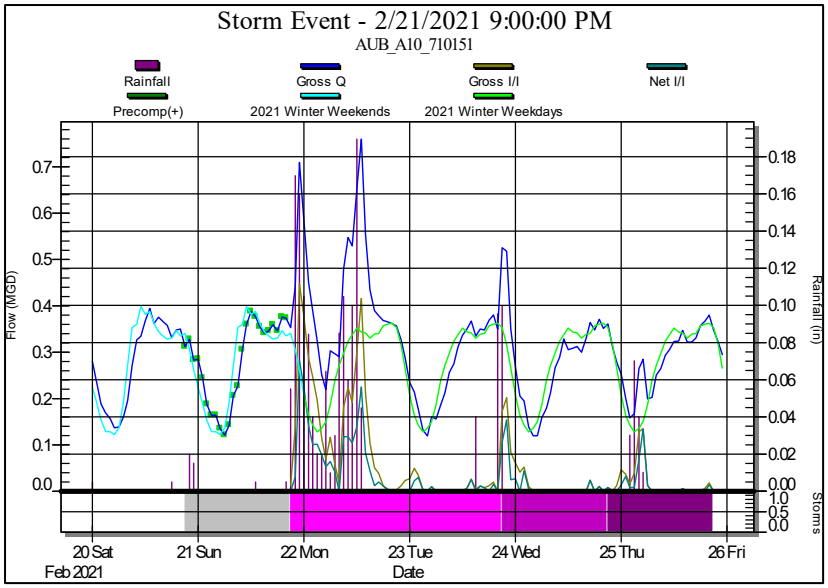

Storm Event - 11/14/2020 3:00:00 PM
AUB_A10_710151
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

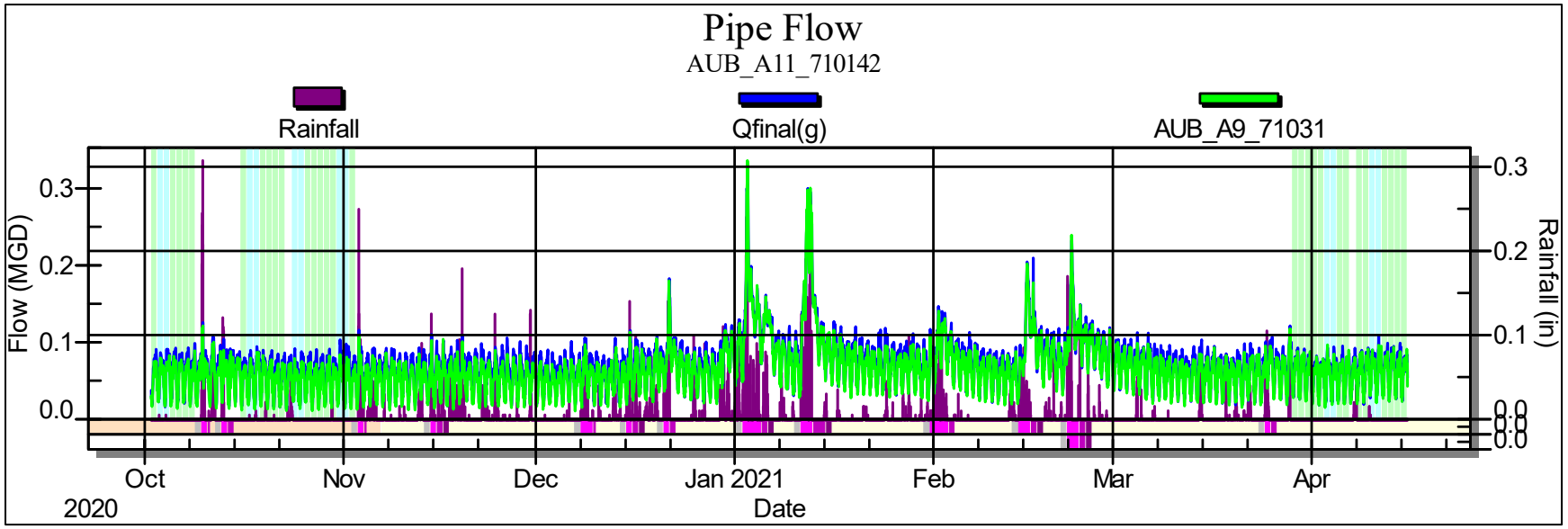

Storm Event - 12/20/2020 11:00:00 PM
AUB_A10_710151
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

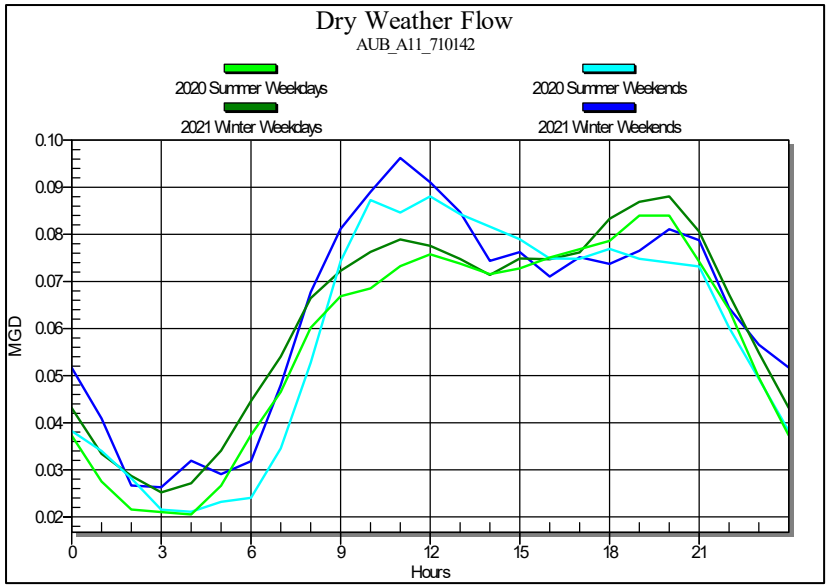

Storm Event - 1/2/2021 7:00:00 AM
AUB_A10_710151
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

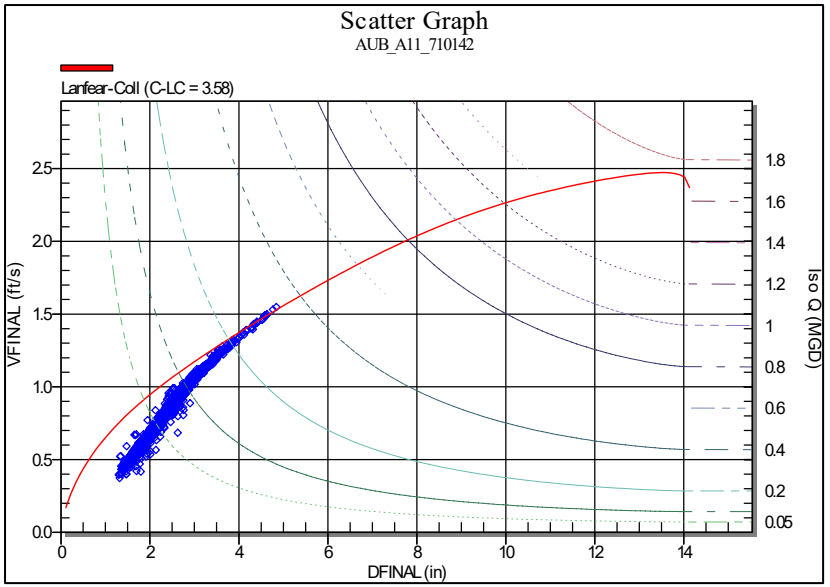

Storm Event - 1/11/2021 8:00:00 AM
AUB_A10_710151
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

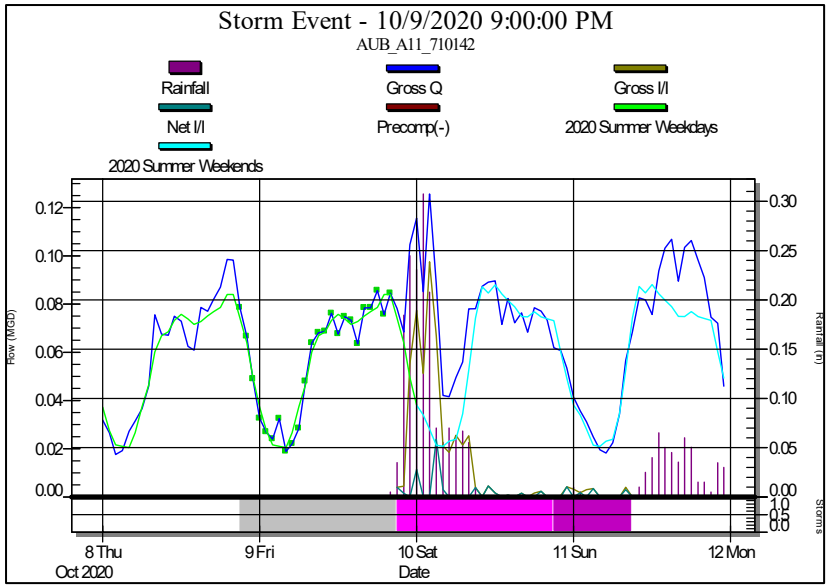

Storm Event - 2/14/2021 7:00:00 AM
AUB_A10_710151
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

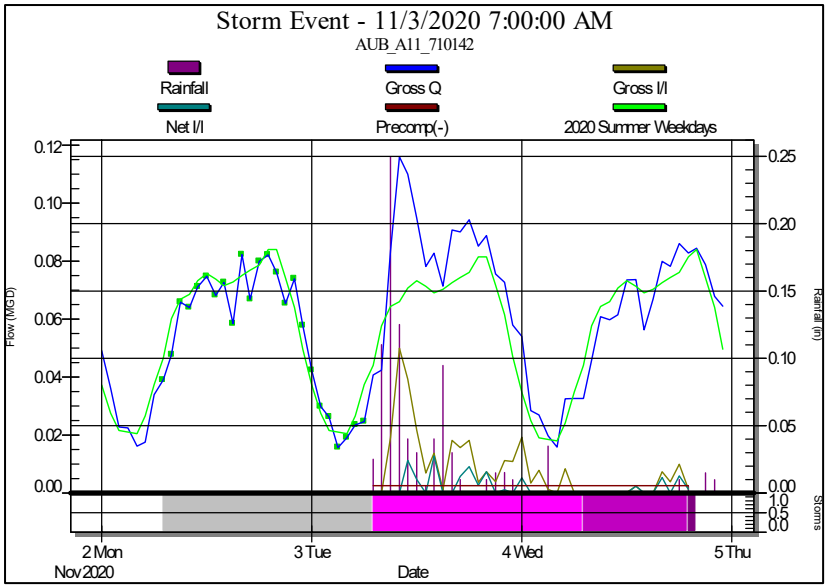

Storm Event - 2/21/2021 9:00:00 PM
AUB_A10_710151
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

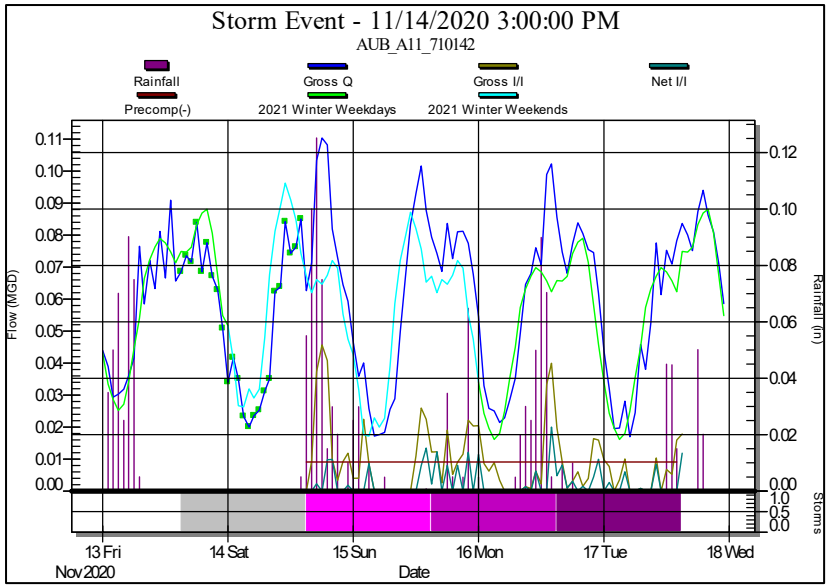

Pipe Flow
AUB_A11_710142
Rainfall
Qfinal(g)
AUB_A9_71031
Flow (MGD)
Rainfall (in)
0.3
0.2
0.1
0.0
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

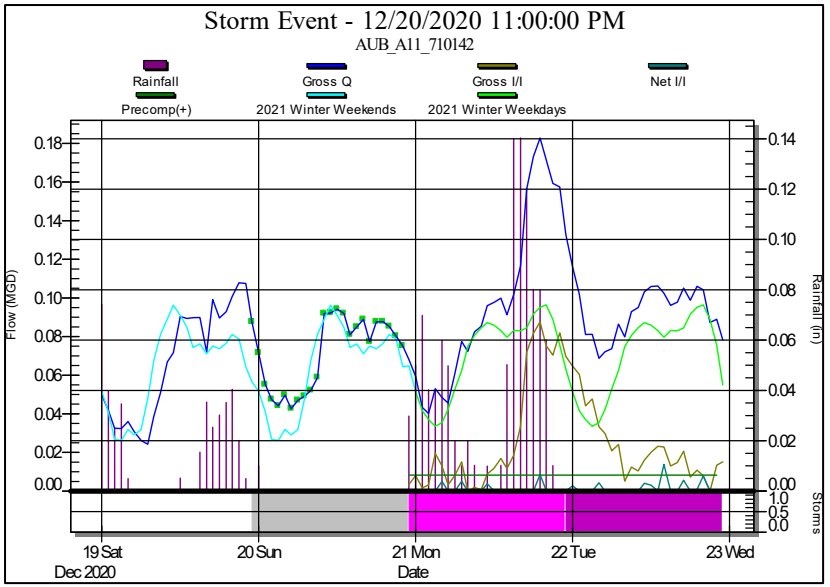

Dry Weather Flow
AUB_A11_710142
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
Hours

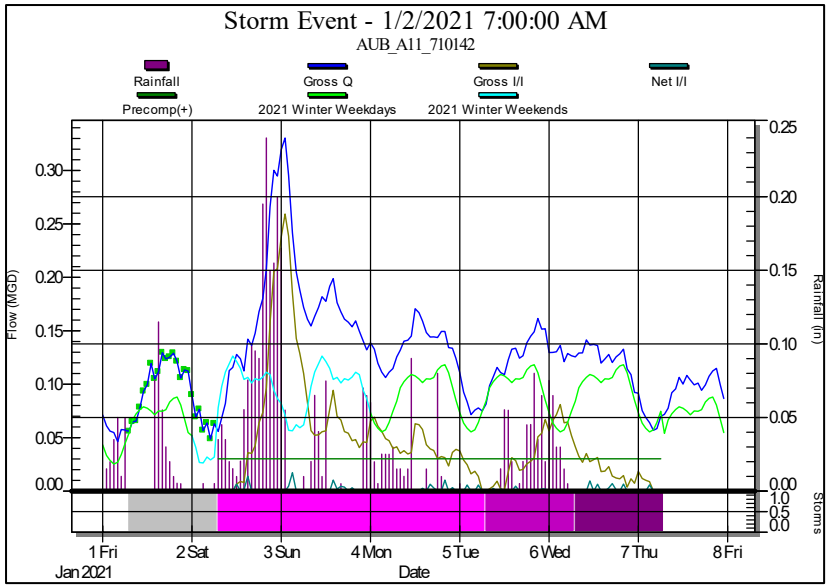

Scatter Graph
AUB_A11_710142
Lanfear-Coll (C-LC = 3.58)
VFINAL (ft/s)
Iso Q (MGD)
DFINAL (in)

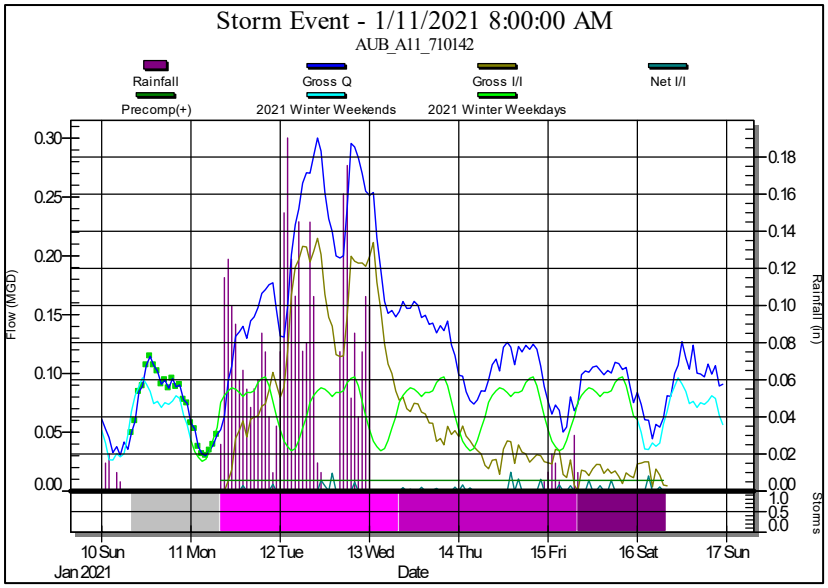

Storm Event - 10/9/2020 9:00:00 PM
AUB_A11_710142
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

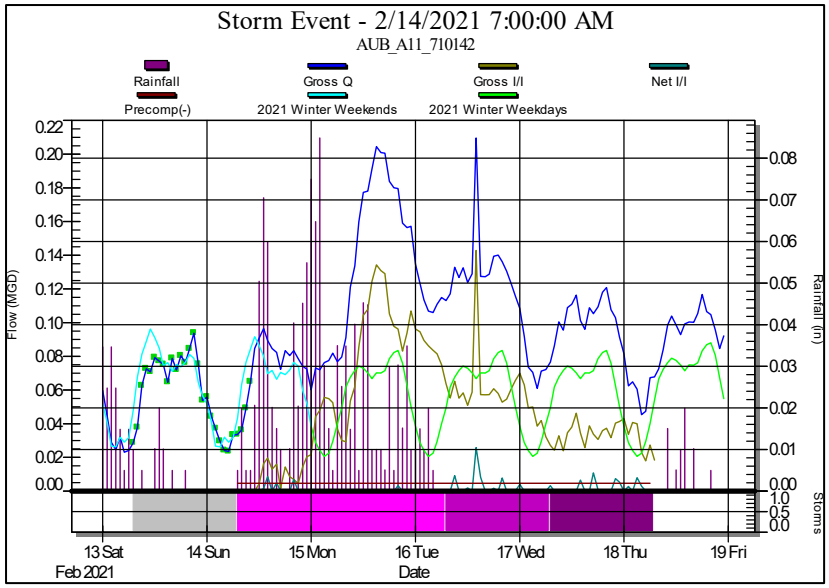

Storm Event - 11/3/2020 7:00:00 AM
AUB_A11_710142
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

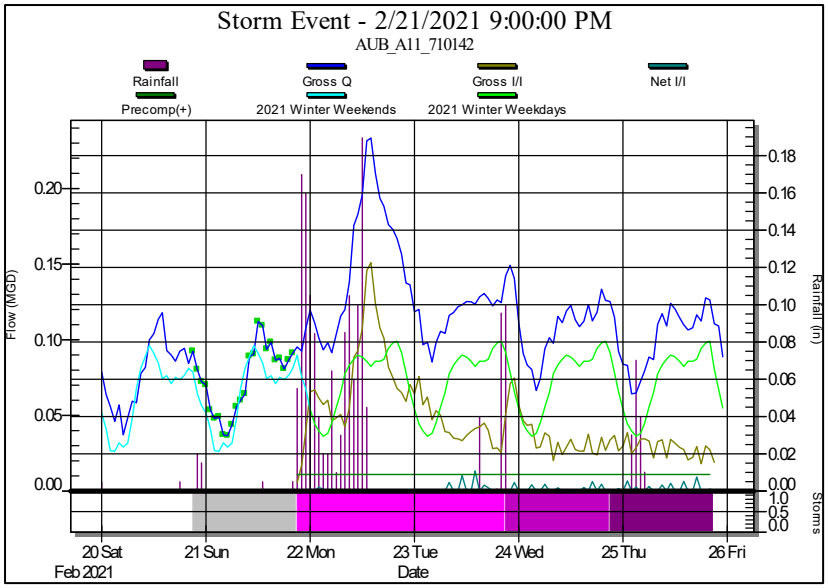

Storm Event - 11/14/2020 3:00:00 PM
AUB_A11_710142
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

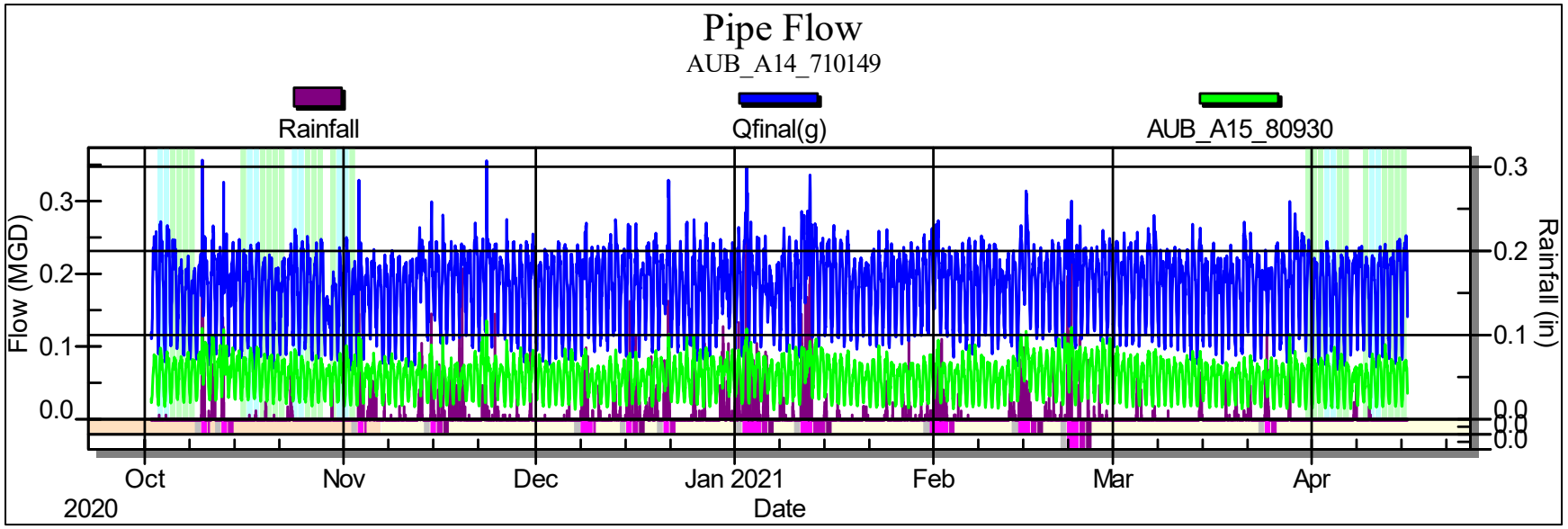

Storm Event - 12/20/2020 11:00:00 PM
AUB_A11_710142
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

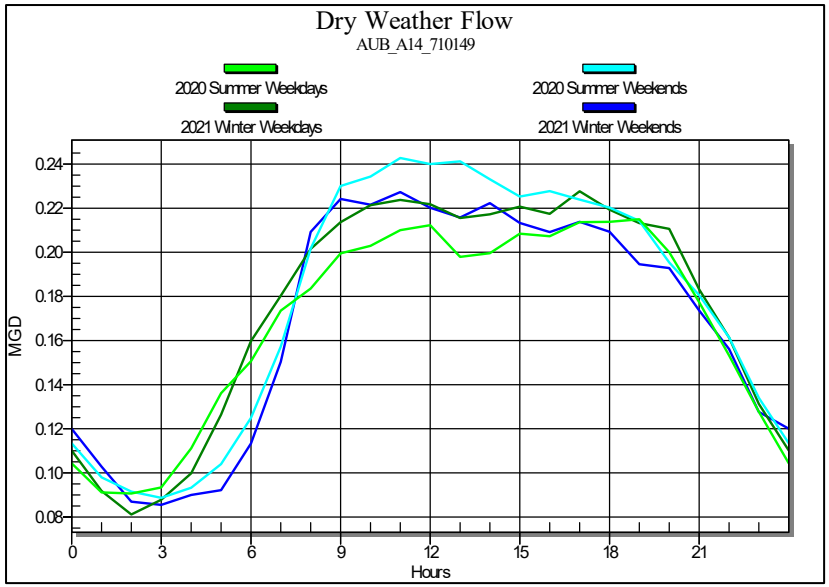

Storm Event - 1/2/2021 7:00:00 AM
AUB_A11_710142
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

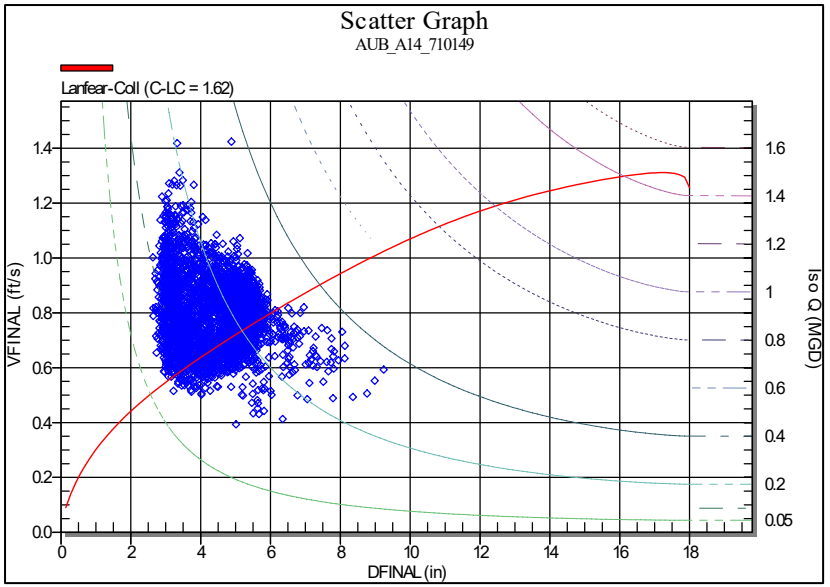

Storm Event - 1/11/2021 8:00:00 AM
AUB_A11_710142
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

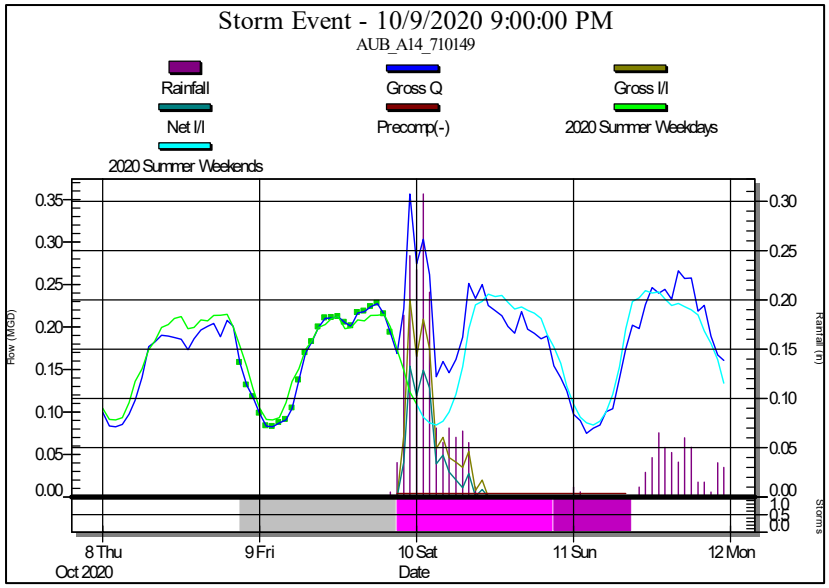

Storm Event - 2/14/2021 7:00:00 AM
AUB_A11_710142
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

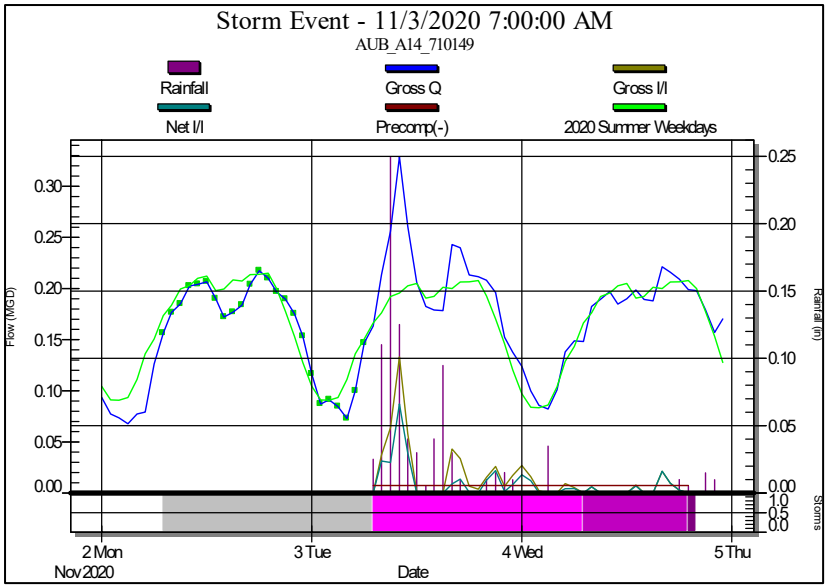

Storm Event - 2/21/2021 9:00:00 PM
AUB_A11_710142
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

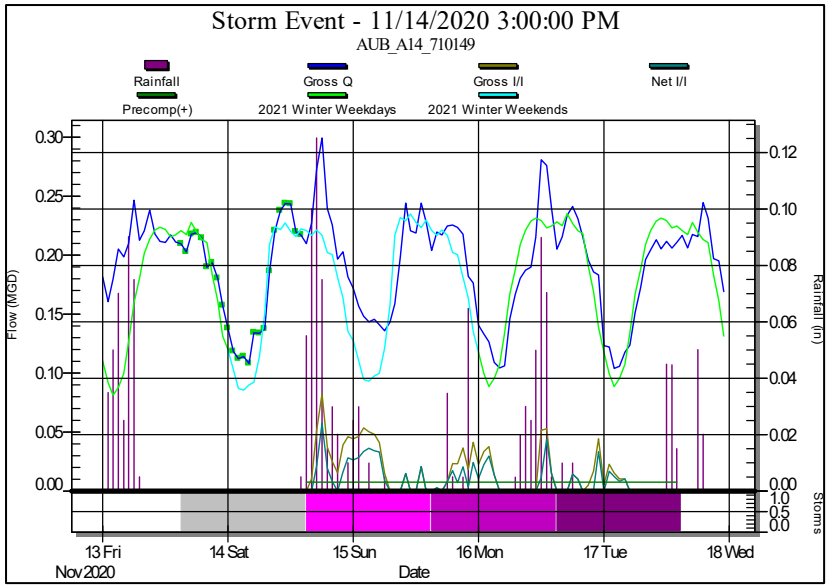

Pipe Flow
AUB_A14_710149
Rainfall
Qfinal(g)
AUB_A15_80930
Flow (MGD)
Rainfall (in)
0.3
0.2
0.1
0.0
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

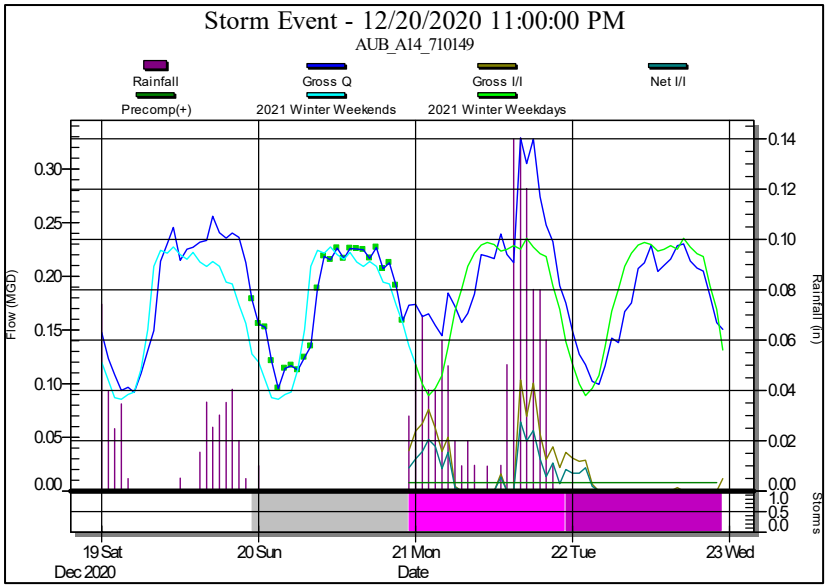

Dry Weather Flow
AUB_A14_710149
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
Hours

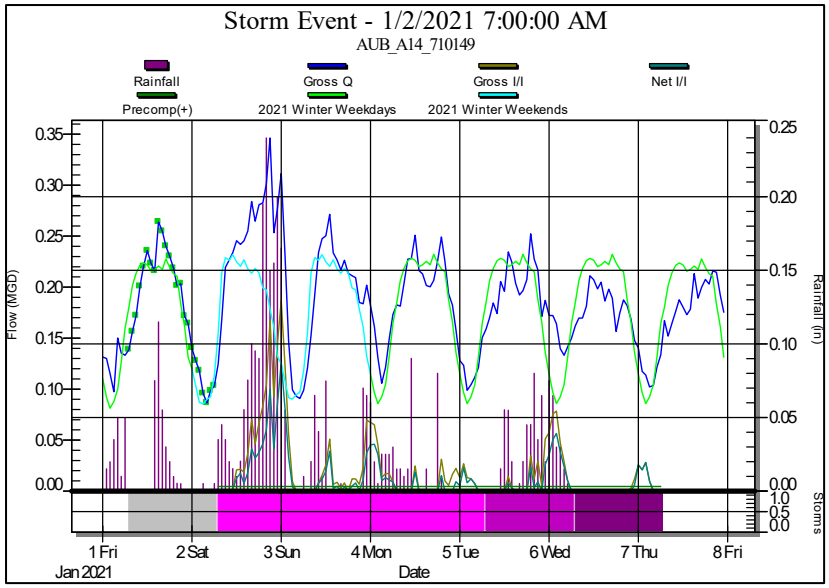

Scatter Graph
AUB_A14_710149
Lanfear-Coll (C-LC = 1.62)
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)

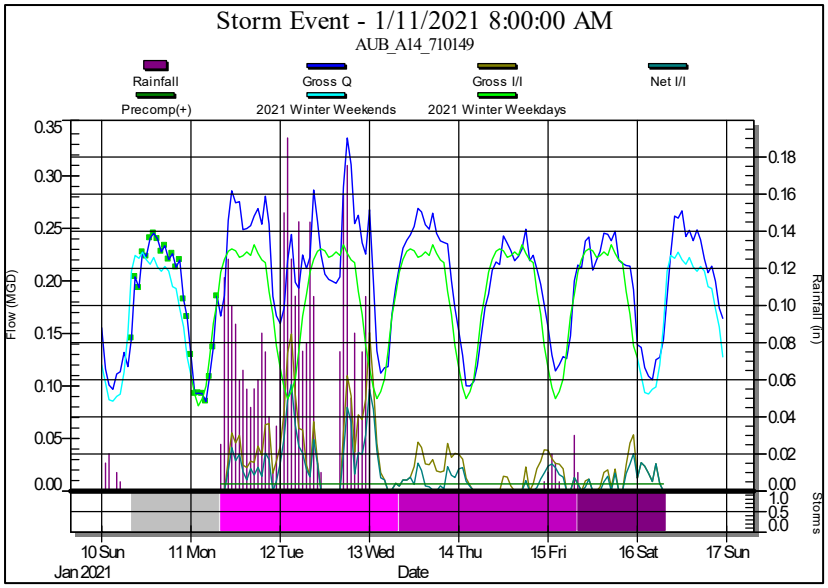

Storm Event - 10/9/2020 9:00:00 PM
AUB_A14_710149
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

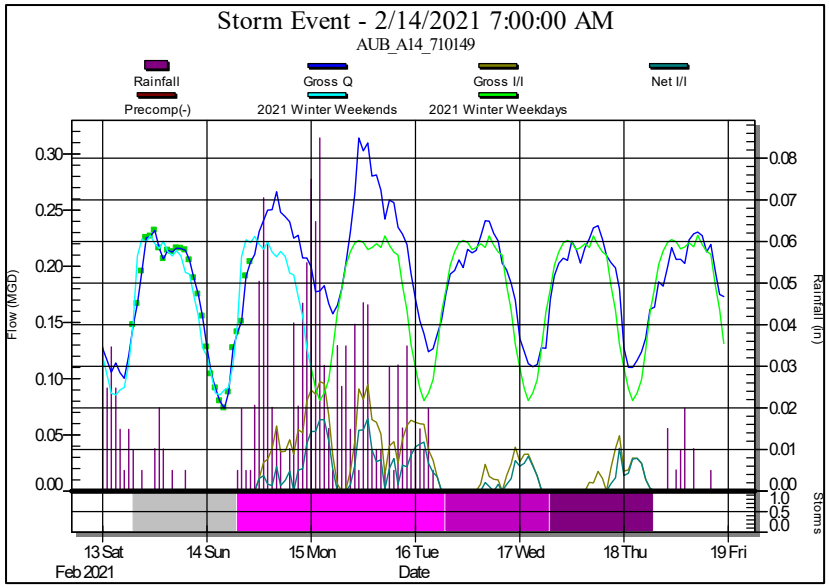

Storm Event - 11/3/2020 7:00:00 AM
AUB_A14_710149
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

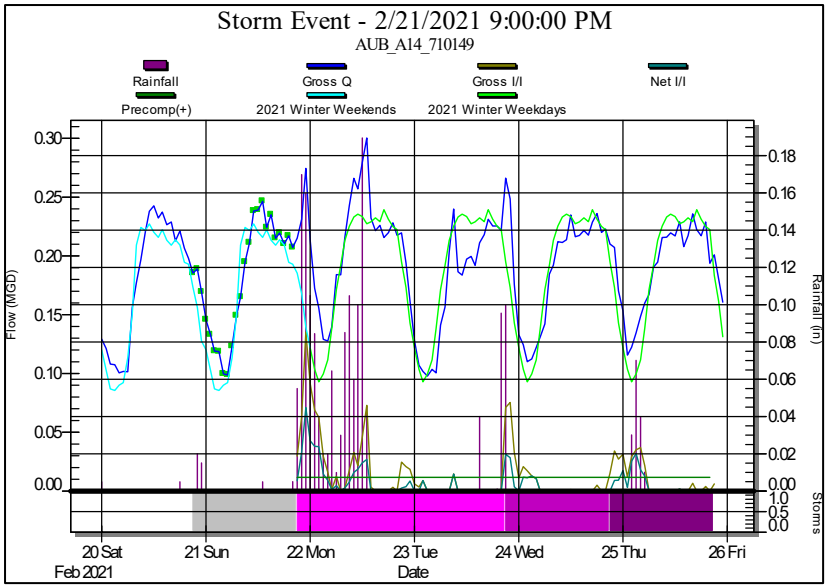

Storm Event - 11/14/2020 3:00:00 PM
AUB_A14_710149
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

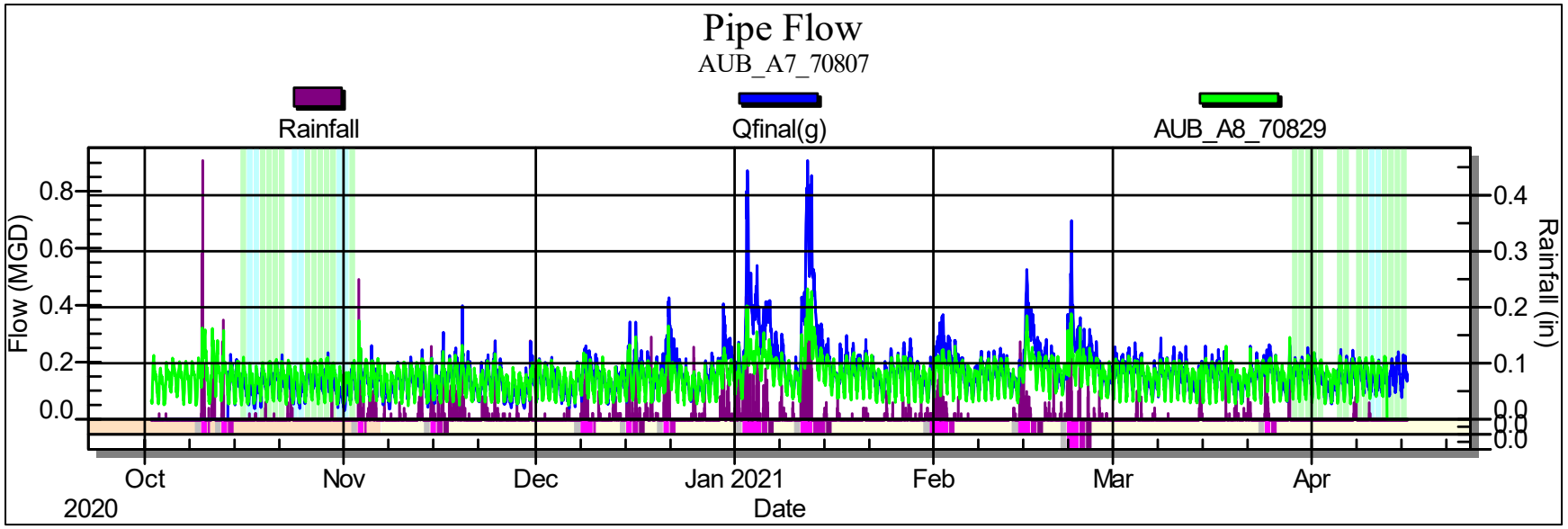

Storm Event - 12/20/2020 11:00:00 PM
AUB_A14_710149
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

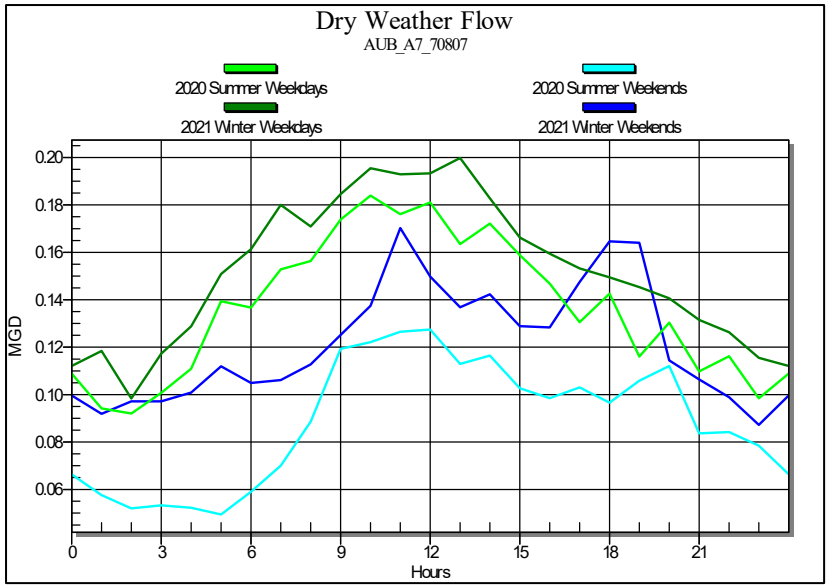

Storm Event - 1/2/2021 7:00:00 AM
AUB_A14_710149
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

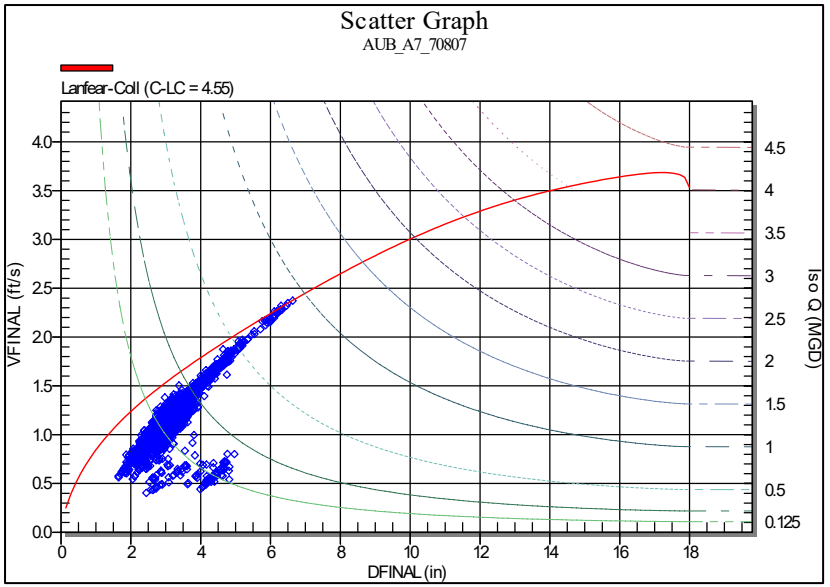

Storm Event - 1/11/2021 8:00:00 AM
AUB_A14_710149
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

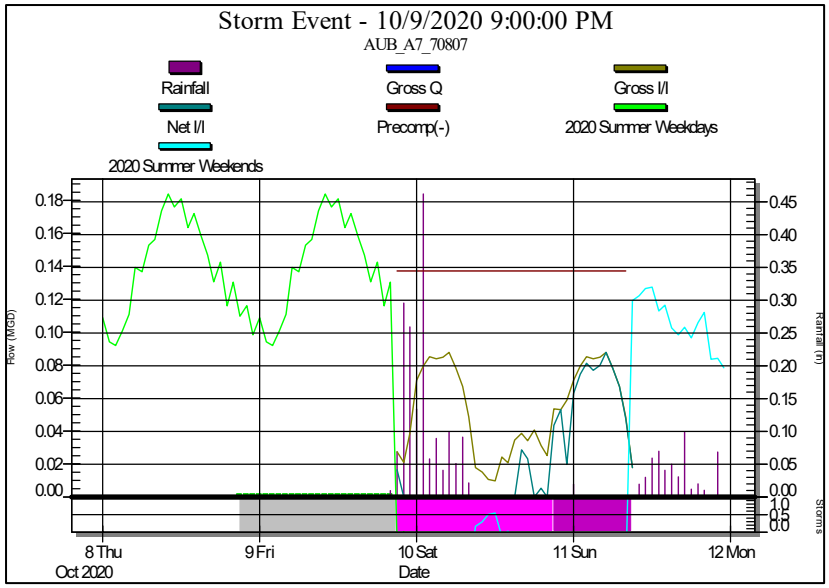

Storm Event - 2/14/2021 7:00:00 AM
AUB_A14_710149
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

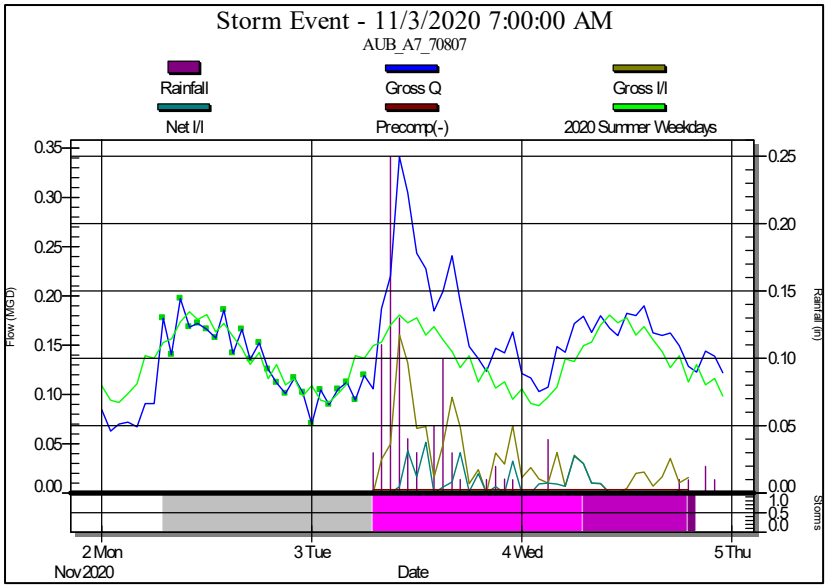

Storm Event - 2/21/2021 9:00:00 PM
AUB_A14_710149
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

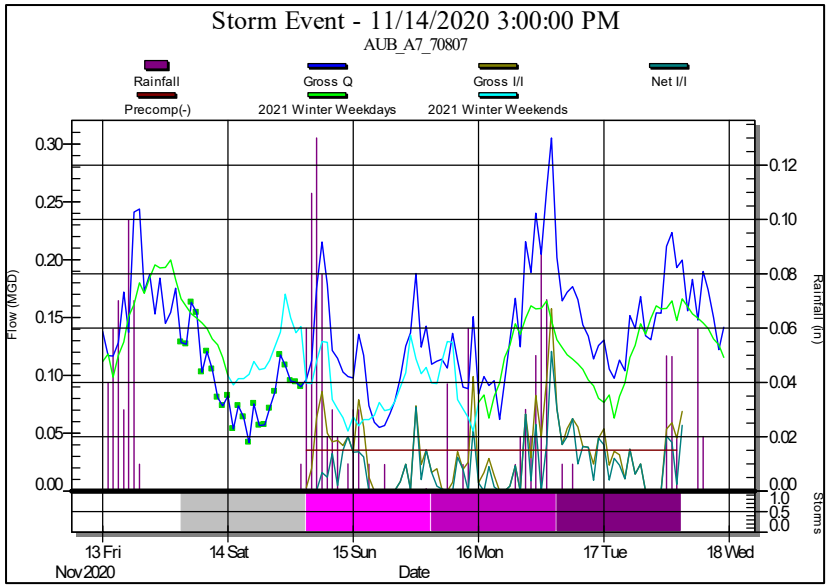

Pipe Flow
AUB_A7_70807
Rainfall
Qfinal(g)
AUB_A8_70829
Flow (MGD)
Rainfall (in)
0.8
0.6
0.4
0.2
0.0
0.4
0.3
0.2
0.1
0.0
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

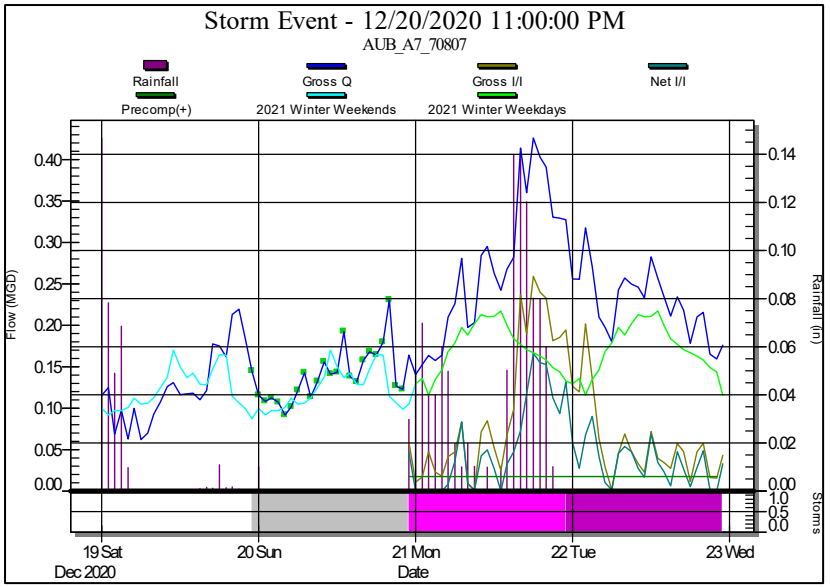

Dry Weather Flow
AUB_A7_70807
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0
3
6
9
12
15
18
21
Hours

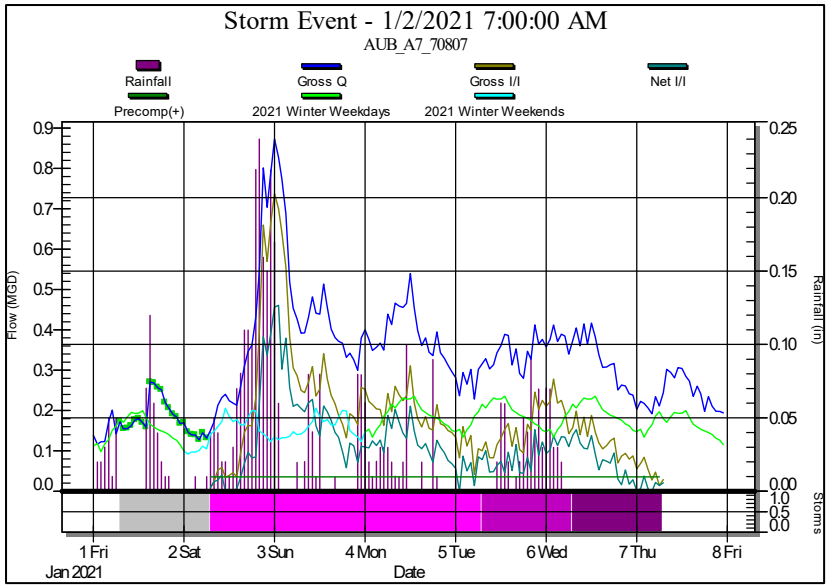

Scatter Graph
AUB_A7_70807
Lanfear-Coll (C-LC = 4.55)
VFINAL (ft/s)
Iso Q (MGD)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0.125
0
2
4
6
8
10
12
14
16
18
DFINAL (in)

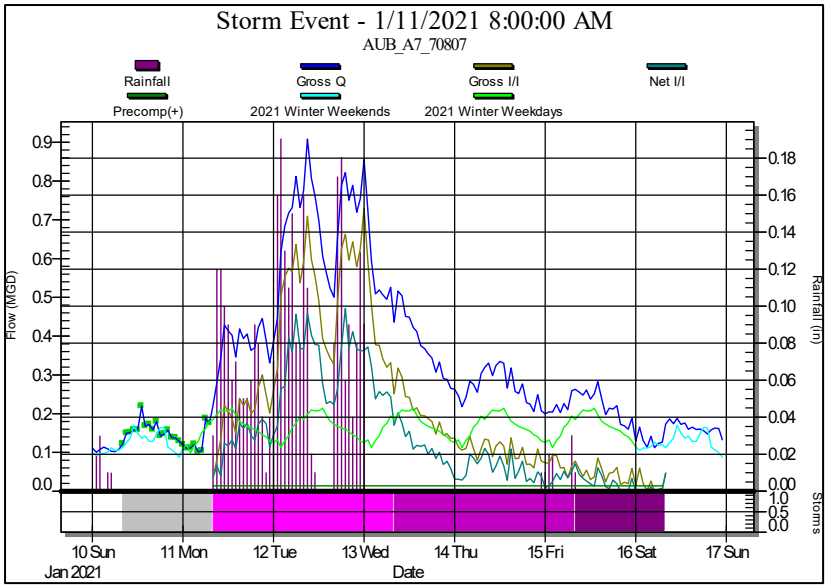

Storm Event - 10/9/2020 9:00:00 PM
AUB_A7_70807
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
Oct 2020
9 Fri
10 Sat
11 Sun
12 Mon
Date

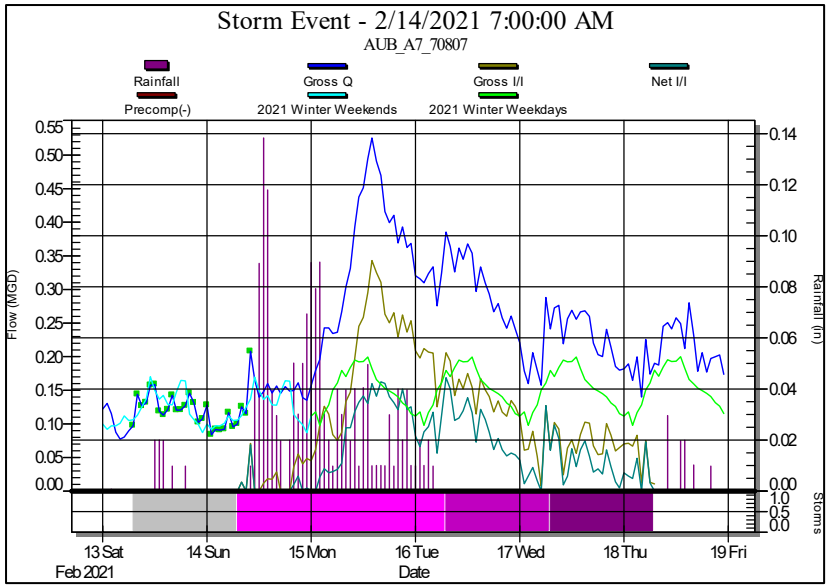

Storm Event - 11/3/2020 7:00:00 AM
AUB_A7_70807
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
Nov 2020
3 Tue
4 Wed
5 Thu
Date

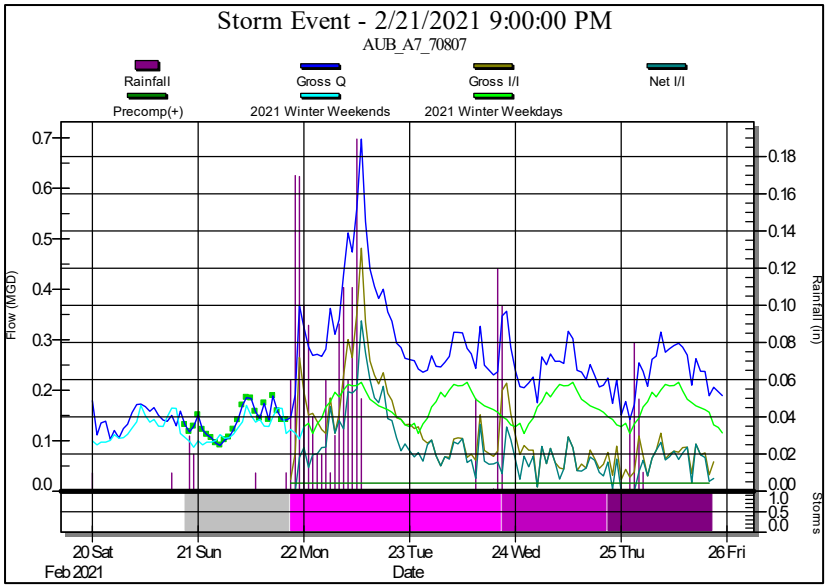

Storm Event - 11/14/2020 3:00:00 PM
AUB_A7_70807
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
Nov 2020
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Date

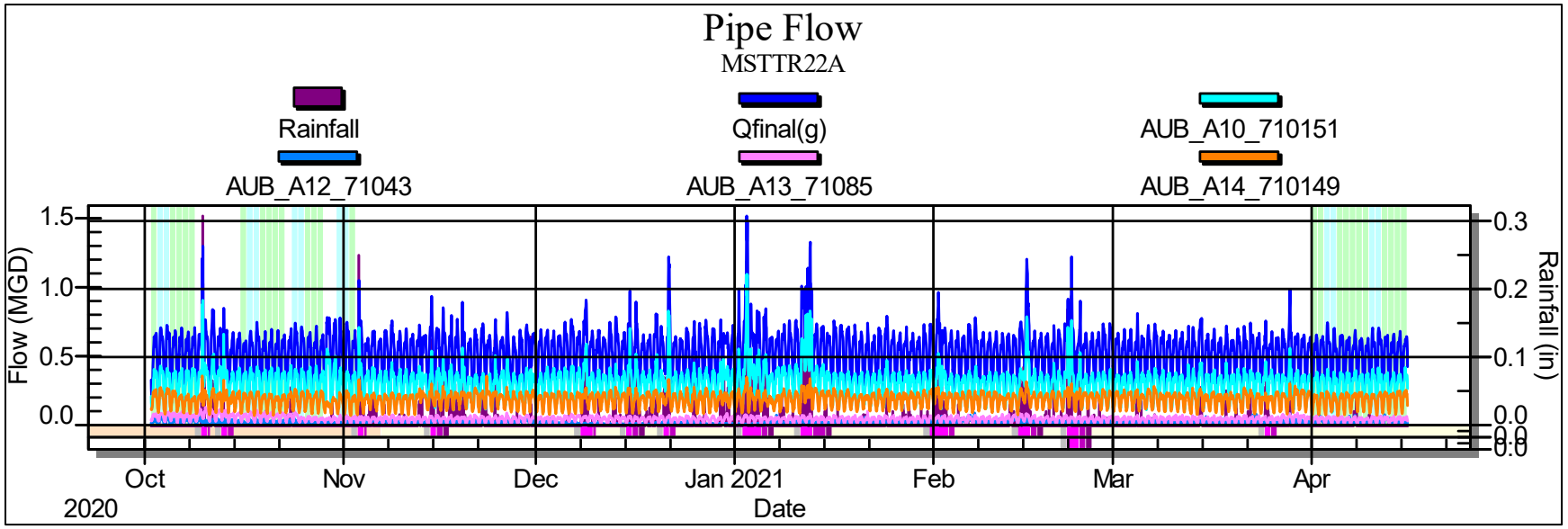

Storm Event - 12/20/2020 11:00:00 PM
AUB_A7_70807
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
Dec 2020
20 Sun
21 Mon
22 Tue
23 Wed
Date

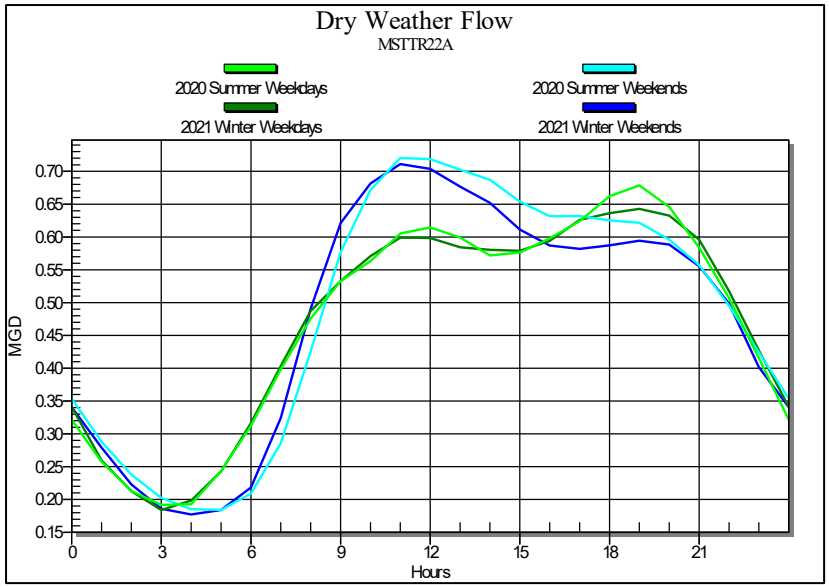

Storm Event - 1/2/2021 7:00:00 AM
AUB_A7_70807
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

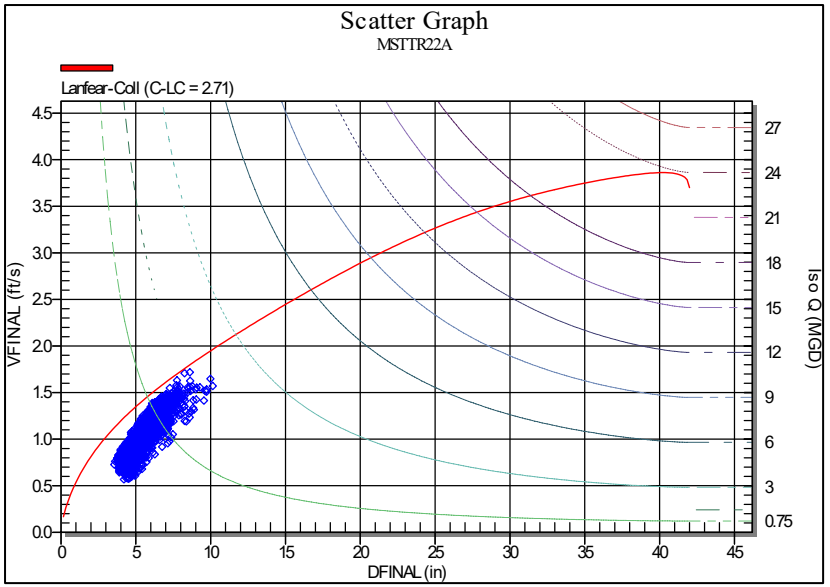

Storm Event - 1/11/2021 8:00:00 AM
AUB_A7_70807
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

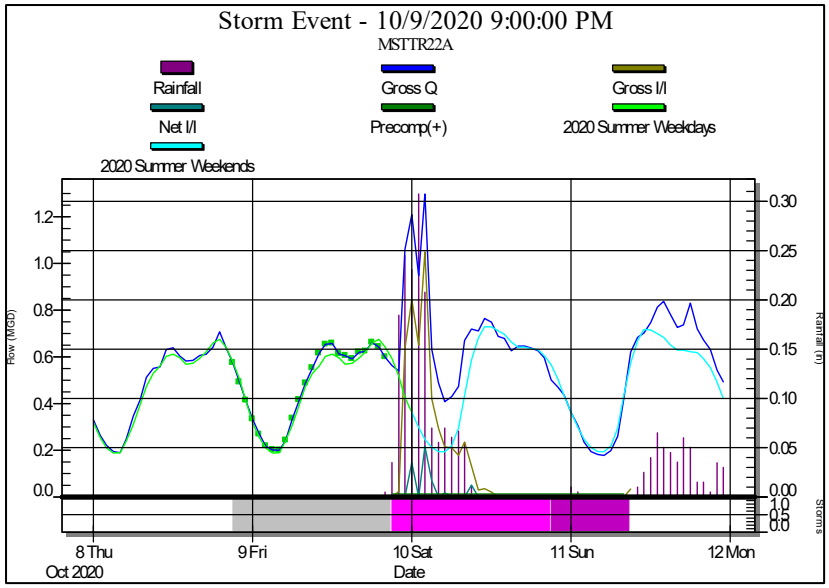

Storm Event - 2/14/2021 7:00:00 AM
AUB_A7_70807
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

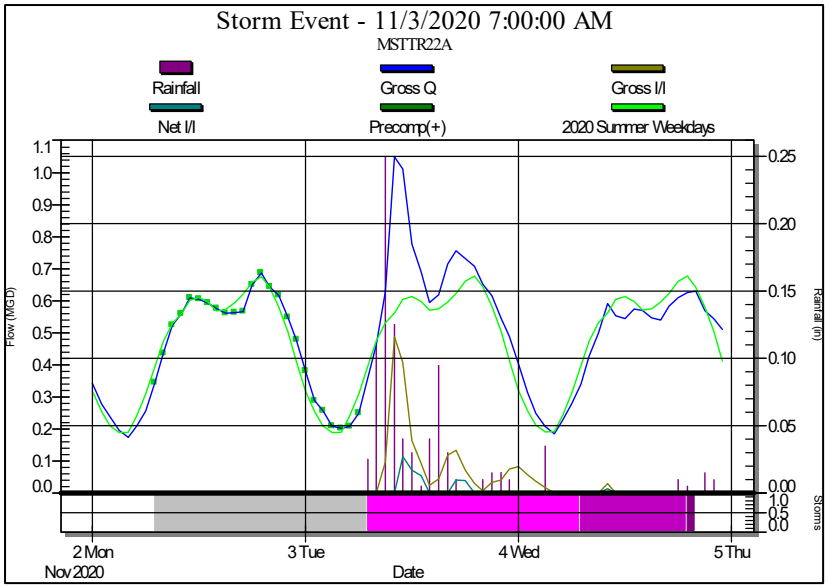

Storm Event - 2/21/2021 9:00:00 PM
AUB_A7_70807
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

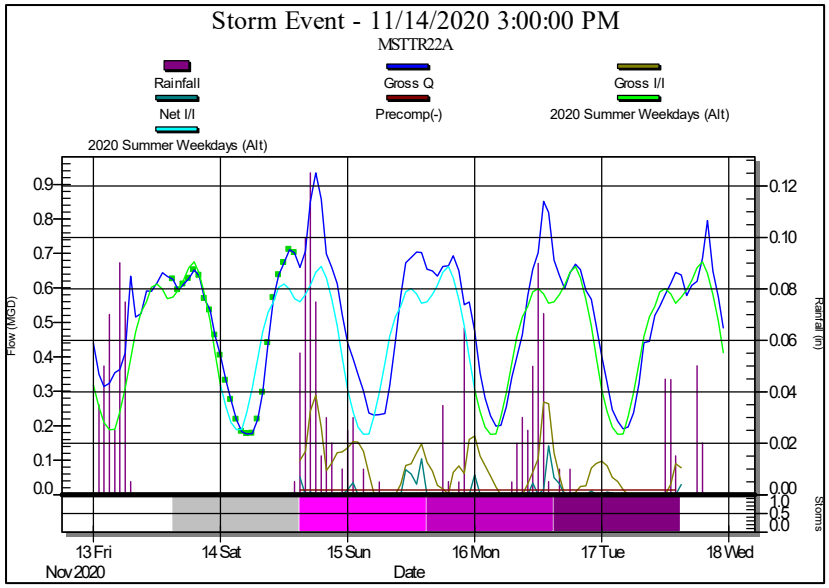

Pipe Flow
MSTTR22A
Rainfall
Qfinal(g)
AUB_A10_710151
AUB_A12_71043
AUB_A13_71085
AUB_A14_710149
Flow (MGD)
Rainfall (in)
1.5
1.0
0.5
0.0
0.3
0.2
0.1
0.0
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

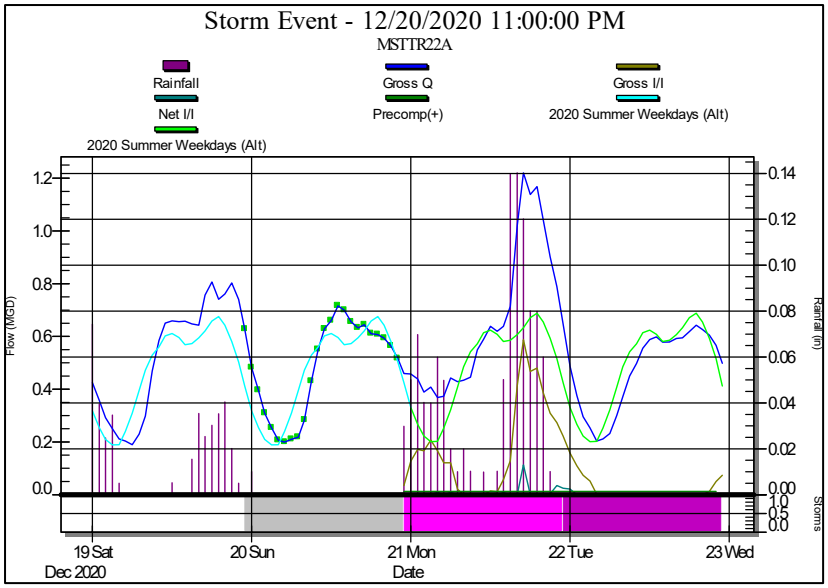

Dry Weather Flow
MSTTR22A
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
Hours

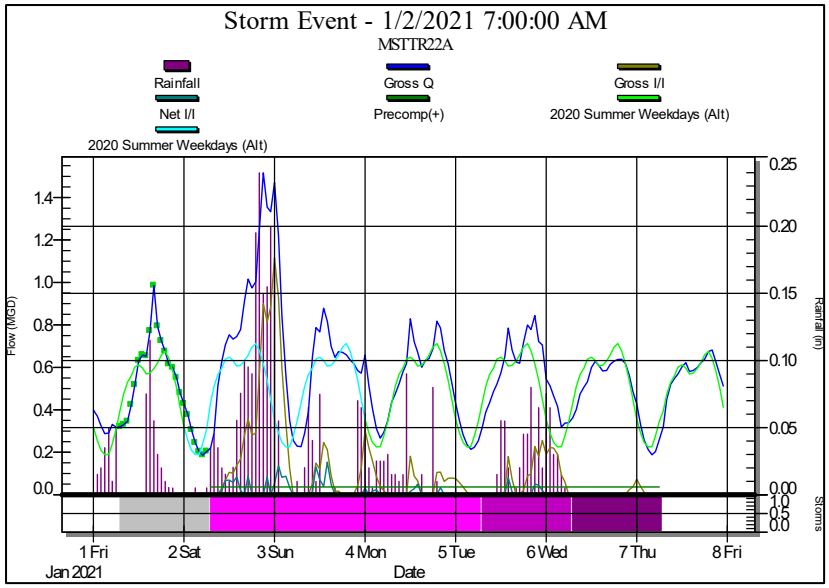

Scatter Graph
MSTTR22A
Lanfear-Coll (C-LC = 2.71)
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)

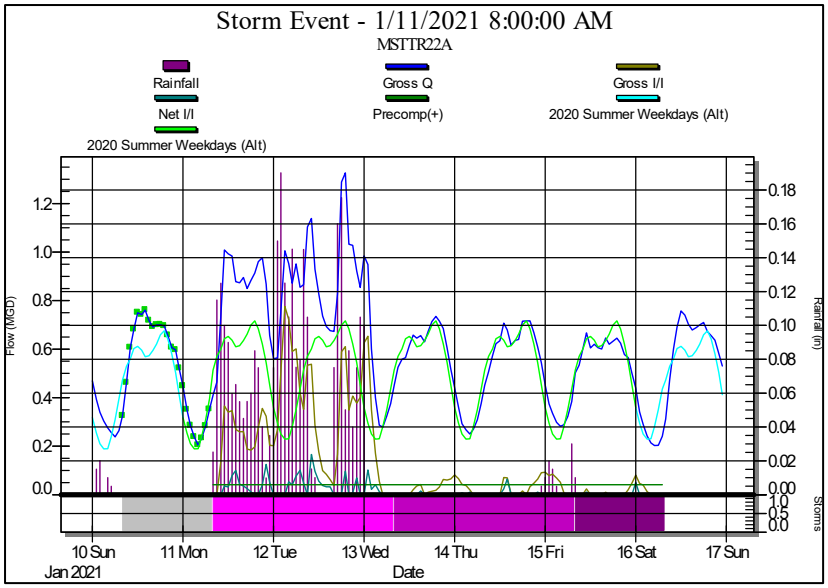

Storm Event - 10/9/2020 9:00:00 PM
MSTTR22A
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
9 Fri
10 Sat
11 Sun
12 Mon
Oct 2020
Date

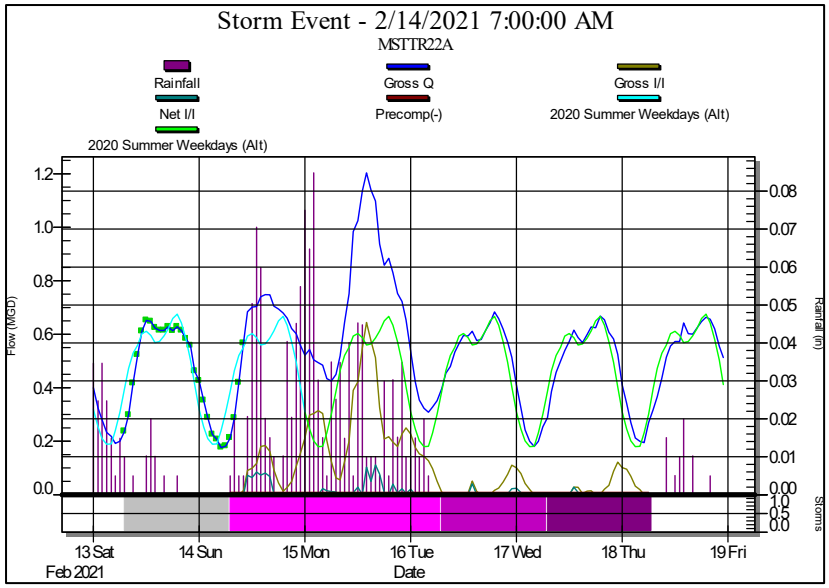

Storm Event - 11/3/2020 7:00:00 AM
MSTTR22A
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
3 Tue
4 Wed
5 Thu
Nov 2020
Date

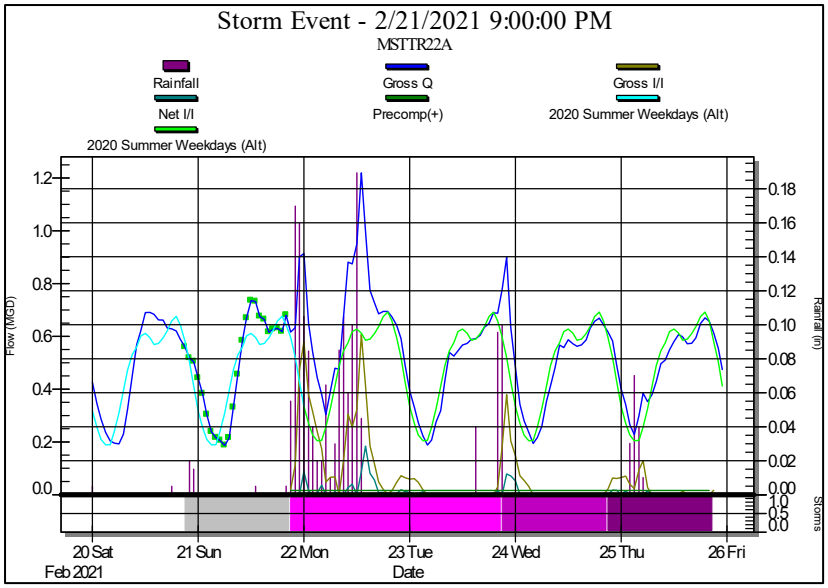

Storm Event - 11/14/2020 3:00:00 PM
MSTTR22A
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2020 Summer Weekdays (Alt)
Flow (MGD)
Rainfall (in)
Storms
13 Fri
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Nov 2020
Date

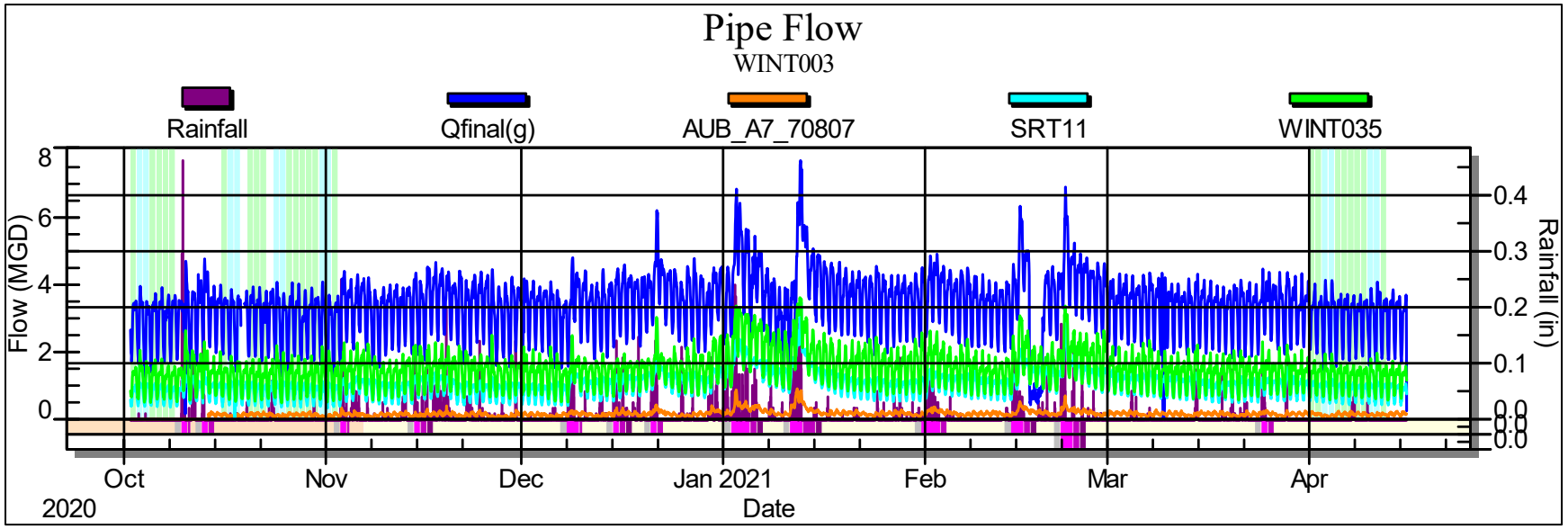

Storm Event - 12/20/2020 11:00:00 PM
MSTTR22A
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2020 Summer Weekdays (Alt)
Flow (MGD)
Rainfall (in)
Storms
19 Sat
20 Sun
21 Mon
22 Tue
23 Wed
Dec 2020
Date

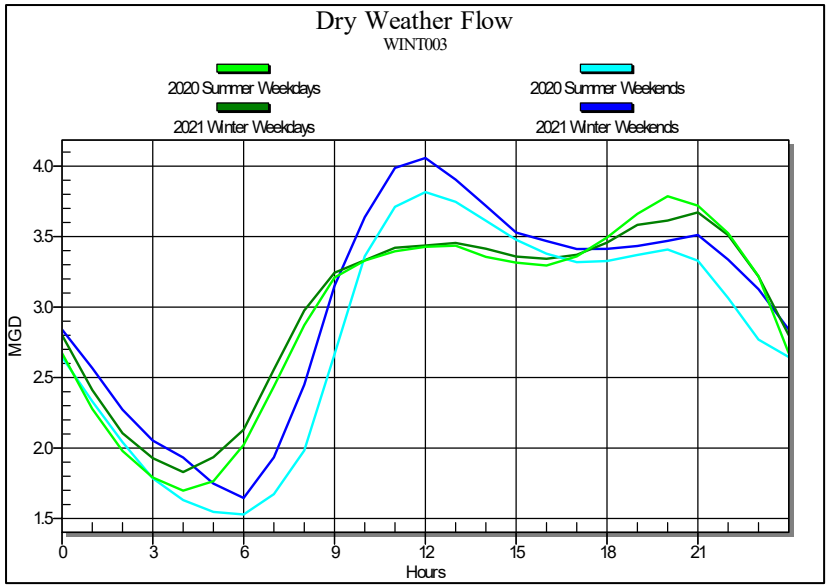

Storm Event - 1/2/2021 7:00:00 AM
MSTTR22A
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2020 Summer Weekdays (Alt)
2020 Summer Weekdays (Alt)
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

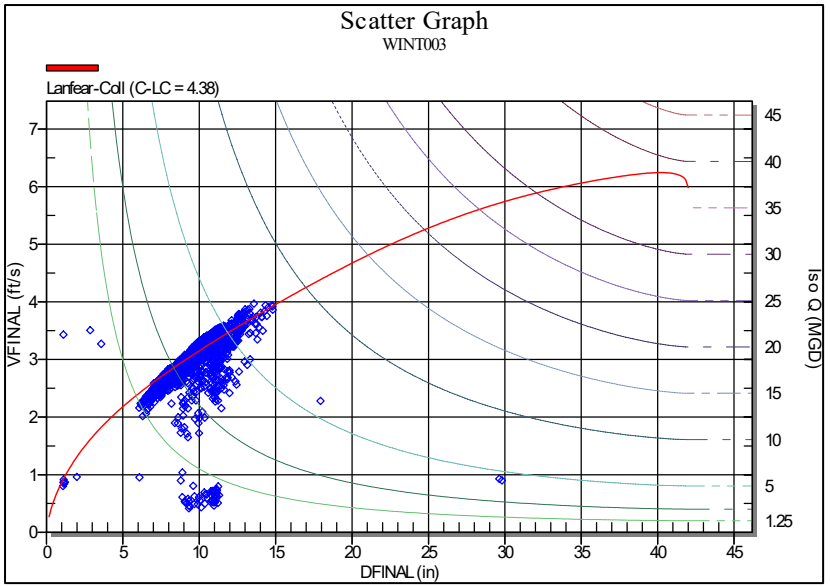

Storm Event - 1/11/2021 8:00:00 AM
MSTTR22A
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2020 Summer Weekdays (Alt)
2020 Summer Weekdays (Alt)
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

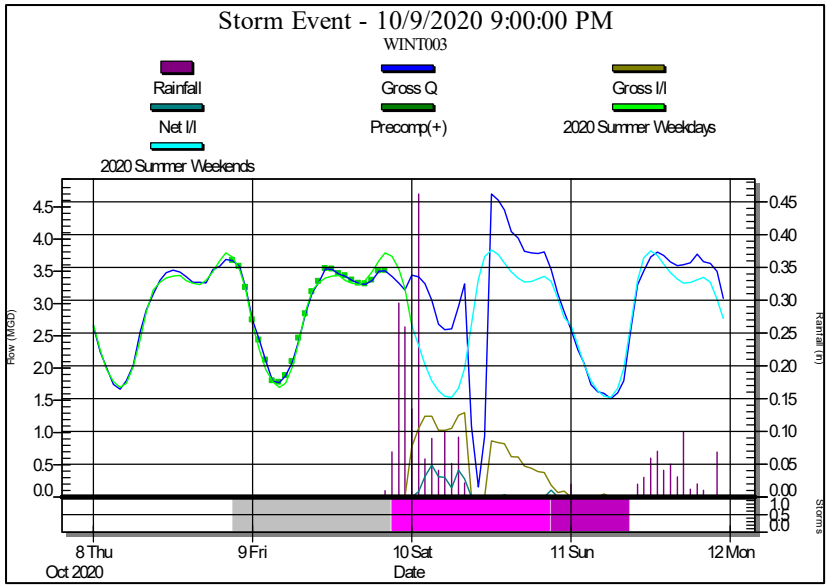

Storm Event - 2/14/2021 7:00:00 AM
MSTTR22A
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2020 Summer Weekdays (Alt)
2020 Summer Weekdays (Alt)
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

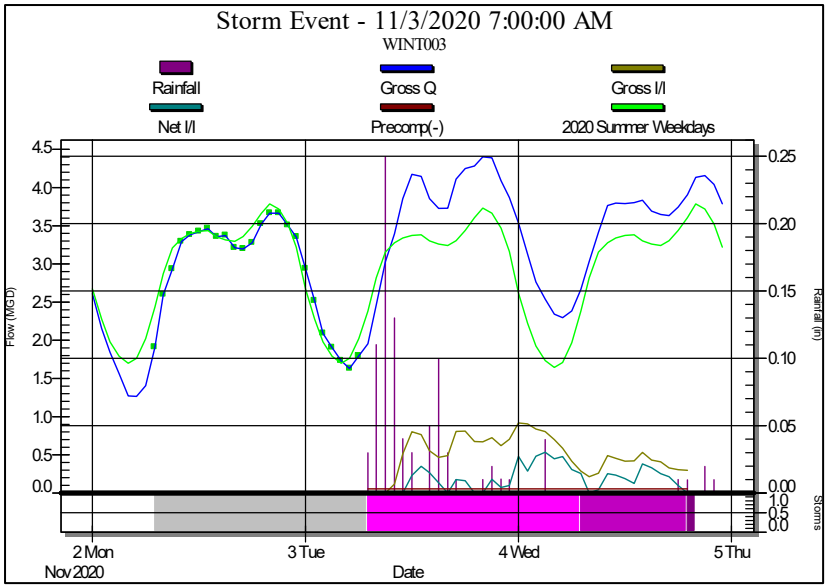

Storm Event - 2/21/2021 9:00:00 PM
MSTTR22A
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2020 Summer Weekdays (Alt)
2020 Summer Weekdays (Alt)
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

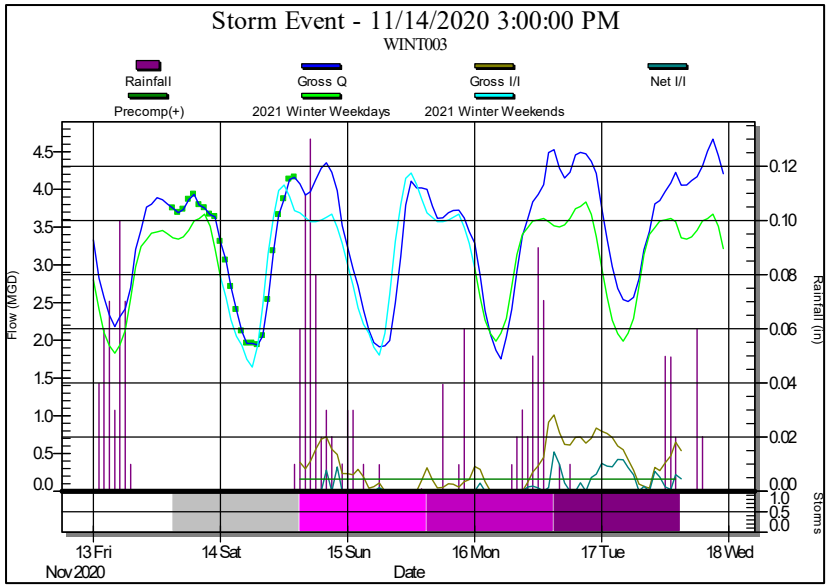

Pipe Flow
WINT003
Rainfall
Qfinal(g)
AUB_A7_70807
SRT11
WINT035
Flow (MGD)
Rainfall (in)
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

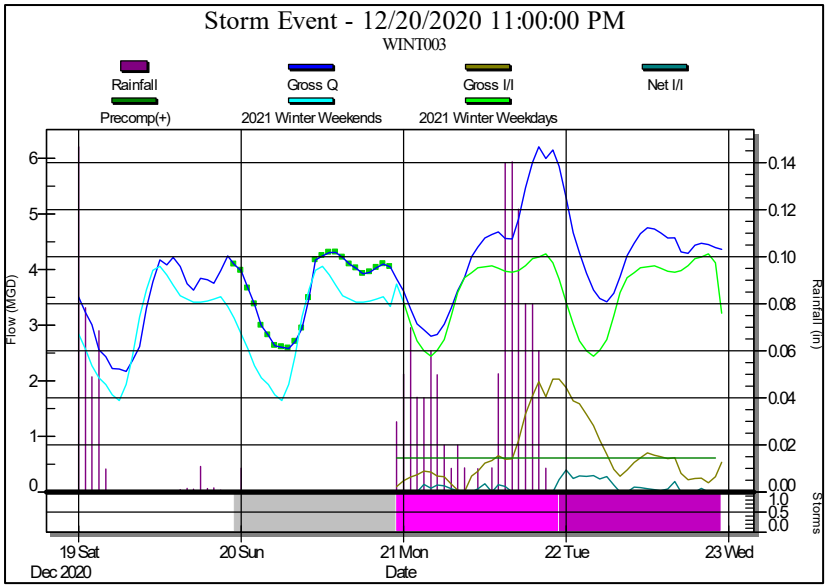

Dry Weather Flow
WINT003
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
Hours

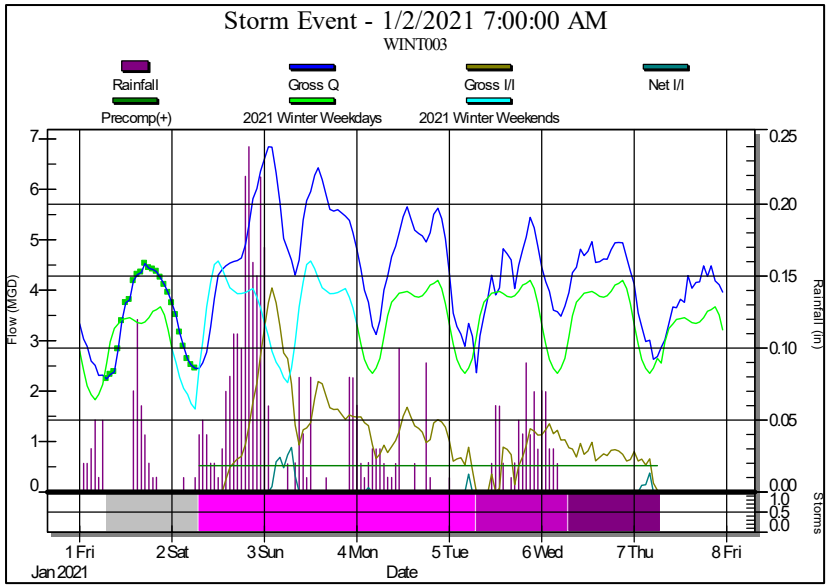

Scatter Graph
WINT003
Lanfear-Coll (C-LC = 4.38)
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)

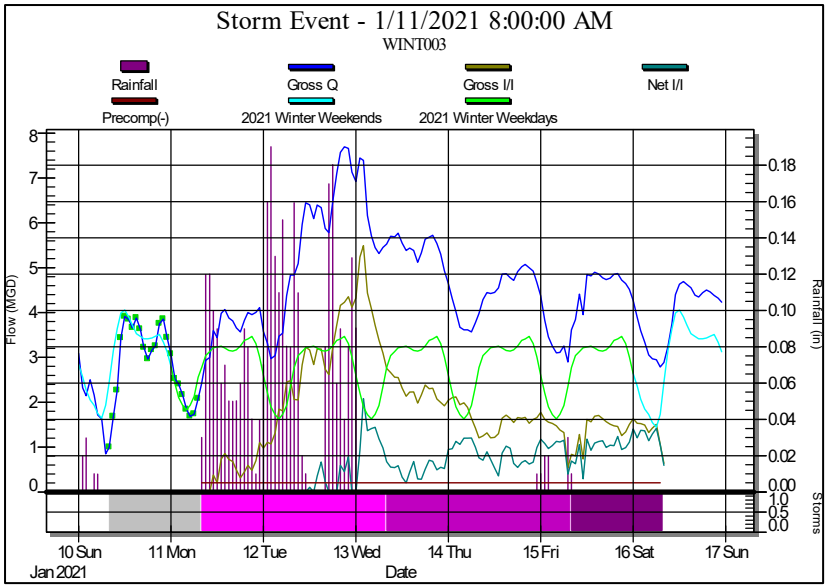

Storm Event - 10/9/2020 9:00:00 PM
WINT003
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
9 Fri
10 Sat
11 Sun
12 Mon
Oct 2020
Date

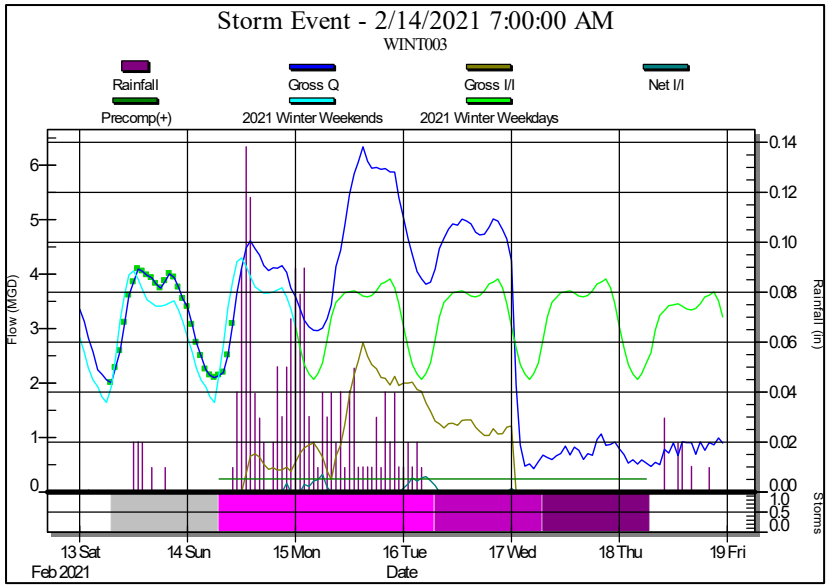

Storm Event - 11/3/2020 7:00:00 AM
WINT003
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
3 Tue
4 Wed
5 Thu
Nov 2020
Date

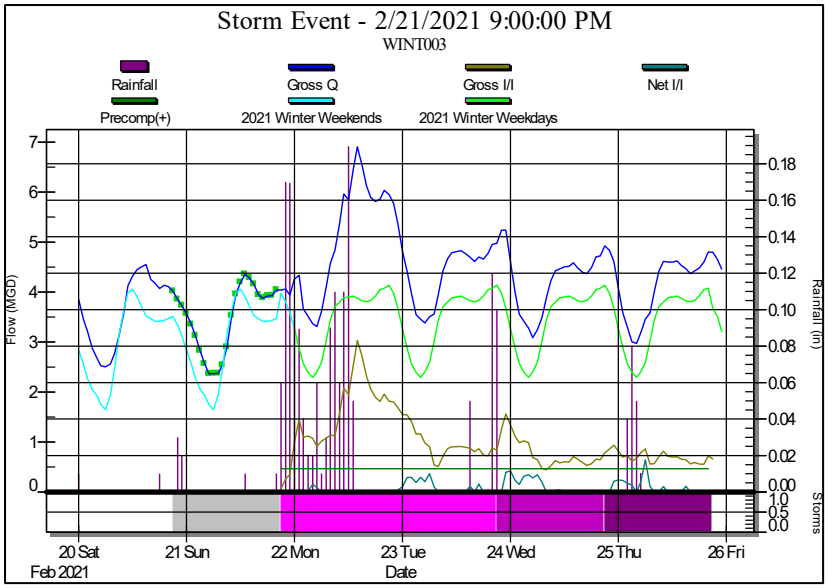

Storm Event - 11/14/2020 3:00:00 PM
WINT003
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Nov 2020
Date

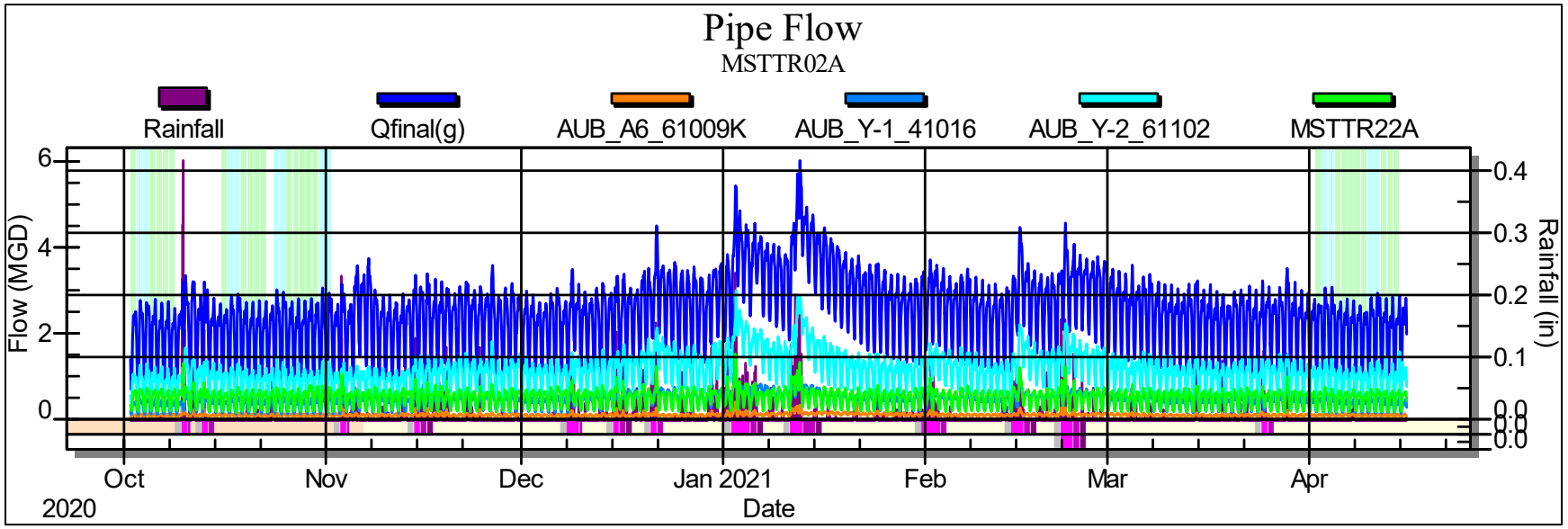

Storm Event - 12/20/2020 11:00:00 PM
WINT003
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
20 Sun
21 Mon
22 Tue
23 Wed
Dec 2020
Date

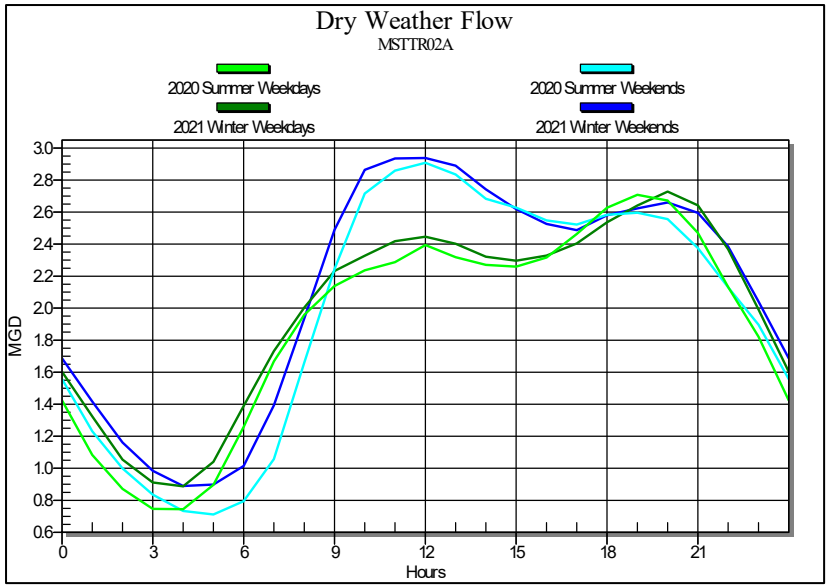

Storm Event - 1/2/2021 7:00:00 AM
WINT003
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

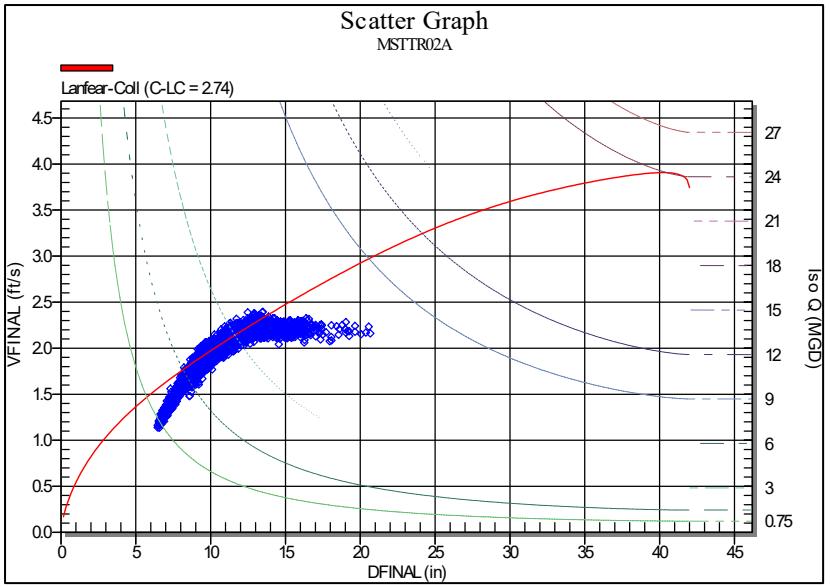

Storm Event - 1/11/2021 8:00:00 AM
WINT003
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

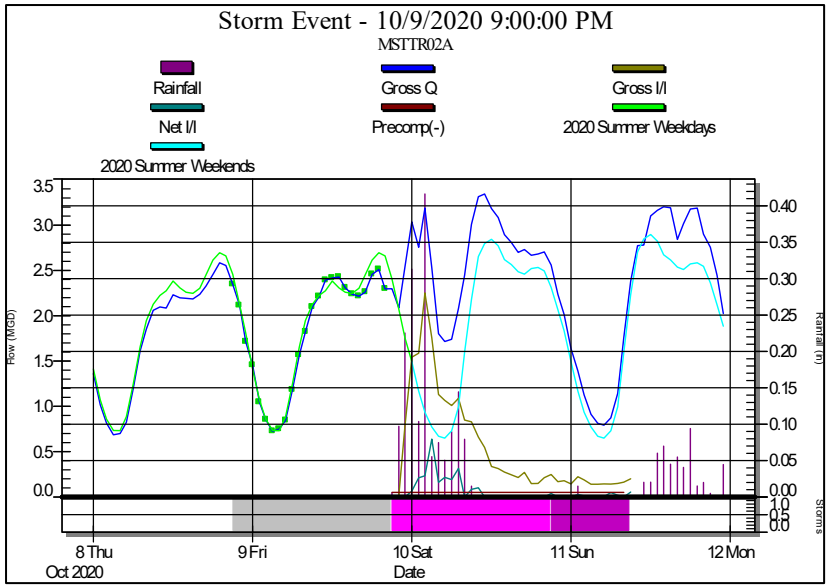

Storm Event - 2/14/2021 7:00:00 AM
WINT003
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

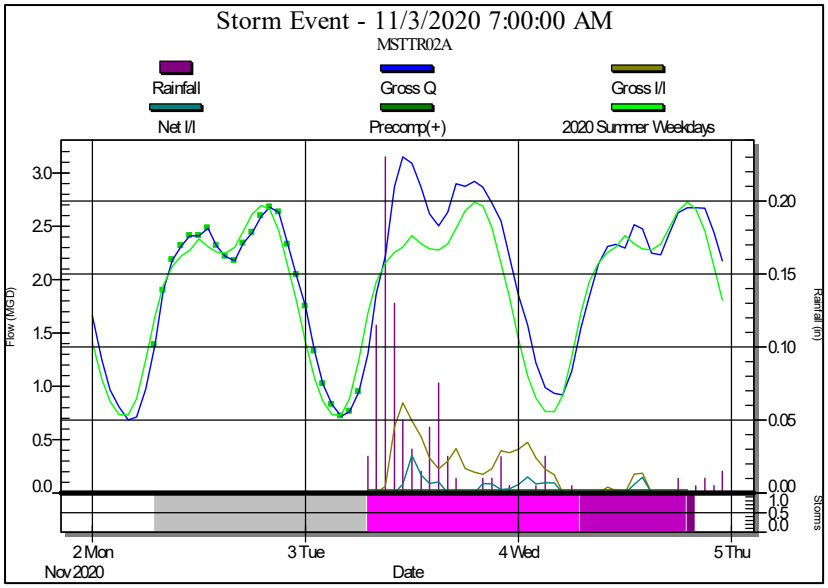

Storm Event - 2/21/2021 9:00:00 PM
WINT003
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

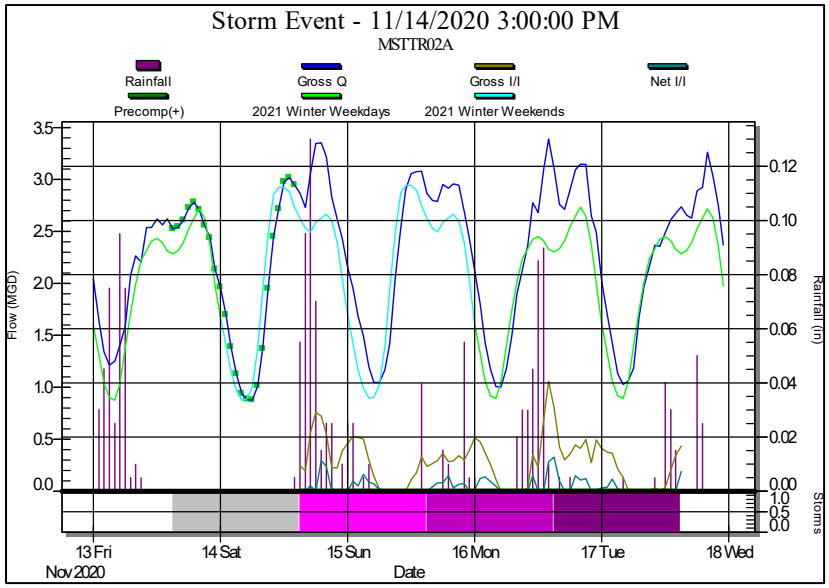

Pipe Flow
MSTTR02A
Rainfall
Qfinal(g)
AUB_A6_61009K
AUB_Y-1_41016
AUB_Y-2_61102
MSTTR22A
Flow (MGD)
Rainfall (in)
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

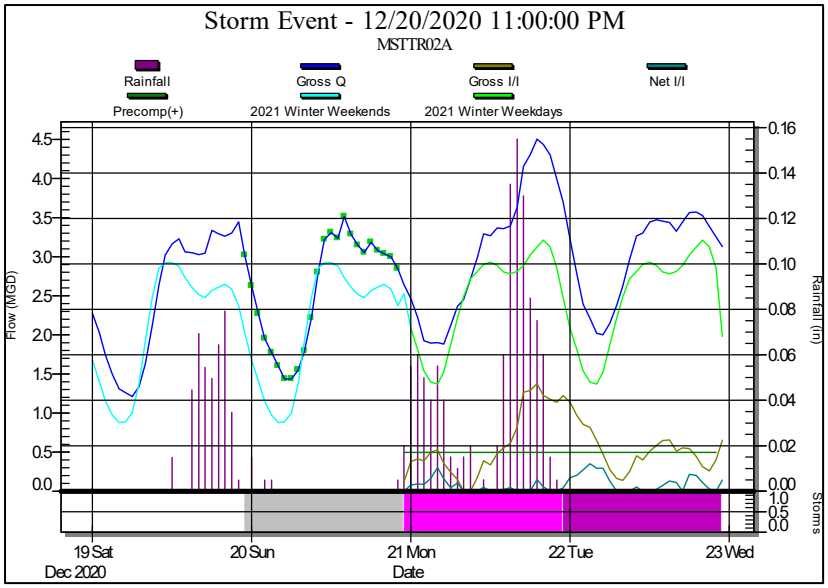

Dry Weather Flow
MSTTR02A
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
Hours

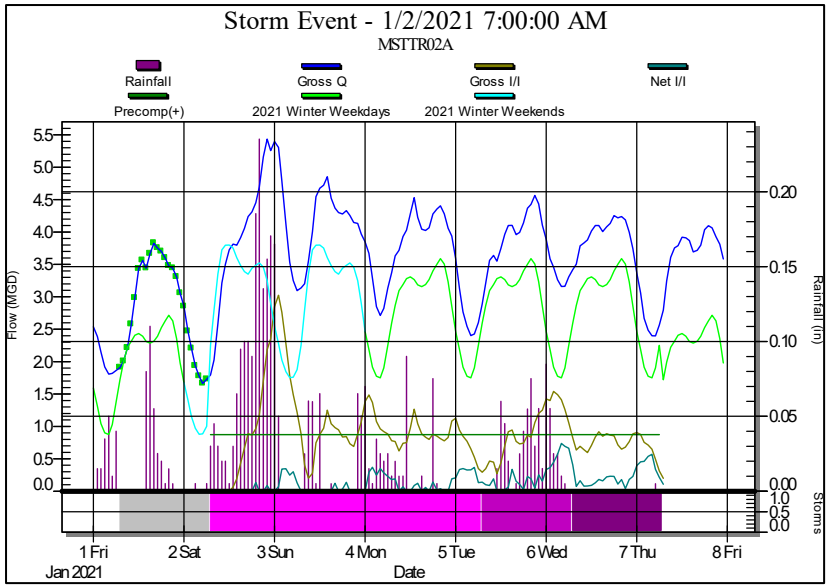

Scatter Graph
MSTTR02A
Lanfear-Coll (C-LC = 2.74)
VFINAL (ft/s)
Iso Q (MGD)
DFINAL (in)

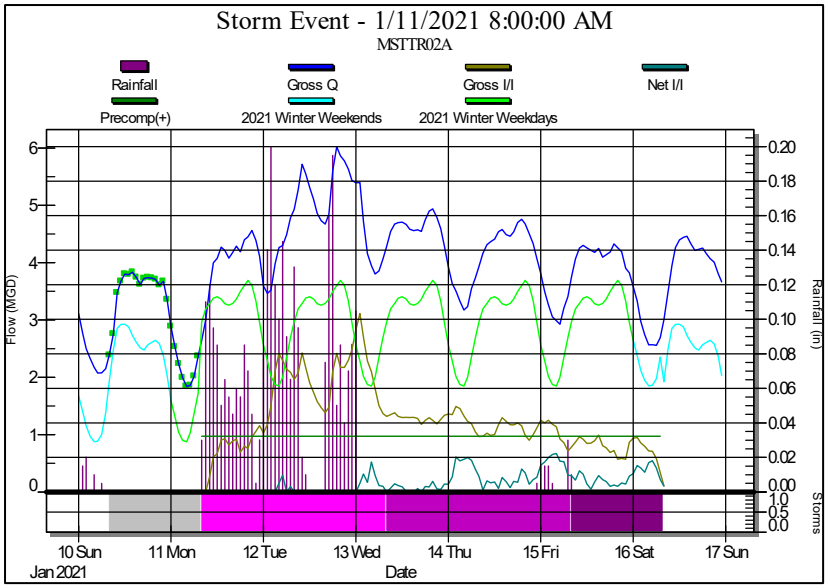

Storm Event - 10/9/2020 9:00:00 PM
MSTTR02A
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
9 Fri
10 Sat
11 Sun
12 Mon
Oct 2020
Date

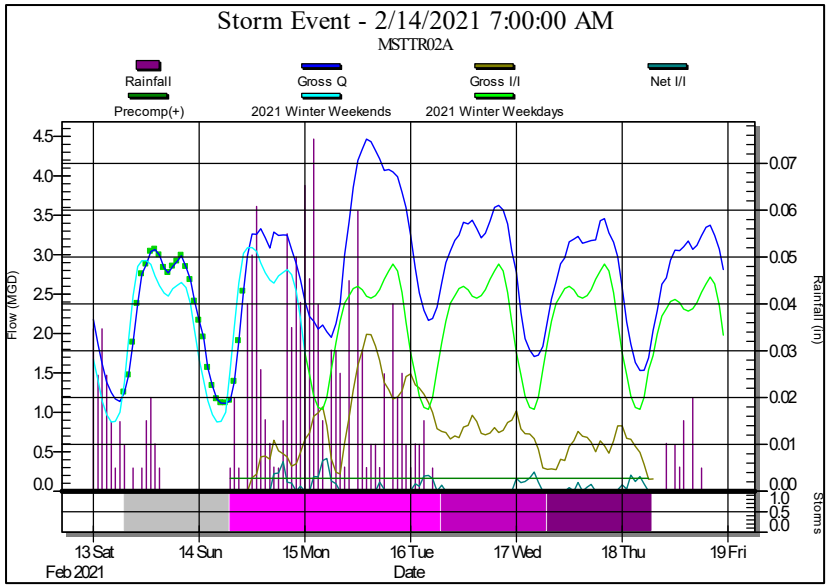

Storm Event - 11/3/2020 7:00:00 AM
MSTTR02A
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
3 Tue
4 Wed
5 Thu
Nov 2020
Date

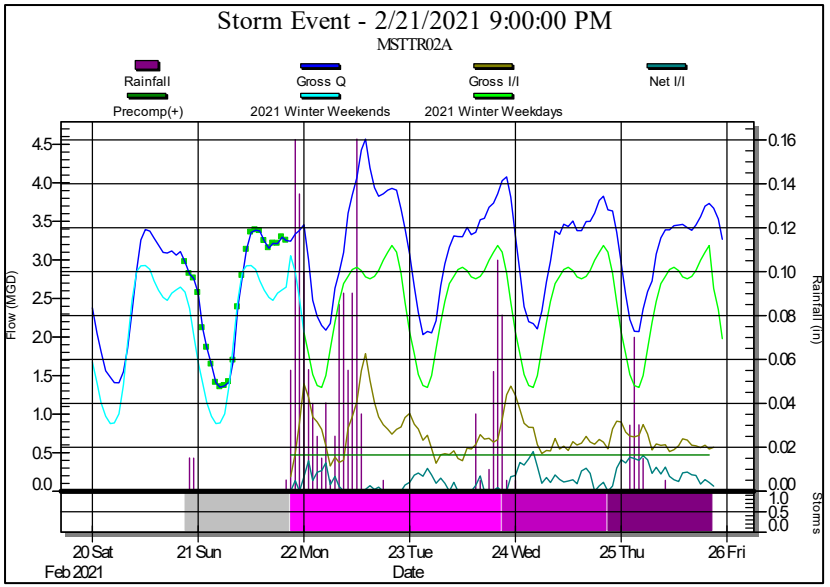

Storm Event - 11/14/2020 3:00:00 PM
MSTTR02A
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Nov 2020
Date

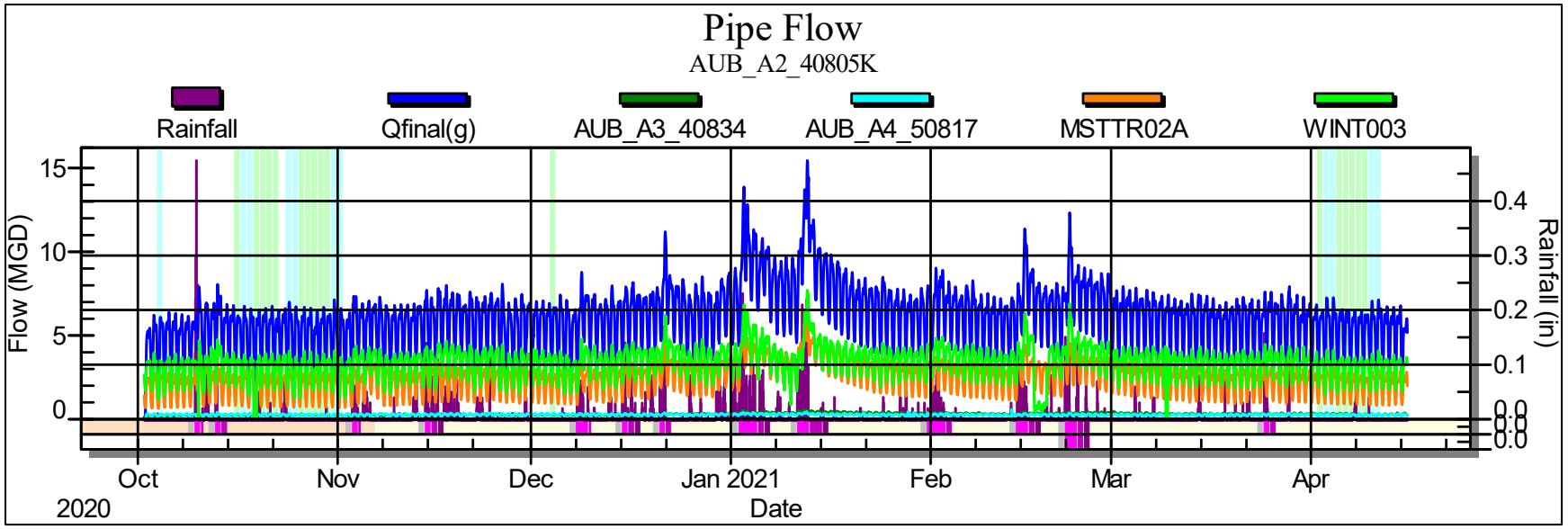

Storm Event - 12/20/2020 11:00:00 PM
MSTTR02A
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
20 Sun
21 Mon
22 Tue
23 Wed
Dec 2020
Date

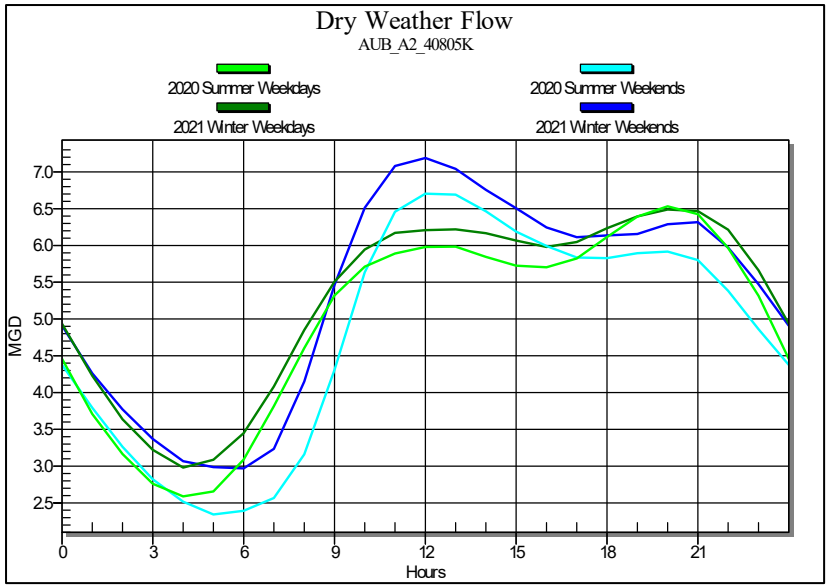

Storm Event - 1/2/2021 7:00:00 AM
MSTTR02A
Rainfall
Precomp(+)
Gross Q
2021 Winter Weekdays
Gross I/I
2021 Winter Weekends
Net I/I
Flow (MGD)
Rainfall (in)
Storms
1 Fri
Jan 2021
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Date

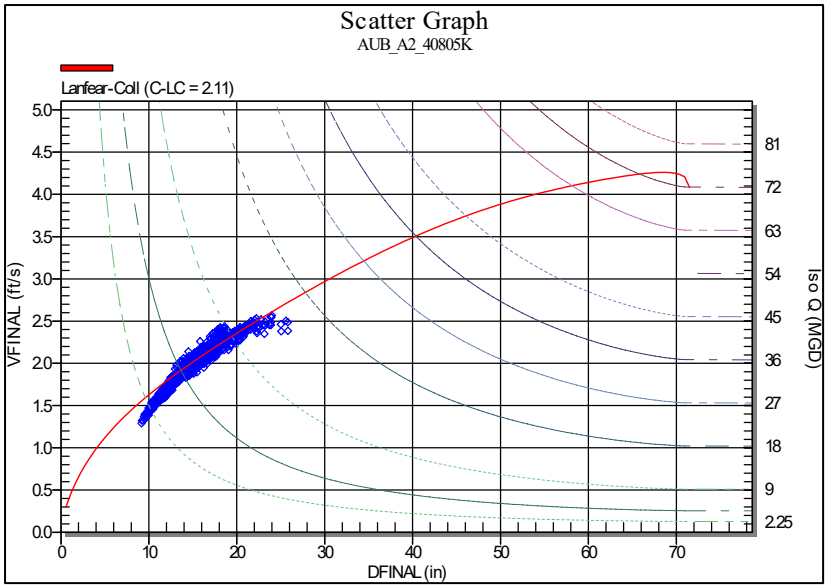

Storm Event - 1/11/2021 8:00:00 AM
MSTTR02A
Rainfall
Precomp(+)
Gross Q
2021 Winter Weekends
Gross I/I
2021 Winter Weekdays
Net I/I
Flow (MGD)
Rainfall (in)
Storms
10 Sun
Jan 2021
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Date

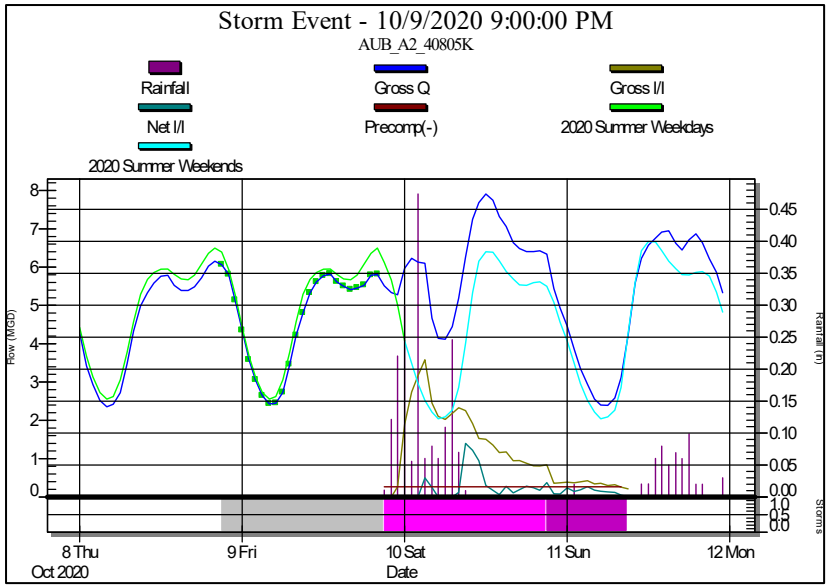

Storm Event - 2/14/2021 7:00:00 AM
MSTTR02A
Rainfall
Precomp(+)
Gross Q
2021 Winter Weekends
Gross I/I
2021 Winter Weekdays
Net I/I
Flow (MGD)
Rainfall (in)
Storms
13 Sat
Feb 2021
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Date

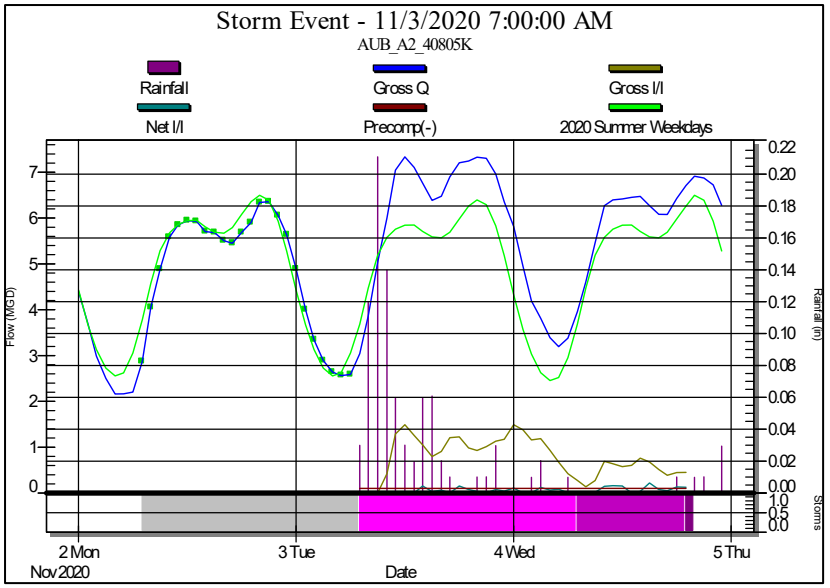

Storm Event - 2/21/2021 9:00:00 PM
MSTTR02A
Rainfall
Precomp(+)
Gross Q
2021 Winter Weekends
Gross I/I
2021 Winter Weekdays
Net I/I
Flow (MGD)
Rainfall (in)
Storms
20 Sat
Feb 2021
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Date

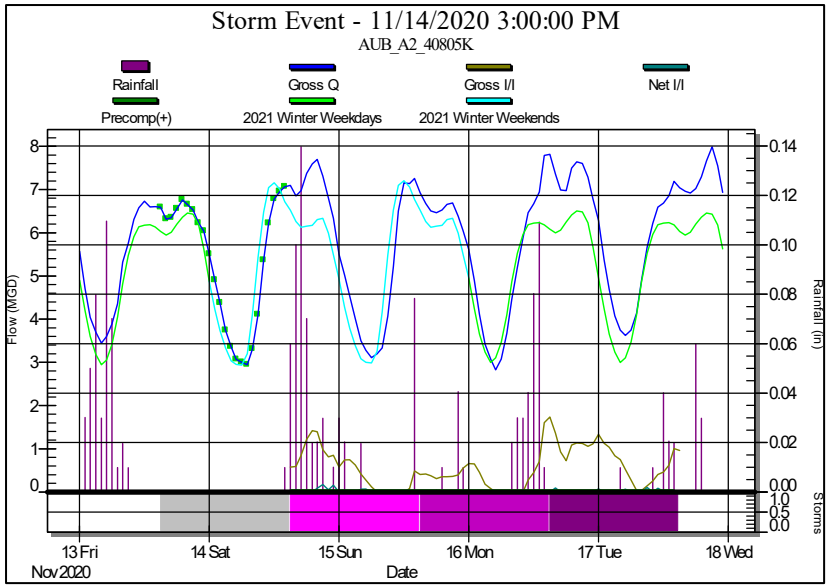

Pipe Flow
AUB_A2_40805K
Rainfall
Qfinal(g)
AUB_A3_40834
AUB_A4_50817
MSTTR02A
WINT003
Flow (MGD)
Rainfall (in)
Oct
2020
Nov
Dec
Jan 2021
Feb
Mar
Apr
Date

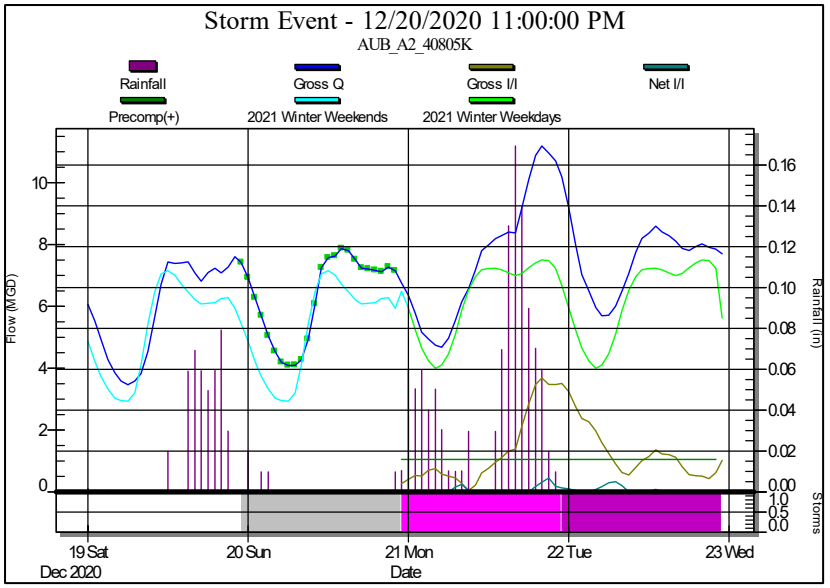

Dry Weather Flow
AUB_A2_40805K
2020 Summer Weekdays
2020 Summer Weekends
2021 Winter Weekdays
2021 Winter Weekends
MGD
Hours

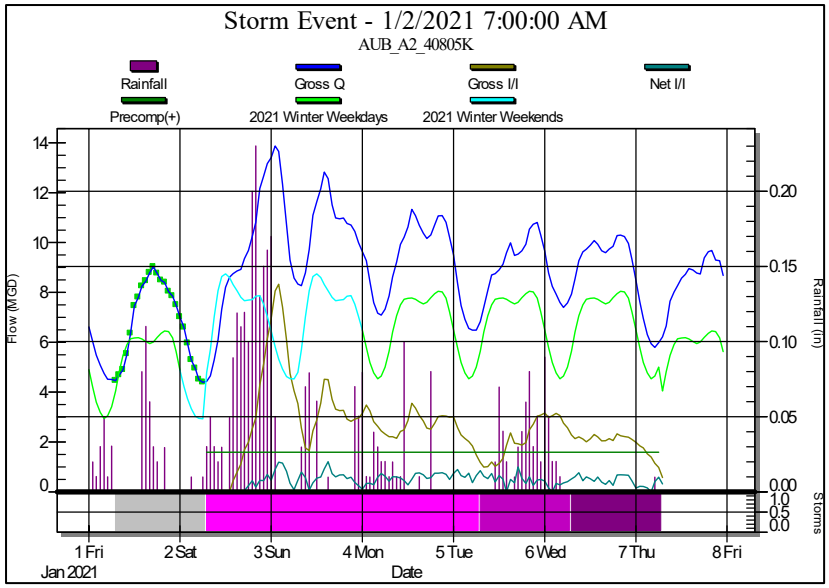

Scatter Graph
AUB_A2_40805K
Lanfear-Coll (C-LC = 2.11)
VFINAL (ft/s)
Iso Q (MGD)
DFINAL (in)

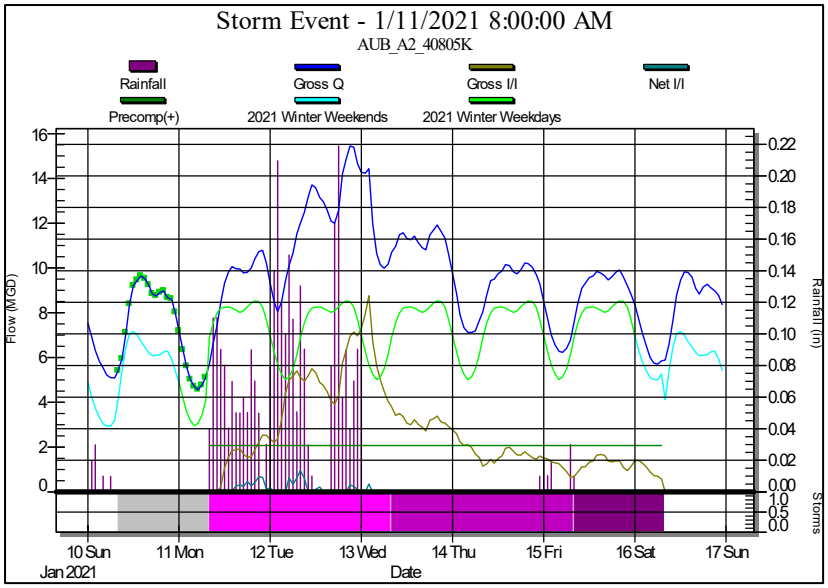

Storm Event - 10/9/2020 9:00:00 PM
AUB_A2_40805K
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2020 Summer Weekdays
2020 Summer Weekends
Flow (MGD)
Rainfall (in)
Storms
8 Thu
9 Fri
10 Sat
11 Sun
12 Mon
Oct 2020
Date

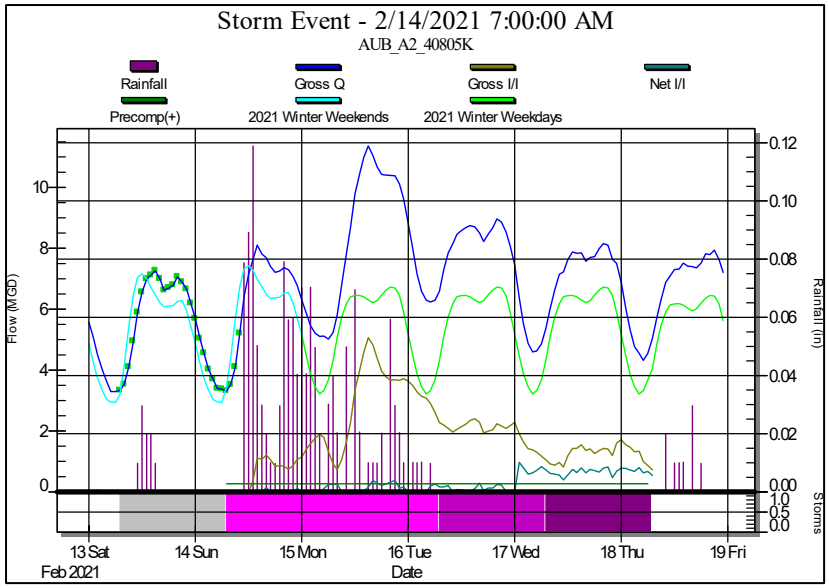

Storm Event - 11/3/2020 7:00:00 AM
AUB_A2_40805K
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(-)
2020 Summer Weekdays
Flow (MGD)
Rainfall (in)
Storms
2 Mon
3 Tue
4 Wed
5 Thu
Nov 2020
Date

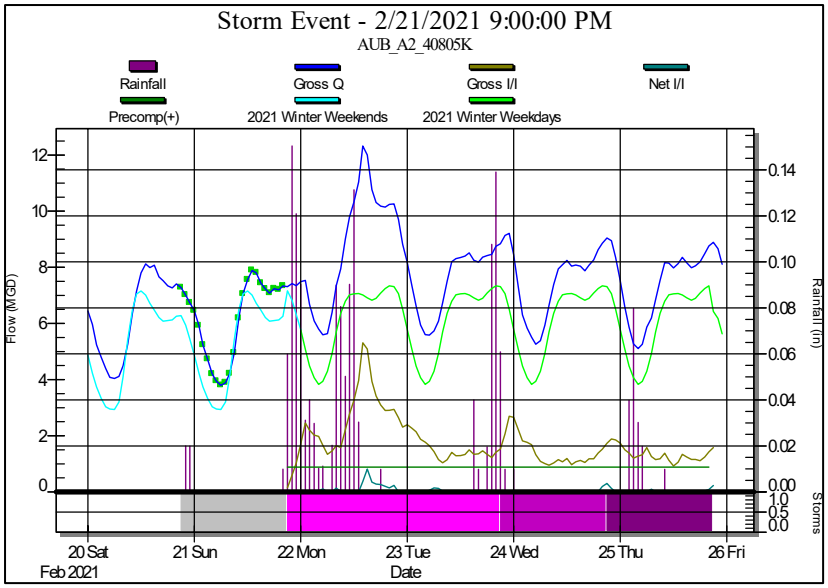

Storm Event - 11/14/2020 3:00:00 PM
AUB_A2_40805K
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
13 Fri
14 Sat
15 Sun
16 Mon
17 Tue
18 Wed
Nov 2020
Date

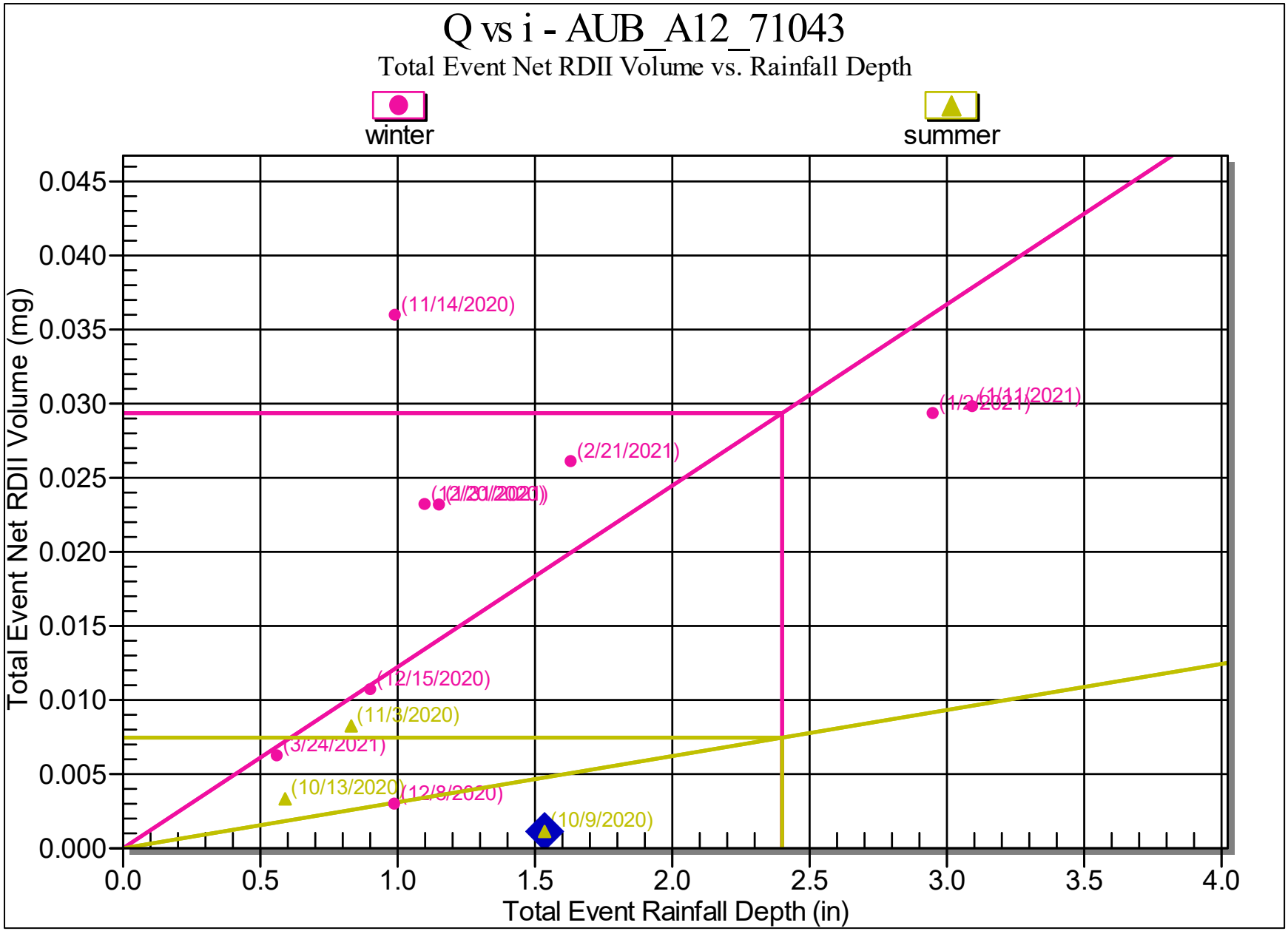

Storm Event - 12/20/2020 11:00:00 PM
AUB_A2_40805K
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
19 Sat
20 Sun
21 Mon
22 Tue
23 Wed
Dec 2020
Date

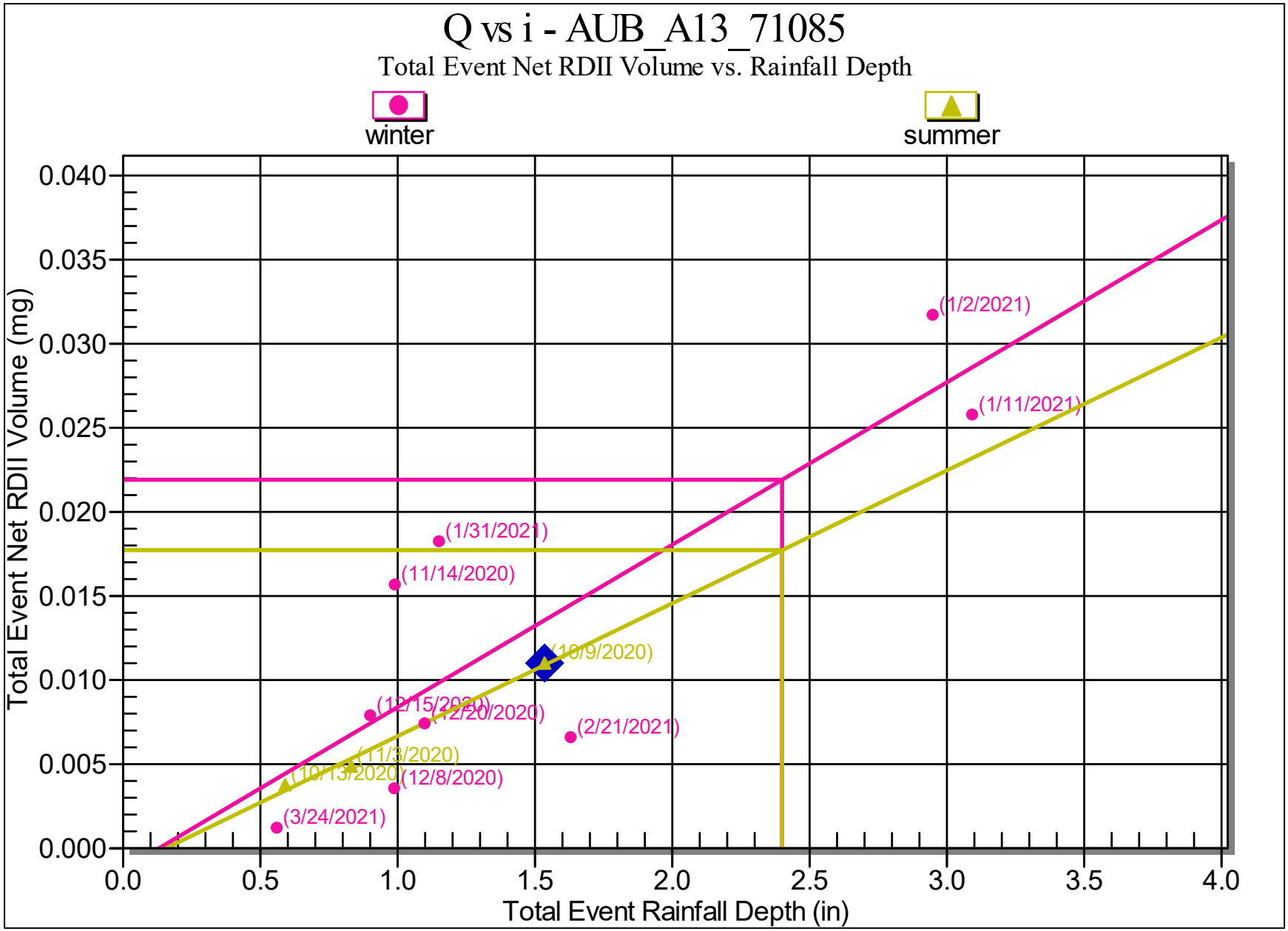

Storm Event - 1/2/2021 7:00:00 AM
AUB_A2_40805K
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekdays
2021 Winter Weekends
Flow (MGD)
Rainfall (in)
Storms
1 Fri
2 Sat
3 Sun
4 Mon
5 Tue
6 Wed
7 Thu
8 Fri
Jan 2021
Date

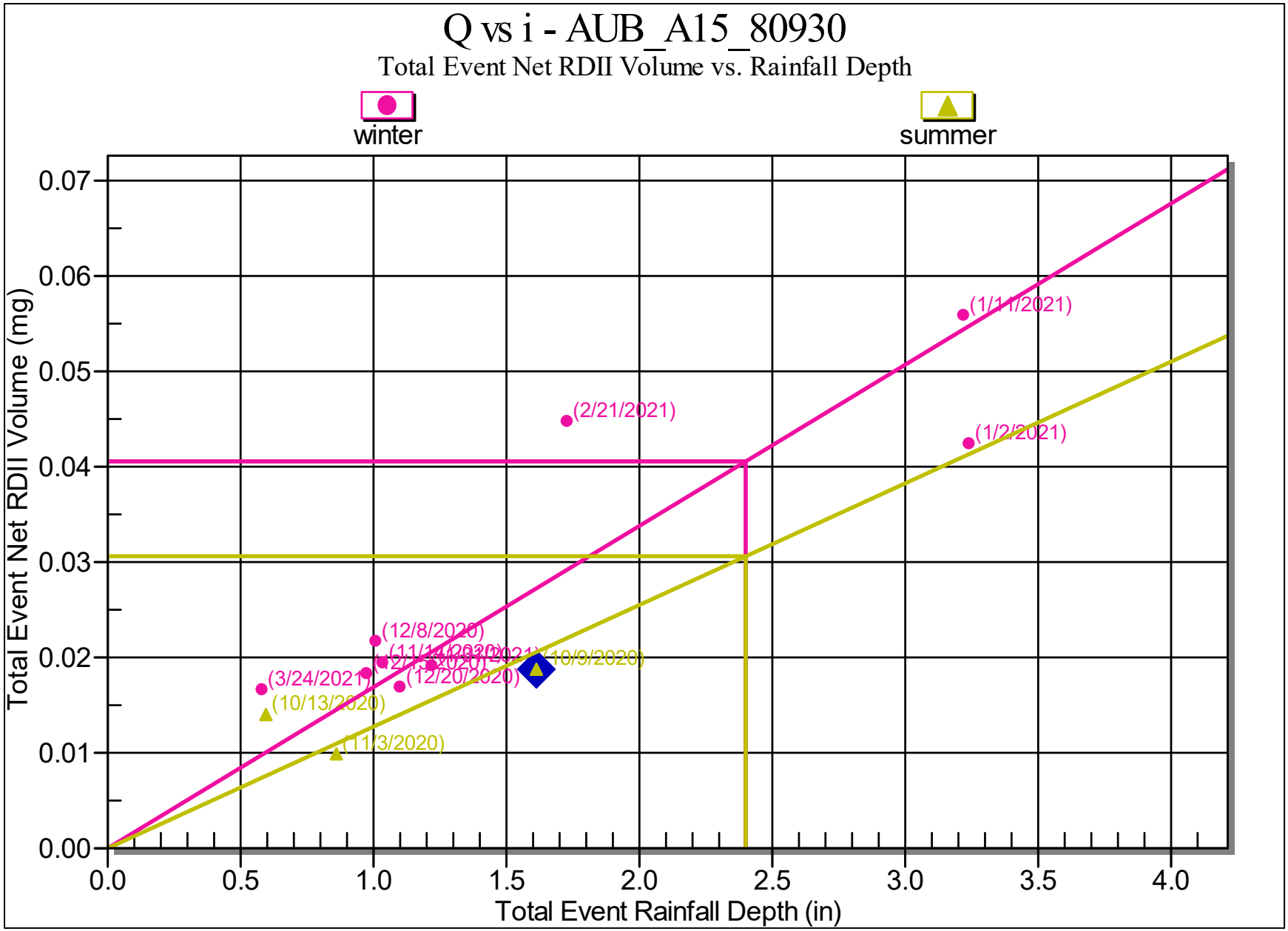

Storm Event - 1/11/2021 8:00:00 AM
AUB_A2_40805K
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
10 Sun
11 Mon
12 Tue
13 Wed
14 Thu
15 Fri
16 Sat
17 Sun
Jan 2021
Date

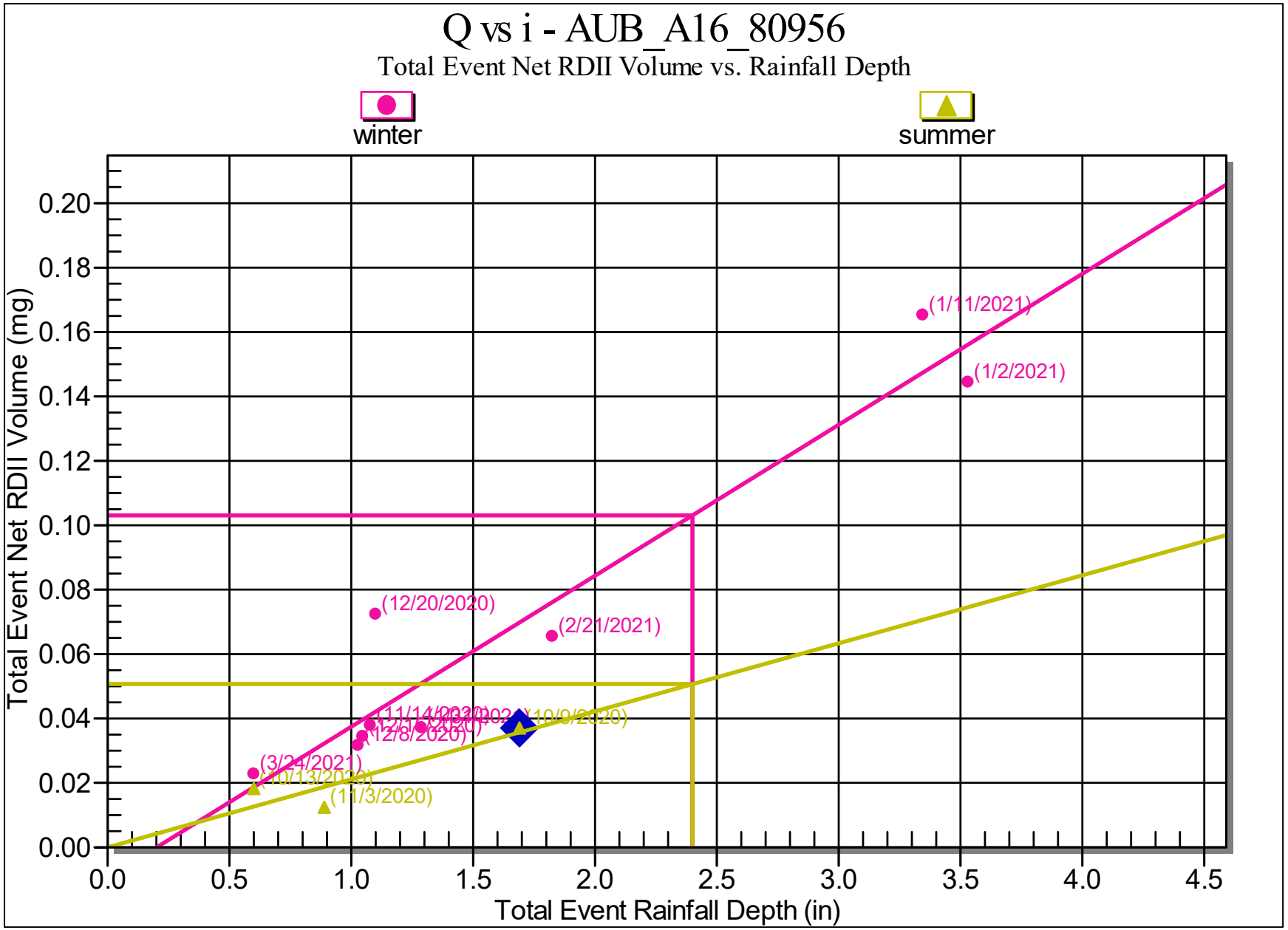

Storm Event - 2/14/2021 7:00:00 AM
AUB_A2_40805K
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
13 Sat
14 Sun
15 Mon
16 Tue
17 Wed
18 Thu
19 Fri
Feb 2021
Date

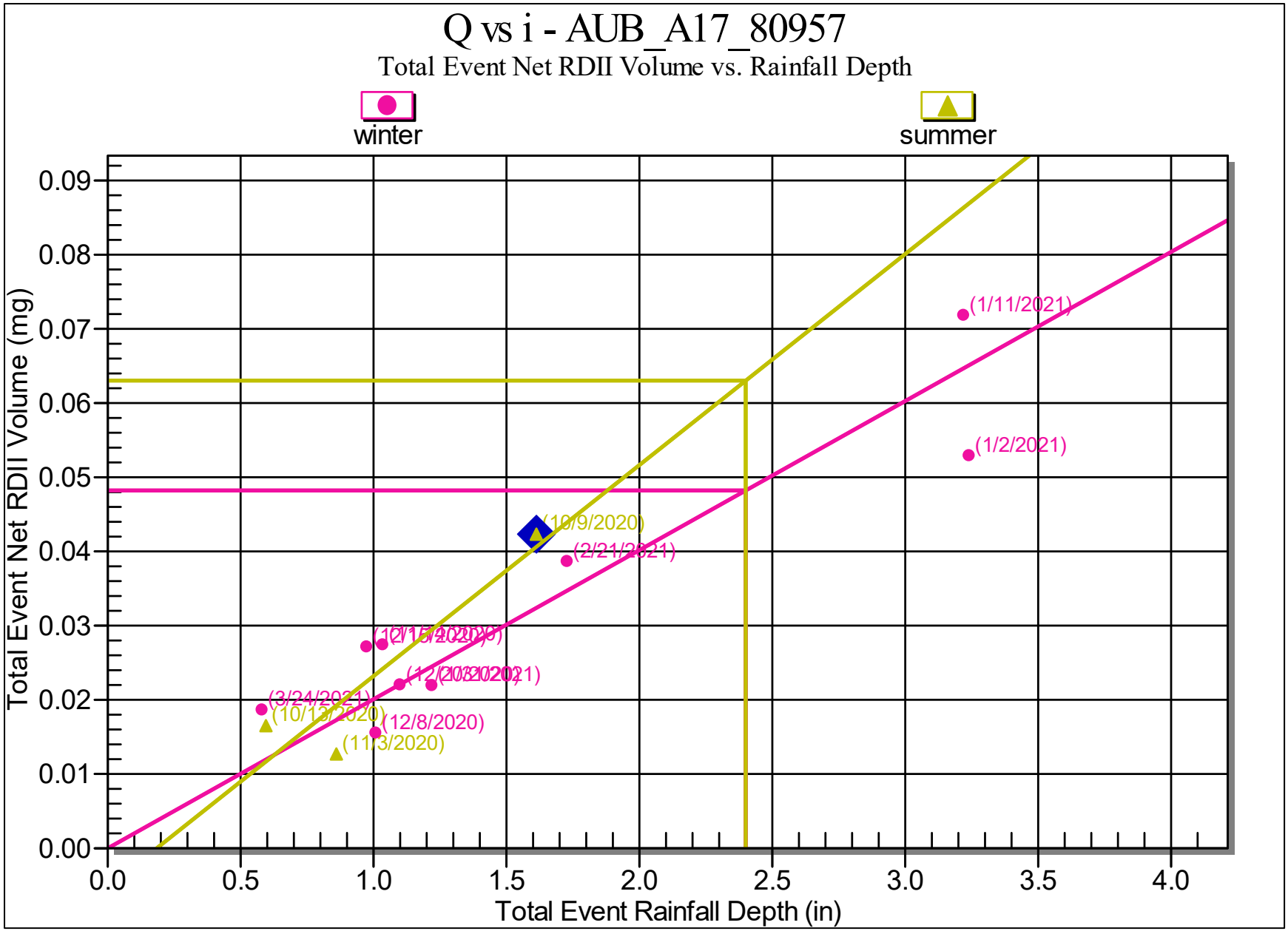

Storm Event - 2/21/2021 9:00:00 PM
AUB_A2_40805K
Rainfall
Gross Q
Gross I/I
Net I/I
Precomp(+)
2021 Winter Weekends
2021 Winter Weekdays
Flow (MGD)
Rainfall (in)
Storms
20 Sat
21 Sun
22 Mon
23 Tue
24 Wed
25 Thu
26 Fri
Feb 2021
Date

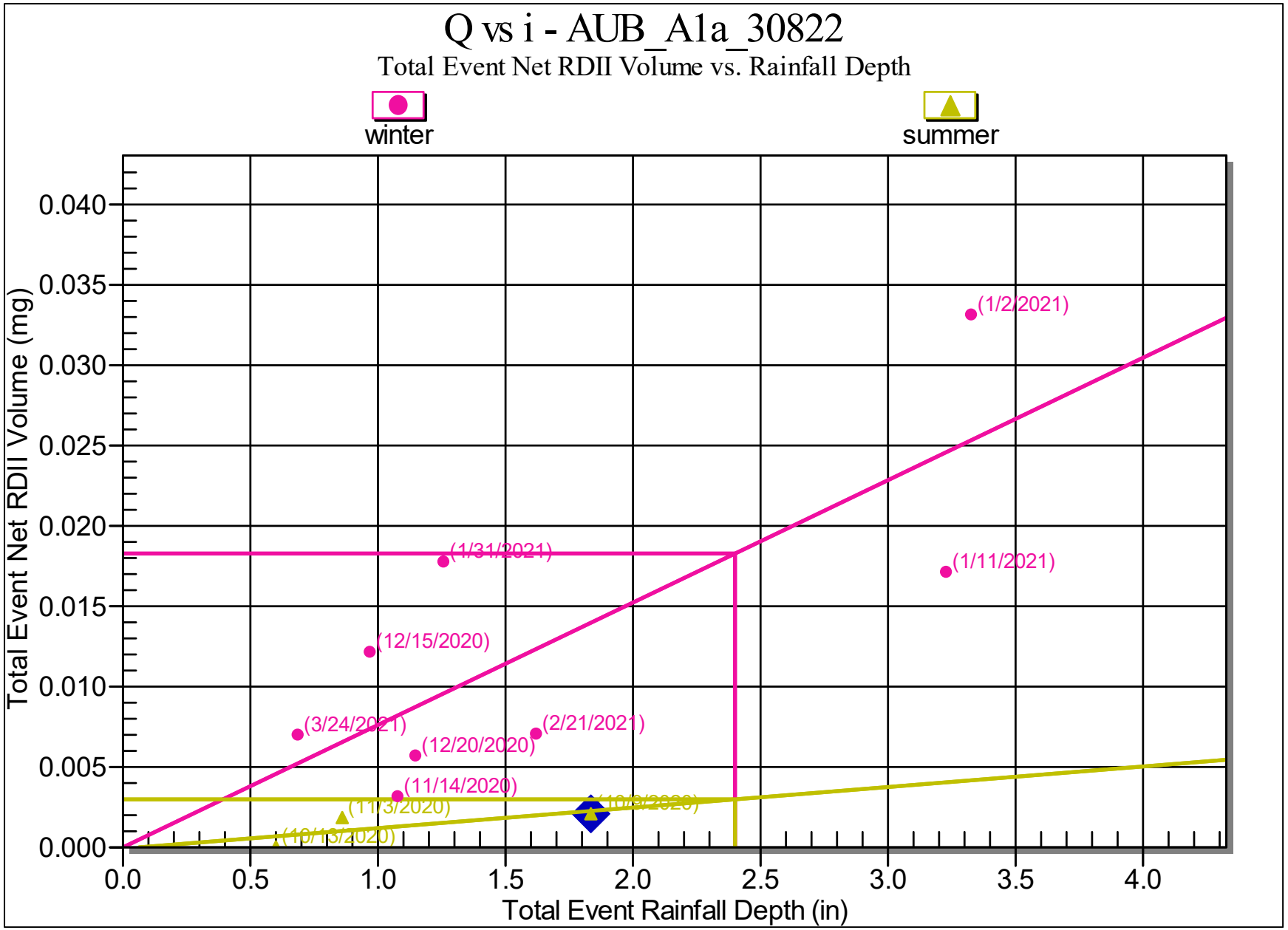

Q vs i - AUB_A12_71043
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Total Event Rainfall Depth (in)
(11/14/2020)
(2/21/2021)
(12/15/2020)
(11/3/2020)
(3/24/2021)
(10/13/2020)
(10/9/2020)

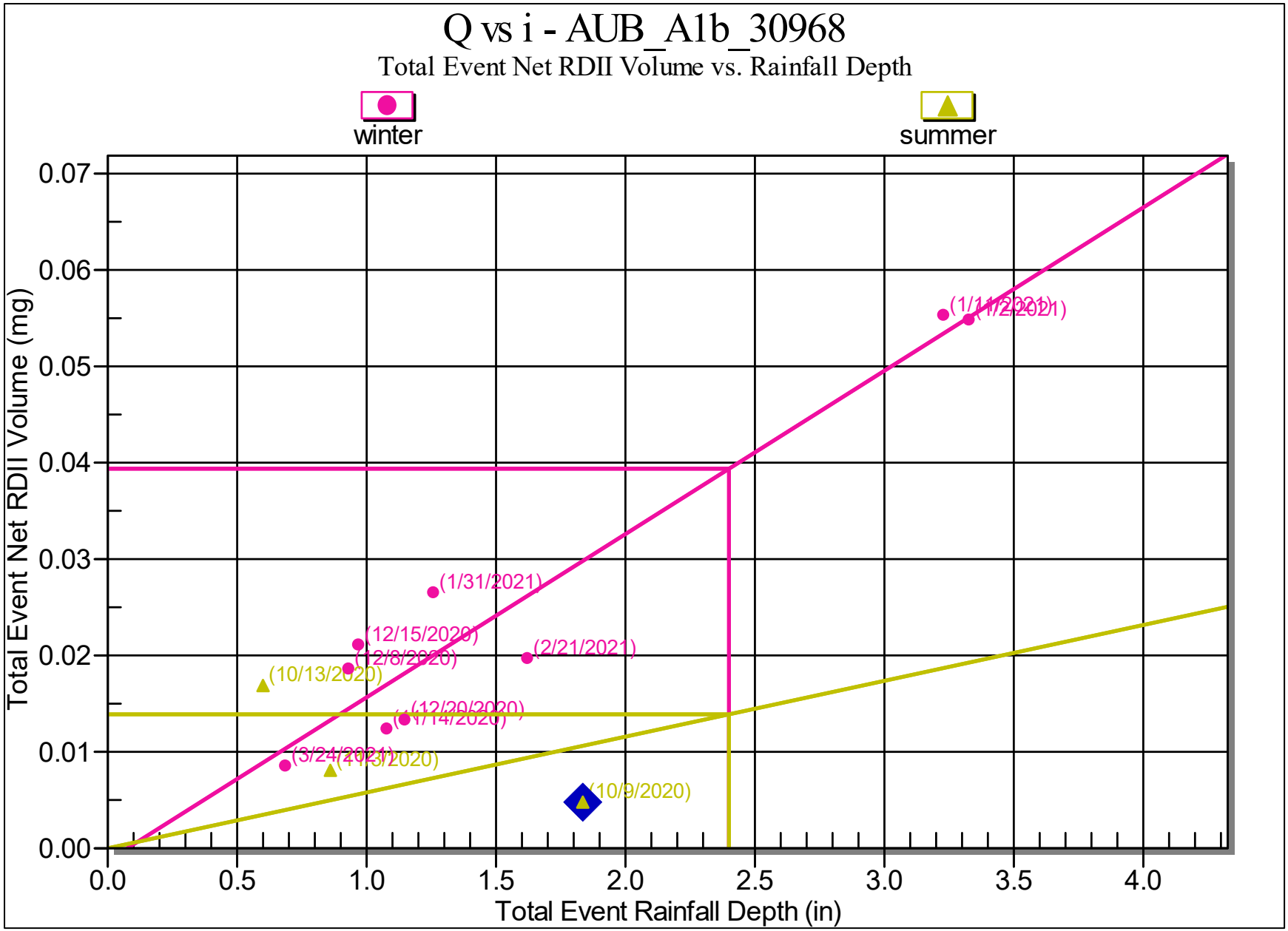

Q vs i - AUB_A13_71085
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Total Event Rainfall Depth (in)
(1/2/2021)
(1/11/2021)
(1/31/2021)
(11/14/2020)
(10/9/2020)
(12/15/2020)
(12/20/2020)
(2/21/2021)
(11/3/2020)
(10/13/2020)
(12/8/2020)
(3/24/2021)

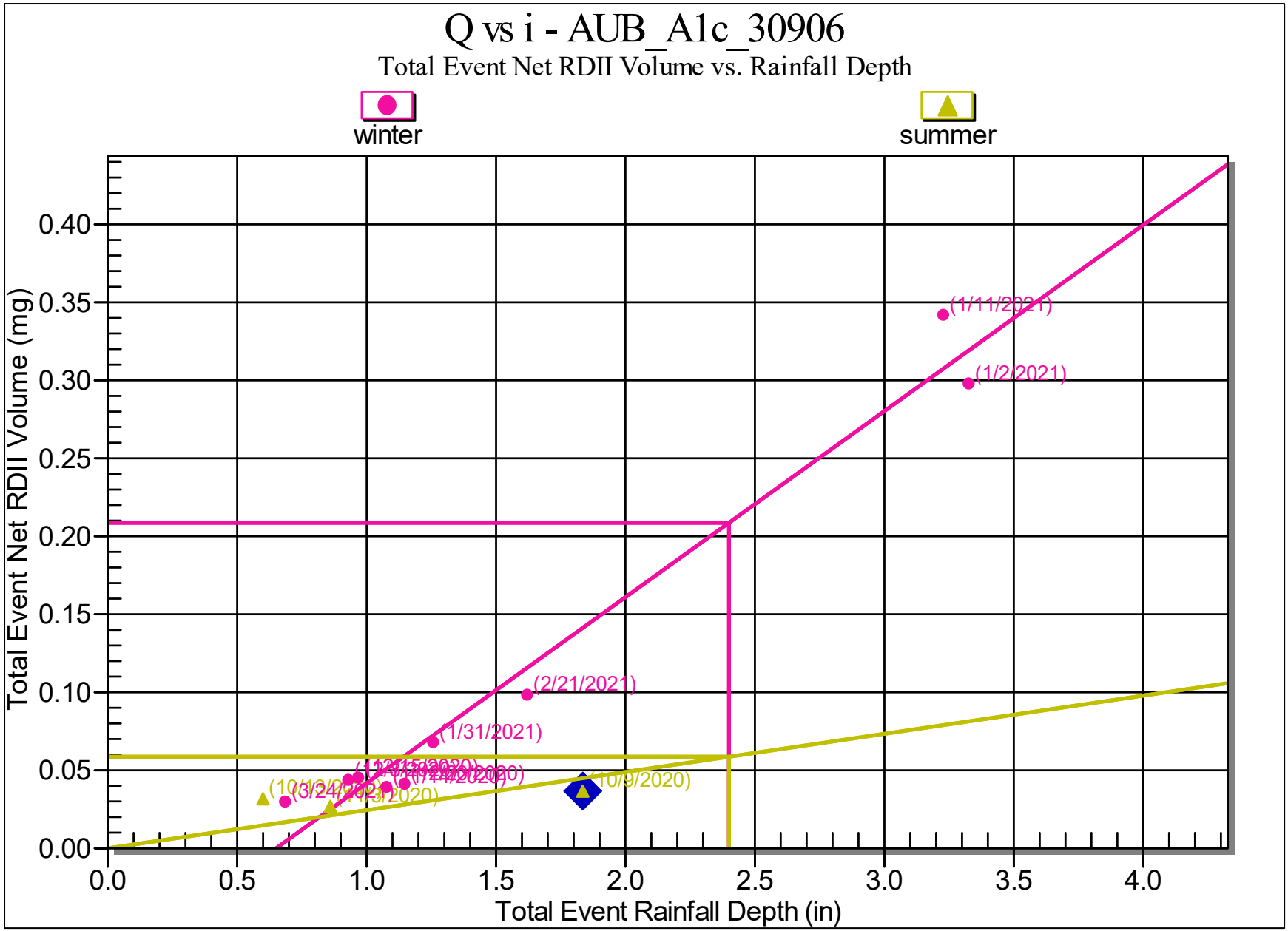

Q vs i - AUB_A15_80930
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Total Event Rainfall Depth (in)
(1/11/2021)
(2/21/2021)
(1/2/2021)
(12/8/2020)
(3/24/2021)
(12/20/2020)
(10/9/2020)
(10/13/2020)
(11/3/2020)

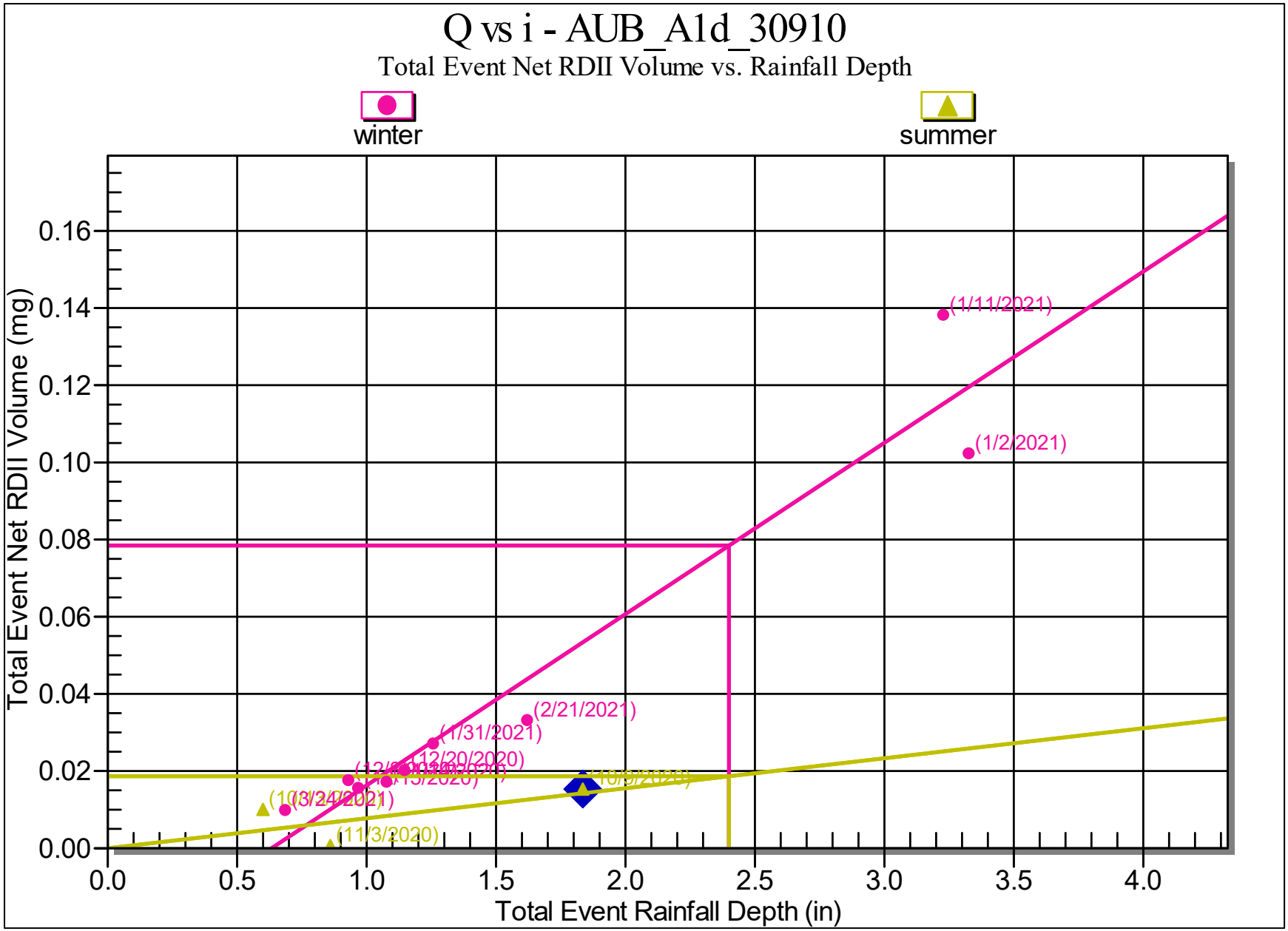

Q vs i - AUB_A16_80956
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
0.18
0.20
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Total Event Rainfall Depth (in)
(1/11/2021)
(1/2/2021)
(12/20/2020)
(2/21/2021)
(12/8/2020)
(10/9/2020)
(3/24/2021)
(11/3/2020)

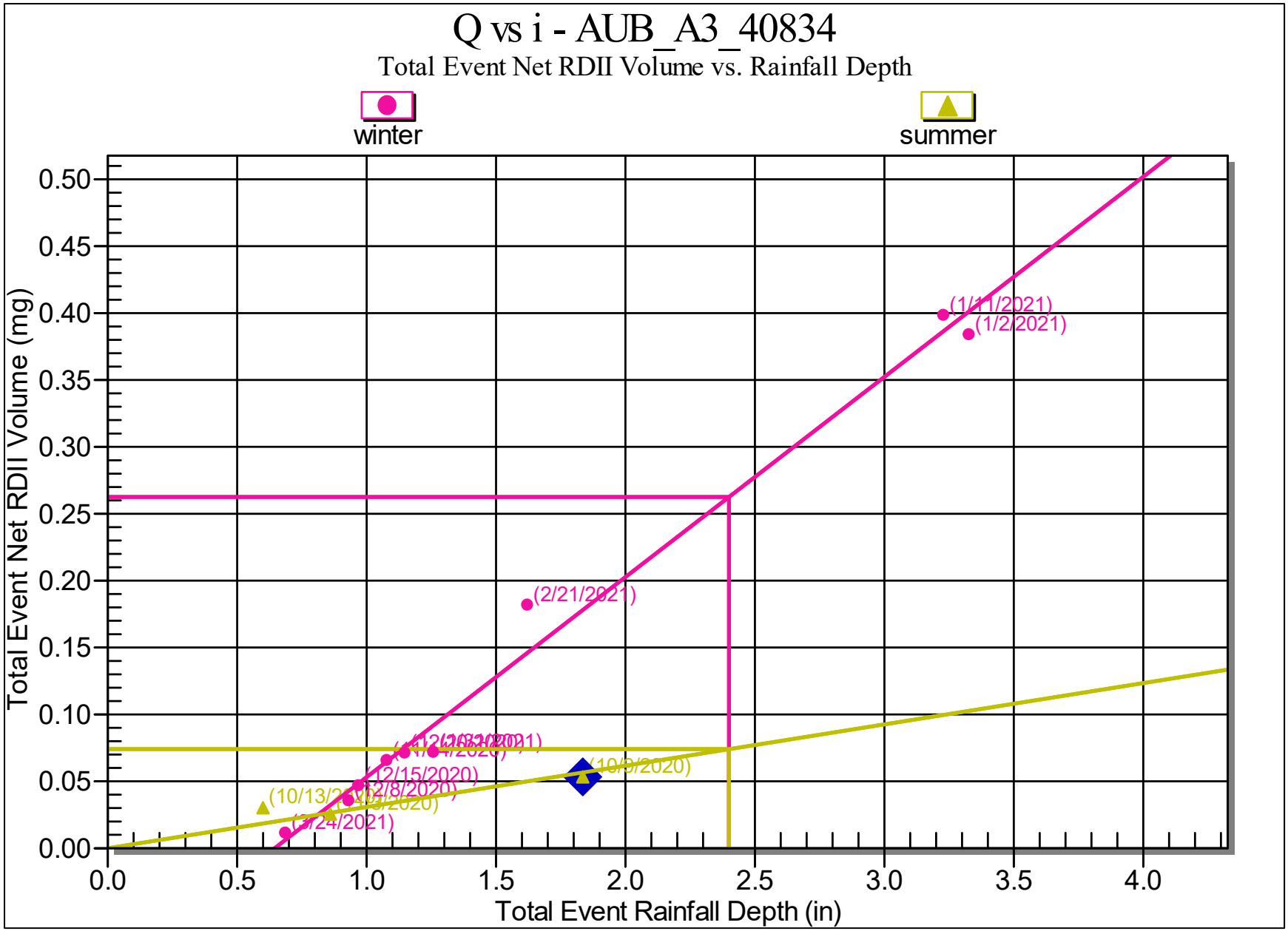

Q vs i - AUB_A17_80957
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Total Event Rainfall Depth (in)
(1/11/2021)
(1/2/2021)
(10/9/2020)
(2/21/2021)
(12/8/2020)
(11/3/2020)

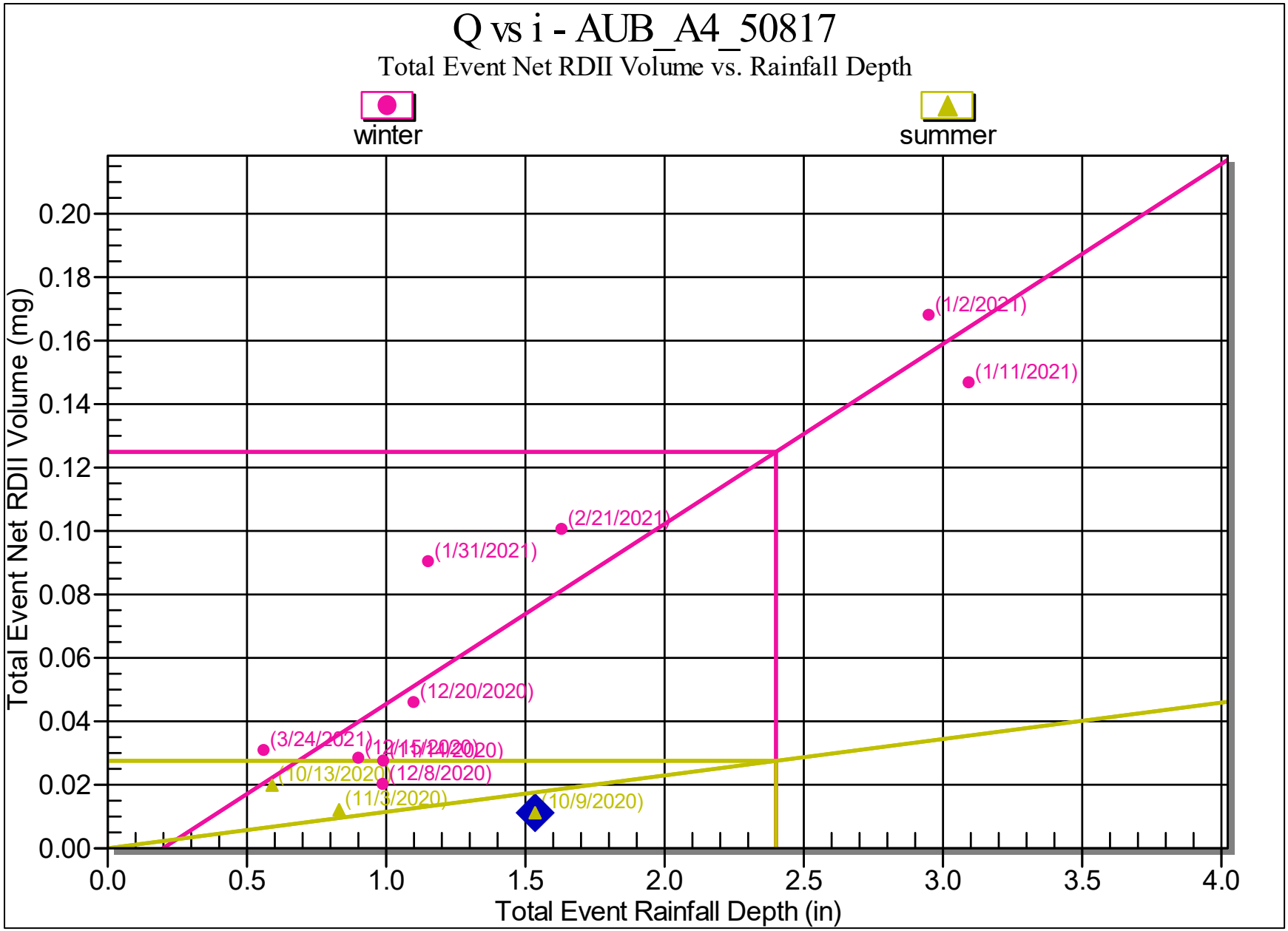

Q vs i - AUB_A1a_30822
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Total Event Rainfall Depth (in)
(1/2/2021)
(1/31/2021)
(1/11/2021)
(12/15/2020)
(3/24/2021)
(2/21/2021)
(12/20/2020)
(11/14/2020)
(11/3/2020)
(10/13/2020)

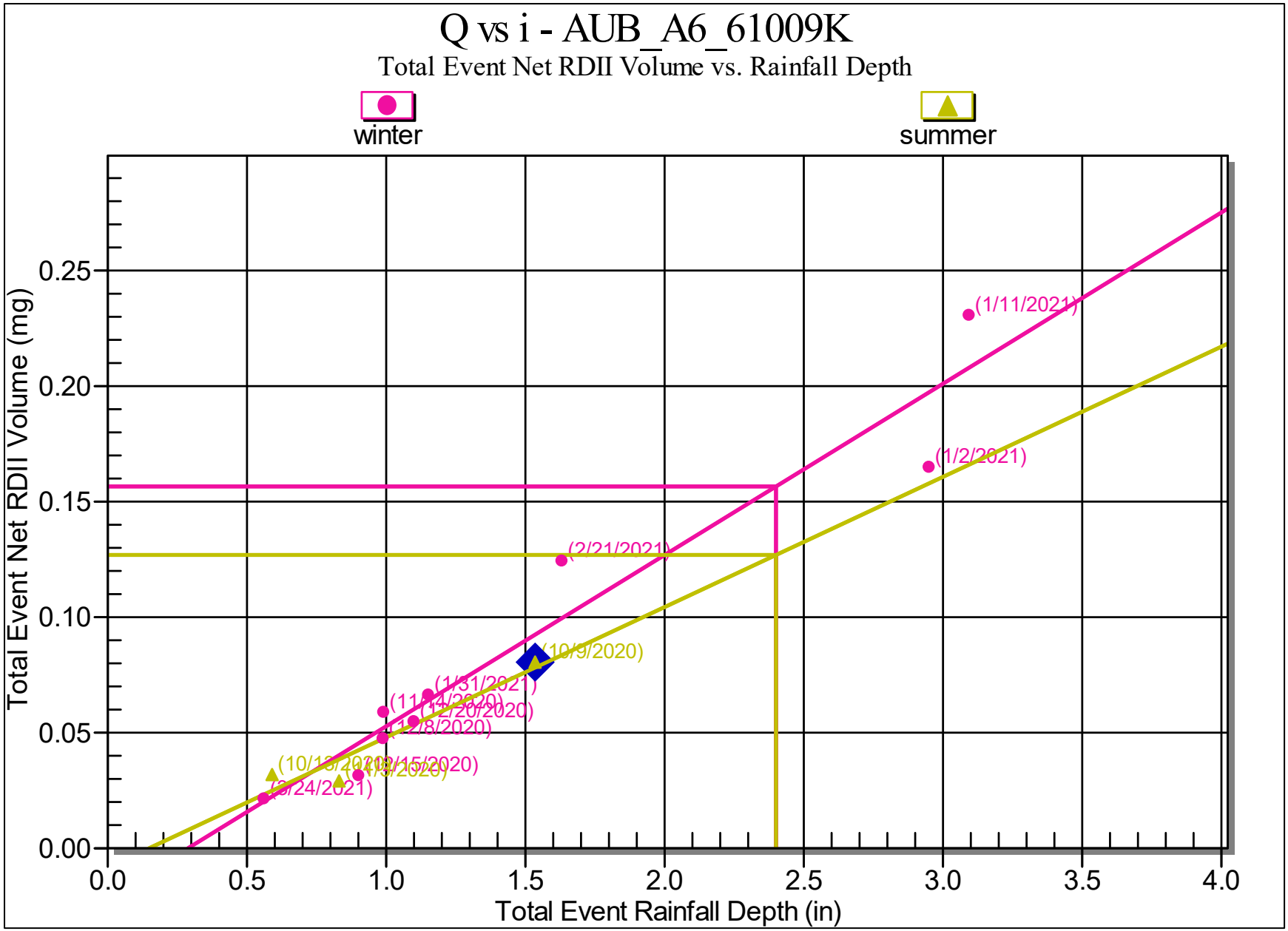

Q vs i - AUB_A1b_30968
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Total Event Rainfall Depth (in)
(1/31/2021)
(12/15/2020)
(2/21/2021)
(10/13/2020)
(10/9/2020)

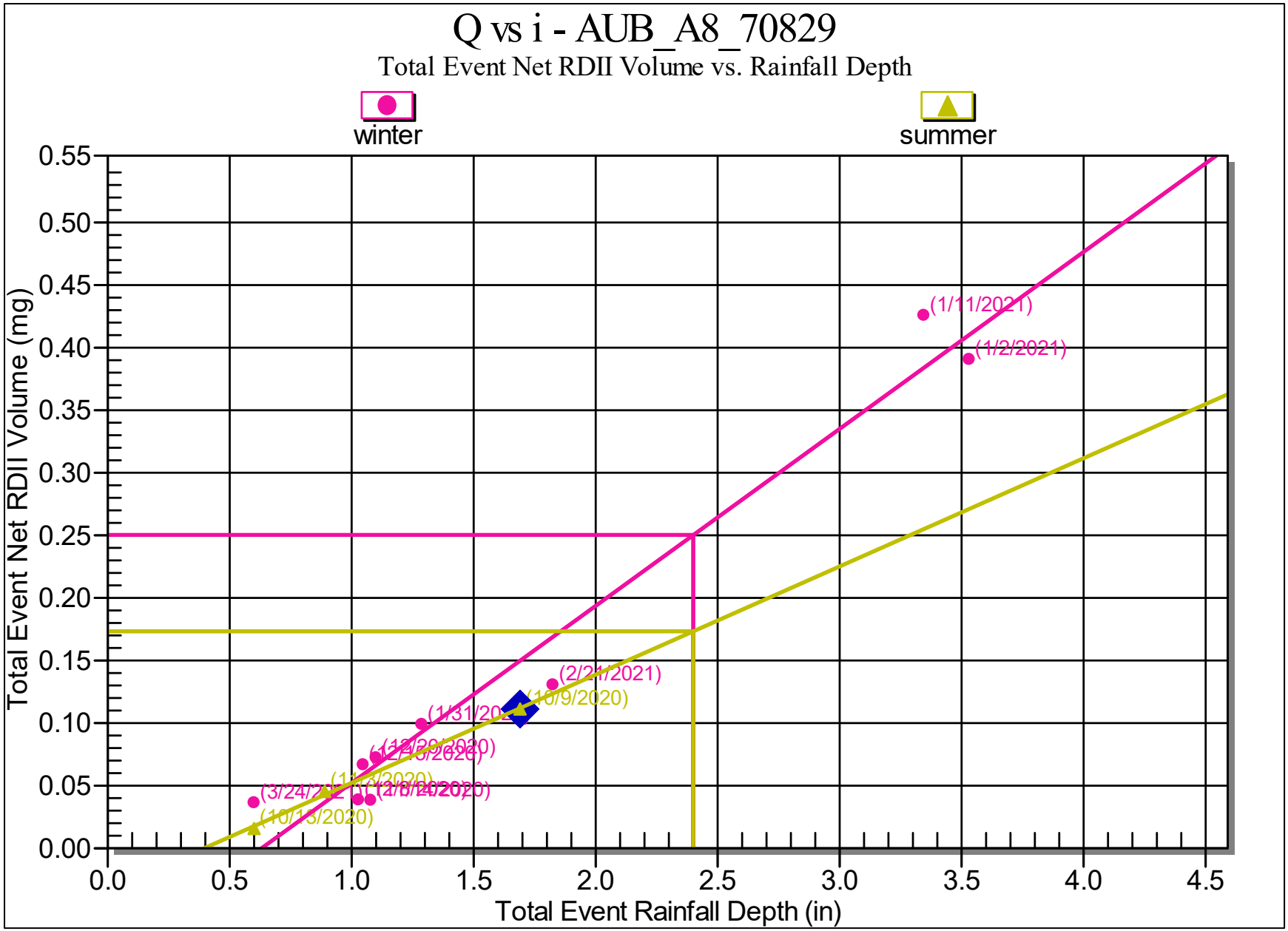

Q vs i - AUB_A1c_30906
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Total Event Rainfall Depth (in)
(1/11/2021)
(1/2/2021)
(2/21/2021)
(1/31/2021)
(10/9/2020)

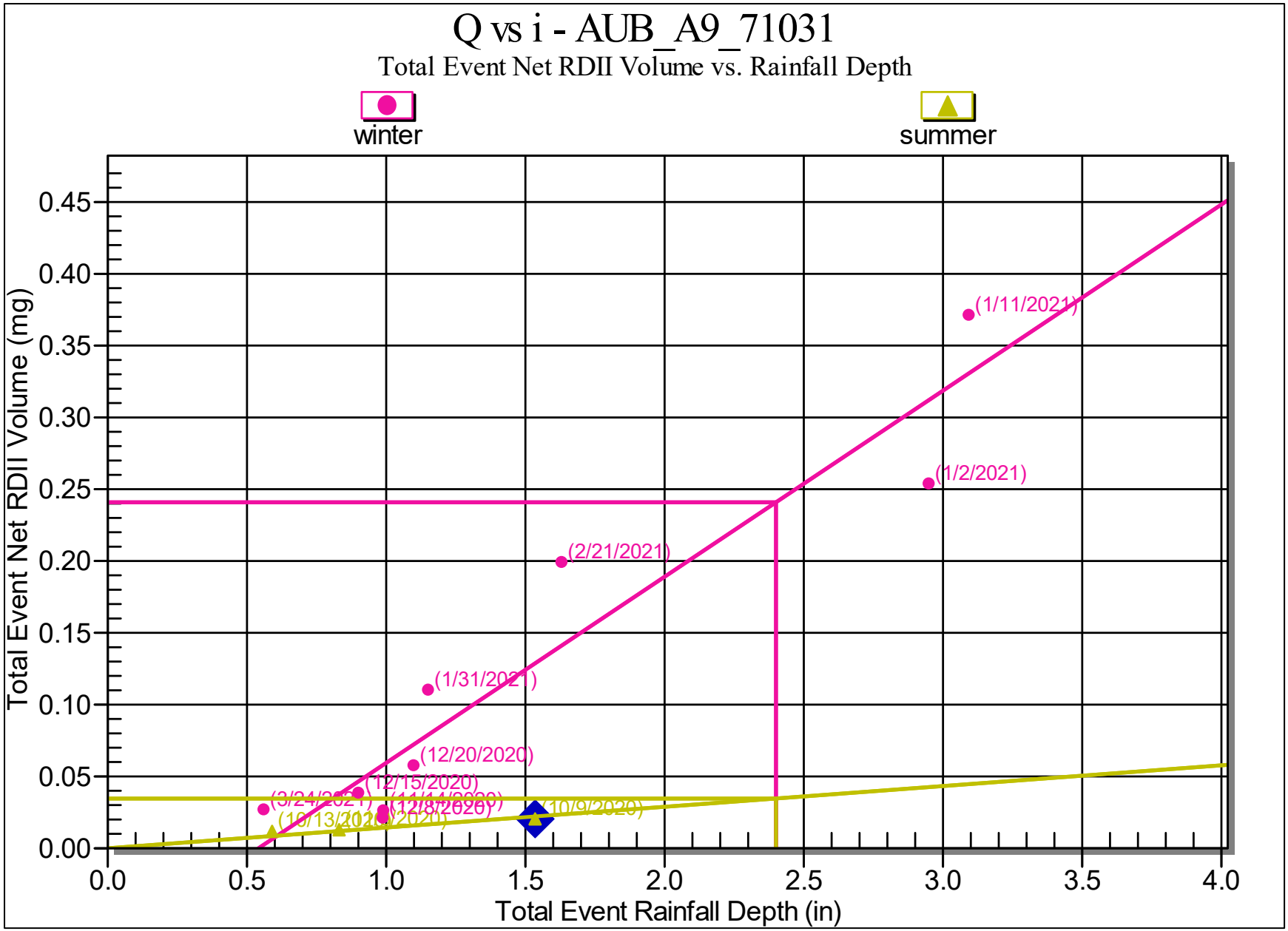

Q vs i - AUB_A1d_30910
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Total Event Rainfall Depth (in)
(1/11/2021)
(1/2/2021)
(2/21/2021)
(1/31/2021)
(12/20/2020)
(11/3/2020)

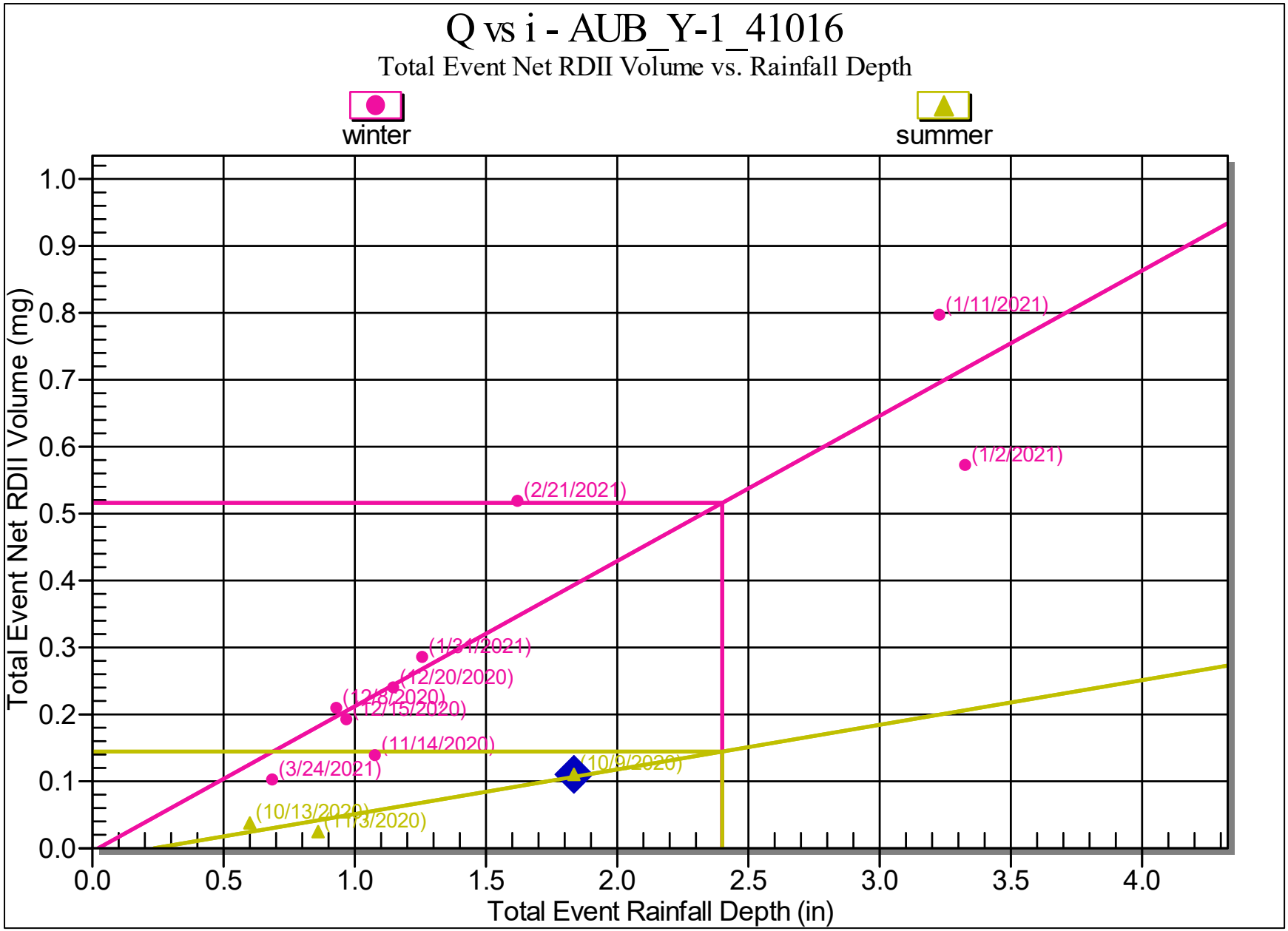

Q vs i - AUB_A3_40834
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
0.45
0.50
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Total Event Rainfall Depth (in)
(1/11/2021)
(1/2/2021)
(2/21/2021)
(2/15/2020)
(10/9/2020)

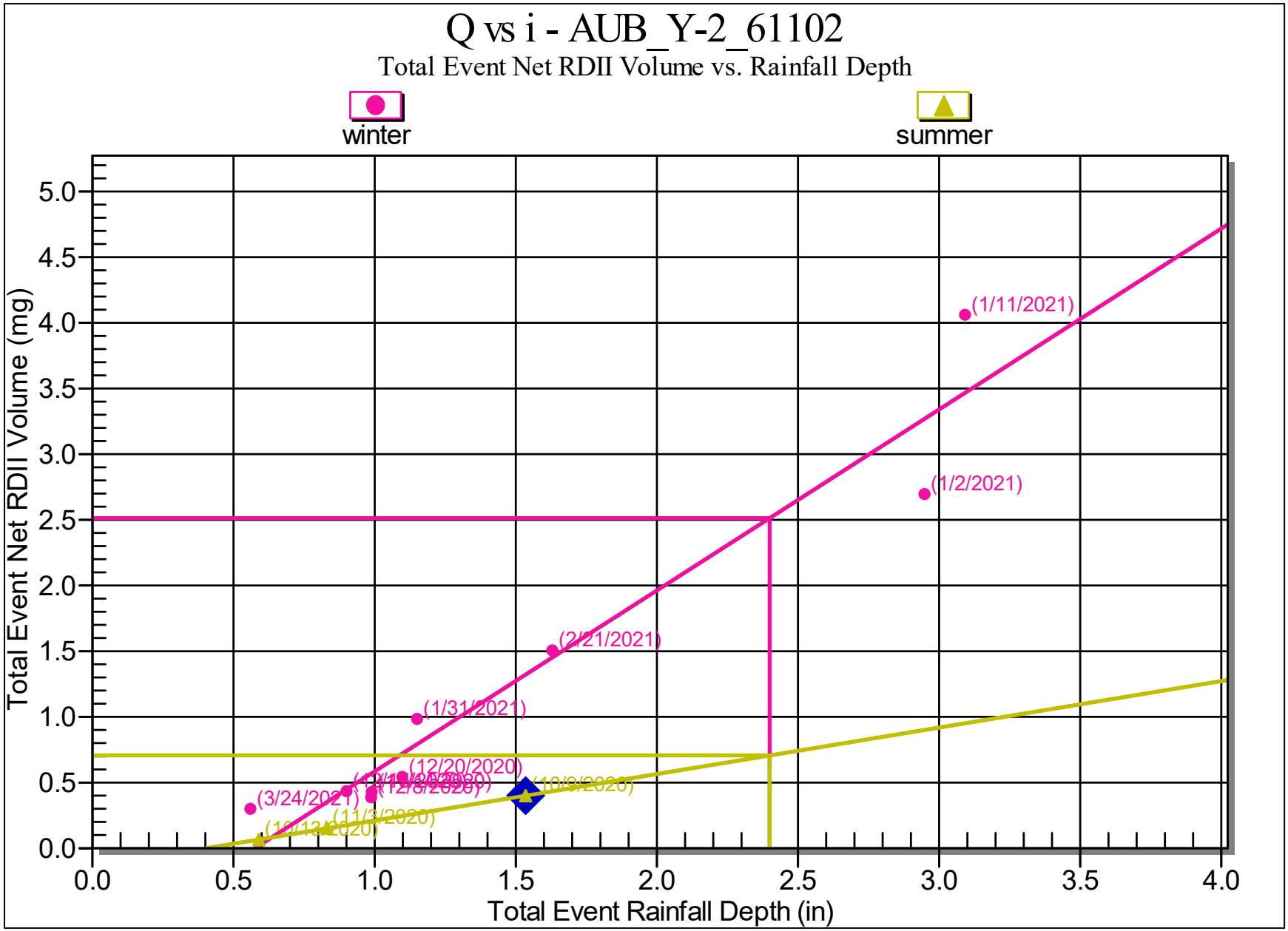

Q vs i - AUB_A4_50817
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
0.18
0.20
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Total Event Rainfall Depth (in)
(1/2/2021)
(1/11/2021)
(2/21/2021)
(1/31/2021)
(12/20/2020)
(3/24/2021)
(12/15/2020)
(12/14/2020)
(10/13/2020)
(12/8/2020)
(11/3/2020)
(10/9/2020)

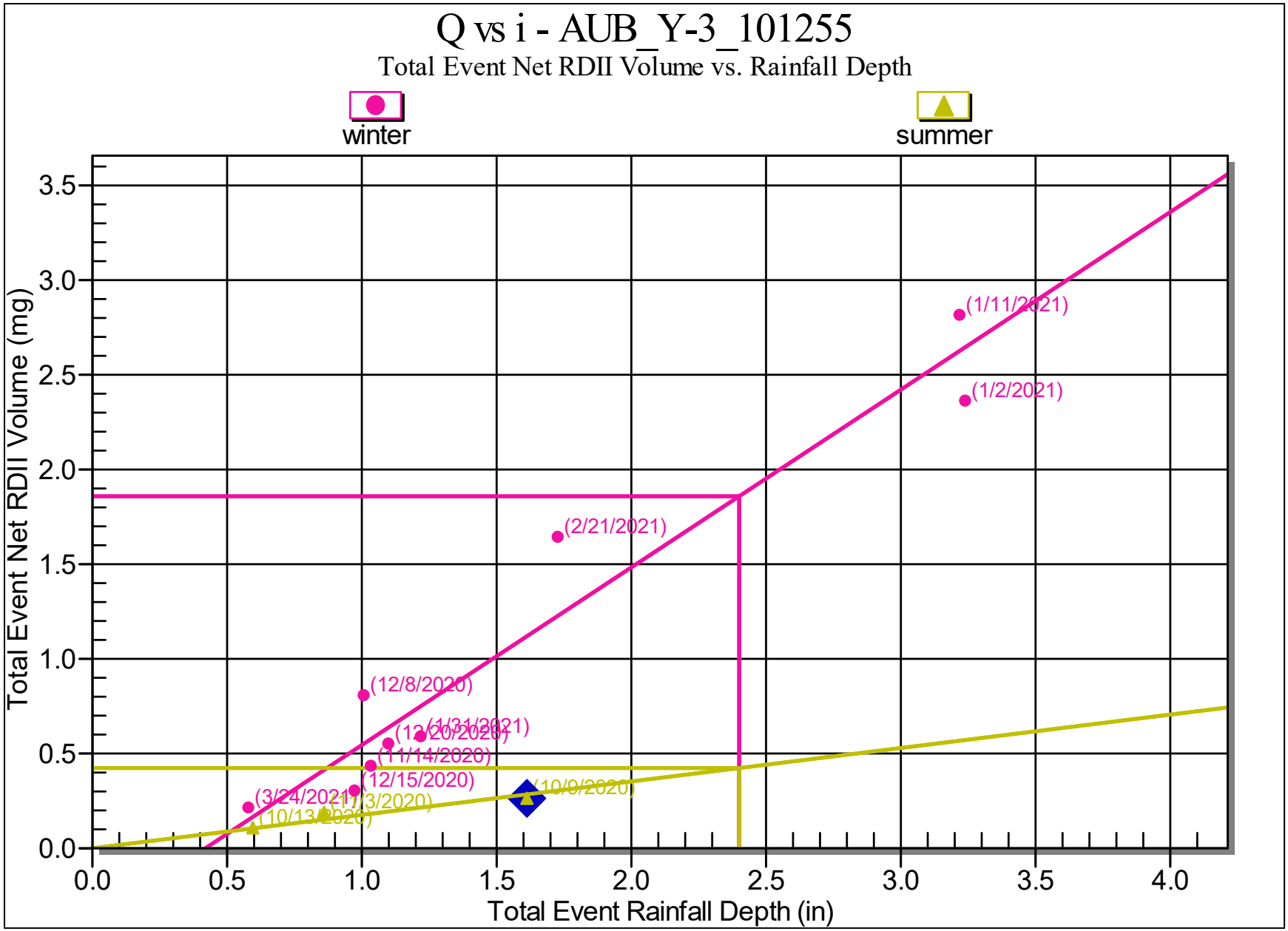

Q vs i - AUB_A6_61009K
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.00
0.05
0.10
0.15
0.20
0.25
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Total Event Rainfall Depth (in)
(1/11/2021)
(1/2/2021)
(2/21/2021)
(10/9/2020)
(1/31/2021)
(11/20/2020)
(11/28/2020)
(10/15/2020)
(3/24/2021)

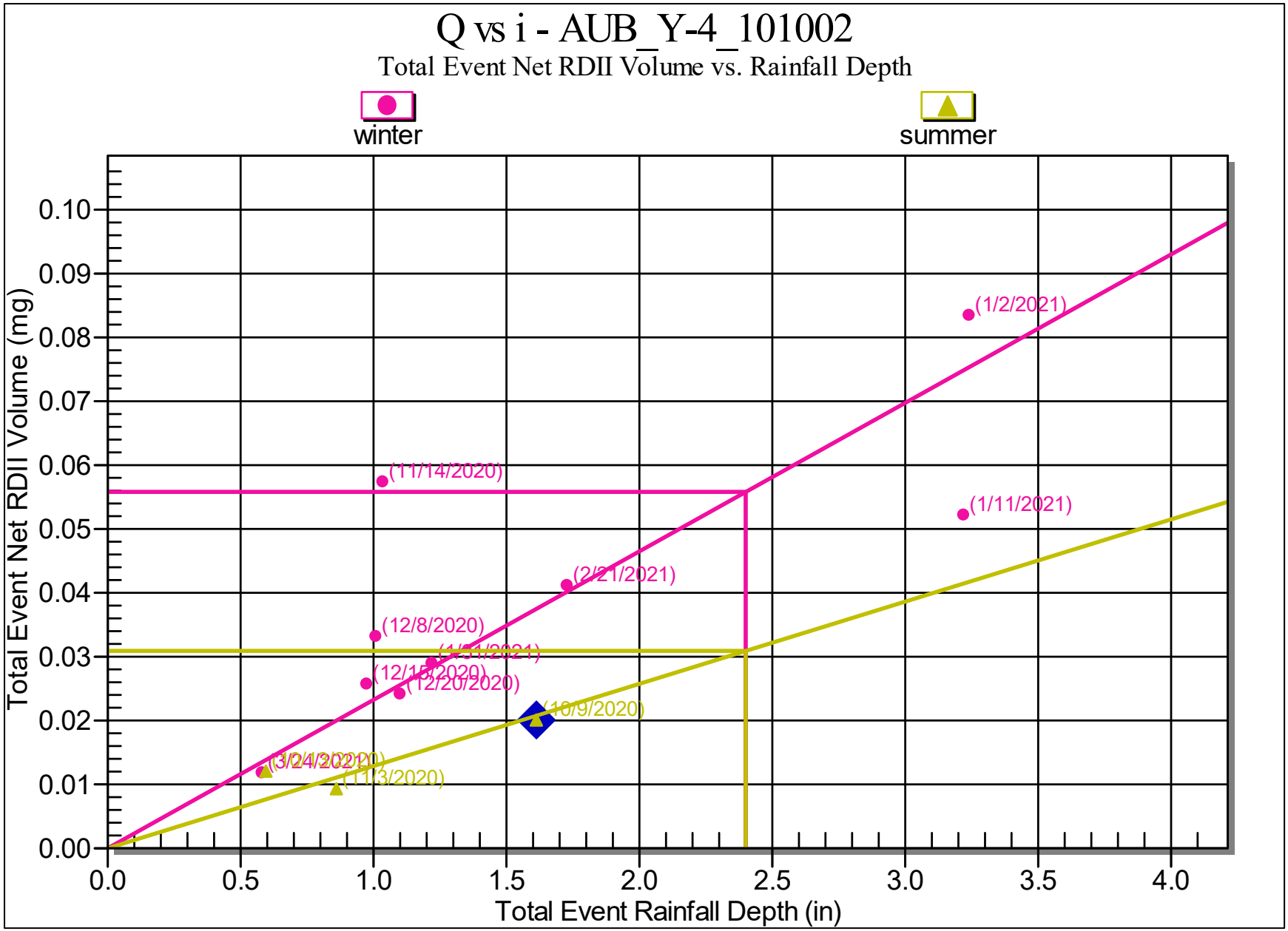

Q vs i - AUB_A8_70829
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Total Event Rainfall Depth (in)
(1/11/2021)
(1/2/2021)
(2/21/2021)
(10/9/2020)
(10/13/2020)

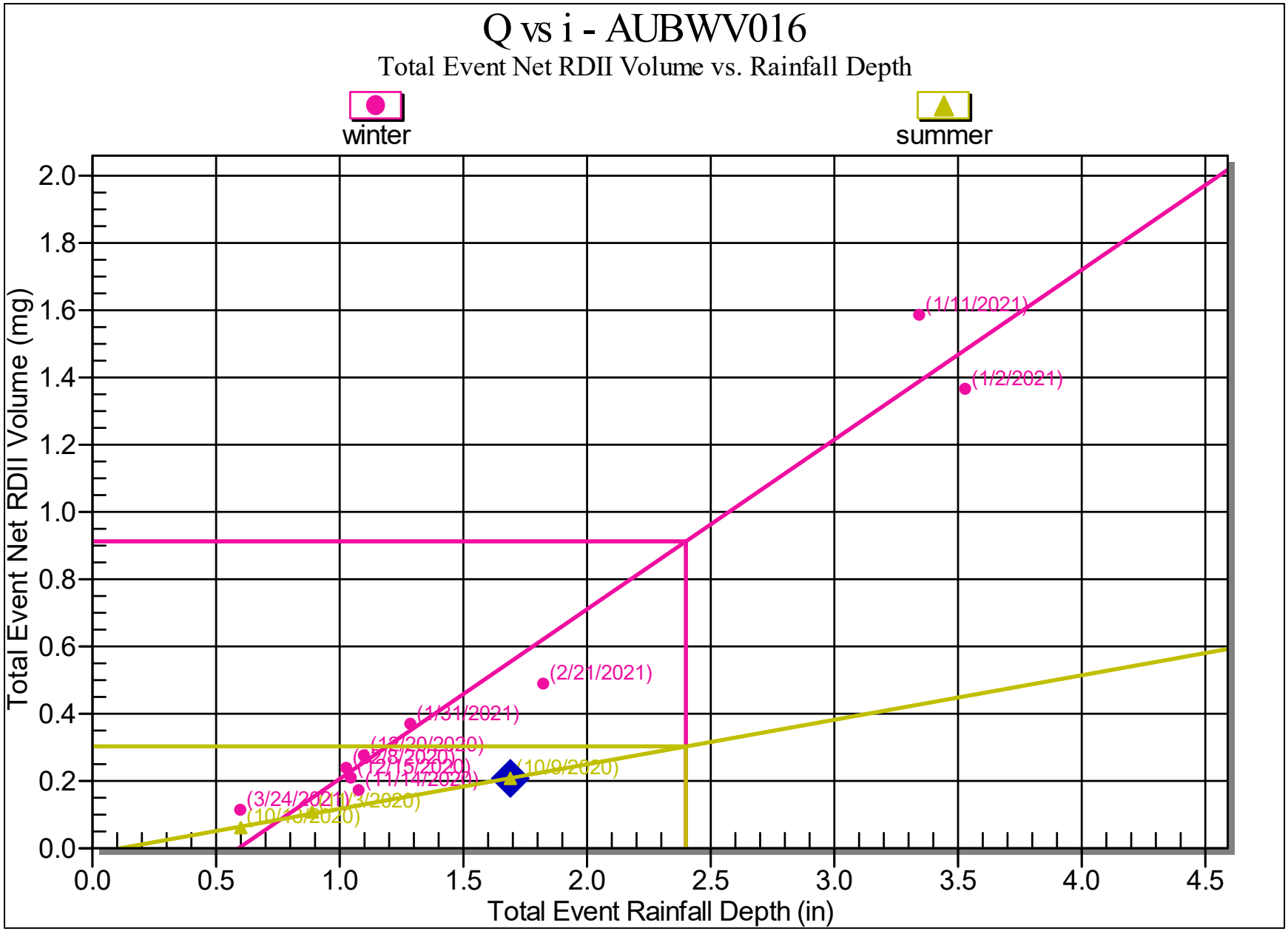

Q vs i - AUB_A9_71031
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
0.45
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Total Event Rainfall Depth (in)
(1/11/2021)
(1/2/2021)
(2/21/2021)
(1/31/2021)
(12/20/2020)
(12/15/2020)
(12/8/2020)
(10/9/2020)

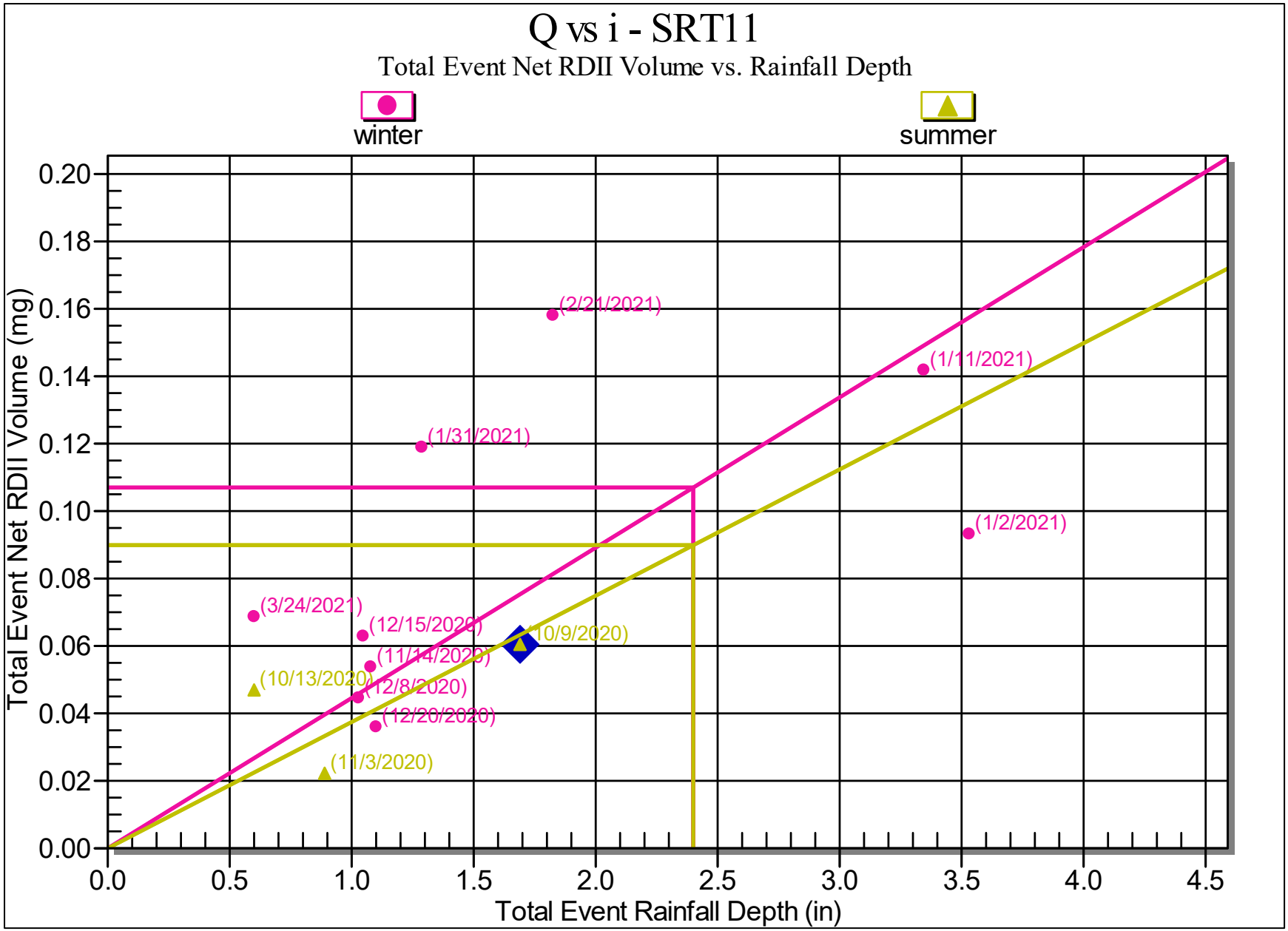

Q vs i - AUB_Y-1_41016
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
Total Event Rainfall Depth (in)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
(1/11/2021)
(1/2/2021)
(2/21/2021)
(1/31/2021)
(12/20/2020)
(12/8/2020)
(12/15/2020)
(11/14/2020)
(3/24/2021)
(10/9/2020)
(10/13/2020)
(11/3/2020)

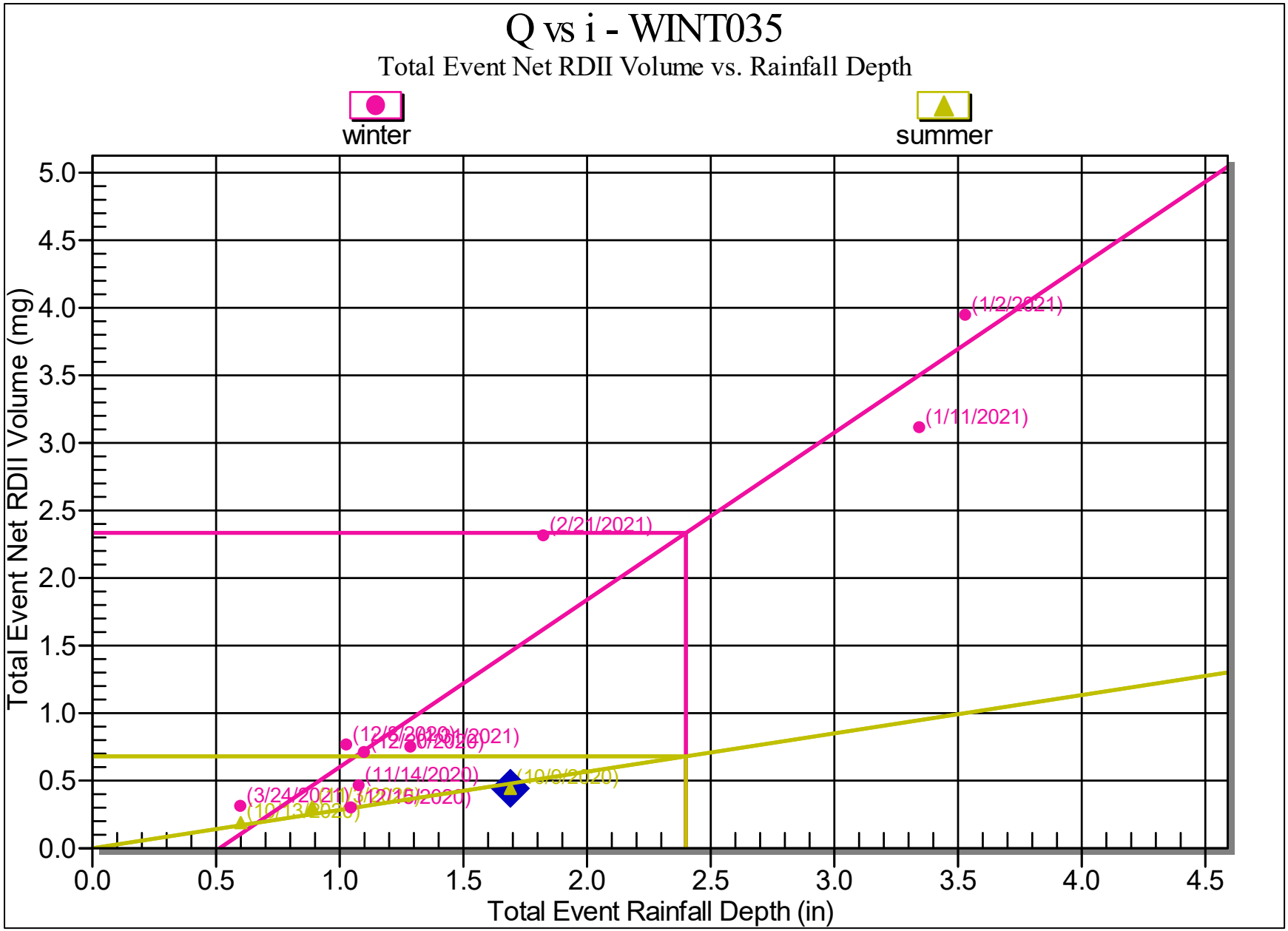

Q vs i - AUB_Y-2_61102
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
Total Event Rainfall Depth (in)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
(1/11/2021)
(1/2/2021)
(2/21/2021)
(1/31/2021)
(12/20/2020)
(3/24/2021)
(11/3/2020)
(10/9/2020)

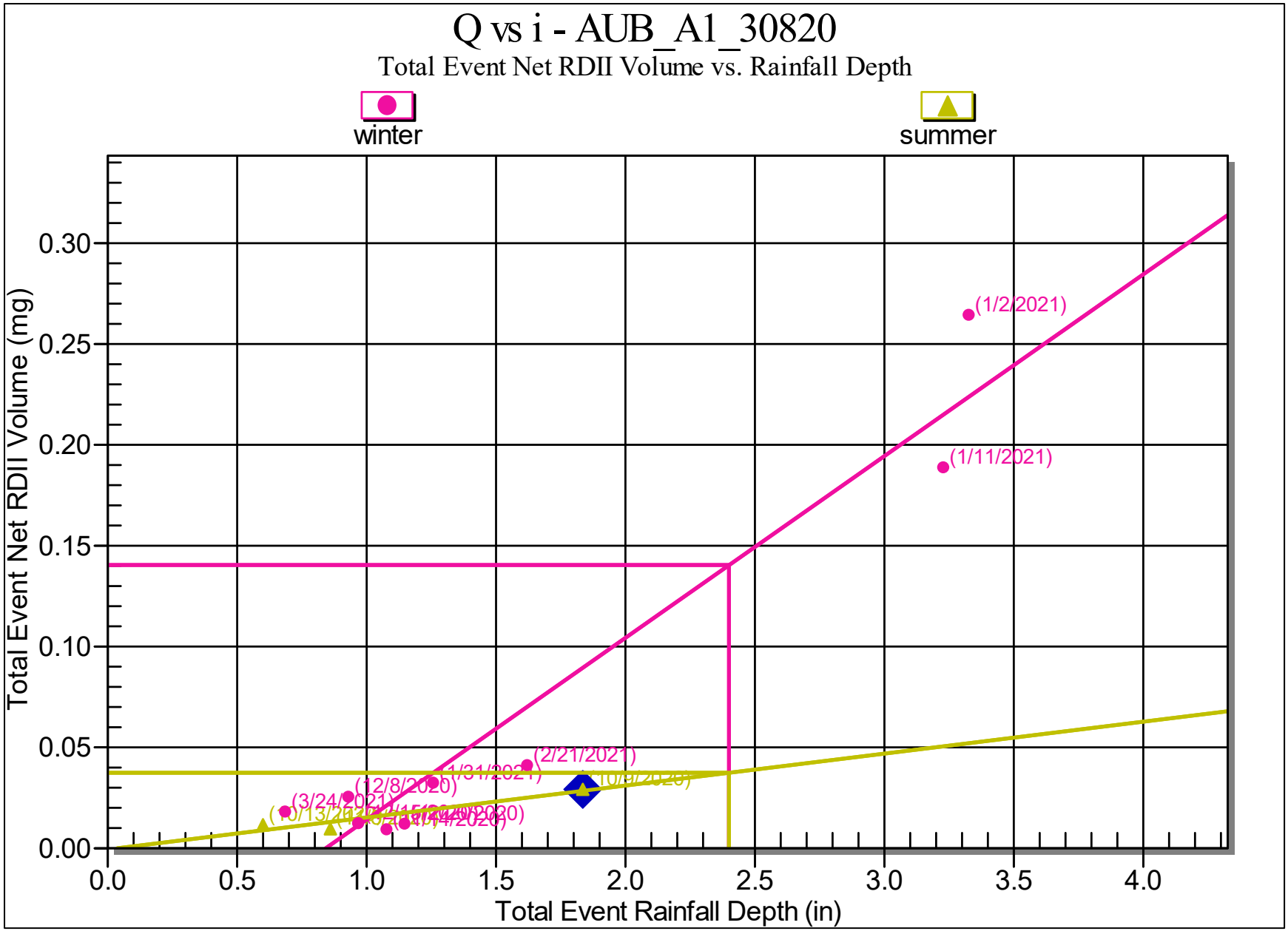

Q vs i - AUB_Y-3_101255
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
Total Event Rainfall Depth (in)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
(1/11/2021)
(1/2/2021)
(2/21/2021)
(12/8/2020)
(1/31/2021)
(12/20/2020)
(11/14/2020)
(12/15/2020)
(3/24/2021)
(11/3/2020)
(10/13/2020)
(10/9/2020)

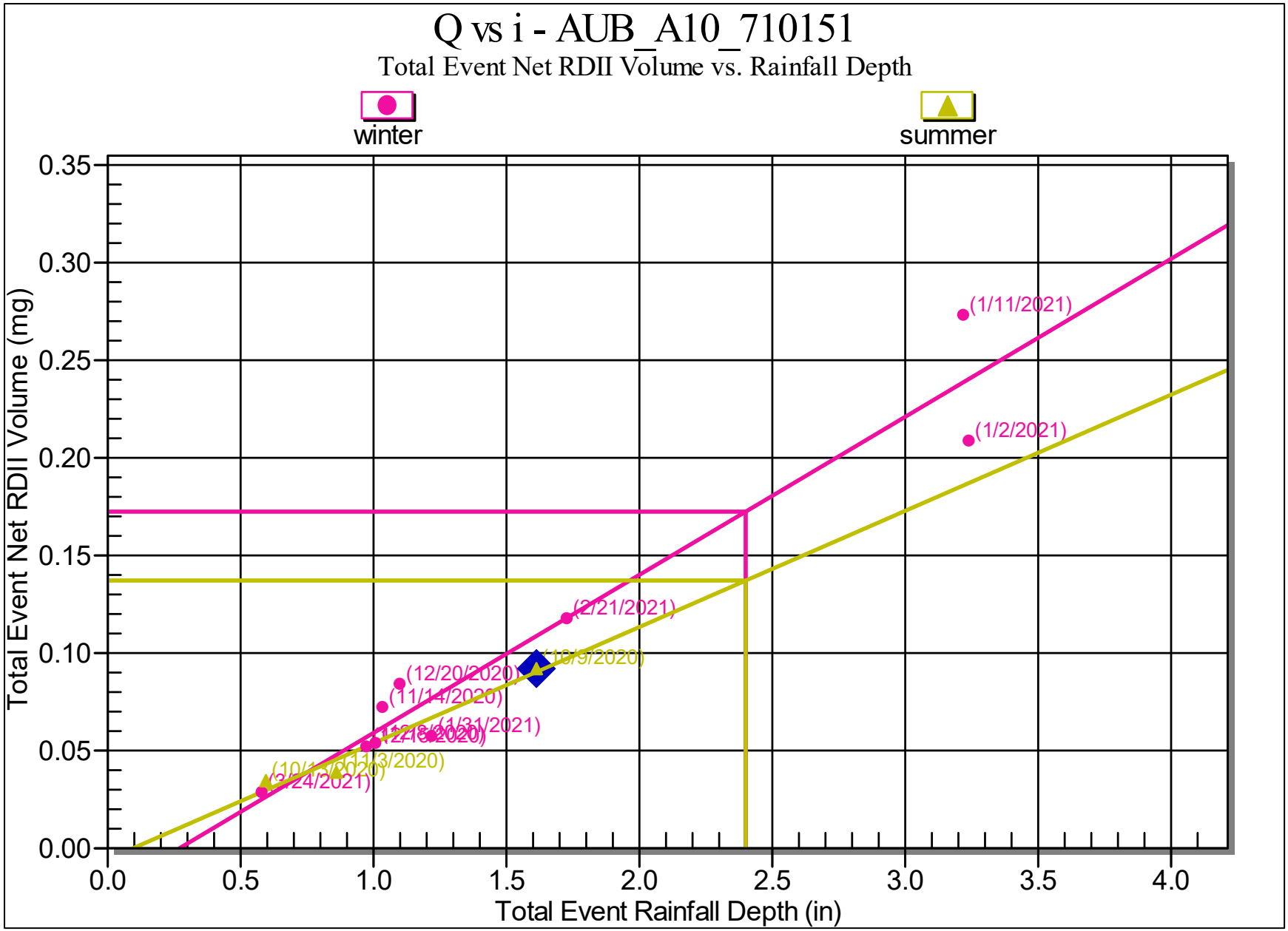

Q vs i - AUB_Y-4_101002
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Total Event Rainfall Depth (in)
(1/2/2021)
(11/14/2020)
(1/11/2021)
(2/21/2021)
(12/8/2020)
(12/20/2020)
(10/9/2020)
(11/3/2020)

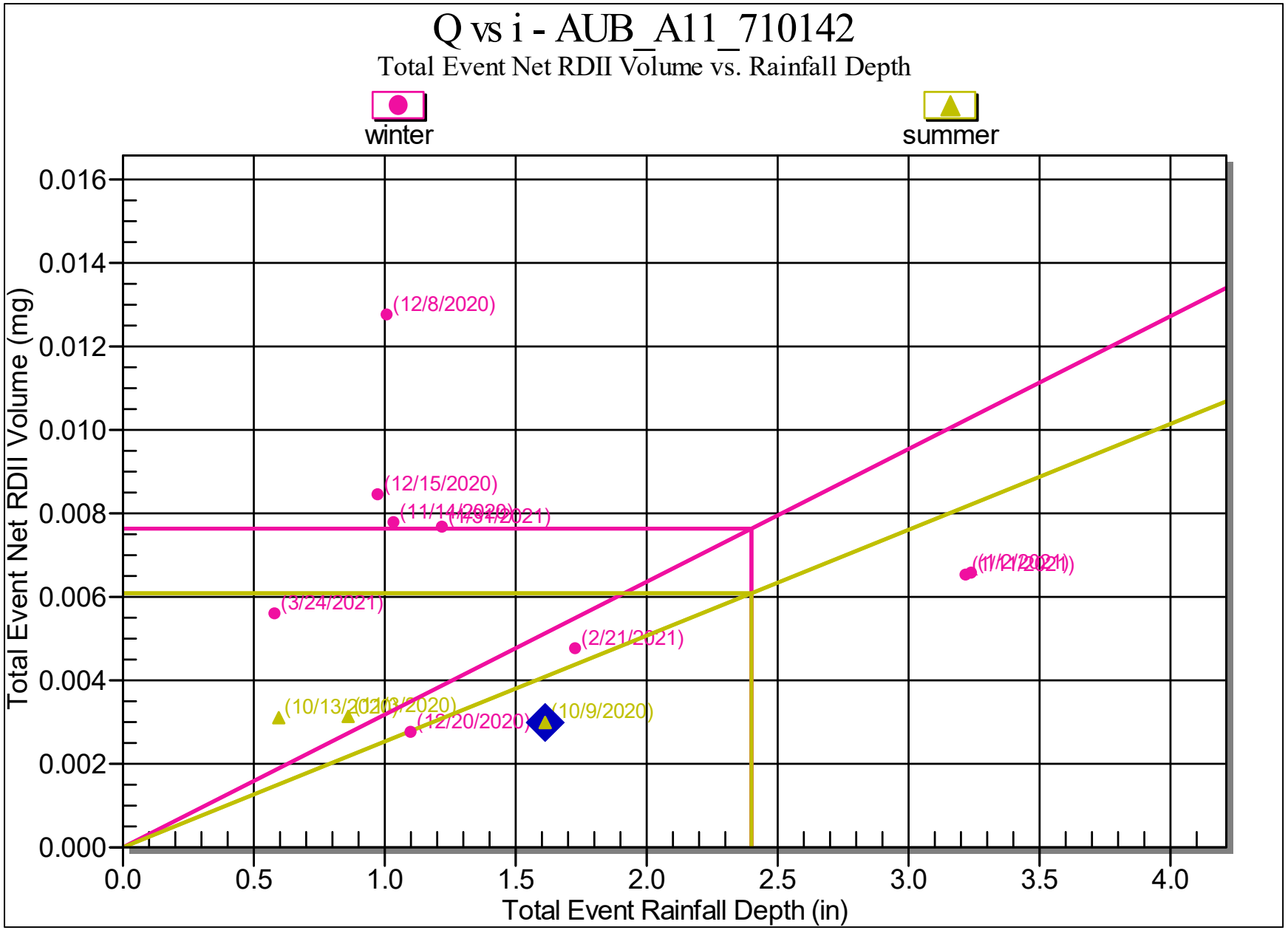

Q vs i - AUBWV016
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
Total Event Rainfall Depth (in)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
(1/11/2021)
(1/2/2021)
(2/21/2021)
(1/31/2021)
(10/9/2020)
(3/24/2021)

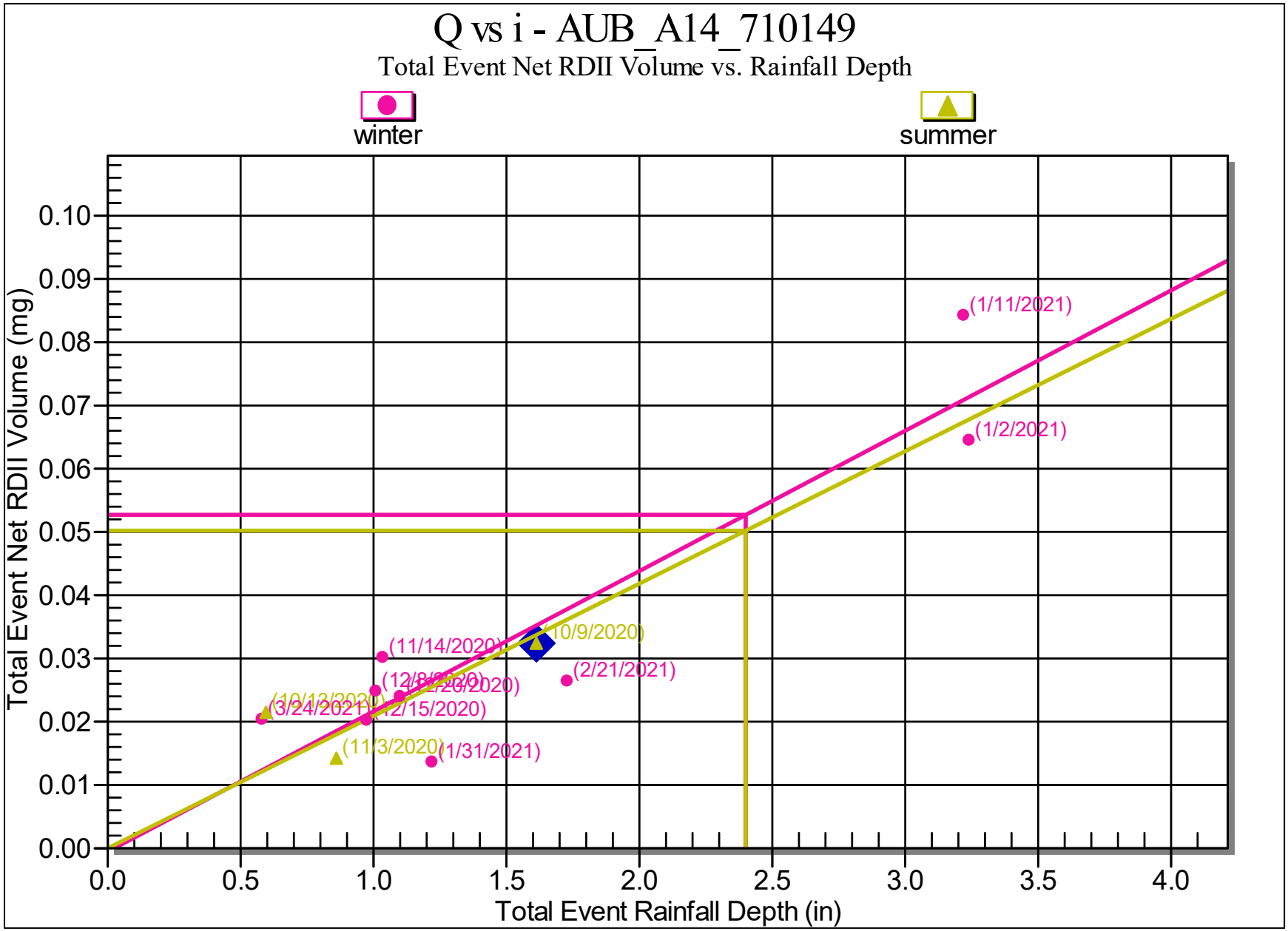

Q vs i - SRT11
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
0.18
0.20
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Total Event Rainfall Depth (in)
(2/21/2021)
(1/11/2021)
(1/31/2021)
(1/2/2021)
(3/24/2021)
(12/15/2020)
(10/9/2020)
(11/14/2020)
(10/13/2020)
(12/8/2020)
(12/20/2020)
(11/3/2020)

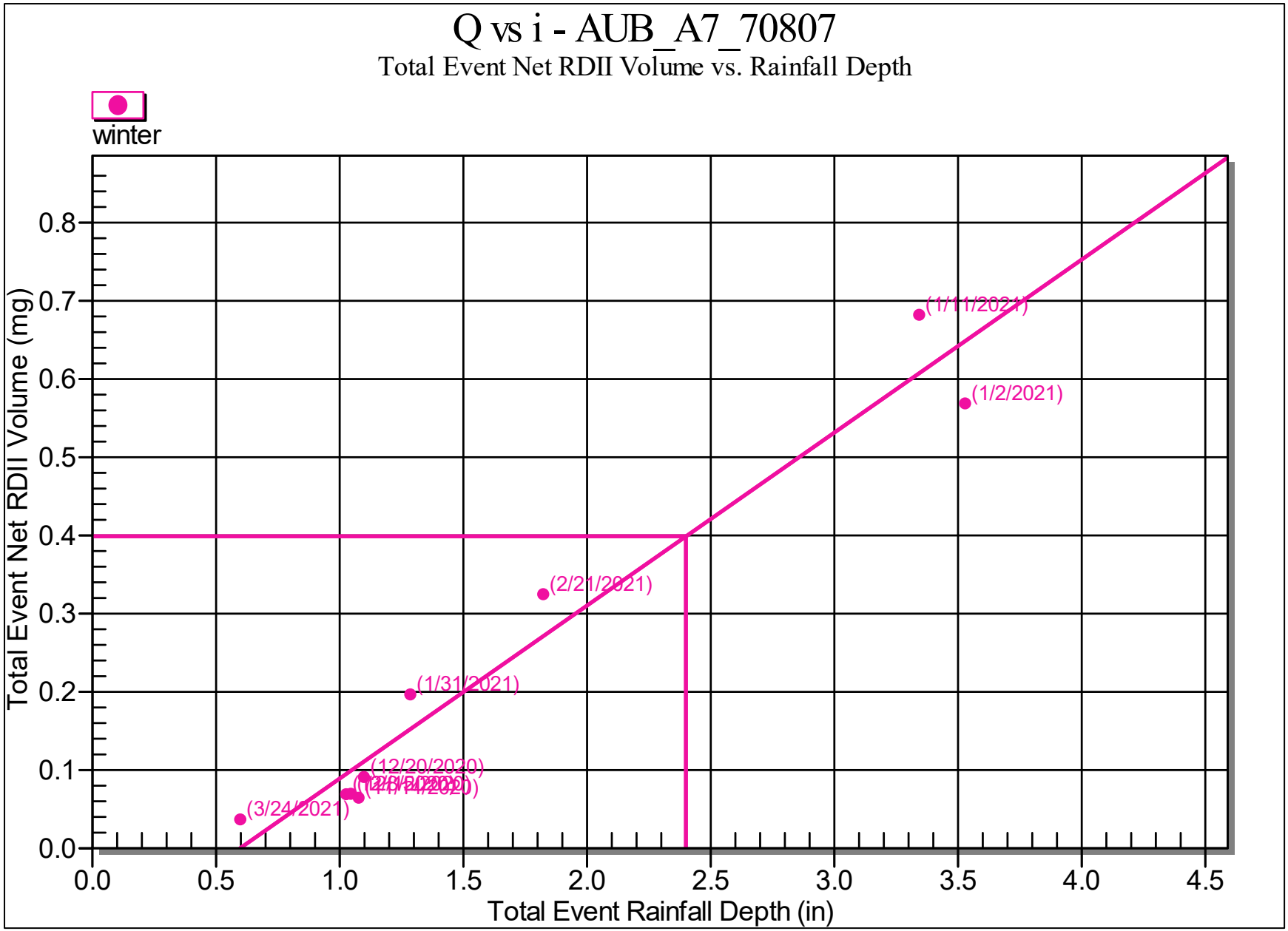

Q vs i - WINT035
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
Total Event Rainfall Depth (in)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
(1/2/2021)
(1/11/2021)
(2/21/2021)
(11/14/2020)
(10/9/2020)

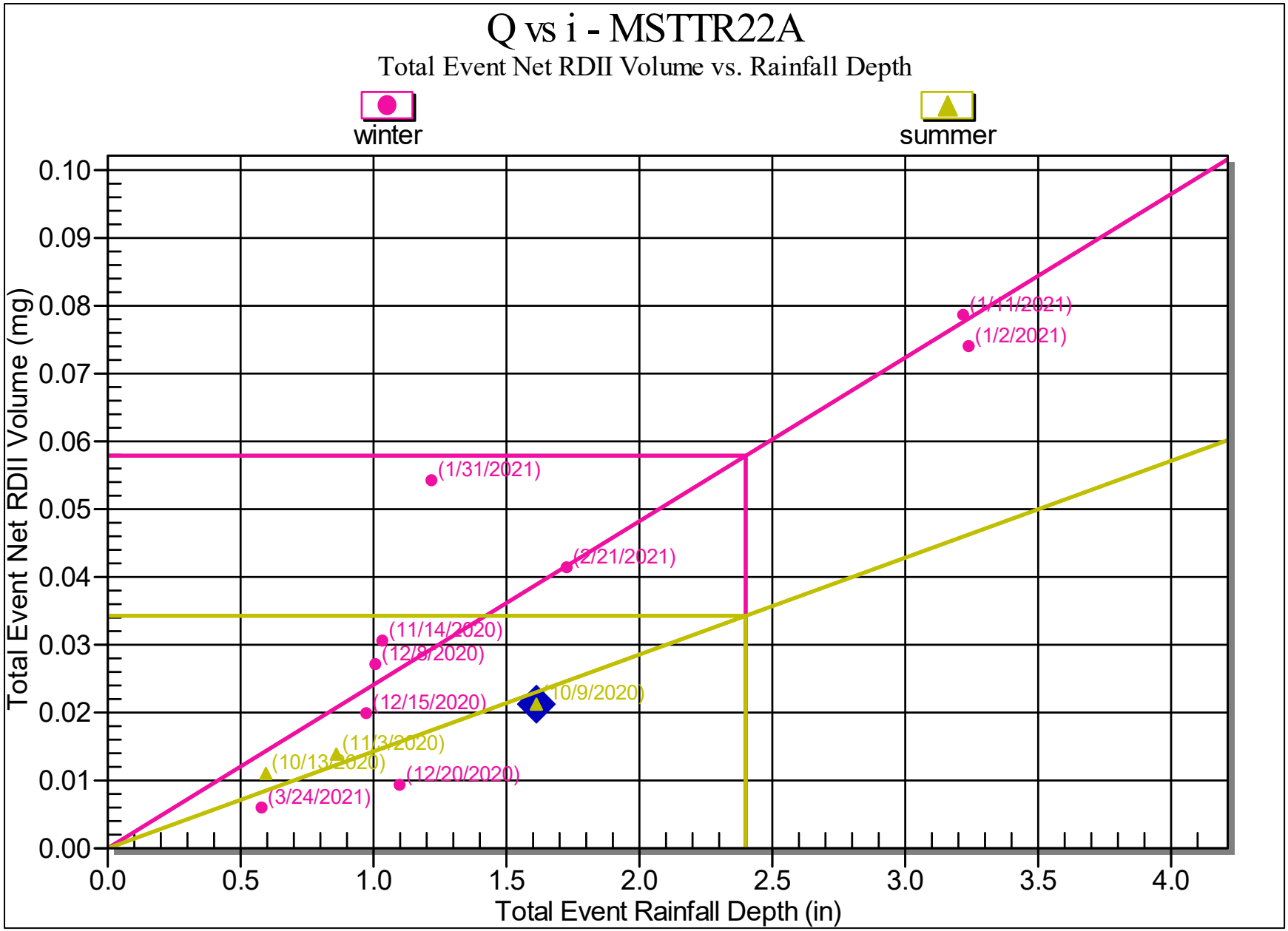

Q vs i - AUB_A1_30820
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Total Event Rainfall Depth (in)
(1/2/2021)
(1/11/2021)
(2/21/2021)
(12/8/2020)
(3/24/2021)

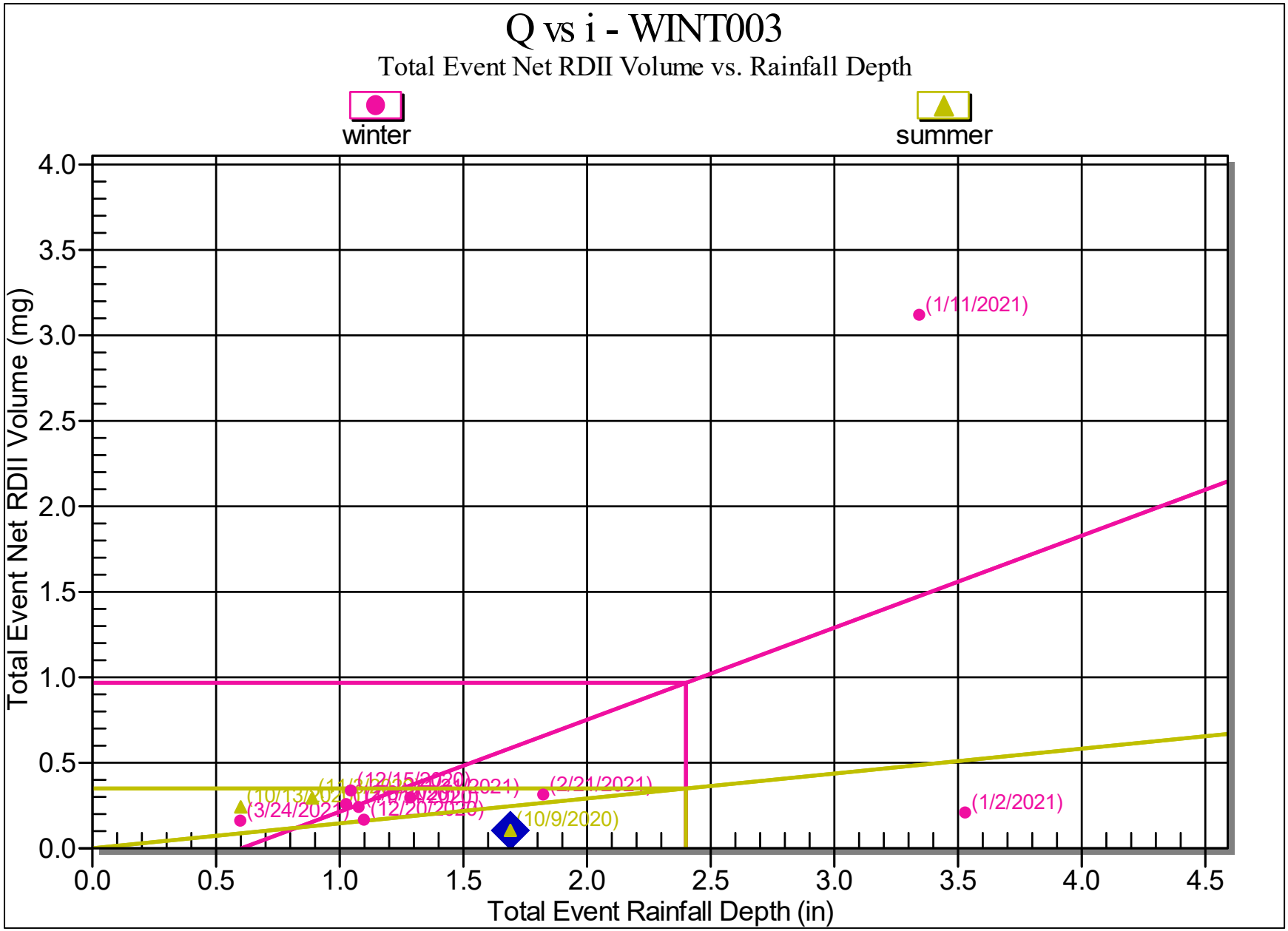

Q vs i - AUB_A10_710151
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Total Event Rainfall Depth (in)
(1/11/2021)
(1/2/2021)
(2/21/2021)
(12/20/2020)
(11/14/2020)
(1/31/2021)
(11/3/2020)
(3/24/2021)

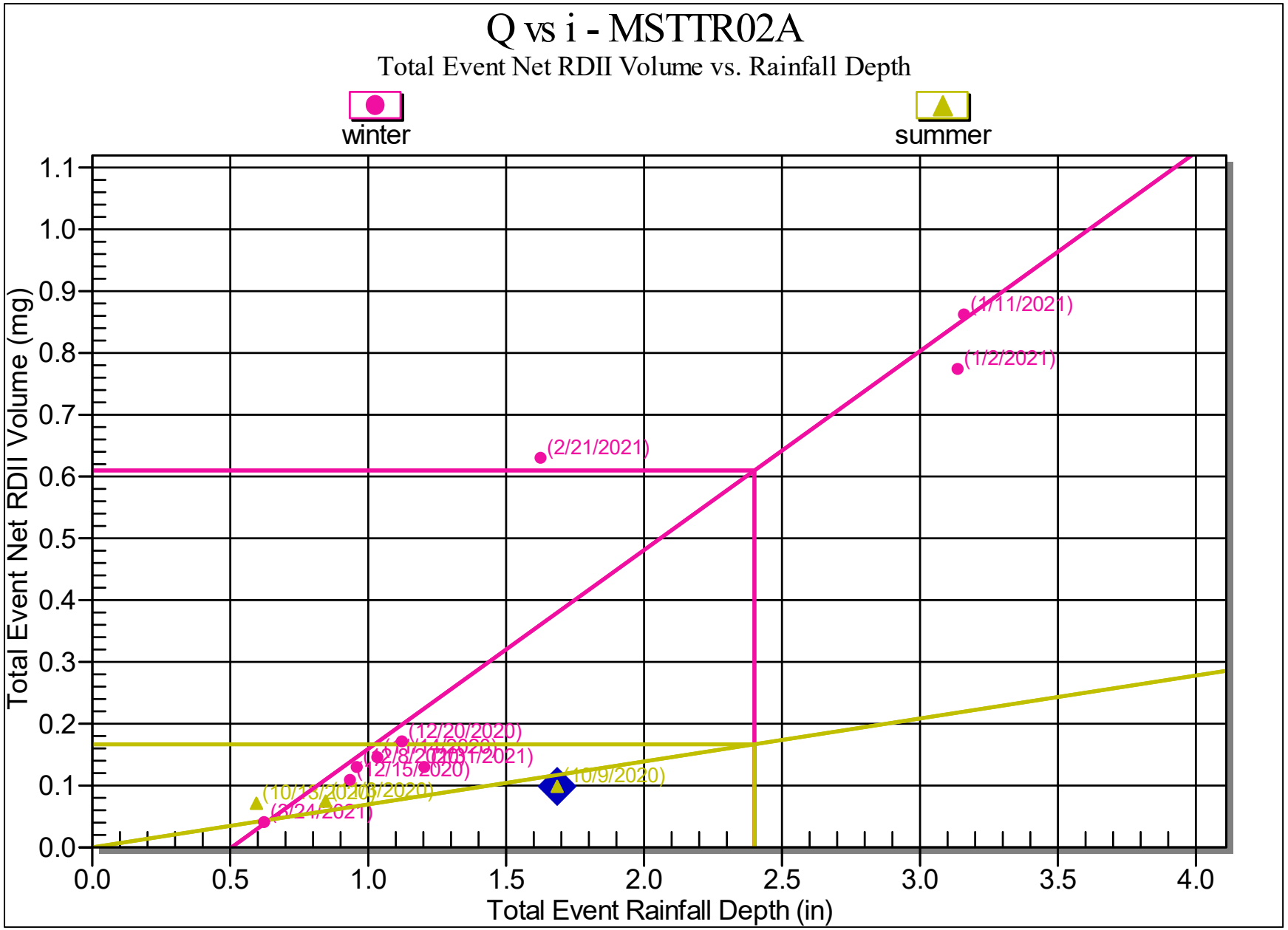

Q vs i - AUB_A11_710142
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
(12/8/2020)
(12/15/2020)
(3/24/2021)
(2/21/2021)
(10/9/2020)
(12/20/2020)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Total Event Rainfall Depth (in)

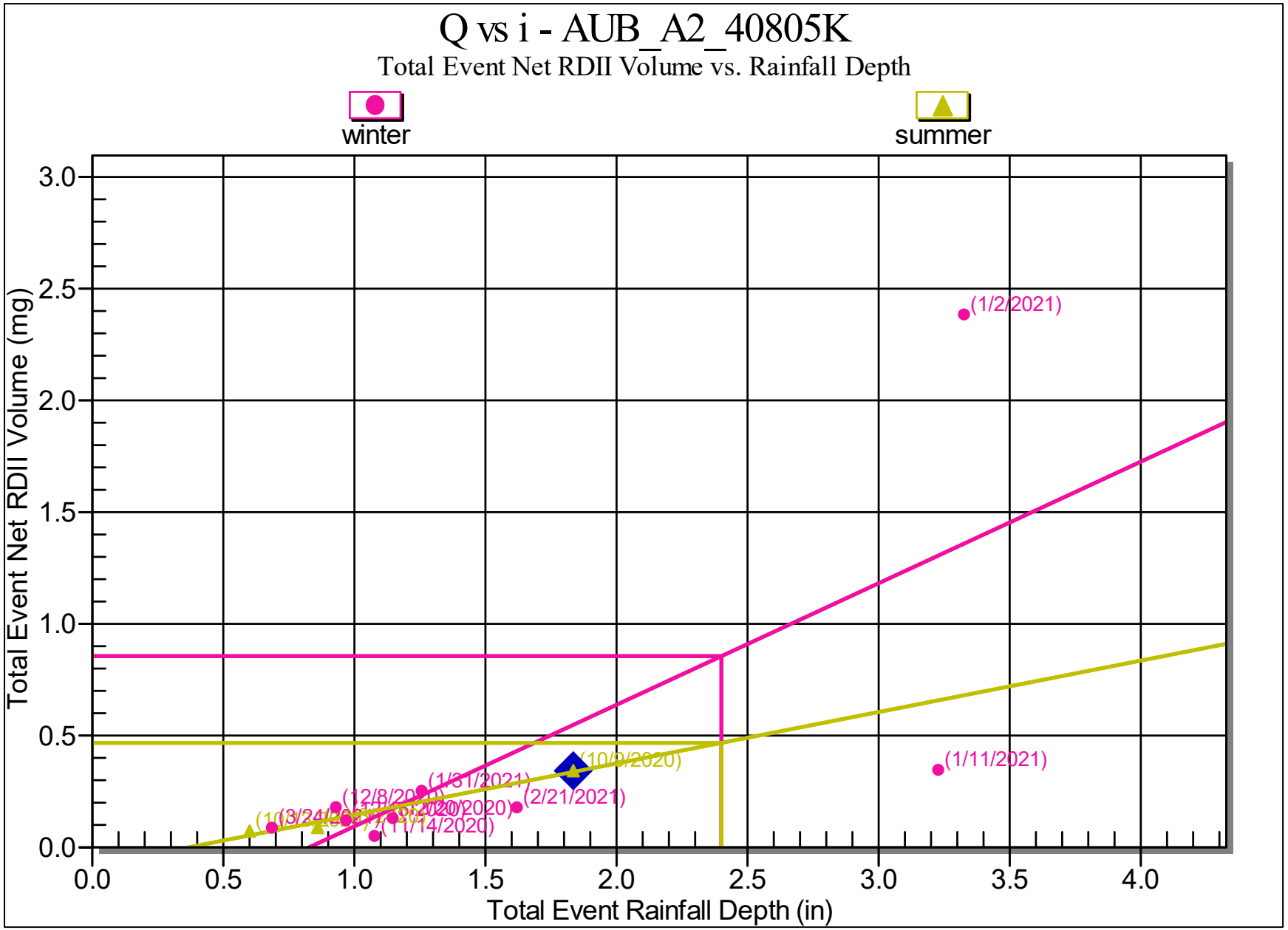

Q vs i - AUB_A14_710149
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Total Event Rainfall Depth (in)
(1/11/2021)
(1/2/2021)
(11/14/2020)
(10/9/2020)
(2/21/2021)
(12/8/2020)
(12/20/2020)
(10/13/2020)
(3/24/2021)
(12/15/2020)
(11/3/2020)
(1/31/2021)


Q vs i - AUB_A7_70807
Total Event Net RDII Volume vs. Rainfall Depth
winter
Total Event Net RDII Volume (mg)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Total Event Rainfall Depth (in)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
(1/11/2021)
(1/2/2021)
(2/21/2021)
(1/31/2021)
(12/20/2020)
(3/24/2021)


Q vs i - MSTTR22A
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Total Event Rainfall Depth (in)
(1/11/2021)
(1/2/2021)
(1/31/2021)
(2/21/2021)
(11/14/2020)
(12/8/2020)
(12/15/2020)
(10/9/2020)
(11/3/2020)
(10/13/2020)
(12/20/2020)
(3/24/2021)


Q vs i - WINT003
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
Total Event Rainfall Depth (in)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
(1/11/2021)
(2/21/2021)
(1/2/2021)
(10/9/2020)
(3/24/2021)
(12/20/2020)


Q vs i - MSTTR02A
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
Total Event Rainfall Depth (in)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
(1/11/2021)
(1/2/2021)
(2/21/2021)
(12/20/2020)
(12/15/2020)
(10/9/2020)
(2/24/2021)

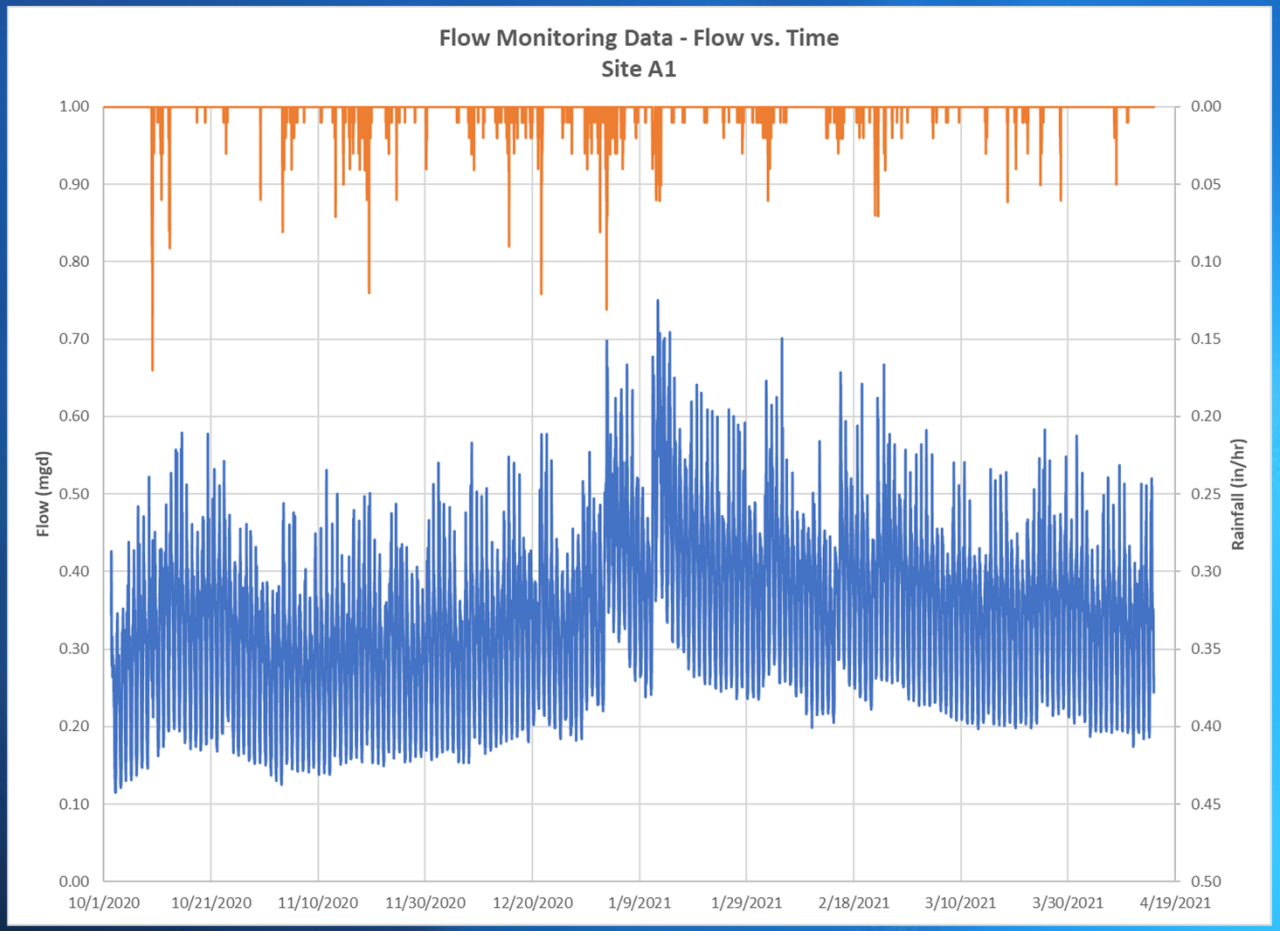

Q vs i - AUB_A2_40805K
Total Event Net RDII Volume vs. Rainfall Depth
winter
summer
Total Event Net RDII Volume (mg)
Total Event Rainfall Depth (in)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
(1/2/2021)
(1/11/2021)
(10/9/2020)
(1/31/2021)
(12/8/2020)
(2/21/2021)
(11/14/2020)

ATTACHMENT 1B

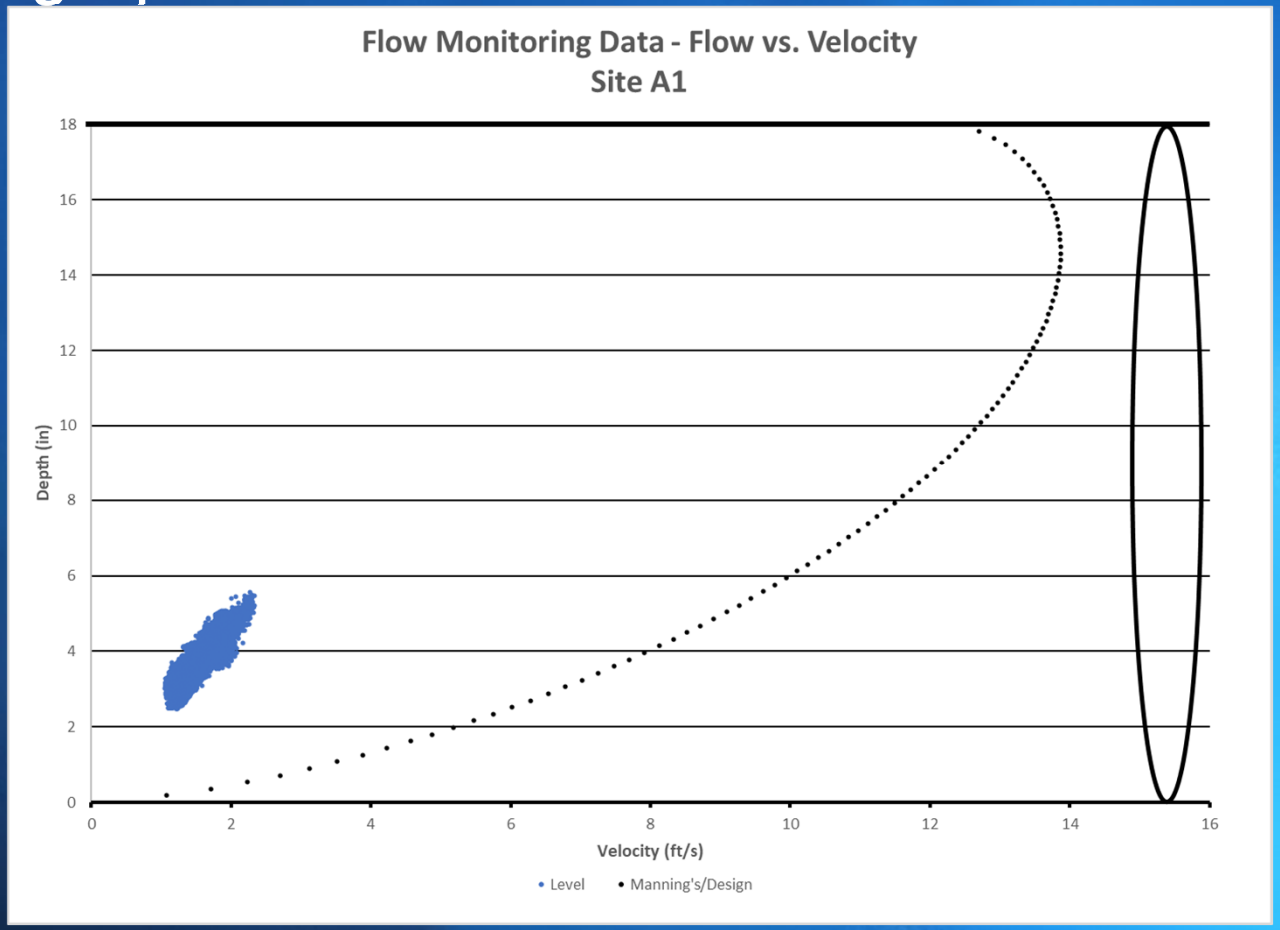
FLOW METER QUALITY REVIEW

Meter AUB_A1

Flow vs Rainfall

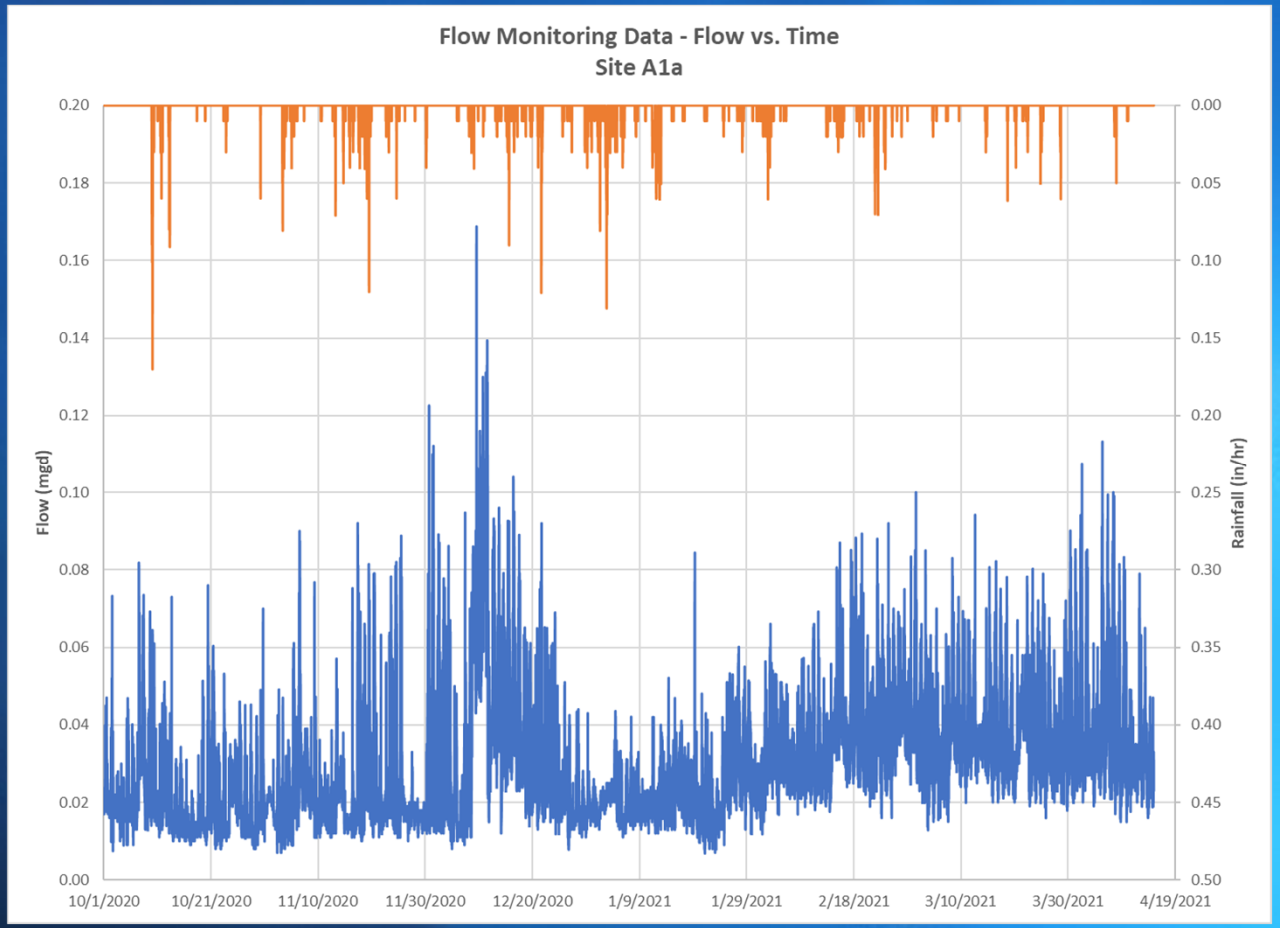


Meter AUB_A1
Scattergraph

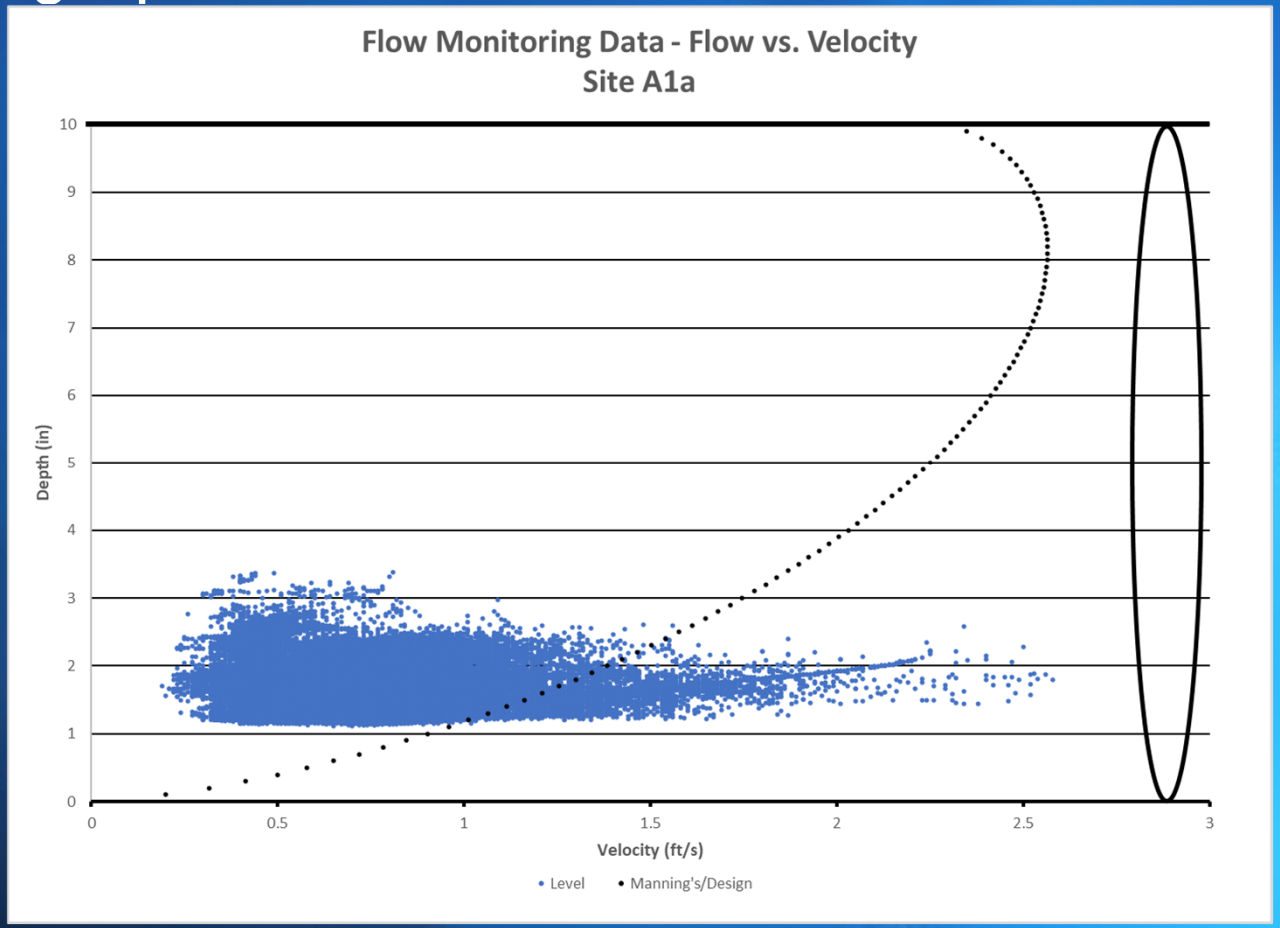


Meter AUB_A1a

Flow vs Rainfall

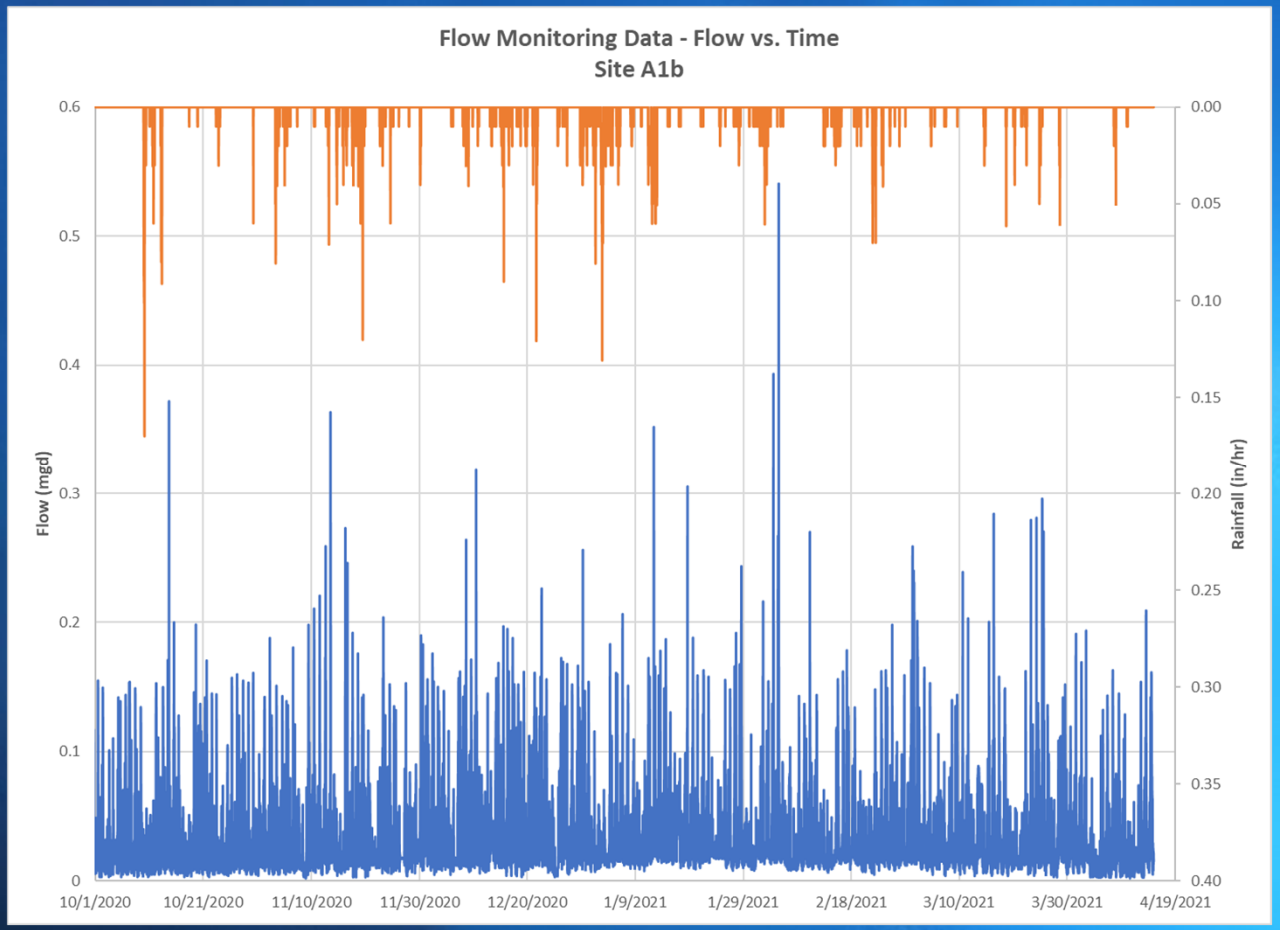


Meter AUB_A1a
Scattergraph

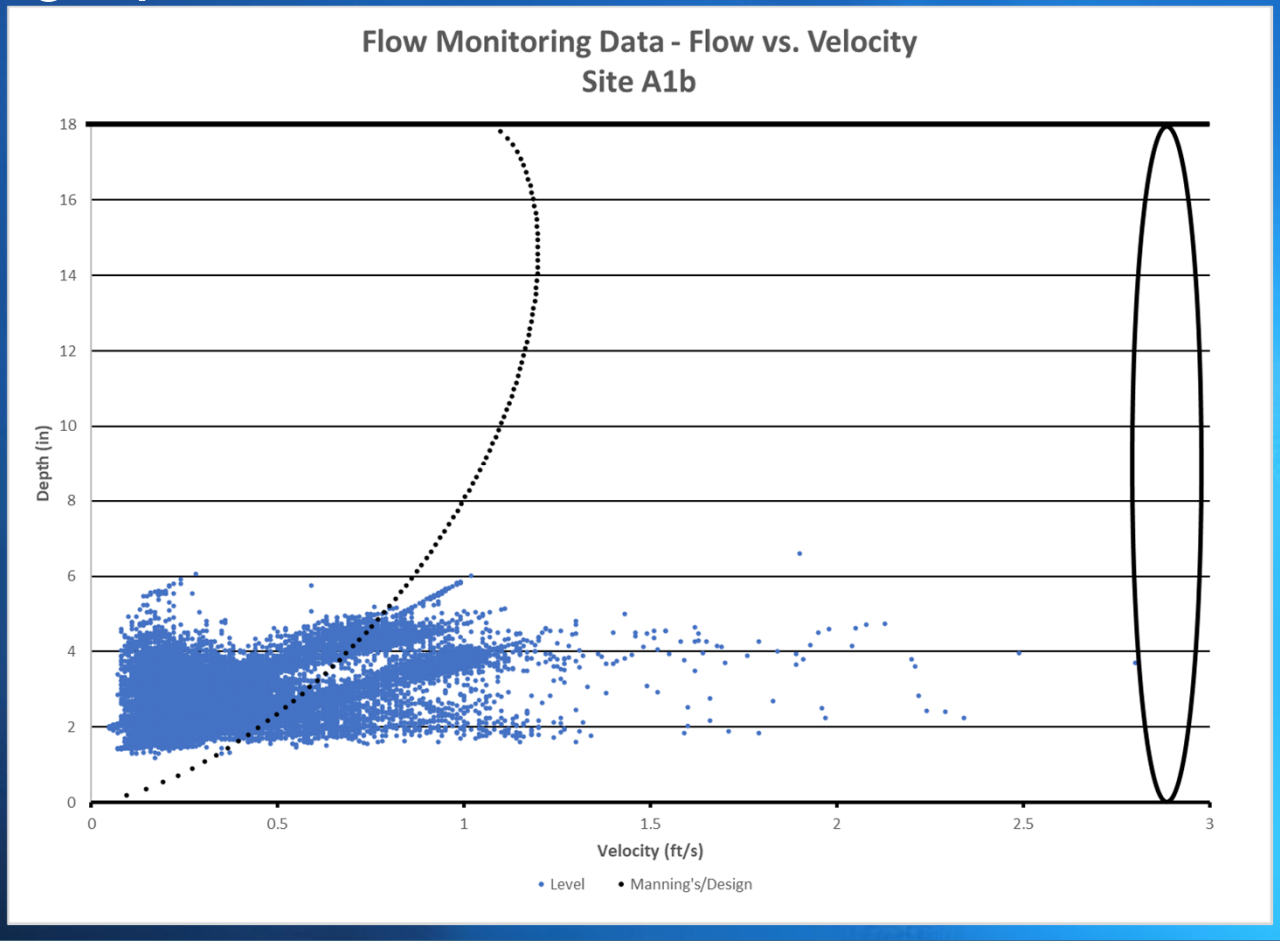


Meter AUB_A1b

Flow vs Rainfall

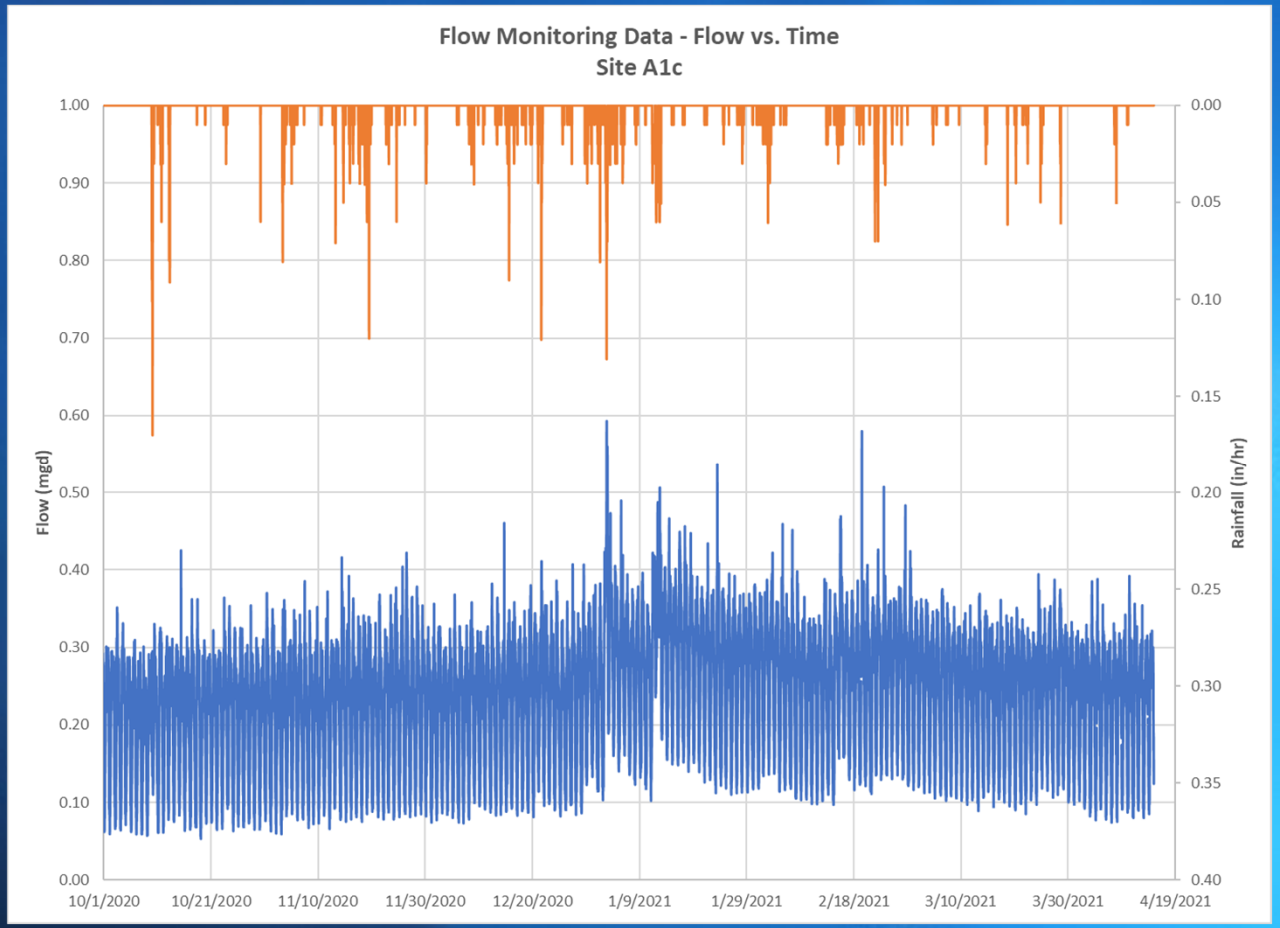


Meter AUB_A1b
Scattergraph

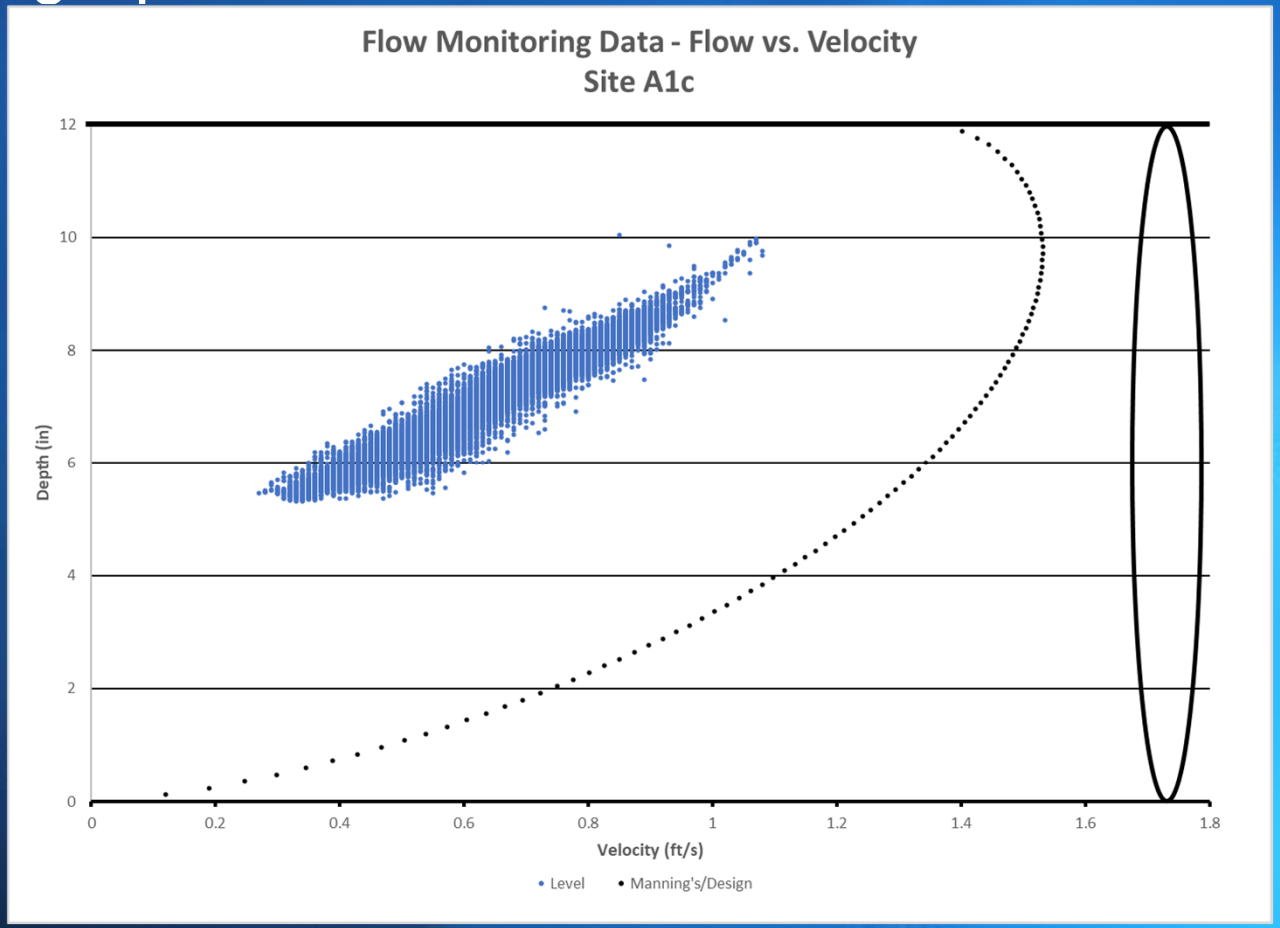


Meter AUB_A1c

Flow vs Rainfall

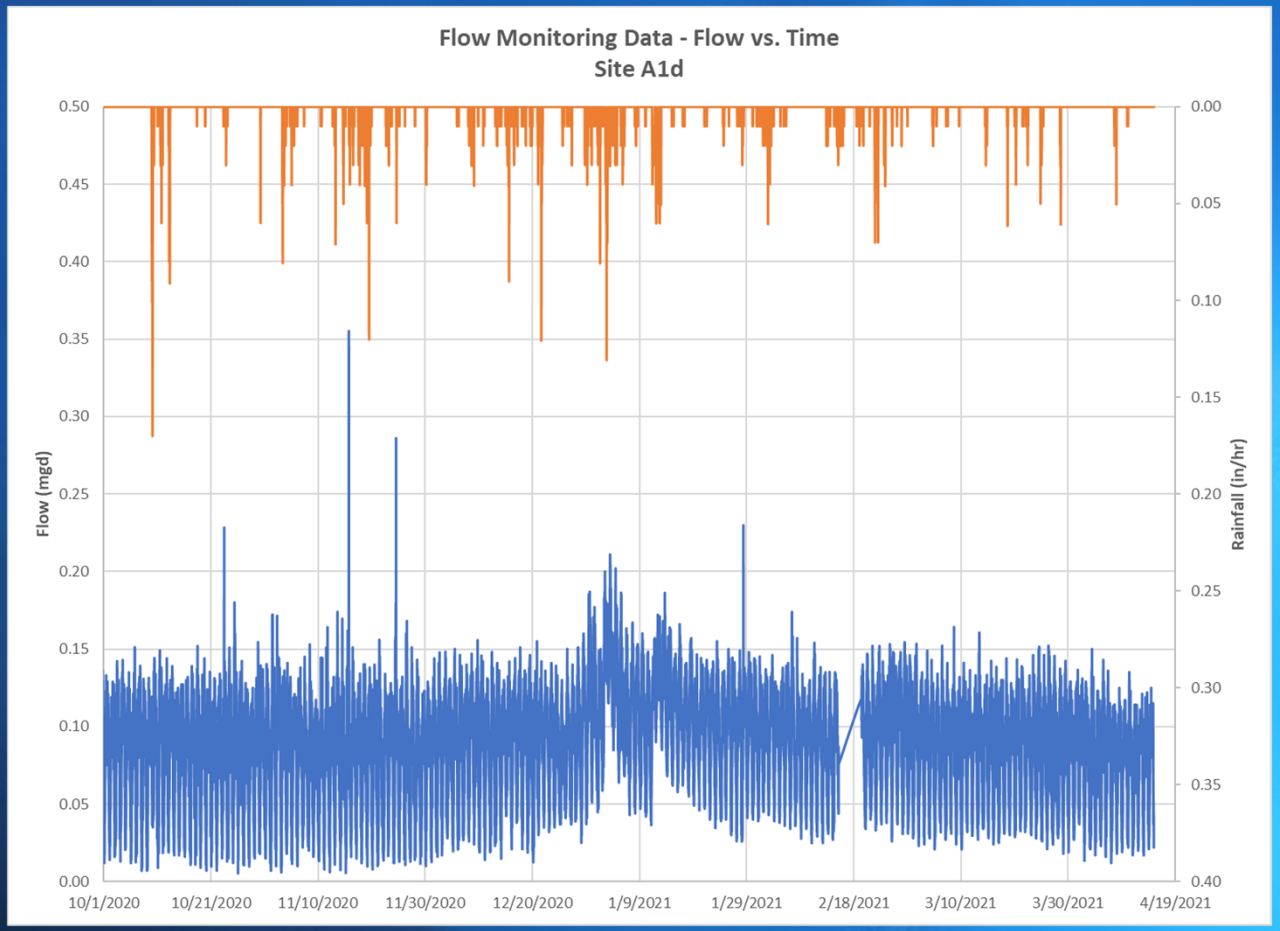


Meter AUB_A1c Scattergraph

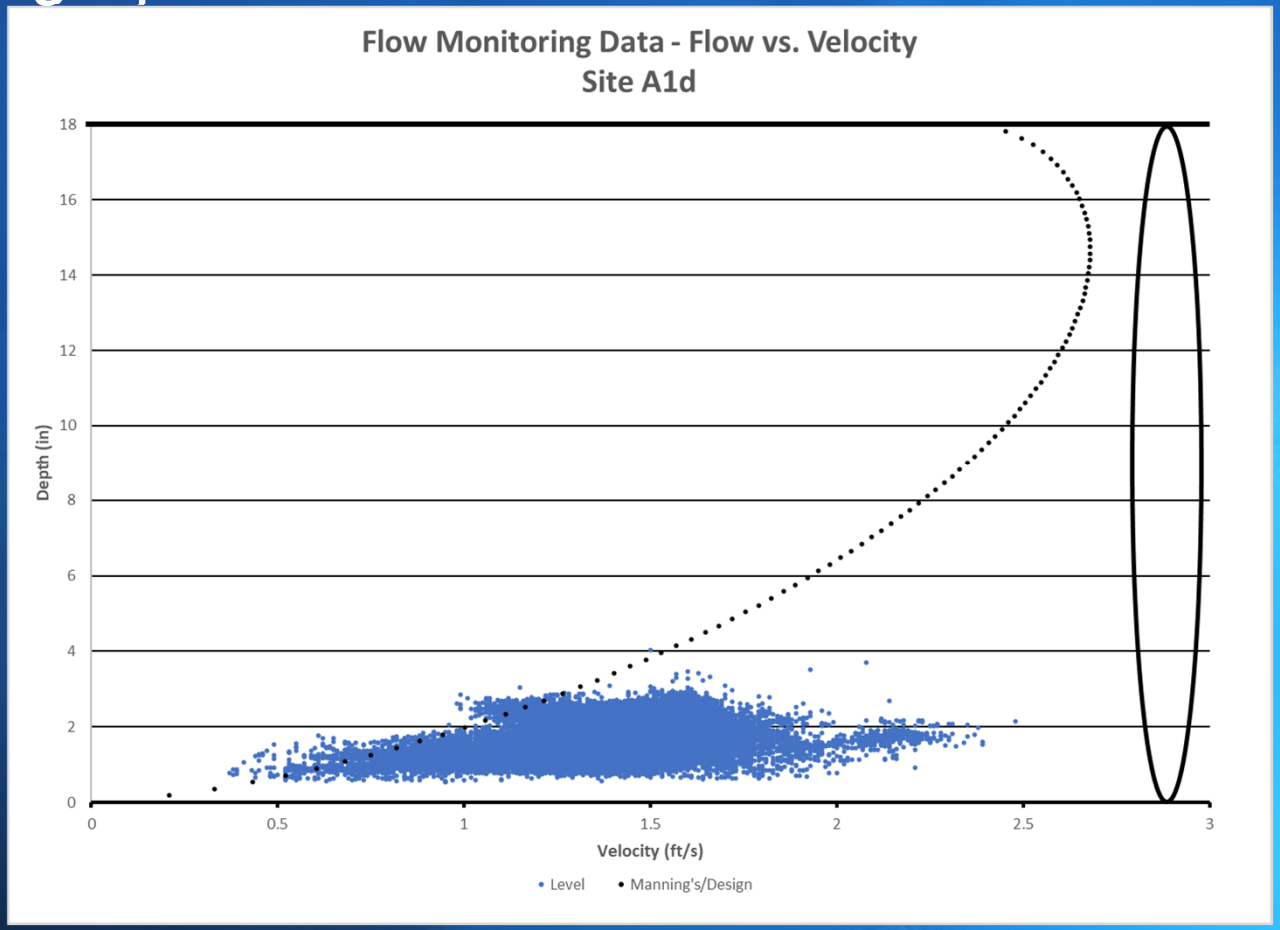


Meter AUB_A1d

Flow vs Rainfall

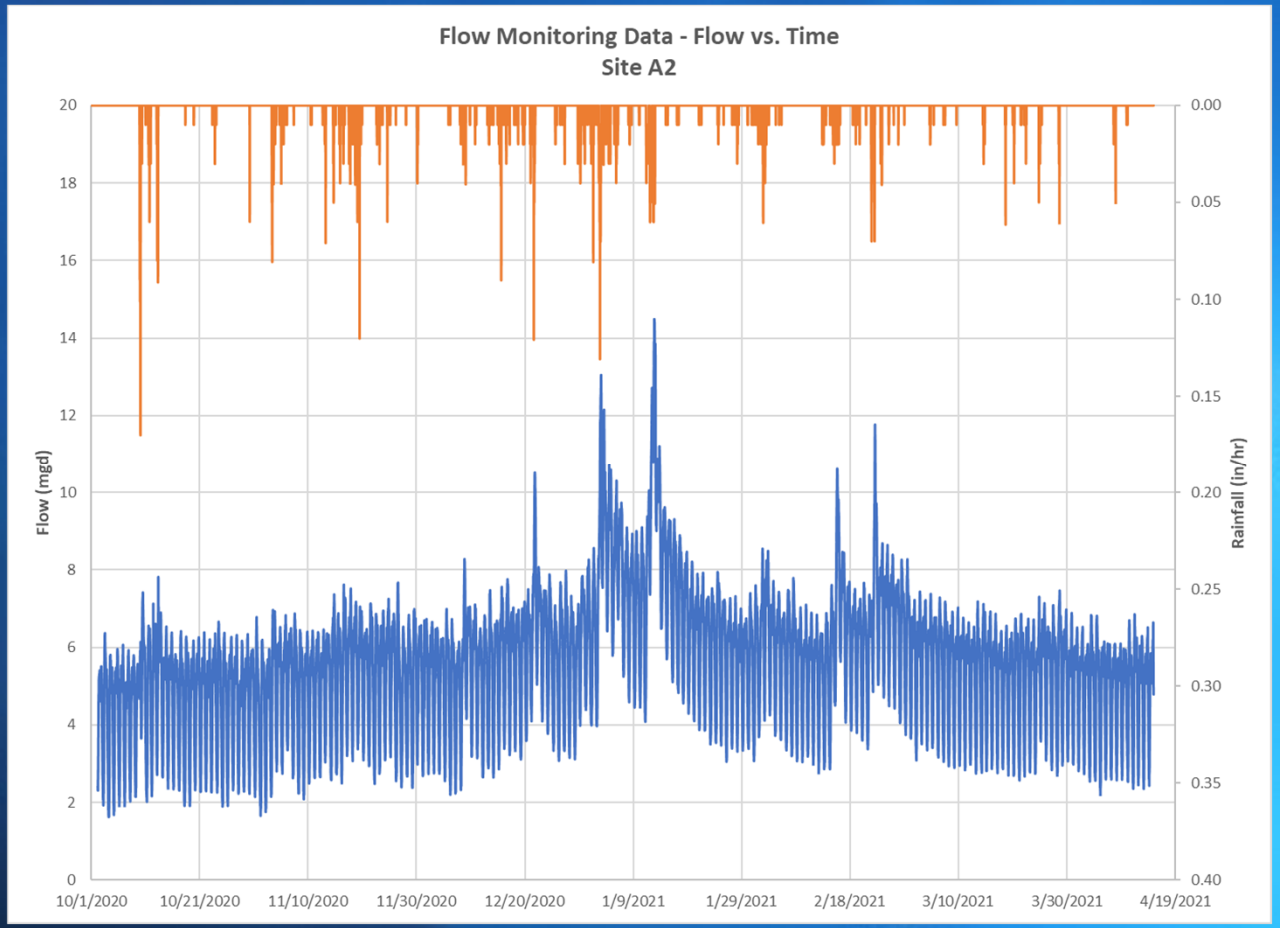


Meter AUB_A1d Scattergraph

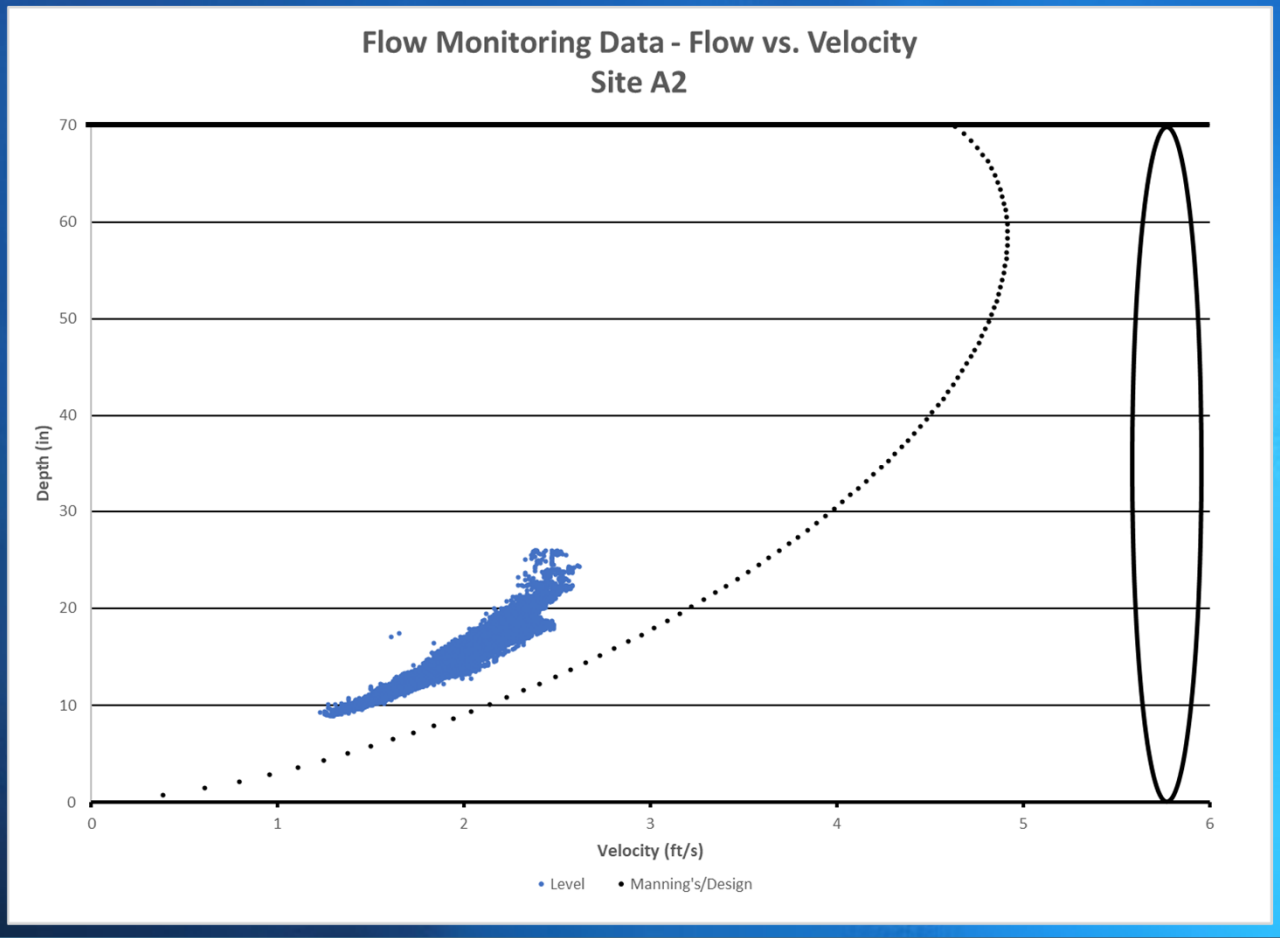


Meter AUB_A2

Flow vs Rainfall

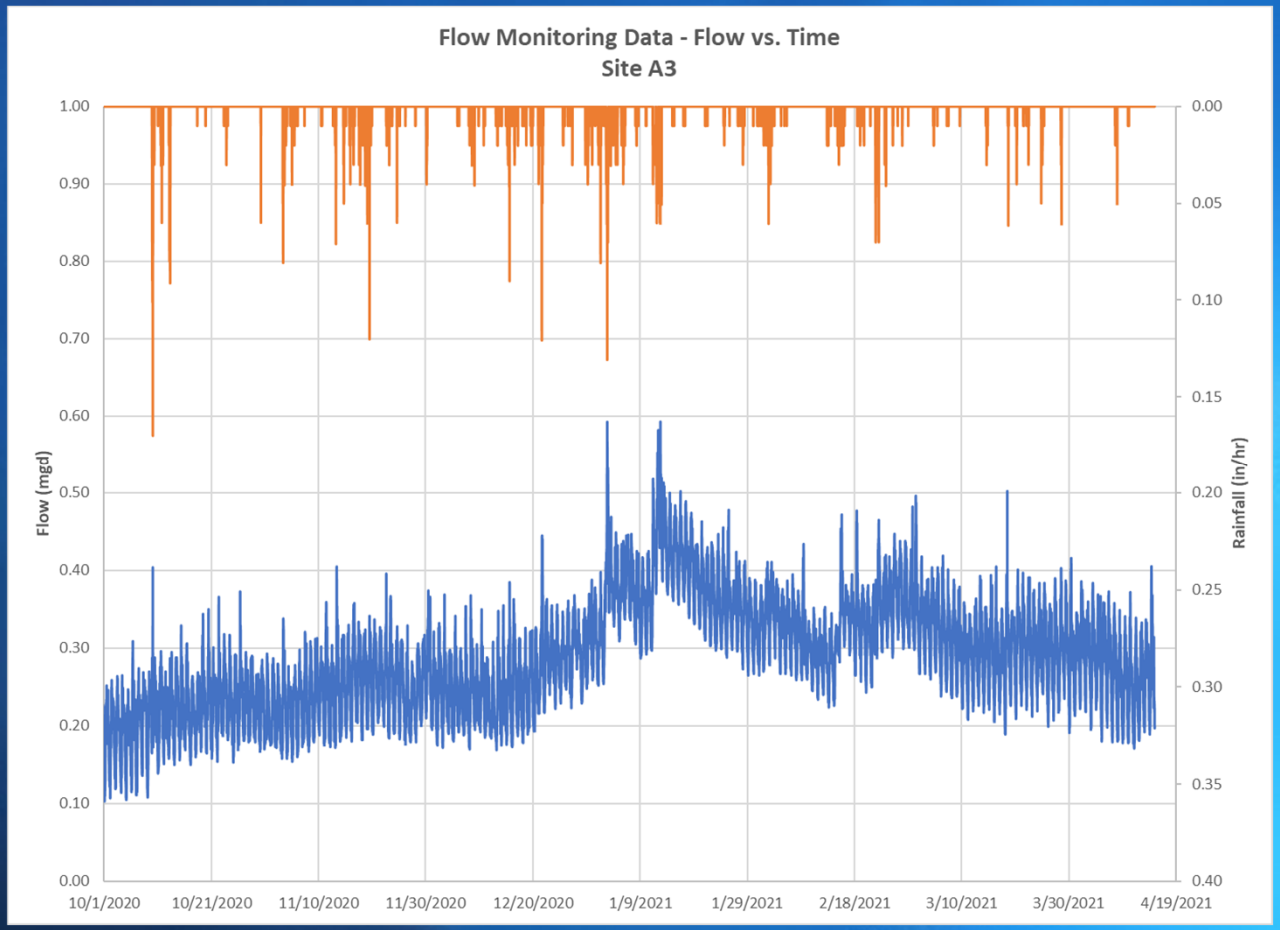


Meter AUB_A2
Scattergraph

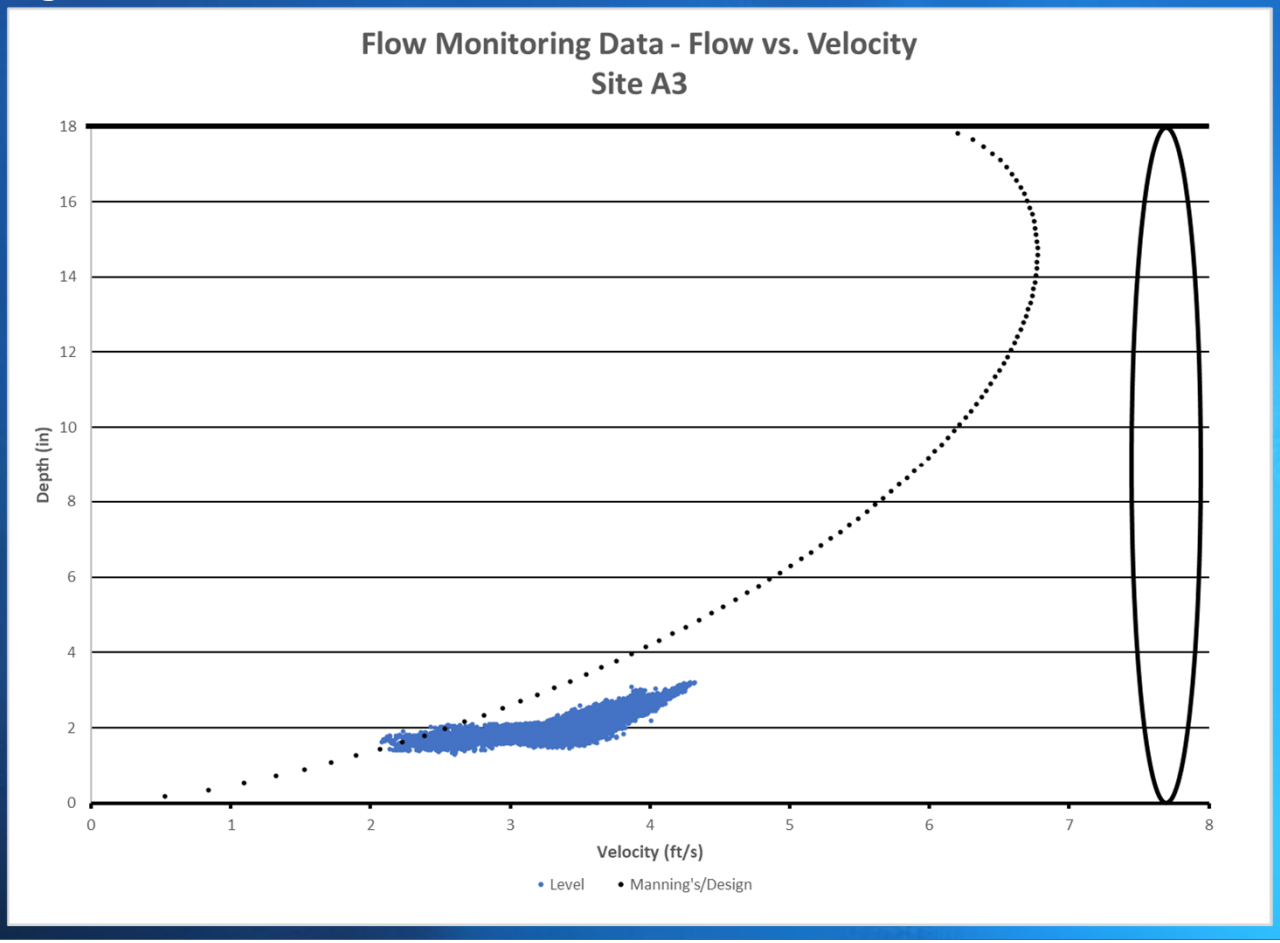


Meter AUB_A3

Flow vs Rainfall

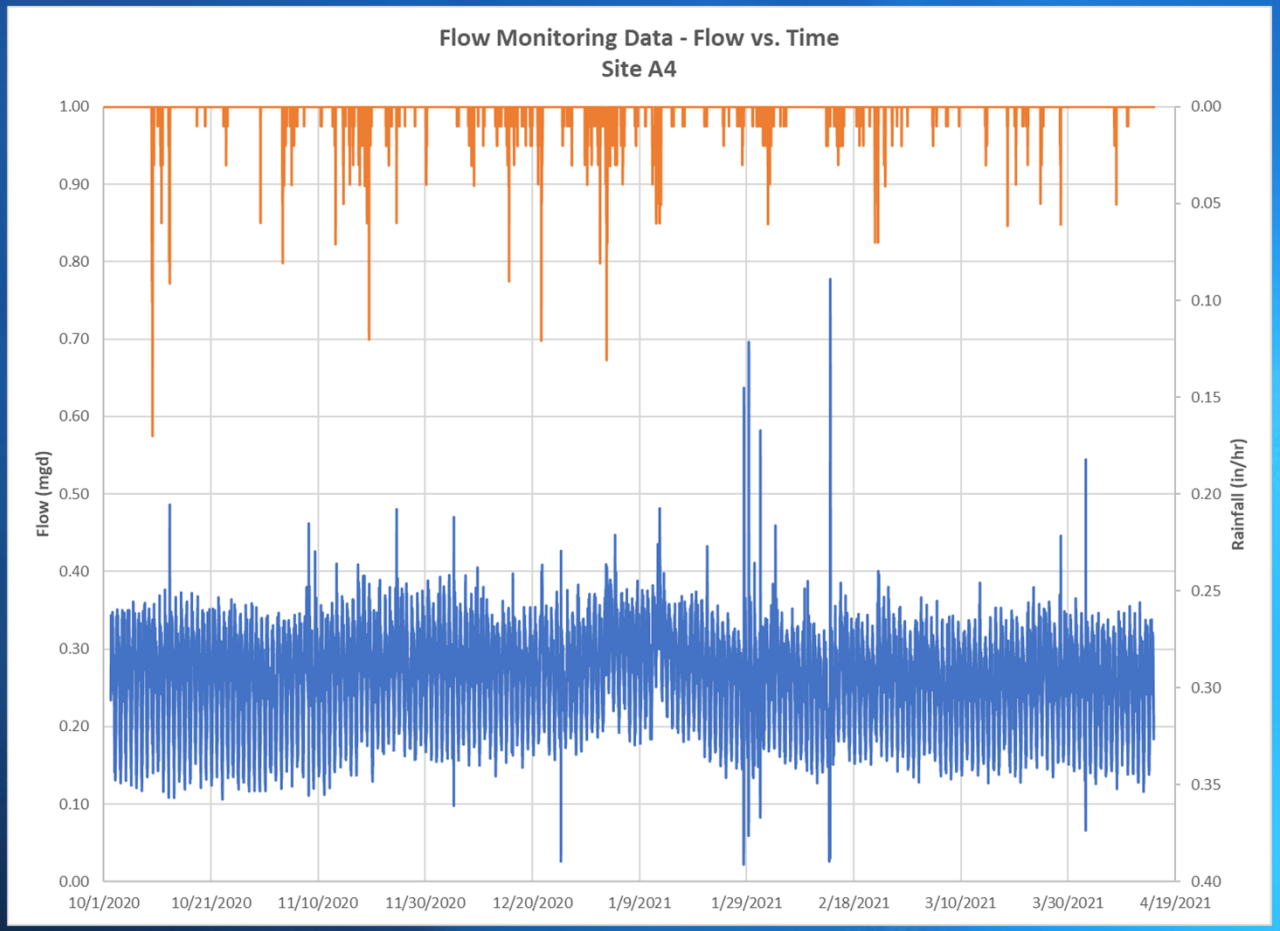


Meter AUB_A3
Scattergraph

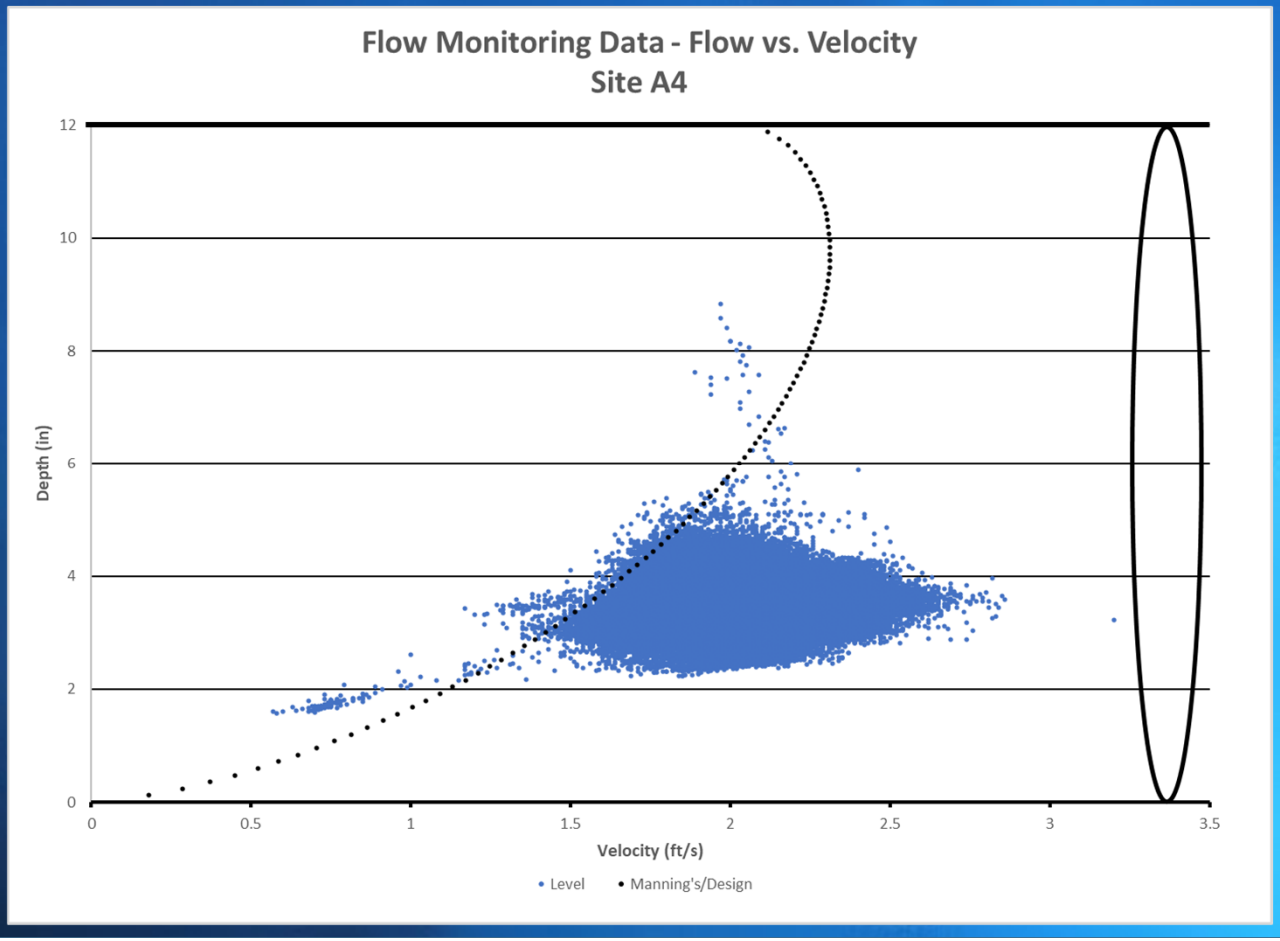


Meter AUB_A4

Flow vs Rainfall

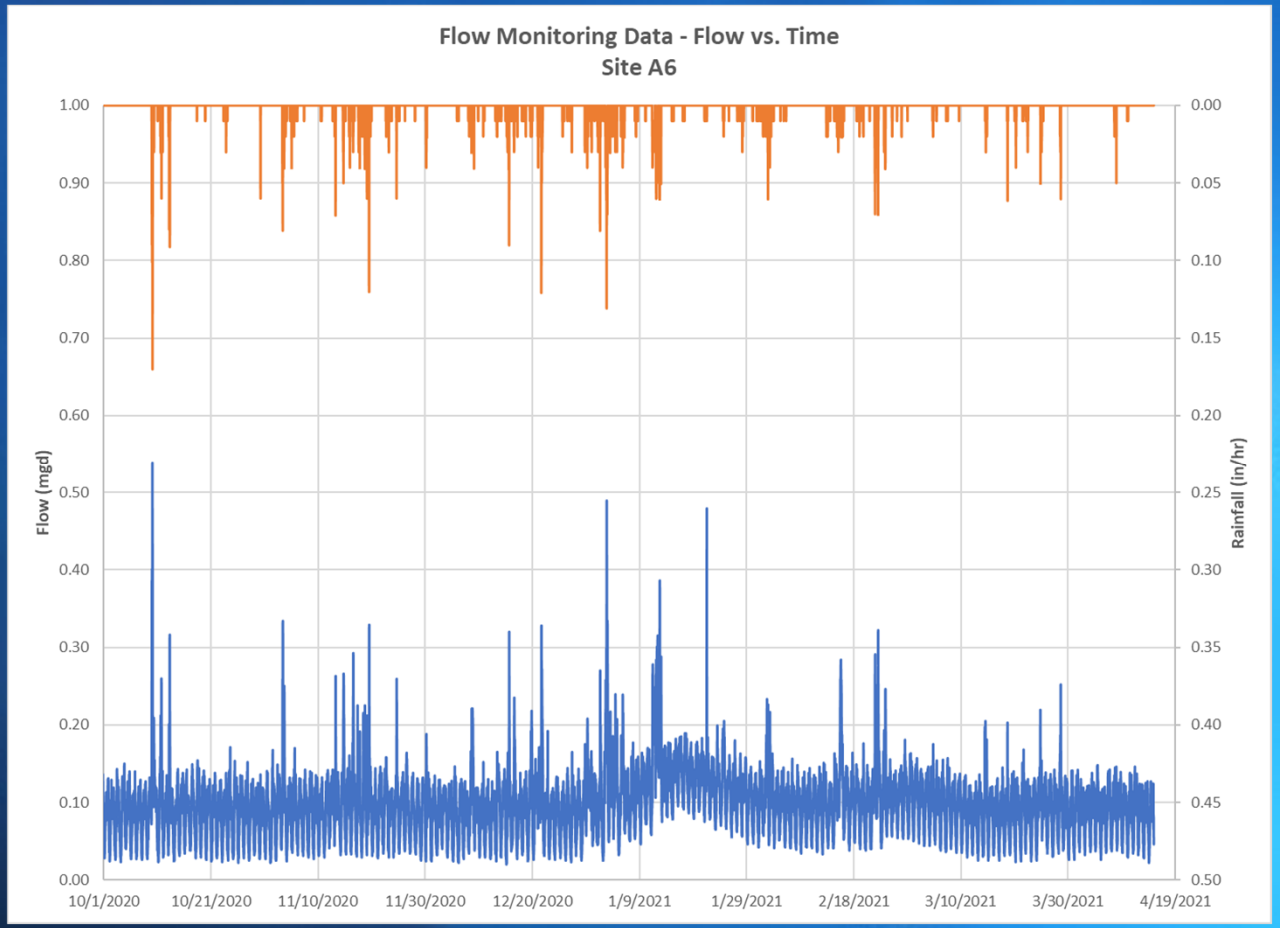


Meter AUB_A4
Scattergraph

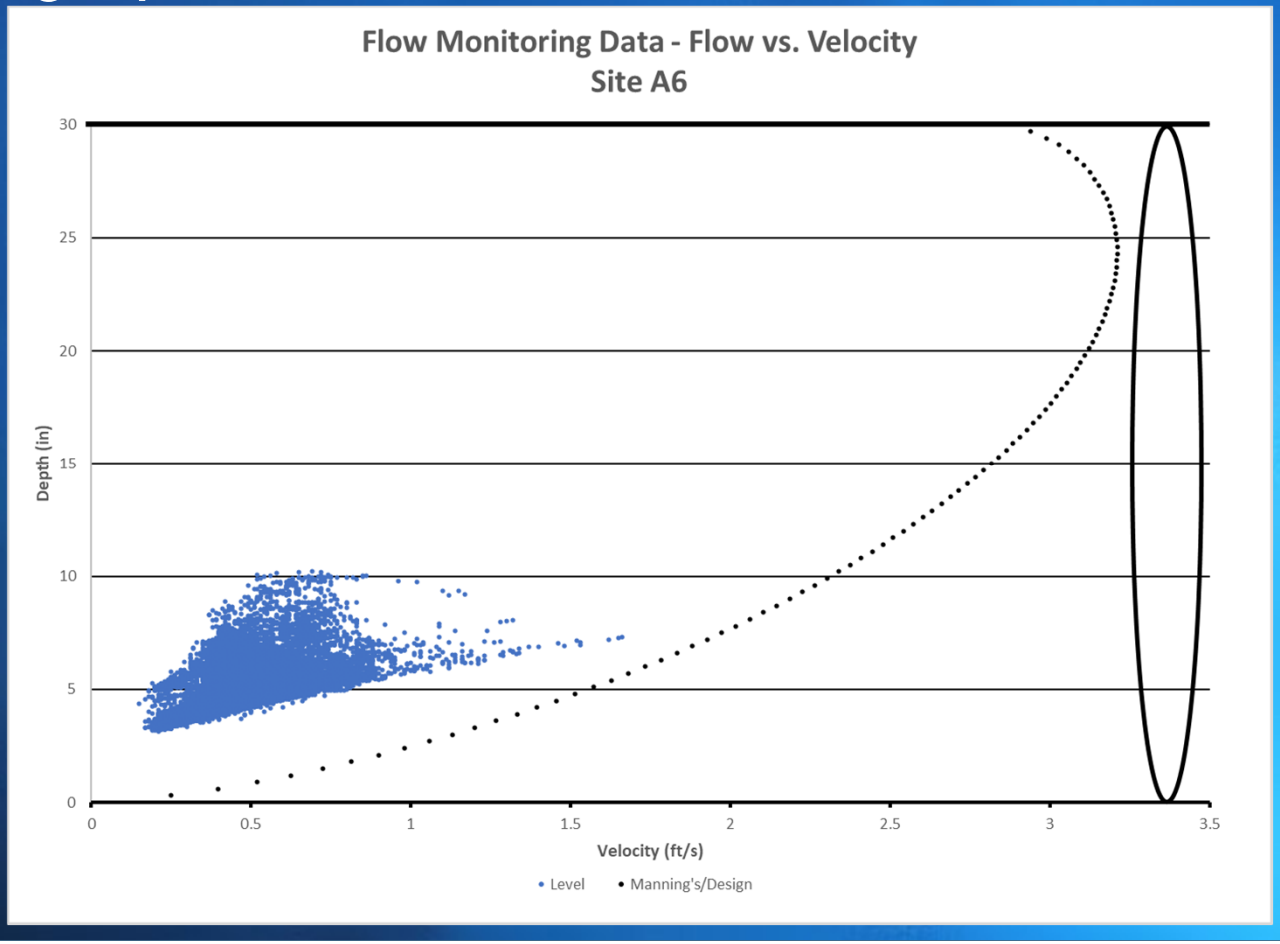


Meter AUB_A6

Flow vs Rainfall

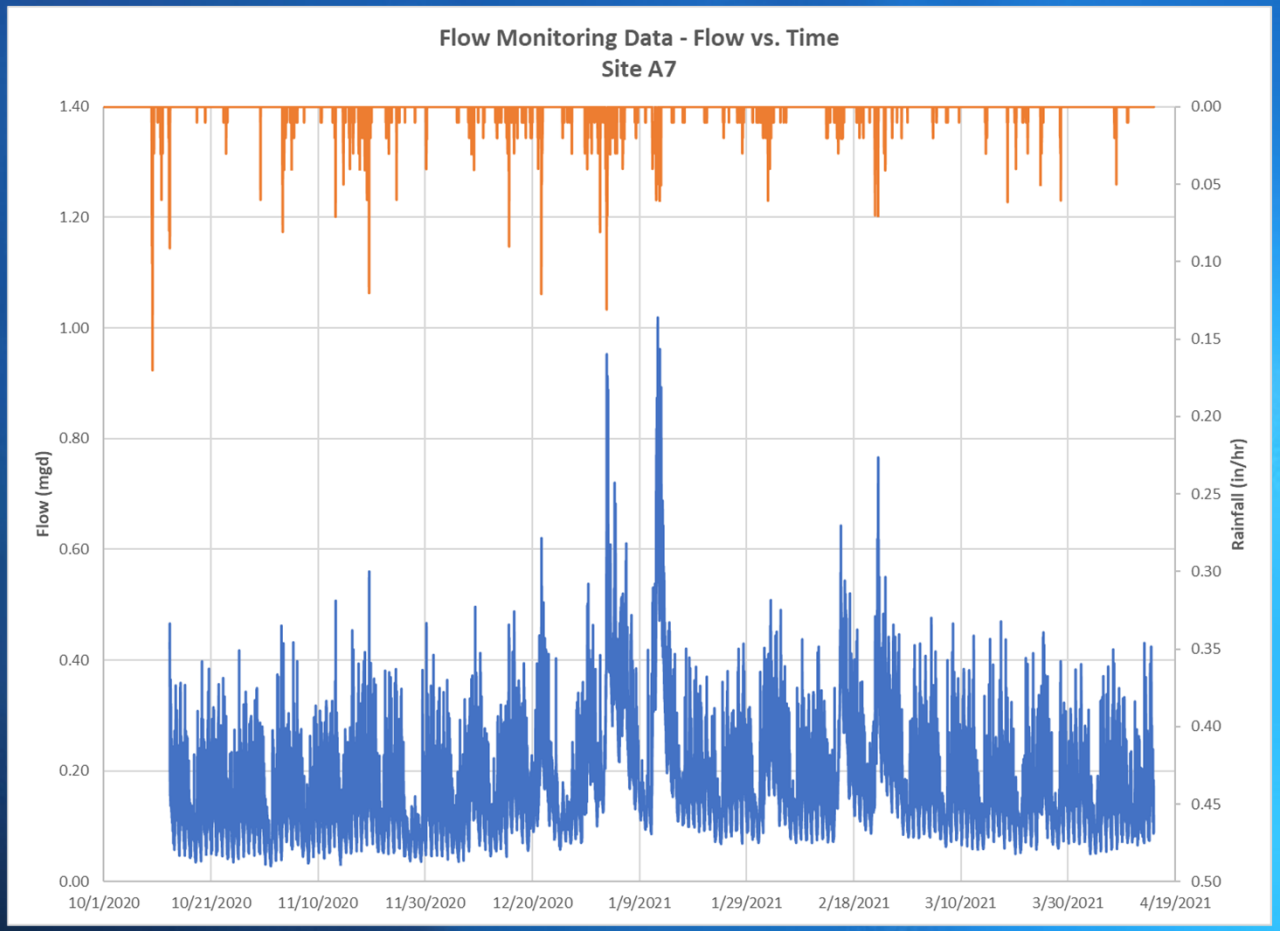


Meter AUB_A6
Scattergraph

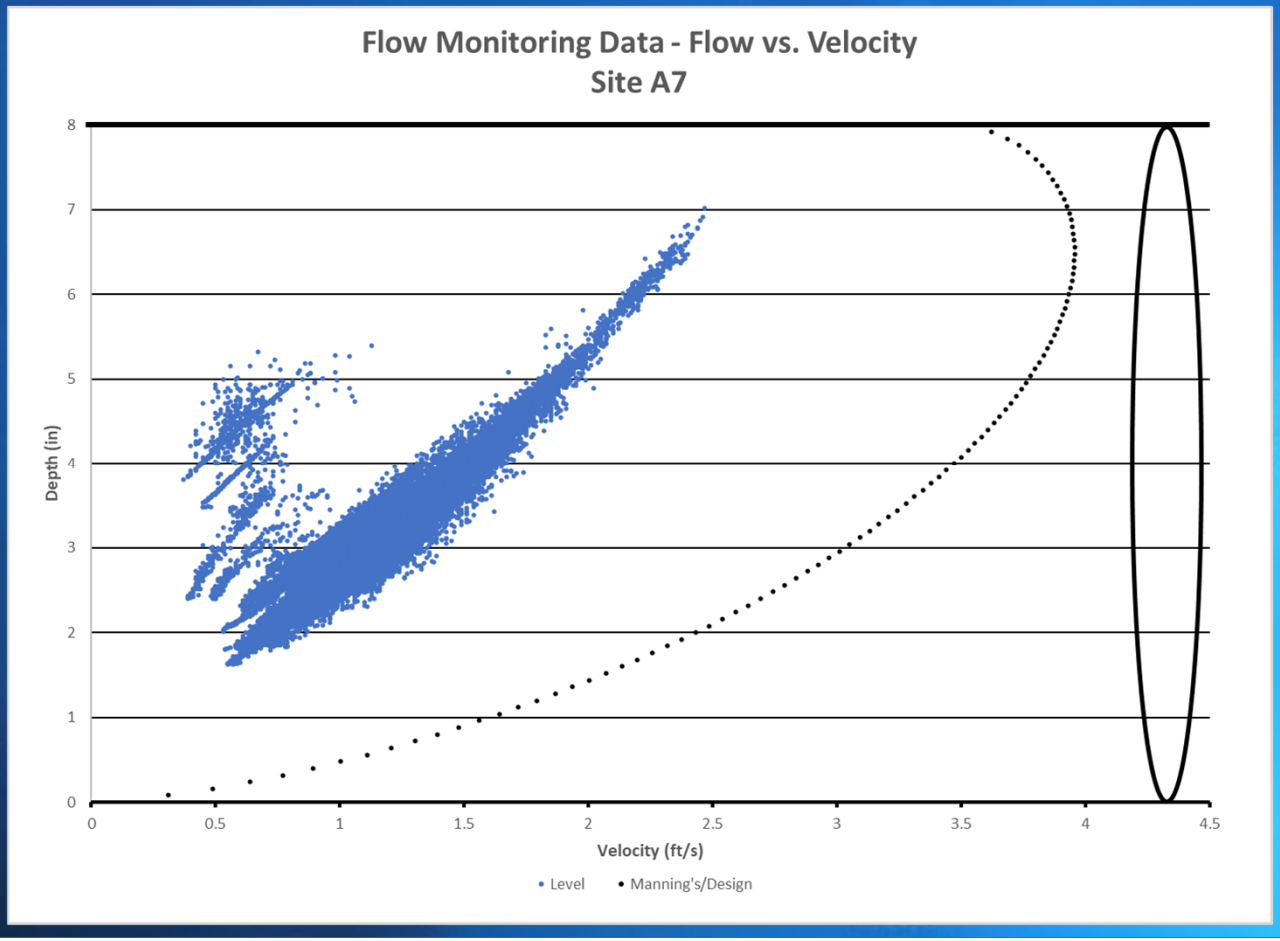


Meter AUB_A7

Flow vs Rainfall

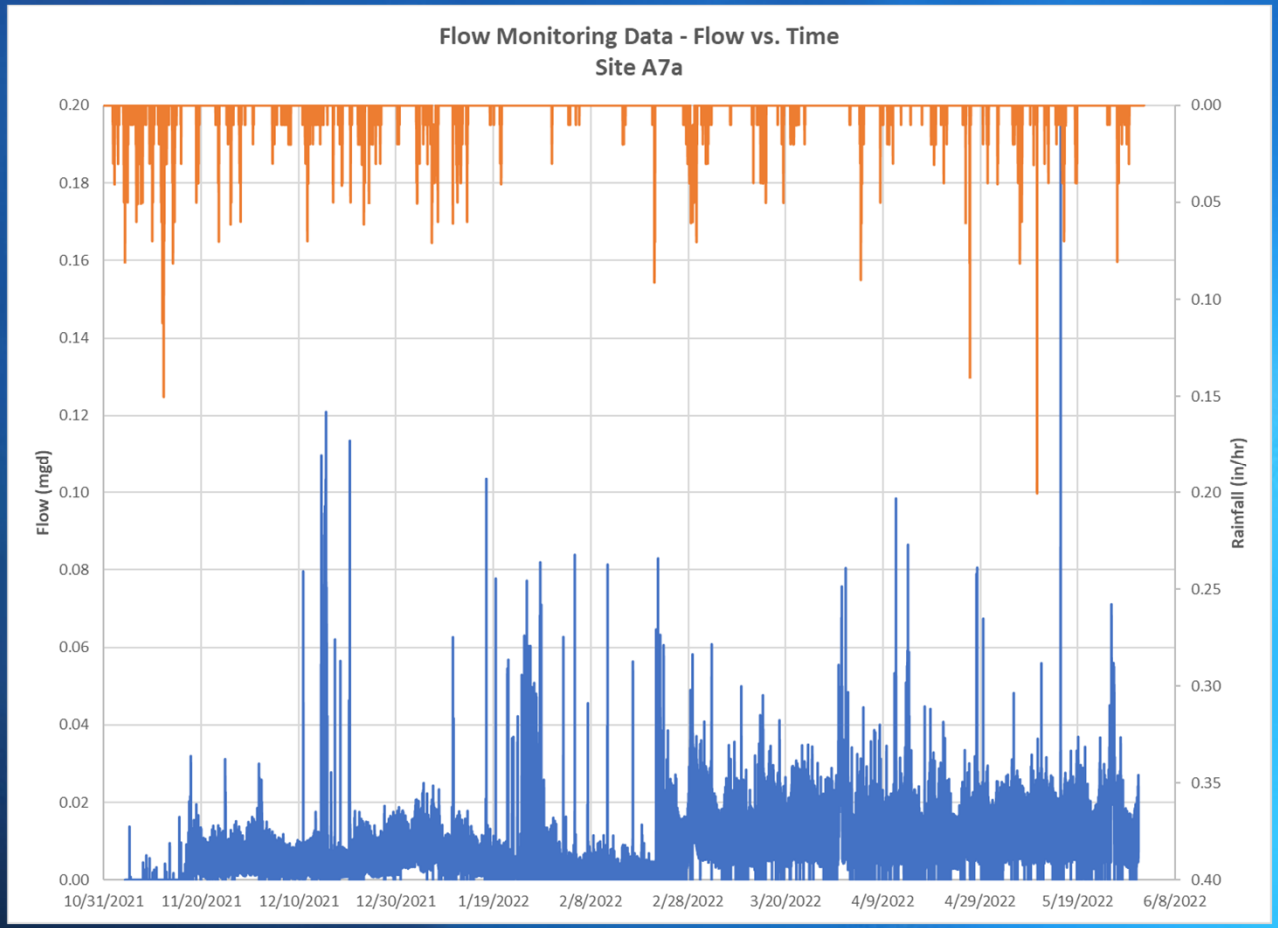


Meter AUB_A7
Scattergraph

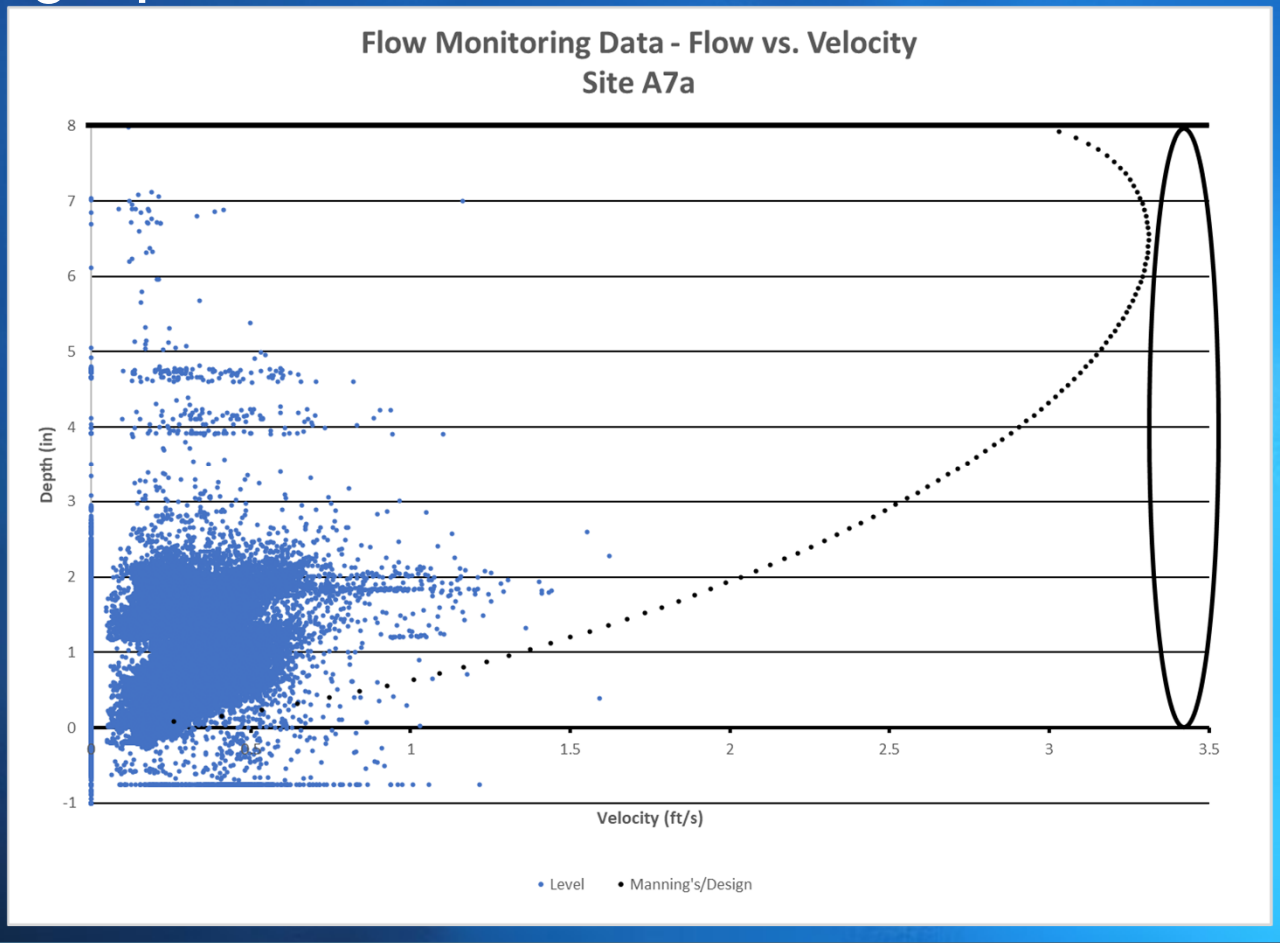


Meter AUB_A7a

Flow vs Rainfall

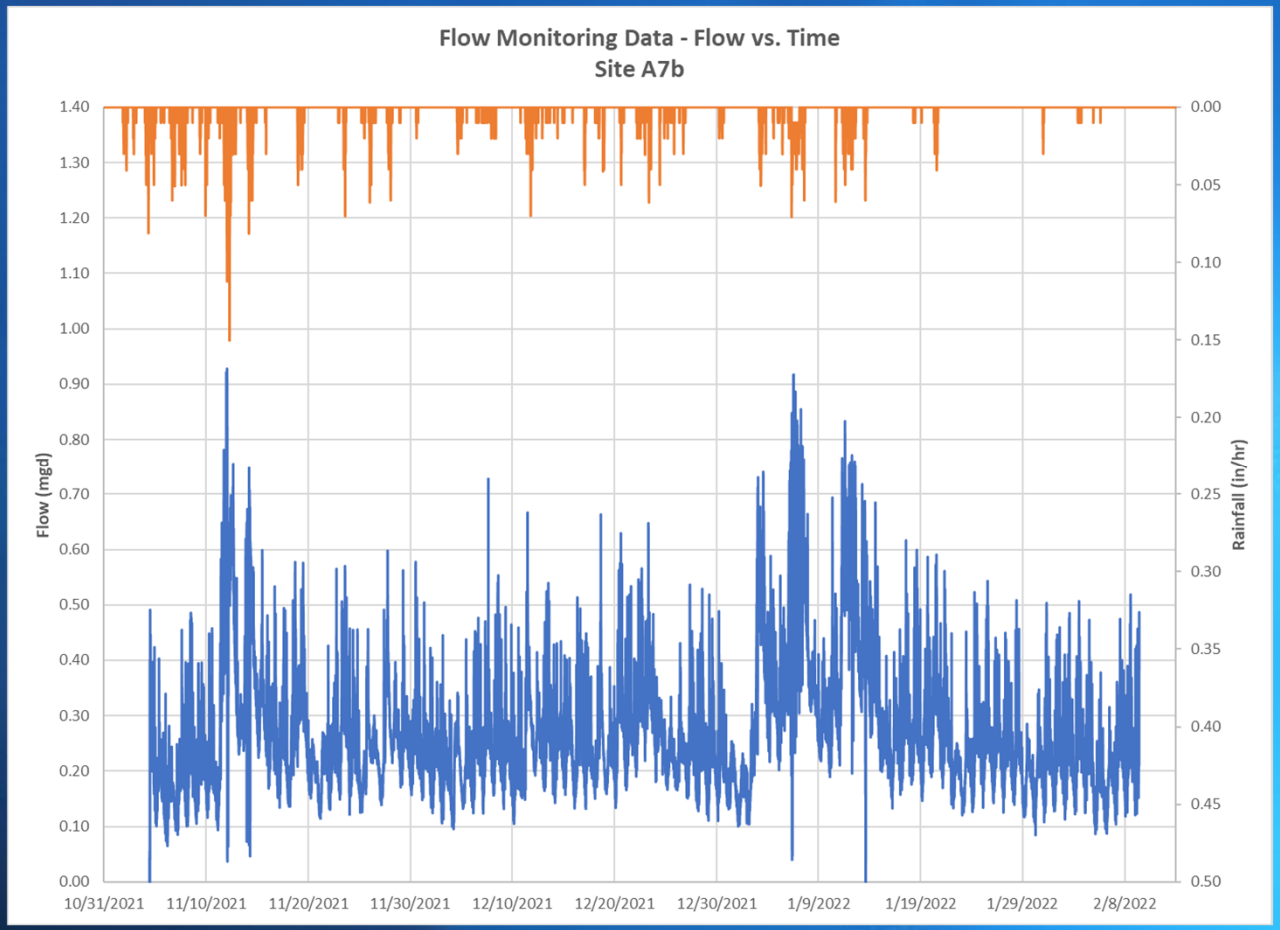


Meter AUB_A7a Scattergraph



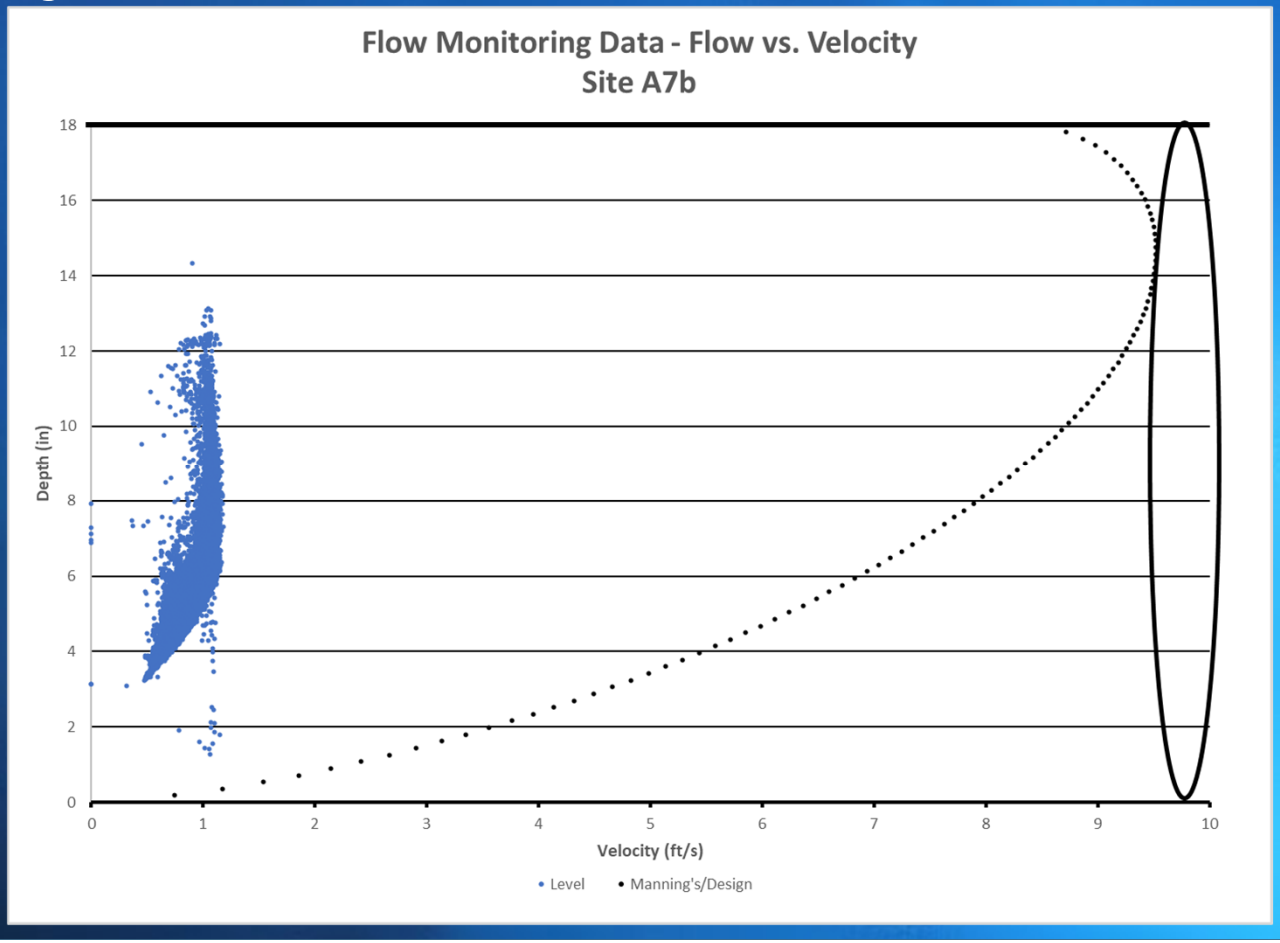
Meter AUB_A7b

Flow vs Rainfall



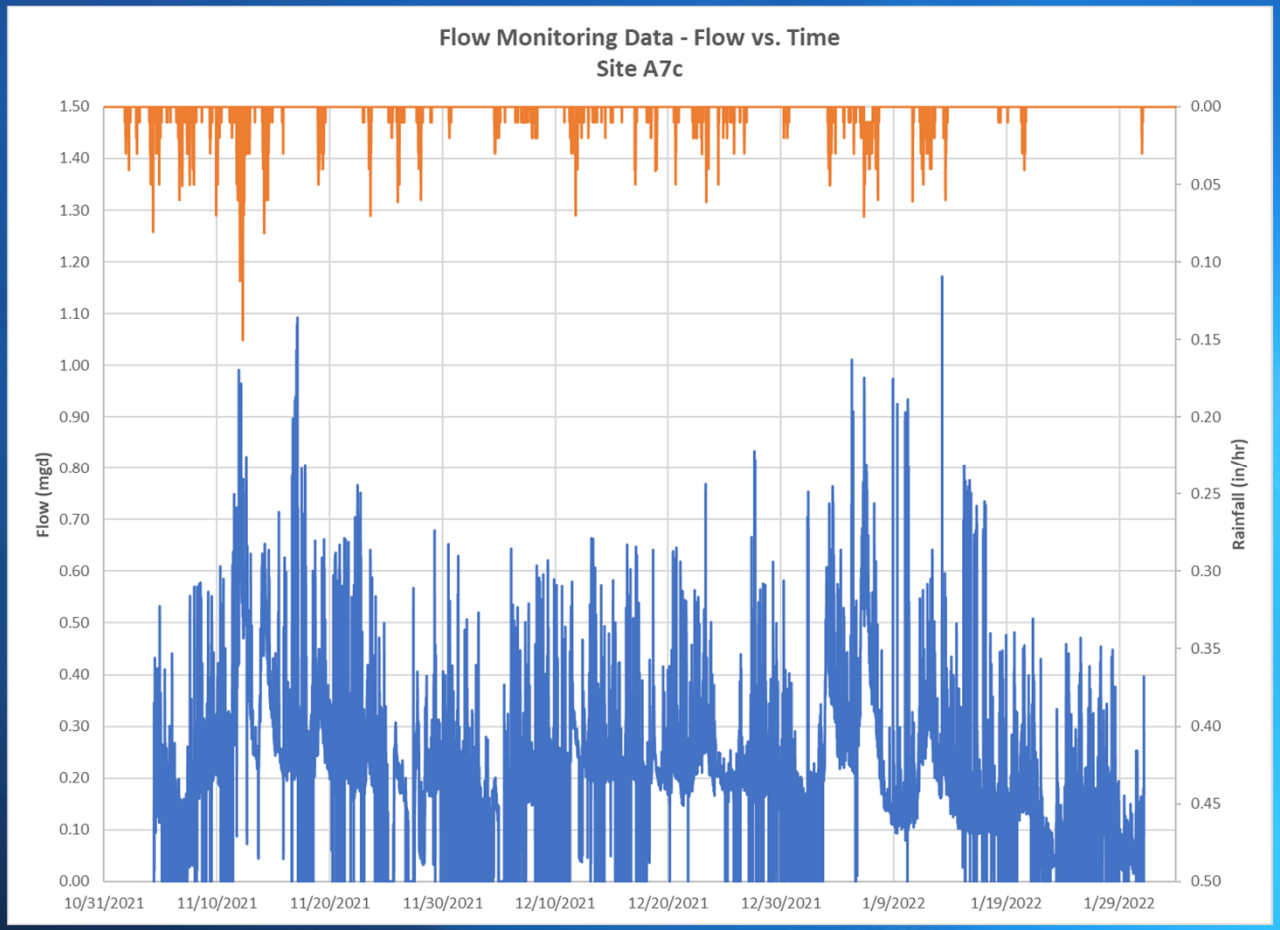
Meter AUB_A7b Scattergraph

Note: 3 data points with negative velocity, including 1 data point with negative depth

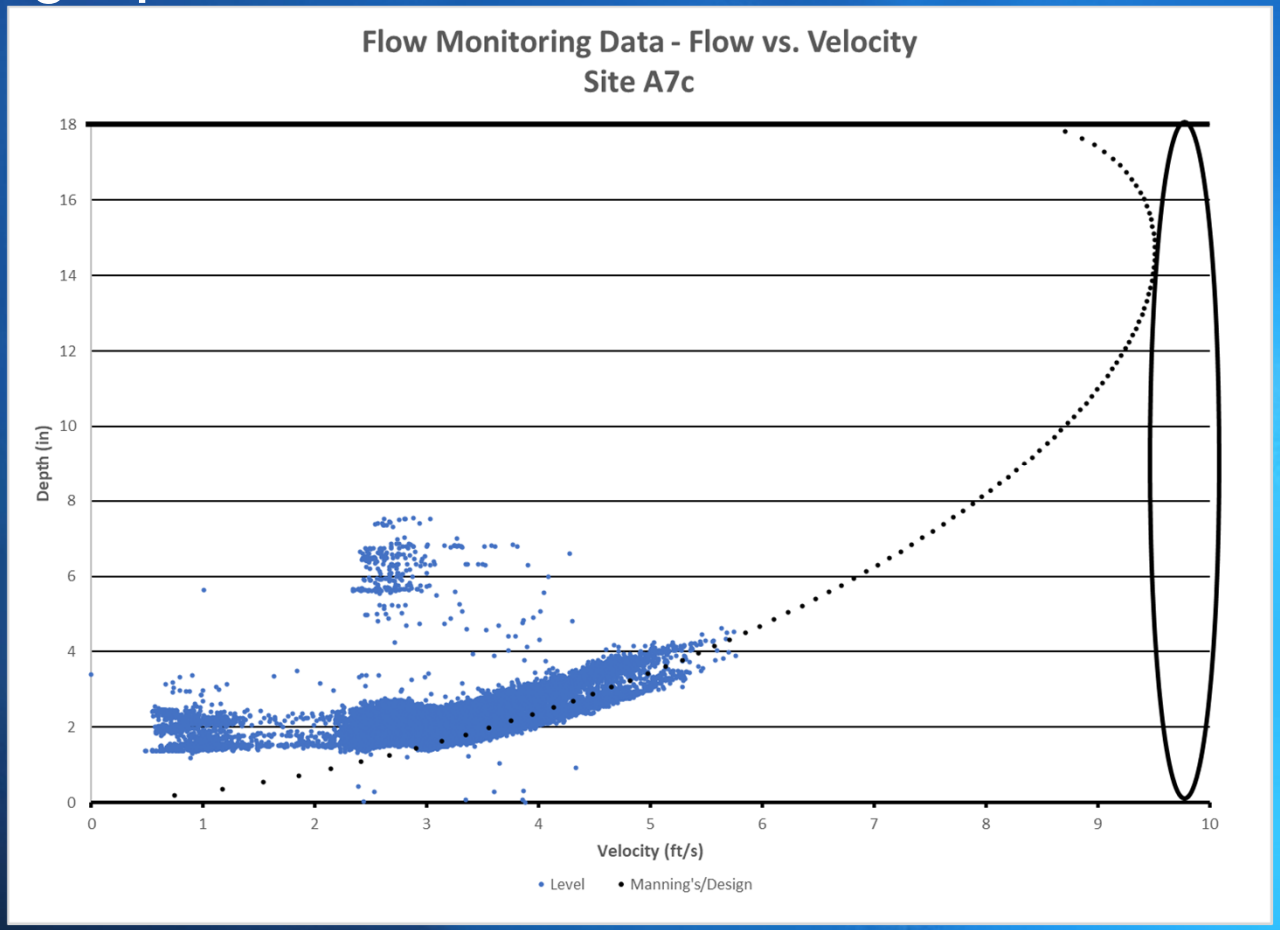


Meter AUB_A7c

Flow vs Rainfall

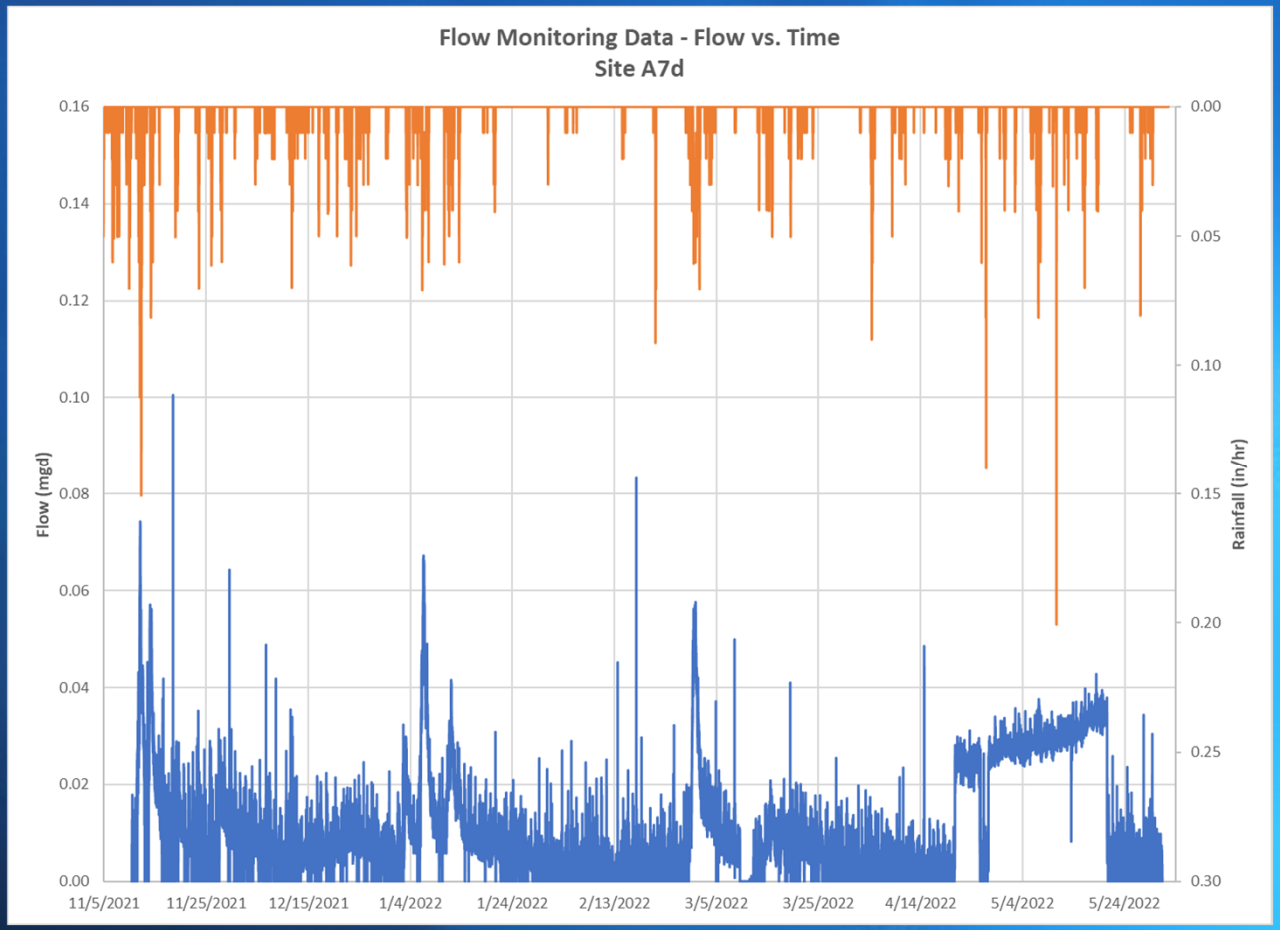


Meter AUB_A7c Scattergraph

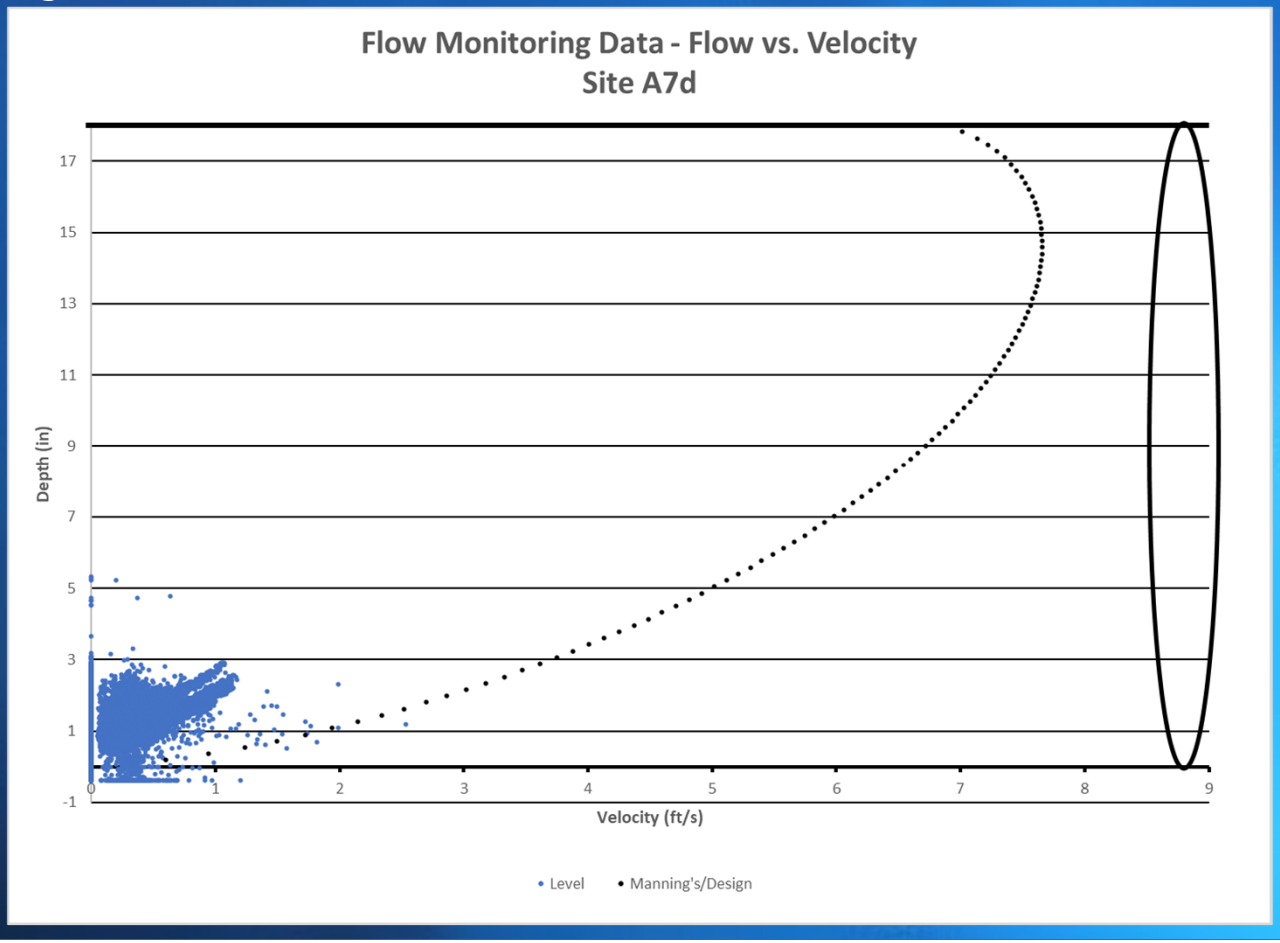


Meter AUB_A7d

Flow vs Rainfall

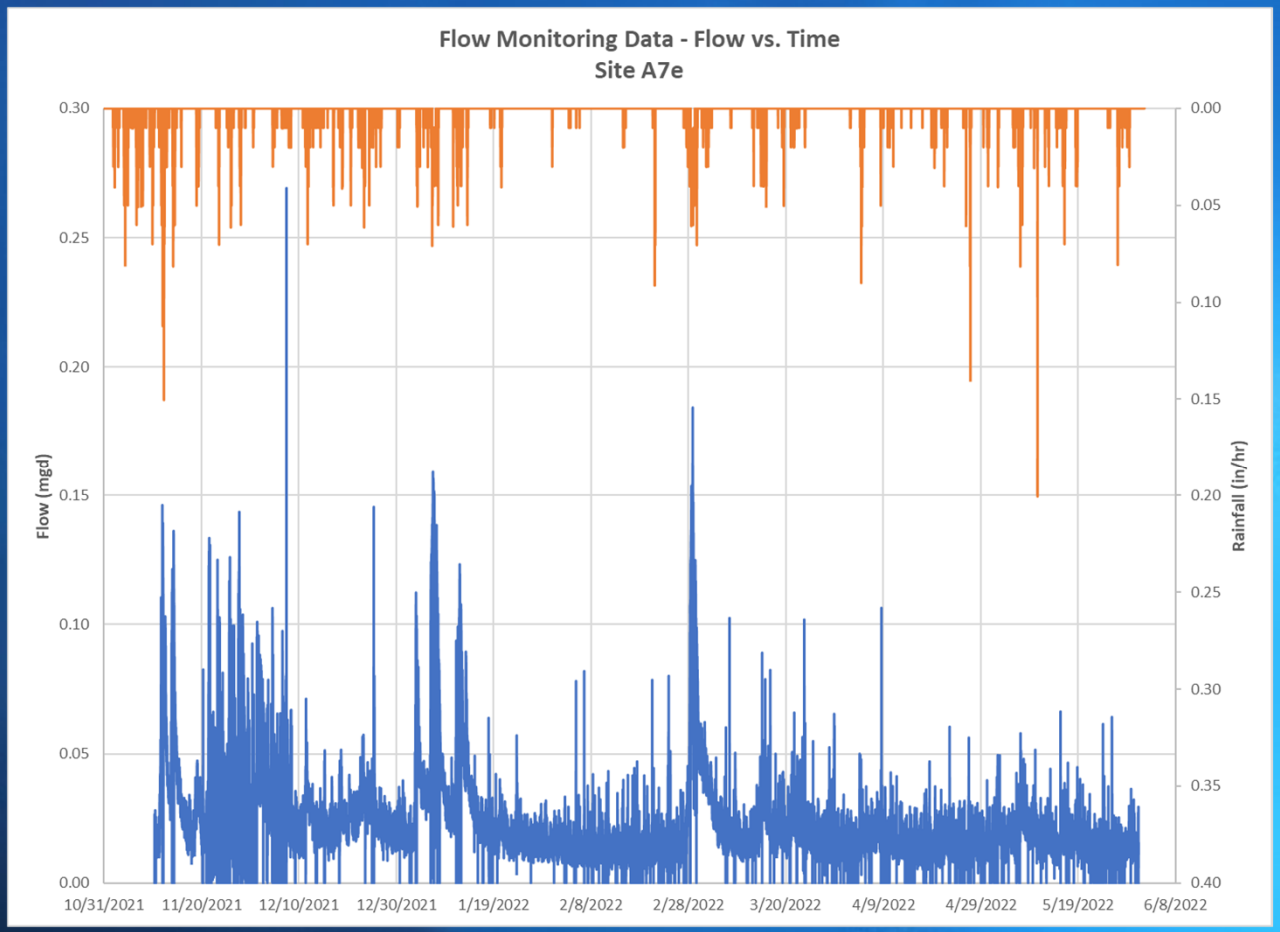


Meter AUB_A7d Scattergraph



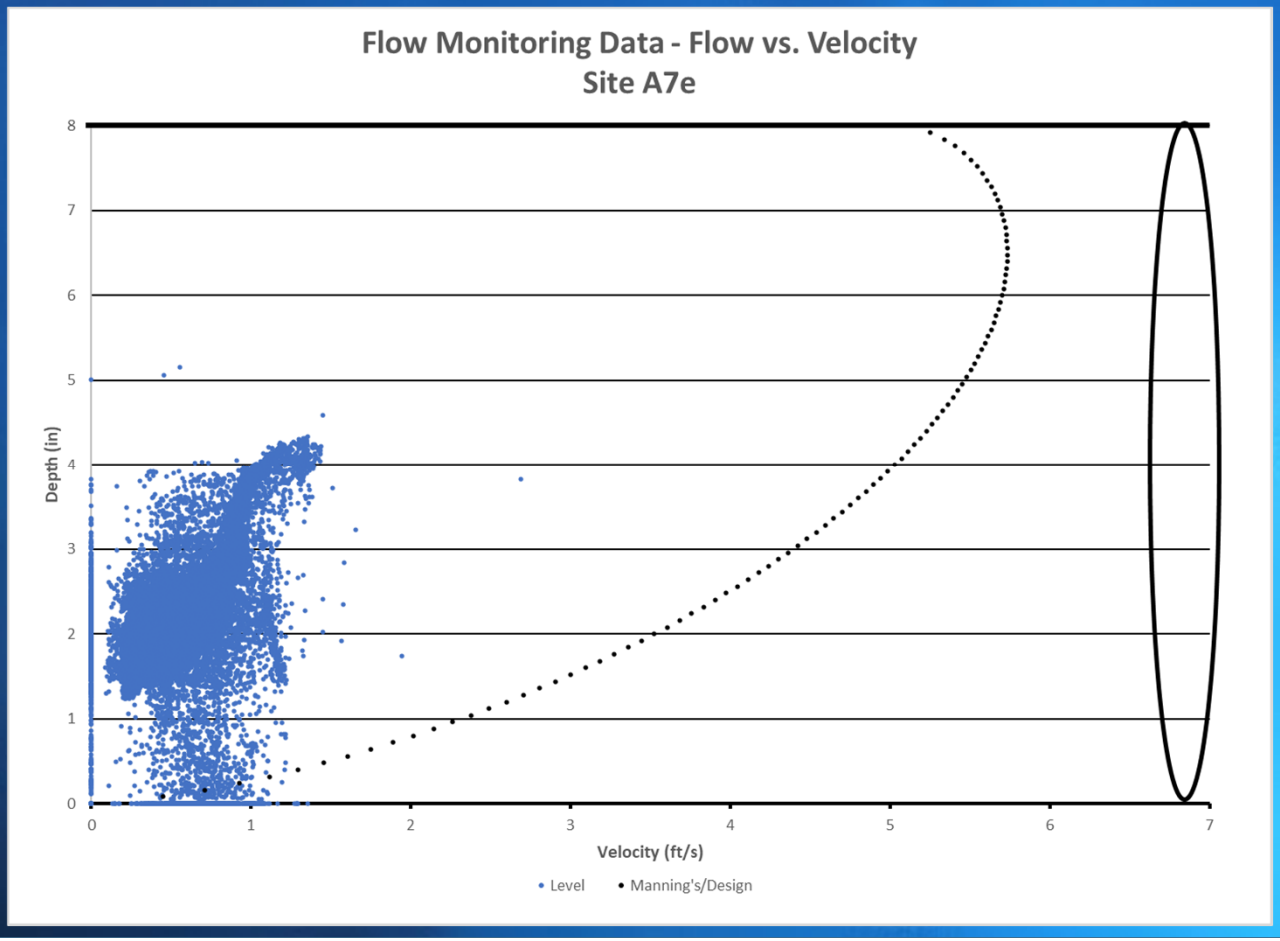
Meter AUB_A7e

Flow vs Rainfall



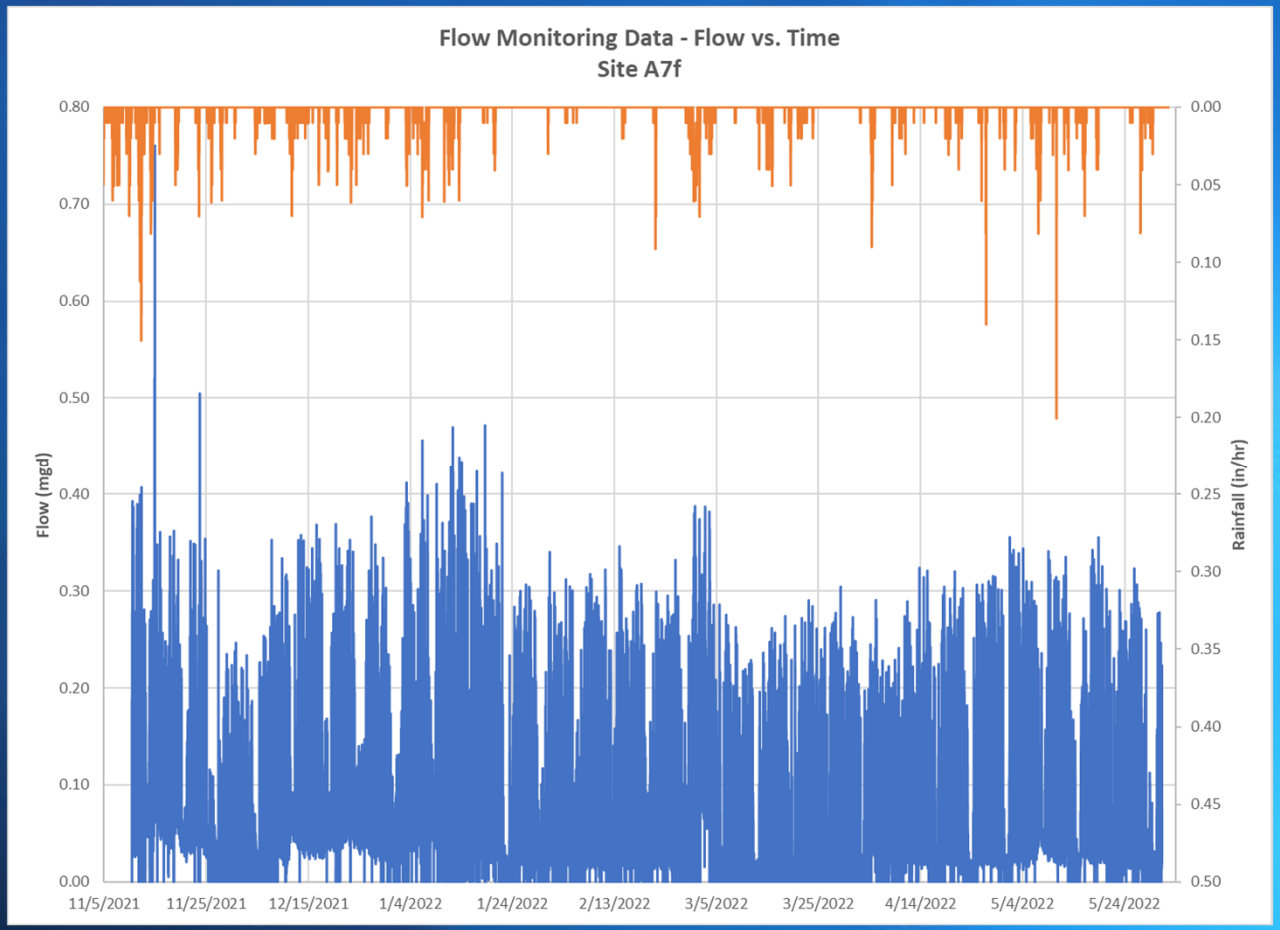
Meter AUB_A7e Scattergraph

Note: 1 data point with negative depth

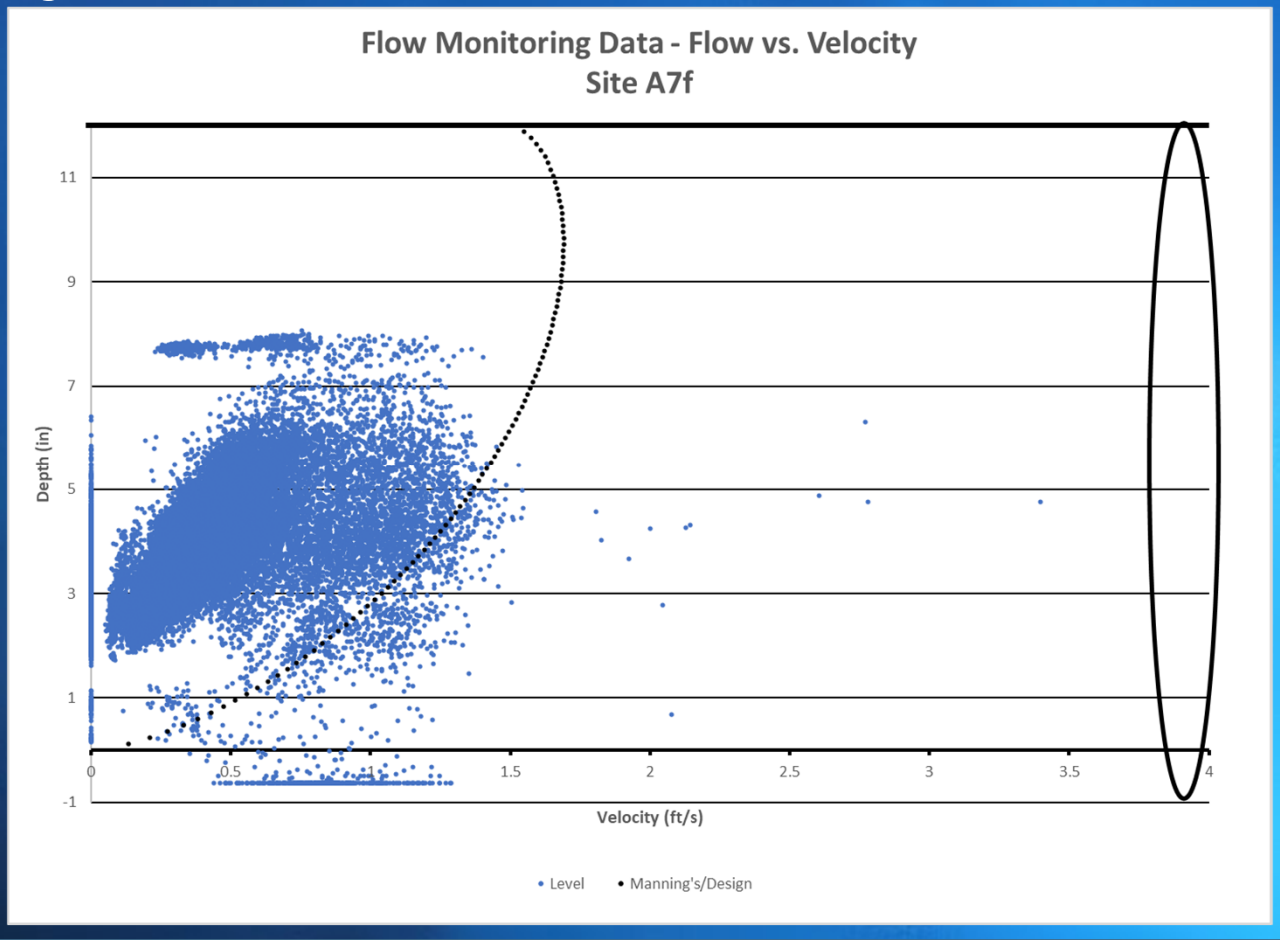


Meter AUB_A7f

Flow vs Rainfall

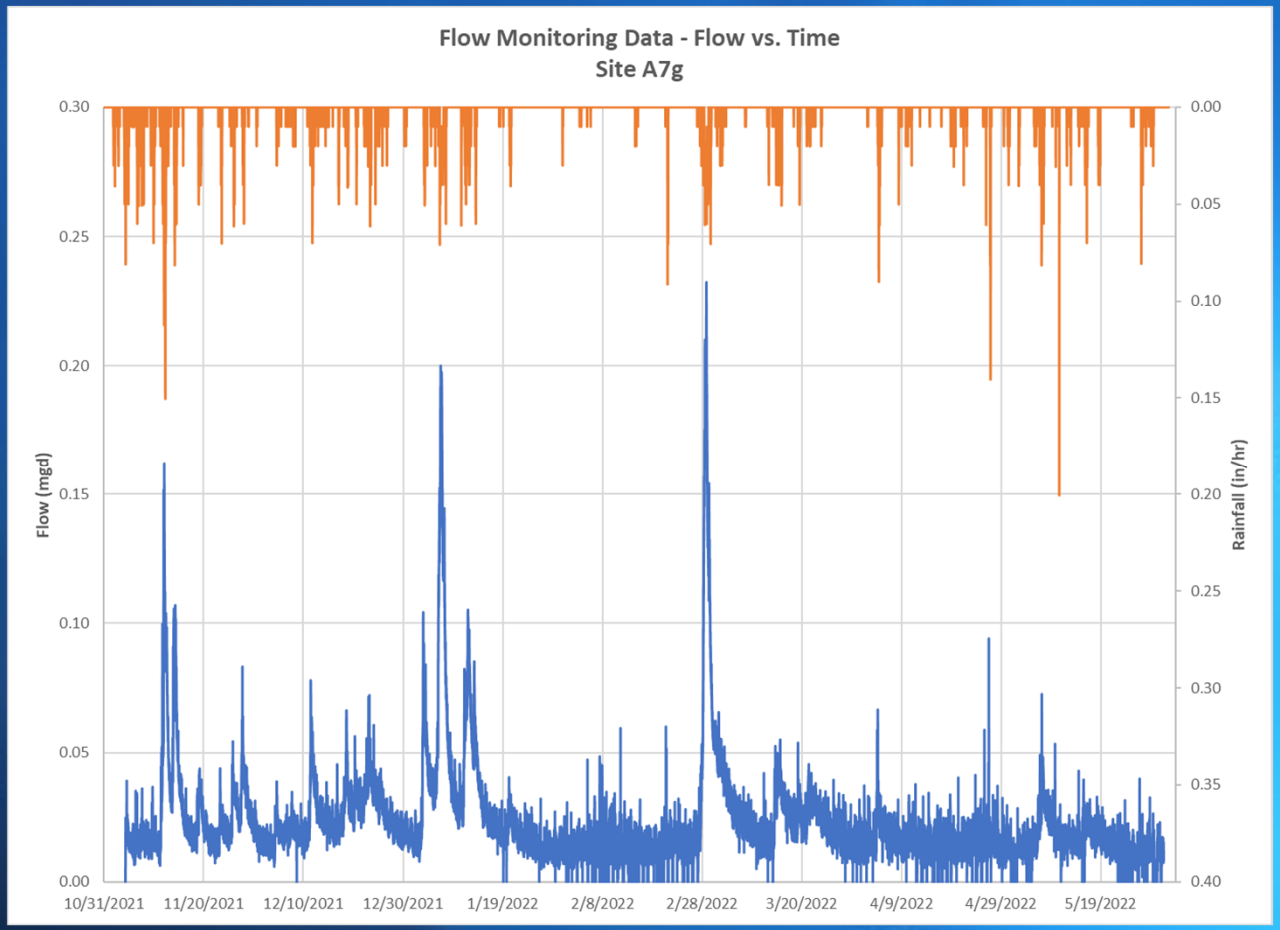


Meter AUB_A7f Scattergraph

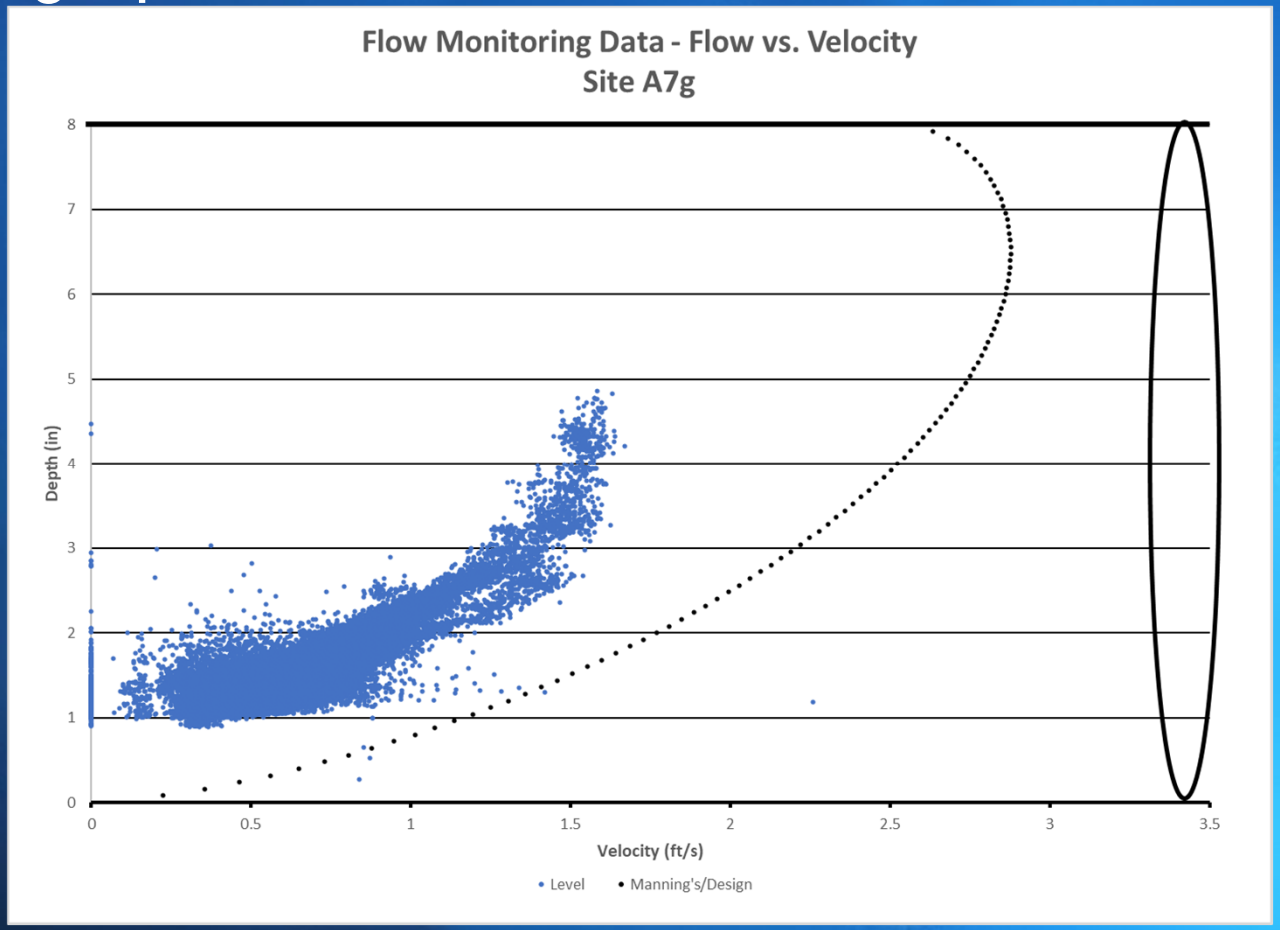


Meter AUB_A7g

Flow vs Rainfall

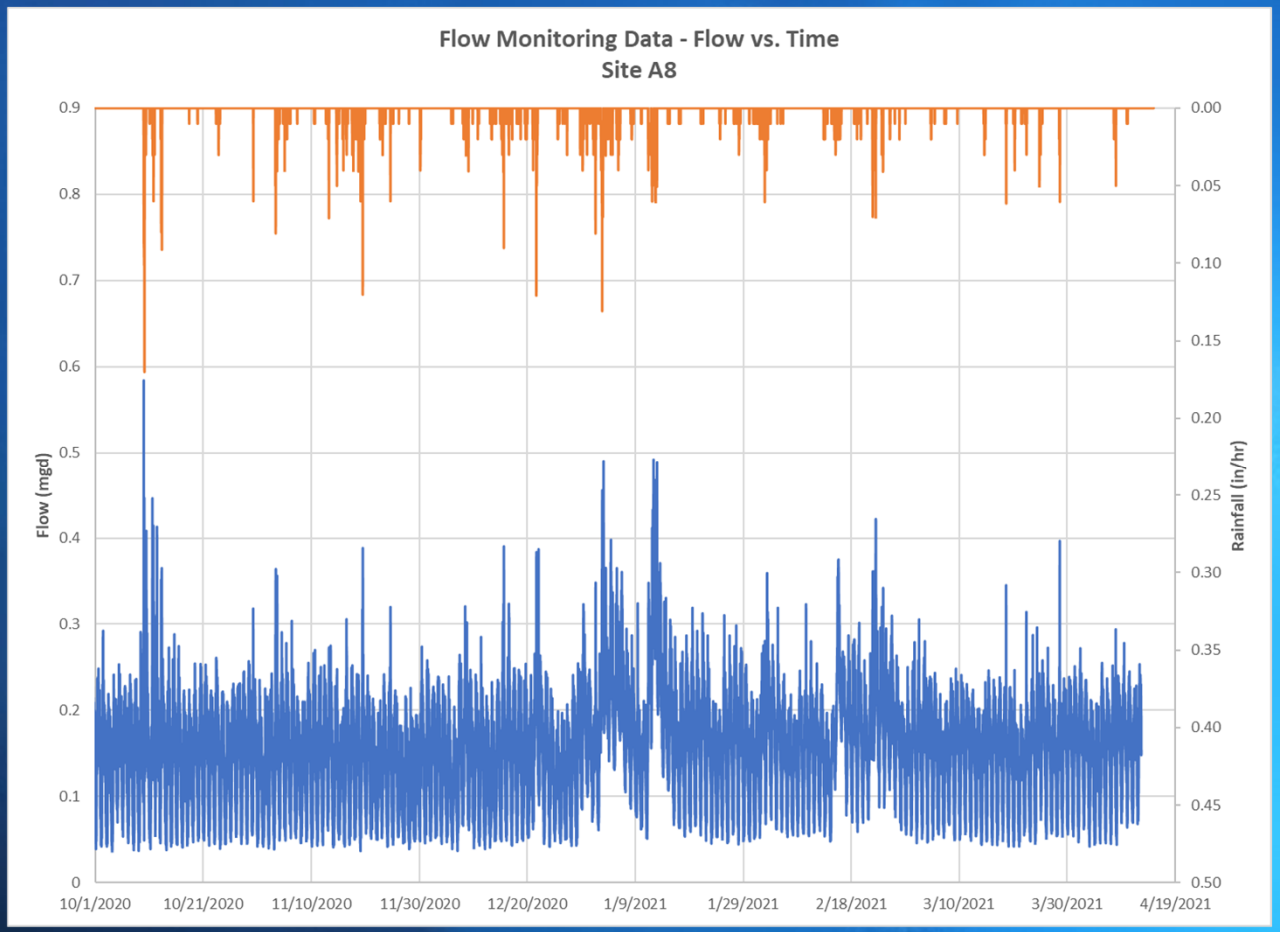


Meter AUB_A7g Scattergraph

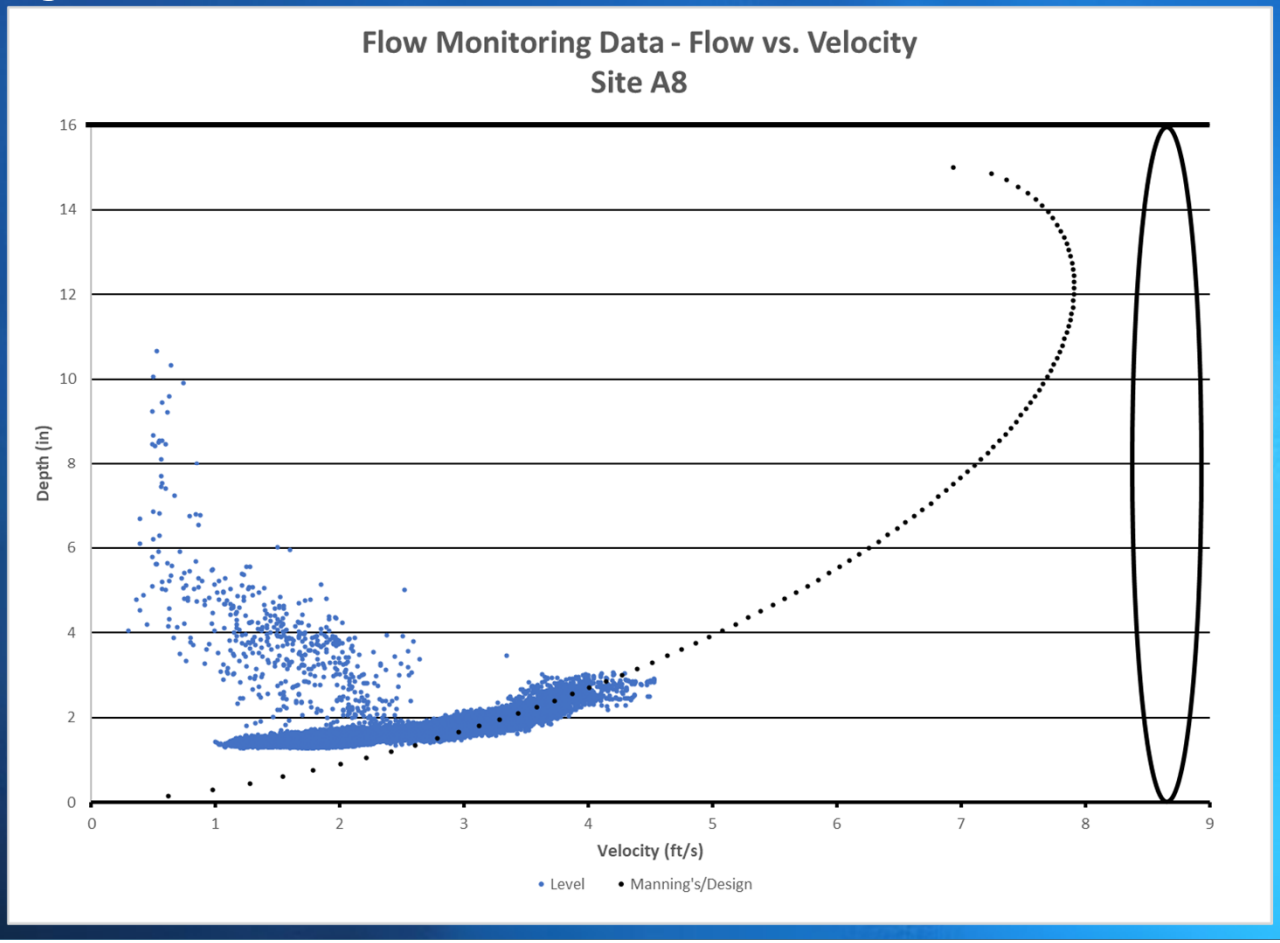


Meter AUB_A8

Flow vs Rainfall

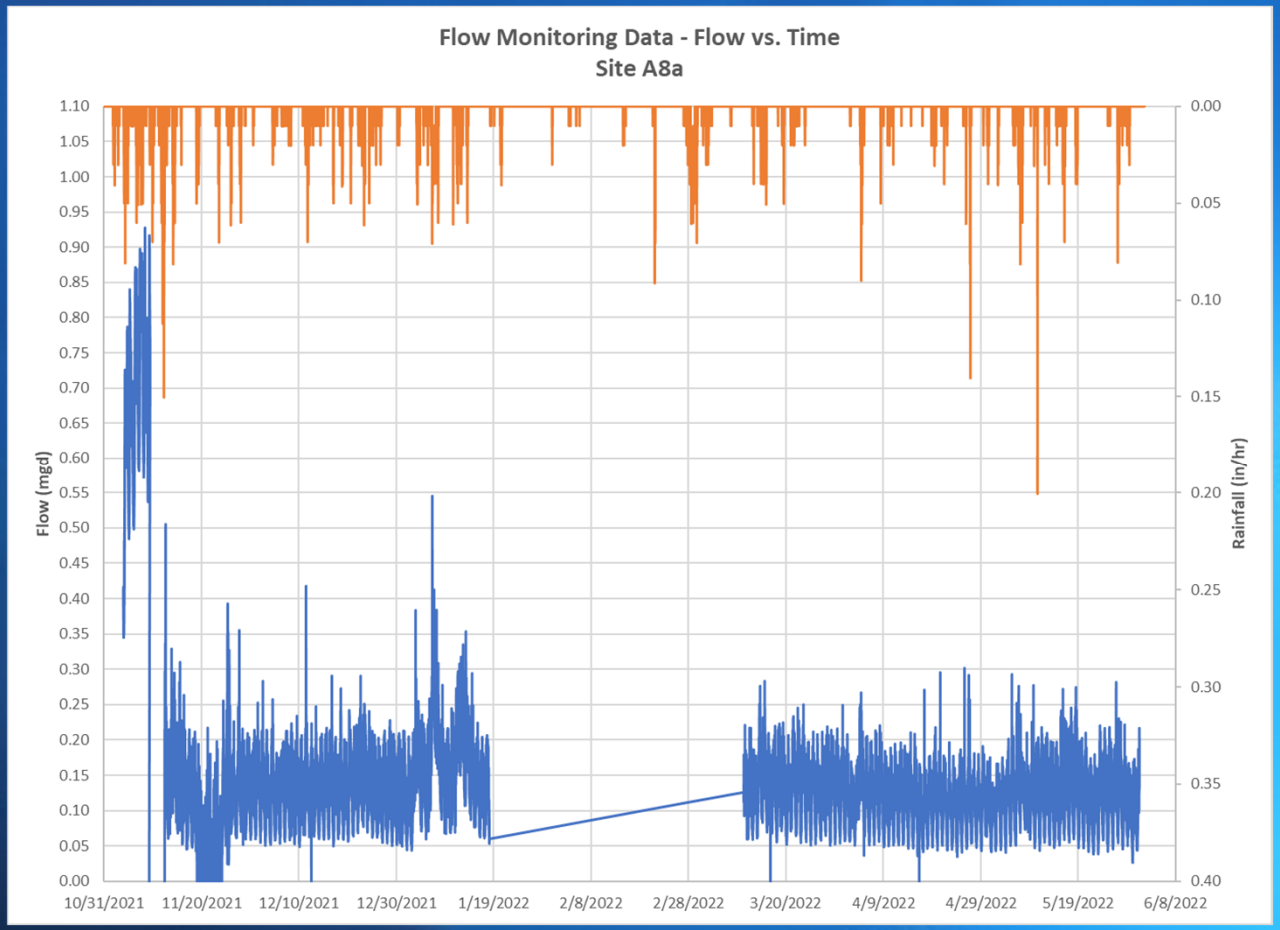


Meter AUB_A8
Scattergraph

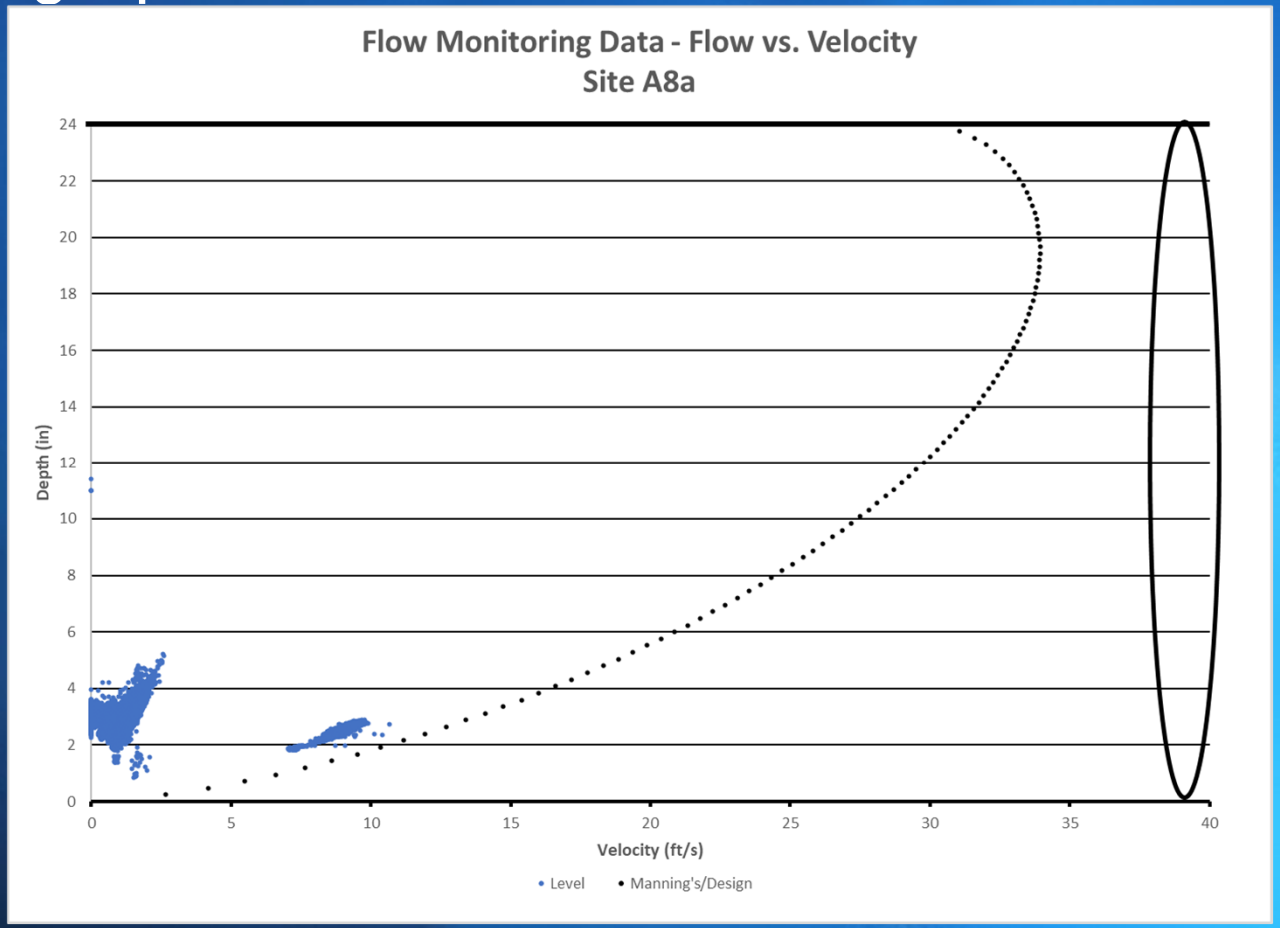


Meter AUB_A8a

Flow vs Rainfall

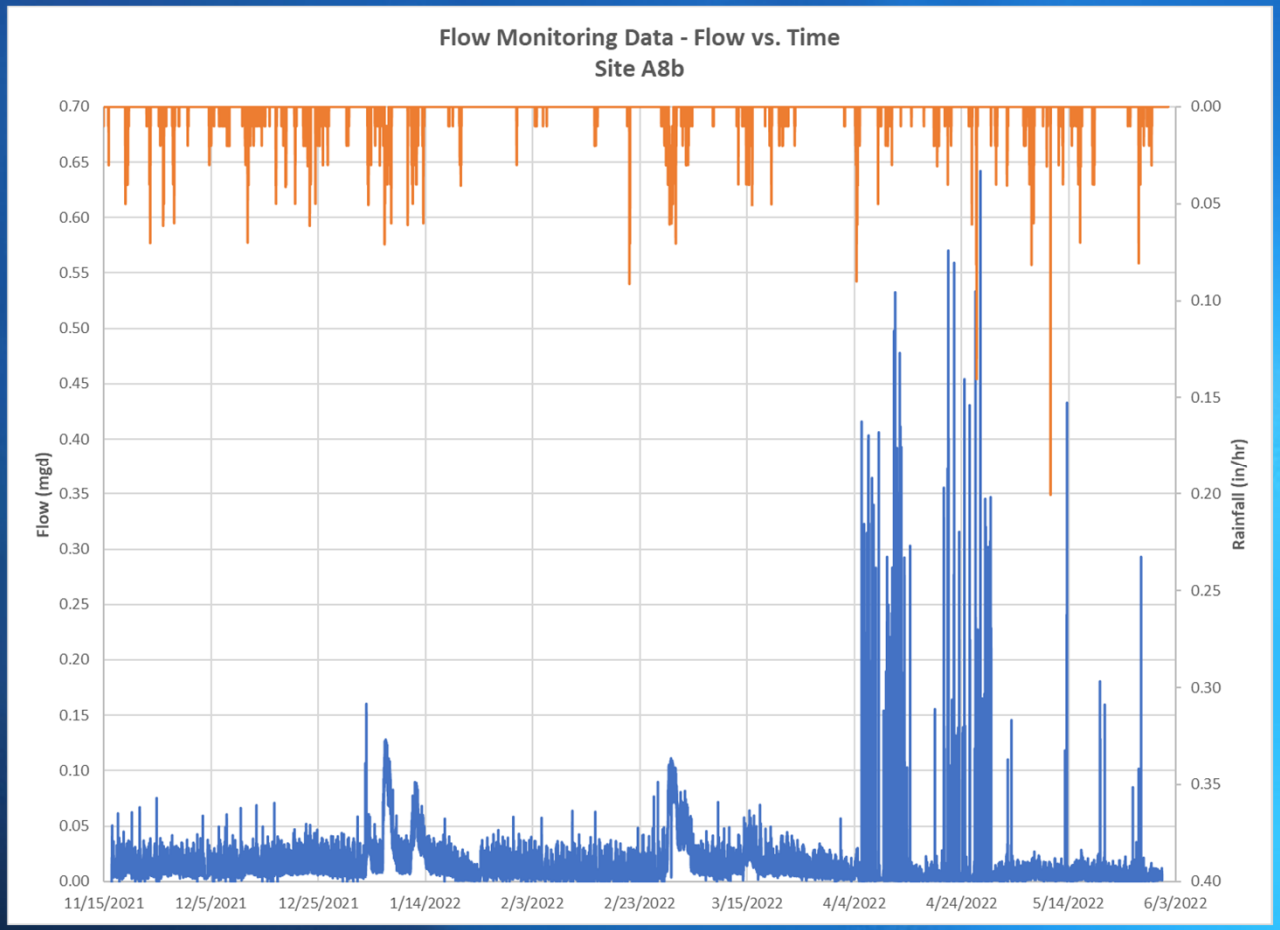


Meter AUB_A8a
Scattergraph

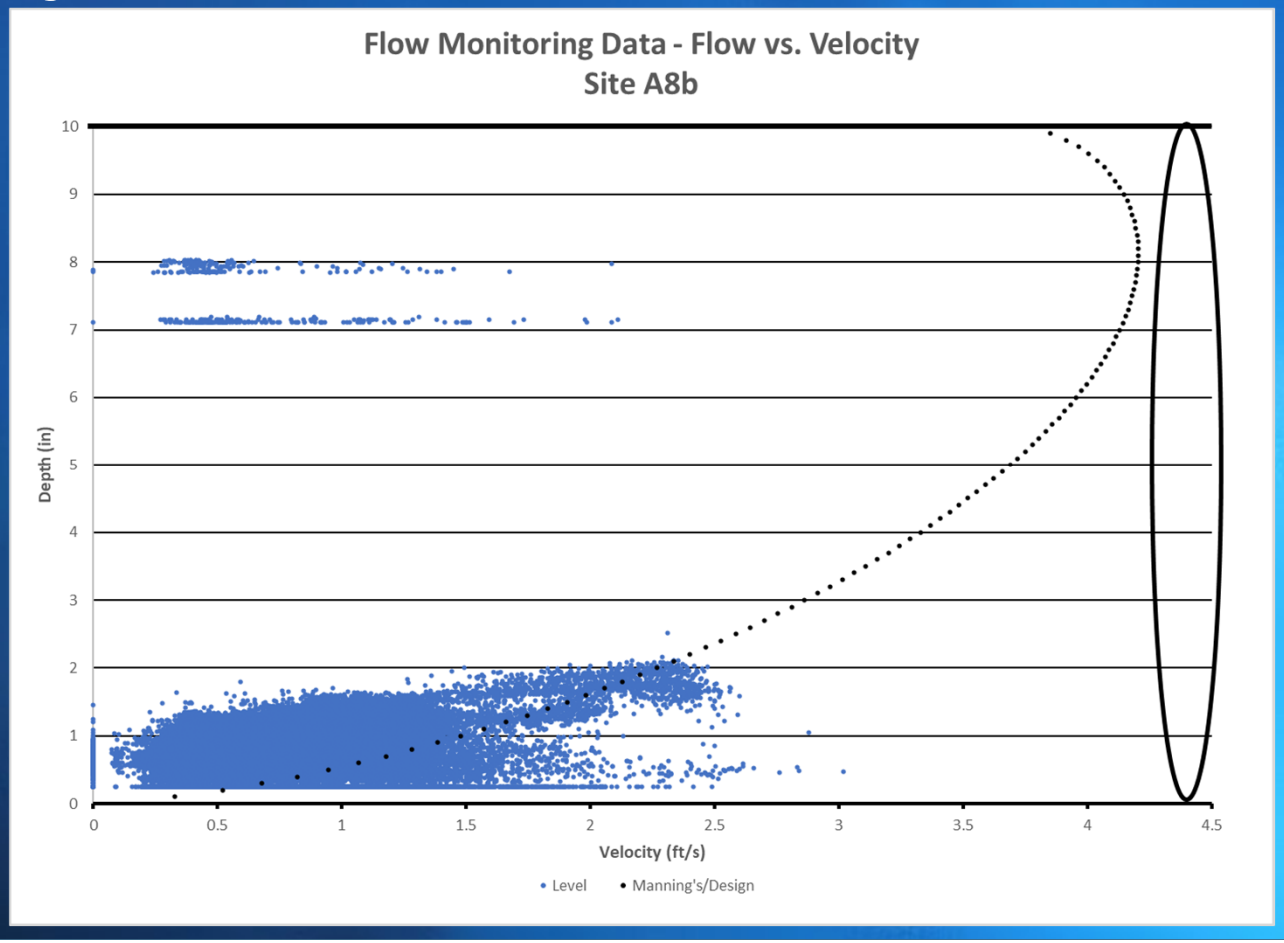


Meter AUB_A8b

Flow vs Rainfall

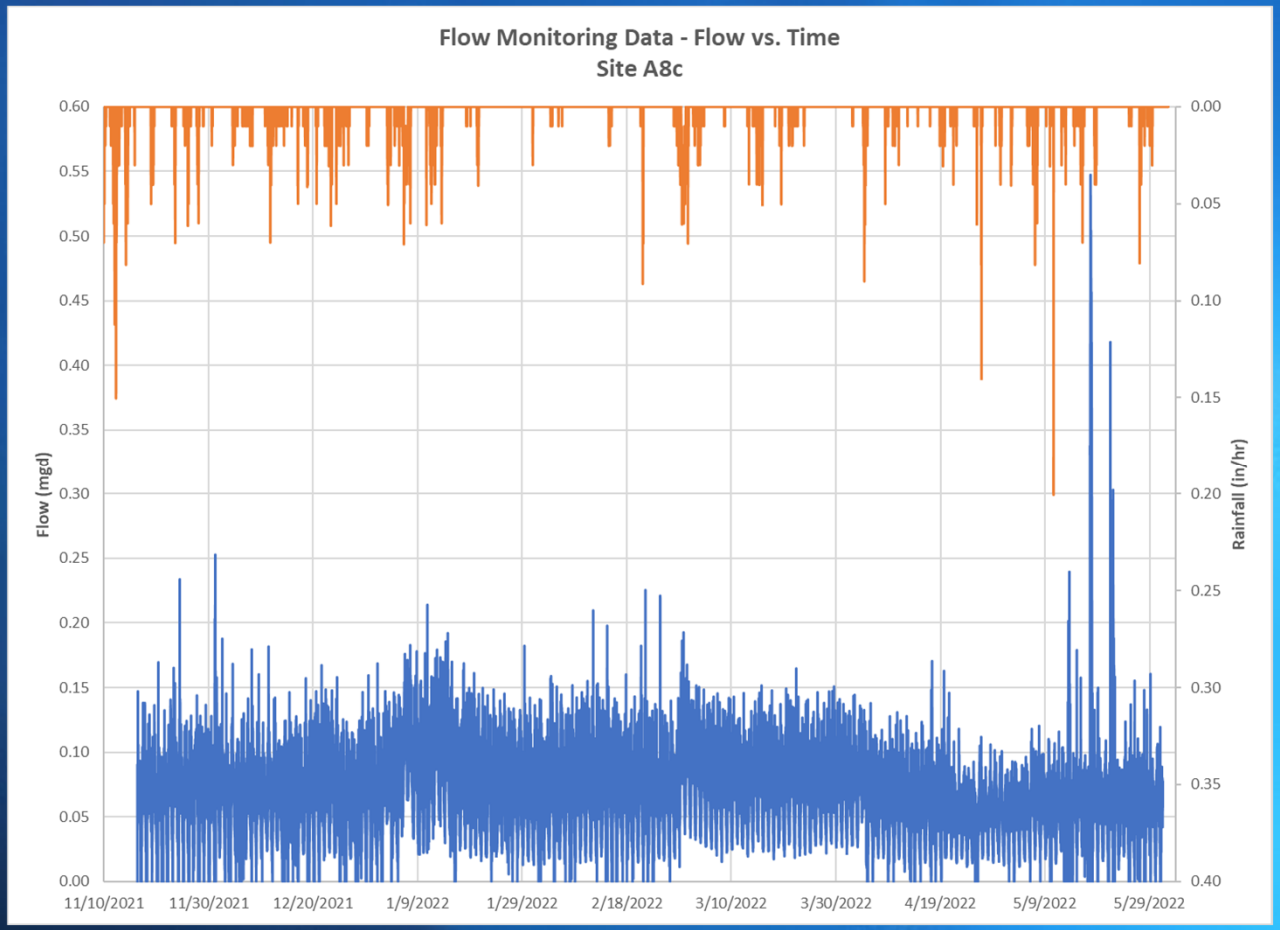


Meter AUB_A8b Scattergraph

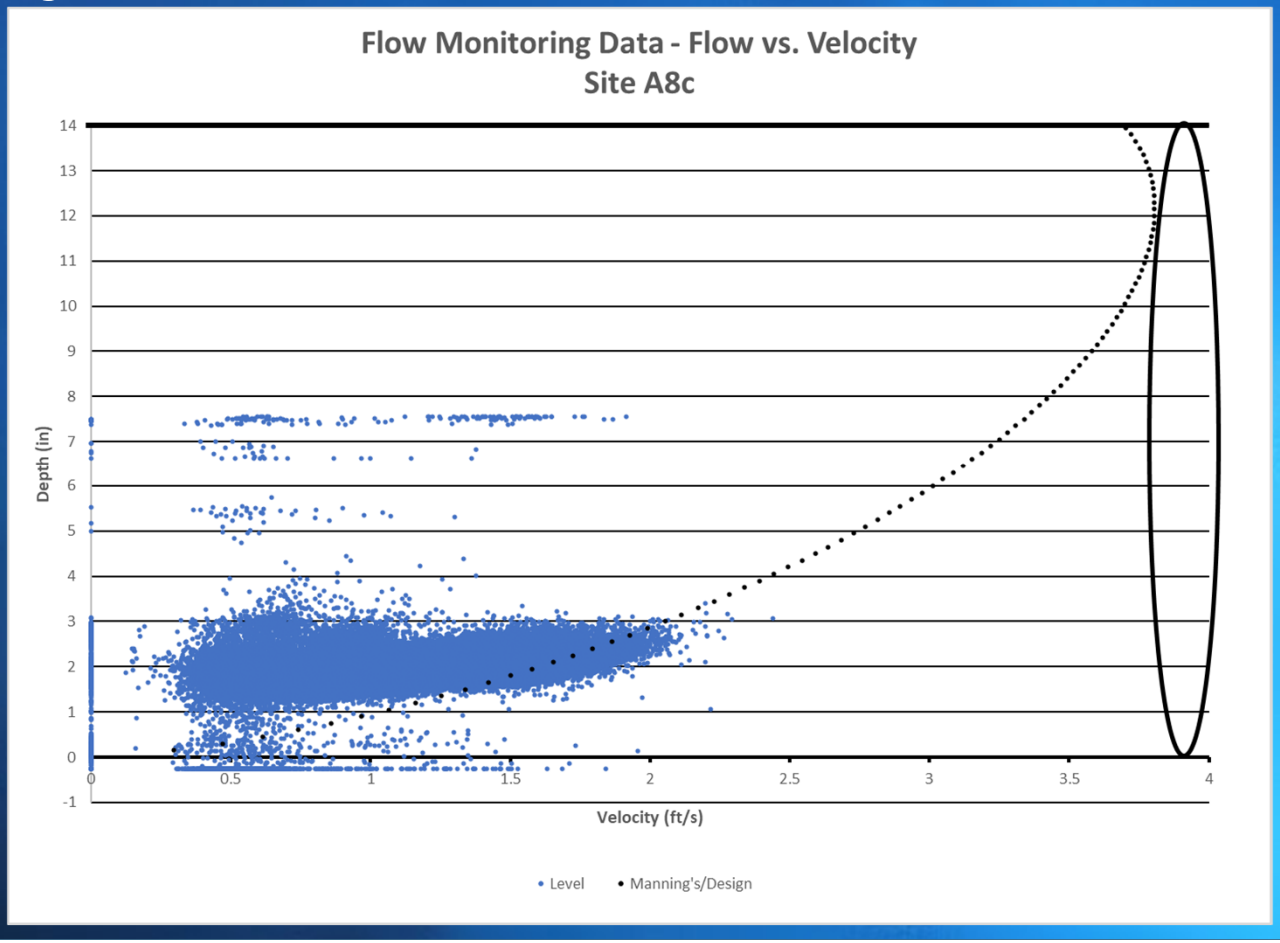


Meter AUB_A8c

Flow vs Rainfall

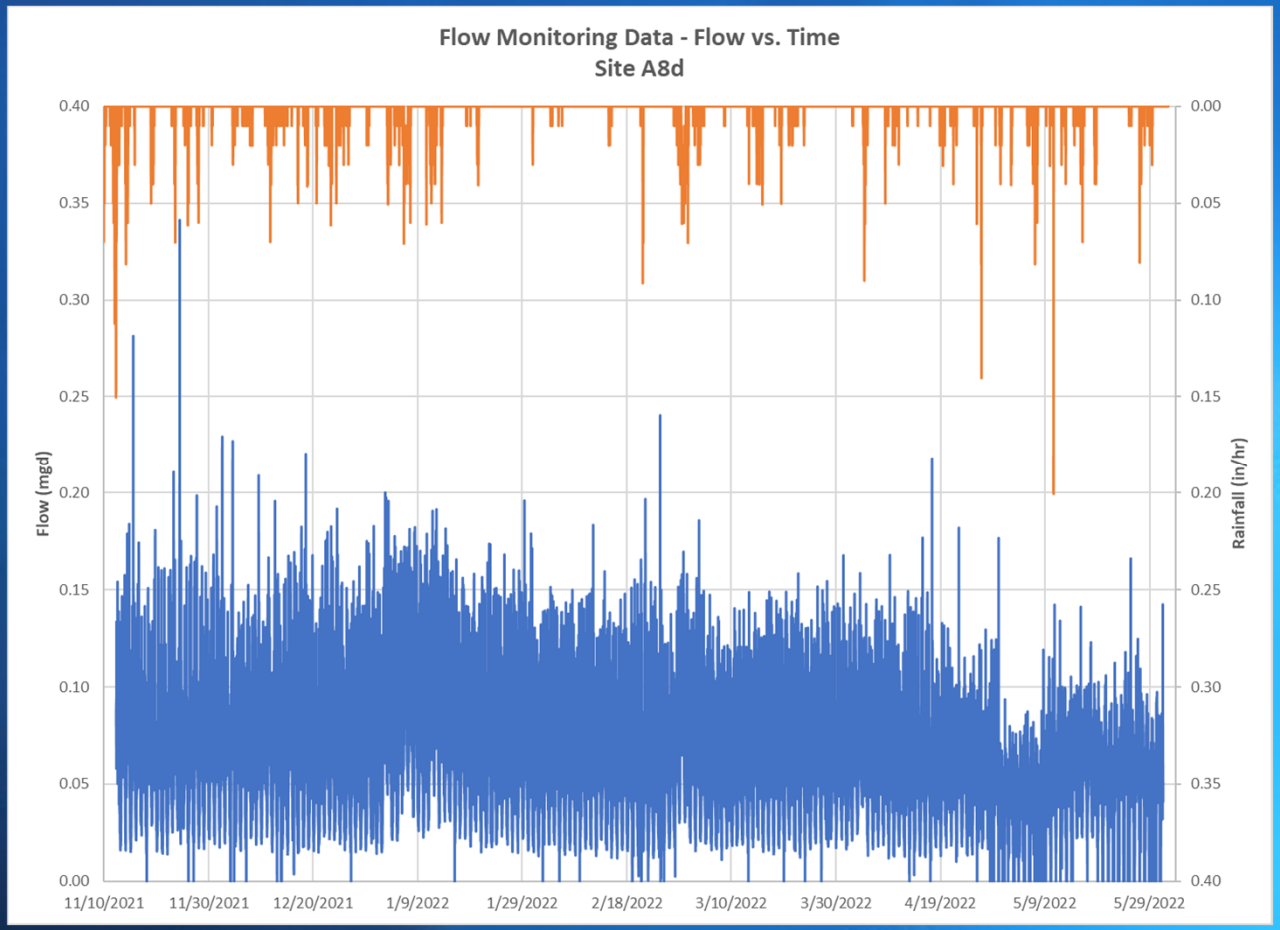


Meter AUB_A8c Scattergraph

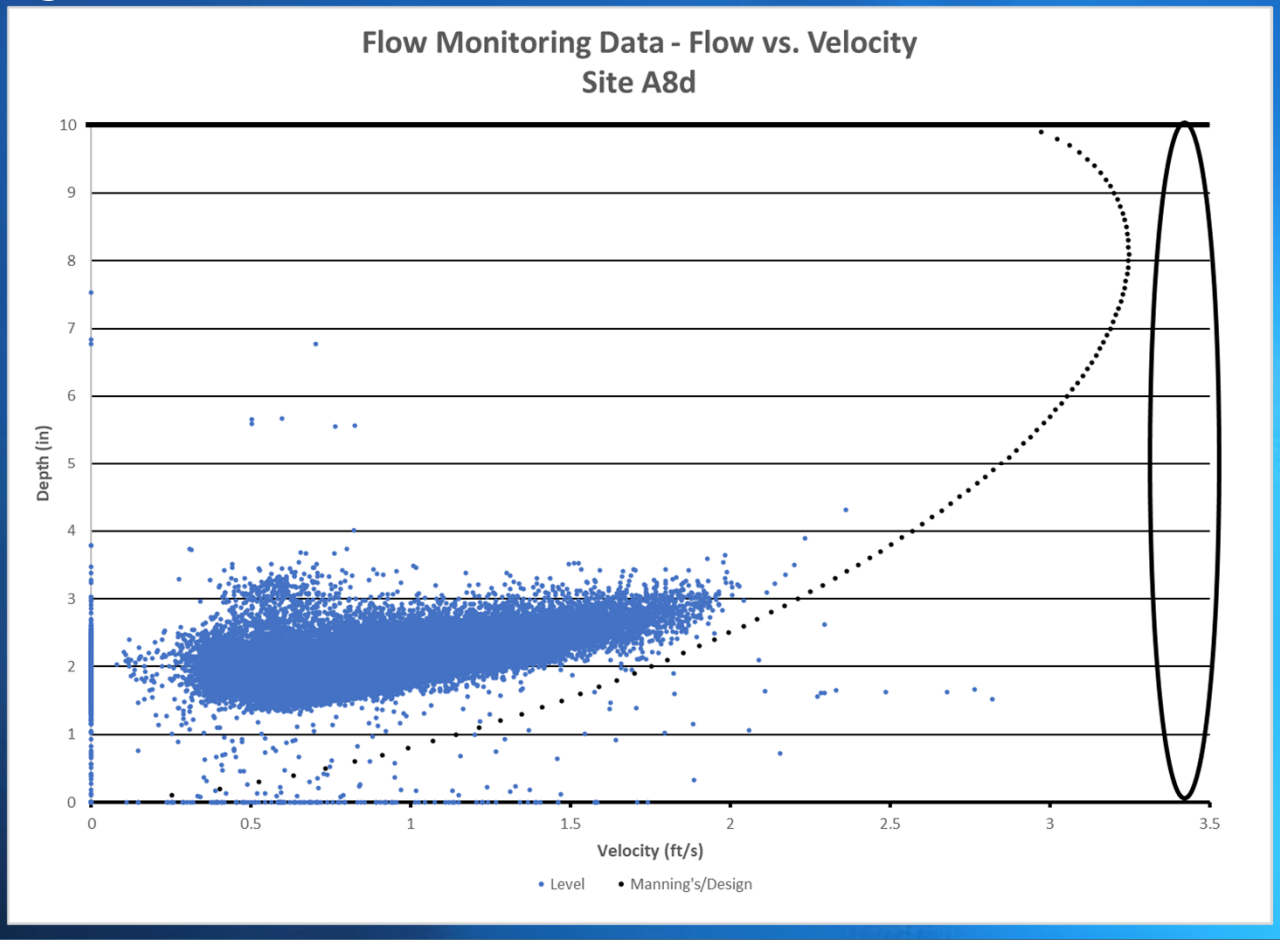


Meter AUB_A8d

Flow vs Rainfall

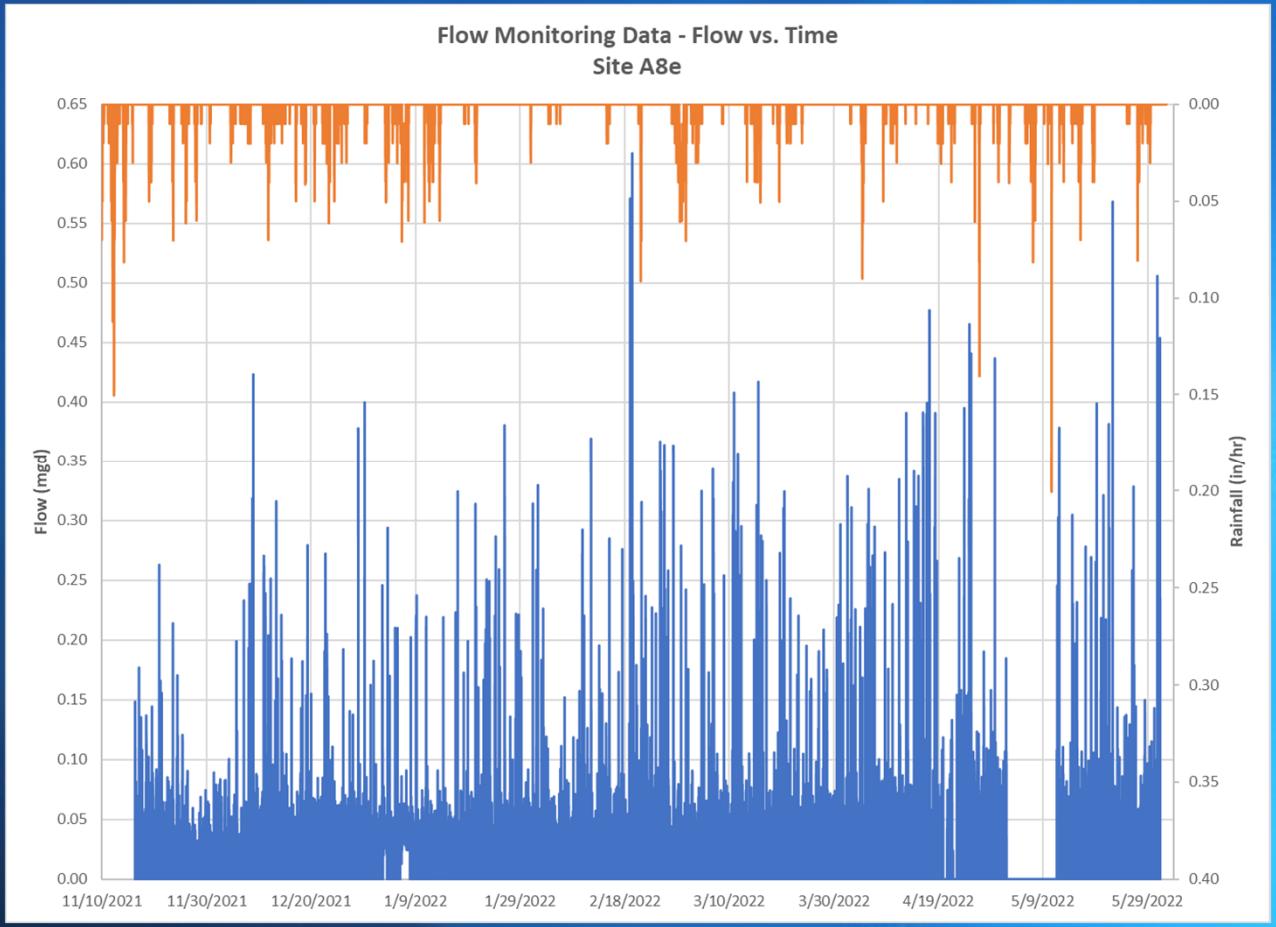


Meter AUB_A8d Scattergraph

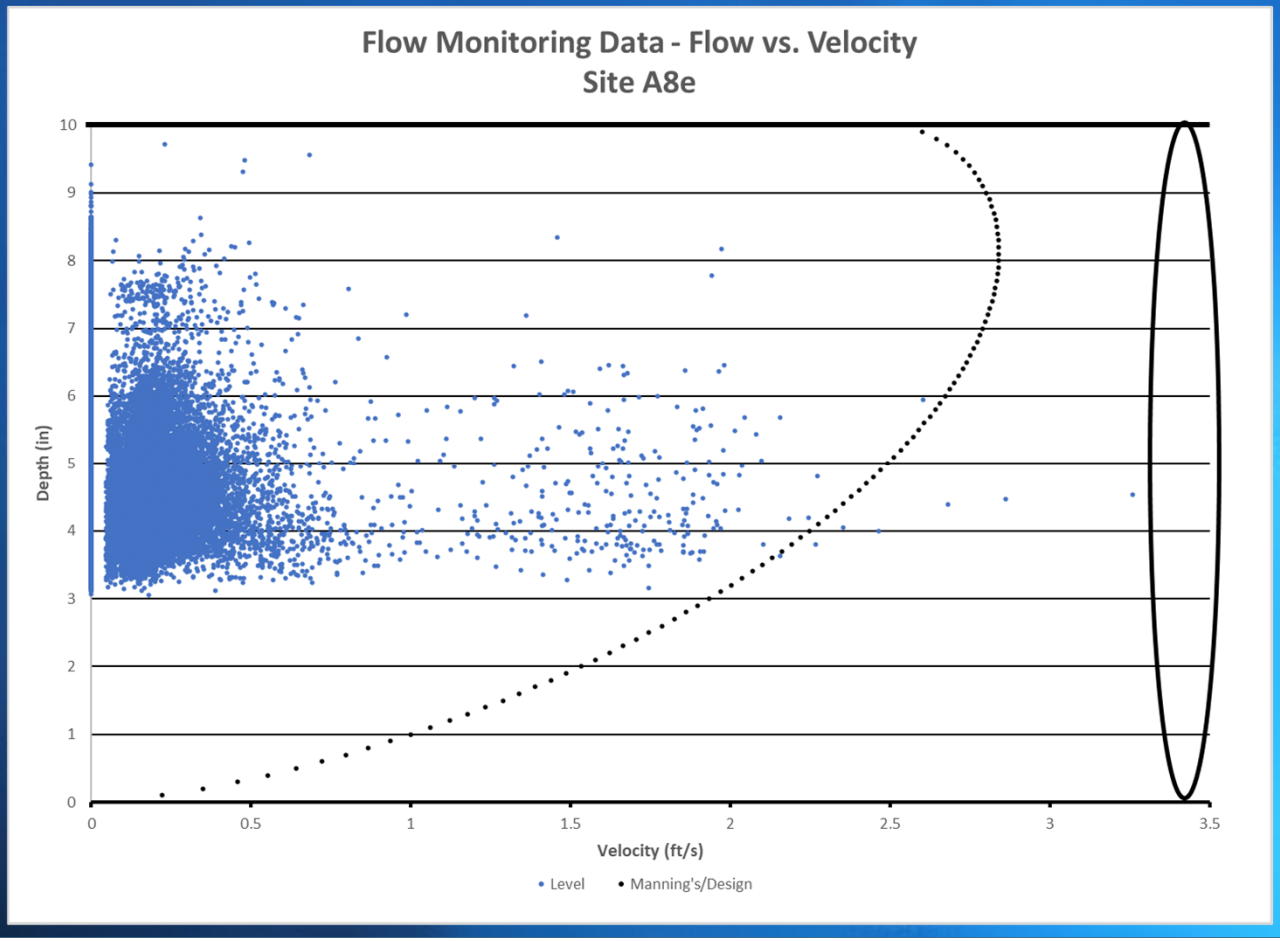


Meter AUB_A8e

Flow vs Rainfall

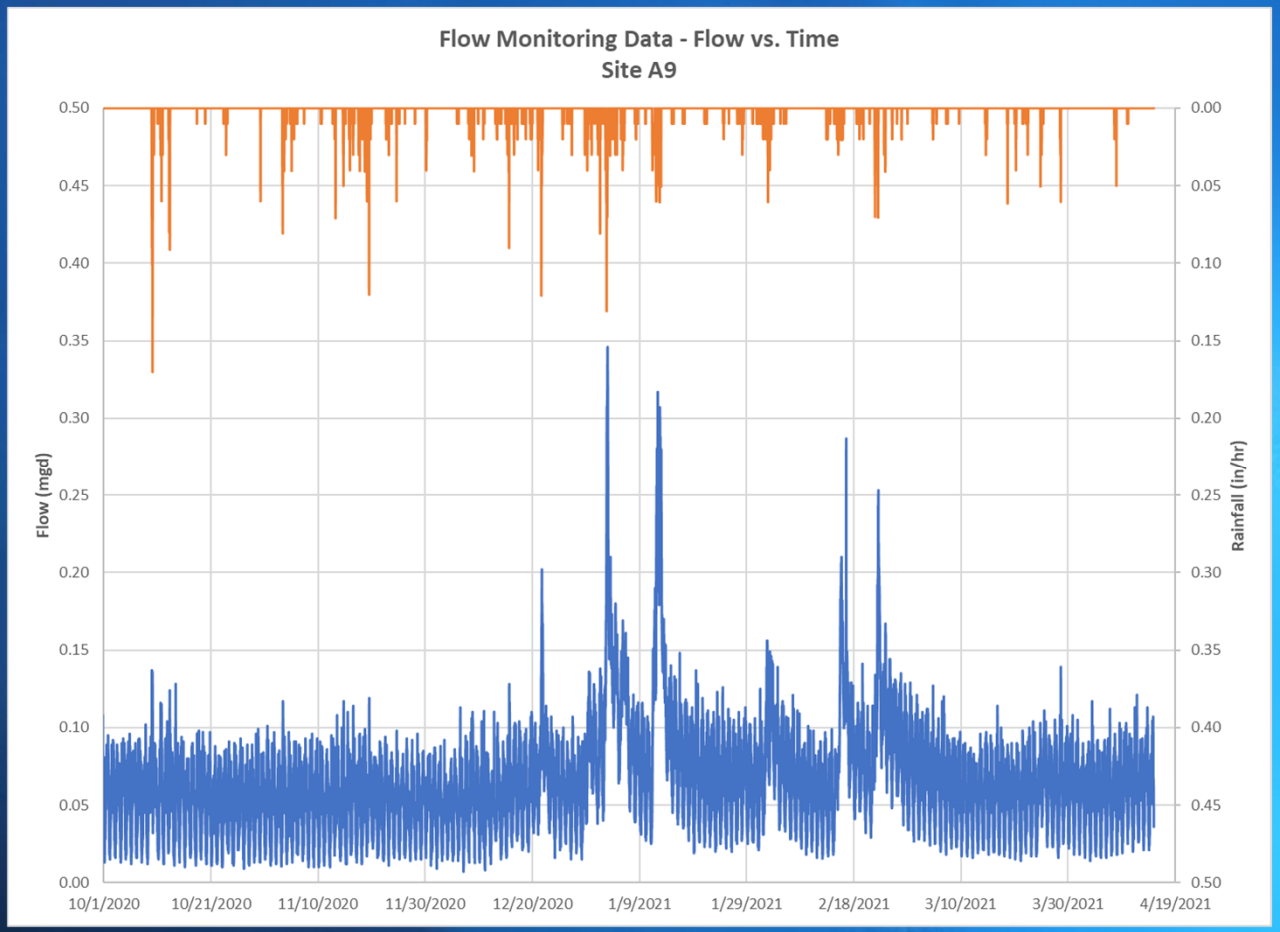


Meter AUB_A8e Scattergraph

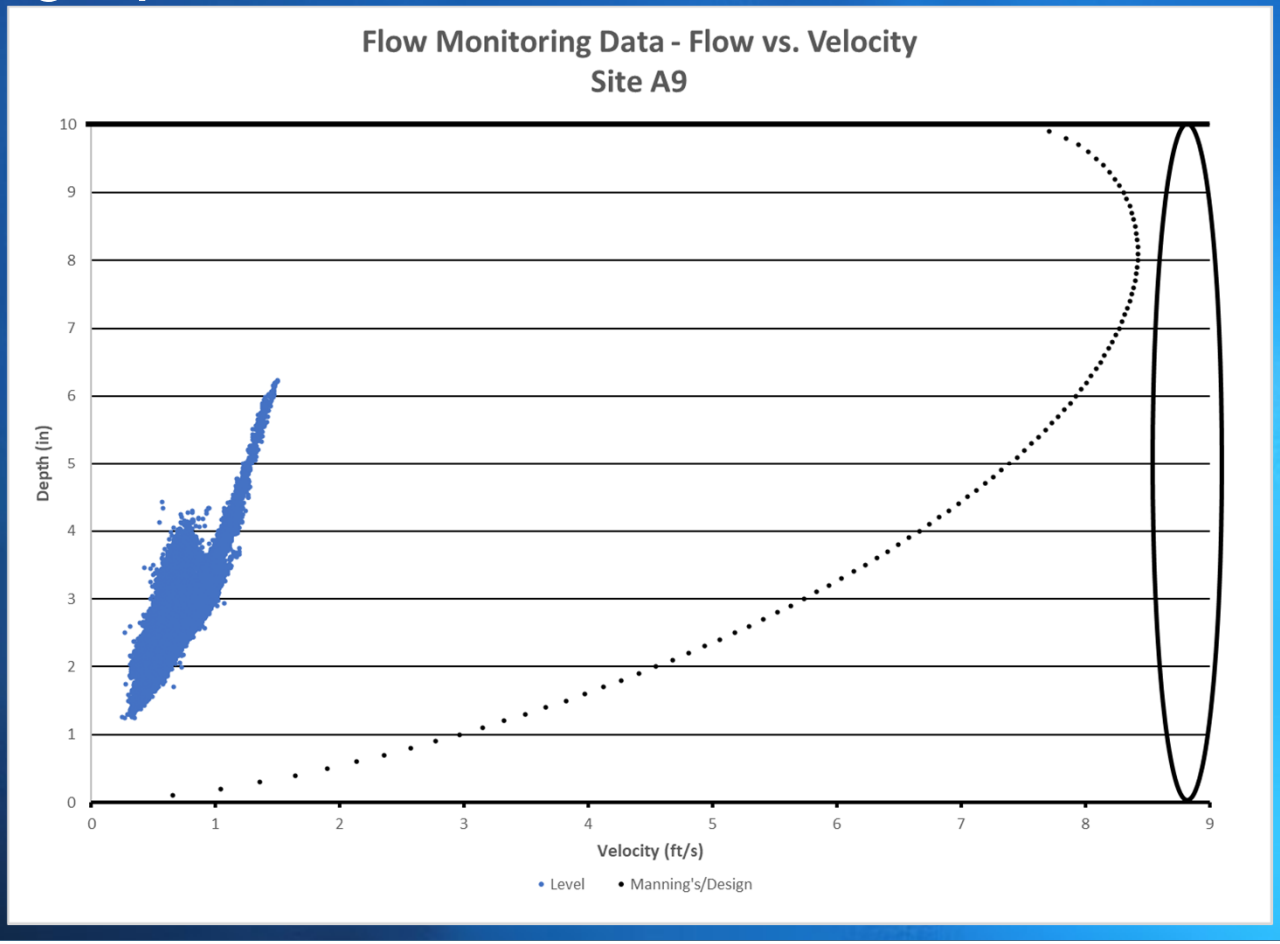


Meter AUB_A9

Flow vs Rainfall

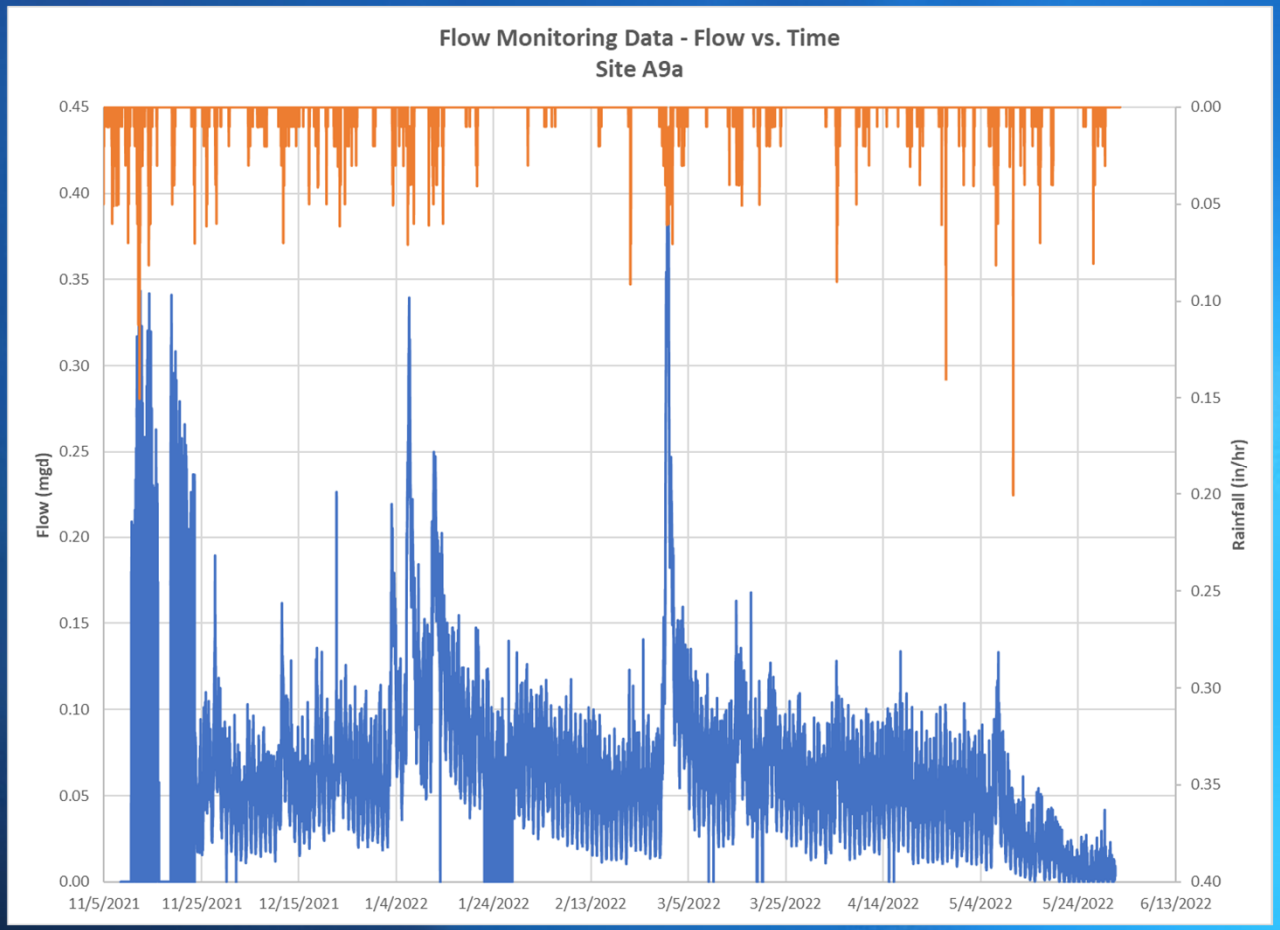


Meter AUB_A9
Scattergraph

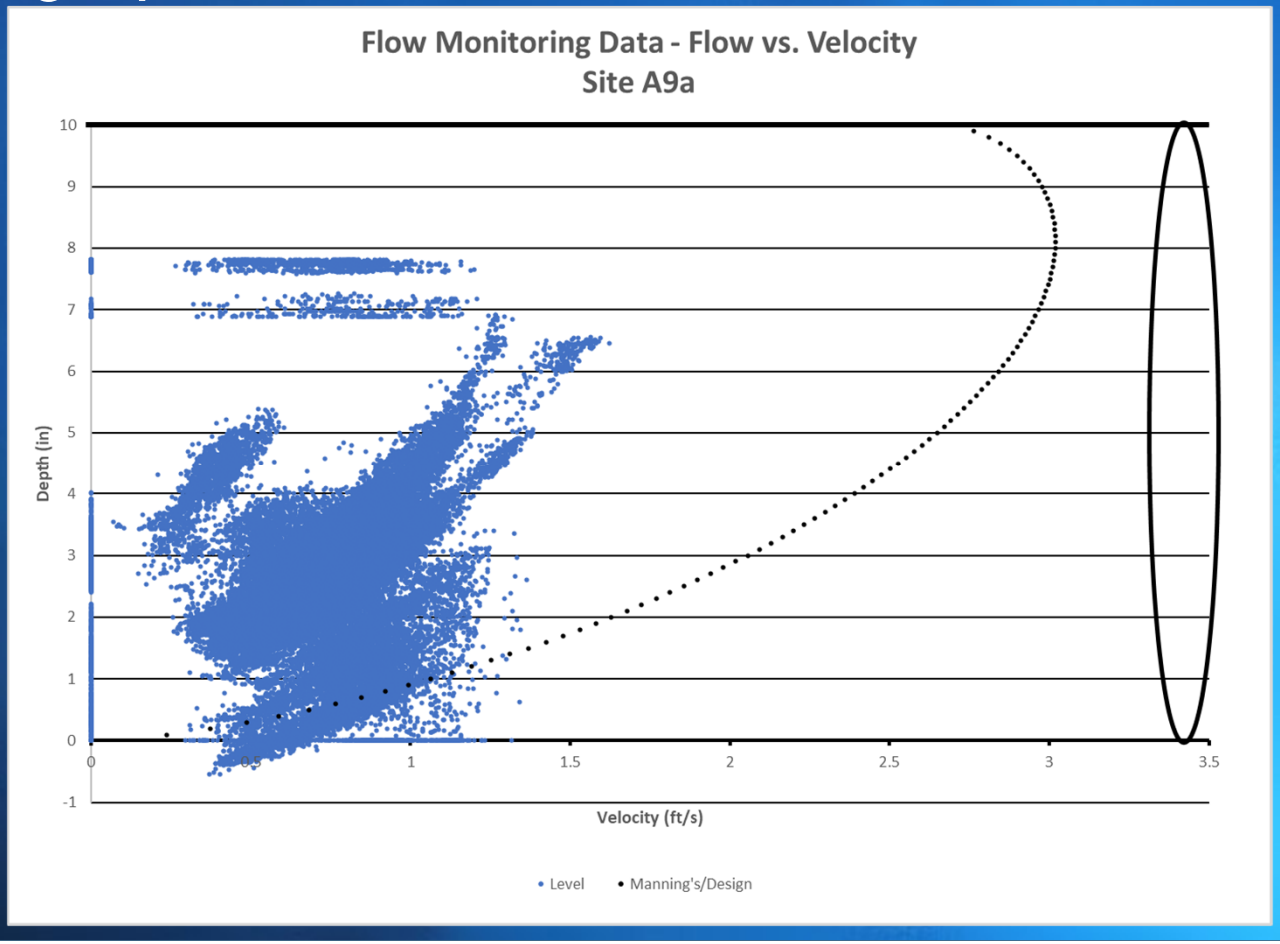


Meter AUB_A9a

Flow vs Rainfall

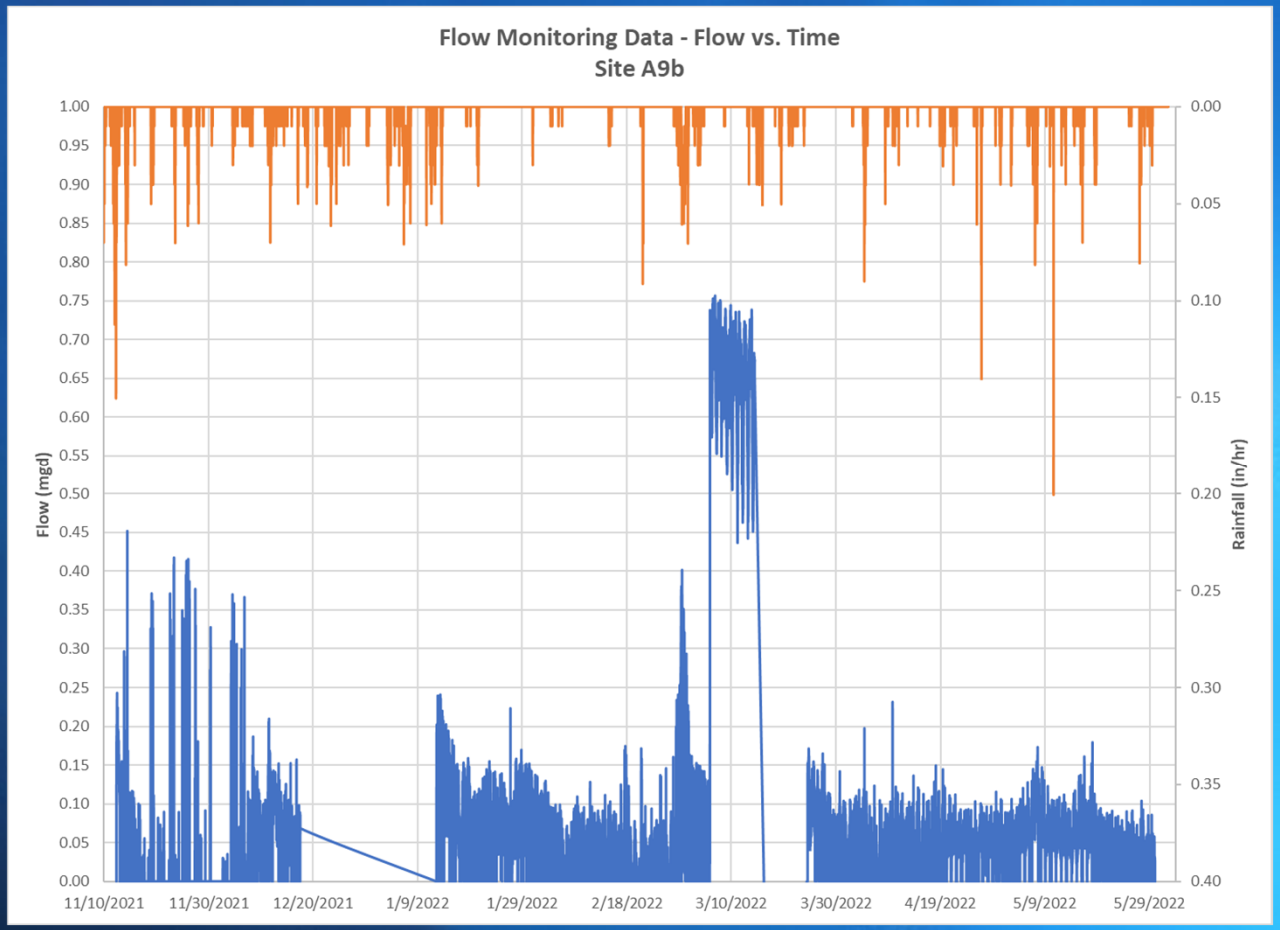


Meter AUB_A9a Scattergraph

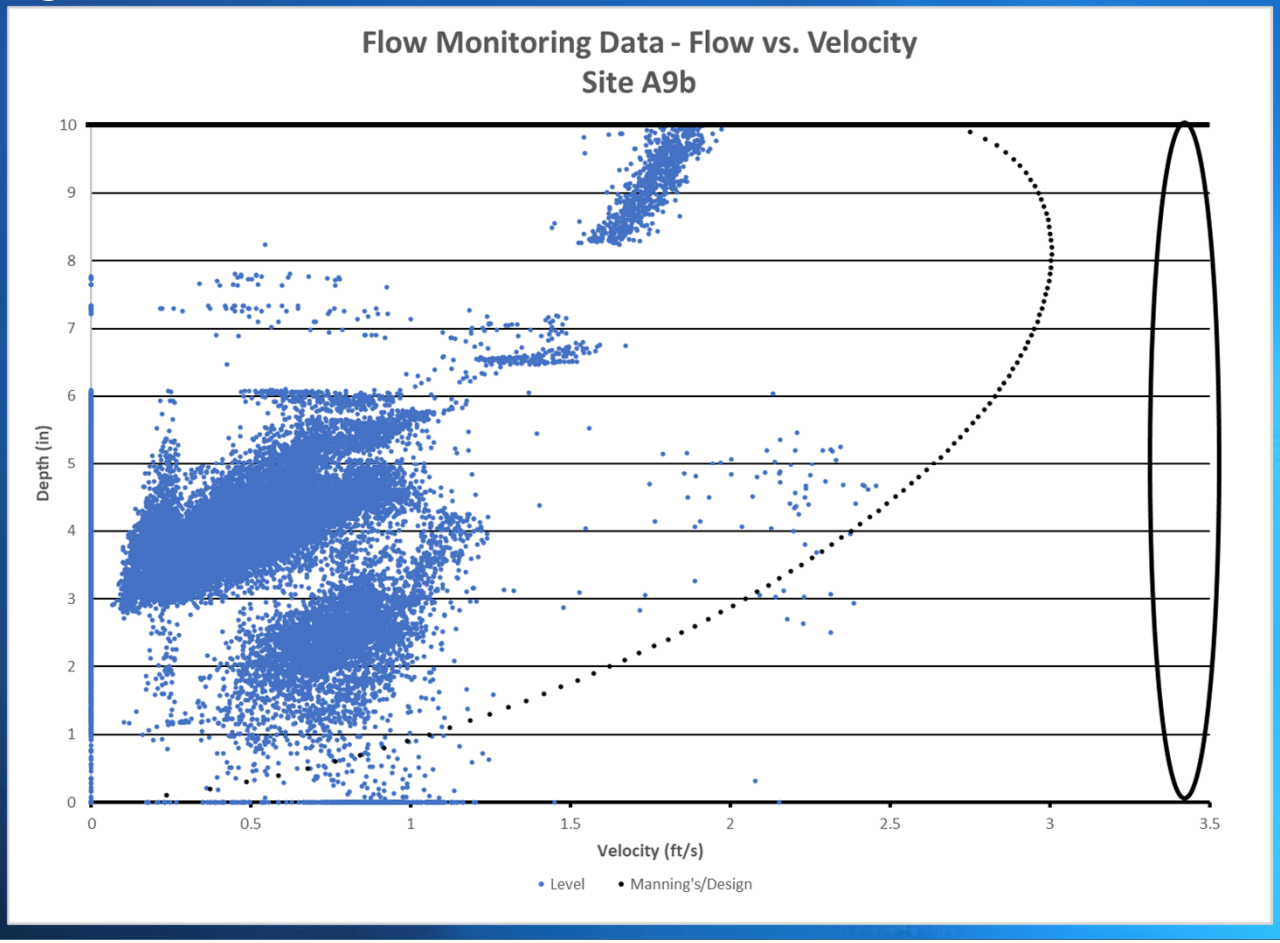


Meter AUB_A9b

Flow vs Rainfall

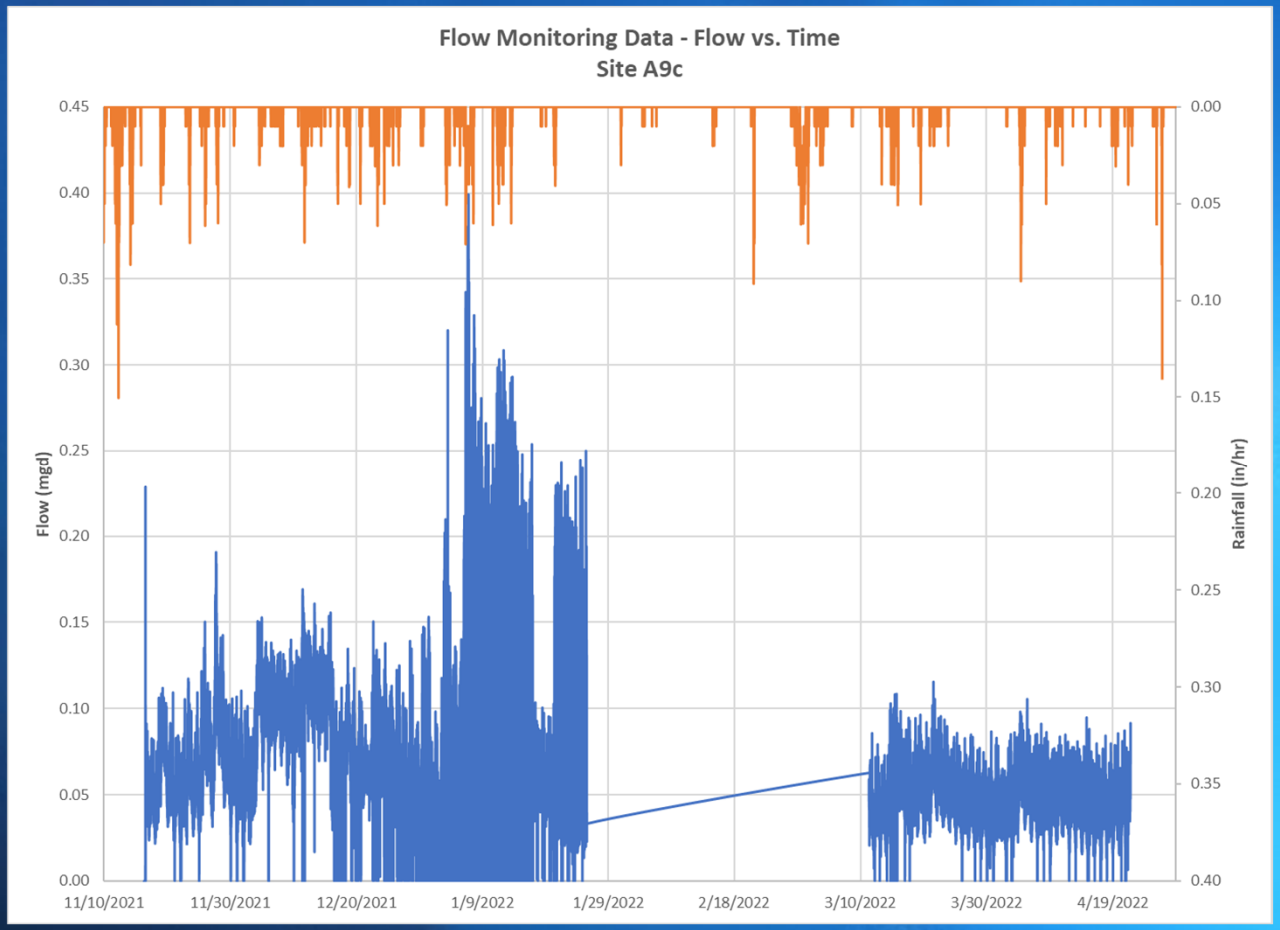


Meter AUB_A9b Scattergraph



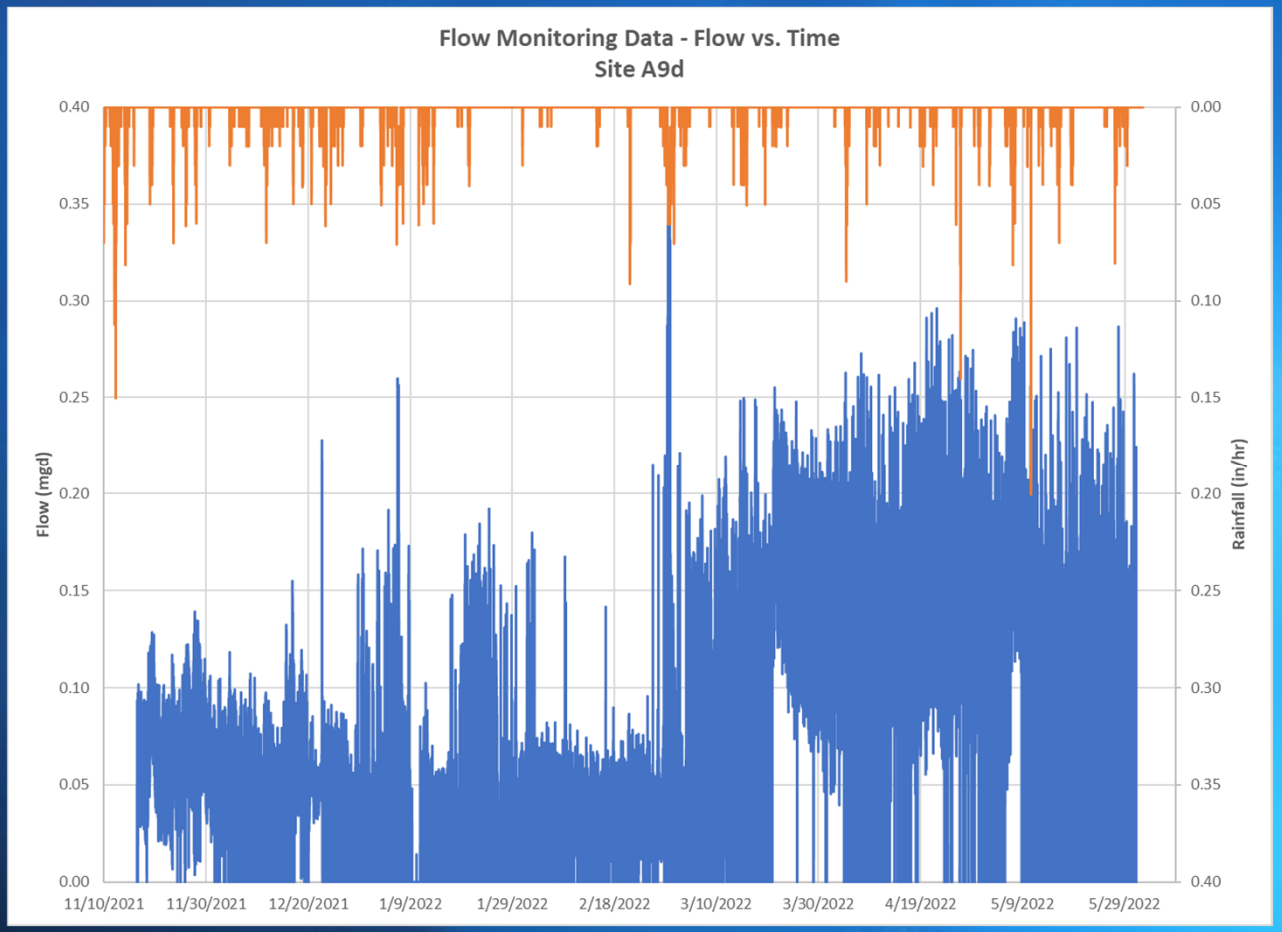
Meter AUB_A9c

Flow vs Rainfall



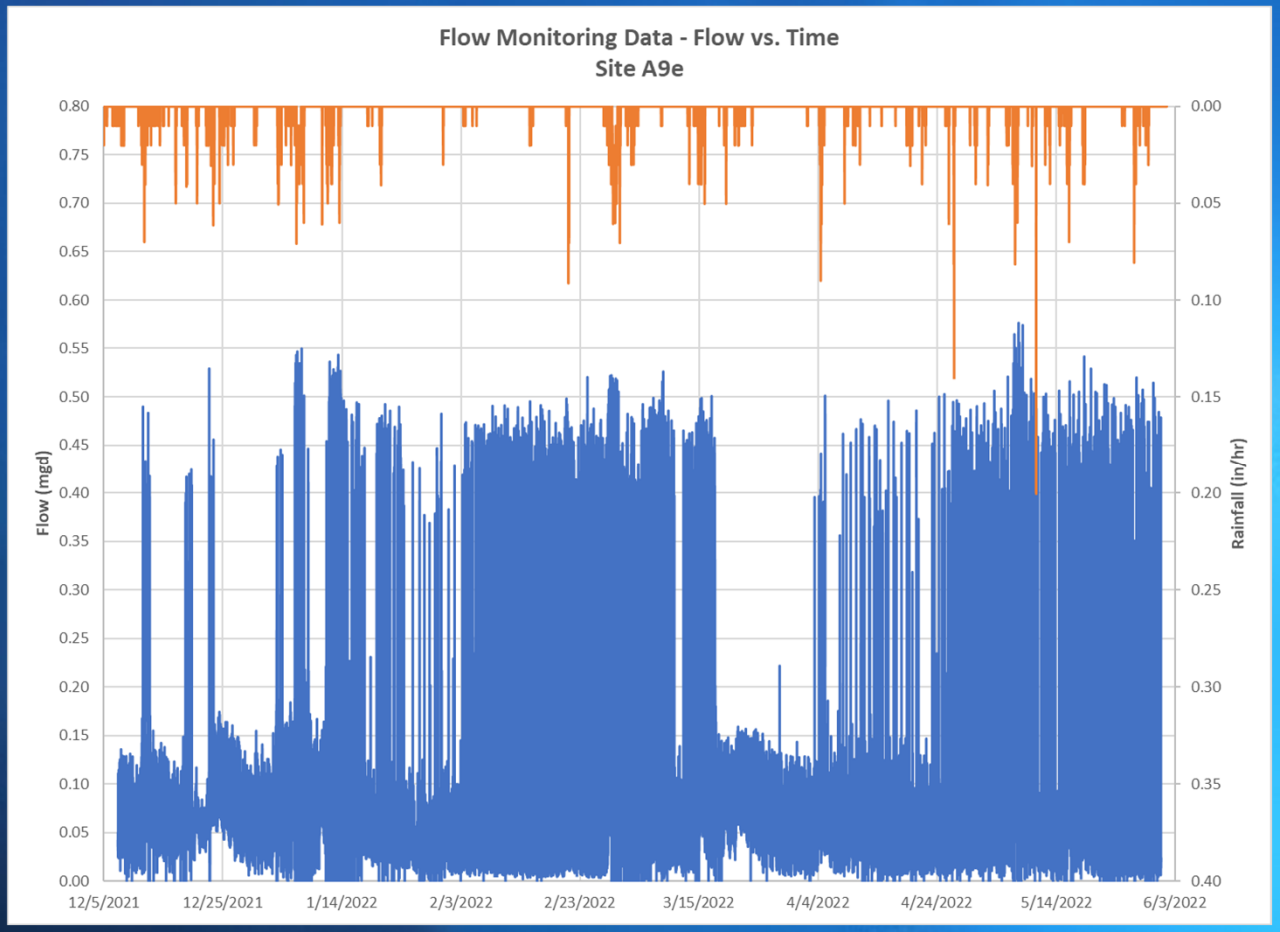
Meter AUB_A9d

Flow vs Rainfall

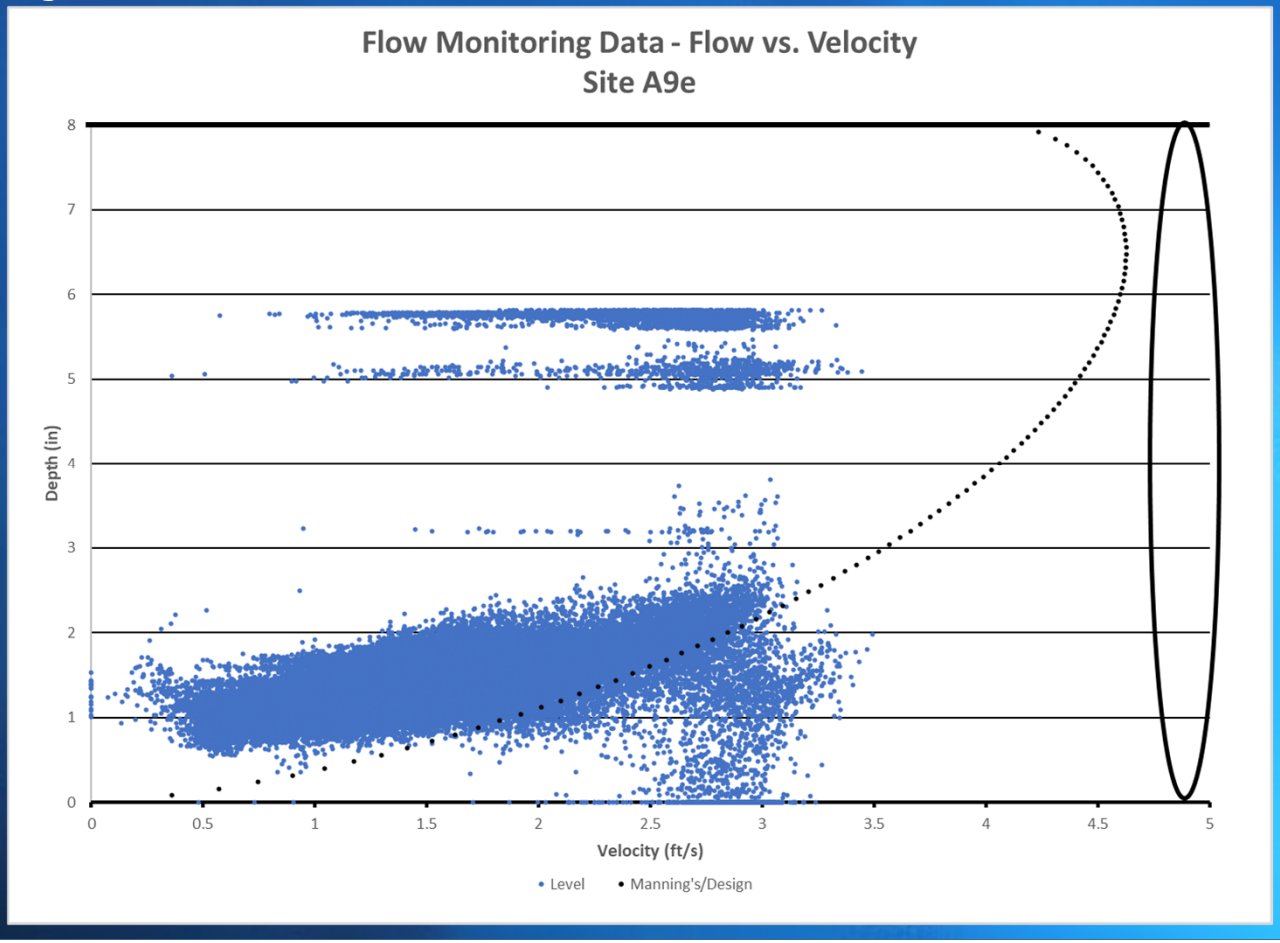


Meter AUB_A9e

Flow vs Rainfall

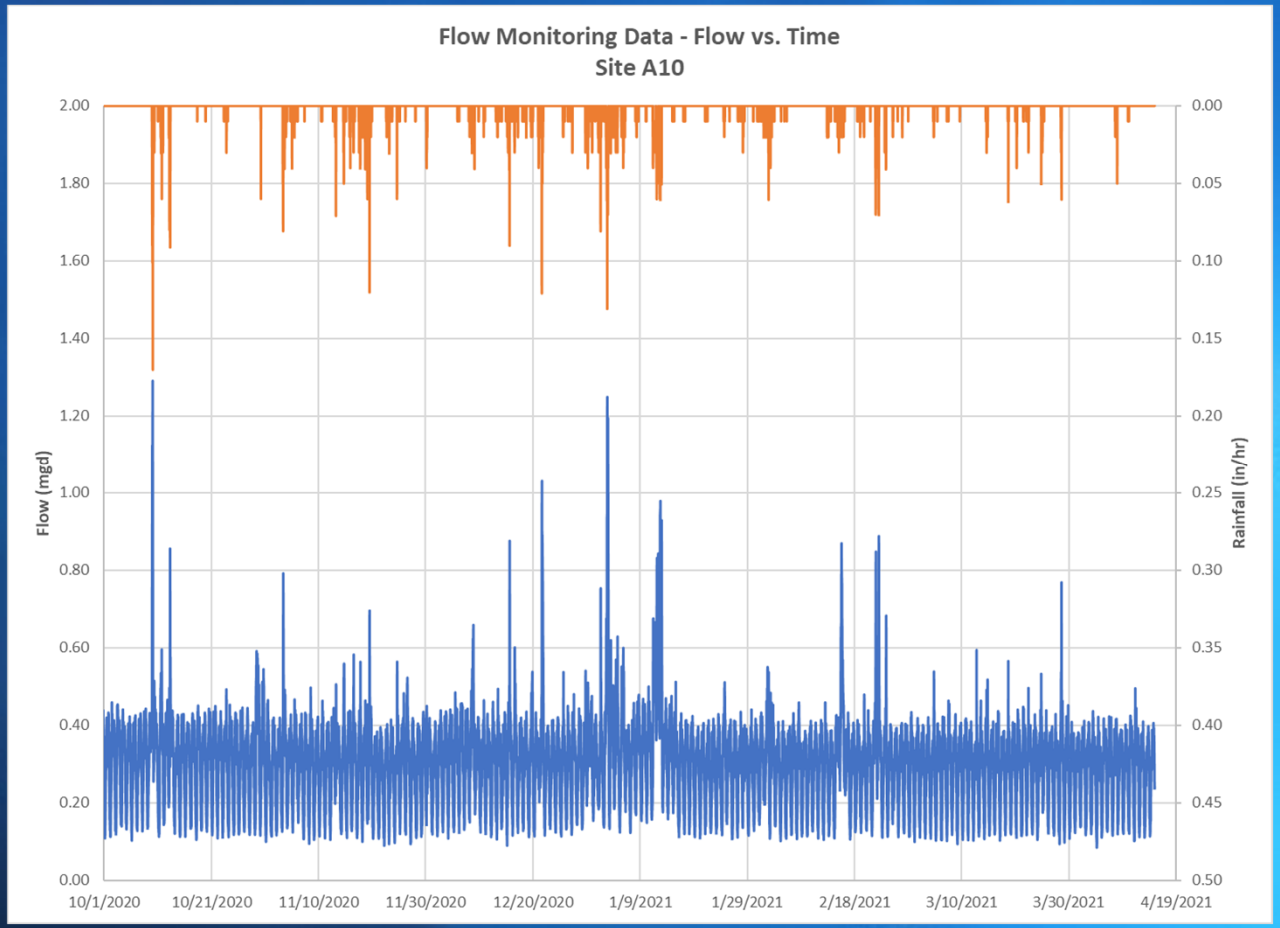


Meter AUB_A9e Scattergraph

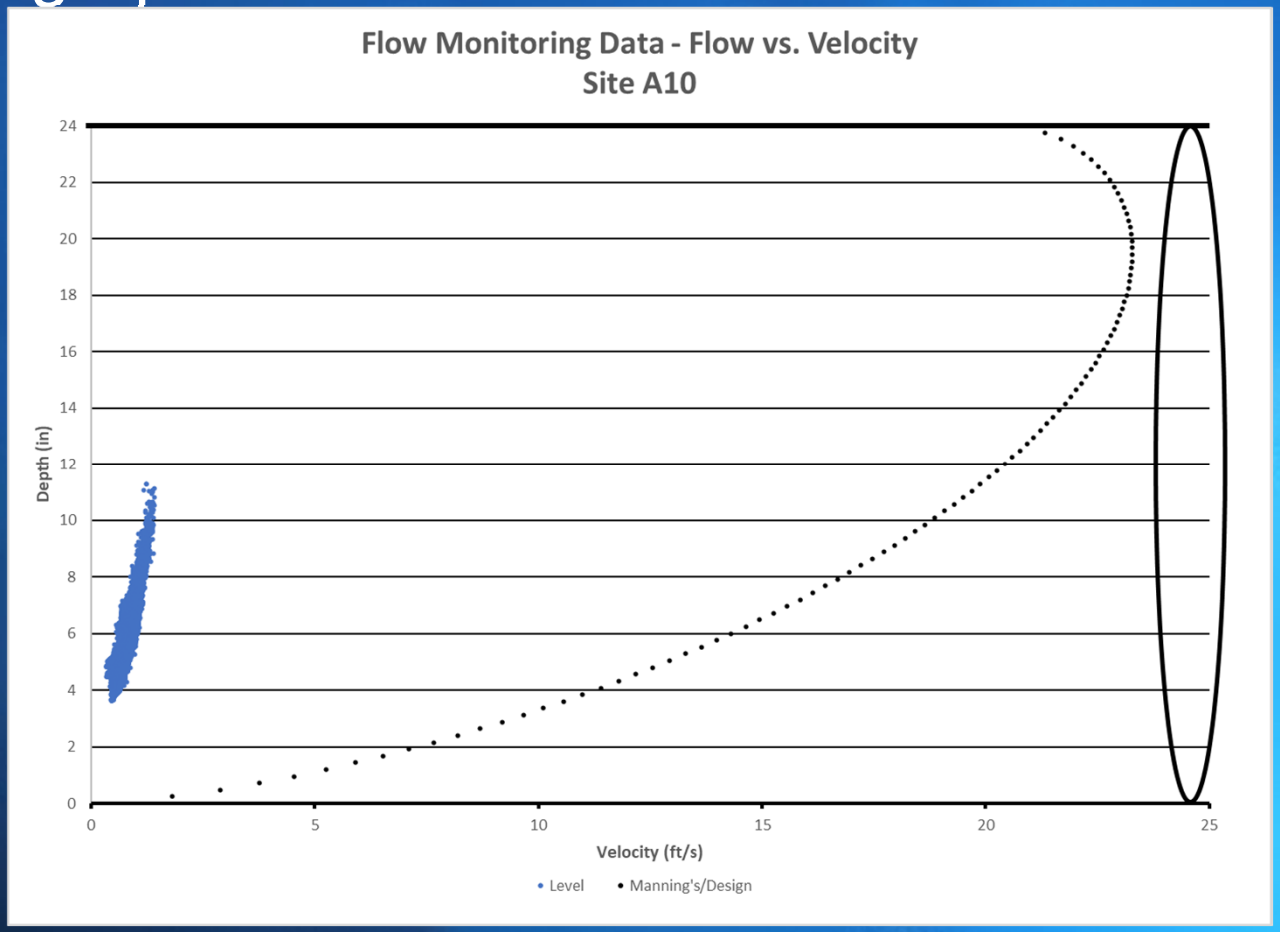


Meter AUB_A10

Flow vs Rainfall

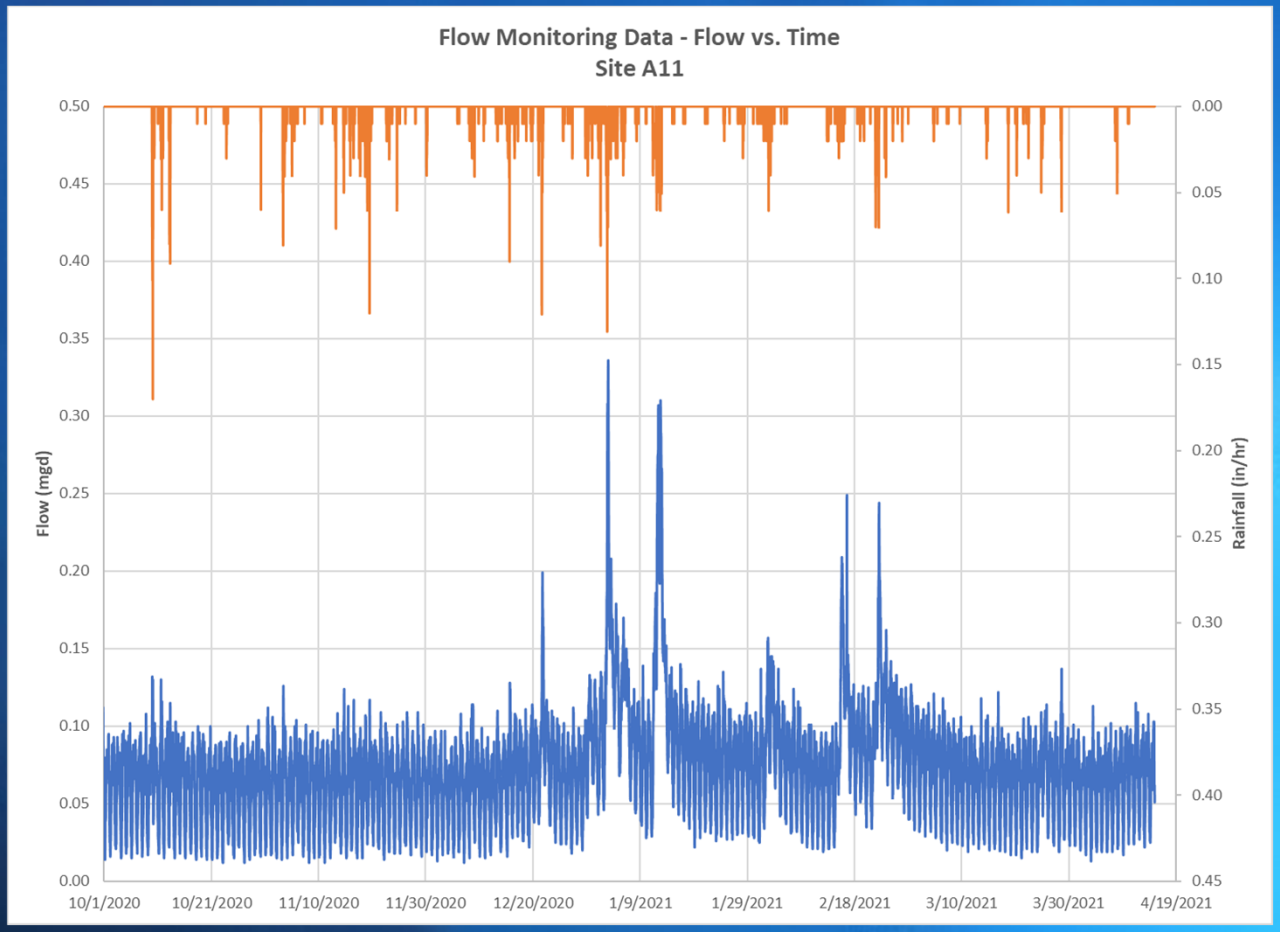


Meter AUB_A10
Scattergraph

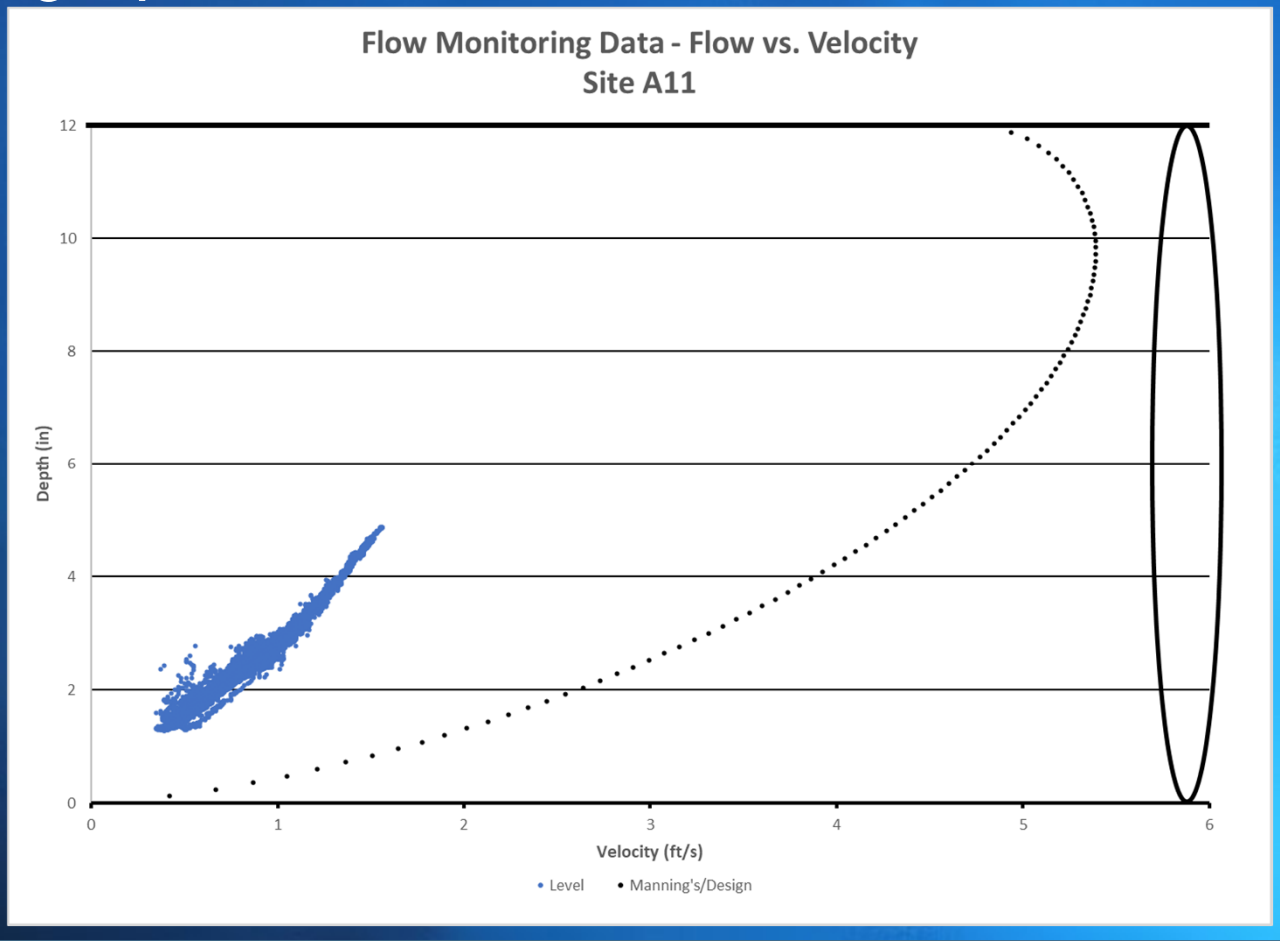


Meter AUB_A11

Flow vs Rainfall

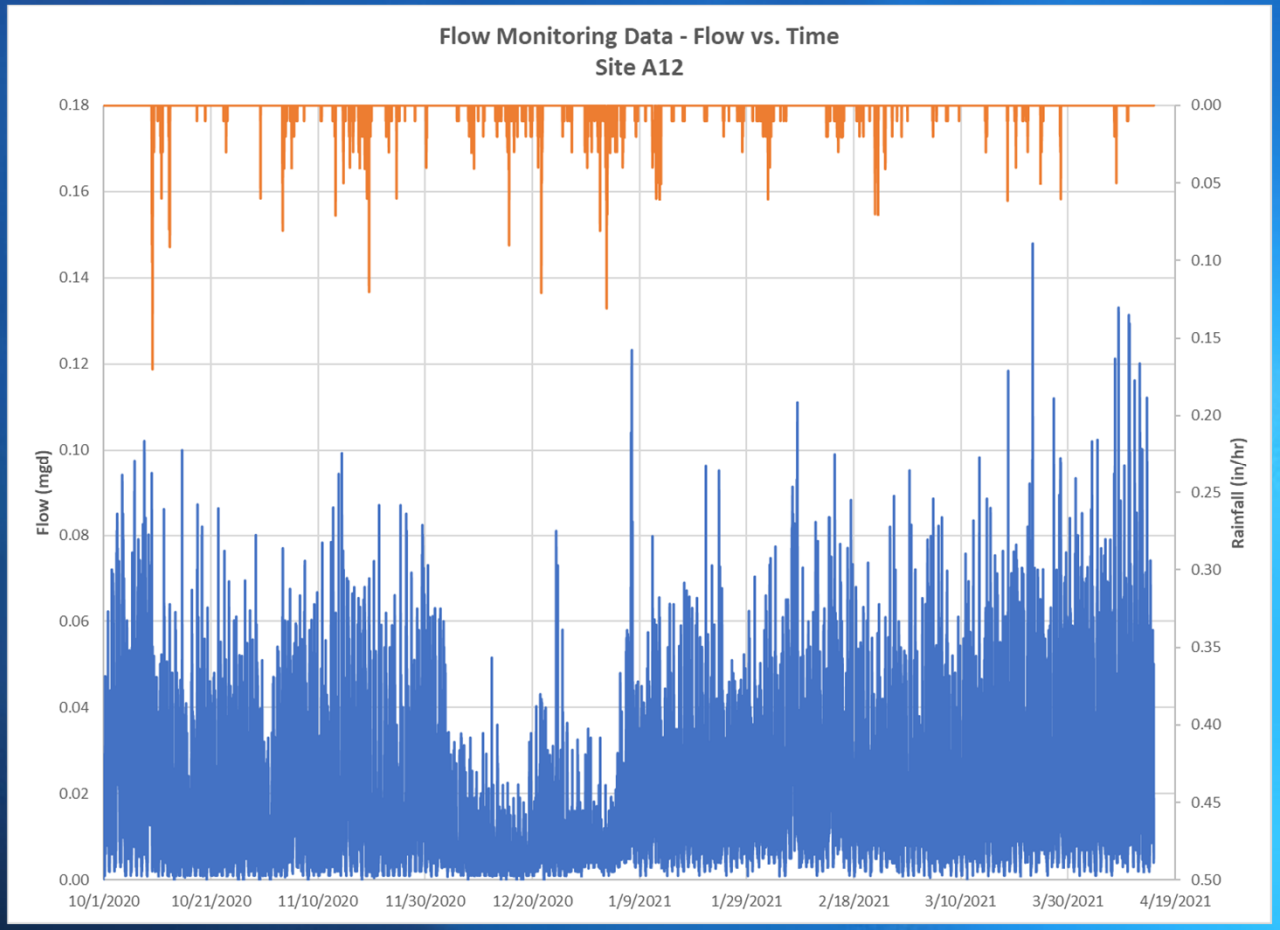


Meter AUB_A11
Scattergraph

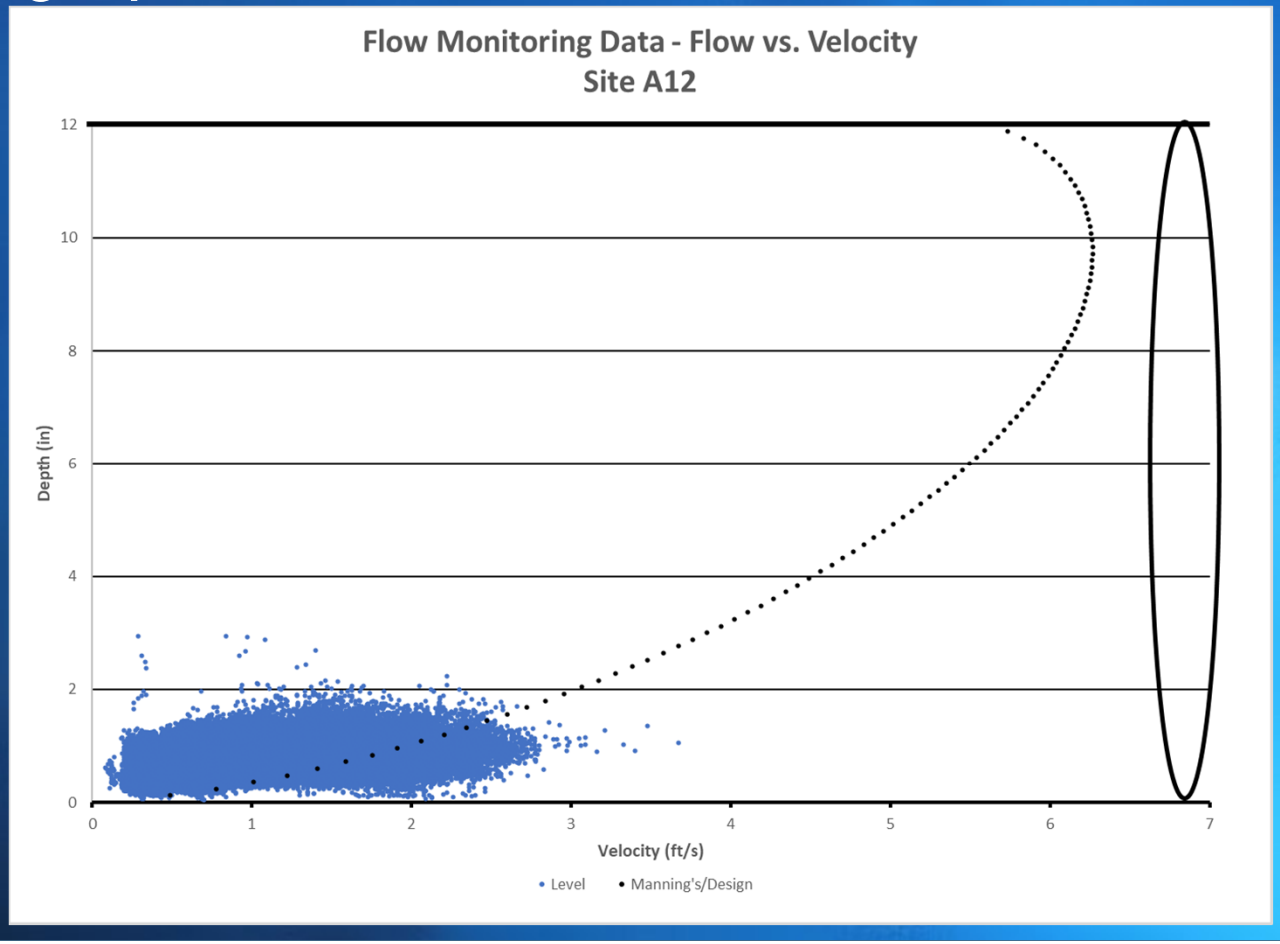


Meter AUB_A12

Flow vs Rainfall

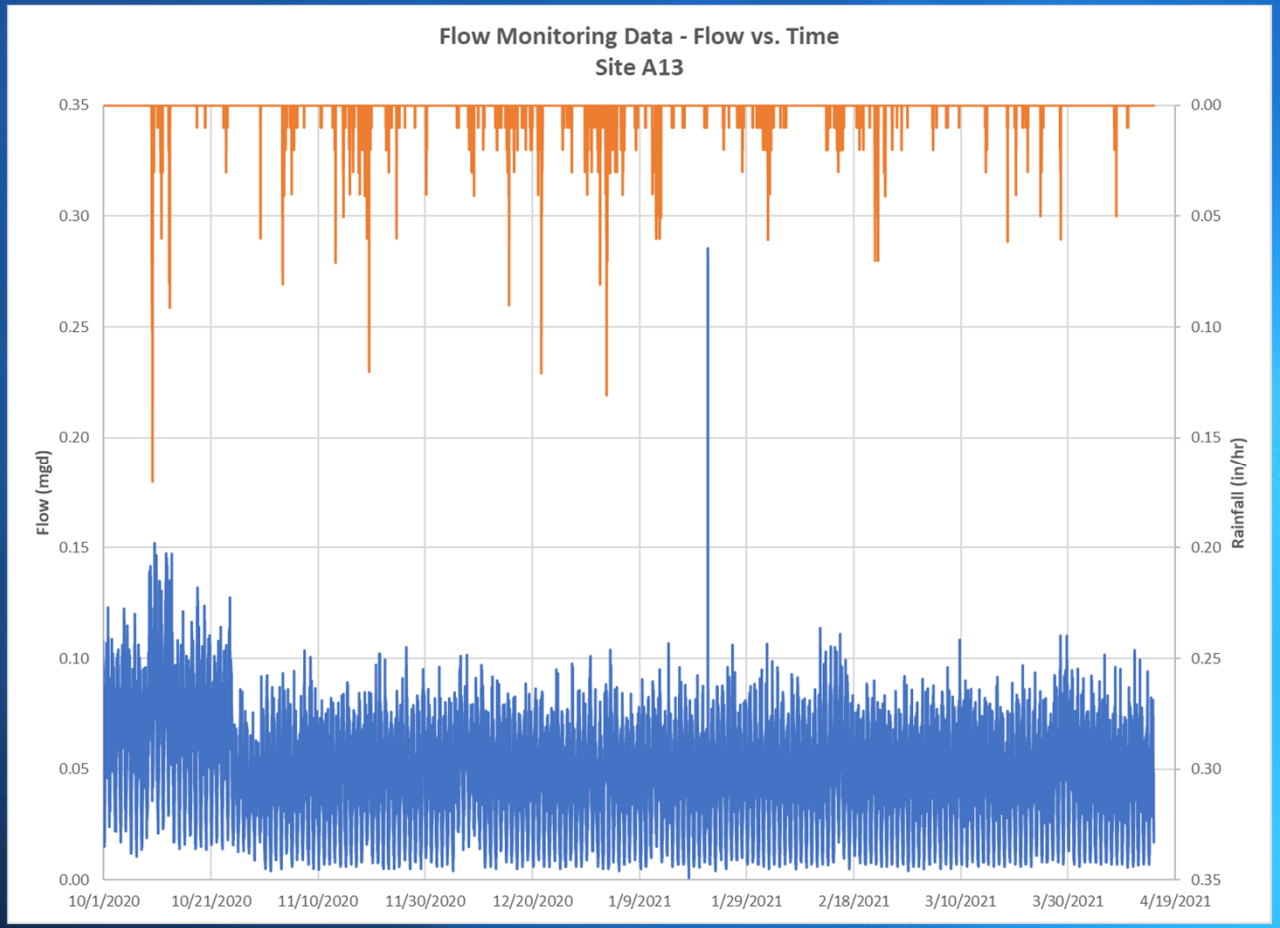


Meter AUB_A12
Scattergraph

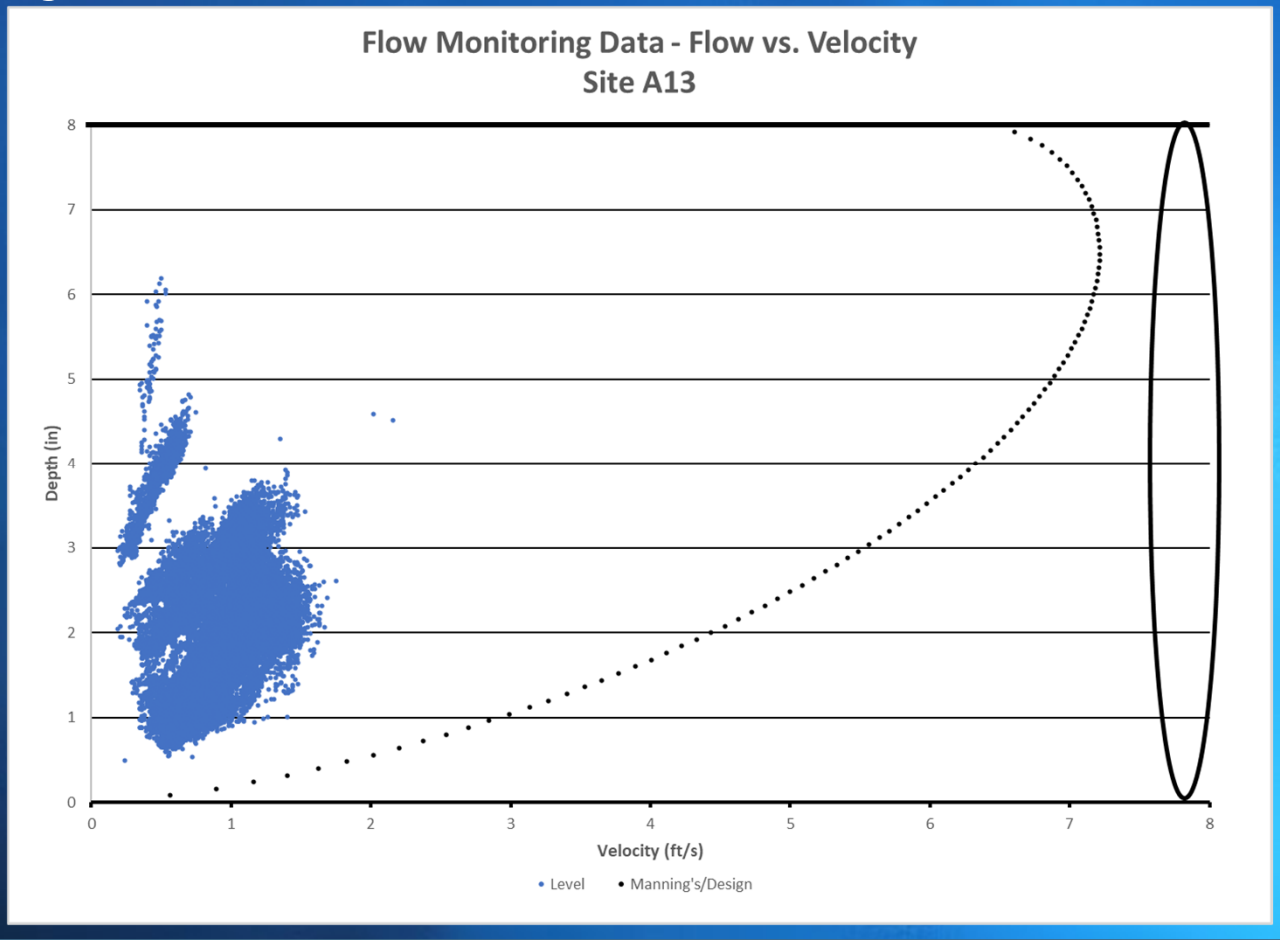


Meter AUB_A13

Flow vs Rainfall

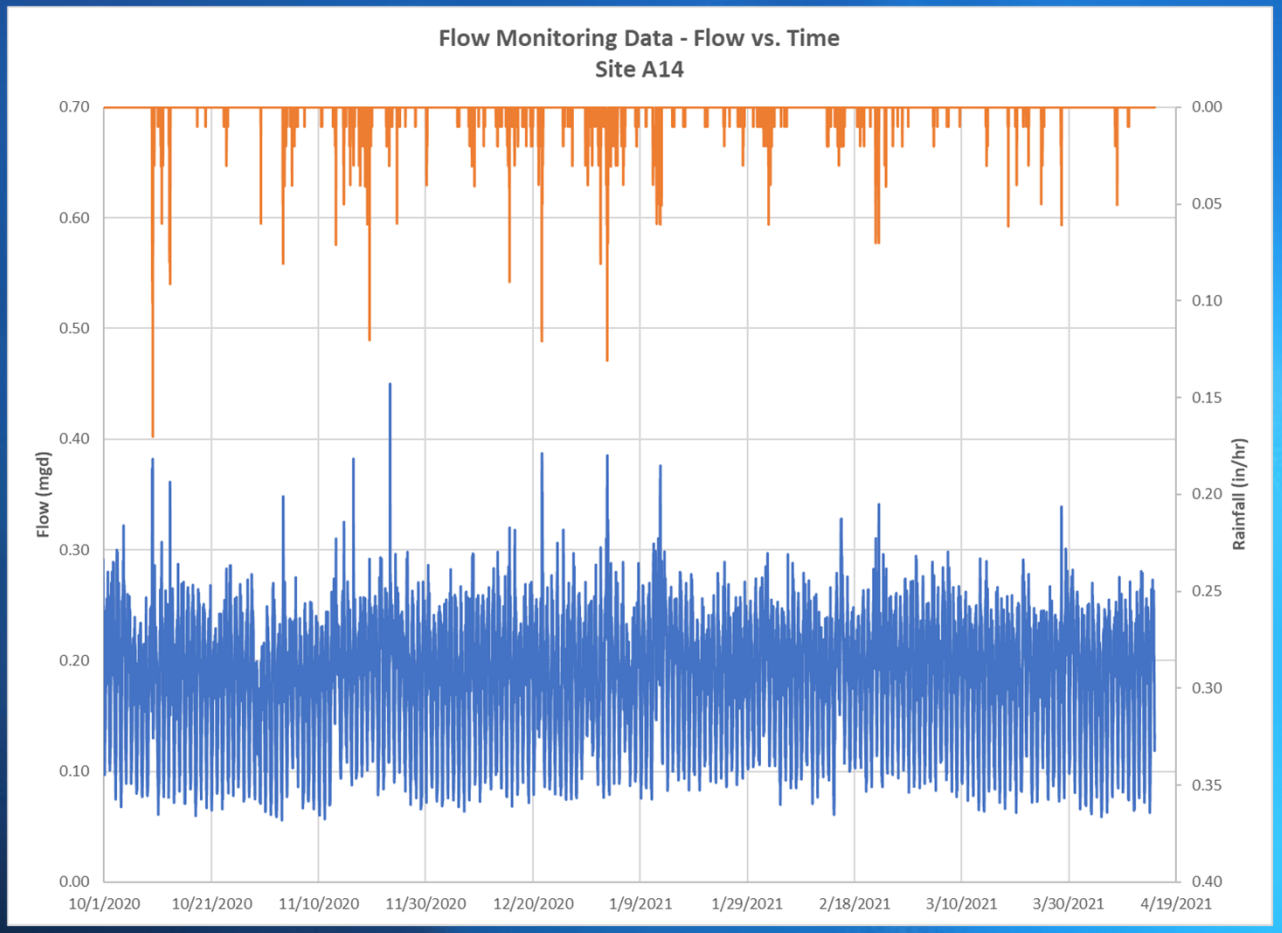


Meter AUB_A13
Scattergraph

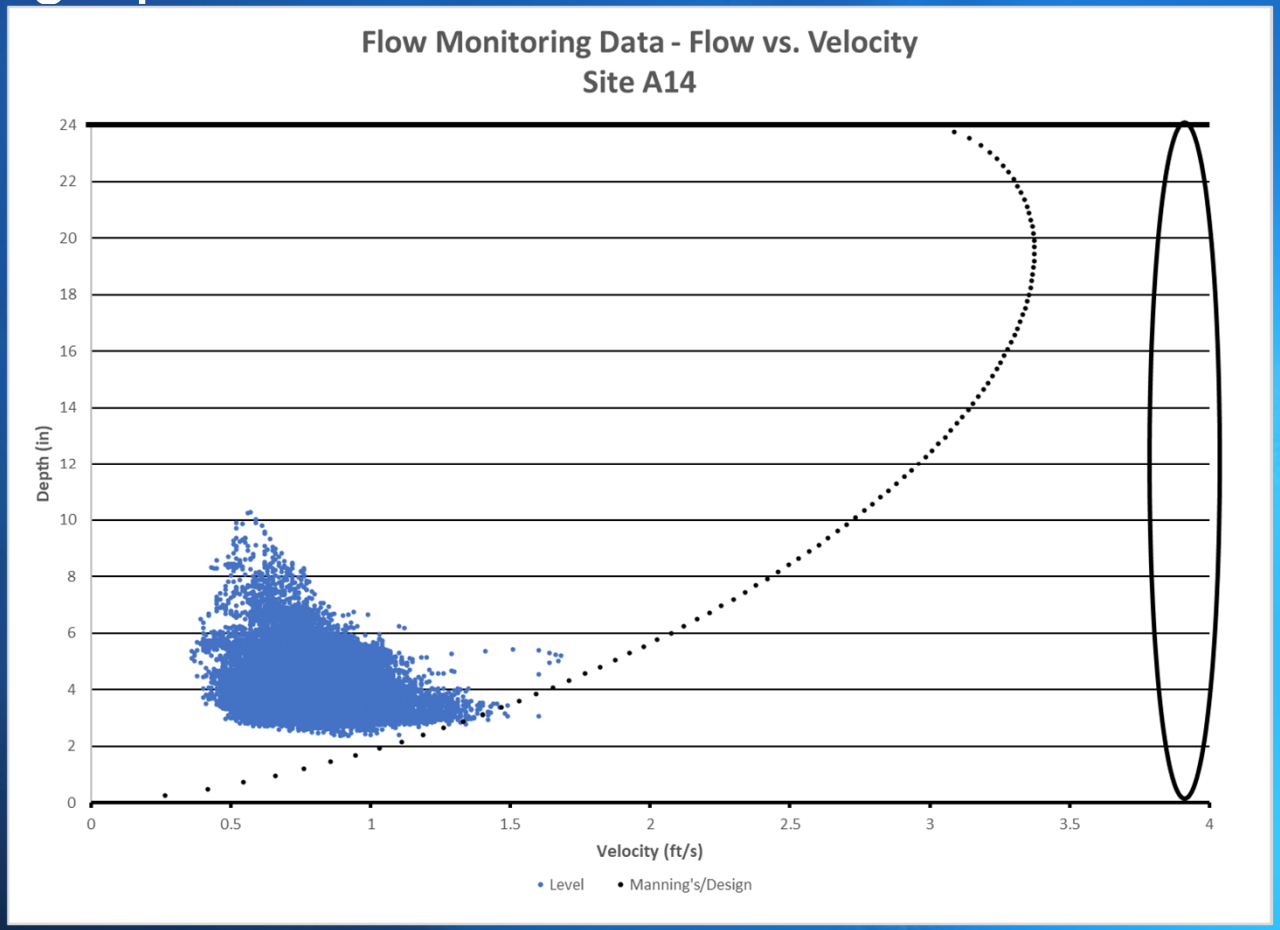


Meter AUB_A14

Flow vs Rainfall

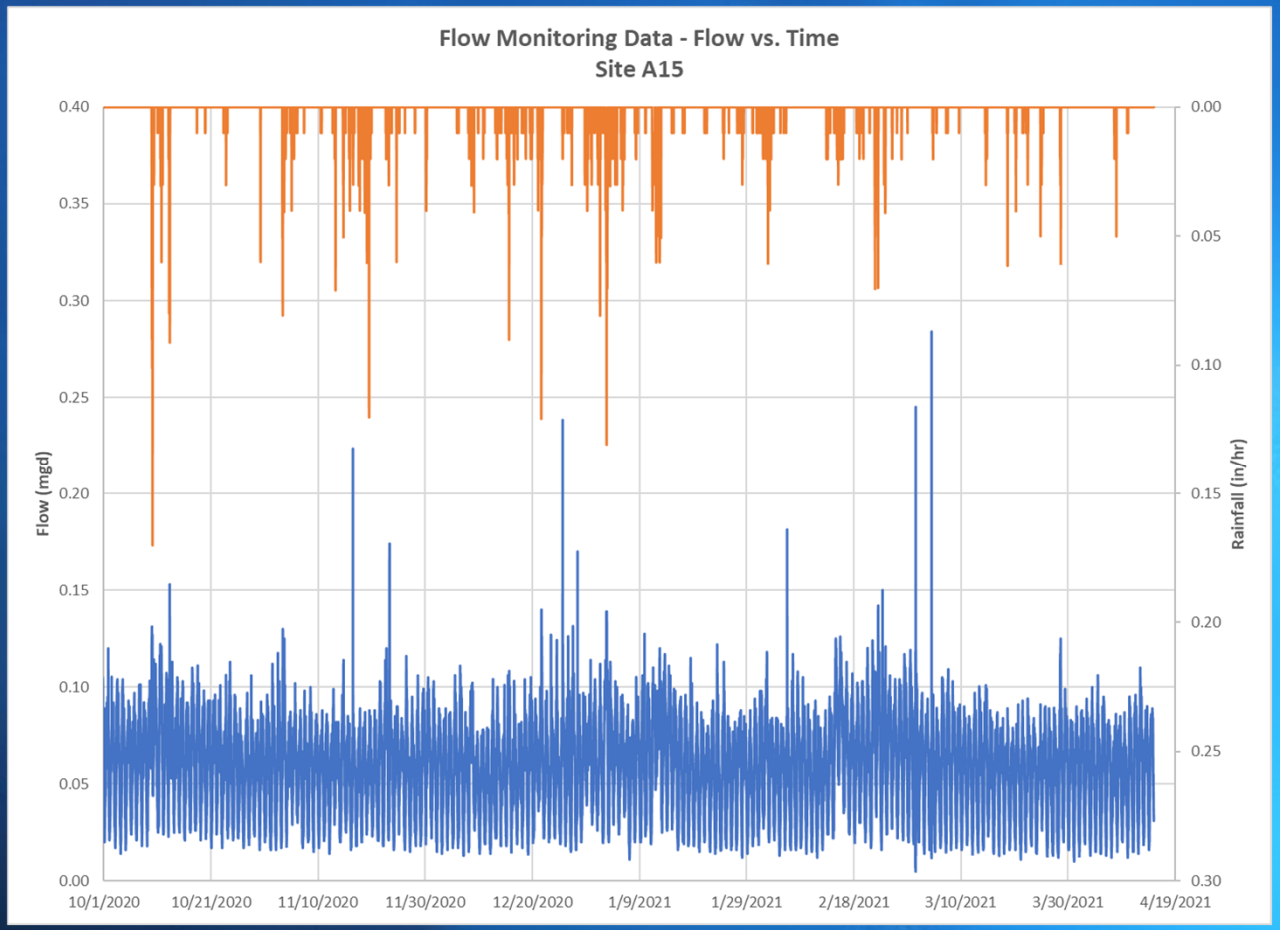


Meter AUB_A14
Scattergraph

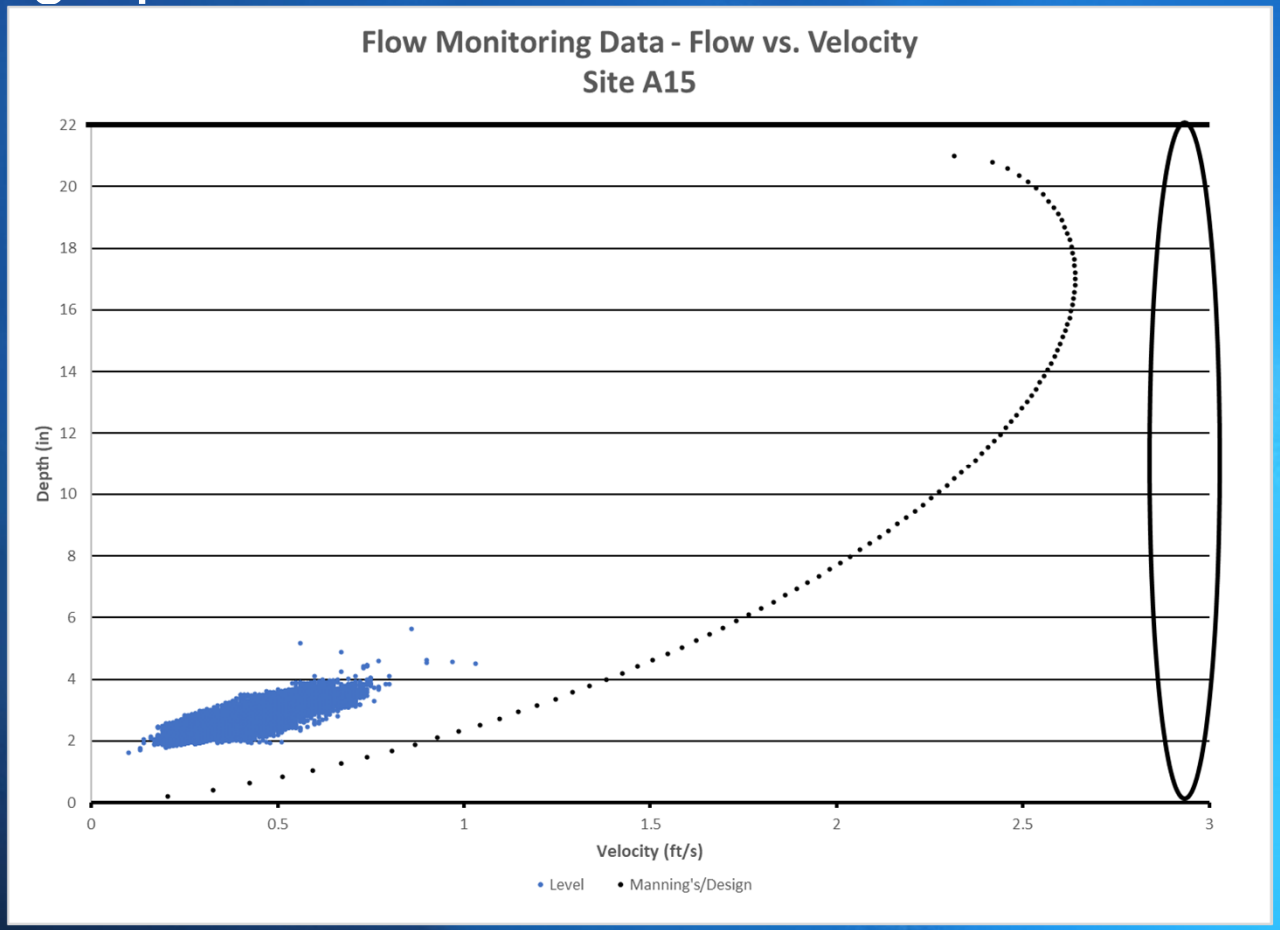


Meter AUB_A15

Flow vs Rainfall

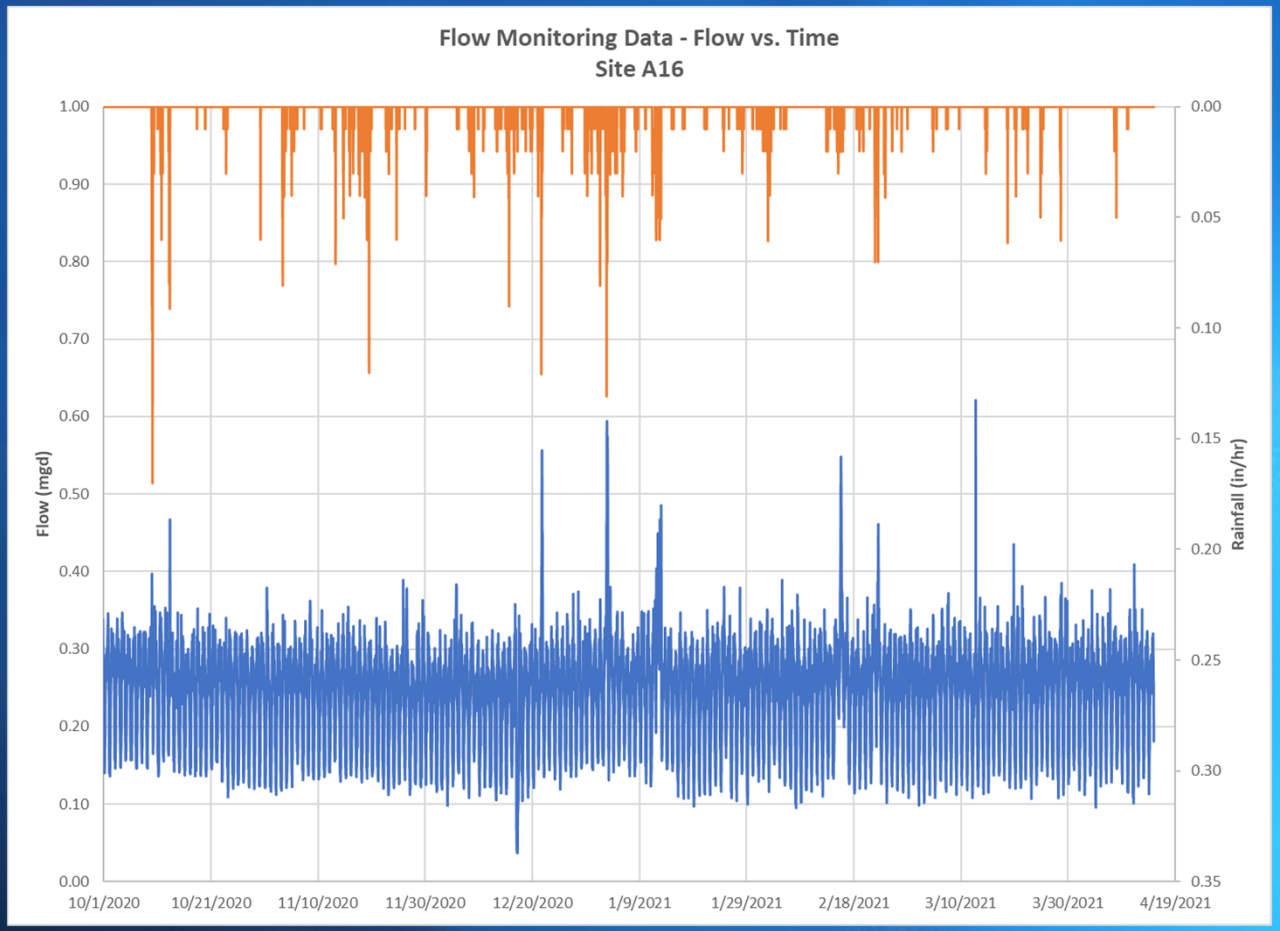


Meter AUB_A15
Scattergraph

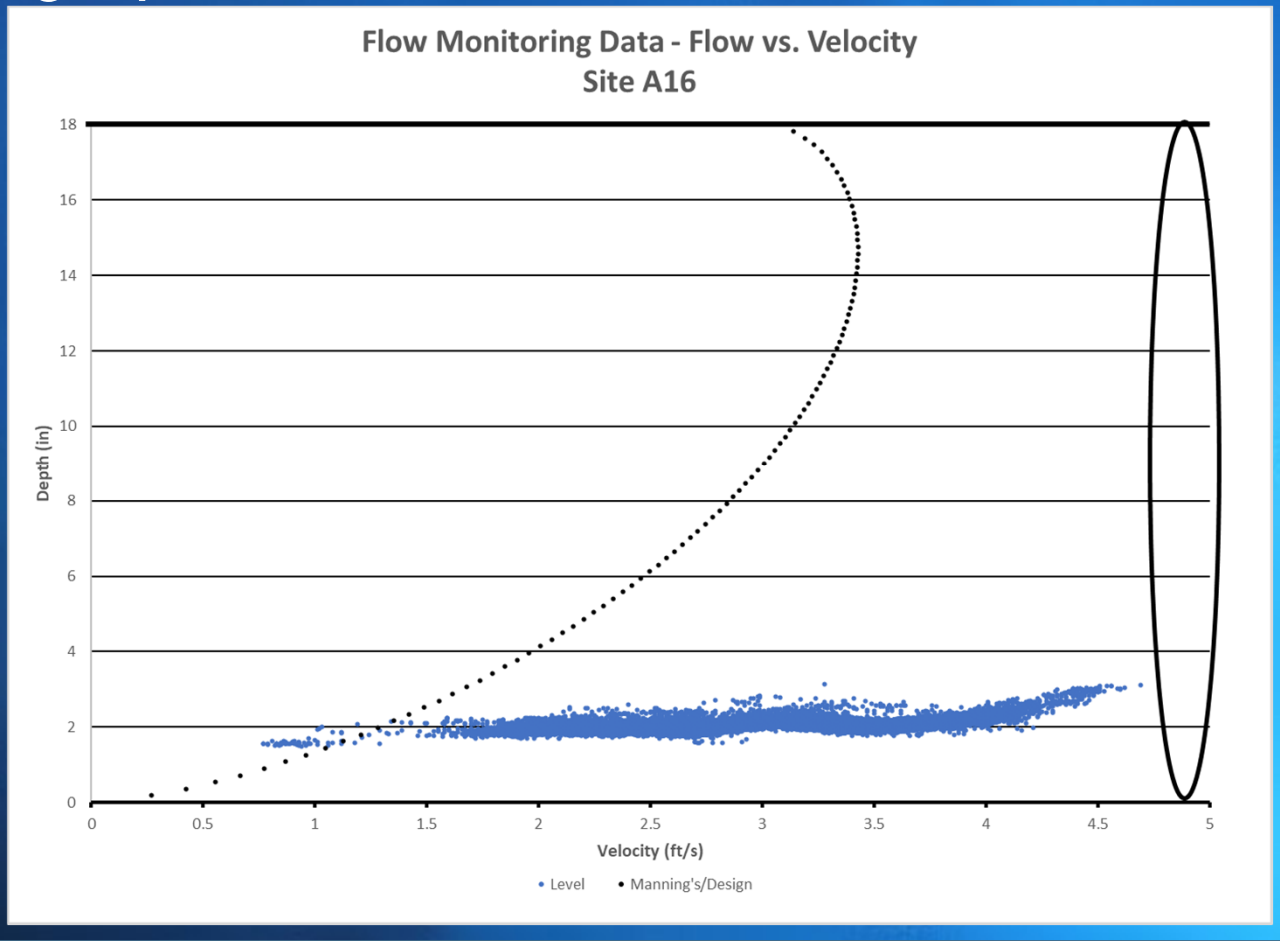


Meter AUB_A16

Flow vs Rainfall

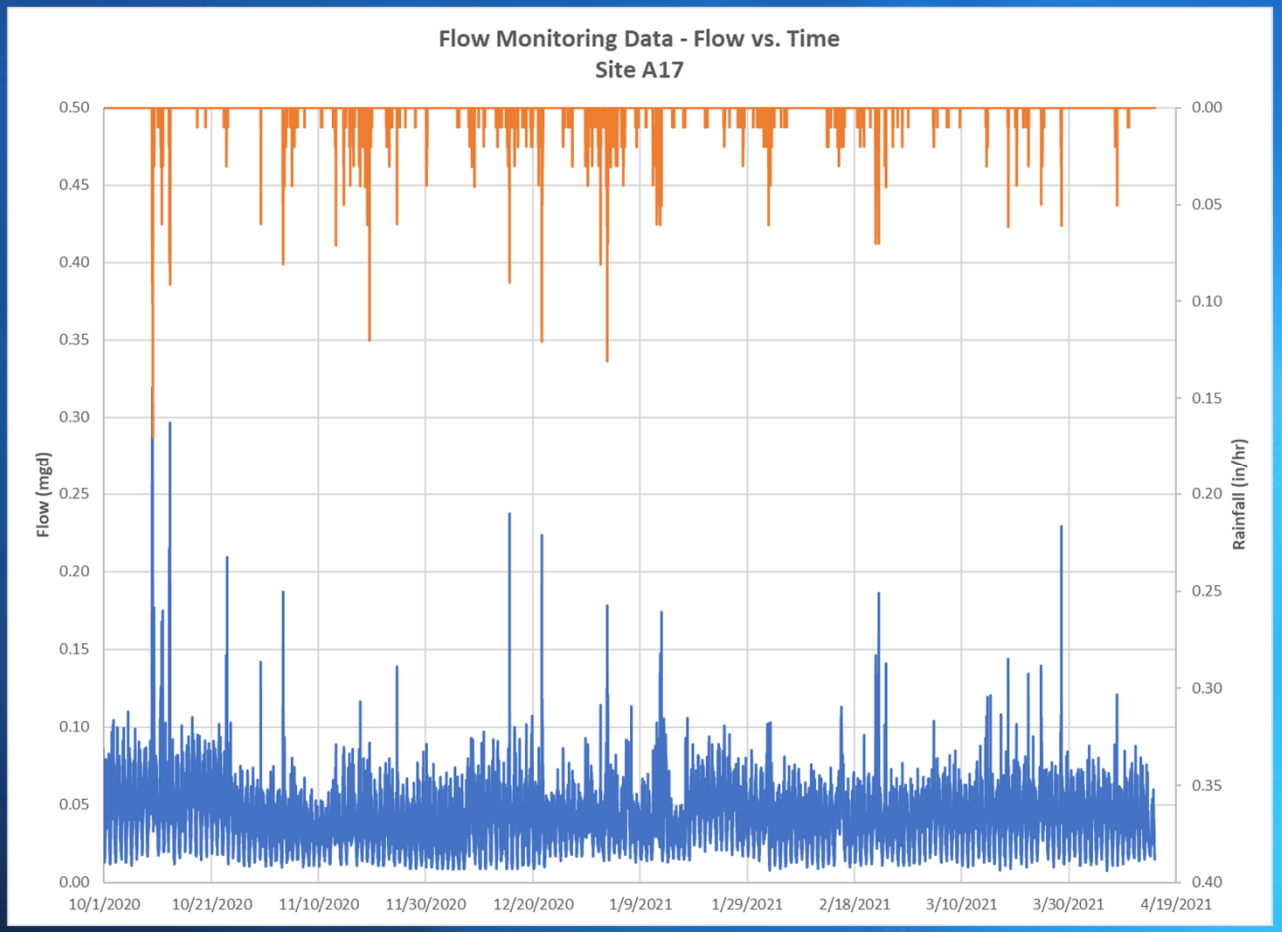


Meter AUB_A16
Scattergraph

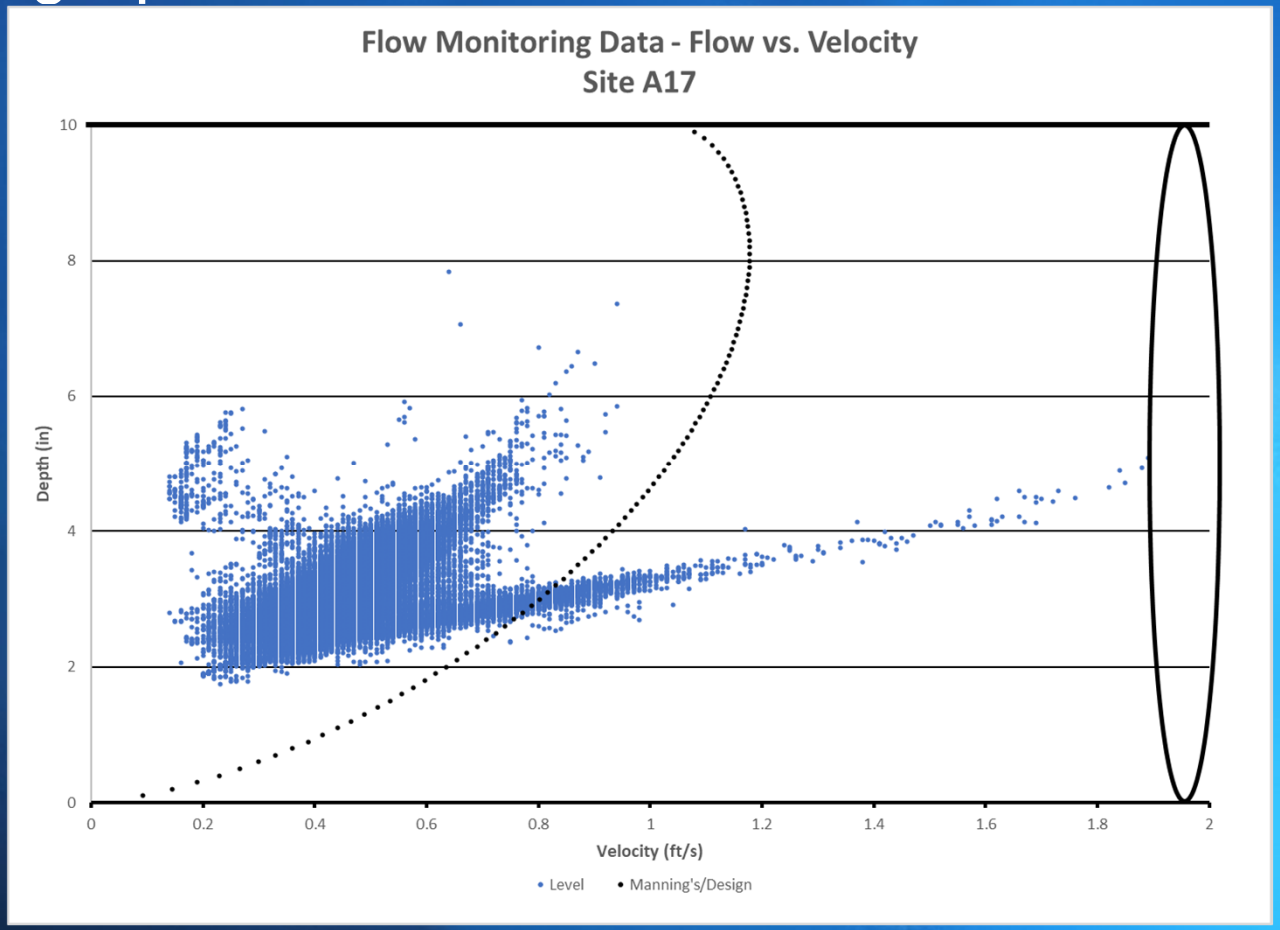


Meter AUB_A17

Flow vs Rainfall

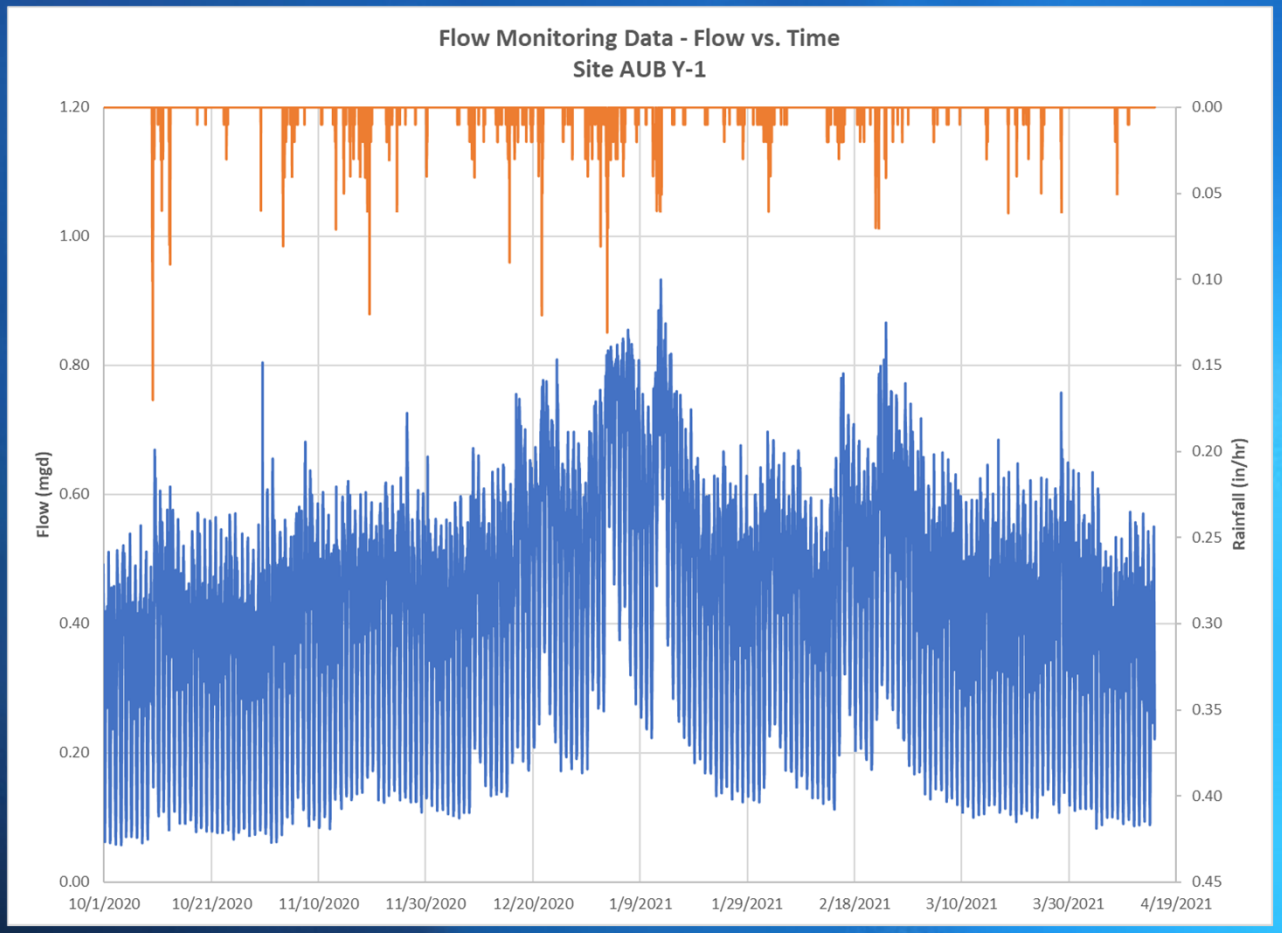


Meter AUB_A17
Scattergraph

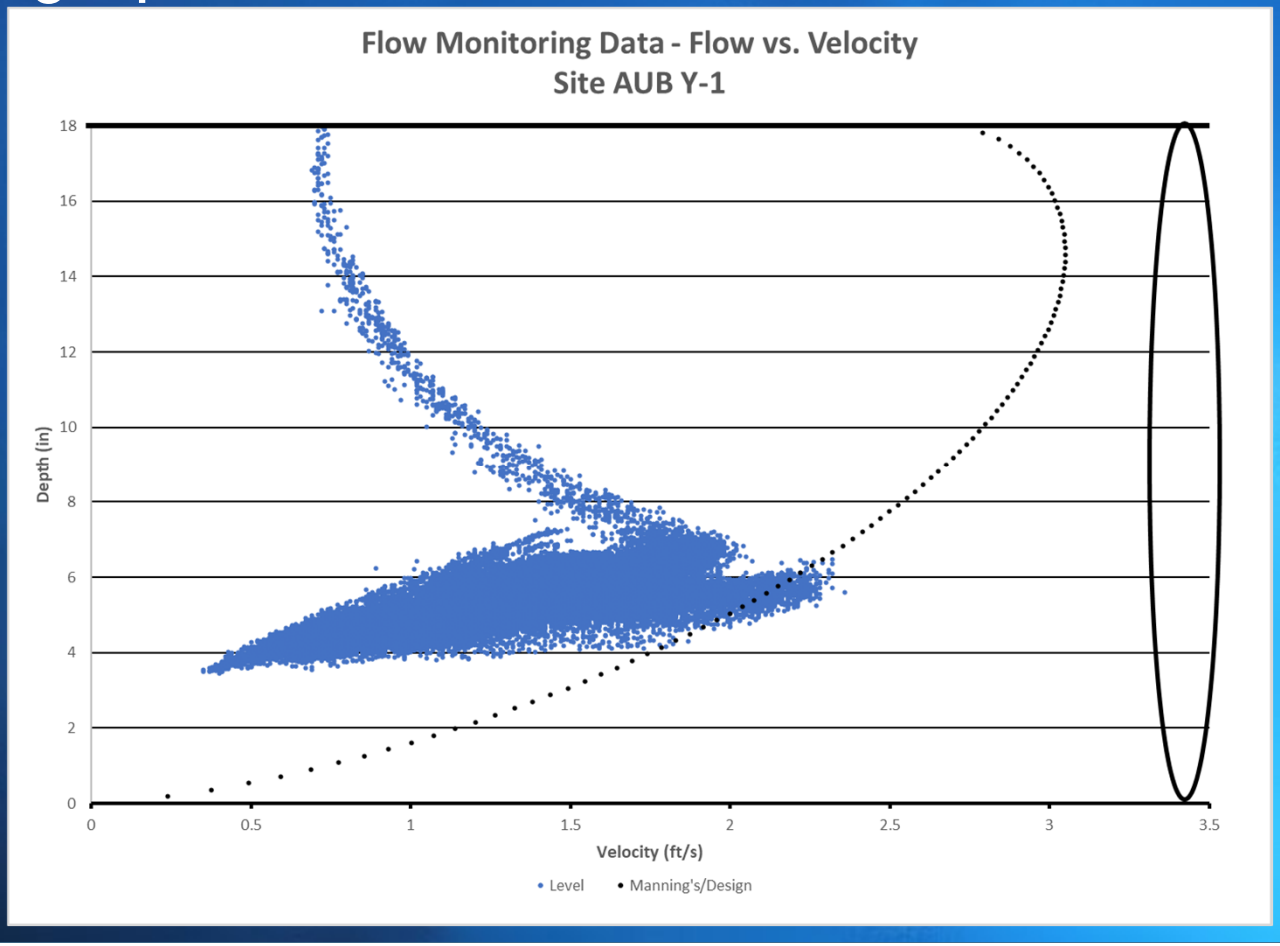


Meter AUB_Y-1

Flow vs Rainfall

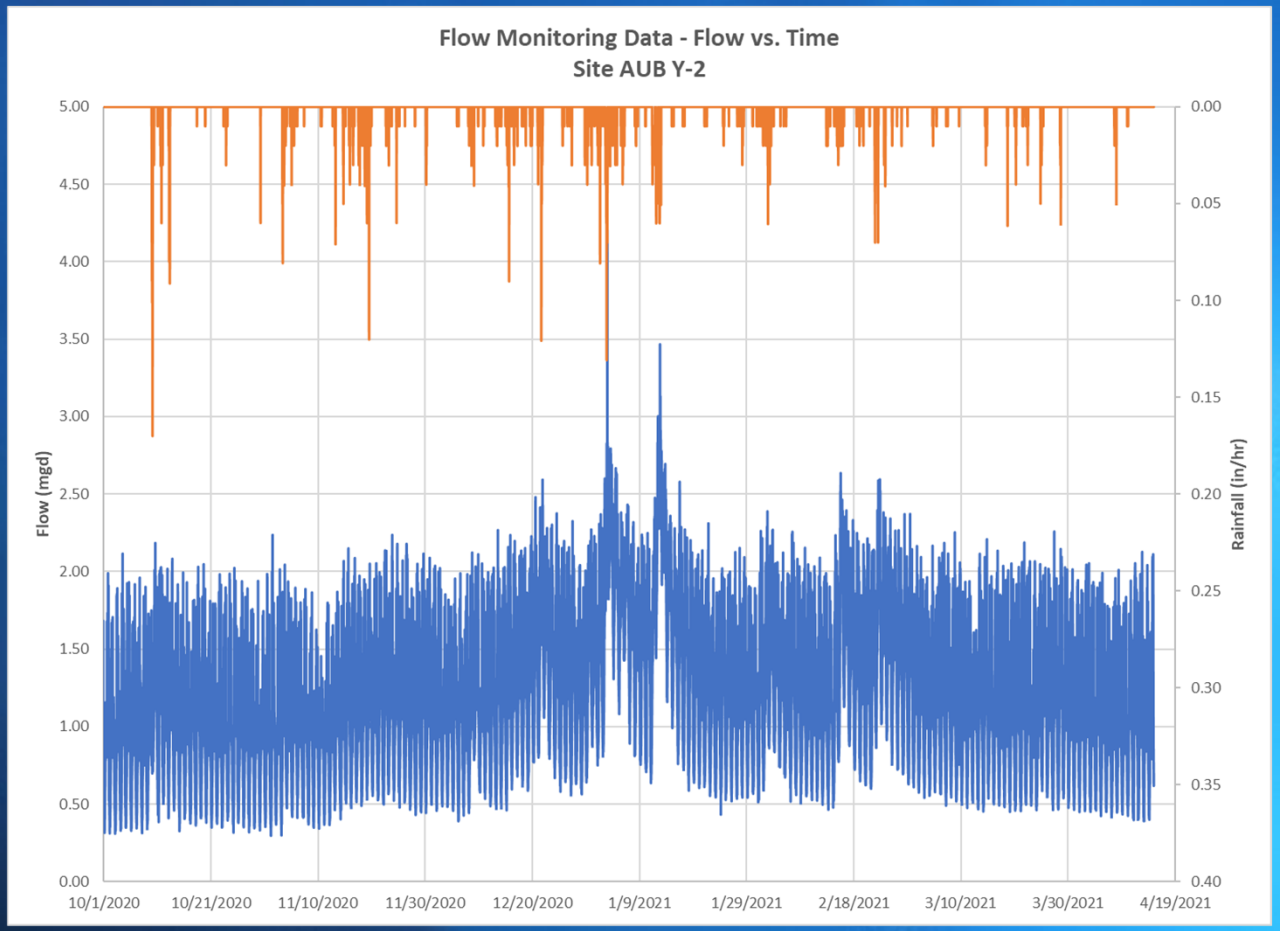


Meter AUB_Y-1
Scattergraph

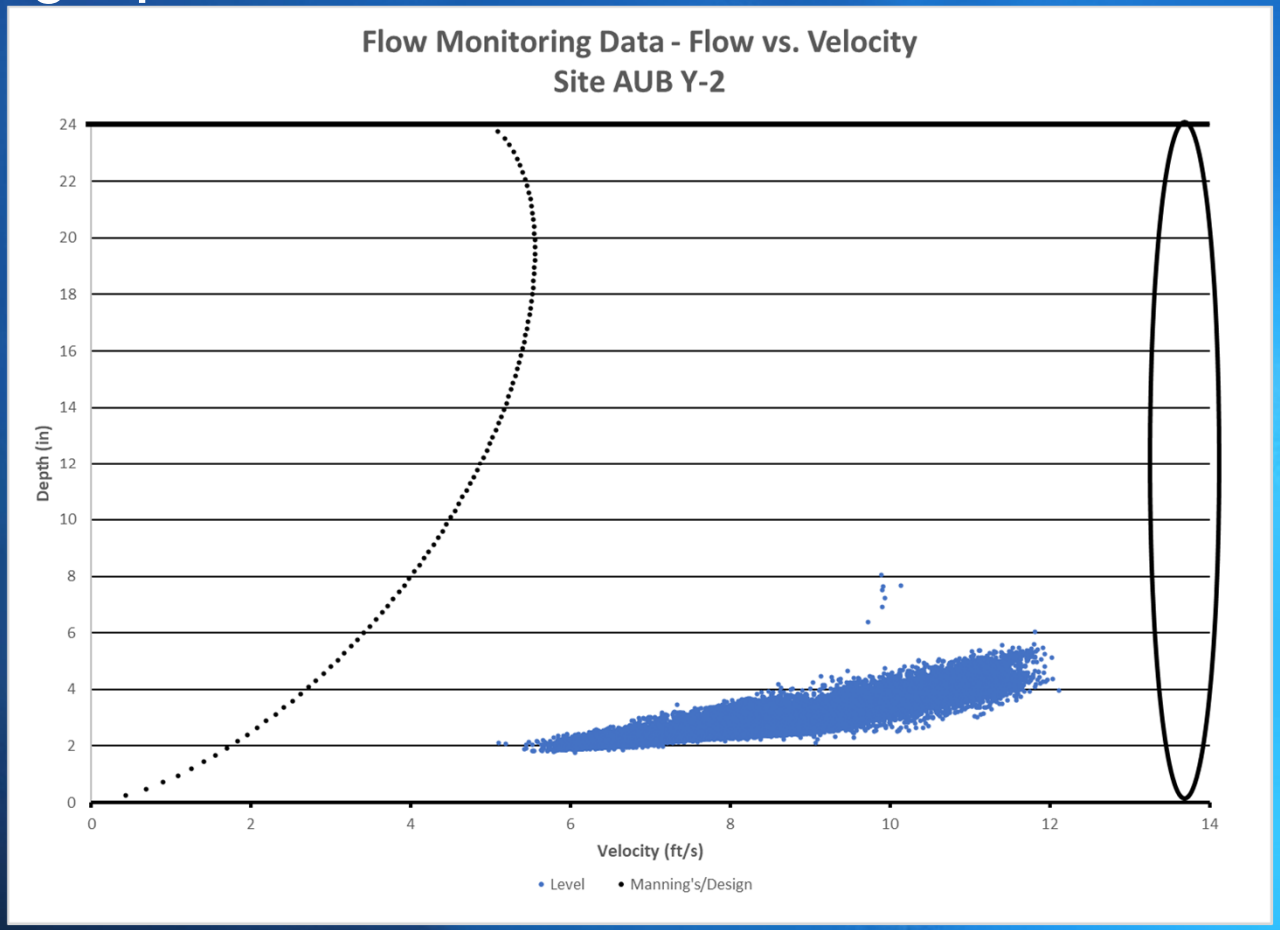


Meter AUB_Y-2

Flow vs Rainfall

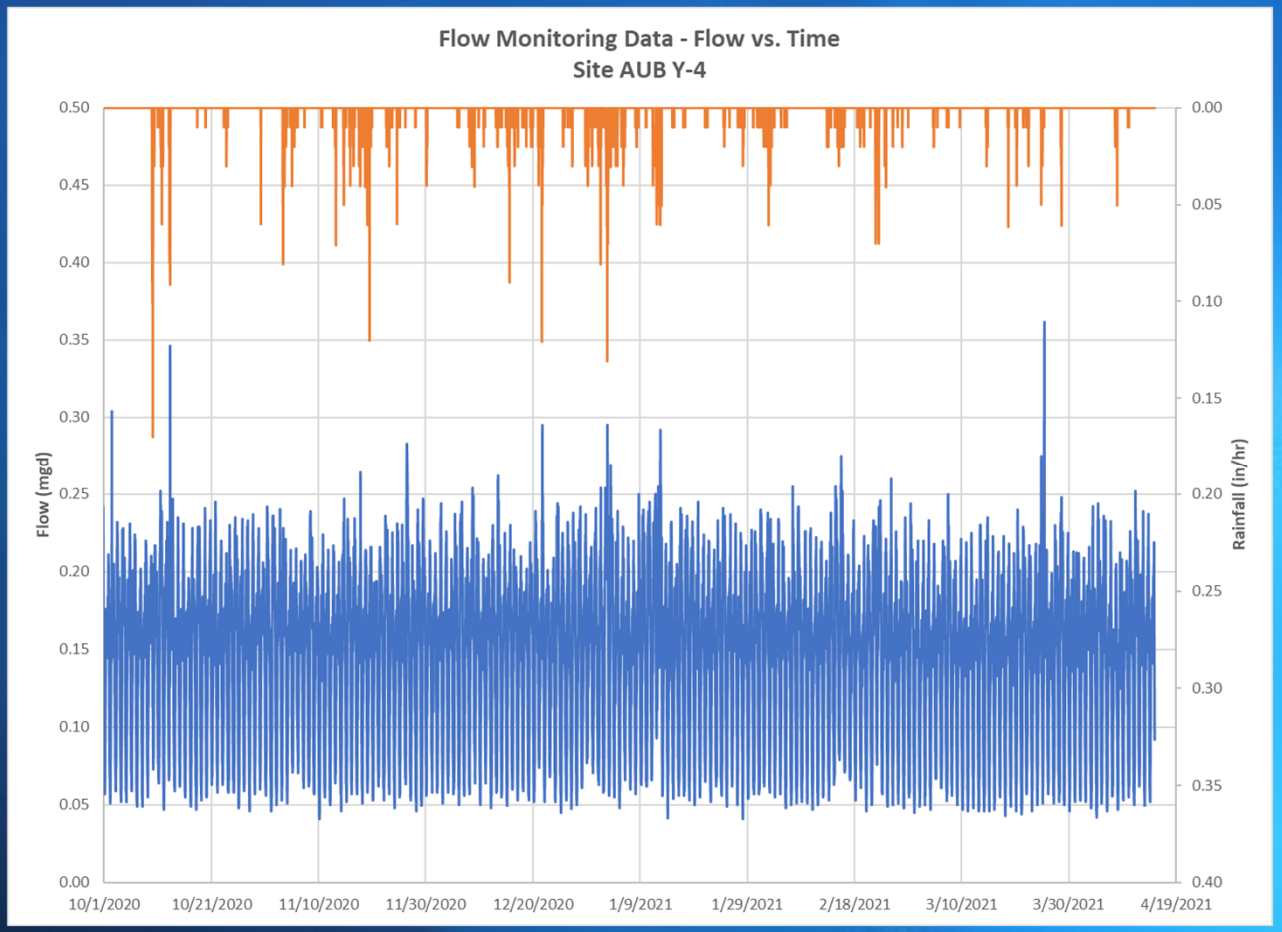


Meter AUB_Y-2
Scattergraph

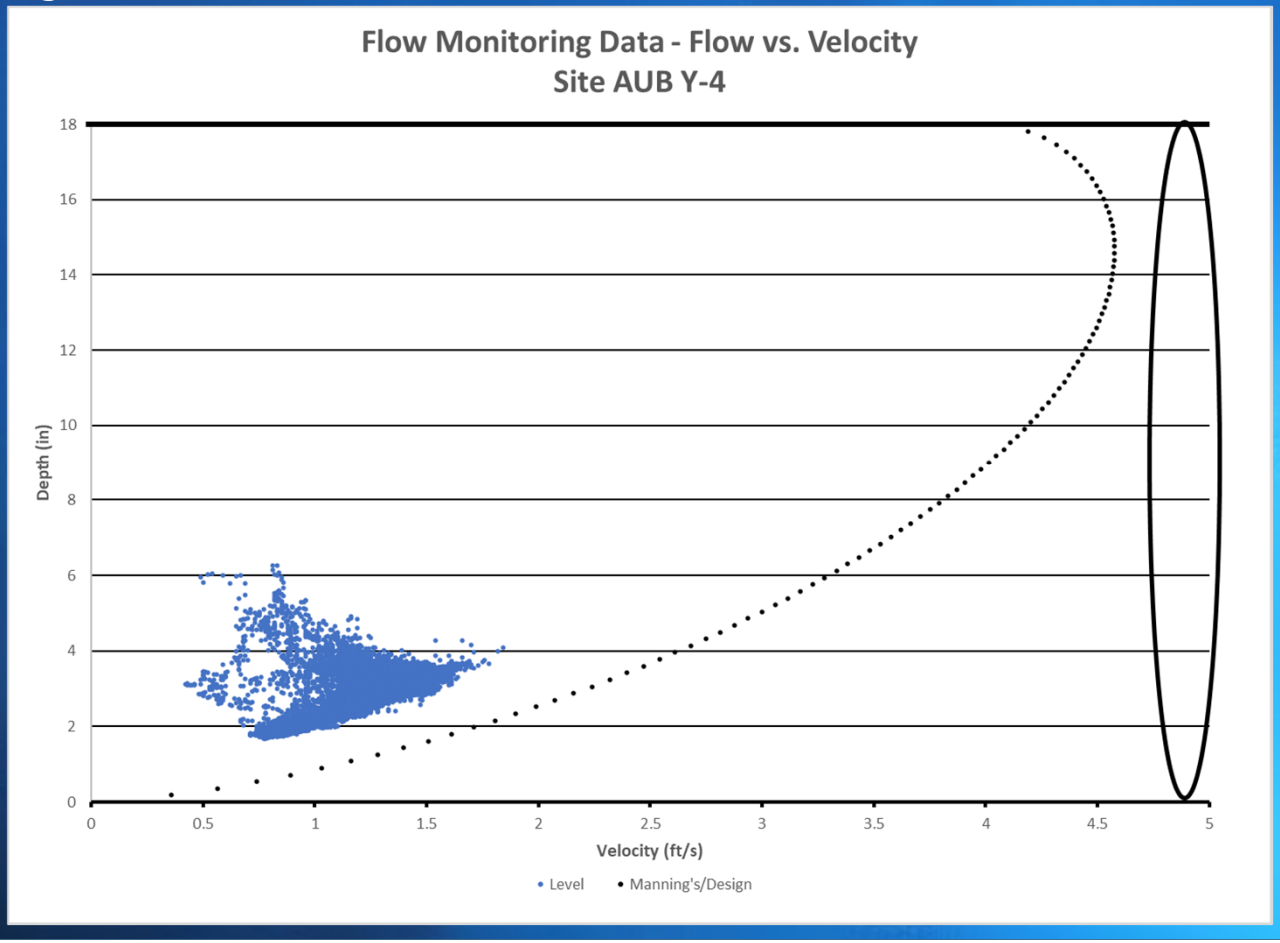


Meter AUB_Y-4

Flow vs Rainfall



Meter AUB_Y-4
Scattergraph



ATTACHMENT 1C

LAND USE ELEMENTS OF COMPREHENSIVE PLAN

LAND USE ELEMENT





LAND USE ELEMENT

TABLE OF CONTENTS

Vision LU-1

Conditions and Trends LU-1

Introduction LU-1

Residential Land Use Designations LU-2

Commercial Land Use Designations LU-6

Industrial Land Use Designations LU-10

Public and Institutional Land Use Designations LU-12

Overlays, Urban Growth Area, and Special Planning Land Use Designations LU-15

MAPS

Map 1.1 – Comprehensive Plan Land Use Map LU-29

Map 1.2 – Districts Map LU-30

Map 1.3 – Designated Areas LU-31

Map 1.4 – Adopted Areas LU-32

Map 1.5 – Impression Corridors LU-33

Map 1.6 – Gateways Map LU-34

VOLUME 1
LAND USE ELEMENT

Vision

The Auburn community is both physically and socially connected. We take pride in the quality of our built environment as well as the beauty and function of our natural environment. Land use patterns are supported by a complete and efficient transportation and utility infrastructure system. Neighborhoods, commercial centers, and parks are attractive, interesting, accessible, and well maintained. Natural riverine and forested corridors are interspersed throughout the city, offering sanctuaries where fish and wildlife reside, and providing opportunities for people to observe and learn about the environment. Residents have a strong association with their neighborhoods, and are engaged and involved in the decisions that steer Auburn into the future.

Conditions and Trends

Dispersed Land Use Pattern

For the first 100 years of Auburn's existence, the land use pattern developed in a relatively logical manner. Auburn was fully contained to the valley floor with a traditional downtown urban center, several north/south heavy commercial and industrial corridors paralleling Highway 167, and a surrounding housing stock that was built primarily between 1910 and 1960. In the last 30 years, the land use pattern of Auburn has changed, primarily from incorporation of areas to the south, east, and west. Each newly incorporated area has its own identity and land use pattern.

Disconnected Communities

Because a significant portion of today's Auburn was settled prior to incorporation, the basic land use patterns and infrastructure have already been established. Furthermore, much of today's Auburn land use pattern was established in either Auburn, the Muckleshoot Reservation, or prior to incorporation in King County or Pierce County. Given the mix of jurisdictional oversight, myriad land use policies, regulations, infrastructure standards, and investments have been applied in these areas. This has resulted in a relatively uncoordinated and random land use pattern. It also means that the various communities lack connectivity to each other, have a mix of identities, and are experiencing a change in their character from rural to more urban.

Robust Diversity of Land Use

Auburn has a strong mix of housing and industry. Auburn's residential land use pattern includes a variety of densities, ages, and housing type. Auburn's nonresidential land use pattern includes a mix of local and regional retail, entertainment, services, manufacturing, warehousing, and distribution centers. This mix of land use is a strength because it exemplifies social, economic, and cultural diversity.

Diversity in Natural Resources

Auburn's natural resources include the Green River and its tributaries, the White River and its tributaries, a robust inventory of wetlands, floodplains, steep slopes, and mature open spaces. With a strong base to work from, the City and its partners can be strategic about how to better connect and preserve natural areas so that the overall system is enhanced for future generations to enjoy.

Introduction

All land within the City of Auburn is assigned a land use designation, which builds off the past Comprehensive Plan Map, the existing land use

pattern, previously approved subarea plans, topography, natural features, and targeted goals for shifting the character of specified areas. This chapter provides a description for each designation, general criteria for how to assign the designation, and a series of policies that govern land use within each designation. The Comprehensive Plan Land Use Map contained in the Core Comprehensive Plan shows the location and boundaries for each designation. This map should be consulted together with the written policies of this Plan when decisions about zoning designations, land use activities, and development of public infrastructure are considered.

This Section of the document also explains the reasoning and intention behind the Plan Map's land use designations. This should be useful in:

- developing and implementing tools (such as zoning provisions)
- interpreting the Plan Map as it applies to specific regulatory decisions or development proposals
- adjusting or amending the Plan Map when changing conditions or land use markets warrant
- planning for public services and infrastructure

Finally, this chapter sets forth special policies intended to address the unique challenges and opportunities of specific locations within Auburn. These specific policies supplement the general goals, objectives and policies found elsewhere in this plan.

Residential Land Use Designations

Character Sketch

Residential uses will comprise a diverse arrangement of multiple densities. The pattern of one single density in a zone or neighborhood will evolve into increased and mixed densities in exchange for amenities that enhance quality of life. There will be greater connectivity and stronger spatial relationships between neighborhoods through strategic locations of roadway, trail, park, and neighborhood-serving businesses. These amenities will help create localized identity while also linking one area to another. The design and build quality of new construction and infill will be held to a high standard. The City will encourage projects to be unique, innovative, and provide the residents of Auburn true choice.

Values

Character: Residential neighborhoods will include amenities, features, and layouts that promote interaction amongst residents.

Wellness: The design of residential neighborhoods will emphasize safety and nonmotorized connectivity.

Service: Through outreach and engagement, individual residents and homeowners' associations are connected to and aware of municipal services, events, and activities.

Economy: Neighborhoods have a physical and personal connection to Auburn's commercial centers and attractions. People want to move to Auburn because of the commercial and recreational opportunities it has to offer.

Celebration: Districts and neighborhoods are identified, promoted, and celebrated.

Environment: The built environment will fit into the natural landscape in a way that protects and respects ecosystem function and that preserves native vegetation and soils.

Sustainability: Natural resources, economic prosperity, and cultural vibrancy are balanced in a way that builds and maintains a thriving and long-lasting community.

General Policies

LU-1 Regulations for new developments and infill should address the following elements:

a. Connectivity by multiple means to adjacent subdivisions, nearby commercial hubs, and parks and recreation facilities.

b. Relationship to nearby existing or future transit service.

c. Usable community amenities and spaces.

d. Environmental protection and preservation of natural features.

e. Preservation of areas that can support low-impact development techniques.

f. Promote the use of energy and water conservation measures

g. Efficient and effective delivery of utility service.

h. Innovative design.

i. Crime prevention through environmental design.

j. Long-term maintenance considerations.

LU-2 As the market and availability of utilities enable denser development to occur, standards should be developed to maximize density while preserving open space and critical areas.

LU-3 Programs should be implemented to improve the quality of low-income neighborhoods and encourage rehabilitation of deteriorating structures and facilities.

LU-4 Public and institutional uses may be permitted as a conditional use if designed in a manner that enhances the residential character of the area. Special care shall be given to ensuring adequate parking, landscaping, and traffic circulation to avoid conflict with residential uses.

LU-5 New residential development should contribute to the creation, enhancement, and improvement of the transportation system, health and human services, emergency services, school system, and park system. This may be accomplished through the development of level-of-service standards, mitigation fees, impact fees, or construction contributions.

LU-6 Cluster development is the preferred form of residential development in all residential designations with the goal of preserving natural areas, critical areas, and areas that support low-impact development. Where clustering accomplishes these objectives, it should not come at the expense of lost development potential. Variances to lot size, lot dimensions, building height, and other bulk or dimensional standards should be utilized in order to create incentives that promote preservation.

Residential Conservancy Designation

Description

This designation should consist primarily of low-density residential uses (one dwelling unit per four acres is allowed) and accessory agricultural uses in areas featuring environmental constraints or requiring special protection such as the Coal Creek Springs watershed area, low-lying areas along the Green River, and areas that are isolated from urban services. This designation will serve to both protect environmental features and hold areas for higher density development until such time public facilities become available.

Designation Criteria

1. Areas with significant environmental constraints, intrinsic value, or that may pose environmental hazards if developed, such as areas tributary to public water sources;

2. Affords greater protections to environmental features than existing designation;

3. Level of service for property consistent with adjacent residential conservancy properties; or

4. Location, size of properties, and character is consistent with a residential conservancy use.

Implementing Zoning Designations

Residential Conservancy

Policies

LU-7 Densities and activities shall be of a very low intensity and shall not compromise environmental and watershed resources.

LU-8 In addition to single-family homes, these larger properties can also be developed with garages, accessory dwelling units, barns, and other accessory outbuildings. Home occupations, agricultural uses, and other allowed nonresidential activities may

VOL. 1

operate out of any type of permitted building, subject to intensity and use limitations.

LU-9 Until these areas are served by public utilities (water, sewer, storm services), existing and new development is not expected to be served by public infrastructure, such as urban streets, curbs, gutters, sidewalks, street lighting, and landscaping.

LU-10 As the market and utility availability enable denser development to occur, standards should be developed to maximize density while preserving open space and critical areas.

LU-11 Small-scale agricultural uses are allowed and encouraged. Commercial activities that are directly related to and support agricultural uses may also be allowed. The procedural standards may vary depending upon the type and scale of agricultural uses and supporting commercial activities. Small-scale agricultural uses are allowed and encouraged.

LU-12 Land use standards should adequately limit and control excessive accumulation of debris. Where a permitted activity does allow outdoor storage, it should be adequately screened from adjacent properties and roads, as well as ensuring adequate soil and environmental protection.

LU-13 Public, institutional, and resource-extractive uses that are low-intensity and preserve the environment may be considered conditional uses.

Single-Family Residential Designation

Description

This designation is the predominant land use category in the City. Maintaining and creating a diverse arrangement of interconnected subdivisions, neighborhoods, and communities that have a mix of densities and housing types; linkages with other residential areas and commercial hubs through nonmotorized modes, such as pedestrian and bicycling, and vehicular modes will be encouraged.

Designation Criteria

1. Previously developed single-family residential areas;
2. Undeveloped areas that do not meet the designation criteria for other Residential, Commercial, Industrial, Institutional or Public/Quasi-Public designations; or
3. Residential Conservancy areas that contain limited critical areas, are served by public utilities (water, sewer, storm services), and meet the development parameters of the single-family designation.

Implementing Zoning Designations

R-1 Residential Zone (One Dwelling Unit Per Acre): All properties located within the Urban Separator Overlay are zoned R-1, as consistent with King County County-wide Planning Policies.

R-5 Residential Zone (Five Dwelling Units Per Acre): All properties not located within the Urban Separator Overlay may be zoned R-5.

R-7 Residential Zone (Seven Dwelling Units Per Acre): All properties not located within the Urban Separator Overlay may be zoned R-7.

Policies

LU-14 Accessory dwelling units should play an integral part of promoting infill development and affordable housing, and are therefore encouraged within this land use category.

LU-15 Home occupations, bed-and-breakfasts, day cares, and other appropriate uses should be encouraged as viable accessory uses.

LU-16 Manufactured homes shall be permitted on single-family lots provided they are sited and constructed in a manner that would blend with adjacent homes.

LU-17 Provide a variety of housing typologies to suit the needs of various potential residents.

LU-18 Density bonuses outside of the Urban Separator Overlay should be approved based on innovations in transportation, stormwater management, and public amenities proposed for the development or adjacent neighborhoods associated

with the request. The onus is on the developer to justify density above baseline. Examples of amenities and concepts that justify density bonuses include park space, art, enhanced landscaping, trails that connect to adjacent properties, neighborhood commercial property set asides, use of low-impact development techniques beyond the minimum code requirements, incorporation of CPTED concepts, and variation of architecture and housing typology.

Moderate Density Residential Designation

Description

Moderate Density Residential designated areas are planned to accommodate a variety of residential dwelling types. Varying intensities may be permitted to provide a transition between single-family residential and other more intensive uses or activities (such as arterial streets) based on adjacent density, intensity, and/or character. Appropriate densities in these areas generally range from 7 up to 20 dwelling units per acre. Dwelling types generally range from single-family dwelling to multiple-family dwellings, with larger structures allowed (within the density range) where offsetting community benefits can be identified.

Designation Criteria

1. Previously developed moderate-density residential areas; or
2. Areas that provide a transition between single-family and multifamily, single-family and nonresidential, multifamily and nonresidential zones or development that are adjacent and meet the development parameters of the Moderate Density Residential designation.

Implementing Zoning Designations

Residential Transition

R-10 Residential (Ten Dwelling Units Per Acre)

R-16 Residential (Sixteen Dwelling Units Per Acre)

Policies

LU-19 Density bonuses and flexible development standards should be considered an incentive for innovative neighborhood design.

LU-20 Carefully developed low-intensity office, or residentially related commercial uses (such as day care centers) can be compatible.

LU-21 Accessory dwelling units should play an integral part of promoting infill development and affordable housing and are therefore encouraged within this land use category.

Multiple-family Designation

Description

This category shall be applied to those areas that are either now developed or are reserved for multiple family dwellings. Densities may range from 20 to 24 units per acre. These communities are served by transit, have nonmotorized connections to surrounding amenities and services, or have access to on-site amenities.

Designation Criteria

1. Previously developed high-density residential or manufactured/mobile home parks; or
2. Properties that are connected to single-family and nonresidential designations by the Residential Transition designation and meet the development parameters of the Multifamily designation.

Implementing Zoning Designations

R-20 Residential Zone (Twenty Dwelling Units Per Acre): All Multiple-family designated land not previously developed as manufactured/mobile home parks are zoned R-20.

Manufactured/Mobile Home Park: All previously developed manufactured/mobile home parks are zoned RMHC.

Policies

LU-22 Development regulations should include density bonuses and flexible development standards that create incentives for innovative site and building design, incorporation of open space and public art, nonmotorized connectivity to parks and commercial areas, proximity to transit services,

VOL. 1

supplemental natural resource protection, supplemental use of CPTED, and supplemental use of low-impact development techniques.

LU-23 Home occupations and shared housing should be allowed in this designation; however, given their high densities, it is appropriate to establish additional restrictions, procedures, and requirements in order to ensure that they are compatible with their surroundings and do not adversely affect the community.

LU-24 Live–work units are encouraged.

LU-25 Improve the quality of low-income neighborhoods and implement programs that encourage rehabilitation of deteriorating structures and facilities the downtown area, areas between lower-density residential uses and more intense nonresidential activities, and areas with high levels of transit service and available high-quality services.

LU-26 Multiple-family development should be subject to building and site design standards. These standards should address the appearance of buildings, compatibility with nearby uses, exterior lighting, connectivity with surrounding properties and uses, the relationship of ground floor spaces and entryways with the streetscape, and connectivity to nearby nonresidential hubs (shopping centers and schools).

LU-27 Provide a variety of housing typologies to suit the needs of various potential residents.

LU-28 Establish intensity limitations such as floor area ratios, density, building height, coverage ratios, setbacks, and other standards.

LU-29 Access to nearby amenities and health and human services should be considered when reviewing senior housing developments.

LU-30 Encourage development of permanent supportive housing to address the homeless population and those with special needs.

LU-31 Encourage adaptive reuse, particularly of historic properties.

Commercial Land Use Designations

Character Sketch

Commercial uses will be wide ranging in terms of scale and type. A mix of businesses – local, regional, and national – will be among the businesses in the various designations, and will be carefully located to create balance and maintain appropriateness based on adjacent uses. These commercial areas will be economically vibrant, unique, and active outside of traditional work hours. They will be accessible by foot, bike, car, and public transport.

Values

Character – Active gathering spaces, such as parks, plazas, cafes, concert venues, festivals and markets, will be distributed throughout the City; these spaces will be engaging and filled with people interacting, irrespective of culture, age, or income level.

Wellness: A variety of healthy food options will be physically and economically accessible to all members of the Auburn community.

Service: The City's resources and services are available and utilized by the business community. The business community finds the City approachable, empathetic, and responsive. An open and collaborative dialogue exists to help identify problems and find solutions.

Economy: A wide complement of retail, service, and dining options will cater to local needs, attract visitors, and encourage consistent patronage of local businesses.

Celebration: Auburn will have a thriving and expanding arts and culture community. There will be events, amenities, and attractions that draw people to congregate and socialize.

Environment: Local businesses benefit from Auburn's collection of natural resources and amenities because residents and visitors are choosing Auburn as their home or destination.

Sustainability: Local businesses benefit from, and contribute to, a sustainable economy because Auburn is an easy location to start up, maintains opportunity for growth, and has a business friendly economic climate.

General Policies

LU-32 The commercial uses permitted must be carefully regulated in regards to performance criteria and design.

LU-33 Permitted uses would consist of local-serving and community-serving retail trade, offices, personal services, and eating establishments.

LU-34 Encourage uses that provide health and human services to the adjacent community.

LU-35 Encourage adaptive reuse, particularly of historic properties.

LU-36 Promote the use of energy and water conservation measures (PSRC 11/12/15)

LU-37 Ensure that legally established existing uses that may not conform with the underlying zone, but that are compatible with their surrounding uses, and are allowed to continue to evolve and operate without being classified as "nonconforming" uses.

Downtown Urban Center Designation

Description

This category should be applied exclusively in downtown Auburn. The area should be developed in a manner consistent with and conducive to pedestrian-oriented activities. The ambiance of the downtown should encourage leisure shopping, provide services to local residents and area employees, and provide amenities that attract regional visitors and shoppers.

Designation Criteria

1. Located within the Urban Center boundaries established by the King County Countywide planning policies or within Business Improvement Area boundaries.

Implementing Zoning Designations

Downtown Urban Center

Policies

LU-38 Vertical mixed-use should be encouraged; the location of retail sales and services should predominately be on the ground floor with residential or more retail or services above. However, small freestanding commercial spaces may be established as an accessory use to a larger vertical mixed-use development.

LU-39 Deviations of height, density or intensity limitations should be allowed when supplemental amenities are incorporated into site and building design. Examples of amenities include use of low-impact development, use of sustainable site and building techniques, public space and art, transit-oriented development, landscaping and lighting, and bike shelters - as well as the inclusion of affordable housing.

LU-40 Encourage a broad mix of uses within the downtown area. A wide range of consumer-oriented goods and services are compatible within this designation since creating an attractive shopping environment is a primary emphasis. Permitted uses include retail trade, offices, personal services, eating and drinking establishments, financial institutions, governmental offices, and similar uses. Legally established existing uses that do not fit within the range of desired new uses continue to be a valuable part of the downtown economy and character and should be allowed to evolve and operate in a manner that resembles listed permitted uses.

LU-41 Encourage multiple family dwellings, particularly within the upper stories of buildings.

LU-42 Drive-in windows should not be permitted to maintain the area's pedestrian environment.

LU-43 Parking standards within the downtown should reflect the pedestrian orientation of the area, but also consider parking's impact for economic development.

LU-44 Discourage uses that rely on direct access by vehicles or involve heavy truck traffic (other than for merchandise delivery).

LU-45 Unsightly outdoor storage and similar activities should be prohibited.

LU-46 The downtown should capitalize on opportunities for multimodal transportation.

LU-47 Encourage adaptive reuse, particularly of historic properties.

LU-48 As a designated VISION 2040 Regional Growth Center that contains a transit station, land use policies and regulations should encourage population and employment growth.

Neighborhood Commercial Designation

Description

Low-intensity, small-scale commercial services that meet the daily needs of and complement the quality of the residential neighborhoods they serve. Commercial uses need to be carefully located (if located within single-family residential neighborhoods) or should be buffered from single-family residential areas. These areas are characterized by lower traffic generation, fewer operating hours, smaller-scale buildings, and less signage than light commercial areas.

Designation Criteria

1. Located along arterial or collector streets;
2. Properties that are buffered from the single-family designation by landscaping, environmental features, or the Residential Transition designation; and
3. Meets the development parameters of the Neighborhood Commercial designation.

Implementing Zoning Designations

Neighborhood Commercial

Policies

LU-49 The commercial uses permitted must be carefully regulated in regards to performance criteria and design. Architectural style, building height and size, lighting, and signage should be consistent with the surrounding residential properties.

LU-50 Permitted uses would consist of small-scale local-serving and community-serving retail trade, offices, personal services, and non-drive-through eating establishments.

LU-51 Special emphasis will be directed at those accessory activities that can alter the character of these areas into heavier commercial areas. Examples include outdoor storage, location and screening of trash receptacles, loading and unloading zones, and parking lots. Regulations and permit conditions will employ techniques that mitigate light and noise impacts associated with surrounding residential properties.

LU-52 Encourage adaptive reuse of existing residential buildings and historic properties.

LU-53 Commercial uses will have an orientation that is directed toward adjacent public streets while also providing pedestrian and bike-oriented access.

LU-54 Upzone requests to the next zone should be approved based on the innovations in transportation and stormwater management and public amenities proposed for the development associated with the request.

Light Commercial Designation

Description

This category represents the prime commercial designation for small-to moderate-scale commercial activities. These commercial areas should be developed in a manner consistent with and attracts pedestrian-oriented activities. Such areas should encourage walkability, leisure shopping, engaging public space, and should provide other amenities conducive to attracting shoppers.

Designation Criteria

1. Previously developed light commercial areas buffered from more intense commercial or

industrial designations by landscaping or environmental features; or
2. Located along arterial or collector streets;
3. Properties that are buffered from the single-family designation by landscaping, environmental features, or the Residential Transition designation; and
4. Meets the development parameters of the Light Commercial designation.

Implementing Zoning Designations

Light Commercial

Policies

LU-55 A wide range of consumer-oriented goods and services are compatible within this designation since creating an attractive shopping environment is a primary emphasis. Permitted uses would consist of local-serving and community-serving retail trade, offices, personal services, eating establishments, financial institutions, governmental offices, and similar uses.

LU-56 Parking lots must be located and designed in a manner that softens their appearance from adjacent public roads. This is accomplished through landscaping, pedestrian spaces, and the location of buildings on the property. Where practicable, low-impact development techniques and landscaping should be used to promote on site stormwater infiltration and shading of hard surfaces. Minimum and maximum parking ratios must be established for each type of permitted use.

LU-57 Development incentives should be established that encourage the creation of electric car charging stations, use of sustainable building and/or operational practices, development of nonmotorized infrastructure, and proximity and connection to public transit.

LU-58 Multiple family dwellings are only allowed as part of mixed-use developments where they do not interfere with the shopping character of the area, such as within the upper stories of buildings.

LU-59 Drive in windows should only be allowed accessory to a permitted use, and only when carefully sited under the administrative use process, in order to ensure that an area's pedestrian environment is not compromised.

LU-60 Large-scale regional retail uses and uses that rely on direct access by vehicles or involve heavy truck traffic (other than for merchandise delivery) are not appropriate in this category.

LU-61 Unsightly outdoor storage and similar activities should be prohibited.

LU-62 Encourage adaptive reuse, particularly of historic properties.

LU-63 Upzone requests to the next zone should be approved based on the innovations in transportation and stormwater management and public amenities proposed for the development associated with the request.

Heavy Commercial Designation

Description

This category is intended to accommodate uses that would also accommodate a wide range of heavier commercial uses involving extensive storage or vehicular movement.

Designation Criteria

1. Previously developed heavy commercial areas; or
2. Located along major arterial streets;
3. Properties that are buffered from the single-family designation by landscaping, environmental features, or the Residential Transition designation and buffered from all other Residential designations; and
4. Meets the development parameters of the Heavy Commercial designation.

Implementing Zoning Designations

Heavy Commercial: All Heavy Commercial designated land not located within the Northeast Auburn Special Planning Area or located within the Northeast Auburn Special Planning Area,

VOL. 1

but incapable of meeting the C-MU zoning requirements.

Policies

LU-69 A wide variety of commercial-oriented services are appropriate within this category. This includes but is not limited to regional-scale retail and entertainment uses, commercial uses with outdoor sales areas, drive-in restaurant or other drive in commercial businesses, and commercial services with outdoor storage as an accessory use.

LU-70 Parking lots must be located and designed in a manner that softens their appearance from adjacent public roads. This is accomplished through landscaping, pedestrian spaces, and the location of buildings on the property. Where practicable, low-impact development techniques and landscaping should be used to promote on site stormwater infiltration and shading of hard surfaces. Minimum and maximum parking ratios must be established for each type of permitted use.

LU-71 Development incentives should be established that encourage the creation of electric car charging stations, use of sustainable building and/or operational practices, development of nonmotorized infrastructure, and proximity and connection to public transit.

Industrial Land Use Designations

Character Sketch

Industrial uses will become a more integrated part of the physical and social life of the City. Since so many people work in these areas and these companies contribute so much to the financial life of the city, it is important that they are connected through paths, roads and by public transportation. Locations that have access to rail and highways that also encourage intelligent growth patterns will be prioritized. Innovation will be a key requirement of new and infill projects as the City looks to mitigate impacts of production and limit damage to the environment.

Values

Character: Buildings, landscaping, and outdoor spaces will be attractive, interesting, well designed, and well maintained.

Wellness: Risk to life and property from all hazards will be minimized. Properties and businesses are connected to nonmotorized corridors that offers alternative means to commute.

Service: The city works closely with individuals and organizations to fully understand the demands, needs, and concerns of the industrial community so that the City can sponsor initiatives that help aid in their success.

Economy: Cornerstone institutions will strategically expand in regional prominence. As industry grows, land use policy will support efforts to grow within Auburn.

Celebration: The Community will be made aware of and celebrate the accomplishments of our local, regional and international leaders in manufacturing, warehousing, and distribution.

Environment: The built environment will fit into the natural landscape in a way that protects and respects ecosystem function. Natural resource protection will be supported and celebrated by City leadership and the community.

Sustainability: Industrial uses are contributing to, and supportive of, efforts to build and maintain a transportation system that ensures the people and goods move safely throughout the City and beyond.

General Policies

LU-72 A wide range of industrial uses may be permitted, subject to performance standards.

LU-73 Outside storage shall be permitted subject to performance criteria addressing its quantity and location.

LU-74 Development incentives should be established that encourage the creation of electric car charging stations, use of sustainable building and/or operational practices, development of nonmotorized

VOL. 1

infrastructure, and proximity and connection to public transit.

LU-75 Promote the use of energy and water conservation measures

Light Industrial Designation

Description

This category is intended to accommodate a wide range of industrial and commercial uses. This designation is intended to provide an attractive location for manufacturing, processing and assembling land use activities that contribute to quality surroundings. A wide variety of appropriate commercial uses in this designation benefit from the location, access, physical configuration, and building types of these properties. It is distinguished from heavier industrial uses by means of performance criteria. All significant activities shall take place inside buildings, and the processing or storage of hazardous materials shall be strictly controlled and permitted only as an incidental part of another use.

Designation Criteria

1. Previously developed light industrial areas; or
2. Located along high-visibility corridors;
3. Provides buffering for heavy industrial areas or is buffered from the single-family designation by landscaping, environmental features, or the Residential Transition designation and buffered from all other Residential designations; and
4. Meets the development parameters of the Light Industrial designation.

Implementing Zoning Designations

Light Industrial

Policies

LU-76 A wide range of industrial uses may be permitted, subject to performance standards. Heavy commercial uses that serve the needs of workers in light industries are also appropriate. These uses include indoor manufacturing, processing, and assembling of materials from previously prepared or raw materials and ancillary and necessary warehousing and distribution of finished goods associated with manufacturing and industrial uses.

LU-77 Parking lots must be located and designed in a manner that softens their appearance from adjacent public roads. This is accomplished through landscaping, pedestrian spaces, and the location of buildings on the property. Where practicable, low-impact development techniques and landscaping should be used to promote on site stormwater infiltration and shading of hard surfaces. Minimum and maximum parking ratios must be established for each type of permitted use.

LU-78 Landscaping, sidewalks, and bike paths will be integral parts of site design if a development is located on an impression corridor or located within or adjacent to an identified nonmotorized corridor.

LU-79 Outside storage shall be permitted subject to performance criteria addressing its quantity and location. This is to ensure compatibility with adjacent uses, so that such storage would not detract from the potential use of the area for light industry. In all cases, such storage shall be extensively screened.

LU-80 Where a light industrial use is located adjacent to a property with a less intense zoning designation, the light industrial use bears the burden of incorporating techniques that mitigate the visual, noise, dust, and odor impacts.

LU-81 Uses involving substantial storage or processing of hazardous materials, as well as substantial emissions, should not be permitted in these areas.

LU-82 A wide range of commercial activities may be allowed to provide increased opportunities for sales tax revenue.

LU-83 The Burlington Northern Santa Fe Railroad Auburn Yard located within the Railroad Special Plan Area is considered a compatible use at its current level of usage. It is not bound by the policies concerning outside storage under the existing light industrial designation

as it was an existing use prior to the development of this policy. Should BNSF decide to reactivate its applications to upgrade the yard to an intermodal facility, the proposal will be subject to the essential public facility siting process as defined in the Capital Facilities Element.

LU-84 Upzone requests to the next zone should be approved based on the innovations in transportation and stormwater management and public amenities proposed for the development associated with the request.

Heavy Industrial Designation

Description

This designation allows the full range of industrial uses, as well as certain heavy commercial uses that serve the needs of workers in light industries are also appropriate.

Designation Criteria

1. Previously developed heavy industrial areas; or
2. Not located along high-visibility corridors;
3. Buffered by the Light Industrial Designation or otherwise buffered from all other compatible designations; and
4. Meets the development parameters of the Heavy Industrial designation.

Implementing Zoning Designations

Heavy Industrial

Policies

LU-85 While this zone should be reserved primarily for the heavier forms of industrial activities, a wide range of industrial activities may be permitted. These heavier forms of industrial activities may include outdoor or semi-enclosed manufacturing, processing, or assembling activities, significant outdoor storage, and uses involving substantial storage or processing of hazardous materials. Heavy commercial uses that serve the needs of workers in heavy industries are also appropriate.

LU-86 Parking lots must be located and designed in a manner that softens their appearance from adjacent public roads. This is accomplished through landscaping, pedestrian spaces, and the location of buildings on the property. Where practicable, low-impact development techniques and landscaping should be used to promote on site stormwater infiltration and shading of hard surfaces. Minimum and maximum parking ratios must be established for each type of permitted use.

LU-87 Landscaping, sidewalks, and bike paths will be integral parts of site design if a development is located on an impression corridor or located within or adjacent to an identified nonmotorized corridor.

LU-88 Where a heavy industrial use is located adjacent to a property with a less intense zoning designation, the heavy industrial use bears the burden of incorporating techniques that mitigate the visual, noise, dust, and odor impacts.

Public and Institutional Land Use Designations

Character Sketch

Public and institutional uses will occur in both low- and high-density environments. For passive uses, land and views will be protected; limited access to these areas will be typical. For more active uses, usability and accessibility will be key features and new development will be subject to standards reflecting programmed space and interconnectivity. These spaces will be varied in type, providing service to areas large and small, urban and more rural in character. Sustainable solutions and innovations that are responsive to the native ecology will be typical of public and institutional uses.

Values

Character: Community facilities and programs bring people together and connect residents and visitors to our natural resources.

Wellness: Multiple recreation options, and nearby trails, parks, activities, and events will be readily accessible to the entire community.

Service: Land use policy supports the provision of community, health and human services to all residents.

Economy: Residents and visitors seek Auburn as a residence or destination because of its natural resources, community events, and community pride.

Celebration: We utilize our open spaces and public facilities to promote who we are, our diversity, and our community pride.

Environment: Residents and visitors will enjoy open spaces and environmentally sensitive areas, while encouraging the appreciation of their importance and beauty. Impacts of new development on natural resources are considerate of their sensitivity and importance.

Sustainability: Public and private funds are used to make investments in land preservation, restoration and protection. Public investments in land and facilities are considered for their perpetual or generational value versus short-term motivations.

General Policies

LU-89 The primary purpose of this designation is to address public needs while taking advantage of synergies with the adjacent areas where they are sited.

LU-90 Innovative strategies to integrate the uses and sites into the areas where they are sited is encouraged. These strategies should maximize use of the site while minimizing fiscal impacts and impacts to adjacent areas.

LU-91 Increase visibility of resources through public information campaigns.

LU-92 Appropriate uses include low-intensity recreational uses, passive use open areas, protected environmental habitat, stormwater detention facilities, and similar low-intensity uses.

LU-93 Promote the use of energy and water conservation measures

Open Space Designation

Description

This category shall be applied to areas that are owned by a public entity and managed in a largely undeveloped character. It includes parks, watersheds, shoreline areas, significant wildlife habitats, storm drainage ponds, utility corridors with public access, and areas with significant development restrictions.

Designation Criteria

1. Passive parks or undeveloped Parks Department property;
2. Any site containing a significant developmental hazard; or
3. Any site containing open space value suitable for public protection without unduly encroaching on private property rights.

Implementing Zoning Designations

Open Space

Policies

LU-94 Active parks that provide sports field, activity and community centers, cemeteries, and public buildings should not be designated as open space.

LU-95 Open space lands are primarily designated to provide wildlife and aquatic habitat, flood detention, vegetation and soil preservation, and view shed protection. Land designated as open space may be used for public access to trails, interpretive centers, education opportunities, and other uses and facilities that support the purpose of their designation.

LU-96 Increase distribution of open space and increase access to open space amenities throughout Auburn.

LU-97 Enhance restoration, preservation and protection of natural resources and critical areas.

LU-98 Seek out opportunities to develop recreation and education opportunities on public lands or through public–private partnerships.

LU-99 Increase visibility of resources through public information campaigns. Continue to work with regional partners to develop and maintain trail systems that connect Auburn with regional destinations.

LU-100 Build on partnerships with school districts to expand public use of school facilities for recreation and exercise, and to improve public access to facilities for this purpose, as appropriate.

Public/Quasi-Public Designation

Description

This category includes those areas that are reserved for public or quasi-public uses. It is intended to include those of a significant extent, and not those smaller public uses that are consistent with and may be included in another designation. These public uses include public schools, developed parks, and uses of quasi-public character such as large churches and private schools. Public uses of an industrial character are included in the industrial designation, and small-scale religious institutions of a residential character are included in the residential designation. Streets, utilities, and other separate uses are not intended to be mapped separately as Public/Quasi-Public.

Designation Criteria

1. Previously developed institutional uses; or
2. Meets the development parameters of the Public/Quasi-Public designation.
3. Properties identified in the Airport Master Plan as Landing Field.

Implementing Zoning Designations

Institutional
Public Use
Landing Field

Policies

LU-101 A responsible management entity and the purpose for the public/quasi-public designation should be identified for each property interest within this designation. Management policies and plans are appropriate for all lands in this designation.

LU-102 Appropriate uses for this designation include facilities that serve the needs of the larger community such as public schools, active parks, city operated municipal facilities, large churches, and fire stations.

LU-103 This designation permits a wide array of uses that tend to be located in the midst of other dissimilar uses. For this reason, the following must be considered of new requests for this designation:

a. The impacts that the designation may have on the surrounding community.
b. Site-specific conditions that should be attached to new requests for this designation that are designed to mitigate impacts on the surrounding community.
c. Site-specific conditions that should be attached to development proposals that are designed to mitigate impacts on the surrounding community.

LU-104 Coordination with other public or institutional entities is essential in the implementation of this land use designation.

LU-105 Industrial and commercial uses that are affiliated with and managed by educational institutions for vocational educational purposes may be classified as an institutional use and permitted on a con¬ditional basis.

LU-106 For the Landing Field (LF) zone, an Airport Master Plan (AMP) should be developed that establishes the vision, policies, and implementation strategies that govern uses, management principles, and future planning efforts. The AMP shall be incorporated by reference in the Auburn Comprehensive Plan as an appendix.

LU-107 Auburn Municipal Airport is included in the federal airport system - the National Plan of Integrated Airport Systems (NPIAS). Participation in the NPIAS is limited to public use airports that meet specific FAA criteria. NPIAS airports are eligible for federal funding of improvements through FAA programs. To maintain eligibility for funding through FAA programs, the Airport Master Plan should be periodically updated as conditions change.

LU-108 Uses, activities, and operations within the LF Airport Landing Field District must be coordinated and consistent with the Airport Master Plan.

LU-109 Future expansions of the LF Airport Landing Field District, for the purpose of airport uses, activities, and operations, should be coordinated and consistent with the Airport Master Plan.

LU-110 While the industrially designated area east of the Airport is highly suited for airport related activities, other industrial type uses are now located here. Therefore, the City will encourage use in this area to take advantage of its proximity to the Airport.

LU-111 New commercial land uses in proximity to the airport should be air-related and/or complementary to the airport.

LU-112 To protect the viability of the Auburn Municipal Airport the City shall create an airport overlay that is consistent with FAA regulations and WSDOT guidance.

LU-113 The City's zoning ordinance and other appropriate regulatory measures shall enforce the airport overlay and the FAR Part 77 surfaces.

LU-114 The airport overlay shall protect the operations of the Auburn Municipal Airport by establishing controls on incompatible land uses and development.

LU-115 The airport overlay should be implemented to manage land uses and development around the airport to ensure compatibility into the future and prevent incompatible future uses. The regulations applied to properties surrounding the airport should encourage land uses that are related to, and benefit from, proximity to the airport but not restricted exclusively to only these.

LU-116 The impact of development on air safety shall be assessed through the City zoning ordinance, FAA regulations, SEPA review, input from the Auburn Municipal Airport, and relevant technical guidance. Appropriate mitigation measures shall be required by the City.

LU-117 Uses in proximity to the airport that may create potential operational (e.g. height or noise) conflicts shall be reviewed for their consistency to airport operations and conformance with the FAA regulations.

LU-118 The airport should be protected from nonconforming uses and structures that pose a safety concern to airport operations.

LU-119 The City shall determine whether nonconforming uses and structures affect airport operations and require their minimization or elimination, at cost to owner, based on individualized study of proposals, City regulations, input from the Auburn Municipal Airport, and relevant technical guidance.

Overlays, Urban Growth Area, and Special Planning Land Use Designations

Character Sketch

These areas help control growth, protect the environment, and prevent urban sprawl conditions in our City. For a variety of reasons, specific areas exist within the City that require further specificity or focus of land use planning, policy, regulation, or investment. Overlays, urban growth areas, and special planning areas may be designated that help further enumerate a purpose. These areas are to be designated through the Comprehensive Plan and treated as a component of the Land Use

VOL. 1

Element of the Plan.

Values

Each area designated as an overlay, urban growth area, or special planning area shall reflect the values identified in the Core Comprehensive Plan.

General Policies

LU-120 These land use designations must be consistent with the Growth Management Act, Puget Sound Regional Council, and countywide planning policies.

LU-121 Any proposed changes to these designations must be pursued in coordination with applicable State, Regional and County agencies.

Urban Separator Designation

Description

Urban separators are areas designated for low-density uses in the King County Countywide planning policies. They are intended to "protect Resource Lands, the Rural Area, and environmentally sensitive areas, and create open space and wildlife corridors within and between communities while also providing public health, environmental, visual, and recreational benefits." There are two primary areas of urban separators, one on Lea Hill and one on West Hill.

Designation Criteria

Areas designated through the process of annexation

Implementing Overlay Designations

Lea Hill Overlay
West Hill Overlay
Urban Separator Overlay

Policies

LU-122 The City is obligated to maintain (and not redesignate) until at least the year 2022, pursuant to countywide planning policies and an annexation agreement with King County.

LU-123 Urban separators are deemed to be both a regional as well as local concern and no modifications to development regulations governing their use may be made without King County review and concurrence. Therefore, the areas designated as "urban separator" on the Comprehensive Land Use map, will be zoned for densities not to exceed one dwelling unit per acre, with lot clustering being required if a subdivision of land is proposed.

Urban Growth Area and Potential Annexation Area Designation

Description

Urban growth areas and potential annexation areas are areas located outside of the municipal city limits of Auburn. They are areas that are anticipated to be incorporated into the City within 10 years of their designation.

Designation Criteria

Potential annexation areas are jointly developed by cities and the County in which they are located. They are based upon countywide growth projections that are divided among all urban growth areas within each respective County. Urban growth areas and potential annexation areas are distinguished from each other by whether they have been assigned to a City or not. Urban growth areas have been identified but have not been assigned to a City. Potential annexation areas are urban growth areas that have been assigned to a specific City.

Implementing Designations

Urban Growth Area
Potential Annexation Area

Policies

LU-124 Work with King and Pierce County, as well as nearby cities, to redesignate urban growth areas into potential annexation areas.

LU-125 Auburn's Potential Annexation Area is shown on the Comprehensive Plan Land Use Map (Map 1.1). Map 1.1 also depicts Growth Impact Areas. These Growth

VOL. 1

Impact Areas are generally adjacent cities or unincorporated County lands in which development that occurs potentially impacts the city of Auburn.

LU-126 The Auburn City Council may revise the boundaries of the Potential Annexation Area in the future, in response to:

a. Amendments to King and Pierce County Urban Growth Areas as specified in the King and Pierce County countywide policies
b. Discussions between Auburn and adjacent jurisdictions regarding POTENTIAL ANNEXATION AREA boundaries
c. Discussions with Pierce County concerning the designation of POTENTIAL ANNEXATION AREA boundaries
d. Changed circumstances relating to population and employment growth and projections, urban service feasibility, or similar factors.

LU-127 Develop strategies and agreements for the review of development and provision of utilities within potential annexation areas that have yet to be annexed.

LU-128 Prior to annexation, develop strategies and agreements that address the orderly transition of areas into the City such as transfer of permit authority, infrastructure financing, financing of fire and police services, and interim development regulations.

Transition Designation

Description

The Transition Designation following establishes policies and guidance are intended to provide a basis for future development of zoning and other regulatory tools to manage and reduce impacts from proximity of boundaries between sharper differences of intensity in land uses and is meant to apply city-wide.

Designation Criteria

The Designation should apply to areas that are located between single-family and multifamily land use designations; between multifamily and nonresidential land use designations; and between single-family and nonresidential land use designations.

Implementing Designations

The Designation and implementing zoning and other regulatory tools shall generally apply to the more intense land use designation.

Policies

LU-129 Between single-family and multifamily:

a. Where a multifamily use is proposed to be located adjacent to a single-family zone, the multifamily use will bear the burden of providing an adequate transition of land use. Mitigating measures that control light, noise, and dust should be incorporated into multifamily development proposals.
b. Provide non-motorized access through the site in order to connect the adjacent land uses.
c. Housing size, type, and orientation shall be utilized as a means of providing harmonious transition of the built environment.
d. Provide a mix of townhomes, duplexes, cottage housing and small-scale multifamily housing.

LU-130 Between multifamily and nonresidential

a. Where a non-residential use is proposed to be located adjacent to a multifamily zone, the non-residential use will bear the burden of providing an adequate transition of land use. Mitigating measures that control light, noise, and dust should be incorporated into nonresidential development proposals.
b. Provide non-motorized access through the site in order to connect the adjacent land uses.
c. Provide a mix of townhomes, duplexes, cottage housing and small-scale multifamily housing.

LU-131 Between single-family and nonresidential:

a. Where a non-residential use is proposed to be located adjacent to a single-family zone, the non-residential use will bear the burden of providing an adequate transition of land use. Mitigating measure that control light, noise, and dust should be incorporated into nonresidential development proposals.

b. Provide non-motorized access through the site in order to connect the adjacent land uses.

Critical Area Overlay Land Use

Description

Under the Growth Management Act cities and counties are required to identify, designate and protect critical areas. Critical areas include (a) wetlands, (b) areas with a critical recharging effect on aquifers used for potable water, (c) fish and wildlife habitat conservation areas, (d) frequently flooded areas, and (e) geologically hazardous areas.

Designation Criteria

Designation of critical areas includes both criteria that should be applied to the specific type of critical area as well as buffers and/or setbacks that are necessary for the protection of the critical area and/or life and property. Designation of critical areas is based on best available science as it applies to local conditions.

Implementing Designations

Wetlands
Critical Aquifer Recharge Areas
Fish and Wildlife Habitat Conservation Areas
Frequently Flooded Areas
Geologically Hazardous Areas

Policies

LU-132 Best available science will be utilized for the specific designation criteria and the associated adopted protection standards and development regulations.

LU-133 Reasonable use provisions will be included within the critical area regulations that ensure a property owner is not denied use of a preexisting parcel, lot or tract.

LU-134 Exemptions to the critical areas ordinance should be provided for very limited and justified circumstances such as maintenance of existing land uses, work within some types of human-made features, limited types of site investigation work, emergency activities, and certain types of invasive vegetation control.

LU-135 Critical area regulations will identify the process and standards for alteration of a critical area and criteria related to mitigation, performance, and monitoring.

Special Planning Area Designation

Description

"Special Planning Areas" consist of Districts, subareas, Impression Corridors, and Gateways within Auburn that warrant additional empha¬sis in planning, investments, and policy develop¬ment. Each may be recognized separately within the Comprehensive Plan, as an Element of the Comprehensive Plan, or as an subarea plan (dis¬cussed below). There are a variety of reasons for designating and distinguishing a special planning area, and once designated, a variety of poten¬tial outcomes. Reasons for designating a special planning area include:

- Areas of high visibility and traffic. These areas create an impression or image of Auburn. It is therefore particularly important to ensure that they are attractive and well maintained. Examples include Auburn Way South and as¬sociated major highway on- and off-ramps.
- Land use activities that warrant joint planning between the City and owner/operator. In ad¬dition to developing approaches and strat¬egies for the land use activity, there may be additional emphasis on ensuring compatibility with surrounding land uses. Examples include, Green River College, the Auburn Municipal Airport, and Emerald Downs Thoroughbred Horse Racetrack.

VOL. 1

- Neighborhoods in which a resident and mer¬chant live and conduct daily business and leisure. Neighborhoods may also be distin¬guished by physical setting, physical separa¬tions, and similarity over an area. Examples include downtown, Lea Hill, and Lakeland.
- Areas with a focused desire to create great¬er physical and economic cohesiveness. These may be large planned developments or clus¬ters. Examples include the Auburn North Business Area and Mt. Rainier Vista.
- Areas with an existing built environment or an existing regulatory framework that does not, in itself, meet the expectations of the seven val¬ues that underscore the Comprehensive Plan. Examples include the need for multimodal connections between West Hill and Lea Hill to north and downtown Auburn.

Designation Criteria

1. **Districts**: The geographic limit of districts and areas that make up this category of Special Planning Areas extends beyond an alignment with any particular street, trail, river, stream, or other linear corridor. Districts may contain other smaller Special Planning Areas, such as subareas. Additionally, districts are generally consistent with the geography of one of the eight "neighborhoods"[1] identified in the 2014 City of Auburn Community Vision Report. Generally speaking, districts are identified for the purpose of creating identity. This means that the land use designations and overarching policies and implementing regulations are not going to change from one district to the next. Instead, Districts are important for event planning, establishing park and open space level-of-service standards, and promoting community identity.

Districts (see Map 1.2)

- West Hill
- North Auburn
- Lea Hill
- Downtown
- South Auburn
- Plateau
- Lakeland
- Southeast Auburn

2. **Subareas**: Subareas are smaller in geography than a district. Though relatively large, multiple subareas may be located within a single district. Subareas allow for the refinement and recognition of existing unique characteristics within a district. Subareas are intended to anticipate, support, and guide long-term growth and redevelopment through planned development and a unique vision for how that area should look and function in the future. It can also be used to provide flexibility when there is uncertainty regarding how an area may be most appropriately developed in the future.

   Twenty-eight (28) subareas currently exist. These subareas are categorized into five different types of subareas:

- Identified Areas;
- Designatged Areas;
  - Economic Development Strategy Areas (a Designated Areas sub-category);
  - Areas of Concern (another Designated Areas sub-category; and
- Adopted Areas.

Uses, intensities, and infrastructure development determined for each subarea or planned area through individual planning processes. Connectivity throughout the planned area, and connections to multimodal transportation opportunities outside of the planned area are also emphasized through the individual planning process. The result of each individual planning process is the adoption of Comprehensive Plan element or subarea plan for the particular subarea by City Council. Each Plan element must be consistent with the general goals, objectives, and policies of the Comprehensive Plan, and once adopted, subarea plans are intended to guide the future development of each respectively adopted subarea.

VOL. 1

1. The eight "neighborhoods" are identified for comprehensive planning purposes only, as neither the City nor its neighborhoods have elected to officially designate the boundaries of City neighborhoods.

2a. Identified Areas: Identified areas are identified as a subarea within the Comprehensive Plan, but have not been established on the Comprehensive Plan Map. Therefore, the specific and detailed boundaries of an identified subarea have not been defined. Identification of a subarea within the Comprehensive Plan occurs by official action of the City Council.

Identified Areas

- Auburn Golf Course
- GSA/Boeing
- Green River College
- Mary Olsen Farm
- Les Gove Campus
- Emerald Downs
- Auburn High School

2b. Desginated Areas: Designated Areas have been designated on the Comprehensive Plan Map, which defines the specific and detailed boundaries of the area. Designation of an area on the Comprehensive Plan Map occurs by official action of the Auburn City Council. It is intended that future development of these areas will be guided by individual Plan element or subarea plan of the Comprehensive Plan. The future subarea plan will either supplement existing goals, policies, and implement strategies, or replace existing Comprehensive Plan designations and policies for the area within the specific and detailed boundary.

Designated Areas (see Map 1.3)

- Auburn Municipal Airport
- BNSF Rail Yard
- Stuck River Road
- Lakeview
- Mt. Rainier

2b(1). Designated Areas - Areas of Concern: Areas of Concern are a specific type (or subcategory) of designated area. Areas of Concern are established because they represent an area that features a lack in the infrastructure and services (e.g. municipal water and sewer service, urban roads, traffic demand, and storm water management) necessary to support increase in density or other development. These areas require a close assessment of and an emphasis on infrastructure development and planning to support further development. While this Plan may not fully represent the intensity of uses that could ultimately be supported in these areas (in part due to the current weakness of the City's infrastructure to support future growth). Development intensification within the Area of Concern needs to be coordinated with the necessary infrastructure and services to support growth.

Designated Areas - Areas of Concern (see Map 1.3):

- AWS/Auburn Black Diamond Rd.
- Pike Street NE
- 8th Street NE

2b(2). Designated Areas - Economic Development Strategy Areas: The Economic Development Strategy Areas are a specific type (or subcategory) of designated area. In 2005, City Council adopted six Economic Development Strategy Areas under Resolution No. 3944. These areas, initially identified by a focus group of diverse business and community interests, are targeted for population and employment growth within the planning horizon of the City's 20-year growth target (2031). By 2012, the City Council added three additional economic development strategy areas , bringing the total to nine (9) strategy areas.

During the City's 2015 update of the Comprehensive Plan the list of economic development strategy areas to reflect current conditions and status of these areas. As such, two of the original six economic development strategy areas was removed from the list. The Urban Center, one of the original six development strategy areas, was removed as it is no longer a designated area. The Urban Center, also known as "Downtown Auburn" or the "Downtown Urban Center" is an adopted area (since 2001) and features its own subarea plan. The Auburn Environmental Park (AEP)/Green Zone has also been removed as an economic development strategy area. The AEP/Green Zone economic development strategy area

was previously zoned EP, Environmental Park Zone. The intent of this zone was to encourage economic development in the form of medical, biotech and "green" technologies including energy conservation, engineering, water quality and similar uses. Through Ordinance No. 6660 City Council rezoned the AEP/Green Zone from EP, Environmental Park Zone to M-1, Light Industrial, hereby effectively removing the need to designate the AEP/Green Zone as an specific economic development strategy area.

The current economic development strategy areas are included below. The boundaries of the economic development strategy areas are incorporated as designated subareas "Designated Areas – Special Planning Areas" map of the Land Use Element.

Designated Areas -Economic Development Strategy Areas (see Map 1.3)

- A St SE (corridor)
- Auburn Way South (AWS) Corridor
- Auburn Way North (AWN) Corridor
- M St SE (between AWN and AWS)
- SE 312th/124th Ave
- NW Manufacturing Village
- 15th St SW/West Valley Hwy N

2c. Adopted Areas: Adopted Areas include an Adopted Subarea Plan incorporated into the Comprehensive Plan that establishes the purpose of its designation, goals and policies, and implementation strategies. Adoption of a subarea plan occurs by official action of the City Council. As an adopted document of the Comprehensive Plan, the subarea Plans are subject to a review, and if necessary, revision to address changes in conditions, issues, or even characteristics of the planned areas. The review and revision a subarea Plan will also include the review and, if necessary, a revision of zoning regulations and architectural design standards.

Adopted Areas (see Map 1.4)

- Downtown (Ordinance No. 5549)
- Auburn Adventist Academy (Resolution No. 2254)
- Auburn North Business Area (Resolution No. 2283)
- Lakeland Hills (Resolution No. 1851)
- Lakeland Hills South (County H.E. Case Z15/UP70)
- Northeast Auburn (Ordinance No. 6183)

3. **Impression Corridors**: Impression corridors are aligned with a particular street, trail, river, stream, or specific linear corridor. Some corridors may be part of a subarea, in which case the Impression Corridor policies are additive to a subarea plan. Impression corridors enhance the areas in which residents, businesses, visitors move throughout the City. The benefit of an impression corridor is twofold: residents know that the City is invested in the aesthetic of main thoroughfares and businesses can build off of the design and aesthetic provided by the impression corridor. Improvements or modification to impression corridors consist of aesthetic signage, landscaping, and monument features, and the rehabilitation or removal of existing buildings and property. Impression Corridor boundaries and policies are formally designated by adoption of the Comprehensive Plan. Priority is given to the impression corridors that are a part of a subarea. Priority impression corridors are the thoroughfares in which residents, businesses, visitors move throughout a specific subarea. The priority impression corridors are italicized below.

Impression Corridors (see Map 1.5)

- *Auburn Way North*
- *Auburn Way South*
- *Auburn Black Diamond Road*
- *A Street SE/Auburn Avenue*
- *C Street SW*
- *Division Street*
- *M Street/Harvey Road*
- *Main Street*
- *8th Street NE*
- *15th Street SW*
- *West Valley Highway*
- *15th Street NW/NE*
- 132nd Ave SE

VOL. 1

- SE 320th Street
- SE 312th Street
- SE 304th Street
- R Street
- Lake Tapps Pkwy SE
- Green River Road
- 37th Street NW
- S 277th Street
- Interurban Trail
- Green River
- White River
- Mill Creek

4. **Gateways**: Gateways are specific places, intersections, or blocks within the City. These essential locations are established because they constitute the first impression into of Auburn. Gateways are intended to create a "welcome" into distinct areas of the City or into the City itself. They are therefore highly important to plan, construct, maintain, and enhance their appearance and function. Gateway locations and policies are formally designated by adoption of the Comprehensive Plan. Priority is given to those gateways that are along an priority impression corridor. Priority gateways function as a entrance to an impression corridor. The priority gateways are italicized below.

Gateways (see Map 1.6)

- *Auburn Way North and Auburn Avenue (where the roads converge)*
- *East Main Street and M Street NE/ SE (at the intersection)*
- *Auburn Way South and 4th Street SE*
- *Auburn Way S and 6th Street SE*
- *West Main Street between C Street NW and B Street NW*
- All roads with an entry into the city
- Hwy 167 Off Ramps
- SR 18 Off Ramps

Implementing Designations

Planned Unit Development (PUD)
Master Plans

Policies

District Policies.

LU-123 Through regulation, capital investment, and community planning, identify, promote and market district identity.

Subarea Policies.

LU-124 Each subarea will contain its own vision, goals, policies and strategies.

LU-125 BNSF Rail Yard - This approximately 150 acre Special Planning Area is located in the south-central portion of the City and surrounded by SR-18 to the North, Ellingson Road to the South, C Street SW to the west and A Street SE to the East. The Special Planning Area should consider both sides of C Street and A Street. Consideration should be given to:

- The needs of Burlington Northern.
- Providing pedestrian, bicycle and vehicular access across the site to connect the southeast and southwest sides of the city.
- Providing a more visually appealing "entry corridor" into the City from the south along A and C Streets.
- Allowing for a mix of uses including single and multifamily development and commercial and industrial uses where appropriate.

LU-126 Stuck River Road - A portion of the Stuck River Road Special Planning Area is currently the site of a large sand and gravel mining operation. This area and other adjacent land comprising a total of approximately 664 acres has been designated as a long term resource area (mineral resource area), so development of the Special Area Plan for this area should be a low priority as mining is expected to continue on this site for as long as 30 years. The land uses for the Stuck River Road Special Planning Area will be determined through the subarea planning process and the City Council's adoption of the subarea plan. Potential land uses applied through the subarea planning process could include single-family

residential, multi-family residential, commercial, institutional, and recreational. Some light industrial uses may be appropriate for consideration and designation through the subarea planning process if the uses are "industrial or business park" in character, conducted entirely within an enclosed building, and exhibit a high degree of performance standards and are non-nuisance in nature and if appropriately limited in extent and location. A mix of housing types ranging from single family residential to multi-family residential is appropriate for this planning area. The subarea plan should be adopted taking into consideration the period during which mining is expected and the intent of the ultimate development of the area. An active permit has been processed by the City with respect to the mining activity on a portion (approximately 664 acres) of the mineral extraction operation. The permit process should continue, however, any permit for mining in the mineral resource area should be granted for the life of the resource, with reviews conducted periodically (every five years) to determine whether changes in the originally proposed mineral extraction operation have arisen and give rise to the need for additional or revised permit conditions to address the new impacts (if any) of any such changes. Any permit applications for additional acreage within the mineral resource area shall be processed by the City.

Development of this area should not occur until adequate public facilities are available to support the development consistent with City concurrency policy.

The City recognizes the potential for expanding the Stuck River Road Special Planning Area to include additional land east of Kersey Way and north of the Covington-Chehalis power line easement, and will consider a proposal by all affected property owners. If the area is expanded, the number of non-multiple family, non-manufactured home park dwellings units may be increased proportionate to the increase in acreage. Any such proposal shall specifically apportion the types and quantities of development to occur within each separate ownership.

LU-127 Lakeview - The Lakeview subarea is currently the site of two independent sand and gravel mining operations. While mining activity continues in the eastern operation, indications in 1995 are that the western operation has ceased. Activity in the western portion is now limited to a concrete batch plant and future site reclamation. Following reclamation, the area should be developed as a primarily single family residential neighborhood of low to moderate urban density. A planned development would be particularly appropriate for this approximately 235 acre site. The permitted development density of the site will depend heavily upon the ability of the transportation system near the site to handle the new uses. Consideration shall be given to the environmental, recreational and amenity value of White Lake, the historical and cultural significance, as well as tribal ownership and jurisdiction of the Muckleshoot Tribe in the development of the Lakeview Plan element. Permit applications have been accepted and are currently being processed by the City with respect to the mining activity on the eastern portion of the area. The permit process should continue, however, any permit for continued mining in this portion of the area should be limited to 10 years to encourage completion of the mining, and subsequent reclamation by the property owner in preparation for development. The Lakeview Plan element should be adopted prior to the City's acceptance or processing of any other permit applications for the mining operation in the Lakeview Special Planning Area. The environmental information and analysis included in the Final Environmental Impact Statement for Lakeview (November 1980), shall be considered in the development of the

Lakeview Plan element. While heavy commercial or industrial uses would not be appropriate as permanent uses of this area, conversion of the area now zoned for heavy industry to office commercial (or similar) uses would be appropriate.

LU-128 Mt. Rainier Vista - This 145 acre subarea is located south of Coal Creek Springs Watershed. Overall development of the Mt. Rainier Vista subarea plan shall be consistent with the following conditions:

1. Primary consideration in use and development of the property shall be given to protection of Coal Creek Springs' water quality. Development types, patterns and standards determined to pose a substantial risk to the public water source shall not be allowed.

2. The maximum number of dwelling units will be determined as part of any sub-area plan process. Dwelling units shall be located within portions of the property where development poses the least risk of contamination for Coal Creek Springs. Lands upon which any level of development would have a high risk for contaminating the water supply shall not be developed, but would be retained as open space. The development pattern shall provide for a logical transition between areas designated for rural uses and those designated for single family residential use. All dwelling units shall be served by municipal water and sanitary sewer service, and urban roads. If 53rd Street S.E. is the major access to serve the Special Planning Area, the developer will be responsible for developing the street to urban standards, from the property owners' eastern property line that abuts 53rd Street, west to the intersection of 53rd and Kersey Way.

3. Percolation type storm sewer disposal systems shall not be permitted. All surface water drainage shall be conveyed consistent with the City's current storm drainage standards. Treatment of stormwater shall occur prior to its discharge to any surface water body, consistent with standard public works or other requirements in general effect at the time of development.

4. The site shall be zoned temporarily, at one unit per four acres, until the sub-area plan is completed and the long-term urban zoning determined.

5. The Mt. Rainier Vista special planning area boundary may be modified through the development of the subarea plan.

6. The Mt. Rainier Vista and Stuck River Road Special Planning Areas shall be coordinated subarea plans.

Designated Areas - Areas of Concern Policies.

LU-129 AWS/Auburn Black Diamond Rd – The area between Auburn-Black Diamond Road and the Burlington Northern Railroad currently lacks urban facilities necessary to support urban development. Major development proposals shall be carefully assessed under SEPA to ensure that the development can be supported by the available facilities. Once property owners are able to demonstrate to the City that they can provide urban services (municipal water and sewer service, urban roads and storm water management) necessary to support the intensity of development proposed within the entire area, the Plan designation and zoning for this area should be changed to an urban residential or commercial classification. The appropriate classification(s) shall be determined after a review of the development proposal and the pertinent Comprehensive Plan policies.

LU-130 Pike Street NE – The area located north of 8th NE, east of Harvey Road, and south of 22nd NE is inadequately served by residential arterials. No increase in density or other development which would increase traffic demand in this area should be approved.

LU-131 8th Street NE – The areas paralleling 8th Street NE located between Auburn Way and M Street are designated for multiple

VOL. 1

family residential while 8th Street NE is designated as a minor arterial. However, the road is not currently constructed to this standard and is not able to support current traffic demand adequately. The Plan designation would greatly increase traffic volumes. Implementation of the Plan designations should not occur until 8th Street NE is constructed to the adequate arterial standard and water service is upgraded. Up zones should not be granted from current zoning until these stems are upgraded or guaranteed.

Designated Areas - Economic Development Strategy Ares Policies.

LU-132 The City should adopt a formal subarea plan for each of the seven economic development strategy areas (listed below) as an element of the Comprehensive Plan. Each economic development strategy area subarea plan should identify the uses, intensities, and infrastructure development necessary to support the types of business and activities that are most consistent with community aspirations. Each subarea plan should address and include policies regarding the expected level of housing density (or residential growth targets) and employment growth targets.

- Auburn Way South Corridor
- Auburn Way North Corridor
- NW Auburn Manufacturing Village
- 15th St. SW/C St. SW/W Valley Hwy. N
- A St. SE
- SE 312th St. /124th Ave SE
- M St. SE between Auburn Way N and Auburn Way S

Adopted Areas Policies.

LU-133 Adoption or revision of a subarea plan will be treated as a comprehensive plan amendment and will comply with the Growth Management Act, Countywide planning policies, Vision 2040, and the Core Comprehensive Plan.

LU-134 Adventist Academy - Adopted under Resolution No. 2254 on November 14, 1991. The Auburn Adventist Academy is Special Planning Area (Adopted Area) is a multi-use campus operated by the Western Washington Conference of Seventh-Day Adventists. The Campus plays a large role in the Western Washington Conference of Seventh-Day Adventists' private elementary and secondary education system in Washington and hosts many community events as well as an annual regional camp meeting for Adventists from Washington and around the world. The Campus previously housed Harris Pine Mill, a furniture manufacturer, for many years. The Mill provided financial benefit to the Academy's budget and provided employment opportunities, learning experiences, and vocational education for Academy students. The Academy continues to include in its plan industrial uses that support the mission of the school financially. The reuse of existing mill buildings and redevelopment of buildings lost to a fire in 1989 are the focal points of the current industrial development. In addition to institutional and industrial uses, the Academy is also operates a landing strip and associated aircraft hangars for student aviation and flight training. A single family subdivision is located to the south of the airstrip. In addition to these uses, the Academy wishes to allow development of uses such a multi-family and senior housing and assisted living and memory care which will generate perpetual revenue through a long-term land lease on a portion of the Campus lying generally north of Auburn Way South and south of 32nd Street S.E. that will directly aid its mission. The financial benefit from these uses will allow funding an endowment, subsidize student tuition, provide financial aid for students needing tuition assistance, for new educational programs, for additional faculty, facility maintenance and upgrades, and other needs. The plan focuses on provides predictability to planning, zoning, subdivision, and development decisions within the Special

VOL. 1

Planning Area (Adopted Area) made by the City.

LU-135 Auburn North Business Area - Adopted under Resolution No. 2283 on March 2, 1992. The Auburn North Business Area Special Planning Area Plan was the result of a comprehensive planning study due to increased development pressure north of the Central Business District. Since the Central Business District, which contains Downtown, the core of Auburn, is adjacent to these areas, future development in this area is crucial. A comprehensive and cohesive direction was also needed based on increased development proposals and rezone requests. In addition to development concerns, many of the considerable undeveloped parcels contain wetlands. All of these factors made development controls beyond zoning and development regulations advisable.

LU-136 Lakeland Hills - Adopted under Resolution No. 1851 on April 18, 1988. Lakeland Hills area lies between the Stuck River and the southern City limits of Auburn in the most southwestern part of the City. The area consists of planned residential and commercial subdivisions, and is predominately residential in nature, offering a range of housing types, including single family and multi-family dwellings. The Lakeland Hills Plan was intended to provide long-term predictability to both the City and potential developers. As a planned community, development and design must be consistent with the policy guidance of the Lakeland Hills Plan.

LU-137 Lakeland Hills South - Approved under Pierce County Hearing Examiner Case Z15/UP70.Lakeland Hills South lies south of the Lakeland Hills special plan area and is the most southwestern part of the City. The area is predominately residential, allowing for a range of housing types, with commercial uses, including Lakeland Town Center, in the center. Nonresidential uses, including civic, religious, and municipal services are allowed throughout the area through an Administrative Use Permit. Unlike Lakeland Hills, Lakeland Hills South was accepted into Auburn was a Planned Unit Development (PUD). The Lakeland Hills PUD, originally the Lakeland Hills South Planned Development District (PDD), was approved under Pierce County Hearing Examiner Case no Z15-UP70 in 1990. Lakeland Hills South PUD is intended to provide enhanced flexibility to develop a site through innovative and alternative development standards. As a PUD, specific development and design standards are prescribed.

LU-138 Auburn Downtown Plan (Urban Center) - Adopted under Ordinance No. 5549 on May 21, 2001. Downtown Auburn is the business, governmental, and cultural hub of Auburn, its physical and cultural heart. Many stores, restaurants, service providers, and small offices are well-represented throughout this district. Downtown hosts many community events and activities, such as the weekly Auburn International Farmers Market in the summer, Soundbites! Concert Series (in the City Hall Plaza) and the Veterans Day Parade. Downtown features public art that includes temporary installations such as Pianos on Parade and a permanent outdoor Downtown Sculpture Gallery with rotating pieces. This dynamism is possible because the district is a collection of uses that coexist in close proximity to one another. Due to the value, importance, and complexity of this district, The Auburn Downtown Plan identified four general needs to be addressed by the plan:

- Update of the existing plan in order to continue Downtown revitalization
- Concern over the reopening of Stampede Pass
- Multiple large projects proposed for Downtown

- Scarce private investment

In conjunction with project-based items, a regulatory element that emerged from the goals of the Auburn Downtown Plan was the Downtown Urban Center (DUC) zoning district, which was established in 2007. While the DUC zoning district is intended specifically to address the needs of downtown, though the implementation of policies identified by the Downtown Auburn Plan , many challenges related to public and private investment, development, and strategic planning have yet to be addressed as downtown has evolved.

LU-139 Northeast Auburn Special Plan Area – Adopted under Ordinance No. 6183 on June 5, 2008. The Plan was prepared in fulfillment of the policies included in the Comprehensive Plan for the area between Auburn Way North and the Green River, south of 277th Street (52nd Street NE) and north of approximately 37th Street NE in the City of Auburn (Map No. 14.2). The planning area was narrowed to an area covering approximately 120 acres, north of 45th Street NW and between Auburn Way North and the existing I Street NE right-of-way. The Northeast Auburn/ Robertson Properties Special Area Plan focuses on proposed develop of the Auburn Gateway project area, a 60-acre group of properties owned or under consideration for purchase by Robertson Properties Group, owners of the Valley 6 Drive-In Theater. The plan calls for a mix of office, retail, and multifamily development under a new zoning designation (C-4, Mixed Use Commercial) for the central portion of this planning area, created to accommodate mixed use development. The plan calls for phased development in coordination with the provision of new roads, stormwater and other utilities, and flood management measures.

Impression Corridor Policies.

LU-140 Create specific plans for each identified corridor, outlining development policies and regulations, necessary capital improvements, and implementation strategies. In the absence of any specific corridor plans, this section contains general policies that are to be applied within designated impression corridors.

LU-141 Coordinate corridor planning, design, construction, and maintenance with other agencies, such as BNSF, the Muckleshoot Indian Reservation, and the Washington State Department of Transportation. Where one agency may more effectively manage the corridor, management or ownership consolidation is appropriate.

LU-142 Promote the elimination or renovation of existing derelict or unmaintained structures, signs, fences, and properties along impression corridors through regulatory or enforcement mechanisms

LU-143 Work with private and public property owners to educate, create incentives, and enforce regulations that are intended to improve the overall appearance of identified corridors.

LU-144 Emphasize the design, orientation, construction materials, landscaping, and site layout for development proposals of new and existing buildings along impression corridors. New construction and the renovation of existing buildings create important opportunities for enhancing the appearance of impression corridors.

LU-145 Establish regulations that ensure coordinated, attractive commercial signage is of an appropriate size and quantity. Signage regulations along these corridors may be different than those in other areas.

LU-146 Take advantage of opportunities to provide informational signs, wayfinding signs, and traffic control signs that

VOL. 1

are attractive, useful, and integrated into a larger citywide signage plan or policy.

LU-147 Outdoor storage of materials, inventory, and other goods and off-street surface parking should be located at the rear of the property. If outdoor storage cannot be located in the rear of the property, then it should be screened from view from adjacent rights-of-way.

LU-148 Design, construct, and enhance impression corridors to accommodate multimodal uses.

LU-149 Design and construct vehicular access points in a manner that consolidates access points serving multiple uses.

LU-150 Signage, landscaping, and monument features should be used to establish prominent access points.

LU-151 Discourage aerial utilities.

LU-152 Invest in impression corridors by acquiring rights-of-way, constructing and widening sidewalks, installing landscaping, building center medians, constructing parklets, providing street furniture, and constructing other improvements.

Gateway Policies.

LU-153 Prioritize by rank all gateways and develop potential opportunities and designs for each location.

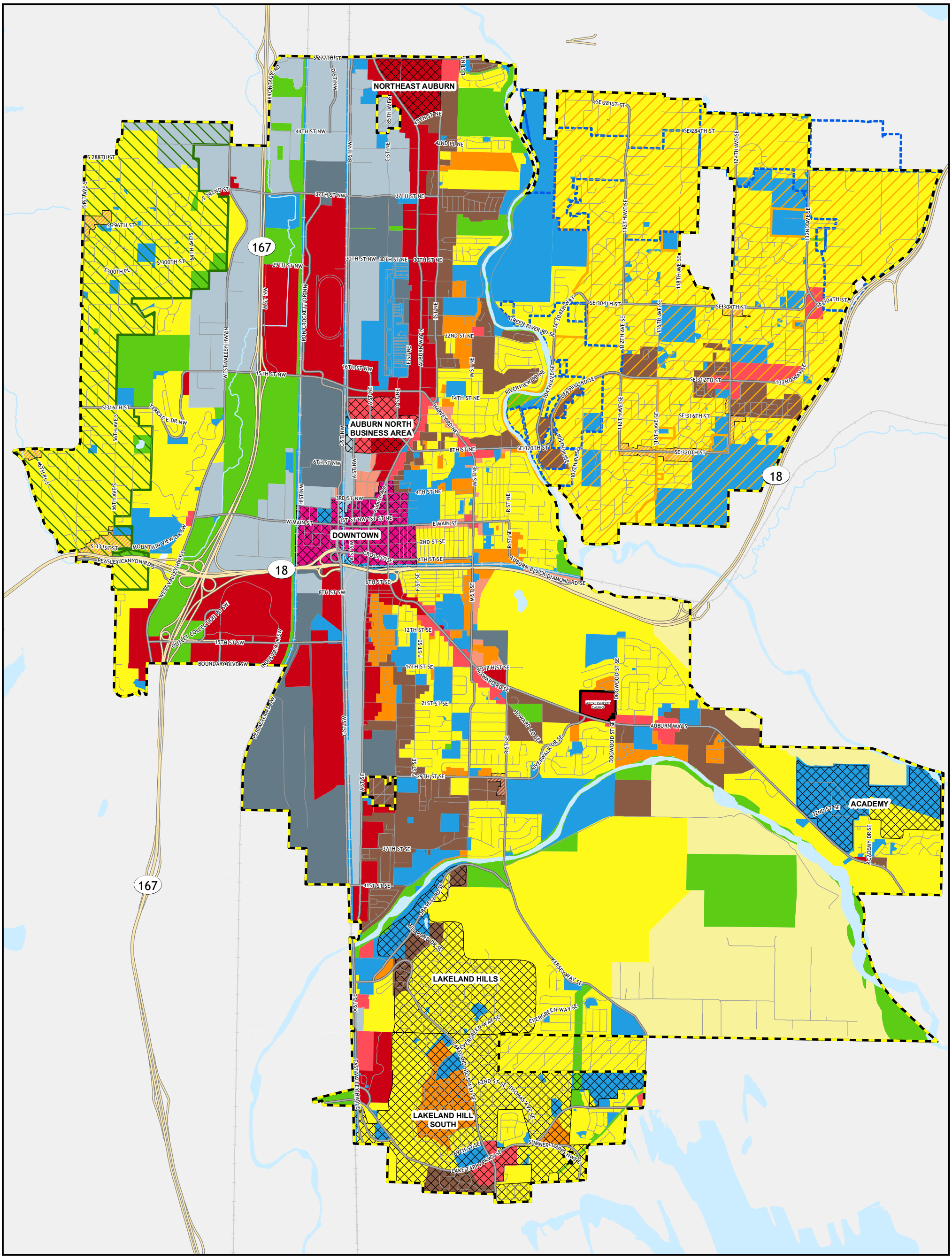
LU-154 Develop land use regulations that incorporate gateway priorities and concepts into private development proposals that are located at identified gateways.

LU-155 Coordinate with the Washington State Department of Transportation to understand options and implement actions at gateway location. Many of the gateway locations are within the WSDOT right-of-way.

LU-156 Develop design layouts for gateway locations. Designs will identify key areas that greet residents and visitors as they enter the City or downtown center, opportunities for signage and monument features, and landscaping.

LU-157 Maintain established gateways.

City of Auburn Comprehensive Land Use



Adopted Areas
Downtown Urban Center
Heavy Commercial
Heavy Industrial
Public/Quasi-Public
Light Commercial
Light Industrial
Moderate Density Residential
Multiple-Family
Neighborhood Commercial
Neighborhood Commercial Overlay
Open Space
Residential Conservancy
Residential Transition Overlay
Single Family
Auburn City Limits
Potential Annexation Areas
Water Features
Lea Hill Overlay (Ordinance: 5346 & 6121)
West Hill Overlay (Ordinance: 6122)
Urban Separators Overlay

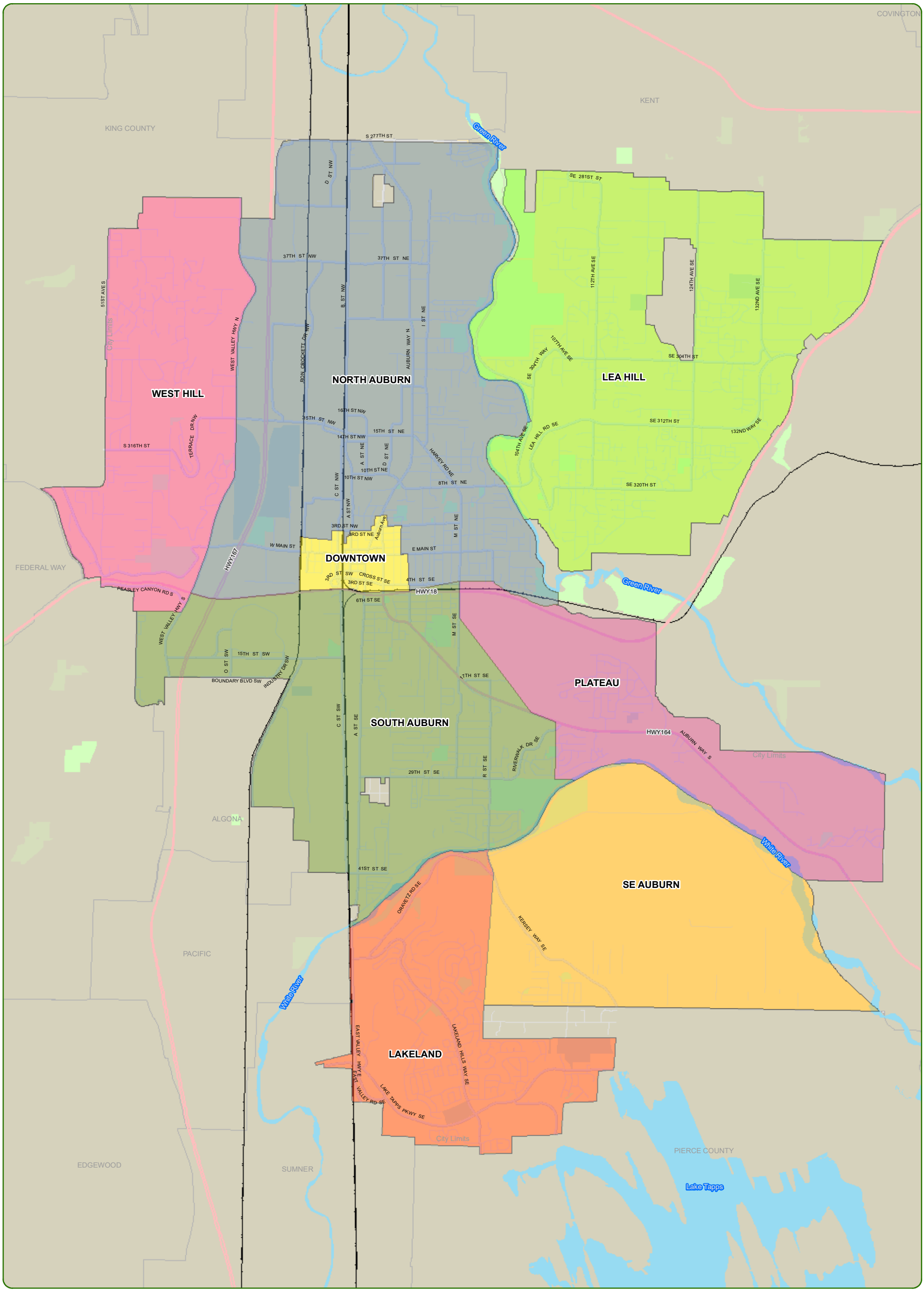
0 1,000 2,000 3,000 4,000 5,000
FEET

N
W E
S

Printed On: 9/14/2022
Map ID: 6208

Information shown is for general reference purposes only and does not necessarily represent exact geographic or cartographic data as mapped. The City of Auburn makes no warranty as to its accuracy.

Zoning map is current through Ordinance No. 6698, December 17, 2018



Districts

Special Planning Areas

(Map 1.2)

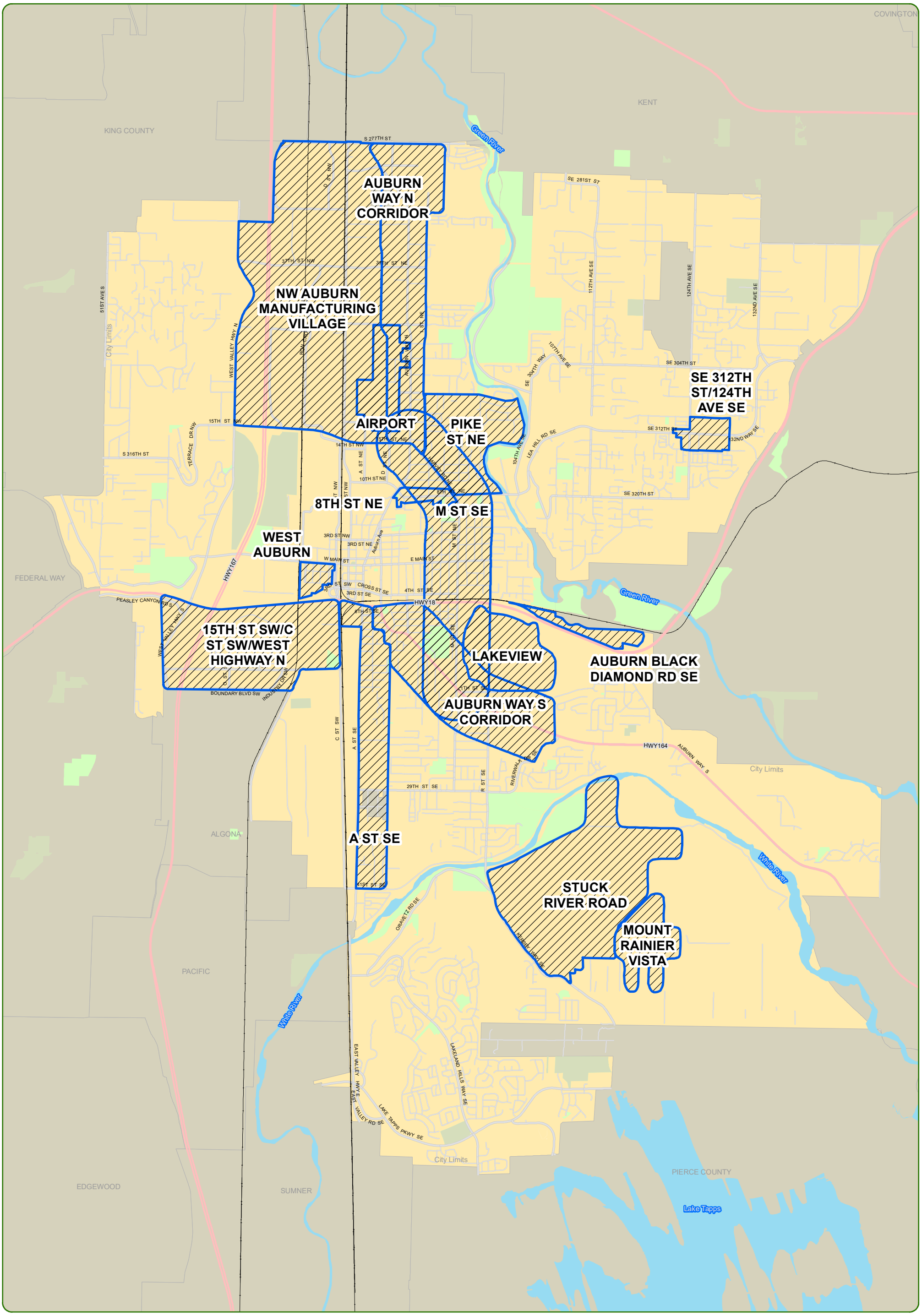
0 ¼ ½ ¾ 1 Mi

N W E S

Printed Date: 1/9/2019
Map ID: 6094

The information shown and/or distributed is for general reference purposes only and does not necessarily represent exact geographic or cartographic data. The City of Auburn makes no warranties as to its accuracy.

Map is current through Ordinance No. 6584 & 6698, December 17, 2018



Designated Areas

Designated Areas

Proposed Special Planning Areas

(Map 1.3)

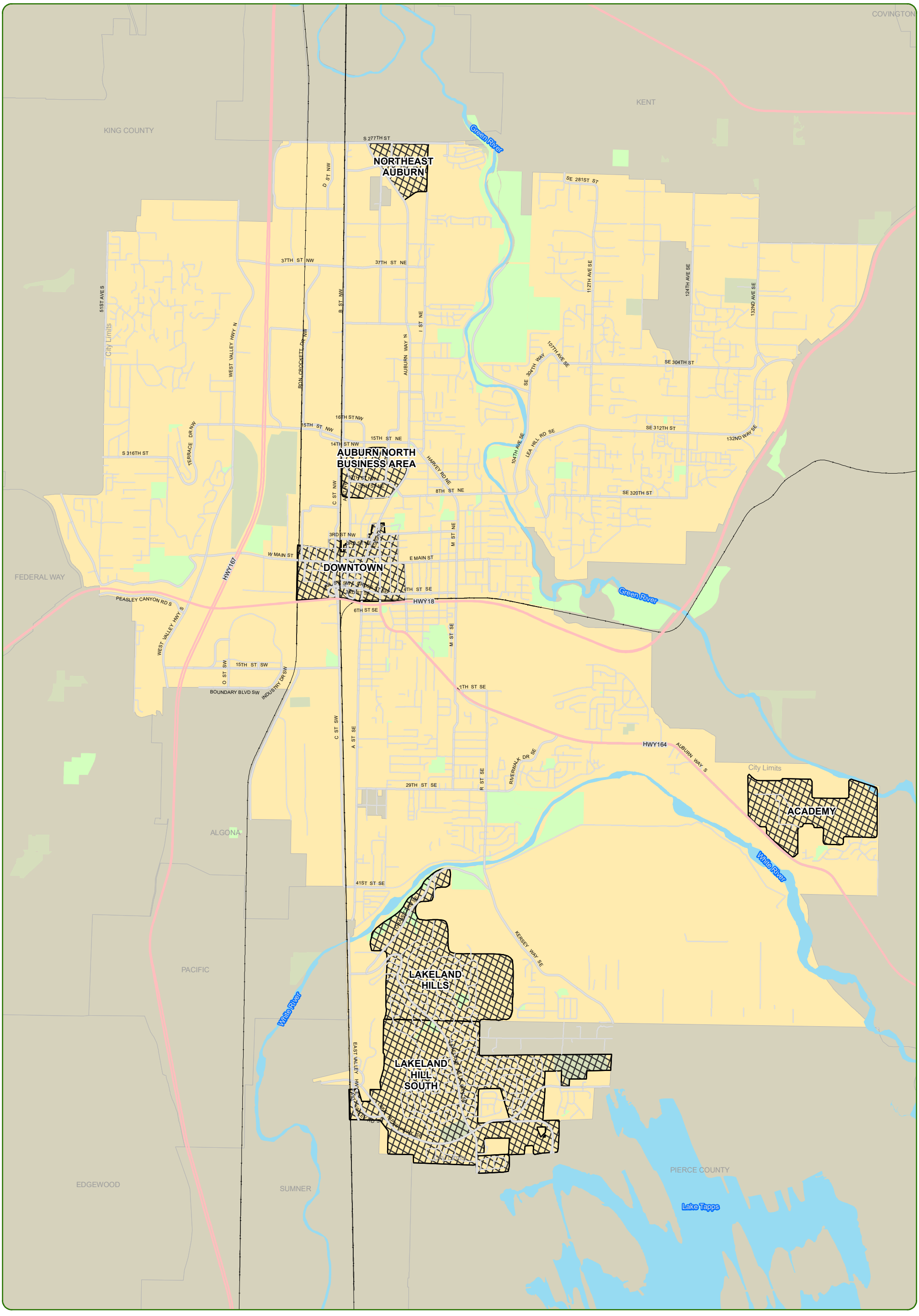
0 ¼ ½ ¾ 1 Mi

N W E S

Printed Date: 1/15/2019
Map ID: 6061

The information shown and/or distributed is for general reference purposes only and does not necessarily represent exact geographic or cartographic data.
The City of Auburn makes no warranties as to its accuracy.

Map is current through Ordinance No. 6584 & 6698, December 17, 2018



Adopted Areas

Adopted Areas

Special Planning Areas

(Map 1.4)

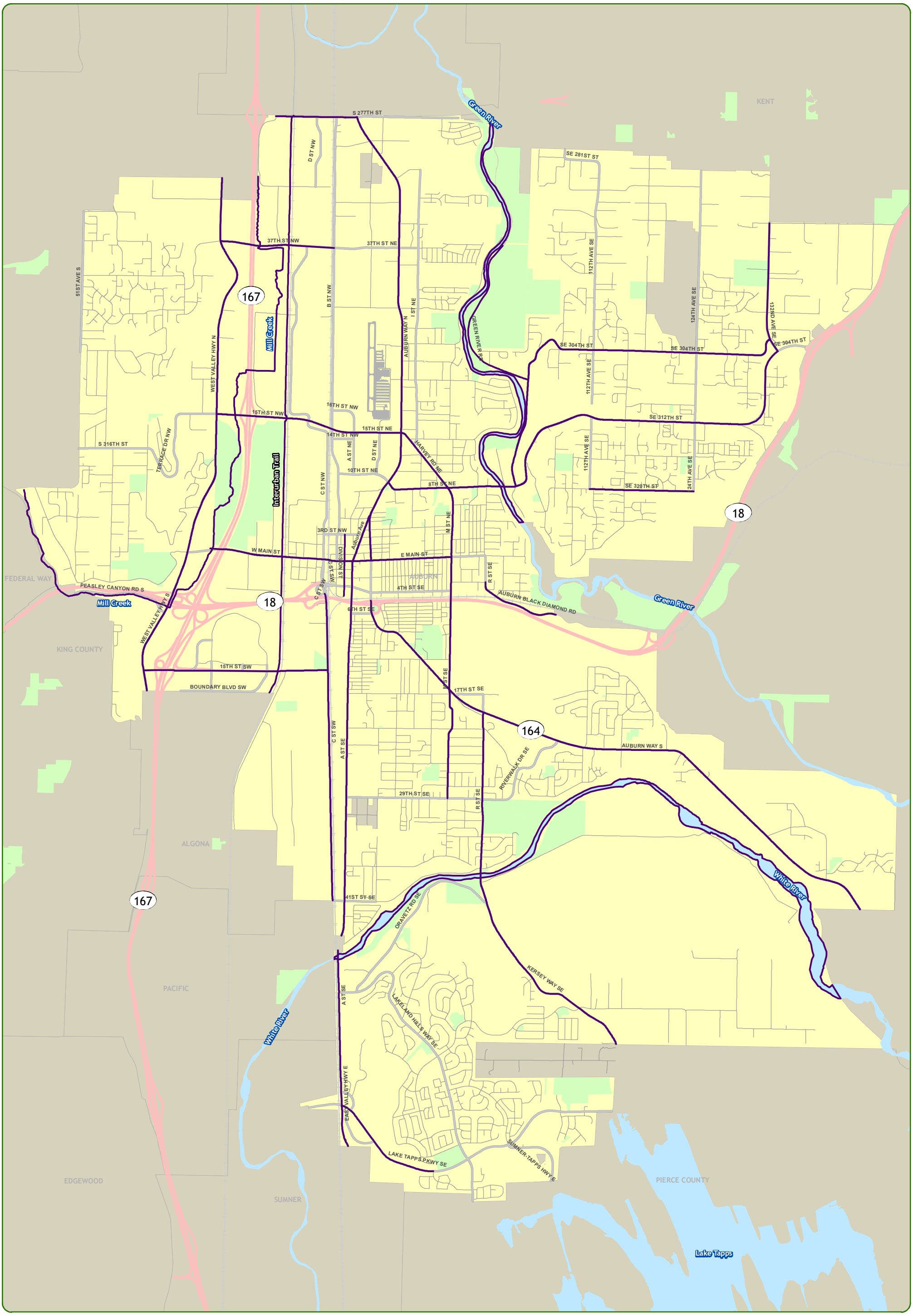
N
W E
S

0 ¼ ½ ¾ 1 Mi

Printed Date: 1/9/2019
Map ID: 6093

The information shown and/or distributed is for general reference purposes only and does not necessarily represent exact geographic or cartographic data. The City of Auburn makes no warranties as to its accuracy.

Map is current through Ordinance No. 6584 & 6698, December 17, 2018



Impression Corridors

Special Planning Areas

(Map 1.5)

Impression Corridors

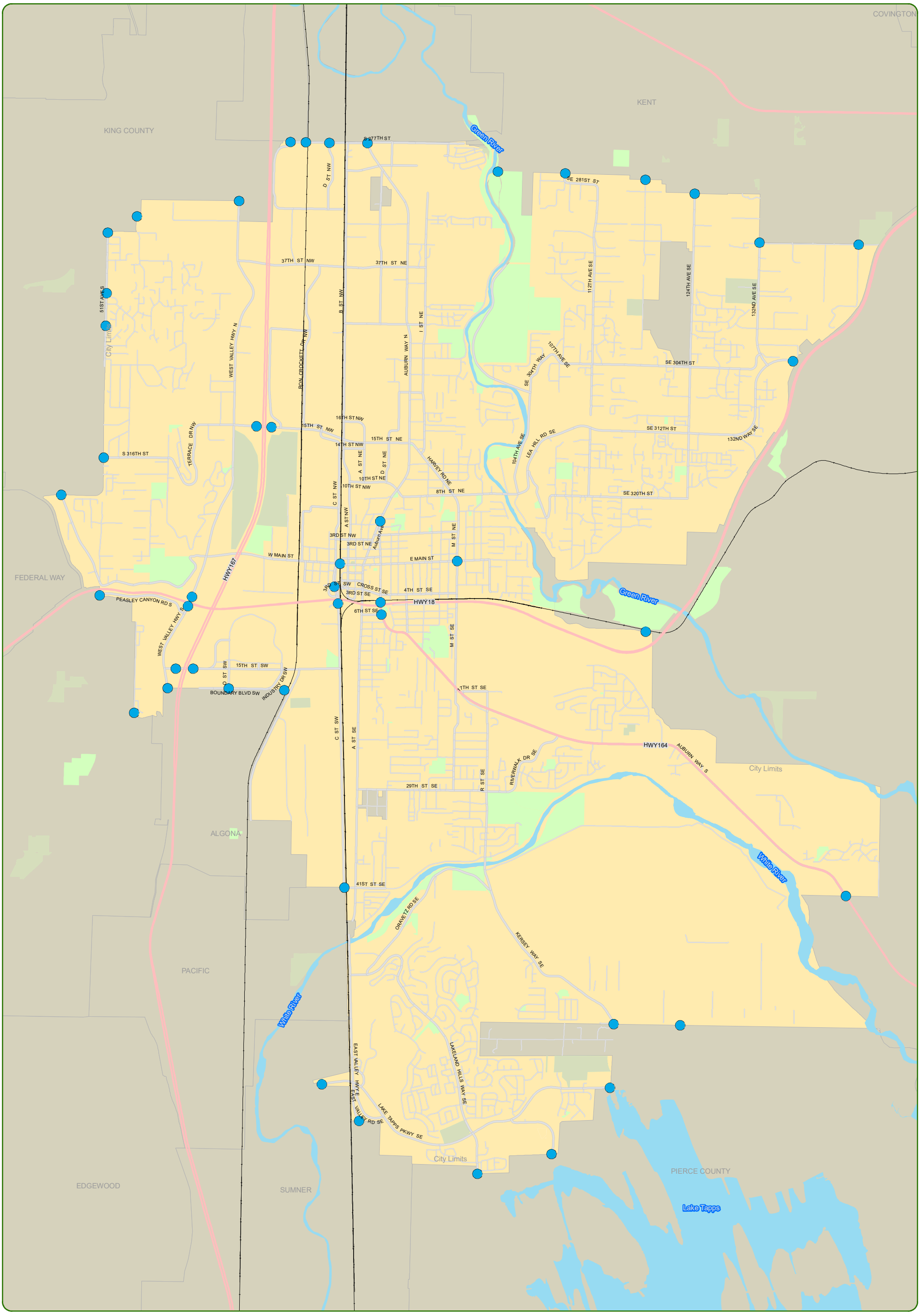
N
W E
S

0 ¼ ½ ¾ 1 Mi

Printed Date: 1/9/2019
Map ID: 6070

Information shown is for general reference purposes only and does not necessarily represent exact geographic or cartographic data as mapped. The City of Auburn makes no warranties as to its accuracy.

Map is current through Ordinance No. 6698, December 17, 2018



Gateways

Special Planning Areas

(Map 1.6)

● Gateways

N
W E
S

0 ¼ ½ ¾ 1 Mi

Printed Date: 1/9/2019
Map ID: 6092

The information shown and/or distributed is for general reference purposes only and does not necessarily represent exact geographic or cartographic data.
The City of Auburn makes no warranties as to its accuracy.

Map is Current through Ordinance No. 6584 & 6698, December 17, 2018

ATTACHMENT 1D

FLOW FACTORS

Table 1 - Existing Acreage by Land Use Classification

Land Use Classification	Total	A1	A1c	A1d	A3	A4	A6	A7	A9	A10	A11	A12	A13	A14	A15	A16	AUB Y-1	AUB Y-2	AUB Y-3	AUB Y-4	WINT003	MSTTR02A	AUBURN53
SINGLE FAMILY	2,778	0.0	40.2	22.6	31.4	0.0	72.4	9.9	17.0	23.2	7.7	20.4	40.1	55.8	46.4	93.5	90.8	603.1	355.4	144.1	624.1	306.5	173.7
MODERATE DENSITY	147	0.0	0.0	0.0	5.0	0.0	2.0	0.0	4.6	2.8	2.6	0.0	17.2	1.7	14.9	27.5	0.0	0.0	20.9	8.5	3.2	35.9	0.0
RESIDENTIAL	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.7	0.0	0.0	0.0	0.0
OPEN SPACE	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.4	0.0	0.1
NEIGHBORHOOD	64	0.0	0.0	0.0	0.0	0.9	8.2	6.1	9.8	0.0	1.7	0.0	1.5	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.7	0.0
NEIGHBORHOOD COMMERCIAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MULTI-FAMILY	335	0.0	52.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.5	0.0	26.8	57.4	35.8	104.8	50.0	0.0
LIGHT INDUSTRIAL	721	103.2	1.0	0.0	0.0	6.7	0.0	36.3	8.6	1.9	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	70.7	0.0	490.6
LIGHT	165	0.0	0.0	0.0	0.0	43.1	12.4	0.0	4.9	4.1	0.6	0.0	0.0	1.2	4.7	10.2	0.0	25.2	11.6	0.0	31.6	13.7	1.7
INSTITUTIONAL	953	0.0	7.9	0.0	23.4	0.0	0.0	4.8	15.9	36.6	4.1	0.0	4.4	0.0	24.4	28.3	115.3	191.2	75.1	103.9	169.9	52.1	95.9
HEAVY	861	0.2	80.4	33.3	28.0	66.0	3.0	1.0	7.4	12.6	0.0	0.0	0.0	0.0	1.8	33.5	0.0	0.0	5.0	0.0	266.6	56.7	265.6
HEAVY	414	61.3	0.0	1.5	8.8	0.0	0.0	23.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.5	0.0	0.0	0.0	0.0	238.9	10.8	37.6
DOWNTOWN	58	0.0	0.0	0.0	0.0	0.0	0.0	27.4	0.0	30.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 2 - Planning Flow Factors

Land Use Classification	Total	A1	A1c	A1d	A3	A4	A6	A7	A9	A10	A11	A12	A13	A14	A15	A16	AUB Y-1	AUB Y-2	AUB Y-3	AUB Y-4	WINT003	MSTTR02A	AUBURN53
SINGLE FAMILY	920	850	600	950	2,100		900	800	600	250	400	900	650	1,900	600	850	1,500	1,100	1,050	400	750	800	900
MODERATE DENSITY	950				2,100		1,000		900	600	600		750	2,400	800	1,000			1,000	600	800	1,000	
RESIDENTIAL	800																		800				
OPEN SPACE	0																						
NEIGHBORHOOD	1020					1,000	1,000	1,000	1,000		800		1,000	1,800								1,000	
MULTI-FAMILY	2440		1,400	2,500												1,700		2,600	2,500	1,500	3,000	3,000	
LIGHT INDUSTRIAL	530	500	250		700	800		600	500	200						500					800		500
LIGHT	640					800	800		500	300	300			1,200	500			500	600		800	600	500
INSTITUTIONAL	1230		400		2,500		1,500	1,000	1,000	200	500		900	1,800	550	800	2,300	1,400	1,000	300	1,500	1,000	1,000
HEAVY	1920	800	600	1,800	3,800	3,200	3,000	1,600	1,500	450					800	1,500			1,500		2,500	1,400	1,500
HEAVY	1890	750		1,700	3,600			1,600								1,500					2,200	1,700	2,000
DOWNTOWN	1500							2,300		800													

Table 3 - ADWF by Land Use

Land Use Classification	Total	A1	A1c	A1d	A3	A4	A6	A7	A9	A10	A11	A12	A13	A14	A15	A16	AUB Y-1	AUB Y-2	AUB Y-3	AUB Y-4	WINT003	MSTTR02A	AUBURN53
SINGLE FAMILY	2,405,279	3	24,102	21,502	66,001	-	65,130	7,946	10,208	5,799	3,063	18,320	26,060	######	27,822	79,452	136,247	663,409	373,206	57,653	468,051	245,191	156,360
MODERATE DENSITY	140,545	-	-	-	10,405	-	2,009	-	4,156	1,669	1,552	-	12,922	4,012	11,881	27,509	-	-	20,866	5,126	2,569	35,871	-
RESIDENTIAL	8,540	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8,540	-	-	-	-
OPEN SPACE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEIGHBORHOOD	65,725	-	-	-	-	910	8,233	6,144	9,765	-	1,400	-	1,474	4,073	-	-	-	-	-	-	-	33,726	-
MULTI-FAMILY	817,559	-	73,176	505	-	-	-	-	-	-	-	-	-	-	-	12,780	-	69,623	143,472	53,659	314,256	150,088	-
LIGHT INDUSTRIAL	140,237	51,614	241	-	-	5,378	-	21,783	4,301	374	-	-	-	-	-	0	-	-	-	-	56,544	-	245,314
LIGHT	105,240	-	-	-	-	34,478	9,957	-	2,458	1,224	193	-	-	1,471	2,366	-	-	12,596	6,955	-	25,301	8,241	835
INSTITUTIONAL	1,078,078	-	3,169	-	58,607	-	16	4,809	15,869	7,315	2,026	-	3,988	21	13,437	22,668	265,188	267,688	75,122	31,157	254,895	52,102	95,935
HEAVY	1,258,311	127	48,229	59,970	106,241	211,291	8,956	1,571	11,109	5,682	-	-	-	-	1,464	50,259	-	-	7,425	-	666,624	79,364	398,378
HEAVY	709,541	45,965	-	2,487	31,630	-	-	38,245	-	-	-	-	-	-	-	47,211	-	-	-	-	525,561	18,441	75,148
DOWNTOWN	87,521	-	-	-	-	-	-	63,013	-	24,509	-	-	-	-	-	-	-	-	-	-	-	-	-
Measured ADWF	7.81	0.099	0.146	0.085	0.281	0.255	0.092	0.145	0.057	0.046	0.008	0.018	0.044	0.122	0.057	0.240	0.401	1.033	0.657	0.143	2.321	0.611	0.949
Estimated ADWF	7.79	0.098	0.149	0.084	0.273	0.252	0.094	0.144	0.058	0.047	0.008	0.018	0.044	0.116	0.057	0.240	0.401	1.013	0.636	0.148	2.314	0.623	0.972
% Difference		1%	-2%	1%	3%	1%	-3%	1%	-1%	-1%	0%	0%	-1%	5%	-1%	0%	0%	2%	3%	-3%	0%	-2%	-2%

AUBWV016	SRT11	WINT035	Unmetered
0.0	0.0	0.0	18.1
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	106.7
0.0	0.0	0.0	0.0
0.0	0.0	0.0	4.1
0.0	0.0	0.0	37.8
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0

FM_Basin_1st_Season	FM_Basin_1st_Season
A1	Unmetered
A10	A1
A11	AUB Y-2
A12	AUBURN53
A13	MSTTR02A
A14	A16
A15	A3
A16	WINT035
A1c	A1c
A1d	AUBY-1
A2	AUB Y-3
A3	A13
A4	A12
A6	WINT003
A7	SRT11
A9	A1d
AUB Y-2	A10
AUB Y-3	A14
AUB Y-4	A7
AUBWV016	A15
AUBY-1	A6
MSTTR02A	AUB Y-4
SRT11	AUBWV016
Unmetered	A9
WINT035	A2
	A11

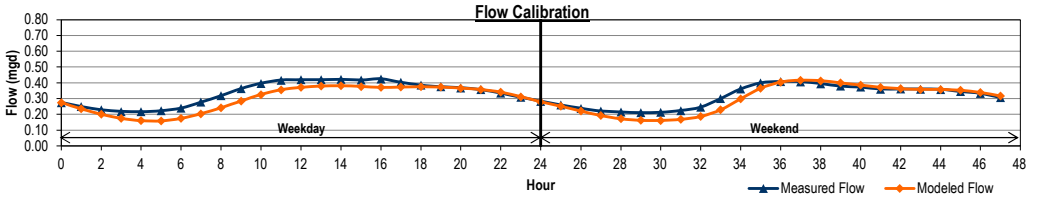
ATTACHMENT 1E

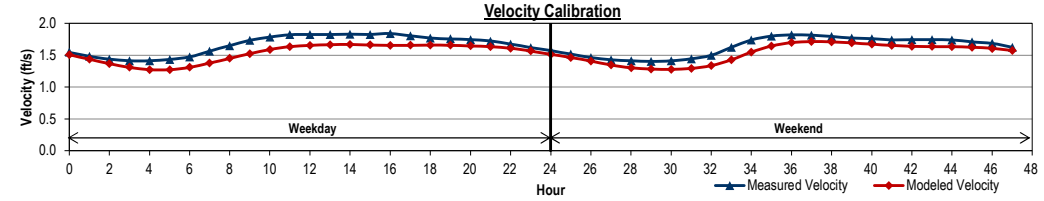
DRY WEATHER CALIBRATION SUMMARY SHEETS

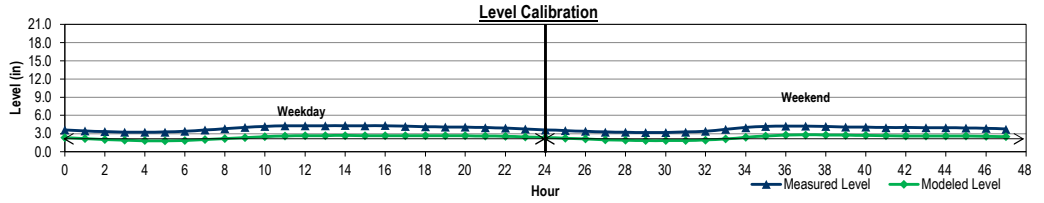
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE A1 DRY WEATHER FLOW CALIBRATION

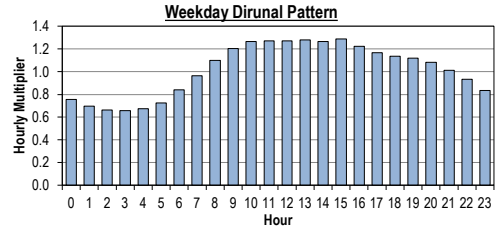
		Measured Data			Modeled Data				Diurnal		
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Level Diff (in)	Initial Curve	Modified Curve	Calibrated Diurnal
Weekday	0	0.28	3.59	1.55	0.28	2.33	1.51	1.26	0.76	0.76	0.76
	1	0.25	3.44	1.48	0.24	2.17	1.44	1.27	0.70	0.70	0.70
	2	0.23	3.32	1.44	0.20	2.02	1.37	1.30	0.66	0.66	0.66
	3	0.22	3.25	1.41	0.18	1.90	1.31	1.34	0.66	0.66	0.66
	4	0.22	3.23	1.41	0.16	1.83	1.27	1.40	0.68	0.68	0.68
	5	0.22	3.26	1.43	0.16	1.81	1.27	1.45	0.73	0.73	0.73
	6	0.24	3.36	1.47	0.17	1.88	1.31	1.49	0.84	0.84	0.84
	7	0.28	3.58	1.56	0.20	2.01	1.38	1.56	0.96	0.96	0.96
	8	0.32	3.79	1.65	0.24	2.17	1.45	1.62	1.10	1.10	1.10
	9	0.36	4.02	1.73	0.28	2.34	1.53	1.68	1.20	1.20	1.20
	10	0.40	4.20	1.79	0.33	2.49	1.59	1.71	1.26	1.26	1.26
	11	0.42	4.29	1.82	0.36	2.60	1.63	1.69	1.27	1.27	1.27
	12	0.42	4.30	1.83	0.37	2.65	1.66	1.65	1.27	1.27	1.27
	13	0.42	4.30	1.83	0.38	2.67	1.67	1.63	1.28	1.28	1.28
	14	0.42	4.31	1.83	0.38	2.68	1.67	1.63	1.27	1.27	1.27
	15	0.42	4.28	1.83	0.38	2.66	1.66	1.62	1.29	1.29	1.29
	16	0.43	4.31	1.84	0.37	2.64	1.65	1.66	1.22	1.22	1.22
	17	0.40	4.21	1.81	0.37	2.64	1.66	1.57	1.17	1.17	1.17
	18	0.38	4.13	1.77	0.38	2.65	1.66	1.49	1.14	1.14	1.14
	19	0.38	4.09	1.76	0.37	2.64	1.66	1.45	1.12	1.12	1.12
	20	0.37	4.05	1.75	0.37	2.62	1.65	1.43	1.08	1.08	1.08
	21	0.36	4.00	1.72	0.36	2.60	1.63	1.40	1.01	1.01	1.01
	22	0.33	3.89	1.68	0.34	2.55	1.61	1.34	0.93	0.93	0.93
	23	0.31	3.76	1.62	0.31	2.46	1.57	1.31	0.83	0.83	0.83
Weekend	24	0.28	3.62	1.57	0.28	2.34	1.51	1.28	0.79	0.79	0.79
	25	0.26	3.49	1.52	0.25	2.23	1.46	1.26	0.72	0.72	0.72
	26	0.24	3.37	1.47	0.22	2.11	1.41	1.25	0.67	0.67	0.67
	27	0.22	3.26	1.43	0.19	1.99	1.35	1.27	0.65	0.65	0.65
	28	0.22	3.21	1.41	0.17	1.89	1.30	1.33	0.64	0.64	0.64
	29	0.21	3.18	1.40	0.16	1.84	1.28	1.34	0.65	0.65	0.65
	30	0.21	3.20	1.41	0.16	1.83	1.28	1.37	0.68	0.68	0.68
	31	0.22	3.26	1.44	0.17	1.86	1.29	1.41	0.75	0.75	0.75
	32	0.25	3.39	1.50	0.19	1.94	1.34	1.45	0.91	0.91	0.91
	33	0.30	3.69	1.62	0.23	2.12	1.43	1.57	1.10	1.10	1.10
	34	0.36	4.01	1.74	0.30	2.38	1.55	1.62	1.21	1.21	1.21
	35	0.40	4.19	1.80	0.36	2.61	1.65	1.58	1.24	1.24	1.24
	36	0.41	4.23	1.82	0.40	2.74	1.70	1.49	1.24	1.24	1.24
	37	0.41	4.23	1.82	0.42	2.78	1.71	1.44	1.20	1.20	1.20
	38	0.39	4.17	1.79	0.41	2.78	1.71	1.39	1.15	1.15	1.15
	39	0.38	4.09	1.77	0.40	2.74	1.69	1.35	1.13	1.13	1.13
	40	0.37	4.06	1.76	0.39	2.69	1.67	1.37	1.09	1.09	1.09
	41	0.36	4.00	1.74	0.37	2.64	1.65	1.35	1.09	1.09	1.09
	42	0.36	3.99	1.75	0.36	2.61	1.64	1.38	1.09	1.09	1.09
	43	0.36	3.99	1.74	0.36	2.60	1.64	1.39	1.09	1.09	1.09
	44	0.36	3.98	1.74	0.36	2.60	1.64	1.38	1.05	1.05	1.05
	45	0.35	3.92	1.71	0.35	2.58	1.63	1.34	1.01	1.01	1.01
	46	0.33	3.86	1.69	0.34	2.54	1.61	1.32	0.93	0.93	0.93
	47	0.31	3.74	1.62	0.32	2.47	1.57	1.27	0.86	0.86	0.86
Average											
	Weekday	**0.34**	**3.87**	**1.67**	**0.30**	**2.38**	**1.53**		**1.02**	**1.02**	**1.02**
	Weekend	**0.32**	**3.75**	**1.64**	**0.30**	**2.37**	**1.53**		**0.96**	**0.96**	**0.96**
	ADWF[1]	**0.33**	**3.84**	**1.66**	**0.30**	**2.37**	**1.53**		**1.00**	**1.00**	**1.00**
% Error											
	Weekday				-11.0%			1.71			
	Weekend				-5.3%			1.62			

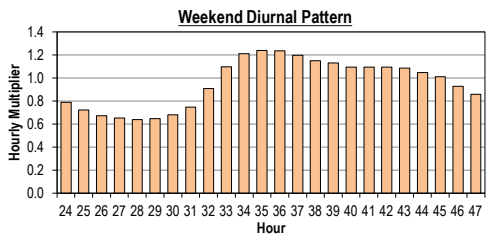
Note:







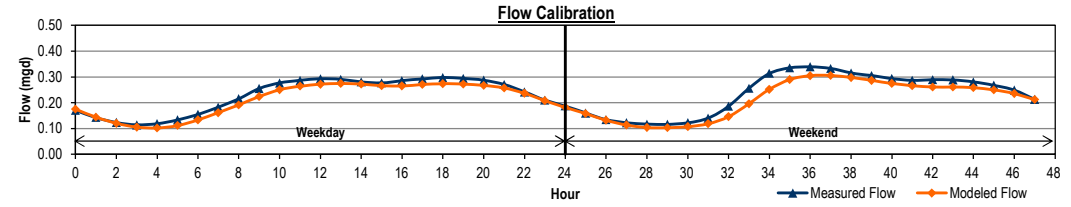


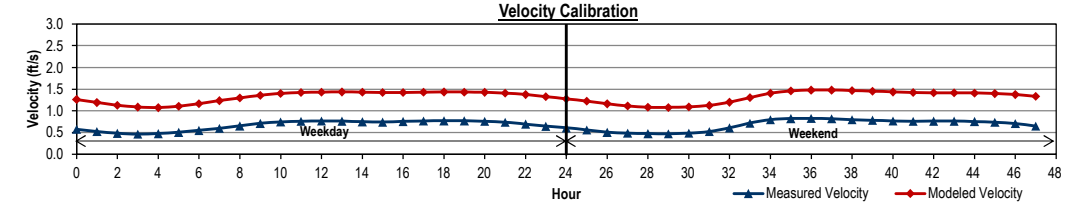


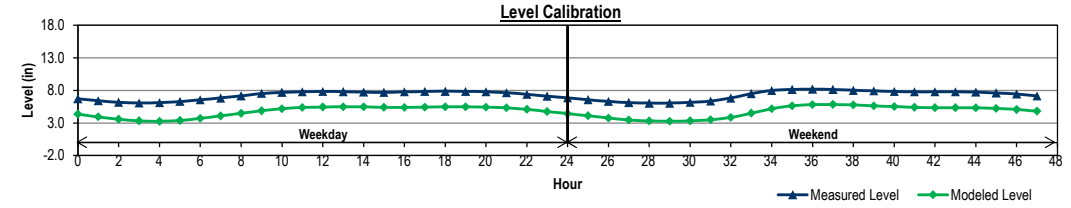
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE A1c DRY WEATHER FLOW CALIBRATION

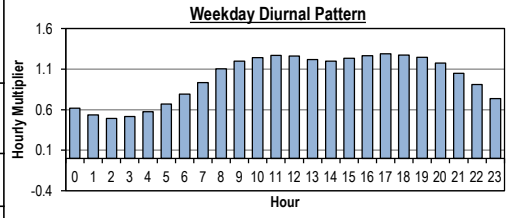
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Level Diff (in)	Diurnal Initial Curve	Diurnal Modified Curve	Diurnal Calibrated Diurnal
Weekday	0	0.17	6.70	0.58	0.18	4.35	1.26	2.35	0.62	0.62	0.62
	1	0.14	6.40	0.52	0.14	3.93	1.19	2.47	0.53	0.53	0.53
	2	0.12	6.17	0.48	0.12	3.57	1.13	2.60	0.49	0.49	0.49
	3	0.11	6.05	0.46	0.11	3.33	1.09	2.72	0.51	0.51	0.51
	4	0.12	6.11	0.48	0.10	3.25	1.08	2.86	0.58	0.58	0.58
	5	0.13	6.28	0.51	0.11	3.37	1.11	2.91	0.67	0.67	0.67
	6	0.15	6.54	0.55	0.13	3.69	1.17	2.85	0.79	0.79	0.79
	7	0.18	6.83	0.60	0.16	4.08	1.23	2.76	0.93	0.93	0.93
	8	0.22	7.15	0.65	0.19	4.47	1.30	2.68	1.11	1.11	1.11
	9	0.26	7.51	0.72	0.22	4.87	1.36	2.65	1.20	1.20	1.20
	10	0.28	7.69	0.75	0.25	5.18	1.40	2.50	1.24	1.24	1.24
	11	0.29	7.77	0.76	0.26	5.36	1.42	2.41	1.27	1.27	1.27
	12	0.29	7.82	0.77	0.27	5.45	1.43	2.37	1.26	1.26	1.26
	13	0.29	7.81	0.76	0.27	5.49	1.44	2.32	1.22	1.22	1.22
	14	0.28	7.73	0.75	0.27	5.47	1.43	2.26	1.20	1.20	1.20
	15	0.28	7.70	0.74	0.27	5.40	1.42	2.30	1.24	1.24	1.24
	16	0.29	7.76	0.76	0.26	5.38	1.42	2.39	1.27	1.27	1.27
	17	0.29	7.82	0.77	0.27	5.43	1.43	2.39	1.29	1.29	1.29
	18	0.30	7.86	0.77	0.27	5.48	1.44	2.38	1.27	1.27	1.27
	19	0.29	7.83	0.77	0.27	5.47	1.43	2.37	1.25	1.25	1.25
	20	0.29	7.78	0.76	0.27	5.41	1.43	2.37	1.17	1.17	1.17
	21	0.27	7.64	0.74	0.26	5.31	1.41	2.33	1.05	1.05	1.05
	22	0.24	7.39	0.70	0.24	5.08	1.38	2.31	0.91	0.91	0.91
	23	0.21	7.10	0.65	0.21	4.76	1.33	2.34	0.74	0.74	0.74
Weekend	24	0.19	6.86	0.61	0.18	4.42	1.28	2.44	0.69	0.69	0.69
	25	0.16	6.57	0.56	0.16	4.11	1.22	2.47	0.58	0.58	0.58
	26	0.13	6.30	0.51	0.13	3.75	1.16	2.54	0.53	0.53	0.53
	27	0.12	6.13	0.49	0.11	3.46	1.11	2.67	0.51	0.51	0.51
	28	0.12	6.04	0.48	0.10	3.30	1.08	2.74	0.50	0.50	0.50
	29	0.12	6.05	0.48	0.10	3.27	1.08	2.78	0.53	0.53	0.53
	30	0.12	6.15	0.49	0.11	3.32	1.09	2.82	0.61	0.61	0.61
	31	0.14	6.35	0.52	0.12	3.48	1.13	2.86	0.81	0.81	0.81
	32	0.19	6.83	0.61	0.15	3.86	1.20	2.97	1.11	1.11	1.11
	33	0.26	7.48	0.72	0.20	4.49	1.31	2.99	1.36	1.36	1.36
	34	0.31	7.97	0.80	0.25	5.17	1.40	2.80	1.45	1.45	1.45
	35	0.33	8.15	0.82	0.29	5.62	1.46	2.53	1.47	1.47	1.47
	36	0.34	8.19	0.83	0.30	5.81	1.48	2.38	1.44	1.44	1.44
	37	0.33	8.15	0.82	0.31	5.83	1.48	2.32	1.37	1.37	1.37
	38	0.32	8.01	0.80	0.30	5.75	1.47	2.26	1.32	1.32	1.32
	39	0.31	7.92	0.78	0.29	5.63	1.45	2.29	1.27	1.27	1.27
	40	0.29	7.83	0.77	0.28	5.51	1.44	2.32	1.24	1.24	1.24
	41	0.29	7.77	0.76	0.27	5.40	1.42	2.37	1.25	1.25	1.25
	42	0.29	7.77	0.77	0.26	5.34	1.42	2.43	1.25	1.25	1.25
	43	0.29	7.77	0.77	0.26	5.33	1.42	2.44	1.22	1.22	1.22
	44	0.28	7.72	0.75	0.26	5.31	1.41	2.41	1.16	1.16	1.16
	45	0.27	7.59	0.74	0.25	5.22	1.40	2.37	1.08	1.08	1.08
	46	0.25	7.44	0.71	0.24	5.06	1.38	2.38	0.92	0.92	0.92
	47	0.21	7.13	0.65	0.21	4.80	1.33	2.33	0.81	0.81	0.81
Average											
	Weekday	**0.23**	**7.23**	**0.67**	**0.21**	**4.73**	**1.32**		**0.99**	**0.99**	**0.99**
	Weekend	**0.24**	**7.26**	**0.68**	**0.21**	**4.72**	**1.32**		**1.02**	**1.02**	**1.02**
	ADWF[1]	**0.23**	**7.24**	**0.67**	**0.21**	**4.73**	**1.32**		**1.00**	**1.00**	**1.00**
% Error											
	Weekday				-6.9%			2.91			
	Weekend				-9.5%			2.99			

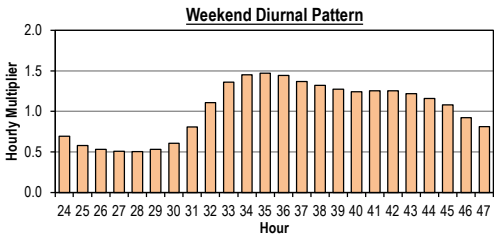
Note:







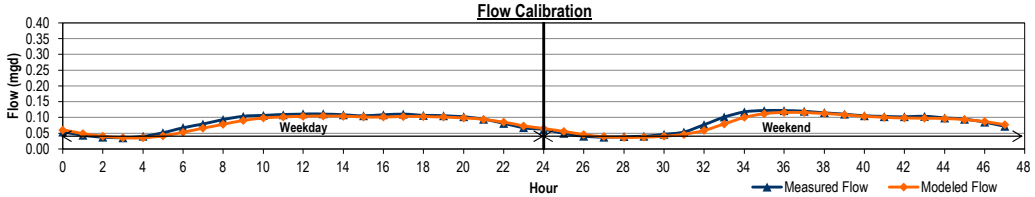


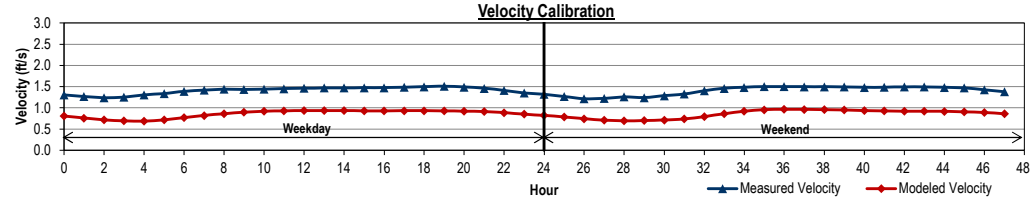


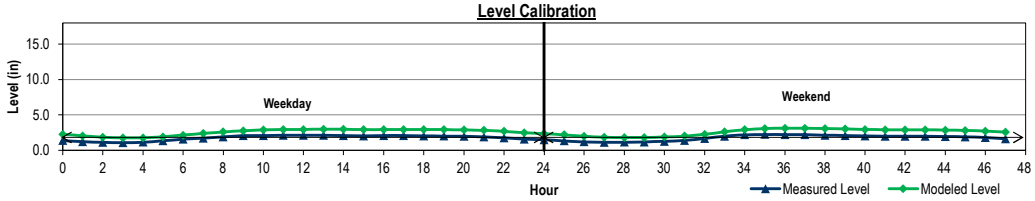
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE A1d DRY WEATHER FLOW CALIBRATION

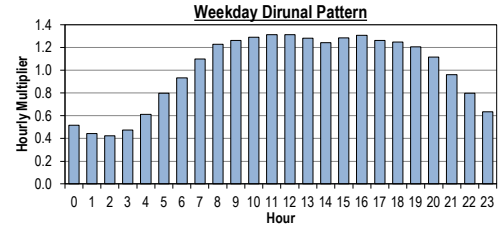
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Level Diff (in)	Diurnal Initial Curve	Diurnal Modified Curve	Diurnal Calibrated Diurnal
Weekday	0	0.05	1.39	1.31	0.06	2.28	0.81	-0.89	0.52	0.52	0.52
	1	0.04	1.22	1.27	0.05	2.06	0.76	-0.83	0.44	0.44	0.44
	2	0.04	1.12	1.24	0.04	1.88	0.72	-0.76	0.42	0.42	0.42
	3	0.04	1.08	1.26	0.04	1.77	0.69	-0.69	0.47	0.47	0.47
	4	0.04	1.15	1.30	0.04	1.77	0.69	-0.63	0.61	0.61	0.61
	5	0.05	1.34	1.34	0.04	1.91	0.72	-0.57	0.80	0.80	0.80
	6	0.07	1.57	1.39	0.05	2.16	0.77	-0.59	0.93	0.93	0.93
	7	0.08	1.72	1.42	0.07	2.39	0.82	-0.67	1.10	1.10	1.10
	8	0.09	1.91	1.44	0.08	2.60	0.86	-0.69	1.23	1.23	1.23
	9	0.10	2.07	1.44	0.09	2.78	0.90	-0.71	1.26	1.26	1.26
	10	0.11	2.10	1.45	0.10	2.89	0.92	-0.79	1.29	1.29	1.29
	11	0.11	2.12	1.45	0.10	2.94	0.93	-0.82	1.31	1.31	1.31
	12	0.11	2.14	1.46	0.10	2.97	0.94	-0.83	1.31	1.31	1.31
	13	0.11	2.13	1.47	0.10	2.98	0.94	-0.85	1.28	1.28	1.28
	14	0.11	2.09	1.47	0.10	2.97	0.94	-0.88	1.24	1.24	1.24
	15	0.11	2.04	1.48	0.10	2.93	0.93	-0.89	1.28	1.28	1.28
	16	0.11	2.09	1.48	0.10	2.93	0.93	-0.84	1.31	1.31	1.31
	17	0.11	2.11	1.49	0.10	2.96	0.94	-0.85	1.26	1.26	1.26
	18	0.11	2.04	1.50	0.10	2.96	0.94	-0.91	1.25	1.25	1.25
	19	0.11	2.01	1.51	0.10	2.93	0.93	-0.91	1.21	1.21	1.21
	20	0.10	1.98	1.49	0.10	2.89	0.92	-0.91	1.12	1.12	1.12
	21	0.09	1.91	1.46	0.09	2.82	0.91	-0.92	0.96	0.96	0.96
	22	0.08	1.76	1.41	0.09	2.69	0.89	-0.93	0.80	0.80	0.80
	23	0.07	1.59	1.35	0.07	2.50	0.85	-0.91	0.63	0.63	0.63
Weekend	24	0.06	1.52	1.32	0.07	2.37	0.82	-0.85	0.59	0.59	0.59
	25	0.05	1.34	1.27	0.06	2.19	0.79	-0.85	0.48	0.48	0.48
	26	0.04	1.20	1.22	0.05	1.99	0.75	-0.79	0.45	0.45	0.45
	27	0.04	1.14	1.23	0.04	1.85	0.71	-0.71	0.46	0.46	0.46
	28	0.04	1.15	1.26	0.04	1.80	0.70	-0.65	0.48	0.48	0.48
	29	0.04	1.19	1.24	0.04	1.82	0.70	-0.63	0.55	0.55	0.55
	30	0.05	1.29	1.29	0.04	1.89	0.71	-0.60	0.64	0.64	0.64
	31	0.05	1.40	1.33	0.05	2.01	0.74	-0.62	0.91	0.91	0.91
	32	0.08	1.69	1.40	0.06	2.26	0.79	-0.57	1.19	1.19	1.19
	33	0.10	2.00	1.46	0.08	2.62	0.86	-0.62	1.39	1.39	1.39
	34	0.12	2.20	1.48	0.10	2.92	0.92	-0.73	1.44	1.44	1.44
	35	0.12	2.24	1.50	0.11	3.08	0.96	-0.84	1.44	1.44	1.44
	36	0.12	2.23	1.50	0.12	3.13	0.97	-0.90	1.41	1.41	1.41
	37	0.12	2.21	1.50	0.12	3.12	0.97	-0.92	1.36	1.36	1.36
	38	0.12	2.15	1.50	0.11	3.08	0.96	-0.93	1.30	1.30	1.30
	39	0.11	2.10	1.49	0.11	3.03	0.95	-0.93	1.25	1.25	1.25
	40	0.11	2.04	1.48	0.10	2.97	0.94	-0.93	1.22	1.22	1.22
	41	0.10	2.00	1.49	0.10	2.91	0.93	-0.91	1.21	1.21	1.21
	42	0.10	1.99	1.49	0.10	2.89	0.92	-0.90	1.23	1.23	1.23
	43	0.10	2.00	1.50	0.10	2.88	0.92	-0.88	1.17	1.17	1.17
	44	0.10	1.95	1.48	0.10	2.87	0.92	-0.92	1.12	1.12	1.12
	45	0.09	1.91	1.47	0.09	2.81	0.91	-0.90	1.01	1.01	1.01
	46	0.09	1.80	1.43	0.09	2.72	0.89	-0.92	0.85	0.85	0.85
	47	0.07	1.64	1.38	0.08	2.57	0.86	-0.92	0.73	0.73	0.73
Average											
	Weekday	**0.08**	**1.78**	**1.41**	**0.08**	**2.58**	**0.86**		**1.00**	**1.00**	**1.00**
	Weekend	**0.08**	**1.77**	**1.41**	**0.08**	**2.57**	**0.86**		**0.99**	**0.99**	**0.99**
	ADWF[1]	**0.08**	**1.77**	**1.41**	**0.08**	**2.58**	**0.86**		**1.00**	**1.00**	**1.00**
% Error											
	Weekday				-5.4%			0.93			
	Weekend				-4.7%			0.93			

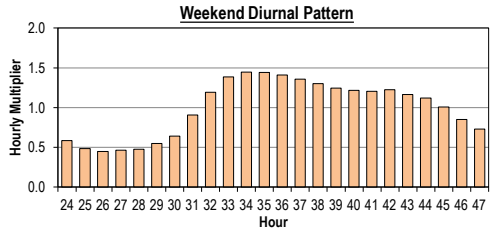
Note:







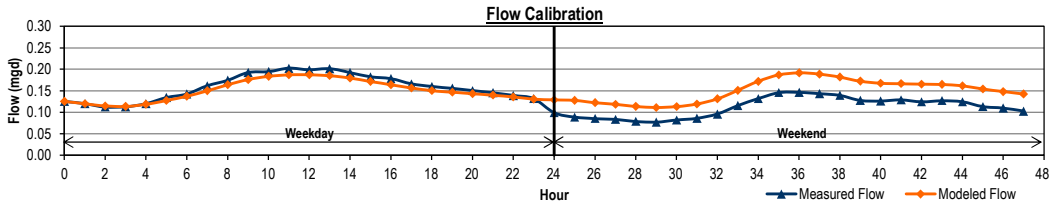


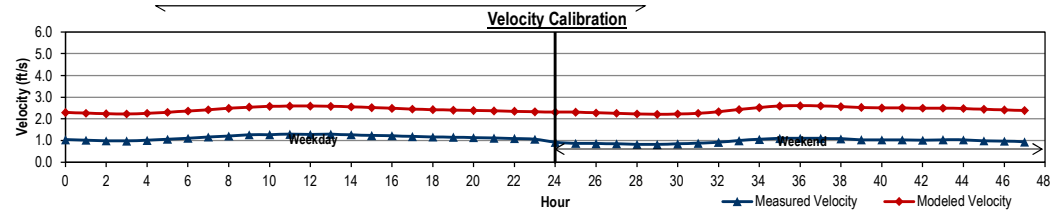


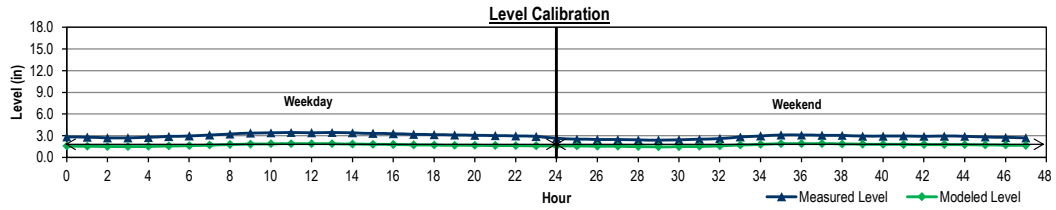
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE A3 DRY WEATHER FLOW CALIBRATION

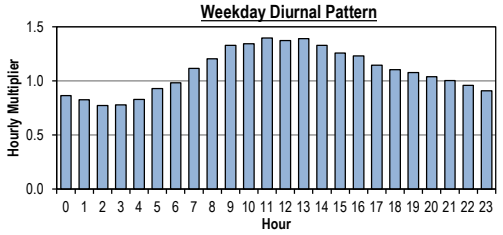
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Level Diff (in)	Diurnal Initial Curve	Diurnal Modified Curve	Diurnal Calibrated Diurnal
Weekday	0	0.13	2.85	1.04	0.13	1.58	2.29	1.27	0.83	0.86	0.86
	1	0.12	2.80	1.02	0.12	1.55	2.26	1.25	0.77	0.83	0.83
	2	0.11	2.73	0.99	0.11	1.52	2.23	1.21	0.78	0.77	0.77
	3	0.11	2.72	0.99	0.11	1.51	2.23	1.22	0.83	0.78	0.78
	4	0.12	2.79	1.02	0.12	1.53	2.26	1.25	0.93	0.83	0.83
	5	0.13	2.91	1.07	0.13	1.58	2.30	1.33	0.98	0.93	0.93
	6	0.14	2.97	1.10	0.14	1.64	2.36	1.33	1.12	0.98	0.98
	7	0.16	3.13	1.17	0.15	1.71	2.42	1.42	1.20	1.12	1.12
	8	0.17	3.24	1.21	0.16	1.79	2.49	1.46	1.33	1.20	1.20
	9	0.19	3.38	1.27	0.18	1.85	2.54	1.53	1.34	1.33	1.33
	10	0.19	3.40	1.27	0.18	1.89	2.57	1.51	1.40	1.34	1.34
	11	0.20	3.46	1.30	0.19	1.90	2.59	1.55	1.37	1.40	1.40
	12	0.20	3.43	1.29	0.19	1.91	2.59	1.53	1.39	1.37	1.37
	13	0.20	3.46	1.29	0.19	1.89	2.58	1.56	1.33	1.39	1.39
	14	0.19	3.40	1.27	0.18	1.87	2.55	1.53	1.26	1.33	1.33
	15	0.18	3.33	1.23	0.17	1.83	2.52	1.50	1.23	1.26	1.26
	16	0.18	3.30	1.22	0.16	1.79	2.49	1.51	1.15	1.23	1.23
	17	0.17	3.21	1.19	0.16	1.75	2.45	1.46	1.10	1.15	1.15
	18	0.16	3.16	1.17	0.15	1.72	2.42	1.44	1.08	1.10	1.10
	19	0.16	3.13	1.16	0.15	1.70	2.40	1.43	1.04	1.08	1.08
	20	0.15	3.08	1.14	0.14	1.68	2.39	1.39	1.00	1.04	1.04
	21	0.15	3.03	1.12	0.14	1.66	2.37	1.37	0.96	1.00	1.00
	22	0.14	2.98	1.10	0.14	1.64	2.35	1.33	0.91	0.96	0.96
	23	0.13	2.91	1.07	0.13	1.61	2.32	1.29	0.86	0.91	0.91
Weekend	24	0.10	2.65	0.92	0.13	1.60	2.31	1.05	0.61	0.68	0.68
	25	0.09	2.54	0.88	0.13	1.59	2.31	0.94	0.59	0.61	0.61
	26	0.09	2.51	0.87	0.12	1.56	2.28	0.94	0.58	0.59	0.59
	27	0.08	2.48	0.85	0.12	1.54	2.25	0.94	0.54	0.58	0.58
	28	0.08	2.43	0.83	0.11	1.51	2.22	0.92	0.53	0.54	0.54
	29	0.08	2.42	0.82	0.11	1.49	2.21	0.93	0.56	0.53	0.53
	30	0.08	2.46	0.85	0.11	1.50	2.22	0.96	0.59	0.56	0.56
	31	0.09	2.51	0.88	0.12	1.53	2.26	0.98	0.66	0.59	0.59
	32	0.10	2.62	0.93	0.13	1.61	2.33	1.01	0.80	0.66	0.66
	33	0.12	2.83	1.00	0.15	1.71	2.43	1.11	0.91	0.80	0.80
	34	0.13	2.99	1.06	0.17	1.83	2.52	1.16	1.01	0.91	0.91
	35	0.15	3.12	1.10	0.19	1.90	2.59	1.22	1.01	1.01	1.01
	36	0.15	3.10	1.10	0.19	1.92	2.61	1.18	0.99	1.01	1.01
	37	0.14	3.08	1.10	0.19	1.91	2.59	1.17	0.96	0.99	0.99
	38	0.14	3.04	1.08	0.18	1.88	2.56	1.16	0.88	0.96	0.96
	39	0.13	2.96	1.04	0.17	1.83	2.52	1.12	0.87	0.88	0.88
	40	0.13	2.96	1.03	0.17	1.81	2.50	1.15	0.89	0.87	0.87
	41	0.13	2.98	1.04	0.17	1.80	2.50	1.18	0.86	0.89	0.89
	42	0.12	2.94	1.02	0.17	1.80	2.49	1.14	0.88	0.86	0.86
	43	0.13	2.96	1.04	0.16	1.79	2.49	1.17	0.86	0.88	0.88
	44	0.12	2.93	1.03	0.16	1.78	2.48	1.16	0.78	0.86	0.86
	45	0.11	2.83	0.99	0.15	1.74	2.44	1.09	0.76	0.78	0.78
	46	0.11	2.78	0.98	0.15	1.71	2.41	1.07	0.71	0.76	0.76
	47	0.10	2.72	0.94	0.14	1.68	2.38	1.04	0.68	0.71	0.71
Average											
	Weekday	**0.16**	**3.12**	**1.15**	**0.15**	**1.71**	**2.42**		**1.09**	**1.09**	**1.09**
	Weekend	**0.11**	**2.78**	**0.97**	**0.15**	**1.71**	**2.41**		**0.77**	**0.77**	**0.77**
	ADWF[1]	**0.14**	**3.02**	**1.10**	**0.15**	**1.71**	**2.41**		**1.00**	**1.00**	**1.00**
% Error											
	Weekday				-4.9%			1.56			
	Weekend				34.3%			1.22			

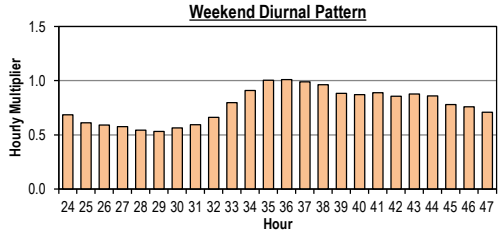
Note:







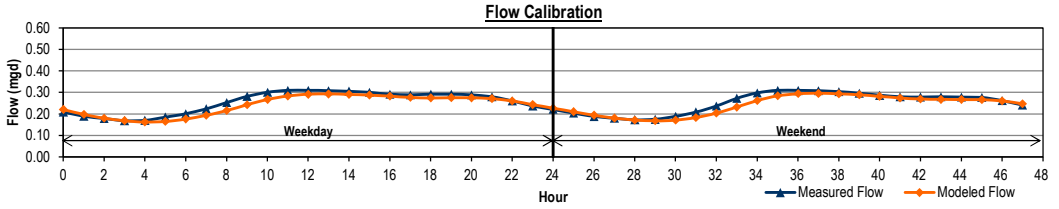


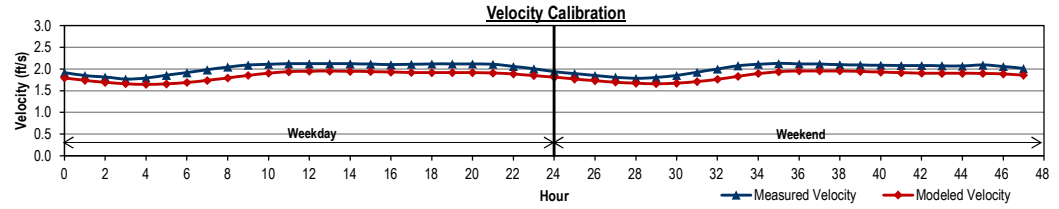


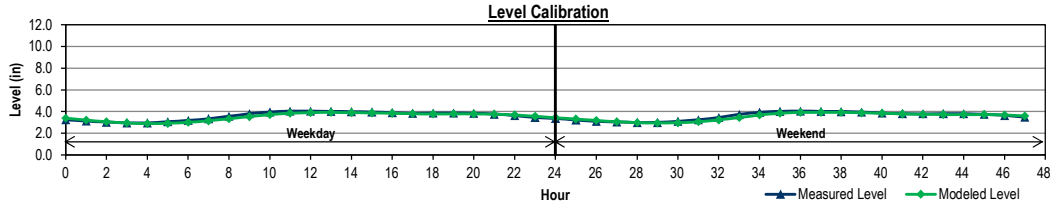
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE A4 DRY WEATHER FLOW CALIBRATION

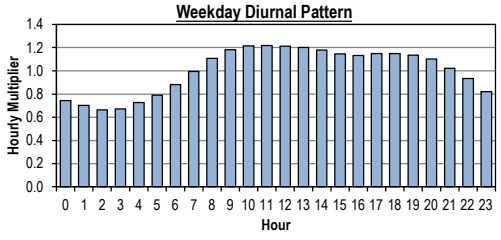
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Level Diff (in)	Diurnal Initial Curve	Diurnal Modified Curve	Diurnal Calibrated Diurnal
Weekday	0	0.21	3.26	1.92	0.22	3.40	1.79	-0.13	0.74	0.74	0.74
	1	0.19	3.12	1.85	0.20	3.21	1.74	-0.09	0.70	0.70	0.70
	2	0.18	3.03	1.81	0.18	3.06	1.69	-0.03	0.66	0.66	0.66
	3	0.17	2.97	1.77	0.17	2.96	1.66	0.01	0.67	0.67	0.67
	4	0.17	2.96	1.79	0.16	2.90	1.64	0.07	0.73	0.73	0.73
	5	0.18	3.06	1.86	0.16	2.92	1.65	0.15	0.79	0.79	0.79
	6	0.20	3.18	1.91	0.18	3.01	1.69	0.17	0.88	0.88	0.88
	7	0.22	3.35	1.98	0.19	3.15	1.74	0.20	0.99	0.99	0.99
	8	0.25	3.57	2.04	0.22	3.33	1.79	0.24	1.11	1.11	1.11
	9	0.28	3.80	2.09	0.24	3.54	1.85	0.26	1.18	1.18	1.18
	10	0.30	3.96	2.11	0.27	3.72	1.90	0.24	1.22	1.22	1.22
	11	0.31	4.03	2.12	0.28	3.84	1.93	0.19	1.22	1.22	1.22
	12	0.31	4.04	2.12	0.29	3.90	1.95	0.14	1.21	1.21	1.21
	13	0.31	4.02	2.12	0.29	3.91	1.95	0.11	1.20	1.20	1.20
	14	0.31	4.00	2.12	0.29	3.90	1.95	0.10	1.18	1.18	1.18
	15	0.30	3.96	2.11	0.29	3.88	1.94	0.08	1.15	1.15	1.15
	16	0.29	3.90	2.10	0.28	3.84	1.93	0.05	1.13	1.13	1.13
	17	0.29	3.85	2.11	0.28	3.80	1.92	0.05	1.15	1.15	1.15
	18	0.29	3.87	2.12	0.27	3.79	1.91	0.08	1.15	1.15	1.15
	19	0.29	3.87	2.12	0.28	3.79	1.92	0.08	1.13	1.13	1.13
	20	0.29	3.84	2.12	0.28	3.79	1.91	0.05	1.10	1.10	1.10
	21	0.28	3.77	2.11	0.27	3.76	1.91	0.01	1.02	1.02	1.02
	22	0.26	3.64	2.06	0.26	3.69	1.88	-0.05	0.93	0.93	0.93
	23	0.24	3.47	2.00	0.24	3.57	1.85	-0.10	0.82	0.82	0.82
Weekend	24	0.22	3.37	1.94	0.23	3.44	1.81	-0.07	0.80	0.80	0.80
	25	0.20	3.23	1.89	0.21	3.31	1.77	-0.08	0.74	0.74	0.74
	26	0.19	3.11	1.85	0.19	3.18	1.73	-0.07	0.71	0.71	0.71
	27	0.18	3.05	1.81	0.18	3.06	1.69	-0.02	0.68	0.68	0.68
	28	0.17	2.99	1.79	0.17	2.98	1.67	0.01	0.69	0.69	0.69
	29	0.17	3.00	1.80	0.17	2.94	1.66	0.06	0.74	0.74	0.74
	30	0.19	3.11	1.85	0.17	2.97	1.67	0.14	0.82	0.82	0.82
	31	0.21	3.25	1.92	0.18	3.07	1.71	0.18	0.93	0.93	0.93
	32	0.24	3.45	2.00	0.20	3.23	1.76	0.22	1.07	1.07	1.07
	33	0.27	3.74	2.07	0.23	3.45	1.83	0.29	1.17	1.17	1.17
	34	0.30	3.93	2.11	0.26	3.68	1.89	0.25	1.22	1.22	1.22
	35	0.31	4.02	2.13	0.28	3.84	1.94	0.18	1.22	1.22	1.22
	36	0.31	4.03	2.12	0.29	3.92	1.95	0.11	1.21	1.21	1.21
	37	0.31	4.03	2.11	0.30	3.93	1.95	0.09	1.19	1.19	1.19
	38	0.30	4.01	2.10	0.29	3.92	1.95	0.09	1.16	1.16	1.16
	39	0.30	3.95	2.09	0.29	3.89	1.94	0.06	1.13	1.13	1.13
	40	0.29	3.86	2.09	0.28	3.84	1.93	0.02	1.10	1.10	1.10
	41	0.28	3.81	2.08	0.27	3.79	1.91	0.02	1.10	1.10	1.10
	42	0.28	3.79	2.08	0.27	3.75	1.90	0.05	1.10	1.10	1.10
	43	0.28	3.81	2.07	0.27	3.73	1.90	0.07	1.09	1.09	1.09
	44	0.28	3.80	2.07	0.27	3.73	1.90	0.07	1.09	1.09	1.09
	45	0.28	3.75	2.09	0.27	3.72	1.90	0.03	1.03	1.03	1.03
	46	0.26	3.65	2.06	0.26	3.69	1.88	-0.04	0.95	0.95	0.95
	47	0.24	3.49	2.01	0.25	3.59	1.85	-0.10	0.87	0.87	0.87
Average											
	Weekday	0.255	3.6	2.02	0.241	3.5	1.84		1.00	1.00	1.00
	Weekend	0.252	3.6	2.00	0.241	3.5	1.84		0.99	0.99	0.99
	ADWF[1]	0.254	3.6	2.01	0.241	3.5	1.84		1.00	1.00	1.00
% Error											
	Weekday				-5.4%			0.26			
	Weekend				-4.3%			0.29			

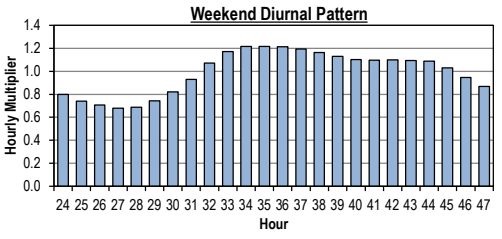
Note:







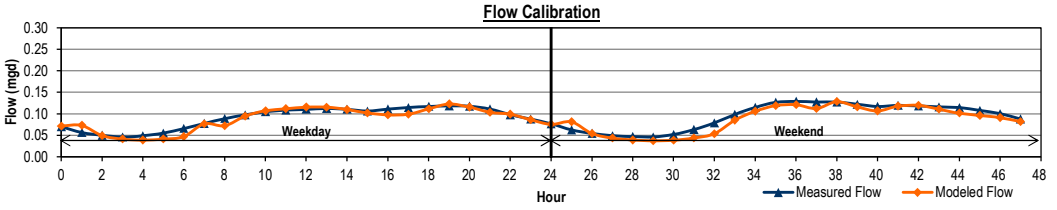


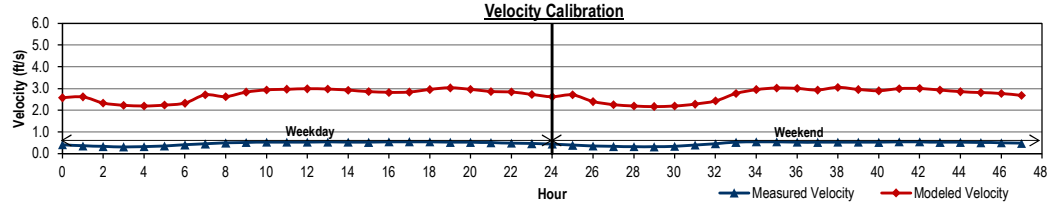


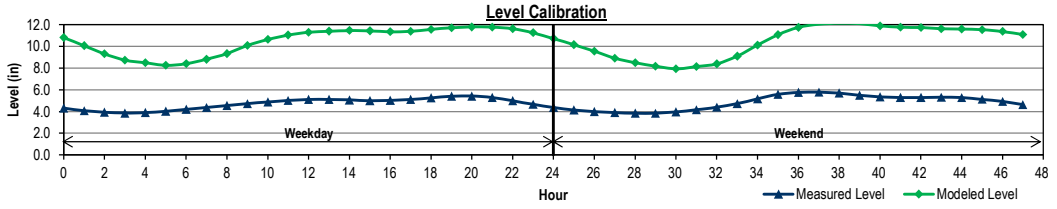
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE A6 DRY WEATHER FLOW CALIBRATION

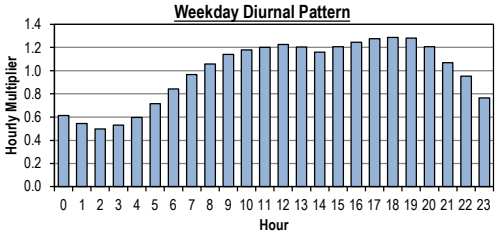
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Level Diff (in)	Diurnal Initial Curve	Diurnal Modified Curve	Diurnal Calibrated Diurnal
Weekday	0	0.07	4.31	0.42	0.07	10.80	2.58	-6.49	0.61	0.61	0.61
	1	0.06	4.07	0.36	0.07	10.07	2.62	-6.00	0.54	0.54	0.54
	2	0.05	3.94	0.33	0.05	9.30	2.34	-5.36	0.50	0.50	0.50
	3	0.05	3.85	0.31	0.04	8.73	2.23	-4.87	0.53	0.53	0.53
	4	0.05	3.90	0.33	0.04	8.48	2.20	-4.58	0.60	0.60	0.60
	5	0.05	4.01	0.36	0.04	8.25	2.24	-4.23	0.72	0.72	0.72
	6	0.07	4.20	0.41	0.05	8.39	2.33	-4.19	0.84	0.84	0.84
	7	0.08	4.37	0.46	0.08	8.80	2.71	-4.43	0.97	0.97	0.97
	8	0.09	4.55	0.50	0.07	9.33	2.63	-4.78	1.06	1.06	1.06
	9	0.10	4.73	0.52	0.09	10.08	2.84	-5.35	1.14	1.14	1.14
	10	0.10	4.88	0.53	0.11	10.63	2.94	-5.75	1.18	1.18	1.18
	11	0.11	5.00	0.54	0.11	11.03	2.97	-6.03	1.20	1.20	1.20
	12	0.11	5.10	0.53	0.12	11.29	2.99	-6.19	1.23	1.23	1.23
	13	0.11	5.11	0.54	0.12	11.39	2.98	-6.28	1.20	1.20	1.20
	14	0.11	5.06	0.54	0.11	11.45	2.92	-6.39	1.16	1.16	1.16
	15	0.11	4.99	0.53	0.10	11.42	2.86	-6.43	1.21	1.21	1.21
	16	0.11	5.02	0.55	0.10	11.33	2.82	-6.31	1.25	1.25	1.25
	17	0.11	5.10	0.55	0.10	11.38	2.84	-6.27	1.28	1.28	1.28
	18	0.12	5.26	0.54	0.11	11.55	2.95	-6.30	1.29	1.29	1.29
	19	0.12	5.41	0.53	0.12	11.70	3.03	-6.29	1.28	1.28	1.28
	20	0.12	5.42	0.52	0.12	11.78	2.96	-6.36	1.21	1.21	1.21
	21	0.11	5.28	0.51	0.10	11.75	2.86	-6.47	1.07	1.07	1.07
	22	0.10	4.98	0.49	0.10	11.63	2.84	-6.64	0.95	0.95	0.95
	23	0.09	4.65	0.47	0.09	11.25	2.73	-6.59	0.76	0.76	0.76
Weekend	24	0.08	4.37	0.45	0.08	10.71	2.63	-6.34	0.68	0.68	0.68
	25	0.06	4.14	0.39	0.08	10.14	2.71	-6.00	0.59	0.59	0.59
	26	0.05	4.00	0.36	0.05	9.54	2.40	-5.55	0.53	0.53	0.53
	27	0.05	3.89	0.33	0.04	8.91	2.26	-5.02	0.51	0.51	0.51
	28	0.05	3.84	0.32	0.04	8.49	2.20	-4.64	0.50	0.50	0.50
	29	0.05	3.84	0.32	0.04	8.16	2.17	-4.33	0.56	0.56	0.56
	30	0.05	3.97	0.34	0.04	7.92	2.20	-3.95	0.69	0.69	0.69
	31	0.06	4.15	0.40	0.04	8.13	2.28	-3.98	0.86	0.86	0.86
	32	0.08	4.38	0.46	0.05	8.38	2.43	-4.00	1.07	1.07	1.07
	33	0.10	4.72	0.53	0.09	9.09	2.77	-4.37	1.25	1.25	1.25
	34	0.11	5.16	0.55	0.11	10.11	2.95	-4.95	1.38	1.38	1.38
	35	0.13	5.57	0.54	0.12	11.07	3.02	-5.49	1.40	1.40	1.40
	36	0.13	5.76	0.53	0.12	11.74	3.01	-5.98	1.39	1.39	1.39
	37	0.13	5.77	0.52	0.11	12.03	2.93	-6.26	1.39	1.39	1.39
	38	0.13	5.69	0.53	0.13	12.12	3.06	-6.43	1.33	1.33	1.33
	39	0.12	5.50	0.53	0.12	12.08	2.95	-6.58	1.28	1.28	1.28
	40	0.12	5.35	0.53	0.11	11.87	2.90	-6.53	1.30	1.30	1.30
	41	0.12	5.29	0.55	0.12	11.75	3.00	-6.46	1.29	1.29	1.29
	42	0.12	5.29	0.54	0.12	11.72	3.00	-6.43	1.26	1.26	1.26
	43	0.12	5.31	0.53	0.11	11.61	2.93	-6.31	1.24	1.24	1.24
	44	0.11	5.27	0.53	0.10	11.59	2.85	-6.32	1.17	1.17	1.17
	45	0.11	5.12	0.51	0.10	11.53	2.81	-6.41	1.09	1.09	1.09
	46	0.10	4.92	0.50	0.09	11.36	2.77	-6.44	0.96	0.96	0.96
	47	0.09	4.62	0.48	0.08	11.09	2.68	-6.47	0.84	0.84	0.84
Average											
	Weekday	0.091	4.7	0.47	0.087	10.5	2.72		0.99	0.99	0.99
	Weekend	0.094	4.8	0.47	0.087	10.5	2.70		1.02	1.02	1.02
	ADWF[1]	0.092	4.7	0.47	0.087	10.5	2.72		1.00	1.00	1.00
% Error											
	Weekday				-3.8%			6.64			
	Weekend				-7.9%			6.58			

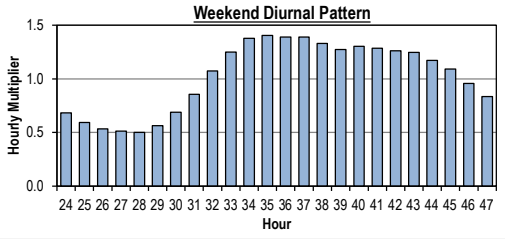
Note:







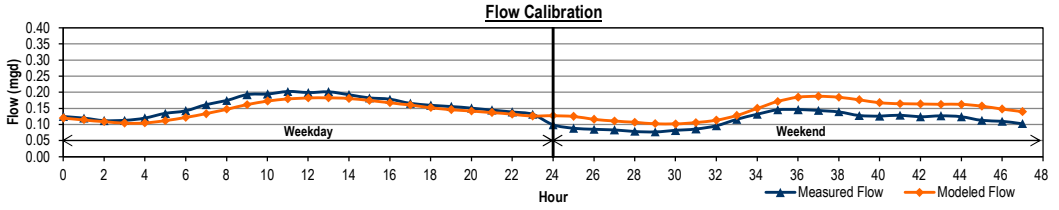


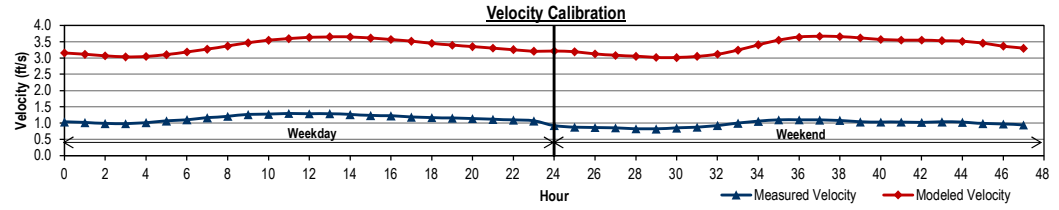


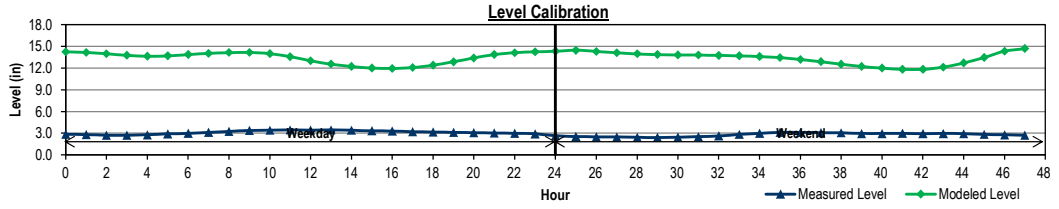
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE A7 DRY WEATHER FLOW CALIBRATION

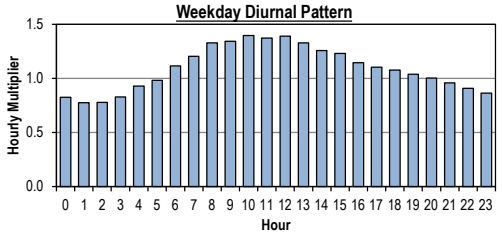
		Measured Data			Modeled Data				Diurnal		
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Level Diff (in)	Initial Curve	Modified Curve	Calibrated Diurnal
Weekday	0	0.13	2.85	1.04	0.12	14.23	3.16	-11.38	0.83	0.83	0.83
	1	0.12	2.80	1.02	0.11	14.14	3.11	-11.34	0.77	0.77	0.77
	2	0.11	2.73	0.99	0.11	13.96	3.07	-11.23	0.78	0.78	0.78
	3	0.11	2.72	0.99	0.10	13.76	3.03	-11.04	0.83	0.83	0.83
	4	0.12	2.79	1.02	0.10	13.62	3.04	-10.84	0.93	0.93	0.93
	5	0.13	2.91	1.07	0.11	13.68	3.10	-10.77	0.98	0.98	0.98
	6	0.14	2.97	1.10	0.12	13.86	3.18	-10.88	1.12	1.12	1.12
	7	0.16	3.13	1.17	0.13	14.02	3.27	-10.89	1.20	1.20	1.20
	8	0.17	3.24	1.21	0.15	14.13	3.37	-10.89	1.33	1.33	1.33
	9	0.19	3.38	1.27	0.16	14.14	3.47	-10.76	1.34	1.34	1.34
	10	0.19	3.40	1.27	0.17	14.00	3.54	-10.59	1.40	1.40	1.40
	11	0.20	3.46	1.30	0.18	13.56	3.59	-10.11	1.37	1.37	1.37
	12	0.20	3.43	1.29	0.18	13.00	3.63	-9.57	1.39	1.39	1.39
	13	0.20	3.46	1.29	0.18	12.54	3.65	-9.08	1.33	1.33	1.33
	14	0.19	3.40	1.27	0.18	12.22	3.64	-8.82	1.26	1.26	1.26
	15	0.18	3.33	1.23	0.17	12.00	3.61	-8.68	1.23	1.23	1.23
	16	0.18	3.30	1.22	0.17	11.95	3.56	-8.66	1.15	1.15	1.15
	17	0.17	3.21	1.19	0.16	12.07	3.51	-8.86	1.10	1.10	1.10
	18	0.16	3.16	1.17	0.15	12.40	3.45	-9.24	1.08	1.08	1.08
	19	0.16	3.13	1.16	0.15	12.86	3.39	-9.74	1.04	1.04	1.04
	20	0.15	3.08	1.14	0.14	13.38	3.35	-10.31	1.00	1.00	1.00
	21	0.15	3.03	1.12	0.14	13.86	3.30	-10.83	0.96	0.96	0.96
	22	0.14	2.98	1.10	0.13	14.11	3.25	-11.14	0.91	0.91	0.91
	23	0.13	2.91	1.07	0.13	14.23	3.21	-11.32	0.86	0.86	0.86
Weekend	24	0.10	2.65	0.92	0.13	14.31	3.21	-11.66	0.61	0.61	0.61
	25	0.09	2.54	0.88	0.13	14.45	3.19	-11.91	0.59	0.59	0.59
	26	0.09	2.51	0.87	0.12	14.30	3.12	-11.79	0.58	0.58	0.58
	27	0.08	2.48	0.85	0.11	14.10	3.08	-11.62	0.54	0.54	0.54
	28	0.08	2.43	0.83	0.11	13.95	3.05	-11.52	0.53	0.53	0.53
	29	0.08	2.42	0.82	0.10	13.85	3.02	-11.43	0.56	0.56	0.56
	30	0.08	2.46	0.85	0.10	13.80	3.01	-11.34	0.59	0.59	0.59
	31	0.09	2.51	0.88	0.11	13.78	3.05	-11.27	0.66	0.66	0.66
	32	0.10	2.62	0.93	0.11	13.74	3.12	-11.12	0.80	0.80	0.80
	33	0.12	2.83	1.00	0.13	13.68	3.24	-10.85	0.91	0.91	0.91
	34	0.13	2.99	1.06	0.15	13.57	3.40	-10.58	1.01	1.01	1.01
	35	0.15	3.12	1.10	0.17	13.43	3.55	-10.31	1.01	1.01	1.01
	36	0.15	3.10	1.10	0.18	13.18	3.64	-10.08	0.99	0.99	0.99
	37	0.14	3.08	1.10	0.19	12.87	3.67	-9.78	0.96	0.96	0.96
	38	0.14	3.04	1.08	0.18	12.53	3.66	-9.48	0.88	0.88	0.88
	39	0.13	2.96	1.04	0.18	12.23	3.62	-9.27	0.87	0.87	0.87
	40	0.13	2.96	1.03	0.17	11.98	3.57	-9.02	0.89	0.89	0.89
	41	0.13	2.98	1.04	0.16	11.82	3.55	-8.84	0.86	0.86	0.86
	42	0.12	2.94	1.02	0.16	11.83	3.55	-8.89	0.88	0.88	0.88
	43	0.13	2.96	1.04	0.16	12.12	3.53	-9.16	0.86	0.86	0.86
	44	0.12	2.93	1.03	0.16	12.70	3.51	-9.77	0.78	0.78	0.78
	45	0.11	2.83	0.99	0.16	13.45	3.45	-10.62	0.76	0.76	0.76
	46	0.11	2.78	0.98	0.15	14.31	3.36	-11.53	0.71	0.71	0.71
	47	0.10	2.72	0.94	0.14	14.69	3.30	-11.98	0.68	0.68	0.68
Average											
	Weekday	0.158	3.1	1.15	0.144	13.4	3.35		1.09	1.09	1.09
	Weekend	0.112	2.8	0.97	0.144	13.4	3.35		0.77	0.77	0.77
	ADWF[1]	0.145	3.0	1.10	0.144	13.4	3.35		1.00	1.00	1.00
% Error											
	Weekday				-8.7%			11.38			
	Weekend				29.0%			11.98			

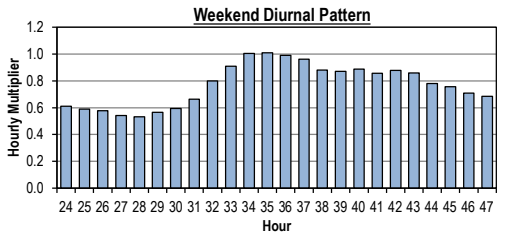
Note:







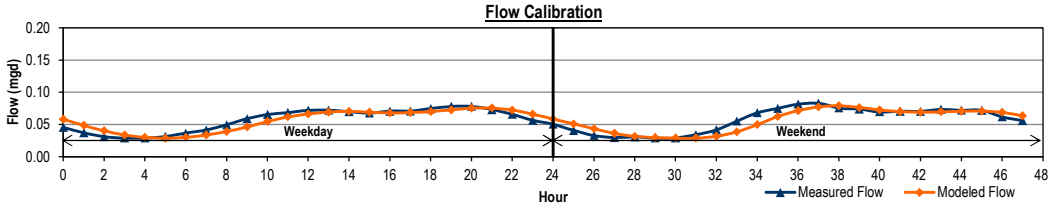


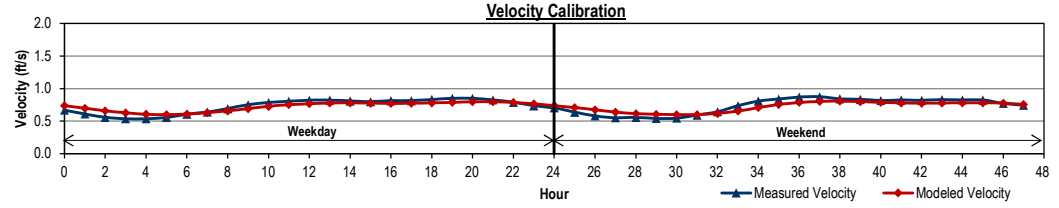


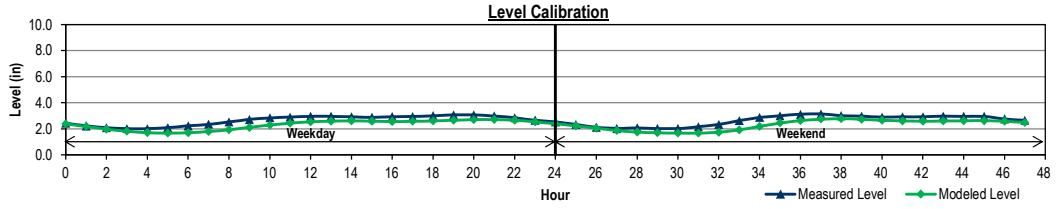
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE A9 DRY WEATHER FLOW CALIBRATION

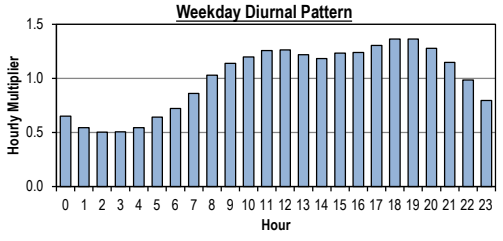
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Level Diff (in)	Diurnal Initial Curve	Diurnal Modified Curve	Diurnal Calibrated Diurnal
Weekday	0	0.05	2.44	0.67	0.06	2.38	0.73	0.06	0.65	0.65	0.65
	1	0.04	2.23	0.61	0.05	2.18	0.70	0.05	0.54	0.54	0.54
	2	0.03	2.08	0.56	0.04	1.98	0.66	0.11	0.50	0.50	0.50
	3	0.03	2.01	0.54	0.03	1.81	0.63	0.20	0.51	0.51	0.51
	4	0.03	2.02	0.54	0.03	1.71	0.61	0.31	0.55	0.55	0.55
	5	0.03	2.09	0.56	0.03	1.67	0.60	0.43	0.64	0.64	0.64
	6	0.04	2.23	0.60	0.03	1.70	0.61	0.53	0.72	0.72	0.72
	7	0.04	2.35	0.64	0.03	1.79	0.63	0.55	0.86	0.86	0.86
	8	0.05	2.53	0.69	0.04	1.93	0.66	0.60	1.03	1.03	1.03
	9	0.06	2.72	0.75	0.05	2.11	0.69	0.61	1.14	1.14	1.14
	10	0.07	2.84	0.78	0.05	2.29	0.72	0.56	1.20	1.20	1.20
	11	0.07	2.90	0.80	0.06	2.44	0.75	0.46	1.26	1.26	1.26
	12	0.07	2.96	0.82	0.07	2.53	0.77	0.43	1.26	1.26	1.26
	13	0.07	2.96	0.82	0.07	2.59	0.78	0.37	1.22	1.22	1.22
	14	0.07	2.92	0.81	0.07	2.61	0.78	0.31	1.18	1.18	1.18
	15	0.07	2.89	0.80	0.07	2.59	0.78	0.29	1.23	1.23	1.23
	16	0.07	2.94	0.81	0.07	2.57	0.77	0.37	1.24	1.24	1.24
	17	0.07	2.94	0.81	0.07	2.58	0.77	0.37	1.30	1.30	1.30
	18	0.07	3.01	0.83	0.07	2.61	0.78	0.40	1.36	1.36	1.36
	19	0.08	3.07	0.85	0.07	2.65	0.79	0.41	1.36	1.36	1.36
	20	0.08	3.07	0.85	0.08	2.70	0.80	0.36	1.28	1.28	1.28
	21	0.07	2.98	0.83	0.08	2.71	0.80	0.27	1.15	1.15	1.15
	22	0.07	2.84	0.79	0.07	2.66	0.79	0.19	0.99	0.99	0.99
	23	0.06	2.66	0.74	0.07	2.54	0.76	0.13	0.79	0.79	0.79
Weekend	24	0.05	2.53	0.70	0.06	2.39	0.74	0.15	0.71	0.71	0.71
	25	0.04	2.33	0.64	0.05	2.22	0.71	0.11	0.57	0.57	0.57
	26	0.03	2.13	0.58	0.04	2.05	0.67	0.08	0.52	0.52	0.52
	27	0.03	2.04	0.55	0.04	1.88	0.64	0.16	0.54	0.54	0.54
	28	0.03	2.07	0.56	0.03	1.75	0.61	0.32	0.50	0.50	0.50
	29	0.03	2.02	0.54	0.03	1.69	0.60	0.33	0.51	0.51	0.51
	30	0.03	2.03	0.55	0.03	1.67	0.60	0.36	0.60	0.60	0.60
	31	0.03	2.16	0.59	0.03	1.67	0.60	0.49	0.73	0.73	0.73
	32	0.04	2.34	0.64	0.03	1.74	0.62	0.60	0.96	0.96	0.96
	33	0.06	2.63	0.73	0.04	1.92	0.65	0.71	1.19	1.19	1.19
	34	0.07	2.87	0.81	0.05	2.18	0.71	0.69	1.31	1.31	1.31
	35	0.08	3.00	0.84	0.06	2.44	0.75	0.56	1.42	1.42	1.42
	36	0.08	3.11	0.87	0.07	2.63	0.78	0.49	1.45	1.45	1.45
	37	0.08	3.14	0.87	0.08	2.74	0.80	0.40	1.32	1.32	1.32
	38	0.08	3.01	0.84	0.08	2.78	0.81	0.23	1.29	1.29	1.29
	39	0.07	2.97	0.83	0.08	2.73	0.80	0.24	1.22	1.22	1.22
	40	0.07	2.90	0.82	0.07	2.66	0.79	0.24	1.23	1.23	1.23
	41	0.07	2.92	0.82	0.07	2.61	0.78	0.30	1.23	1.23	1.23
	42	0.07	2.92	0.82	0.07	2.59	0.78	0.33	1.28	1.28	1.28
	43	0.07	2.97	0.83	0.07	2.60	0.78	0.37	1.26	1.26	1.26
	44	0.07	2.95	0.83	0.07	2.62	0.78	0.33	1.26	1.26	1.26
	45	0.07	2.95	0.82	0.07	2.62	0.78	0.33	1.08	1.08	1.08
	46	0.06	2.76	0.77	0.07	2.59	0.77	0.17	0.98	0.98	0.98
	47	0.06	2.65	0.74	0.06	2.49	0.76	0.16	0.88	0.88	0.88
Average											
	Weekday	0.057	2.7	0.73	0.056	2.3	0.72		1.00	1.00	1.00
	Weekend	0.057	2.6	0.73	0.056	2.3	0.72		1.00	1.00	1.00
	ADWF[1]	0.057	2.7	0.73	0.056	2.3	0.72		1.00	1.00	1.00
% Error											
	Weekday				-1.8%			0.61			
	Weekend				-1.9%			0.71			

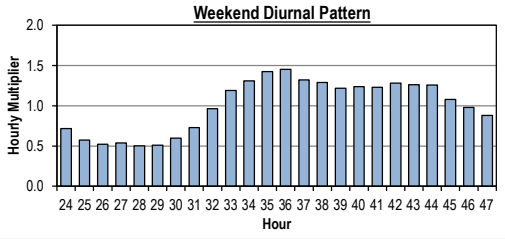
Note:







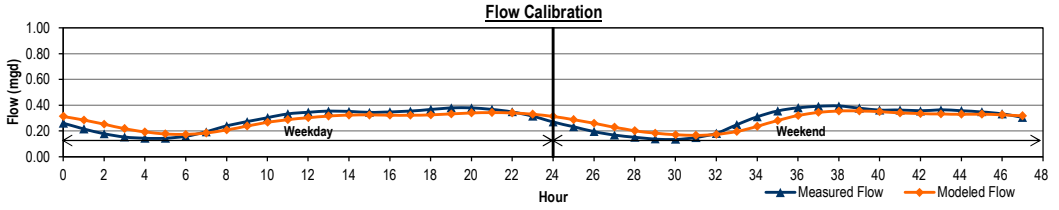


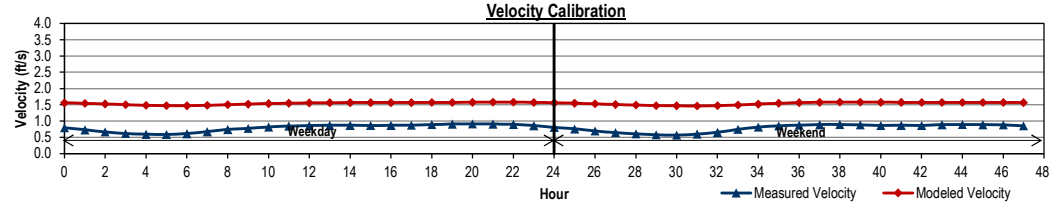


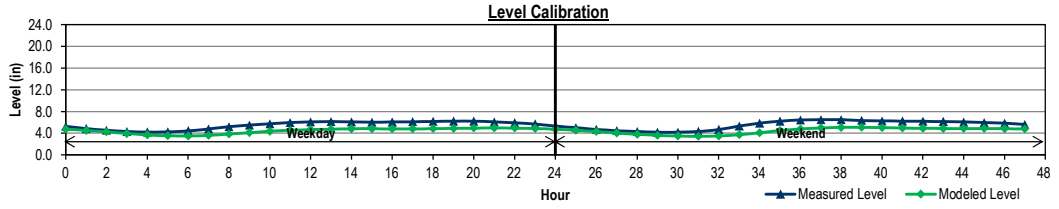
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE A10 DRY WEATHER FLOW CALIBRATION

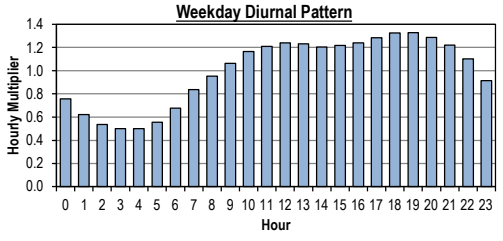
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Level Diff (in)	Diurnal Initial Curve	Diurnal Modified Curve	Diurnal Calibrated Diurnal
Weekday	0	0.26	5.25	0.80	0.31	4.73	1.56	0.52	0.76	0.76	0.76
	1	0.22	4.88	0.73	0.29	4.52	1.55	0.36	0.62	0.62	0.62
	2	0.18	4.54	0.67	0.25	4.24	1.53	0.30	0.54	0.54	0.54
	3	0.15	4.31	0.62	0.22	3.94	1.50	0.36	0.50	0.50	0.50
	4	0.14	4.21	0.60	0.19	3.70	1.48	0.52	0.50	0.50	0.50
	5	0.14	4.23	0.59	0.18	3.54	1.47	0.69	0.55	0.55	0.55
	6	0.16	4.42	0.62	0.17	3.51	1.47	0.91	0.68	0.68	0.68
	7	0.19	4.76	0.68	0.18	3.61	1.48	1.16	0.84	0.84	0.84
	8	0.24	5.18	0.74	0.21	3.83	1.50	1.35	0.95	0.95	0.95
	9	0.27	5.49	0.78	0.24	4.11	1.52	1.38	1.06	1.06	1.06
	10	0.30	5.73	0.82	0.27	4.35	1.54	1.38	1.17	1.17	1.17
	11	0.33	5.96	0.85	0.29	4.53	1.55	1.44	1.21	1.21	1.21
	12	0.35	6.07	0.86	0.30	4.66	1.56	1.41	1.24	1.24	1.24
	13	0.35	6.12	0.87	0.32	4.75	1.56	1.37	1.23	1.23	1.23
	14	0.35	6.09	0.87	0.32	4.81	1.57	1.28	1.20	1.20	1.20
	15	0.34	6.03	0.87	0.32	4.82	1.57	1.21	1.22	1.22	1.22
	16	0.35	6.06	0.87	0.32	4.80	1.57	1.26	1.24	1.24	1.24
	17	0.35	6.10	0.88	0.32	4.80	1.57	1.30	1.28	1.28	1.28
	18	0.37	6.17	0.89	0.33	4.83	1.57	1.34	1.33	1.33	1.33
	19	0.38	6.23	0.91	0.33	4.88	1.57	1.35	1.33	1.33	1.33
	20	0.38	6.21	0.92	0.34	4.94	1.58	1.27	1.29	1.29	1.29
	21	0.37	6.10	0.91	0.34	4.96	1.58	1.14	1.22	1.22	1.22
	22	0.35	5.92	0.90	0.34	4.93	1.58	0.99	1.10	1.10	1.10
	23	0.31	5.67	0.86	0.33	4.86	1.57	0.81	0.92	0.92	0.92
Weekend	24	0.27	5.32	0.81	0.31	4.73	1.56	0.59	0.81	0.81	0.81
	25	0.23	5.01	0.76	0.29	4.53	1.55	0.47	0.68	0.68	0.68
	26	0.20	4.69	0.70	0.26	4.30	1.53	0.39	0.59	0.59	0.59
	27	0.17	4.46	0.65	0.23	4.04	1.51	0.42	0.53	0.53	0.53
	28	0.15	4.31	0.61	0.20	3.79	1.49	0.52	0.48	0.48	0.48
	29	0.14	4.18	0.58	0.18	3.60	1.48	0.58	0.47	0.47	0.47
	30	0.13	4.18	0.57	0.17	3.48	1.47	0.69	0.52	0.52	0.52
	31	0.15	4.32	0.60	0.17	3.43	1.47	0.89	0.64	0.64	0.64
	32	0.18	4.67	0.65	0.17	3.50	1.47	1.17	0.87	0.87	0.87
	33	0.25	5.29	0.75	0.20	3.72	1.49	1.58	1.09	1.09	1.09
	34	0.31	5.83	0.82	0.24	4.08	1.52	1.75	1.25	1.25	1.25
	35	0.36	6.22	0.86	0.28	4.47	1.55	1.74	1.33	1.33	1.33
	36	0.38	6.42	0.88	0.32	4.78	1.57	1.63	1.37	1.37	1.37
	37	0.39	6.48	0.89	0.34	4.97	1.58	1.51	1.38	1.38	1.38
	38	0.39	6.47	0.90	0.35	5.06	1.58	1.42	1.32	1.32	1.32
	39	0.38	6.34	0.88	0.36	5.06	1.58	1.28	1.27	1.27	1.27
	40	0.36	6.26	0.87	0.35	5.01	1.58	1.25	1.27	1.27	1.27
	41	0.36	6.22	0.87	0.34	4.95	1.58	1.27	1.25	1.25	1.25
	42	0.36	6.18	0.87	0.33	4.91	1.57	1.28	1.27	1.27	1.27
	43	0.36	6.15	0.89	0.33	4.88	1.57	1.27	1.25	1.25	1.25
	44	0.36	6.07	0.89	0.33	4.87	1.57	1.20	1.22	1.22	1.22
	45	0.35	5.96	0.89	0.33	4.86	1.57	1.10	1.17	1.17	1.17
	46	0.33	5.83	0.88	0.33	4.82	1.57	1.01	1.07	1.07	1.07
	47	0.31	5.60	0.85	0.32	4.76	1.57	0.84	0.94	0.94	0.94
Average											
	Weekday	0.285	5.5	0.80	0.280	4.4	1.54		1.00	1.00	1.00
	Weekend	0.286	5.5	0.79	0.280	4.4	1.54		1.00	1.00	1.00
	ADWF[1]	0.285	5.5	0.79	0.280	4.4	1.54		1.00	1.00	1.00
% Error											
	Weekday				-1.9%			1.44			
	Weekend				-2.0%			1.75			

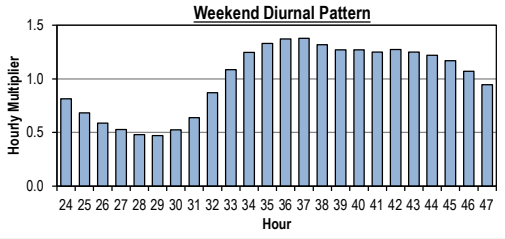
Note:







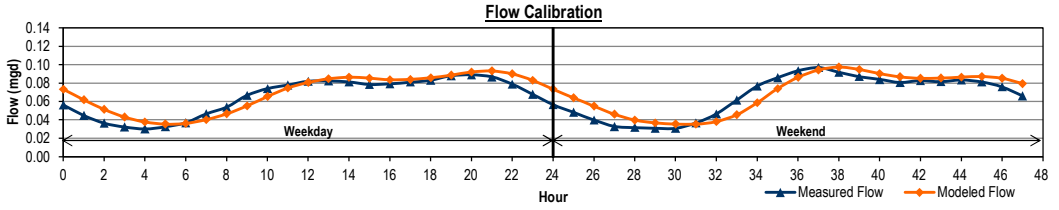


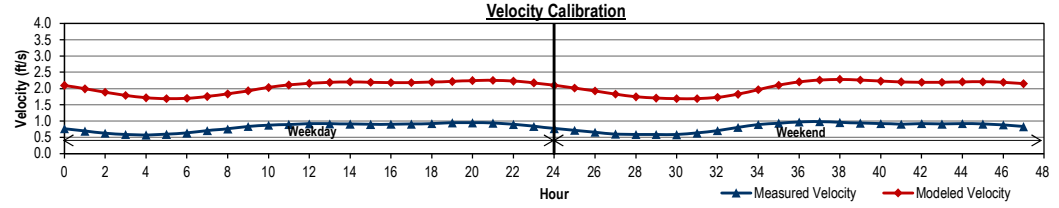


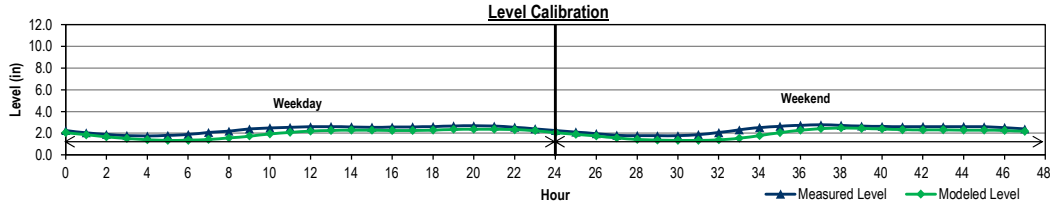
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE A11 DRY WEATHER FLOW CALIBRATION

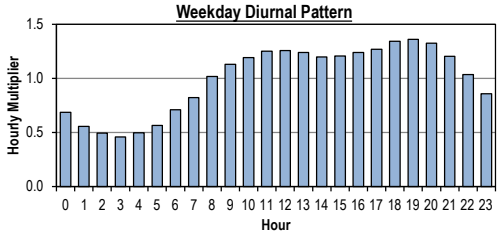
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Level Diff (in)	Diurnal Initial Curve	Diurnal Modified Curve	Diurnal Calibrated Diurnal
Weekday	0	0.06	2.23	0.77	0.07	2.05	2.10	0.18	0.69	0.69	0.69
	1	0.04	2.04	0.69	0.06	1.86	1.99	0.18	0.56	0.56	0.56
	2	0.04	1.88	0.63	0.05	1.66	1.89	0.22	0.49	0.49	0.49
	3	0.03	1.79	0.59	0.04	1.52	1.79	0.27	0.46	0.46	0.46
	4	0.03	1.74	0.57	0.04	1.40	1.72	0.34	0.50	0.50	0.50
	5	0.03	1.79	0.60	0.04	1.34	1.69	0.45	0.56	0.56	0.56
	6	0.04	1.89	0.64	0.04	1.35	1.70	0.54	0.71	0.71	0.71
	7	0.05	2.07	0.71	0.04	1.43	1.76	0.64	0.82	0.82	0.82
	8	0.05	2.19	0.76	0.05	1.56	1.84	0.63	1.02	1.02	1.02
	9	0.07	2.38	0.84	0.06	1.73	1.93	0.65	1.13	1.13	1.13
	10	0.07	2.49	0.88	0.07	1.94	2.03	0.55	1.19	1.19	1.19
	11	0.08	2.54	0.90	0.07	2.08	2.11	0.46	1.25	1.25	1.25
	12	0.08	2.59	0.92	0.08	2.18	2.16	0.41	1.26	1.26	1.26
	13	0.08	2.60	0.92	0.08	2.25	2.19	0.35	1.24	1.24	1.24
	14	0.08	2.58	0.91	0.09	2.28	2.20	0.30	1.20	1.20	1.20
	15	0.08	2.55	0.90	0.09	2.27	2.19	0.28	1.21	1.21	1.21
	16	0.08	2.56	0.90	0.08	2.25	2.18	0.31	1.24	1.24	1.24
	17	0.08	2.58	0.91	0.08	2.25	2.18	0.33	1.27	1.27	1.27
	18	0.08	2.61	0.92	0.09	2.29	2.20	0.32	1.35	1.35	1.35
	19	0.09	2.67	0.95	0.09	2.35	2.22	0.32	1.36	1.36	1.36
	20	0.09	2.68	0.95	0.09	2.36	2.24	0.32	1.32	1.32	1.32
	21	0.09	2.65	0.94	0.09	2.37	2.25	0.28	1.20	1.20	1.20
	22	0.08	2.55	0.90	0.09	2.32	2.23	0.23	1.04	1.04	1.04
	23	0.07	2.41	0.84	0.08	2.23	2.17	0.18	0.86	0.86	0.86
Weekend	24	0.06	2.24	0.77	0.07	2.05	2.10	0.19	0.74	0.74	0.74
	25	0.05	2.11	0.72	0.06	1.90	2.01	0.20	0.61	0.61	0.61
	26	0.04	1.96	0.66	0.06	1.73	1.93	0.23	0.50	0.50	0.50
	27	0.03	1.81	0.60	0.05	1.56	1.83	0.24	0.48	0.48	0.48
	28	0.03	1.78	0.59	0.04	1.43	1.75	0.35	0.47	0.47	0.47
	29	0.03	1.77	0.59	0.04	1.37	1.71	0.40	0.47	0.47	0.47
	30	0.03	1.76	0.59	0.04	1.34	1.69	0.42	0.56	0.56	0.56
	31	0.04	1.87	0.64	0.04	1.34	1.69	0.54	0.71	0.71	0.71
	32	0.05	2.06	0.71	0.04	1.39	1.73	0.67	0.94	0.94	0.94
	33	0.06	2.31	0.81	0.05	1.53	1.82	0.78	1.17	1.17	1.17
	34	0.08	2.52	0.89	0.06	1.79	1.97	0.74	1.31	1.31	1.31
	35	0.09	2.64	0.94	0.07	2.05	2.11	0.59	1.43	1.43	1.43
	36	0.09	2.73	0.97	0.09	2.27	2.20	0.46	1.48	1.48	1.48
	37	0.10	2.77	0.99	0.09	2.41	2.26	0.36	1.40	1.40	1.40
	38	0.09	2.72	0.96	0.10	2.47	2.28	0.25	1.33	1.33	1.33
	39	0.09	2.66	0.94	0.09	2.44	2.26	0.21	1.28	1.28	1.28
	40	0.08	2.62	0.92	0.09	2.38	2.23	0.25	1.23	1.23	1.23
	41	0.08	2.59	0.91	0.09	2.32	2.20	0.26	1.26	1.26	1.26
	42	0.08	2.61	0.92	0.09	2.31	2.19	0.30	1.24	1.24	1.24
	43	0.08	2.59	0.91	0.09	2.31	2.19	0.28	1.27	1.27	1.27
	44	0.08	2.61	0.92	0.09	2.28	2.20	0.33	1.24	1.24	1.24
	45	0.08	2.59	0.91	0.09	2.28	2.21	0.30	1.16	1.16	1.16
	46	0.08	2.52	0.88	0.09	2.25	2.19	0.27	1.01	1.01	1.01
	47	0.07	2.38	0.83	0.08	2.18	2.15	0.21	0.86	0.86	0.86
Average											
	Weekday	0.065	2.3	0.82	0.069	2.0	2.04		1.00	1.00	1.00
	Weekend	0.066	2.3	0.82	0.069	2.0	2.04		1.01	1.01	1.01
	ADWF[1]	0.065	2.3	0.82	0.069	2.0	2.04		1.00	1.00	1.00
% Error											
	Weekday				5.9%			0.65			
	Weekend				4.9%			0.78			

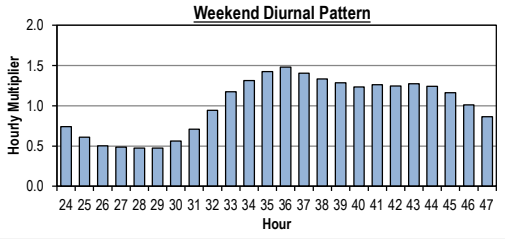
Note:







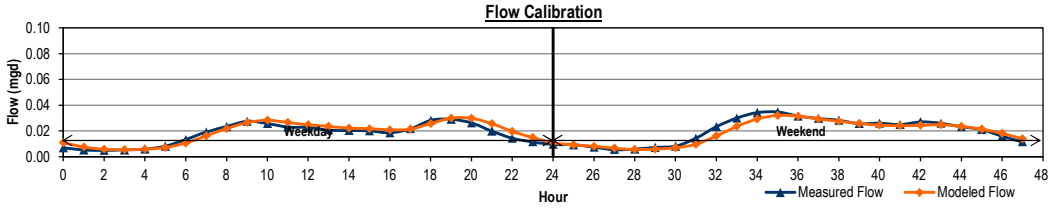


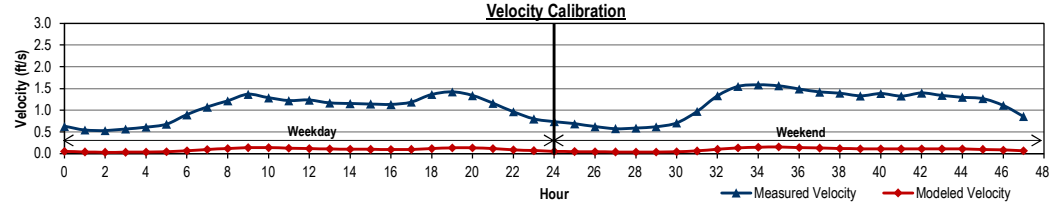


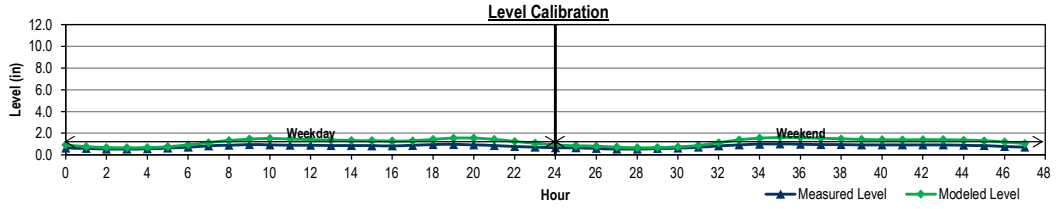
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE A12 DRY WEATHER FLOW CALIBRATION

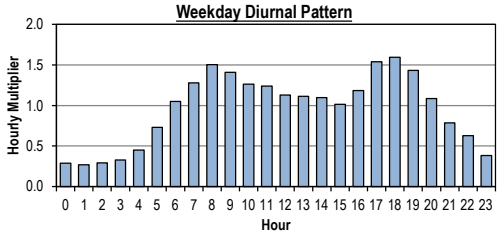
		Measured Data			Modeled Data				Diurnal		
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Level Diff (in)	Initial Curve	Modified Curve	Calibrated Diurnal
Weekday	0	0.01	0.64	0.63	0.01	0.92	0.05	-0.28	0.29	0.29	0.29
	1	0.01	0.58	0.55	0.01	0.76	0.04	-0.18	0.27	0.27	0.27
	2	0.00	0.55	0.53	0.01	0.67	0.03	-0.12	0.29	0.29	0.29
	3	0.01	0.54	0.57	0.01	0.65	0.03	-0.11	0.33	0.33	0.33
	4	0.01	0.56	0.61	0.01	0.68	0.04	-0.12	0.45	0.45	0.45
	5	0.01	0.63	0.68	0.01	0.75	0.05	-0.12	0.73	0.73	0.73
	6	0.01	0.72	0.90	0.01	0.91	0.07	-0.19	1.05	1.05	1.05
	7	0.02	0.84	1.08	0.02	1.14	0.10	-0.30	1.28	1.28	1.28
	8	0.02	0.90	1.22	0.02	1.32	0.12	-0.43	1.50	1.50	1.50
	9	0.03	0.94	1.37	0.03	1.46	0.14	-0.52	1.41	1.41	1.41
	10	0.03	0.93	1.29	0.03	1.51	0.14	-0.58	1.26	1.26	1.26
	11	0.02	0.89	1.22	0.03	1.46	0.13	-0.57	1.24	1.24	1.24
	12	0.02	0.89	1.23	0.02	1.41	0.12	-0.52	1.13	1.13	1.13
	13	0.02	0.86	1.17	0.02	1.37	0.11	-0.50	1.11	1.11	1.11
	14	0.02	0.86	1.15	0.02	1.33	0.10	-0.47	1.10	1.10	1.10
	15	0.02	0.85	1.14	0.02	1.31	0.10	-0.46	1.02	1.02	1.02
	16	0.02	0.83	1.13	0.02	1.29	0.10	-0.45	1.18	1.18	1.18
	17	0.02	0.88	1.19	0.02	1.30	0.10	-0.42	1.54	1.54	1.54
	18	0.03	0.95	1.36	0.03	1.43	0.12	-0.48	1.59	1.59	1.59
	19	0.03	0.97	1.42	0.03	1.55	0.13	-0.58	1.43	1.43	1.43
	20	0.03	0.93	1.34	0.03	1.55	0.13	-0.61	1.09	1.09	1.09
	21	0.02	0.85	1.16	0.03	1.43	0.12	-0.58	0.78	0.78	0.78
	22	0.01	0.77	0.97	0.02	1.25	0.09	-0.48	0.63	0.63	0.63
	23	0.01	0.72	0.80	0.01	1.08	0.07	-0.36	0.38	0.38	0.38
Weekend	24	0.01	0.66	0.74	0.01	0.92	0.05	-0.26	0.51	0.51	0.51
	25	0.01	0.65	0.69	0.01	0.84	0.05	-0.19	0.41	0.41	0.41
	26	0.01	0.60	0.63	0.01	0.80	0.05	-0.20	0.30	0.30	0.30
	27	0.01	0.54	0.58	0.01	0.72	0.04	-0.18	0.32	0.32	0.32
	28	0.01	0.53	0.59	0.01	0.66	0.04	-0.12	0.39	0.39	0.39
	29	0.01	0.60	0.62	0.01	0.68	0.04	-0.08	0.45	0.45	0.45
	30	0.01	0.62	0.71	0.01	0.74	0.05	-0.12	0.79	0.79	0.79
	31	0.01	0.71	0.97	0.01	0.88	0.06	-0.17	1.27	1.27	1.27
	32	0.02	0.82	1.33	0.02	1.14	0.10	-0.31	1.64	1.64	1.64
	33	0.03	0.92	1.55	0.02	1.38	0.13	-0.47	1.87	1.87	1.87
	34	0.03	1.00	1.59	0.03	1.54	0.15	-0.54	1.90	1.90	1.90
	35	0.03	1.01	1.56	0.03	1.61	0.15	-0.59	1.72	1.72	1.72
	36	0.03	0.99	1.49	0.03	1.59	0.14	-0.60	1.62	1.62	1.62
	37	0.03	0.95	1.42	0.03	1.53	0.13	-0.57	1.55	1.55	1.55
	38	0.03	0.95	1.39	0.03	1.48	0.12	-0.53	1.40	1.40	1.40
	39	0.03	0.93	1.33	0.03	1.43	0.11	-0.50	1.42	1.42	1.42
	40	0.03	0.91	1.39	0.02	1.39	0.11	-0.48	1.37	1.37	1.37
	41	0.02	0.93	1.32	0.02	1.38	0.11	-0.45	1.48	1.48	1.48
	42	0.03	0.93	1.40	0.02	1.39	0.11	-0.46	1.42	1.42	1.42
	43	0.03	0.92	1.34	0.02	1.40	0.11	-0.48	1.27	1.27	1.27
	44	0.02	0.89	1.30	0.02	1.37	0.11	-0.48	1.15	1.15	1.15
	45	0.02	0.85	1.27	0.02	1.30	0.10	-0.45	0.87	0.87	0.87
	46	0.02	0.78	1.11	0.02	1.20	0.09	-0.42	0.63	0.63	0.63
	47	0.01	0.71	0.86	0.01	1.05	0.07	-0.33	0.53	0.53	0.53
Average											
	Weekday	0.018	0.8	1.03	0.019	1.2	0.09		0.96	0.96	0.96
	Weekend	0.020	0.8	1.13	0.019	1.2	0.09		1.09	1.09	1.09
	ADWF[1]	0.018	0.8	1.06	0.019	1.2	0.09		1.00	1.00	1.00
% Error											
	Weekday				7.2%			0.61			
	Weekend				-5.7%			0.60			

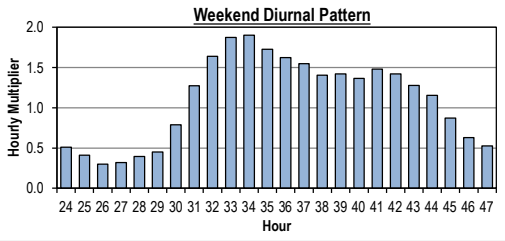
Note:







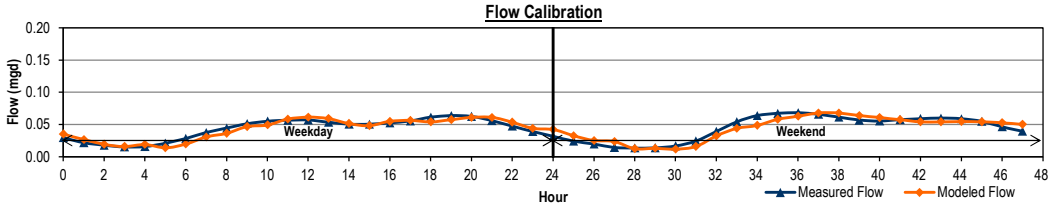


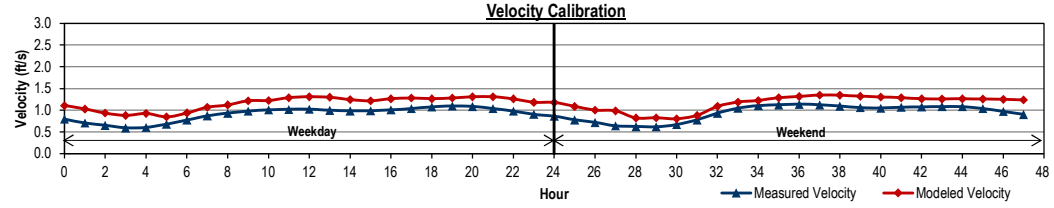


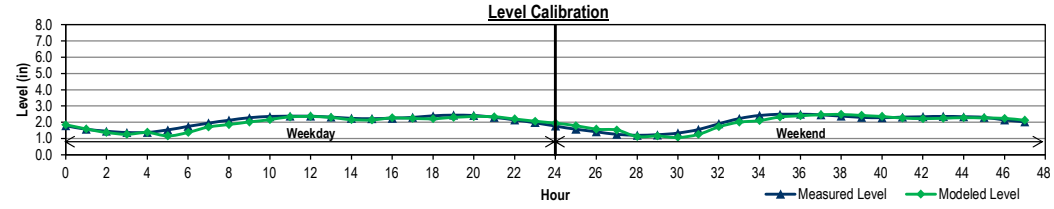
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE A13 DRY WEATHER FLOW CALIBRATION

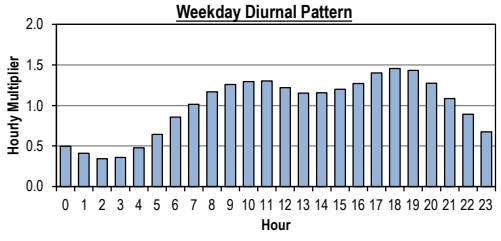
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Level Diff (in)	Diurnal Initial Curve	Diurnal Modified Curve	Diurnal Calibrated Diurnal
Weekday	0	0.03	1.79	0.80	0.04	1.85	1.11	-0.06	0.50	0.50	0.50
	1	0.02	1.57	0.71	0.03	1.59	1.03	-0.01	0.41	0.41	0.41
	2	0.02	1.46	0.65	0.02	1.38	0.93	0.08	0.34	0.34	0.34
	3	0.02	1.37	0.60	0.02	1.27	0.88	0.11	0.36	0.36	0.36
	4	0.02	1.38	0.60	0.02	1.39	0.93	-0.01	0.48	0.48	0.48
	5	0.02	1.54	0.68	0.01	1.17	0.85	0.37	0.65	0.65	0.65
	6	0.03	1.75	0.77	0.02	1.38	0.94	0.36	0.86	0.86	0.86
	7	0.04	1.96	0.87	0.03	1.72	1.07	0.24	1.02	1.02	1.02
	8	0.04	2.12	0.93	0.04	1.86	1.12	0.26	1.17	1.17	1.17
	9	0.05	2.28	0.98	0.05	2.02	1.22	0.26	1.26	1.26	1.26
	10	0.06	2.35	1.01	0.05	2.16	1.23	0.19	1.30	1.30	1.30
	11	0.06	2.38	1.02	0.06	2.33	1.29	0.05	1.30	1.30	1.30
	12	0.06	2.38	1.02	0.06	2.36	1.31	0.02	1.22	1.22	1.22
	13	0.05	2.32	1.00	0.06	2.30	1.30	0.02	1.15	1.15	1.15
	14	0.05	2.25	0.99	0.05	2.16	1.25	0.08	1.15	1.15	1.15
	15	0.05	2.22	0.99	0.05	2.15	1.22	0.07	1.20	1.20	1.20
	16	0.05	2.26	1.01	0.05	2.27	1.26	-0.01	1.27	1.27	1.27
	17	0.06	2.31	1.04	0.06	2.24	1.28	0.07	1.40	1.40	1.40
	18	0.06	2.40	1.08	0.05	2.22	1.26	0.18	1.46	1.46	1.46
	19	0.06	2.45	1.10	0.06	2.31	1.28	0.14	1.43	1.43	1.43
	20	0.06	2.43	1.09	0.06	2.36	1.31	0.07	1.28	1.28	1.28
	21	0.06	2.31	1.04	0.06	2.34	1.31	-0.03	1.08	1.08	1.08
	22	0.05	2.15	0.98	0.05	2.20	1.26	-0.05	0.89	0.89	0.89
	23	0.04	1.98	0.91	0.04	2.06	1.18	-0.09	0.67	0.67	0.67
Weekend	24	0.03	1.77	0.86	0.04	1.95	1.18	-0.18	0.56	0.56	0.56
	25	0.02	1.58	0.78	0.03	1.79	1.09	-0.21	0.45	0.45	0.45
	26	0.02	1.42	0.72	0.03	1.58	1.00	-0.16	0.33	0.33	0.33
	27	0.01	1.26	0.64	0.02	1.53	0.99	-0.26	0.31	0.31	0.31
	28	0.01	1.21	0.63	0.01	1.12	0.82	0.09	0.32	0.32	0.32
	29	0.01	1.24	0.62	0.01	1.15	0.83	0.08	0.38	0.38	0.38
	30	0.02	1.34	0.67	0.01	1.07	0.81	0.27	0.56	0.56	0.56
	31	0.02	1.55	0.78	0.02	1.26	0.88	0.30	0.89	0.89	0.89
	32	0.04	1.91	0.93	0.03	1.72	1.09	0.19	1.24	1.24	1.24
	33	0.05	2.23	1.05	0.04	2.01	1.19	0.22	1.46	1.46	1.46
	34	0.06	2.43	1.11	0.05	2.11	1.23	0.32	1.53	1.53	1.53
	35	0.07	2.49	1.13	0.06	2.33	1.29	0.16	1.56	1.56	1.56
	36	0.07	2.50	1.14	0.06	2.40	1.32	0.10	1.50	1.50	1.50
	37	0.07	2.46	1.12	0.07	2.47	1.35	-0.01	1.40	1.40	1.40
	38	0.06	2.38	1.10	0.07	2.49	1.35	-0.10	1.30	1.30	1.30
	39	0.06	2.31	1.06	0.06	2.43	1.32	-0.12	1.26	1.26	1.26
	40	0.06	2.28	1.05	0.06	2.36	1.31	-0.08	1.31	1.31	1.31
	41	0.06	2.32	1.07	0.06	2.26	1.29	0.05	1.35	1.35	1.35
	42	0.06	2.35	1.08	0.05	2.22	1.26	0.13	1.37	1.37	1.37
	43	0.06	2.36	1.08	0.05	2.25	1.26	0.11	1.35	1.35	1.35
	44	0.06	2.34	1.08	0.05	2.28	1.26	0.07	1.25	1.25	1.25
	45	0.05	2.30	1.04	0.05	2.27	1.26	0.03	1.06	1.06	1.06
	46	0.05	2.15	0.97	0.05	2.25	1.25	-0.09	0.90	0.90	0.90
	47	0.04	2.02	0.90	0.05	2.13	1.24	-0.11	0.73	0.73	0.73
Average											
	Weekday	0.044	2.1	0.91	0.043	2.0	1.16		0.99	0.99	0.99
	Weekend	0.044	2.0	0.94	0.044	2.0	1.16		1.02	1.02	1.02
	ADWF[1]	0.044	2.0	0.92	0.043	2.0	1.16		1.00	1.00	1.00
% Error											
	Weekday				-1.1%			0.37			
	Weekend				-0.7%			0.32			

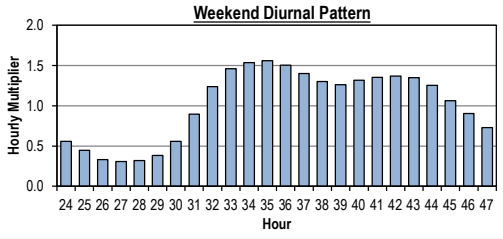
Note:







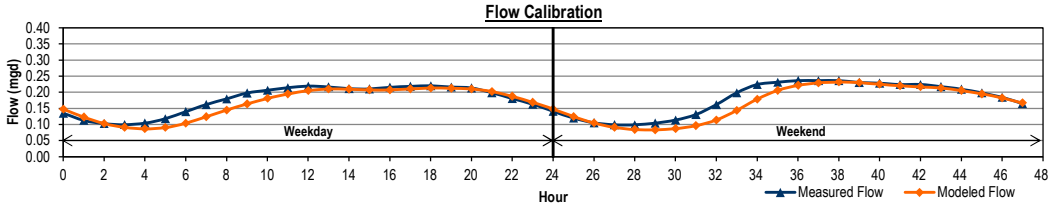


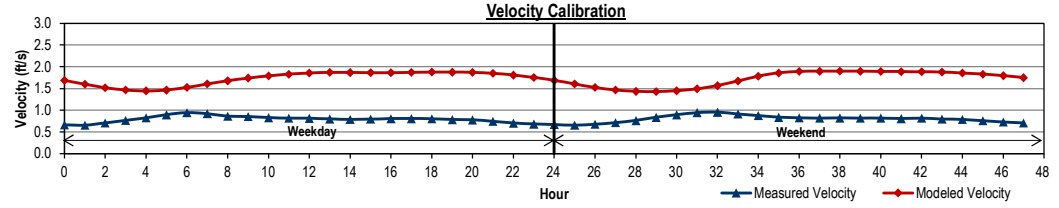


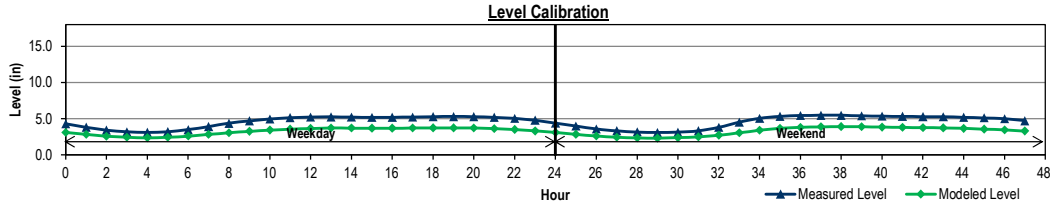
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE A14 DRY WEATHER FLOW CALIBRATION

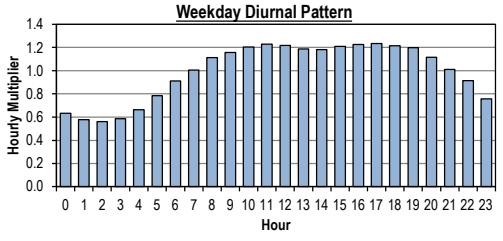
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Level Diff (in)	Diurnal Initial Curve	Diurnal Modified Curve	Diurnal Calibrated Diurnal
Weekday	0	0.14	4.29	0.66	0.15	3.09	1.69	1.20	0.63	0.63	0.63
	1	0.11	3.83	0.66	0.12	2.83	1.60	1.00	0.58	0.58	0.58
	2	0.10	3.42	0.71	0.10	2.58	1.52	0.84	0.56	0.56	0.56
	3	0.10	3.19	0.77	0.09	2.43	1.47	0.76	0.59	0.59	0.59
	4	0.10	3.12	0.83	0.09	2.37	1.45	0.75	0.66	0.66	0.66
	5	0.12	3.21	0.90	0.09	2.42	1.47	0.79	0.79	0.79	0.79
	6	0.14	3.49	0.94	0.10	2.59	1.53	0.90	0.91	0.91	0.91
	7	0.16	3.91	0.92	0.12	2.83	1.61	1.09	1.01	1.01	1.01
	8	0.18	4.37	0.86	0.14	3.06	1.68	1.32	1.11	1.11	1.11
	9	0.20	4.71	0.86	0.16	3.25	1.74	1.46	1.16	1.16	1.16
	10	0.21	4.94	0.83	0.18	3.43	1.79	1.51	1.20	1.20	1.20
	11	0.21	5.13	0.82	0.19	3.56	1.83	1.57	1.23	1.23	1.23
	12	0.22	5.22	0.81	0.21	3.66	1.86	1.57	1.22	1.22	1.22
	13	0.22	5.25	0.80	0.21	3.70	1.87	1.55	1.19	1.19	1.19
	14	0.21	5.21	0.79	0.21	3.70	1.87	1.51	1.18	1.18	1.18
	15	0.21	5.17	0.80	0.21	3.68	1.86	1.49	1.21	1.21	1.21
	16	0.22	5.20	0.81	0.21	3.68	1.86	1.52	1.23	1.23	1.23
	17	0.22	5.23	0.81	0.21	3.71	1.87	1.52	1.23	1.23	1.23
	18	0.22	5.28	0.80	0.21	3.73	1.88	1.55	1.21	1.21	1.21
	19	0.22	5.30	0.79	0.21	3.73	1.88	1.58	1.20	1.20	1.20
	20	0.21	5.29	0.78	0.21	3.70	1.87	1.59	1.12	1.12	1.12
	21	0.20	5.19	0.75	0.20	3.64	1.85	1.55	1.01	1.01	1.01
	22	0.18	5.03	0.71	0.19	3.49	1.81	1.53	0.91	0.91	0.91
	23	0.16	4.78	0.68	0.17	3.31	1.76	1.46	0.76	0.76	0.76
Weekend	24	0.14	4.40	0.67	0.15	3.10	1.69	1.30	0.67	0.67	0.67
	25	0.12	3.99	0.66	0.12	2.84	1.61	1.15	0.59	0.59	0.59
	26	0.11	3.59	0.68	0.10	2.61	1.53	0.98	0.56	0.56	0.56
	27	0.10	3.32	0.72	0.09	2.43	1.47	0.89	0.56	0.56	0.56
	28	0.10	3.17	0.77	0.08	2.34	1.43	0.83	0.59	0.59	0.59
	29	0.10	3.09	0.84	0.08	2.33	1.43	0.77	0.64	0.64	0.64
	30	0.11	3.14	0.90	0.09	2.38	1.45	0.76	0.73	0.73	0.73
	31	0.13	3.32	0.95	0.10	2.50	1.49	0.83	0.91	0.91	0.91
	32	0.16	3.81	0.96	0.11	2.71	1.57	1.09	1.11	1.11	1.11
	33	0.20	4.51	0.91	0.14	3.04	1.68	1.47	1.26	1.26	1.26
	34	0.22	5.04	0.88	0.18	3.40	1.79	1.64	1.30	1.30	1.30
	35	0.23	5.32	0.84	0.21	3.66	1.86	1.66	1.33	1.33	1.33
	36	0.24	5.44	0.83	0.22	3.80	1.89	1.64	1.32	1.32	1.32
	37	0.24	5.47	0.82	0.23	3.87	1.90	1.60	1.33	1.33	1.33
	38	0.24	5.47	0.82	0.23	3.90	1.90	1.57	1.30	1.30	1.30
	39	0.23	5.40	0.82	0.23	3.88	1.90	1.52	1.28	1.28	1.28
	40	0.23	5.35	0.82	0.22	3.84	1.89	1.51	1.26	1.26	1.26
	41	0.22	5.32	0.81	0.22	3.79	1.89	1.52	1.26	1.26	1.26
	42	0.22	5.29	0.82	0.22	3.77	1.89	1.53	1.22	1.22	1.22
	43	0.22	5.27	0.80	0.21	3.73	1.88	1.53	1.18	1.18	1.18
	44	0.21	5.19	0.79	0.21	3.66	1.86	1.52	1.11	1.11	1.11
	45	0.20	5.11	0.76	0.20	3.57	1.83	1.54	1.03	1.03	1.03
	46	0.18	4.99	0.73	0.18	3.45	1.80	1.54	0.93	0.93	0.93
	47	0.16	4.72	0.71	0.17	3.29	1.75	1.43	0.79	0.79	0.79
Average											
	Weekday	0.177	4.6	0.80	0.167	3.3	1.73		1.00	1.00	1.00
	Weekend	0.180	4.6	0.80	0.167	3.2	1.72		1.01	1.01	1.01
	ADWF[1]	0.178	4.6	0.80	0.167	3.3	1.73		1.00	1.00	1.00
% Error											
	Weekday				-6.0%			1.59			
	Weekend				-7.4%			1.66			

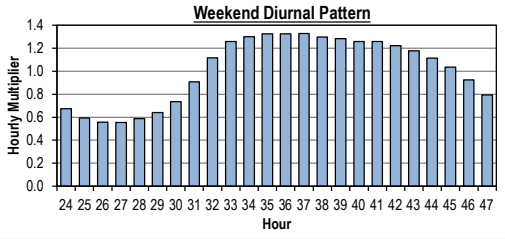
Note:







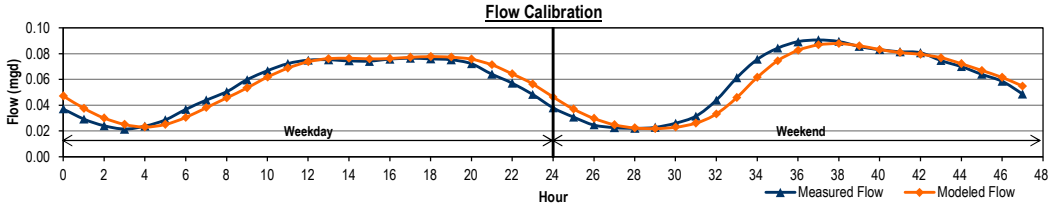


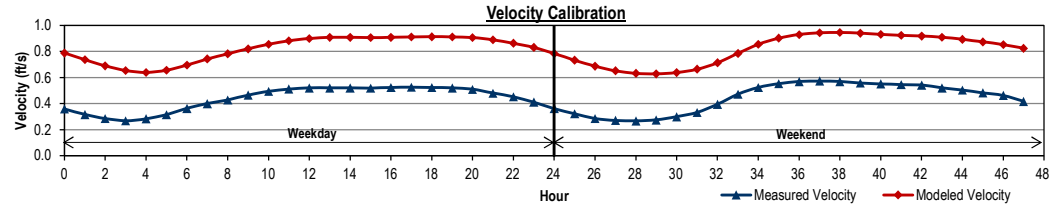


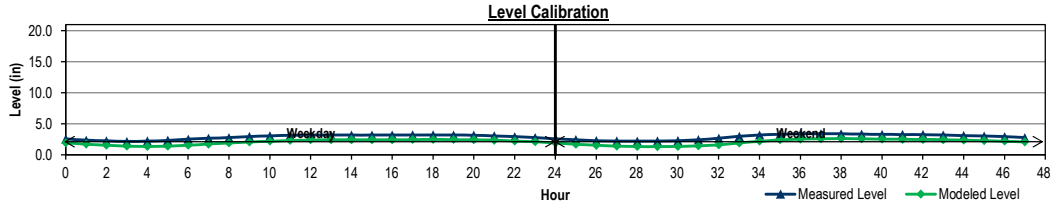
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE A15 DRY WEATHER FLOW CALIBRATION

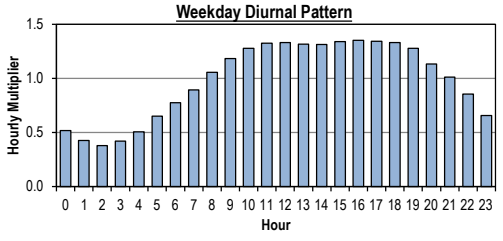
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Level Diff (in)	Diurnal Initial Curve	Diurnal Modified Curve	Diurnal Calibrated Diurnal
Weekday	0	0.04	2.57	0.36	0.05	1.93	0.79	0.64	0.52	0.52	0.52
	1	0.03	2.39	0.32	0.04	1.73	0.74	0.66	0.43	0.43	0.43
	2	0.02	2.26	0.28	0.03	1.55	0.69	0.71	0.38	0.38	0.38
	3	0.02	2.18	0.27	0.03	1.42	0.65	0.76	0.42	0.42	0.42
	4	0.02	2.22	0.28	0.02	1.37	0.64	0.86	0.51	0.51	0.51
	5	0.03	2.35	0.31	0.03	1.42	0.66	0.93	0.65	0.65	0.65
	6	0.04	2.53	0.36	0.03	1.56	0.70	0.97	0.78	0.78	0.78
	7	0.04	2.67	0.40	0.04	1.74	0.74	0.93	0.89	0.89	0.89
	8	0.05	2.81	0.43	0.05	1.90	0.78	0.91	1.06	1.06	1.06
	9	0.06	2.97	0.47	0.05	2.05	0.82	0.91	1.18	1.18	1.18
	10	0.07	3.07	0.49	0.06	2.20	0.85	0.87	1.28	1.28	1.28
	11	0.07	3.16	0.51	0.07	2.32	0.88	0.83	1.33	1.33	1.33
	12	0.07	3.20	0.52	0.07	2.40	0.90	0.80	1.33	1.33	1.33
	13	0.08	3.21	0.52	0.08	2.44	0.91	0.77	1.32	1.32	1.32
	14	0.07	3.19	0.52	0.08	2.45	0.91	0.74	1.31	1.31	1.31
	15	0.07	3.19	0.52	0.08	2.44	0.91	0.75	1.34	1.34	1.34
	16	0.08	3.21	0.52	0.08	2.44	0.91	0.77	1.35	1.35	1.35
	17	0.08	3.23	0.53	0.08	2.46	0.91	0.77	1.34	1.34	1.34
	18	0.08	3.22	0.52	0.08	2.47	0.91	0.76	1.33	1.33	1.33
	19	0.08	3.22	0.52	0.08	2.46	0.91	0.76	1.28	1.28	1.28
	20	0.07	3.17	0.51	0.08	2.44	0.91	0.73	1.13	1.13	1.13
	21	0.06	3.05	0.48	0.07	2.37	0.89	0.68	1.01	1.01	1.01
	22	0.06	2.94	0.45	0.06	2.25	0.86	0.69	0.85	0.85	0.85
	23	0.05	2.79	0.41	0.06	2.11	0.83	0.68	0.66	0.66	0.66
Weekend	24	0.04	2.60	0.36	0.05	1.92	0.78	0.69	0.54	0.54	0.54
	25	0.03	2.45	0.32	0.04	1.71	0.73	0.73	0.44	0.44	0.44
	26	0.02	2.30	0.29	0.03	1.54	0.69	0.76	0.40	0.40	0.40
	27	0.02	2.24	0.27	0.02	1.41	0.65	0.82	0.39	0.39	0.39
	28	0.02	2.21	0.27	0.02	1.35	0.63	0.87	0.40	0.40	0.40
	29	0.02	2.23	0.27	0.02	1.33	0.63	0.90	0.46	0.46	0.46
	30	0.03	2.29	0.30	0.02	1.36	0.64	0.93	0.56	0.56	0.56
	31	0.03	2.43	0.33	0.03	1.45	0.66	0.98	0.78	0.78	0.78
	32	0.04	2.68	0.39	0.03	1.63	0.71	1.06	1.09	1.09	1.09
	33	0.06	2.98	0.47	0.05	1.91	0.78	1.08	1.34	1.34	1.34
	34	0.08	3.21	0.52	0.06	2.20	0.86	1.01	1.49	1.49	1.49
	35	0.08	3.33	0.55	0.07	2.41	0.90	0.92	1.58	1.58	1.58
	36	0.09	3.40	0.57	0.08	2.54	0.93	0.86	1.60	1.60	1.60
	37	0.09	3.41	0.57	0.09	2.60	0.94	0.81	1.58	1.58	1.58
	38	0.09	3.40	0.57	0.09	2.62	0.95	0.78	1.52	1.52	1.52
	39	0.09	3.34	0.56	0.09	2.59	0.94	0.75	1.47	1.47	1.47
	40	0.08	3.31	0.55	0.08	2.55	0.93	0.76	1.44	1.44	1.44
	41	0.08	3.29	0.55	0.08	2.52	0.92	0.77	1.43	1.43	1.43
	42	0.08	3.27	0.54	0.08	2.49	0.92	0.78	1.32	1.32	1.32
	43	0.07	3.19	0.52	0.08	2.45	0.91	0.74	1.24	1.24	1.24
	44	0.07	3.13	0.50	0.07	2.38	0.89	0.75	1.13	1.13	1.13
	45	0.06	3.04	0.48	0.07	2.29	0.87	0.74	1.04	1.04	1.04
	46	0.06	2.94	0.46	0.06	2.20	0.85	0.74	0.86	0.86	0.86
	47	0.05	2.78	0.42	0.05	2.08	0.82	0.71	0.67	0.67	0.67
Average											
	Weekday	0.056	2.9	0.44	0.057	2.1	0.82		0.99	0.99	0.99
	Weekend	0.058	2.9	0.44	0.057	2.1	0.81		1.03	1.03	1.03
	ADWF[1]	0.056	2.9	0.44	0.057	2.1	0.82		1.00	1.00	1.00
% Error											
	Weekday				2.0%			0.97			
	Weekend				-2.4%			1.08			

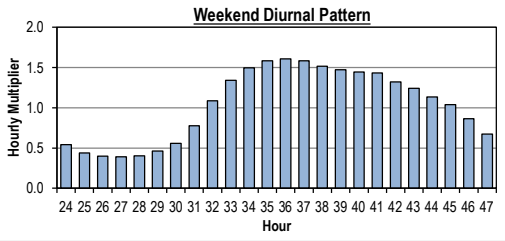
Note:







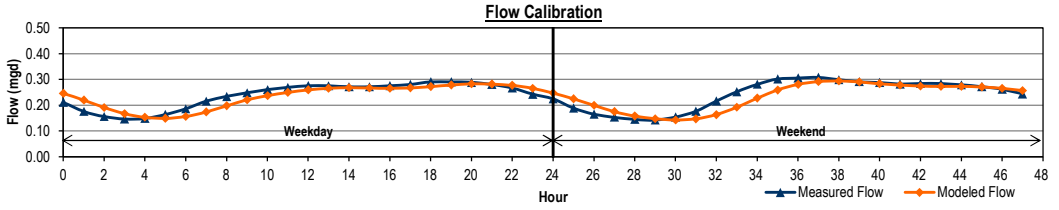


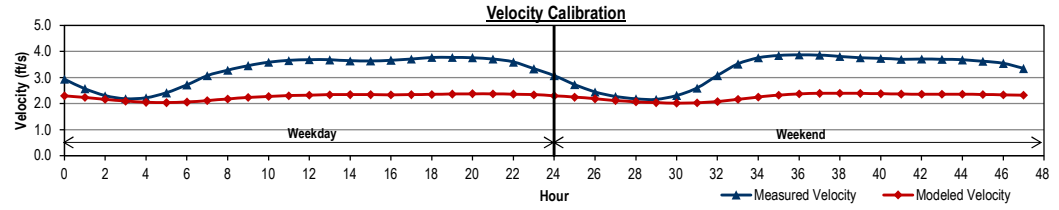


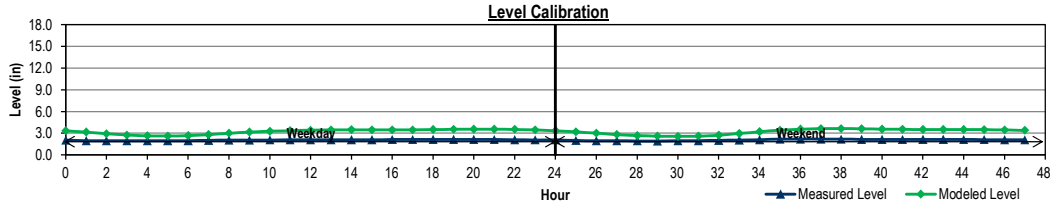
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE A16 DRY WEATHER FLOW CALIBRATION

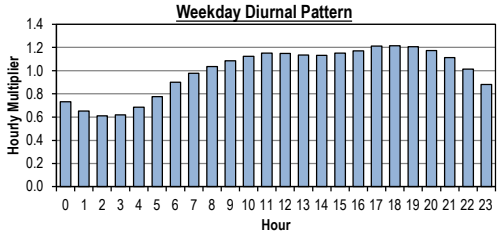
		Measured Data			Modeled Data				Diurnal		
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Level Diff (in)	Initial Curve	Modified Curve	Calibrated Diurnal
Weekday	0	0.21	2.05	2.93	0.25	3.32	2.30	-1.28	0.73	0.73	0.73
	1	0.18	1.98	2.57	0.22	3.15	2.24	-1.17	0.65	0.65	0.65
	2	0.16	1.97	2.30	0.19	2.94	2.16	-0.97	0.61	0.61	0.61
	3	0.15	1.95	2.19	0.17	2.75	2.09	-0.80	0.62	0.62	0.62
	4	0.15	1.95	2.22	0.15	2.64	2.05	-0.69	0.68	0.68	0.68
	5	0.16	1.97	2.41	0.15	2.61	2.04	-0.64	0.78	0.78	0.78
	6	0.19	1.98	2.72	0.16	2.67	2.06	-0.69	0.90	0.90	0.90
	7	0.22	2.01	3.07	0.17	2.81	2.11	-0.80	0.98	0.98	0.98
	8	0.23	2.04	3.28	0.20	2.99	2.18	-0.96	1.04	1.04	1.04
	9	0.25	2.05	3.46	0.22	3.15	2.23	-1.11	1.09	1.09	1.09
	10	0.26	2.06	3.59	0.24	3.26	2.27	-1.20	1.12	1.12	1.12
	11	0.27	2.08	3.65	0.25	3.35	2.30	-1.27	1.15	1.15	1.15
	12	0.28	2.10	3.69	0.26	3.41	2.32	-1.31	1.15	1.15	1.15
	13	0.28	2.10	3.68	0.27	3.45	2.34	-1.35	1.13	1.13	1.13
	14	0.27	2.10	3.64	0.27	3.47	2.34	-1.37	1.13	1.13	1.13
	15	0.27	2.10	3.64	0.27	3.46	2.34	-1.36	1.15	1.15	1.15
	16	0.28	2.11	3.66	0.27	3.45	2.34	-1.34	1.17	1.17	1.17
	17	0.28	2.12	3.71	0.27	3.46	2.34	-1.34	1.21	1.21	1.21
	18	0.29	2.15	3.77	0.27	3.50	2.35	-1.35	1.21	1.21	1.21
	19	0.29	2.15	3.77	0.28	3.53	2.37	-1.39	1.21	1.21	1.21
	20	0.29	2.14	3.76	0.28	3.56	2.37	-1.42	1.17	1.17	1.17
	21	0.28	2.12	3.71	0.28	3.56	2.37	-1.43	1.11	1.11	1.11
	22	0.27	2.09	3.59	0.28	3.52	2.36	-1.43	1.01	1.01	1.01
	23	0.24	2.06	3.34	0.27	3.45	2.34	-1.38	0.88	0.88	0.88
Weekend	24	0.22	2.07	3.07	0.25	3.33	2.30	-1.26	0.79	0.79	0.79
	25	0.19	1.99	2.73	0.22	3.18	2.25	-1.19	0.69	0.69	0.69
	26	0.17	1.96	2.45	0.20	3.00	2.18	-1.04	0.64	0.64	0.64
	27	0.15	1.96	2.28	0.17	2.82	2.12	-0.86	0.60	0.60	0.60
	28	0.14	1.93	2.18	0.16	2.68	2.07	-0.75	0.59	0.59	0.59
	29	0.14	1.92	2.16	0.15	2.60	2.03	-0.67	0.64	0.64	0.64
	30	0.15	1.94	2.31	0.14	2.56	2.02	-0.61	0.74	0.74	0.74
	31	0.18	1.97	2.60	0.15	2.59	2.03	-0.62	0.90	0.90	0.90
	32	0.22	2.02	3.08	0.16	2.73	2.08	-0.71	1.05	1.05	1.05
	33	0.25	2.05	3.52	0.19	2.95	2.16	-0.91	1.17	1.17	1.17
	34	0.28	2.10	3.75	0.23	3.20	2.25	-1.10	1.26	1.26	1.26
	35	0.30	2.17	3.85	0.26	3.41	2.32	-1.24	1.28	1.28	1.28
	36	0.31	2.18	3.87	0.28	3.55	2.37	-1.37	1.29	1.29	1.29
	37	0.31	2.20	3.86	0.29	3.62	2.39	-1.42	1.25	1.25	1.25
	38	0.30	2.17	3.81	0.29	3.63	2.40	-1.45	1.22	1.22	1.22
	39	0.29	2.15	3.76	0.29	3.60	2.39	-1.45	1.20	1.20	1.20
	40	0.29	2.15	3.74	0.28	3.56	2.38	-1.42	1.18	1.18	1.18
	41	0.28	2.13	3.70	0.28	3.53	2.36	-1.40	1.19	1.19	1.19
	42	0.28	2.14	3.71	0.27	3.51	2.36	-1.37	1.19	1.19	1.19
	43	0.28	2.14	3.70	0.27	3.50	2.35	-1.36	1.17	1.17	1.17
	44	0.28	2.13	3.68	0.27	3.50	2.35	-1.37	1.14	1.14	1.14
	45	0.27	2.11	3.63	0.27	3.48	2.35	-1.37	1.09	1.09	1.09
	46	0.26	2.09	3.54	0.27	3.45	2.34	-1.36	1.02	1.02	1.02
	47	0.24	2.07	3.35	0.26	3.39	2.32	-1.32	0.94	0.94	0.94
Average											
	Weekday	0.238	2.1	3.26	0.234	3.2	2.26		1.00	1.00	1.00
	Weekend	0.242	2.1	3.26	0.234	3.2	2.26		1.01	1.01	1.01
	ADWF[1]	0.239	2.1	3.26	0.234	3.2	2.26		1.00	1.00	1.00
% Error											
	Weekday				-2.0%			1.43			
	Weekend				-3.2%			1.45			

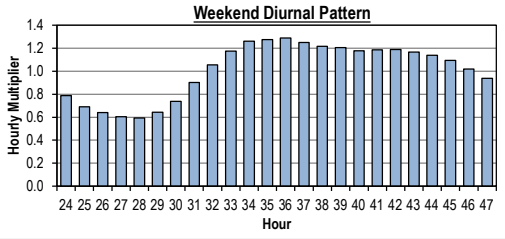
Note:







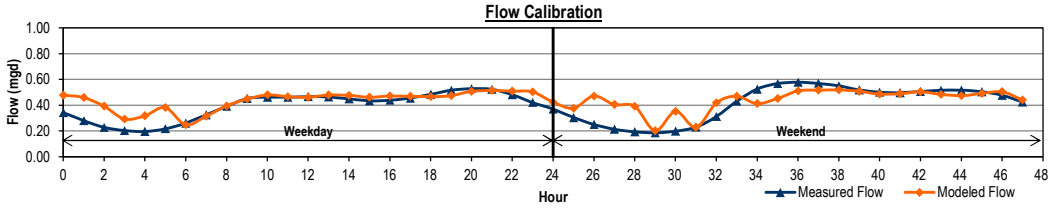


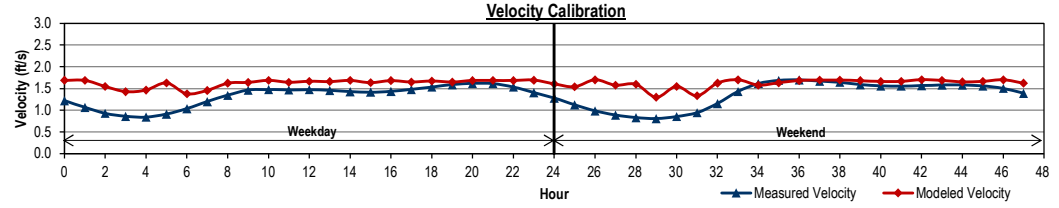


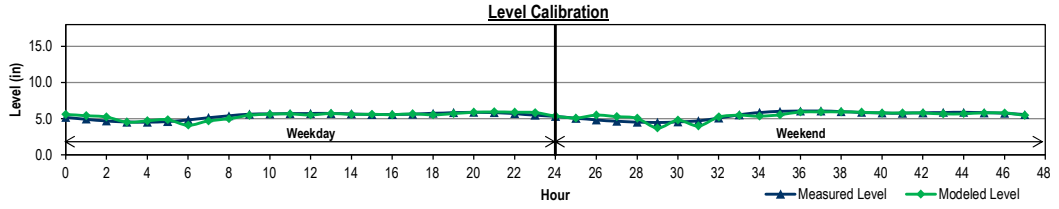
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE Y-1 DRY WEATHER FLOW CALIBRATION

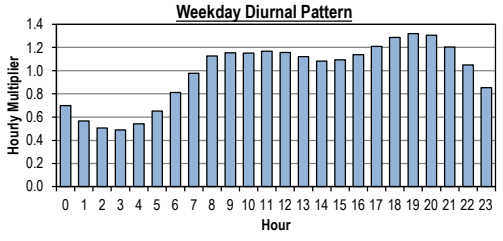
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Level Diff (in)	Diurnal Initial Curve	Diurnal Modified Curve	Diurnal Calibrated Diurnal
Weekday	0	0.34	5.20	1.22	0.48	5.59	1.69	-0.39	0.70	0.70	0.70
	1	0.28	4.93	1.07	0.46	5.41	1.69	-0.48	0.57	0.57	0.57
	2	0.23	4.68	0.93	0.39	5.24	1.55	-0.57	0.51	0.51	0.51
	3	0.20	4.55	0.86	0.29	4.53	1.43	0.02	0.49	0.49	0.49
	4	0.20	4.51	0.84	0.32	4.71	1.46	-0.20	0.54	0.54	0.54
	5	0.22	4.61	0.91	0.38	4.86	1.63	-0.24	0.65	0.65	0.65
	6	0.26	4.85	1.04	0.25	4.10	1.38	0.75	0.81	0.81	0.81
	7	0.33	5.14	1.20	0.31	4.70	1.46	0.44	0.98	0.98	0.98
	8	0.39	5.40	1.34	0.39	4.98	1.62	0.42	1.13	1.13	1.13
	9	0.45	5.63	1.46	0.45	5.48	1.64	0.16	1.15	1.15	1.15
	10	0.46	5.68	1.48	0.48	5.63	1.69	0.05	1.15	1.15	1.15
	11	0.46	5.70	1.47	0.47	5.66	1.64	0.04	1.17	1.17	1.17
	12	0.47	5.73	1.47	0.46	5.52	1.67	0.21	1.16	1.16	1.16
	13	0.46	5.73	1.46	0.48	5.71	1.66	0.02	1.12	1.12	1.12
	14	0.45	5.68	1.43	0.48	5.59	1.69	0.09	1.08	1.08	1.08
	15	0.43	5.58	1.42	0.46	5.63	1.64	-0.04	1.10	1.10	1.10
	16	0.44	5.58	1.43	0.47	5.55	1.68	0.03	1.14	1.14	1.14
	17	0.46	5.63	1.48	0.47	5.66	1.65	-0.03	1.21	1.21	1.21
	18	0.48	5.74	1.53	0.47	5.54	1.67	0.20	1.29	1.29	1.29
	19	0.52	5.84	1.59	0.47	5.70	1.65	0.14	1.32	1.32	1.32
	20	0.53	5.88	1.62	0.51	5.89	1.68	-0.02	1.30	1.30	1.30
	21	0.52	5.84	1.62	0.51	5.94	1.69	-0.10	1.20	1.20	1.20
	22	0.48	5.70	1.54	0.51	5.90	1.68	-0.20	1.05	1.05	1.05
	23	0.42	5.48	1.41	0.50	5.83	1.69	-0.34	0.85	0.85	0.85
Weekend	24	0.37	5.33	1.28	0.42	5.36	1.61	-0.03	0.76	0.76	0.76
	25	0.30	5.07	1.13	0.38	5.10	1.54	-0.04	0.63	0.63	0.63
	26	0.25	4.83	0.99	0.47	5.49	1.70	-0.66	0.53	0.53	0.53
	27	0.21	4.64	0.89	0.40	5.28	1.58	-0.64	0.48	0.48	0.48
	28	0.19	4.54	0.83	0.39	5.06	1.60	-0.52	0.46	0.46	0.46
	29	0.19	4.49	0.81	0.20	3.72	1.30	0.77	0.50	0.50	0.50
	30	0.20	4.56	0.85	0.35	4.80	1.55	-0.25	0.57	0.57	0.57
	31	0.23	4.71	0.95	0.23	4.00	1.33	0.71	0.78	0.78	0.78
	32	0.31	5.09	1.15	0.42	5.24	1.62	-0.15	1.08	1.08	1.08
	33	0.43	5.54	1.43	0.47	5.48	1.70	0.06	1.31	1.31	1.31
	34	0.52	5.86	1.61	0.41	5.34	1.58	0.52	1.42	1.42	1.42
	35	0.57	6.01	1.69	0.45	5.55	1.63	0.45	1.44	1.44	1.44
	36	0.58	6.06	1.70	0.51	5.91	1.68	0.14	1.42	1.42	1.42
	37	0.57	6.07	1.67	0.52	5.94	1.69	0.13	1.37	1.37	1.37
	38	0.55	5.99	1.64	0.52	5.95	1.70	0.04	1.30	1.30	1.30
	39	0.52	5.87	1.59	0.51	5.91	1.68	-0.04	1.25	1.25	1.25
	40	0.50	5.79	1.56	0.49	5.78	1.66	0.00	1.24	1.24	1.24
	41	0.50	5.78	1.56	0.49	5.78	1.67	-0.01	1.26	1.26	1.26
	42	0.51	5.82	1.57	0.50	5.80	1.70	0.02	1.29	1.29	1.29
	43	0.52	5.86	1.58	0.48	5.66	1.68	0.20	1.29	1.29	1.29
	44	0.52	5.88	1.58	0.47	5.69	1.65	0.18	1.26	1.26	1.26
	45	0.50	5.83	1.56	0.49	5.80	1.67	0.03	1.19	1.19	1.19
	46	0.48	5.75	1.50	0.50	5.80	1.70	-0.05	1.06	1.06	1.06
	47	0.42	5.57	1.39	0.44	5.46	1.62	0.11	0.92	0.92	0.92
Average											
	Weekday	0.395	5.4	1.33	0.436	5.4	1.62		0.99	0.99	0.99
	Weekend	0.414	5.5	1.35	0.438	5.4	1.62		1.03	1.03	1.03
	ADWF[1]	0.400	5.4	1.33	0.437	5.4	1.62		1.00	1.00	1.00
% Error											
	Weekday				10.3%			0.75			
	Weekend				5.9%			0.77			

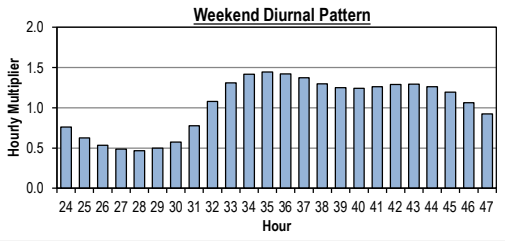
Note:







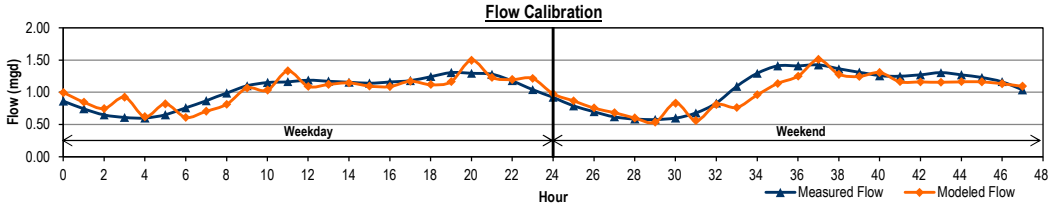


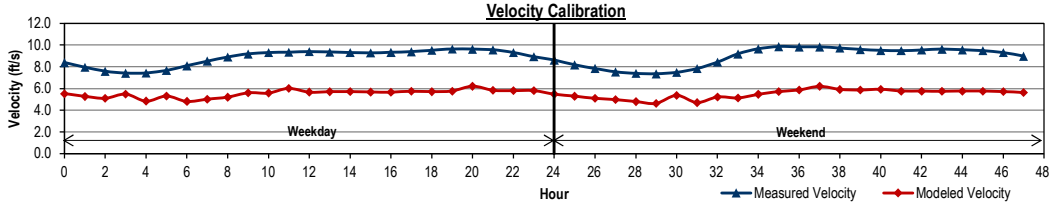


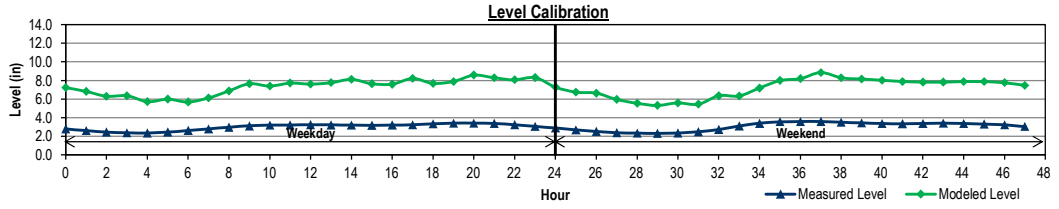
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE Y-2 DRY WEATHER FLOW CALIBRATION

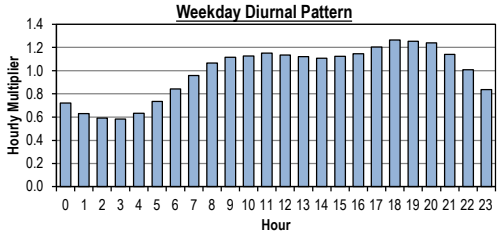
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Level Diff (in)	Diurnal Initial Curve	Diurnal Modified Curve	Diurnal Calibrated Diurnal
Weekday	0	0.86	2.80	8.39	1.00	7.24	5.53	-4.44	0.72	0.72	0.72
	1	0.74	2.61	7.96	0.85	6.83	5.28	-4.22	0.63	0.63	0.63
	2	0.65	2.45	7.59	0.75	6.30	5.10	-3.85	0.59	0.59	0.59
	3	0.61	2.38	7.43	0.92	6.36	5.49	-3.98	0.58	0.58	0.58
	4	0.60	2.36	7.43	0.62	5.72	4.84	-3.36	0.63	0.63	0.63
	5	0.65	2.45	7.67	0.82	5.99	5.30	-3.54	0.74	0.74	0.74
	6	0.76	2.63	8.09	0.61	5.68	4.82	-3.05	0.84	0.84	0.84
	7	0.87	2.79	8.52	0.71	6.12	5.02	-3.32	0.96	0.96	0.96
	8	0.99	2.97	8.89	0.81	6.87	5.20	-3.90	1.07	1.07	1.07
	9	1.10	3.13	9.19	1.06	7.65	5.61	-4.52	1.12	1.12	1.12
	10	1.15	3.20	9.32	1.03	7.39	5.58	-4.19	1.13	1.13	1.13
	11	1.16	3.22	9.35	1.33	7.72	6.01	-4.51	1.15	1.15	1.15
	12	1.19	3.25	9.39	1.09	7.60	5.67	-4.35	1.14	1.14	1.14
	13	1.17	3.22	9.36	1.12	7.75	5.71	-4.53	1.12	1.12	1.12
	14	1.16	3.20	9.32	1.15	8.11	5.72	-4.91	1.11	1.11	1.11
	15	1.14	3.18	9.29	1.10	7.65	5.67	-4.46	1.12	1.12	1.12
	16	1.16	3.21	9.33	1.09	7.59	5.66	-4.38	1.15	1.15	1.15
	17	1.18	3.24	9.39	1.17	8.21	5.75	-4.97	1.21	1.21	1.21
	18	1.24	3.33	9.52	1.12	7.68	5.70	-4.35	1.27	1.27	1.27
	19	1.31	3.42	9.64	1.16	7.88	5.76	-4.46	1.26	1.26	1.26
	20	1.30	3.40	9.62	1.50	8.58	6.21	-5.18	1.24	1.24	1.24
	21	1.28	3.38	9.56	1.23	8.29	5.84	-4.90	1.14	1.14	1.14
	22	1.18	3.25	9.32	1.20	8.07	5.81	-4.82	1.01	1.01	1.01
	23	1.04	3.05	8.94	1.21	8.31	5.81	-5.25	0.84	0.84	0.84
Weekend	24	0.92	2.88	8.62	0.98	7.27	5.49	-4.39	0.77	0.77	0.77
	25	0.79	2.68	8.18	0.87	6.74	5.29	-4.06	0.68	0.68	0.68
	26	0.70	2.53	7.85	0.76	6.63	5.10	-4.09	0.60	0.60	0.60
	27	0.62	2.39	7.53	0.68	5.96	4.98	-3.57	0.57	0.57	0.57
	28	0.59	2.33	7.40	0.60	5.55	4.80	-3.21	0.56	0.56	0.56
	29	0.58	2.32	7.36	0.53	5.32	4.64	-2.99	0.58	0.58	0.58
	30	0.60	2.36	7.49	0.83	5.59	5.38	-3.23	0.66	0.66	0.66
	31	0.68	2.50	7.84	0.56	5.45	4.70	-2.95	0.81	0.81	0.81
	32	0.83	2.73	8.43	0.81	6.35	5.22	-3.62	1.06	1.06	1.06
	33	1.09	3.11	9.18	0.76	6.34	5.13	-3.23	1.25	1.25	1.25
	34	1.29	3.40	9.65	0.96	7.18	5.47	-3.78	1.37	1.37	1.37
	35	1.41	3.56	9.86	1.14	7.99	5.72	-4.43	1.37	1.37	1.37
	36	1.41	3.57	9.83	1.25	8.18	5.88	-4.62	1.38	1.38	1.38
	37	1.43	3.59	9.83	1.51	8.84	6.20	-5.25	1.32	1.32	1.32
	38	1.36	3.50	9.73	1.28	8.28	5.91	-4.78	1.27	1.27	1.27
	39	1.31	3.44	9.61	1.24	8.16	5.87	-4.72	1.22	1.22	1.22
	40	1.26	3.36	9.51	1.31	8.02	5.93	-4.65	1.21	1.21	1.21
	41	1.25	3.35	9.49	1.16	7.88	5.76	-4.53	1.23	1.23	1.23
	42	1.27	3.38	9.55	1.16	7.83	5.76	-4.45	1.26	1.26	1.26
	43	1.30	3.42	9.63	1.16	7.82	5.75	-4.40	1.23	1.23	1.23
	44	1.27	3.38	9.57	1.16	7.88	5.76	-4.50	1.19	1.19	1.19
	45	1.23	3.31	9.48	1.16	7.88	5.76	-4.56	1.13	1.13	1.13
	46	1.16	3.23	9.31	1.13	7.76	5.72	-4.53	1.01	1.01	1.01
	47	1.04	3.05	8.99	1.09	7.47	5.64	-4.42	0.89	0.89	0.89
Average											
	Weekday	1.021	3.0	8.85	1.027	7.3	5.55		0.99	0.99	0.99
	Weekend	1.058	3.1	8.91	1.004	7.2	5.49		1.03	1.03	1.03
	ADWF[1]	1.031	3.0	8.87	1.021	7.3	5.53		1.00	1.00	1.00
% Error											
	Weekday				0.6%			5.25			
	Weekend				-5.1%			5.25			

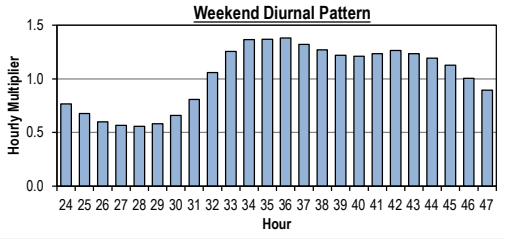
Note:







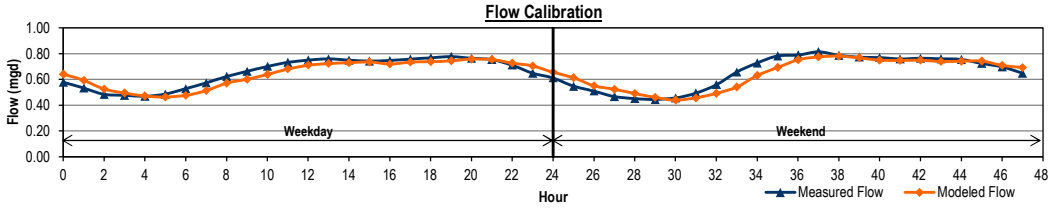


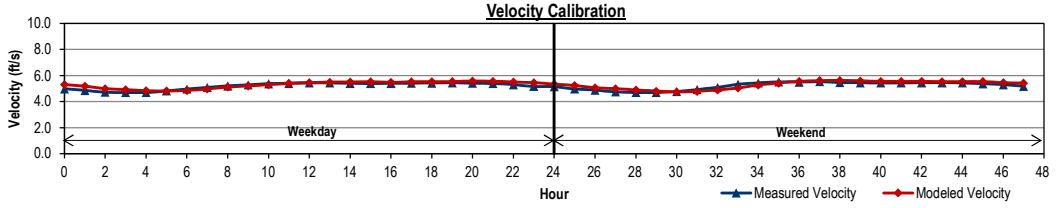


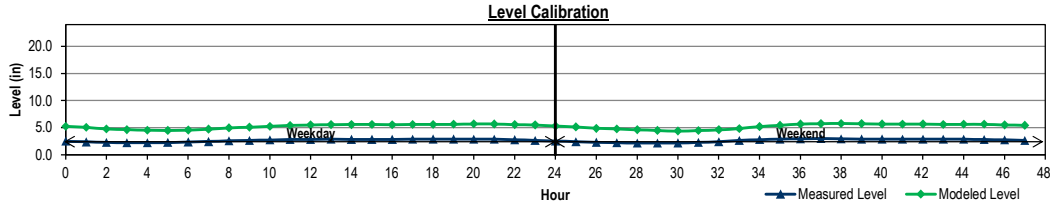
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE Y-3 DRY WEATHER FLOW CALIBRATION

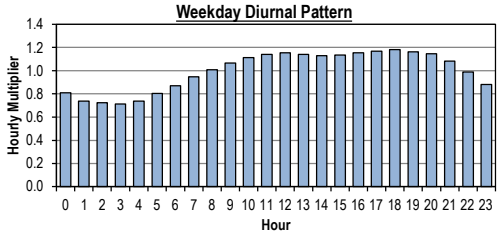
		Measured Data			Modeled Data				Diurnal		
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Level Diff (in)	Initial Curve	Modified Curve	Calibrated Diurnal
Weekday	0	0.58	2.51	4.99	0.64	5.26	5.30	-2.74	0.81	0.81	0.81
	1	0.53	2.40	4.85	0.59	5.06	5.18	-2.66	0.74	0.74	0.74
	2	0.48	2.30	4.71	0.53	4.79	5.00	-2.49	0.72	0.72	0.72
	3	0.48	2.27	4.70	0.49	4.64	4.91	-2.38	0.71	0.71	0.71
	4	0.47	2.25	4.70	0.47	4.55	4.84	-2.30	0.74	0.74	0.74
	5	0.49	2.27	4.82	0.46	4.50	4.81	-2.23	0.80	0.80	0.80
	6	0.53	2.37	4.96	0.48	4.57	4.85	-2.20	0.87	0.87	0.87
	7	0.57	2.47	5.08	0.51	4.73	4.96	-2.26	0.95	0.95	0.95
	8	0.62	2.59	5.20	0.57	4.98	5.12	-2.39	1.01	1.01	1.01
	9	0.66	2.67	5.28	0.60	5.10	5.20	-2.43	1.07	1.07	1.07
	10	0.70	2.75	5.37	0.64	5.24	5.29	-2.49	1.11	1.11	1.11
	11	0.73	2.82	5.40	0.68	5.41	5.39	-2.59	1.14	1.14	1.14
	12	0.75	2.86	5.42	0.71	5.52	5.46	-2.66	1.15	1.15	1.15
	13	0.76	2.88	5.44	0.72	5.57	5.49	-2.69	1.14	1.14	1.14
	14	0.75	2.86	5.40	0.73	5.59	5.50	-2.73	1.13	1.13	1.13
	15	0.74	2.85	5.39	0.74	5.62	5.52	-2.76	1.14	1.14	1.14
	16	0.75	2.86	5.40	0.72	5.56	5.48	-2.70	1.15	1.15	1.15
	17	0.76	2.89	5.41	0.73	5.60	5.51	-2.72	1.17	1.17	1.17
	18	0.77	2.91	5.42	0.74	5.63	5.52	-2.72	1.18	1.18	1.18
	19	0.78	2.93	5.44	0.74	5.64	5.53	-2.71	1.16	1.16	1.16
	20	0.76	2.91	5.41	0.76	5.70	5.57	-2.79	1.15	1.15	1.15
	21	0.75	2.88	5.38	0.75	5.69	5.56	-2.80	1.08	1.08	1.08
	22	0.71	2.80	5.30	0.73	5.58	5.50	-2.78	0.99	0.99	0.99
	23	0.65	2.66	5.17	0.70	5.50	5.45	-2.83	0.88	0.88	0.88
Weekend	24	0.61	2.57	5.14	0.66	5.32	5.33	-2.75	0.83	0.83	0.83
	25	0.55	2.43	4.97	0.61	5.15	5.23	-2.72	0.78	0.78	0.78
	26	0.51	2.34	4.88	0.55	4.88	5.06	-2.55	0.71	0.71	0.71
	27	0.47	2.24	4.74	0.52	4.78	4.99	-2.53	0.69	0.69	0.69
	28	0.45	2.20	4.70	0.49	4.63	4.89	-2.43	0.68	0.68	0.68
	29	0.45	2.19	4.70	0.46	4.50	4.80	-2.31	0.70	0.70	0.70
	30	0.46	2.21	4.77	0.44	4.39	4.74	-2.19	0.75	0.75	0.75
	31	0.49	2.29	4.92	0.46	4.48	4.79	-2.19	0.85	0.85	0.85
	32	0.56	2.44	5.09	0.49	4.63	4.90	-2.20	1.00	1.00	1.00
	33	0.66	2.65	5.32	0.54	4.85	5.04	-2.20	1.11	1.11	1.11
	34	0.73	2.81	5.43	0.63	5.22	5.27	-2.41	1.19	1.19	1.19
	35	0.78	2.92	5.51	0.69	5.46	5.42	-2.54	1.20	1.20	1.20
	36	0.79	2.95	5.50	0.75	5.68	5.55	-2.73	1.24	1.24	1.24
	37	0.81	3.00	5.52	0.78	5.76	5.60	-2.76	1.20	1.20	1.20
	38	0.79	2.95	5.46	0.78	5.78	5.62	-2.83	1.18	1.18	1.18
	39	0.77	2.92	5.44	0.77	5.74	5.59	-2.81	1.17	1.17	1.17
	40	0.77	2.91	5.43	0.75	5.66	5.55	-2.75	1.16	1.16	1.16
	41	0.76	2.89	5.42	0.75	5.65	5.54	-2.76	1.16	1.16	1.16
	42	0.76	2.89	5.44	0.75	5.66	5.55	-2.77	1.16	1.16	1.16
	43	0.76	2.88	5.44	0.74	5.63	5.52	-2.75	1.15	1.15	1.15
	44	0.75	2.88	5.43	0.74	5.64	5.53	-2.76	1.10	1.10	1.10
	45	0.72	2.82	5.37	0.74	5.64	5.53	-2.82	1.06	1.06	1.06
	46	0.70	2.76	5.30	0.71	5.52	5.46	-2.76	0.99	0.99	0.99
	47	0.65	2.66	5.18	0.69	5.45	5.42	-2.78	0.93	0.93	0.93
Average											
	Weekday	0.657	2.7	5.19	0.643	5.3	5.29		1.00	1.00	1.00
	Weekend	0.656	2.7	5.21	0.645	5.3	5.29		1.00	1.00	1.00
	ADWF[1]	0.657	2.7	5.20	0.644	5.3	5.29		1.00	1.00	1.00
% Error											
	Weekday				-2.1%			2.83			
	Weekend				-1.6%			2.83			

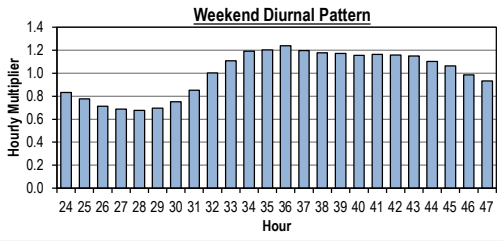
Note:







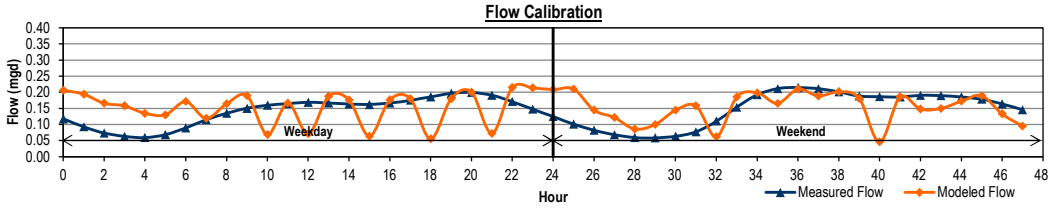


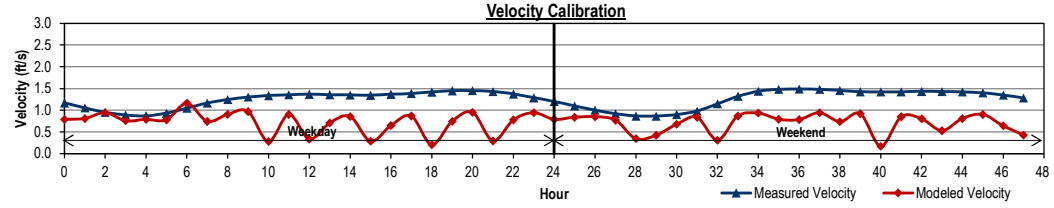


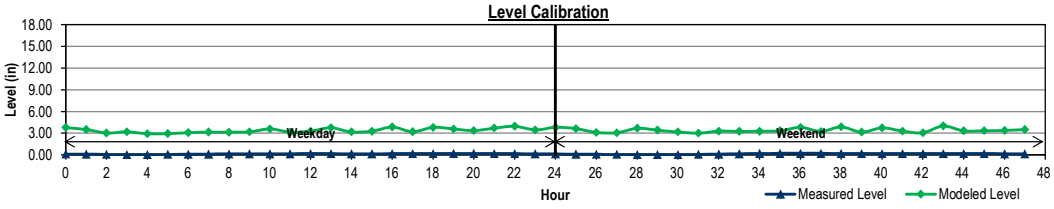
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE Y-4 DRY WEATHER FLOW CALIBRATION

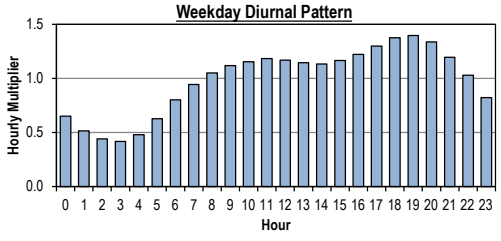
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Level Diff (in)	Diurnal Initial Curve	Diurnal Modified Curve	Diurnal Calibrated Diurnal
Weekday	0	0.12	0.12	1.17	0.21	3.78	0.79	-3.66	0.65	0.65	0.65
	1	0.09	0.09	1.05	0.19	3.49	0.81	-3.40	0.52	0.52	0.52
	2	0.07	0.07	0.95	0.17	3.04	0.94	-2.96	0.44	0.44	0.44
	3	0.06	0.06	0.89	0.16	3.18	0.76	-3.12	0.42	0.42	0.42
	4	0.06	0.06	0.87	0.13	2.92	0.79	-2.86	0.48	0.48	0.48
	5	0.07	0.07	0.93	0.13	2.94	0.78	-2.87	0.63	0.63	0.63
	6	0.09	0.09	1.05	0.17	3.07	1.16	-2.98	0.80	0.80	0.80
	7	0.11	0.11	1.17	0.12	3.14	0.74	-3.03	0.94	0.94	0.94
	8	0.13	0.13	1.25	0.16	3.13	0.91	-3.00	1.05	1.05	1.05
	9	0.15	0.15	1.30	0.19	3.18	0.97	-3.03	1.12	1.12	1.12
	10	0.16	0.16	1.34	0.07	3.59	0.28	-3.43	1.15	1.15	1.15
	11	0.16	0.16	1.35	0.17	3.13	0.90	-2.97	1.18	1.18	1.18
	12	0.17	0.17	1.37	0.07	3.28	0.34	-3.11	1.17	1.17	1.17
	13	0.17	0.17	1.36	0.19	3.76	0.71	-3.59	1.15	1.15	1.15
	14	0.16	0.16	1.35	0.18	3.17	0.86	-3.00	1.13	1.13	1.13
	15	0.16	0.16	1.35	0.06	3.26	0.29	-3.10	1.17	1.17	1.17
	16	0.17	0.17	1.37	0.18	3.85	0.65	-3.69	1.22	1.22	1.22
	17	0.17	0.17	1.39	0.18	3.19	0.87	-3.02	1.30	1.30	1.30
	18	0.19	0.19	1.42	0.06	3.79	0.21	-3.61	1.38	1.38	1.38
	19	0.20	0.20	1.45	0.18	3.59	0.75	-3.39	1.40	1.40	1.40
	20	0.20	0.20	1.45	0.20	3.36	0.95	-3.16	1.34	1.34	1.34
	21	0.19	0.19	1.43	0.07	3.70	0.29	-3.51	1.20	1.20	1.20
	22	0.17	0.17	1.37	0.21	3.95	0.78	-3.78	1.03	1.03	1.03
	23	0.15	0.15	1.29	0.21	3.46	0.94	-3.31	0.82	0.82	0.82
Weekend	24	0.12	0.12	1.20	0.21	3.79	0.79	-3.67	0.71	0.71	0.71
	25	0.10	0.10	1.10	0.21	3.64	0.84	-3.53	0.57	0.57	0.57
	26	0.08	0.08	1.00	0.15	3.11	0.85	-3.03	0.48	0.48	0.48
	27	0.07	0.07	0.92	0.12	3.05	0.77	-2.98	0.42	0.42	0.42
	28	0.06	0.06	0.87	0.09	3.67	0.35	-3.61	0.41	0.41	0.41
	29	0.06	0.06	0.87	0.10	3.43	0.42	-3.37	0.44	0.44	0.44
	30	0.06	0.06	0.90	0.14	3.17	0.68	-3.10	0.54	0.54	0.54
	31	0.08	0.08	0.98	0.16	3.00	0.84	-2.92	0.77	0.77	0.77
	32	0.11	0.11	1.15	0.06	3.29	0.31	-3.18	1.07	1.07	1.07
	33	0.15	0.15	1.32	0.19	3.25	0.87	-3.10	1.34	1.34	1.34
	34	0.19	0.19	1.44	0.20	3.26	0.93	-3.07	1.48	1.48	1.48
	35	0.21	0.21	1.48	0.17	3.32	0.79	-3.11	1.50	1.50	1.50
	36	0.21	0.21	1.49	0.21	3.82	0.79	-3.60	1.48	1.48	1.48
	37	0.21	0.21	1.48	0.19	3.23	0.94	-3.02	1.41	1.41	1.41
	38	0.20	0.20	1.46	0.20	3.88	0.74	-3.67	1.32	1.32	1.32
	39	0.19	0.19	1.43	0.18	3.14	0.92	-2.96	1.30	1.30	1.30
	40	0.19	0.19	1.42	0.05	3.73	0.17	-3.55	1.30	1.30	1.30
	41	0.19	0.19	1.42	0.19	3.29	0.85	-3.10	1.33	1.33	1.33
	42	0.19	0.19	1.44	0.15	3.06	0.80	-2.87	1.33	1.33	1.33
	43	0.19	0.19	1.43	0.15	4.01	0.53	-3.82	1.30	1.30	1.30
	44	0.19	0.19	1.42	0.17	3.32	0.81	-3.14	1.25	1.25	1.25
	45	0.18	0.18	1.40	0.19	3.35	0.90	-3.17	1.15	1.15	1.15
	46	0.16	0.16	1.35	0.13	3.37	0.64	-3.21	1.02	1.02	1.02
	47	0.15	0.15	1.28	0.09	3.52	0.43	-3.37	0.87	0.87	0.87
Average											
	Weekday	0.141	0.1	1.25	0.153	3.4	0.73		0.99	0.99	0.99
	Weekend	0.148	0.1	1.26	0.154	3.4	0.71		1.03	1.03	1.03
	ADWF[1]	0.143	0.1	1.25	0.153	3.4	0.72		1.00	1.00	1.00
% Error											
	Weekday				8.1%			3.78			
	Weekend				4.0%			3.82			

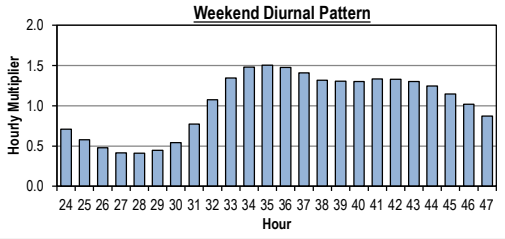
Note:







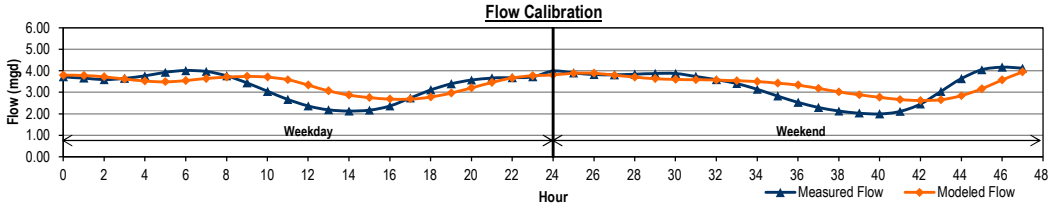


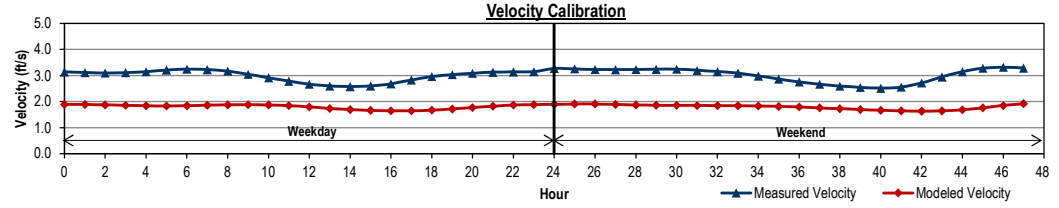


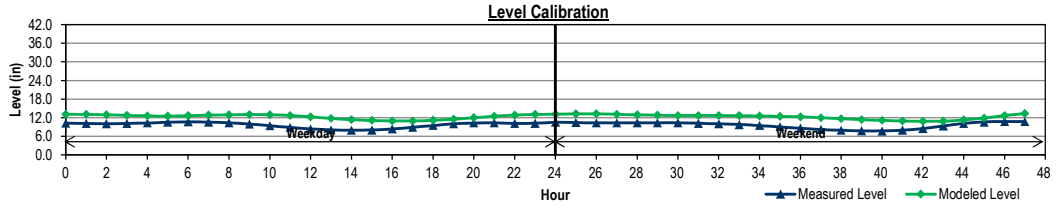
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE WINT003 DRY WEATHER FLOW CALIBRATION

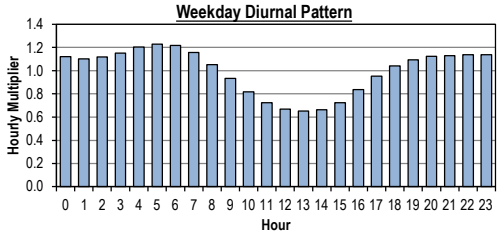
		Measured Data			Modeled Data				Diurnal		
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Level Diff (in)	Initial Curve	Modified Curve	Calibrated Diurnal
Weekday	0	3.72	10.21	3.14	3.80	13.08	1.89	-2.87	1.12	1.12	1.12
	1	3.66	10.15	3.12	3.78	13.05	1.89	-2.90	1.10	1.10	1.10
	2	3.59	10.07	3.10	3.72	12.94	1.88	-2.88	1.12	1.12	1.12
	3	3.65	10.15	3.11	3.62	12.76	1.85	-2.61	1.15	1.15	1.15
	4	3.76	10.27	3.15	3.52	12.58	1.84	-2.31	1.20	1.20	1.20
	5	3.93	10.51	3.21	3.49	12.52	1.83	-2.01	1.23	1.23	1.23
	6	4.01	10.63	3.24	3.55	12.62	1.84	-1.99	1.22	1.22	1.22
	7	3.97	10.58	3.23	3.64	12.79	1.86	-2.21	1.16	1.16	1.16
	8	3.77	10.35	3.17	3.71	12.92	1.87	-2.57	1.05	1.05	1.05
	9	3.44	9.94	3.05	3.74	12.99	1.88	-3.05	0.93	0.93	0.93
	10	3.05	9.41	2.92	3.71	12.94	1.87	-3.53	0.82	0.82	0.82
	11	2.67	8.85	2.78	3.58	12.71	1.85	-3.86	0.72	0.72	0.72
	12	2.36	8.37	2.67	3.34	12.26	1.79	-3.89	0.67	0.67	0.67
	13	2.18	8.06	2.60	3.06	11.74	1.73	-3.68	0.65	0.65	0.65
	14	2.12	7.96	2.58	2.87	11.35	1.69	-3.39	0.66	0.66	0.66
	15	2.17	8.02	2.60	2.75	11.11	1.66	-3.08	0.72	0.72	0.72
	16	2.36	8.36	2.68	2.69	10.97	1.65	-2.61	0.84	0.84	0.84
	17	2.73	8.92	2.83	2.68	10.96	1.65	-2.04	0.95	0.95	0.95
	18	3.11	9.46	2.96	2.78	11.15	1.67	-1.69	1.04	1.04	1.04
	19	3.40	10.03	3.03	2.97	11.52	1.72	-1.49	1.09	1.09	1.09
	20	3.57	10.28	3.09	3.20	11.98	1.77	-1.70	1.12	1.12	1.12
	21	3.67	10.31	3.13	3.46	12.47	1.82	-2.16	1.13	1.13	1.13
	22	3.68	10.16	3.14	3.66	12.84	1.86	-2.69	1.14	1.14	1.14
	23	3.72	10.20	3.15	3.77	13.04	1.88	-2.83	1.14	1.14	1.14
Weekend	24	3.99	10.51	3.27	3.81	13.10	1.89	-2.59	1.20	1.20	1.20
	25	3.90	10.39	3.25	3.88	13.23	1.91	-2.84	1.17	1.17	1.17
	26	3.83	10.30	3.23	3.89	13.24	1.91	-2.94	1.17	1.17	1.17
	27	3.82	10.30	3.22	3.79	13.07	1.89	-2.78	1.18	1.18	1.18
	28	3.84	10.32	3.23	3.70	12.91	1.87	-2.59	1.19	1.19	1.19
	29	3.88	10.37	3.24	3.64	12.79	1.86	-2.42	1.19	1.19	1.19
	30	3.88	10.36	3.24	3.60	12.72	1.85	-2.36	1.15	1.15	1.15
	31	3.74	10.20	3.20	3.59	12.70	1.85	-2.50	1.10	1.10	1.10
	32	3.58	10.00	3.15	3.57	12.67	1.85	-2.67	1.05	1.05	1.05
	33	3.41	9.79	3.09	3.54	12.62	1.84	-2.82	0.96	0.96	0.96
	34	3.13	9.46	2.98	3.50	12.55	1.83	-3.09	0.87	0.87	0.87
	35	2.83	9.04	2.87	3.43	12.42	1.81	-3.38	0.78	0.78	0.78
	36	2.53	8.59	2.76	3.34	12.25	1.79	-3.67	0.70	0.70	0.70
	37	2.29	8.20	2.66	3.18	11.96	1.76	-3.76	0.65	0.65	0.65
	38	2.12	7.92	2.59	3.02	11.65	1.73	-3.73	0.62	0.62	0.62
	39	2.03	7.77	2.55	2.88	11.37	1.69	-3.60	0.61	0.61	0.61
	40	1.99	7.72	2.51	2.77	11.14	1.67	-3.42	0.65	0.65	0.65
	41	2.11	7.97	2.56	2.66	10.92	1.64	-2.95	0.75	0.75	0.75
	42	2.45	8.49	2.71	2.62	10.82	1.63	-2.33	0.93	0.93	0.93
	43	3.04	9.33	2.95	2.65	10.89	1.64	-1.56	1.11	1.11	1.11
	44	3.64	10.12	3.15	2.84	11.27	1.69	-1.15	1.24	1.24	1.24
	45	4.05	10.61	3.28	3.16	11.90	1.76	-1.29	1.28	1.28	1.28
	46	4.17	10.77	3.31	3.58	12.67	1.85	-1.90	1.26	1.26	1.26
	47	4.12	10.73	3.29	3.95	13.35	1.92	-2.61	1.22	1.22	1.22
Average											
	Weekday	3.262	9.6	2.99	3.379	12.3	1.80		1.00	1.00	1.00
	Weekend	3.266	9.6	3.01	3.358	12.3	1.80		1.00	1.00	1.00
	ADWF[1]	3.263	9.6	2.99	3.373	12.3	1.80		1.00	1.00	1.00
% Error											
	Weekday				3.6%			3.89			
	Weekend				2.8%			3.76			

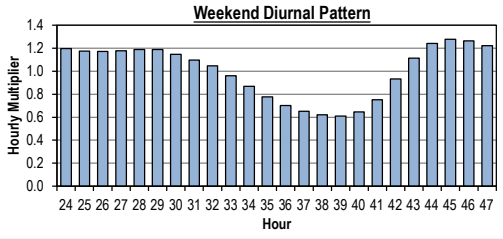
Note:







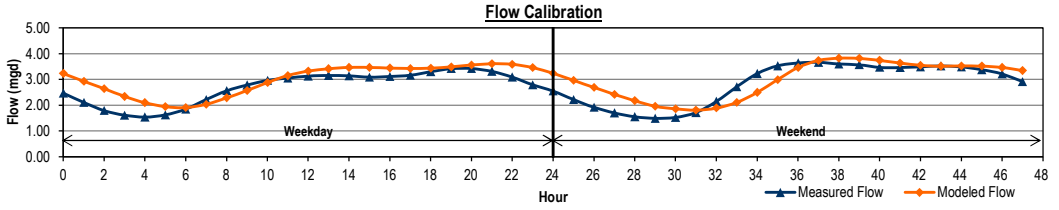


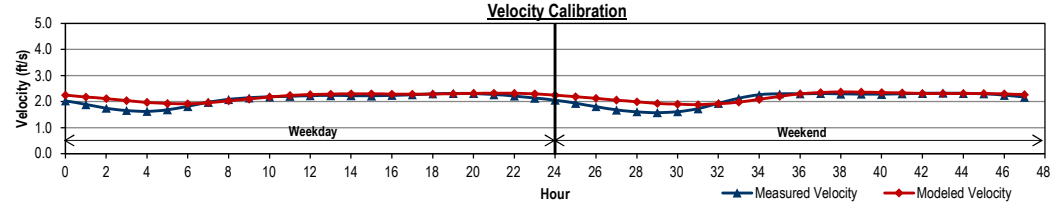


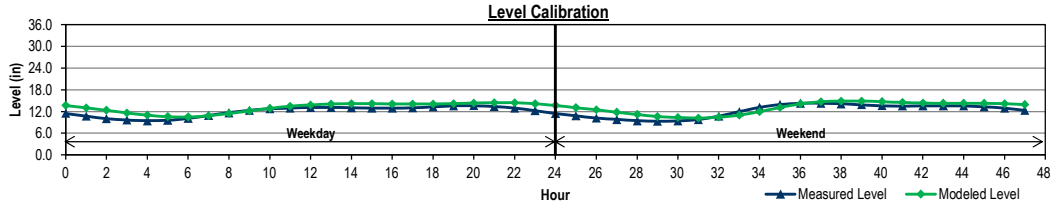
City of Auburn
Collection System Planning Project
FLOW MONITORING SITE MSTTR02 DRY WEATHER FLOW CALIBRATION

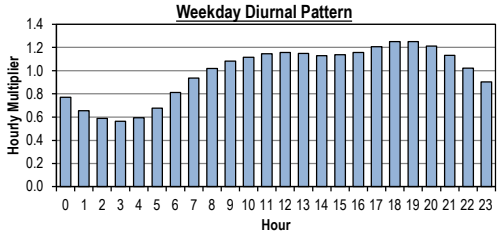
		Measured Data			Modeled Data				Diurnal		
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Level Diff (in)	Initial Curve	Modified Curve	Calibrated Diurnal
Weekday	0	2.46	11.47	2.03	3.23	13.65	2.24	-2.18	0.77	0.77	0.77
	1	2.11	10.69	1.89	2.93	12.98	2.18	-2.29	0.66	0.66	0.66
	2	1.79	10.02	1.75	2.64	12.33	2.11	-2.31	0.59	0.59	0.59
	3	1.61	9.62	1.65	2.34	11.60	2.03	-1.98	0.56	0.56	0.56
	4	1.54	9.45	1.63	2.10	10.98	1.97	-1.53	0.59	0.59	0.59
	5	1.62	9.59	1.68	1.94	10.56	1.93	-0.98	0.68	0.68	0.68
	6	1.85	10.09	1.81	1.91	10.46	1.91	-0.38	0.81	0.81	0.81
	7	2.22	10.90	1.97	2.03	10.80	1.95	0.10	0.94	0.94	0.94
	8	2.56	11.66	2.08	2.28	11.45	2.03	0.21	1.02	1.02	1.02
	9	2.78	12.32	2.14	2.56	12.13	2.10	0.20	1.08	1.08	1.08
	10	2.96	12.74	2.18	2.88	12.85	2.17	-0.12	1.12	1.12	1.12
	11	3.05	12.94	2.20	3.15	13.45	2.23	-0.51	1.15	1.15	1.15
	12	3.13	13.09	2.23	3.32	13.83	2.27	-0.74	1.16	1.16	1.16
	13	3.15	13.13	2.23	3.42	14.04	2.29	-0.91	1.15	1.15	1.15
	14	3.14	13.05	2.23	3.47	14.14	2.30	-1.09	1.13	1.13	1.13
	15	3.09	12.94	2.22	3.46	14.14	2.29	-1.20	1.14	1.14	1.14
	16	3.11	12.94	2.24	3.44	14.09	2.29	-1.14	1.16	1.16	1.16
	17	3.16	12.99	2.26	3.42	14.05	2.29	-1.07	1.21	1.21	1.21
	18	3.30	13.26	2.30	3.43	14.08	2.29	-0.82	1.25	1.25	1.25
	19	3.42	13.55	2.31	3.49	14.18	2.30	-0.63	1.25	1.25	1.25
	20	3.42	13.58	2.30	3.56	14.33	2.31	-0.74	1.21	1.21	1.21
	21	3.31	13.38	2.27	3.61	14.44	2.32	-1.06	1.13	1.13	1.13
	22	3.09	12.91	2.21	3.59	14.39	2.32	-1.48	1.02	1.02	1.02
	23	2.79	12.23	2.14	3.46	14.13	2.29	-1.89	0.90	0.90	0.90
Weekend	24	2.55	11.46	2.06	3.24	13.66	2.25	-2.21	0.81	0.81	0.81
	25	2.21	10.77	1.94	2.96	13.06	2.19	-2.29	0.70	0.70	0.70
	26	1.92	10.16	1.80	2.69	12.44	2.12	-2.28	0.62	0.62	0.62
	27	1.70	9.79	1.68	2.42	11.79	2.06	-2.00	0.57	0.57	0.57
	28	1.55	9.45	1.61	2.18	11.18	1.99	-1.73	0.55	0.55	0.55
	29	1.49	9.29	1.58	1.96	10.61	1.93	-1.31	0.56	0.56	0.56
	30	1.52	9.36	1.61	1.85	10.32	1.90	-0.96	0.63	0.63	0.63
	31	1.72	9.77	1.73	1.81	10.19	1.88	-0.42	0.79	0.79	0.79
	32	2.14	10.70	1.93	1.89	10.41	1.91	0.28	0.99	0.99	0.99
	33	2.71	11.92	2.13	2.11	10.99	1.98	0.93	1.18	1.18	1.18
	34	3.23	13.14	2.26	2.49	11.95	2.08	1.19	1.29	1.29	1.29
	35	3.53	13.91	2.30	2.99	13.10	2.20	0.82	1.33	1.33	1.33
	36	3.64	14.24	2.30	3.46	14.11	2.30	0.13	1.34	1.34	1.34
	37	3.66	14.29	2.31	3.73	14.68	2.35	-0.40	1.32	1.32	1.32
	38	3.60	14.13	2.30	3.83	14.88	2.37	-0.74	1.31	1.31	1.31
	39	3.57	13.85	2.29	3.81	14.86	2.36	-1.01	1.27	1.27	1.27
	40	3.47	13.59	2.28	3.74	14.71	2.35	-1.12	1.27	1.27	1.27
	41	3.46	13.48	2.30	3.63	14.49	2.33	-1.01	1.28	1.28	1.28
	42	3.49	13.52	2.32	3.55	14.32	2.31	-0.80	1.29	1.29	1.29
	43	3.52	13.58	2.33	3.51	14.24	2.30	-0.66	1.28	1.28	1.28
	44	3.49	13.53	2.31	3.52	14.25	2.31	-0.73	1.24	1.24	1.24
	45	3.38	13.27	2.30	3.52	14.25	2.31	-0.98	1.18	1.18	1.18
	46	3.21	12.93	2.25	3.46	14.14	2.29	-1.21	1.07	1.07	1.07
	47	2.91	12.33	2.17	3.34	13.89	2.27	-1.56	0.93	0.93	0.93
Average											
	Weekday	2.694	12.0	2.08	2.985	13.0	2.18		0.99	0.99	0.99
	Weekend	2.819	12.2	2.09	2.987	13.0	2.18		1.03	1.03	1.03
	ADWF[1]	2.730	12.1	2.08	2.985	13.0	2.18		1.00	1.00	1.00
% Error											
	Weekday				10.8%			2.31			
	Weekend				5.9%			2.29			

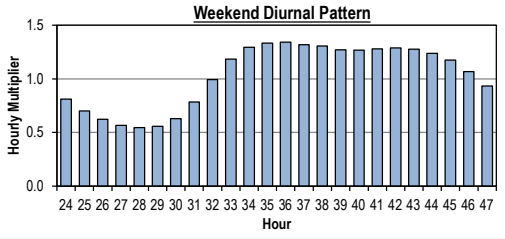
Note:







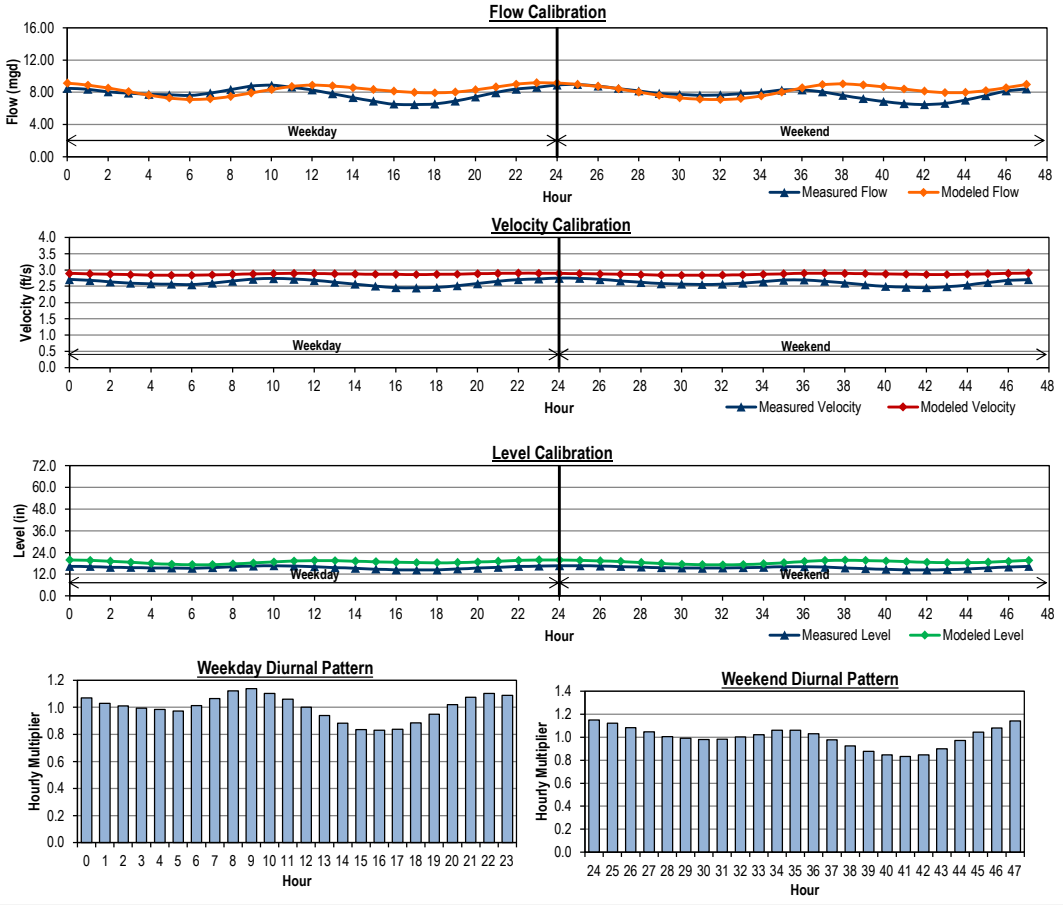




City of Auburn
Collection System Planning Project
FLOW MONITORING SITE AUBRN53 DRY WEATHER FLOW CALIBRATION

		Measured Data			Modeled Data				Diurnal		
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Level Diff (in)	Initial Curve	Modified Curve	Calibrated Diurnal
Weekday	0	8.50	16.35	2.71	9.14	19.87	2.89	-3.52	1.07	1.07	1.07
	1	8.36	16.20	2.68	8.90	19.58	2.88	-3.38	1.03	1.03	1.03
	2	8.05	15.87	2.63	8.52	19.12	2.87	-3.25	1.01	1.01	1.01
	3	7.90	15.68	2.60	8.09	18.57	2.86	-2.89	0.99	0.99	0.99
	4	7.76	15.51	2.57	7.65	17.98	2.84	-2.48	0.98	0.98	0.98
	5	7.69	15.42	2.56	7.29	17.49	2.84	-2.07	0.97	0.97	0.97
	6	7.60	15.33	2.55	7.11	17.21	2.84	-1.88	1.01	1.01	1.01
	7	7.91	15.64	2.60	7.19	17.27	2.85	-1.63	1.07	1.07	1.07
	8	8.33	16.08	2.66	7.48	17.65	2.86	-1.57	1.12	1.12	1.12
	9	8.76	16.52	2.72	7.91	18.21	2.88	-1.69	1.14	1.14	1.14
	10	8.89	16.68	2.74	8.34	18.78	2.89	-2.10	1.10	1.10	1.10
	11	8.63	16.46	2.72	8.72	19.27	2.89	-2.81	1.06	1.06	1.06
	12	8.29	16.14	2.68	8.88	19.52	2.89	-3.38	1.00	1.00	1.00
	13	7.81	15.68	2.62	8.79	19.43	2.88	-3.75	0.94	0.94	0.94
	14	7.35	15.23	2.57	8.57	19.15	2.87	-3.93	0.88	0.88	0.88
	15	6.90	14.78	2.51	8.35	18.87	2.87	-4.09	0.84	0.84	0.84
	16	6.53	14.40	2.46	8.14	18.61	2.86	-4.20	0.83	0.83	0.83
	17	6.49	14.37	2.45	7.99	18.39	2.86	-4.02	0.84	0.84	0.84
	18	6.55	14.45	2.47	7.93	18.30	2.86	-3.85	0.89	0.89	0.89
	19	6.91	14.83	2.52	8.03	18.41	2.87	-3.58	0.95	0.95	0.95
	20	7.42	15.34	2.58	8.29	18.73	2.88	-3.39	1.02	1.02	1.02
	21	7.96	15.86	2.65	8.65	19.17	2.90	-3.31	1.07	1.07	1.07
	22	8.40	16.27	2.70	9.00	19.62	2.90	-3.36	1.10	1.10	1.10
	23	8.62	16.46	2.72	9.19	19.89	2.90	-3.43	1.09	1.09	1.09
Weekend	24	8.91	16.69	2.75	9.15	19.87	2.89	-3.18	1.15	1.15	1.15
	25	8.97	16.71	2.74	8.97	19.66	2.89	-2.95	1.12	1.12	1.12
	26	8.76	16.51	2.71	8.74	19.38	2.88	-2.87	1.08	1.08	1.08
	27	8.47	16.21	2.67	8.44	19.01	2.87	-2.80	1.04	1.04	1.04
	28	8.16	15.90	2.62	8.02	18.48	2.85	-2.58	1.01	1.01	1.01
	29	7.86	15.59	2.58	7.63	17.95	2.84	-2.36	0.99	0.99	0.99
	30	7.73	15.44	2.57	7.31	17.51	2.84	-2.06	0.98	0.98	0.98
	31	7.64	15.35	2.56	7.14	17.25	2.84	-1.91	0.98	0.98	0.98
	32	7.68	15.39	2.57	7.11	17.18	2.84	-1.79	1.00	1.00	1.00
	33	7.83	15.60	2.60	7.22	17.32	2.85	-1.72	1.02	1.02	1.02
	34	7.98	15.80	2.64	7.54	17.71	2.87	-1.92	1.06	1.06	1.06
	35	8.28	16.13	2.69	8.01	18.33	2.88	-2.20	1.06	1.06	1.06
	36	8.29	16.12	2.69	8.55	19.03	2.90	-2.90	1.03	1.03	1.03
	37	8.05	15.87	2.65	8.94	19.56	2.90	-3.69	0.98	0.98	0.98
	38	7.62	15.45	2.60	9.03	19.71	2.89	-4.26	0.92	0.92	0.92
	39	7.21	15.05	2.54	8.91	19.58	2.89	-4.53	0.88	0.88	0.88
	40	6.85	14.70	2.50	8.67	19.29	2.88	-4.60	0.84	0.84	0.84
	41	6.60	14.45	2.47	8.40	18.95	2.87	-4.50	0.83	0.83	0.83
	42	6.49	14.38	2.46	8.13	18.60	2.86	-4.22	0.85	0.85	0.85
	43	6.61	14.52	2.48	7.97	18.36	2.86	-3.85	0.90	0.90	0.90
	44	7.03	14.95	2.54	7.98	18.35	2.87	-3.40	0.97	0.97	0.97
	45	7.60	15.50	2.61	8.20	18.61	2.88	-3.12	1.04	1.04	1.04
	46	8.15	16.03	2.68	8.57	19.07	2.89	-3.05	1.08	1.08	1.08
	47	8.43	16.28	2.71	8.98	19.58	2.90	-3.30	1.14	1.14	1.14
Average											
	Weekday	7.817	15.6	2.61	8.256	18.7	2.87		1.00	1.00	1.00
	Weekend	7.800	15.6	2.61	8.233	18.7	2.87		1.00	1.00	1.00
	ADWF[1]	7.812	15.6	2.61	8.250	18.7	2.87		1.00	1.00	1.00
% Error											
	Weekday				5.6%			4.20			
	Weekend				5.6%			4.60			

Note:



ATTACHMENT 1F

RDII PARAMETERS

Table 1 Connected Basin Area

Basin	Area (acres)	Connected Impervious (acres)	Connected Pervious (acres)	Total Connected (acres)	Total Connected (%)
A1	223.6	1.2	5.8	7.0	3.2
A1c	151.1	0.5	2.4	2.9	1.9
A1d	52.5	0.3	4.2	4.5	8.6
A3	83.0	1.4	31.5	33.0	39.7
A4	113.1	0.5	3.8	4.4	3.9
A6	97.6	0.6	5.4	6.0	6.1
A7	109.1	3.3	17.4	20.7	19.0
A9	52.5	1.5	4.9	6.4	12.1
A10	115.3	3.8	5.8	9.6	8.3
A11	16.7	0.0	0.0	0.0	0.2
A12	21.4	0.2	0.0	0.2	0.9
A13	63.3	0.2	0.3	0.5	0.8
A14	102.2	1.5	1.0	2.6	2.5
A15	72.3	0.3	0.4	0.7	1.0
A16	285.4	1.7	2.0	3.7	1.3
AUB Y-1	93.7	0.2	0.7	0.8	0.9
AUB Y-2	872.1	11.3	78.5	89.8	10.3
AUB Y-3	541.4	8.7	54.1	62.8	11.6
AUB Y-4	177.7	0.2	0.2	0.4	0.2
AUBRN53	997.7	10.0	29.9	39.9	4.0
AUBWV016	214.2	1.7	6.4	8.1	3.8
MSTTR02A	481.9	1.4	3.9	5.3	1.1
SRT11	111.4	0.9	3.3	4.2	3.8
WINT003	74.5	0.2	0.3	0.5	0.7
WINT035	1,685.2	13.5	50.6	64.0	3.8
Default	101.7	0.7	3.1	3.8	3.7

Table 2 Model A Parameters

Basin	Impervious (%)	Time of Concentration (min)	Reduction Factor	Initial Loss (in)
A1	0.55	7	0.9	0.0020
A1c	0.3	7	0.9	0.0020
A1d	0.6	7	0.9	0.0020
A3	1.7	7	0.9	0.0020
A4	0.47	7	0.9	0.0020
A6	0.6	7	0.9	0.0020
A7	3	7	0.9	0.0020
A9	2.8	7	0.9	0.0020
A10	3.3	7	0.9	0.0020
A11	0.1	7	0.9	0.0020
A12	0.8	3	0.9	0.0020
A13	0.3	7	0.9	0.0020
A14	1.5	7	0.9	0.0020
A15	0.4	7	0.9	0.0020
A16	0.6	7	0.9	0.0020
AUB Y-1	0.2	7	0.9	0.0020
AUB Y-2	1.3	7	0.9	0.0020
AUB Y-3	1.6	7	0.9	0.0020
AUB Y-4	0.1	7	0.9	0.0020
AUBRN53	1	20	0.9	0.0020
AUBWV016	0.8	120	0.9	0.1327
MSTTR02A	0.3	80	1	0.0000
SRT11	0.8	7	0.9	0.0020
WINT003	0.3	80	1	0.0000
WINT035	0.8	7	0.9	0.0020
Unmetered	0.7	7	0.9	0.0020

Table 3 RDI Parameters

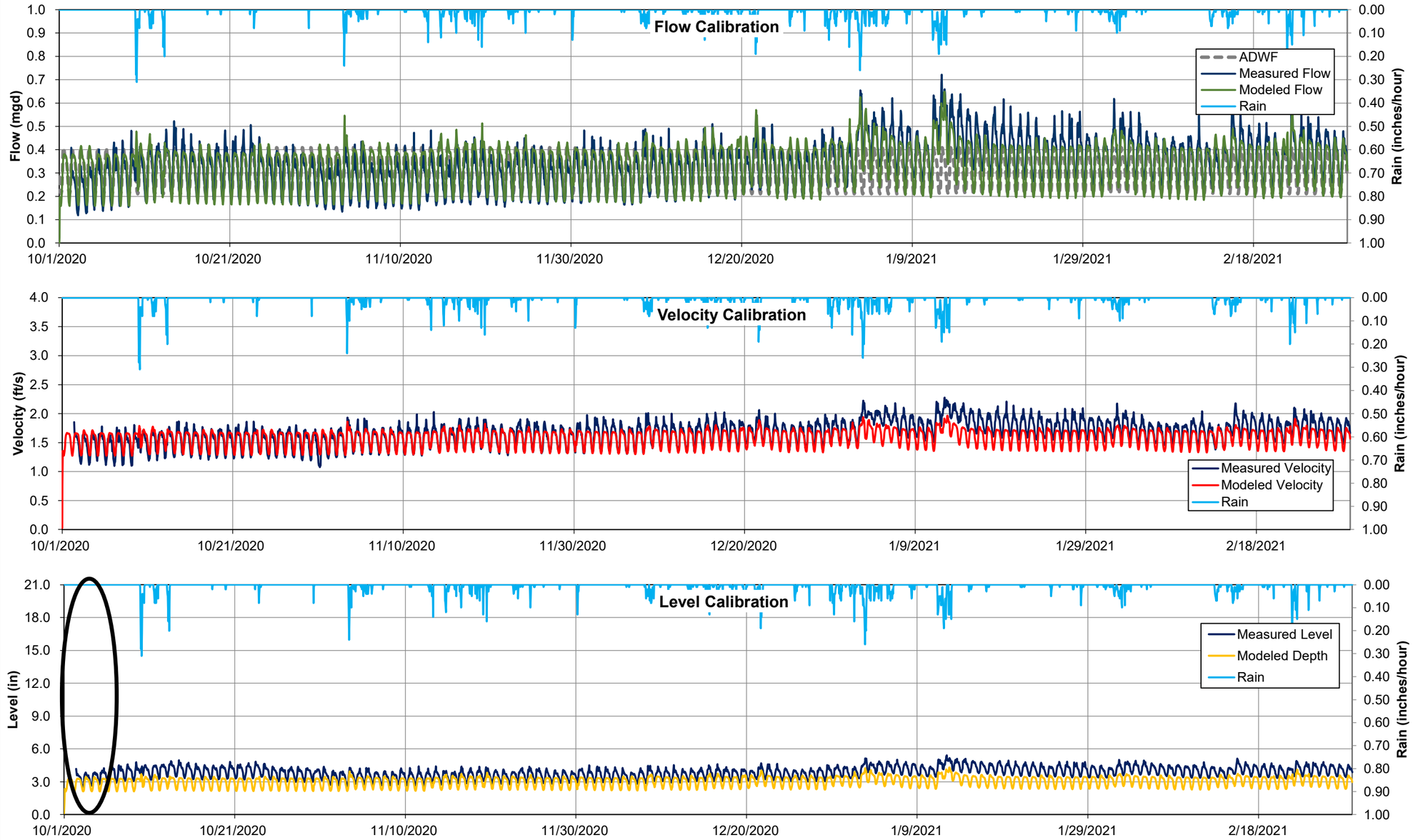
Basin	Percent RDI Area (%)	Surface Storage (Umax)	Root Zone Storage (Lmax)	Overland Coefficient (Cqof)	Groundwater Coefficient (Carea)	TC Overland Flow (CKof)	TC Interflow (CKif)	TC Baseflow (CKbf)	Overland Flow Threshold (Tof)	Interflow Threshold (Tif)	Groundwater Threshold (Tg)	Initial Surface Storage (U)	Initial Root Zone Moisture (L)	Initial Groundwater Depth (GWL)	Initial Overland Flow (OF)	Initial Interflow (IF)	Specific Yield (Sy)	Minimum Groundwater Depth	Max GW depth causing Baseflow	GW Depth for Unit Capillary flux (GWLfl1)
A1	2.60	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
A1c	1.60	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
A1d	8.00	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
A3	38.00	0.030	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
A4	3.40	0.060	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
A6	5.50	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
A7	16.00	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
A9	9.30	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
A10	5.00	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
A11	0.10	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
A12	0.05	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
A13	0.45	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
A14	1.00	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
A15	0.60	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
A16	0.70	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
AUB Y-1	0.70	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
AUB Y-2	9.00	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
AUB Y-3	10.00	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
AUB Y-4	0.10	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
AUBRN53	3.00	0.063	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
AUBWV016	3.00	0.032	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
MSTTR02A	0.80	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
SRT11	3.00	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
WINT003	0.40	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
WINT035	3.00	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0
Unmetered	3.00	0.033	0.328	0.200	1	10	200	1000	0	0	0	0	0	32.8	0	0	0.1	0	32.8	0

ATTACHMENT 1G

WET WEATHER CALIBRATION SUMMARY SHEETS

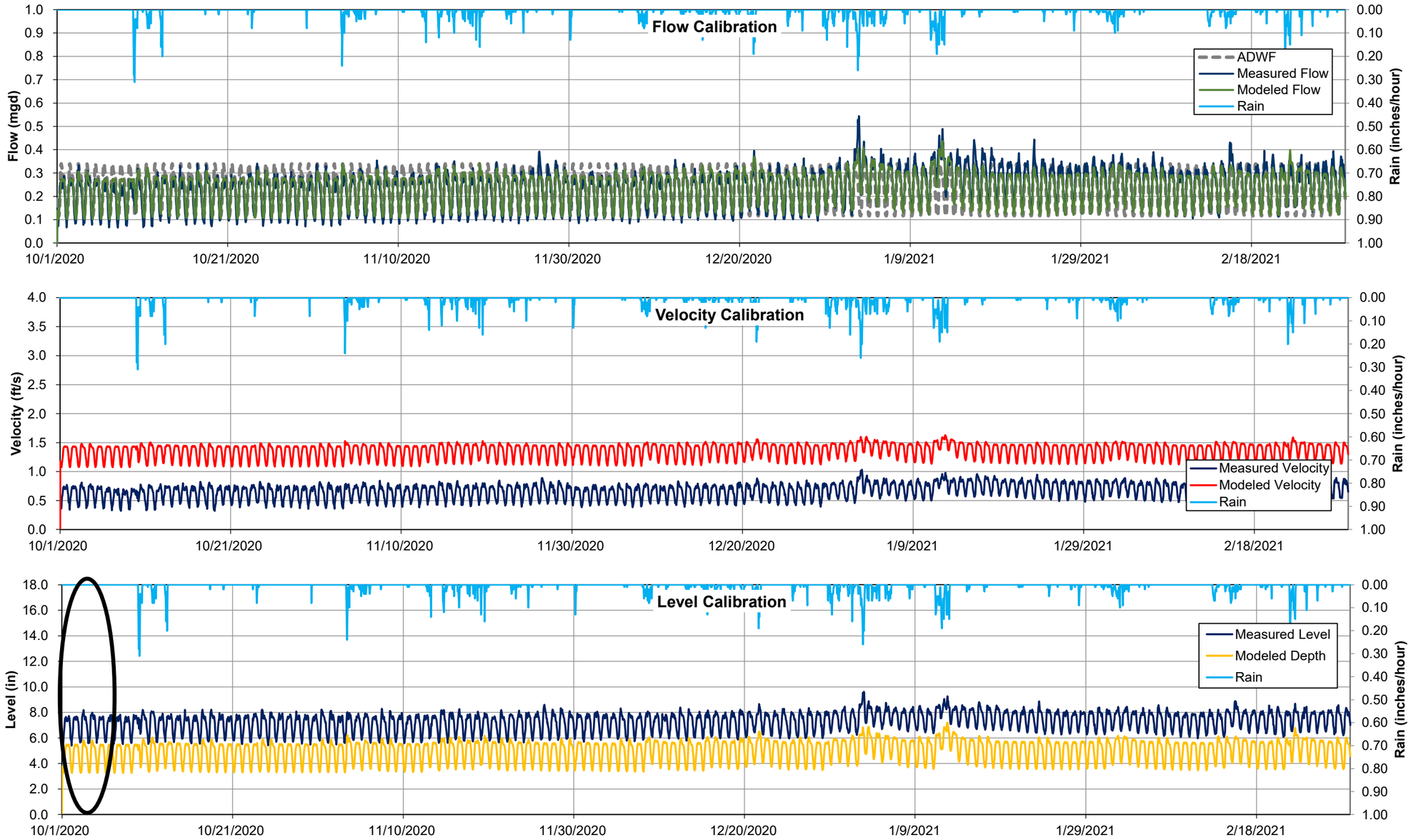
FLOW MONITORING A1 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: A1
Pipeline diameter: 21"
City Manhole ID: 308-20



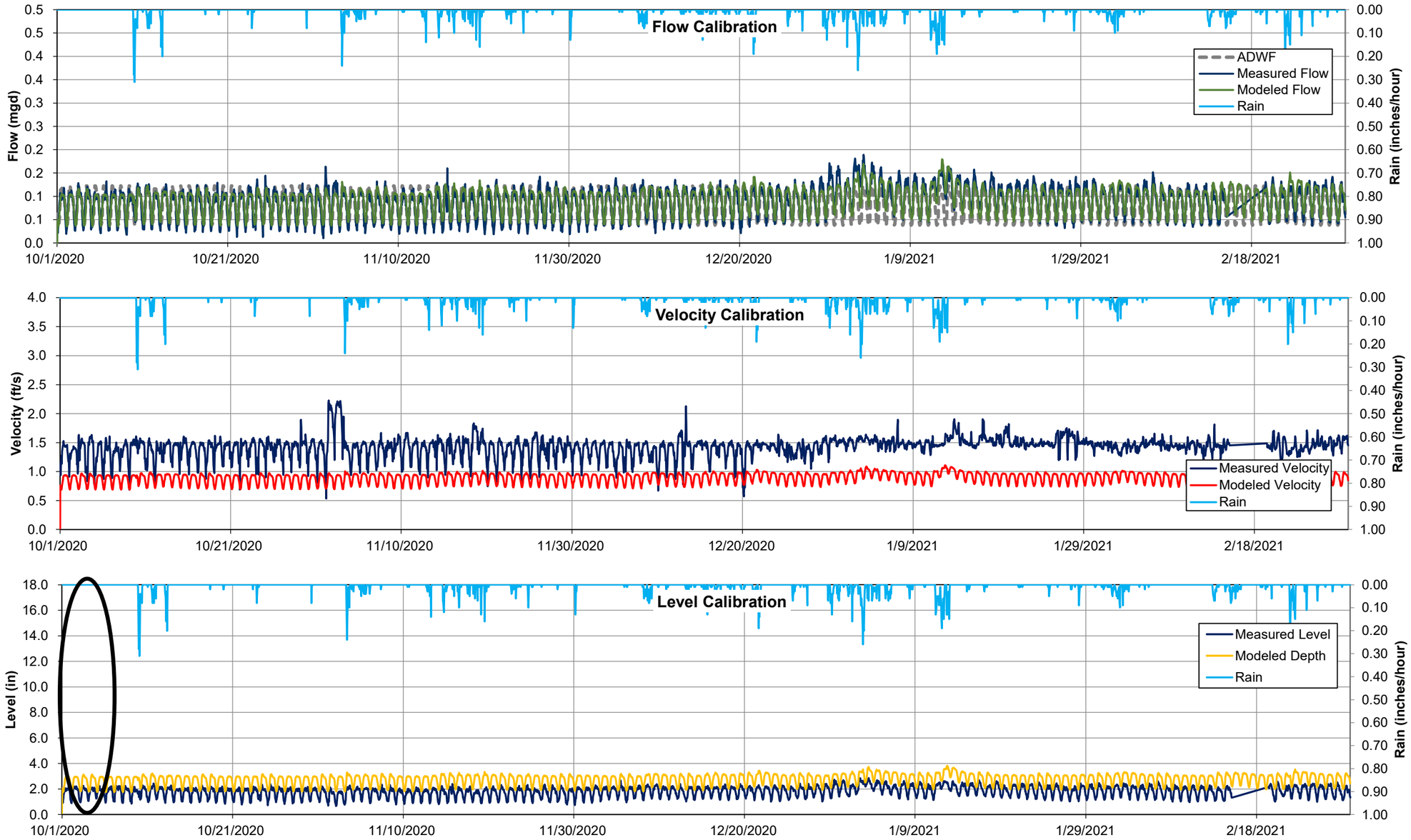
FLOW MONITORING A1c WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: A1c
Pipeline diameter: 18"
City Manhole ID: 309-06



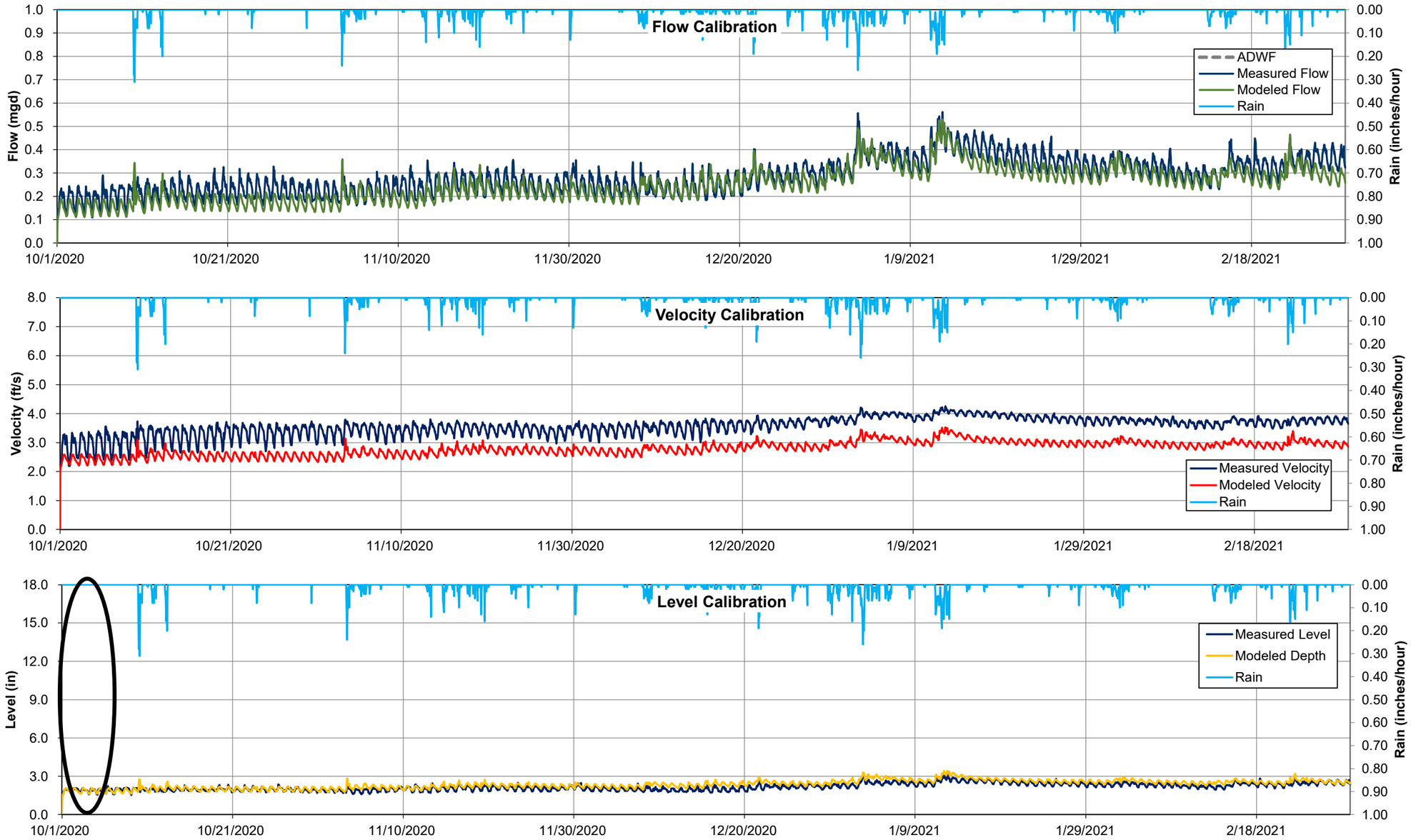
FLOW MONITORING A1d WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: A1d
Pipeline diameter: 18"
City Manhole ID: 309-10



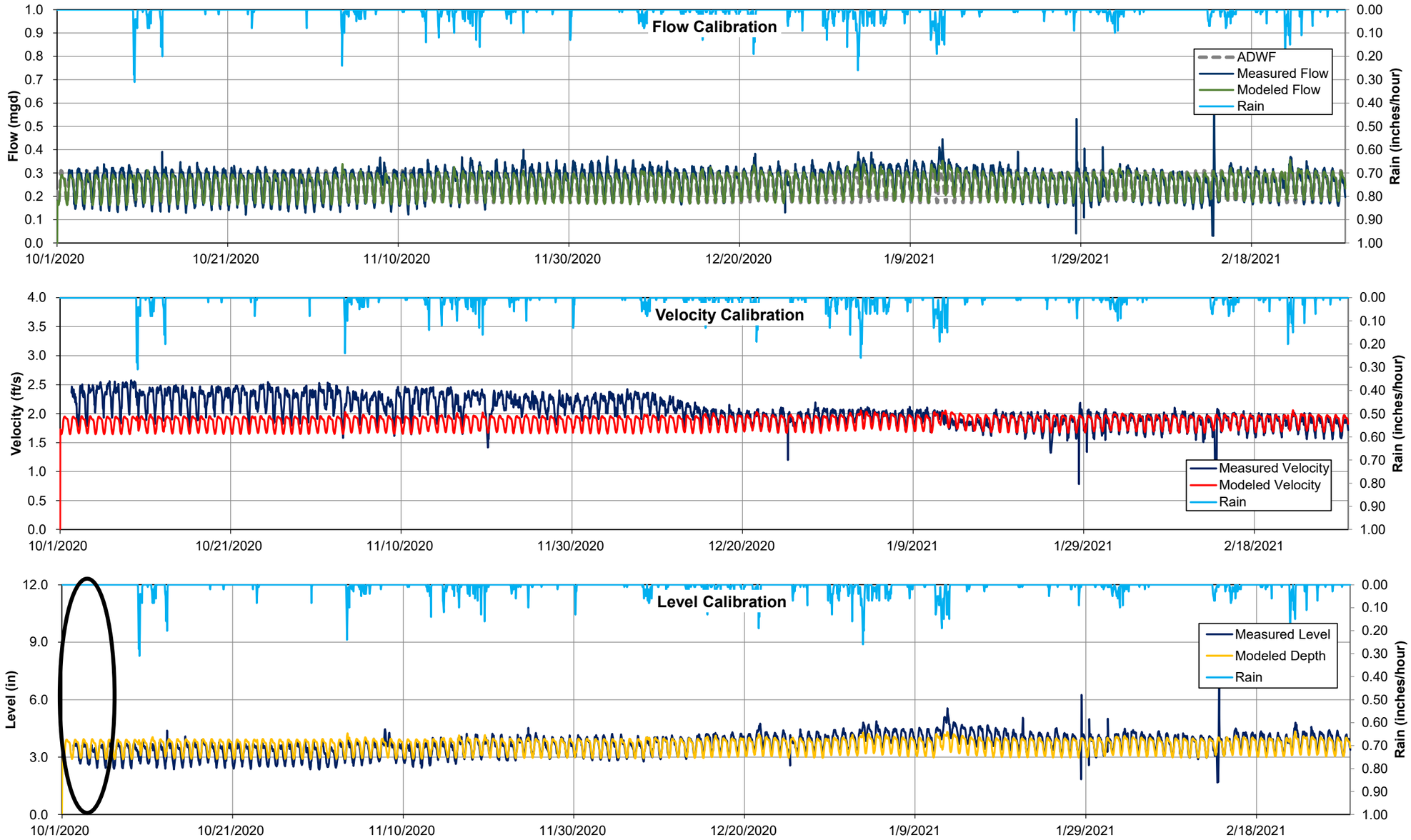
FLOW MONITORING A3 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: A3
Pipeline diameter: 18"
City Manhole ID: 409-34



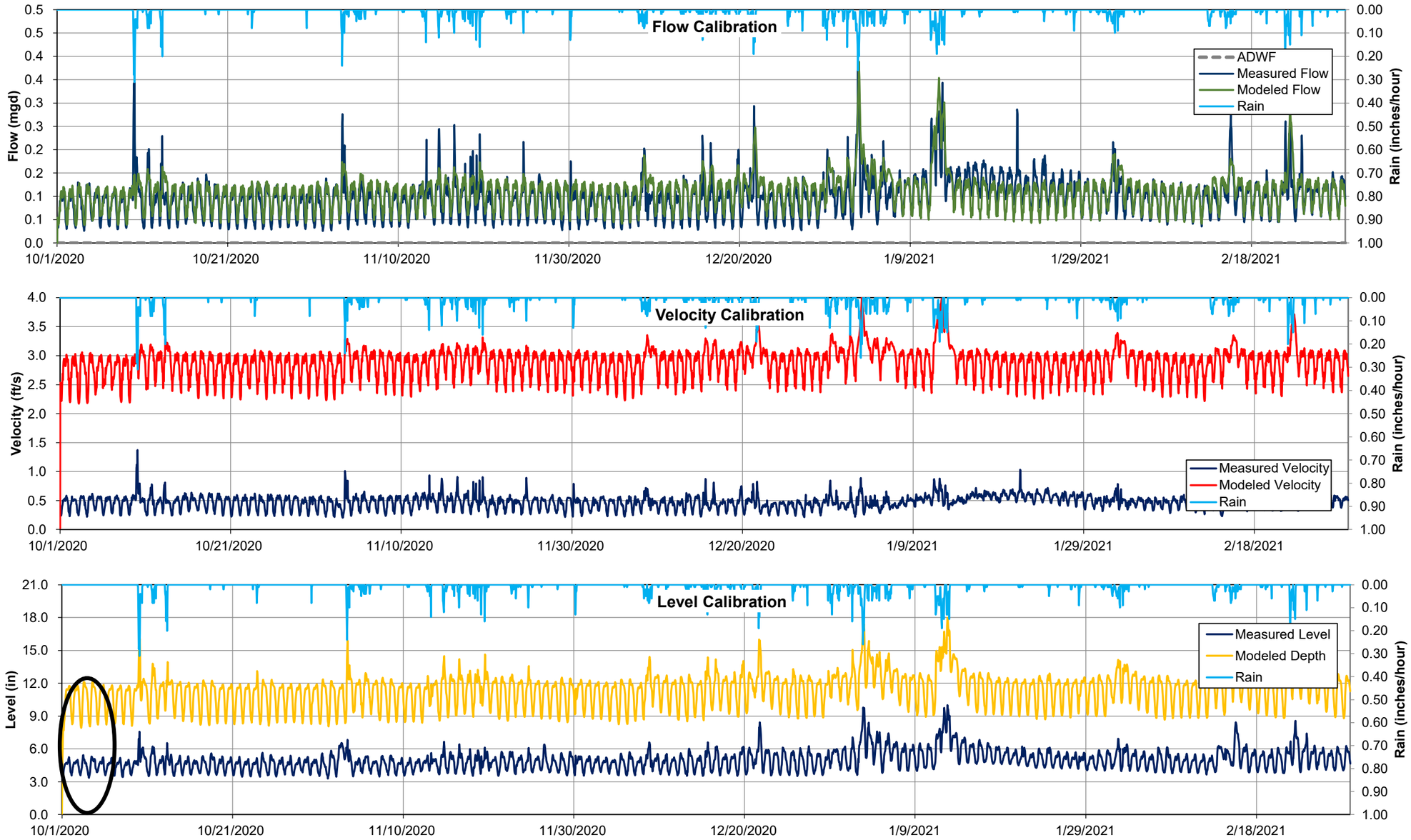
FLOW MONITORING A4 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: A4
Pipeline diameter: 12"
City Manhole ID: 508-17



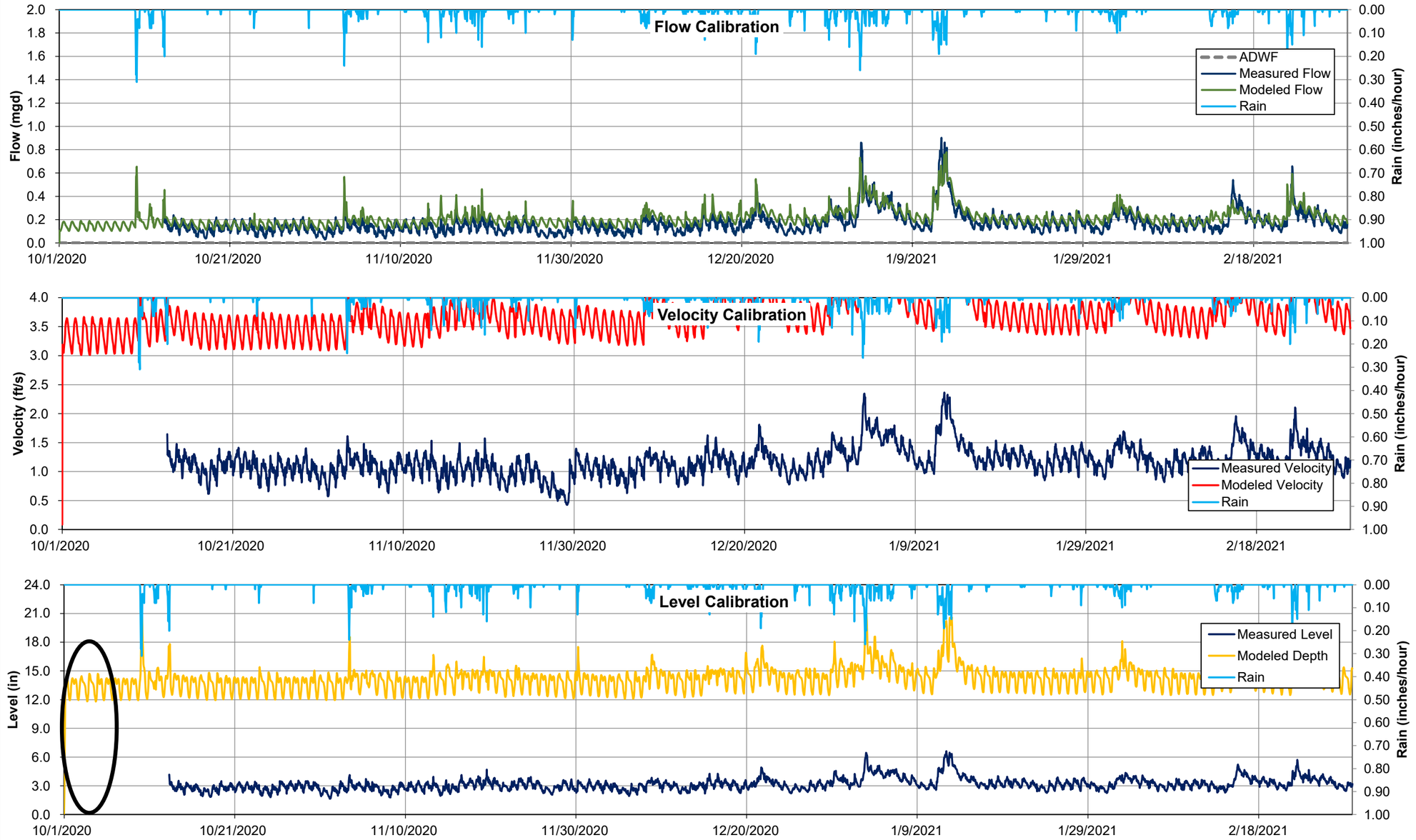
FLOW MONITORING A6 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: A6
Pipeline diameter: 12"
City Manhole ID: 610-31



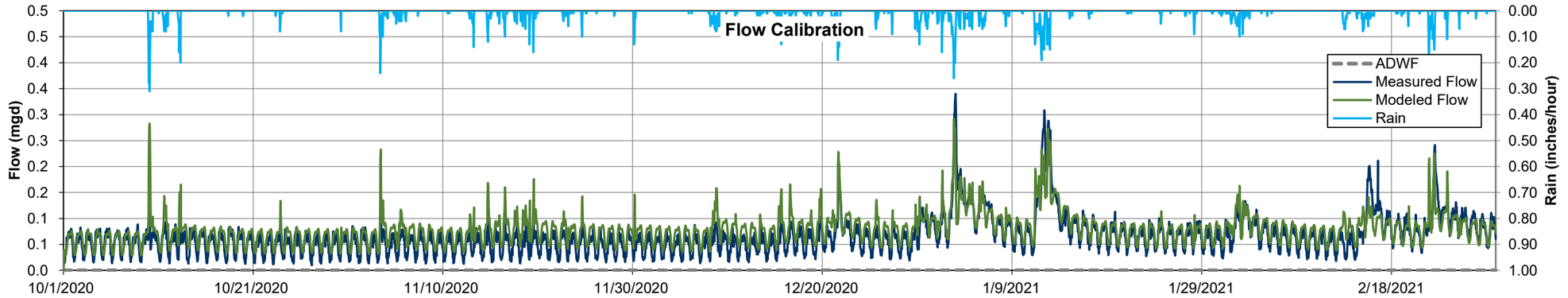
FLOW MONITORING A7 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

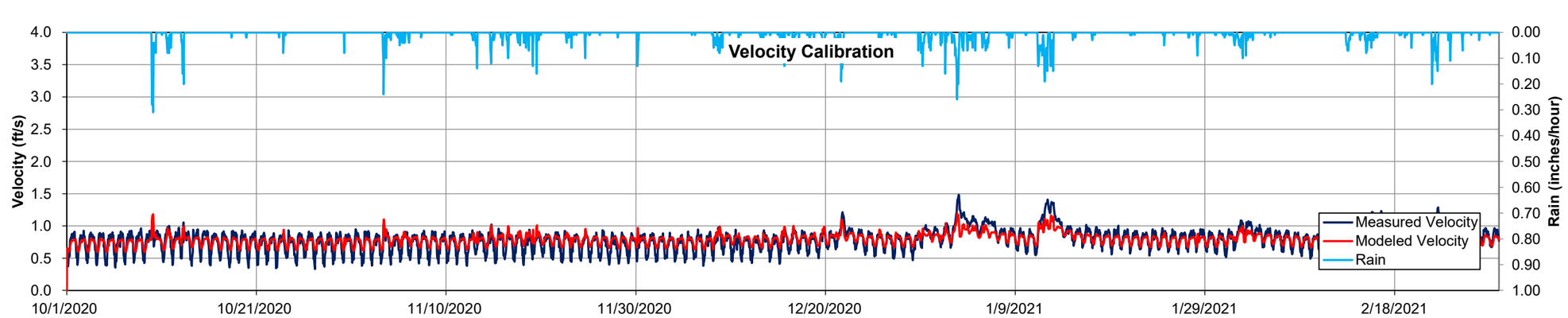
Location: A7
Pipeline diameter: 18"
City Manhole ID: 707-03

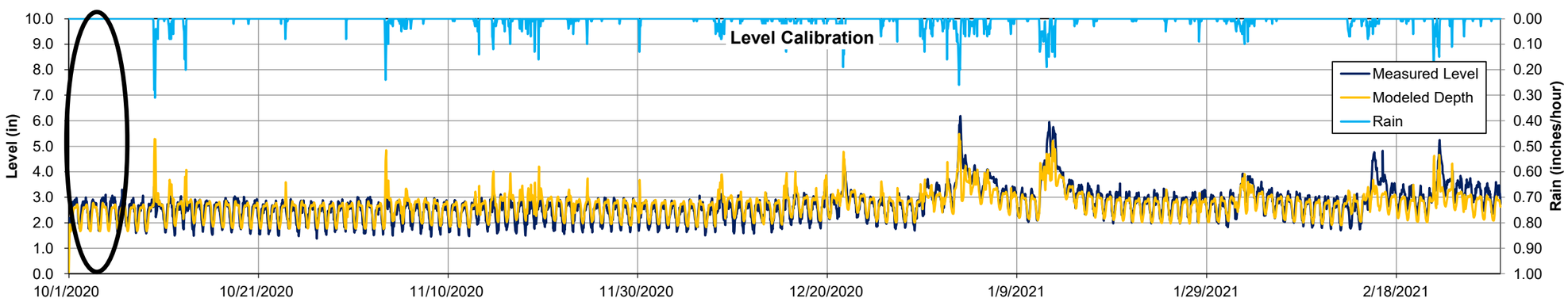


FLOW MONITORING A9 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: A9
Pipeline diameter: 10"
City Manhole ID: 710-31

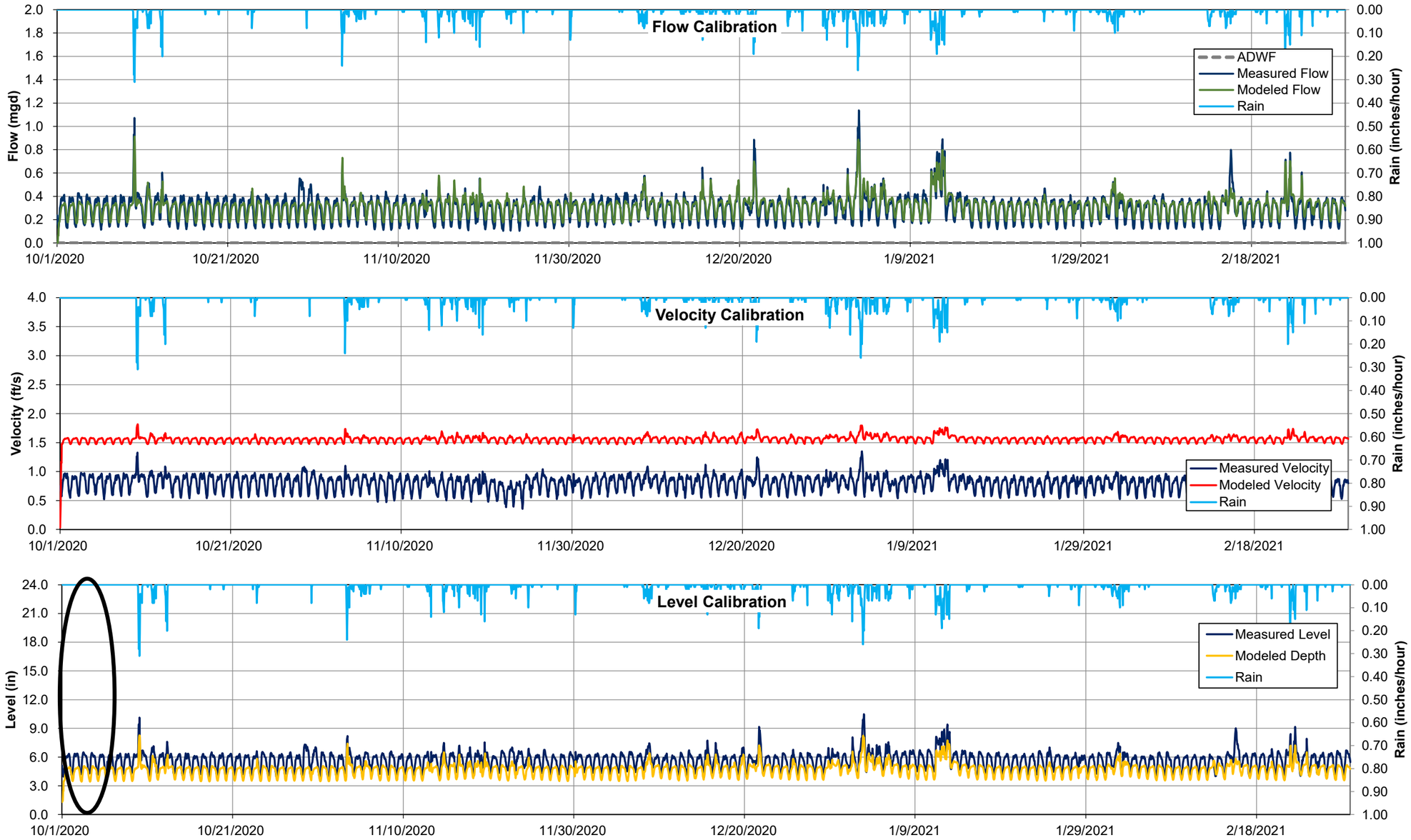






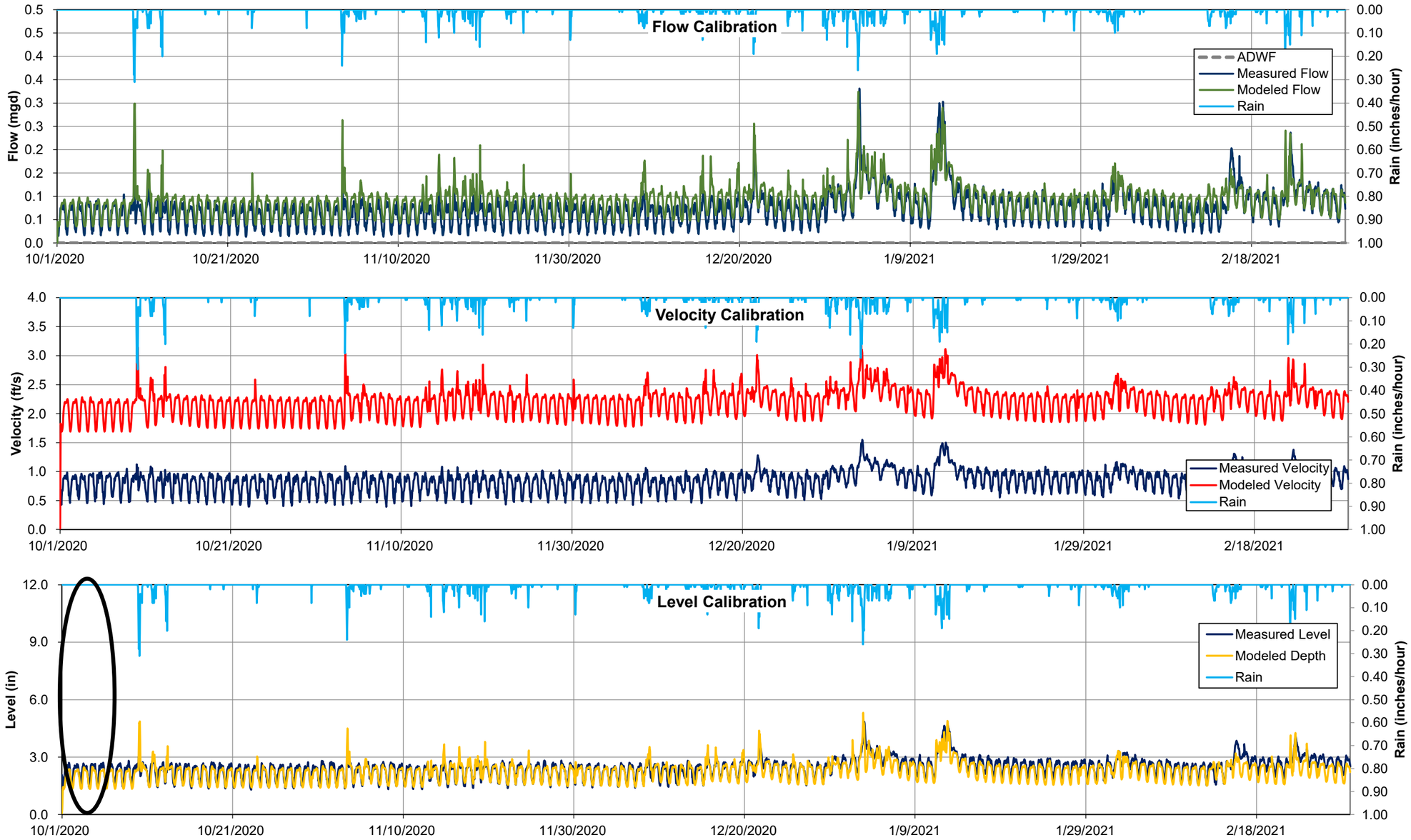
FLOW MONITORING A10 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: A10
Pipeline diameter: 24"
City Manhole ID: 710-151



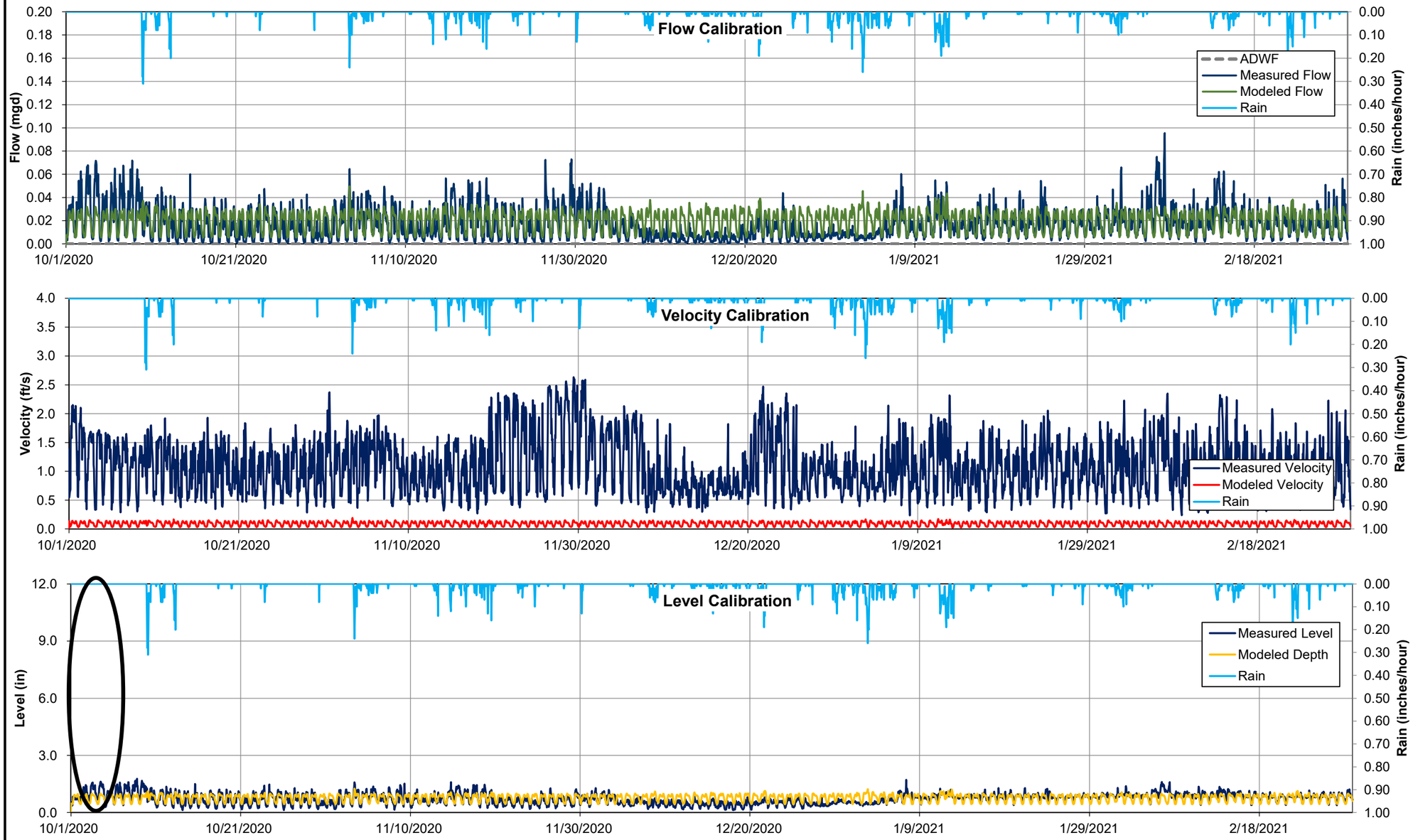
FLOW MONITORING A11 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: A11
Pipeline diameter: 12"
City Manhole ID: 710-142



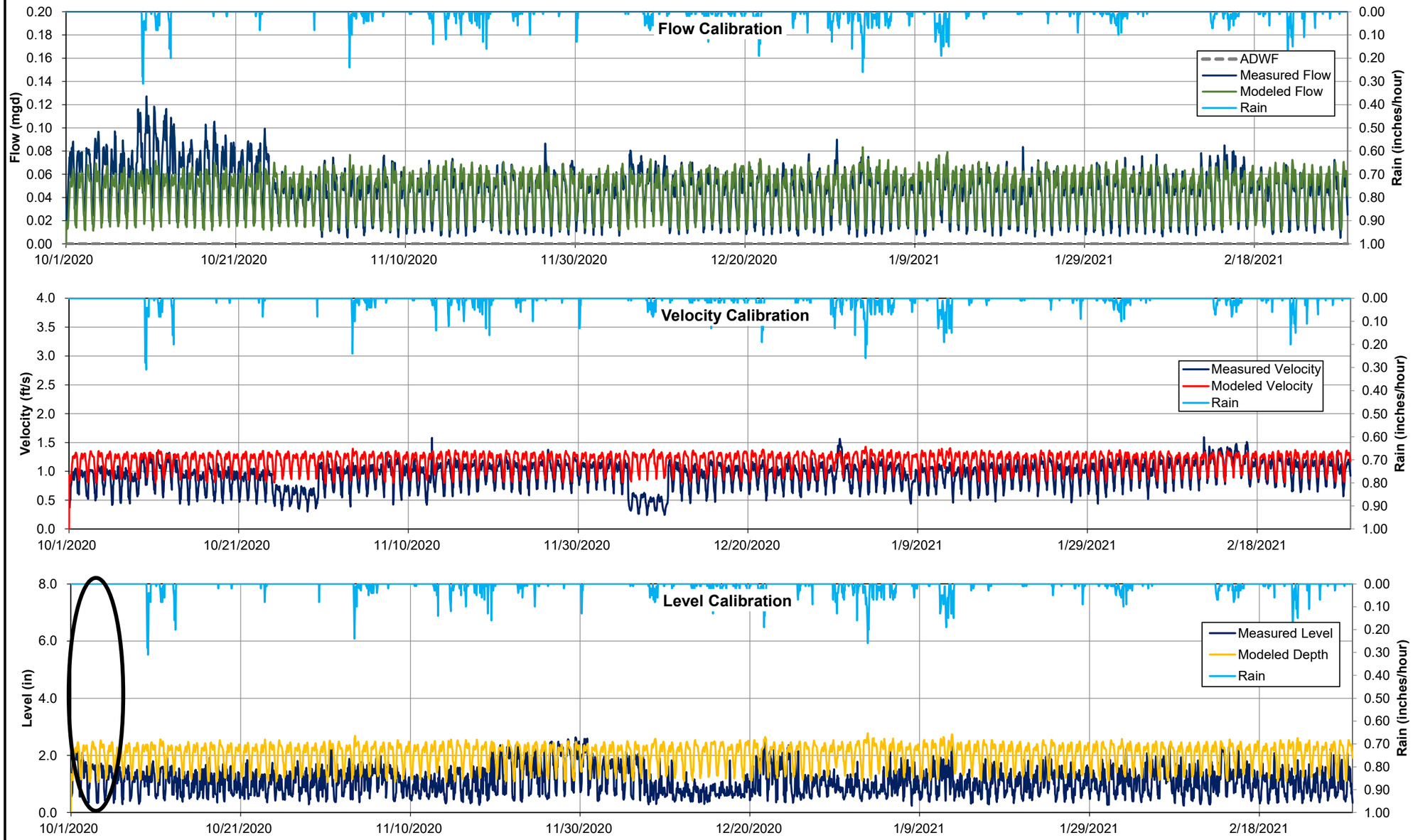
FLOW MONITORING A12 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: A12
Pipeline diameter: 12"
City Manhole ID: 710-43



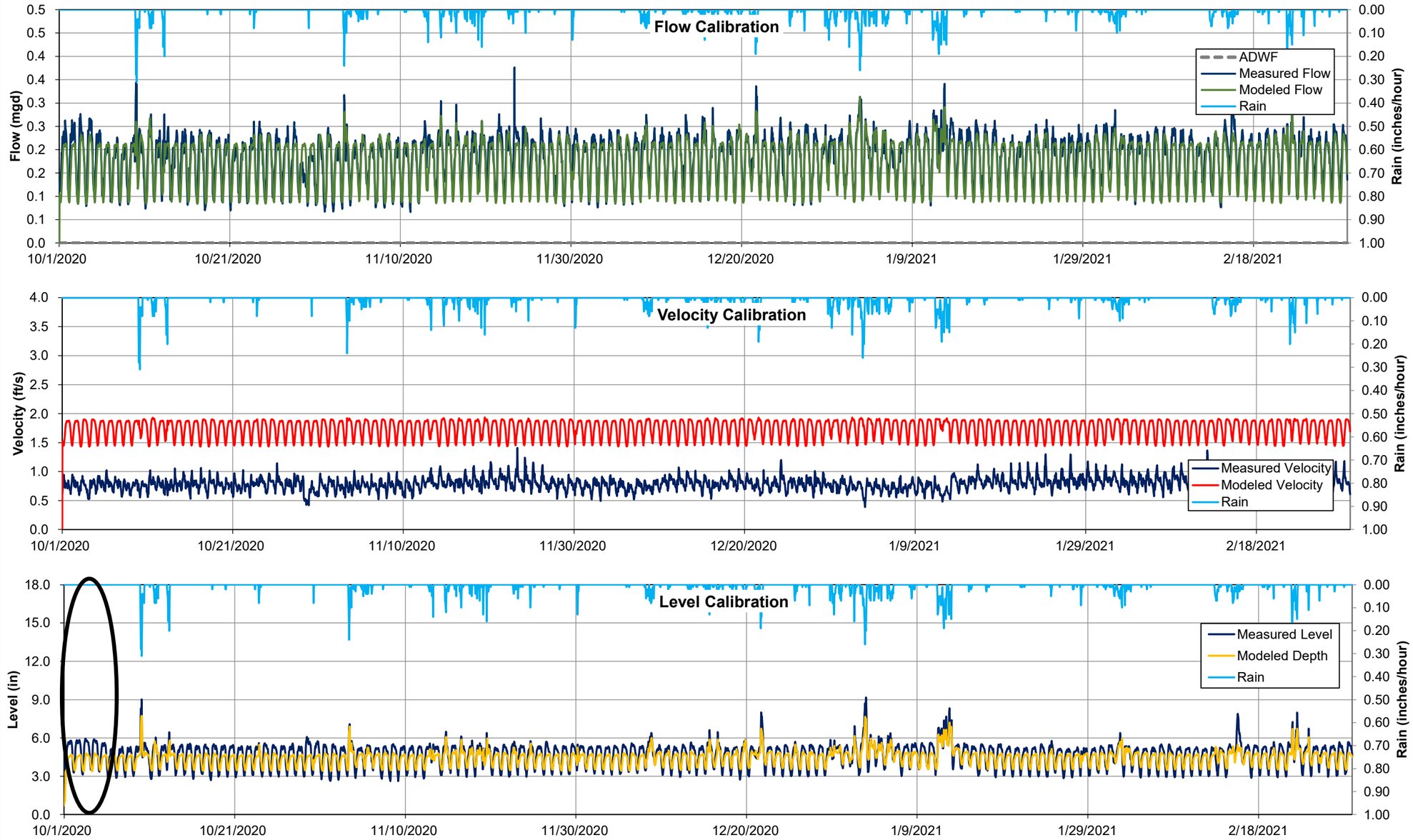
FLOW MONITORING A13 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: A13
Pipeline diameter: 8"
City Manhole ID: 710-85



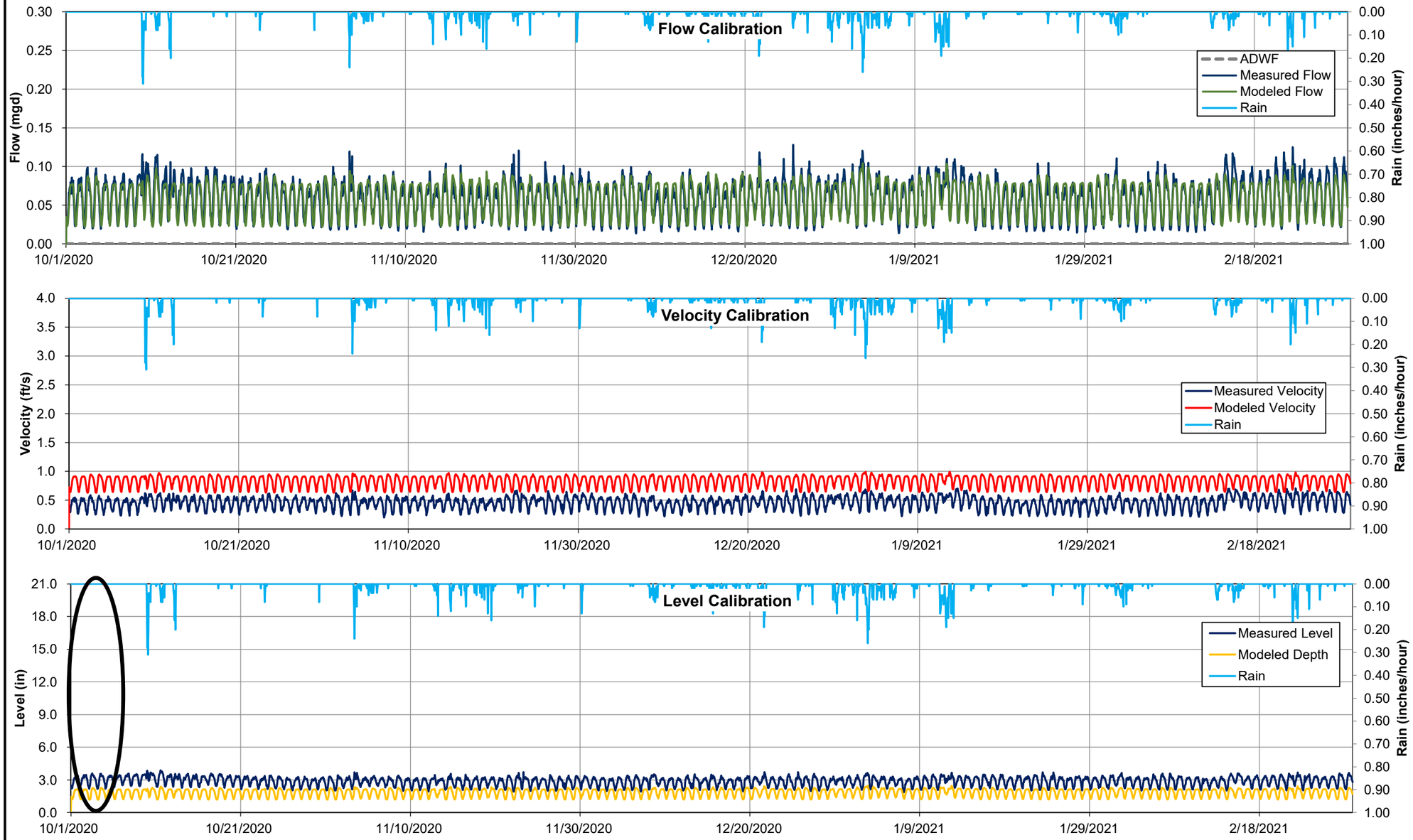
FLOW MONITORING A14 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: A14
Pipeline diameter: 18"
City Manhole ID: 710-149



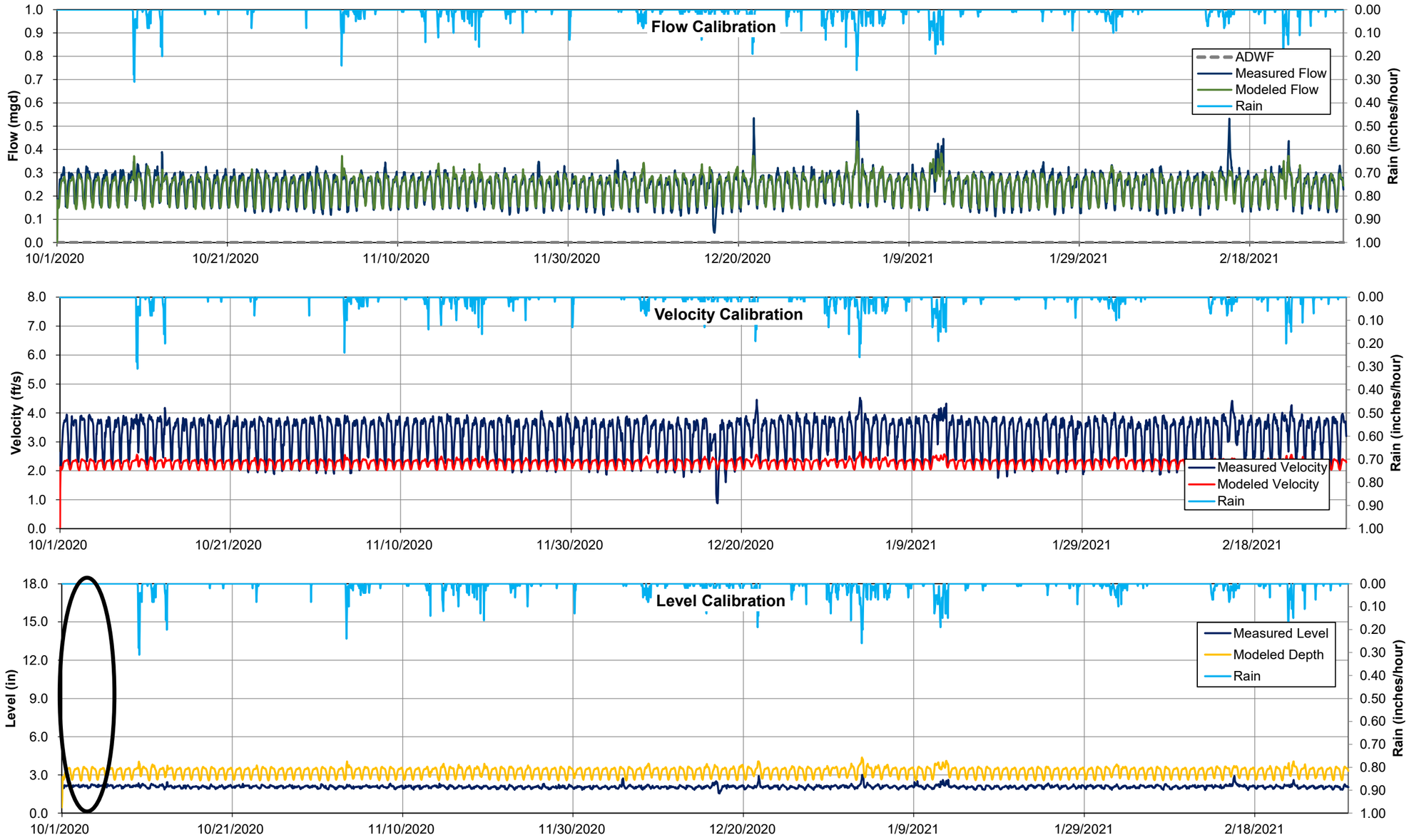
FLOW MONITORING A15 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: A15
Pipeline diameter: 21"
City Manhole ID: 809-30



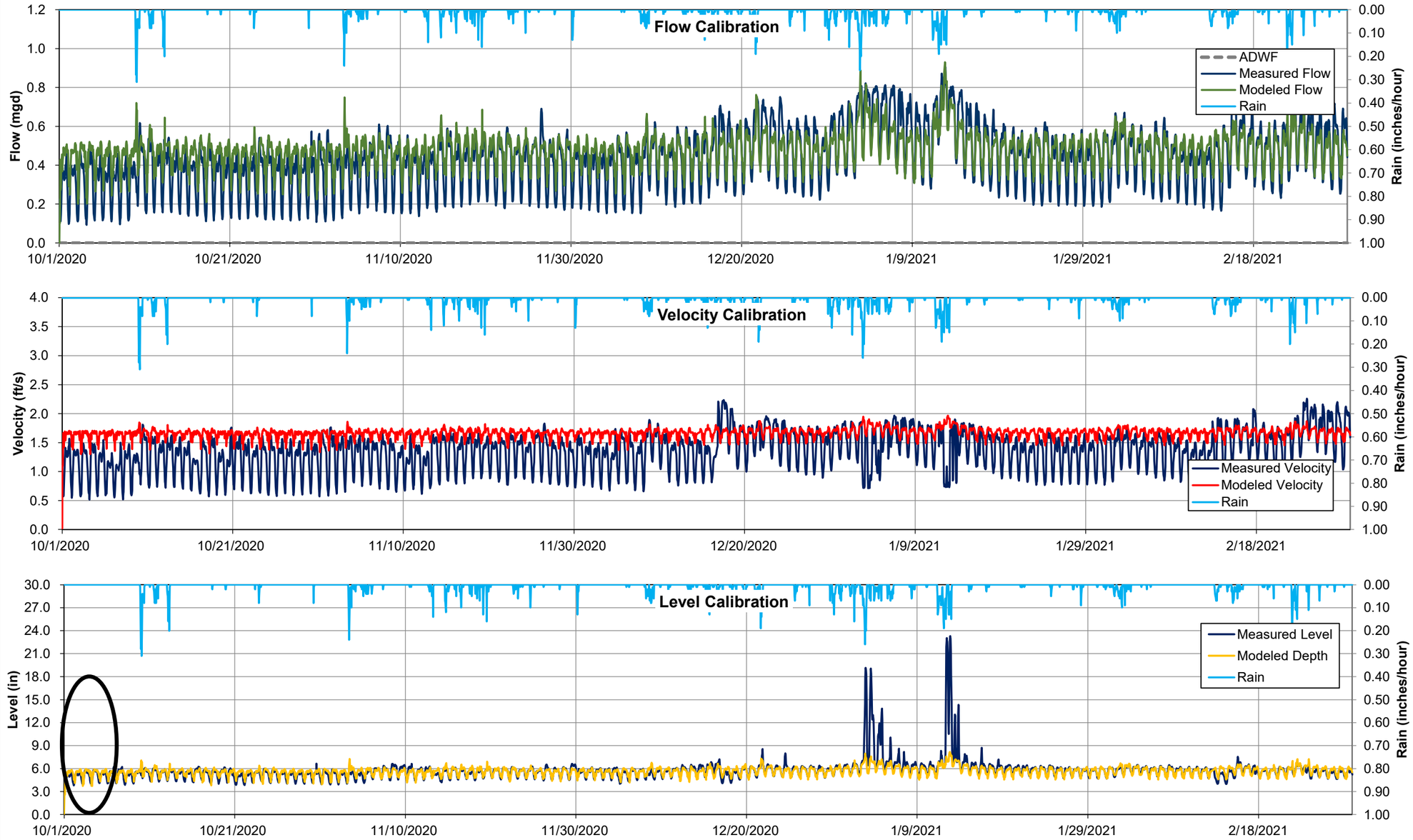
FLOW MONITORING A16 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: A16
Pipeline diameter: 18"
City Manhole ID: 809-56



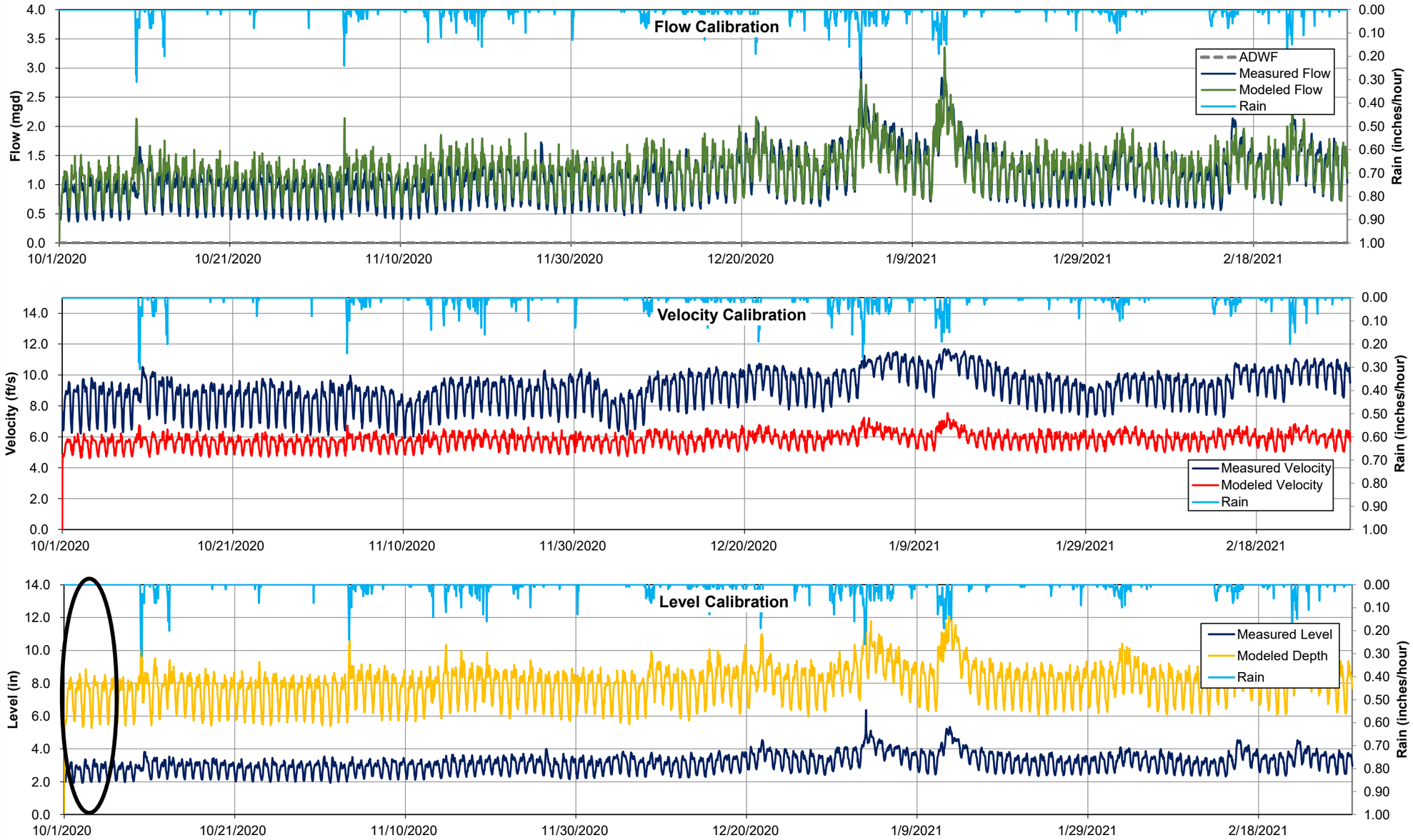
FLOW MONITORING Y-1 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: Y-1
Pipeline diameter: 18"
City Manhole ID: 410-16



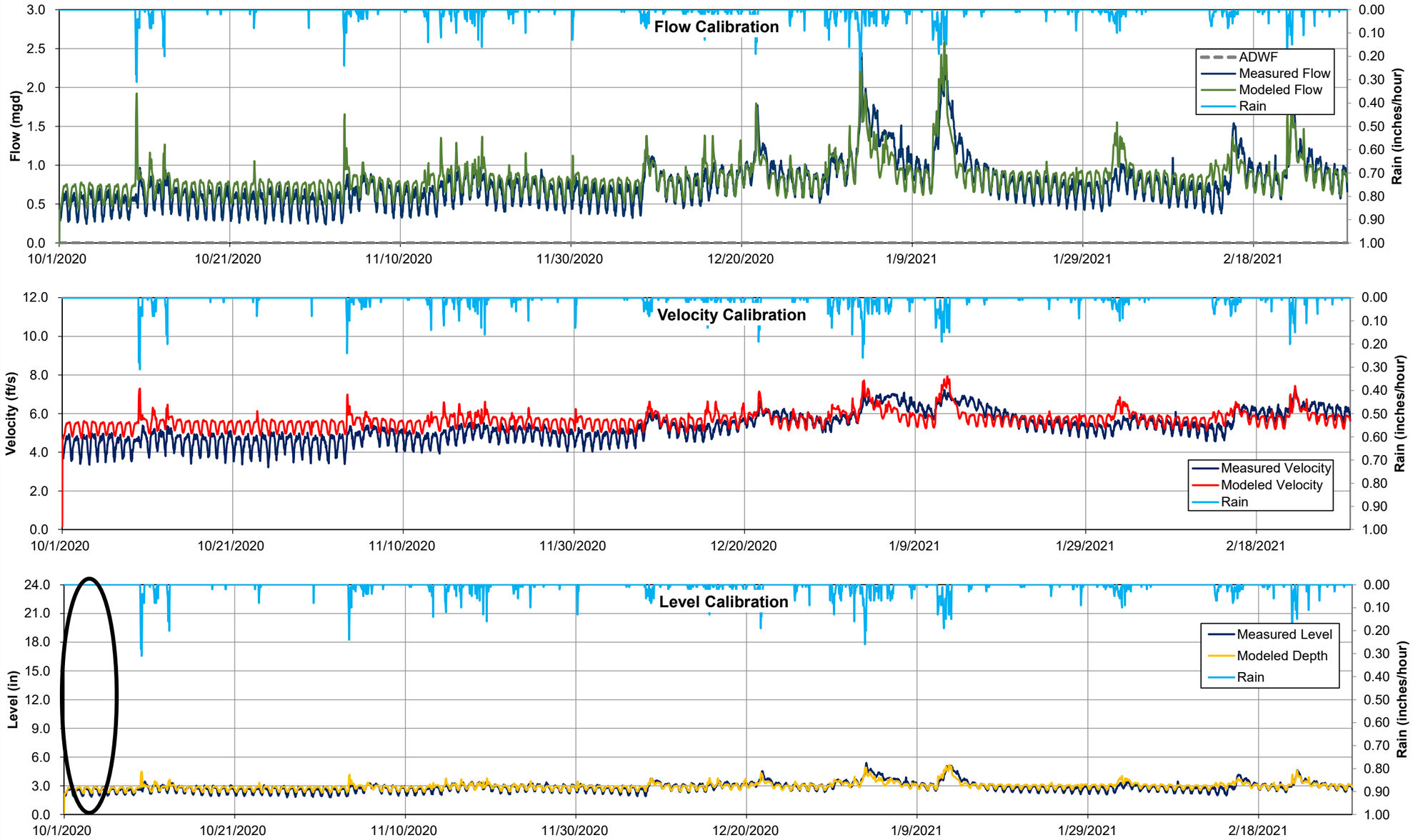
FLOW MONITORING Y-2 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: Y-2
Pipeline diameter: 14"
City Manhole ID: 611-02



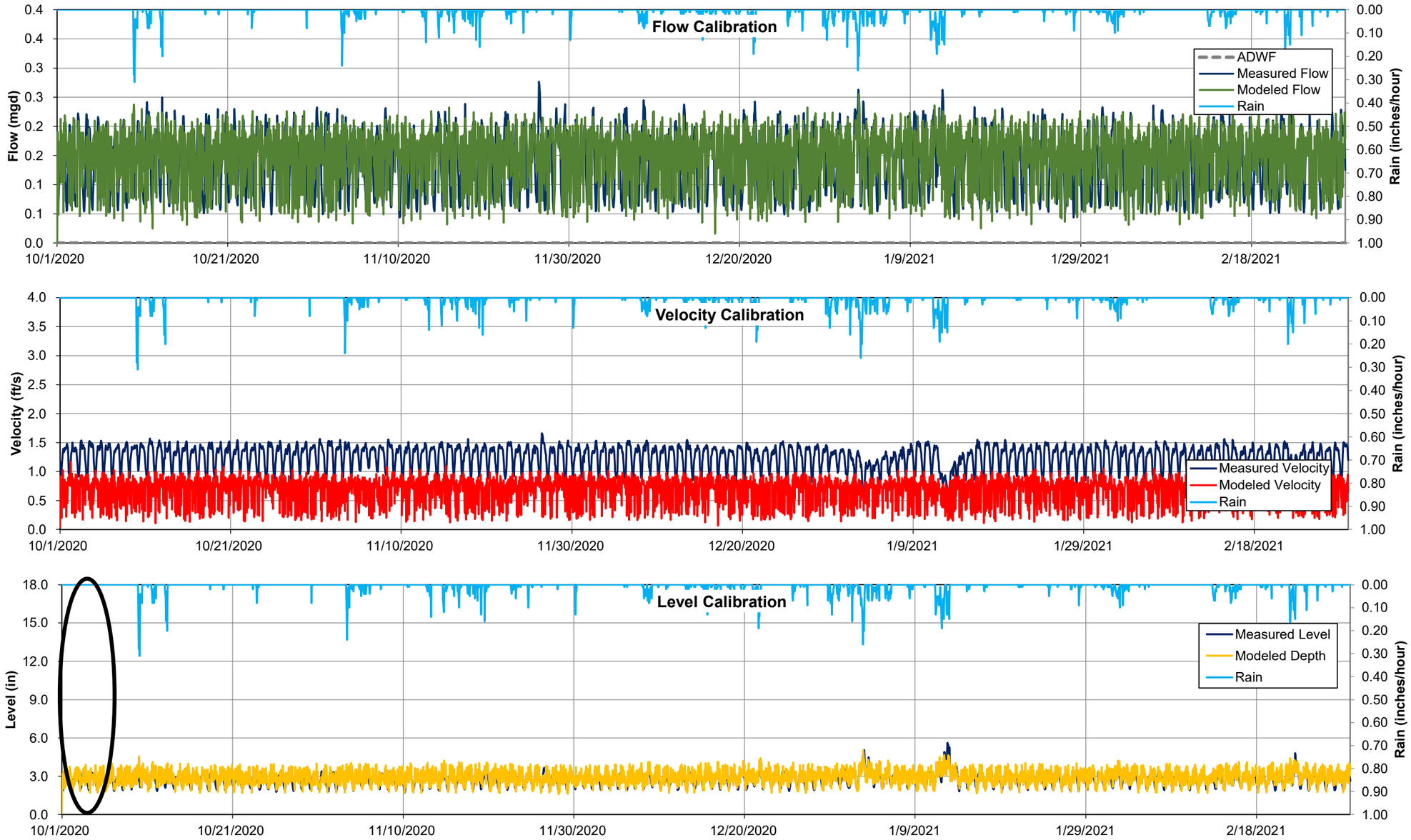
FLOW MONITORING Y-3 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: Y-3
Pipeline diameter: 24"
City Manhole ID: 1012-55



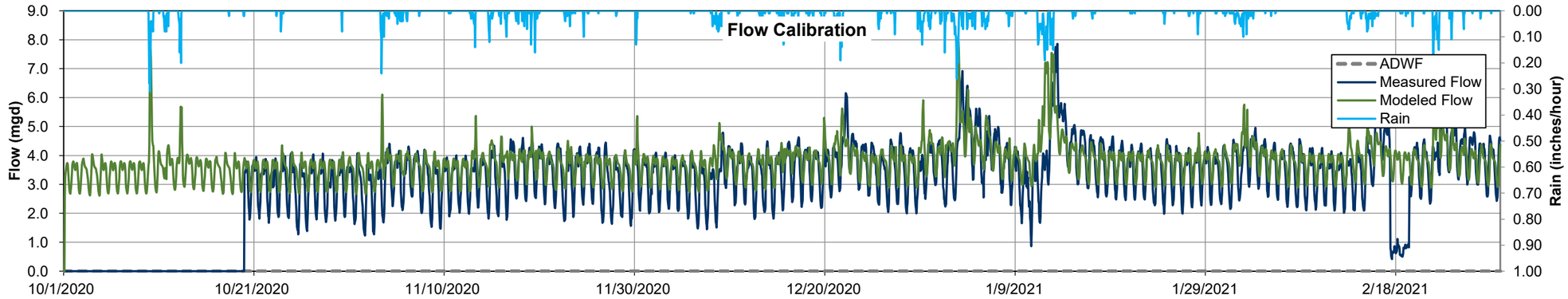
FLOW MONITORING Y-4 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

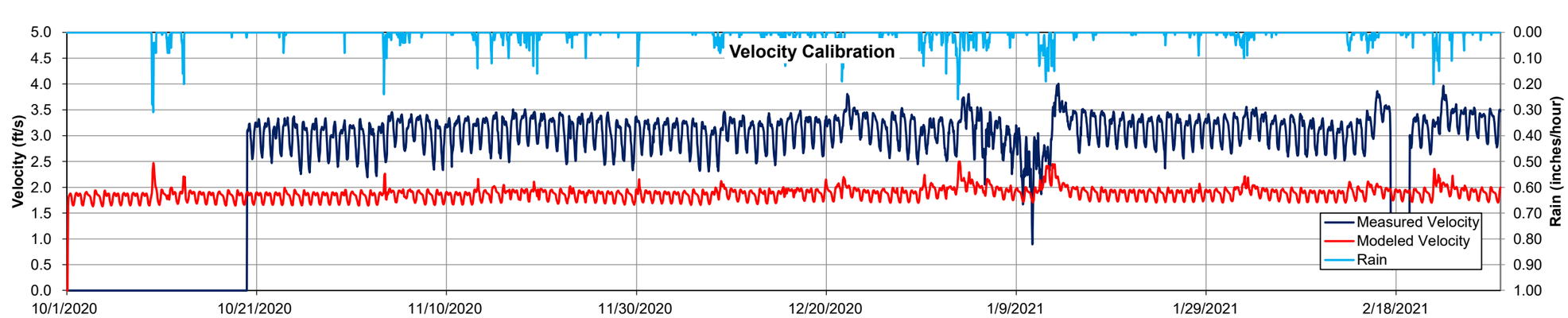
Location: Y-4
Pipeline diameter: 18"
City Manhole ID: 1010-02

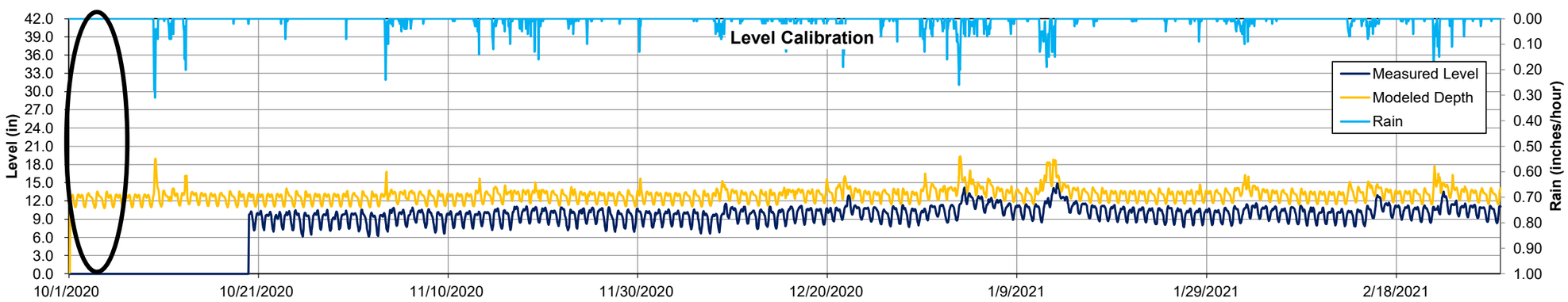


FLOW MONITORING WINT003 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: WINT003
Pipeline diameter: 42"
City Manhole ID: 508-02

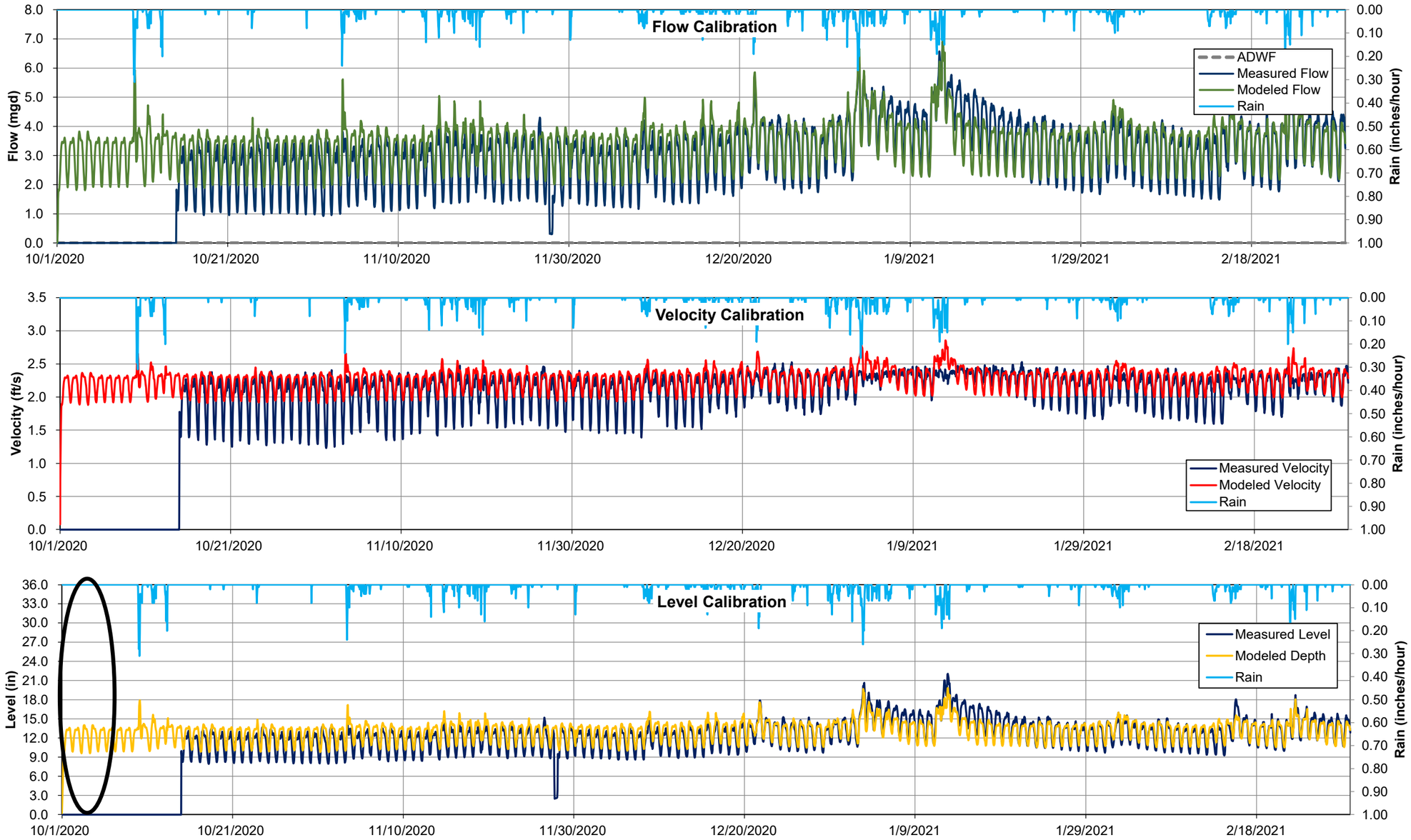






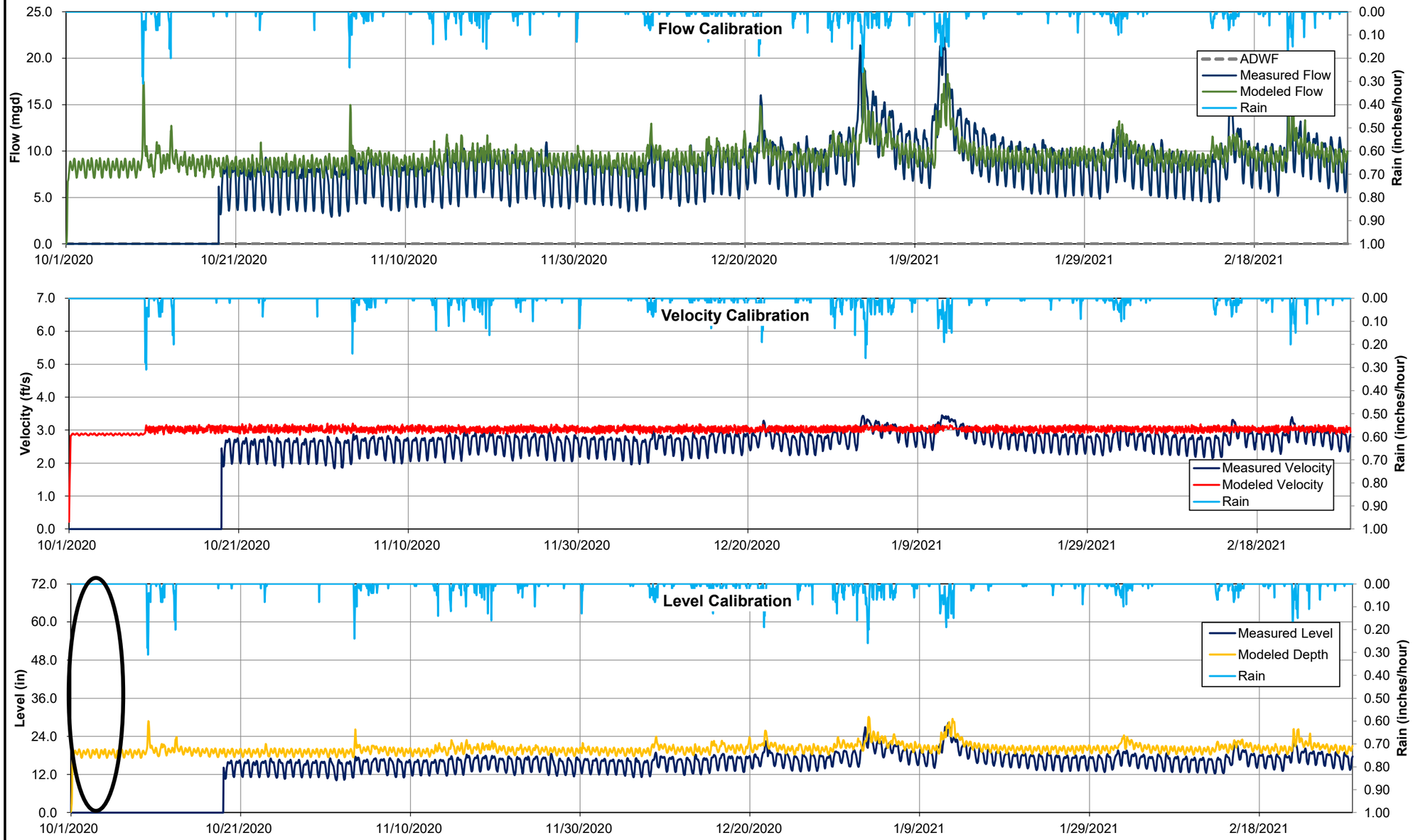
FLOW MONITORING MSTTR02 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: MSTTR02
Pipeline diameter: 36"
City Manhole ID: 509-16



FLOW MONITORING AUBRN53 WET WEATHER FLOW CALIBRATION
Collection System Planning Project
City of Auburn

Location: AUBRN53
Pipeline diameter: 72"
City Manhole ID: 207-01



APPENDIX E

PUMP STATION DATA SUMMARY

PUMP STATION DATA SUMMARY

Structure ID	Pump Station Name	Year Built	Serial Number	Number of Pumps	Wet Well						Lead Pump		Lag Pump		Single Pump Capacity (gpm)	Single Pump Capacity (mgd)	Total Station Capacity (All Pumps Running)- (mgd)
					Invert Elevation (feet)	Rim Elevation (feet)	Depth (feet)	Unit Area (ft^3/ft)	Volume (ft^3)	Diameter, Assuming Circular (feet)	Start Level (feet)	Stop Level (feet)	Start Level (feet)	Stop Level (feet)			
South Hill Sewer Basin																	
1610	Area 19	2006	09-07383-00V	2	522.21	540.81	18.6	28.27	525.8	6	529.2	527.5	530.2	527.5	325	0.468	0.702
1511	North Tapps	2007	09-07382-00N	2	505	537.45	32.45	28.26	917.0	6	512	510.6	513	510.6	510	0.734	1.101
1509	Terrace View	2007	09-07382-00N	2	58.5	77.6	19.1	28.27	540.0	6	64.6	63.8	65.6	63.8	675	0.972	1.458
Valley Sewer Basin																	
210	Auburn 40	2010	12-07206-00	2	23	57.4	34.4	63.6	2187.8	9	28.5	26.5	29.5	26.5	440	0.634	0.951
1309	Ellingson Road	2011	12-07210-00-F	2	72.3	93.9	21.6	50.27	1085.8	8	77.5	75.8	79.0	75.8	1527	2.199	3.299
1009	F Street	1980	08-7822-D	2	80.2	103.3	23.1	28.27	653.0	6	86.7	85.3	87.7	85.3	400	0.576	0.864
710	R Street	1977	07-7563-F	2	53.98	71	17.02	28.26	481.0	6	60.2	59.2	61.2	59.2	100	0.144	0.216
811	Valley Meadows	1992	14-1723-Z	2	46.98	72.5	25.52	28.26	721.2	6	51.5	50.5	52.5	50.5	125	0.180	0.270
710	8th Street	1974	14-1795-Z	2	60.25	78.25	18	28.27	508.9	6	64.1	63.05	65.05	63.05	150	0.216	0.324
511	22nd Street	1967	800-5	2	41	57.43	16.43	28.7	471.5	6	47.1	45.8	48.1	45.8	550	0.792	1.188
Auburn Way South Sewer Basin																	
912	Dogwood	2010	09-07394-00-F	2	255	273.4	18.4	50.26	924.8	8	260	259	260.8	259	300	0.432	0.648
West Hill Sewer Basin																	
705	Peasley Ridge	2001	08-8478-K	2	454.55	474.25	19.7	28.26	556.7	6	460.5	458.6	461.5	458.6	275	0.396	0.594
206	Hudson	2018	18-01131-00-X	2	25.58	53.23	27.7	50.27	1392.5	8	29.0	27.1	30.0	27.1	600	0.864	1.296
Lea Hill Sewer Basin																	
614	Rainer Ridge	1980	07-7699-C	2	385.25	405	19.75	28.26	558.1	6	391.2	389.1	392.2	389.1	200	0.288	0.432
611	Riverside	1981	07-7784-R	2	41.96	71.21	29.25	28.26	826.6	6	48.4	47.0	49.4	47.0	400	0.576	0.864
413	Verdana	2011	19-01368-00-N	3	363.17	394	30.83	175	5395.3	15	371.37	369.37	372.37	369.37	1750	2.520	3.780
514	Promenade	2018	09-07404-00-X	2	370.60	391	20.40	79	1611.6	10	374.10	372.10	374.60	372.10	174	0.250	0.375

Pump/Pump Station Manufacturer Information

All pump stations except 22nd Street Pump Station

Lenexa, Kansas 66215
Phone: 913.888.5201

22nd Street Pump Station

Smith and Loveless
Cornell Pumps 14040 Santa Fe Trail Drive, Portland, OR

Local Equipment Representative

ADS Equipment
PO Box 81045
Seattle, WA 98108
Phone: 206.763.3600

Local Equipment Representative

Ideal Pump
8625 219th SE
Woodinville, WA 98072
Phone: 425.481.7777

Use of contents on this sheet is subject to the limitations specified at the end of this document.

APPENDIX F

SEPA CHECKLIST

SEPA[1] Environmental Checklist

Purpose of checklist

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization, or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. **You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown.** You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to **all parts of your proposal**, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for lead agencies

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B, plus the Supplemental Sheet for Nonproject Actions (Part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in "Part B: Environmental Elements" that do not contribute meaningfully to the analysis of the proposal.

[1] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/Checklist-guidance

A.Background

Find help answering background questions[2]

1. **Name of proposed project, if applicable:**

   City of Auburn, 2024 Comprehensive Sewer Plan

2. **Name of applicant:**

   City of Auburn, Public Works Department, Sewer Division

3. **Address and phone number of applicant and contact person:**

   City of Auburn
   Public Works Department
   25 West Main Street
   Auburn, WA 98001
   253-931-3010

   Robert Elwell, Sewer Utility Engineer
   253-931-4008

4. **Date checklist prepared:**

   June 17, 2024

5. **Agency requesting checklist:**

   City of Auburn

6. **Proposed timing of schedule (including phasing, if applicable):**

   The Comprehensive Sewer Plan is scheduled for adoption during 2024. It identifies near-term projects for the next six years, and long-term projects over the next twenty years. It also provides direction for inspection, maintenance, and operation of the utility. A public hearing was held regarding the adoption of the Plan at the June 4, 2024 Planning Commission meeting.

7. **Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.**

None beyond those discussed in this Comprehensive Sewer Plan The next comprehensive sewer plan update is proposed for the year 2032.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

Depending upon the scope of projects proposed in the plan, an individual environmental checklist and threshold determination would be completed as specified projects are proposed for construction. There are no environmental or background studies that have been completed for this sanitary sewer plan.

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

At this time, there are no known pending applications for general applicability related to the area covered by the sewer system. There may be applications pending related to improvements to the sewer system such as various on-going plats and developer extensions occurring within the sewer service area. The City plans to adopt the capital improvement plan outlined in this document as part of the City's six-year capital facilities plan.

10. List any government approvals or permits that will be needed for your proposal, if known.

The Comprehensive Sewer Plan must be approved by the City of Auburn City Council, the King County Council, and the Washington State Department of Ecology.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page.

The proposed non-project action includes adoption of the Comprehensive Sewer Plan as an element of the City's Comprehensive Plan. The City of Auburn's 2024 Comprehensive Sewer Plan replaces the City of Auburn's 2016 Comprehensive Sewer Plan. The plan examines the existing sewer service area which includes both areas within the city limits and potential annexation areas for the City of Auburn. It addresses policies, design criteria, and recommends improvements to the sewer system and its service area. The plan analyzes the current level of service and identifies important projects necessary to meet City and State Standards regarding public health, facility efficiency, and operations and maintenance. The wide range of facility improvements includes repair and replacement, system improvements, facility evaluations, and extensions of the utility to meet future sewer demands. The Comprehensive Sewer Plan is an ongoing element of the city Comprehensive Plan and serves as a guide for the operation, maintenance and expansion of the utility within its Sewer Service Area, in accordance with local, County, and State requirements.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The sewer service planning area as established in the plan is defined as the City of Auburn's existing city limits and potential annexation areas. The City of Auburn's service area has been modified by several interlocal agreements with neighboring sewer service providers. Those agreements are included in Appendix A of the Comprehensive Sewer Plan. The service area is shown on Figure 1.2 of the Comprehensive Sewer Plan and reflects those agreements.

B.Environmental Elements

1. Earth

Find help answering earth questions[3]

a. General description of the site:

The sewer service area is characterized by a relatively flat valley floor bordered by steep hillsides and upland plateaus overlooking the valley.

Circle or highlight one: Flat, rolling, hilly, steep slopes, mountainous, other:

b. What is the steepest slope on the site (approximate percent slope)?

The actual land slopes vary throughout the planning area. Steep slopes exist east and north of the Green River on Lea Hill, south of the White River, and west along the West Valley Highway toward the West Hill. The steepest slopes are close to 100 percent.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them, and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

The valley floor is made up primarily of soils of the Oridia, Renton, Snohomish, and Briscott series. These soils are poorly drained and formed in the alluvium (river

[3] https://ecology.wa.gov/regulations-permits/sepa/environmental-review/sepa-guidance/sepa-checklist-guidance/sepa-checklist-section-b-environmental-elements/environmental-elements-earth

sediments) associated with the White and Green rivers. These are considered good agricultural soils, though in many areas, are not well-drained. There is no designated farmland within the City of Auburn.

The hillsides and plateaus are made up of primarily Alderwood associated soils and a small amount of Everett associated soils (U.S. Department of Agriculture, 1973). Alderwood soils are moderately well drained gravelly sandy loams 20-40 inches deep. Beneath these soils is glacial till with low permeability. Roots penetrate easily to the hardpan layer. Runoff potential is slow to medium. Erosion and slippage hazard is moderate, ranging to severe on steeper slopes. The Everett series consists of somewhat excessively drained soils that are underlain by very gravelly sand. These soils formed in very gravelly glacial outwash deposits under conifers. They are found on terraces and terrace fronts and are gently undulating to moderately steep.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

Some steep slopes, in the areas described earlier, are possible locations of unstable soils. Geologic hazard areas including volcanic, seismic, landslide, and erosion hazard areas are mapped in the City Comprehensive Plan and sensitive areas maps.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

Does not apply, since the proposed Comprehensive Sewer Plan is a non-project action. Sewer system construction projects identified in the plan will require excavation and grading of an undetermined quantity of material. Specific projects will be subject to individual environmental review prior to construction.

f. Could erosion occur because of clearing, construction, or use? If so, generally describe.

Does not apply to this non-project action. Specific projects will be subject to individual environmental review before implementation.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

Does not apply, since this non-project action does not involve site specific development proposals.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any.

This is a non-project action, so no site specific erosion control is proposed. Specific projects described by the plan will be subject to individual environmental review

before implementation. Where applicable, erosion and sedimentation control measures together with best management practices per the 2019 Surface Water Management Manual will be used in all areas of potential erosion.

2. Air

Find help answering air questions[4]

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

Does not apply to this non-project action. Specific projects, which are subject to environmental review, will be evaluated for their potential impact and corresponding mitigation measures prior to implementation.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

Does not apply to this non-project action. Specific projects, which are subject to environmental review, will be evaluated for their potential impact and corresponding mitigation measures prior to implementation.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

Does not apply to this non-project action. Specific projects will be subject to individual environmental review before implementation. However, standard emission controls for construction equipment will be utilized during construction of projects recommended by this plan.

3. Water

Find help answering water questions[5]

a. Surface:

Find help answering surface water questions[6]

1. Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

[4] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-Air
[5] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-3-Water
[6] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-3-Water/Environmental-elements-Surface-water

The major bodies of water within Auburn are the Green River, the White River, Mill Creek, Bowman Creek, and White Lake.

2. **Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.**

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation and compliance with the City's Shoreline Master Program.

3. **Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.**

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

4. **Will the proposal require surface water withdrawals or diversions? Give a general description, purpose, and approximate quantities if known.**

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

5. **Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.**

Several areas within Auburn lie within the 100-year floodplain of the Green or White River and Mill Creek. . Specific projects described by the plan which lie within these flood plains will be subject to individual environmental review before implementation and must comply with all applicable regulations.

6. **Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.**

No

b. Ground:

Find help answering ground water questions[7]

1. **Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate**

[7] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-3-Water/Environmental-elements-Groundwater

quantities withdrawn from the well. Will water be discharged to groundwater? Give a general description, purpose, and approximate quantities if known.

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

2. **Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (domestic sewage; industrial, containing the following chemicals…; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.**

Does not apply to this non-project action. No waste material will be discharged into the ground as a result of this Plan.

c. Water Runoff (including stormwater):

1. **Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.**

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

2. **Could waste materials enter ground or surface waters? If so, generally describe.**

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

3. **Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.**

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

4. Plants

Find help answering plants questions

a. Check the types of vegetation found on the site:

☒ **deciduous tree: alder, maple, aspen, other**

☒ **evergreen tree: fir, cedar, pine, other**

☒ **shrubs**

☒ **grass**

☒ **pasture**

☒ **crop or grain**

☒ **orchards, vineyards, or other permanent crops.**

☒ **wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other**

☒ **water plants: water lily, eelgrass, milfoil, other**

☒ **other types of vegetation**

Does not apply to this non-project action. A wide variety of plants exist across the Plan area. Specific projects described by the plan will be subject to individual environmental review before implementation.

b. What kind and amount of vegetation will be removed or altered?

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

c. List threatened and endangered species known to be on or near the site.

Does not apply to this non-project action. Any threatened or endangered species on or near the recommended projects of this Plan will be listed at the time of the environmental review process for each individual project.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any.

Does not apply to this non-project action. Specific projects will be subject to individual environmental review before implementation.

e. List all noxious weeds and invasive species known to be on or near the site.

Does not apply to this non-project action. Any noxious weeds or invasive species on or near the recommended projects of this plan will be listed at the time of environmental review process for each individual project.

5. Animals

Find help answering animal questions[8]

a. List any birds and other animals that have been observed on or near the site or are known to be on or near the site.

Examples include:

- **Birds: hawk, heron, eagle, songbirds, other: geese, ducks, crows**
- **Mammals: deer, beaver, other: urban animals such as dogs, cats, squirrels, rodents, opossums, raccoons, etc are also present.**
- **Fish: salmon, trout**

Does not apply to this non-project action. Adoption of the Comprehensive Sewer Plan does not involve a specific site. Many of the following species could be present within the project area. Specific projects will be subject to individual environmental review for the identification of species present before implementation.

b. List any threatened and endangered species known to be on or near the site.

The City of Auburn Comprehensive Plan identifies the presence of Great Blue Heron and Bald Eagles within the sewer service area. The Environmental Impact Statement for the Auburn Thoroughbred Racetrack indicates that peregrine falcons, bald eagles, and the Aleutian Canadian Goose have been seen in the Auburn area. Chinook Salmon have been listed as endangered by the National Marine Fisheries Service and Bull Trout have been listed as endangered by the US Fish and Wildlife Service. Chinook are known to use Mill Creek and the Green and White Rivers. Bull Trout may inhabit the Green and White Rivers.

c. Is the site part of a migration route? If so, explain.

Does not apply to this non-project action. Adoption of the Comprehensive Sewer Plan does not involve a specific site. Specific projects will be subject to individual environmental review before implementation. Auburn is a portion of the Pacific Flyway for migratory birds and the migration route of a threatened or endangered species on or near the location of recommended projects of this plan will be listed at the time of the environmental review process for that particular project.

d. Proposed measures to preserve or enhance wildlife, if any.

Does not apply to this non-project action. Specific projects will be subject to individual environmental review before implementation.

[8] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-5-Animals

e. List any invasive animal species known to be on or near the site.

Does not apply to this non-project action. Any invasive animal species on or near the recommended projects of this Plan will be listed at the time of environmental review process for each individual project.

6. Energy and natural resources

Find help answering energy and natural resource questions[9]

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Does not apply to this non-project action. Specific projects will be subject to individual environmental review before implementation.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

Does not apply to this non-project action. Specific projects will be subject to individual environmental review before implementation.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any.

Does not apply to this non-project action. Adoption of the Comprehensive Sewer Plan itself will not result in the direct reduction or control of energy impacts. The policies included in Chapter 2 of this plan do promote sustainability practices within the Sewer Utility.

7. Environmental health

Health Find help with answering environmental health questions[10]

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur because of this proposal? If so, describe.

Does not apply to this non-project action. Specific projects will be subject to individual environmental review before implementation.

[9] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-6-Energy-natural-resou
[10] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-7-Environmental-health

1. **Describe any known or possible contamination at the site from present or past uses.**

Does not apply to this non-project action. Specific projects will be subject to individual environmental review before implementation.

2. **Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.**

Does not apply to this non-project action. Specific projects will be subject to individual environmental review before implementation.

3. **Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.**

-

Does not apply to this non-project action. Specific projects will be subject to individual environmental review before implementation.

4. **Describe special emergency services that might be required.**

Does not apply to this non-project action. Specific projects will be subject to individual environmental review before implementation.

5. **Proposed measures to reduce or control environmental health hazards, if any.**

Does not apply to this non-project action. Specific projects will be subject to individual environmental review before implementation.

b. Noise

1. **What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?**

Does not apply to this non-project action. Specific projects will be subject to individual environmental review before implementation.

2. **What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site)?**

Does not apply to this non-project action. Specific projects will be subject to individual environmental review before implementation.

3. **Proposed measures to reduce or control noise impacts, if any:**

Does not apply to this non-project action. Specific projects will be subject to individual environmental review before implementation.

8. Land and shoreline use

Find help answering land and shoreline use questions[11]

a. **What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.**

The sewer service area comprises various land uses including residential, industrial, commercial, open space, and public land uses.

b. **Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses because of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?**

Much of Green and White River Valleys and the City of Auburn were used for agriculture at some time in the past. Over the last several decades, rapid growth in the area resulted in much of the agricultural land converting to urban uses. No land within the city is designated as agricultural, though some parcels continue as that type of use. No change in land use will result from the adoption of the Comprehensive Sewer Plan.

1. **Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how?**

No.

c. **Describe any structures on the site.**

Many types of structures exist in the sewer service area, including residential, commercial, institutional, manufacturing, and industrial buildings.

d. **Will any structures be demolished? If so, what?**

[11] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-8-Land-shoreline-use

Does not apply to this non-project action. Projects which are subject to environmental review will identify any structures proposed for demolition.

e. What is the current zoning classification of the site?

In general, the sewer service area contains various zoning districts in Auburn and Unincorporated King and Pierce Counties. In general, the zoning includes single-family and multi-family residential, light and heavy commercial, light and heavy industrial, public, and open spaces. Specific Comprehensive Plan Land Use designations will be identified along with each project's individual environmental review.

f. What is the current comprehensive plan designation of the site?

-
- *The sewer service area contains various Comprehensive Plan designations. The City of Auburn has jurisdiction over the majority of the service area. Several small portions of the service area, as shown on Figure 2-2, lie within King County or Pierce County. Those areas are subject to the land use designations of the King County and Pierce County Comprehensive Plans. Specific zoning designations will be identified along with each project's individual environmental review.*
-

g. If applicable, what is the current shoreline master program designation of the site?

Portions of the City along the Green and White Rivers fall under the Shoreline Master Program. Shorelines of the State are reflected in Auburn's Shorelines Master Program, and specific projects described by the plan will be required to comply with the program.

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.

Lands classified as critical areas exist within the sewer service area, including wetlands and streams, geologic hazard areas, aquifer recharge, habitat areas, groundwater protection areas, and frequently flooded areas. Specific projects described by the plan will be subject to individual environmental review before implementation.

i. Approximately how many people would reside or work in the completed project?

Does not apply to this non-project action. No specific development is proposed

j. Approximately how many people would the completed project displace?

Does not apply to this non-project action. The Plan's programs and project are not intended to displace any people.

k. Proposed measures to avoid or reduce displacement impacts, if any.

Does not apply to this non-project action.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any.

The Comprehensive Sewer Plan is written in accordance with all existing local, county, and state regulations. This includes the City Comprehensive Plan developed under the Growth Management Act policies, the King County Comprehensive Plan, the King County Regional Wastewater Services Plan, and the Pierce County Comprehensive Plan.

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:

The Comprehensive Sewer Plan includes policies consistent with King County and Pierce County policies to not extend sanitary sewer service to county rural zoned properties.

9. Housing

Find help answering housing questions[12]

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

Does not apply to this non-project action.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

Does not apply to this non-project action.

[12] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-9-Housing

c. Proposed measures to reduce or control housing impacts, if any:

Does not apply to this non-project action.

10. Aesthetics

Find help answering aesthetics questions[13]

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

b. What views in the immediate vicinity would be altered or obstructed?

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

c. Proposed measures to reduce or control aesthetic impacts, if any:

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

11. Light and glare

Find help answering light and glare questions[14]

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

c. What existing off-site sources of light or glare may affect your proposal?

[13] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-10-Aesthetics
[14] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-11-Light-glare

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

d. Proposed measures to reduce or control light and glare impacts, if any:

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

12. Recreation

Find help answering recreation questions

a. What designated and informal recreational opportunities are in the immediate vicinity?

The City of Auburn provides a full range of parks and recreational facilities.

b. Would the proposed project displace any existing recreational uses? If so, describe.

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

13. Historic and cultural preservation

Find help answering historic and cultural preservation questions[15]

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers? If so, specifically describe.

Although this non-project action will not directly affect any of these structures, there are several such buildings located within the sewer service area within the City of Auburn. Policies concerning these sites are addressed in the Historic Preservation Element of the City's Comprehensive Plan.

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

[15] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-13-Historic-cultural-p

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

14. Transportation

Find help with answering transportation questions[16]

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

Numerous streets and highways traverse the service area. State Highways 18 and 167 are the two major highways crossing the service area. The City is served by a network of streets classified as arterials, collectors, and local streets.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

Yes, the City of Auburn is served by Sound Transit, King County Metro, Pierce Transit, and Muckleshoot Tribal Transit.

c. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle, or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

[16] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-14-Transportation

d. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

Does not apply to this non-project action. Specific projects described by the plan will be subject to individual environmental review before implementation.

e. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

Does not apply to this non-project action.

f. Will the proposal interfere with, affect, or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

Does not apply to this non-project action.

g. Proposed measures to reduce or control transportation impacts, if any:

Does not apply to this non-project action.

15. Public services

Find help answering public service questions[17]

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

Does not apply to this non-project action.

b. Proposed measures to reduce or control direct impacts on public services, if any.

Does not apply to this non-project action.

16. Utilities

Find help answering utilities questions[18]

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other: cable television.

[17] https://ecology.wa.gov/regulations-permits/sepa/environmental-review/sepa-guidance/sepa-checklist-guidance/sepa-checklist-section-b-environmental-elements/environmental-elements-15-public-services
[18] https://ecology.wa.gov/regulations-permits/sepa/environmental-review/sepa-guidance/sepa-checklist-guidance/sepa-checklist-section-b-environmental-elements/environmental-elements-16-utilities

Various levels of service are available throughout the service area.

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

The recommended repairs, replacements, improvements, or extensions to sewer system facilities are required to meet the level of service criteria set forth by local, county, and state governments. The facilities include sewer mains, manholes, pump stations, force mains and related appurtenances. Each recommended project will be subject to its own environmental review process.

C.Signature

Find help about who should sign[19]

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: _____

Name of signee Robert Elwell

Position and Agency/Organization Sewer Utility Engineer, City of Auburn

Date Submitted: May 24, 2024

D.Supplemental sheet for nonproject actions

Find help for the nonproject actions worksheet[20]

Do not use this section for project actions.

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

[19] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-C-Signature

[20] https://ecology.wa.gov/regulations-permits/sepa/environmental-review/sepa-guidance/sepa-checklist-guidance/sepa-checklist-section-d-non-project-actions

1. **How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?**

The proposed non-project action consists of adoption of the Comprehensive Sewer Plan, which will not itself increase discharge to water or air. Implementation of some elements of the Comprehensive Sewer Plan has the potential to result in discharges to water and air. For example construction projects identified in the Plan have the potential to result in increased noise and exhaust from construction equipment and dust from exposed soils.

- **Proposed measures to avoid or reduce such increases are:**

No specific mitigation is proposed for the Plan adoption. The potential for discharge to air or water will be minimized through the use of best management practices and through the design and construction and operation consistent with the applicable local, state, and federal laws. Proposed projects will be reviewed and addressed on an individual basis by the appropriate agencies prior to implementation.

2. **How would the proposal be likely to affect plants, animals, fish, or marine life?**

It is not anticipated that the proposed projects will have a significant impact upon fish or wildlife. Improvements to the system described by the plan are intended to increase reliability, thereby reducing the risk of environmental contamination, thereby reducing potential harmful effects on wildlife.

- **Proposed measures to protect or conserve plants, animals, fish, or marine life are:**

No such measures are proposed for the plan adoption. Proposed projects will be reviewed on an individual basis and addressed by the appropriate agencies as they commence.

3. **How would the proposal be likely to deplete energy or natural resources?**

It is not anticipated that any of the proposed projects will have significant impact on the use of or need for energy or natural resources. Specific projects described by the plan will reviewed for their potential impact to energy and resource use as part of individual environmental reviews prior to implementation.

- **Proposed measures to protect or conserve energy and natural resources are:**

None specifically, as this is a non-project action. However, the proposed Sewer Comprehensive Plan includes a policy to evaluate activities to emphasize "sustainability practices." Specific projects described by the plan will reviewed for their potential impact to energy and resource use as part of individual environmental reviews prior to implementation.

4. **How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection, such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?**

It is not anticipated that the proposed projects will have a significant impact upon environmentally sensitive areas or areas designated for governmental protection. Improvements to the system described by the plan are intended to increase reliability, thereby reducing the risk of impacts to sensitive areas..

- **Proposed measures to protect such resources or to avoid or reduce impacts are:**

The Plan does not increase the ability of any person, company, or agency to develop projects that would affect sensitive areas. Proposed projects identified as part of the plan will be reviewed on an individual basis and addressed by the appropriate agencies prior to implementation. Conformance with the applicable local, state, and federal guidelines and regulations will be required.

5. **How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?**

The Comprehensive Sewer Plan does not allow or encourage uses incompatible with existing plans. Specific projects will be subject to individual environmental review before implementation.

- **Proposed measures to avoid or reduce shoreline and land use impacts are:**

None specifically, as this is a non-project action. However, specific projects described by the plan will reviewed for their potential impact to shoreline use and land use as part of individual environmental reviews prior to implementation.

6. **How would the proposal be likely to increase demands on transportation or public services and utilities?**

The proposal will not result in an increase in demands on transportation and public services. The Comprehensive Sewer Plan responds to growth by identifying the public facilities and improvement needed to address future growth addressed by the City Comprehensive Plan.

- **Proposed measures to reduce or respond to such demand(s) are:**

The Comprehensive Sewer Plan identifies sewer facilities required to accommodate growth. Any proposal to construct those facilities will be subject to environmental review which will identify specific impacts to transportation, public services or other utilities.

7. **Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.**

The Sewer Comprehensive Plan does not appear to present any conflict with local, state, or federal laws or requirements.

[Correction]

DETERMINATION OF NON-SIGNIFICANCE (DNS)
City of Auburn Comprehensive Plan Sewer Update
SEP24-0008

The City of Auburn is issuing a Notice of Application (NOA) and a Determination of Non-Significance (DNS) for the following described project. The permit applications and listed studies may be reviewed at the Auburn Department of Community Development at One E Main St., 2nd Floor, Customer Service Center, Auburn, WA 98001 and by visiting www.auburnwa.gov/landuse.

Proposal: The proposed non-project action includes adoption of the Comprehensive Sewer Plan as an element of the city's Comprehensive Plan. The City of Auburn's 2024 Comprehensive Sewer Plan replaces the City of Auburn's 2016 Comprehensive Sewer Plan. The plan examines the existing sewer service area which includes both areas within the city limits and potential annexation areas for the City of Auburn. It addresses policies, design criteria, and recommends improvements to the sewer system within its service area. The plan analyzes the current level of service and identifies important projects necessary to meet city and state standards regarding public health, facility efficiency, and operations and maintenance. The wide range of facility improvements includes repair and replacement, system improvements, facility evaluations, and extensions of the utility to meet future sewer demands. The Comprehensive Sewer Plan is an ongoing element of the city's Comprehensive Plan and serves as a guide for the operation, maintenance and expansion of the utility within the sewer service area, in accordance with the local, County, and State requirements.

Location: City-wide

Notice of Application:
Not Applicable.
Application Complete:
June 25, 2024
Permit Application:
June 17, 2024

File Nos.
SEP24-0008

Property Owner:
City of Auburn
25 W Main St.
Auburn WA, 98001

Applicant:
City of Auburn
Robert Elwell
25 W Main St.
Auburn WA, 98001

Studies/Plans Submitted with Application:
SEPA Environmental Checklist, prepared by City of Auburn, revision dated September 2023
Sewer Comprehensive Plan Element, prepared by City of Auburn, revision dated June 2024

Other Permits, Plans, and Approvals Needed:
Not Applicable.

Statement of Consistency and List of Applicable Development Regulations: This proposal is subject to and shall be consistent with the Auburn City Code, Comprehensive Plan, and Public Works Design and Construction Standards.

Lead Agency: City of Auburn. The lead agency for this proposal has determined that it does not have probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed

environmental checklist and other information on file with the lead agency. This information is available to the public on request.

SEPA Environmental Review: This DNS is issued under WAC 197-11-340(2); the lead agency will not act on this proposal for 14 days from the date below.

Public Comment Period: This may be your only opportunity to comment on the environmental impact of the proposal. All persons may comment on this application. Comments must be in writing and submitted by **5:00 p.m. on August 26, 2024** to the mailing address of 25 W Main St., Auburn, WA, 98001 or emailed to the contact below. Any person wishing to become a party of record, shall include in their comments that they wish to receive notice of and participate in any hearings, if relevant, and request a copy of decisions once made. *The responsible official will reconsider the DNS based on timely comments and may retain, modify, or, if significant adverse impacts are likely, withdraw the DNS.* ***If the DNS is retained, it will be final after the expiration of the comment deadline.***

Any person aggrieved of the City's determination may file an appeal with the Auburn City Clerk at 25 West Main Street, Auburn, WA 98001-4998 within 14 days of the close of the comment period, or by 5:00 p.m. on September 9, 2024.

For questions regarding this project, please contact Gabriel Clark, Planner I, at planning@auburnwa.gov or 253-470-2147.

Public Hearing: N/A

RESPONSIBLE SEPA OFFICIAL:
Alexandria D. Teague, Planning Services Manager

ADDRESS:
25 West Main St.
Auburn, WA 98001
253-931-3090

DATE ISSUED: August 8, 2024 SIGNATURE: Alexandria D. Teague

Note: This determination does not constitute approval of the proposal. Approval of the proposal can only be made by the legislative or administrative body vested with that authority. The proposal is required to meet all applicable regulations.

APPENDIX G

RECLAIMED WATER CHECKLIST

For questions, call Kristina Westbrook,
King County Reclaimed Water Program Manager at (206) 296-5279
www.kingcounty.gov/reclaimedwater

King County

Water Reclamation Evaluation Checklist
For Systems with 1,000 or more Connections

The County and State recognize that changing conditions could initiate a need to respond in new ways to future water quality standards, wastewater discharge requirements, take advantage of advances in treatment technologies and/or allow our region to be positioned to respond to changes associated with climate change and population growth.

In 2003, Chapter 90.46 of the Revised Code of Washington (RCW) was amended to require public water systems serving 1,000 or more connections to evaluate opportunities for reclaimed water when completing their water system plans. Please use this checklist to meet King County consistency requirements in responding to this legislation.

Please use this checklist, including the inventory template, to ensure that your water system plan includes sufficient information about opportunities for reclaimed water and your system's efforts to develop those opportunities. If a question is not applicable or the information is unavailable, then answer, "unknown" or "n/a." King County will consider the checklist completed if each answer is filled in with the best available information, even if the utility states that it is not aware of any reclaimed water opportunities within its service area.

Water System Name: City of Auburn
Date: 03/11/2024
PWS ID# 03350V
Contact: Senait Gebreeyesus

1. **Identifying Potential Future Demand for Reclaimed Water:** King County maintains a database and map of potential reclaimed water users for evaluating future projects. Please use the template below, or similar table, to provide information to assist King County in further researching these potential uses.
   - **Large Utility Water Users** (choose one):
     - ☐ Attached is an inventory of twenty large (above 20,000 gallons/month on average), non single-family residential, water users served by our utility that have a potential for reclaimed water use, or
     - ☑ Attached is an inventory of our utility's top twenty water users, or
     - ☐ The information requested is unknown or not available.
       Additional Comments: _____
   - **Large Self Suppliers** (choose one):
     - ☐ Attached is an inventory of large, self-supplied water users within our water utility's service boundaries - especially those near wastewater treatment plants, mainlines, outfalls, and pump stations or similar reclaimed water facilities), or
     - ☑ The information requested is unknown or not available.
       Additional Comments: _____
   - **Other** (choose one):
     - ☐ Attached is an inventory of other water users (such as those that are clustered near one another and could be served by a single system) that may be likely candidates for reclaimed water use, or
     - ☑ The information requested is unknown or not available.
       Additional Comments: _____

2. **Environmental Commitment**: Are you a city/town, or providing water service to a city/town, that has made commitments within resource management plans, salmon recovery plans, or other environmental initiatives for which there is a potential opportunity for using reclaimed water to assist in meeting commitments? (choose one)

☐ Yes, here are plans that have potential for reclaimed water use in our service area to meet the above commitments:

_____

_____

☑ The information requested is unknown, not available.
Additional Comments: _____

3. **Identifying Areas of Potential Use of Reclaimed Water for Environmental Benefit:**
Below are ***examples*** of uses of reclaimed water ***that comply with State, Federal and other reclaimed water environmental, health and safety standards***. All of these uses are currently in effect somewhere in Washington State. To the best of your knowledge, are any of these potential uses for reclaimed water applicable to your area?

River Augmentation (choose one):

☐ Yes, our water rights are limited by instream flows. For more information, King County may contact:

_____

_____

☑ The information requested is unknown, or not available.
Additional Comments: _____

Groundwater Recharge (choose one):

☐ Yes, we withdraw water from an aquifer that is in a groundwater management area, or from a declining aquifer, where water levels may need to be replenished or to maintain aquifer storage. For more information, King County may contact:

_____

☑ The information requested is unknown, or not available.
Additional Comments: _____

Water Rights Mitigation (choose one):

☑ Yes, our area is pursuing, or planning to pursue, new or additional water rights, and there may be an opportunity to use reclaimed water for mitigation of those new water rights. For more information, King County may contact:
Application G1-28404. Contact Ingrid Gaub, 253-804-3113

☐ The information requested is unknown, or not available.
Additional Comments: _____

Potential Areas of Environmental Need (choose one):

☐ Yes, parts of our service area include potential environmental enhancement locations, such as wetlands enhancement, aquifer recharge, stream flow augmentation, that might be candidates for reclaimed water use. For more information, King County may contact:

_____

☑ The information requested is unknown, or not available.
Additional Comments: _____

4. **Local Reclaimed Water Legislation**: If water reclamation is mandated for this water system through local government agreement, contract, local regulations, ordinances, or other mechanisms, please provide a copy of the governing mechanism (choose one).

   ☐ Yes, local legislation exists in our area in support of reclaimed water use. The following relevant legislation is attached (please list titles of documents):

   _____

   _____

   ☑ No water reclamation legislation exists, or is known to exist, at a local level in our service area.

5. **Coordination with Local Wastewater Utility:** Include a brief description of your interactions with any wastewater or reclaimed water utility (King County or other) adjacent to your service area to evaluate any potential opportunities to develop reclaimed water (choose one).

   ☑ Describe if applicable:
   The City of Auburn's policy is to coordinate with King County to explore potential opportunities for water reclamation.

   ☐ None. Additional Comments: _____

Template for
Inventory of Water Users and Identification of Potential Reclaimed Water Users

Site Owner or Site Name	Site Address (for general mapping purposes)	Estimated Annual Water Use	Water uses not requiring potable water[1]	Is this a Potential Reclaimed Water Customer?
Boeing	700 15th St SW	188,246,355 gal.	?	Yes
Muckleshoot Casino	2402 Auburn Way S	32,219,539 gal.		No
Auburn Manor	210 37th St SE	22,827,838 gal.		No
Copper Gate	4750 Auburn Way N	14,905,895 gal.		No? (new)
Emerald Downs	2828 Emerald Downs Dr.	29,984,048 gal.	12,095,080	Yes
White River Estates	4248 A St. SE	15,270,794 gal.		No
Laundry Facility	1600 M ST. NW	25,749,807 gal.		No? (new)
Promenade Apartments	12902 SE 312th St	15,666,411 gal.		No? (new)
MultiCare	202 N Division St	13,091,590 gal.		No
Villas/Reserve	1107 A St NE	11,592,354 gal.		No? (new)
Walmart/Supermall	1200 Supermall Way	13,991,247 gal.	1,319,101	Yes
Auburn Dairy	702 W Main St	10,548,203 gal.		No
Rio Verde	1402 22nd St NE	12,753,400 gal.		No
College Place	31600 126th Ave SE	11,624,762 gal.		No? (new)
Skylark Village	900 29th St SE	12,359,952 gal.		No? (new)
The River Estates	3611 I St. NE	10,086,593 gal.		No? (new)
Safeway	3520 Pacific Ave S	9,678,279 gal.		No
Adventist Academy	32nd St SE & Wyman Dr.	9,028,734 gal.	?	Yes
Forest Villa (PIC)	4205 Auburn Way S	9,163,094 gal.		No
Tall Cedars	40137th St SE	6,759,209 gal.		No

[1] See Washington State Reclamation and Reuse Standards, September 1997, Section 1, Articles 1-5 for allowable uses of reclaimed water. http://www.ecy.wa.gov/PROGRAMS/WQ/reclaim/standards.html



Comprehensive Storm Drainage Plan Update

Prepared for

CITY OF AUBURN WASHINGTON

November 2024

Parametrix

Comprehensive Storm Drainage Plan Update

Prepared for

City of Auburn
25 W Main Street
Auburn, WA 98001

Prepared by

Parametrix
719 2nd Avenue, Suite 200
Seattle, WA 98104
T. 206.394.3700 F. 1.206.649.6353
www.parametrix.com

November 2024 | 553-1931-052

Citation

Parametrix. 2024. Comprehensive Storm Drainage Plan Update. Prepared for City of Auburn by Parametrix, Seattle, Washington. November 2024.

Contents

1. Introduction 1-1
1.1 Purpose and Objectives 1-1
1.2 Approach and Document Organization 1-2
2. Background 2-1
2.1 Storm Drainage Utility 2-1
2.1.1 Organizational Structure 2-1
2.1.2 Funding Mechanisms 2-2
2.2 Development Code and Design Standards Updates 2-4
2.3 Regulatory and Policy Considerations 2-4
2.3.1 Growth Management Act 2-6
2.3.2 Phase II Municipal Stormwater Permit 2-6
2.3.3 Governmental Accounting Standards Board 2-8
3. System Goals and Policies 3-1
3.1 City Comprehensive Plan Consistency 3-1
3.2 Storm Drainage Comprehensive Plan Policy Goals 3-1
3.2.1 System Planning 3-1
3.2.2 Operations and Maintenance 3-2
3.2.3 Fiscal Responsibility 3-3
3.2.4 Environment and Regional Coordination 3-3
4. Drainage System 4-1
4.1 Natural Drainage 4-1
4.1.1 Receiving Waters 4-3
4.1.2 Drainage Areas 4-4
4.1.3 Geology and Groundwater 4-6
4.1.4 Soils and Runoff Potential 4-8
4.1.5 Land Use and Development 4-8
4.1.6 Flood Hazard Mapping 4-11
4.1.7 Recent Climate and Precipitation Trends 4-11
4.1.8 Anticipated Changes in Climate 4-12
4.2 Stormwater Drainage Infrastructure 4-15
4.3 Critical Facilities 4-18
4.4 Water Quality 4-20

Contents (continued)

4.4.1 Existing Conditions 4-20
4.4.2 Regulatory Compliance 4-20
4.5 Existing Drainage Problems 4-21

5. Evaluation of the Storm Drainage Utility 5-1
5.1 Hydraulic Evaluation 5-1
5.1.1 Updating Existing Models 5-2
5.1.2 Creating New Models 5-2
5.1.3 Updating Precipitation Record and Flow Frequency 5-3
5.2 Asset Management Review 5-3
5.2.1 Best Practices 5-3
5.2.2 Evaluation 5-4
5.2.3 Recommendations 5-7
5.3 Regulatory-Driven Improvements Investigation 5-8
5.3.1 New Permit Requirements and Recommendations 5-8
5.4 Climate Change Analysis 5-10
5.4.1 Discussion of Proposed Approaches 5-10
5.4.2 Recommendations 5-13

6. Maintenance and Operations 6-1
6.1 Utility Responsibility and Authority 6-1
6.1.1 Organizational Structure 6-1
6.1.2 Staffing Level 6-1
6.1.3 Level of Service 6-2
6.1.4 Training and Education 6-2
6.2 Routine Operations Provided by the Storm Drainage Utility 6-3
6.2.1 Catch Basin and Manhole Inspection, Cleaning, and Repair 6-3
6.2.2 Stormwater Pipeline Cleaning 6-3
6.2.3 Stormwater Outfall Inspection, Cleaning, and Maintenance 6-4
6.2.4 Drainage Ditch Maintenance and Restoration 6-4
6.2.5 Stormwater Facility Inspection, Maintenance, and Restoration 6-4
6.2.6 Culvert Inspection and Cleaning 6-5
6.2.7 General Facility Maintenance and Other Field Tasks 6-5
6.2.8 Storm Drainage Utility Overhead 6-5

Contents (continued)

6.3 Routine Operations Provided to the Storm Drainage Utility 6-6
6.3.1 Vegetation Maintenance 6-6
6.3.2 Stormwater Pump Station Maintenance 6-6
6.3.3 Manufactured Treatment Device Maintenance 6-6
6.4 Non-Routine and Emergency Operations 6-7
6.4.1 Customer Service Requests 6-7
6.4.2 Emergency Response Program 6-7
6.4.3 Source Control Inspection Program 6-8
6.5 Data Collection and Record-Keeping 6-8
6.6 M&O Staffing Requirements 6-10
6.6.1 Existing Staffing Requirements 6-10
6.6.2 Future Staffing Requirements and Equipment Needs 6-13
6.7 Potential Improvement Opportunities and Capital Needs 6-16

7. Capital Improvements 7-1
7.1 Project Prioritization 7-3
7.2 Proposed Capital Improvement Projects 7-3
7.3 Programmatic Drainage Projects 7-6

8. Implementation Plan 8-1
8.1 6-Year and 20-Year Capital Improvement Program 8-1
8.2 Programmatic Measures for NPDES Compliance 8-5
8.3 Future Staffing and Equipment Needs 8-7
8.3.1 Engineering Services 8-7
8.3.2 Maintenance and Operation Services 8-7
8.4 Continue Implementation of Best Practices for Asset Management 8-7
8.5 Recommendations for Additional Activities 8-8
8.5.1 Climate Change 8-8
8.5.2 Ditch Maintenance Program 8-9
8.5.3 Ongoing System Updates and Capital Facilities Plan Projects 8-9
8.6 Implementation Plan 8-10

9. Financial Plan 9-1
9.1 Introduction 9-1
9.2 Past Financial Performance 9-1

Contents (continued)

9.2.1 Comparative Financial Statements 9-1
9.3 Financial Plan 9-5
9.4 Available Funding Assistance and Financing Resources 9-8
9.4.1 City Resources 9-8
9.4.2 Outside Resources 9-8
9.4.3 Capital Financing Strategy 9-9
9.5 Financial Forecast 9-10
9.5.1 Current Financial Structure 9-11
9.5.2 Financial Forecast 9-12
9.6 Current and Projected Rates 9-15
9.6.1 Current Rates 9-15
9.6.2 Projected Rates 9-16
9.6.3 Affordability 9-16
9.7 Conclusion 9-17

10. Limitations 10-1

11. References 11-1

FIGURES

Figure 2-1. Public Works Department Staff Organizational Chart 2-1
Figure 4-1. Natural Drainage Features of the City of Auburn 4-2
Figure 4-2. Drainage Subareas for the City of Auburn Storm Drainage Utility 4-5
Figure 4-3. Surface Geology in the Vicinity of the City of Auburn 4-7
Figure 4-4. Land Use Designations for the City of Auburn 4-10
Figure 4-5. Projected Change in Average Precipitation for Seattle, Washington. 4-13
Figure 4-6. Projected Changes in 1-Hour Precipitation Statistics for the 2080s vs. 1970–1999 4-14
Figure 4-7. Drainage Infrastructure for the City of Auburn Storm Drainage Utility 4-17
Figure 4-8. City and Storm Drainage Critical Facilities for the City of Auburn 4-19
Figure 4-9. Drainage Problem Locations for the Storm Drainage Utility 4-23
Figure 5-1. Pipe Installation Date Relative to Total Linear Feet of Pipe 5-4
Figure 5-2. Pipe Material Relative to Total Linear Feet of Pipe 5-5

Contents (continued)

Figure 5-3. Key Areas for Vulnerability Assessment 5-12
Figure 6-1. City Drainage Ditch Inventory 6-14
Figure 7-1. Capital Improvement Project Locations 7-2
Figure 8-1. Annual Costs for 6-Year Capital Improvement Plan 8-3
Figure 8-2. NPDES Compliance Schedule 8-6
Figure 8-3. Implementation Plan Activities Timeline 8-11

TABLES

Table 2-1. 2024 and 2025 Utility Rates for Storm Drainage Service 2-3
Table 2-2. Federal, State, and City Regulations, Guidance, and Programs Relevant to the Auburn Storm Drainage Utility 2-4
Table 4-1. Federal Emergency Management Agency Flood Insurance Rate Maps Applicable to Auburn 4-11
Table 4-2. Precipitation Frequency Data for Auburn, Washington, from NOAA Atlas 2 4-12
Table 4-3. Stormwater Drainage Infrastructure Summary 4-16
Table 4-4. Critical City Facilities 4-18
Table 4-5. Critical Stormwater Facilities 4-18
Table 4-6. Existing Drainage Problems 4-21
Table 5-1. Recommended Actions Regarding New Permit Requirements 5-9
Table 6-1. Storm Drainage Utility M&O Personnel 6-2
Table 6-2. Existing Storm Drainage System Maintenance and Staffing Requirements 6-10
Table 6-3. Existing Vegetation Maintenance and Staffing Requirements 6-12
Table 6-4. Future Storm Drainage System Maintenance and Staffing Requirements 6-16
Table 7-1. Summary Programmatic Drainage Projects 7-7
Table 8-1. Annual Cost Summary for 6-Year Capital Improvement Plan 8-2
Table 8-2. Capital Improvement Cost Summary for 2031–2044 8-4
Table 8-3. Ongoing System Updates 8-9
Table 8-4. Capital Facilities Plan Project Schedule 2024–2026 8-10
Table 9-1. Summary of Historical Fund Resources and Uses Arising from Cash Transactions 9-2
Table 9-2. Summary of Historical Comparative Statements of Net Position 9-4

Contents (continued)

Table 9-3. 10-Year and 20-Year Capital Improvement Plans 9-6

Table 9-4. 10-Year Capital Improvement Plan (Escalated $)..... 9-7

Table 9-5. 10-Year and 20-Year Capital Financing Strategy..... 9-10

Table 9-7. Ending Cash Balance Summary..... 9-15

Table 9-8. Existing Schedule of Rates..... 9-15

Table 9-9. Proposed Storm Drainage Rates..... 9-16

Table 9-10. Community Affordability Test..... 9-16

APPENDICES

A Western Washington Phase II NPDES MS4 Permit

B Hydrologic and Hydraulic Modeling Analysis

C Asset Management Evaluation

D Noted Changes to the NPDES MS4 Permit

E Ditch Maintenance and Operations Program - Development and Recommended Actions

F SEPA Compliance Documentation

Acronyms and Abbreviations

ACC	Auburn City Code
BMP	best management practice
CCTV	closed-circuit television
CDR	critical drainage review
CEMP	City Emergency Management Plan
CFP	capital facilities plan
CIP	capital improvement project
CMMS	computerized maintenance management system
COA Supplement	City of Auburn Supplement
CWA	Clean Water Act
DEM	digital elevation model
Ecology	Washington State Department of Ecology
Engineering	City of Auburn Department of Engineering Services
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESU	equivalent service unit
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FTE	full-time equivalent
GASB	Governmental Accounting Standards Board
GIS	geographic information system
GMA	Growth Management Act
G.O.	general obligation
H&H	hydrologic and hydraulic

Acronyms and Abbreviations (continued)

HPA	Hydraulic Project Approval
IDDE	illicit discharge detection and elimination
KCFCD	King County Flood Control District
KCSWDM	King County Surface Water Design Manual
LID	low impact development
LOMR	Letters of Map Revision
LOS	level of service
MEP	maximum extent practicable
M&O	maintenance and operations
MS4	municipal separate storm sewer system
NASSCO	National Association of Sewer Service Companies
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NSF	non-single family
OCI	Overall condition index
OCR	overall condition rating
PACP	Pipeline Assessment and Certification Program
PCB	polychlorinated biphenyl
PFAS	per- and polyfluoroalkyl substance
Plan	Comprehensive Storm Drainage Plan
RCP	Representation Concentration Pathway
RCW	Revised Code of Washington
ROW	right-of-way
R&R	repair and replacement

Acronyms and Abbreviations (continued)

RSI	required supplementary information
SCIP	Source Control Inspection Program
SEPA	State Environmental Policy Act
SDC	system development charge
SFHA	Special Flood Hazard Areas
SMAP	Stormwater Management Action Plan
SR	State Route
SRP	soluble reactive phosphorus
SWMP	Stormwater Management Program
SWMMWW	Surface Water Management Manual for Western Washington
TAPE	Technology Assessment Protocol – Ecology
TMDL	total maximum daily load
UIC	underground injection control
ULID	utility local improvement district
USACE	U.S. Army Corps of Engineers
VRFA	Valley Regional Fire Authority
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation

1. Introduction

This Comprehensive Storm Drainage Plan (Plan) for the City of Auburn, Washington, updates the previous plan that was completed in December 2015. The 2015 Plan is being updated for several reasons:

- The Washington State Growth Management Act (GMA) requires planning documents to be reassessed and updated periodically.
- Current and future regulatory and permitting requirements, such as those associated with the National Pollutant Discharge Elimination System (NPDES), need to be addressed. Since adoption of the 2015 Plan, the NPDES permit was updated and reissued in 2019 and will be updated again in August 2024.
- New compliance elements, such as the Stormwater Management Action Plan (SMAP) and the Source Control Inspection Program (SCIP) require new activities and regulatory responsibilities.
- Continued growth and system expansion via development, in addition to the 2024 annexed development area from the City of Kent, requires new and revised evaluations of the storm drainage system maintenance responsibilities and expanded service area.
- The storm drainage system inventory has been updated and is needed to manage utility assets and to update the analyses used for condition assessments and replacement planning.
- The capital improvements identified in the 2015 Plan needed reevaluation to account for completed projects, new compliance elements, changes in system conditions, new problem areas identified, and new development, as well as to incorporate new financial information.

In addition, expectations and changes to the stormwater program mission are evolving, which may include increasing coordination with land use and watershed planning, identifying proactive actions to update and retrofit the system, improving the maintenance programs and record-keeping, providing area-wide or basin stormwater control systems, and considering long-term retrofitting.

This Plan contains time frames that are the intended framework for future funding decisions and within which future actions and decisions are intended to occur. However, these time frames are estimates and, depending on factors involved in the processing of applications and project work and the availability of funding, the timing may change from the included time frames. The framework does not represent actual commitments by the City of Auburn, which may depend on funding resources available.

1.1 Purpose and Objectives

The purpose of this Plan is to guide the City's Storm Drainage Utility with respect to future activities and improvements. The Plan's objectives are to:

- Evaluate environmental, social, and regulatory drivers to update the system goals for capital facility infrastructure development, operation, maintenance, and other key elements of utility management.
- Perform hydraulic modeling analysis to evaluate system capacity, focusing on known problems and areas where data are available for model development and calibration. Incorporate those updates into the hydraulic models used for analyzing the system.
- Develop capital improvements that meet system needs and effectively manage risks.

- Document maintenance and operations (M&O) activities and develop recommendations for improving the M&O program.
- Review and document the condition of existing stormwater system assets and develop a prioritization system for inspecting critical system elements.
- List and describe Capital Improvement Projects (CIPs) to prioritize 6- and 20-year funding frameworks.
- Provide future-looking suggestions based on potential changing climate factors.
- Incorporate information and activities from current and anticipated NPDES compliance planning.
- Identify additional staffing needed based on NPDES requirements and future maintenance and operation activities.
- Coordinate the capital and operations plans to meet the anticipated revenue stream.
- Develop programmatic recommendations to address utility needs.

1.2 Approach and Document Organization

This Plan is organized to focus on the actions the utility will take to implement the Plan. In most cases, supporting documentation and background information is included in appendices rather than chapters of the Plan. The Plan is organized into the following chapters:

Chapter 1 Introduction: Describes the reasons for developing an updated Plan and states the purpose and objectives of the Plan.

Chapter 2 Background: Provides background information regarding the Storm Drainage Utility and regulatory drivers for developing system goals.

Chapter 3 System Goals and Policies: Specifies the system goals used to develop capital improvements and future M&O activities.

Chapter 4 Drainage System: Describes the existing conditions of the City's drainage system.

Chapter 5 Evolution of the Storm Drainage Utility: Describes methodologies used to evaluate existing problems and develop CIPs.

Chapter 6 Maintenance and Operations: Documents existing Storm Drainage Utility M&O activities.

Chapter 7 Capital Improvements: Describes recommended capital improvement projects, including cost estimates and conceptual figures.

Chapter 8 Implementation Plan: Prioritizes CIPs and lays out a future work plan.

Chapter 9 Finance: Identifies the total cost of providing stormwater drainage services and provides a program for the utility to remain viable during execution of the CIP.

Chapter 10 Limitations: Sets the limits of legal applications of this document.

Chapter 11 References: Lists documents referenced throughout the Plan.

2. Background

This chapter provides a brief description of the Storm Drainage Utility, organizational structure, and funding mechanisms, as well as an overview of the federal, state, and local regulations that can affect stormwater management in the City.

2.1 Storm Drainage Utility

2.1.1 Organizational Structure

The City's Storm Drainage Utility is organized under the larger umbrella of the Public Works Department (see Figure 2-1). The Public Works Department covers several areas of responsibility related to stormwater management:

- Utility Program.
- Transportation Program.
- M&O Program.
- Project Engineering.
- GIS (Asset Management).

Under these programs, the Public Works Department is responsible for the planning, design, construction, operations, and maintenance of the City's storm drainage. Management and construction of storm drainage CIPs is provided by Engineering Services, while maintenance of storm drainage facilities is provided by dedicated stormwater and vegetation divisions within M&O.

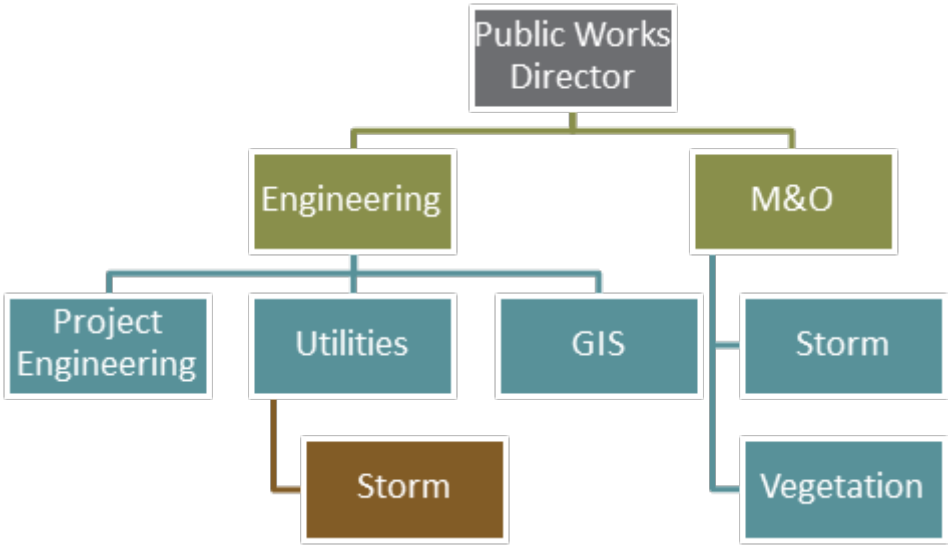


Figure 2-1. Public Works Department Staff Organizational Chart

2.1.2 Funding Mechanisms

The following section provides adapted text from Auburn City Code (ACC) Title 13: Water, Sewers and Public Utilities, Chapter 13.48, Storm Drainage Utility, §13.48.060, Authority to establish rates. Per the ACC, the City has established rate classifications, service charges, and various fees and charges to pay for the following costs:

- The development, adoption, and implementation of a Comprehensive Storm Drainage Plan.
- The debt service and related financing expenses of the design and construction of storm drainage and water quality facilities required for the management of stormwater and surface waters that benefit the service area.
- The operation, repair, maintenance, improvement, replacement, and reconstruction of storm drainage facilities that benefit the present service area (e.g., CIPs to increase system capacity in accordance with level of service [LOS] goals).
- The purchase of a fee or lesser interest, including easements, in land that may be necessary for the storm drainage system in the service area, including, but not limited to, land necessary for the installation and construction of storm drainage facilities and all other facilities that are reasonably required for proper and adequate management of stormwater for the benefit of the service area.
- The costs of monitoring, inspection, enforcement, and administration of the utility, including, but not limited to, water quality surveillance, private system maintenance inspection, construction inspection, and other activities that are reasonably required for the proper and adequate implementation of the City's stormwater and surface water policies and regulations.
- Preparing and implementing requirements for the City's municipal separated storm sewer system (MS4) permit.

2.1.2.1 Rates

The currently established rates for the storm drainage service are provided in Table 2-1 below, which lists rates for 2024 and 2025. Base rates are the monthly charge for service from the Storm Drainage Utility to recover costs incurred by the utility, such as administrative, billing, and collection. Equivalent service units (ESU) are used as a means for estimating the development or impervious surfaces[1] estimated to contribute an amount of runoff to the City's storm drainage system, which is approximately equal to that which is created by the average single-family residential parcel. Open, uncovered, retention/detention facilities shall not be considered as impervious surfaces for the purpose of ESU calculations. One ESU is equal to 2,600 square feet of impervious surface area or any portion thereof. Table 2-1 provides the current monthly charges, base rates, and ESU monthly rates for classifications used by the utility.

[1] An impervious surface is a hard surface area that prevents the entry of water into the soil mantle (see ACC Chapter 13.41). Common impervious surfaces include, but are not limited to rooftops, walkways, patios, concrete, or asphalt paving.

Table 2-1. 2024 and 2025 Utility Rates for Storm Drainage Service

	Effective as of January 1, 2024	Effective as of January 1, 2025
Single-family parcel types	Monthly charge, $	Monthly charge, $
Single-family residential parcels [a]	18.09	19.31
Two-family residential parcels [b]	19.25	19.31
Non-single-family (NSF) parcels	ESU rate per month, $	ESU rate per month, $
NSF [c]	18.09	19.31
NSF with detention [d]	15.57	16.62
NSF with retention [e]	13.04	13.92
NSF with water quality treatment [f]	16.64	17.76
NSF with detention and water quality treatment	4.12	15.07
NSF with retention and water quality treatment	11.59	12.37

[a.] Any parcel of land having on it a single detached dwelling unit that is designed for occupancy by one family or a similar group of people.
[b.] A building designed exclusively for occupancy by two families living independently of each other and containing two dwelling units.
[c.] Any parcel of developed land other than single-family or two-family (duplex) residential.
[d.] Detention is the temporary storage of stormwater and surface water runoff, with provisions for the controlled offsite surface release of the stored water.
[e.] Retention means the storage of stormwater and surface water runoff, with no provisions for off-site surface release of the stored water other than by evaporation and infiltration.
[f.] Water quality treatment means an engineered and approved facility to remove contaminants in the existing flow regime of stormwater generated from a developed parcel pursuant to applicable design standards in place at the time of approval.

Storm Drainage Utility rates are billed monthly. Storm drainage charges start from the day a water meter servicing the property is installed by the City. In cases where the property does not receive water service from the City, storm drainage charges start from the day that the storm drainage permit is finalized by the City. Payments received for utility bills are applied to expenses in the following order of priority: late charges, additional fees, stormwater, garbage, sewer, and water. Payment for stormwater drainage service charges is due and payable to the Finance Department office 15 days after the billing date that appears on the bill. Utility charges are constituted as a lien and thus can be applied to a lien upon the property from which such charges are due, superior to all other liens and encumbrances whatsoever, except for general taxes and local special assessments.

2.1.2.2 Connection Fees

Connection fees are comprised of a connection permit fee and a system development charge (SDC). Connection permit fees are applied to cover the planning, review, inspection, record drawings, and processing of permit information for new connections to the public storm drainage system. Other permit fees are assessed for inspection and permit processing for various repair, retrofit, and demolition activities.

A utility SDC is a charge imposed on new customers, or existing customers revising use of their property, in recognition of the previous investment of the City and its customers in the utility systems. The purpose of an SDC is to recover a fair share of the costs of providing existing utility system infrastructure to serve new customers or revised uses of existing customers and provide for future improvements to serve new customers. As with Storm Drainage Utility rates, SDCs are based on the relative amount of impervious surface added to the system. In 2024, SDCs were estimated to be $1,759 per ESU.

2.2 Development Code and Design Standards Updates

In compliance with the previous NPDES MS4 permit, the City has conducted updates to its development regulations and design standards and adopted a stormwater manual as required by the permit. Specifically, the City adopted the Washington State Department of Ecology (Ecology) 2019 Surface Water Management Manual for Western Washington (SWMMWW), with a City of Auburn Supplement (COA Supplement). The COA Supplement has received minor updates as needed—generally annually—to include new technologies and regulations. Ecology has recently adopted an update to the 2024 SWMMWW. The City has formally updated the standards to the revised manual as a condition of the NPDES MS4 permit.

In August 2024, Ecology issued an updated NPDES MS4 permit to comply with requirements of the federal Clean Water Act (CWA) when the current permit expires. The new permit would be effective through July 31, 2029.

Development regulations related to stormwater and drainage design standards will also be reviewed for potential revision consistent with current policies and LOS goals.

See the following section for an overview of the City's Stormwater Management Program (SWMP) and Chapter 8 for specific steps needed to maintain compliance with updated NPDES MS4 permit requirements.

2.3 Regulatory and Policy Considerations

Numerous federal, state, and local regulations govern stormwater management in the City. Other plans and programs provide additional guidance. Applicable regulations and policy guidance are summarized in Table 2-2.

Table 2-2. Federal, State, and City Regulations, Guidance, and Programs Relevant to the Auburn Storm Drainage Utility

Title	Regulation, Guidance, or Program	Application to the City
Federal		
Clean Water Act (CWA): §402 NPDES	Regulation	The National Pollutant Discharge Elimination System (NPDES) permit includes several requirements that affect stormwater management in the City. See Section 2.3.2 below.
CWA: §303(d) Impaired Waters and Total Maximum Daily Load (TMDL) Program	Regulation	In addition to existing TMDLs, new TMDLs could lead to more stringent stormwater quality controls in future NPDES permits.
CWA: §404 Permit Program	Regulation	Some stormwater Capital Improvement Projects (CIPs) can affect wetlands or other "waters of the U.S." §404 permitting and mitigation can increase CIP costs and schedules.
Endangered Species Act (ESA)	Regulation	Stormwater CIPs that involve federal permitting or funding could require consultation with federal agencies under §7 of the ESA. ESA consultation could increase project timelines and costs.

Table 2-2. Federal, State, and City Regulations, Guidance, and Programs Relevant to the Auburn Storm Drainage Utility (continued)

Title	Regulation, Guidance, or Program	Application to the City
National Flood Insurance Program	Program	The Plan could affect the City's rating under the Community Rating System, which affects flood insurance rates.
Governmental Accounting Standards Board (GASB) Statement 34	Program	Requires accurate inventory of City's stormwater infrastructure. See Section 2.3.3 below.
State		
State Environmental Policy Act (SEPA) (Washington Administrative Code [WAC] 197-11)	Regulation	Each CIP would require SEPA review prior to implementation unless that project is categorically exempt.
Water quality standards (WAC 173-201A)	Regulation	The NPDES MS4 permit does not authorize discharges that would violate State water quality standards. The State may establish TMDLs for water bodies that violate the standards. As noted above, the TMDLs can become NPDES permit requirements.
§401 water quality certification	Regulation	Individual projects that require §404 or other federal permits would also require a §401 certification from Ecology. A §401 certification could include site-specific mitigation measures, which could affect CIP design and cost estimates.
Puget Sound Water Quality Management Plan	Guidance	Plan recommendations should be consistent with the Puget Sound Water Quality Management Plan.
Puget Sound Partnership	Guidance	In 2007, the Washington State Legislature created a State agency for the purpose of developing and overseeing the implementation of a 2014/2015 "Action Agenda" to clean up, restore, and protect Puget Sound by 2020. The partnership's "Action Agenda" identified three priorities, one of which is to prevent pollution from urban stormwater runoff.
Growth Management Act (GMA) and City Comprehensive Plan	Regulation	This Plan is required by the GMA. GMA is discussed in Section 2.3.1 below.
State Hydraulic Code (Revised Code of Washington 77.55, WAC 220-660)	Regulation	CIPs that involve work in waters of the State would require a Hydraulic Project Approval (HPA) permit. HPA permitting and mitigation measures could affect CIP costs.
Archaeological and cultural coordination	Regulation	If any CIPs are planned for areas with known or suspected archaeological sites, the City will need to coordinate with the Department of Archaeology and Historic Preservation, local Indian tribes, and King County Historic Preservation.

Table 2-2. Federal, State, and City Regulations, Guidance, and Programs Relevant to the Auburn Storm Drainage Utility (continued)

Title	Regulation, Guidance, or Program	Application to the City
City		
Environmental review (Auburn City Code [ACC] Title 16.06)	Regulation	Each CIP would be subject to environmental review prior to permitting and construction as prescribed in ACC 16.06. This chapter of the ACC was adopted under the authority of SEPA.
Critical areas ordinance (ACC Title 16.10)	Regulation	The Plan should avoid CIPs in critical areas (e.g., wetlands, groundwater protection zones, or wildlife habitat). If a CIP must be sited in a critical area, the cost estimate should include costs for mitigation and permitting as prescribed in ACC 16.10.
Development regulations (ACC Title 18)	Regulation	The City's development regulations must be consistent with NPDES MS4 permit requirements.
Shoreline Master Program (ACC Title 16.08)	Regulation	Future projects should be located and designed to be consistent with the City shoreline regulations (ACC 16.08). Projects within designated shorelines could require permits and mitigation, which could affect project costs and schedules.

Most of the regulations listed in Table 2-2 primarily affect the implementation of specific measures recommended in the Plan. For example, CIPs that could affect wetlands would need to comply with City critical areas regulations and possibly federal CWA Section 404 regulations. However, three of the regulations listed in Table 2-2—the GMA, Ecology's Phase II NPDES Stormwater permit, and federal Governmental Accounting Standards Board (GASB) Statement 34—directly affect the LOS for this Plan.

These regulations are discussed in greater detail in Sections 2.3.1 through 2.3.3 below.

2.3.1 Growth Management Act

The Washington State Legislature enacted the GMA in 1990 in response to rapid population growth and concerns with suburban sprawl, environmental protection, quality of life, and related issues. The GMA is codified primarily in Revised Code of Washington (RCW) Chapter 36.70A.

The GMA provides a framework for regional coordination, and counties planning under the GMA are required to adopt countywide planning policies to guide plan adoption within the county and to establish urban growth areas. Local comprehensive plans must include the following elements: land use, housing, capital facilities, utilities, transportation, economic development, parks and recreation, and, for counties, a rural element. This Plan serves as a component of the utilities element for City-owned storm drainage assets.

2.3.2 Phase II Municipal Stormwater Permit

The NPDES MS4 permit program is a requirement of the federal CWA, which is intended to protect and restore waters for "fishable, swimmable" uses. The federal Environmental Protection Agency (EPA) has delegated permit authority to state environmental agencies, and these agencies can set

permit conditions in accordance with and in addition to the minimum federal requirements. In Washington, Ecology is the NPDES-delegated permit authority.

Phase I of the stormwater NPDES regulation applies to cities and counties that operate MS4s and had populations of 100,000 people or more according to the 1990 census. Phase II of the stormwater NPDES regulation applies to municipalities that operate MS4s and have populations of fewer than 100,000 people according to the 1990 census. Auburn is a Phase II permittee.

Ecology issued the current Western Washington Phase II Municipal Stormwater permit (the NPDES MS4 permit) in July 2024, with an effective date of August 2024. The NPDES MS4 permit term will last until July 2029.

The NPDES MS4 permit requires the City to submit a SWMP Plan by March 31 of each year, in which the City identifies activities to be completed in compliance with the permit requirements. The permit also requires submittal of an annual report that looks back on SWMP activities for the prior year. The NPDES MS4 permit and associated requirements are described in detail in the City's current SWMP Plan, which is available on the City's website.

The NPDES MS4 permit allows municipalities to discharge stormwater runoff from their municipal drainage systems into the state's water bodies (e.g., streams, rivers, lakes, and wetlands) as long as municipalities implement programs to protect water quality by reducing the discharge of "nonpoint source" pollutants to the "maximum extent practicable" (MEP) through application of permit-specified "best management practices" (BMPs). The stormwater management activities specified in the NPDES MS4 permit are collectively referred to as the SWMP and grouped under the following program components:

- SWMP administration.
- Public education and outreach.
- Public involvement and participation.
- Illicit discharge detection and elimination (IDDE).
- Control of runoff from new development, redevelopment, and construction sites.
- Municipal operations and maintenance.
- Monitoring and assessment.

The NPDES MS4 permit also requires compliance with established total maximum daily loads (TMDLs).[2] The current NPDES MS4 permit requires the City to monitor discharges to the White River, in association with the Puyallup River watershed fecal coliform TMDL. Additional actions required by the City to ensure compliance with TMDLs are listed in Appendix 2 of the NPDES MS4 permit (Appendix A of this Plan). Ecology has identified several other water bodies in the vicinity of Auburn that do not appear to meet the water quality standards, and additional TMDL requirements are possible in future permits.

[2] A total maximum daily load (TMDL) is a calculated maximum pollutant loading a water body can receive while still meeting water quality standards. Once a TMDL is established, the State determines how much each source must reduce its discharges of the pollutant in order to bring the water body back into compliance with the water quality standards. The federal CWA requires that TMDLs be established for all water bodies that do not meet water quality standards, and that TMDL requirements be included in the NPDES permits for dischargers into the affected water bodies.

2.3.3 Governmental Accounting Standards Board

Financial reporting by public utilities must adhere to requirements set by the GASB, the agency responsible for developing standards of state and local governmental accounting and financial reporting. Most prominent is GASB Statement 34, "Basic Financial Statements—and Management's Discussion and Analysis—for State and Local Governments," which was issued in June 1999. The main objective of Statement 34's requirements is to have financial reports that are more comprehensive and are easier to understand by the public. Statement 34 consists of several components, which can be seen in full in paragraphs 3 to 166 of the GASB publications. In summary, Statement 34 requires that the basic financial statements and required supplementary information (RSI) for general purpose governments should consist of the following:

- Management's discussion and analysis. In sum, this requirement states that prior to the basic financial statements, a discussion providing an analytical overview of the government's financial activities is necessary.
- Basic financial statements, which should include:
  - → Government-wide financial statements that include information on net assets (e.g., storm drainage infrastructure) and a statement of activities.
  - → Fund financial statements that focus on information about the government's major governmental and enterprise funds (e.g., the City's Storm Drainage Utility), including its blended component units.
  - → Notes to the financial statements that will enable users to understand the basic financial statements.
- Required supplementary information. Budgetary comparison schedules should be presented as RSI along with other types of data, as required by previous GASB pronouncements.

Consequently, the City needs an accurate inventory of its stormwater infrastructure in order to comply with the GASB 34 requirements.

3. System Goals and Policies

This chapter describes a set of overarching goals for the City's Storm Drainage Utility and policies for complying with these goals.

3.1 City Comprehensive Plan Consistency

The City Comprehensive Plan is the City's growth management plan and contains policies for protecting critical areas and natural resource lands, designating urban growth areas, preparing comprehensive utility plans, and implementing them through capital investments and development regulations. Therefore, the City Comprehensive Plan provides a framework of policies for development, expansion, and maintenance of the Storm Drainage Utility reflected in this Storm Drainage Comprehensive Plan.

3.2 Storm Drainage Comprehensive Plan Policy Goals

The City's Storm Drainage Utility policies are grouped within goal statements that are headlined under the following categories:

- System Planning.
- Operations and Maintenance.
- Fiscal Responsibility.
- Environment and Regional Coordination.

Taken together with the City Comprehensive Plan and ACC these goals define how the Storm Drainage Utility shall be operated and maintained. Several policies have been developed within each goal, many of which are also based on the Washington Department of Ecology SWMMWW and the City's Phase II NPDES MS4 permit.

3.2.1 System Planning

Goal 1: Employ recognized best business practices resulting in creating a sustainable, efficient, and cost-effective operation of the Storm Drainage Utility.

POLICY 1.1 Incorporate the Comprehensive Storm Drainage Plan as an Element of the City's Comprehensive Plan.

POLICY 1.2 The City shall seek to manage stormwater runoff within the public Right Of Way (ROW):

- to provide access to and functionality of critical services.
- to preserve mobility on major transportation routes (i.e., arterial roads) and residential roads.
- to protect real property structures (e.g., residences and businesses).

POLICY 1.3 The City shall seek to provide pump redundancy and backup power generators or dual power feeds at City-owned and -operated drainage pump stations.

POLICY 1.4 The City shall routinely assess the performance of pumped systems with a focus on capacity and vulnerability. This review aims to ensure that these systems operate efficiently, meet their intended capacity, and remain resilient against potential risks.

POLICY 1.5 The City shall require the separation of sanitary and storm sewer facilities wherever combined sewers may be discovered.

POLICY 1.6 Establish, maintain, and update an asset database to be used in prioritizing asset maintenance and repair and replacement activities. The database will include asset age and material information and will be validated and updated through inspections, records review, and other available information.

POLICY 1.7 Review complaints/citizen reports and claims made against the City and create a list of operational and capital improvements to be implemented by the Plan.

POLICY 1.8 The City shall use the outcomes of future rainfall intensity data updates for informing the design of its stormwater systems. Specifically, the same design storms—such as the 25-year event for pipe capacity and the 100-year event for storage facilities—shall be employed using projected rainfall statistics. The City shall draw upon relevant studies, including those mentioned in the King County Surface Water Design Manual (KCSWDM) or other ongoing regional research once the results become available (King County DNR 2021).

3.2.2 Operations and Maintenance

Goal 2: Maintain existing infrastructure and ensure facilities are reliable and operational now and into the future.

POLICY 2.1 The City shall maintain or seek access to all City-owned facilities for necessary maintenance and operation. [ACC 13.48.440B]

POLICY 2.2 The City's Storm Drainage Utility shall be responsible for implementation, maintenance, and operation of the City's public storm drainage system. Storm systems serving City-owned properties managed by other departments and/or divisions of the City that are not part of the public storm drainage serving the public ROW (e.g., Parks, Arts & Recreation; Administration – Facilities; Public Works – Airport) shall be responsible for their own maintenance and upkeep.

POLICY 2.3 Drainage facilities constructed to serve private property shall be owned and maintained by the property owner. Drainage facilities constructed to serve public ROW shall be owned and maintained by the City.

POLICY 2.4 The City shall seek to maintain storm drainage infrastructure to ensure proper function of drainage facilities by performing scheduled maintenance in accordance with the NPDES permit. [ACC 13.48.180]

POLICY 2.5 The City shall seek to seasonally maintain storm drain inlets, conveyance, and outfalls to preserve design conveyance capacity.

POLICY 2.6 Employee safety will be a primary consideration in the design, construction, operation, and maintenance of storm drainage infrastructure.

POLICY 2.7 Investigate all customer service calls within 24 hours and record results in the computerized maintenance management system (CMMS.)

3.2.3 Fiscal Responsibility

Goal 3: Responsibly manage funds, employ best business practices, and operate the utility in a cost-effective manner.

POLICY 3.1 Appropriate rates and system development charges shall be assessed and periodically updated to fund the ongoing maintenance, operation, and capital expenditures of the utility. [ACC 13.48.060]

POLICY 3.2 Manage the Storm Drainage Utility funds and resources in a professional manner in compliance with applicable laws, regulations, and City financial policies, which requires ongoing monitoring of revenues and expenses in order to make prudent business decisions, and report to City officials, as needed, regarding the status of utility operations.

POLICY 3.3 The City shall require that developers evaluate off-site storm drainage systems, consider improvements needed to serve new development, and construct identified improvements prior to or simultaneously with such development.

POLICY 3.4 The City shall continue to prioritize asset management as a business practice and use it to plan for preventative maintenance, predict system depreciation and replacement costs, prioritize inspections for condition status to inform system risk, and prepare to minimize the occurrence and impact of system failures.

POLICY 3.5 The City will monitor capital project implementation by tracking schedule, budget accuracy, and overall efficiency.

POLICY 3.6 Consider replacing or upgrading storm facilities to current standards in the ROW whenever a street is to be substantially reconstructed or other significant utility work is to be completed, especially when storm improvements are specifically identified in the Plan. In addition, consider street and other utility improvement needs when replacing or upgrading storm facilities.

POLICY 3.7 Pursue opportunities to secure grants and other revenue partnerships to fund storm drainage program needs.

POLICY 3.8 The utility will not accept nonstandard, powered, or private facilities for ownership, operation, or maintenance by the utility.

3.2.4 Environment and Regional Coordination

Goal 4: Work to protect the natural environment within the City and contribute to the preservation of natural resources throughout the region.

POLICY 4.1 The Storm Drainage Utility shall work with other jurisdictions and agencies to address regional water quality issues.

POLICY 4.2 The City shall comply with all federal, state, and local regulations pertaining to stormwater management, facility maintenance, and pollution control.

POLICY 4.3 The City shall promote policies that preserve existing native vegetation and natural drainage courses while maintaining their conveyance capacity.

POLICY 4.4 Environmental issues, such as water quality and fish habitat protection, shall be considered in all new development applications and new storm drainage improvements. This policy includes consideration of new and emerging concerns, such as the chemical 6PPD-quinone in street runoff and the effects of climate change on stream temperatures.

POLICY 4.5 The City shall seek to minimize impacts to natural river systems by encouraging pretreatment of surface flows from new development and reintroduction into groundwater, where feasible.

POLICY 4.6 The City shall seek opportunities, where feasible, to reintroduce treated urban runoff back into the groundwater system as new development and redevelopment occurs in order to minimize urbanization impacts to the hydrology of natural river systems.

POLICY 4.7 The City shall evaluate the feasibility of improving the water quality of its existing discharges into river systems.

POLICY 4.8 The City shall seek to comply with all federal, state, and local regulations to reduce runoff volumes and pollutant loads associated with new development and redevelopment.

POLICY 4.9 The City shall seek to prevent erosion and landslides related to construction, operation, and maintenance of the publicly owned drainage system.

4. Drainage System

Chapter 4 develops a future work plan to collect and organize information describing the current conditions of the storm drainage system, which provides the basis for investigations (Chapter 5) designed to evaluate the Storm Drainage Utility performance relative to the system goals. This chapter provides an overview of the City's drainage system, including both natural (Section 4.1) and constructed (Section 4.2) drainage elements. It also summarizes key factors related to the storm drainage system, namely critical facilities (Section 4.3) and water quality (Section 4.4), and existing issues facing the Storm Drainage Utility (Section 4.5).

Figures presented in this chapter consist of several maps of the Storm Drainage Utility service, drainage and surrounding areas.

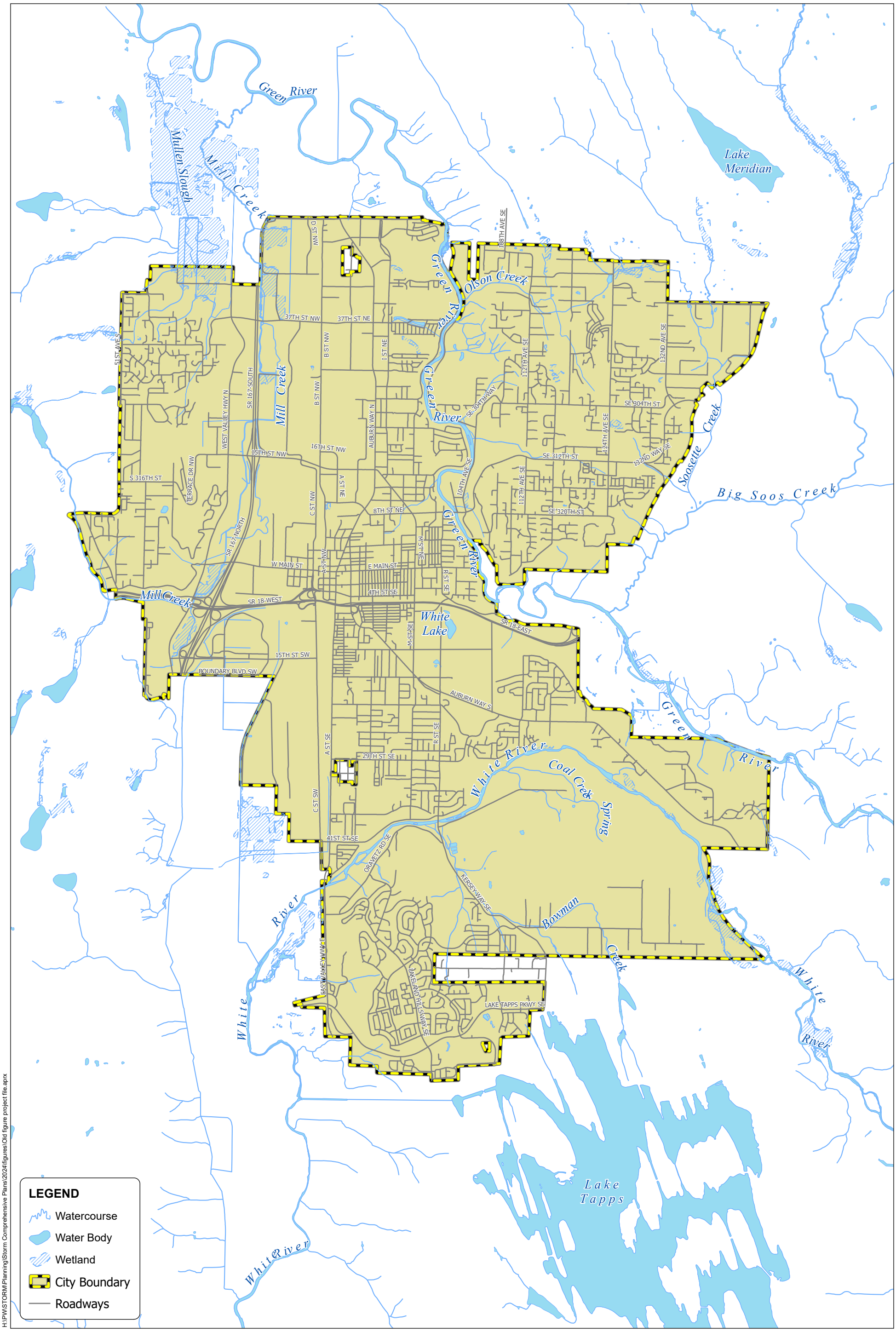
4.1 Natural Drainage

The City of Auburn encompasses approximately 30 square miles; the central portion of the City lies along the bottom of a valley, while the outer edges of the City extend into the surrounding hills (see Figure 4-1). In general, stormwater runoff from the City flows to one of three major receiving waters: the Green River, the White River, and Mill Creek. Other notable water features in the Auburn area include the following:

- Big Soos Creek, which drains southeast into the Green River.
- Soosette Creek (also known as Little Soos Creek), which drains south into Big Soos Creek.
- Mullen Slough, which drains along the northwest side of Mill Creek toward the Green River.
- Bowman Creek, which drains north into the White River.
- Olson Creek, which drains west into the Green River.
- Lake Tapps, which is located just south of the City.
- White Lake, which is located southeast of R Street SE and State Route (SR) 18.
- Coal Creek Springs, which drains north to the White River.

The City contains nearly 30 miles of rivers and streams and more than 1,000 acres of floodplain area associated with these water features. There are over 1,500 acres of wetlands, including forested/shrub and freshwater emergent wetlands.

The following section provides additional information on each of the three major receiving waters.


Green River
Mullen Slough
Mill Creek
Lake Meridian
Olson Creek
Green River
Mill Creek
Soosette Creek
Big Soos Creek
White Lake
Coal Creek Spring
White River
Bowman Creek
Lake Tapps
37TH ST NW
37TH ST NE
51ST AVE S
SR 167-SOUTH
WEST VALLEY HWY N
B ST NW
I ST NE
D ST NW
108TH AVE SE
112TH AVE SE
132ND AVE SE
SE 304TH ST
SE 304TH WAY
15TH ST NW
16TH ST NW
AUBURN WAY N
S 316TH ST
TERRACE DR NW
SR 167-NORTH
C ST NW
A ST NE
8TH ST NE
104TH AVE SE
SE 312TH ST
124TH AVE SE
132ND WAY SE
SE 320TH ST
W MAIN ST
A ST NW
E MAIN ST
M ST NE
R ST SE
4TH ST SE
SR 18-WEST
SR 18-EAST
15TH ST SW
BOUNDARY BLVD SW
AUBURN WAY S
A ST SE
29TH ST SE
C ST SW
41ST ST SE
ORAVETZ RD SE
KERSEY WAY SE
EAST VALLEY HWY E
LAKELAND HILLS WAY SE
LAKE TAPPS PKWY SE
White River
Green River
LEGEND
Watercourse
Water Body
Wetland
City Boundary
Roadways
H:\PW\STORM\Planning\Storm Comprehensive Plans\2024\figures\Old figure project file.aprx
COMPREHENSIVE STORM DRAINAGE PLAN
May 2024
0
4,000
8,000
Feet
1:50,734
N
CITY OF AUBURN WASHINGTON
Figure 4-1
Natural Drainage Features
of the City of Auburn

4.1.1 Receiving Waters

4.1.1.1 Green River

The Green River flows over 93 miles, beginning on the west slope of the Cascade mountains and ending in the Duwamish Waterway, meandering through the northeast portion of Auburn along the east valley wall. Throughout the last century, the Green River was altered for the purpose of flood control, including the construction of levees and bank revetments and the diversion of the White River in the early 1900s. In 1962, the Howard A. Hanson Dam was built on the Green River to control flooding in the valley.

From 1960 to 2007, the City of Auburn participated in Green River flood management activities as part of the Green River Flood Control District. In 2007, the Green River Flood Control District was phased out because flood control and management efforts for the Green River are now included in the King County Flood Control District (KCFCD), which was established in 2007. These efforts are reflected in the 2006 King County Flood Hazard Management Plan. The KCFCD goals and objectives include maintaining and repairing levees and revetments and acquiring at-risk floodplain properties. Auburn elected officials and staff serve on advisory committees for the KCFCD.

4.1.1.2 White River

The White River originates on the slopes of Mount Rainier and flows generally northward and westward into the Puget Sound lowlands. Near Auburn, the White River flows north and then west through the southern portions of the City before it curves southward toward the Puyallup River. The White River is a very dynamic, sediment-laden river, which has led to changing channel morphology.

Prior to 1900, the White River flowed into the Green-Duwamish River; however, floodwaters from the White River drained to both the Green-Duwamish River and the Puyallup River. A flood in 1906 caused the White River to shift and flow into the old Stuck River channel, which leads to the Puyallup River. In 1907, a diversion wall was constructed in Game Farm Park to permanently direct the White River flow into the Puyallup River (USACE 2009a).

The shifting of floodwaters from the White River caused inter-jurisdictional conflicts between King and Pierce Counties. After attempts by the two counties to control flooding along the White River met with limited success, the U.S. Army Corps of Engineers (USACE) was engaged for help. In 1948, the USACE finished construction of the Mud Mountain Dam to control floods on the White River.

At the time Mud Mountain Dam was finished, White River channel capacity in Auburn was estimated to be 20,000 cubic feet per second. Since then, vegetation encroachment and sediment accumulation have reduced channel capacity (USACE 2009a). Reduced channel capacity causes higher river levels during large storm events, which can impact the City's gravity drainage outfalls along the White River.

4.1.1.3 Mill Creek

Mill Creek flows out of the hills on the west side of the valley near SR 18 and then turns northward along the western portion of the City, running adjacent to SR 167. It crosses under SR 167 several times as it flows through the valley floor. Approximately 1 mile north of the City boundary, Mill Creek discharges into the Green River.

Historically, Mill Creek served as vital habitat for migrating salmon and provided ideal conditions for rearing and storm refuge. However, increasing development has altered the natural flow pattern of Mill Creek, including the installation of diversions and culverts, channel straightening, degradation of water quality, and aggradation from increased stormwater inflows with high sediment loads. In many

areas the stream is straight and shallow and exhibits a lack of quality riparian habitat for Endangered Species Act (ESA)-listed species such as Chinook salmon and bull trout (USACE 2009b). Aggradation along Mill Creek has also contributed to flooding and drainage problems in the City. The City's drainage outfalls to Mill Creek can become submerged, thereby reducing the hydraulic capacity of the system.

4.1.2 Drainage Areas

The City's drainage can be described by dividing the City into six general subareas and their discharge location (Figure 4-2):

- Lea Hill lies northeast of the Green River. Most of the Lea Hill area drains west into the Green River. However, the eastern edge drains south and east out of the City into Soosette Creek and Big Soos Creek.
- West Hill lies west of Mill Creek. The West Hill area drains into several small tributaries to Mill Creek. The northern portion of West Hill drains to the northeast into steep ravines that discharge to Mullen Slough and other wetland areas on the valley floor.
- The southern portion of the City drains to the White River. The area west of Bowman Creek consists largely of single family residential developments, which drain to the White River to the west and north and Bowman Creek to the east, with a small portion draining south toward Lake Tapps. The area east of Bowman Creek consists of rural residential development. This area drains to Bowman Creek on the southwest and the White River on the northeast side.
- The southeast portion of the City lies along a narrow plateau between the Green and White Rivers. Runoff from this area drains to the Green River along the north side and the White River along the south side.
- The north central portion of the City lies along the valley floor and is located north of 27th Street SE. This is part of the central and most developed area of the City. The topography in this area is so flat that roadways and storm drainage infrastructure largely determine the receiving water to which runoff is diverted. Runoff from this area is generally split between Mill Creek and the Green River.
- The south central portion of the City also lies along the valley floor and is located south of 27th Street SE. This area is also part of the most developed area of the City. The topography in this area is so flat that roadways and storm drainage infrastructure largely determine the receiving water to which runoff is directed. This area features extensive infiltration into groundwater, but otherwise drains toward the White River.

The above-described areas can be divided into smaller drainage subbasins. The City maintains a mapping of the storm drainage basins and subbasins, with a total of 59 drainage subbasins. Each subbasin is identified by a series of one, two, or three letters (Figure 4-2).

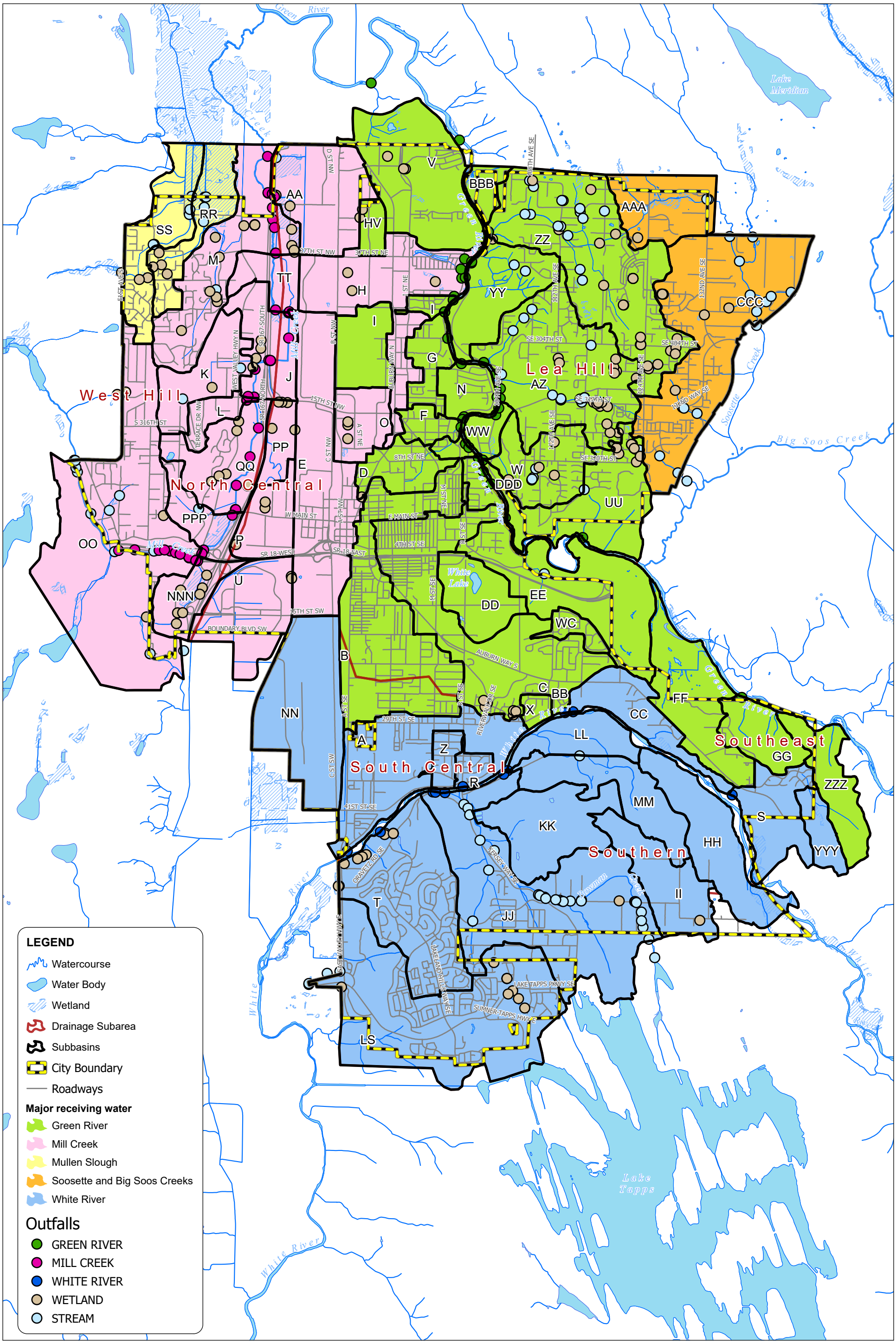


Figure 4-2
Drainage Subareas for the City of Auburn Storm Drainage Utility

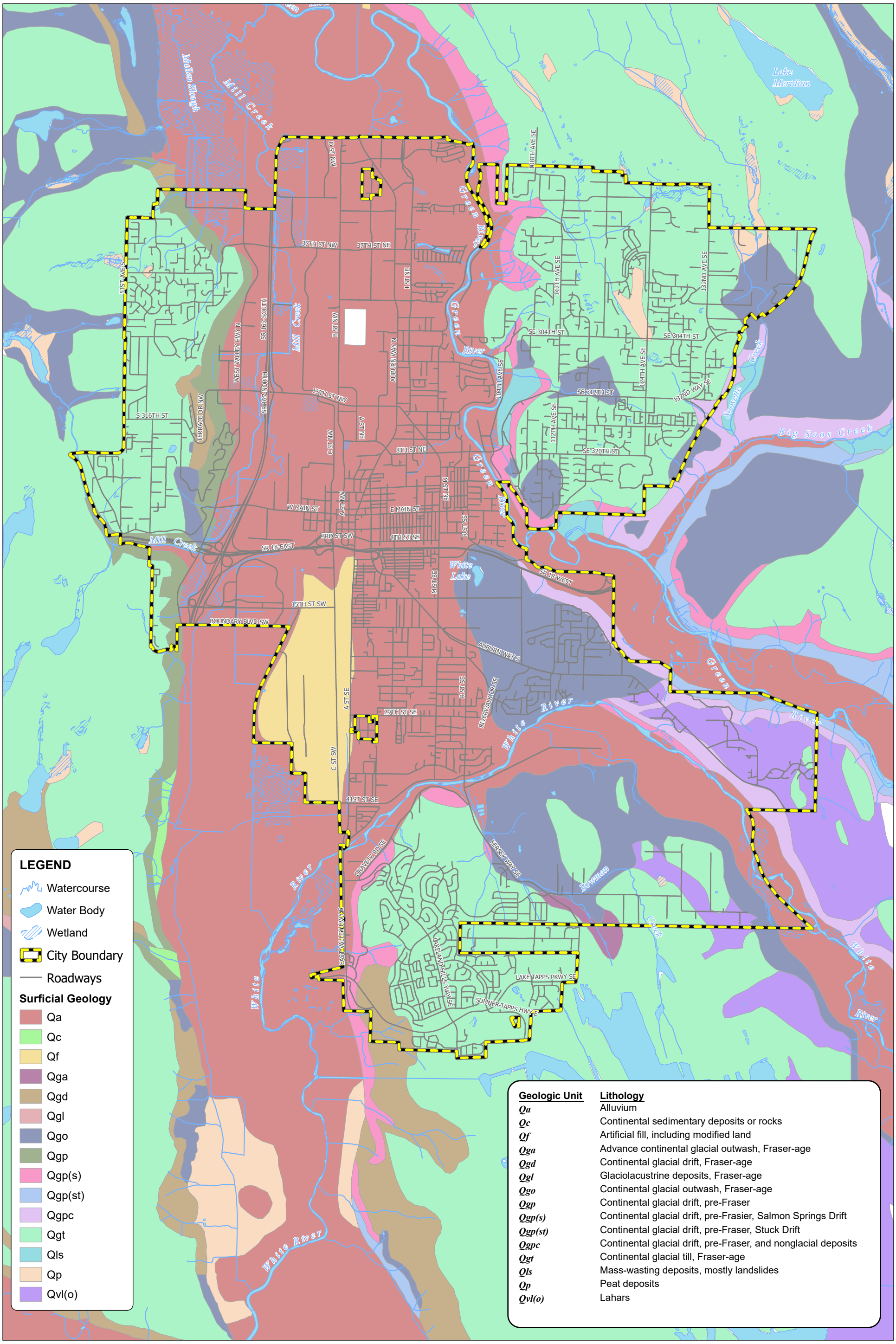
4.1.3 Geology and Groundwater

Topography and geology in the Auburn region has been influenced largely by millions of years of advancing and retreating glaciers, most recently with the Vashon glaciation occurring approximately 12,000 to 18,000 years ago (Booth 1991). Following the retreat of the glacier, interglacial processes, such as landslides, mudflows, erosion, and alluvial deposition, have continued to shape the region. In general, the upland hills around the City's periphery comprise glacial and interglacial deposits, while the valley is filled with more recent deposits overlying glacial and older interglacial deposits.

Major geologic units of the White and Green River valley include undifferentiated glacial and interglacial deposits, Vashon recessional deltaic deposits, undifferentiated alluvium, Osceola mudflow, and White River alluvium. The undifferentiated glacial and interglacial deposits form the lowest layer in the valley consist of materials deposited during the glacial periods. As the glacier retreated, meltwater flowed into a water-filled embayment then occupying the present White and Green River valley area. This meltwater deposited sand and gravel known as the Vashon recessional deltaic deposits. After the end of the glacial period, the Green River deposited undifferentiated alluvium in the valley because of erosion of upland glacial deposits. Approximately 5,700 years ago, a massive volcanic mudflow from Mount Rainier, known as the Osceola mudflow, flowed down into the valley (Troost and Booth 2008). White River alluvium is the geologic unit nearest the surface and consists of alluvial deposits from the White and Green Rivers.

Bedrock is found approximately 1,280 feet beneath the valley floor. Surficial geologic mapping of the Auburn region is shown in Figure 4-3.

In general, groundwater flow systems in the Auburn area are characterized by upland recharge flowing toward the valley. The two major aquifers in the White and Green River valley are the modern alluvium aquifer and a deep deltaic valley aquifer; the latter is used for Auburn's water supply. The modern alluvium aquifer is the shallowest aquifer in the Auburn-Kent Valley, often lying 10 to 15 feet below the ground surface. Groundwater in the deep deltaic valley generally flows in a pattern parallel to the direction of the Green River in the north and the White River in the south.



LEGEND

- Watercourse
- Water Body
- Wetland
- City Boundary
- Roadways

Surficial Geology

- Qa
- Qc
- Qf
- Qga
- Qgd
- Qgl
- Qgo
- Qgp
- Qgp(s)
- Qgp(st)
- Qgpc
- Qgt
- Qls
- Qp
- Qvl(o)

Geologic Unit	Lithology
Qa	Alluvium
Qc	Continental sedimentary deposits or rocks
Qf	Artificial fill, including modified land
Qga	Advance continental glacial outwash, Fraser-age
Qgd	Continental glacial drift, Fraser-age
Qgl	Glaciolacustrine deposits, Fraser-age
Qgo	Continental glacial outwash, Fraser-age
Qgp	Continental glacial drift, pre-Fraser
Qgp(s)	Continental glacial drift, pre-Frasier, Salmon Springs Drift
Qgp(st)	Continental glacial drift, pre-Fraser, Stuck Drift
Qgpc	Continental glacial drift, pre-Fraser, and nonglacial deposits
Qgt	Continental glacial till, Fraser-age
Qls	Mass-wasting deposits, mostly landslides
Qp	Peat deposits
Qvl(o)	Lahars

H:\PW\STORM\Planning\Storm Comprehensive Plans\2024\figures\Old figure project file.aprx

COMPREHENSIVE STORM DRAINAGE PLAN
May 2024

0 4,000 8,000 Feet
1:48,000

N

CITY OF AUBURN WASHINGTON

Figure 4-3
Surface Geology in the Vicinity of the City of Auburn

4.1.4 Soils and Runoff Potential

Surface soils are classified by the Natural Resources Conservation Service (NRCS) into four hydrologic soil groups based on the soil's runoff potential: A, B, C, and D. Group A soils generally have the lowest runoff potential while Group D soils have the highest. Hydrologic soil groups are defined by NRCS (1986) as follows:

- Group A is sand, loamy sand, or sandy loam types of soils. It has low runoff potential and high infiltration rates, even when thoroughly wetted. It consists chiefly of deep, well- to excessively drained sands or gravels and has a high rate of water transmission.
- Group B is silt loam or loam. It has a moderate infiltration rate when thoroughly wetted and consists chiefly of moderately deep to deep, moderately well- to well-drained soils with moderately fine to moderately coarse textures.
- Group C is sandy clay loam. It has low infiltration rates when thoroughly wetted and consists chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine structure.
- Group D is clay loam, silty clay loam, sandy clay, silty clay, or clay. It has very low infiltration rates when thoroughly wetted and consists chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material.

Areas in the valley floor is mostly Group D soils, which typically have very low infiltration rates and high runoff potential. The West Hill, Lea Hill, and Lakeland Hills areas are predominantly Group C soils, which have low infiltration rates and moderate to high runoff potential. The Southeast area, Bowman Creek area, and valley area located generally between SR 18 and the White River have Group A soils, which are characterized by high infiltration rates and low runoff potential. See the NRCS maps (http://www.nrcs.usda.gov/) for mapped soils within the City.

4.1.5 Land Use and Development

Land use and the intensity of development have considerable effects on the quality and quantity of stormwater runoff flowing into the drainage system and ultimately discharging to receiving waters. As the population of the City increases, new areas of the City are developed or existing areas are redeveloped at a higher density. These changes can result in increased stormwater runoff and greater water quality impacts to water bodies. However, development regulations and drainage design standards imposed by the City are intended to mitigate these impacts. The following sections describe expected growth and how development regulations and design standards are being updated to reduce impacts to stormwater runoff.

4.1.5.1 Recent Growth

Auburn's population has steadily increased since the 1950s. Auburn's population increased by an average of 8% per year from 1960 to 1980, then slowed to approximately 1.7% per year from 1980 to 1994. Auburn's population growth rate began to increase in 1998 and continued as the City annexed new areas, known locally as the Lea Hill, West Hill, and Lakeland Hills areas. The larger Lea Hill area annexations began in 2000 and continued to 2024. The West Hill area was annexed in 2007, while the Lakeland Hills area annexations occurred between 1998 and 2005. As of 2010, the population of Auburn increased to 70,180 and increased to 86,340 by 2020. The Washington State Office of Financial Management indicates that Auburn's population in 2023 was approximately 88,820 (approximately 78,760 in King County and 10,060 in Pierce County).

4.1.5.2 Future Growth

The City's goals, objectives, and policies for growth and development are described in detail in the 2025 Comprehensive Plan. These goals, objectives, and policies are applied to different areas of the City through land use designations (see Figure 4-4). The City also has developed special land use plans for certain areas of the City where specific land use goals have been identified. An important example is the City's downtown area; one of the goals described in the Comprehensive Plan is to encourage development and redevelopment in the downtown area to serve as an urban center for the community.

4.1.5.3 Development Regulations and Drainage Design Standards

The City implements state and federal stormwater regulations through the stormwater code, the COA Supplement, and related stormwater management programs and policies. City stormwater regulations contain specific requirements for managing stormwater quality and quantity in areas subject to new development and redevelopment. For example, the SWMMWW provides guidance for implementing low impact development (LID) measures that are designed both to improve water quality and to control peak flows and durations of runoff. The City reviews and updates its local development regulations and design standards as necessary to meet the NPDES MS4 permit requirements. The COA Supplement was last updated in 2022.

City stormwater regulations and development standards are intended to avoid substantial increases in stormwater discharges to the existing drainage system through the implementation of on-site stormwater controls. This would keep stormwater conveyance demands at or near existing levels.

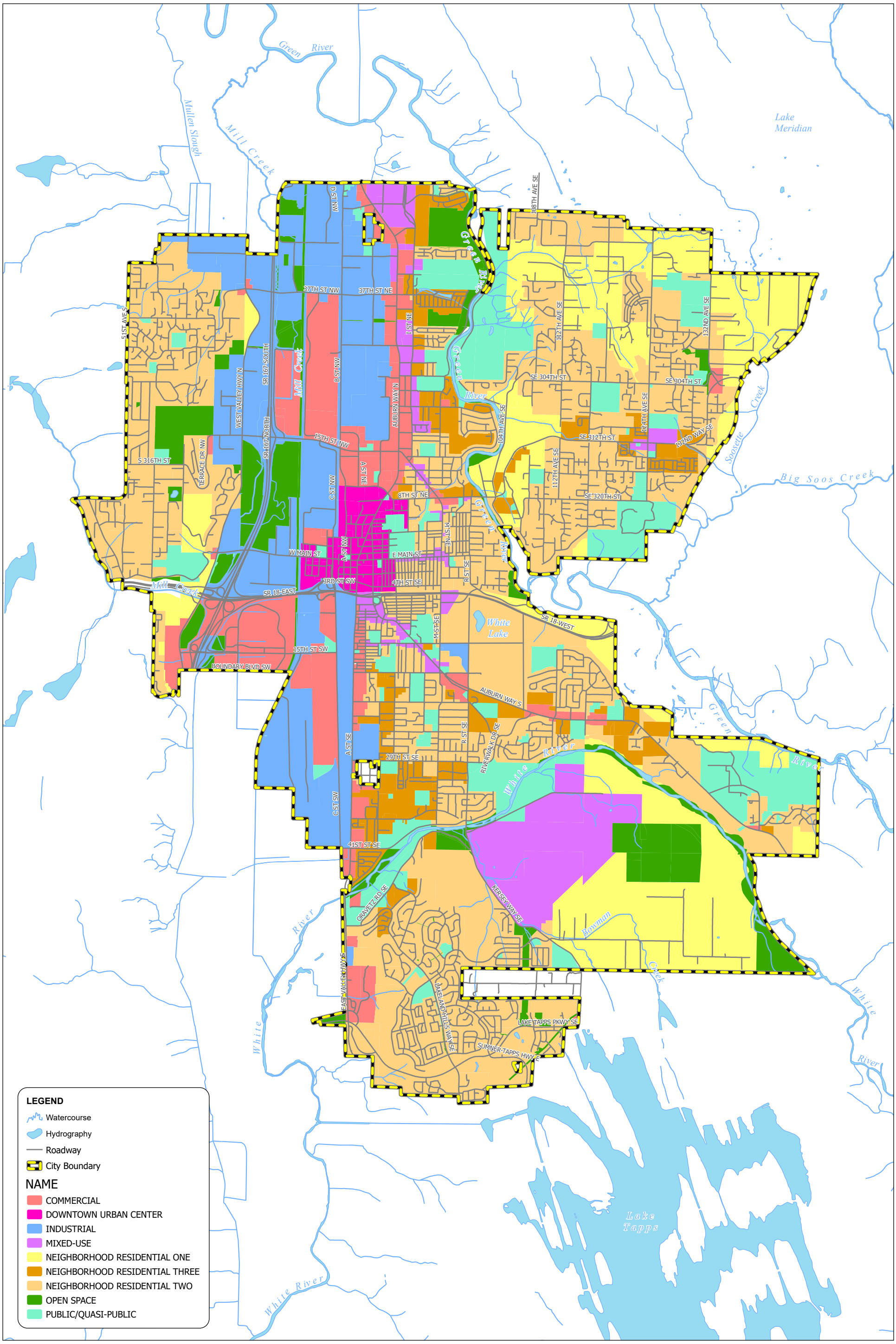


Figure 4-4
Land Use Designations for the City of Auburn

4.1.6 Flood Hazard Mapping

The City of Auburn is a participant in the National Flood Insurance Program (NFIP) administered through the Federal Emergency Management Agency (FEMA) to enable property owners to purchase insurance protection from the government against losses from flooding. Participation in the NFIP is based on an agreement between the City and the federal government, stating that if the City adopts and enforces a floodplain management ordinance to reduce future flood risks to new construction in areas designated as Special Flood Hazard Areas (SFHA), the federal government will make flood insurance available within the community as a financial protection against flood losses. The SFHAs and other risk premium zones applicable to each participating community are depicted on Flood Insurance Rate Maps (FIRMs).

FEMA established flood hazard zones from a Flood Insurance Study (FIS) for King County conducted in 2013, which examined flooding along several major rivers. Although the primary purpose of the FIS was to establish flood insurance rates, the flood mapping resulting from these studies is also used for floodplain management and flood hazard mitigation planning. Updates to the flood hazard zones are continually being made at local levels (King County and Pierce County) and represented in Preliminary FIRMs or Letters of Map Revision (LOMR). Preliminary FIRMs for all of King County were reissued on August 19, 2020. The most recent flood hazard mapping for Pierce County is presented in its Rivers Flood Hazard Management Plan adopted in 2023 and also in LOMR files located on the FEMA Map Service Center Web page (Pierce County 2023). Table 4-1 lists the FIRMs developed for areas within the City of Auburn.

Table 4-1. Federal Emergency Management Agency Flood Insurance Rate Maps Applicable to Auburn

53033CIND1B	53033CIND2B	53033C1232G	53033C1235G
53033C1242G	53033C1251G	53033C1252G	53033C1253G
53033C1254G	53033C1257G	53033C1259G	53033C1261G
53033C1262G	53033C1263G	53033C1264G	53033C1266G
53033C1267G	53033C1268G	53033C1269G	53033C1476F
53033C1477F			

4.1.7 Recent Climate and Precipitation Trends

Auburn's climate is typical of that in the Puget Sound lowlands of Western Washington, where the summers are cool and comparatively dry, while the winters are mild, wet, and cloudy (WRCC 2014). Mean annual precipitation in the Puget Sound lowlands varies from 32 inches (north Seattle) to approximately 47 inches (near Centralia, Washington).

The precipitation gauge at Auburn City Hall has been recording data since 1995. The mean annual precipitation recorded at that gauge (with missing data filled in from the nearby King County Lakeland Hills gauge) from 2015 to 2022 was approximately 39 inches. This is very similar to the mean annual precipitation recorded at the two nearest long-term gauges:

- Seattle-Tacoma Airport, which is part of the National Oceanic and Atmospheric Administration (NOAA) Cooperative Network (Station 457473), has a mean annual precipitation of approximately 38 inches based on 74 years of recorded data (WRCC 2014b). The Seattle-Tacoma Airport gauge is located approximately 8 miles northwest of Auburn.
- Kent, Washington (NOAA Co-op Station 454169) has a mean annual precipitation of approximately 39 inches based on 57 years of recorded data (WRCC 2014c). The Kent gauge is located approximately 7 miles north of Auburn.

Precipitation-frequency data for Washington are compiled in Volume 9 of NOAA Atlas 2 (Miller et al. 1973); precipitation-frequency estimates for Auburn, Washington, are listed in Table 4-2.

Table 4-2. Precipitation Frequency Data for Auburn, Washington, from NOAA Atlas 2

Frequency, duration	Precipitation (inches)
2-year, 6-hour	0.95
2-year, 24-hour	1.75
100-year, 6-hour	1.90
100-year, 24-hour	3.80

4.1.8 Anticipated Changes in Climate

Changing climate will continue to be a key factor in the performance, operation, maintenance, and design of the City's stormwater system. According to the publication, *Climate Change Impacts and Adaptation in Washington State*, the state is projected to experience decreases in snowpack, increases in stream temperatures, changes in stream base flow, increased frequency of high rainfall intensity and magnitude, and changes in peak stormwater runoff, streamflow, and flooding frequency (Snover et al. 2013). This section provides an assessment and strategy for the City to address future changes and effects to the storm sewer and flood management systems while considering the range of uncertain climate projections.

The available information on future climate conditions will help guide decisions and investments, avert impending impacts on stormwater programs from climate change, and enhance the effectiveness and resilience of stormwater systems in the face of environmental uncertainties. Assessing future climate impact magnitude, risk, and uncertainty are critical to making appropriate decisions about physical attributes (size, location, elevation, capacity) and performance (service levels, acceptable impacts, failure scenarios) for stormwater programs.

The following future climate conditions are potentially impactful to the City's stormwater programs:

- **Precipitation:** Projected changes in precipitation show evidence for increased frequency of intense, large, or persistent rains in the future, mostly in the winter storm season. These increases could exceed the existing level of performance in the City's stormwater system.
- **System performance and flooding:** Increased frequency of larger or more intense storms could lead to increased stormwater runoff and thus more frequent flooding of existing storm drainage systems in the City. Pumped or other operated systems are typically more vulnerable to changing storms.
- **River and stream flooding:** Increased frequency of larger and longer duration storms could lead to increased local stream and river flooding, increased stages over known or mapped floodplains, and different flood control operations on the White and Green River dams.
- **Groundwater:** More frequent storms of higher magnitude have the potential for increased infiltration and thus rising groundwater table. This should be a consideration in infiltration facility design, subsurface excavations, and installation of stormwater structures such as vaults.
- **High temperature:** Average and extreme high temperatures in Auburn are expected to be higher in the future, causing effects like higher summer surface water temperatures that can be harmful to aquatic life and fisheries.

4.1.8.1 Uncertainty and Risk Management

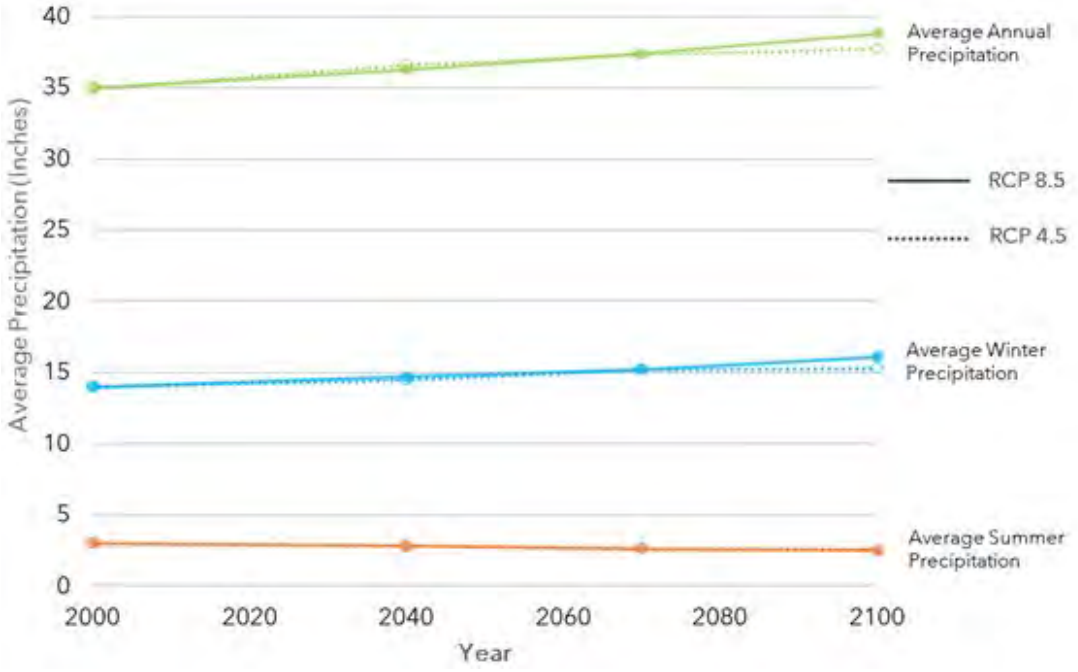
Addressing uncertainty in climate projections is an important aspect of climate research. Since future outcomes in climate conditions heavily rely on human activities and the Earth's climate system is extraordinarily complex, global climate models have an amount of uncertainty. All future climactic conditions are projections, not predictions. Ongoing research aims to reduce uncertainties by improving climate models, refining data collection methods, and enhancing our understanding of the Earth's climate system and its interactions with human activities.

When possible, this section uses locally refined, dynamic data to inform potential future climate scenarios. Because uncertainty is inherent in projections of climate change, the likelihood of a range of possibilities are presented.

Stormwater management is a risk-based practice, which means that standards are typically based on the likelihood or probability that an event will occur, and the level of protection needed is related to that possibility. Consequently, the approaches to applying recommendations in part consider the coincident events (e.g., sea level rise ranges plus event probability) with expected performance. No "reasonable" or applicable stormwater standards can apply to all possible events or outcomes, and extremes can exceed system capacity. An important consideration that is a core practice when establishing storm system criteria is to consider the consequences of failure, because all systems (unless designed for the probable maximum flood) can fail in any year.

4.1.8.2 Precipitation Projections

According to climate models, the region's average precipitation is expected to undergo minimal changes (Hegewisch et al. 2023). Figure 4-5 illustrates the projected alterations in average precipitation for two climate scenarios: Representation Concentration Pathway (RCP) 4.5 (low end) and RCP 8.5 (high end). When examining individual seasons, we observe a slight increase in total precipitation during the winter, an almost negligible loss of precipitation in the summer, a slight increase in precipitation in the fall, and a slight decrease in precipitation in the spring.



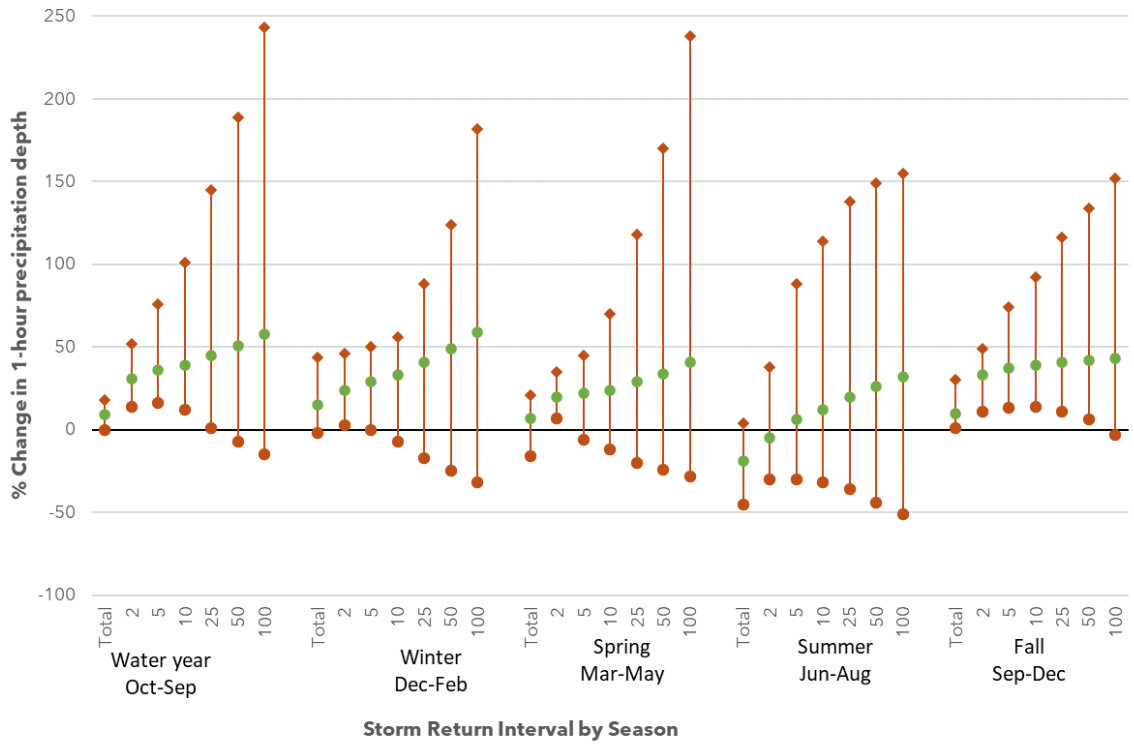
Modified from Hegewisch et al. 2023.

Figure 4-5. Projected Change in Average Precipitation for Seattle, Washington.

Although the City is not predicted to see a significant increase in overall precipitation, climate models predict an increase in the intensity of precipitation, specifically during the winter months. Heavy rain events in the Pacific Northwest are often caused by atmospheric rivers, where long, narrow regions of concentrated moisture are carried from lower latitudes (Morgan et al. 2021). Intensification of atmospheric rivers is projected to cause an increase in extreme winter precipitation frequency.

Figure 4-6 outlines the anticipated percentage change in extreme heavy rain events in SeaTac, Washington. The figure shows predicted changes in short duration storms (1 hour) across different return frequencies (ranging from 2 to 100 years) during the entire water year, as well as individual seasons (winter, spring, summer, and fall) for the 2080s (spanning from 2070 to 2099) relative to 1970 to 1999. Key details are summarized below:

- **Projection scope:** The total projection includes all precipitation occurring in a season or water year.
- **Return frequencies:** The 2- to 100-year return frequency projections represent the high- and low-end extremes, estimated based on only the largest value in each year.
- **Measurement:** All 2080 projections are expressed as the percent change in 1-hour precipitation depth relative to the climate normal period from 1970 to 1999, following the convention established by NOAA.
- **Climate scenarios:** The results are based on two greenhouse gas scenarios: RCP 8.5 (high end) and RCP 4.5 (low end).
- **Data presentation:** The data is organized by water year, season, total annual precipitation, and extremity.



*Green circles indicate model average, red diamonds represent the high model results,red circles represent the low model

Modified from Mauger et al. 2019

Figure 4-6. Projected Changes in 1-Hour Precipitation Statistics for the 2080s vs. 1970–1999

4.1.8.3 Implications

The increase in precipitation intensity will have several key implications or risks to the stormwater system. More frequent and intense winter storms are likely to exceed the capacity of the stormwater system more often than current conditions.

Impact

Stormwater structures are sized to meet system LOS objectives, considering the anticipated frequency of storm events. Historical rainfall data are collected and characterized by intensity (e.g., inches of rain per minute or hour) or magnitude over a certain time period (e.g., X-inches in 24 hours). The design storms are usually described in the likelihood of exceeding a certain depth. For instance, a 4% chance of occurrence may also be described by the "average" frequency of occurrence for that duration, such as a 25-year, 24-hour event (for a 4% exceedance event).

Future rainfall patterns are predicted to deviate from historic norms. Note that storms are not "increasing in size" (larger storms are possible any time without climate change), but rather the *frequency* of larger events is greater. For example, if a 3-inch, 24-hour storm has occurred every 25 years in the recent past, climate change can cause a 3-inch storm to occur more frequently in the future. The new 25-year, 24-hour storm could be 3.5 inches of rain or more at the same potential frequency. Storm intensity (the rate of rainfall depth per unit of time) follows the same pattern—the same extreme rates are more frequent.

For example, when a storm system is designed to convey water away from a roadway for a 25-year, 24-hour event, we assume that the system may fail, on average, once every 25 years. We accept this failure level because the impact may be modest and the cost of providing additional protection is high. However, with more frequent events of the same size, flooding could happen every 10 to 15 years, which may not be tolerable for safety, system disruption, or property damage. Consequently, returning to the same LOS would require a new drainage system to provide the same frequency of performance. However, floods could still occur that exceed that LOS. If a higher LOS is desired, careful consideration of a new, future design storm becomes necessary.

4.2 Stormwater Drainage Infrastructure

As part of the implementation of the City's NPDES MS4 permit, the City embarked on a substantial effort to update its inventory of drainage system infrastructure owned or operated by the Storm Drainage Utility. The citywide inventory is completed, but continued maintenance and new features will be ongoing. An up-to-date system inventory will assist the City in the following objectives:

- Help to meet regulatory requirements.
- Provide input for hydraulic models to analyze system conveyance capacity.
- Serve as a basis for an asset criticality database used to prioritize repair and replacement (R&R) activities.
- Support the City's M&O activities through the CMMS.

Table 4-3 provides a summary of stormwater infrastructure inventory.

Table 4-3. Stormwater Drainage Infrastructure Summary

Infrastructure element	Quantity [a]	Unit
Pipes, all sizes	1,310,937	Linear feet
Pipes, all sizes (excluding force mains)	15,259	Count
6–10 in. diameter	3,361	Count
	215,900	Linear feet
12–15 in. diameter	8,822	Count
	698,000	Linear feet
16–18 in. diameter	1,480	Count
	165,600	Linear feet
21–24 in. diameter	858	Count
	106,500	Linear feet
27–36 in. diameter	548	Count
	85,200	Linear feet
42–48 in. diameter	173	Count
	37,200	Linear feet
54–72 in. diameter	17	Count
	2,300	Linear feet
Force mains	35	Count
	4,400	Linear feet
Open channels	222,000 [b]	Linear feet
Culverts	1,164	Count
Manholes	3,172	Count
Catch basins	10,800	Count
Control structures	223	Count
Outfalls (to water courses, ditches, etc.)	124	Count
Detention ponds	156	Count
Infiltration ponds	14	Count
Vaults	8	Count
Pump stations	7	Count

[a.] Quantities are based on current inventory and have not yet been finalized.

[b.] Length has been approximated based on available data.

Most storm drainage infrastructure is in the City's core between Mill Creek and the Green River, where development densities are highest. Figure 4-7 shows an overview of the City's stormwater drainage infrastructure.

Emerald Park PS
Brannan Park PS
West Main PS
A Street PS
Auburn Way South PS
White River PS
M Street PS

LEGEND

- Pump Station
- Infiltration Pond or Swale
- Detention Pond
- Stormwater Vault or Tank
- Storm Pipe
- Open Channel (Ditch)
- Roadway
- Watercourse
- Water Body
- Wetland
- City Boundary

H:\PW\STORM\Planning\Storm Comprehensive Plans\2024\figures\Old figure project file.aprx

COMPREHENSIVE STORM DRAINAGE PLAN
May 2024

0 4,000 8,000 Feet
1:48,000

N

CITY OF AUBURN WASHINGTON

Figure 4-7
Drainage Infrastructure for the City of Auburn Storm Drainage Utility

4.3 Critical Facilities

Policies and system goals for managing the City's critical facilities and critical stormwater assets are described in Chapter 3, Section 3.2. Two groups of system goals and policies in particular focus on criticality. The first applies to critical facilities, stating that the City will manage stormwater runoff within the public ROW in the vicinity of critical facilities to allow access and ensure function of these facilities at all times (Policy 1.2). Ten critical facilities have been identified and included in Table 4-4.

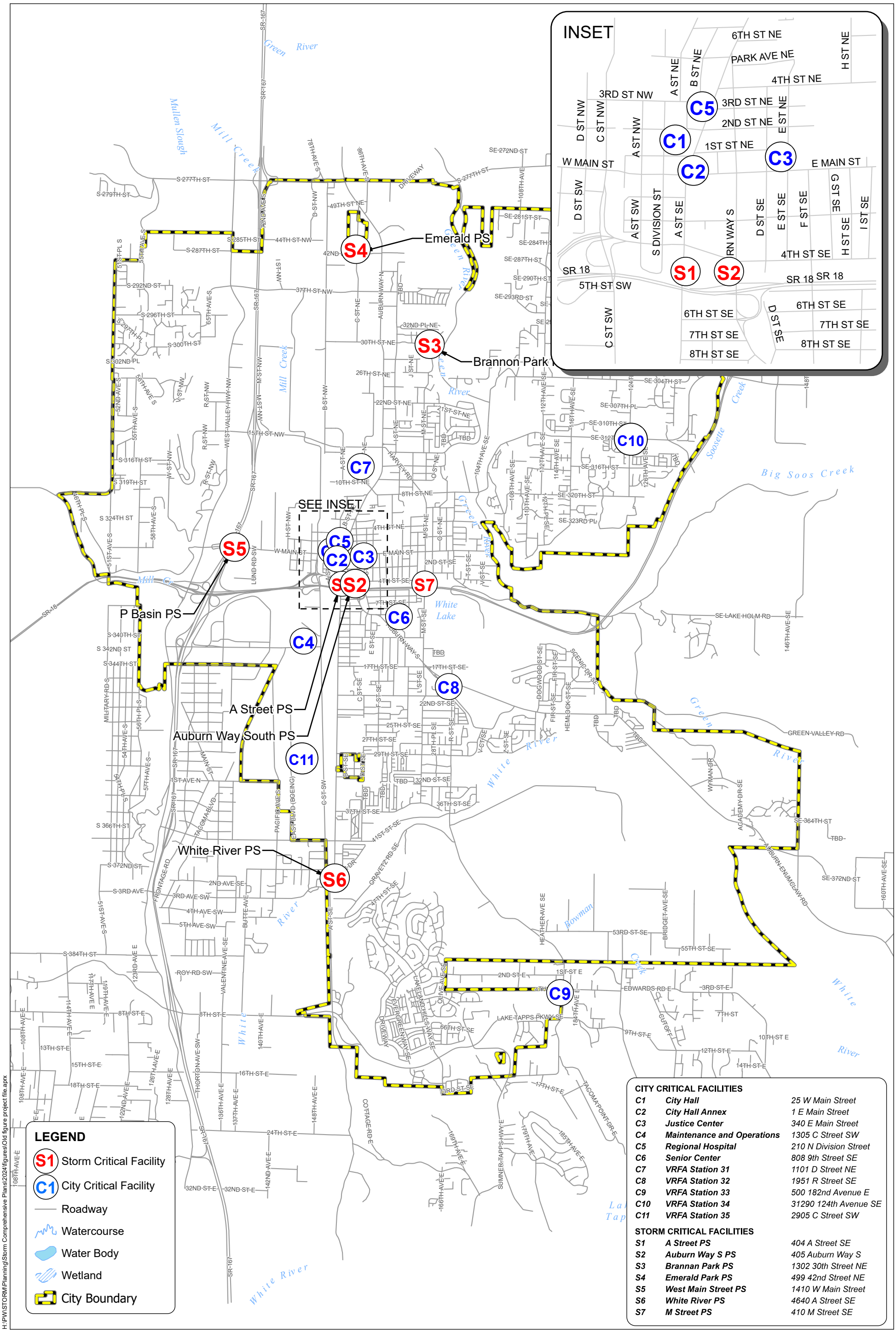
The second group of policies relates to the management of the City's critical stormwater assets (Policies 1.4, 1.6, 2.4, 2.5, and 3.4). The City will modify its inspection and maintenance practices to prioritize active management of facilities with the highest combined risk and likelihood of failure (i.e., a criticality based maintenance program). Factors that impact likelihood of failure include the age of the asset, inspection or repair history of the asset, and condition of the asset. The consequences of a system failure impacting a hospital or school are considered more serious than one affecting a residence or unoccupied property and are thus assigned as critical assets. The City has identified 10 City facilities (Table 4-4) and seven stormwater pump stations (Table 4-5) as critical assets. The list of critical stormwater assets may expand as the City refines its criticality database by adding information (e.g., inspection and repair logs, asset age; see Policy 1.6). The locations of these critical facilities are shown in Figure 4-8.

Table 4-4. Critical City Facilities

Facility	Address
City Hall	25 W Main Street
City Hall Annex	1 E Main Street
Justice Center	340 E Main Street
Maintenance and Operation Facility	1305 C Street SW
Regional Hospital	201 N Division Street
Valley Regional Fire Authority (VRFA) Station 31	1101 D Street NE
VRFA Station 32	1951 R Street SE
VRFA Station 33	500 182nd Avenue E
VRFA Station 34	31290 124th Avenue SE
VRFA Station 35	2905 C Street SW

Table 4-5. Critical Stormwater Facilities

Storm drainage facility	Year constructed	Address
A Street Pump Station	1973	404 A Street SE
Auburn Way S Pump Station	1994	405 Auburn Way S
Brannan Park Pump Station	2001	1302 30th Street NE
Emerald Park Pump Station	1999	499 42nd Street NE
M Street Pump Station	2014	410 M Street SE
West Main Street Pump Station	2008	1410 W Main Street
White River Pump Station	2012	4640 A Street SE



COMPREHENSIVE STORM DRAINAGE PLAN
August 2024

0 4,000 8,000 Feet
1:48,000

N

CITY OF AUBURN WASHINGTON

Figure 4-8
City and Storm Drainage Critical Facilities for the City of Auburn

4.4 Water Quality

This section describes the existing water quality and regulatory conditions that affect surface water quality in Auburn and describes processes that are required to maintain compliance with the City's NPDES MS4 permit.

4.4.1 Existing Conditions

According to water resource inventories by Ecology, the main water bodies within the City's administrative boundaries include the Green River, Mill Creek, White Lake, White River, Bowman Creek, and Soosette Creek. Municipal storm sewers that discharge runoff to surface waters are not authorized to violate state water quality standards.

Appendix 2 of the NPDES MS4 permit (Appendix A of this Plan) describes water bodies that are impaired and have additional requirements based on established TMDLs. A fecal coliform TMDL for the Puyallup River watershed is included in the current NPDES MS4 permit. As part of the TMDL, Ecology has designated the basin as a high-priority basin for IDDE screenings. Details of the required activities are included in Appendix 2 to the NPDES MS4 permit.

The Green River has a TMDL for temperature that was approved by EPA in 2011. The TMDL report indicated a cumulative waste load allocation was developed for all the municipal stormwater permittees. However, the TMDL did not contain any additional TMDL-related actions for stormwater permittees (Ecology 2011).

Other TMDLs under development include the lower White River pH TMDL and the Soos Creek subbasin multiparameter (temperature, dissolved oxygen, bacteria, and fine sediment) TMDL, described in the following paragraphs.

The lower White River pH TMDL was approved by EPA on January 13, 2023, and additional stormwater actions are listed in the public comment draft of the 2024–2029 NPDES MS4 permit. These include outfall and tributary conveyance mapping, monthly IDDE screening for flow in the critical period of May 1 to October 31, soluble reactive phosphorus (SRP) testing of flow from outfalls in the watershed during the critical period under certain sampling conditions (preceding precipitation, stormwater flow, and river flow), and source control tracing for any flow with SRP values that exceed the specified limits. Phosphorus treatment BMPs for new development and redevelopment will be required in the watershed no later than June 30, 2027.

The Soos Creek TMDL is not expected to be complete in time for the 2024–2029 Municipal Stormwater Permit. The temperature, dissolved oxygen, and bacteria TMDL is expected to be finalized in 2026. The fine sediment portion has become a separate TMDL and development of the draft implementation plan began in 2023. The impairments in this TMDL have been identified as fine sediment, high peak flows during storm events, and issues related to habitat degradation.

Other waterbodies listed as impaired on the Ecology water quality map include Mill Creek for bacteria (fecal coliform and e. coli), dissolved oxygen, pH, and benthic macro invertebrates; Bowman Creek for dissolved oxygen, temperature, and fecal coliform; and Olson Creek for benthic macroinvertebrates. These impairments will be addressed through future TMDLs.

4.4.2 Regulatory Compliance

The City has a well-developed MS4 M&O program that employs and provides training on numerous processes and procedures to minimize water quality impacts from municipal operations. The City also actively implements stormwater management BMPs in its municipal activities. BMPs include activities, prohibitions of practices, maintenance procedures, and structural and/or managerial

practices that prevent or reduce the release of pollutants and other adverse impacts to waters of Washington State.

The current NPDES MS4 permit includes provisions for monitoring and assessment of water quality. Permittees have the option of paying annual fees to participate in statewide monitoring programs or developing individual monitoring programs to meet the requirement. The City notified Ecology in 2013 that it intends to participate in the statewide monitoring programs and has continued contributing the required funds every year since.

The City is in full compliance with its NPDES MS4 permit, with programs, codes, processes, and procedures that meet all of the requirements currently in effect. The City's SWMP Plan contains a summary of the NPDES MS4 permit requirements and descriptions of the City's current and planned activities for permit compliance.

The City will continue to make sundry changes to comply with updated requirements of the NPDES MS4 permit that phase in during the permit term. The City is conducting a process to identify and implement needed updates to codes, standards, and programs by the relevant due dates.

A schedule of relevant due dates to comply with updated NPDES MS4 permit requirements is provided in Chapter 8, Figure 8-2.

4.5 Existing Drainage Problems

Members of the City staff working within the Storm Drainage Utility are experienced and familiar with the condition of the drainage system. Existing drainage problems have been observed by the staff and are known to cause frequent flooding of roadways. The most apparent problems were identified for analysis (see Hydraulic Evaluation, Section 5.1). Existing drainage problems are described in Table 4-6 and locations are mapped in Figure 4-9. Problems were evaluated for potential inclusion in the capital improvement plan. CIPs developed to address these problems are described in Chapter 7.

Table 4-6. Existing Drainage Problems

No.	Priority	Location	Description	Approximate frequency or last noted occurrence
1	1	West Main Street dead end near SR 167	The dead-end portion of Old West Main Street near State Route (SR) 167 has a history of observed flooding. The City installed a temporary pump station to dewater the gravity pipe flowing on the south side of Old West Main Street in an effort to protect local businesses from flooding. Since its installation in 2008, the pump station has eliminated flooding at the observed location. The pump station, however, does not meet the City's level of service guidelines regarding pump redundancy and may be insufficient to convey the 25-year flow rate. The City's gravity pipe on the north side of Old West Main Street experiences flooding at one catch basin approximately once per year. High water persists even in summer months. The pump station and gravity pipe discharge to a Washington State Department of Transportation ditch along the east side of SR 167.	Catch basin flooding once per year and system surcharging
2	2	Auburn Way South	Auburn Way South/SR 18 Underpass – minor roadway flooding causes disruptions to traffic during periods of intense rainfall.	Every few years

Table 4-6. Existing Drainage Problems (continued)

No.	Priority	Location	Description	Approximate frequency or last noted occurrence
3	3	I St NE	The area between 33rd Street NE and 35th Street NE on the east side of I Street NE has reoccurring flooding when the river level is high.	Every few years
4	2	Auburn Way South and A Street Pump Stations	Two existing stormwater pumping stations are reliant on portable emergency power, increasing workflow and reducing system reliability at time of need.	
5	3	Storm Pipeline Extension[a]	There are areas within the City not served by the public storm system, such as paved alleys and residential streets where roadwork is not anticipated.	

[a] Drainage problem 5, Storm Pipeline Extension, is not depicted in Figure 4-9 because it applies to multiple areas across the City and does not pertain to a specific location.

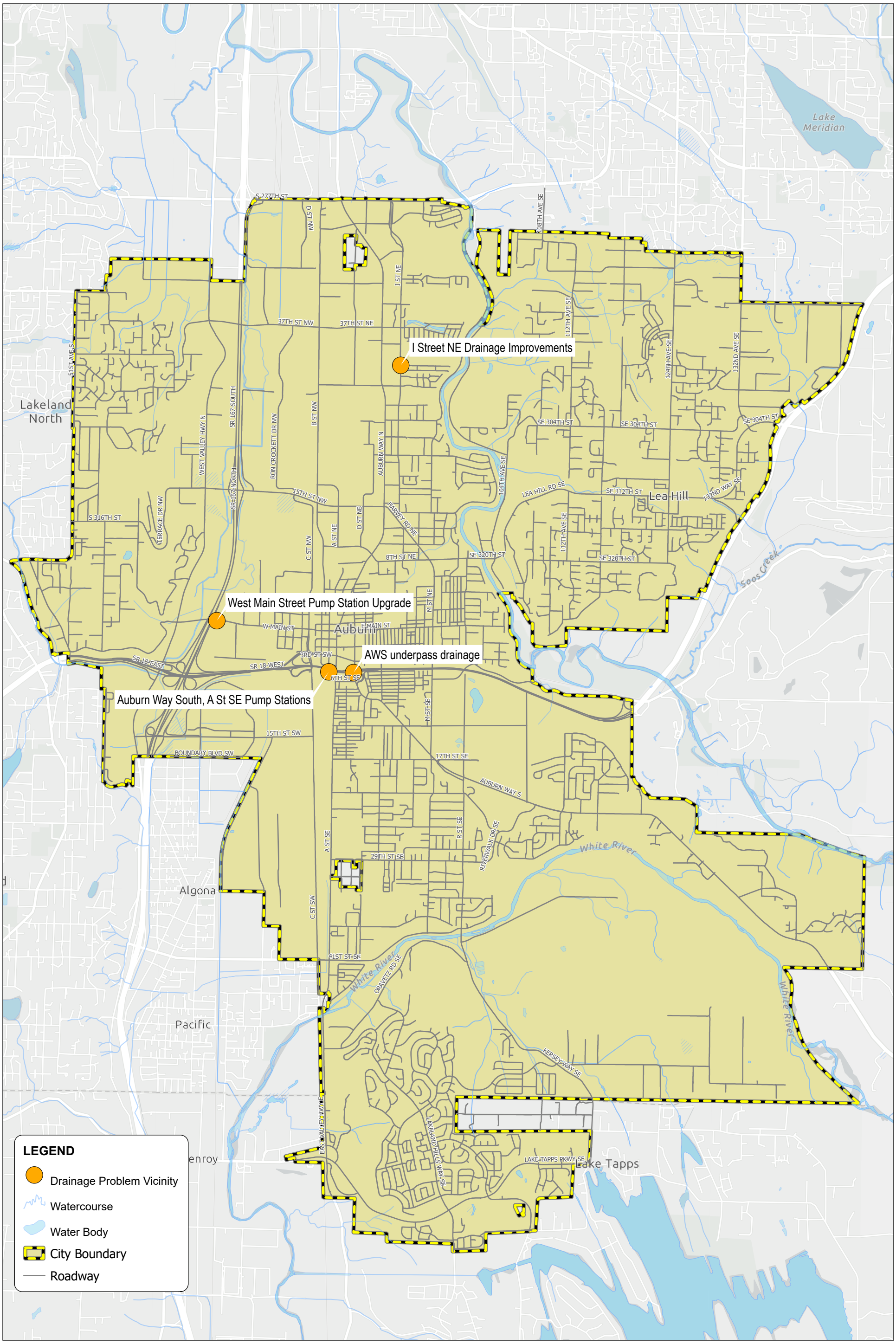


Figure 4-9
Drainage Problem Locations for the Storm Drainage Utility

5. Evaluation of the Storm Drainage Utility

This chapter presents analyses conducted to evaluate the Storm Drainage Utility and identify gaps between existing service levels and the system goals described in Section 3.2. The following types of evaluations were completed to identify Storm Drainage Utility future activities to address the range of system goals:

- Existing system deficiency and future service area expansion: Identified existing system deficiencies and future service areas in Chapter 4 and considered them in developing the capital improvement plan (Chapter 7). Did not evaluate improvements to address existing deficiencies and future expansion relative to policy and system goals as a part of this Plan.
- Hydraulic: Gathered system data, updated or developed computer models, assessed hydraulic performance, and developed CIPs with respect to associated system design criteria.
- Asset management: Reviewed existing asset system for data gaps, analyzed the adequacy of the condition assessment data being collected, established criteria for preparing criticality and risk analyses, developed the prioritization system to inspect critical system elements, developed the system requirements specification for integrating pipe criticality into the City's CMMS, estimated the funds needed for future asset repair and replacement, and included those estimates in the resource planning assessment (Chapter 6).
- Regulatory-driven improvements: Determined differences between the 2024–2029 permit and the previous NPDES MS4 permit and evaluated how the differences could affect City regulations, infrastructure, and activities; estimated the time and costs for NPDES MS4 permit compliance.
- Climate change analysis: Conducted a climate change analysis by reviewing the projected alterations in climate outlined in Chapter 4 and offered recommendations for effective mitigation measures.
- Maintenance and operations: Assessed process performance, equipment, and personnel with respect to service levels for M&O (covered in Chapter 6).

These evaluations were conducted to develop capital improvements for the 6- and 20-year horizons, as well as to identify future M&O needs. The following sections summarize the hydraulic, asset management, regulatory-driven improvements, and climate change evaluations. The existing system deficiency and future service area expansion are described in Chapter 4, and the M&O evaluations are described in Chapter 6.

5.1 Hydraulic Evaluation

As described in Chapter 4, the City of Auburn owns and operates a large system of stormwater drainage infrastructure to collect and convey stormwater runoff to nearby receiving waters.

Hydraulic modeling efforts for the 2024 Plan focused on updating models covering locations of proposed capital projects. The model updates were based on recent geographic information system (GIS) data, design drawings, and record drawings.

The City reviewed the remaining CIPs listed in the 2015 Plan and the recent proposed stormwater CIPs. Six projects are located within existing subbasins represented by hydrologic and hydraulic (H&H) subbasin models. Two of the projects were evaluated with associated H&H subbasins models

and were included in this Plan's CIP program. Appendix B provides a detailed description of the H&H model updates and CIP evaluation results.

The following sections describe the steps used to update existing models or develop new models.

5.1.1 Updating Existing Models

The hydraulic components of existing models were updated with recent GIS data. The following model data were verified against the GIS data:

- Pipe size.
- Pipe invert elevations.
- Pipe material (for estimating pipe roughness).
- Node rim elevation.
- System connectivity.

Where the GIS data did not accurately describe the existing system, technical reports, record drawings, or construction drawings were used to update the model. Where data were available, models were given more detail with respect to pump and storage facility information.

For model hydrology, subcatchment delineations within problem areas were reviewed and revised based on recent GIS data, topographic data, and 2024 aerial photography. For subbasins with significant changes in basin delineation, total impervious area was updated with the City's impervious area coverage. No existing models were calibrated or uncalibrated. If new and significant large infiltration facilities were constructed since the 2015 Plan, the percent impervious area was reduced based on an assumed contributing area by visual inspection of aerial photography.

5.1.2 Creating New Models

The following is a general description of steps followed to develop new Personal Computer Stormwater Management Models (PCSWMM)[3].

1. Infrastructure data from existing GIS databases were used to build drainage networks in problem areas. Drainage network models consist of catch basins, manholes, pipes, junctions, ditches, control structures, vaults, storage ponds, pump stations, and outfalls. GIS data were validated and augmented as necessary based on record drawings and City-conducted field investigations.
2. The drainage network was developed to a level of detail that is sufficient for analyzing conveyance on a subbasin-wide or problem-specific scale. In general, pipes 1 foot in diameter or greater were included. Smaller-diameter pipes and pipes that were part of private systems were generally not included in the model unless they provided an important link within the system.
3. Subbasin areas were divided into smaller drainage area delineations called subcatchments, which in the model are linked into the drainage network at specific nodes. Hydrologic parameters, such as area, slope, and percent impervious area, are developed for each subcatchment. Subcatchment slope was estimated as the average slope based on a digital elevation model (DEM). Total impervious area was estimated with the City's impervious area coverage.

[3] PCSWMM is a GIS-based hydraulic and hydrologic modeling platform developed by Computational Hydraulics International (CHI). The software fully supports the EPA SWMM5 hydrology and hydraulics engine, thus providing comparable computation between EPA SWMM and PCSWMM models. Information about PCSWMM software can be found at http://www.chiwater.com/Software/PCSWMM/index.asp.

For the purposes of this plan, there was no requirement to develop new models. Rather, the existing H&H models from the 2015 Plan underwent refinement and updates. Further information on these specific modifications is available in Appendix B.

5.1.3 Updating Precipitation Record and Flow Frequency

Auburn's H&H models use historical meteorological data to estimate stormwater flows and storage within the City's storm drainage system. The data consist of monthly evaporation and 15-minute precipitation volumes. As part of the Plan, the 15-minute precipitation record was extended to September 30, 2022, creating an approximate 74-year precipitation record.

Long-term simulations were performed using the extended precipitation record to determine the 2% and 4% exceedance storms (one in 50-year and one in 25-year flows, respectively) for the updated models. These storms were used as design storms to size capital improvements, which meet the water treatment standards and LOS (see Chapter 7 for a description of proposed capital improvements).

5.2 Asset Management Review

All utilities manage their assets in one way or another through maintenance practices, CIPs, and repair and replacement (R&R) activities. However, the ability to make an informed decision regarding where and how to direct limited resources is dependent on the quality of the utility's asset management. A comprehensive asset management framework includes building a thorough asset inventory, using that inventory to prioritize and document maintenance and inspection tasks, and tracking annual management expenses. An asset management framework developed in this way will demonstrate both the extent of the existing system, as well as aid in forecasting its useful life and the future costs of maintenance, reparation, and replacement.

Stormwater system assets fall into this framework but also exhibit unique characteristics regarding their service levels, failure risk and consequences, and asset response approaches. For example, the consequence of failure for a stormwater pipe is less significant than it would be for a water pipe, and this distinction is reflected in the asset management approach. The asset management plan for the City's stormwater system accounts for these considerations along with the current inventory and condition information while adopting a responsible approach to resource management of the assets.

5.2.1 Best Practices

The best practices for asset management involve methodically basing choices on an understanding of asset condition and performance, risks, and costs in the long term. Asset management best practices include the following:

- Establishing and maintaining a sustainable LOS that balances the performance goals of the utility, regulatory requirements, and consumer demand.
- Preparing and regularly updating an inventory and map of the system.
- Understanding the risk associated with managing a given asset (i.e., defining the asset's likelihood and consequence of failure).
- Implementing a prioritization process for work based on condition assessments and taking a life cycle approach to asset management planning.
- Establishing funding levels and rates to provide reliable, cost-effective service, and support ongoing infrastructure rehabilitation or replacement projects.

These best practices were followed in evaluating the management of the City's assets, as described below. System goals for the City's Storm Drainage Utility were established in Chapter 3 of this Plan.

5.2.2 Evaluation

For the Plan, the preliminary focus of the asset management evaluation was on the City's stormwater collection pipe network, the results of which may be used to inform the management plan for the other categories of assets within the City's Storm Drainage Utility system. The City uses Cartegraph as its CMMS to store and map its asset inventory, so all evaluations were performed on data exported from this source.

Data Gaps Analysis & Condition Assessment

The first step in the evaluation involved assessing the comprehensiveness of the asset inventory. To do so, a data gaps analysis and condition assessment was necessary to understand the completeness of the asset inventory and the availability of feature data for developing criticality and risk analyses. The results of these analyses demonstrated a pipe inventory that was incomplete. Several pipes were missing attribute data—namely installation date and material—critical for estimating risk of failure in the next step in the evaluation. See Figure 5-1 and Figure 5-2 for the availability of pipe attribute data relative to the total length of pipe in the system for reference.

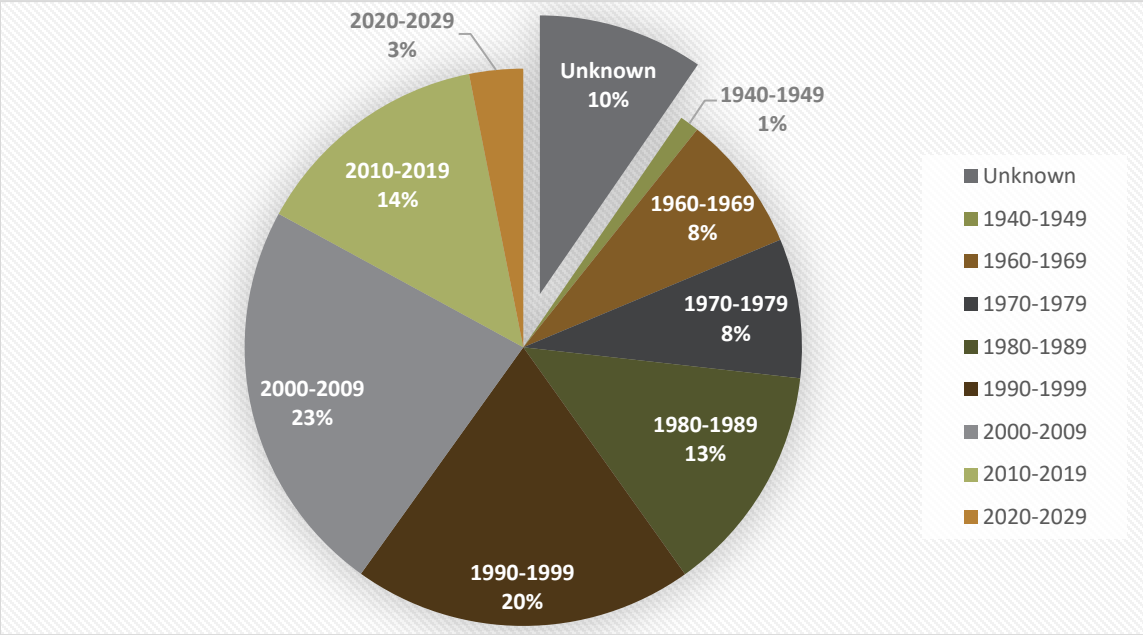


Figure 5-1. Pipe Installation Date Relative to Total Linear Feet of Pipe

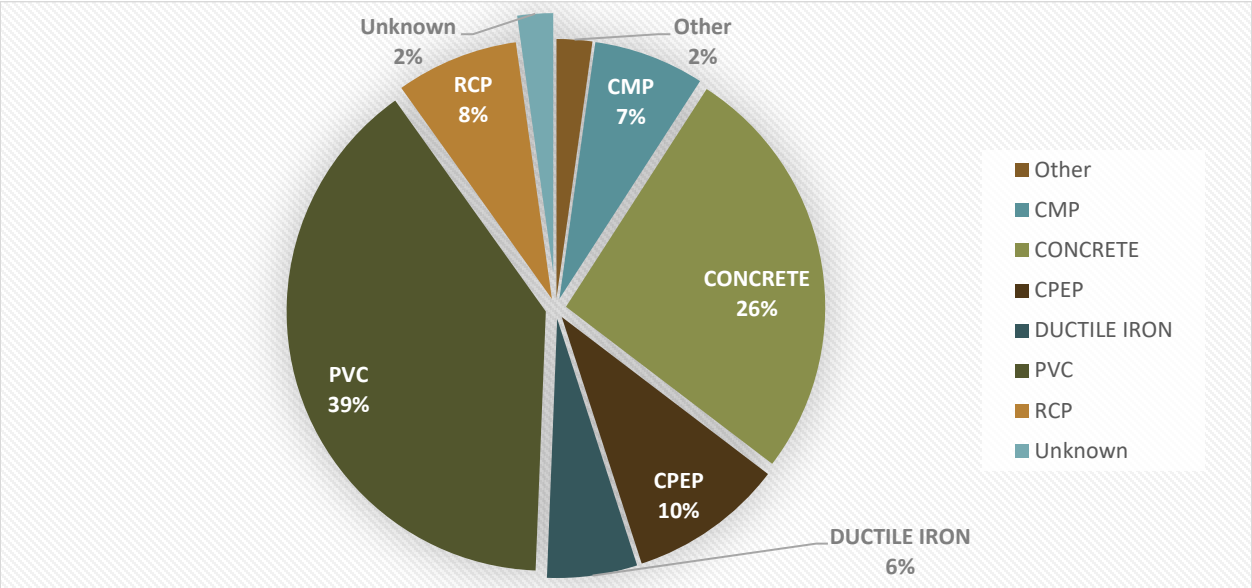


Figure 5-2. Pipe Material Relative to Total Linear Feet of Pipe

For the purposes of the risk evaluation, professional estimates were made to serve as placeholders for missing attribute data. A preliminary GIS-based assessment was performed to provide an estimate installation date based on adjacent infrastructure, parcel build-out years, and historical imagery as needed. Estimated inputs were added to a copy of the installation date attribute to ensure estimates could be distinguished from the original dataset. Further detail regarding the steps taken in the data gaps analysis and condition assessment is provided in Appendix C. There were critical data gaps in other stormwater asset inventories, namely culverts. Thus it could be beneficial to do a similar GIS-based assessment for other asset types to have a comprehensive starting point for prioritization of work. It is recommended that critical data gaps be addressed as part of the asset management program, as summarized in the following paragraphs.

Risk Determination

The next step in the evaluation involves determining the risk associated with managing each of the City's storm drainage assets. The exported pipe data from the City's Cartegraph database was used to build a risk assessment spreadsheet. The spreadsheet evaluates specified criteria to generate a score for likelihood of failure and criticality of failure for each asset. Within the spreadsheet, likelihood of failure is largely dependent on critical attributes specific to the feature, while criticality of failure is dependent on location-based factors.

For the City's pipe network, the attributes used to develop the likelihood of failure score include installation data and material. The installation date provides the age of the pipe, while the installation material is used to estimate the expected useful life. Combining these characteristics provides an estimate for the pipe's remaining useful life, which is the basis for the likelihood of failure score. In general, if a pipe had a negative remaining useful life, it had a high likelihood of failure (the highest score being 5), whereas if it had a positive remaining useful life, it had a low likelihood of failure (the lowest score possible is 1).

The criticality of failure score was developed by evaluating a pipe's proximity to critical facilities, high-priority roadways, and high-trafficked roadways. If a pipe is in close proximity to one of the aforementioned factors, this results in a higher criticality of failure score (the highest score being 5). Conversely, a pipe not in close proximity to any evaluated factors results in a low criticality of failure score (the lowest score being 1).

While the spreadsheet was developed solely for the City's pipe system, a similar process may be followed for the other asset types within the stormwater inventory. See Appendix C for the critical attributes recommended to use in determining the risk for the other types of stormwater assets.

Work Prioritization

The resulting failure scores allow for the City to rank different assets both on likelihood and criticality of failure. It is recommended to use this ranking strategy to develop an inspection program where inspections of different types of assets are prioritized based on their rank. The asset inspection program will serve to fill data gaps, update the likelihood of failure score based on field verification, and identify asset features requiring repair or replacement. After inspection data are input for an asset feature, the results of the inspection will supersede the use of estimated remaining useful life and installation date (where applicable) in calculating a likelihood of failure score. Using this system to prioritize maintenance allows resources to be used more efficiently and fills in data gaps resulting in a more robust asset inventory.

For the City's pipe system, the recommended program would prioritize inspection based on likelihood of failure and then criticality of failure. In this way, pipes with likelihood of failure scores greater than or equal to 4 (or a negative useful life estimate) will be inspected first. The next tier of inspections should address pipes with likelihood of failure scores equal to 3 and pipes with unknown installation dates. After pipes are inspected, they should be assigned a condition score, which will supersede the installation date and useful life expectancy in determining the likelihood of failure. The likelihood of failure for a pipe will increase over time, and this prioritization method will take this into account while integrating field inspection data. Since storm catch basins and storm manholes are related to pipes, it is recommended to inspect these at the same time as adjacent pipes.

The same inspection prioritization method is recommended for culverts as the failure consequences are similar. For storm pumps, it is recommended to closely evaluate their condition as their useful life nears the end (e.g., 5 or fewer years) and upgrade or replace them before probable failure. Stormwater control facilities should be routinely inspected and prioritized for inspection when critical feature data are unavailable. As mentioned previously, critical feature data for each asset type are listed in Appendix C. More detail regarding the inspection frequency and schedule for each type of stormwater asset is included in Chapter 6.

Life Cycle Estimation

A life cycle analysis was performed for pipes to demonstrate the expected depreciation rate of each asset and provide background for the recommended maintenance frequency of the entire system. To do so, the remaining useful life estimate for the City's pipe database was analyzed over time. This analysis was used to identify any spikes in development (and accordingly when spikes in R&R would be expected) and estimate the total linear feet of pipe "lost" (or whose projected remaining useful life becomes negative) per year. This rate of pipe loss may be used as a point of comparison for basing the resource planning recommendations in Chapter 6. A similar life cycle analysis could be beneficial for culverts.

As features are updated with field-verified data (during inspection or maintenance), the results of this life cycle analysis are expected to change. For this reason, the pipe depreciation analysis may be reconducted to evaluate the effect on the projected rate of pipe loss. The results of the pipe depreciation analysis can be found in Appendix C.

Cost Projection

A brief review of costs were included in the asset management evaluation for consideration in setting the R&R budget and resource planning goals in Chapter 6. Two options were contemplated in setting the R&R budget: investigating the prior use or need and evaluating the results of the life cycle estimation. The City's R&R spending in previous years was compiled to investigate the prior use. To evaluate the results of the life cycle estimation, the cost of replacing pipes based on the rate of depreciation was projected. The useful life of the system was also varied to observe the change in budgetary needs.

A comprehensive cost estimate was prepared for both pipe replacement and the replacement of catch basins and manholes within the City. Notably, the cost estimate for pipe replacement serves as a generic assessment for the City of Auburn rather than being tied to any specific project or geographical area. The primary calculations for cost estimation assume the replacement of 5,000 linear feet of pipe along with the associated conveyance structures, such as manholes and catch basins. To simplify these calculations, certain generalizations were made—including the assumption that all pipes are of uniform size, material, and depth—based on GIS averages for the City.

Furthermore, various scenarios were explored to assess how the cost of pipe replacement might vary based on location (downtown versus rural) and quantity (5,000 versus 10,000 linear feet). The resulting cost opinion is intentionally conservative, approximately $1,500 per linear foot, to account for the wide range of generalizations and assumptions inherent in the process. Notably, the analysis indicated that pipe replacement in rural areas is expected to be less costly than in the City center. Additionally, replacing a larger quantity of pipe is only marginally more cost-effective.

For detailed estimates and further information regarding the cost projection, please refer to Appendix C.

As a prudent practice, it is recommended to diligently track the costs associated with installation, repair, and replacement of asset features on an annual basis. This data serve as valuable reference information for future asset replacement budget planning. As additional data are collected, cost opinions can be updated to enhance accuracy.

5.2.3 Recommendations

Evaluations completed for this Plan consisted of developing a system requirements specification for implementing risk assessment using the data in the City's asset management system, Cartegraph. The spreadsheet's scoring methods may be integrated into Cartegraph so that, as the pipe inventory is updated, likelihood of failure and criticality of failure scores can be used to inform future R&R priorities. Currently, the spreadsheet only includes collection system piping scores. However, there is an opportunity to expand the scoring methods to include other asset features, as described in Appendix C.

The following are recommended to implement the asset management strategy:

- Train staff in asset inventory needs, capability, data collection, data quality objectives, and maintenance of system.
- Implement the likelihood of failure and criticality of failure scoring methods into Cartegraph.
- Implement the prioritized inspection and asset information update process to fill data gaps in the asset data and provide observation-based condition assessments.

- Develop a process for reviewing the asset inventory and a routine for updating when changes and inspections occur.
- Expand scoring methods to include asset types other than collection system piping and implement them similarly into Cartegraph and inspection prioritization techniques.
- Consider reconducting pipe depreciation analysis every 5 years to evaluate the effect of implementing the prioritization practice.
- Assess the inspection process in 5 years to assess the efficiency of the program and identify areas for improvement.

5.3 Regulatory-Driven Improvements Investigation

The federal Clean Water Act requires municipalities to help maintain fishable/swimmable waters through the NPDES MS4 permit program (see Section 2.3.2 and Appendix A), which requires municipalities to reduce the discharge of pollutants from their stormwater systems to the MEP by implementing municipal stormwater management programs. The City has an established municipal SWMP that complies with all NPDES MS4 permit requirements currently in effect. Updates to the City's codes, programs, and standards are being developed to comply with the requirements of the updated 2024 NPDES MS4 permit.

The City's SWMP plan identifies activities that will be implemented by the City to comply with NDPES MS4 permit requirements. The SWMP plan is updated annually to reflect new requirements that phase in during each year, including one-time and new ongoing activities. An updated SWMP is submitted to Ecology in March of each year. The City's current SWMP plan is accessible on the City website.

To plan for upcoming requirements of the new NPDES MS4 permit, the City formed a project team consisting of staff from the City Public Works department and Parametrix.

The project team reviewed Auburn's citywide stormwater management programs, codes, standards, processes, and documentation protocols in order to identify potential actions to comply with the NPDES MS4 permit conditions over the 5-year permit period. From these sources, the project team catalogued responsible City departments/entities, reference documents, and potential requirements for each updated section of the permit. Interviews were then conducted with appropriate staff (e.g., stormwater M&O staff) to discuss the potential implications of permit changes for existing City codes, programs, and standards. The information on existing City practices and programs was then compared to the updated permit requirements to identify potential compliance needs. Some policy issues and potential compliance strategies were also identified. This Plan was developed using the draft 2024 NPDES MS4 permit and updated as needed following the release of the final 2024 NPDES MS4 permit. A table summarizing the notable changes between the previous permit, the draft 2024 NPDES MS4 permit, and the final 2024 NPDES MS4 permit was developed and is included in Appendix D. Recommended future activities are summarized below and included in the implementation plan in Chapter 8.

5.3.1 New Permit Requirements and Recommendations

Table 5-1 summarizes the recommended actions to address regulatory driven stormwater program responsibilities.

Table 5-1. Recommended Actions Regarding New Permit Requirements

Permit Section	New Requirement	Recommended Action(s)
S5.C.1.c.iii	Adopt and implement tree canopy goals and policies to support stormwater management and water quality improvement in receiving waters.	Prepare an assessment of existing conditions. Draft a list of potential policies. Select and adopt policies.
S5.C.1.d.i	Complete a stormwater management action plan (SMAP) for at least one new high-priority catchment area or additional actions for the existing SMAP.	Identify a preferred catchment area for inclusion or enhancement. Prepare a new SMAP or update the existing SMAP.
S5.C.1.d.i.(a)	Consider implementing projects that address transportation-related runoff from high traffic areas.	Review the road system plan. Review high-priority roadways. Determine candidate sites for retrofitting using SMAPs, capital improvement projects, or other relevant plans. Select projects and include in capital improvement plan.
S5.C.2.a.i.(b)	Provide public education regarding source control best management practices (BMPs) for building materials to reduce pollution to stormwater, including stormwater pollution from materials containing polychlorinated biphenyls (PCBs).	Provide public education regarding source control BMPs for building materials.
S5.C.4.b.ii	Map permittee-owned or operated properties with tree canopy.	Begin mapping of permittee-owned or operated properties with tree canopy based on available, existing data.
S5.C.4.b.iii	Develop a map of discharge points that have stormwater treatment and flow control BMPs/facilities. Use to estimate the area managed by stormwater treatment and flow control BMPs/facilities.	Develop a methodology to map tributary basins to outfalls. Identify facilities to be mapped. Use a geographic information system (GIS) to prepare a map of catchment areas. Quantify the total managed or unmanaged acreage of treated or controlled City-owned facilities.
S5.C.4.b.iv	Map overburdened communities in relation to stormwater treatment and flow control BMPs/facilities, outfalls, discharge points, and tree canopy on permittee-owned or operated properties.	Overlay available data regarding overburdened communities with previously prepared maps of areas with stormwater treatment or flow control facilities and tree canopy.
S5.C.5.e.ii	Develop a management plan for per- and polyfluoroalkyl substances (PFAS).	Coordinate with firefighting agencies/departments to implement specific protocols regarding PFAS discharges into stormwater.
S5.C.7.c	Fully fund, start construction, or completely implement project(s) that meet the City's assigned equivalent acreage of 14.2 acres.	Prioritize projects developed in the SMAP that together meet the City's assigned 14.2 acres.
S5.C.9.e	Develop and implement a municipal street sweeping program to target high-priority areas.	Review and revise the existing sweeping program as needed. Include map of swept priority areas in annual report.

5.4 Climate Change Analysis

Section 4.1.8 reviewed the projected climate changes specific to the City. This section focuses on potential strategies to mitigate these changes and provides recommendations for effective implementation. By comprehending expected shifts in the environment, the City can proactively adapt its practices and policies to safeguard the community.

5.4.1 Discussion of Proposed Approaches

Although the City is not predicted to see a significant increase in overall precipitation, climate models predict an increase in the frequency of intense precipitation, specifically during the winter months (see Figure 4-5). Increased winter storm intensity frequency is most likely to push the stormwater system past the accepted LOS over time up to the projected time frame of the reported climate models.

Storm intensity (rate of rainfall for a unit of time, usually in inches per minute) tends to affect storm drainage systems differently than prolonged, atmospheric river systems. Storm sewers and local conveyance systems are generally designed for the peak runoff intensity (within a short or long event), whereas larger conveyance systems, streams and floodplains, and stormwater control facilities are designed using hydrographs for longer duration events. This would suggest, based on the predictions regarding total rainfall versus intense rainfall, that storm sewers, conveyance systems, and culverts will be more vulnerable to capacity exceedance and subsequent flooding.

One approach to addressing this potential service deficiency is to design with future projected storm patterns or to apply a larger design storm. This would address the greater flood frequency risk. However, it would not “prevent” flooding. This would increase the costs of all projects for both public and private development and would also impact the cost of housing impacting the affordability of future housing developments. Stormwater conveyance systems are designed to manage a specific LOS, usually the peak runoff rate from a 25-year, 24-hour storm. Performance is typically evaluated by hydraulic metrics, such as minimum freeboard in a channel, headwater depth on a culvert, or surcharging in a storm sewer that keeps water in the system and away from property. While a stormwater system may not be performing according to design, the impacts may not be flooding or property damage. In addition, storms larger than the design storm can and will occur, with adverse consequences.

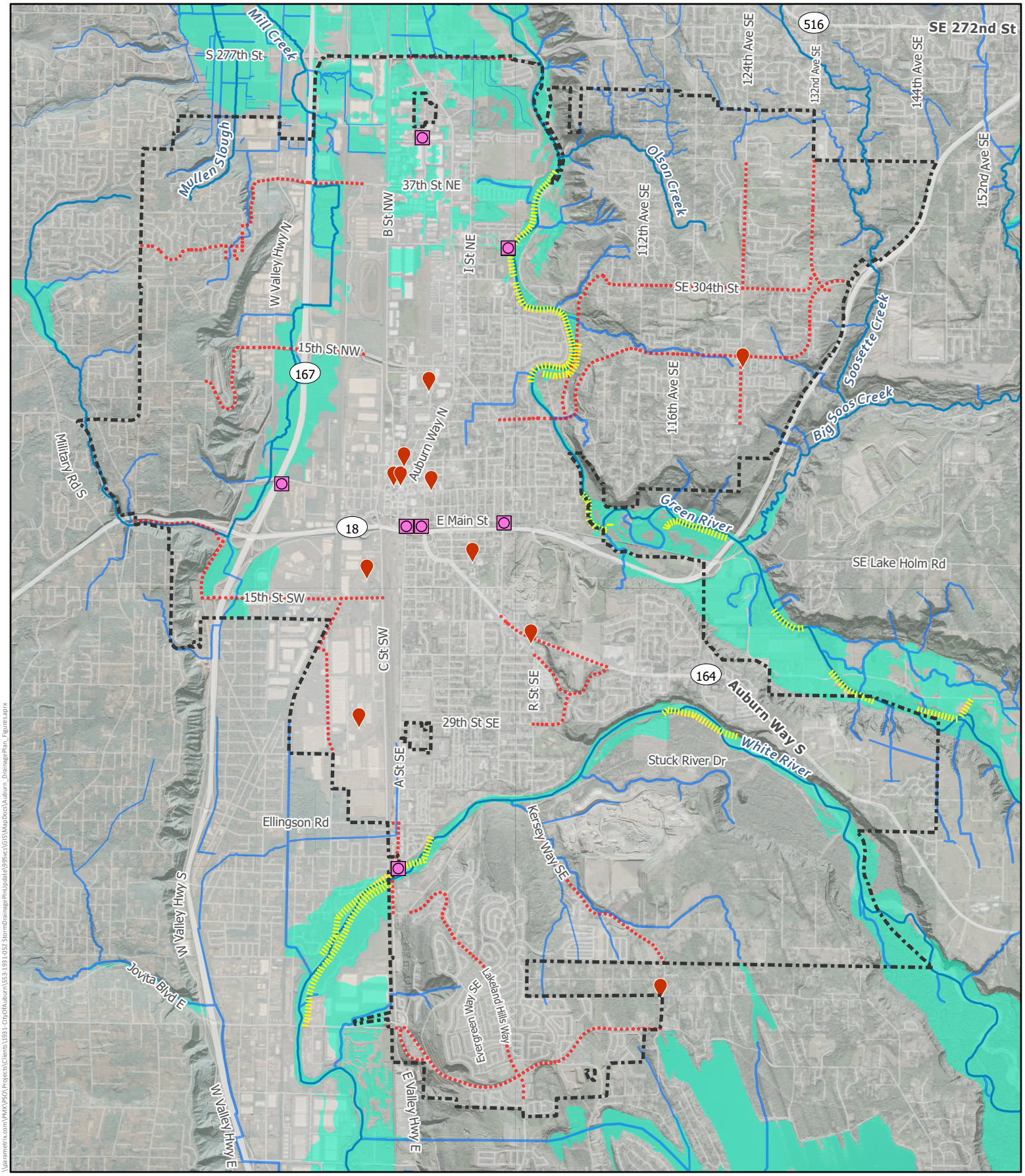
It has generally been deemed to not meet cost-benefit metrics to build systems to address every likely storm outcome. An event exceeding the design capacity of a system could occur at any time; the “average” number of times it occurs is likely to increase with increased storm intensity frequency due to climate change. Another approach would be to address the *consequences* of the projected change on a site-by-site basis rather than a blanket change in service levels for future rainfall.

Stormwater flow control facilities are designed to manage changes to the landscape and resultant runoff to existing or predeveloped levels. The analyses use a historical rainfall record and projections of that record over an extended time period, all based on past rainfall patterns. The stormwater control standards require runoff changes to be matched to land conditions prior to development or existing conditions, typically a forested condition. One approach to new stormwater standards to address flow control under a changed climate with more frequent intense rains is to use projected rainfall patterns that are modified to add climate change projections. In addition, flow control evaluations are comparative, which means they evaluate the hydrologic changes due to development. This is different than considering the changes in hydrology from the site today with a site under future climate conditions (in addition to restoring existing hydrology to predevelopment

conditions). The comparative change (future climate to compare existing and future site development) may not be significant.

Another approach involves identifying the City's most vulnerable areas to the effects of climate change and using this information to make informed decisions about potential stormwater infrastructure improvements. Figure 5-3 highlights key areas of vulnerability. The extent of floodplains indicates where the City is most susceptible to flooding. Similarly, levee locations should be evaluated to determine if adjustments are necessary due to changes in flood levels. Pump stations should be assessed for capacity. Ensuring access to critical facilities and emergency routes is crucial; both the areas around these facilities and the routes to them should be evaluated for vulnerability. By assessing the stormwater infrastructure in these areas, the City can better understand the impact of potential infrastructure failures and make decisions to mitigate the most harmful consequences.

River and stream flooding could increase in frequency due to climate change. According to the stream flow projections shown in the publication, Effect of Climate Change on Flooding in King County Rivers, winter flow volumes are expected to rise due to an increase in the proportion of precipitation falling as rain over the course of the 21st century (Lee et al. 2018). This increase is anticipated despite the modest long-term projections for average annual rainfall shown in Figure 4-5. Smaller, local stream systems (e.g., Olson Creek, Mill Creek, Bowman Creek) are expected to have more frequent flooding (i.e., flow overflowing its confined banks), and extreme events are more likely to occur (i.e., the current 1% probability flood would have a higher percentage chance of occurring in the future). Storm drainage infrastructure that interfaces with these natural drainages should be reevaluated to consider negative consequences and resiliency (the ability to safely withstand critical service disruption).



Date: 8/14/2024
Sources: City of Auburn, King County, WA Ecology, WA DNR, FEMA, USGS, ESRI
Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes.

- Critical Facilities
- Pump Stations
- Watercourse
- Evacuation Routes
- Levees
- Auburn City Limits
- Floodplain

0 ¼ ½ 1 Miles

Figure 5-3
Key Areas for Vulnerability Assessment
Stormwater Drainage Utility
Comprehensive Storm Drainage Plan

Parametrix | City of Auburn Washington

5.4.2 Recommendations

Stormwater design guidelines will need to consider the possible changes in storms that are *informed* by future climate scenarios. The strategy aligns with the guidance for stormwater design and sizing recommended and approved by the Water and Land Resources Division of the King County Department of Natural Resources (King County DNR 2021). For example, the guidance provides direction for the design of new pipe systems with sufficient capacity to convey and contain (at minimum) the future predicted 25-year peak flow. Pipe system structures may overtop during runoff events that exceed the 25-year design capacity. However, this is permissible as long as the overflow resulting from a larger event (e.g., a 100-year runoff event) does not lead to severe flooding or erosion issues. Additional design guidelines for new flow control standards, conveyance standards, culverts, ditches, and canals are also included.

The recommended approach to mitigate effects due to climate change is described as follows.

Drainage System Performance. Because of likely changes in the frequency of intense rainfall, the following recommendations should be considered in the design of conveyance systems:

- Review and revise the hydraulic performance metrics related to freeboard, headwater depth, and surcharging. Evaluate the financial implications associated with enforcing strict hydraulic performance standards.
- Prepare a critical drainage review (CDR) process (as identified as a work order in Section 8) to evaluate the consequences of storm events exceeding the design parameters. Establish clear policies regarding safety, property protection, service continuity, and mitigation of nuisance flooding to make systems more resilient to infrequent but probable flooding. Ensure that the level of protection aligns with the associated costs and risk factors.
- Prioritize effective hydraulic performance and resilience measures for critical facilities during severe storm events that go beyond the intended design limits.
- Perform a vulnerability analysis of critical drainage and stormwater infrastructure to identify any areas where the effects of climate change may be intolerable. Prioritize these areas for capital improvement projects to minimize the adverse effects of flooding.

River and Stream Flooding. River and stream flooding frequency is expected to increase. The vulnerability of existing infrastructure in or near streams or floodplains has not been assessed in this Plan.

6. Maintenance and Operations

An evaluation of existing Storm Drainage Utility M&O activities was conducted in support of this Plan. This chapter documents existing Storm Drainage Utility M&O activities with the primary purpose of establishing a baseline understanding of the proactive and responsive maintenance procedures performed by City Storm Drainage Utility M&O staff. This baseline understanding is used herein to evaluate utility staffing, data collection and computerized record-keeping needs, and other utility needs necessary to continue to meet system goals.

The information provided in this chapter is a summary of information collected during City Storm Drainage Utility staff interviews, review of computerized records, and existing utility forms/checklists.

6.1 Utility Responsibility and Authority

This section provides an overview of the Storm Drainage Utility organization and basic information related to utility staffing, training, and education.

6.1.1 Organizational Structure

The City Storm Drainage Utility is operated as a utility enterprise under the direction of the director of public works. The Public Works Department is responsible for planning, design, construction, operation, maintenance, quality control, and management of the storm drainage system. The City has a mayor-council form of government; therefore, the director of public works reports to the mayor, with input from council through council study sessions and meetings. The mayor provides oversight for the implementation of policies, planning, and management for the Storm Drainage Utility. The City Council provides direction on policy and budget considerations.

The Engineering Services Department is the lead group for comprehensive storm drainage system planning, development of a CIP, and the design, construction, and inspection of projects related to the storm drainage system.

M&O Services is the lead group responsible for the day-to-day maintenance and operation of the storm drainage system. The storm drainage/sanitary sewer manager reports to the M&O Services general manager and oversees 11 total storm drainage employees (1 field supervisor and 10 maintenance workers, as shown in Table 6-1). The Vegetation Maintenance Division is responsible for mowing, tree trimming, and weed control of City ROW and storm facilities.

The overall Public Works Department organizational structure is shown in Figure 2-1.

6.1.2 Staffing Level

The Storm Drainage Utility currently includes 10 full-time M&O field staff, plus a field supervisor and a manager, who perform administrative duties. This chapter does not include an evaluation of utility management, which includes regulatory compliance, planning, and coordination with other City departments. Position titles and the primary functions of the M&O staff working within the Storm Drainage Utility are shown in Table 6-1.

Table 6-1. Storm Drainage Utility M&O Personnel

Position	Primary function(s)
Storm drainage/sanitary sewer manager	Management of sanitary sewer and storm drainage M&O staff
Storm field supervisor	Supervision of field staff
Maintenance worker	Ten full-time staff dedicated to field inspection and maintenance

M&O = Maintenance and Operations

In addition to the M&O field staff identified in Table 6-1, secondary staff support the following Storm Drainage Utility functions:

- Management and administration: A full-time manager performs administrative duties for both the Sanitary Sewer and Storm Divisions. Management and administrative tasks include general oversight of the Sanitary Sewer and Storm Drainage Utility M&O staff, regulatory compliance, planning, and coordination with other City departments. Field work is supervised by a full-time field supervisor.
- Vegetation maintenance: The Vegetation Maintenance Division consists of 10 full-time staff, a field supervisor, and a manager. These staff primarily support the Storm Drainage Utility M&O field staff (approximately 60% of total staff effort) with pond vegetative control, weed control and herbicide spraying, ROW and ditch mowing, tree trimming and removal, and leaf removal.
- Contracted services: The Storm Drainage Utility uses other City departments or external contractors for some services, as discussed in Section 6.3.

M&O activities routinely performed by Storm Drainage Utility staff are discussed in Section 6.2. The staffing plan presented in Section 6.6 considers M&O activities performed by Storm Drainage Utility and Vegetation Maintenance staff.

6.1.3 Level of Service

The Storm Drainage Utility operates in accordance with the system goals and policies outlined in Chapter 3 and internally adopted objectives integral to meeting those goals. These objectives are generally based on the current staffing level and tasks deemed most critical to the City and its residents. However, the existing staffing requirements discussed in Section 6.6 herein include near-term goals that may not be met by existing staff.

6.1.4 Training and Education

The City recognizes the value of having a knowledgeable and well-trained staff operating the storm drainage system and encourages employees to obtain the highest level of training available. At this time, the State of Washington does not require certification for stormwater maintenance operators, but the City would support any effort to establish certification for these positions. Seminars, conferences, and college coursework have become tools to advance knowledge for maintenance staff.

Many M&O staff are specialized in specific job functions, which can promote expertise through specialization but also has the potential to limit the ability of the utility to absorb absences due to vacation, sickness, retirement, resignation, and termination. To mitigate this limitation, the City has broadened the scope of the Storm Drainage Utility's education system by conducting cross-training programs.

6.2 Routine Operations Provided by the Storm Drainage Utility

This section discusses routine operations provided by the Storm Drainage Utility M&O staff shown in Table 6-1. Each subsection provides a brief description of the M&O activity, City goals with respect to proactive maintenance, and the estimated Storm Drainage Utility staff effort to achieve the proactive maintenance goal.

6.2.1 Catch Basin and Manhole Inspection, Cleaning, and Repair

The storm drainage system includes approximately 10,800 catch basins and 3,172 manholes. Catch basin and manhole maintenance includes initial inspection and potential follow-up cleaning and/or repair. Inspection is performed by a two-person crew using utility mapping to locate the targeted facilities. M&O staff use condition categories from the CMMS asset management system to identify which facilities require further cleaning or repair. The condition categories consider items such as observation of trash, debris, sediment, or vegetation blocking or within the catch basin/manhole; structural damage; evidence of contamination or pollution; and the integrity of catch basin grates, manhole covers, and ladders. Follow-up cleaning and maintenance work orders are generated based upon the results of initial inspection and typically include a two-person crew. Based upon recent maintenance history, approximately one in five catch basin and manhole inspections leads to further cleaning. The City assumes that a total of 5% of catch basins and manholes per year require an additional visit post inspection for some level of maintenance or repair. Catch basins and manholes requiring only minor maintenance tasks that can be performed during inspection are not included in this total.

Catch basin inspection is required as part of the City's NPDES MS4 permit, per the most recent permit, 2024–2029 issuance. The City is required to inspect and maintain all catch basin facilities every 2 years, with each 2-year cycle ending on December 31. To achieve this permit requirement, the City goal is to inspect 40 catch basins per day. Manhole inspection frequency is not mandated by the permit, but the City's goal is to complete inspection of all City manholes on a 4-year rotating schedule.

The City will use the CMMS software (see Section 6.5) to record and track results of catch basin inspection, cleaning, and maintenance efforts. In the future, if catch basin inspection records demonstrate that catch basins generally comply with maintenance standards and do not require inspection every 2 years, the City may be able to justify and suggest a less frequent inspection schedule for compliance with the Permit.

6.2.2 Stormwater Pipeline Cleaning

The storm drainage system includes approximately 250 miles of collection system piping. The City currently cleans its stormwater pipelines on an as-needed basis. Cleaning of the storm drainage system is performed using a City-owned Vactor/jet truck. Cleaning is typically performed from structure to structure (e.g., catch basin or manhole) by a two-person crew.

Jetting of stormwater pipelines is the principal means of removing debris or obstructions from the storm drainage system. A hose with a special end fitting is inserted into a pipe and high-pressure water (up to 2,500 pounds per square inch) is sent through the hose. The high-pressure water exits the small hole at the tip of the nozzle, breaking down and/or scouring obstructions. Debris is then removed via suction by the Vactor truck equipment at each manhole.

The City expects to clean 4% of its stormwater pipeline system per year. On average, a two-person crew can clean approximately 1,500 feet of pipe per day and inspect approximately 500 feet of pipe per day.

6.2.3 Stormwater Outfall Inspection, Cleaning, and Maintenance

The storm drainage system includes 124 outfalls or discharges from localized collection systems to the Green River, White River, or Mill Creek. Outfall maintenance includes initial inspection and potential follow-up corrective actions. Outfall inspections are performed to identify the following: excessive vegetative growth that could obstruct flow, outfall erosion protection, structural damage to the conveyance system itself, and abnormal discharge that might be indicative of contamination (as demonstrated by a color, sheen, or odor). Cleaning and minor maintenance tasks are performed during inspection. Necessary follow-up repairs or more intensive maintenance work orders are generated based upon the results of the initial inspection. The City goal is to inspect, clean, and perform minor maintenance tasks at each outfall twice per year. The City assumes that 5% of outfall inspections per year require an additional visit post-inspection for some level of maintenance/repair. For a two-person crew, it is anticipated that inspection, cleaning, and minor maintenance requires 2 hours per outfall, while follow-up maintenance or repairs requires 0.5 hour per outfall.

6.2.4 Drainage Ditch Maintenance and Restoration

The storm drainage system includes approximately 42 miles of drainage ditches (as shown in Figure 6-1). Drainage ditch maintenance is required to preserve the original line and grade, hydraulic capacity, and purpose of the ditch. Routine maintenance activities include regrading and removal of sediment; nuisance vegetation; and isolated obstructions, such as trash, trees, and accumulated debris. Because vegetation is important for erosion control, the City strives to minimize the removal of beneficial vegetation.

Up to six M&O staff are required for a single ditch maintenance crew to operate the City-owned excavator, control traffic (as necessary), and manually regrade or remove obstructions. On average, these crews can complete 200 feet of ditch maintenance per hour. This rate does not include mobilization and demobilization, equipment repair and other downtime, waste disposal, and administrative tasks, such as training and record keeping. Currently the ditch inventory is maintained on an as-needed basis, however the City has a target to maintain all ditches within the system on a 5-year cycle.

6.2.5 Stormwater Facility Inspection, Maintenance, and Restoration

Inspection of the approximate 300 City stormwater facilities is performed by a one-person crew using an inspection checklist to identify conditions that require correction. Facilities include stormwater ponds, swales, vaults, tanks, UIC, LID, and manufactured treatment devices. The checklist includes items such as observation of trash, debris, sediment, and animal or insect infestation that could impact function or future maintenance; structural damage or erosion; evidence of contamination or pollution; and the integrity and/or function of emergency overflow spillways (as applicable). The City goal is to inspect each facility once per year. On average, inspection activities require 0.75 hours for a one-person crew per location. This rate does not include mobilization and demobilization, equipment repair and other downtime, waste disposal, and administrative tasks, such as training and record keeping.

Maintenance and restoration of each facility type varies. The City has a goal of maintaining permeable pavement twice per year. On average, a four-person crew can maintain 0.3 miles of permeable pavement per hour. The maintenance of vaults, tanks, and underground injection control (UIC) wells are all accounted for under general facility maintenance in Section 6.2.9, Manufactured treatment devices are maintained by an outside contractor and included in Section 6.3.3.

Maintenance of ponds and swales (of which there are approximately 184) are performed as necessary, with the expectation of maintaining or restoring 20% of the system each year. A six-person stormwater pond crew is required for pond maintenance, while swales require a four-person crew. For the purposes

of the full-time equivalent (FTE) calculation, the expected maintenance of ponds and swales have been combined (as there are only two swales within the system). Follow-up maintenance and restoration is scheduled during the summer months. The City assigns a six-person stormwater pond/swale crew approximately 21 days per year (3 days per week for 3 out of 4 months in the summer).

After significant storms, it is recommended that some stormwater facilities be inspected to verify proper function and identify damage, if any. It is recommended that the City develop a list of facilities that should be inspected following these larger storm events.

6.2.6 Culvert Inspection and Cleaning

Culvert maintenance includes inspection and cleaning of the approximately 1,164 culverts within the storm drainage system. Culverts are typically inspected by a two-person crew, with corrective actions and cleaning performed during the inspection when possible. On average, inspection and cleaning activities require 1 hour per culvert for a two-person crew. Culvert inspection focuses on the assessment of free flow within the culvert and identifying any structural defects. Any debris that cannot be removed during the initial inspection or any noted structural concerns result in a work order for corrective action. The City goal is to inspect (and clean as necessary) each culvert once per year.

6.2.7 General Facility Maintenance and Other Field Tasks

Storm Drainage Utility M&O staff perform a number of field tasks that do not readily fall into the categories previously listed and often support other City departments. Examples of these additional storm drainage tasks include the following:

- General facility maintenance: Maintenance may include detention vault and tank cleaning and sediment removal, weir cleaning, filter inspection and cleaning, and maintenance of oil/water separators and UIC.
- Engineering support: Storm Drainage Utility M&O staff often provide facility inspection services for engineering projects and support Engineering through visual observation in the field. M&O staff also make small repairs such as replacing catch basins or failed culverts or minor drainage pipe replacement. See Section 6.7 for recommendations related to documenting M&O repair projects.

Identifying the FTE for each task identified above was not considered as a part of this Plan. Instead, the FTE for the above tasks have been combined into one group summarizing the general inspection and field tasks performed by the Storm Drainage Utility staff. The City may choose to identify the expected FTE for each task at a later date, if desired. FTE assumptions are summarized in Section 6.6.

6.2.8 Storm Drainage Utility Overhead

The Storm Drainage Utility is responsible for ensuring routine operations are carried out as described above. To do so, several tasks not readily assigned to any one of the routine operation categories must be performed. Examples of these tasks are listed below:

- Training: Staff must be trained in routine field operations as well as the general order of processes required before and after field operations
- Record keeping and map maintenance: The utility ensures the results of routine operations are recorded and updated with condition assessments and mapped appropriately. The utility also notes any other field observations that may require further investigation. Additional details regarding this topic are given in Section 6.5.

- Equipment repair: Staff must address equipment malfunctions and necessary repairs, as needed.
- Preparation: Time is needed to prepare for routine operations

These tasks are expected for each routine operation previously described, but they have not been allocated to the specific tasks. For the purposes of resource planning, overhead is expected to account for 10% of the available staffing time.

6.3 Routine Operations Provided to the Storm Drainage Utility

This section discusses routine operations performed by other City staff or by contracted services in support of the Storm Drainage Utility. Each subsection provides a brief description of the M&O activity. FTE efforts for these activities are funded by the Storm Drainage Utility. Because Vegetation Maintenance staff primarily support the Storm Drainage Utility (approximately 60% of total staff effort), these staff are included in the existing staffing requirements discussed in Section 6.6.

6.3.1 Vegetation Maintenance

Vegetation maintenance is performed by Vegetation Maintenance Division full-time and seasonal staff that support City Storm Drainage Utility M&O staff. Vegetation maintenance includes mowing, herbicide application, seeding and replanting, and removal of nuisance vegetation or vegetation that impairs the function of storm drainage facilities. In the fall, vegetation maintenance also includes removal of leaves that can accumulate and block flow to catch basins (performed as needed).

Full-time Storm Drainage Utility staff may also perform limited vegetation maintenance as part of the routine operations discussed in Section 6.2.

6.3.2 Stormwater Pump Station Maintenance

Maintenance of the seven pump stations within the City storm drainage system is performed by Sanitary Sewer Utility staff because they have pump specialists who perform all pump station maintenance. Sanitary ewer Utility staff perform scheduled weekly and monthly maintenance inspections, as described in the City of Auburn Sewer Comprehensive Plan Update and summarized below.

Pump station maintenance activities include both weekly and monthly inspections and include checking lubrication, seals, valves, and general cleanliness of pump stations, as well as cleaning out sumps and trash racks.

6.3.3 Manufactured Treatment Device Maintenance

As described in Section 6.2.5, manufactured treatment devices are inspected by city staff annually to identify conditions that require additional, unscheduled maintenance. Such conditions could include excess sediment accumulation, damaged piping, or vault and access cover damage. Manufactured treatment devices are serviced by City staff, as noted in the inspections. Some proprietary media or filter units are maintained by a private contractor, as needed.

6.4 Non-Routine and Emergency Operations

The intent of the routine inspection and maintenance activities discussed in Sections 6.2 and 6.3 is to minimize, through proactive management of the stormwater facilities, the potential for conditions that could lead to emergencies. This section discusses unscheduled activities performed by Storm Drainage Utility M&O staff and describes a response plan for emergency conditions.

6.4.1 Customer Service Requests

Customer service requests, typically related to a local drainage complaint, trigger creation of a work order to inspect the affected area or stormwater facility and identify potential solutions. In some cases, relatively simple solutions, such as removal of blockages, can alleviate the issue. However, other cases require coordination with Engineering or other City departments. On average, City Storm Drainage Utility staff respond to approximately five customer service/complaint-related work orders per week. The effort required to resolve these complaints varies considerably.

Good recordkeeping helps in complaint resolution by ensuring that all relevant data are gathered and by serving as a reminder to resolve the complaint and notify the complainant. When a complaint is received, the following information is recorded to the extent possible:

- Name and contact information of the person making the complaint.
- Brief description of the nature of the complaint.
- Time and date the complaint was received.
- Storm Drainage Utility staff assigned to respond.

Following initial response, the complaint record gets updated to include the results of inspections and any corrective actions taken. If the complaint cannot be resolved internally within the Storm Drainage Utility, the complaint record will be forwarded to Engineering for further investigation.

Notification of any system investigation and/or action is provided to the customer making the complaint.

6.4.2 Emergency Response Program

The Storm Drainage Utility, in conjunction with the other utility divisions, has prepared an Emergency Binder as a guide on how to handle emergency situations. While the guide is by no means all-inclusive for every type of disaster, it is a valuable tool for dealing with many of the emergency situations that municipalities face. Copies of the Emergency Binder are available at the M&O Building, and at City Hall Annex with the Director.

The primary objectives of the Utilities response is ensuring public safety, restoring essential services as quickly as possible, and providing assistance to other areas as required. There is also a master response program for the entire City, as documented in the City's Comprehensive Emergency Management Plan (CEMP). The material in the CEMP provides guidance for mitigation, preparedness, responsibilities, recovery operations, training, and community education activities. Copies of the CEMP are located in each City department, the M&O Building, and the VRFA.

The utility has implemented a standby program whereby one on-call employee is designated to be the first to receive after-hours emergency calls. Most storm drainage system problems that occur outside of normal working hours are reported through the City's 911 emergency response system or a non- emergency response number. An emergency callout list is provided to the emergency operator in order to contact utility staff in case of an emergency. The primary responder to those after-hours

calls is the on-call employee. Storm Drainage Utility M&O staff have been trained to respond to system emergencies. The contacted staff assesses the situation, contacts additional staff as necessary, and then responds in accordance with established emergency response procedures.

6.4.3 Source Control Inspection Program

Per the NPDES MS4 permit, the City must implement a program to prevent pollutant-laden runoff from existing development to its MS4. A source control inventory of publicly and privately owned institutional, commercial, and industrial sites with the potential to contribute pollutants to the MS4 was developed in 2022 and must be updated once every 5 years. The City is required to annually inspect 20% of the sites listed in its source control inventory to assess compliance with source control requirements, evaluate the effectiveness of existing BMPs (and provide recommendations), and ensure required BMPs and actions are enacted through enforcement (as needed).

The City has hired a full-time employee to handle the SCIP. As the program is only in its second year, the required time and resources are still being evaluated. It is recommended that the City document these aspects and evaluate after 5 years. This will allow the City to develop a more accurate estimate of the required FTE for implementation of the SCIP.

6.5 Data Collection and Record-Keeping

Data collection and record-keeping functions for the Storm Drainage Utility are performed using a CMMS system called Cartegraph, a web-based commercial software package provided by Cartegraph Inc. Cartegraph integrates GIS data with utility M&O records, providing managers with overview information about system and operational performance and field crews with information related to the condition and failure history of specific stormwater facilities. The City currently uses Cartegraph to plan field staff activities (work orders), record results of both routine and non-routine maintenance, and compare actual maintenance efforts to City goals. The City recently upgraded its Cartegraph system and plans to transition toward the use of Cartegraph as an asset management tool, through which the City would optimize staffing and capital resource planning.

In recent years, the City has made considerable progress in adding asset information to Cartegraph, specifically GIS data, physical information related to size and material, and installation dates. However, to fully utilize the asset management function of Cartegraph, additional information related to risk, asset criticality, and condition is also necessary. To assist the City's transition to an asset management program, as described in Chapter 5, the attributes listed below should be used within Cartegraph to define each of the City stormwater assets (catch basin, pipe segment, stormwater pond, etc.).

Asset-specific attributes. The following asset-specific attributes are related to the asset and remain relatively unchanged over time.

- Asset ID: The unique asset number that is used by all business systems to identify an asset.
- Location: Where the asset is located (GIS).
- Installation date: The date the asset was installed.
- In-service date: The date the asset was placed into service.
- Material: The material making up the composition of the asset's structure.
- Asset class: A group of assets that share the same characteristics (e.g., ponds, pipe segments). Asset class is used to estimate replacement costs and useful life of groups of assets.
- Nameplate information and asset specifications: Important information that is used to uniquely describe an asset, such as the manufacturer name, type of asset, serial number, size, material, etc. This information is used for asset identification, replacement, and repair.

Operation-specific attributes: The following attributes are related to routine operations (inspection and repair or replacement) for each asset and must be updated afterwards accordingly.

- Replacement cost: The cost to replace the asset.
- Replacement year: The year the replacement cost data were calculated.
- Inspection date: The date the asset was inspected.
- Overall condition rating (OCR): The condition rating of the asset assigned as a result of the inspection.
- Overall condition index (OCI): A numeric score describing the condition of the asset, assigned as a result of the inspection (related to OCR).

Post-processing attributes. The attributes listed below are generated using asset-specific and operation-specific attributes data for each asset. These attributes are not manually entered. They are calculated to determine the risk associated with each asset and prioritize future work accordingly (as previously described in Chapter 5, and detailed in Appendix C).

- Useful life: The average life expectancy of the asset (life expectancy estimates for the different asset types can be found in Appendix C).
- Remaining useful life: The age of the asset (installation year – current year) subtracted from its useful life.
- Asset criticality: A value assigned to each asset that indicates how essential it is to maintain a defined LOS. Typically it is defined as a combined score based on the consequence of failure and the likelihood of failure.
  - → Criticality of failure: A score assigned to an asset on the scale of 1 to 5 that communicates the social and economic cost if the asset fails, where a score of 1 would represent an asset not expected to have extreme consequences after failure, and a score of 5 would represent an asset that may have detrimental consequences after failure. This score will not be entered manually into Cartegraph; it is determined largely based on location-based factors and will be assigned using a GIS-based spatial analysis.
  - → Likelihood of failure (condition): A score assigned to an asset on a scale of 1 to 5 that communicates the estimated time until the asset fails, where a score of 1 would represent an asset in excellent condition, and a score of 5 would represent an asset on the brink of failure. This score will not be entered manually into Cartegraph. It is initially calculated based on critical attributes (as defined in Appendix C), but after the inspection date becomes available, the results of the inspection (OCI and OCR) will supersede the estimated rank based on critical attributes in assigning a likelihood of failure score.

M&O attributes. The following M&O attributes are captured as part of the operations, maintenance, and repair history associated with each asset:

- Asset ID: The unique asset number that is used by all business systems to identify an asset. Work orders should be associated with one or more assets.
- Issue, cause, action: These codes are used to classify historical M&O activities associated with corrective actions or unplanned maintenance.
  - → Issue: What is the problem observed in the field?
  - → Cause: What is the underlying cause of the problem?
  - → Action: What was done to address the cause?

- Target hours and actual hours: Recording the estimated hours and actual hours to complete a work order can help in determining efficiency, planning workloads, and assessing repair costs.
- Target start and stop dates and actual dates: Recording the estimated and actual start and stop dates for a work order can help in determining efficiency, planning workloads, and assessing repair costs.
- Work order costs: Work order costs include labor, parts, materials, and equipment and should be accurately recorded for each work order.
- Work order type: Work order types are used to group and compare different types of work activities. Typical work order types are as follows:
  - → Capital improvement: Work associated with a CIP.
  - → Corrective maintenance: Work associated with an unplanned repair.
  - → Preventive maintenance: Work associated with a planned preventive maintenance activity (or inspection).
  - → Predictive maintenance: Work associated with predictive measures (usually for critical assets).
- Warranty information: Helps to determine assets that are under warranty and the warranty maintenance requirements.

6.6 M&O Staffing Requirements

This section outlines existing and future staffing requirements for M&O staff.

6.6.1 Existing Staffing Requirements

Existing staffing requirements for M&O activities discussed in this chapter were compiled and evaluated to determine the M&O staffing level needed to efficiently operate, maintain, repair the storm drainage system and collect and report the information necessary to properly operate system. Table 6-2 and Table 6-3 evaluate Storm Drainage Utility and Vegetation Maintenance Division staff, respectively. Each table evaluates the estimated time to conduct storm drainage system M&O tasks in the manner currently performed. Calculated days for each M&O activity are for a single person performed over an 8-hour "day." Therefore, an activity that is performed quarterly and that requires 4 hours and two M&O staff to complete would result in an annual requirement of 4 days.

Table 6-2. Existing Storm Drainage System Maintenance and Staffing Requirements

Work activity	FTE days required annually	Assumptions/City goal
Catch basin and manhole inspection, cleaning, and repair		
Catch basin inspection	270	Inspect once every 2 years, total of 10,800 catch basins. Perform 40 inspections per day with 2-person crew.
Manhole inspection	79	Inspect once every 4 years, total of 3,172 manholes. Perform 20 inspections per day with 2-person crew.
Catch basin cleaning	68	1 cleaning is required for every 10 inspections. 2-person crew, 0.25 hour each.

Table 6-2. Existing Storm Drainage System Maintenance and Staffing Requirements (continued)

Work activity	FTE days required annually	Assumptions/City goal
Manhole cleaning	32	1 cleaning is required for every 10 inspections. 2-person crew, 0.4 hour each.
Catch basin/manhole repair	155	310 repairs (approximately 5% of all inspected) per year. 2-person crew, 0.5 hours each.
Stormwater pipeline cleaning		
Pipeline cleaning	67	City expects 50,688 ft per year (entire system in 25 years). 2-person crew can clean 1,500 ft of pipe per day.
Stormwater outfall inspection, cleaning, and maintenance		
Inspection/Cleaning	124	City goal is 2 times per year (124 total outfalls). 2-person crew, 2 hours each.
Maintenance	2	City expects 10% of annual outfall inspections to require an additional maintenance visit. 2-person crew, 0.5 hours each.
Maintenance and restoration of drainage ditches, stormwater ponds/swales, and permeable pavement		
Drainage ditch maintenance and restoration	166	City's goal is once every 5 years. 6-person crew, 200 ft per hour.
Stormwater pond and swale maintenance and restoration	28	6-person crew expected to maintain/restore 20% of the ponds and swales within the system per year.
Permeable pavement maintenance and restoration	9	City's goal is 2 times per year (approximately 89,000 square feet). 4-person crew, 0.3 miles per hour.
Stormwater facility inspection		
Stormwater facility inspection	28	City goal is once per year for each facility (approximately 300 total). Includes ponds, swales, vaults, tanks, UIC, LID, and manufactured treatment devices" 1-person crew, 0.75 hours each.
Culvert inspection and cleaning		
Culvert inspection and cleaning	291	City goal of once per year for each of 1,164 culverts. 2-person crew, 1 hour each.
Other stormwater M&O activities		
General facility maintenance and other field tasks	26	1 day per week. 2-person crew, 2 hours each.
Customer service requests/complaints	65	5 requests per week.[a] 2-person crew, 1 hour each.
Utility overhead for routine operations		
FTE total for Routine Operations	1410	
Overhead	141	Assumed 10% of FTE total.
Data entry	130	20 hours per week total (8 people at 0.5 hours per day).

Table 6-2. Existing Storm Drainage System Maintenance and Staffing Requirements (continued)

Work activity	FTE days required annually	Assumptions/City goal
SCIP		
Implementation of SCIP	260	FTE reflects the full-time employee who will be implementing the SCIP. 1 person, 52 weeks per year, 40 hours per week.
Subtotal	1,941	
Total	2,135	Assumes 10% unquantified work
Total number of working days available per FTE	221	365 minus weekends (104), holidays (12), vacation (15), sick (12) and training (1).
Number of FTEs required	9.7	2,135 days required divided by 221 days per FTE year.
Current funded FTEs	10.0	10 full-time staff dedicated to field inspection and maintenance.

Note: FTE = full-time equivalent. FTE days are defined as 8 hours.

a. Many customer service requests are related to maintenance needs for privately owned drainage systems.

Table 6-3. Existing Vegetation Maintenance and Staffing Requirements

Work activity	FTE days required annually	Assumptions/City goal
Pond/Vegetation Management		
Mowing	683	6-person crew, 40 hours per week for 7 months
Weeding/Spraying	152	4-person crew, 20 hours per week for 7 months
Weed Control/Herbicide Spraying		
Weed Control/Herbicide Spraying	59	2-person crew, 3 days per week for 6 months
ROW and Ditch Mowing		
Staff 1	137	40 hours per week for 9 months
Staff 2	49	2 days per week for 8 months
Tree Trimming and Removal		
Tree Trimming and Removal	173	4-person crew, 40 hours per week for 4 months
Leaf Removal		
Leaf Removal	390	2-person crew, 40 hours per week for 12 months
Total	1,641	
Total number of working days available per FTE	221	365 minus weekends (104), holidays (12), vacation (15), sick (12), and training (1).
Number of FTEs required	7.4	1,641 days required divided by 221 days per FTE year
Current funded FTEs	7.6	6.6 FTE 3 seasonal staff

Note: FTE = full-time equivalent. FTE days are defined as 8 hours.

Table 6-2 shows that the Storm Drainage Utility meets the base level of staffing required with respect to meeting current City proactive goals for M&O activities. Additional staffing needs required to implement future regulatory requirements and recommended management activities are discussed in Section 6.6.2. Table 6-3 shows that there is adequate staffing to meet current vegetation maintenance needs of the Storm Drainage Utility.

6.6.2 Future Staffing Requirements and Equipment Needs

The M&O activities discussed in Section 6.2 and summarized in Table 6-2 are current efforts and do not include additional activities that will be required as part of the revised NPDES MS4 permit. In order to implement newly recommended asset management tasks with respect to drainage ditches and pipe inspection (see Table 6-4), additional staffing may be required. Future staffing requirements are summarized in the sections below.

6.6.2.1 Drainage Ditch Maintenance Program

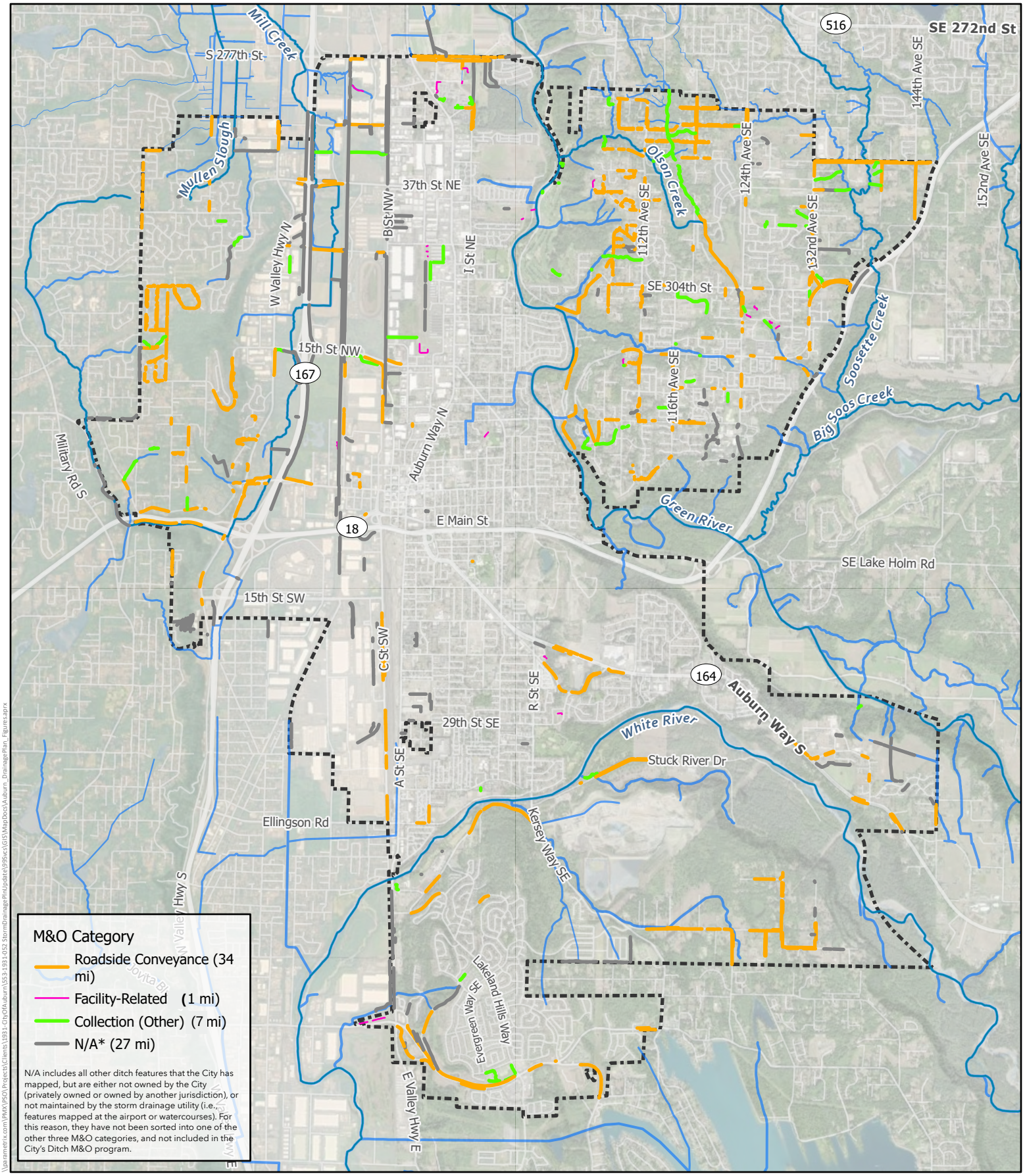
The City's ditch maintenance program was reviewed by Parametrix on behalf of this Plan to determine if additional controls and resources are required to meet needs and address potential liabilities. As a result of the review, it is recommended that the City categorize ditches according to the anticipated M&O needs (roadside ditch, facility-related, and collection [other]) and incorporate inspection as a new aspect in the ditch maintenance program. Figure 6-1 shows the extent of the City's ditch inventory and the recommended categorization according to M&O needs.

Roadside ditches are expected to require constant maintenance. Additional or enhanced actions are not anticipated at this time but could be an outcome of an enhanced maintenance program that could be proposed or required under the NPDES MS4 permit. The collection ditches will require additional routine maintenance, such as annual mowing and sediment removal. Facility-related ditches are recommended to be maintained and inspected with the facilities they are related to. This will require adjusting the City's goal of maintenance frequency.

Inspection will involve field verifying the condition, updating the asset inventory with findings, and generating a work order (as needed). Work orders will ensure the appropriate staff are aware of the issue (M&O, vegetation, office staff, etc.). Features in need of action are prioritized, and that work is scheduled appropriately. The following items will require consideration in incorporating the proposed ditch maintenance program.

- How does inspection turn into a work order?
- How often should ditches be inspected?
- What are the thresholds for action?

Because the inspection process is new, it is expected to take time to understand the staff and time needed as well as to set an achievable goal for inspection of the entire system. To begin to understand the expectation of M&O staff, starting estimates were developed for consideration. For the purposes of this Plan, inspection is anticipated to require a one-person crew to inspect 500 feet of ditch per hour, and it is recommended to inspect all ditches within the program annually. Further, the frequency and resources needed for this program should be evaluated every 5 years.



Date: 5/10/2024
Sources: City of Auburn, King County, Pierce County, WA Ecology, WA DNR, USGS, ESRI
Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes.

Figure 6-1
City Drainage Ditch Inventory
Maintenance & Operations (M&O) Categorization
Stormwater Drainage Utility
Comprehensive Storm Drainage Plan

Parametrix | City of Auburn Washington

For the near-term future ditch program, additional analysis and resource streams have been identified. The proposed ditch inspection program and recordkeeping will be initiated. New protocols for finding, adding, mapping, and classifying ditches in the system are needed and should primarily focus on collector and facility ditches. Newly added ditches will require ownership and responsibility research and subsequent easements or purchase. The ditch inspections may reveal system failures that require minor capitol repairs or replacement. The projects should be added as a programmatic CIP. In addition, an assessment to consider ditch improvements for water quality improvement will be prepared, focused on roadside ditches.

The findings and recommendations of the drainage ditch maintenance program have been discussed in further detail in Appendix E.

Taking this into consideration, the City will need to increase the expectation of overall Storm Drainage Utility staffing in order to dedicate more staff to drainage ditch maintenance and restoration (see Table 6-4). It is recommended that the City consider adjusting from the current levels to a regulated biannual basis for maintaining the its ditch inventory. In addition, it would be recommended to inspect the ditch inventory annually to prioritize ditches for maintenance. In order to meet this goal, approximately 363 FTE days (with a six-person crew), or 1.6 FTE per year would be needed (see Table 6-4).

6.6.2.2 Stormwater Pipe Inspection

As explained in Chapter 5.2, the City has a goal to implement an inspection prioritization program for its stormwater pipe system. The program will prioritize inspection for pipes with the highest likelihood of failure scores, which are generally those that are older, have little to no critical attribute data on record, or have no recorded history inspection. As part of the inspection process, feature attributes will be added/updated to the CMMS system, resulting in a robust pipe inventory and a more efficient use of resources. In the beginning of the program, there will be a greater number of pipes with high likelihood of failure scores (approximately 52,000 feet of pipe) since there is a large amount of missing feature data, and approximately 15,000 feet of the City's pipe system per year is expected to have surpassed its expected useful life (see Appendix C).

They City will slowly expand its pipe inspection program as time and finances allow, beginning with periodic use of the Sanitary Sewer Utility's closed-circuit television (CCTV) equipment on an as-needed basis. Since the CCTV equipment will be used as-needed, it is not anticipated to require additional FTE days at this time and has not been included in Table 6-4. Dedicated equipment for the storm utility will be investigated and worked into future budget cycles.

"Lamping" inspections, where the camera is inserted into the manhole or catch basin but not advanced through the pipe system, are typically performed as a first step of the CCTV process. Although the visual range is limited, lamping can identify structures and piping that are in very good condition. In these cases, no additional CCTV inspection would be necessary. Lamping can be utilized in many areas to get a baseline and can be done with current equipment. It is not a full substitute for CCTV inspections but will help get the program going before additional equipment can be purchased.

6.6.2.3 Other M&O Activities

The NPDES MS4 permit requires the City to implement a municipal street sweeping program to target high-priority areas (see Section 5.3). The City will need to review the existing street sweeping program and ensure the permit requirements are addressed or revised, as necessary. The new requirements are not anticipated to require additional FTE days for sweeping crews.

Table 6-4. Future Storm Drainage System Maintenance and Staffing Requirements

Work activity	FTE days required annually	Assumptions/City goal
Drainage ditch maintenance program		
Drainage ditch inspection	55	1-person crew, 500 ft per hour. Inspection of the entire system (~220,000 ft) annually.
Roadside ditch maintenance and restoration	327	6-person crew, 200 ft per hour. Expect to maintain the entire category (79% of drainage ditch inventory) every 2 years.
Collector-ditch maintenance and restoration	79	6-person crew, 200 ft per hour. Expect to maintain the entire category (20% of drainage ditch inventory) every 2 years.
Facility-related ditch maintenance and restoration	20	6-person crew, 200 ft per hour. Expect to maintain (1% of drainage ditch inventory) at the same time as maintenance occurs for the related facility (annually).
Total	530	Assumes 10% unquantified work
Additional FTE required for ditch maintenance and restoration	363	Subtracting the existing staffing goal (166 FTE days) to understand the additional need.
Total number of working days available per FTE	221	365 minus weekends (104), holidays (12), vacation (15), sick (12), and training (1).
Number of FTEs required	1.6	363 days required divided by 221 days per FTE year.

Note: FTE = full-time equivalent

6.6.2.4 Equipment Considerations

The Storm Drainage Utility utilizes the Sanitary Sewer Utility's reallocated CCTV inspection equipment and truck. New equipment would allow for increased efficiency and inspection frequency. It is recommended that the City consider the benefit of acquiring a CCTV for the Storm Drainage Utility after the pipe inspection program has been in effect for 5 years.

6.7 Potential Improvement Opportunities and Capital Needs

The Storm Drainage Utility has a positive track record for M&O, as evidenced by the limited need for non-routine maintenance and few customer service complaints about the City's drainage system. Routine facility cleaning, regular inspections, experienced staff, and a well-planned storm drainage system contribute to that success. Additionally, significant increases to the drainage ditch maintenance and pipeline inspection program could be addressed by the City by adding to the current Storm Drainage Utility M&O staff. An additional 1.6 FTEs are required to achieve proactive City M&O goals (Table 6-4).

Based upon discussions with City staff and analysis of M&O activities discussed in this chapter, the following improvement opportunities are available to the Storm Drainage Utility. These opportunities are based on improving existing services, regulatory compliance, and improving work productivity:

- Continue to integrate asset management with existing utility management software (Cartegraph and GIS).
  - → Continue to add GIS attributes to known Storm Drainage Utility assets.
  - → Perform and document condition assessments. Use defined criteria (such as leaks/cracks observed, cleanliness, and other specific measures), and provide staff training to ensure assessment consistency.
  - → Use results of condition assessments to move toward risk-based maintenance to best utilize staff resources. For example, consistently high assessment scores would result in a lower risk or need for maintenance, allowing M&O staff to be diverted to more essential activities.
  - → Over time, demonstrate (through maintenance records) that a subset of City catch basins do not require inspection, cleaning, and maintenance every 2 years per the NPDES MS4 permit.
- Reevaluate the inspection frequency and expected effort for the pipe inspection and ditch maintenance programs to adjust as needed.
- Consider obtaining a CCTV inspection equipment for pipe inspection the following utility equipment to improve M&O efficiency.
- Consider aligning catch basin cleaning with stormwater pipeline cleaning and CCTV to ensure efficient use of available resources.
- All M&O repair projects should be constructed to established City engineering standards. It is recommended that the City develop a more formal procedure for tracking M&O repair projects to ensure that as-built and GIS records are updated when repairs are completed.
- Develop a list of facilities that should be inspected following major design storms and inspect accordingly to verify proper function and identify damage, if any.
- Document the time and resources required on behalf of the SCIP program. Evaluate the resource need of the program after 5 years. This will allow the City to develop a more accurate estimate of the required FTE for implementation of the SCIP.
- Continue to develop the ditch maintenance program as broken down in the steps below.
  - → Ditch mapping and classification: Develop protocols for finding, adding, mapping, and classifying ditches within the system. Focus primarily on collector and facility ditches. Accurate mapping and classification will help prioritize maintenance efforts.
  - → Adding new ditches: Consider the steps required when adding new ditches to the system. Elements to address include determining ownership, responsibility, and any necessary easements or land purchases. Having a clear plan in place ensures smooth integration of new ditches.
  - → System failures and CIP: Use the results of regular ditch inspections to identify system failures. System failures may include erosion, blockages, or other issues that require capital repair or replacement. Add a program to the CIP to address ditches with these system failures.

- → Water quality improvements: Implement a program that focuses on retrofitting ditches with water quality enhancements. Specifically target roadside ditches, which play a crucial role in managing runoff and pollutant removal.

- Coordinate with the Street division to review and revise the City's street sweeping plan, as needed.

7. Capital Improvements

This chapter describes the recommended capital improvement plan for the City of Auburn Storm Drainage Utility. Of the 12 CIPs described in this chapter, 4 are included in the 6-year plan (2025–2030) and 8 are included in the 20-year plan (2031–2044). The 6-year plan includes the highest priority CIPs that address existing drainage problems, address an ongoing waste disposal issue, and ensure compliance with NPDES MS4 permit deadlines. The 20-year plan addresses longer-term capital goals (see Chapter 8). This Plan contains timeframes that are the intended framework for future funding decisions and within which future actions and decisions are intended to occur. However, these time frames are estimates and, depending on factors involved in the processing of applications and project work and the availability of funding, the timing may change. The framework, which may depend on available funding resources, does not represent actual commitments by the City of Auburn.

In general, CIPs are modifications to stormwater drainage infrastructure designed to improve the condition and function of the drainage system so that it can meet the LOS goals established for the City's Storm Drainage Utility (see Chapter 3). CIPs may also be developed to ensure the utility is able to carry out routine operations and ensure compliance with permit requirements.

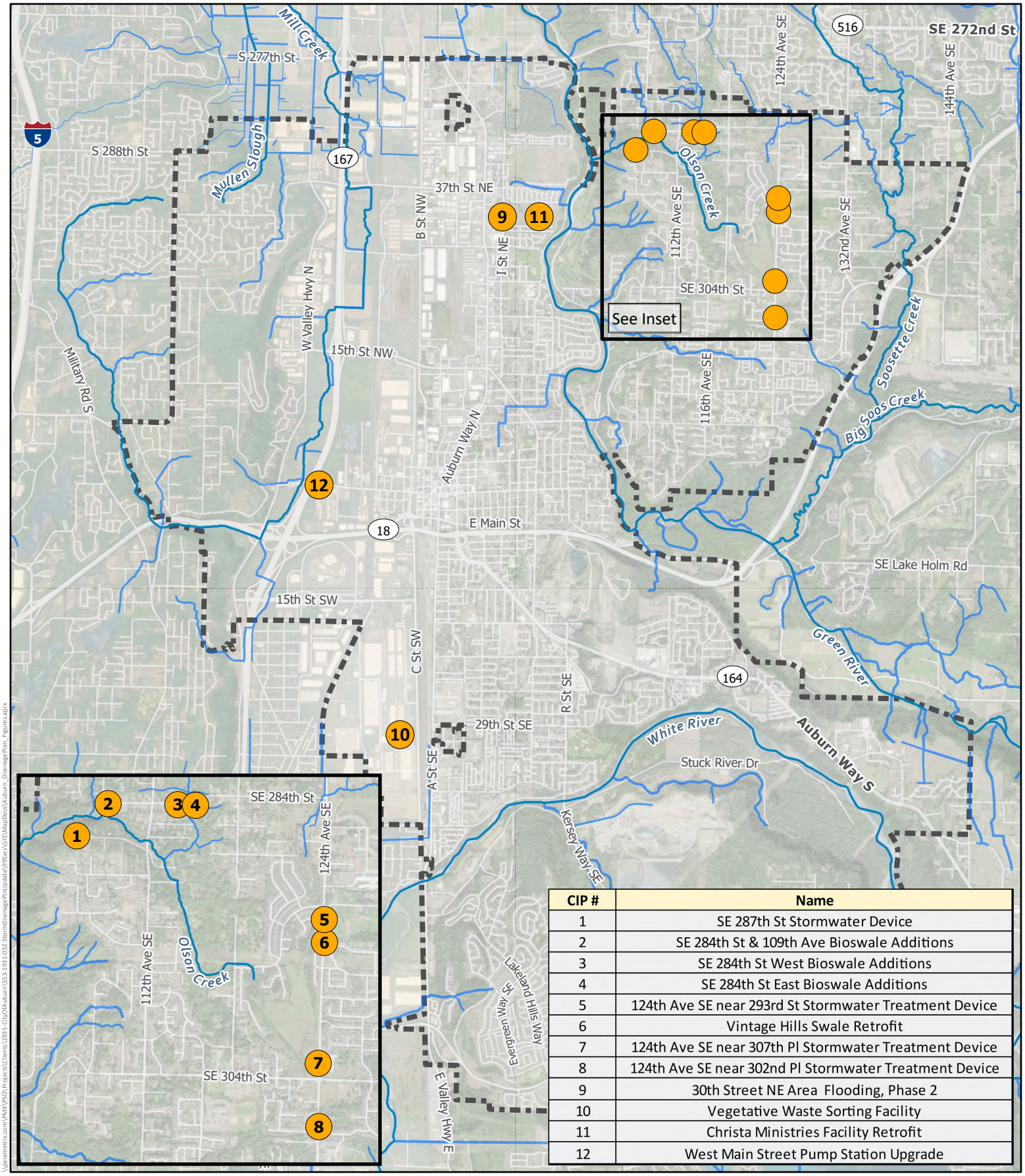
The CIPs presented in this chapter were identified and developed through focused investigations and by working collaboratively with City staff. This focused and collaborative approach was based on the practical consideration that the quantity and delivery of CIPs the City can implement is limited by existing revenue streams and staff availability. The intent is to produce an economical capital improvement plan that addresses the most salient issues in the near term, while still planning for the long-term ability of the Storm Drainage Utility to meet LOS goals. The following steps were used to develop the CIPs.

A list of potential projects was developed for further investigation. The list was developed by working closely with City staff to identify the delayed projects from the 2015 Plan that were still necessary or beneficial to the Utility, locate and characterize existing problems based on direct staff observations, recognize potential opportunities for enhancement, and address needs of the utility. Projects that were generated on behalf of the SMAP for Olsen Creek were also included in this list. Such observations are a valuable supplement to modeling analyses and, in this case, were used in conjunction with modeling activities to assist with model development.

For the potential projects that required H&H analyses, modeling was completed using PCSWMM, a software package that uses GIS technology to import and export data, allowing a seamless transition between the system inventories and modeling input files. Models used the historical event that most closely produced a once per 25-year flow rate (the specific event varied by basin). Results from historical events were used to assess the extent and severity of the drainage problem. Results from the design event were used to understand the feasibility of the potential project in mitigating the drainage problem.

Potential projects were developed and discussed with members of the City staff to identify the most viable alternative/solution. Potential projects were then evaluated based on their potential benefit and feasibility, and a final list was developed. Once the projects were defined, the project team developed concept-level cost estimates.

An overview of project locations is shown in Figure 7-1. Section 7.1 describes a tiered method for establishing project priorities. Section 7.2 presents detailed descriptions of CIPs. Section 7.3 describes programmatic drainage projects.



CIP #	Name
1	SE 287th St Stormwater Device
2	SE 284th St & 109th Ave Bioswale Additions
3	SE 284th St West Bioswale Additions
4	SE 284th St East Bioswale Additions
5	124th Ave SE near 293rd St Stormwater Treatment Device
6	Vintage Hills Swale Retrofit
7	124th Ave SE near 307th Pl Stormwater Treatment Device
8	124th Ave SE near 302nd Pl Stormwater Treatment Device
9	30th Street NE Area Flooding, Phase 2
10	Vegetative Waste Sorting Facility
11	Christa Ministries Facility Retrofit
12	West Main Street Pump Station Upgrade

Date: 5/9/2024
Sources: City of Auburn, King County, Pierce County, WA Ecology, WA DNR, USGS, ESRI
Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes.

Auburn City Limits
Watercourse
CIP Location

0 ¼ ½ 1 Miles

Figure 7-1
Capital Improvement Project (CIP) Locations
Stormwater Drainage Utility
Comprehensive Storm Drainage Plan

Parametrix | City of Auburn Washington

7.1 Project Prioritization

Storm Drainage Utility staff prioritized CIPs by grouping them into one of three tiers. Projects in the top tier, or highest priority, are classified as tier 1. Projects with medium priority are classified as tier 2. And projects with lowest priority relative to the other projects are considered tier 3.

The following items were considered when prioritizing the CIPs:

- The magnitude of the LOS gap that would be addressed by a CIP. For example, a project that rectifies an annual flooding problem would rank higher than a project in a different area that eliminates less frequent flooding.
- The reduction in risk and reduction in consequences associated with a CIP. For example, the consequence of flooding that occurs near critical facilities (e.g., hospital or fire station) or along major arterial streets may be larger than flooding along residential streets. A CIP that addresses a larger consequence would rank higher.
- The opportunity for coordination with ongoing City of Auburn street improvements or other utility or transportation projects. Coordinated projects that reduce the overall cost of a CIP would rank higher.
- The capital funding capacity of the Storm Drainage Utility. The overall list of project priorities attempts to balance the need for action with the funding and implementation capacity of the Storm Drainage Utility.
- The action deadlines necessary for compliance with the NPDES MS4 permit.
- Other considerations with the potential to improve water quality, reductions in maintenance, and increased reliability of the system.

Priorities for each project are included in each project description in the following sections. Project priority and budgetary constraints were considered together in developing the year-by-year schedules for project implementation in the 6- and 20-year capital improvement plans (see Chapter 8).

7.2 Proposed Capital Improvement Projects

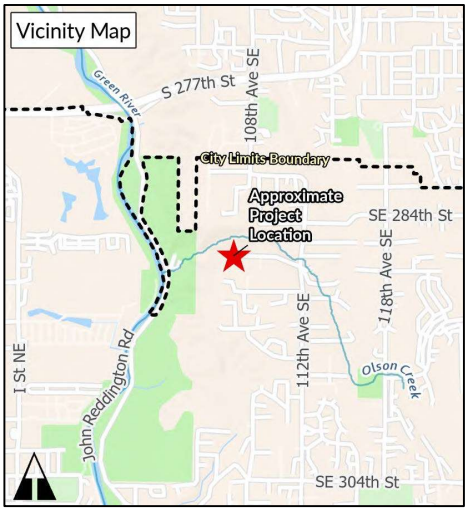
CIPs described in this section were developed as part of this Plan and are described in sufficient detail to allow the City to proceed with budgeting and design. Project descriptions are organized into summaries containing the following information:

- Project number: CIP numbers generally assigned to align with the number given in the SMAP (as applicable) for consistency.
- Project name: A short, descriptive name assigned to each project.
- Project type: A brief description of the specific type of project being undertaken, used to categorize and identify the purpose or focus of the project.
- Location: A simple description of the project location, such as the cross streets.
- Existing and proposed use: A summary of the existing and proposed site conditions.
- Drainage basin: The receiving water drainage basin where the project is situated.
- Tributary drainage area: Area (in acres) that drains to the project (as applicable).
- Total cost: The estimated cost of the project, based on the attached opinion (estimate) of probable cost.

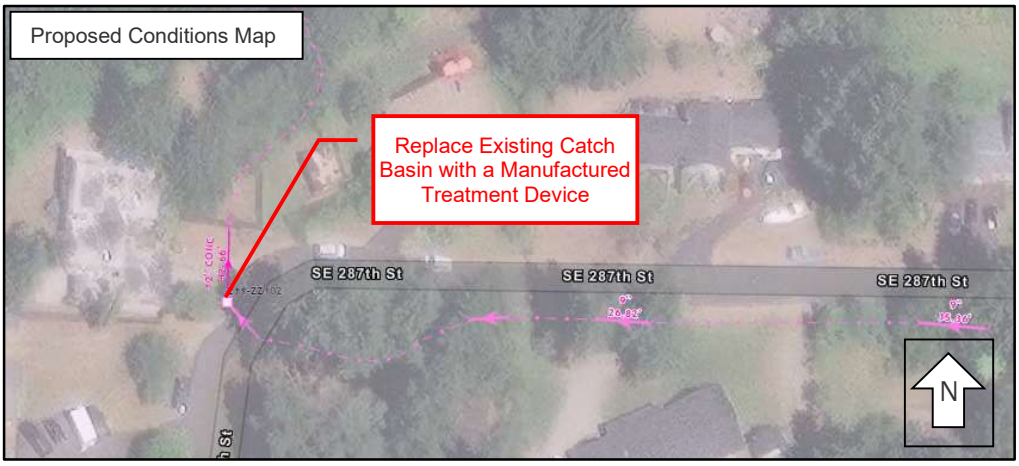
- Project description: A description of the proposed project, including major project elements and sizes.
- Site opportunities: The anticipated opportunities and benefits of the project.
- Site challenges: The anticipated challenges in undertaking the project.
- Opinion (estimate) of probable cost: A list of estimated costs, including construction costs, engineering and administrative costs, taxes, and contingency costs. The estimate was developed based on the conceptual design, preliminary quantity take-offs, and estimated unit costs. Estimated unit costs were based on bids from the WSDOT Unit Bid Tab, vendor quotes, and escalated project costs from recent projects with similar components.
- Vicinity map: A figure showing the location of the project relative to the City of Auburn.
- Proposed conditions figures: Figures showing the conceptual design and location of project elements.

CIP summaries and cost opinions are presented on the following pages.

CIP 1 – SE 287th Street Stormwater Device
6-Year Capital Improvement Plan (Priority 1)







RETROFIT TYPE
Road retrofit
Manufactured treatment device

LOCATION
At the end of SE 287th Street

EXISTING USE
ROW

PROPOSED USE
ROW with enhanced runoff treatment

DRAINAGE BASIN
Olson Creek

TRIBUTARY DRAINAGE AREA
7.3 acres total
2.0 acres impervious

TOTAL COST (2024 DOLLARS)
$427,000

Project Description

This project is proposing to replace the existing Type 1 catch basin with a stormwater treatment technology reviewed and certified by the Washington state Technology Assessment Protocol – Ecology (TAPE) program to provide 7.3 acres with enhanced water quality treatment. This project would provide treatment for approximately 700 linear feet of roadway. The catch basin replacement will likely be low complexity since there is existing infrastructure in place and traffic control needs will be low. Final size, placement, and configuration of the project components may be adjusted as the design progresses.

Site Opportunities

- Low traffic control requirements.

Site Challenges

- Water quality only, no flow control.
- Need site survey to confirm catch basin is located within City ROW.

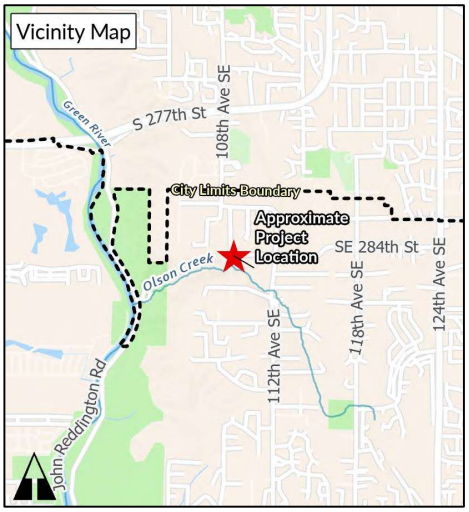
Opinion (Estimate) of Probable Cost

Project Name	CIP 1 - SE 287th Street Stormwater Device
Location	At the end of SE 287th Street (Near 10624 SE 287th Street, Auburn, WA 98092)

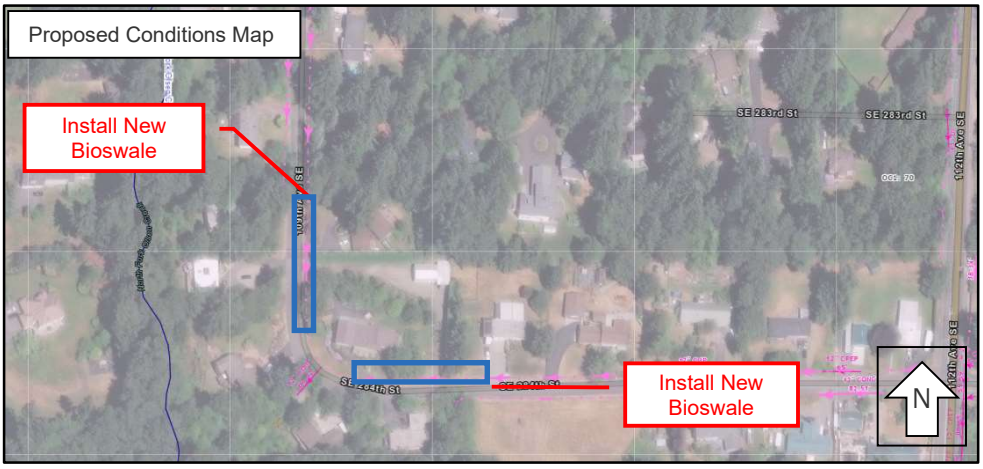
ITEM NO.	SPEC SECTION	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST
		SITE PREP AND TESC				
1		MOBILIZATION (10%)	10%	% of lines 5-13		$14,442
2		CONTRACTOR PROVIDED SURVEY (3%)	3%	% of lines 5-13		$4,332
3		TESC (5%)	5%	% of lines 5-13		$7,221
4		DEWATERING (2%)	2%	% of lines 5-13		$2,888
					Lines 1 - 4 Subtotal	**$28,883**
		MATERIALS				
5		SAWCUTTING	56	LF	$31	$1,715
6		PAVEMENT REMOVAL/RESTORATION	11	SY	$220	$2,347
7		ENHANCED MEDIA FILTER SYSTEM 6X8	2	EA	$60,000	$120,000
8		CONNECTION TO DRAINAGE STRUCTURE	4	EA	$3,415	$13,661
9		STRUCTURE EXCAVATION CLASS A INCL. HAUL	44	CY	$41	$1,824
10		SHORING OR EXTRA EXCAVATION CLASS B	1	LS	$1,000	$1,000
11		STRUCTURE EX AND SHORING LABOR (50% OF EACH)	50	% of lines 9-10		$1,412
12		CRUSHED SURFACING BASE COURSE	3	TN	$54	$176
13		RECORD DRAWINGS	1	LS	$2,280	$2,280
					Lines 5 - 13 Subtotal	**$144,416**
					Subtotal Line-Item Costs	**$173,299**
					Design Contigency 50%	**$86,649**
					Permitting 5%	**$8,665**
					Design 25%	**$43,325**
					City Project Mgmt. Admin. 5%	**$8,665**
					Construction Management 25%	**$43,325**
					Management Reserve 10%	**$17,330**
					TOTAL PROJECT COST	**$382,000**

CIP 2 – SE 284th Street & 109th Avenue SE Bioswale Additions

20-Year Capital Improvement Plan (Priority 3)







RETROFIT TYPE
Road retrofit
New bioswales

LOCATION
SE 284th Street and 109th Avenue SE

EXISTING USE
ROW (vegetated and gravel driveway)

PROPOSED USE
ROW with basic runoff treatment

DRAINAGE BASIN
Olson Creek

TRIBUTARY DRAINAGE AREA
20.6 acres total
3.0 acres impervious

TOTAL COST (2024 DOLLARS)
$143,000

Project Description

This project will retrofit a section of SE 284th Street by adding two bioswale ditch enhancements. The bioswales will provide basic water quality treatment to 20.6 acres, including approximately 2,300 linear feet of roadway. Final size, placement, and configuration of the project components may be adjusted as the design progresses.

Site Opportunities

- Treatment can be situated within ROW.
- Provides some flow control.

Site Challenges

- Clearing and grubbing required.

Opinion (Estimate) of Probable Cost

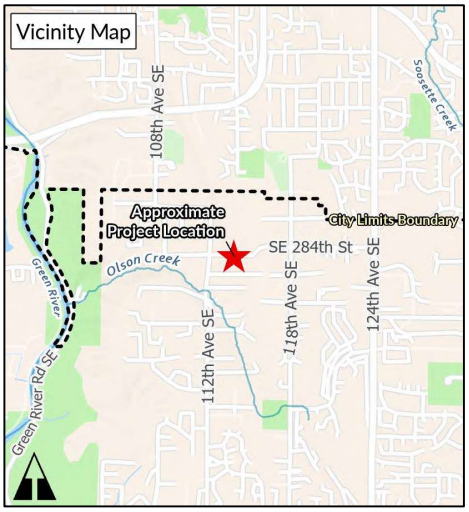
Project Name	CIP 2 - SE 284th Street & 109th Avenue SE Bioswale Additions
Location	SE 284th Street and 109th Avenue SE

ITEM NO.	SPEC SECTION	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST
		SITE PREP AND TESC				
1		MOBILIZATION (10%)	10%	% of lines 5-9		$5,390
2		CONTRACTOR PROVIDED SURVEY (3%)	3%	% of lines 5-9		$1,617
3		TESC (5%)	5%	% of lines 5-9		$2,695
4		DEWATERING (2%)	2%	% of lines 5-9		$1,078
					Lines 1 - 4 Subtotal	**$10,781**
		MATERIALS				
5		CLEARING AND GRUBBING	0.1	ACRE	$10,000	$1,045
6		CHANNEL EXCAVATION INCL. HAUL	169	CY	$40	$6,724
7		TOPSOIL TYPE A	253	SY	$66	$16,599
8		COMPOST BLANKET	42	SY	$8	$337
9		SEEDING, FERTILIZING, AND MULCHING	506	SY	$58	$29,200
					Lines 5 - 9 Subtotal	**$53,904**
					Subtotal Line-Item Costs	**$64,685**
					Design Contigency **50%**	**$32,343**
					Permitting **5%**	**$3,234**
					Design **25%**	**$16,171**
					City Project Mgmt. Admin. **5%**	**$3,234**
					Construction Management **25%**	**$16,171**
					Management Reserve **10%**	**$6,469**
					TOTAL PROJECT COST	**$143,000**

Parametrix

CIP 3 – SE 284th Street West Bioswale Additions

6-Year Capital Improvement Plan (Priority 1)





RETROFIT TYPE
Road retrofit
New bioswales

LOCATION
Along SE 284th Street

EXISTING USE
ROW

PROPOSED USE
ROW with basic runoff treatment

DRAINAGE BASIN
Olson Creek

TRIBUTARY DRAINAGE AREA
2.2 acres total
1.1 acres impervious

TOTAL COST (2024 DOLLARS)
$52,000



Project Description

This project will retrofit a section of SE 284th Street by adding two bioswale ditch enhancements to the side of the road. The bioswales will provide basic water quality treatment to 2.2 acres, including approximately 700 linear feet of roadway. Final size, placement, and configuration of the project components may be adjusted as the design progresses.

Site Opportunities

- Treatment can be situated within ROW.
- Provides some flow control.

Site Challenges

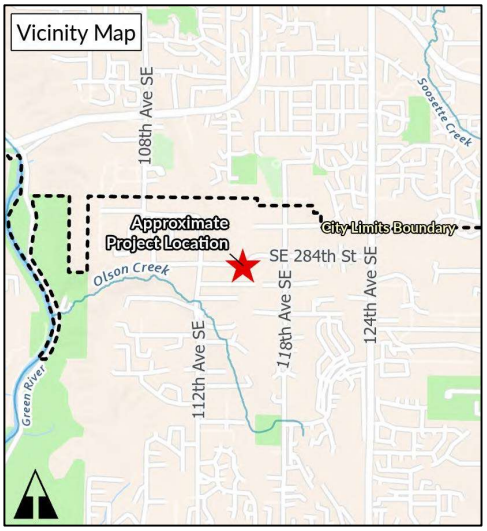
- Clearing and grubbing required.

Opinion (Estimate) of Probable Cost

Project Name	CIP 3 - SE 284th Street West Bioswale Additions
Location	Along SE 284th Street (Near 11429 SE 284th Street, Auburn, WA 98082)

ITEM NO.	SPEC SECTION	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST
		SITE PREP AND TESC				
1		MOBILIZATION (10%)	10%	% of lines 6-10		$1,719
2		CONTRACTOR PROVIDED SURVEY (3%)	3%	% of lines 6-10		$516
3		TESC (5%)	5%	% of lines 6-10		$860
4		DEWATERING (2%)	2%	% of lines 6-10		$344
5		PROJECT TEMPORARY TRAFFIC CONTROL (15%)	15%	% of lines 6-10		$2,579
					Lines 1 - 5 Subtotal	**$6,017**
		MATERIALS				
6		CLEARING AND GRUBBING	0.04	ACRE	$10,000	$419
7		CHANNEL EXCAVATION INCL. HAUL	68	CY	$40	$2,698
8		TOPSOIL TYPE A	34	SY	$66	$2,221
9		COMPOST BLANKET	17	SY	$8	$135
10		SEEDING, FERTILIZING, AND MULCHING	203	SY	$58	$11,718
					Lines 6 - 10 Subtotal	**$17,192**
					Subtotal Line-Item Costs	**$23,209**
					Design Contigency **50%**	**$11,604**
					Permitting **5%**	**$1,160**
					Design **25%**	**$5,802**
					City Project Mgmt. Admin. **5%**	**$1,160**
					Construction Management **25%**	**$5,802**
					Management Reserve **10%**	**$2,321**
					TOTAL PROJECT COST	**$52,000**

CIP 4 – SE 284th Street East Bioswale Additions
20-Year Capital Improvement Plan (Priority 3)





RETROFIT TYPE
Road retrofit
New bioswale

LOCATION
Along SE 284th Street

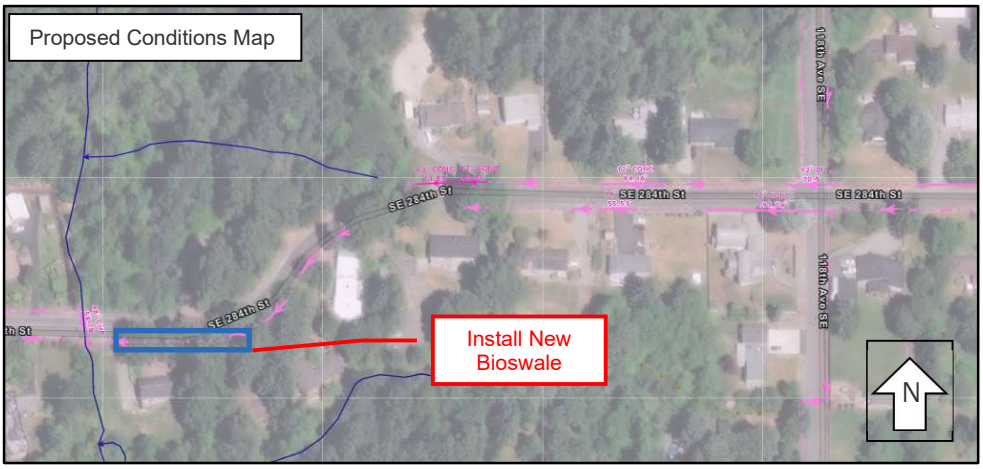
EXISTING USE
Roadside ditch

PROPOSED USE
Roadside bioswale

DRAINAGE BASIN
Olson Creek

TRIBUTARY DRAINAGE AREA
1.8 acres total
0.8 acres impervious

TOTAL COST (2024 DOLLARS)
$28,000



Project Description

This project will retrofit a section of SE 284th Street by adding a bioswale ditch enhancement to the side of the road. This bioswale will provide basic water quality treatment to 1.8 acres, including approximately 1,600 linear feet of roadway. Final size, placement, and configuration of the project components may be adjusted as the design progresses.

Site Opportunities

- Treatment can be situated within ROW.
- Provides some flow control.

Site Challenges

- Clearing and grubbing required.

Opinion (Estimate) of Probable Cost

Project Name	CIP 4 - SE 284th Street East Bioswale Additions
Location	Along SE 284th Street (Near 11619 SE 284th Street, Auburn, WA 98082)

ITEM NO.	SPEC SECTION	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST
		SITE PREP AND TESC				
1		MOBILIZATION (10%)	10%	% of lines 6-10		$932
2		CONTRACTOR PROVIDED SURVEY (3%)	3%	% of lines 6-10		$280
3		TESC (5%)	5%	% of lines 6-10		$466
4		DEWATERING (2%)	2%	% of lines 6-10		$186
5		PROJECT TEMPORARY TRAFFIC CONTROL (15%)	15%	% of lines 6-10		$1,398
					Lines 1 - 5 Subtotal	**$3,262**
		MATERIALS				
6		CLEARING AND GRUBBING	0.02	ACRE	$10,000	$227
7		CHANNEL EXCAVATION INCL. HAUL	37	CY	$40	$1,463
8		TOPSOIL TYPE A	18	SY	$66	$1,204
9		COMPOST BLANKET	9	SY	$8	$73
10		SEEDING, FERTILIZING, AND MULCHING	110	SY	$58	$6,353
					Lines 6 - 10 Subtotal	**$9,321**
					Subtotal Line-Item Costs	**$12,583**
					Design Contigency **50%**	**$6,292**
					Permitting **5%**	**$629**
					Design **25%**	**$3,146**
					City Project Mgmt. Admin. **5%**	**$629**
					Construction Management **25%**	**$3,146**
					Management Reserve **10%**	**$1,258**
					TOTAL PROJECT COST	**$28,000**

CIP 5 – 124th Avenue SE near SE 293rd Street Stormwater Treatment Device

20 Capital Improvement Plan (Priority 2)





RETROFIT TYPE
Road retrofit
Manufactured treatment device

LOCATION
124th Avenue SE near SE 293rd Street

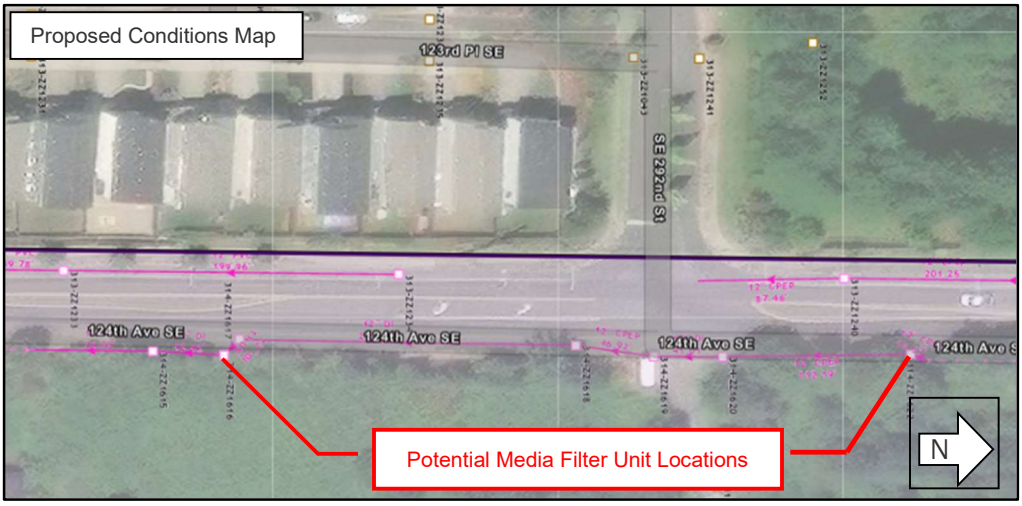
EXISTING USE
Untreated ROW

PROPOSED USE
ROW with enhanced runoff treatment

DRAINAGE BASIN
Olson Creek

TRIBUTARY DRAINAGE AREA
14.1 acres total
2.4 acres impervious

TOTAL COST (2024 DOLLARS)
$581,000



Project Description

This project will retrofit a section of 124th Avenue SE by replacing existing Type 1 catch basins with TAPE-approved manufactured treatment devices. The manufactured treatment devices will provide enhanced water quality treatment to 14.1 acres, including approximately 800 linear feet of roadway. Final size, placement, and configuration of the project components may be adjusted as the design progresses.

Site Opportunities

- Provides enhanced stormwater treatment for a high traffic roadway.

Site Challenges

- May be constrained by outlet height.
- Coordination with other utilities.

Opinion (Estimate) of Probable Cost

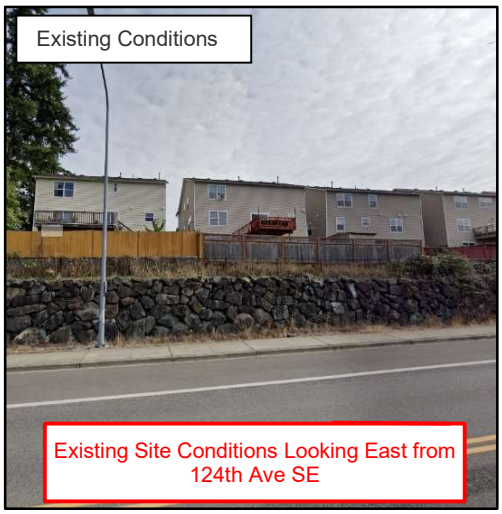
Project Name	CIP 5 - 124th Avenue SE near SE 293rd Street Stormwater Treatment Device
Location	Along 124th Avenue SE near SE 293rd Street

ITEM NO.	SPEC SECTION	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST
		SITE PREP AND TESC				
1		MOBILIZATION (10%)	10%	% of lines 6-16		$19,562
2		CONTRACTOR PROVIDED SURVEY (3%)	3%	% of lines 6-16		$5,868
3		TESC (5%)	5%	% of lines 6-16		$9,781
4		DEWATERING (2%)	2%	% of lines 6-16		$3,912
5		PROJECT TEMPORARY TRAFFIC CONTROL (15%)	15%	% of lines 6-16		$29,342
					Lines 1 - 5 Subtotal	**$68,466**
		MATERIALS				
6		UTILITY RELOCATION (SMALL)	1	LS	$15,000	$15,000
7		PAVEMENT REMOVAL/RESTORATION	52	SY	$220	$11,489
8		REMOVE CEMENT CONCRETE CURB AND GUTTER	20	LF	$14	$274
9		ENHANCED MEDIA FILTER SYSTEM 6X10	2	EA	$68,000	$136,000
10		CONNECTION TO DRAINAGE STRUCTURE	4	EA	$3,415	$13,661
11		STRUCTURE EXCAVATION CLASS A INCL. HAUL	52	CY	$41.04	$2,128
12		SHORING OR EXTRA EXCAVATION CLASS B	1	LS	$1,000	$1,000
13		STRUCTURE EX AND SHORING LABOR (50% OF EACH)	50	% of lines 11-12		$1,564
14		CRUSHED SURFACING BASE COURSE	4	TN	$54	$220
15		SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.	100	LF	$120	$12,000
16		RECORD DRAWINGS	1	LS	$2,280	$2,280
					Lines 6 - 16 Subtotal	**$195,616**
					Subtotal Line-Item Costs	**$264,082**
					Design Contigency **50%**	**$132,041**
					Permitting **5%**	**$13,204**
					Design **25%**	**$66,020**
					City Project Mgmt. Admin. **5%**	**$13,204**
					Construction Management **25%**	**$66,020**
					Management Reserve **10%**	**$26,408**
					TOTAL PROJECT COST	**$581,000**

Parametrix

CIP 6 – Vintage Hills Swale Retrofit
20-Year Capital Improvement Plan (Priority 1)





RETROFIT TYPE
Existing facility retrofit
Swale soil amendment

LOCATION
Along 124th Avenue SE

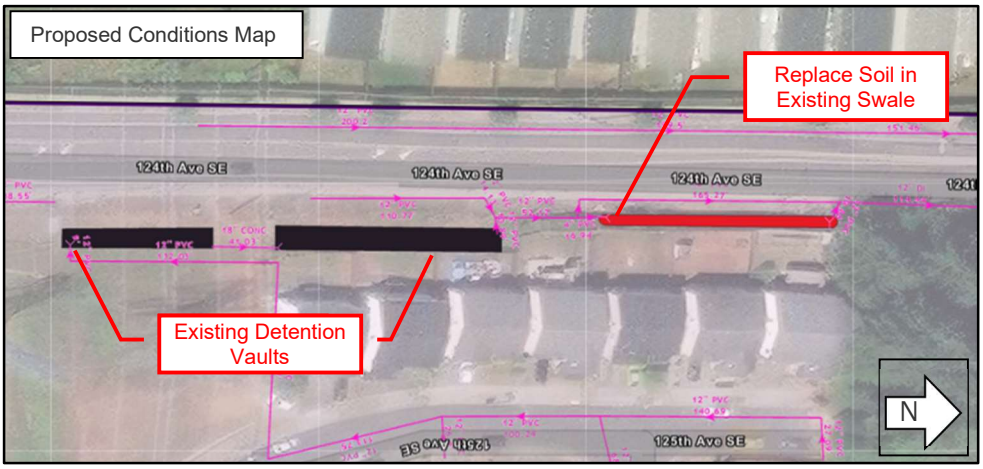
EXISTING USE
Bioswale

PROPOSED USE
Bioretention swale with enhanced treatment

DRAINAGE BASIN
Olson Creek

TRIBUTARY DRAINAGE AREA
5.0 acres total
1.1 acres impervious

TOTAL COST (2024 DOLLARS)
$264,000



Project Description

This project is proposing to amend the soil in the existing Vintage Hills swale. The soil will be replaced from conventional soil to bioretention soil to provide enhanced treatment for 5.0 acres. Rock check dams may be required throughout the length of the swale to ensure infiltration occurs to provide treatment. Final size, placement, and configuration of the project components may be adjusted as the design progresses.

Site Opportunities

- Upgrading vintage basic treatment to enhanced treatment.

Site Challenges

- Water quality only, no flow control (though flow control is provided by the detention vaults).

Opinion (Estimate) of Probable Cost

Project Name	CIP 6 - Vintage Hills Swale Retrofit
Location	Along 124th Avenue SE (Near 29501 125th Avenue SE, Auburn, WA 98082)

ITEM NO.	SPEC SECTION	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST
		SITE PREP AND TESC				
1		MOBILIZATION (10%)	10%	% of lines 6-13		$10,458
2		CONTRACTOR PROVIDED SURVEY (3%)	3%	% of lines 6-13		$3,137
3		TESC (5%)	5%	% of lines 6-13		$5,229
4		DEWATERING (2%)	2%	% of lines 6-13		$2,092
5		PROJECT TEMPORARY TRAFFIC CONTROL (15%)	15%	% of lines 6-13		$15,687
					Lines 1 - 5 Subtotal	**$20,915**
		MATERIALS				
6		CHANNEL EXCAVATION INCL. HAUL	151	CY	$40	$6,012
7		EROSION CONTROL BLANKET	75	SY	$9	$687
8		18" BIORETENTION SOIL	750	SF	$120	$90,000
9		COMPOST BLANKET	75	SY	$8	$603
10		QUARRY SPALLS	6	TN	$70	$424
11		TRASH RACK	1	EA	$500	$500
12		SEEDING, FERTILIZING, AND MULCHING	75	SY	$58	$4,351
13		RECORD DRAWINGS	1	LS	$2,000	$2,000
					Lines 6 - 13 Subtotal	**$104,577**
					Subtotal Line-Item Costs	**$125,492**
					Design Contigency 50%	**$62,746**
					Permitting 5%	**$6,275**
					Design 15%	**$18,824**
					City Project Mgmt. Admin. 5%	**$6,275**
					Construction Management 25%	**$31,373**
					Management Reserve 10%	**$12,549**
					TOTAL PROJECT COST	**$264,000**

Parametrix

CIP 7 – 124th Avenue SE near SE 307th Place Stormwater Treatment Device

20-Year Capital Improvement Plan (Priority 2)





RETROFIT TYPE
Road retrofit
Manufactured treatment device

LOCATION
124th Avenue SE near SE 307th Place

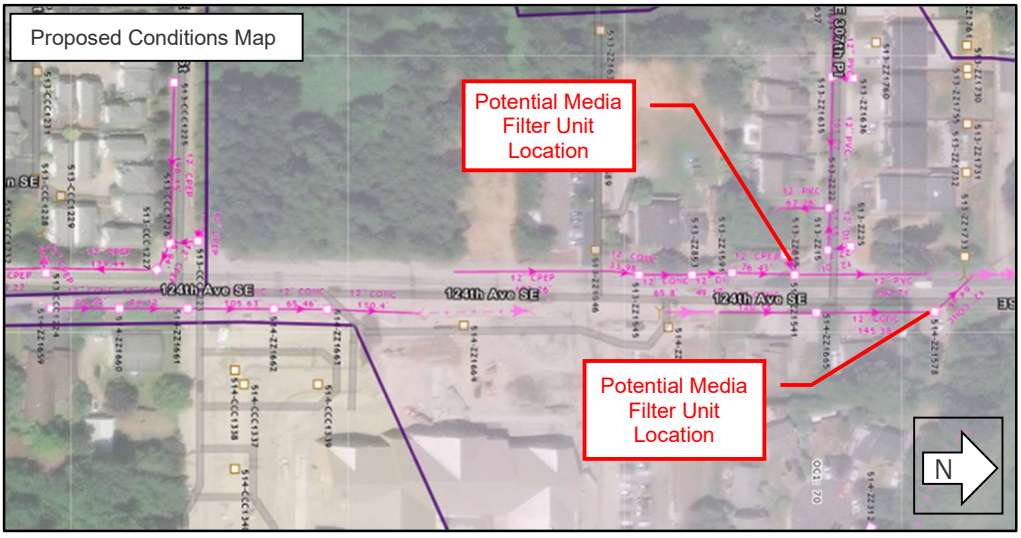
EXISTING USE
Untreated ROW

PROPOSED USE
ROW with enhanced runoff treatment

DRAINAGE BASIN
Olson Creek

TRIBUTARY DRAINAGE AREA
5.9 acres total
1.4 acres impervious

TOTAL COST (2024 DOLLARS)
$531,000



Project Description

This project will retrofit a section of 124th Avenue SE by replacing existing Type 1 catch basins with TAPE-approved manufactured treatment devices. The manufactured treatment devices will provide enhanced water quality treatment to 5.9 acres, including approximately 1,200 linear feet of roadway. Final size, placement, and configuration of the project components may be adjusted as the design progresses.

Site Opportunities

- Provides enhanced stormwater treatment for a high traffic roadway.

Site Challenges

- May be constrained by outlet height.
- Coordination with other utilities.
- Traffic control requirements.

Opinion (Estimate) of Probable Cost

Project Name	CIP 7 - 124th Avenue SE near SE 307th Place Stormwater Treatment Device
Location	124th Avenue SE near SE 307th Place

ITEM NO.	SPEC SECTION	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST
		SITE PREP AND TESC				
1		MOBILIZATION (10%)	10%	% of lines 6-16		$17,847
2		CONTRACTOR PROVIDED SURVEY (3%)	3%	% of lines 6-16		$5,354
3		TESC (5%)	5%	% of lines 6-16		$8,924
4		DEWATERING (2%)	2%	% of lines 6-16		$3,569
5		PROJECT TEMPORARY TRAFFIC CONTROL (15%)	15%	% of lines 6-16		$26,771
					Lines 1 - 5 Subtotal	**$62,466**
		MATERIALS				
6		UTILITY RELOCATION (SMALL)	1	LS	$15,000	$15,000
7		PAVEMENT REMOVAL/RESTORATION	50	SY	$220	$10,902
8		REMOVE CEMENT CONCRETE CURB AND GUTTER	16	LF	$14	$219
9		ENHANCED MEDIA FILTER SYSTEM 6X8	2	EA	$60,000	$120,000
10		CONNECTION TO DRAINAGE STRUCTURE	4	EA	$3,415	$13,661
11		STRUCTURE EXCAVATION CLASS A INCL. HAUL	44	CY	$41.04	$1,824
12		SHORING OR EXTRA EXCAVATION CLASS B	1	LS	$1,000	$1,000
13		STRUCTURE EX AND SHORING LABOR (50% OF EACH)	50	% of lines 11-12		$1,412
14		CRUSHED SURFACING BASE COURSE	3	TN	$54	$176
15		SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.	100	LF	$120	$12,000
16		RECORD DRAWINGS	1	LS	$2,280	$2,280
					Lines 6 - 16 Subtotal	**$178,475**
					Subtotal Project Cost	**$240,941**
					Design Contigency 50%	**$120,470**
					Permitting 5%	**$12,047**
					Design 25%	**$60,235**
					City Project Mgmt. Admin. 5%	**$12,047**
					Construction Management 25%	**$60,235**
					Management Reserve 10%	**$24,094**
					TOTAL PROJECT COST	**$531,000**

Parametrix

CIP 8 – 124th Avenue SE near SE 302nd Place Stormwater Treatment Device

20-Year Capital Improvement Plan (Priority 2)





RETROFIT TYPE
Road retrofit
Manufactured treatment device

LOCATION
124th Avenue SE near SE 302nd Place

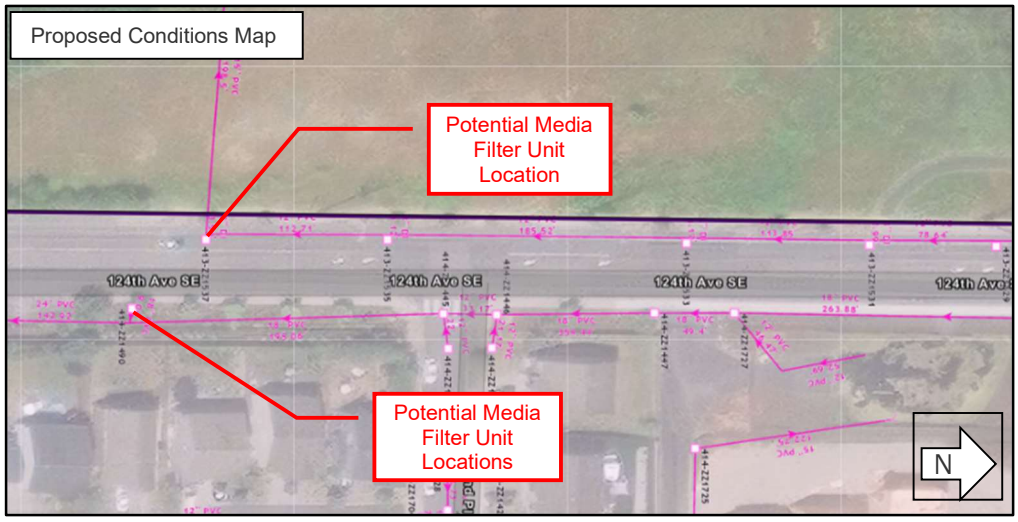
EXISTING USE
Untreated ROW

PROPOSED USE
ROW with enhanced runoff treatment

DRAINAGE BASIN
Olson Creek

TRIBUTARY DRAINAGE AREA
2.9 acres total
1.3 acres impervious

TOTAL COST (2024 DOLLARS)
$531,000



Project Description

This project will retrofit a section of 124th Avenue SE by replacing existing Type 1 catch basins with a TAPE-approved manufactured treatment devices. The manufactured treatment devices will provide enhanced water quality treatment to 2.9 acres, including approximately 1,600 linear feet of roadway. Final size, placement, and configuration of the project components may be adjusted as the design progresses.

Site Opportunities

- Provides enhanced stormwater treatment for a high traffic roadway.

Site Challenges

- May be constrained by outlet height.
- Coordination with other utilities.
- Traffic control requirements.

Opinion (Estimate) of Probable Cost

Project Name	CIP 8 - 124th Avenue SE near SE 302nd Place Stormwater Treatment Device
Location	124th Avenue SE near SE 302nd Place

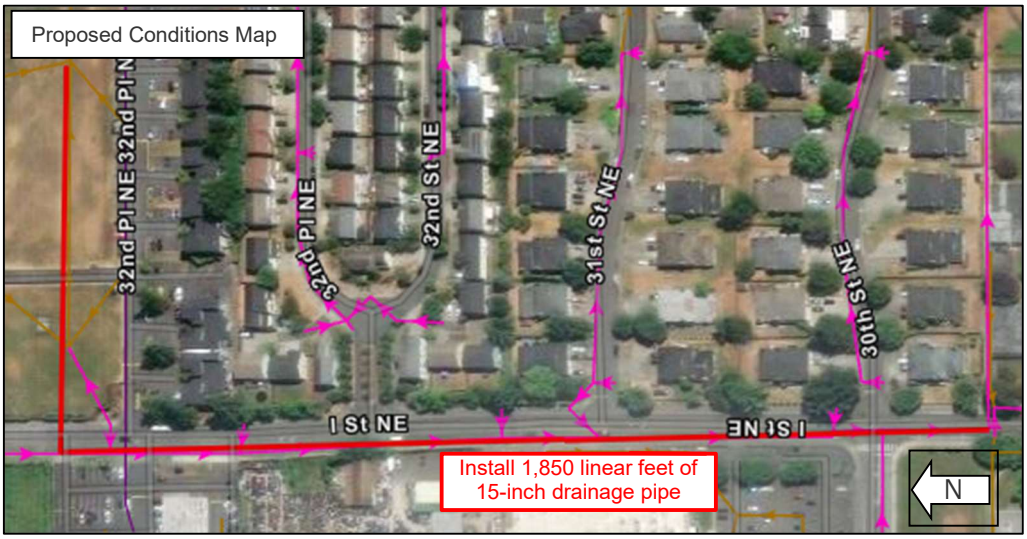
ITEM NO.	SPEC SECTION	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST
		SITE PREP AND TESC				
1		MOBILIZATION (10%)	10%	% of lines 6-16		$17,847
2		CONTRACTOR PROVIDED SURVEY (3%)	3%	% of lines 6-16		$5,354
3		TESC (5%)	5%	% of lines 6-16		$8,924
4		DEWATERING (2%)	2%	% of lines 6-16		$3,569
5		PROJECT TEMPORARY TRAFFIC CONTROL (15%)	15%	% of lines 6-16		$26,771
					Lines 1 - 5 Subtotal	**$62,466**
		MATERIALS				
6		UTILITY RELOCATION (SMALL)	1	LS	$15,000	$15,000
7		PAVEMENT REMOVAL/RESTORATION	50	SY	$220	$10,902
8		REMOVE CEMENT CONCRETE CURB AND GUTTER	16	LF	$14	$219
9		ENHANCED MEDIA FILTER SYSTEM 6X8	2	EA	$60,000	$120,000
10		CONNECTION TO DRAINAGE STRUCTURE	4	EA	$3,415	$13,661
11		STRUCTURE EXCAVATION CLASS A INCL. HAUL	44	CY	$41.04	$1,824
12		SHORING OR EXTRA EXCAVATION CLASS B	1	LS	$1,000	$1,000
13		STRUCTURE EX AND SHORING LABOR (50% OF EACH)	50	% of lines 11-12		$1,412
14		CRUSHED SURFACING BASE COURSE	3	TN	$54	$176
15		SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.	100	LF	$120	$12,000
16		RECORD DRAWINGS	1	LS	$2,280	$2,280
					Lines 6 - 16 Subtotal	**$178,475**
					Subtotal Line-Item Costs	**$240,941**
					Design Contigency 50%	**$120,470**
					Permitting 5%	**$12,047**
					Design 25%	**$60,235**
					City Project Mgmt. Admin. 5%	**$12,047**
					Construction Management 25%	**$60,235**
					Management Reserve 10%	**$24,094**
					TOTAL PROJECT COST	**$531,000**

Parametrix

CIP 9 – 30th Street NE Area Flooding, Phase 2
20-Year Capital Improvement Plan (Priority 3)







RETROFIT TYPE
Road retrofit
Upgraded conveyance system

LOCATION
East of I Street NE between 32nd Street NE and 35th Street NE

EXISTING USE
Conveyance system

PROPOSED USE
New conveyance system and upgraded pipe

DRAINAGE BASIN
Mill Creek and Green River

TRIBUTARY DRAINAGE AREA
Unknown

TOTAL COST (2024 DOLLARS)
$1,186,000

NOTES
Cost, design, figures, and description completed by Brown & Caldwell in 2015. Cost and description updated by Parametrix per City comments

Project Description

The north-central area of Auburn has a history of surface flooding with street flooding occurring once every few years. The residential development east of I Street NE between 32nd Street NE and 35th Street NE discharges flows into a City-owned infiltration area. The infiltration area commonly experiences prolonged periods of standing water due to high groundwater from extended high flows in the Green River, which is adjacent to the infiltration area. The drainage system on I Street NE currently lacks infrastructure to collect and convey stormwater away from the infiltration area, as well as residential roadways and parking area. Ponding occurs within the parking areas of the developments and presents a nuisance and potential hazard to local residents.

This project is Phase 2 of a three-phased capital improvement project (Relieve 30th Street NE Area Flooding) from the 2015 Comprehensive Stormwater Drainage Plan. The goal of the 2015 CIP was to increase the capacity of the 30th Street NE system to reduce flooding along 30th Street NE and to provide capacity to connect other flooding drainage systems (C Street NE and I Street NE). The implementation of this CIP is occurring in phases, as funding, staff availability, and priorities allow. The first phase (30th Street NE Area Flooding, Phase 1) was scheduled for construction in 2015/2016. The next phase, referred to as CIP 9 in this Plan, is scheduled for the 2031–2044 timeframe.

This project would address the flooding adjacent to I Street NE. This project would locate a storm drain line to capture stormwater from the two residential developments currently discharging stormwater to the City's infiltration area. In addition, this project would construct a new storm drain within I Street NE southward to connect into the 42-inch-diameter storm drain (constructed as part of the 30th Street NE Area Flooding project, Phase I, from the 2015 Plan) near the intersection of I Street NE and 30th Street NE. The 42-inch-diameter line will have sufficient available capacity to convey the I Street NE flows.

Site Opportunities

- Public drainage infrastructure will be designed and maintained so that the annual chance of a flooding disruption that inundates the city roadways to an impassable level occurs no more than once every 25 years.
- Public drainage infrastructure will be designed and maintained so that the annual chance of occurrence of flooding (surface water from ROW runoff entering premises and damaging building structures) will occur no more than once every 50 years.

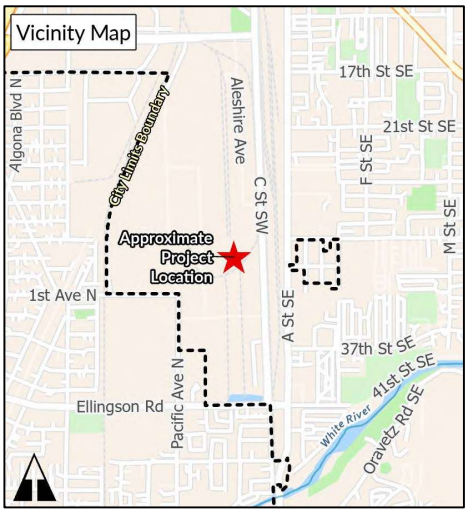
Opinion (Estimate) of Probable Cost

Project Name	CIP 9 - 30th Street NE Area Flooding, Phase 2
Location	30th Street NE and I Street NE

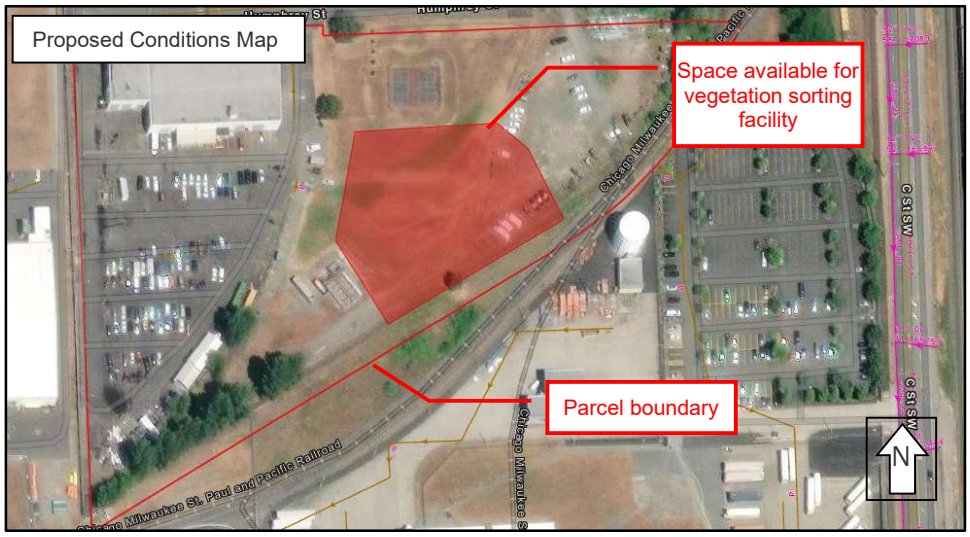
ITEM NO.	SPEC SECTION	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST
SITE PREP AND TESC						
1		CONTRACTOR OVERHEAD, PROFIT, AND MOBILIZATION	18%	% of lines 2-2		$115,380
					Lines 1 - 1 Subtotal	**$115,380**
MATERIALS						
2		2015 PROJECT (4A) 1,850 LF OF 15-IN DRAINAGE PIPE	1	LS	$641,000	$641,000
					Lines 2 - 2 Subtotal	**$641,000**
					Subtotal Line-Item Costs	**$756,380**
					Construction Contingency 20%	**$151,276**
					Sales Tax (all above costs) 9%	**$79,874**
					Subtotal Construction Costs	**$987,530**
					Permitting, design, management, and administration 20%	**$197,506**
					TOTAL PROJECT COST	**$1,186,000**

Parametrix

CIP 10 – Vegetative Waste Sorting Facility
6-Year Capital Improvement Plan (Priority 3)







RETROFIT TYPE
New waste sorting facility

LOCATION
GSA site

EXISTING USE
Shared open space

PROPOSED USE
Waste sorting facility for plant/organic material pulled from conveyance and treatment systems and facilities

DRAINAGE BASIN
White River

TRIBUTARY DRAINAGE AREA
N/A

TOTAL COST (2024 DOLLARS)
$200,000

NOTES
Cost, design, figures, and description completed by Brown & Caldwell. Cost and description updated by Parametrix per City comments.

Project Description

The Storm Drainage Utility is responsible for the M&O of the storm drainage system. Pond and drainage ditch maintenance and rehabilitation involves removal of plant material and sediments, which are considered non-hazardous and are suitable for recycling. During fall and winter, debris from storm cleanups also yield materials suitable for recycling. The Storm Drainage Utility currently uses the City-owned Jacobson Tree Farm property for storing and drying of these materials prior to hauling off-site for recycling. The property is owned by the Parks Department and is scheduled to be repurposed, precluding its use for ongoing M&O activities.

This project addresses the need for a new site to sort, dry, and store materials removed from drainage ditches, swales, and ponds during maintenance and restoration activities necessary to maintain the storm drainage system. The project property is being sourced from existing land owned by the City. The cost to develop the property and purchase equipment are represented in the project cost.

Site Opportunities

- The City shall seek to maintain storm drainage infrastructure to ensure proper function of drainage facilities in accordance with Ecology requirements.

Site Challenges

- Coordination with other users of the site.

Opinion (Estimate) of Probable Cost

Project Name	CIP 10 - Vegetative Waste Sorting Facility
Location	GSA Site

ITEM NO.	SPEC SECTION	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST
		SITE PREP AND TESC				
1		MOBILIZATION (10%)	10%	% of lines 5-5		$10,000
2		CONTRACTOR PROVIDED SURVEY (5%)	5%	% of lines 5-5		$5,000
3		TESC (5%)	5%	% of lines 5-5		$5,000
4		PROJECT TEMPORARY TRAFFIC CONTROL (5%)	5%	% of lines 5-5		$5,000
					Lines 1 - 4 Subtotal	**$25,000**
		MATERIALS				
5		2015 PROJECT (10) DEVELOP PROPERTY AND PURCHASE EQUIPMENT	1	LS	$100,000	$100,000
					Lines 5 - 5 Subtotal	**$100,000**
					Subtotal Line-Item Costs	**$125,000**
					Construction Cost Contigency **20%**	**$25,000**
					Permitting **5%**	**$6,250**
					Design **10%**	**$12,500**
					City Project Mgmt. Admin. **5%**	**$6,250**
					Construction Management **10%**	**$12,500**
					Management Reserve **10%**	**$12,500**
					TOTAL PROJECT COST	**$200,000**

CIP 11 – Christa Ministries Facility Retrofit
20-Year Capital Improvement Plan (Priority 3)





RETROFIT TYPE
Existing facility retrofit
New water quality pond

LOCATION
Christa Ministries property

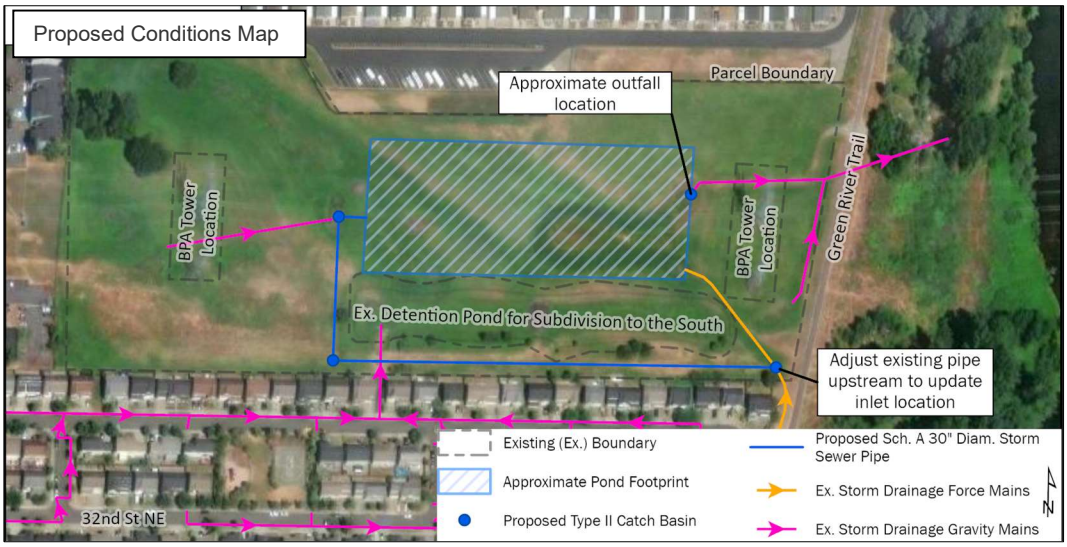
EXISTING USE
Bioswale

PROPOSED USE
Enhanced water quality treatment pond

DRAINAGE BASIN
Green River

TRIBUTARY DRAINAGE AREA
377 acres total
242 acres impervious

TOTAL COST (2024 DOLLARS)
$2,906,000



Project Description

This project proposes retrofitting an existing stormwater swale to an enhanced water qualtiy treatment pond. The pond would be sized based on current enhanced treatment standards for 377 acres of contributing area before discharging into the Green River. Final size, placement, and configuration of the project components may be adjusted as the design progresses.

Site Opportunities

- The location may be suited to provide educational signage due to surrounding residential areas and the Green River Trail to the east.
- Provides enhanced water quality treatment of stormwater from large contributing drainage area based on current standards.

Site Challenges

- Adjacent utilities will likely require coordination (sewer, water, gas, and communications) and may constrain placement locations of the treatment systems.
- Field verification of stormwater infrastructure will be necessary to ensure project feasibility.
- Verification of inlet and outlet pipe elevations will need to be verified to determine feasibility.
- Coordination with BPA easement will be needed.
- A condition assessment of the existing storm pipe at the proposed outfall will be required to evaluate whether repair or replacement will be necessary.
- A wetland impact mitigation analysis will be needed.

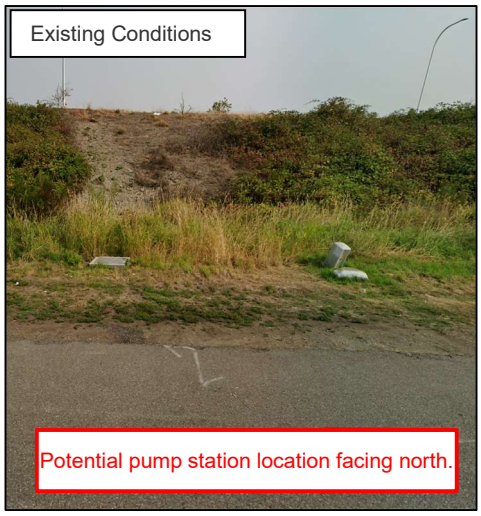
Opinion (Estimate) of Probable Cost

Project Name	CIP11 - Christa Ministries Facility Retrofit
Location	Christa Ministries Property (Southeast in 35th St NE & I St NE intersection)

ITEM NO.	SPEC SECTION	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST
		SITE PREP AND TESC				
1		MOBILIZATION (10%)	10%	% of lines 1-4		$107,010
2		CONTRACTOR PROVIDED SURVEY (6%)	6%	% of lines 1-4		$64,206
3		TESC (5%)	5%	% of lines 1-4		$53,505
4		PROJECT TEMPORARY TRAFFIC CONTROL (3%)	3%	% of lines 1-4		$32,103
					Lines 1 - 4 Subtotal	**$256,825**
		MATERIALS				
5		CLEARING AND GRUBBING	4	ACRE	$45,471	$175,703
6		CHANNEL EXCAVATION INCL. HAUL	7,065	CY	$39	$275,535
7		COMMON BORROW INCL. HAUL	1,445	CY	$30	$43,350
8		EMBANKMENT COMPACTION	1,445	CY	$9	$13,005
9		SCHEDULE A STORM SEWER PIPE 30 IN. DIAM.	1,190	LF	$311	$370,090
10		CATCH BASIN TYPE 2 60 IN. DIAM.	3	EACH	$9,978	$29,934
11		CONNECTION TO DRAINAGE STRUCTURE	2	EACH	$3,535	$7,070
12		QUARRY SPALLS	18	TON	$68	$1,224
13		GRAVEL MAINTENANCE ROAD	3,028	SY	$32	$96,882
14		CATCH BASIN TYPE 2 72 IN. DIAM.	1	EACH	$11,877	$11,877
15		SEEDING, FERTILIZING, AND MULCHING (BY ACRE)	4	ACRE	$10,205	$39,433
16		RECORD DRAWINGS	1	LS	$6,000.00	$6,000
					Lines 5 - 16 Subtotal	**$1,070,103**
					Subtotal Line-Item Costs	**$1,326,927**
				Construction Cost Contingency	**30%**	**$398,078**
				Permitting	**9%**	**$119,423**
				Design (Including Contingency)	**40%**	**$530,771**
				City Project Mgmt. Admin.	**10%**	**$132,693**
				Construction Management	**20%**	**$265,385**
				Management Reserve	**10%**	**$132,693**
					TOTAL PROJECT COST	**$2,906,000**

CIP 12 – West Main Street Pump Station Upgrade
6-Year Capital Improvement Plan (Priority 1)





RETROFIT TYPE
Existing facility retrofit
Pump station upgrade

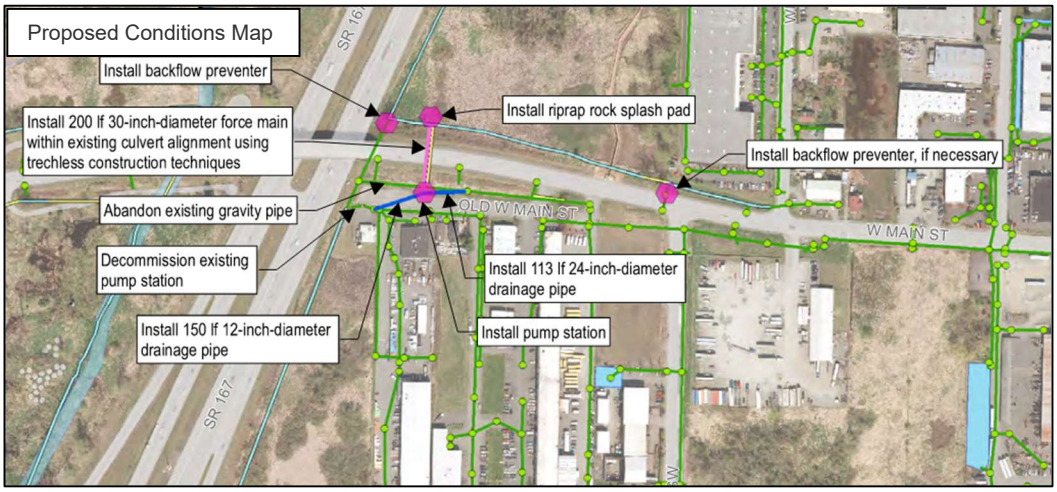
LOCATION
South of West Main Street, east of the SR 167 overpass

EXISTING USE
Pump station

PROPOSED USE
Upgraded pump station

DRAINAGE BASIN
Mill Creek

TRIBUTARY DRAINAGE AREA
N/A



TOTAL COST (2024 DOLLARS)
$3,929,000

NOTES
Cost, design, figures, and description completed by Brown & Caldwell. Cost and description updated by Parametrix per City comments.

Site Opportunities

This project consists of building a new pump station sized to convey the peak 25-year flow rate with multiple pumps to meet the pump redundancy LOS. The new pump station would convey all flows from the gravity pipe on the north and south sides of Old West Main Street. The pump station and its associated area pipes will be reassessed for overall function and purpose. A new design for the pump station will be created that will allow for adequate pumping capacity and a new discharge location that will alleviate backflow flooding from Mill Creek and its drainage ditches.

Site Opportunities

- Meet pump redundancy LOS goal.
- Address history of local flooding.

Site Challenges

- May require post-construction monitoring to determine whether an additional backflow preventer is warranted.
- Discharges to WSDOT ditch may require additional coordination with WSDOT.

Opinion (Estimate) of Probable Cost

Project Name	CIP 12 -West Main Street Pump Station Upgrade
Location	South of West Main Street east of the SR 167 overpass

ITEM NO.	SPEC SECTION	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST
		SITE PREP AND TESC				
1		WETLAND PERMITTING AND MITIGATION	20%	% of construction subtotal		$302,000
2		CONTRACTOR OVERHEAD, PROFIT, AND MOBILIZATION	18%	% of construction subtotal		$271,800
					Lines 1 - 2 Subtotal	**$573,800**
		MATERIALS				
3		2015 PROJECT (1) STORMWATER PUMP STATION WITH SCADA/TELEMETRY	1	LS	$999,000	$999,000
4		2015 PROJECT (1) GRAVITY PIPING: 150 FT OF 12-INCH-DIAMETER PIPE AND 113 FT OF 24-INCH-DIAMETER PIPE	1	LS	$114,000	$114,000
5		2015 PROJECT (1) FORCE MAIN: 200 FT OF 30-INCH-DIAMETER FORCE MAIN, ABANDON CULVERT, RIPRAP ROCK SPLASH PAD AT CULVERT OUTFALL	1	LS	$343,000	$343,000
6		2015 PROJECT (1) ANCILLARY IMPROVEMENTS: DECOMMISION EXISTING STATION, INSTALL BACKFLOW PREVENTER ON WSDOT CULVERT	1	LS	$54,000	$54,000
					Lines 3 - 6 Subtotal	**$1,510,000**
					Subtotal Line-Item Costs	**$2,083,800**
					Construction Contingency 30%	**$625,140**
					Sales Tax (all above costs) 9%	**$238,387**
					Subtotal Construction Costs	**$2,947,327**
					Permitting, Design, Management, Administration, Contingency 33.3%	**$981,460**
					TOTAL PROJECT COST	**$3,929,000**

7.3 Programmatic Drainage Projects

To ensure an adequate level of utility funding in the future, the City must consider longer-range programmatic efforts to maintain and/or improve storm drainage service. Table 7-1 lists programmatic projects that should be included in the Storm Drainage Utility budget. These projects are not linked to any specific problem or location, but are included for budgetary purposes. By itemizing these activities, the Storm Drainage Utility can track actual costs to compare with budgeted costs and specifically track how these expenditures address the LOS goals listed in Chapter 3. The items listed in the table below are distributed between the 6- and 20-year CIPs in Chapter 8.

Table 7-1. Summary Programmatic Drainage Projects

Project Number	Program Name	Description	Priority	Total Project Cost (2024 dollars)
13	Street Utility Improvements	The Storm Drainage Utility will seek opportunities to incorporate drainage improvements into transportation and pavement projects on City roads. A significant portion of storm drainage costs related to projects make improvements to the street network are incurred by the City's Transportation Program.	2	$5,200,000
14	Frame & Grate Replacement	As manholes and catch basins age and their condition deteriorates, frame and grates can become loose and/or misoriented or, due to age, are no longer meeting standards. This annual project will replace approximately 50 storm manhole and catch basin frame and grates to maintain access to the storm system and decrease the likelihood of the manholes becoming road hazards. In some years, this replacement will be a stand-alone project, and in some years, many of these replacements will be in conjunction with other City projects.	2	$1,700,000
15	Storm Drainage Infrastructure Repair & Replacement Program	This program addresses the need to repair or replace storm drainage infrastructure, such as individual pipes, pump station repair and maintenance, and pond improvements. The long-term priorities for R&R should be developed by adhering to the City's system goals regarding the maintenance of a criticality database and the prioritized assessment of critical infrastructure.	1	$14,400,000
16	Storm Pipeline Extension Program	Program to extend stormwater infrastructure into areas lacking infrastructure or where known stormwater issues occur.	3	$7,450,000

Note: All costs are in 2024 dollars.

8. Implementation Plan

This chapter presents the implementation plan, which brings together information from the preceding chapters of this 2024 Comprehensive Storm Drainage Plan to form a work plan of future activities for the Storm Drainage Utility. The information in this chapter serves as a road map to the Storm Drainage Utility staff. This road map outlines the critical elements of plan implementation (e.g., capital improvement plan implementation, NPDES MS4 permit compliance, future staffing, asset management, drainage ditch maintenance program, climate change, etc.) and links them into a schedule of utility activities.

The implementation plan is divided into five main sections:

- Section 8.1 presents the capital improvement plan for both 6-year and 20-year time frames.
- Section 8.2 contains a summary of activities for NPDES MS4 permit compliance.
- Section 8.3 presents recommendations for future staffing and M&O activities.
- Section 8.4 summarizes the recommendations for continuing the implementation of best practices for asset management.
- Section 8.5 lists recommendations for additional activities that help the Storm Drainage Utility achieve the system goals.

The foldout chart (Figure 8-3) at the conclusion of this chapter shows the proposed implementation timeline. Appendix F provides the SEPA determination for the implementation plan.

8.1 6-Year and 20-Year Capital Improvement Program

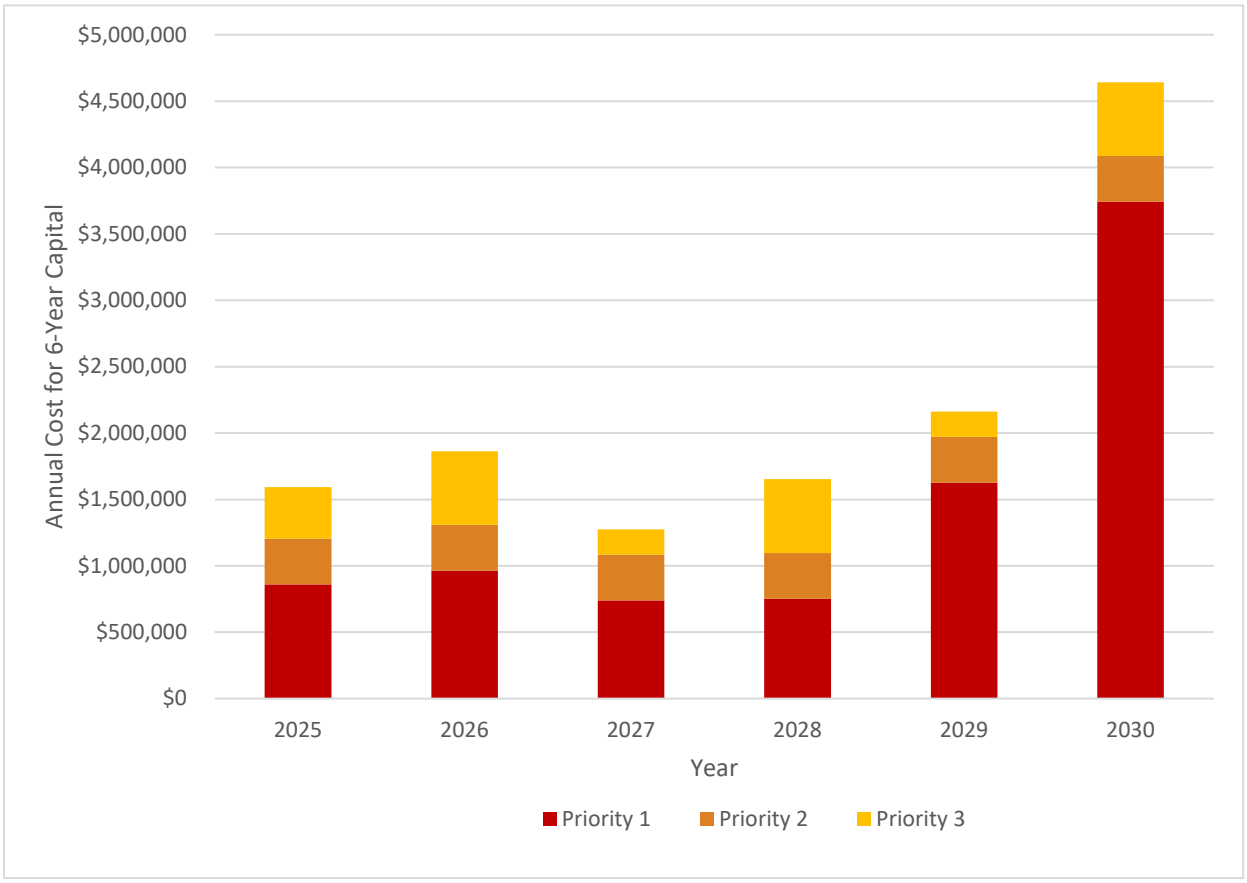
The 6-year CIP contains near-term capital improvement projects focused on mitigating critical existing drainage problems that have been observed and are well understood by the City's staff, addressing an ongoing waste disposal issue and ensuring compliance with NPDES MS4 permit requirements. These projects are described in detail in Chapter 7. In addition to site-specific projects, the 6-year CIP contains ongoing programmatic efforts, such as the Storm Drainage Utility's participation in the Street Utility Improvement program, which is a program designed to complete storm repairs and replacements in conjunction with transportation projects. Table 8-1 lists the short-term capital improvement projects and programs described in Chapter 7 and lays out annual expenditures for the 6-year capital improvement time frame. Project timing is based on project priorities weighed with likely budgetary constraints such that costs are distributed somewhat evenly from year to year (see Table 8-1 and Figure 8-1).

Table 8-1. Annual Cost Summary for 6-Year Capital Improvement Plan

Project Number	Project Name	Priority	Repair/ Replacement	Upgrade/ Expansion	2025	2026	2027	2028	2029	2030	6-Year Cost
1	SE 287th Street Stormwater Device	1	0%	100%	$139,000	$243,000	$0	$0	$0	$0	$382,000
3	SE 284th Street West Bioswale Additions	1	0%	100%	$0	$0	$20,000	$32,000	$0	$0	$52,000
10	Vegetative Waste Sorting Facility	3	90%	10%	$200,000	$0	$0	$0	$0	$0	$200,000
12	West Main Street Pump Station Upgrade	1	25%	75%	$0	$0	$0	$0	$907,000	$3,022,000	$3,929,000
13	Street Utility Improvements	2	100%	0%	$260,000	$260,000	$260,000	$260,000	$260,000	$260,000	$1,560,000
14	Frame & Grate Replacement	2	100%	0%	$85,000	$85,000	$85,000	$85,000	$85,000	$85,000	$510,000
15	Storm Drainage Infrastructure Repair & Replacement Program	1	100%	0%	$720,000	$720,000	$720,000[a]	$720,000[a]	$720,000	$720,000	$4,320,000
16	Storm Pipeline Extension Program	3	0%	100%	$190,000	$555,000	$190,000	$555,000	$190,000	$555,000	$2,235,000
	Total 6-year CIP cost for priority 1 projects/programs:				$859,000	$963,000	$740,000	$752,000	$1,627,000	$3,742,000	$8,683,000
	Total 6-year CIP cost for priority 2 projects/programs:				$345,000	$345,000	$345,000	$345,000	$345,000	$345,000	$2,070,000
	Total 6-year CIP cost for priority 3 projects/programs:				$390,000	$555,000	$190,000	$555,000	$190,000	$555,000	$2,435,000
	Total 6-year cost:				$1,594,000	$1,863,000	$1,275,000	$1,652,000	$2,162,000	$4,642,000	$13,188,000

Note: All costs are in 2024 dollars.

[a] Funding includes budget for implementing CIP 6 following updated requirements from the 2024 NPDES MS4 permit.



Note: All costs are in 2024 dollars.

Figure 8-1. Annual Costs for 6-Year Capital Improvement Plan

After high-priority drainage problems are addressed, the City will be able to focus on the remaining projects described in Chapter 7. In addition, the City will continue to emphasize the management of existing storm drainage assets to ensure that LOS goals are continuously met. Table 8-2 summarizes the program expenditures and forecasts total capital improvement costs for the years 2031 to 2044.

In addition to the identified projects and programs, the Storm Drainage Utility will be involved in several ongoing system updates and capital facilities plan (CFP) projects that will require the utility's time and expenditures. Additional detail regarding these items are provided in Section 8.5.

Table 8-2. Capital Improvement Cost Summary for 2031–2044

Project Number	Project Name	Priority	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	Cost for 2031–2044
2	SE 284th Street & 109th Avenue Bioswale Additions	3													$55,000	$88,000	$143,000
4	SE 284th Street East Bioswale Additions	3													$11,000	$17,000	$28,000
5	124th Avenue SE near SE 293rd Street Stormwater Treatment Device	2									$225,000	$356,000					$581,000
6	Vintage Hills Swale Retrofit	1	$95,000[a]	$169,000[a]													$264,000
7	124th Avenue SE near SE 307th Place Stormwater Treatment Device	2					$205,000	$326,000									$531,000
8	124th Avenue SE near SE 302nd Place Stormwater Treatment Device	2							$205,000	$326,000							$531,000
9	30th Street NE Area Flooding, Phase 2	3											$198,000	$988,000			$1,186,000
11	Christa Ministries Facility Retrofit	1			$774,000	$2,132,000											$2,906,000
13	Street Utility Improvements	2	$260,000	$260,000	$260,000	$260,000	$260,000	$260,000	$260,000	$260,000	$260,000	$260,000	$260,000	$260,000	$260,000	$260,000	$3,640,000
14	Frame & Grate Replacement	2	$85,000	$85,000	$85,000	$85,000	$85,000	$85,000	$85,000	$85,000	$85,000	$85,000	$85,000	$85,000	$85,000	$85,000	$1,190,000
15	Storm Drainage Infrastructure Repair & Replacement Program	1	$720,000[a]	$720,000[a]	$720,000	$720,000	$720,000	$720,000	$720,000	$720,000	$720,000	$720,000	$720,000	$720,000	$720,000	$720,000	$10,080,000
16	Storm Pipeline Extension Program	3	$190,000	$555,000	$190,000	$555,000	$190,000	$555,000	$190,000	$555,000	$190,000	$555,000	$190,000	$555,000	$190,000	$555,000	$5,215,000
Total 2031–2044 cost for priority 1 projects/programs:			$815,000	$889,000	$1,494,000	$2,852,000	$720,000	$720,000	$720,000	$720,000	$720,000	$720,000	$720,000	$720,000	$720,000	$720,000	$13,250,000
Total 2031–2044 cost for priority 2 projects/programs:			$345,000	$345,000	$345,000	$345,000	$550,000	$671,000	$550,000	$671,000	$570,000	$701,000	$345,000	$345,000	$345,000	$345,000	$6,473,000
Total 2031–2044 cost for priority 3 projects/programs:			$190,000	$555,000	$190,000	$555,000	$190,000	$555,000	$190,000	$555,000	$190,000	$555,000	$388,000	$1,543,000	$256,000	$660,000	$6,572,000
Total 2031–2044 cost for projects/programs:			$1,350,000	$1,789,000	$2,029,000	$3,752,000	$1,460,000	$1,946,000	$1,460,000	$1,946,000	$1,480,000	$1,976,000	$1,453,000	$2,608,000	$1,321,000	$1,725,000	$26,295,000

Note: All costs are in 2024 dollars.

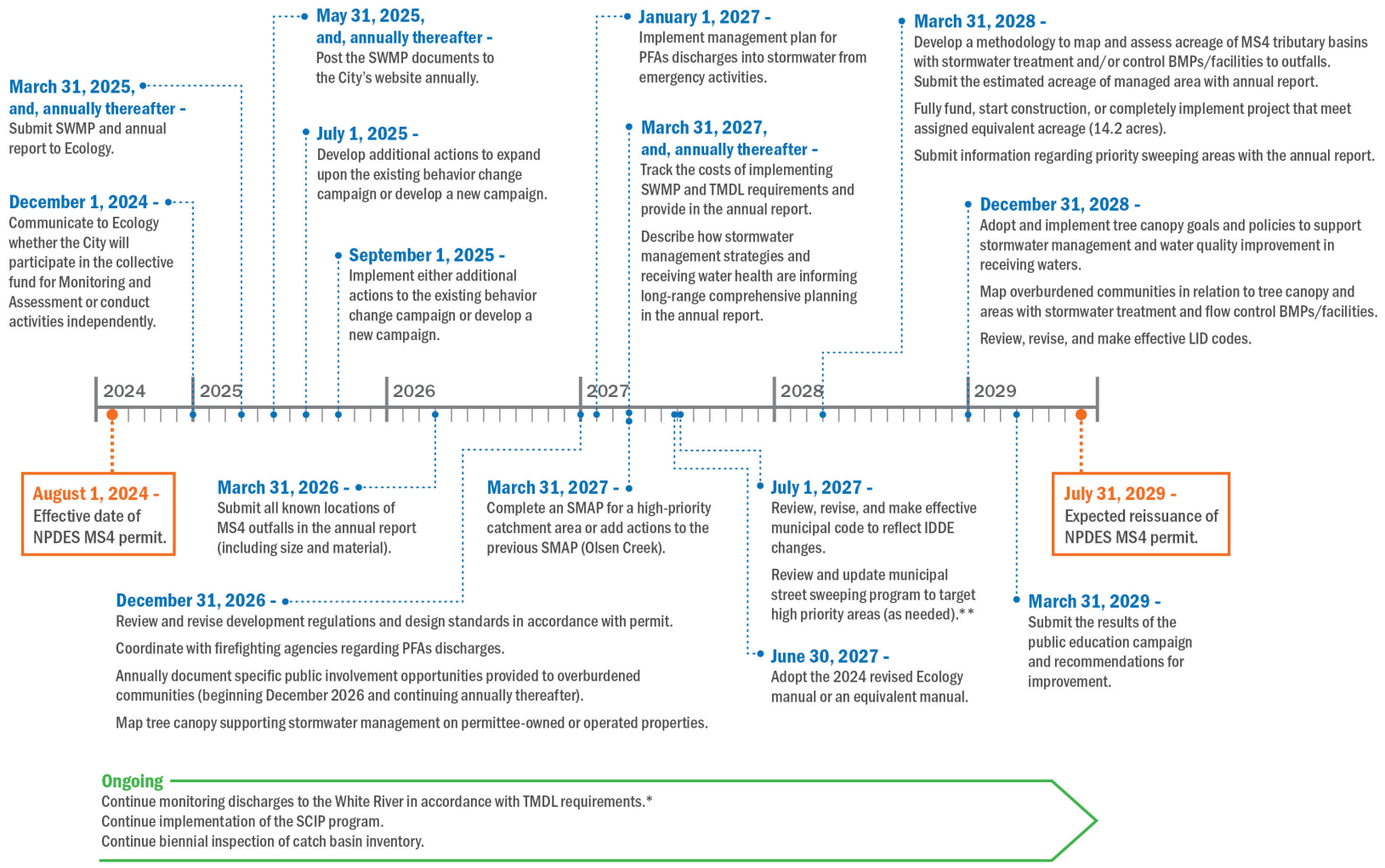
[a] CIP 6 will be funded earlier (2027–2028) to comply with requirements from the 2024 NPDES MS4 permit. Projected cost to implement CIP 6 in 2027 and 2028 will be added back to the budget for the Storm Drainage Infrastructure Repair & Replacement Program in 2031 and 2032.

8.2 Programmatic Measures for NPDES Compliance

The City of Auburn is covered by the Western Washington Phase II Municipal Stormwater permit. The permit regulates stormwater discharges from the City's MS4 (see Section 2.3.2). The current version of the NPDES MS4 permit was issued in August 2024 and will remain in effect through July 2029, when a new version is due to be issued. A regulatory-driven improvements investigation was performed on behalf of this Plan and was discussed in Chapter 5.3. The recommended actions on behalf of this investigation have been summarized below.

- Update local development regulations and drainage standards in accordance with updated NPDES MS4 permit requirements.
- Review and revise municipal code to reflect IDDE changes, specifically concerning routine washdowns of structures likely to have PCB-containing materials.
- Carry out permit-required activities related to TMDLs (identified in Chapter 4.4.1).
- Develop and implement protocols with firefighting agencies regarding PFAS discharges into stormwater.
- Develop and implement tree canopy goals to support stormwater management and improve receiving water quality.
- Prepare an SMAP for a new high-priority catchment area or enhance the existing one for Olson Creek.
- Ensure the existing street sweeping plan covers the permit requirements.
- Reflect on the ongoing public outreach campaign and consider adding new actions or developing a new campaign.
- Map piped MS4 outfalls with flow control or stormwater treatment upstream to determine the amount of treated/untreated area within the MS4.
- Continue implementing the SCIP.

These actions have been further detailed and organized on a timeline in Figure 8-3. Additionally, the compliance-specific schedule for key requirements under the current NPDES MS4 permit is shown in Figure 8-2.



Note

*Important dates for other TMDL requirements (mandated by the NPDES MS4 permit) are shown in Figure 8-3.
**Only one sweeping event is required in 2027. Three sweeping events are required each year thereafter, with at least one event occurring between July and September.

Abbreviation Key

ACC: *Auburn City Code*
IDDE: *Illicit Discharge Detection and Elimination*
BMP: *Best Management Practice*
NPDES: *National Pollutant Discharge Elimination System*
SWMP: *Stormwater Management Program*
MS4: *Municipal Separate Storm Sewer System*
TMDL: *Total Maximum Daily Load*
PFAS: *Per- and Polyfluoroalkyl Substance*
SMAP: *Stormwater Management Action Plan*
LID: *Low Impact Development*
SCIP: *Source Control Improvement Program*

Figure 8-2. NPDES Compliance Schedule

8.3 Future Staffing and Equipment Needs

During this planning effort, current Engineering and M&O staffing were considered in light of future activities that will need to be performed to maintain compliance with the NPDES MS4 permit. M&O staffing and equipment were also reviewed, taking into account existing maintenance goals and future, additional M&O responsibilities. The following sections summarize the additional staffing, staffing responsibilities, and equipment needs for the Storm Drainage Utility.

8.3.1 Engineering Services

As part of this Plan, the City evaluated engineering staffing responsibilities required to address the revised NPDES MS4 permit and other storm drainage system deficiencies. The recommended actions in Figure 8-3 are expected to be managed by engineering staff.

8.3.2 Maintenance and Operation Services

The evaluation of M&O staffing for managing, operating, and maintaining the storm drainage system in Chapter 6 revealed that the Storm Drainage Utility is adequately staffed to meet current proactive City goals. However, additional staff and equipment may be necessary to fulfill NPDES MS4 permit requirements and anticipated future work (as outlined in Section 6.6.2). Although no immediate staffing additions are planned, ongoing monitoring of staffing levels will assess the need.

Support from M&O staff will be needed in the following actions (identified in Chapter 6 and summarized below):

- Asset management recommendations (Section 8.4):
  - → Prioritizing work using risk-based scoring methods.
  - → Documenting condition assessments and work orders in Cartegraph.
- Street Sweeping Plan (NPDES MS4 permit):
  - → Coordinating with the Street Division (as needed) to implement the required street sweeping plan.
- Ditch Maintenance Program (Section 8.5):
  - → Carrying out the recommended needs from the ditch maintenance program.

Additionally, based on discussions with City staff and analysis of M&O activities, the Storm Drainage Utility will consider obtaining CCTV inspection equipment for pipe inspection within five years.

8.4 Continue Implementation of Best Practices for Asset Management

As an integral part of this comprehensive plan, the City conducted a thorough review of its existing asset inventory and management practices, as discussed in Chapter 5.2. The recommended actions have been summarized below.

- System inventory:
  - → Continuously update the inventory with additional data collected during maintenance activities (e.g., condition assessment and frequency of maintenance).

- → Train staff on asset inventory needs, capability, data collection, data quality objectives, and maintenance processes.
- → Develop a process for reviewing and updating the asset inventory when changes and inspections occur (see Section 5.2.3).
- → Implement the prioritized inspection and asset information update process to address data gaps and provide observation-based condition assessments.

- Risk-based scoring in Cartegraph:
  - → Integrate scoring methods into Cartegraph.
  - → Populate critical feature attributes (used in risk calculations).
  - → Add scoring fields to calculate likelihood of failure and criticality of failure scores for each pipe in Cartegraph.
- Risk-based scoring improvements:
  - → Expand scoring methods to include asset types beyond collection system piping.
  - → Implement these improvements into Cartegraph and inspection prioritization techniques (see Appendix C for recommended attributes for other stormwater assets).
- Maintenance and R&R prioritization:
  - → Prioritize maintenance activities for assets with the highest risk.
  - → Assess the inspection process every 5 years to evaluate efficiency and identify areas for improvement.
  - → Consider reconducting pipe depreciation analysis periodically to assess the impact of prioritization practices.

8.5 Recommendations for Additional Activities

The following sections summarize recommendations for additional activities discussed during this Plan for the Storm Drainage Utility. Section 8.5 is divided into the following three sub-sections:

- Section 8.5.1 summarizes recommendations discussed in Section 5.4.2.
- Section 8.5.2 summarizes recommendations discussed in Section 6.6.2.1.
- Section 8.5.3 presents the ongoing system updates carried out by the Storm Drainage Utility and the CFP projects that will require coordination from the Utility.

8.5.1 Climate Change

As discussed in Chapter 5.4, climate change will need to be considered in developing and implementing stormwater design guidelines for future scenarios. The actions recommended on behalf of climate change are summarized below.

- Review and revise the hydraulic performance metrics related to freeboard, headwater depth, and surcharging. Evaluate the financial implications associated with enforcing strict hydraulic performance standards.
- Prepare a CDR process to evaluate the consequences of storm events exceeding the design parameters. Establish clear policies regarding safety, property protection, service continuity, and mitigation of nuisance flooding to make systems more resilient to infrequent but

probable flooding. Ensure that the level of protection aligns with the associated costs and risk factors.

- Prioritize effective hydraulic performance and resilience measures for critical facilities during severe storm events that go beyond the intended design limits.
- Perform a vulnerability analysis of stormwater infrastructure along critical roadways to identify any areas where the effects of climate change may be intolerable. Prioritize these areas for capital improvement projects to minimize the adverse effects of flooding.

8.5.2 Ditch Maintenance Program

A drainage ditch maintenance program was developed as a part of this Plan. See Chapter 6.6.2.1 for more details. The previously discussed recommendations have been summarized below.

- Develop protocols for finding, adding, mapping, and classifying ditches within the system.
- Consider the steps required when adding new ditches to the system.
- Use the results of regular ditch inspections to identify system failures.
- Implement a program that focuses on retrofitting ditches with water quality enhancements.

8.5.3 Ongoing System Updates and Capital Facilities Plan Projects

The City will be involved in several ongoing system updates throughout the period of 2031–2044. These updates and their projected costs and timelines have been listed in Table 8-3 below.

Table 8-3. Ongoing System Updates

Name	Description	2031–2044 Cost
Pump Station Level of Service Review	Program to review all pump stations for level of service. Specifically focus on A Street SE and Auburn Way S as an existing drainage issue has been identified there (see Section 4.5).	$400,000
Pump Station Update	Program to update the pump stations according to the results of the level of service review.	$2,000,000
Underground Injection Wells Retrofit Program	Retrofit program to map underground injection wells in the City with water quality treatment.	$975,000
	Total 2031–2044 cost:	$3,375,000

Note: All costs are in 2024 dollars.

In addition, there are several CFP projects that will require coordination from the Storm Drainage Utility from 2024–2026. These projects are listed in Table 8-4 below.

Table 8-4. Capital Facilities Plan Project Schedule 2024–2026

Name	2024 Cost	2025 Cost	2026 Cost	Cost for 2024–2026
R Street SE Widening - 22nd Street SE to 33rd Street SE		$303,850	$938,897	$1,242,747
Regional Growth Center Improvements	$100,000			$100,000
R Street SE Preservation	$320,000			$320,000
12th Street SE Water Main Improvements	$16,000			$16,000
Arterial Preservation	$215,000			$215,000
Jornada Park Access Improvements	$100,000			$100,000
C Street SW Preservation (W Main to GSA signal)	$50,000			$50,000
M Street NE Widening		$824,000		$824,000
Total project cost for 2024–2026:	$801,000	$1,127,850	$938,897	$2,867,747

Note: Costs shown in this table have been escalated as described in Section 9.

8.6 Implementation Plan

The recommended actions within this Plan have been organized in a timeline, as depicted in Figure 8-3. This timeline serves as a guide for implementing the actions in a structured manner.

Implementation Plan Activities Timeline

Chapter	Action	2024 Q1-Q4	2025 Q1	2025 Q2	2025 Q3	2025 Q4	2026 Q1	2026 Q2	2026 Q3	2026 Q4	2027 Q1	2027 Q2	2027 Q3	2027 Q4	2028 Q1	2028 Q2	2028 Q3	2028 Q4	2029 Q1	2029 Q2	2029 Q3	2029 Q4	2030 Q1	2030 Q2	2030 Q3	2030 Q4	2031-2044
CIP																											
7	1. SE 287th St Stormwater Device																										
7	2. SE 284th St & 109th Ave Bioswale Additions																										
7	3. SE 284th St West Bioswale Additions																										
7	4. SE 284th St East Bioswale Additions																										
7	5. 124th Ave SE near 293rd St Stormwater Treatment Device																										
7	6. Vintage Hills Swale Retrofit																										
7	7. 124th Ave SE near 307th Pl Stormwater Treatment Device																										
7	8. 124th Ave SE near 302nd Pl Stormwater Treatment Device																										
7	9. 30th Street NE Area Flooding, Phase 2																										
7	10. Vegetative Waste Sorting Facility																										
7	11. Christa Ministries Facility Retrofit																										
7	12. West Main Street Pump Station Upgrade																										
7	Street Utility Improvements																										
7	Frame & Grate Replacement																										
7	Storm Drainage Infrastructure Repair & Replacement Program																										
System Goals and Policies																											
2	Review and update inventory of existing capital facilities.																										
2	Forecast capital facility needs for planning period. Consider reducing LOS or																										
2	Identify the proposed locations and capacity of expanded/new facilities.																										
2	Update the 6-year plan biennially.																										
3	Routinely assess performance of pumped systems.																										
3	Consider using future rainfall intensity data for designing stormwater systems.																										
4	Address the existing drainage problems through capital or otherwise.																										
NPDES MS4 permit Compliance																											
2	Review development regulations from new permit to ensure consistency with																										
2	Adopt the revised manual as required by NPDES MS4 permit.																										
	Review and revise municipal code to reflect IDDE changes.																										
2	Submit a SWMP plan to Ecology every year.																										
2	Submit an annual report to Ecology by March 31 every year.																										
2	Track the costs of implementing SWMP and TMDL requirements and provide in																										
2	By March 31, 2027, describe how stormwater management strategies and receiving water health are informing long-range comprehensive planning in the annual report.																										
2	Monitor discharges to the White River, in association with the Puyallup River																										
2	Routinely update and review asset inventory for accuracy.																										
4	Update development regulations and design standards in accordance with NPDES																										
4	Map all known piped MS4 outfalls to the Lower White River.																										
4	Screen all known piped MS4 outfalls to the Lower White River for illicit discharges.																										
4	Require phosphorus treatment BMPs for all new and redevelopment projects in the Lower White River implementation area.																										

Legend

Completed

Recommended Start

Midway Point (Anticipated Duration)

Deadline

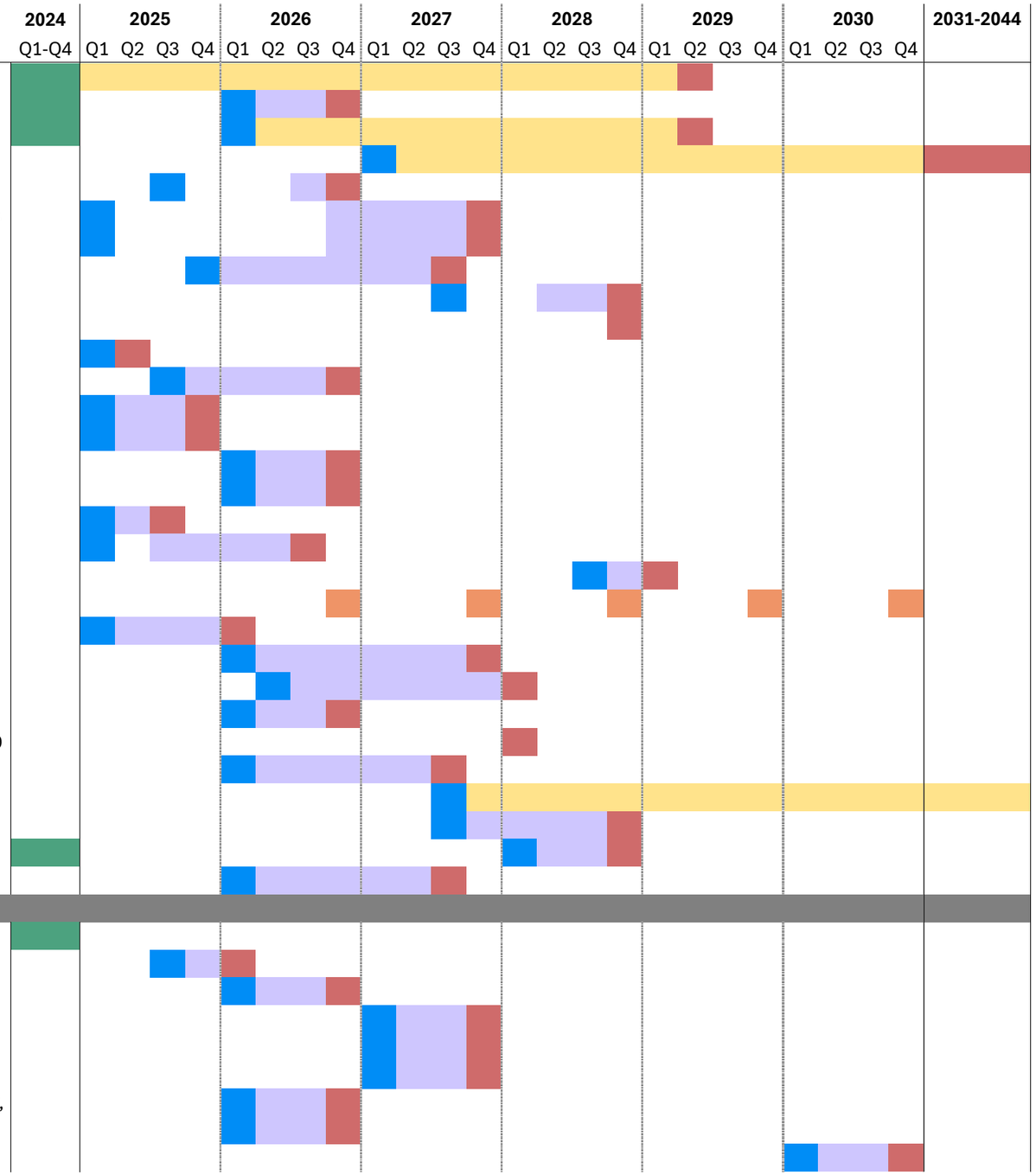
Repeated Action

Ongoing Action

Figure 8-3.
Implementation Plan Activities Timeline
(1 of 3)

Implementation Plan Activities Timeline

Chapter	Action
4	Continue ongoing inspection programs and re-inspect facilities found to have
4	Enact public education and outreach activities to increase awareness of bacterial
4	Maintain pet waste collection stations at Permittee owned or operated lands, as
4	Review expected activities for Soos Creek TMDL when it becomes available and
4	Develop process to identify and implement needed updates to codes, standards,
5	Coordinate with firefighting agencies/departments to implement specific protocols regarding PFAS discharges into stormwater.
5	Prepare an assessment of existing conditions.
5	Draft a list of potential policies.
5	Select and adopt policies.
5	Identify a preferred catchment area for inclusion or enhancement.
5	Prepare a new SMAP or update the existing SMAP.
5	Review the road system plan.
5	Review high-priority roadways.
5	Determine candidate sites for retrofitting using SMAPs, capital improvement
5	Select projects and include in capital improvement plan.
5	Document the effectiveness of the behavior change campaign required under the
5	Develop a public education campaign. Consider source control BMPs for building
5	Submit results of public education campaign and recommended strategies for
5	Document public involvement opportunities to overburdened communities.
5	Identify facilities to be mapped.
5	Develop a methodology for mapping outfalls.
5	Use a geographic information system (GIS) to prepare a map of catchment areas.
5	Begin mapping of permittee-owned or operated properties with tree canopy based
5	Prioritize projects developed in the SMAP that together meet the City's assigned 8.9
5	Review and revise the existing sweeping program.
5	Enact the modified sweeping program.
5	Review, revise, and make effective LID codes
6	Evaluate the resource need of the SCIP program and update accordingly.
6	Coordinate with the Street utility to review and revise the City's street sweeping
Asset Management	
5	Implement asset management program.
5	Train staff on asset inventory needs, data collection and quality objectives, and
5	Implement the likelihood of failure and criticality of failure scoring methods into
5	Establish & conduct the practice for prioritization of inspection and other work
5	Develop & conduct process for reviewing the asset inventory and a routine for updating when changes and inspections occur.
5	Expand scoring methods to include asset types other than collection system piping, and implement similarly into Cartegraph and inspection prioritization techniques.
5	Re-conduct pipe depreciation analysis every 5 years to evaluate the effect of the



Legend

Completed

Recommended Start

Midway Point (Anticipated Duration)

Deadline

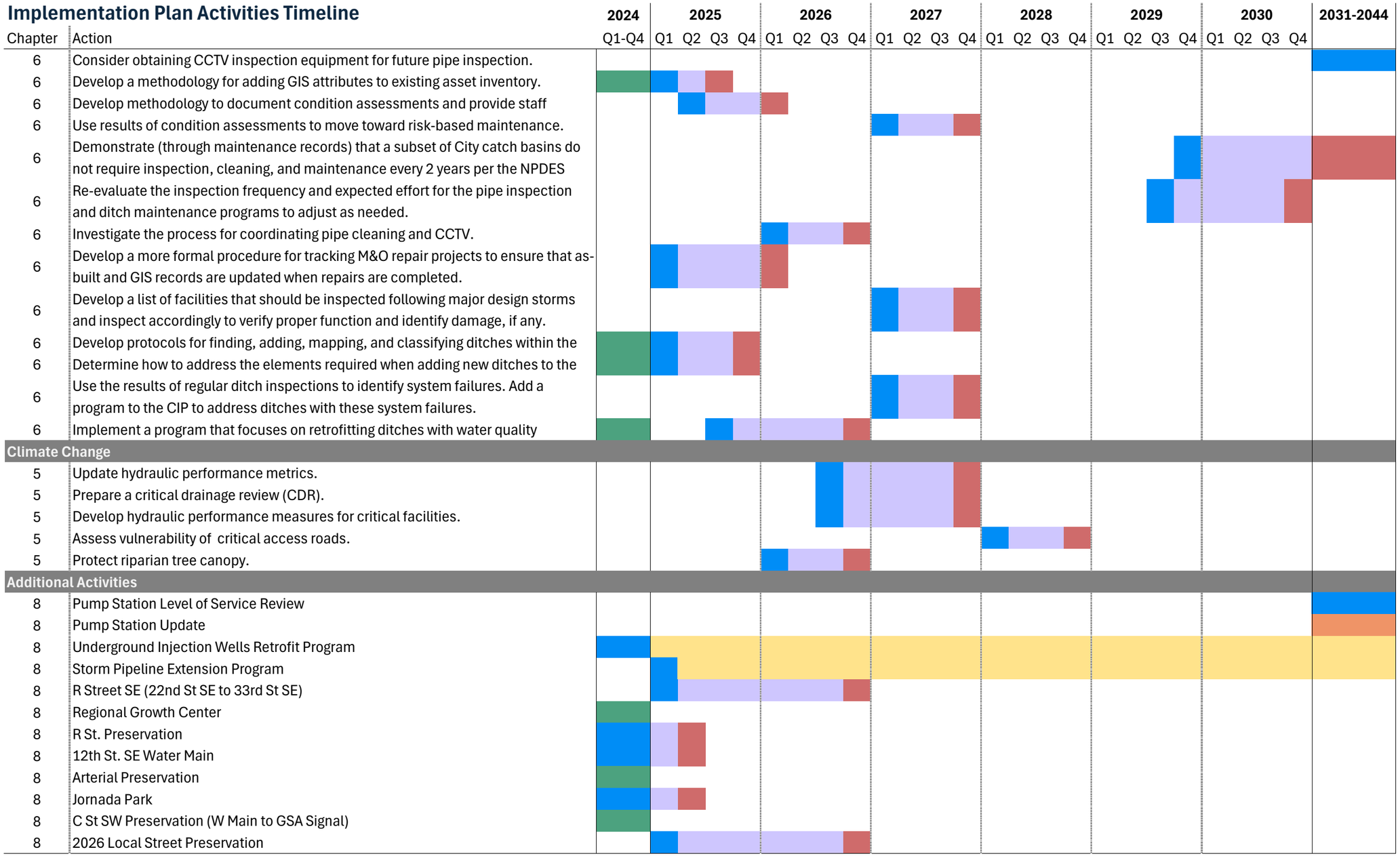
Repeated Action

Ongoing Action

Figure 8-3.
Implementation Plan Activities Timeline
(2 of 3)

Implementation Plan Activities Timeline

Chapter	Action
6	Consider obtaining CCTV inspection equipment for future pipe inspection.
6	Develop a methodology for adding GIS attributes to existing asset inventory.
6	Develop methodology to document condition assessments and provide staff
6	Use results of condition assessments to move toward risk-based maintenance.
6	Demonstrate (through maintenance records) that a subset of City catch basins do not require inspection, cleaning, and maintenance every 2 years per the NPDES
6	Re-evaluate the inspection frequency and expected effort for the pipe inspection and ditch maintenance programs to adjust as needed.
6	Investigate the process for coordinating pipe cleaning and CCTV.
6	Develop a more formal procedure for tracking M&O repair projects to ensure that as-built and GIS records are updated when repairs are completed.
6	Develop a list of facilities that should be inspected following major design storms and inspect accordingly to verify proper function and identify damage, if any.
6	Develop protocols for finding, adding, mapping, and classifying ditches within the
6	Determine how to address the elements required when adding new ditches to the
6	Use the results of regular ditch inspections to identify system failures. Add a program to the CIP to address ditches with these system failures.
6	Implement a program that focuses on retrofitting ditches with water quality
Climate Change	
5	Update hydraulic performance metrics.
5	Prepare a critical drainage review (CDR).
5	Develop hydraulic performance measures for critical facilities.
5	Assess vulnerability of critical access roads.
5	Protect riparian tree canopy.
Additional Activities	
8	Pump Station Level of Service Review
8	Pump Station Update
8	Underground Injection Wells Retrofit Program
8	Storm Pipeline Extension Program
8	R Street SE (22nd St SE to 33rd St SE)
8	Regional Growth Center
8	R St. Preservation
8	12th St. SE Water Main
8	Arterial Preservation
8	Jornada Park
8	C St SW Preservation (W Main to GSA Signal)
8	2026 Local Street Preservation



Legend

Completed

Recommended Start

Midway Point (Anticipated Duration)

Deadline

Repeated Action

Ongoing Action

Figure 8-3.
Implementation Plan Activities Timeline
(3 of 3)

9. Financial Plan

9.1 Introduction

This chapter was prepared by FCS Group to provide a financial program that allows the City of Auburn Storm Drainage Utility to remain financially viable during the planning period. This financial viability analysis considers the historical financial condition, current and identified future financial goals and policy obligations, M&O needs, and the financial impacts of the capital projects identified in this Comprehensive Storm Drainage Plan. Furthermore, this chapter provides a review of the Storm Drainage Utility's current rate structure with respect to rate adequacy and customer affordability.

9.2 Past Financial Performance

This section includes a historical summary of financial performance as reported by the City, including fund resources and uses arising from cash transactions.

9.2.1 Comparative Financial Statements

The City legally owns and operates the Auburn Storm Drainage Utility. Table 9-1 shows a summary of storm drainage fund resources and uses arising from cash transactions for the previous six years (2017 through 2022). The 2023 financial statements were not available at the time this chapter was developed. Table 9-2 shows a summary of assets and liabilities, with the difference between the two reported as "net position." Increases and decreases in net position are useful indicators of the financial position of the City's utility. Noteworthy findings and trends for the historical performance and condition of the City's Storm Drainage Utility are then discussed.

Table 9-1. Summary of Historical Fund Resources and Uses Arising from Cash Transactions

	2017	2018	2019	2020	2021	2022
OPERATING REVENUES						
Charges for Service	$ 9,778,102	$ 9,809,840	$ 10,110,490	$ 10,301,049	$ 10,591,890	$ 10,985,794
Other Operating Revenue	-	-	-	-	-	-
Total Operating Revenues	$ 9,778,102	$ 9,809,840	$ 10,110,490	$ 10,301,049	$ 10,591,890	$ 10,985,794
OPERATING EXPENSES						
Operations and Maintenance	$ 3,379,046	$ 3,568,600	$ 3,509,728	$ 3,360,404	$ 4,150,264	$ 4,135,306
Administration	3,372,935	3,326,599	3,230,505	3,144,182	3,109,673	3,835,875
Depreciation and Amortization	1,885,931	2,067,030	2,092,443	2,120,788	2,133,233	1,837,459
Other Operating Expenses	13,085	-	-	-	-	-
Total Operating Expenses	$ 8,650,997	$ 8,962,229	$ 8,832,676	$ 8,625,374	$ 9,393,170	$ 9,808,640
Operating Income (Loss)	$ 1,127,105	$ 847,611	$ 1,277,814	$ 1,675,675	$ 1,198,720	$ 1,177,154
NONOPERATING REVENUES (EXPENSES)						
Interest Revenue	$ 151,733	$ 327,884	$ 518,073	$ 162,516	$ (34,640)	$ 300,426
Other Non-Operating Revenue	78,397	165,136	81,307	125,963	102,214	132,440
Gain (Loss) on Sale of Capital Assets	-	-	-	-	-	-
Interest Expense	(328,972)	(310,816)	(293,420)	(129,471)	(152,526)	(133,330)
Other Non-Operating Expense	-	(101,328)	-	(26,022)	-	(428,759)
Total Non-Operating Revenues (Expenses)	$ (98,842)	$ 80,876	$ 305,960	$ 132,986	$ (84,952)	$ (129,223)
Income (Loss) before Contributions and Transfers	$ 1,028,263	$ 928,487	$ 1,583,774	$ 1,808,661	$ 1,113,768	$ 1,047,931
Capital Contributions	$ 2,313,033	$ 995,853	$ 1,021,824	$ 1,546,772	$ 5,364,962	$ 1,408,167
Transfers In	300,000	125,000	-	-	-	-
Transfers Out	(672,122)	(332,589)	(138,357)	(137,399)	(155,972)	(133,555)
Change in Net Position	$ 2,969,174	$ 1,716,751	$ 2,467,241	$ 3,218,034	$ 6,322,758	$ 2,322,543
Net Position, January 1	$ 64,010,652	$ 66,979,826	$ 68,696,577	$ 71,163,818	$ 74,381,852	$ 80,704,610
Net Position, December 31	$ 66,979,826	$ 68,696,577	$ 71,163,818	$ 74,381,852	$ 80,704,610	$ 83,027,153
O&M Coverage Ratio	113.0%	109.5%	114.5%	119.4%	112.8%	112.0%
Net Operating Income as a % of Operating Revenue	11.5%	8.6%	12.6%	16.3%	11.3%	10.7%
Debt Service Coverage Ratio	3.75	3.63	4.21	5.59	4.92	4.46

9.2.1.1 Findings and Trends

- The City's storm drainage charges for services increased from $9.8 million in 2017 to $11.0 million in 2022. The average annual increase was approximately 2.4% per year, with a total increase of 12.4% from 2017 to 2022. Operating expenditures increased by $1.2million across the 6 years with an average annual increase of 2.5%. While operating expenditures increased across the 6 years, they fell in 2019 and 2020 before increasing by 8.9% in 2021. With growth in total operating revenues slightly below growth in operating expenses, operating income has remained positive in all years.
- The M&O coverage ratio (total operating revenues divided by total operating expenses) was 113% in 2017. With relatively balanced revenues and expenses, this metric has maintained its stability, ending 2022 at 112.0%. A ratio of 100% or greater shows that operating revenue will successfully cover operating expenses, and the utility has remained above this ratio for the past 6 years.
- Net operating income as a percentage of operating revenue was 11.5% in 2017, decreasing to 8.6% in 2018, before recovering back to 10.7% by 2022. Similar to the M&O coverage ratio, these trends show how successfully operating revenue actually covered operating expenses, with higher positive numbers being the best and negative numbers showing a need for improvement. In addition, these trends demonstrate the ability of the utility to invest in capital, whether through direct cash transfers or the issuance and servicing of debt.

- The debt service coverage ratio measures the amount of cash flow available to meet principal and interest payments. Typically, revenue bond debt service coverage requires a minimum factor of 1.25 during the life of the loans. This ratio is calculated by dividing cash or net operating income (operating revenues minus operating expenses) by annual revenue bond debt service. The debt service coverage ratio for all outstanding revenue bond debt ended 2017 at 3.8, decreasing to 3.6 in 2018, before increasing to 4.5 by 2022. The fact that this ratio has sustained levels higher than the minimum target of 1.25 indicates a stable capacity for new debt and will likely result in favorable terms when entering the bond market.

Table 9-2. Summary of Historical Comparative Statements of Net Position

	2017	2018	2019	2020	2021	2022
CURRENT ASSETS						
Cash and Cash Equivalents	$ 14,545,114	$ 10,644,121	$ 12,738,639	$ 17,124,762	$ 16,904,318	$ 16,689,485
Investments	-	4,781,224	4,389,043	2,729,581	4,951,200	4,566,850
Restricted Cash:						
Bond Payments	804,480	803,251	800,093	679,184	657,541	658,088
Customer Deposits	3,422	3,422	3,422	3,422	3,422	3,422
Other (Reserve for Bonds and Rate Stabilization)	1,195,817	1,203,670	1,211,285	1,081,961	1,082,389	1,088,818
Customer Accounts	1,066,124	1,105,972	1,631,660	1,712,774	1,611,351	1,796,825
Other Receivables	-	14,757	14,757	-	7,104	7,104
Due From Other Governmental Units	70,124	103,343	-	72,123	109,161	122,276
Inventories	7,390	4,795	9,099	8,745	9,597	10,414
Total Current Assets	$ 17,692,471	$ 18,664,555	$ 20,797,998	$ 23,412,552	$ 25,336,083	$ 24,943,282
NONCURRENT ASSETS						
Long-Term Contracts, Leases and Notes	$ -	$ -	$ -	$ -	$ -	$ -
Net Pension Asset	-	-	-	-	2,040,168	751,962
Capital Assets Not Being Depreciated:						
Land	5,937,014	5,937,014	5,937,014	5,937,014	5,937,014	5,937,014
Intangible - Water Rights	-	-	-	-	-	-
Construction In Progress	459,310	153,082	648,531	342,126	980,569	1,135,843
Capital Assets:						
Buildings and Equipment	290,575	290,575	290,575	282,111	282,111	282,111
Improvements Other Than Buildings	79,177,949	81,449,103	82,903,631	84,749,193	89,739,833	93,201,563
Right of Use (Leases)		-	-	-	-	-
Less Accumulated Depreciation	(26,325,396)	(28,392,426)	(30,484,869)	(32,587,697)	(34,720,930)	(36,558,389)
Total Noncurrent Assets Net of Accumulated Depreciation	$ 59,539,452	$ 59,437,348	$ 59,294,882	$ 58,722,747	$ 64,258,765	$ 64,750,104
TOTAL ASSETS	$ 77,231,923	$ 78,101,903	$ 80,092,880	$ 82,135,299	$ 89,594,848	$ 89,693,386
DEFFERED OUTFLOWS OF RESOURCES						
Deferred Outflow from Bond Refunding	$ -	$ -	$ -	$ 29,232	$ 29,232	$ 29,232
Deferred Outflow related to Pensions	292,611	254,676	274,851	309,222	286,842	820,313
Total Deferred Outflows of Resources	292,611	254,676	274,851	338,454	316,074	$ 849,545
CURRENT LIABILITIES						
Current Payables	$ 391,180	$ 308,381	$ 578,689	$ 305,576	$ 626,924	$ 496,608
Claims Payable	-	-	-	-	-	-
Loans Payable - Current	-	-	-	-	-	-
Employee Leave Benefits - Current	173,857	156,429	154,609	156,429	199,603	246,831
Leases Payable - Current	-	-	-	-	-	-
Revenue Bonds Payable - Current	425,578	437,948	452,418	411,430	426,973	446,716
Payable From Restricted Assets:						
Accrued Interest	377,766	365,303	347,675	267,753	249,914	229,124
Deposits	3,422	3,422	3,422	3,422	3,422	3,422
Other Liabilities Payable	469					
Total Current Liabilities	$ 1,372,272	$ 1,271,483	$ 1,536,813	$ 1,144,610	$ 1,506,836	$ 1,422,701
NONCURRENT LIABILITIES						
Employee Leave Benefits	$ 52,506	$ 56,590	$ 41,091	$ 56,590	$ 86,394	$ 94,689
Loans Payable	-	-	-	-	-	-
Leases Payable	-	-	-	-	-	-
Revenue Bonds Payable	7,495,862	7,030,496	6,550,661	6,069,633	5,564,619	5,039,861
Net Pension Liability	1,339,843	805,573	527,198	509,014	(122,090)	128,697
Total Non Current Liabilities	$ 8,888,211	$ 7,892,659	$ 7,118,950	$ 6,635,237	$ 5,528,923	$ 5,263,247
TOTAL LIABILITIES	$ 10,260,483	$ 9,164,142	$ 8,655,763	$ 7,779,847	$ 7,035,759	$ 6,685,948
DEFERRED INFLOWS OF RESOURCES						
Deferred Inflow Related to Leases	$ -	$ -	$ -	$ -	$ -	$ -
Deferred Inflow Related to Pensions	284,225	495,860	548,150	312,054	2,170,553	829,830
Total Deferred Inflows of Resources	$ 284,225	$ 495,860	$ 548,150	$ 312,054	$ 2,170,553	$ 829,830
NET POSITION						
Net Investment in Capital Assets	$ 52,422,492	$ 52,772,155	$ 53,091,896	$ 52,920,868	$ 56,884,546	$ 58,512,575
Restricted For:						
Debt Service	398,648	411,110	426,793	375,725	393,992	1,078,288
Rate Stabilization	419,403	427,257	436,817	438,483	438,483	438,483
Pension Asset		-	-	-	-	751,962
Unrestricted	13,739,283	15,086,055	17,208,312	20,646,776	22,987,589	22,245,845
TOTAL NET POSITION	$ 66,979,826	$ 68,696,577	$ 71,163,818	$ 74,381,852	$ 80,704,610	$ 83,027,153
Current Ratio	12.9	14.7	13.5	20.5	16.8	17.5
Debt to Net Position Ratio	0.12	0.11	0.10	0.09	0.08	0.07
Debt to Noncurrent Capital Assets Ratio	0.14	0.13	0.12	0.11	0.10	0.09

9.2.1.2 Findings and Trends

- The current ratio is calculated by dividing unrestricted current assets by current liabilities and measures an entity's ability to pay short-term obligations. This ratio ranges from a low of 12.9 in 2017, reaching a high of 20.5 in 2020, before ending at 17.5 in 2022. Anything above 2.0 for this liquidity ratio is good.
- The debt-to-net-position ratio compares total debt to total net position, which is the difference between current assets and liabilities. This ratio begins at 0.12 or 12% debt in 2017 and decreases to 0.07 or 7% by 2022. These results indicate the utility has ample borrowing capacity to address future capital improvement needs. For utilities, a ratio of 40% to 60% helps to moderate rate impacts by spreading costs over a longer period. Based on these results, the City may consider utilizing debt service for future capital investments, especially if it benefits system expansion.
- The debt-to-noncurrent-capital-asset ratio compares total debt to noncurrent capital assets, which are also known as property, plant, and equipment. This ratio begins at 0.14 or 14% debt to 86% noncurrent assets in 2017. Noncurrent capital assets increase by $5.2 million throughout the 6-year history, while debt decreases $2.5 million, and the ratio decreases to 0.09 or 9% by 2022. Similar to the debt-to-net position ratio, these results indicate the utility has ample borrowing capacity and may consider utilizing debt service for future capital investments, especially if it benefits system expansion. A ratio of 40% debt to 60% equity or below is a general industry target.

9.3 Financial Plan

The Storm Drainage Utility is responsible for generating sufficient revenue to meet all of its costs. The primary source of funding is derived from ongoing monthly service charges, with additional revenue coming from late fees, storm applications and investment interest. The City controls the level of user charges and, with City Council approval, can adjust user charges as needed to meet financial objectives.

The financial plan can only confirm financial feasibility if it considers the total system costs of providing storm drainage services, both operating and capital. To meet these objectives, the following elements have been completed.

1. Capital Funding Plan. Identifies the total capital improvement plan obligations of the planning period. The plan defines a strategy for funding the capital improvement plan, including an analysis of available resources from rate revenues, existing reserves, system development charges, debt financing, and any special resources that may be readily available (e.g., grants, developer contributions). The capital funding plan impacts the financial plan through the use of debt financing (resulting in annual debt service) and the assumed rate revenue made available for capital funding.
2. Financial Forecast. Identifies future annual non-capital costs associated with the operation, maintenance, and administration of the storm drainage system. Included in the financial plan is a reserve analysis that forecasts cash flow and fund balance activity, along with testing for satisfaction of actual or recommended minimum fund balance policies. The financial plan ultimately evaluates the sufficiency of utility revenues in meeting all obligations, including cash uses such as operating expenses, debt service, capital outlays, and reserve contributions, as well as any coverage requirements associated with long-term debt. The plan also identifies the future adjustments required to fully fund all utility obligations in the planning period.

9.3.1.1 Capital Funding Plan

To properly evaluate future capital funding needs, capital costs were escalated by 3% annually to the year of planned spending. The capital improvement plan developed for this Plan identifies $26.5 million in escalated project costs over the 10-year planning horizon from 2024 to 2033. The 20-year period through 2043 includes $61.7 million in total escalated project costs.

A summary of the 10-year and 20-year capital improvement plans are shown in Table 9-3. As shown, each year has varied capital cost obligations depending on construction schedules and infrastructure planning needs.

Table 9-3. 10-Year and 20-Year Capital Improvement Plans

Year	Unescalated $	Escalated $
2024	$ 2,531,000	$ 2,531,000
2025	3,498,220	3,603,167
2026	6,257,780	6,638,879
2027	1,282,000	1,400,876
2028	1,659,000	1,867,219
2029	1,255,000	1,454,889
2030	1,620,000	1,934,365
2031	1,352,000	1,662,789
2032	2,065,000	2,615,880
2033	2,104,000	2,745,243
10-Year Total	$ 23,624,000	$ 26,454,307
2034 - 2043	23,073,000	35,209,528
20-Year Total	$ 46,697,000	$ 61,663,835

Table 9-4 provides more detail for the 10-year capital improvement plan.

Table 9-4. 10-Year Capital Improvement Plan (Escalated $)

Project	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Vegetative Waste Sorting Facility		$206,000								
SE 287th Street Stormwater Device		158,332	289,923							
2026 Local Street Preservation		157,075	485,362							
R Street SE Widening - 22nd Street SE to 33rd Street SE		303,850	938,897							
Storm Pipeline Extension Program		195,700	588,800	207,618	624,657	220,262	662,699	233,676	703,057	247,907
Street Utility Improvements	260,000	267,800	275,834	284,109	292,632	301,411	310,454	319,767	329,360	339,241
Frame & Grate Replacement	85,000	87,550	90,177	92,882	95,668	98,538	101,494	104,539	107,675	110,906
Storm Drainage Infrastructure Repair & Replacement Program	720,000	741,600	763,848	786,763	810,366	834,677	859,718	885,509	912,074	939,437
SE 284th Street West Bioswale Additions				29,504	43,895					
West Main Street Pump Station Upgrade	265,000	661,260	3,206,040							
Pump Station Level of Service Review									253,354	
Vintage Hills Swale Retrofit								119,298	215,351	
Storm Comprehensive Plan Update	400,000									
Underground Injection Wells Retrofit Program									95,008	97,858
Christa Ministries Facility Retrofit										1,009,894
Regional Growth Center Improvements	100,000									
R Street SE Preservation	320,000									
12th Street SE Water Main Improvements	16,000									
Arterial Preservation	215,000									
Jornada Park Access Improvements	100,000									
C Street SW Preservation (W Main to GSA signal)	50,000									
M Street NE Widening		824,000								
Total	$2,531,000	$3,603,167	$6,638,879	$1,400,876	$1,867,219	$1,454,889	$1,934,365	$1,662,789	$2,615,880	$2,745,243

9.4 Available Funding Assistance and Financing Resources

Feasible long-term capital funding strategies must be defined to ensure that adequate resources are available to fund the capital improvement plan identified in this Plan. In addition to the City's resources, such as accumulated cash reserves, capital revenues, and rate revenues designated for capital purposes, capital needs can be met from outside sources, such as grants, low-interest loans, and bond financing. The following is a summary of the City's internal and external resources.

9.4.1 City Resources

Resources appropriate for funding capital needs include accumulated cash in the capital fund, rate revenues designated for capital spending purposes, developer contributions, and capital-related charges such as system development charges. The first two resources will be discussed in the Fiscal Policies section of the Financial Forecast. Capital-related charges are discussed below.

9.4.1.1 System Development Charges

A connection charge, such as the City's SDC, refers to a one-time charge imposed on new customers as a condition of connecting to the storm drainage system. The purpose of the SDC is two-fold: (1) to promote equity between new and existing customers and (2) to provide a source of revenue to fund capital projects necessary for meeting growth. This revenue can only be used to fund utility capital projects or to pay debt service incurred to finance those projects. In the absence of a connection charge, growth-related capital costs would be borne in large part by existing customers. In 2024, the City charged all new customers an SDC of $1,759 per ESU, which is defined as 2,600 square feet of impervious surface area.

9.4.1.2 Local Facilities Charge

A utility local improvement district (ULID) is another mechanism for funding infrastructure that assesses benefited properties based on the special benefit received by the construction of specific facilities. Most often used for local facilities, some ULIDs also recover related general facilities costs. Substantial legal and procedural requirements can make this a relatively expensive process, and there are mechanisms by which a ULID can be rejected.

9.4.2 Outside Resources

This section outlines various grant, loan, and bond opportunities available to the City through federal and state agencies to fund the capital improvement plan identified in the Plan.

9.4.2.1 Grants and Low-Cost Loans

Historically, federal and state grant programs were available to local utilities for capital funding assistance. However, these assistance programs have been mostly eliminated, substantially reduced in scope and amount, or replaced by loan programs. Remaining grant programs are generally lightly funded and heavily subscribed. Nonetheless, the benefit of low-interest loans makes the effort of applying worthwhile.

The State of Washington's Department of Commerce maintains a document currently entitled "Funding Programs for Drinking Water and Wastewater Projects; Updated 3-5-2024," which contains details on government programs, eligibility requirements, and contact information, should the City wish to inquire about program offerings and eligibility requirements.

9.4.2.2 Bond Financing

General Obligation Bonds – General obligation (G.O.) bonds are bonds secured by the full faith and credit of the issuing agency, committing all available tax and revenue resources to debt repayment. With this high level of commitment, G.O. bonds have relatively low interest rates and few financial restrictions. However, the authority to issue G.O. bonds is restricted in terms of the amount and use of the funds, as defined by the Washington constitution and statute. Specifically, the amount of debt that can be issued is linked to assessed valuation.

RCW 39.36.020 states:

> *(2)(a)(ii) Counties, cities, and towns are limited to an indebtedness amount not exceeding one and one-half percent of the value of the taxable property in such counties, cities, or towns without the assent of three-fifths of the voters therein voting at an election held for that purpose.*
>
> *(b) In cases requiring such assent counties, cities, towns, and public hospital districts are limited to a total indebtedness of two and one-half percent of the value of the taxable property therein.*

While bonding capacity can limit the availability of G.O. bonds for utility purposes, these can sometimes play a valuable role in project financing. A utility rate savings may be realized through two avenues: the lower interest rate and related bond costs and the extension of repayment obligation to all tax-paying properties (not just developed properties) through the authorization of an ad valorem property tax levy.

Revenue Bonds – Revenue bonds are commonly used to fund utility capital improvements. The debt is secured by the revenues of the issuing utility. With this limited commitment, revenue bonds typically bear higher interest rates than G.O. bonds and require security conditions related to the maintenance of dedicated reserves (a bond reserve) and financial performance (added bond debt service coverage). The City agrees to satisfy these requirements by resolution as a condition of bond sale.

Revenue bonds can be issued in Washington without a public vote. There is no bonding limit, except perhaps the practical limit of the utility's ability to generate sufficient revenue to repay the debt and provide coverage. In some cases, poor credit might make issuing revenue bonds problematic.

9.4.3 Capital Financing Strategy

An ideal capital financing strategy would include the use of grants and low-cost loans when debt issuance is required. However, these resources are very limited and competitive in nature and do not provide a reliable source of funding for planning purposes. It is recommended that the City pursue these funding avenues but assume revenue bond financing to meet the needs that can't be met by available cash resources. The capital financing strategy developed to fund the capital improvement plan identified in this Plan assumes the following funding resources:

- Accumulated cash reserves.
- Transfers of excess cash (over minimum balance targets) from the operating fund.
- System development charge revenues.
- King County Opportunity Fund grant revenues.
- Interest earned on capital fund balances.

The majority, 83%, of projects are funded through cash resources. The remaining 17% are funded through a combination of system development charges and grants. No new debt is anticipated in the next 10-year or 20-year planning periods. Table 9-5 presents the 10-year and 20-year capital financing strategy.

Table 9-5. 10-Year and 20-Year Capital Financing Strategy

Year	Capital Expenditures Escalated	System Development Charge Revenue	Grant Funding	Cash / Reserve Funding	Total Financial Resources
2024	$ 2,531,000	$ 375,000	$ -	$ 2,156,000	$ 2,531,000
2025	3,603,167	362,335	-	3,240,832	3,603,167
2026	6,638,879	374,698	500,000	5,764,181	6,638,879
2027	1,400,876	387,482	-	1,013,394	1,400,876
2028	1,867,219	400,703	-	1,466,516	1,867,219
2029	1,454,889	414,375	-	1,040,514	1,454,889
2030	1,934,365	428,514	-	1,505,851	1,934,365
2031	1,662,789	443,135	-	1,219,655	1,662,789
2032	2,615,880	458,255	-	2,157,626	2,615,880
2033	2,745,243	473,890	-	2,271,353	2,745,243
Subtotal	$ 26,454,307	$ 4,118,387	$ 500,000	$ 21,835,920	$ 26,454,307
2034 - 2043	35,209,528	5,725,752	-	29,483,776	35,209,528
Total	$ 61,663,835	$ 9,844,139	$ 500,000	$ 51,319,696	$ 61,663,835

9.5 Financial Forecast

The financial forecast, or revenue requirement analysis, forecasts the amount of annual revenue that needs to be generated by storm drainage service rates. The analysis incorporates operating revenues, M&O expenses, debt service payments, rate-funded capital needs, and any other identified revenues or expenses related to operations. The objective of the financial forecast is to evaluate the sufficiency of the current level of rates. In addition to annual operating costs, the revenue needs also include debt covenant requirements and specific fiscal policies and financial goals of the City.

For this analysis, two revenue sufficiency tests have been developed to reflect the financial goals and constraints of the City—cash needs must be met, and debt coverage requirements must be realized. In order to operate successfully with respect to these goals, both tests of revenue sufficiency must be met.

Cash Test – The cash flow test identifies all known cash requirements for the City in each year of the planning period. Typically, these include M&O expenses, debt service payments, rate-funded system reinvestment funding or directly funded capital outlays, and any additions to specified reserve balances. The total annual cash needs of the City are then compared to projected cash revenues using the current rate structure. Any projected revenue shortfalls are identified, and the rate increases necessary to make up the shortfalls are established.

Coverage Test – The coverage test is based on a commitment made by the City when issuing revenue bonds and some other forms of long-term debt. For the purposes of this analysis, revenue bond debt is assumed for any needed debt issuance. As a security condition of issuance, the City would be required per covenant to agree that the revenue bond debt would have a higher priority for payment (a senior lien) compared to most other expenditures; the only outlays with a higher lien are M&O expenses. Debt service coverage is expressed as a multiplier of the annual revenue bond debt service payment. For example, a 1.00 coverage factor would imply that no additional cushion is required. A 1.25 coverage factor means revenue must be sufficient to pay M&O expenses, annual revenue bond debt service payments, and an additional 25% of annual revenue bond debt service payments. The excess cash flow derived from the added coverage, if any, can be used for any purpose, including funding capital projects. Targeting a higher coverage factor can help the City achieve a better credit rating and provide lower interest rates for future debt issues.

In determining the annual revenue requirement, both the cash and coverage sufficiency tests must be met, and the test with the greatest deficiency drives the level of needed rate increase in any given year.

9.5.1 Current Financial Structure

The City maintains a fund structure and implements financial policies that target management of a financially viable and fiscally responsible storm drainage system.

9.5.1.1 Fiscal Policies

A summary of the key financial policies employed by the City, as well as those recommended and incorporated in the financial program, are discussed below.

Operating Fund – Operating reserves are designed to provide a liquidity cushion to ensure that adequate cash working capital will be maintained to deal with significant cash balance fluctuations, such as seasonal fluctuations in billings and receipts, unanticipated cash expenses, or lower than expected revenue collections. Like other types of reserves, operating reserves also serve another purpose: they help smooth rate increases over time. Target funding levels for an operating reserve are generally expressed as a certain number of days of M&O expenses, with the minimum requirement varying with the expected revenue volatility. Industry practice for utility operating reserves ranges from 30 days (8%) to 120 days (33%) of M&O expenses, with the lower end more appropriate for utilities with stable revenue streams and the higher end more appropriate for utilities with significant seasonal or consumption-based fluctuations.

This financial plan targets a minimum balance in the Storm Drainage Utility operating fund equal to 60 days of M&O expenses.

Capital Fund – A utility capital contingency reserve is an amount of cash set aside in case of an emergency should a piece of equipment or a portion of the utility's infrastructure fail unexpectedly. The reserve could also be used for other unanticipated capital needs, including capital project cost overruns. Industry practices range from maintaining a balance equal to 1% to 2% of fixed assets, an amount equal to a 5-year rolling average of capital improvement plan costs, or an amount determined sufficient to fund equipment failure (other than catastrophic failure). The final target level should balance industry standards with the risk level of the City.

This financial plan targets a minimum balance in the Storm Drainage Utility capital fund equal to 1% of fixed assets.

Rate Stabilization Fund - A rate stabilization reserve is a restricted fund balance intended to be available to offset specific variations in revenues or expenses. For rate modeling, planned deposits into the fund would appear as an expense, and use of the reserve would rarely appear in rate

planning (only when analyzing adverse conditions). The reserve is established with specific rules and restrictions regarding contributions, withdrawals, and replenishment. These rules are generally constructed to minimize or mitigate rate impacts.

The City currently maintains a rate stabilization reserve for the Storm Drainage Utility but does not have a formal rate stabilization reserve policy. For modeling purposes, the study does not assume additional reserves are funded. Rather, the City will maintain the reserve at its current level.

System Reinvestment – System reinvestment funding promotes system integrity through ongoing repair and replacement of system infrastructure. Ideally, a detailed asset management plan would guide the level of rate funded system reinvestment. However, in absence of this level of effort, annual depreciation expense is commonly used as a measure of the decline in asset value associated with routine use of the system. Particularly for utilities that do not already have an explicit system reinvestment policy in place, implementing a funding level based on full depreciation expense could significantly impact rates. An alternative benchmark is annual depreciation expense net of debt principal payments on outstanding debt. This approach recognizes that customers are still paying for certain assets through the debt component of their rate and intends to avoid simultaneously charging customers for an asset and its future replacement. The specific benchmark used to set system reinvestment funding targets is a matter of policy that must balance various objectives, including managing rate impacts, keeping long-term costs down, and promoting "generational equity" (i.e., not excessively burdening current customers with paying for facilities that will serve a larger group of customers in the future).

The City is currently phasing in system reinvestment funding and is forecast to reach 67% of annual depreciation levels by 2033. With this phase-in strategy in place, the City is forecast to fund an average of $1.1 million in capital costs annually through rate revenues within the 10-year forecast period.

Debt Management – It is prudent to consider policies related to debt management as part of a broader utility financial policy structure. Debt management policies should be evaluated and formalized, including the level of acceptable outstanding debt, debt repayment, bond coverage, and total debt coverage targets. The City has two outstanding storm drainage revenue bonds, one of which will be fully repaid in 2030, with the second fully repaid by 2032. This forecast meets or exceeds the required revenue bond debt service coverage of 1.25.

9.5.2 Financial Forecast

The financial forecast is primarily based upon the City's budget through 2024 and takes into consideration other key factors and assumptions needed to develop a complete portrait of the City's annual Storm Drainage Utility financial obligations. The following is a list of the key revenue and expense factors and assumptions used to develop the financial forecast.

- Growth – Rate revenue is escalated utilizing a 0.4% growth rate developed based on actual historical trends within the City.
- Revenue – The City has two general revenue sources: (1) storm drainage service charges (rate revenue) and (2) miscellaneous (non-rate) revenue. In the event of a forecasted annual shortfall, rate revenue can be increased to meet the annual revenue requirement. For the purpose of this financial forecast, rate revenues are forecasted to increase with customer growth. Non-rate revenues are held constant throughout the forecast period, with the exception of interest earnings, which are calculated based on projected balances, assumed investment rates, and senior rebates, which increase with customer growth assumptions.

- System Development Charge Revenue – The existing system development charges are applied to the projected new connections to forecast revenue. Connection charges are forecasted to generate an average of $412,000 annually from 2024 through 2033. This equates to an average of 204 new ESUs per year. Connection charge revenue is directed towards annual capital needs.
- Expenses – M&O expense projections are based on the City's budget through 2024 with general cost inflation increases of 3%, labor cost inflation of 5% for 2025 and 2026, decreasing to 3% thereafter and benefit cost inflation increases of 12.5% for 2025 and 2026, decreasing to 5.5% per year thereafter. Budget figures were used for taxes through 2024. Future taxes are calculated based on forecasted revenues and prevailing tax rates.
- Facilities GO Bond - In order to construct a new facility for M&O for the City, the Storm Drainage Utility will fund part of a G.O. bond totaling approximately $38 million. Beginning in 2025, the Storm Drainage Utility's proportionate share of the bond is forecasted at $333,000 annually for the remainder of the 20-year forecast.
- Existing Debt – The Storm Drainage Utility has two outstanding revenue bond debt issues. The 2020 refunding bond has annual payments of $314,000 that end after 2030, with the 2013 revenue bond carrying payments of $343,000 annually, ending after 2032. The total annual existing debt service obligations begin 2024 at $659,000 and are completely repaid by 2033.
- Future Debt – No new debt is anticipated in the 10-year and 20-year forecast periods.
- Transfers to Capital – Operating fund balance above the minimum requirement is assumed to be available to fund capital projects and projected to be transferred to the capital fund each year, if needed. In total, the utility is forecast to fund $13 million in capital projects from excess operating fund cash within the 10-year forecast period.

Although the financial plan is completed through 2043, the rate strategy focuses on the shorter-term planning period of 2024 through 2033. It is recommended that the City revisit the proposed rates every 2 to 3 years to ensure that the rate projections developed remain adequate. Any significant changes should be incorporated into the financial plan and future rates should be adjusted as needed.

Table 9-6 summarizes the annual revenue requirements based on the forecast of revenues, expenditures, fund balances, and fiscal policies.

Table 9-6. 10-Year Financial Forecast

Revenue Requirement	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Revenues										
Rate Revenues Under Existing Rates	$ 12,458,782	$ 12,508,618	$ 12,558,652	$ 12,608,887	$ 12,659,322	$ 12,709,959	$ 12,760,799	$ 12,811,843	$ 12,863,090	$ 12,914,542
Non-Rate Revenues	262,900	291,876	206,130	181,367	181,869	182,399	182,953	183,531	184,135	184,766
Total Revenues	$ 12,721,682	$ 12,800,494	$ 12,764,782	$ 12,790,254	$ 12,841,191	$ 12,892,359	$ 12,943,752	$ 12,995,373	$ 13,047,225	$ 13,099,308
Expenses										
Cash Operating Expenses	$ 10,828,608	$ 11,812,282	$ 12,353,297	$ 12,714,570	$ 13,093,018	$ 13,485,879	$ 13,893,762	$ 14,317,305	$ 14,757,174	$ 15,214,068
Existing Debt Service	659,447	659,311	657,169	657,253	658,401	656,328	655,274	342,972	342,888	-
New Debt Service	-	-	-	-	-	-	-	-	-	-
Rate Funded System Reinvestment	1,000,000	903,142	717,190	782,323	838,652	899,000	958,051	1,330,768	1,388,178	1,790,229
Total Expenses	$ 12,488,055	$ 13,374,736	$ 13,727,656	$ 14,154,146	$ 14,590,070	$ 15,041,207	$ 15,507,087	$ 15,991,045	$ 16,488,240	$ 17,004,297
Total Surplus (Deficiency)	$ 233,628	$ (574,242)	$ (962,874)	$ (1,363,891)	$ (1,748,878)	$ (2,148,849)	$ (2,563,335)	$ (2,995,672)	$ (3,441,016)	$ (3,904,990)
Annual Rate Adjustment		6.75%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Cumulative Annual Rate Adjustment		6.75%	9.95%	13.25%	16.65%	20.15%	23.75%	27.47%	31.29%	35.23%
Rate Revenues After Rate Increase	$ 12,458,782	$ 13,352,949	$ 13,808,552	$ 14,279,700	$ 14,766,923	$ 15,270,770	$ 15,791,809	$ 16,330,626	$ 16,887,827	$ 17,464,039
Additional Taxes from Rate Increase	-	97,098	143,738	192,143	242,374	294,493	348,566	404,660	462,845	523,192
Net Cash Flow After Rate Increase	$ 233,628	$ 172,992	$ 143,288	$ 114,778	$ 116,348	$ 117,469	$ 119,109	$ 118,451	$ 120,876	$ 121,315
Coverage After Rate Increases	4.84	5.87	5.21	4.90	4.99	5.11	5.22	10.15	10.36	n/a

The financial forecast indicates that at existing rate levels the utility will become deficient in 2025 as growth in expenses outpaces growth in revenues and the utility phases in rate funded system reinvestment levels, reaching 67% of annual depreciation by 2033. The City has adopted a 6.75% increase for 2025, in order to resolve the remaining projected deficiency, rates will need to increase by 3% annually from 2026 through 2033.

9.5.2.1 City Funds and Reserves

Table 9-7 shows a summary of the projected operating fund and capital fund ending balances through 2033 based on the rate forecasts presented above. The operating fund is maintained at a minimum of 60 days of M&O expenses, and the capital fund balance continues to meet or exceed the minimum target of 1% of fixed assets in every year of the forecast.

Table 9-7. Ending Cash Balance Summary

Ending Fund Balances	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Operating Fund	$ 1,804,768	$ 1,968,714	$ 2,058,883	$ 2,119,095	$ 2,182,170	$ 2,247,646	$ 2,315,627	$ 2,386,218	$ 2,459,529	$ 2,535,678
Capital Fund	20,694,062	18,986,240	14,372,092	14,339,309	13,908,111	13,957,671	13,600,577	13,895,557	13,312,629	13,009,799
Total	$ 22,498,830	$ 20,954,954	$ 16,430,975	$ 16,458,404	$ 16,090,281	$ 16,205,318	$ 15,916,204	$ 16,281,774	$ 15,772,158	$ 15,545,477

9.6 Current and Projected Rates

9.6.1 Current Rates

The existing storm drainage rate is a monthly flat rate that is charged to each customer per ESU. Each single-family customer is considered one ESU. All non-single-family customers are charged based on the total amount of impervious surface area on-site. The average single family residential lot has 2,600 square feet of impervious surface area, so the total impervious surface area for a non-residential lot is divided by 2,600 to calculate the number of ESUs for that site. Table 9-8 shows the existing City of Auburn storm drainage rate schedule.

Table 9-8. Existing Schedule of Rates

Description	2024 Existing
Per ESU Rate	
Single Family	$ 18.09
Non-Single Family (NSF)	18.09
NSF w/Detention	15.57
NSF w/Retention	13.04
NSF w/Water Quality	16.64
NSF w/Detention & Water Quality	14.12
NSF w/Retention & Water Quality	11.59

9.6.2 Projected Rates

The financial forecast discussed above indicates the need for annual rate adjustments in order to satisfy all forecasted financial obligations. The City has adopted a 6.75% rate increase for 2025, with annual 3% increases forecasted from 2026 through 2033. Table 9-9 shows the projected rates with increases applied uniformly to all storm drainage classes.

Table 9-9. Proposed Storm Drainage Rates

Description	Existing	Proposed								
		2025	2026	2027	2028	2029	2030	2031	2032	2033
	Per ESU Rate									
Single Family	$ 18.09	$ 19.31	$ 19.89	$ 20.49	$ 21.10	$ 21.73	$ 22.38	$ 23.05	$ 23.74	$ 24.45
Non-Single Family (NSF)	18.09	19.31	19.89	20.49	21.10	21.73	22.38	23.05	23.74	24.45
NSF w/Detention	15.57	16.62	17.12	17.63	18.16	18.70	19.26	19.84	20.44	21.05
NSF w/Retention	13.04	13.92	14.34	14.77	15.21	15.67	16.14	16.62	17.12	17.63
NSF w/Water Quality	16.64	17.76	18.29	18.84	19.41	19.99	20.59	21.21	21.85	22.51
NSF w/Detention & Water Quality	14.12	15.07	15.52	15.99	16.47	16.96	17.47	17.99	18.53	19.09
NSF w/Retention & Water Quality	11.59	12.37	12.74	13.12	13.51	13.92	14.34	14.77	15.21	15.67

9.6.3 Affordability

A common affordability metric used by the EPA to measure the relative financial impact storm drainage rates have on a community as a whole considers whether rates exceed 2.5% of a community's median household income. The average median household income for the City was $87,406 between 2018 and 2022 according to the U.S. Census Bureau. The 2022 value is escalated based on the actual rate of inflation in 2023 of 4.31% and the 3% inflation rate used in the financial forecast to project the median household income in future years. Table 9-10 presents the City's monthly storm drainage bill, projected to 2033 and tested against the 2.5% monthly affordability threshold.

Table 9-10. Community Affordability Test

Year	Inflation	Median HH Income	2.5% Monthly Threshold	Projected Monthly Bill	% of Median HH Income
2022		$ 87,406			
2023	4.31%	91,173			
2024	3.00%	93,908	$ 195.64	$ 18.09	0.23%
2025	3.00%	96,726	201.51	19.31	0.24%
2026	3.00%	99,627	207.56	19.89	0.24%
2027	3.00%	102,616	213.78	20.49	0.24%
2028	3.00%	105,695	220.20	21.10	0.24%
2029	3.00%	108,866	226.80	21.73	0.24%
2030	3.00%	112,132	233.61	22.38	0.24%
2031	3.00%	115,495	240.62	23.05	0.24%
2032	3.00%	118,960	247.83	23.74	0.24%
2033	3.00%	122,529	255.27	24.45	0.24%

Applying the 2.50% test, the City's rates are forecasted to remain within the indicated affordability range through 2033.

9.7 Conclusion

The results of this analysis indicate that at existing rate levels the utility will be deficient beginning in 2025. To keep pace with expenses and continue to phase in rate-funded system reinvestment towards depreciation levels, the City has adopted a 6.75% rate increase in 2025. Forecasting into the future, a 3% annual rate increase will be required from 2026 through 2033. It is recommended that the City regularly review and update the key underlying assumptions that compose the multiyear financial plan to ensure that adequate revenues are collected to meet the City's total financial obligations.

10. Limitations

This document was prepared solely for the City of Auburn in accordance with professional standards at the time the services were performed and in accordance with the contract between City of Auburn and Parametrix dated March 16, 2022. This document is governed by the specific scope of work authorized by the City of Auburn; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by the City of Auburn and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

11. References

Booth, D.B. 1991. Glacier Physics of the Puget Lobe, Southwest Cordilleran Ice Sheet. *Geographie Physique et Quaternaire* 45:301–316.

Ecology (Washington State Department of Ecology). 2011. Green River Temperature Total Maximum Daily Load: Water Quality Improvement Report. Publication No. 11-10-046. Northwest Regional Office, Water Quality Program, Washington State Department of Ecology, Bellevue, WA. June.

Hegewisch, K.C., J.T. Abatzoglou, O. Chegwidden, and B. Nijssen. 2023. Climate Mapper web tool. Climate Toolbox. https://climatetoolbox.org/. Accessed January 2023.

Lee, S.-Y., G.S. Mauger, and J.S. Won. 2018. Effect of Climate Change on Flooding in King County Rivers Using New Regional Climate Model Simulations to Quantify Changes in Flood Risk. Report prepared for King County. Climate Impacts Group, University of Washington, Seattle, WA.

King County DNR (Department of Natural Resources and Parks). 2021.King County Surface Water Design Manual. King County, Seattle, WA. July.

Mauger, G., and J. Won. 2019. Expanding the Ensemble of Precipitation Projections for King County. University of Washington Climate Impacts Group, Seattle, WA.

Miller, J.F., R.H. Frederick, and R.J. Tracey. 1973. Precipitation-Frequency Atlas of the Western United States: NOAA Atlas 2, Volume IX–Washington. United States Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service. Silver Spring, MD.

Morgan, H., G.S. Mauger, and J.S. Won. 2021. Climate Change and Stormwater in Portland, Gresham, and Clackamas County. Report prepared for the City of Portland, City of Gresham, and Clackamas County by the Climate Impacts Group, University of Washington, Seattle, WA.

PSRC (Puget Sound Regional Council). 2020. Vision 2050: A Plan for the Central Puget Sound Region. https://www.psrc.org/planning-2050/vision-2050.

Natural Resources Conservation Center (NRCS). June 1986. Urban Hydrology for Small Watershed, Technical Release 55 (TR-55). United States Department of Agriculture, Natural Resources Conservation Service, Conservation Engineering Division.

Pierce County. 2023. Pierce County Rivers Flood Hazard Management Plan, Adopted February 19, 2013, Ordinance 2012-53s. Pierce County Public Works & Utilities Surface Water Management.

Snover, A.K, G.S. Mauger, L.C. Whitely Binder, M. Krosby, and I. Tohver. 2013. Climate Change Impacts and Adaptation in Washington State: Technical Summaries for Decision Makers. State of Knowledge Report prepared for the Washington State Department of Ecology by the Climate Impacts Group, University of Washington, Seattle, WA.

Troost, K.G., and D.B. Booth, D.B, 2008. Geology of Seattle and the Seattle Area, Washington. The Geological Society of America, *Reviews in Engineering Geology XX, 2008.*

U.S. Army Corps of Engineers (USACE). October 2009a. Mud Mountain Dam: White and Puyallup Rivers Channel Capacity Study. U.S. Army Corps of Engineers, Seattle District, Hydraulic Engineering Section, Seattle, WA.

USACE. 2009b. Project Management Plan for Wetland 5K Reach Mill Creek Restoration, Green Duwamish Ecosystem Restoration Program. U.S. Army Corps of Engineers, Seattle District, Seattle, WA.

WRCC (Western Regional Climate Center). 2014a. "Climate of Washington." http://www.wrcc.dri.edu/narratives/WASHINGTON.htm.

WRCC. 2014b. "Period of Record Monthly Climate Summary for Seattle Tcoma Wscmo Ap, Washington." http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?waseat.

WRCC. 2014c. Period of Record Monthly Climate Summary for Kent, Washington." http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?wakent.

Appendix A

Western Washington Phase II NPDES MS4 Permit

Issuance Date:	July 1, 2024
Effective Date:	August 1, 2024
Expiration Date:	July 31, 2029

WESTERN WASHINGTON PHASE II MUNICIPAL STORMWATER PERMIT

National Pollutant Discharge Elimination System and
State Waste Discharge General Permit for discharges from
Small Municipal Separate Storm Sewer Systems
In Western Washington

State of Washington
Department of Ecology
Olympia, WA 98504-7600

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1251 *et seq*.

Until this Permit expires, is modified, or revoked, Permittees that have properly obtained coverage under this Permit are authorized to discharge to waters of the State in accordance with the special and general conditions which follow.

Vincent McGowan, P.E.
Water Quality Program Manager
Washington State Department of Ecology

This page intentionally left blank

TABLE OF CONTENTSTABLE OF CONTENTS

S1. PERMIT COVERAGE AREA AND PERMITTEES 1

A. Geographic Area of Permit Coverage 1
B. Regulated Small Municipal Separate Storm Sewer Systems (MS4s) 1
C. Permit Waivers 3
D. Obtaining Coverage Under this Permit 4

S2. AUTHORIZED DISCHARGES 8

A. Stormwater Discharges 8
B. Non-Stormwater Discharges 8
C. Responsibilities and Liabilities 8
D. Compliance with State and Local Authorizations 8
E. Indian Country 9

S3. RESPONSIBILITIES OF PERMITTEES 10

A. Compliance with Conditions 10
B. Reliance on Another Entity 10

S4. COMPLIANCE WITH STANDARDS 11

A. Prohibition of Discharge of Toxicants 11
B. Compliance with Standards 11
C. MEP Standard 11
D. AKART Standard 11
E. Responsibilities of Permittees 11
F. Violations of Water Quality Standards and Adaptive Management 11
G. Revoke and Reissue Permit 14

S5. STORMWATER MANAGEMENT PROGRAM FOR CITIES, TOWNS, AND COUNTIES 15

A. Stormwater Management Program General Requirements 15
B. Stormwater Management Program Standards 17
C. Stormwater Management Program Components 17
1. Stormwater Planning 17
2. Public Education and Outreach 20
3. Public Involvement and Participation 23
4. MS4 Mapping and Documentation 24
5. Illicit Discharge Detection and Elimination 26
6. Controlling Runoff from New Development, Redevelopment, and Construction Sites 32

7. Stormwater Management for Existing Development 35
8. Source Control Program for Existing Development 37
9. Operations and Maintenance 40

S6. STORMWATER MANAGEMENT PROGRAM FOR SECONDARY PERMITTEES.....48

A. Secondary Permittees and New Secondary Permittees Coverage..... 48
B. Coordination 49
C. Legal Authority..... 49
D. Stormwater Management Program for Secondary Permittees 49
1. Public Education and Outreach..... 49
2. Public Involvement and Participation 50
3. Illicit Discharge Detection and Elimination..... 50
4. Construction Site Stormwater Runoff Control 54
5. Post-Construction Stormwater Management for New Development and Redevelopment..... 55
6. Pollution Prevention and Good Housekeeping for Municipal Operations 55

S7. COMPLIANCE WITH TOTAL MAXIMUM DAILY LOAD REQUIREMENTS 58

A. TMDL Specific Requirements 58

S8. MONITORING AND ASSESSMENT 58

A. Regional Status and Trends Monitoring..... 58
B. Stormwater Management Program (SWMP) Effectiveness and Source Identification Studies..... 59
C. Stormwater Discharge Monitoring..... 60
D. Payments into the Stormwater Action Monitoring Collective Fund. 61

S9. REPORTING & RECORDKEEPING REQUIREMENTS 62

A. Annual Report Submittal..... 62
B. Records Retention..... 62
C. Records Available to the Public..... 62
D. Annual Report for Cities, Towns, and Counties..... 62
E. Annual Report for Secondary Permittees..... 63

GENERAL CONDITIONS..... 64

DEFINITIONS AND ACRONYMS 73

LIST OF APPENDICES

APPENDIX 1. Minimum Technical Requirements for New Development and Redevelopment

APPENDIX 2. Total Maximum Daily Load Requirements

APPENDIX 3. Annual Report Questions for Cities, Towns and Counties

APPENDIX 4. Annual Report Questions for Secondary Permittees

APPENDIX 5. Annual Report Questions for New Permittees

APPENDIX 6. Street Waste Disposal

APPENDIX 7. Determining Construction Site Damage Transport Potential

APPENDIX 8. Businesses and Activities that are Potential Sources of Pollutants

APPENDIX 9. Stormwater Discharge Monitoring

APPENDIX 10. Equivalent Programs for Runoff Controls for New Development, Redevelopment, and Construction Sites

APPENDIX 11. Annual Contribution Amounts to Stormwater Action Monitoring Collective Funds

APPENDIX 12. Stormwater Management for Existing Development Reporting

APPENDIX 13. IDDE Reporting Data and Format

APPENDIX 14. Stormwater Management Action Plan Requirements for New Permittees

ADA ACCESSIBILITY

The Department of Ecology is committed to providing people with disabilities access to information and services by meeting or exceeding the requirements of the Americans with Disabilities Act (ADA), Section 504 and 508 of the Rehabilitation Act, and Washington State Policy #188.

To request ADA Accommodation, contact Water Quality Reception at 360-407-6600. For Washington Relay Service or TTY call 711 or 877-833-6341. Visit Ecology's accessibility webpage[1] for more information.

For document translation services, call Water Quality Reception at 360-407-6600.

Para publicaciones en español, por favor llame a la Recepción de Calidad del Agua al 360-407-6600.

[1] https://ecology.wa.gov/About-us/Accessibility-equity/Accessibility/

SPECIAL CONDITIONS

S1. PERMIT COVERAGE AREA AND PERMITTEES

A. Geographic Area of Permit Coverage

This Permit is applicable to owners or operators of regulated small Municipal Separate Storm Sewer Systems (MS4s) located west of the eastern boundaries of the following counties: Whatcom, Skagit, Snohomish, King, Pierce, Lewis, and Skamania.

1. For all cities required to obtain coverage under this Permit, the geographic area of coverage is the entire incorporated area of the city.
2. For all counties required to have coverage under this Permit, the geographic area of coverage is the urban areas and urban growth areas associated with permitted cities under the jurisdictional control of the county. The geographic area of coverage also includes any urban growth area contiguous to permitted urban areas under the jurisdictional control of the county.
3. For Whatcom County, the geographic area of coverage also includes the unincorporated Birch Bay urban growth area.

   For Thurston County, the geographic area of coverage also includes the unincorporated Yelm urban growth area.
4. For Secondary Permittees required to obtain coverage under this Permit, the minimum geographic area of coverage is all areas identified under S1.A.1 and S1.A.2. At the time of Permit coverage, the Washington State Department of Ecology (Ecology) may establish a geographic area of coverage specific to an individual Secondary Permittee.
5. All regulated small MS4s owned or operated by the Permittees named in S1.D.2.a(i), and (ii), and S1.D.2.b and located in another city or county area requiring coverage under this Permit, or the *Phase I Municipal Stormwater Permit* or the *Eastern Washington Phase II Municipal Stormwater Permit*, are also covered under this Permit.

B. Regulated Small Municipal Separate Storm Sewer Systems (MS4s)

All operators of regulated small MS4s are required to apply for and obtain coverage under this Permit or be permitted under a separate individual permit, unless waived or exempted in accordance with Section S1.C.

1. A regulated small MS4:
   a. Is a "Small MS4" as defined in the *Definitions and Acronyms* section at the end of this Permit; and
   b. Is located within, or partially located within, an urban area as defined by the latest decennial census conducted by the U.S. Census Bureau, or designated by Ecology pursuant to 40 CFR 123.35(b) or 40 CFR 122.26(f); and
   c. Discharges stormwater from the MS4 to a surface water of Washington State; and
   d. Is not eligible for a waiver or exemption under S1.C, below.
2. All other operators of MS4s, including special purpose districts, which meet the criteria for a regulated small MS4 shall obtain coverage under this Permit. Other operators of small MS4s may include, but are not limited to: flood control, or diking and drainage districts; schools, including universities; and correctional facilities that own or operate a small MS4 serving non-agricultural land uses.
3. Any other operators of small MS4s may be required by Ecology to obtain coverage under this Permit or an alternative NPDES permit if Ecology determines the small MS4 is a significant source of pollution to surface waters of the State. Notification of Ecology's determination that permit coverage is required will be through the issuance of an Administrative Order issued in accordance with Chapter 90.48 RCW.
4. The owner or operator of a regulated small MS4 may obtain coverage under this Permit as a Permittee, Co-Permittee, or Secondary Permittee as defined in S1.D.1, below.
5. Pursuant to 40 CFR 122.26(f), any person or organization may petition Ecology to require that additional small MS4s obtain coverage under this Permit. The process for petitioning Ecology is:
   a. The person or organization shall submit a complete petition in writing to Ecology. A complete petition shall address each of the relevant factors for petitions outlined on Ecology's website.
   b. In making its determination on the petition, Ecology may request additional information from either the petitioner or the entity that is the subject of the petition.
   c. Ecology will make a final determination on a complete petition within 180 days of receipt of the petition and inform both the petitioner and the MS4 of the decision, in writing.

d. If Ecology's final determination is that the candidate MS4 will be regulated, Ecology will issue an order to the operator of the MS4 requiring them to obtain coverage under this Permit. The order will specify:

   i. The geographic area of permit coverage for the MS4.

   ii. Any modified dates or deadlines for developing and implementing this Permit, as appropriate to the MS4, and for submitting their first annual report.

   iii. A deadline for the operator of the MS4 to submit a complete Notice of Intent (NOI, provided on Ecology's website) to Ecology.

C. Permit Waivers

Owners and operators of an otherwise regulated small MS4 are not required to obtain coverage under this Permit if:

1. The small MS4 is operated by:

   a. A federal entity, including any department, agency, or instrumentality of the executive, legislative, and judicial branches of the Federal government of the United States.

   b. Federally recognized Indian Tribes located within Indian Country, including all trust or restricted lands within the 1873 Survey Area of the Puyallup Tribe of Indians.

   c. The Washington State Department of Transportation.

Or

2. The portions of the small MS4 located within the census defined urban area(s) serve a total population of less than 1000 people ***and*** a, b, and c, below ***all*** apply:

   a. The small MS4 is not contributing substantially to the pollutant loadings of a physically interconnected MS4 that is regulated by the NPDES stormwater program.

   b. The discharge of pollutants from the small MS4 has not been identified as a cause of impairment of any water body to which the MS4 discharges.

   c. In areas where an EPA approved TMDL has been completed, stormwater controls on the MS4 have not been identified as necessary to meet wasteload allocations established in the TMDL that address the pollutant(s) of concern.

In determining the total population served, both resident and commuter populations shall be included. For example:

- For publicly operated school complexes including universities and colleges, the total population served would include the sum of the average annual student enrollment plus staff.
- For flood control, diking, and drainage districts, the total population served would include residential population and any non-residents regularly employed in the areas served by the small MS4.

D. Obtaining Coverage Under this Permit

All operators of regulated small MS4s are required to apply for and obtain coverage in accordance with this Section, unless waived or exempted in accordance with Section S1.C.

1. Unless otherwise noted, the term "Permittee" shall include a city, town, or county Permittee, New Permittee, Co-Permittee, Secondary Permittee, and New Secondary Permittee as defined below:
   a. "Permittee" is a city, town, or county owning or operating a regulated small MS4 applying and receiving a permit as a single entity.
   b. "New Permittee" is a city, town, or county that is subject to *the Western Washington Phase II Municipal Stormwater General Permit* and was not subject to the Permit prior to August 1, 2024.
   c. "Co-Permittee" is any owner or operator of a regulated small MS4 that is applying in a cooperative agreement with at least one other applicant for coverage under this Permit. Co-Permittees own or operate a regulated small MS4 located within or in proximity to another regulated small MS4.
   d. A "Secondary Permittee" is an operator of a regulated small MS4 that is not a city, town, or county. Secondary Permittees include special purpose districts and other MS4s that meet the criteria for a regulated small MS4 in S1.B, above.
   e. "New Secondary Permittee" is a Secondary Permittee that is covered under a Municipal Stormwater General Permit and was not covered by the Permit prior to August 1, 2024.
2. Operators of regulated small MS4s have submitted, or shall submit, to Ecology either a Notice of Intent (NOI) for Coverage under National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater General Permit or a Duty to Reapply - NOI provided on Ecology's Water Quality Permitting Portal (WQWebPortal).

a. The following Permittees and Secondary Permittees submitted a Duty to Reapply - NOI to Ecology prior to February 1, 2024:

   i. **Cities and towns:** Aberdeen, Algona, Anacortes, Arlington, Auburn, Bainbridge Island, Battle Ground, Bellevue, Bellingham, Black Diamond, Bonney Lake, Bothell, Bremerton, Brier, Buckley, Burien, Burlington, Camas, Centralia, Clyde Hill, Covington, Des Moines, DuPont, Duvall, Edgewood, Edmonds, Enumclaw, Everett, Federal Way, Ferndale, Fife, Fircrest, Gig Harbor, Granite Falls, Issaquah, Kelso, Kenmore, Kent, Kirkland, Lacey, Lake Forest Park, Lake Stevens, Lakewood, Longview, Lynden, Lynnwood, Maple Valley, Marysville, Medina, Mercer Island, Mill Creek, Milton, Monroe, Mountlake Terrace, Mount Vernon, Mukilteo, Newcastle, Normandy Park, Oak Harbor, Olympia, Orting, Pacific, Port Orchard, Port Angeles, Poulsbo, Puyallup, Redmond, Renton, Sammamish, SeaTac, Sedro-Woolley, Shelton, Shoreline, Snohomish, Snoqualmie, Steilacoom, Sumner, Tukwila, Tumwater, University Place, Vancouver, Washougal, and Woodinville.

   ii. **Counties:** Cowlitz, Kitsap, Thurston, Skagit, and Whatcom.

   iii. **Secondary Permittees:** Bainbridge Island School District #303, Bellingham School District, Bellingham Technical College, Cascadia College, Central Kitsap School District, Centralia College, Clark College, Consolidated Diking Improvement District #1 of Cowlitz County, Edmonds Community College, Evergreen College, Highline Community College, Kelso School District, Kent School District, Longview School District, Lower Columbia College, Port of Anacortes, Port of Bellingham, Port of Everett, Port of Olympia, Port of Skagit County, Port of Vancouver, Skagit Valley College, University of Washington Bothell, Washington State University Vancouver, Washington State Department of Enterprise Services (Capitol Campus), Washington Department of Corrections (Larch Corrections Center, Monroe Correctional Complex, Washington Corrections Center for Women, and Washington State Penitentiary), Western Washington University, and Whatcom Community College.

b. Operators of regulated small MS4s have submitted or shall submit to Ecology a “Notice of Intent (NOI) for Coverage under National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater General Permit” provided on Ecology’s website before the effective date of this Permit, with the following exceptions:

   i. Operators of regulated small MS4s located in the Cities of Ridgefield and Yelm, and Sound Transit shall submit a NOI, or application, to Ecology no later than 30 days after the effective date of this Permit.

ii. Operators of regulated small MS4s listed in S1.D.2.a do not need to submit a new application to be covered under this Permit.

c. For operators of regulated small MS4s listed in S1.D.2.a, coverage under this Permit is automatic and begins on the effective date of this Permit, unless the operator chooses to opt out of this General Permit. Any operator of a regulated small MS4 that is opting out of this Permit shall submit an application for an individual MS4 permit in accordance with 40 CFR 122.33(b)(2)(ii) no later than the effective date of this Permit.

d. Operators of regulated small MS4s which want to be covered under this Permit as Co-Permittees shall each submit a NOI to Ecology.

e. Operators of regulated small MS4s which are relying on another entity to satisfy all of their permit obligations shall submit a NOI to Ecology.

f. Operators of small MS4s designated by Ecology pursuant to S1.B.3 of this Permit shall submit a NOI to Ecology within 120 days of receiving notification from Ecology that permit coverage is required.

3. Application Requirements

a. For NOIs submitted after the issuance date of this Permit, the applicant shall include a certification that the public notification requirements of WAC 173-226-130(5) have been satisfied. Ecology will notify applicants in writing of their status concerning coverage under this Permit within 90 days of Ecology's receipt of a complete NOI.

b. Each Permittee applying as a Co-Permittee shall submit a NOI provided on Ecology's website. The NOI shall clearly identify the areas of the MS4 for which the Co-Permittee is responsible.

c. Permittees relying on another entity or entities to satisfy one or more of their permit obligations shall notify Ecology in writing. The notification shall include a summary of the permit obligations that will be carried out by another entity. The summary shall identify the other entity or entities and shall be signed by the other entity or entities. During the term of the Permit, Permittees may terminate or amend shared responsibility arrangements by notifying Ecology, provided this does not alter implementation deadlines.

d. Secondary Permittees required to obtain coverage under this Permit, and the *Phase I Municipal Stormwater Permit* or the *Eastern Washington Phase II Municipal Stormwater Permit*, may obtain coverage by submitting a single NOI.

S2. AUTHORIZED DISCHARGES

A. Stormwater Discharges

This Permit authorizes the discharge of stormwater to surface waters and to groundwaters of the State from MS4s owned or operated by each Permittee covered under this Permit, in the geographic area covered pursuant to S1.A. These discharges are subject to the following limitations:

1. Discharges to groundwaters of the State through facilities regulated under the Underground Injection Control (UIC) program, Chapter 173-218 WAC, are not authorized under this Permit.
2. Discharges to groundwaters not subject to regulation under the federal *Clean Water Act* are authorized in this Permit only under state authorities, Chapter 90.48 RCW, the *Water Pollution Control Act*.

B. Non-Stormwater Discharges

This Permit authorizes discharges of non-stormwater flows to surface waters and to groundwaters of the State from MS4s owned or operated by each Permittee covered under this Permit, in the geographic area covered pursuant to S1.A, only under one or more of the following conditions:

1. The discharge is authorized by a separate NPDES or State Waste Discharge permit.
2. The discharge is from emergency firefighting activities. See Special Conditions S5.C.5, S6.D.3 to address non-stormwater discharges (e.g., discharges associated with cleanup after the emergency).
3. The discharge is from another illicit or non-stormwater discharge that is managed by the Permittee as provided in Special Condition S5.C.5 or S6.D.3.

These discharges are also subject to the limitations in S2.A.1 and S2.A.2, above.

C. Responsibilities and Liabilities

This Permit does not relieve entities that cause illicit discharges, including spills of oil or hazardous substances, from responsibilities and liabilities under state and federal laws and regulations pertaining to those discharges.

D. Compliance with State and Local Authorizations

Discharges from MS4s constructed after the effective date of this Permit shall receive all applicable state and local permits and use authorizations, including compliance with Chapter 43.21C RCW (the *State Environmental Policy Act*).

E. Indian Country

This Permit does not authorize discharges of stormwater to waters within Indian Country as defined in 18 U.S.C. §1151, or to waters subject to water quality standards of Indian Tribes, including portions of the Puyallup River and other waters on trust or restricted lands within the 1873 Survey Area of the Puyallup Tribe of Indians Reservation, except where authority has been specifically delegated to Ecology by the U.S. Environmental Protection Agency. The exclusion of such discharges from this Permit does not waive any rights the State may have with respect to the regulation of the discharges. Indian Country includes:

1. All land within any Indian Reservation notwithstanding the issuance of any patent and including rights-of-way running through the reservation. This includes all federal, tribal, and Indian and non-Indian privately owned land within the reservation.
2. All off-reservation Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same.
3. All off-reservation federal trust lands held for Native American Tribes.

   Puyallup Exception: Following the "Puyallup Tribes of Indians Land Settlement Act of 1989," 25 USC §1773; the permit does apply to land within the Puyallup Reservation except for discharges to surface water on land held in trust by the federal government.

S3. RESPONSIBILITIES OF PERMITTEES

A. Compliance with Conditions

Each Permittee covered under this Permit is responsible for compliance with the terms of this Permit for the regulated small MS4s that they own or operate. Compliance with (1) or (2) below is required as applicable to each Permittee, whether the Permittee has applied for coverage as a Permittee, Co-Permittee, or Secondary Permittee.

1. All city, town, and county Permittees are required to comply with all conditions of this Permit, including any appendices referenced therein, except for Special Condition S6 – *Stormwater Management Program for Secondary Permittees*.
2. All Secondary Permittees are required to comply with all conditions of this Permit, including any appendices referenced therein, except for Section S5 – *Stormwater Management Program for Cities, Towns, and Counties* and S8 – *Monitoring and Assessment*.

B. Reliance on Another Entity

Permittees may rely on another entity to satisfy one or more of the requirements of this Permit. Permittees that are relying on another entity to satisfy one or more of their permit obligations remain responsible for permit compliance if the other entity fails to implement permit conditions. Permittees may rely on another entity provided all the requirements of 40 CFR 122.35(a) are satisfied including, but not limited to:

1. The other entity, in fact, implements the Permit requirements.
2. The other entity agrees to take on responsibility for implementation of the Permit requirement(s) on the Permittee's behalf. This shall be indicated on the NOI or Annual Report.

S4. COMPLIANCE WITH STANDARDS

A. Prohibition of Discharge of Toxicants

In accordance with RCW 90.48.520, the discharge of toxicants to waters of the State of Washington which would violate any water quality standard, including toxicant standards, sediment criteria, and dilution zone criteria is prohibited. The required response to such discharges is defined in Section S4.F, below.

B. Compliance with Standards

This Permit does not authorize a discharge which would be a violation of Washington State *Surface Water Quality Standards* (Chapter 173-201A WAC), *Groundwater Quality Standards* (Chapter 173-200 WAC), *Sediment Management Standards* (Chapter 173-204 WAC), or human health-based criteria in the *National Toxics Rule* (40 CFR 131.45). The required response to such discharges is defined in Section S4.F, below.

C. MEP Standard

The Permittee shall reduce the discharge of pollutants to the Maximum Extent Practicable (MEP).

D. AKART Standard

The Permittee shall use All Known, Available, and Reasonable methods of prevention, control, and Treatment (AKART) to prevent and control pollution of waters of the State of Washington.

E. Responsibilities of Permittees

In order to meet the goals of the *Clean Water Act*, and comply with S4.A, S4.B, S4.C, and S4.D, each Permittee shall comply with all of the applicable requirements of this Permit as identified in S3 – *Responsibilities of Permittees*.

F. Violations of Water Quality Standards and Adaptive Management

A Permittee remains in compliance with S4 despite any discharges prohibited by S4.A or S4.B, when the Permittee undertakes the following response toward long-term water quality improvement:

1. A Permittee shall notify Ecology in writing within 30 days of becoming aware, based on credible site-specific information that a discharge from the MS4 owned or operated by the Permittee is causing or contributing to a known or likely violation of Water Quality Standards in the receiving water. Written notification provided under this subsection shall, at a minimum, identify the source of the site-specific information, describe the nature and extent of the known or likely violation in the receiving water, and explain the reasons why the MS4 discharge is believed to be causing or contributing to the problem. For ongoing or continuing violations, a single written notification to Ecology will fulfill this requirement.
2. In the event that Ecology determines, based on a notification provided under S4.F.1 or through any other means, that a discharge from an MS4 owned or operated by the Permittee is causing or contributing to a violation of Water Quality Standards in a receiving water, Ecology will notify the Permittee in writing that an adaptive management response, outlined in S4.F.3, below, is required, unless:
    a. Ecology also determines that the violation of Water Quality Standards is already being addressed by a Total Maximum Daily Load (TMDL) or other enforceable water quality cleanup plan; or
    b. Ecology concludes the MS4 contribution to the violation will be eliminated through implementation of other permit requirements.
3. Adaptive Management Response
    a. Within 60 days of receiving a notification under S4.F.2, or by an alternative date established by Ecology, the Permittee shall review its Stormwater Management Program (SWMP) and submit a report to Ecology. The report shall include:
        i. A description of the operational and/or structural BMPs that are currently being implemented to prevent or reduce any pollutants that are causing or contributing to the violation of Water Quality Standards, including a qualitative assessment of the effectiveness of each Best Management Practice (BMP).
        ii. A description of potential additional operational and/or structural BMPs that will or may be implemented in order to apply AKART on a site-specific basis to prevent or reduce any pollutants that are causing or contributing to the violation of Water Quality Standards.

iii. A description of the potential monitoring or other assessment and evaluation efforts that will or may be implemented to monitor, assess, or evaluate the effectiveness of the additional BMPs.

iv. A schedule for implementing the additional BMPs including, as appropriate: funding, training, purchasing, construction, monitoring, and other assessment and evaluation components of implementation.

b. Ecology will, in writing, acknowledge receipt of the report within a reasonable time and notify the Permittee when it expects to complete its review of the report. Ecology will either approve the additional BMPs and implementation schedule or require the Permittee to modify the report as needed to meet AKART on a site-specific basis. If modifications are required, Ecology will specify a reasonable time frame in which the Permittee shall submit, and Ecology will review the revised report.

c. The Permittee shall implement the additional BMPs, pursuant to the schedule approved by Ecology, beginning immediately upon receipt of written notification of approval.

d. The Permittee shall include with each subsequent annual report a summary of the status of implementation and the results of any monitoring, assessment or evaluation efforts conducted during the reporting period. If, based on the information provided under this subsection, Ecology determines that modification of the BMPs or implementation schedule is necessary to meet AKART on a site-specific basis, the Permittee shall make such modifications as Ecology directs. In the event there are ongoing violations of water quality standards despite the implementation of the BMP approach of this Section, the Permittee may be subject to compliance schedules to eliminate the violation under WAC 173-201A-510(4) and WAC 173-226-180 or other enforcement orders as Ecology deems appropriate during the term of this Permit.

e. A TMDL or other enforceable water quality cleanup plan that has been approved and is being implemented to address the MS4's contribution to the Water Quality Standards violation supersedes and terminates the S4.F.3 implementation plan.

f. Provided the Permittee is implementing the approved adaptive management response under this Section, the Permittee remains in compliance with Special Condition S4, despite any on-going violations of Water Quality Standards identified under S4.A or B, above.

g. The adaptive management process provided under Section S4.F is not intended to create a shield for the Permittee from any liability it may face under 42 U.S.C. 9601 et seq. or Chapter 70.105D RCW.

G. Revoke and Reissue Permit

Ecology may modify or revoke and reissue this General Permit in accordance with G14 – *General Permit Modification and Revocation*, if Ecology becomes aware of additional control measures, management practices, or other actions beyond what is required in this Permit that are necessary to:

1. Reduce the discharge of pollutants to the MEP;
2. Comply with the state AKART requirements; or
3. Control the discharge of toxicants to waters of the State of Washington.

S5. STORMWATER MANAGEMENT PROGRAM FOR CITIES, TOWNS, AND COUNTIES

A. Stormwater Management Program General Requirements

Each Permittee shall develop and implement a Stormwater Management Program (SWMP). A SWMP is a set of actions and activities comprising the components listed in S5 and any additional actions necessary to meet the requirements of applicable TMDLs pursuant to S7 – *Compliance with Total Maximum Daily Load Requirements* and S8 – *Monitoring and Assessment*. This Section applies to all cities, towns, and counties covered under this Permit (termed as "Permittee," including cities, towns, and counties that are Co-Permittees).

New Permittees subject to this Permit, as described in S1.D.1.b, shall fully meet the requirements in S5 as modified in footnotes below or as specified in an alternate schedule as a condition of coverage by Ecology. Permittees obtaining coverage after the issuance date of this Permit shall fully meet the requirements in S5 as specified in an alternate schedule as a condition of coverage by Ecology.

1. At a minimum, the Permittee's SWMP shall be implemented throughout the geographic area subject to this Permit as described in S1.A.[2]
2. Each Permittee shall prepare written documentation of the SWMP, called the SWMP Plan. The SWMP Plan shall be organized according to the program components in S5.C, or a format approved by Ecology and shall be updated at least annually for submittal with the Permittee's annual reports to Ecology (see S9 – *Reporting Requirements*). The SWMP Plan shall be written to inform the public of the planned SWMP activities for the upcoming calendar year, and shall include a description of:
    a. Planned activities for each of the program components included in S5.C.
    b. Any additional planned actions to meet the requirements of applicable TMDLs pursuant to S7– *Compliance with Total Maximum Daily Load Requirements*.
    c. Any additional planned actions to meet the requirements of S8 – *Monitoring and Assessment*.
3. The SWMP shall include an ongoing program for gathering, tracking, maintaining, and using information to evaluate SWMP development, implementation, and permit compliance and to set priorities.

[2] New Permittees shall fully develop and implement the SWMP in accordance with the schedules contained in this Section no later than March 31, 2029.

a. Each Permittee shall track the cost or estimated cost of development and implementation of each component of the SWMP and sources of funding. This information shall be provided with each Annual Report, no later than March 31, 2027. Permittees shall provide annual average costs (or estimates) to implement the SWMP and TMDL requirements.[3]

b. Each Permittee shall track the number of inspections, follow-up actions because of inspections, official enforcement actions, and types of public education activities as required by the respective program component. This information shall be included in the annual report.

4. Permittees shall continue implementation of existing stormwater management programs until they begin implementation of the updated stormwater management program in accordance with the terms of this Permit, including implementation schedules.

5. Coordination among Permittees

a. Coordination among entities covered under municipal stormwater NPDES permits may be necessary to comply with certain conditions of the SWMP. The SWMP shall include, when needed, coordination mechanisms among entities covered under a municipal stormwater NPDES permit to encourage coordinated stormwater-related policies, programs, and projects within adjoining or shared areas, including:

i. Coordination mechanisms clarifying roles and responsibilities for the control of pollutants between physically interconnected MS4s covered by a Municipal Stormwater Permit.

ii. Coordinating stormwater management activities for shared water bodies, or watersheds among Permittees to avoid conflicting plans, policies, and regulations.

b. The SWMP shall include coordination mechanisms among departments within each jurisdiction to eliminate barriers to compliance with the terms of this Permit. Permittees shall include a written description of internal coordination mechanisms in the Annual Report due no later than March 31, 2026.

[3] New Permittees shall begin cost tracking as required in S5.A.3.a, no later than January 1, 2026.

B. Stormwater Management Program Standards

The SWMP shall be designed to reduce the discharge of pollutants from regulated small MS4s to the MEP, meet state AKART requirements, and protect water quality.

C. Stormwater Management Program Components

The SWMP shall include the components listed below. To the extent allowable under state or federal law, all components are mandatory for city, town, or county Permittees covered under this Permit.

1. Stormwater Planning

Each Permittee shall implement a Stormwater Planning program to inform and assist in the development of policies and strategies as water quality management tools to protect receiving waters.

The minimum performance measures are:

a. Each Permittee shall continue to convene an inter-disciplinary team to inform and assist in the development, progress, and influence of this program.[4]

b. Coordination with long-range plan updates.

   i. Each Permittee shall describe how stormwater management needs and protection/improvement of receiving water health are (or are not) informing the long-range or comprehensive planning update processes and influencing policies and implementation strategies in their jurisdiction in the Annual Report, due March 31, 2027. The Annual Report shall describe the water quality and watershed protection policies, strategies, codes, and other measures intended to protect and improve local receiving water health through planning, considering stormwater management needs or limitations.

c. Low Impact Development (LID) code-related requirements.

   i. Permittees shall continue to require LID Principles and LID BMPs when updating, revising, and developing new local development-related codes, rules, standards, or other enforceable documents, as needed.

      The intent shall be to make LID the preferred and commonly used approach to site development. The local development-related codes, rules, standards, or other enforceable documents shall be designed to

[4] New Permittees shall convene an interdisciplinary team no later than August 1, 2025.

minimize impervious surfaces, native vegetation loss, and stormwater runoff in all types of development situations, where feasible.

(a) Annually, each Permittee shall assess and document any newly identified administrative or regulatory barriers to implementation of LID Principles or LID BMPs since local codes were updated in accordance with the 2013 Permit, and the measures developed to address the barriers. If applicable, the report shall describe mechanisms adopted to encourage or require implementation of LID principles or LID BMPs.

ii. By December 31, 2028, New Permittees shall review, revise, and make effective their local development-related codes, rules, standards, or other enforceable documents to incorporate and require LID principles and LID BMPs. New Permittees shall conduct a similar review and revision process, and consider the range of issues, outlined in the following document: *Integrating LID into Local Codes: A Guidebook for Local Governments* (Puget Sound Partnership, 2012).

New Permittees shall submit a summary of the results of the review and revision process with the annual report due no later than March 31, 2029. This summary shall be in the required format described in Appendix 5 and include, at a minimum, a list of the participants (job title, brief job description, and department represented), the codes, rules, standards, and other enforceable documents reviewed, and the revisions made to those documents which incorporate and require LID principles and LID BMPs. The summary shall include existing requirements for LID principles and LID BMPs in development-related codes. The summary shall be organized as follows:

(a) Measures to minimize impervious surfaces;

(b) Measures to minimize loss of native vegetation; and

(c) Other measures to minimize stormwater runoff.

iii. No later than December 31, 2028, adopt and implement tree canopy goals and policies to support stormwater management. Permittees shall consider how existing or future tree canopy can support stormwater management and water quality improvements in receiving waters. Establish a long-term (e.g. 5, 10 year or longer) goal of canopy, existing or future projection, to be used for stormwater management that is appropriate to the jurisdiction. Specific considerations for canopy for

stormwater management on Permittee-owned or operated lands shall include (but are not limited to):

(a) Maintaining or increasing canopy in overburdened communities.

(b) Maintaining existing mature canopy.

Document considerations, reasoning, and rationale for goals and policies.

d. Stormwater Management Action Planning (SMAP).[5] Permittees shall conduct a similar process and consider the range of issues outlined in the *Stormwater Management Action Planning Guidance* (Ecology, 2024; Publication no. 24-10-027) for one new priority catchment or additional actions for an existing SMAP.[6] A purpose of the SMAP is to support implementation in the Stormwater Management for Existing Development (SMED) Program with the identification of strategic investments through the identification of projects and actions.

i. Stormwater Management Action Plan (SMAP). No later than March 31, 2027, Permittees shall complete and submit a SMAP for at least one new high priority catchment area, or additional actions for an existing SMAP, that identifies all of the following:

(a) A description of the stormwater facility retrofits needed for the area, including the BMP types and preferred locations. Include projects that address transportation-related runoff from high traffic areas.

(b) Land management/development strategies and/or actions identified for water quality management.

(c) Focused, enhanced, or customized implementation of stormwater management actions related to Permit sections within S5, including:

- IDDE field screening;
- Prioritization of Source Control inspections;
- O&M inspections or enhanced maintenance; or
- Public Education and Outreach behavior change programs.

Identified actions shall support other specifically identified stormwater management strategies and actions for the basin overall, or for the catchment area in particular.

[5] New Permittees are exempt from S5.C.1.d. for this Permit term.
[6] City of Shelton shall follow the SMAP requirements outlined in Appendix 14.

(d) If applicable, identification of changes needed to local long-range plans to address SMAP priorities.

(e) A proposed implementation schedule and budget sources for:

- Short-term actions (i.e., actions to be accomplished within six years); and
- Long-term actions (i.e., actions to be accomplished within seven to 20 years).

(f) Actions in the SMAP that may benefit overburdened communities, including specifically vulnerable populations and highly impacted Communities.

(g) A process and schedule to provide future assessment and feedback to improve the planning process and implementation of procedures or projects.

2. Public Education and Outreach

The SWMP shall include an education and outreach program designed to:

- Build general awareness about methods to address and reduce impacts from stormwater runoff;
- Effect behavior change to reduce or eliminate behaviors and practices that cause or contribute to adverse stormwater impacts; and
- Create stewardship opportunities that encourages community engagement in addressing the impacts from stormwater runoff.

Permittees may choose to meet these requirements individually or as a member of a regional group. Regional collaboration on general awareness or behavior change programs, or both, includes Permittees developing a consistent message, determining best methods for communicating the message, and when appropriate, creating strategies to effect behavior change. If a Permittee chooses to adopt one or more elements of a regional program, the Permittee should participate in the regional group and shall implement the adopted element(s) of the regional program in the local jurisdiction.

The minimum performance measures are:

a. Each Permittee shall implement an education and outreach program. The program design shall be based on local or regional (or a combination of both) water quality information and priority audience characteristics to identify high priority audiences, subject areas, and/or BMPs. Based on the priority

audience's demographic, the Permittee shall consider delivering its selected messages in language(s) other than English, as appropriate to the priority audience.[7]

i. ***General awareness.*** To build general awareness, Permittees shall annually select, at a minimum, one priority audience and one subject area from either (a) or (b):

(a) *Priority audiences:* General public (including overburdened communities, school age children, college/university, or trade students) or businesses (including home-based, or mobile businesses). Subject areas:

- General impacts of stormwater on surface waters, including impacts from impervious surfaces.
- Low impact development (LID) principles and LID BMPs.

(b) *Priority audiences:* Engineers, contractors, developers, property owners/managers, or land use planners. Subject areas:

- Technical standards for stormwater site and erosion control plans.
- LID principles and LID BMPs.
- Stormwater treatment and flow control BMPs/facilities.
- Source control BMPs for building materials to reduce pollution to stormwater, including but not limited to stormwater pollution from PCB-containing materials.

(c) Permittees shall provide subject area information to the priority audience on an ongoing or strategic schedule.

ii. ***Behavior change.*** To affect behavior change, Permittees shall select, at a minimum, one priority audience and one BMP.

(a) *Priority Audiences:* Residents, landscapers, property managers/owners, developers, school age children, college/university, trade students, or businesses (including home-based or mobile businesses).

BMPs:

[7] New Permittees shall begin implementing the requirements of S5.C.2.a no later than August 1, 2027.

- Use and storage of: pesticides, fertilizers, and/or other household chemicals.
- Use and storage of: automotive chemicals, hazardous cleaning supplies, carwash soaps, and/or other hazardous materials.
- Prevention of illicit discharges.
- Yard care techniques protective of water quality.
- Carpet cleaning.
- Repair and maintenance BMPs for: vehicles, equipment, and/or home/buildings.
- Pet waste management and disposal.
- LID Principles and LID BMPs.
- Stormwater facility maintenance, including LID facilities.
- Dumpster and trash compactor maintenance.
- Litter and debris prevention.
- Sediment and erosion control.
- (Audience specific) Source control BMPs (refer to S5.C.8).
- (Audience specific) Locally important, municipal stormwater-related subject area.

(b) Social marketing campaign development. Based on the recommendation from 2024 evaluation and report, no later than July 1, 2025, each Permittee shall follow social marketing practices and methods and develop a campaign that is tailored to the community, including development of a program evaluation plan. Each Permittee shall:[8]

1. Develop a strategy and schedule to implement the existing campaign more effectively; or
2. Develop a strategy and schedule to expand the existing campaign to a new priority audience or BMPs; or

[8] No later than August 1, 2025, New Permittees shall follow social marketing practices and methods to develop a behavior change program that is tailored to the community per S5.C.2.a.ii(b).

3. Develop a strategy and schedule for a new priority audience and BMP behavior change campaign.

(c) Behavior change campaign implementation. No later than September 1, 2025, begin to implement the strategy developed in S5.C.2.a.ii.(b).[9]

(d) Behavior change campaign evaluation. No later than March 31, 2029, evaluate and submit report on:

1. The changes in understanding and adoption of behaviors resulting from the implementation of the strategy; and

2. Any planned or recommended changes to the campaign to be more effective; describe the strategies and process to achieve the results.

(e) Behavior change campaign adaptive management. Permittees shall use results of the evaluation to continue to direct effective methods and implementation of the ongoing behavior change program.

iii. ***Stewardship.*** Each Permittee shall provide, partner with, or promote stewardship opportunities to encourage residents or businesses to participate in activities or events planned and organized within the community, such as: stream teams, storm drain marking, volunteer monitoring, riparian plantings, and watershed habitat improvement. Permittees may provide, partner with, or promote stewardship opportunities created or organized by existing organizations (including non-Permittees).[10]

3. Public Involvement and Participation

Permittees shall provide ongoing opportunities for public involvement and participation through advisory councils, public hearings, watershed committees, participation in developing rate-structures or other similar activities. Each Permittee shall comply with applicable state and local public notice requirements when developing elements of the SWMP and SMAP.

The minimum performance measures are:

a. Permittees shall create opportunities for the public, including overburdened communities, to participate in the decision-making processes involving the development, implementation, and update of the Permittee's SMAP and

[9] No later than October 1, 2025, New Permittees shall begin to implement the strategy developed in S5.C.2.a.ii(b).
[10] New Permittees shall implement the stewardship requirements according to S5.C.2.a.iii no later than August 1, 2027.

SWMP.[11] Permittees shall document specific outreach measures for overburdened communities.

i. Annually, document specific public involvement and participation opportunities provided to overburdened communities and specifically, highly impacted communities.

ii. No later than December 31, 2026, document methods used to identify overburdened communities.

b. Each Permittee shall post on their website their SWMP Plan and the Annual Report, required under S9.A, no later than May 31 each year. All other submittals shall be available to the public upon request.

4. MS4 Mapping and Documentation

The SWMP shall include an ongoing program for mapping and documenting the MS4.[12]

The minimum performance measures are:

a. *Ongoing Mapping:* Each Permittee shall maintain mapping data for the features listed below:

i. Known MS4 outfalls and known MS4 discharge points.

(a) Map outfall size and material, where known.

ii. Receiving waters, other than groundwater.

iii. Stormwater treatment and flow control BMPs/facilities owned or operated by the Permittee.

iv. Geographic areas served by the Permittee's MS4 that do not discharge stormwater to surface waters.

v. Tributary conveyances to all known outfalls and discharge points with a 24-inch nominal diameter or larger, or an equivalent cross-sectional area for non-pipe systems. The following features or attributes (or both) shall be mapped:

(a) Tributary conveyance type, material, and size where known.

(b) Associated drainage areas.

[11]New Permittees shall develop and begin to implement requirements according to S5.C.3.a no later than August 1, 2025. New Permittees are exempt from SMAP this permit term.

[12]New Permittees shall meet the requirements to map the MS4 according to S5.C.4 no later than March 31, 2029, except where otherwise noted in this Section.

(c) Land use.

vi. Connections between the MS4 owned or operated by the Permittee and other municipalities or public entities.

vii. All connections to the MS4 authorized or allowed by the Permittee after February 16, 2007. [13,14]

viii. All known connections from the MS4 to a privately owned stormwater system.

b. *New Mapping.* Each Permittee shall:

i. No later than March 31, 2026, submit locations of all known MS4 outfalls according to the standard templates and format provided in the Annual Report. Report the size and material of the outfalls, where known.

ii. No later than December 31, 2026, using available, existing data, map tree canopy to support stormwater management on Permittee-owned or operated properties. Permittees shall develop and follow a methodology to intentionally identify canopy for stormwater management purposes, which may be updated annually or as needed.

iii. No later than March 31, 2028, implement a methodology to map and assess acreage of MS4 tributary basins to outfalls with a 24-inch nominal diameter or larger, or an equivalent cross-sectional area for non-pipe systems that have stormwater treatment and flow control BMPs/facilities owned or operated by the Permittee. Submit with the March 31, 2028 Annual Report a map(s) (.pdf) and table (.xlsx) with a breakdown of the MS4 tributary basins quantifying estimated acres managed or unmanaged by stormwater treatment and flow control BMPs/facilities owned or operated by the Permittee.

iv. No later than December 31, 2028, using available, existing data map overburdened communities in relation to stormwater treatment and flow control BMPs/facilities, outfalls, discharge points, and tree canopy on Permittee-owned or operated properties.

c. The required format for mapping is electronic (e.g. Geographic Information System, CAD drawings, or other software that can map and store points,

[13]New Permittees shall meet the requirements of S5.C.4.a.vii after August 1, 2024, for all connections to the MS4 authorized after August 1, 2024.

[14]Permittees do not need to map the following residential connections: individual driveways, sump pumps, or roof downspouts.

lines, polygons, and associated attributes), with fully described mapping standards.

d. To the extent consistent with national security laws and directives, each Permittee shall make available to Ecology, upon request, available maps depicting the information required in S5.C.4.a through c, above.

e. Upon request, and to the extent appropriate, Permittees shall provide mapping information to federally recognized Indian Tribes, municipalities, and other Permittees. This Permit does not preclude Permittees from recovering reasonable costs associated with fulfilling mapping information requests by federally recognized Indian Tribes, municipalities, and other Permittees.

5. Illicit Discharge Detection and Elimination

The SWMP shall include an ongoing program designed to prohibit, prevent, detect, characterize, trace, and eliminate illicit connections and illicit discharges into the MS4.[15]

The minimum performance measures are:

a. The program shall include procedures for reporting and correcting or removing illicit connections, spills, and other illicit discharges when they are suspected or identified. The program shall also include procedures for addressing pollutants entering the MS4 from an interconnected, adjoining MS4.

Illicit connections and illicit discharges shall be identified through, but not limited to, field screening, inspections, complaints/reports, construction inspections, maintenance inspections, source control inspections, and/or monitoring information, as appropriate.

b. Permittees shall inform public employees, businesses, and the public of hazards associated with illicit discharges and improper disposal of waste.

c. Each Permittee shall implement an ordinance or other regulatory mechanism to effectively prohibit non-stormwater, illicit discharges into the Permittee's MS4 to the maximum extent allowable under state and federal law. The ordinance or other regulatory mechanism in effect as of the effective date of this Permit shall be revised, if necessary, to meet the requirements of this Section no later than July 1, 2027.

[15]New Permittees shall meet the requirements of S5.C.5 no later than August 1, 2026 except where otherwise noted in this Section.

i. *Allowable Discharges:* The regulatory mechanism does not need to prohibit the following categories of non-stormwater discharges:

(a) Diverted stream flows

(b) Rising groundwaters

(c) Uncontaminated groundwater infiltration (as defined at 40 CFR 35.2005(b)(20))

(d) Uncontaminated pumped groundwater

(e) Foundation drains

(f) Air conditioning condensation

(g) Irrigation water from agricultural sources that is commingled with urban stormwater

(h) Springs

(i) Uncontaminated water from crawl space pumps

(j) Footing drains

(k) Flows from riparian habitats and wetlands

(l) Non-stormwater discharges authorized by another NPDES or State Waste Discharge permit

(m) Non-stormwater discharges from emergency firefighting activities in accordance with S2 Authorized Discharges

ii. *Conditionally allowable discharges:* The regulatory mechanism may allow the following categories of non-stormwater discharges only if the stated conditions are met:

(a) Discharges from potable water sources, including but not limited to water line flushing, hyperchlorinated water line flushing, fire hydrant system flushing, and pipeline hydrostatic test water. Planned discharges shall be dechlorinated to a total residual chlorine concentration of 0.1 ppm or less, pH-adjusted, if necessary, and volumetrically and velocity controlled to prevent re-suspension of sediments in the MS4.

(b) Discharges from lawn watering and other irrigation runoff, including from reclaimed water sources. These discharges shall be minimized

through, at a minimum, public education activities and water conservation efforts.

(c) Discharges from swimming pools, spas, and hot tubs. The discharges shall be dechlorinated/debrominated to a total residual concentration of 0.1 ppm or less, free from sodium chloride, pH-adjusted, and reoxygenated if necessary, volumetrically and velocity controlled to prevent re-suspension of sediments in the MS4. Discharges shall be thermally controlled to prevent an increase in temperature of the receiving water. Swimming pool cleaning wastewater and filter backwash shall not be discharged to the MS4.

(d) Street and sidewalk wash water and water used to control dust. The Permittee shall reduce these discharges through, at a minimum, public education activities and/or water conservation efforts. To avoid washing pollutants into the MS4 Permittees shall minimize the amount of street wash and dust control water used.

(e) Routine external building washdown that does not use detergents for buildings built or renovated before 1950 and after 1980. These discharges shall be reduced through, at minimum, public education activities and water conservation efforts.

Commercial, industrial, and multi-story residential structures constructed or renovated between the years 1950 and 1980 (i.e. those most likely to have PCB-containing building materials), shall be assessed for PCB-containing materials consistent with *How to find and address PCBs in building materials* (Ecology, 2024, Publication No. 22-04-024) prior to routine building washdown to the MS4. Structures confirmed or suspected to have PCB-containing materials shall not discharge washdown to the MS4.

Single-family residential buildings are exempt from PCB assessment prior to building washdown, for the purposes of this section. Structures built or renovated between 1950-1980 and determined to be without PCB-containing materials may conduct routine building washdown (without detergents) as described above.

(f) Other non-stormwater discharges. The discharges shall be in compliance with the requirements of a pollution prevention plan reviewed by the Permittee which addresses control of such discharges.

iii. The Permittee shall further address any category of discharges in (i) or (ii), above if the discharges are identified as significant sources of pollutants to waters of the State.

iv. The ordinance or other regulatory mechanism shall include escalating enforcement procedures and actions.

d. Each Permittee shall implement an ongoing program designed to detect and identify non-stormwater discharges and illicit connections into the Permittee's MS4.[16] The program shall include the following components:

i. Procedures for conducting investigations of the Permittee's MS4, including field screening and methods for identifying potential sources. These procedures may also include source control inspections.

The Permittee shall implement a field screening methodology appropriate to the characteristics of the MS4 and water quality concerns. Screening for illicit connections may be conducted using *Illicit Connection and Illicit Discharge Field Screening and Source Tracing Guidance Manual* (Herrera Environmental Consultants, Inc.; May 2020), or another methodology of comparable or improved effectiveness. The Permittee shall document the field screening methodology in the Annual Report.

(a) All Permittees shall complete field screening for an average of 12% of the MS4 each year.[17]

ii. A publicly listed and publicized hotline or other telephone number for public reporting of spills and other illicit discharges.

iii. An ongoing training program for all municipal field staff who, as part of their normal job responsibilities, might come into contact with or otherwise observe an illicit discharge and/or illicit connection to the MS4, on the identification of an illicit discharge and/or connection, and on the proper procedures for reporting and responding to the illicit discharge and/or connection. Follow-up training shall be provided, as needed, to address changes in procedures, techniques, requirements, or staffing. Permittees shall document and maintain records of the trainings provided and the staff trained.[18]

[16]New Permittees shall fully implement the requirements of S5.C.5.d no later than August 1, 2028.

[17]New Permittees shall complete S5.C.5.d.i requirements for field screening covering at least 40% of the MS4 within the Permittee's coverage area no later than December 31, 2028, and on average 12% each year thereafter.

[18]New Permittees shall develop and begin implementing the ongoing training program described in S5.C.5.d.iii no later than March 31, 2026.

e. Each Permittee shall implement an ongoing program designed to address illicit discharges, including spills and illicit connections, into the Permittee's MS4.[19] The program shall include:

i. Procedures for characterizing the nature of, and potential public or environmental threat posed by, any illicit discharges found by or reported to the Permittee. Procedures shall address the evaluation of whether the discharge must be immediately contained and steps to be taken for containment of the discharge.

ii. Procedures for the post-emergency clean-up of firefighting activities:

(a) No later than December 31, 2026, the Permittee shall coordinate with firefighting agencies/departments that serve the areas that discharge to the MS4 to be notified when PFAS-containing AFFFs are used during emergency firefighting activities.

(b) No later than January 1, 2027, Permittee shall update and implement procedures to minimize discharges to the MS4 during post-emergency clean-up and disposal activities including, but not limited to, the immediate clean-up in all situations where PFAS-containing AFFFs have been used, diversions, and other measures that prevent discharges to the MS4. The Permittee is not expected to deploy control measures during an emergency.

iii. Procedures for tracing the source of an illicit discharge; including visual inspections and, when necessary, opening manholes, using mobile cameras, collecting and analyzing water samples, and/or other detailed inspection procedures.

iv. Procedures for eliminating the discharge including notification of appropriate authorities (including owners or operators of interconnected MS4s), notification of the property owner, technical assistance, follow-up inspections, and use of the compliance strategy developed pursuant to S5.C.5.c.iv, including escalating enforcement and legal actions if the discharge is not eliminated.

v. Compliance with the provisions in (i)-(iv) above shall be achieved by meeting the following timelines:

[19]New Permittees shall fully develop and implement the requirements of S5.C.5.e no later than August 1, 2028.

(a) Immediately respond to all illicit discharges, including spills, which are determined to constitute a threat to human health, welfare, or the environment, consistent with General Condition G3.

(b) Investigate (or refer to the appropriate agency with the authority to act) within 7 days, on average, any complaints, reports, or monitoring information that indicates a potential illicit discharge.

(c) Initiate an investigation within 21 days of any report or discovery of a suspected illicit connection to determine the source of the connection, the nature and volume of discharge through the connection, and the party responsible for the connection.

(d) Upon confirmation of an illicit connection, use the compliance strategy in a documented effort to eliminate the illicit connection within 6 months. All known illicit connections to the MS4 shall be eliminated.

f. Permittees shall train staff who are responsible for identification, investigation, termination, cleanup, and reporting of illicit discharges, including spills, and illicit connections, to conduct these activities. Follow-up training shall be provided as needed to address changes in procedures, techniques, requirements, or staffing. Permittees shall document and maintain records of the training provided and the staff trained.[20]

g. Recordkeeping: Each Permittee shall track and maintain records of the activities conducted to meet the requirements of this Section. In the Annual Report, each Permittee shall submit data for the illicit discharges, spills, and illicit connections including those that were found by, reported to, or investigated by the Permittee during the previous calendar year. The data shall include the information and format specified in Appendix 13 and WQWebIDDE. Each Permittee may either use their own system or WQWebIDDE for recording this data.

[20]New Permittees shall meet the requirements of S5.C.5.f no later than March 31, 2026.

6. Controlling Runoff from New Development, Redevelopment, and Construction Sites

Each Permittee shall implement and enforce a program to reduce pollutants in stormwater runoff to a regulated small MS4 from new development, redevelopment, and construction site activities. The program shall apply to private and public development, including transportation projects.[21]

The minimum performance measures are:

a. Implement an ordinance or other enforceable mechanism that addresses runoff from new development, redevelopment, and construction site projects.

   No later than June 30, 2027, each Permittee shall adopt and make effective a local program, that meets the requirements of S5.C.6.b(i) through (iii), below, and shall apply to all applications[22] submitted:

   i. On or after July 1, 2027.

   ii. Prior to January 1, 2017, that have not started construction[23] by July 1, 2022.[24]

   iii. Prior to July 1, 2022, that have not started construction by July 1, 2027.

   iv. Prior to July 1, 2027, that have not started construction by July 1, 2032.

b. The ordinance or other enforceable mechanism shall include, at a minimum:

   i. The Minimum Requirements, thresholds, and definitions in Appendix 1, or the 2019 Appendix 1 amended to include the changes identified in Appendix 10, or Phase I program approved by Ecology and amended to include Appendix 10, for new development, redevelopment, and construction sites. Adjustment and exceptions criteria equivalent to those in Appendix 1 shall be included. More stringent requirements may

[21]For continuing Permittees, this means continuing to implement existing programs developed under previous permits until updates are made to meet the schedules defined. *New Permittees shall meet the requirements of S5.C.6 no later than June 30, 2027, except where otherwise specified in this Section.*

[22]In this context, "application" means, at a minimum a complete project description, site plan, and, if applicable, SEPA checklist. Permittees may establish additional elements of a completed application.

[23]In this context "started construction" means the site work associated with, and directly related to the approved project has begun. For example: grading the project site to final grade or utility installation. Simply clearing the project site does not constitute the start of construction. Permittees may establish additional requirements related to the start of construction.

[24]**For Lynden, Snoqualmie S5.C.6.a.ii is replaced with these dates**: Prior to January 1, 2018, that have not started construction by January 1, 2023. **For Aberdeen S5.C.6.a.ii is replaced with these dates**: Prior to July 1, 2018, that have not started construction by June 30, 2023. **Shelton S5.C.6.a.ii and iii is replaced with these dates:** Prior to January 1, 2023, which have not started construction by January 1, 2028.

be used, and/or certain requirements may be tailored to local circumstances through the use of Ecology-approved basin plans or other similar water quality and quantity planning efforts. Such local requirements and thresholds shall provide equal protection of receiving waters and equal levels of pollutant control to those provided in Appendix 1.

ii. The local requirements shall include the following requirements, limitations, and criteria that, when used to implement the minimum requirements in Appendix 1 (or program approved by Ecology under the 2024 Phase I Permit), will protect water quality, reduce the discharge of pollutants to the MEP, and satisfy the State requirement under Chapter 90.48 RCW to apply AKART prior to discharge:

(a) Site planning requirements;

(b) BMP selection criteria.

(c) BMP design criteria.

(d) BMP infeasibility criteria.

(e) LID competing needs criteria.

(f) BMP limitations.

Permittees shall document how the criteria and requirements will protect water quality, reduce the discharge of pollutants to the MEP, and satisfy the state AKART requirements.

Permittees who choose to use the requirements, limitations, and criteria above in the *Stormwater Management Manual for Western Washington*, or a Phase I program approved by Ecology, may cite this choice as their sole documentation to meet this requirement.

iii. The legal authority, through the approval process for new development and redevelopment, to inspect and enforce maintenance standards for private stormwater facilities approved under the provisions of this Section that discharge to the Permittee's MS4.

c. The program shall include a permitting process with site plan review, inspection, and enforcement capability to meet the standards listed in (i) through (iv) below, for both private and public projects, using qualified personnel (as defined in *Definitions and Acronyms*). At a minimum, this program shall be applied to all sites that meet the minimum thresholds adopted pursuant to S5.C.6.b.i, above.

i. Review of all stormwater site plans for proposed development activities.

ii. Inspect, prior to clearing and construction, all permitted development sites that have a high potential for sediment transport as determined through plan review based on definitions and requirements in Appendix 7 – *Determining Construction Site Sediment Damage Potential*. As an alternative to evaluating each site according to Appendix 7, Permittees may choose to inspect all construction sites that meet the minimum thresholds adopted pursuant to S5.C.6.b.i, above.

iii. Inspect all permitted development sites during construction to verify proper installation and maintenance of required erosion and sediment controls. Enforce, as necessary, based on the inspection.

iv. Each Permittee shall manage maintenance activities to inspect all stormwater treatment and flow control BMPs/facilities, and catch basins, in new residential developments at least twice per 12-month period with no less than 4 months between inspections, until 90% of the lots are constructed (or when construction has stopped and the site is fully stabilized), to identify maintenance needs and enforce compliance with maintenance standards as needed.

v. Inspect all permitted development sites upon completion of construction and prior to final approval or occupancy to ensure proper installation of permanent stormwater facilities. Verify that a maintenance plan is completed and responsibility for maintenance is assigned for stormwater treatment and flow control BMPs/facilities. Enforce, as necessary, based on the inspection.

vi. Compliance with the inspection requirements in (ii) through (v), above, shall be determined by the presence and records of an established inspection program designed to inspect all sites. Compliance shall be determined by achieving at least 80% of required inspections annually. The inspections may be combined with other inspections provided they are performed using qualified personnel.

vii. The program shall include a procedure for keeping records of inspections and enforcement actions by staff including inspection reports, warning letters, notices of violations, and other enforcement records. Records of maintenance inspections and maintenance activities shall be maintained.

viii. An enforcement strategy shall be implemented to respond to issues of non-compliance.

d. The program shall make available to representatives of proposed new development and redevelopment, as applicable: the link to the online *Construction Stormwater General Permit* Notice of Intent (NOI) form for construction activity, a link to the online *Industrial Stormwater General Permit* NOI form for industrial activity, and a link to the online registration requirements for Underground Injection Control (UIC) wells. Permittees shall continue to enforce local ordinances controlling runoff from sites that are also covered by stormwater permits issued by Ecology.[25]

e. Each Permittee shall ensure that all staff whose primary job duties are implementing the program to Control Stormwater Runoff from New Development, Redevelopment, and Construction Sites, including permitting, plan review, construction site inspections, and enforcement, are trained to conduct these activities. Follow-up training shall be provided as needed to address changes in procedures, techniques, or staffing. Permittees shall document and maintain records of the training provided and the staff trained.[26]

7. Stormwater Management for Existing Development

Each Permittee shall implement a Program to control or reduce stormwater discharges to waters of the State from areas of existing development.[27] The Program shall aim to focus on strategic stormwater investments over longer planning timeframes.

The minimum performance measures are:

a. Permittees shall implement stormwater facility retrofits, or tailored SWMP actions that meet the criteria described in Appendix 12, using one or a combination of the following:

   i. Strategic stormwater investments identified in Stormwater Management Action Plan(s) (SMAPs, S5.C.1.d.), or similar stormwater planning process; and/or

   ii. Opportunistic stormwater investments identified by leveraging projects outside of SMAP areas to improve stormwater management and infrastructure.

[25]New Permittees shall meet the requirements of S5.C.6.d beginning no later than August 1, 2024.
[26]New Permittees shall meet the requirements of S5.C.6.e no later than December 31, 2027.
[27] New Permittees are exempt from this permit section.

b. With each Annual Report, each Permittee shall provide a list of planned, individual projects scheduled for funding or implementation during this Permit term for the purpose of meeting the assigned equivalent acreage in Appendix 12. This list shall include at a minimum the information and use the formatting specified in Appendix 12 (.xlsx file format).

c. No later than March 31, 2028, Permittees shall fully fund, start construction, or completely implement project(s) that meet the assigned equivalent acreage and submit documentation with the Annual Report (due on March 31, 2028) as described in Appendix 12.[28]

   i. Projects that started construction on or after January 1, 2023, may be included towards achieving the acres required.

   ii. Permittees may contribute to meeting an overall regional goal to satisfy this permit requirement as described in S5.C.7.d.

   iii. Permittees that completely implement stormwater facility retrofit projects by the expiration date of this Permit that will exceed the area required for this Permit term may apply the excess as a credit to be used for the next Permit term (e.g. 2029-2034 Permit term), not to exceed 50% of the next Permit's requirement.

   iv. Permittees shall report which projects may provide Tribal benefits and benefits to overburdened communities including specifically Vulnerable Populations and Highly Impacted Communities.

d. Permittees may collaborate to meet a regional goal.

   i. Each Permittee is required to manage at least 0.5 equivalent acres within their own jurisdiction but may receive acreage credit for contributing to meeting an overall regional goal outside their defined MS4 Permit coverage area. For Permittees assigned 0.5 acres, participation and in-kind services to regional collaboration projects may count as the contribution for this Permit term if there is regional agreement on the strategy.

   ii. Permittees may contribute to a regional goal, that is the sum of Phase II partners assigned acreage from Appendix 12. Projects may be implemented outside of Permit coverage areas to meet their individual requirement as part of a regional goal where benefits to receiving waters within the Permit coverage areas are identified and anticipated.

[28] See Appendix 12 for descriptions of project status types: fully fund, start construction, and completely implement.

e. Permittees shall report the amount of estimated or projected equivalent acres managed by stormwater facility retrofits for the next Permit term (e.g. 2029-2032). This report shall be submitted to Ecology no later than March 31, 2028.

8. Source Control Program for Existing Development

The Permittee shall implement a program to prevent and reduce pollutants in runoff from areas of existing development that discharge to the MS4. The program shall include application of source control BMPs, inspections, and enforcement.

The minimum performance measures are:

a. Permittees shall enforce ordinance(s), or other enforceable documents, requiring the application of source control BMPs for pollutant generating sources associated with existing land uses and activities (see Appendix 8 to identify pollutant generating sources). [29]

Permittees shall update and make effective the ordinance(s), or other enforceable documents, as necessary to meet the requirements of this Section no later than August 1, 2027.

The requirements of this subsection are met by using the source control BMPs in the SWMMWW, or a Phase I Program approved by Ecology. In cases where the manual(s) lack guidance for a specific source of pollutants, the Permittee shall work with the owner/operator to implement or adapt BMPs based on the best professional judgement of the Permittee.

Applicable operational source control BMPs shall be required for all pollutant generating sources. Structural source control BMPs, or treatment BMPs/facilities, or both, shall be required for pollutant generating sources if operational source control BMPs do not prevent illicit discharges or violations of surface water, groundwater, or sediment management standards because of inadequate stormwater controls. Implementation of source control requirements may be done through education and technical assistance programs, provided that formal enforcement authority is available to the Permittee and is used as determined necessary by the Permittee, in accordance with S5.C.8.d., below.

[29] No later than August 1, 2026, New Permittees shall adopt and make effective ordinance(s), or other enforceable documents, requiring the application of source control BMPs for pollutant generating sources associated with existing land uses and activities (see Appendix 8 to identify pollutant generating sources).

b. Permittees shall implement a program to identify publicly and privately owned institutional, commercial, and industrial sites which have the potential to generate pollutants to the MS4.[30] Permittees shall update the inventory at least once every 5 years. The inventory shall include:

   i. Businesses and/or sites identified based on the presence of activities that are pollutant generating (refer to Appendix 8); and

   ii. Other pollutant generating sources, based on complaint response, such as: home-based businesses and multi-family sites.

c. Permittees shall implement an inspection program, performed by qualified personnel, for sites identified pursuant to S5.C.8.a.i., above.[31]

   i. All identified sites with a business address shall be provided information about activities that may generate pollutants and the source control requirements applicable to those activities. This information shall be provided by mail, telephone, electronic communications, or in person. This information may be provided all at one time or spread out over the Permit term to allow for tailoring and distribution of the information during site inspections.

   ii. The Permittee shall annually complete the number of inspections equal to 20% of the businesses and/or sites listed in their source control inventory to assess BMP effectiveness and compliance with source control requirements. The Permittee may count follow-up compliance inspections at the same site toward the 20% inspection rate. The Permittee may select which sites to inspect each year and is not required to inspect 100% of sites over a 5-year period. Sites may be prioritized for inspection based on their land use category, potential for pollution generation, proximity to receiving waters, or to address an identified pollution problem within a specific geographic area or sub-basin.

   iii. Each Permittee shall inspect 100% of sites identified through credible complaints.

   iv. Permittees may count inspections conducted based on complaints, or when the property owner denies entry, to the 20% inspection rate.

[30] No later than August 1, 2027, New Permittees shall establish an inventory that follows this permit section.
[31] No later than January 1, 2028, New Permittees shall implement an inspection program for sites identified.

v. Annual Reporting of inspections shall be organized by business type or activities with potential to generate pollutants to the MS4. Standard Industrial Code (SIC), Major Group, and NAICS numbers may be provided for reference as noted in Appendix 8.

d. Permittees shall implement a progressive enforcement policy that requires sites to comply with stormwater requirements within a reasonable time period as specified below:[32]

i. If the Permittee determines, through inspections or otherwise, that a site has failed to adequately implement required BMPs, the Permittee shall take appropriate follow-up action(s), which may include phone calls, reminder letters, emails, or follow-up inspections.

ii. When a Permittee determines that a site has failed to adequately implement BMPs after a follow-up inspection(s) the Permittee shall take enforcement action as established through authority in its municipal codes or ordinances, or through the judicial system.

iii. Each Permittee shall maintain records, including documentation of each site visit, inspection reports, warning letters, notices of violations, and other enforcement records demonstrating an effort to bring sites into compliance. Each Permittee shall also maintain records of sites that are not inspected because the property owner denies entry.

iv. A Permittee may refer non-emergency violations of local ordinances to Ecology, provided, the Permittee also makes a documented effort of progressive enforcement. At a minimum, a Permittee's enforcement effort shall include documentation of inspections and warning letters or notices of violation.

v. Application and enforcement of local ordinances at sites identified pursuant to S5.C.8.a.i., including sites with discharges authorized by a separate NPDES permit.

[32] No later than January 1, 2028, New Permittees shall implement a progressive enforcement policy as described in this permit section.

e. Permittees shall train staff who are responsible for implementing the source control program to conduct these activities.[33] The ongoing training program shall cover the legal authority for source control, source control BMPs and their proper application, inspection protocols, lessons learned, typical cases, and enforcement procedures. Follow-up training shall be provided as needed to address changes in procedures, techniques, requirements, or staff. Permittees shall document and maintain records of the training provided and the staff trained.

9. Operations and Maintenance

Each Permittee shall implement and document a program to regulate maintenance activities and to conduct maintenance activities by the Permittee to prevent or reduce stormwater impacts.[34]

The minimum performance measures are:

a. Each Permittee shall implement maintenance standards that are as protective, or more protective, of facility function than those specified in the *Stormwater Management Manual for Western Washington,* or a Phase I program approved by Ecology. For facilities which do not have maintenance standards, the Permittee shall develop a maintenance standard. No later than June 30, 2027, Permittees shall update their maintenance standards as necessary to meet the requirements of this Section.

   i. The purpose of the maintenance standard is to determine if maintenance is required. The maintenance standard is not a measure of the facility's required condition at all times between inspections. Exceeding the maintenance standard between inspections and/or maintenance is not a Permit violation.

   ii. Unless there are circumstances beyond the Permittee's control, when an inspection identifies an exceedance of the maintenance standard, maintenance shall be performed:

      - Within 1 year for typical maintenance of facilities, except catch basins.
      - Within 6 months for catch basins.
      - Within 2 years for maintenance that requires capital construction of less than $25,000.

[33] New Permittees shall develop and implement a training program no later than December 31, 2027.
[34] New Permittees shall develop and implement the requirements of S5.C.9 no later than June 30, 2027 except where otherwise noted in this Section.

Circumstances beyond the Permittee's control include denial or delay of access by property owners, denial or delay of necessary Permit approvals, and unexpected reallocations of maintenance staff to perform emergency work. For each exceedance of the required timeframe, the Permittee shall document the circumstances and how they were beyond their control.

b. Maintenance of stormwater treatment and flow control BMPs/facilities regulated by the Permittee:

i. The program shall include provisions to verify adequate long-term O&M of stormwater treatment and flow control BMPs/facilities that are permitted and constructed pursuant to S5.C.6.c and shall be maintained in accordance with S5.C.9.a.

The provisions shall include:

(a) Implementation of an ordinance or other enforceable mechanism that:

- Clearly identifies the party responsible for maintenance in accordance with maintenance standards established under S5.C.9.a.
- Requires inspection of facilities in accordance with the requirements in (b), below.
- Establishes enforcement procedures.

(b) Annual inspections of all stormwater treatment and flow control BMPs/facilities that discharge to the MS4 and were permitted by the Permittee according to S5.C.6.c, including those permitted in accordance with requirements adopted pursuant to the 2007-2024 Ecology municipal stormwater permits, unless there are maintenance records to justify a different frequency. Inspections shall be conducted by qualified personnel or a qualified third party.

Permittees may reduce the inspection frequency based on maintenance records of double the length of time of the proposed inspection frequency. In the absence of maintenance records, the Permittee may substitute written statements to document a specific less frequent inspection schedule. Written statements shall be based on actual inspection and maintenance experience and shall be certified in accordance with G19 – *Certification and Signature*.

ii. Compliance with the inspection requirements in (b), above, shall be determined by the presence and records of an established inspection program designed to inspect all facilities, and achieving at least 80% of required inspections annually.

iii. The program shall include a procedure for keeping records of inspections and enforcement actions by staff, qualified personnel, and qualified third parties, including inspection reports, warning letters, notices of violations, and other enforcement records. Records of maintenance inspections and maintenance activities shall be maintained.

c. Maintenance of stormwater facilities owned or operated by the Permittee:

i. Each Permittee shall implement a program to annually inspect all municipally owned or operated stormwater treatment and flow control BMPs/facilities. Permittees shall implement appropriate maintenance action(s) in accordance with the adopted maintenance standards. The inspection program shall be implemented by qualified personnel.

Permittees may reduce the inspection frequency based on maintenance records of double the length of time of the proposed inspection frequency. In the absence of maintenance records, the Permittee may substitute written statements to document a specific less frequent inspection schedule. Written statements shall be based on actual inspection and maintenance experience and shall be certified in accordance with G19 – *Certification and Signature*.

ii. Each Permittee shall spot check potentially damaged stormwater treatment and flow control BMPs/facilities after major storm events (24-hour storm event with a 10 year or greater recurrence interval). If spot checks indicate widespread damage/maintenance needs, inspect all stormwater treatment and flow control BMPs/facilities that may be affected. Conduct repairs or take appropriate maintenance action in accordance with maintenance standards established above, based on the results of the inspections.

iii. Each Permittee shall continue to inspect all catch basins and inlets owned or operated by the Permittee by December 31, 2025 and every two years after.[35] Clean catch basins if the inspection indicates cleaning is needed to comply with maintenance standards established in the *Stormwater Management Manual for Western Washington.* Decant water shall be disposed of in accordance with Appendix 6 – *Street Waste Disposal*.

The following alternatives to the standard approach of inspecting all catch basins every two years may be applied to all or portions of the system:

(a) The catch basin inspection schedule of every two years may be changed as appropriate to meet the maintenance standards based on maintenance records of double the length of time of the proposed inspection frequency. In the absence of maintenance records for catch basins, the Permittee may substitute written statements to document a specific, less frequent inspection schedule. Written statements shall be based on actual inspection and maintenance experiences and shall be certified in accordance with G19 – *Certification and Signature*.

(b) Inspections every two years may be conducted on a "circuit basis" whereby 25% of catch basins and inlets within each circuit are inspected to identify maintenance needs. Include an inspection of the catch basin immediately upstream of any MS4 outfall, discharge point, or connections to public or private storm systems, if applicable. Clean all catch basins within a given circuit for which the inspection indicates cleaning is needed to comply with maintenance standards established under S5.C.9.a, above.

(c) The Permittee may clean all pipes, ditches, and catch basins and inlets within a circuit once during the Permit term. Circuits selected for this alternative must drain to a single point.

iv. Compliance with the inspection requirements in S5.C.9.c.i-iii, above, shall be determined by the presence of an established inspection program achieving at least 95% of required inspections.

[35] New Permittees shall inspect and, if needed, clean all catch basins and inlets owned or operated by the Permittee in accordance with the requirements of S5.C.7.c once during the permit term, to be completed no later than December 31, 2028 and every two years after.

d. Implement practices, policies, and procedures to reduce stormwater impacts associated with runoff from all lands owned or maintained by the Permittee, and road maintenance activities under the functional control of the Permittee. No later than December 31, 2027, document the practices, policies, and procedures. Lands owned or maintained by the Permittee include but are not limited to: streets; parking lots; roads; highways; buildings; parks; open space; road rights-of-way; maintenance yards; and stormwater treatment and flow control BMPs/facilities.

   The following activities shall be addressed:

   i. Pipe cleaning.

   ii. Cleaning of culverts that convey stormwater in ditch systems.

   iii. Ditch maintenance.

   iv. Street cleaning.

   v. Road repair and resurfacing, including pavement grinding.

   vi. Snow and ice control.

   vii. Utility installation.

   viii. Pavement striping maintenance.

   ix. Maintaining roadside areas, including vegetation management.

   x. Dust control.

   xi. Application of fertilizers, pesticides, and herbicides according to the instructions for their use including reducing nutrients and pesticides and using alternatives that minimize environmental impacts.

   xii. Sediment and erosion control.

   xiii. Landscape maintenance and vegetation disposal.

   xiv. Trash and pet waste management.

   xv. Building exterior cleaning and maintenance.

      (a) For Permittee-owned buildings built or renovated between 1950-1980, update policies, practices, or procedures to include Source Control BMPs to minimize PCBs from entering the MS4. Permittees shall not discharge washdown water to the MS4 if the building is confirmed or suspected to have PCB-containing materials.

   xvi. Preparing Permittee-owned buildings for renovation or demolition.

(a) Update policies, practices, or procedures to include Source Control BMPs for building materials to prevent PCBs from entering the MS4 in preparation for and during demolition and renovations.

e. No later than July 1, 2027, develop and implement a municipal street sweeping program to focus on priority areas and times during the year that would reasonably be expected to result in the maximum water quality benefits to receiving waters. The following program elements shall be included:

i. Priority areas: Apply street sweeping program to curbed municipal streets that discharge to outfalls and meet any of the following criteria:

(a) High traffic streets, such as arterials or collectors.

(b) Streets that serve commercial or industrial land use areas.

ii. Program timing: Sweep priority areas at least once between July and September each year and at least two additional times a year as determined by the Permittee to provide additional water quality benefits. For calendar year 2027, only one sweeping event is required between July and December.

(a) Compliance during this Permit term shall be determined by records of a sweeping program designed to sweep all priority areas identified and sweeping at least 90% of priority areas each sweeping event.

(b) Permittee may document reasoning for alternative sweeping timing and frequency based on local conditions (e.g., climate) and estimated pollutant deposition quantities. Documentation shall also be based on actual maintenance experience and be certified in accordance with G19 – *Certification and Signature*.

iii. Operational Procedures: Procedures to follow equipment design performance specifications to ensure that street sweeping equipment is operated at the proper design speed with appropriate verification, and that it is properly maintained.

iv. Street Waste Disposal: Dispose of sweeper waste material in accordance with Appendix 6 – *Street Waste Disposal*.

v. Reporting: No later than March 31, 2028, submit with the Annual Report the following information about the priority areas:

(a) Priority areas swept identified on a map (i.e. streets that are considered high traffic (estimated number of vehicles served/or arterials or collectors, and streets serving commercial or industrial land use).

(b) Sweeping date(s).

(c) Sweeping frequency.

(d) Type of sweeper.

(e) Total curb miles of priority areas and curb miles swept.

(f) Approximation of street waste solids removed for each sweeping event (indicate unit of measurement and wet or dry weight, where available).

f. Implement a Stormwater Pollution Prevention Plan (SWPPP) for all heavy equipment maintenance or storage yards and material storage facilities owned or operated by the Permittee in areas subject to this Permit that are not required to have coverage under the *Industrial Stormwater General Permit* or another NPDES permit that authorizes stormwater discharges associated with the activity. SWPPPs shall include the following information, at a minimum:

i. A detailed description of the operational and structural BMPs in use at the facility and a schedule for implementation of additional BMPs when needed. BMPs selected shall be consistent with the *Stormwater Management Manual for Western Washington*, or a Phase I program approved by Ecology. The SWPPP shall be updated as needed to maintain relevancy with the facility.

ii. At minimum, annual inspections of the facility, including visual observations of discharges, to evaluate the effectiveness of the BMPs, identify maintenance needs, and determine if additional or different BMPs are needed. The results of these inspections shall be documented in an inspection report or check list.

iii. An inventory of the materials and equipment stored on-site, and the activities conducted at the facility which may be exposed to precipitation or runoff and could result in stormwater pollution.

iv. A site map showing the facility's stormwater drainage, discharge points, and areas of potential pollutant exposure.

v. A plan for preventing and responding to spills at the facility which could result in an illicit discharge.

g. Implement an ongoing training program for employees of the Permittee whose primary construction, operations, or maintenance job functions may impact stormwater quality. The training program shall address the importance of protecting water quality, operation and maintenance standards, inspection procedures, relevant SWPPPs, selecting appropriate BMPs, street sweeper operation, ways to perform their job activities to prevent or minimize impacts to water quality, and procedures for reporting water quality concerns. Follow-up training shall be provided as needed to address changes in procedures, techniques, requirements, or staffing. Permittees shall document and maintain records of training provided. The staff training records to be kept include dates, activities or course descriptions, and names and positions of staff in attendance.

h. Maintain records of the activities conducted to meet the requirements of this Section.

S6. STORMWATER MANAGEMENT PROGRAM FOR SECONDARY PERMITTEES

A. Secondary Permittees and New Secondary Permittees Coverage

This Section applies to all Secondary Permittees and all New Secondary Permittees, whether coverage under this Permit is obtained individually or as a Co-Permittee with a city, town, county, or another Secondary Permittee.

New Secondary Permittees subject to this Permit shall fully meet the requirements of this Section as modified in the footnotes in S6.D below, or as established as a condition of coverage by Ecology.

1. To the extent allowable under state, federal or local law, all components are mandatory for each Secondary Permittee covered under this Permit, whether covered as an individual Permittee or as a Co-Permittee.
2. Each Secondary Permittee shall develop and implement a Stormwater Management Program (SWMP). A SWMP is a set of actions and activities comprising the components listed in S6 and any additional actions necessary to meet the requirements of applicable TMDLs pursuant to S7 – *Compliance with Total Maximum Daily Load Requirements*. The SWMP shall be designed to reduce the discharge of pollutants from regulated small MS4s to the MEP and protect water quality.
3. Unless an alternate implementation schedule is established by Ecology as a condition of Permit coverage, the SWMP shall be developed and implemented in accordance with the schedules contained in this Section and shall be fully developed and implemented no later than four and one-half years from the initial Permit coverage date. Secondary Permittees that are already implementing some or all of the required SWMP components shall continue implementation of those components.
4. Secondary Permittees may implement parts of their SWMP in accordance with the schedule for cities, towns, and counties in S5, provided they have signed a memorandum of understanding or other agreement to jointly implement the activity or activities with one or more jurisdictions listed in S1.D.2.a or S1.D.2.b and submitted a copy of the agreement to Ecology.
5. Each Secondary Permittee shall prepare written documentation of the SWMP, called the SWMP Plan. The SWMP Plan shall be updated annually to include a description of program activities for the upcoming calendar year and shall be submitted with the Annual Report.

B. Coordination

Secondary Permittees shall coordinate stormwater-related policies, programs, and projects within a watershed and interconnected MS4s. Where relevant and appropriate, the SWMP shall coordinate among departments of the Secondary Permittee to ensure compliance with the terms of this Permit.

C. Legal Authority

To the extent allowable under state law and federal law, each Secondary Permittee shall be able to demonstrate that they can operate pursuant to legal authority which authorizes or enables the Secondary Permittee to control discharges to and from MS4s owned or operated by the Secondary Permittee.

This legal authority may be a combination of statutes, ordinances, permits, contracts, orders, interagency agreements, or similar instruments.

D. Stormwater Management Program for Secondary Permittees

The SWMP for Secondary Permittees shall include the following components:

1. Public Education and Outreach

Each Secondary Permittee shall implement the following stormwater education strategies:

a. Storm drain inlets owned or operated by the Secondary Permittee that are located in maintenance yards, in parking lots, along sidewalks, and at pedestrian access points shall be clearly labeled with a message similar to "Dump no waste – Drains to waterbody."[36]

   As identified during visual inspection and regular maintenance of storm drain inlets per the requirements of S6.D.3.d and S6.D.6.a.i, below, or as otherwise reported to the Secondary Permittee, any inlet having a label that is no longer clearly visible and/or easily readable shall be re-labeled within 90 days.

b. Each year beginning no later than three years from the initial date of Permit coverage, public ports, colleges, and universities shall distribute educational information to tenants and residents on the impact of stormwater discharges on receiving waters, and steps that can be taken to reduce pollutants in stormwater runoff. Distribution may be by hard copy or electronic means. Appropriate topics may include:

[36]New Secondary Permittees shall label all inlets as described in S6.D.1.a no later than four years from the initial date of permit coverage.

i. How stormwater runoff affects local water bodies.

ii. Proper use and application of pesticides and fertilizers.

iii. Benefits of using well-adapted vegetation.

iv. Alternative equipment washing practices, including cars and trucks that minimize pollutants in stormwater.

v. Benefits of proper vehicle maintenance and alternative transportation choices; proper handling and disposal of vehicle wastes, including the location of hazardous waste collection facilities in the area.

vi. Hazards associated with illicit connections and illicit discharges.

vii. Benefits of litter control of pet waste.

viii. Source control BMPs for building materials to reduce pollution to stormwater including, but not limited to, stormwater pollution from PCB-containing materials.

2. Public Involvement and Participation

Each year, no later than May 31, each Secondary Permittee shall:

a. Make the annual report available on the Permittee's website; and

b. Make available on the Permittee's website, the latest updated version of the SWMP Plan.

3. Illicit Discharge Detection and Elimination

Each Secondary Permittee shall:

a. From the initial date of Permit coverage, comply with all relevant ordinances, rules, and regulations of the local jurisdiction(s) in which the Secondary Permittee is located that govern non-stormwater discharges.

b. Implement appropriate policies prohibiting illicit discharges,[37] and an enforcement plan to ensure compliance with illicit discharge policies.[38] These policies shall address, at a minimum: illicit connections, non-stormwater discharges, including spills of hazardous materials, and improper disposal of pet waste and litter. Policies shall be revised, if necessary, to meet the requirements of this Section no later than July 1, 2027.

   i. *Allowable discharges*: The policies do not need to prohibit the following categories of non-stormwater discharges:

      (a) Diverted stream flows

      (b) Rising groundwaters

      (c) Uncontaminated groundwater infiltration (as defined at 40 CFR 35.2005(b)(20))

      (d) Uncontaminated pumped groundwater

      (e) Foundation drains

      (f) Air conditioning condensation

      (g) Irrigation water from agricultural sources that is commingled with urban stormwater

      (h) Springs

      (i) Uncontaminated water from crawl space pumps

      (j) Footing drains

      (k) Flows from riparian habitats and wetlands

      (l) Discharges from emergency firefighting activities in accordance with S2 – *Authorized Discharges*

      (m) Non-stormwater discharges authorized by another NPDES or State Waste Discharge Permit

[37]New Secondary Permittees shall develop and implement appropriate policies prohibiting illicit discharges and identify possible enforcement mechanisms as described in S6.D.3.b no later than one year from the initial date of permit coverage.

[38]New Secondary Permittees shall develop and implement an enforcement plan as described in S6.D.3.b no later than 18 months from the initial date of permit coverage.

ii. *Conditionally allowable discharges*: The policies may allow the following categories of non-stormwater discharges only if the stated conditions are met and such discharges are allowed by local codes:

(a) Discharges from potable water sources including, but not limited to, water line flushing, hyperchlorinated water line flushing, fire hydrant system flushing, and pipeline hydrostatic test water. Planned discharges shall be dechlorinated to a total residual chlorine concentration of 0.1 ppm or less, pH-adjusted if necessary, and volumetrically and velocity controlled to prevent resuspension of sediments in the MS4.

(b) Discharges from lawn watering and other irrigation runoff, including from reclaimed water sources. These discharges shall be minimized through, at a minimum, public education activities and water conservation efforts conducted by the Secondary Permittee and/or the local jurisdiction.

(c) Discharges from swimming pools, spas, and hot tubs. The discharges shall be dechlorinated/debrominated to a total residual concentration of 0.1 ppm or less, free from sodium chloride, pH-adjusted and reoxygenated if necessary, and volumetrically and velocity controlled to prevent resuspension of sediments in the MS4. Discharges shall be thermally controlled to prevent an increase in temperature of the receiving water. Swimming pool cleaning wastewater and filter backwash shall not be discharged to the MS4.

(d) Street and sidewalk wash water, water used to control dust. The Secondary Permittee shall reduce these discharges through, at a minimum, public education activities and/or water conservation efforts conducted by the Secondary Permittee and/or the local jurisdiction. To avoid washing pollutants into the MS4, the Secondary Permittee shall minimize the amount of street wash and dust control water used.

(e) Routine external building washdown that does not use detergents for buildings built before 1950 and after 1980. These discharges shall be reduced through, at minimum, public education activities or water conservation efforts, or both.

Commercial, industrial, and multi-story residential structures constructed or renovated between the years 1950 and 1980 (i.e. those most likely to have PCB containing building materials), shall be assessed for PCB-containing materials consistent with *How to Find PCBs in Building Materials* (Ecology, 2024; Publication No. 22-040-024) prior to routine building washdown to the MS4. Structures confirmed or suspected to have PCB-containing materials shall not discharge washdown water to the MS4. Structures built between 1950-1980, without PCB-containing materials, may proceed with routine building washdown (without detergents) as described above.

(f) Other non-stormwater discharges shall be in compliance with the requirements of a pollution prevention plan reviewed by the Permittee which addresses control of such discharges.

iii. The Secondary Permittee shall address any category of discharges in (i) or (ii), above, if the discharge is identified as a significant source of pollutants to waters of the State.

c. Maintain a storm sewer system map showing the locations of all known MS4 outfalls and discharge points, labeling the receiving waters (other than groundwater) and delineating the areas contributing runoff to each outfall and discharge point. Make the map (or completed portions of the map) available on request to Ecology and to the extent appropriate to other Permittees.

i. No later than December 31, 2026, the required format for mapping is an electronic format with fully described mapping standards.[39]

ii. No later than March 31, 2027, Permittees shall submit locations of all known MS4 outfalls according to the standard templates and format provided in the Annual Report. This reporting shall include the size and material of the outfalls.

d. Conduct field inspections and visually inspect for illicit discharges at all known MS4 outfalls and discharge points. Visually inspect at least one third (on average) of all known outfalls and discharge points each year beginning no later than two years from the initial date of Permit coverage. Implement procedures to identify and remove any illicit discharges. Keep records of inspections and follow-up activities.

[39]New Secondary Permittees shall meet the requirements of S6.D.3.c no later than four and one-half years from the initial date of permit coverage.

e. Implement a spill response plan that includes coordination with a qualified spill responder.[40]

f. No later than two years from initial date of Permit coverage, provide staff training or coordinate with existing training efforts to educate staff on proper BMPs for preventing illicit discharges, including spills. Train all Secondary Permittee staff who, as part of their normal job responsibilities, have a role in preventing such illicit discharges.

4. Construction Site Stormwater Runoff Control

From the initial date of Permit coverage, each Secondary Permittee shall:

a. Comply with all relevant ordinances, rules, and regulations of the local jurisdiction(s) in which the Secondary Permittee is located that govern construction phase stormwater pollution prevention measures.

b. Ensure that all construction projects under the functional control of the Secondary Permittee which require a construction stormwater permit obtain coverage under the NPDES *Construction Stormwater General Permit* or an individual NPDES permit prior to discharging construction related stormwater.

c. Coordinate with the local jurisdiction regarding projects owned or operated by other entities which discharge into the Secondary Permittee's MS4, to assist the local jurisdiction with achieving compliance with all relevant ordinances, rules, and regulations of the local jurisdiction(s).

d. Provide training or coordinate with existing training efforts to educate relevant staff in erosion and sediment control BMPs and requirements or hire trained contractors to perform the work.

e. Coordinate, as requested, with Ecology or the local jurisdiction to provide access for inspection of construction sites or other land disturbances which are under the functional control of the Secondary Permittee during land disturbing activities and/or construction period.

[40]New Secondary Permittees shall develop and implement a spill response plan as described in S6.D.3.e no later than four and one-half years from the initial date of permit coverage.

5. Post-Construction Stormwater Management for New Development and Redevelopment

From the initial date of Permit coverage, each Secondary Permittee shall:

a. Comply with all relevant ordinances, rules, and regulations of the local jurisdiction(s) in which the Secondary Permittee is located that govern post-construction stormwater pollution prevention measures.

b. Coordinate with the local jurisdiction regarding projects owned or operated by other entities which discharge into the Secondary Permittee's MS4 to assist the local jurisdiction with achieving compliance with all relevant ordinances, rules, and regulations of the local jurisdiction(s).

6. Pollution Prevention and Good Housekeeping for Municipal Operations

Each Secondary Permittee shall:

a. Implement a municipal operation and maintenance (O&M) plan to minimize stormwater pollution from activities conducted by the Secondary Permittee. The O&M Plan shall include appropriate pollution prevention and good housekeeping procedures for all of the following operations, activities, and/or types of facilities that are present within the Secondary Permittee's boundaries and under the functional control of the Secondary Permittee.[41] The O&M Plan Shall be updated, as needed, no later than July 1, 2027.

   i. *Stormwater collection and conveyance systems* including catch basins, stormwater pipes, open channels, culverts, and stormwater treatment and flow control BMPs/facilities. The O&M Plan shall address, at a minimum: scheduled inspections and maintenance activities including cleaning and proper disposal of waste removed from the system. Secondary Permittees shall properly maintain stormwater collection and conveyance systems owned or operated by the Secondary Permittee and annually inspect and maintain all stormwater facilities to ensure facility function.

   Secondary Permittees shall establish maintenance standards that are as protective or more protective of facility function than those specified in the *Stormwater Management Manual for Western Washington*. Secondary Permittees shall review their maintenance standards to ensure they are consistent with the requirements of this Section.

[41]New Secondary Permittees shall develop and implement the operation and maintenance plan described in S6.D.6.a no later than three years from initial date of permit coverage.

Secondary Permittees shall conduct spot checks of potentially damaged permanent stormwater treatment and flow control BMPs/facilities following major storm events (24-hour storm event with a 10-year or greater recurrence interval).

ii. *Roads, highways, and parking lots*. The O&M Plan shall address, at a minimum: deicing, anti-icing, and snow removal practices; snow disposal areas; material (e.g., salt, sand, or other chemical) storage areas; and all-season BMPs to reduce road and parking lot debris and other pollutants from entering the MS4.

iii. *Vehicle fleets*. The O&M Plan shall address, at a minimum: storage, washing, and maintenance of Secondary Permittee vehicle fleets; and fueling facilities. Secondary Permittees shall conduct all vehicle and equipment washing and maintenance in a self-contained covered building or in designated wash and/or maintenance areas.

iv. *External building maintenance*. The O&M Plan shall address, at a minimum: building exterior cleaning and maintenance including cleaning, washing, painting; maintenance and management of dumpsters; and other maintenance activities. For buildings owned by the Secondary Permittee and built or renovated between 1950 and 1980, the O&M Plan shall include building material assessment for PCBs consistent with *How to Find and Address PCBs in Building Materials* guidance (Ecology, 2024; Publication No. 22-040-024) prior to exterior building washdown to the MS4. Structures confirmed or suspected to have PCB-containing materials shall not discharge washdown water to the MS4.

v. *Preparing Permittee-owned buildings for renovation or demolition.* The O&M Plan shall address Source Control BMPs for building materials to prevent PCBs from entering the MS4 in preparation for and during demolition and renovations.

vi. *Parks and open space*. The O&M Plan shall address, at a minimum: proper application of fertilizer, pesticides, and herbicides; sediment and erosion control; BMPs for landscape maintenance and vegetation disposal; and trash and pet waste management.

vii. *Material storage facilities and heavy equipment maintenance or storage yards*. Secondary Permittees shall develop and implement a Stormwater Pollution Prevention Plan to protect water quality at each of these facilities owned or operated by the Secondary Permittee and not covered under the *Industrial Stormwater General Permit* or under another NPDES

permit that authorizes stormwater discharges associated with the activity.

viii. *Other facilities* that would reasonably be expected to discharge contaminated runoff. The O&M Plan shall address proper stormwater pollution prevention practices for each facility.

b. From the initial date of Permit coverage, Secondary Permittees shall also have permit coverage for all facilities operated by the Secondary Permittee that are required to be covered under the *Industrial Stormwater General Permit* or another NPDES permit that authorizes discharges associated with the activity.

c. The O&M Plan shall include sufficient documentation and records as necessary to demonstrate compliance with the O&M Plan requirements in S6.D.6.a(i) through (viii), above.

d. No later than three years from the initial date of Permit coverage, Secondary Permittees shall implement a program designed to train all employees whose primary construction, operations, or maintenance job functions may impact stormwater quality. The training shall address:

i. The importance of protecting water quality.

ii. The requirements of this Permit.

iii. Operation and maintenance requirements.

iv. Inspection procedures.

v. Ways to perform their job activities to prevent or minimize impacts to water quality.

vi. Procedures for reporting water quality concerns, including potential illicit discharges (including spills).

S7. COMPLIANCE WITH TOTAL MAXIMUM DAILY LOAD REQUIREMENTS

The following requirements apply if an applicable TMDL is approved for stormwater discharges from MS4s owned or operated by the Permittee. Applicable TMDLs are TMDLs which have been approved by EPA on or before the issuance date of this Permit or prior to the date that Ecology issues coverage under this Permit, whichever is later.

A. TMDL Specific Requirements

1. For applicable TMDLs listed in Appendix 2, affected Permittees shall comply with the specific requirements identified in Appendix 2. Each Permittee shall keep records of all actions required by this Permit that are relevant to applicable TMDLs within their jurisdiction. The status of the TMDL implementation shall be included as part of the annual report submitted to Ecology. Each annual report shall include a summary of relevant SWMP and Appendix 2 activities conducted in the TMDL area to address the applicable TMDL parameter(s).
2. For applicable TMDLs not listed in Appendix 2, compliance with this Permit shall constitute compliance with those TMDLs.

S8. MONITORING AND ASSESSMENT

A. Regional Status and Trends Monitoring

1. All Permittees that chose S8.A.2 Regional Status and Trends Monitoring Option in the *Phase II Western Washington Municipal Stormwater Permit*, August 1, 2019 – July 31, 2024, shall make a one-time payment into the Stormwater Action Monitoring (SAM) collective fund to implement regional small streams and marine nearshore areas status and trends monitoring in Puget Sound or, urban streams in the Lower Columbia River basin. This payment is due on or before December 1, 2024. Submit payment amount according to Section S8.D, below.
2. All City and County Permittees covered under the *Phase II Western Washington Municipal Stormwater Permit*, August 1, 2019 – July 31, 2024, except the Cities of Aberdeen and Centralia, shall notify Ecology in writing which of the following two options for regional status and trends monitoring (S8.A.2.a or S8.A.2.b) the Permittee chooses to carry out during this Permit term. The written notification with G19 signature is due to Ecology no later than December 1, 2024. Either option will fully satisfy the Permittee's obligations under this Section (S8.A.2). Each Permittee shall select a single option for this Permit term.

a. Make annual payments into a Stormwater Action Monitoring (SAM) collective fund to implement regional receiving water status and trends monitoring of either: small streams and marine nearshore areas in Puget Sound, or urban streams in Clark and Cowlitz Counties in the Lower Columbia River basin, depending on the Permittee's location. The annual payments into the collective fund are due on or before August 15 each year beginning in 2025. Submit payments according to Section S8.D, below.

Or

b. Conduct stormwater discharge monitoring per the requirements in Section S8.C.

B. Stormwater Management Program (SWMP) Effectiveness and Source Identification Studies

1. All Permittees that chose S8.B Effectiveness Studies Option in the *Phase II Western Washington Municipal Stormwater Permit,* August 1, 2019 – July 31, 2024, shall make a one-time payment into the collective fund for Stormwater Action Monitoring (SAM) to implement effectiveness studies and source identification studies. The payment is due on or before December 1, 2024. Submit payment according to Section S8.D, below.
2. All City and County Permittees covered under the *Phase II Western Washington Municipal Stormwater Permit*, August 1, 2019 – July 31, 2024, shall notify Ecology in writing which of the following two options (S8.B.2.a or S8.B.2.b) for effectiveness and source identification studies the Permittee chooses to carry out during this Permit term. The written notification with G19 signature is due to Ecology no later than December 1, 2024. Either option will fully satisfy the Permittee's obligations under this Section (S8.B.2). Each Permittee shall select a single option for this Permit term.

   a. Make annual payments into a SAM collective fund to implement effectiveness and source identification studies. The annual payments into the collective fund are due on or before August 15 each year beginning in 2025. Submit payments according to Section S8.D, below.

   Or

   b. Conduct stormwater discharge monitoring per the requirements in Section S8.C.

3. All Permittees shall provide information as requested for effectiveness and source identification studies that are under contract with Ecology as active Stormwater Action Monitoring (SAM) projects. These requests will be limited to records of SWMP activities and associated data tracked and/or maintained in accordance with S5 – *Stormwater Management Program for Cities, Towns, and Counties* and/or S9 – *Reporting Requirements*. A maximum of three requests during the Permit term from the SAM Coordinator will be transmitted to the Permittee's permit coordinator via Ecology's regional permit manager. The Permittee shall have 90 days to provide the requested information.

C. Stormwater Discharge Monitoring.

1. This Section applies only to Permittees who choose to conduct stormwater discharge monitoring per S8.A.2.b and/or S8.B.2.b in lieu of participation in the regional status and trends monitoring and/or effectiveness and source identification studies. These Permittees shall conduct monitoring in accordance with Appendix 9 and an Ecology-approved Quality Assurance Project Plan (QAPP) as follows:

   a. Permittees who choose the option to conduct stormwater discharge monitoring for either S8.A.2 or S8.B.2 shall monitor three independent discharge locations.

      Permittees who choose the option to conduct stormwater discharge monitoring for both S8.A.2 and S8.B.2 shall conduct this monitoring at a total of six locations; at least four locations shall be independent (one location may be nested in another basin).

   b. No later than February 1, 2025, each Permittee shall submit to Ecology a draft stormwater discharge monitoring QAPP for review and approval. The QAPP shall be prepared in accordance with the requirements in Appendix 9. The final QAPP shall be submitted to Ecology for approval as soon as possible following finalization, and before August 15, 2025 or within 60 days of receiving Ecology's comments on the draft QAPP (whichever is later).

   c. Flow monitoring shall begin no later than October 1, 2025, or within 30 days of receiving Ecology's approval of the final QAPP (whichever is later). Stormwater discharge monitoring shall be fully implemented no later than October 1, 2026.

   d. Data and analyses shall be reported annually in accordance with the Ecology-approved QAPP. Each Permittee shall enter into the Department's Environmental Information Management (EIM) database all water and solids concentration data collected pursuant to Appendix 9.

i. Within 60 days of completing the study, or no later than March 31, 2029, publish a final report with the results of the study and recommended future actions based on findings, include a summary of results.

D. Payments into the Stormwater Action Monitoring Collective Fund.

1. This Section applies to all Permittees who choose to make annual payments into the SAM collective funds for S8.A *Regional Status and Trends Monitoring* and/or S8.B *Effectiveness and Source Identification Studies*.
2. Permittees submitting payment for S8.A.1. or S8.B.1., payment amounts are listed in Appendix 11 of the WWA Phase II Municipal Stormwater Permit, August 1, 2019– July 31, 2024.
3. Each Permittee's S8.A.2.a and S8.B.2.a payment amounts are listed in Appendix 11 and in the invoices that will be sent to the Permittee approximately three months in advance of each payment due date. Mail payments according to the instructions in the invoice.

S9. REPORTING & RECORDKEEPING REQUIREMENTS

A. Annual Report Submittal

1. No later than March 31 of each year beginning in 2025, each Permittee shall submit an Annual Report. The reporting period for the first Annual Report will be from January 1, 2024, through December 31, 2024. The reporting period for all subsequent Annual Reports will be the previous calendar year unless otherwise specified.
2. Permittees shall submit Annual Reports electronically using Ecology's Water Quality Permitting Portal (WQWebPortal) available on Ecology's website.

B. Records Retention

Each Permittee is required to keep all records related to this Permit and the SWMP for at least five years after the expiration date of this Permit.

C. Records Available to the Public

Each Permittee shall make all records related to this Permit and the Permittee's SWMP available to the public at reasonable times during business hours. The Permittee will provide a copy of the most recent annual report to any individual or entity, upon request.

1. A reasonable charge may be assessed by the Permittee for making photocopies of records.
2. The Permittee may require reasonable advance notice of intent to review records related to this Permit.

D. Annual Report for Cities, Towns, and Counties

Each annual report shall include the following:

1. A copy of the Permittee's current Stormwater Management Program Plan (SWMP Plan), as required by S5.A.2.
2. Submittal of the annual report form as provided by Ecology pursuant to S9.A, describing the status of implementation of the requirements of this Permit during the reporting period.

3. Attachments to the annual report form including summaries, descriptions, reports, and other information as required, or as applicable, to meet the requirements of this Permit during the reporting period, or as a required submittal. Refer to Appendix 3 for annual report questions.[42]
4. If applicable, notice that the MS4 is relying on another entity to satisfy any of the obligations under this Permit.
5. Certification and signature pursuant to G19.D, and notification of any changes to authorization pursuant to G19.C.
6. A notification of any annexations, incorporations or jurisdictional boundary changes resulting in an increase or decrease in the Permittee's geographic area of Permit coverage during the reporting period.

E. Annual Report for Secondary Permittees

Each annual report shall include the following:

1. A copy of the Permittee's current Stormwater Management Program Plan (SWMP Plan), as required by S6.A.2.
2. Submittal of the annual report form as provided by Ecology pursuant to S9.A, describing the status of implementation of the requirements of this Permit during the reporting period.
3. Attachments to the annual report form including summaries, descriptions, reports, and other information as required, or as applicable, to meet the requirements of this Permit during the reporting period. Refer to Appendix 4 for annual report questions.
4. If applicable, notice that the MS4 is relying on another entity to satisfy any of the obligations under this Permit.
5. Certification and Signature pursuant to G19.D, and notification of any changes to authorization pursuant to G19.C.
6. A notification of any jurisdictional boundary changes resulting in an increase or decrease in the Secondary Permittee's geographic area of Permit coverage during the reporting period.

[42]New Permittees refer to Appendix 5 for annual report questions.

GENERAL CONDITIONS

G1. DISCHARGE VIOLATIONS

All discharges and activities authorized by this Permit shall be consistent with the terms and conditions of this Permit.

G2. PROPER OPERATION AND MAINTENANCE

The Permittee shall, at all times, properly operate and maintain all facilities and systems of collection, treatment, and control (and related appurtenances) which are installed or used by the Permittee for pollution control to achieve compliance with the terms and conditions of this Permit.

G3. NOTIFICATION OF DISCHARGE, INCLUDING SPILLS

If a Permittee has knowledge of a discharge, including spills, into or from a MS4 which could constitute a threat to human health, welfare, or the environment, the Permittee shall:

A. Take appropriate action to correct or minimize the threat to human health, welfare and/or the environment.

B. Notify the Ecology regional office and other appropriate spill response authorities immediately but in no case later than within 24 hours of obtaining that knowledge.

C. Immediately report spills or other discharges which might cause bacterial contamination of marine waters, such as discharges resulting from broken sewer lines and failing onsite septic systems, to the Ecology regional office and to the Washington State Department of Health, Shellfish Program.

D. Immediately report spills or discharges of oils or hazardous substances to the Ecology regional office and to the Washington Emergency Management Division at 1-800-258-5990.

G4. BYPASS PROHIBITED

The intentional bypass of stormwater from all or any portion of a stormwater treatment BMP whenever the design capacity of the treatment BMP is not exceeded, is prohibited unless the following conditions are met:

A. Bypass is: (1) unavoidable to prevent loss of life, personal injury, or severe property damage; or (2) necessary to perform construction or maintenance-related activities essential to meet the requirements of the *Clean Water Act* (CWA); and

B. There are no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated stormwater, or maintenance during normal dry periods.

"Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.

G5. RIGHT OF ENTRY

The Permittee shall allow Ecology, or an authorized representative of Ecology (including an authorized contractor acting as a representative of Ecology), upon the presentation of credentials and such other documents as may be required by law, to:

A. Enter upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records shall be kept under the conditions of this Permit;

B. To have access to, and copy at reasonable cost and at reasonable times, any records that shall be kept under the terms of the Permit;

C. To inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit;

D. Sample or monitor at reasonable times, for the purposes of assuring Permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

G6. DUTY TO MITIGATE

The Permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this Permit which has a reasonable likelihood of adversely affecting human health or the environment.

G7. PROPERTY RIGHTS

This Permit does not convey any property rights of any sort, or any exclusive privilege.

G8. COMPLIANCE WITH OTHER LAWS AND STATUTES

Nothing in the Permit shall be construed as excusing the Permittee from compliance with any other applicable federal, state, or local statutes, ordinances, or regulations.

G9. MONITORING

A. Representative Sampling

Samples and measurements taken to meet the requirements of this Permit shall be representative of the volume and nature of the monitored discharge, including representative sampling of any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions affecting effluent quality.

B. Records Retention

The Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original recordings for continuous monitoring instrumentation, copies of all reports required by this Permit, and records of all data used to complete the application for this Permit, for a period of at least five years. This period of retention shall be extended during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by the Ecology. On request, monitoring data and analysis shall be provided to Ecology.

C. Recording of Results

For each measurement or sample taken, the Permittee shall record the following information: (1) the date, exact place and time of sampling; (2) the individual who performed the sampling or measurement; (3) the dates and times the analyses were performed; (4) who performed the analyses; (5) the analytical techniques or methods used; and (6) the results of all analyses.

D. Test Procedures

All sampling and analytical methods used to meet the monitoring requirements in this Permit shall conform to the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136, unless otherwise specified in this Permit or approved in writing by Ecology.

E. Flow Measurement

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated, and maintained to ensure that the accuracy of the measurements is consistent with the accepted industry standard for that type of device. Frequency of calibration shall be in conformance with manufacturer's recommendations or at a minimum frequency of at least one calibration per year. Calibration records should be maintained for a minimum of three years.

F. Lab Accreditation

The Permittee shall ensure all monitoring data that it is required to submit to Ecology under this Permit is prepared by a laboratory registered or accredited under the provisions of Accreditation of Environmental Laboratories, Chapter 173-50 WAC. Flow, temperature, and settleable solids are exempt from this requirement. Conductivity, turbidity, and pH are also exempt from this requirement, unless the laboratory must be registered or accredited for any other parameter. Quick methods of field detection of pollutants are exempted from this requirement when the purpose of the sampling is identification and removal of a suspected illicit discharge.

G. Additional Monitoring

Ecology may establish specific monitoring requirements in addition to those contained in this Permit by administrative order or Permit modification.

G10. REMOVED SUBSTANCES

With the exception of decant from street waste vehicles, the Permittee shall not allow collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of stormwater to be resuspended or reintroduced to the MS4 or to waters of the State. Decant from street waste vehicles resulting from cleaning stormwater facilities may be reintroduced only when other practical means are not available and only in accordance with the *Street Waste Disposal* guidelines in Appendix 6. Solids generated from maintenance of the MS4 may be reclaimed, recycled, or reused when allowed by local codes and ordinances. Soils that are identified as contaminated pursuant to Chapter 173-350 WAC shall be disposed at a qualified solid waste disposal facility (see Appendix 6).

G11. SEVERABILITY

The provisions of this Permit are severable, and if any provision of this Permit, or the application of any provision of this Permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this Permit shall not be affected thereby.

G12. REVOCATION OF COVERAGE

The director may terminate coverage under this General Permit in accordance with Chapter 43.21B RCW and Chapter 173-226 WAC. Cases where coverage may be terminated include, but are not limited to the following:

A. Violation of any term or condition of this General Permit;

B. Obtaining coverage under this General Permit by misrepresentation or failure to disclose fully all relevant facts;

C. A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge;

D. A determination that the permitted activity endangers human health or the environment, or contributes significantly to water quality standards violations;

E. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090; and

F. Nonpayment of permit fees assessed pursuant to RCW 90.48.465.

Revocation of coverage under this General Permit may be initiated by Ecology or requested by any interested person.

G13. TRANSFER OF COVERAGE

This Permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the Permit to change the name of the Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

G14. GENERAL PERMIT MODIFICATION AND REVOCATION

This General Permit may be modified, revoked and reissued, or terminated in accordance with the provisions of WAC 173-226-230. Grounds for modification, revocation and reissuance, or termination include, but are not limited to, the following:

A. A change occurs in the technology or practices for control or abatement of pollutants applicable to the category of dischargers covered under this General Permit;

B. Effluent limitation guidelines or standards are promulgated pursuant to the CWA or Chapter 90.48 RCW, for the category of dischargers covered under this General Permit;

C. A water quality management plan containing requirements applicable to the category of dischargers covered under this General Permit is approved;

D. Information is obtained which indicates that cumulative effects on the environment from dischargers covered under this General Permit are unacceptable; or

E. Changes in state law that reference this Permit.

G15. REPORTING A CAUSE FOR MODIFICATION OR REVOCATION

A Permittee who knows or has reason to believe that any activity has occurred, or will occur, which would constitute cause for modification or revocation and reissuance under General Condition G12, G14, or 40 CFR 122.62 shall report such plans, or such information, to Ecology so that a decision can be made on whether action to modify, or revoke and reissue, this Permit will be required. Ecology may then require submission of a new or amended application. Submission of such application does not relieve the Permittee of the duty to comply with this Permit until it is modified or reissued.

G16. APPEALS

A. The terms and conditions of this General Permit, as they apply to the appropriate class of dischargers, are subject to appeal within thirty days of issuance of this General Permit in accordance with Chapter 43.21B RCW, and Chapter 173-226 WAC.

B. The terms and conditions of this General Permit, as they apply to an individual discharger, are appealable in accordance with Chapter 43.21B RCW within thirty days of the effective date of coverage of that discharger. Consideration of an appeal of General Permit coverage of an individual discharger is limited to the General Permit's applicability or non-applicability to that individual discharger.

C. The appeal of General Permit coverage of an individual discharger does not affect any other dischargers covered under this General Permit. If the terms and conditions of this General Permit are found to be inapplicable to any individual discharger(s), the matter shall be remanded to Ecology for consideration of issuance of an individual permit or permits.

D. Modifications of this Permit are appealable in accordance with Chapter 43.21B RCW and Chapter 173-226 WAC.

G17. PENALTIES

40 CFR 122.41(a)(2) and (3), 40 CFR 122.41(j)(5), and 40 CFR 122.41(k)(2) are hereby incorporated into this Permit by reference.

G18. DUTY TO REAPPLY

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee shall apply for and obtain a new permit. The Permittee shall apply for permit renewal at least 180 days prior to the specified expiration date of this Permit.

G19. CERTIFICATION AND SIGNATURE

All formal submittals to Ecology shall be signed and certified.

A. All permit applications shall be signed by either a principal executive officer or ranking elected official.

B. All formal submittals required by this Permit shall be signed by a person described, above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

1. The authorization is made in writing by a person described, above, and submitted to Ecology; and

2. The authorization specifies either an individual or a position having responsibility for the overall development and implementation of the stormwater management program. A duly authorized representative may thus be either a named individual or any individual occupying a named position.

C. Changes to authorization. If an authorization under condition G19.B.2 is no longer accurate because a different individual or position has responsibility for the overall development and implementation of the stormwater management program, a new authorization satisfying the requirements of condition G19.B.2 shall be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.

D. Certification. Any person signing a formal submittal under this Permit shall make the following certification:

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that Qualified Personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information

submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for willful violations."

G20. NON-COMPLIANCE NOTIFICATION

In the event a Permittee is unable to comply with any of the terms and conditions of this Permit, the Permittee shall:

A. Notify Ecology of the failure to comply with the permit terms and conditions in writing within 30 days of becoming aware that the non-compliance has occurred. The written notification shall include all of the following:

1. A description of the non-compliance, including dates.
2. Beginning and end dates of the non-compliance, and if the compliance has not been corrected, the anticipated date of correction.
3. Steps taken or planned to reduce, eliminate, or prevent reoccurrence of the non-compliance.

B. Take appropriate action to stop or correct the condition of non-compliance.

G21. UPSETS

Permittees shall meet the conditions of 40 CFR 122.41(n) regarding "Upsets." The conditions are as follows:

A. ***Definition***. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

B. ***Effect of an upset***. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of paragraph (C) of this condition are met. Any determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, will not constitute final administrative action subject to judicial review.

C. ***Conditions necessary for demonstration of upset***. A Permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed contemporaneous operating logs, or other relevant evidence that:

1. An upset occurred and that the Permittee can identify the cause(s) of the upset;
2. The permitted facility was at the time being properly operated;
3. The Permittee submitted notice of the upset as required in 40 CFR 122.41(l)(6)(ii)(B) (24-hour notice of noncompliance); and
4. The Permittee complied with any remedial measures required under 40 CFR 122.41(d) (Duty to Mitigate).

D. ***Burden of proof***. In any enforcement proceeding the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G22. DUTY TO PROVIDE INFORMATION

The Permittee shall furnish to Ecology, within a reasonable time, any information which the Ecology may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Ecology upon request, copies of records required to be kept by this permit.

G23. OTHER INFORMATION

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Ecology, it shall promptly submit such facts or information.

G24. OTHER REQUIREMENTS OF 40 CFR

The other requirements of 40 CFR Part 122.41 and 40 CFR Part 122.42 are incorporated in this permit by reference.

DEFINITIONS AND ACRONYMS

This Section includes definitions for terms used in the body of the Permit and in all the appendices except Appendix 1. Terms defined in Appendix 1 are necessary to implement requirements related to Appendix 1.

40 CFR means Title 40 of the Code of Federal Regulations, which is the codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the federal government.

AKART means All Known, Available, and Reasonable methods of prevention, control, and Treatment. See also state *Water Pollution Control Act*, RCW 90.48.010 and RCW 90.48.520.

All Known, Available and Reasonable Methods of Prevention, Control and Treatment (AKART) refers to the state *Water Pollution Control Act*, RCW 90.48.010 and RCW 90.48.520.

Applicable TMDL means a TMDL which has been approved by EPA on or before the issuance date of this Permit, or prior to the date that Ecology issues coverage under this Permit, whichever is later.

Aqueous Film-Forming Foam (AFFF) is a type of foam used to fight liquid-fueled fires (i.e., those started by oil, gasoline, or other flammable liquids).

Beneficial Uses means uses of waters of the State which include, but are not limited to: use for domestic, stock watering, industrial, commercial, agricultural, irrigation, mining, fish and wildlife maintenance and enhancement, recreation, generation of electric power and preservation of environmental and aesthetic values, and all other uses compatible with the enjoyment of the public waters of the State.

Best Management Practices are the schedules of activities, prohibitions of practices, maintenance procedures, and structural and/or managerial practices approved by Ecology that, when used singly or in combination, prevent or reduce the release of pollutants and other adverse impacts to waters of Washington State.

BMP means Best Management Practice.

Bypass means the diversion of stormwater from any portion of a stormwater treatment facility.

Circuit means a portion of a MS4 discharging to a single point or serving a discrete area determined by traffic volumes, land use, topography, or the configuration of the MS4.

Component or **Program Component** means an element of the Stormwater Management Program listed in S5 - *Stormwater Management Program for Cities, Towns, and Counties*, S6 – *Stormwater Management Program for Secondary Permittees*, S7 – *Compliance with Total Maximum Daily Load Requirements*, or S8 – *Monitoring and Assessment*, of this Permit.

Conveyance System means that portion of the municipal separate storm sewer system designed or used for conveying stormwater.

Co-Permittee means an owner or operator of an MS4 which is in a cooperative agreement with at least one other applicant for coverage under this Permit. A Co-Permittee is an owner or operator of a regulated MS4 located within or in proximity to another regulated MS4. A Co-Permittee is only responsible for permit conditions relating to discharges from the MS4 the Co-Permittee owns or operates. See also 40 CFR 122.26(b)(1).

CWA means the federal *Clean Water Act* (formerly referred to as the federal *Water Pollution Control Act* or federal *Water Pollution Control Act Amendments of 1972*) Pub.L. 92-500, as amended Pub. L. 95-217, Pub. L. 95-576, Pub. L. (6-483 and Pub. L. 97-117, 33 U.S.C. 1251 et seq.).

Director means the Director of the Washington State Department of Ecology, or an authorized representative.

Discharge Point means the location where a discharge leaves the Permittee's MS4 through the Permittee's MS4 facilities/BMPs designed to infiltrate.

Entity means a governmental body, or a public or private organization.

EPA means the U.S. Environmental Protection Agency.

Fully Stabilized means the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (such as riprap, gabions, or geotextiles) which prevents erosion.

General Permit means a permit which covers multiple dischargers of a point source category within a designated geographical area, in lieu of individual permits being issued to each discharger.

Groundwater means water in a saturated zone or stratum beneath the surface of the land or below a surface water body. Refer to Chapter 173-200 WAC.

Hazardous Substance means any liquid, solid, gas, or sludge, including any material, substance, product, commodity, or waste, regardless of quantity, that exhibits any of the physical, chemical, or biological properties described in WAC 173-303-090 or WAC 173-303-100.

Heavy Equipment Maintenance or Storage Yard means an uncovered area where any heavy equipment, such as mowing equipment, excavators, dump trucks, backhoes, or bulldozers are washed or maintained, or where at least five pieces of heavy equipment are stored on a long-term basis.

Highway means a main public road connecting towns and cities.

Hydraulically Near means runoff from the site discharges to the sensitive feature without significant natural attenuation of flows that allows for suspended solids removal. See Appendix 7- *Determining Construction Site Sediment Damage Potential* for a more detailed definition.

Hyperchlorinated means water that contains more than 10 mg/Liter chlorine.

Illicit Connection means any infrastructure connection to the MS4 that is not intended, permitted or used for collecting and conveying stormwater or non-stormwater discharges allowed as specified in this Permit (S5.C.5 and S6.D.3). Examples include sanitary sewer connections, floor drains, channels, pipelines, conduits, inlets, or outlets that are connected directly to the MS4.

Illicit Discharge means any discharge to a MS4 that is not composed entirely of stormwater or of non-stormwater discharges allowed as specified in this Permit (S5.C.5 and S6.D.3).

Impervious Surface means a non-vegetated surface area that either prevents or retards the entry of water into the soil mantle as under natural conditions prior to development. A non-vegetated surface area which causes water to run off the surface in greater quantities or at an increased rate of flow from the flow present under natural conditions prior to development. Common impervious surfaces include, but are not limited to, roof tops, walkways, patios, driveways, parking lots or stormwater areas, concrete or asphalt paving, gravel roads, packed earthen materials, and oiled, macadam or other surfaces which similarly impede the natural infiltration of stormwater.

Land Disturbing Activity means any activity that results in a change in the existing soil cover (both vegetative and non-vegetative) and/or the existing soil topography. Land disturbing activities include, but are not limited to clearing, grading, filling and excavation. Compaction that is associated with stabilization of structures and road construction shall also be considered land disturbing activity. Vegetation maintenance practices, including landscape maintenance and gardening, are not considered land disturbing activity. Stormwater facility maintenance is not considered land disturbing activity if conducted according to established standards and procedures.

LID means Low Impact Development.

LID BMP means Low Impact Development Best Management Practices.

LID Principles means land use management strategies that emphasize conservation, use of on-site natural features, and site planning to minimize impervious surfaces, native vegetation loss, and stormwater runoff.

Low Impact Development (LID) means a stormwater and land use management strategy that strives to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation and transpiration by emphasizing conservation, use of on-site natural features, site planning, and distributed stormwater management practices that are integrated into a project design.

Low Impact Development Best Management Practices (LID BMP) means distributed stormwater management practices, integrated into a project design, that emphasize pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation and transpiration. LID BMPs include, but are not limited to, bioretention, rain gardens, permeable pavements, roof downspout controls, dispersion, soil quality and depth, vegetated roofs, minimum excavation foundations, and water re-use.

Material Storage Facilities means an uncovered area where bulk materials (liquid, solid, granular, etc.) are stored in piles, barrels, tanks, bins, crates, or other means.

Maximum Extent Practicable refers to paragraph 402(p)(3)(B)(iii) of the federal *Clean Water Act* which reads as follows: Permits for discharges from municipal storm sewers shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques, and system, design, and engineering methods, and other such provisions as the Administrator or the State determines appropriate for the control of such pollutants.

MEP means Maximum Extent Practicable.

MS4 means Municipal Separate Storm Sewer System.

Municipal Separate Storm Sewer System means a conveyance, or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

1. Owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under Section 208 of the CWA that discharges to waters of Washington State.
2. Designed or used for collecting or conveying stormwater.
3. Which is not a combined sewer.
4. Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

5. Which is defined as “large” or “medium” or “small” or otherwise designated by Ecology pursuant to 40 CFR 122.26.

National Pollutant Discharge Elimination System means the national program for issuing, modifying, revoking, and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 402, 318, and 405 of the federal *Clean Water Act*, for the discharge of pollutants to surface waters of the State from point sources. These permits are referred to as NPDES permits and, in Washington State, are administered by the Washington State Department of Ecology.

Native Vegetation means vegetation comprised of plant species, other than noxious weeds, that are indigenous to the coastal region of the Pacific Northwest, and which reasonably could have been expected to naturally occur on the site. Examples include trees such as Douglas Fir, western hemlock, western red cedar, alder, big-leaf maple; shrubs such as willow, elderberry, salmonberry, and salal; and herbaceous plants such as sword fern, foam flower, and fireweed.

New Development means land disturbing activities, including Class IV General Forest Practices that are conversions from timber land to other uses; structural development, including construction or installation of a building or other structure; creation of hard surfaces; and subdivision, short subdivision and binding site plans, as defined and applied in Chapter 58.17 RCW. Projects meeting the definition of redevelopment shall not be considered new development. Refer to Appendix 1 for a definition of hard surfaces.

New Permittee means a city, town, or county that is subject to the Western Washington Municipal Stormwater General Permit and was not subject to the permit prior to August 1, 2024.

New Secondary Permittee means a Secondary Permittee that is covered under a Municipal Stormwater General Permit and was not covered by the permit prior to August 1, 2024.

NOI means Notice of Intent.

Notice of Intent (NOI) means the application for, or a request for coverage under, a General Permit pursuant to WAC 173-226-200.

Notice of Intent for Construction Activity means the application form for coverage under the *Construction Stormwater General Permit*.

Notice of Intent for Industrial Activity means the application form for coverage under the *Industrial Stormwater General Permit*.

NPDES means National Pollutant Discharge Elimination System.

Outfall means a point source as defined by 40 CFR 122.2 at the point where a discharge leaves the Permittee's MS4 and enters a surface receiving waterbody or surface receiving waters. Outfall does not include pipes, tunnels, or other conveyances which connect segments of the same stream or other surface waters and are used to convey primarily surface waters (i.e., culverts).

Overburdened Community means a geographic area where vulnerable populations face combined, multiple environmental harms and health impacts, and includes, but is not limited to, highly impacted communities.

> "Vulnerable populations" means population groups that are more likely to be at higher risk for poor health outcomes in response to environmental harms, due to:
>
> (i) Adverse socioeconomic factors, such as unemployment, high housing and transportation costs relative to income, limited access to nutritious food and adequate health care, linguistic isolation, and other factors that negatively affect health outcomes and increase vulnerability to the effects of environmental harms; and
>
> (ii) Sensitivity factors, such as low birth weight and higher rates of hospitalization.
>
> "Vulnerable populations" includes, but is not limited to:
>
> - Racial or ethnic minorities;
> - Low-income populations;
> - Populations disproportionately impacted by environmental harms; and
> - Populations of workers experiencing environmental harms.
>
> "Highly impacted community" means a community designated by the Department of Health based on cumulative impact analyses or a community located in census tracts that are fully or partially on "Indian country" as defined in 18 U.S.C. Sec. 1151.

PCBs means Polychlorinated biphenyls.

Permittee unless otherwise noted, the term "Permittee" includes city, town, or county Permittee, Co-Permittee, New Permittee, Secondary Permittee, and New Secondary Permittee.

PFAS means Per and Polyfluoroalkyl Substances

Physically Interconnected means that one MS4 is connected to another storm sewer system in such a way that it allows for direct discharges to the second system. For example, the roads with drainage systems and municipal streets of one entity are physically connected directly to a storm sewer system belonging to another entity.

Project site means that portion of a property, properties, or rights-of-way subject to land disturbing activities, new hard surfaces, or replaced hard surfaces. Refer to Appendix 1 for a definition of hard surfaces.

QAPP means Quality Assurance Project Plan.

Qualified Personnel means someone who has professional training in the aspects of stormwater management for which they are responsible and are under the functional control of the Permittee. Qualified Personnel may be staff members, contractors, or trained volunteers with professional certification. Permittees may train and certify volunteers.

Qualified Third Party means someone who has professional training in the aspects of stormwater management for which they are responsible but are hired by private entities and not under the functional control of the Permittee. Qualified Third Parties may be contractors, or consultants.

Quality Assurance Project Plan means a document that describes the objectives of an environmental study and the procedures to be followed to achieve those objectives.

RCW means the Revised Code of Washington State.

Receiving Waterbody or **Receiving Waters** means naturally and/or reconstructed naturally occurring surface water bodies, such as creeks, streams, rivers, lakes, wetlands, estuaries, and marine waters, or groundwater, to which a MS4 discharges.

Reclaimed water means water derived in any part from a wastewater with a domestic wastewater component that has been adequately and reliably treated to meet the requirements of Chapter 173-219 WAC, so that it can be used for beneficial purposes. Reclaimed water is not considered a wastewater**.**

Redevelopment means, on a site that is already substantially developed (i.e., has 35% or more of existing hard surface coverage), the creation or addition of hard surfaces; the expansion of a building footprint or addition or replacement of a structure; structural development including construction, installation or expansion of a building or other structure; replacement of hard surface that is not part of a routine maintenance activity; and land disturbing activities. Refer to Appendix 1 for a definition of hard surfaces.

Regulated Small Municipal Separate Storm Sewer System means a Municipal Separate Storm Sewer System which is automatically designated for inclusion in the Phase II stormwater permitting program by its location within an Urban Area, or by designation by Ecology and is not eligible for a waiver or exemption under S1.C.

Runoff is water that travels across the land surface and discharges to water bodies either directly or through a collection and conveyance system. See also "**Stormwater**."

SAM means Stormwater Action Monitoring.

Secondary Permittee is an operator of a regulated small MS4 which is not a city, town or county. Secondary Permittees include special purpose districts and other public entities that meet the criteria in S1.B.

Sediment/Erosion-Sensitive Feature means an area subject to significant degradation due to the effects of construction runoff, or areas requiring special protection to prevent erosion. See Appendix 7 *Determining Construction Site Sediment Damage Potential* for a more detailed definition.

Shared Water Bodies means water bodies, including downstream segments, lakes and estuaries that receive discharges from more than one Permittee.

Significant Contributor means a discharge that contributes a loading of pollutants considered to be sufficient to cause or exacerbate the deterioration of receiving water quality or instream habitat conditions.

Small Municipal Separate Storm Sewer System means an MS4 that is not defined as "large" or "medium" pursuant to 40 CFR 122.26(b)(4) & (7) or designated under 40 CFR 122.26 (a)(1)(v).

Source Control BMP means a structure or operation that is intended to prevent pollutants from coming into contact with stormwater through physical separation of areas or careful management of activities that are sources of pollutants. The SWMMWW separates source control BMPs into two types. Structural Source Control BMPs are physical, structural, or mechanical devices, or facilities, that are intended to prevent pollutants from entering stormwater. Operational BMPs are non-structural practices that prevent or reduce pollutants from entering stormwater.

Stormwater means runoff during and following precipitation and snowmelt events, including surface runoff, drainage or interflow.

Stormwater Action Monitoring (SAM) is the regional stormwater monitoring program for Washington State. This means a stormwater-focused monitoring and assessment program consisting of these components: status and trends monitoring in small streams and marine nearshore areas, stormwater management program effectiveness studies, and source identification projects. The priorities and scope for SAM are set by a formal stakeholder group that selects the studies and oversees the program's administration.

Stormwater Associated with Industrial and Construction Activity means the discharge from any conveyance which is used for collecting and conveying stormwater, which is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant, or associated with clearing, grading and/or excavation, and is required to have an NPDES permit in accordance with 40 CFR 122.26.

Stormwater Facility Retrofits means both: projects that retrofit existing treatment and/or flow control facilities; and new flow control or treatment facilities or BMPs that will address impacts from existing development.

Stormwater Management Program (SWMP) means a set of actions and activities designed to reduce the discharge of pollutants from the MS4 to the MEP and to protect water quality, and comprising the components listed in S5 (for cities, towns, and counties) or S6 (for Secondary Permittees) of this Permit and any additional actions necessary to meet the requirements of applicable TMDLs pursuant to S7 –*Compliance with TMDL Requirements*, and S8– *Monitoring and Assessment*.

Stormwater Treatment and Flow Control BMPs/Facilities means detention facilities, permanent treatment BMPs/facilities; and bioretention, vegetated roofs, and permeable pavements that help meet Appendix 1 Minimum Requirements #6 (treatment), #7 (flow control), or both.

Surface Waters includes lakes, rivers, ponds, streams, inland waters, salt waters, and all other surface waters and water courses within the jurisdiction of the State of Washington.

SWMMWW or ***Stormwater Management Manual for Western Washington*** means the technical manual published by the Department of Ecology in 2024 (Publication No. 24-10-013, 2024*).*

SWMP means Stormwater Management Program.

TMDL means Total Maximum Daily Load.

Total Maximum Daily Load (TMDL) means a water cleanup plan. A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The calculation must include a margin of safety to ensure that the water body can be used for the purposes the state has designated. The calculation must also account for seasonable variation in water quality. Water quality standards are set by states, territories, and tribes. They identify the uses for each water body, for example, drinking water supply, contact recreation (swimming), and aquatic life support (fishing), and the scientific criteria to support that use. The *Clean Water Act*, Section 303, establishes the water quality standards and TMDL programs.

Tributary Conveyance means pipes, ditches, catch basins, and inlets owned or operated by the Permittee and designed or used for collecting and conveying stormwater.

UGA means Urban Growth Area.

Urban Growth Area (UGA) means those areas designated by a county pursuant to RCW 36.70A.110.

Urban Area means urban areas with a population of 50,000 or more people. Urban Areas are designated by the U.S. Census Bureau based on the most recent decennial census.

Vehicle Maintenance or Storage Facility means an uncovered area where any vehicles are regularly washed or maintained, or where at least 10 vehicles are stored.

Water Quality Standards means *Surface Water Quality Standards*, Chapter 173-201A WAC, *Groundwater Quality Standards*, Chapter 173-200 WAC, and *Sediment Management Standards*, Chapter 173-204 WAC.

Waters of the State includes those waters as defined as "waters of the United States" in 40 CFR Subpart 122.2 within the geographic boundaries of Washington State and "waters of the State" as defined in Chapter 90.48 RCW which includes lakes, rivers, ponds, streams, inland waters, underground waters, salt waters and all other surface waters and water courses within the jurisdiction of the State of Washington.

Waters of the United States refers to the definition in 40 CFR 122.2.

Errata for 2024-2029 Municipal Stormwater Permits

Permits Issued on July 1, 2024 |Effective August 1, 2024

Phase I, and WWA Phase II Permit:

Appendix 11 was missing the label for Mount Vernon on page 3, in the row that displayed their population and costs for SAM contributions. The appendix was updated to include the city's name for clarity.

EWA Phase II Permit:

Appendix 8 was missing the label for Mount Vernon on page 4, in the row that displayed their population and costs for SAM contributions. The appendix was updated to include the city's name for clarity.

WWA Phase II Permit:

- Permit section S5.C.8.c and S5.C.8.d.v reference to "S5.C.8.a.i." should reference "S5.C.8.b."
- Permit Section S5.C.7.e refers to "(e.g.2029-2032)" this should reference "(e.g. 2029-2034)."
- Appendix 3, Question 31 references "(S5.C.2.b.iv)" this should be "(S5.C.4.b.iv)."

Issued 7/3/24; 7/17/24

This page intentionally left blank

APPENDIX 1 - Minimum Technical Requirements for New Development and Redevelopment

Section 1. Exemptions

The purpose of this section is to identify activities whose resulting surfaces may be considered "exempt" from the Minimum Requirements, even though those surfaces, per the definitions in **Section 2. Definitions Related to Minimum Requirements**, would be considered replaced hard surfaces or land disturbed.

Unless otherwise indicated in this section, the surfaces that result from the activities described below are exempt from the Minimum Requirements. Exempt surfaces do not need to be included when evaluating the Project Level Thresholds or TDA Level Thresholds as described in **Section 3. Applicability of the Minimum Requirements**.

The following list further defines how these exemptions may be used:

- A project may combine different types of exempt activities. If the project includes only exempt activities, then the whole project is exempt.
- If the "exempt" activity is part of, directly related to, or caused by a new development or redevelopment project, then it is not considered an exempt activity. It is considered part of the new development or redevelopment project.
- If an exempt activity requires making an ADA update per the federal Americans with Disabilities Act requirements, then the ADA update is considered part of the exempt activity, and the exemption applies to the surfaces disturbed for the ADA update. Note that this exemption does not extend to additional work, such as extending a sidewalk beyond what is necessary for the ADA update.

Forest Practice Activities

Forest practices regulated under Title 222 WAC, except for Class IV-General forest practices that are conversions from timberland to other uses, are exempt from the provisions of the Minimum Requirements.

Commercial Agriculture Activities

Commercial agriculture activities involving working the land for production are generally exempt. However, the conversion from timberland to agriculture, and the construction of impervious surfaces are not exempt.

Oil and Gas Field Activities

Construction of drilling sites, waste management pits, and access roads, as well as construction of transportation and treatment infrastructure such as pipelines, natural gas treatment plants, natural gas pipeline compressor stations, and crude oil pumping stations are exempt. Operators are encouraged to implement and maintain Best Management Practices (BMPs) to minimize erosion and control sediment during and after construction activities to help ensure protection of surface water quality during storm events.

Pavement Maintenance Activities

Pavement maintenance activities include only targeted pavement repairs or maintenance. The limits of the exempt surfaces include only the area that must be disturbed to repair or maintain the pavement.

Pavement maintenance activities do not:

- change the characteristics of a roadway (e.g. changing a four-way intersection to a roundabout).
- increase the traffic capacity of a roadway or parking area (e.g. include restriping to add lanes or parking spaces).
- expand the area of coverage (i.e. add new hard surfaces).

The following pavement maintenance activities are exempt from all Minimum Requirements:

- pothole patching, square cut patching, or other targeted preservation work,
- overlaying (including grinding and overlaying, so long as base course is not exposed) existing asphalt or concrete pavement. Examples of overlay materials include bituminous surface treatment (BST or “chip seal”), asphalt, or concrete,
- shoulder grading,
- reshaping/regrading drainage systems (including adding curb/gutter and/or wedge curbs),
- crack sealing, and
- vegetation maintenance associated with the road right-of-way.

The following are not pavement maintenance activities, and are not exempt:

- Removing and replacing a pavement to base course or lower, or repairing the pavement base (except for pothole or square cut patching): These are considered replaced hard surfaces.
- Extending the pavement edge, or paving graveled shoulders: These are

considered new hard surfaces.

- Upgrading from dirt to gravel, a bituminous surface treatment ("chip seal"), asphalt, concrete, or permeable pavement; upgrading from gravel to chip seal, asphalt, concrete, or permeable pavement; or upgrading from chip seal to asphalt, concrete, or permeable pavement: These are considered new hard surfaces.

Underground Utility Activities

Underground utility activities include installing, maintaining, and/or upgrading an underground utility. The limits of the exempt surfaces include only the area disturbed by the trench work necessary for the underground utility work (including any over-excavating necessary for the utility trench).

For an underground utility activity to be exempt, it cannot be part of, directly related to, or caused by a new development or redevelopment project.

Underground utility activities must replace the ground surface with in-kind material or materials with similar runoff characteristics.

Underground utility activities are subject to only **4.2 Minimum Requirement #2: Construction Stormwater Pollution Prevention Plan (SWPPP)**.

Section 2. Definitions Related to Minimum Requirements

ADT

Average Daily Traffic

Arterial

A road or street primarily for through traffic. The term generally includes roads or streets considered collectors. It does not include local access roads which are generally limited to providing access to abutting property. See also RCW 35.78.010, RCW 36.86.070, and RCW 47.05.021.

Bioretention BMPs

Engineered stormwater facilities that provide Runoff Treatment by passing the stormwater through a specified soil profile (Bioretention Soil Mix, or BSM), and typically either retain or detain the treated stormwater for Flow Control. Bioretention facilities include a variety of plant material including trees, shrubs, grasses, and/or other herbaceous plants adapted to the local climate and soil moisture conditions. Bioretention is typically implemented as an LID practice, and

as such is typically sited to receive stormwater runoff from a small contributing area.

Certified Erosion and Sediment Control Lead (CESCL)

An individual who has current certification through an approved erosion and sediment control training program that meets the minimum training standards established by Ecology (see **BMP C160: Certified Erosion and Sediment Control Lead**). A CESCL is knowledgeable in the principles and practices of erosion and sediment control. The CESCL must have the skills to assess site conditions and construction activities that could impact the quality of stormwater and, the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges. Certification is obtained through an Ecology approved erosion and sediment control course. Course listings are provided online at Ecology's website.

Commercial agriculture

Those activities conducted on lands defined in RCW 84.34.020(2), and activities involved in the production of crops or livestock for commercial trade. An activity ceases to be considered commercial agriculture when the area on which it is conducted is proposed for conversion to a nonagricultural use or has lain idle for more than five years, unless the idle land is registered in a federal or state soils conservation program, or unless the activity is maintenance of irrigation ditches, laterals, canals, or drainage ditches related to an existing and ongoing agricultural activity.

Common plan of development or sale

A site where multiple separate and distinct construction activities may be taking place at different times on different schedules and/or by different contractors, but still under a single plan. Examples include:

1. phased projects and projects with multiple filings or lots, even if the separate phases or filings/lots will be constructed under separate contract or by separate owners (e.g. a development where lots are sold to separate builders);
2. a development plan that may be phased over multiple years, but is still under a consistent plan for long-term development;
3. projects in a contiguous area that may be unrelated but still under the same contract, such as construction of a building extension and a new parking lot at the same facility; and
4. linear projects such as roads, pipelines, or utilities.

If the project is part of a common plan of development or sale, the disturbed area of the entire plan must be used in determining permit requirements.

Converted vegetation (areas)

The surfaces on a project site where native vegetation, pasture, scrub/shrub, or unmaintained non-native vegetation (e.g., Himalayan blackberry, scotch broom) are converted to lawn or landscaped areas, or where native vegetation is converted to pasture.

Effective impervious surface

Those impervious surfaces that are connected via sheet flow or discrete conveyance to a drainage system. Impervious surfaces are considered ineffective if:

1. the runoff is fully dispersed in accordance with **BMP T5.30: Full Dispersion**;
2. residential roof runoff is infiltrated in accordance with **BMP T5.10A: Downspout Full Infiltration**; or
3. all runoff from the impervious surface is infiltrated (i.e. approved continuous runoff modeling methods indicate that the entire runoff file is infiltrated).

Erodible or leachable materials

Wastes, chemicals, or other substances that measurably alter the physical or chemical characteristics of runoff when exposed to rainfall. Examples include erodible soils that are stockpiled, uncovered process wastes, manure, fertilizers, oily substances, ashes, kiln dust, and garbage dumpster leakage.

Hard surface

An impervious surface, a permeable pavement, or a vegetated roof.

Highway

A main public road connecting towns and cities.

Impervious surface

A surface area which either prevents or retards the entry of water into the soil mantle as under natural conditions prior to development. A surface area which causes water to run off the surface in greater quantities or at an increased rate of flow from the flow present under natural conditions prior to development. Common impervious surfaces include, but are not limited to, roof tops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel roads, packed earthen materials, and oiled, macadam or other surfaces which similarly impede the natural infiltration of stormwater.

- For purposes of determining whether the thresholds for application of Minimum Requirements are exceeded, open, uncovered retention or detention BMPs shall not be considered as impervious surfaces. Open, uncovered retention or detention BMPs shall be considered impervious surfaces for the purposes of runoff modeling.

- When an underdrain (not intended to infiltrate) is used below an artificial turf surface, that surface shall be considered (and modeled) as impervious surface.

Land disturbing activity

Any activity that results in a change in the existing soil cover (both vegetative and nonvegetative) and/or the existing soil topography. Land disturbing activities include, but are not limited to clearing, grading, filling, and excavation. Compaction that is associated with stabilization of structures and road construction shall also be considered a land disturbing activity. Vegetation maintenance practices, including landscape maintenance and gardening, are not considered land-disturbing activity. Stormwater facility maintenance is not considered land disturbing activity if conducted according to established standards and procedures.

Low impact development (LID)

A stormwater and land use management strategy that strives to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation, and transpiration by emphasizing conservation, use of on-site natural features, site planning, and distributed stormwater management practices that are integrated into a project design.

Low Impact Development Best Management Practices (LID BMPs)

Distributed stormwater management practices, integrated into a project design, that emphasize pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation, and transpiration. LID BMPs include, but are not limited to:

- **BMP T7.30: Bioretention**,
- **BMP T5.14: Rain Gardens**,
- **BMP T5.15: Permeable Pavements**,
- **BMP T5.10A: Downspout Full Infiltration**,
- **BMP T5.10B: Downspout Dispersion Systems**,
- **BMP T5.10C: Perforated Stub-out Connections**
- **BMP T5.30: Full Dispersion**,
- **BMP T5.13: Post-Construction Soil Quality and Depth**,
- **BMP T5.19: Minimal Excavation Foundations**,
- **BMP T5.17: Vegetated Roofs**, and
- **BMP T5.20: Rainwater Harvesting**.

Low Impact Development (LID) Principles

Land use management strategies that emphasize conservation, use of on-site natural features, and site planning to minimize impervious surfaces, native vegetation loss, and stormwater runoff.

Maintenance

Repair and maintenance includes activities conducted on currently serviceable structures, facilities, and equipment that involves no expansion or use beyond that previously existing and results in no significant adverse hydrologic impact. It includes those usual activities taken to prevent a decline, lapse, or cessation in the use of structures and systems. Those usual activities may include replacement of dysfunctional facilities, including cases where environmental permits require replacing an existing structure with a different type of structure, if the functioning characteristics of the original structure are not changed. One example is the replacement of a collapsed, fish blocking, round culvert with a new box culvert under the same span, or width, of roadway. Regarding stormwater facilities, maintenance includes assessment to ensure ongoing proper operation, removal of built-up pollutants (i.e. sediments), replacement of failed or failing treatment media, and other actions taken to correct defects as identified in the BMP design guidance within Volume V of the SWMMWW. See also Pavement Maintenance exemptions in **Section 1. Exemptions**.

Native vegetation

Vegetation comprised of plant species, other than noxious weeds, that are indigenous to the coastal region of the Pacific Northwest and which reasonably could have been expected to naturally occur on the site. Examples include trees such as Douglas fir, western hemlock, western red cedar, alder, big-leaf maple, and vine maple; shrubs such as willow, elderberry, salmonberry and salal; and herbaceous plants such as sword fern, foam flower, and fireweed.

New development

Land disturbing activities, including Class IV-general forest practices that are conversions from timberland to other uses; structural development, including construction or installation of a building or other structure; creation of hard surfaces; and subdivision, short subdivision and binding site plans, as defined and applied in Chapter 58.17 RCW. Projects meeting the definition of redevelopment shall not be considered new development.

New hard surface

A surface that is:

- upgraded from dirt to gravel, a bituminous surface treatment ("chip seal"), asphalt, concrete, permeable pavement, a structure with a vegetated roof, or an impervious structure; or
- upgraded from gravel to chip seal, asphalt, concrete, permeable pavement, a structure with a vegetated roof, or an impervious structure; or
- upgraded from chip seal to asphalt, concrete, permeable pavement, a structure with a vegetated roof, or an impervious structure.

  Note that if asphalt or concrete has been overlaid by a chip seal, the existing condition should be considered as asphalt or concrete.

New impervious surface

A surface that is:

- changed from a pervious surface to an impervious surface (e.g. resurfacing by upgrading from dirt to gravel, a bituminous surface treatment ("chip seal"), asphalt, concrete, or an impervious structure); or
- upgraded from gravel to chip seal, asphalt, concrete, or an impervious structure; or
- upgraded from chip seal to asphalt, concrete, or an impervious structure.

  Note that if asphalt or concrete has been overlaid by a chip seal, the existing condition should be considered as asphalt or concrete.

On-site stormwater management BMPs

Development and mitigation techniques that serve to infiltrate, disperse, and retain stormwater runoff on a project site. As used in this appendix, a synonym for Low Impact Development BMPs.

Permeable pavement

Pervious concrete, porous asphalt, permeable pavers, or other forms of pervious or porous paving material intended to allow passage of water through the pavement section. It often includes an aggregate base that provides structural support and acts as a stormwater reservoir.

Pervious surface

Any surface material that allows stormwater to infiltrate into the ground. Examples include lawn, landscape, pasture, native vegetation areas, and permeable pavements.

Pollution-generating hard surface (PGHS)

Those hard surfaces considered to be a significant source of pollutants in stormwater runoff. See the listing of surfaces under pollution-generating impervious surface.

Pollution-generating impervious surface (PGIS)

Those impervious surfaces considered to be a significant source of pollutants in stormwater runoff. Such surfaces include those which are subject to any of the following:

- vehicular use (as further defined in this section).
- industrial activities (as further defined in the glossary of the SWMMWW).
- storage of erodible or leachable materials, wastes, or chemicals, and which receive direct rainfall or the run-on or blow-in of rainfall.
- metal roofs unless they are coated with an inert, non-leachable material (e.g. baked-on enamel coating).
- roofs that are subject to venting significant amounts of dusts, mists, or fumes from manufacturing, commercial, or other indoor activities.

Pollution-generating pervious surface (PGPS)

Any pervious surface subject to any of the following:

- vehicular use (as further defined in this glossary).
- industrial activities (as further defined in the glossary of the SWMMWW).
- storage of erodible or leachable materials, wastes or chemicals, and that receive direct rainfall or run-on or blow-in of rainfall.
- use of pesticides and fertilizers.
- loss of soil.

Artificial turf is also considered to be PGPS.

Typical PGPS include permeable pavement subject to vehicular use, lawns and landscaped areas including: golf courses, parks, cemeteries, and sports fields (natural and artificial turf).

Pre-developed condition

The native vegetation and soils that existed at a site prior to the influence of Euro-American settlement. The pre-developed condition shall be assumed to be forested land cover unless reasonable, historic information is provided that indicates the site was prairie prior to settlement.

Project

Any proposed action to alter or develop a site; or the proposed action of a permit application or an approval that requires drainage review.

Project site

That portion of a property, properties, and right-of-way subject to land disturbing activities, new hard surfaces, or replaced hard surfaces.

Rain garden

A non-engineered shallow landscaped depression, with compost-amended native soils and adapted plants. The depression is designed to pond and temporarily store stormwater runoff from adjacent areas, and to allow stormwater to pass through the amended soil profile. See **BMP T5.14: Rain Gardens**.

Receiving waterbody or receiving waters

Naturally and/or reconstructed naturally occurring surface water bodies, such as creeks, streams, rivers, lakes, wetlands, estuaries, and marine waters, or groundwater, to which a MS4 discharges.

Redevelopment

On a site that is already substantially developed (i.e. has 35% or more of existing hard surface coverage), the creation or addition of hard surfaces; the expansion of a building footprint or addition or replacement of a structure; structural development including construction, installation, or expansion of a building or other structure; replacement of hard surface that is not part of a routine maintenance activity; and land disturbing activities.

Replaced hard surface

For structures, the removal down to (i.e. exposing the top of) the foundation and replacement. For other hard surfaces, the removal down to (i.e. exposing the top of) bare soil or base course and replacement.

Replaced impervious surface

For structures, the removal down to (i.e. exposing the top of) the foundation and replacement. For other impervious surfaces, the removal down to (i.e. exposing the top of) bare soil or base course and replacement.

Site

The area defined by the legal boundaries of a parcel or parcels of land that is (are) subject to new development or redevelopment. For road projects, the length of the project site and the right-of-way boundaries define the site.

A Site may include multiple parcels and/or sections of right-of-way, if multiple parcels and/or sections of right-of-way are subject to the new development or redevelopment project.

Source control BMP

A structure or operation intended to prevent pollutants from coming into contact with stormwater through physical separation of areas or careful management of activities that are sources of pollutants. The SWMMWW separates source control BMPs into two types: structural and operational.

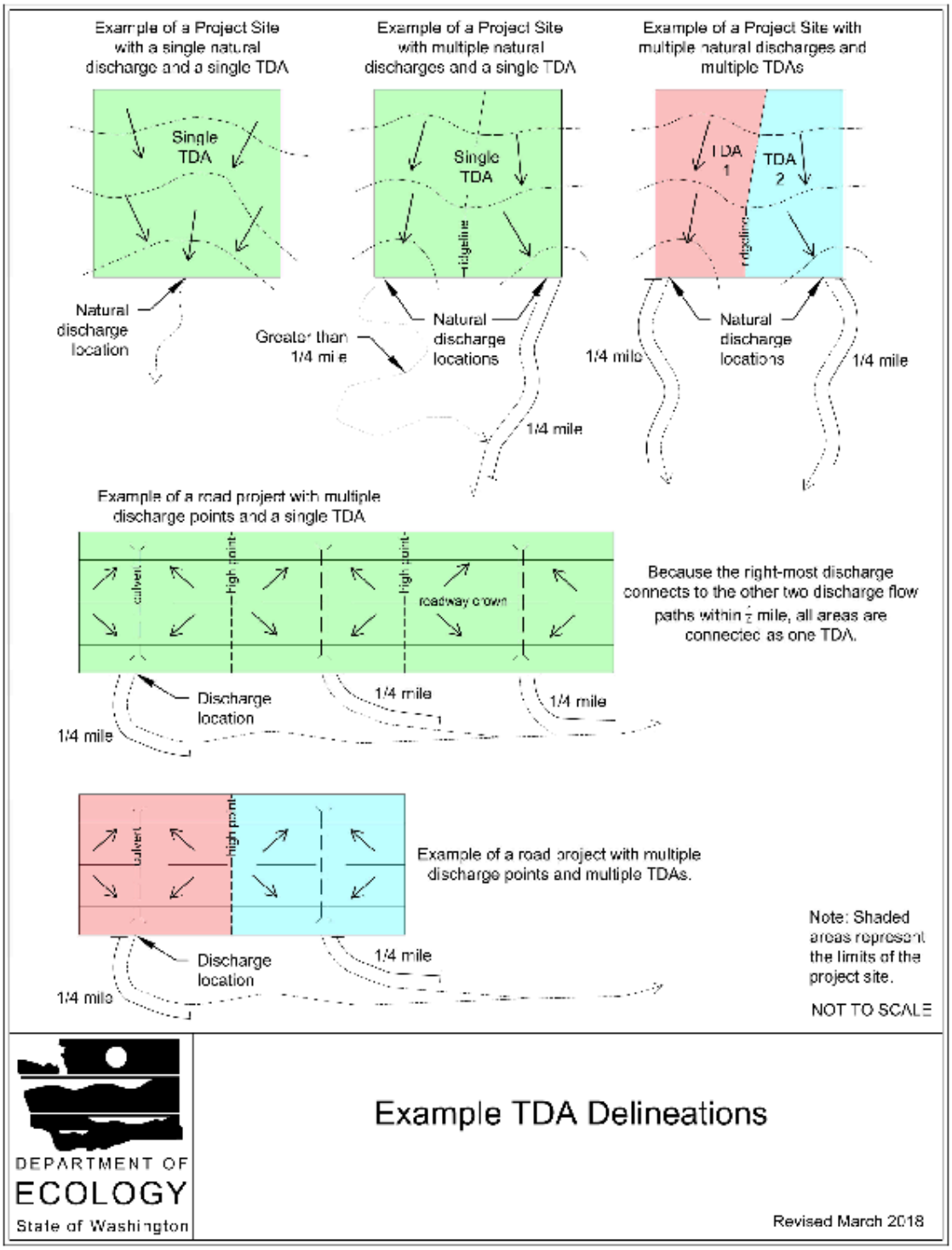
- *Structural Source Control BMPs* are physical, structural, or mechanical devices or facilities that are intended to prevent pollutants from entering stormwater.
- *Operational Source Control BMPs* are non-structural practices that prevent or reduce pollutants from entering stormwater.

Threshold Discharge Area

An area within a project site draining to a single natural discharge location or multiple natural discharge locations that combine within one-quarter mile downstream (as determined by the shortest flowpath). The examples in **Figure 1: Example TDA Delineations** below illustrate this definition. The purpose of this definition is to clarify how the thresholds of this appendix are applied to project sites with multiple discharge points.

If the project site does not currently discharge at the natural location and is such that it is impractical (as determined by the local jurisdiction) to return the discharge to the natural location, then the TDA delineation would be based on the discharge(s) at the existing location(s). An example of this case is a site in an ultra-urban environment, where fully built-out conveyance systems exist and are not in the natural (i.e. historic) locations.

Figure 1: Example TDA Delineations



Vehicular use

Regular use of an impervious or pervious surface by motor vehicles. The following are subject to regular vehicular use:

- roads,
- un-vegetated road shoulders,
- bike lanes within the traveled lane of a roadway,
- driveways,
- parking lots,
- unrestricted access fire lanes,
- vehicular equipment storage yards,
- railway lines, including light rail elevated and non-elevated guideways/tracks, and
- airport runways and other surfaces intended for movement and/or storage of aircraft.

The following are not considered subject to regular vehicular use:

- sidewalks not subject to drainage from roads for motor vehicles,
- paved bicycle pathways separated from and not subject to drainage from roads for motor vehicles,
- restricted access fire lanes, and
- infrequently used maintenance access roads.

Wetlands

Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from non-wetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from non-wetland areas to mitigate the conversion of wetlands.

Section 3. Applicability of the Minimum Requirements

3.1 Minimum Requirement Thresholds

Not all the Minimum Requirements apply to every new development or redevelopment project. The applicability varies depending on the project type and size. This section identifies thresholds that determine the applicability of the Minimum Requirements to projects. Use the flow charts in **Figure 2: Flow Chart for Determining Whether the Permittee Must Regulate the Project**, **Figure 3: Flow Chart for Determining Requirements for New Development**, and **Figure 4: Flow Chart for Determining Requirements for Redevelopment** to determine which of the Minimum Requirements apply. The Minimum Requirements themselves are presented in **Section 4. Minimum Requirements**.

Use the thresholds in **sections 3.2 and 3.3** at the time of application for a subdivision, plat, short plat, building permit, or other construction permit. The plat or short plat approval shall identify all stormwater BMPs that are required for each lot. For projects involving only land disturbing activities, (e.g. clearing or grading), the thresholds apply at the time of application for the permit allowing or authorizing that activity. Note the exemption in **Section 1. Exemptions** for forest practices other than Class IV General.

For projects that are implemented in incremental stages or phases as part of a common plan of development or sale, the thresholds below must be considered for the complete project at full build-out.

The Permittee may allow the Minimum Requirements to be met for an equivalent (flow and pollution characteristics) area. The equivalent area may be within the same TDA. If the equivalent area is outside the TDA, or off-site, the equivalent area must drain to the same receiving water and the guidance for equivalent facilities using in-basin transfers must be followed, as detailed in ***I-D.6 Regional Facility Area Transfers*** in the SWMMWW. The Permittee is responsible for maintaining tracking records for all area transfers approved by the Permittee.

Figure 2: Flow Chart for Determining Whether the Permittee Must Regulate the Project

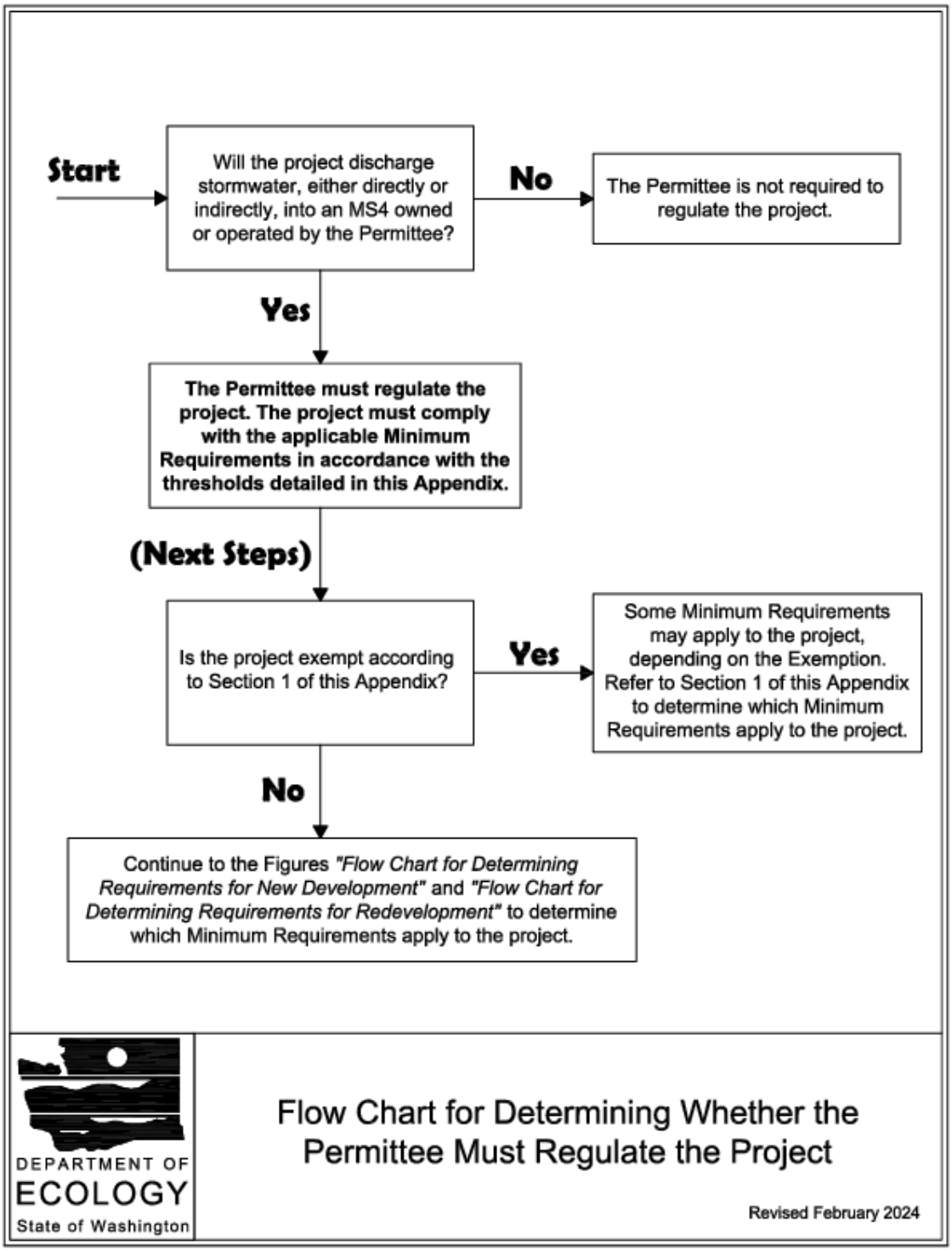


Figure 3: Flow Chart for Determining Requirements for New Development

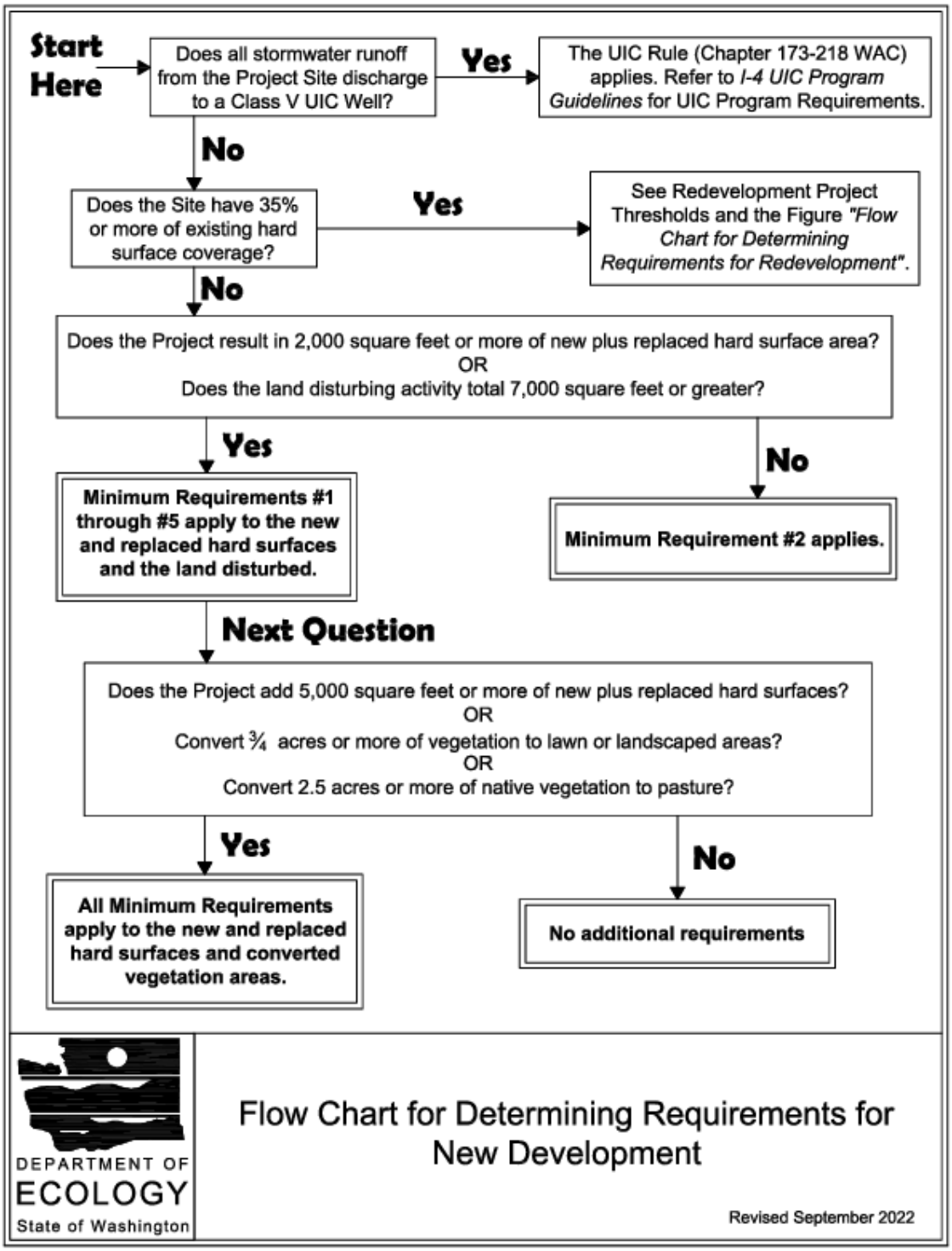
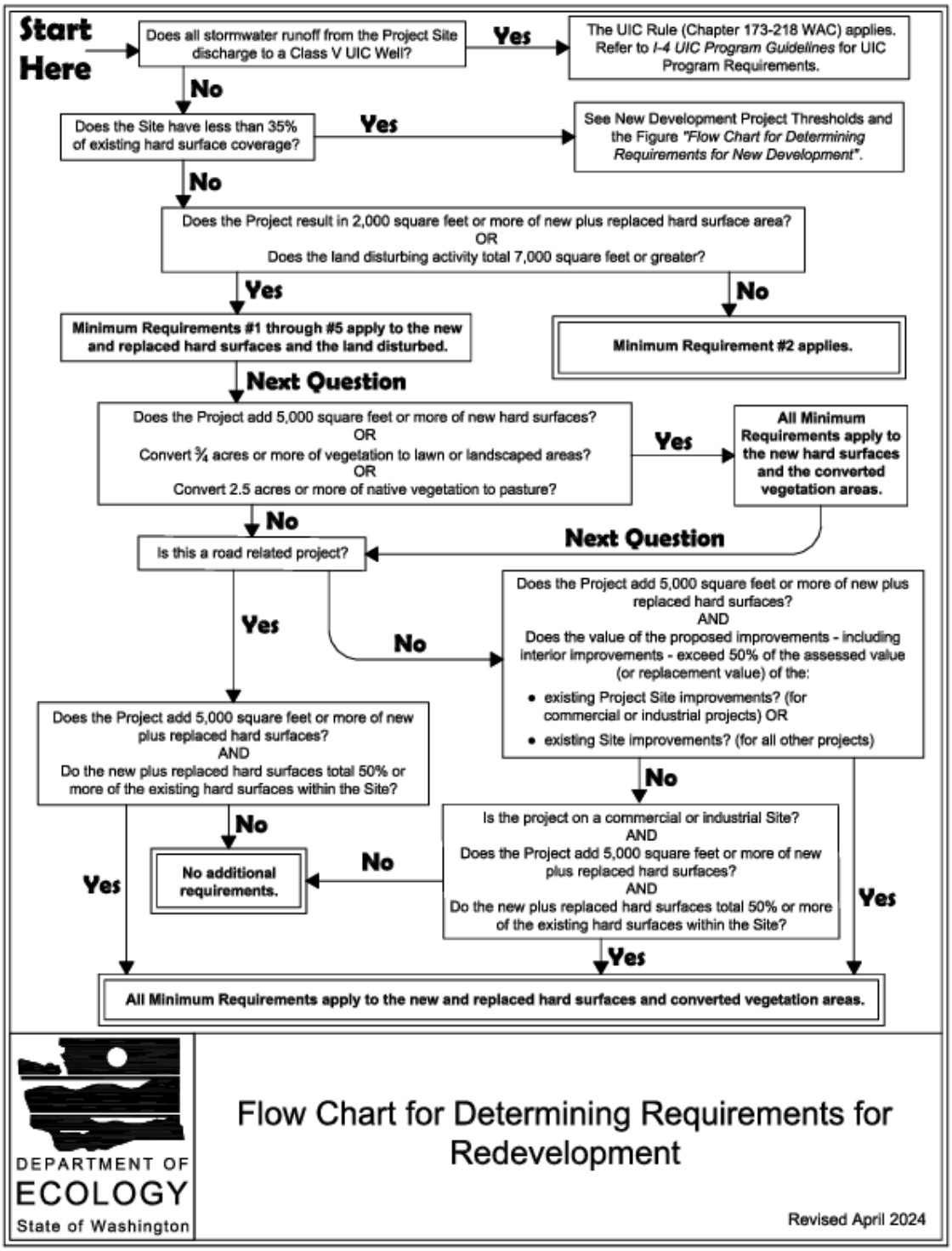


Figure 4: Flow Chart for Determining Requirements for Redevelopment



3.2 New Development Project Thresholds

All new development shall be required to comply with Minimum Requirement #2.

The following new development shall comply with Minimum Requirements #1 through #5 for the new and replaced hard surfaces and the land disturbed:

- Results in 2,000 square feet, or greater, of new plus replaced hard surface area, or
- Has land disturbing activity of 7,000 square feet or greater.

The following new development shall comply with all Minimum Requirements for the new and replaced hard surfaces and the converted vegetation areas:

- the Project adds 5,000 square feet, or more, of new plus replaced hard surface area, or
- Converts ¾ acres, or more, of vegetation to lawn or landscaped areas, or
- Converts 2.5 acres, or more, of native vegetation to pasture.

3.3 Redevelopment Project Thresholds

All redevelopment shall be required to comply with Minimum Requirement #2.

The following redevelopment shall comply with Minimum Requirements #1 through #5 for the new and replaced hard surfaces and the land disturbed:

- Results in 2,000 square feet, or more, of new plus replaced hard surface area, or
- Has land disturbing activity of 7,000 square feet or greater.

The following redevelopment shall comply with all Minimum Requirements for the new hard surfaces and converted vegetation areas:

- Adds 5,000 square feet or more of new hard surfaces or,
- Converts ¾ acres, or more, of vegetation to lawn or landscaped areas, or
- Converts 2.5 acres, or more, of native vegetation to pasture.

3.4 Additional Requirements for Redevelopment

Road-related projects shall comply with all Minimum Requirements for the new and replaced hard surfaces and the converted vegetation areas if:

- the Project adds 5,000 square feet or more of new plus replaced hard surfaces, and
- the new plus replaced hard surfaces total 50% or more of the existing hard surfaces within the Site.

Other types of redevelopment projects shall comply with all the Minimum Requirements for the new and replaced hard surfaces and the converted vegetation areas if either of the two thresholds below are crossed:

- Threshold 1:
    - the Project adds 5,000 square feet or more of new plus replaced hard surfaces, and
        - For commercial or industrial projects: the valuation of the proposed improvements, including interior improvements, exceeds 50% of the assessed value of the existing Project Site improvements.
        - For all other projects: the valuation of the proposed improvements, including interior improvements, exceeds 50% of the assessed value of the existing Site improvements.
- Threshold 2 (for commercial or industrial sites only):
    - the Project adds 5,000 square feet or more of new plus replaced hard surfaces, and
    - the new plus replaced hard surfaces total 50% or more of the existing hard surfaces within the Site.

The Permittee may exempt or institute a stop-loss provision for redevelopment projects from compliance with Minimum Requirement #5, #6, #7, and/or #8 as applied to the replaced hard surfaces if the Permittee has adopted a plan and a schedule that fulfills those requirements in regional facilities.

Section 4. Minimum Requirements

This Section describes the Minimum Requirements for stormwater management for new development projects and redevelopment projects. **Section 3. Applicability of the Minimum Requirements** should be consulted to determine which of the Minimum Requirements apply to any given project. **Figure 3: Flow Chart for Determining Requirements for New Development** and **Figure 4: Flow Chart for Determining Requirements for Redevelopment** should be consulted to determine whether the Minimum Requirements apply to new surfaces, replaced surfaces, or new and replaced surfaces.

4.1 Minimum Requirement #1: Preparation of a Stormwater Site Plan

All projects meeting the Project Thresholds in **Section 3. Applicability of the Minimum Requirements** shall prepare a Stormwater Site Plan for local jurisdiction review. Stormwater Site Plans shall use site-appropriate development principles, as required, and encouraged by local development codes, to retain native vegetation and minimize impervious surfaces to the extent feasible. Stormwater Site Plans shall be prepared in accordance with the guidance in ***III-3 Stormwater Site Plans*** in the SWMMWW.

4.2 Minimum Requirement #2: Construction Stormwater Pollution Prevention Plan (SWPPP)

Permittees may choose to allow compliance with this Minimum Requirement to be achieved for an individual site if the site is covered under and fully implementing the requirements of Ecology's *CONSTRUCTION STORMWATER GENERAL PERMIT - National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for Stormwater Discharges Associated with Construction Activity*.

All new development and redevelopment projects are responsible for preventing erosion and discharge of sediment and other pollutants into receiving waters.

Minimum Requirement Thresholds

Compliance requirements for this Minimum Requirement are as follows:

- Projects that meet either of the following thresholds must prepare a Construction Stormwater Pollution Prevention Plan (SWPPP) for local jurisdiction review:
    - result in 2,000 square feet or more of new plus replaced hard surface area, or
    - disturb 7,000 square feet or more of land,
- Projects below those thresholds (listed directly above) are not required to prepare a Construction SWPPP but must consider all of the Construction SWPPP Elements (listed below) and develop controls for all Construction SWPPP Elements that pertain to the project site.

General Requirements

The Construction SWPPP shall include a narrative and drawings. All BMPs shall be clearly referenced in the narrative and marked on the drawings. The Construction SWPPP narrative shall include documentation to explain and justify the pollution prevention decisions made for the project. Each of the 13 Construction SWPPP Elements (listed below) must be considered and included in the Construction SWPPP unless site conditions render the Element unnecessary and the exemption from that Element is clearly justified in the narrative of the SWPPP.

Clearing and grading activities for developments shall be allowed only if conducted pursuant to an approved site development plan (e.g. subdivision approval) that establishes permitted areas of clearing, grading, cutting, and filling. These permitted clearing and grading areas and any other areas required to preserve critical or sensitive areas, buffers, native growth protection easements, or tree retention areas (as may be required by local jurisdictions), shall be delineated on the site plans and the development site.

The Construction SWPPP shall be implemented beginning with initial land disturbance and until final stabilization. Sediment and Erosion control BMPs shall be consistent with the BMPs contained in ***II-4 Construction Stormwater BMPs*** in the SWMMWW.

Seasonal Work Limitations: From October 1 through April 30, land disturbing activities shall only be permitted if shown to the satisfaction of the local jurisdiction that turbid water will be prevented from leaving the site through a combination of the following:

1. Site conditions including existing vegetative coverage, slope, soil type and proximity to receiving waters; and
2. Limitations on activities and the extent of disturbed areas; and
3. Proposed erosion and sediment control measures.

Based on the information provided and/or local weather conditions, the local jurisdiction may expand or restrict the seasonal work limitations.

The following activities are exempt from the seasonal work limitations:

1. Routine maintenance and necessary repair of erosion and sediment control BMPs,
2. Routine maintenance of public facilities or existing utility structures that do not expose the soil or result in the removal of the vegetative cover to soil, and
3. Activities where there is one hundred percent infiltration of stormwater runoff within the site in approved and installed erosion and sediment control facilities.

If erosion and sediment control requirements are not being met (i.e. turbid water is leaving the site), then the local jurisdiction shall require that the contractor maintain the existing BMPs or implement other BMPs as appropriate.

Construction SWPPP Elements

Element 1: Preserve Vegetation / Mark Clearing Limits

a. Before beginning land disturbing activities, including clearing and grading, clearly mark all clearing limits, sensitive areas and their buffers, and trees that are to be preserved within the construction area.
b. Retain the duff layer, topsoil, and natural vegetation in an undisturbed state to the maximum degree practicable.

Element 2: Establish Construction Access

a. Limit construction vehicle access and exit to one route, if possible.
b. Stabilize access points with a pad of quarry spalls, crushed rock, or other equivalent BMPs, to minimize tracking of sediment onto roads.
c. Locate wheel wash or tire baths on site if the stabilized construction entrance is not effective in preventing tracking sediment onto roads.
d. If sediment is tracked off site, clean the affected roadway(s) thoroughly at the end of each day, or more frequently as necessary (for example, during wet weather). Remove sediment from roads by shoveling, sweeping, or picking up and transporting the sediment to a controlled sediment disposal area.
e. Conduct street washing only after sediment is removed in accordance with 2.d (above).
f. Control street wash wastewater by pumping back on site, or otherwise prevent it from discharging into systems tributary to waters of the State.

Element 3: Control Flow Rates

a. Protect properties and waterways downstream of construction sites from erosion and the associated discharge of turbid waters due to increases in the velocity and peak volumetric flow rate of stormwater runoff from the project site.
b. Where necessary to comply with 3.a (above), construct stormwater infiltration or detention BMPs as one of the first steps in grading. Ensure that detention BMPs function properly before constructing site improvements (e.g. impervious surfaces).
c. If permanent infiltration BMPs are used for temporary flow control during construction, protect these BMPs from sedimentation during the construction phase.

Element 4: Install Sediment Controls

Design, install, and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants. At a minimum:

a. Construct sediment control BMPs (sediment ponds, traps, filters, etc.) as one of the first steps in grading. These BMPs must be functional before other land disturbing activities take place.
b. Minimize sediment discharges from the site. The design, installation and maintenance of erosion and sediment controls must address factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site.
c. Direct stormwater runoff from disturbed areas through **BMP C241: Sediment Pond (Temporary)** or other appropriate sediment removal BMP, before the runoff leaves a construction site or before discharge to an infiltration facility. Runoff from fully stabilized areas may be discharged without a sediment removal BMP but must control flow rates per **Element 3: Control Flow Rates**.
d. Locate BMPs intended to trap sediment on site in a manner to avoid interference with the movement of juvenile salmonids attempting to enter off-channel areas or drainages.
e. Provide and maintain natural buffers around surface waters, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration, unless infeasible.
f. Where feasible, design outlet structures that withdraw impounded stormwater from the surface to avoid discharging sediment that is still suspended lower in the water column.

Element 5: Stabilize Soils

a. Stabilize exposed and unworked soils by application of effective BMPs that prevent erosion. Applicable BMPs include but are not limited to: temporary and permanent seeding, sodding, mulching, plastic covering, erosion control fabrics and matting, soil application of polyacrylamide (PAM), the early application of gravel base on areas to be paved, and dust control.
b. Control stormwater volume and velocity within the site to minimize soil erosion.
c. Control stormwater discharges, including both peak flow rates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion.

d. Soils must not remain exposed and unworked for more than the time periods set forth below to prevent erosion:
    - During the dry season (May 1 - September 30): 7 days
    - During the wet season (October 1 - April 30): 2 days
e. Stabilize soils at the end of the shift before a holiday or weekend if needed based on the weather forecast.
f. Stabilize soil stockpiles from erosion, protect with sediment trapping measures, and where possible, locate away from storm drain inlets, waterways, and drainage channels.
g. Minimize the amount of soil exposed during construction activity.
h. Minimize the disturbance of steep slopes.
i. Minimize soil compaction and, unless infeasible, preserve topsoil.

Element 6: Protect Slopes

a. Design and construct cut-and-fill slopes in a manner to minimize erosion. Applicable practices include, but are not limited to, reducing continuous length of slope with terracing and diversions, reducing slope steepness, and roughening slope surfaces (for example, track walking).
b. Divert off-site stormwater (run-on) or groundwater away from slopes and disturbed areas with interceptor dikes, pipes and/or swales. Off-site stormwater should be managed separately from stormwater generated on site.
c. At the top of slopes, collect drainage in pipe slope drains or protected channels to prevent erosion. Temporary pipe slope drains must be sized to convey the flow rate calculated by one of the following methods:
    - Single Event Hydrograph Method: The peak volumetric flow rate calculated using a 10-minute time step from a Type 1A, 10-year, 24-hour frequency storm.

      OR
    - Continuous Simulation Method: The 10-year peak flow rate, as determined by an approved continuous runoff model with a 15-minute time step.

    The hydrologic analysis must use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis must use the temporary or permanent project land cover condition, whichever will produce the highest flow rates. If using the Western Washington Hydrology Model (WWHM) to predict flows, bare soil areas should be modeled as "lawn" area.

d. Place excavated material on the uphill side of trenches, consistent with safety and space considerations.

e. Place check dams at regular intervals within constructed channels that are cut down a slope.

Element 7: Protect Drain Inlets

a. Protect all storm drain inlets made operable during construction so that stormwater runoff does not enter the conveyance system without first being filtered or treated to remove sediment.

b. Clean or remove and replace storm drain inlet protection devices when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).

Element 8: Stabilize Channels and Outlets

a. Design, construct, and stabilize all on-site conveyance channels to prevent erosion from the flow rate calculated by one of the following methods:

- Single Event Hydrograph Method: The peak volumetric flow rate calculated using a 10-minute time step from a Type 1A, 10-year, 24-hour frequency storm.

  OR

- Continuous Simulation Method: The 10-year peak flow rate, as determined by an approved continuous runoff model with a 15-minute time step.

The hydrologic analysis must use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis must use the temporary or permanent project land cover condition, whichever will produce the highest flow rates. If using the Western Washington Hydrology Model (WWHM) to predict flows, bare soil areas should be modeled as "lawn" area.

b. Provide stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes, and downstream reaches at the outlets of all conveyance systems.

Element 9: Control Pollutants

Design, install, implement, and maintain effective pollution prevention measures to minimize the discharge of pollutants. The project proponent must:

a. Handle and dispose of all pollutants, including waste materials and demolition debris that occur on site, in a manner that does not cause contamination of stormwater.

b. Provide cover, containment, and protection from vandalism for all chemicals, liquid products, petroleum products, and other materials that have the potential to pose a threat to human health or the environment. Minimize storage of hazardous materials on-site. Safety Data Sheets (SDS) should be supplied for all materials stored. Chemicals should be kept in their original labeled containers. On-site fueling tanks must include secondary containment. Secondary containment means placing tanks or containers within an impervious structure capable of containing 110% of the volume of the largest tank within the containment structure. Double-walled tanks do not require additional secondary containment.

c. Conduct maintenance, fueling, and repair of heavy equipment and vehicles using spill prevention and control measures. Clean contaminated surfaces immediately following any spill incident.

d. Discharge wheel wash or tire bath wastewater to:
   - a separate on-site treatment system that prevents discharge to surface water, or
   - to the sanitary sewer, with local sewer district approval.

e. Apply fertilizers and pesticides in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Follow manufacturers' label requirements for application rates and procedures.

f. Use BMPs to prevent contamination of stormwater runoff by pH-modifying sources. The sources for this contamination include, but are not limited to bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, recycled concrete stockpiles, waste streams generated from concrete grinding and sawing, exposed aggregate processes, dewatering concrete vaults, concrete pumping and mixer washout waters.

g. Adjust the pH of stormwater if necessary to prevent violations of water quality standards.

h. Ensure that washout of concrete trucks is performed off-site or in designated concrete washout areas only. Do not wash out concrete truck drums onto the ground, or into storm drains, open ditches, streets, or streams. Washout of small concrete handling equipment may be disposed of in a formed area awaiting

concrete where it will not contaminate surface or groundwater. Do not dump excess concrete on site, except in designated concrete washout areas. Concrete spillage or concrete discharge directly to groundwater or surface waters of the State is prohibited. At no time shall concrete be washed off into the footprint of an area where an infiltration BMP will be installed.

i. Obtain written approval from Ecology before using chemical treatment other than CO_2, dry ice, or food grade vinegar to adjust pH.

j. Uncontaminated water from water-only based shaft drilling for construction of building, road, and bridge foundations may be infiltrated provided the wastewater is managed in a way that prohibits discharge to surface waters. Prior to infiltration, water from water-only based shaft drilling that comes into contact with curing concrete must be neutralized until pH is in the range of 6.5 to 8.5 (su).

Element 10: Control Dewatering

a. Discharge foundation, vault, and trench dewatering water, which have similar characteristics to stormwater runoff at the site, into a controlled conveyance system before discharge to:
    i. A sediment control BMP (e.g. **BMP C240: Sediment Trap** or **BMP C241: Sediment Pond (Temporary)**);
    ii. Infiltration;
    iii. Transport off site in a vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters;
    iv. Ecology-approved on-site chemical treatment or other suitable treatment technologies;
    v. Sanitary or combined sewer discharge with local sewer district approval, if there is no other option; or
    vi. Use of a sedimentation bag that discharges to a ditch or swale for small volumes of localized dewatering.

b. Discharge clean, non-turbid dewatering water, such as well-point groundwater, to systems tributary to, or directly into surface waters of the State, as specified in **Element 8: Stabilize Channels and Outlets**, provided the dewatering flow does not cause erosion or flooding of receiving waters. Do not route clean dewatering water through stormwater sediment BMPs. Note that "surface waters of the State" may exist on a construction site as well as off site; for example, a creek running through a site.

c. Handle highly turbid or otherwise contaminated dewatering water separately from stormwater.

Element 11: Maintain BMPs

a. Maintain and repair all temporary and permanent erosion and sediment control BMPs as needed to ensure continued performance of their intended function in accordance with BMP specifications.
b. Remove all temporary erosion and sediment control BMPs within 30 days after achieving final site stabilization or after the temporary BMPs are no longer needed.

Element 12: Manage the Project

a. Phase development projects to the maximum degree practicable and consider seasonal work limitations.
b. Inspect, maintain, and repair all BMPs as needed to ensure continued performance of their intended function.
c. Maintain, update, and implement the Construction SWPPP.
d. Projects that disturb one or more acres must have site inspections conducted by a Certified Erosion and Sediment Control Lead (CESCL). Project sites disturbing less than one acre may have a CESCL or a person without CESCL certification conduct inspections. By the initiation of construction, the Construction SWPPP must identify the CESCL or inspector, who must be present on site or on-call at all times.

Element 13: Protect Infiltration BMPs

The project proponent must protect existing and proposed infiltration BMPs during construction. The primary purpose of On-Site Stormwater Management (often referred to as Low Impact Development, or LID) is to reduce the disruption of the natural site hydrology through infiltration. BMPs used to meet **4.5 Minimum Requirement #5: On-Site Stormwater Management** (often called LID BMPs) are permanent facilities.

a. Protect all infiltration BMPs from sedimentation through installation and maintenance of erosion and sediment control BMPs on portions of the site that drain into the infiltration BMPs. Restore the BMPs to their fully functioning condition if they accumulate sediment during construction. Restoring the BMP must include removal of sediment and any sediment-laden soils within the BMP and replacing the removed soils with soils meeting the design specification.
b. Prevent compacting infiltration BMPs by excluding construction equipment and foot traffic. Protect completed lawn and landscaped areas from compaction due to construction equipment.

c. Control erosion and avoid introducing sediment from surrounding land uses onto **BMP T5.15: Permeable Pavement**. Do not allow muddy construction equipment on the base material or pavement. Do not allow sediment-laden runoff onto permeable pavements.
d. Permeable pavement fouled with sediments or no longer passing an initial infiltration test must be cleaned using procedures from the local stormwater manual or the manufacturer's procedures.
e. Keep all heavy equipment off existing soils under infiltration BMPs that have been excavated to final grade to retain the infiltration rate of the soils.

4.3 Minimum Requirement #3: Source Control of Pollution

Following construction, all new development and redevelopment projects meeting the Project Thresholds in **Section 3. Applicability of the Minimum Requirements** shall apply all known, available, and reasonable Source Control BMPs.

Source Control BMPs shall be selected, designed, and maintained in accordance with ***III-1.1 Choosing Your Source Control BMPs*** and **Volume IV** of the SWMMWW.

4.4 Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls

All new development and redevelopment projects meeting the Project Thresholds in **Section 3. Applicability of the Minimum Requirements** shall preserve and maintain natural drainage patterns to the maximum extent practicable at the site. Discharges from the Project Site shall occur at the natural location, to the maximum extent practicable.

The manner by which runoff is discharged from the Project Site must not cause a significant adverse impact to downstream receiving waters and downgradient properties, and should be addressed as part of the off-site analysis described in the SWMMWW.

All concentrated discharge locations (i.e. discharges from pipe systems, culverts, and ditches) must address energy dissipation. A project proponent who believes that energy dissipation should not be required must provide justification in the project's stormwater site plan.

4.5 Minimum Requirement #5: On-Site Stormwater Management

All new development and redevelopment projects meeting the Project Thresholds in **Section 3. Applicability of the Minimum Requirements** shall apply Stormwater Management BMPs in accordance with the following thresholds, standards, and lists to infiltrate, disperse, and retain stormwater runoff on site to the extent feasible without causing flooding or erosion impacts.

Compliance Options by Project Type

All projects that require Minimum Requirement #5 (per the Project Thresholds in **Section 3. Applicability of the Minimum Requirements**) must employ Stormwater Management BMPs as detailed below. The compliance options for the project depend on the amount of improvements proposed, the location of the project, the size of the parcel the project is on, and whether or not the project is Flow Control exempt.

Each project must use a single compliance option (either the List Approach or the LID Performance Standard and **BMP T5.13: Post-Construction Soil Quality and Depth**). Use of both compliance options on a single project is not allowed.

Projects that Trigger Only Minimum Requirements #1 - #5

Projects that are not Flow Control exempt that trigger only Minimum Requirements #1 through #5 (per the Project Thresholds in **Section 3. Applicability of the Minimum Requirements**) shall either:

- Use the LID BMPs from List #1 for all surfaces within each type of surface in List #1;

  or

- Use any Flow Control BMP(s) desired to achieve the LID Performance Standard and apply **BMP T5.13: Post-Construction Soil Quality and Depth** (if feasible).

Projects that Trigger Minimum Requirements #1 - #9

Projects that are not Flow Control exempt that trigger Minimum Requirements #1 through #9 (per the Project Thresholds in **Section 3. Applicability of the Minimum Requirements**) have the compliance options shown in **Table 1: Minimum Requirement #5 Compliance Options for Projects Triggering Minimum Requirements #1 - #9**.

Table 1: Minimum Requirement #5 Compliance Options for Projects Triggering Minimum Requirements #1 - #9

Project Location and Parcel Size	Minimum Requirement #5 Compliance Options
Projects inside the UGA, on any size parcel	• Use the LID BMPs from List #2 for all surfaces within each type of surface in List #2; or • Use any Flow Control BMPs desired to achieve the LID Performance Standard and apply **BMP T5.13: Post-Construction Soil Quality and Depth** (if feasible).
Projects outside the UGA, on a parcel smaller than 5 acres	
Projects outside the UGA, on a parcel 5 acres or larger	Use any Flow Control BMPs desired to achieve the LID Performance Standard and apply **BMP T5.13: Post-Construction Soil Quality and Depth** (if feasible).
Note: This text refers to the Urban Growth Area (UGA) as designated under the Growth Management Act (GMA) (Chapter 36.70A RCW) of the State of Washington. If the project is located in a county that is not subject to planning under the GMA, the city limits shall be used instead.	

Flow Control Exempt Projects

Projects qualifying as Flow Control exempt in accordance with the **TDA Exemption** in **4.7 Minimum Requirement #7: Flow Control** shall either:

- Use the LID BMPs from List #3 for all surfaces within each type of surface in List #3;

  or

- Use any Flow Control BMP(s) desired to achieve the LID Performance Standard and apply **BMP T5.13: Post-Construction Soil Quality and Depth** (if feasible).

If the project has multiple TDAs, all TDAs must be Flow Control exempt per the **TDA Exemption** in **4.7 Minimum Requirement #7: Flow Control** for the project to use the options listed here.

Compliance Methods

LID Performance Standard

The LID Performance Standard compliance method for Minimum Requirement #5 requires modeling the proposed Flow Control BMPs to demonstrate the flow reduction as described below.

Stormwater discharges shall match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 8% of the 2-year peak flow to 50% of the 2-year peak flow. Refer to the **Flow Control Performance Standard** section in **4.7 Minimum Requirement #7: Flow Control** for information about the assignment of the pre-developed condition. Project sites that must also meet **4.7 Minimum Requirement #7: Flow Control** must match flow durations between 8% of the 2-year flow through the full 50-year flow.

Designers selecting this option cannot use **BMP T5.14: Rain Gardens** to achieve the LID Performance Standard. They may choose to use BMP T7.30: Bioretention to achieve the LID Performance Standard.

The List Approach

The List Approach compliance method for Minimum Requirement #5 requires evaluating the BMPs in **Table 2: The List Approach for MR5 Compliance**.

For each surface, evaluate the feasibility of the BMPs in the order listed for that type of surface, and use the first BMP that is considered feasible. The designer must document the site conditions and infeasibility criteria used to deem BMPs infeasible. Once a BMP is deemed feasible and used for a surface, no other BMP from the list is necessary for that surface.

If all BMPs in the list are infeasible, then the designer must document the site conditions and infeasibility criteria used to deem each BMP infeasible. This documentation will demonstrate compliance with Minimum Requirement #5.

Feasibility shall be determined by evaluation against:

- Design criteria, limitations, and infeasibility criteria identified for each BMP in **Volume V** of the SWMMWW; and
- Competing Needs Criteria as listed in ***I-3.4.5 MR5: On-Site Stormwater Management*** in the SWMMWW.

Table 2: The List Approach for MR5 Compliance

List #1 (For MR #1 - #5 Projects That Are Not Flow Control Exempt)	List #2 (For MR #1 - #9 Projects That Are Not Flow Control Exempt)	List #3 (For Flow Control Exempt Projects)
Surface Type: Lawn and Landscaped Areas		
BMP T5.13: Post-Construction Soil Quality and Depth	**BMP T5.13: Post-Construction Soil Quality and Depth**	**BMP T5.13: Post-Construction Soil Quality and Depth**
Surface Type: Roofs		
1. **BMP T5.30: Full Dispersion** or **BMP T5.10A: Downspout Full Infiltration**	1. **BMP T5.30: Full Dispersion** or **BMP T5.10A: Downspout Full Infiltration**	1. **BMP T5.10A: Downspout Full Infiltration**
2. **BMP T5.14: Rain Gardens** or **BMP T7.30: Bioretention Cells, Swales, and Planter Boxes**	2. **BMP T7.30: Bioretention Cells, Swales, and Planter Boxes**	2. **BMP T5.10B: Downspout Dispersion Systems**
3. **BMP T5.10B: Downspout Dispersion Systems**	3. **BMP T5.10B: Downspout Dispersion Systems**	3. **BMP T5.10C: Perforated Stub-out Connections**
4. **BMP T5.10C: Perforated Stub-out Connections**	4. **BMP T5.10C: Perforated Stub-out Connections**	
Surface Type: Other Hard Surfaces		
1. **BMP T5.30: Full**	1. **BMP T5.30: Full**	**BMP T5.12: Sheet Flow**

<table>
<tr><th>List #1

(For MR #1 - #5 Projects That Are Not Flow Control Exempt)</th><th>List #2

(For MR #1 - #9 Projects That Are Not Flow Control Exempt)</th><th>List #3

(For Flow Control Exempt Projects)</th></tr>
<tr><td>Dispersion</td><td>Dispersion</td><td rowspan="4">Dispersion

or

BMP T5.11: Concentrated Flow Dispersion</td></tr>
<tr><td>2. BMP T5.15: Permeable Pavement
or
BMP T5.14: Rain Gardens
or
BMP T7.30: Bioretention Cells, Swales, and Planter Boxes</td><td>2. BMP T5.15: Permeable Pavement</td></tr>
<tr><td>3. BMP T5.12: Sheet Flow Dispersion
or
BMP T5.11: Concentrated Flow Dispersion</td><td>3. BMP T7.30: Bioretention Cells, Swales, and Planter Boxes</td></tr>
<tr><td></td><td>4. BMP T5.12: Sheet Flow Dispersion
or
BMP T5.11: Concentrated Flow Dispersion</td></tr>
<tr><td colspan="3">Notes for using the List Approach:

1. Size BMP T5.14: Rain Gardens and BMP T7.30: Bioretention used in the List Approach to have a minimum horizontal projected surface area below the overflow which is at least 5% of the area draining to it.
2. When the designer encounters BMP T5.15: Permeable Pavement in the List Approach, it is not a requirement to pave these surfaces. Where pavement is proposed, it must be permeable to the extent feasible unless BMP T5.30: Full Dispersion is employed.</td></tr>
</table>

4.6 Minimum Requirement #6: Runoff Treatment

All new development and redevelopment projects meeting the Project Thresholds in **Section 3. Applicability of the Minimum Requirements** shall apply Runoff Treatment BMPs in accordance with the following thresholds, standards, and requirements to remove pollutants from stormwater runoff.

TDA Thresholds

Each TDA within a project that requires Minimum Requirement #6 (per the Project Thresholds in **Section 3. Applicability of the Minimum Requirements**) must be reviewed to determine if Runoff Treatment BMPs are required for the TDA to be in compliance with Minimum Requirement #6.

Note that it is possible for a project that triggers the thresholds for Minimum Requirement #6, per the Project Thresholds in **Section 3. Applicability of the Minimum Requirements,** to not need Runoff Treatment BMP(s) in one or more individual TDAs to be in compliance with Minimum Requirement #6. If a TDA does not trigger either of the TDA thresholds for Runoff Treatment BMPs, then the designer must document the areas within the TDA used to determine that neither of the TDA thresholds are met. This documentation will demonstrate compliance with Minimum Requirement #6 for the TDA.

When assessing a TDA against the following thresholds, only consider the types of surfaces (e.g. new hard surfaces, replaced hard surfaces, converted vegetation areas) that are subject to Minimum Requirement #6, per the Project Thresholds in **Section 3. Applicability of the Minimum Requirements**.

The following TDAs require construction of Runoff Treatment BMPs. If a TDA meets either of the following thresholds, Runoff Treatment BMPs are required. The project proponent must demonstrate that the TDA does not meet either of the following thresholds for Runoff Treatment BMPs to not be required for that TDA.

- TDAs that have a total of 5,000 square feet or more of pollution-generating hard surface (PGHS), or
- TDAs that have a total of 3/4 of an acre or more of pollution-generating pervious surfaces (PGPS) – not including permeable pavements, and from which there will be a surface discharge in a natural or man-made conveyance system from the site.

Runoff Treatment Performance Goal Thresholds

1. Oil Control

Oil Control BMPs are required for areas that typically generate high concentrations of oil due to high traffic turnover or the frequent transfer of oil. These types of areas include:

- An area of a commercial or industrial site subject to an expected average daily traffic (ADT) count equal to or greater than 100 vehicles per 1,000 square feet of gross building area, or 300 total trip ends per day.
- An area of a commercial or industrial site subject to petroleum storage and transfer in excess of 1,500 gallons per year, not including routinely delivered heating oil.
- An area of a commercial or industrial site subject to parking, storage, or maintenance of 25 or more vehicles that are over 10 tons gross weight (trucks, buses, trains, heavy equipment, etc.).
- A road intersection with a measured ADT count of 25,000 vehicles or more on the main roadway and 15,000 vehicles or more on any intersecting roadway, excluding projects proposing primarily pedestrian or bicycle use improvements.

2. Phosphorus Treatment

Phosphorus Treatment BMPs are required for projects (or portions of projects) within watersheds that have been determined by the local jurisdiction (e.g. through a lake management plan), Ecology (e.g. through a TMDL waste load allocation), or the USEPA to be sensitive to phosphorus and are being managed to control phosphorus. The following are examples of sources that the local jurisdiction can use for determining whether a water body is sensitive to phosphorus:

- Those waterbodies reported under section 303(d) of the Clean Water Act, where designated uses are not supported due to phosphorous or other water quality criteria related to excessive phosphorus. This information can be viewed on Ecology's Water Quality Atlas at the following web address:

  https://apps.ecology.wa.gov/waterqualityatlas/wqa/map

- Those listed in Washington State's Nonpoint Source Assessment required under section 319(a) of the Clean Water Act due to nutrients.
- A locally adopted plan that contains requirements, recommendations, or policies indicating that a particular receiving water is sensitive to phosphorus

3. Metals Treatment

Metals Treatment BMPs are required for the types of project sites listed below that:

a. discharge directly to fresh waters designated for aquatic life use or that have an existing aquatic life use; or
b. discharge to conveyance systems that are tributary to fresh waters designated for aquatic life use or that have an existing aquatic life use; or
c. infiltrate stormwater within ¼ mile of a fresh water designated for aquatic life use or that has an existing aquatic life use.

The types of project sites are:

- Sites subject to industrial activities,
- Commercial project sites,
- Multifamily residential project sites, and
- High ADT roads as follows:
    - Within Urban Growth Areas:
        - Roads with an ADT of 7,500 or greater.
    - Outside of Urban Growth Areas:
        - Roads with an ADT of 15,000 or greater
- Light rail elevated and non-elevated guideways/tracks
- Other project sites that are anticipated to generate a high pollutant loading, including:
    - Parking areas as follows:
        - Commercial or industrial areas: All on-street parking areas.
        - Areas other than commercial or industrial areas: On-street parking areas on streets with an expected total ADT of ≥ 7,500.
        - Parking areas with an expected trip end count ≥ 40 vehicles per 1,000 sf of gross building area.
        - Parking areas with ≥ 100 expected trip ends per day.
    - Fueling stations
    - Transit center bus stops

The following areas of the above-listed project sites do not require Metals Treatment BMPs:

- Areas that discharge directly, or indirectly through a municipal separate storm sewer system, to a water listed in ***Appendix III-A: Basic Treatment Receiving Waters*** in the SWMMWW.

- Landscaped areas of industrial, commercial, and multi-family project sites that do not involve any other pollution-generating sources (e.g. industrial activities, customer parking, storage of erodible or leachable material, wastes, or chemicals).
- Parking lots of industrial and commercial project sites, dedicated solely to parking of employees' private vehicles that do not involve any other pollution-generating sources (e.g. industrial activities, customer parking, storage of erodible or leachable material, wastes, or chemicals).

For TDAs with a mix of land use types, Metals Treatment BMPs are required when the runoff from the areas subject to the Metals Treatment Performance Goal comprises 50% or more of the total runoff from the TDA.

4. Basic Treatment

Areas that must provide Phosphorus Treatment BMPs or Metals Treatment BMPs do NOT have to provide additional Basic Treatment BMPs to meet the Basic Treatment Performance Goal.

If Phosphorus Treatment BMPs or Metals Treatment BMPs are not provided, Basic Treatment BMPs are required.

Runoff Treatment BMP Sizing

Size Runoff Treatment BMPs for the entire area that drains to them, even if some of those areas are not pollution-generating or were not included in the Project Thresholds decisions (see **Section 3. Applicability of the Minimum Requirements**) or the TDA Thresholds decisions of this Minimum Requirement.

Runoff Treatment BMPs are sized by using either a volume (the Water Quality Design Volume) or a flow rate (the Water Quality Design Flow Rate), depending on the Runoff Treatment BMP selected. Refer to the selected Runoff Treatment BMP to determine whether the BMP is sized based on a volume or a flow rate. See below for details about the Water Quality Design Volume and the Water Quality Design Flow Rate used to size Runoff Treatment BMPs.

Water Quality Design Volume

The Water Quality Design Volume may be calculated by either of the following methods:

- *Continuous Simulation Method:* Using an approved continuous runoff model, the Water Quality Design Volume shall be the simulated daily volume that represents the upper limit of the range of daily volumes that accounts for 91% of the entire runoff volume over a multi-decade period of record.
- *Single Event Hydrograph Method:* The Water Quality Design Volume shall be the volume of runoff predicted by the Natural Resource Conservation Service (NRCS) curve number equations (as detailed in ***III-2.3 Single Event Hydrograph Method*** in the SWMMWW). The precipitation depth used in the equations shall be as predicted from a 24-hour storm with a 6-month return frequency (a.k.a., 6-month, 24-hour storm).

Water Quality Design Flow Rate

The Water Quality Design Flow Rate is dependent on the location of the Runoff Treatment BMP relative to Detention BMP(s):

- *Upstream of Detention BMPs or when there are no Detention BMPs:* The Water Quality Design Flow Rate shall be the flow rate at or below which 91% of the total runoff volume, as estimated by an approved continuous runoff model, will be treated.

  Ecology has assigned design criteria for Runoff Treatment BMPs to achieve the BMP's Runoff Treatment Performance Goal (e.g. Basic Treatment Performance Goal, Metals Treatment Performance Goal, etc.) at the Water Quality Design Flow Rate. At a minimum, 91% of the total runoff volume, as estimated by an approved continuous runoff model, must pass through Runoff Treatment BMP(s) at or below the approved hydraulic loading rate for the BMP(s).

- *Downstream of Detention BMPs:* The Water Quality Design Flow Rate shall be the full 2-year release rate from the Detention BMP.

Runoff Treatment BMP Selection, Design, and Maintenance

Runoff Treatment BMPs shall be:

- Selected in accordance with the process identified in ***III-1.2 Choosing Your Runoff Treatment BMPs*** in the SWMMWW,
- Designed in accordance with the design criteria in **Volume V** of the SWMMWW, and

- Maintained in accordance with the maintenance criteria in **Volume V** of the SWMMWW.

Additional Requirements

The (direct or indirect) discharge of untreated stormwater from pollution-generating hard surfaces to groundwater must not be authorized by the Permittee, except for infiltration or dispersion of runoff through LID BMPs per **The List Approach** in **4.5 Minimum Requirement #5: On-Site Stormwater Management**.

4.7 Minimum Requirement #7: Flow Control

All new development and redevelopment projects meeting the Project Thresholds in **Section 3. Applicability of the Minimum Requirements** shall apply Flow Control BMPs in accordance with the following thresholds, standards, and requirements to reduce the impacts of stormwater runoff from hard surfaces and land cover conversions.

TDA Exemption

Flow Control is not required for TDAs that discharge directly to, or indirectly through an MS4 to a water listed in ***Appendix I-A: Flow Control Exempt Receiving Waters*** in the SWMMWW, subject to all of the following restrictions:

- Direct discharge to the exempt receiving water does not result in the diversion of drainage from any perennial stream classified as Types 1, 2, 3, or 4 in the State of Washington Interim Water Typing System, or Types “S”, “F”, or “Np” in the Permanent Water Typing System, or from any category I, II, or III wetland.
- If flow splitters or conveyance elements are applied to route natural runoff volumes from the TDA to any downstream Type 5 stream or category IV wetland, then:
    - Design of the flow splitters or conveyance elements must be based on approved continuous simulation modeling analysis. The design must assure that flows delivered to Type 5 stream reaches will approximate, but in no case exceed, durations ranging from 50% of the 2-year to the 50-year peak flow.
    - Flow splitters or conveyance elements that deliver flow to category IV wetlands must also be designed using approved continuous simulation modeling to preserve pre-project wetland hydrologic conditions unless specifically waived or exempted by regulatory agencies with permitting jurisdiction.
- The TDA must be drained by a conveyance system that is comprised entirely of manmade conveyance elements (e.g. pipes, ditches, outfall protection).

- The conveyance system must extend to the ordinary high-water mark of the exempt receiving water (or the mean higher high-water mark for tidally influenced exempt receiving waters). To avoid construction activities in sensitive areas, an alternative to extending the conveyance system to the ordinary high-water mark is to ensure that flows are properly dispersed before reaching the buffer zone of the sensitive or critical area.
- The conveyance system between the TDA and the exempt receiving water shall have sufficient hydraulic capacity (per local jurisdiction conveyance sizing requirements) to convey discharges from future build-out conditions (under current zoning) from contributing areas of the Site, and the existing condition from contributing off-site areas.
- Any erodible elements of the manmade conveyance system must be adequately stabilized to prevent erosion under the conditions noted above.

Note that Ecology does not consider newly constructed or reconstructed stream channels to be manmade conveyance elements.

Permittees may petition Ecology to exempt projects in additional areas. A petition must justify the proposed exemption based upon a hydrologic analysis that demonstrates that the potential stormwater runoff from the exempted area will not significantly increase the erosion forces on the stream channel nor have near field impacts. See ***Appendix I-A: Flow Control Exempt Receiving Waters*** in the SWMMWW for details

TDA Thresholds

Each TDA within a project that requires Minimum Requirement #7 (per the Project Thresholds in **Section 3. Applicability of the Minimum Requirements**) must be reviewed to determine if Flow Control BMPs are required for the TDA to be in compliance with Minimum Requirement #7.

Note that it is possible for a project that triggers the thresholds for Minimum Requirement #7, per the Project Thresholds in **Section 3. Applicability of the Minimum Requirements,** to not need Flow Control BMP(s) in one or more individual TDAs to be in compliance with Minimum Requirement #7. If a TDA does not trigger any of the TDA thresholds for Flow Control BMPs, then the designer must document the areas within the TDA used to determine that none of the TDA thresholds are met. This documentation will demonstrate compliance with Minimum Requirement #7 for the TDA.

When assessing a TDA against the following thresholds, only consider the types of surfaces (e.g. new hard surfaces, replaced hard surfaces, converted vegetation areas) that are subject to Minimum Requirement #7, per the Project Thresholds in **Section 3. Applicability of the Minimum Requirements**.

The following TDAs require construction of Flow Control BMPs to achieve the Flow Control Performance Standard. If a TDA meets any of the following thresholds, Flow Control BMPs are required. The project proponent must demonstrate that the TDA does not meet any of the following thresholds for Flow Control BMPs to not be required for that TDA.

- TDAs that have a total of 10,000 square feet or more of effective impervious surfaces, or
- TDAs that convert ¾ acres or more of native vegetation, pasture, scrub/shrub, or unmaintained non-native vegetation to lawn or landscape, or convert 2.5 acres or more of native vegetation to pasture, and from which there is a surface discharge in a natural or man-made conveyance system from the TDA, or
- TDAs that through a combination of effective hard surfaces and converted vegetation areas cause a 0.15 cubic feet per second (cfs) or greater increase in the 100-year flow frequency as estimated using an approved continuous simulation model and 15-minute time steps.

  The 0.15 cfs increase should be a comparison of the post project runoff to the existing condition runoff. For the purpose of applying this threshold, the existing condition is either the pre-project land cover, or the land cover that existed prior to the first issue date of the Municipal Stormwater Permit to the local jurisdiction.

Flow Control Performance Standard

Stormwater discharges shall match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow. The pre-developed condition to be matched shall be a forested land cover unless:

- Reasonable, historic information is provided that indicates the site was prairie prior to settlement (modeled as pasture in the approved continuous simulation model); or,
- The drainage area of the immediate stream and all subsequent downstream basins have had at least 40% total impervious area (TIA) since 1985. ***Figure I-3.4: Basins with 40% Total Impervious Area as of 1985*** in the SWMMWW depicts those areas which meet this criterion.

  In this case, the pre-developed condition to be matched shall be the existing land cover condition. Where basin-specific studies determine a stream channel to be unstable, even though the above criterion is met, the pre-developed condition assumption shall be the “historic” land cover condition, or a land cover condition commensurate with achieving a target flow regime identified by an approved basin study.

Alternative Flow Control Performance Standard

An alternative Flow Control Performance Standard may be established through application of watershed-scale hydrologic modeling and supporting field observations. Possible reasons for an alternative Flow Control Performance Standard include:

- Establishment of a stream–specific threshold of significant bedload movement other than the assumed 50% of the 2-year peak flow;
- Zoning and Land Clearing Ordinance restrictions that, in combination with an alternative Flow Control Performance Standard, maintain or reduce the naturally occurring erosive forces on the stream channel; or
- A duration control standard is not necessary for protection, maintenance, or restoration of designated and existing beneficial uses or Clean Water Act compliance.

See the SWMMWW for details on how an Alternative Flow Control Performance Standard may be established.

Additional Requirement

Flow Control BMPs shall be selected in accordance with ***III-1.3 Choosing Your Flow Control BMPs*** and designed and maintained in accordance with **Volume V** of the SWMMWW.

4.8 Minimum Requirement #8: Wetlands Protection

All new development and redevelopment projects meeting the Project Thresholds in **Section 3. Applicability of the Minimum Requirements** shall include Stormwater Management BMPs in accordance with the following thresholds, standards, and requirements to reduce the impacts of stormwater runoff to wetlands.

TDA Thresholds

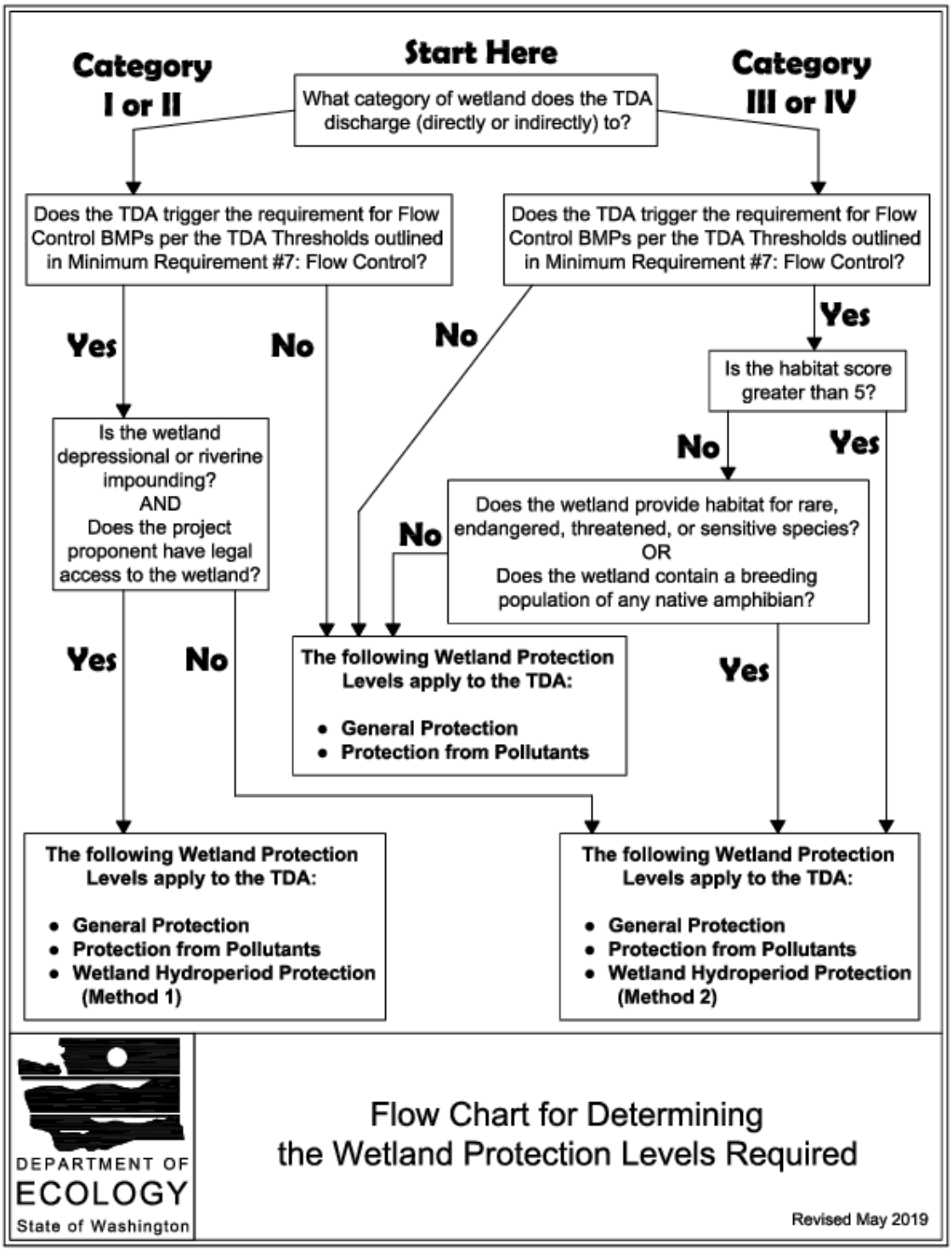
This Minimum Requirement applies only to TDAs whose stormwater discharges into a wetland, either directly or indirectly through a conveyance system.

Each TDA within a project that requires Minimum Requirement #8 (per the Project Thresholds in **Section 3. Applicability of the Minimum Requirements**) must be reviewed to determine what Level(s) of Wetland Protection must be applied to the TDA to comply with Minimum Requirement #8. The Level(s) of Wetland Protection that must be applied are dependent upon:

- The category of wetland that the TDA is discharging to,
- Whether or not the TDA triggers the requirement for Flow Control BMPs per the **TDA Thresholds** in **4.7 Minimum Requirement #7: Flow Control**,
- Whether or not the wetland is a depressional or impounded wetland,
- Whether or not the project proponent has legal access to the wetland,
- The wetland habitat score,
- Whether or not the wetland provides habitat for rare, endangered, threatened, and/or sensitive species, and
- Presence of a breeding population of native amphibians.

Refer to **Figure 5: Flow Chart for Determining Wetland Protection Level Requirements** to determine what Level(s) of Wetland Protection must be applied to comply with Minimum Requirement #8.

Figure 5: Flow Chart for Determining Wetland Protection Level Requirements



Levels of Wetland Protection

The following Levels of Wetland Protection are further explained in ***Appendix I-C: Wetland Protection Guidelines*** in the SWMMWW.

General Protection

General Protection includes general practices that benefit wetlands of all types.

Protection from Pollutants

Protection from Pollutants includes measures to protect the wetland from pollutants in stormwater runoff. Measures of protection include Construction Stormwater BMPs, Source Control BMPs, LID practices and principles, and Runoff Treatment BMPs.

Wetland Hydroperiod Protection

Wetland Hydroperiod Protection includes measures to avoid excessive hydrologic alteration of existing wetlands from development. There are two methods within Wetland Hydroperiod Protection:

- Method 1: Monitoring and Wetland Stage Modeling

  This method requires data collection specific to the wetland, as well as continuous simulation modeling to demonstrate that the proposed project will not negatively alter the wetland hydrology.

- Method 2: Site Discharge Modeling

  This method requires continuous simulation modeling of the runoff from the TDA to demonstrate that the changes in total discharge volume to the wetland will remain similar to the pre-development condition.

Additional Requirements

Stormwater Management BMPs shall not be built within a wetland or its buffer, except for:

- Necessary conveyance systems as approved by the Permittee; or
- As allowed in ***I-C.6 Compensatory Mitigation of Wetlands*** in the SWMMWW.

4.9 Minimum Requirement #9: Operation and Maintenance

All new development and redevelopment projects meeting the Project Thresholds in **Section 3. Applicability of the Minimum Requirements** shall create an operation and maintenance (O&M) manual for all BMPs used to meet **4.6 Minimum Requirement #6: Runoff Treatment**, **4.7 Minimum Requirement #7: Flow Control**, and/or **4.8 Minimum Requirement #8: Wetlands Protection**.

The O&M manual shall identify:

- Maintenance requirements that are consistent with the provisions in **Volume V** of the SWMMWW, and
- The party (or parties) responsible for the operation, maintenance, and long-term funding source(s).

For private facilities approved by the Permittee, a copy of the O&M manual shall be retained on site or within reasonable access to the site and shall be transferred with the property to the new owner. For public facilities, a copy of the O&M manual shall be retained in the appropriate department.

A log of maintenance activity that indicates what actions were taken shall be kept and be available for inspection by the local government.

Section 5. Adjustments

Adjustments to the Minimum Requirements may be granted by the Permittee provided that written findings of fact are prepared that address the following:

- The adjustment provides substantially equivalent environmental protection.
- Based on sound Engineering practices, the objectives of safety, function, environmental protection, and facility maintenance are met.

Section 6. Exceptions

Exceptions to the Minimum Requirements may be granted by the Permittee following legal public notice of an application for an exception, legal public notice of the Permittee's decision on the application, and written findings of fact that document the Permittee's determination to grant an exception. Permittees shall keep records, including the written findings of fact, of all local exceptions to the Minimum Requirements.

The Permittee may grant an exception to the Minimum Requirements if such application imposes a severe and unexpected economic hardship. To determine whether the application imposes a severe and unexpected economic hardship on the project applicant, the Permittee must consider and document, with written findings of fact, the following:

- The current (pre-project) use of the Site, and
- How the application of the Minimum Requirement(s) restricts the proposed use of the Site compared to the restrictions that existed prior to the adoption of the Minimum Requirements; and
- The possible remaining uses of the Site if the exception were not granted; and
- The uses of the Site that would have been allowed prior to the adoption of the Minimum Requirements; and
- A comparison of the estimated amount and percentage of value loss as a result of the Minimum Requirements versus the estimated amount and percentage of value loss as a result of requirements that existed prior to adoption of the Minimum Requirements; and
- The feasibility for the owner to alter the project to apply the Minimum Requirements.

In addition, any exception must meet the following criteria:

- The exception will not increase risk to the public health and welfare, nor be injurious to other properties in the vicinity and/or downstream, and to the quality of waters of the state; and
- The exception is the least possible exception that could be granted to comply with the intent of the Minimum Requirements.

Section 7. Altering the Minimum Requirements with Basin Plans

Basin Plans provide a mechanism by which the performance standards in the Minimum Requirements can be evaluated and refined based on an analysis of a basin or watershed. Basin Plans may be used to develop control strategies to address impacts from future development and to correct specific problems whose sources are known or suspected. Basin Plans can be effective at addressing both long-term cumulative impacts of pollutant loads and short-term acute impacts of pollutant concentrations, as well as hydrologic impacts to streams, wetlands, and groundwater resources.

Basin Plans may be used by the Permittee to revise the default standards of the following Minimum Requirements:

- **4.5 Minimum Requirement #5: On-Site Stormwater Management**,
- **4.6 Minimum Requirement #6: Runoff Treatment**,
- **4.7 Minimum Requirement #7: Flow Control**, and/or
- **4.8 Minimum Requirement #8: Wetlands Protection**.

For a Basin Plan to serve as a means of revising the standards of one or more of the Minimum Requirements listed above, the following conditions must be met:

- The Basin Plan must be formally adopted by all jurisdictions with responsibilities under the plan; and
- All ordinances or regulations called for by the Basin Plan must be in effect; and
- The Basin Plan must be reviewed and approved by Ecology.

Basin Plans may also be used to demonstrate an equivalent level of Runoff Treatment, Flow Control, and/or wetland protection through the construction and use of regional stormwater facilities.

Basin Plans will require the use of continuous runoff computer models and field work to verify and support the models. Permittees who are considering the use of Basin Plans to revise the default standards of one or more of the Minimum Requirements are encouraged to contact Ecology early in the planning stage.

Some examples of how Basin Plans can alter the Minimum Requirements are given in within the guidance for each Minimum Requirement in the SWMMWW. See ***I-3.4 Minimum Requirements (MRs)*** in the SWMMWW.

This page intentionally left blank

APPENDIX 2 – TOTAL MAXIMUM DAILY LOAD (TMDL) REQUIREMENTS

Additional Permit requirements are based on applicable TMDLs in accordance with Special Condition S7 – Compliance with Total Maximum Daily Load Requirements

TABLE OF CONTENTS

WRIA 1 - Nooksack River Watershed Bacteria TMDL 2
WRIA 1 - Lake Whatcom Watershed Total Phosphorus and Bacteria Total Maximum Daily Loads 5
WRIA 3 – Padilla Bay Freshwater Tributaries Fecal Coliform Bacteria Total Maximum Daily Load 8
WRIA 5 - Stillaguamish River 10
WRIA 7 - Snohomish River Tributaries 12
WRIA 8 - North Creek 15
WRIA 8 - Swamp Creek 17
WRIA 8 - Bear-Evans Watershed 19
WRIA 8 - Issaquah Creek Basin Water Cleanup Plan for Fecal Coliform Bacteria 21
WRIA 8 - Little Bear Creek Fecal Coliform Water Quality Improvement Project 23
WRIA 10 – Lower White River pH TMDL 25
WRIA 10 - Puyallup Watershed Water Quality Improvement Project 28
WRIA 10 - Clarks Creek Fecal Coliform TMDL 35
WRIA 10 - Clarks Creek Dissolved Oxygen and Sediment Total Maximum Daily Load 37
WRIA 10 - South Prairie Creek Water Quality Improvement Project 41
WRIA 11 - Nisqually River Basin Water Quality Improvement Project 43
WRIA 13 - Henderson Inlet Watershed Fecal Coliform Bacteria Water Quality Improvement Project 45
WRIA 13 - Deschutes River Watershed 48
WRIA 13 – Budd Inlet 49
WRIA 14 - Oakland Bay, Hammersley Inlet, and Selected Tributaries Fecal Coliform TMDL 50
WRIA 15 - Sinclair and Dyes Inlets Fecal Coliform Bacteria Total Maximum Daily Load 52
WRIA 22 - Grays Harbor/Chehalis Watershed Fecal Coliform Bacteria Total Maximum Daily Load 56

Name of TMDL	WRIA 1 - NOOKSACK RIVER WATERSHED BACTERIA TMDL
Document(s) for TMDL	*Nooksack River Watershed Bacteria Total Maximum Daily Load*, June 2000, Ecology Publication No. 00-10-036. https://fortress.wa.gov/ecy/publications/publications/0010036.pdf *Nooksack River Watershed Bacteria Total Maximum Daily Load Detailed Implementation Plan,* January 2002, Ecology Publication No. 01-10-060. https://fortress.wa.gov/ecy/publications/publications/0110060.pdf
Location of Original 303(d) Listings	WA-01-1010, WA-01-1012, WA-01-1014, WA-01-1015, WA-01-1016, WA-01-1110, WA-01-1111, WA-01-1115, WA-01-1116, WA-01-1117, WA-01-1118, WA-01-1119, WA-01-1120, WA-01-1125, AR42TO, BX84LO, UZ70KA, LLPL
Area Where TMDL Requirements Apply	TMDL coverage includes areas served by an MS4 draining to the Nooksack River and its tributaries, Fishtrap Creek, Bertrand Creek, Double Ditch drain, Duffner Ditch, Bender road ditch, between Nugents Corner and Marine Drive.
Parameter(s)	Fecal Coliform
EPA Approval Date	August 8, 2000
MS4 Permittee	Phase II Permit: City of Ferndale WAR04-5552 Phase II Permit: City of Lynden WAR04-5719

CITY OF FERNDALE

Actions Required

Business Inspections:

The Permittee shall inspect facilities with SIC Industry Group no. 074, 075, including NAICS Major Group 1152xx, and NAICS 325315 (composting facilities) as part of their ongoing inspection program identified in S5.C.8. If the Permittee determines, through inspections or otherwise, that a facility has failed to adequately implement BMPs to prevent bacteria source potential, the Permittee shall re-inspect the facility at least once more during the permit term to verify compliance, and/or initiate enforcement action.

Public Education and Outreach:

Each Permittee shall include public education and outreach activities that increase awareness of bacterial pollution problems and promote proper pet waste management as a BMP under General Awareness.

Operations and Maintenance:

Each Permittee shall maintain Pet Waste collection stations at Permittee owned or operated lands that are reasonably expected to have domestic animal (dog and horse) use and the potential for pollution to stormwater**.**

Illicit Connection/Illicit Discharge Detection and Elimination:

When conducting IDDE field screening during normal course of business (as required by S5.C.5.d for Phase II Permittees, and IDDE as required by S5.C.9.c for Phase I Permittees) in a TMDL area, Permittees shall obtain a grab sample to screen for bacteria sources when at the drainage circuit's most downstream sampling location if there is water flow. For the purposes of IDDE, stormwater quality sampling is defined as obtaining and processing grab samples of stormwater within the conveyance system of the MS4, at discharge points, and/or outfalls (if there is flow) at each drainage circuit's most downstream accessible sampling location. Permittees shall follow their adopted IDDE Procedures to conduct source tracing efforts if bacteria levels and/or observations trigger a response (see IDDE guidance manual for bacteria trigger levels).

Qualitative and quantitative information about the source identification and elimination activities, including procedures followed, sampling locations, and results (including documenting no flow) shall be annually documented in TMDL reporting in the Annual Report.

CITY OF LYNDEN

Actions Required

Business Inspections:

The Permittee shall inspect facilities with SIC Industry Group no. 074, 075, including NAICS Major Group 1152xx, and NAICS 325315 (composting facilities) as part of their ongoing inspection program identified in S5.C.8. If the Permittee determines, through inspections or otherwise, that a facility has failed to adequately implement BMPs to prevent bacteria source potential, the Permittee shall re-inspect the facility at least once more during the permit term to verify compliance, and/or initiate enforcement action.

Public Education and Outreach:

Each Permittee shall include public education and outreach activities that increase awareness of bacterial pollution problems and promote proper pet waste management as a BMP under General Awareness.

Operations and Maintenance:

Each Permittee shall maintain Pet Waste collection stations at Permittee owned or operated lands that are reasonably expected to have domestic animal (dog and horse) use and the potential for pollution to stormwater.

Illicit Connection/ Illicit Discharge Detection and Elimination:

When conducting IDDE field screening during normal course of business (as required by S5.C.5.d for Phase II Permittees, and IC/IDDE as required by S5.C.9.c for Phase I Permittees) in a TMDL area, Permittees shall obtain a grab sample to screen for bacteria sources when at the drainage circuit's most downstream sampling location if there is water flow. For the purposes of IC/IDDE, stormwater quality sampling is defined as obtaining and processing grab samples of stormwater within the conveyance system of the MS4, at discharge points, and/or outfalls (if there is flow) at each drainage circuit's most downstream accessible sampling location. Permittees shall follow their adopted IDDE Procedures to conduct source tracing efforts if bacteria levels and/or observations trigger a response (see IDDE guidance manual for bacteria trigger levels).

Qualitative and quantitative information about the source identification and elimination activities, including procedures followed, sampling locations, and results (including documenting no flow) shall be annually documented in TMDL reporting in the Annual Report.

Name of TMDL	WRIA 1 - LAKE WHATCOM WATERSHED TOTAL PHOSPHORUS AND BACTERIA TMDL
EPA Approved Document(s) for TMDL	*Lake Whatcom Watershed Total Phosphorus and Bacteria Total Maximum Daily Loads. Volume 1 (Water Quality Study Findings)*, November 2008, Ecology Publication No. 08-03-024 https://fortress.wa.gov/ecy/publications/summarypages/0803024.html *Volume* 2 *(Water Quality Improvement Report and Implementation Strategy)* November 2014 revised February 2016, Ecology Publication No. 13-10-012
Location of Original 303(d) Listings	Whatcom Lake 5846 and 8621 (WA-01-9170) Austin Creek 9719 Anderson Creek 39036 Brannian Creek 45603 Smith Creek 39145 Olsen Creek 45589 (WA-01-3150) Carpenter Creek 45604 Euclid Creek 45618 Silver Beach Creek 45633 (WA-01-3120) Mill Wheel Creek 45652 Euclid Creek 48035
Area Where TMDL Requirements Apply	These requirements apply to areas served by MS4s within the City of Bellingham and Whatcom County
Parameter(s)	Total Phosphorus, Fecal Coliform Bacteria
EPA Approval Date	April 7, 2016
MS4 Permittee	City of Bellingham WAR04-5550 Whatcom County WAR04-5557

CITY OF BELLINGHAM & WHATCOM COUNTY

Actions Required

Business Inspections:

The Permittee shall inspect facilities with SIC Industry Group no. 074, 075, including NAICS Major Group 1152xx, and NAICS 325315 (composting facilities) as part of their ongoing inspection program identified in S5.C.8. If the Permittee determines, through inspections or otherwise, that

a facility has failed to adequately implement BMPs to prevent bacteria source potential, the Permittee shall re-inspect the facility at least once more during the permit term to verify compliance, and/or initiate enforcement action.

Public Education and Outreach:

Each Permittee shall include public education and outreach activities that increase awareness of bacterial pollution problems and promote proper pet waste management as a BMP under General Awareness.

Operations and Maintenance:

Each Permittee shall maintain Pet Waste collection stations at Permittee owned or operated lands that are reasonably expected to have domestic animal (dog and horse) use and the potential for pollution to stormwater.

All permanent stormwater treatment facilities/BMPs within the TMDL area that treat phosporus shall be inspected and maintained in accordance with the requirements of S5.C.9.b and S5.C.9.c; reduced inspection frequency options do not apply.

Illicit Connection/ Illicit Discharge Detection and Elimination:

When conducting IDDE field screening during normal course of business (as required by S5.C.5.d for Phase II Permittees, and IC/IDDE as required by S5.C.9.c for Phase I Permittees) in a TMDL area, Permittees shall obtain a grab sample to screen for bacteria sources when at the drainage circuit's most downstream accessible sampling location if there is water flow. For the purposes of IC/IDDE, stormwater quality sampling is defined as obtaining and processing grab samples of stormwater within the conveyance system of the MS4, at discharge points, and/or outfalls (if there is flow) at each drainage circuit's most downstream accessible sampling location. Permittees shall follow their adopted IDDE Procedures to conduct source tracing efforts if bacteria levels and/or observations trigger a response (see IDDE guidance manual for bacteria trigger levels).

Qualitative and quantitative information about the source identification and elimination activities, including procedures followed, sampling locations, and results (including documenting no flow) shall be annually documented in TMDL reporting in the Annual Report.

Administration

a. By March 31, 2028, the City and the County shall submit a draft update of the "Lake Whatcom Implementation" tasks as developed under the previous permit term. The updated draft will include actions for the next permit term that build upon 2024-2029 implementation tasks. The City and the County shall finalize the Lake Whatcom Implementation tasks for 2029-2034 and submit with the March 31, 2029 Annual Report.

b. Include in the Annual Report the phosphorus reduction activities based on the current accepted TMDL reassessment model and the 2024-2029 "Lake Whatcom Implementation" tasks.

Name of TMDL	WRIA 3 – PADILLA BAY FRESHWATER TRIBUTARIES FECAL COLIFORM BACTERIA TOTAL MAXIMUM DAILY LOAD
Document(s) for TMDL	Padilla Bay Freshwater Tributaries Fecal Coliform Bacteria Total Maximum Daily Load Report - Water Quality Improvement Report and Implementation Plan (20-10-036) https://apps.ecology.wa.gov/publications/documents/2010036.pdf
Location of Original 303(d) Listings	Big Indian Slough (45711) No Name Slough (7158) Joe Leary Slough (16410) Joe Leary Slough (39607) Joe Leary Slough (39608)
Area Where TMDL Requirements Apply	These requirements apply to areas served by MS4s listed below within the TMDL coverage area.
Parameter(s)	Fecal coliform bacteria
EPA Approval Date	December 22nd, 2020
MS4 Permittee	Phase II Permit: Skagit County (WAR045556), City of Burlington (WAR045551)

SKAGIT COUNTY & CITY OF BURLINGTON

Actions Required

Business Inspections:

The Permittee shall inspect facilities with SIC Industry Group no. 074, 075, including NAICS Major Group 1152xx, and NAICS 325315 (composting facilities) as part of their ongoing inspection program identified in S5.C.8. If the Permittee determines, through inspections or otherwise, that a facility has failed to adequately implement BMPs to prevent bacteria source potential, the Permittee shall re-inspect the facility at least once more during the permit term to verify compliance, and/or initiate enforcement action.

Public Education and Outreach:

Each Permittee shall include public education and outreach activities that increase awareness of bacterial pollution problems and promote proper pet waste management as a BMP under General Awareness.

Operations and Maintenance:

Each Permittee shall maintain Pet Waste collection stations at Permittee owned or operated lands that are reasonably expected to have domestic animal (dog and horse) use and the potential for pollution to stormwater.

Illicit Connection/Illicit Discharge Detection and Elimination:

When conducting IDDE field screening during normal course of business (as required by S5.C.5.d for Phase II Permittees, and IC/IDDE as required by S5.C.9.c for Phase I Permittees) in a TMDL area, Permittees shall obtain a grab sample to screen for bacteria sources when at the drainage circuit's most downstream sampling location if there is water flow. For the purposes of IC/IDDE, stormwater quality sampling is defined as obtaining and processing grab samples of stormwater within the conveyance system of the MS4, at discharge points, and/or outfalls (if there is flow) at each drainage circuit's most downstream accessible sampling location. Permittees shall follow their adopted IDDE Procedures to conduct source tracing efforts if bacteria levels and/or observations trigger a response (see IDDE guidance manual for bacteria trigger levels).

Qualitative and quantitative information about the source identification and elimination activities, including procedures followed, sampling locations, and results (including documenting no flow) shall be annually documented in TMDL reporting in the Annual Report.

Name of TMDL	WRIA 5 – STILLAGUAMISH RIVER
EPA Approved Document(s) for TMDL	*Stillaguamish River Watershed Fecal Coliform, Dissolved Oxygen, pH, Arsenic, and Mercury Total Maximum Daily Load (Water Cleanup Plan) – Submittal Report*, May 2005, Ecology Publication No. 05-10-044. https://fortress.wa.gov/ecy/publications/publications/0510044.pdf *Stillaguamish River Watershed Fecal Coliform, Dissolved Oxygen, pH, Arsenic, and Mercury Total Maximum Daily Load (Water Cleanup Plan) – Water Quality Implementation Plan*, June 2007, Ecology Publication No. 07-10-033. https://fortress.wa.gov/ecy/publications/documents/0710033.pdf
Location of Original 303(d) Listings	QJ28UC, HD76OJ, JU33JU, GH05SX, IJ55EP, VJ74AO, 390KRD, OT80TY, QE93BW, ZO73WL, WO38NV, SN06ZT, LU17DC
Area Where TMDL Requirements Apply	Requirements apply in all areas regulated under the Permittees' municipal stormwater permit and draining to fresh or marine waters within Water Resource Inventory Area (WRIA) 5
Parameter	Fecal Coliform, Dissolved Oxygen
EPA Approval Date	June 21, 2005
MS4 Permittee	Phase I Permit: Snohomish County Phase II Permit: Arlington

SNOHOMISH COUNTY & CITY OF ARLINGTON

Actions Required

Business Inspections:

Each Permittee shall continue their ongoing inspection programs for facilities with SIC Industry Group no. 074, 075, including NAICS Major Group 1152xx, and NAICS 325315 (composting facilities). If the Permittee determines, through inspections or otherwise, that a facility has failed to adequately implement BMPs to prevent bacteria source potential, each Permittee shall re-inspect the facility at least once more during the permit term to verify compliance, and/or initiate enforcement actions.

Public Education and Outreach:

Each Permittee shall include public education and outreach activities that increase awareness of bacterial pollution problems and promote proper pet waste management as a BMP under General Awareness.

Operations and Maintenance:

Each Permittee shall maintain Pet Waste collection stations at Permittee owned or operated lands that are reasonably expected to have domestic animal (dog and horse) use and the potential for pollution to stormwater.

Illicit Connection/ Illicit Discharge Detection and Elimination:

When conducting IDDE field screening during normal course of business (as required by S5.C.5.d for Phase II Permittees, and IC/IDDE as required by S5.C.9.c for Phase I Permittees) in a TMDL area, Permittees shall obtain a grab sample to screen for bacteria sources when at the drainage circuit's most downstream sampling location if there is water flow. For the purposes of IC/IDDE, stormwater quality sampling is defined as obtaining and processing grab samples of stormwater within the conveyance system of the MS4, at discharge points, and/or outfalls (if there is flow) at each drainage circuit's most downstream accessible sampling location. Permittees shall follow their adopted IDDE Procedures to conduct source tracing efforts if bacteria levels and/or observations trigger a response (see IDDE guidance manual for bacteria trigger levels).

Qualitative and quantitative information about the source identification and elimination activities, including procedures followed, sampling locations, and results (including documenting no flow) shall be annually documented in TMDL reporting in the Annual Report.

Name of TMDL	**WRIA 7 – SNOHOMISH RIVER TRIBUTARIES**
EPA Approved Document(s) for TMDL	*Water Quality Assessment of Tributaries to the Snohomish River and Nonpoint Source Pollution TMDL*, September 1997, Ecology Publication No. 97-334. https://fortress.wa.gov/ecy/publications/SummaryPages/97334.html *Snohomish River Tributaries Fecal Coliform Total Maximum Daily Load Submittal Report*, June 2001, Ecology publication No. 00-10-087. https://fortress.wa.gov/ecy/publications/summarypages/0010087.html *Lower Snohomish River Tributaries Fecal Coliform Bacterial Total Maximum Daily Load: Detailed Implementation Plan*, June 2003, Ecology Publication No. 03-10-031. https://fortress.wa.gov/ecy/publications/documents/0310031.pdf
Location of Original 303(d) Listings	WA-07-1012, WA-07-015, WA-07-1052, WA-07-1163WA-07-1163, WA-07-1030 and WA-07-040
Area Where TMDL Requirements Apply	Requirements apply in all areas regulated under the Permittees' municipal stormwater permit and draining to the WASWIS segment number, and all upstream tributaries within the jurisdiction of the Permittee and within the geographic area covered by this Permit contributing to waterbodies: Allen Creek, YT94RF: Quilceda Creek, TH58TS: French Creek, XZ24XU: Woods Creek, FZ74HO: Pilchuck River, NF79WA: Marshland Watershed, XW79FQ.
Parameter	Fecal Coliform
EPA Approval Date	August 9, 2001
MS4 Permittee	Phase I Permit: Snohomish County Phase II Permit: Granite Falls, Lake Stevens, Monroe, Snohomish, Marysville, Arlington, Everett

SNOHOMISH COUNTY

Actions Required

Business Inspections:

Each Permittee shall continue their ongoing inspection programs for facilities with SIC Industry Group no. 074, 075, including NAICS Major Group 1152xx, and NAICS 325315 (composting facilities). If the Permittee determines, through inspections or otherwise, that a facility has failed to adequately implement BMPs to prevent bacteria source potential, each Permittee shall re-inspect the facility at least once more during the permit term to verify compliance, and/or initiate enforcement actions.

Public Education and Outreach: Each Permittee shall include public education and outreach activities that increase awareness of bacterial pollution problems and promote proper pet waste management as a BMP under General Awareness.

Operations and Maintenance: Each Permittee shall maintain Pet Waste collection stations at Permittee owned or operated lands that are reasonably expected to have domestic animal (dog and horse) use and the potential for pollution to stormwater.

Targeted Illicit Connection and Illicit Discharge Detection and Elimination:

During each permit term, Permittees shall use their available data (such as land use data, age of infrastructure, information on type of business activities, and water quality sampling results) to identify at least one high priority area (such as a tributary or a stream segment) that will be the target of a bacteria focused IC/IDDE effort. Sampling of stormwater shall be conducted as part of the Permittee's Targeted IC/IDDE efforts to focus investigations on municipal stormwater contributions of bacteria to receiving waters. For the purposes of Targeted IC/IDDE, stormwater quality sampling is defined as obtaining grab samples of stormwater within the conveyance system of the MS4, and/or outfalls. Permittees shall annually screen for bacteria sources by inspecting and taking grab samples (if there is flow) at each drainage circuit's most downstream accessible sampling location. Permittees shall follow their adopted IDDE Procedures to conduct source tracing efforts if bacteria levels and/or observations trigger a response (see IDDE guidance manual for bacteria trigger levels).

No later than December 31, 2025, each Permittee shall have a written plan and include documentation of how the high priority area was selected and include a preliminary sampling schedule and locations. For Permittees with multiple TMDL areas, the plan may include rationale for staggering the implementation in the identified high priority areas. Documentation shall be submitted with the Annual Report due by March 31, 2026. Begin implementing the plan and schedule no later than January 1, 2026, and implement annually within the high priority area through December 31, 2028. For Permittees implementing a staggered schedule, implementation may be extended to June 30, 2029. Qualitative and quantitative information about the source identification and elimination activities, including procedures followed, all

sampling locations, and sampling results shall be annually documented in TMDL reporting in the Annual Report. Sampling methodology must include collecting grab samples (or documenting no flow) during the critical period if a critical period is identified in the TMDL.

CITY OF GRANITE FALLS, LAKE STEVENS, MONROE, SNOHOMISH, MARYSVILLE, EVERETT AND ARLINGTON

Actions Required

***Business Inspections**:*

Each Permittee shall continue their ongoing inspection programs for facilities with SIC Industry Group no. 074, 075, including NAICS Major Group 1152xx, and NAICS 325315 (composting facilities). If the Permittee determines, through inspections or otherwise, that a facility has failed to adequately implement BMPs to prevent bacteria source potential, each Permittee shall re-inspect the facility at least once more during the permit term to verify compliance, and/or initiate enforcement actions.

***Public Education and Outreach**:* Each Permittee shall include public education and outreach activities that increase awareness of bacterial pollution problems and promote proper pet waste management as a BMP under General Awareness.

Operations and Maintenance: Each Permittee shall maintain Pet Waste collection stations at Permittee owned or operated lands that are reasonably expected to have domestic animal (dog and horse) use and the potential for pollution to stormwater.

Illicit Connection/Illicit Discharge Detection and Elimination:

When conducting IDDE field screening during normal course of business (as required by S5.C.5.d for Phase II Permittees, and IC/IDDE as required by S5.C.9.c for Phase I Permittees) in a TMDL area, Permittees shall obtain a grab sample to screen for bacteria sources when at the drainage circuit's most downstream accessible sampling location if there is water flow. For the purposes of IC/IDDE, stormwater quality sampling is defined as obtaining and processing a grab samples of stormwater within the conveyance system of the MS4, at discharge points, and/or outfalls (if there is flow) at each drainage circuit's most downstream accessible sampling location. Permittees shall follow their adopted IDDE Procedures to conduct source tracing efforts if bacteria levels and/or observations trigger a response (see IDDE guidance manual for bacteria trigger levels).

Qualitative and quantitative information about the source identification and elimination activities, including procedures followed, sampling locations, and results (including documenting no flow) shall be annually documented in TMDL reporting as required in the Permittees' Annual Report.

Name of TMDL	WRIA 8 - NORTH CREEK
EPA Approved Document(s) for TMDL	*North Creek Watershed: Total Maximum Daily Load Evaluation for Fecal Coliform Bacteria*, June 2001, Ecology Publication No. 01-03-020. https://fortress.wa.gov/ecy/publications/summarypages/0103020.html *North Creek Fecal Coliform Total Maximum Daily Load Submittal Report*, June 2002, Ecology publication No. 02-10-020. https://fortress.wa.gov/ecy/publications/summarypages/0210020.html *North Creek Fecal Coliform Bacteria Total Maximum Daily Load: Detailed Implementation Plan*, October 2003, Ecology Publication No. 03-10-047. https://fortress.wa.gov/ecy/publications/SummaryPages/0310047.html
Location of Original 303(d) Listings	WA-08-1065
Area Where TMDL Requirements Apply	Requirements apply in all areas regulated under the Permittees' municipal stormwater permit and draining to the portion of the WASWIS segment SM74QQ starting at the confluence with the Sammamish River and including all upstream tributaries contributing to the North Creek segment of WASWIS SM74QQ.
Parameter	Fecal Coliform
EPA Approval Date	August 2, 2002
MS4 Permittee	Phase I Permit: Snohomish County Phase II Permit: Everett, Bothell, Mill Creek

SNOHOMISH COUNTY & EVERETT, BOTHELL & MILL CREEK

Actions Required

Business Inspections: Each Permittee shall continue their ongoing inspection programs for facilities with SIC Industry Group no. 074, 075, including NAICS Major Group 1152xx, and NAICS 325315 (composting facilities). If the Permittee determines, through inspections or otherwise, that a facility has failed to adequately implement BMPs to prevent bacteria source potential, the Permittee shall re-inspect the facility at least once more during the permit term to verify compliance, and/or initiate enforcement actions.

***Public Education and Outreach**:* Each Permittee shall include public education and outreach activities that increase awareness of bacterial pollution problems and promote proper pet waste management as a BMP under General Awareness.

Operations and Maintenance: Each Permittee shall maintain Pet Waste collection stations at Permittee owned or operated lands that are reasonably expected to have domestic animal (e.g., dog and horse) use and the potential for pollution to stormwater.

***Targeted Illicit Connection and Illicit Discharge Detection and Elimination (IDDE)**:* During each permit term, Permittees shall use their available data (such as land use data, age of infrastructure, information on type of business activities, and water quality sampling results) to identify at least one high priority area (such as a tributary or a stream segment) that will be the focus of a bacteria targeted IC/IDDE effort. Sampling of stormwater shall be conducted as part of the Permittee's Targeted IDDE to focus investigations on municipal stormwater contributions of bacteria to receiving waters. For the purposes of Targeted IC/IDDE, stormwater quality sampling is defined as obtaining grab samples of stormwater within the conveyance system of the MS4 and/or outfalls. Annually Permittees shall screen for bacteria sources by taking grab samples (if there is flow) at each drainage circuit's most downstream accessible sampling location. Permittees shall follow the Permittee's own adopted IDDE Procedures to conduct source tracing if bacteria levels and/or observations trigger a response (see IDDE annual for bacteria trigger levels).

No later than December 31, 2025, each Permittee shall prepare a written plan and include documentation of how the high priority area was selected and include a preliminary sampling schedule and locations. For Permittees with multiple TMDL areas, the plan may include rationale for staggering the implementation in the identified high priority areas. Documentation shall be submitted with the Annual Report due by March 31, 2026. Permittees shall begin implementing the plan and schedule no later than January 1, 2026. Targeted IC/IDDE shall be implemented annually within the high priority area through December 31, 2028. For Permittees implementing a staggered schedule, implementation may be extended to June 30, 2029. Qualitative and quantitative information about the source identification and elimination activities, including procedures followed, sampling locations, and results shall be documented annually in TMDL reporting as required in the Permittee's Annual Report. Sampling methodology must include collecting grab samples (or document no flow) during the critical period, if a critical period is identified in the TMDL.

Name of TMDL	WRIA 8 - SWAMP CREEK
EPA Approved Document(s) for TMDL	*Swamp Creek Fecal Coliform Bacteria Total Maximum Daily Load: Water Quality Improvement Report and Implementation Plan*, June 2006, Ecology Publication No. 06-10-021. https://fortress.wa.gov/ecy/publications/publications/0610021.pdf
Location of Original 303(d) Listings	WA-08-1060
Area Where TMDL Requirements Apply	Requirements apply in all areas regulated under the Permittees municipal stormwater permit and draining to the portion of the WASWIS segment SM74QQ starting at the confluence with the Sammamish River and including all upstream tributaries contributing to the Swamp Creek segment of WASWIS GJ57UL.
Parameter	Fecal Coliform
EPA Approval Date	August 16, 2006
MS4 Permittee	Phase I Permit: Snohomish County Phase II Permit: Everett, Bothell, Lynnwood, Brier, Mountlake Terrace, Kenmore

SNOHOMISH COUNTY & CITY OF EVERETT, BOTHELL, LYNWOOD, BRIER, MOUNT LAKE TERRACE & KENMORE

Actions Required

Business Inspections: Each Permittee shall continue their ongoing inspection programs for facilities with SIC Industry Group no. 074, 075, including NAICS Major Group 1152xx, and NAICS 325315 (composting facilities). If the Permittee determines, through inspections or otherwise, that a facility has failed to adequately implement BMPs to prevent bacteria source potential, the Permittee shall re-inspect the facility at least once more during the permit term to verify compliance, and/or initiate enforcement actions.

Public Education and Outreach: Each Permittee shall include public education and outreach activities that increase awareness of bacterial pollution problems and promote proper pet waste management as a BMP under General Awareness.

Operations and Maintenance: Each Permittee shall maintain Pet Waste collection stations at Permittee owned or operated lands that are reasonably expected to have domestic animal (e.g., dog and horse) use and the potential for pollution to stormwater.

Targeted Illicit Connection and Illicit Discharge Detection and Elimination*:* During each permit term, Permittees shall use their available data (such as land use data, age of infrastructure, information on type of business activities, and water quality sampling results) to identify at least one high priority area (such as a tributary or a stream segment) that will be the focus of a targeted IC/IDDE effort. Sampling of stormwater shall be conducted as part of the Permittee's Targeted IC/IDDE efforts to focus investigations on municipal stormwater contributions of bacteria to receiving waters. For the purposes of Targeted IC/IDDE, stormwater quality sampling is defined as obtaining grab samples of stormwater within the conveyance system of the MS4 and/or outfalls. Permittees shall screen for bacteria sources annually by inspecting and taking grab samples (if there is flow) at each drainage circuit's most downstream accessible sampling location. Permittees shall follow their adopted IDDE Procedures to conduct source tracing efforts if bacteria levels and/or observations trigger a response (see IDDE guidance manual for bacteria trigger levels).

No later than December 31, 2025, each Permittee shall prepare a written plan and include documentation of how the high priority area was selected and include a preliminary sampling schedule and locations. For Permittees with multiple TMDL areas, the plan may include rationale for staggering the implementation in the identified high priority areas. Documentation shall be submitted with the Annual Report due by March 31, 2026. Permittees shall begin implementing the plan and schedule no later than January 1, 2026. Targeted IC/IDDE shall be implemented annually within the high priority area through December 31, 2028. For Permittees implementing a staggered schedule, implementation may be extended to June 30, 2029. Qualitative and quantitative information about the source identification and elimination activities, including procedures followed, sampling locations, and results shall be documented annually in TMDL reporting as required in the Permittee's Annual Report. Sampling methodology must include collecting grab samples (or document no flow) during the critical period, if a critical period is identified in the TMDL.

Name of TMDL	WRIA 8 - BEAR-EVANS WATERSHED
Document(s) for TMDL	*Bear-Evans Watershed Fecal Coliform Bacteria Total Maximum Daily Load, Water Quality Improvement Report*, June 2008, Ecology Publication No. 08-10-026. https://fortress.wa.gov/ecy/publications/documents/0810026.pdf *Bear-Evans Watershed Temperature, Dissolved Oxygen and Fecal Coliform Bacteria Total Maximum Daily Load, Water Quality Implementation Plan*, March 2011, Ecology Publication No. 11-10-024. https://fortress.wa.gov/ecy/publications/documents/1110024.pdf
Location of Original 303(d) Listings	Bear Creek (EW54VY, BA64JJ, WR69YU)) Cottage Lake Creek (NO74J5) Unnamed Tributary to Bear Creek (EU47RU) Evans Creek (MI67EG)
Area Where TMDL Requirements Apply	Bear Creek and Evans Creek watersheds (includes Cottage Lake watershed)
Parameter	Fecal Coliform
EPA Approval Date	August 11, 2008
MS4 Permittee	Phase I: King County Phase II: No actions identified for Phase II Permittees

KING COUNTY

Actions Required

Business Inspections: The Permittee shall inspect facilities with SIC Industry Group no. 074, 075, including NAICS Major Group 1152xx, and NAICS 325315 (composting facilities) as part of their ongoing inspection program identified in S5.C.8. If the Permittee determines, through inspections or otherwise, that a facility has failed to adequately implement BMPs to prevent bacteria source potential, the Permittee shall re-inspect the facility at least once more during the permit term to verify compliance, and/or initiate enforcement action.

Public Education and Outreach: The Permittee shall include public education and outreach activities that increase awareness of bacterial pollution problems and promote proper pet waste management as a BMP under General Awareness.

Operations and Maintenance: The Permittee shall maintain Pet Waste collection stations at Permittee owned or operated lands that are reasonably expected to have domestic animal (e.g., dog and horse) use and the potential for pollution to stormwater.

Illicit Discharge Detection and Elimination: When conducting IDDE field screening during normal course of business (as required by S5.C.9.c for Phase I Permittees) in a TMDL area, the Permittee shall obtain a grab sample to screen for bacteria sources at the drainage circuit's most downstream sampling location if there is water flow. For the purposes of IDDE, stormwater quality sampling is defined as obtaining and processing grab samples of stormwater within the conveyance system of the MS4, at discharge points, and/or outfalls (if there is flow) at each drainage circuit's most downstream accessible sampling location. The Permittee shall follow their adopted IDDE Procedures to conduct source tracing efforts if bacteria levels and/or observations trigger a response (see IDDE guidance manual for bacteria trigger levels).

Qualitative and quantitative information about the source identification and elimination activities, including procedures followed, sampling locations, and results (including documenting no flow) shall be documented annually in TMDL reporting in the Annual Report.

Name of TMDL	WRIA 8 - ISSAQUAH CREEK BASIN WATER CLEANUP PLAN FOR FECAL COLIFORM BACTERIA
EPA Approved Document(s) for TMDL	*Issaquah Creek Basin Water Cleanup Plan for Fecal Coliform Bacteria: Total Maximum Daily Load Submittal Report*, June 2004, Ecology Publication No. 04-10-055. https://fortress.wa.gov/ecy/publications/documents/0410055.pdf
Location of Original 303(d) Listings	Issaquah Creek, TF310B (WA-08-1110) North Fork Issaquah Creek, CZ80NC (WA-08-1110) Tibbetts Creek, MB51QQ, EA48LQ (WA-08-1115)
Area Where TMDL Requirements Apply	These requirements apply to areas served by MS4s within the TMDL coverage area.
Parameter(s)	Fecal Coliform Bacteria
EPA Approval Date	October 1, 2004
MS4 Permittee:	Phase I Permit: King County Phase II Permit: City of Issaquah, WAR04-5518

KING COUNTY & CITY OF ISSAQUAH

Actions Required

Business Inspections: Each Permittee shall inspect facilities with SIC Industry Group no. 074, 075, including NAICS Major Group 1152xx, and NAICS 325315 (composting facilities) as part of their ongoing inspection program identified in S5.C.8. If the Permittee determines, through inspections or otherwise, that a facility has failed to adequately implement BMPs to prevent bacteria source potential, the Permittee shall re-inspect the facility at least once more during the permit term to verify compliance, and/or initiate enforcement action.

Public Education and Outreach: Each Permittee shall include public education and outreach activities that increase awareness of bacterial pollution problems and promote proper pet waste management as a BMP under General Awareness.

Operations and Maintenance: Each Permittee shall maintain Pet Waste collection stations at Permittee owned or operated lands that are reasonably expected to have domestic animal (e.g., dog and horse) use and the potential for pollution to stormwater.

Illicit Discharge Detection and Elimination: When conducting IDDE field screening during normal course of business (as required by S5.C.5.d for Phase II Permittees and IDDE as required by S5.C.9.c for Phase I Permittees) in a TMDL area, Permittees shall obtain a grab sample to screen for bacteria sources at the drainage circuit's most downstream sampling location if there is water flow. For the purposes of IDDE, stormwater quality sampling is defined as obtaining and processing grab samples of stormwater within the conveyance system of the MS4, at discharge points, and/or outfalls (if there is flow) at each drainage circuit's most downstream accessible sampling location. Permittees shall follow their adopted IDDE Procedures to conduct source tracing efforts if bacteria levels and/or observations trigger a response (see IDDE guidance manual for bacteria trigger levels).

Qualitative and quantitative information about the source identification and elimination activities, including procedures followed, sampling locations, and results (including documenting no flow) shall be documented annually in TMDL reporting as required in the Permittees' Annual Report.

Name of TMDL	WRIA 8 - LITTLE BEAR CREEK FECAL COLIFORM WATER QUALITY IMPROVEMENT PROJECT
Document(s) for TMDL	*Little Bear Creek Fecal Coliform Total Maximum Daily Load (Water Cleanup Plan),* May 2005, Ecology Publication No. 05-10-034. https://fortress.wa.gov/ecy/publications/publications/0510034.pdf
Location of Original 303(d) Listings	Little Bear Creek, UT96KR (WA-08-1085).
Area Where TMDL Requirements Apply	These requirements apply to areas served by MS4s within the TMDL coverage area.
Parameter(s)	Fecal coliform bacteria
EPA Approval Date	July 1, 2005
MS4 Permittee:	Phase I Permit: Snohomish County Phase II Permit: City of Woodinville, WAR04-5545

SNOHOMISH COUNTY & CITY OF WOODINVILLE

Actions Required

Business Inspections: Each Permittee shall inspect facilities with SIC Industry Group no. 074, 075, including NAICS Major Group 1152xx, and NAICS 325315 (composting facilities) as part of their ongoing inspection program identified in S5.C.8. If the Permittee determines, through inspections or otherwise, that a facility has failed to adequately implement BMPs to prevent bacteria source potential, the Permittee shall re-inspect the facility at least once more during the permit term to verify compliance, and/or initiate enforcement action.

Public Education and Outreach: Each Permittee shall include public education and outreach activities that increase awareness of bacterial pollution problems and promote proper pet waste management as a BMP under General Awareness.

Operations and Maintenance: Each Permittee shall maintain Pet Waste collection stations at Permittee owned or operated lands that are reasonably expected to have domestic animal (e.g., dog and horse) use and the potential for pollution to stormwater.

Illicit Connection/Illicit Discharge Detection and Elimination: When conducting IDDE field screening during normal course of business (as required by S5.C.5.d for Phase II Permittees and IC/IDDE as required by S5.C.9.c for Phase I Permittees) in a TMDL area, Permittees shall obtain a grab sample to screen for bacteria sources at the drainage circuit's most downstream sampling location if there is water flow. For the purposes of IC/IDDE, stormwater quality sampling is defined as obtaining and processing grab samples of stormwater within the conveyance system of the MS4, at discharge points, and/or outfalls (if there is flow) at each drainage circuit's most downstream accessible sampling location. Permittees shall follow their adopted IDDE Procedures to conduct source tracing efforts if bacteria levels and/or observations trigger a response (see IDDE guidance manual for bacteria trigger levels).

Qualitative and quantitative information about the source identification and elimination activities, including procedures followed, sampling locations, and results (including documenting no flow) shall be documented annually in TMDL reporting in the Annual Report.

Name of TMDL	WRIA 10 – LOWER WHITE RIVER PH TMDL
Document(s) for TMDL	*Lower White River (LWR) pH Total Maximum Daily Load – Technical Analysis and TMDL Allocations*, Ecology Publication No. 2-10-011 https://apps.ecology.wa.gov/publications/documents/2210011.pdf
Location of Original 303(d) Listings	White River, multiple locations 7524, 7525, 7526
Area Where TMDL Requirements Apply	Requirements apply in all areas regulated under the Permittee's municipal stormwater permit and discharging to water bodies listed within the specific requirement in this TMDL section.
Parameter	pH[1]
EPA Approval Date	January 2023
MS4 Permittees	Phase I Permit: King County, Pierce County Phase II Permit: Auburn, Algona, Buckley, Enumclaw, Pacific, Sumner

KING AND PIERCE COUNTIES AND ASSOCIATED CITIES

Actions Required

1. MS4 Mapping: No later than March 31, 2029:
    a. The Permittee shall ensure all known piped MS4 outfalls that they own or operate, which discharge to the Lower White River or its primary tributaries within the TMDL implementation area, are mapped and documented.[2, 3]
    b. The Permittee shall map all tributary conveyances to their piped MS4 outfalls identified in (1)(a), if not already mapped.
2. Illicit Discharge Detection and Elimination:

[1] This TMDL sets soluble reactive phosphorus (SRP) allocations in order to limit periphyton growth and meet the numeric water quality criteria for pH in the White River.

[2] The screening program is limited to "piped outfalls" owned or operated by the Permittee, which means only MS4 outfalls that are made of pipe material (e.g., corrugated metal, concrete, etc.) require screening; it does not include open pervious outfalls, such as ditches.

[3] The TMDL implementation area is the contributing drainage area to the White River between RM 3.6 and RM 28 where phosphorus management practices are necessary to meet allocations for discharges to the river and the TMDL load capacity of the river itself. Primary tributaries to the Lower White River within the TMDL area include Boise Creek, Second Creek, Pussyfoot Creek, Bowman Creek, and Government Canal.

a. No later than October 31, 2028, the Permittee shall screen all known piped MS4 outfalls that they own or operate, which discharge to the Lower White River and its primary tributaries, within the TMDL implementation area.
    i. For at least one dry season within this permit cycle, the Permittee shall screen piped MS4 outfalls once a month, from May 1st – October 31st, for the presence of a discharge. All piped MS4 outfalls may be screened within the same year or divided into groups and screened over multiple years.
    ii. Document MS4 outfall screening results. If no discharge is found during outfall screening by October 31, 2028, the Permittee may plan to reduce this screening to once in May and again once in October, or as close to these months as practicable, during low flow tier conditions (i.e. <900 cfs), for future permit cycles.
    iii. Actively controlled stormwater discharges (e.g., pump stations, batch treatment systems) are included in the screening program, but they have slightly different sampling requirements as described in (2)(b)(iii).
b. If a discharge at the piped MS4 outfall is present and estimated to be more than 2.24 gallons per minute, the Permittee shall collect an end-of-pipe sample for soluble reactive phosphorus (SRP) analysis.
    i. Sampling is restricted to May 1st - October 31st when there is little to no rain locally (<0.2" rainfall in past 48 hours).
    ii. Sampling is restricted to when the daily average flow in the White River is lower than 2000 cfs (USGS gage 12100490 at R Street near Auburn).
    iii. For all actively controlled municipal stormwater discharges (e.g., pump stations, batch treatment systems), no later than October 31, 2028, monthly sample events must be scheduled for dates/times when discharge is known to occur within the May 1-October 31 period. If monthly sampling meets any of the SRP requirements in section (2)(d)(i) through (iv) in the one season sampled during this permit cycle, the Permittee may plan to reduce screening to once in May and once in October, or as close to these months as practicable, for future permit cycles.
c. If any stormwater outfall samples collected during the critical period and analyzed for SRP concentrations exceed the values in (2)(c)(i) and (ii) below, the Permittee shall begin source tracing for SRP sources to the MS4[4]. Any sample exceedances of the SRP values in (2)(c)(i) and (ii) below are not a violation of this Permit. Analytical methods should follow approved methods as listed in this Permit's Appendix 9, Stormwater Discharge Monitoring, and 40 CFR Section 136.3 for ortho-phosphate (parameter #44 in Table 1B). Standard Method 4500-P G-2011 (for ortho-phosphate) is recommended for obtaining reporting limits needed for (c)(i) and (ii) below.

[4] WLAs apply during the critical period from May 1st to October 31st.

i. 7.5 ug/L of SRP (when the daily average White River flow is less than 900 cfs at USGS gage 12100490) or,
ii. 79 ug/L of SRP (when the daily average river flow is between 900 cfs and 2000 cfs at USGS gage 12100490) or,
iii. The load of SRP is less than the WLA assigned to the Permittee.

d. Permittees are meeting TMDL requirements, and no additional source tracing is required, if MS4 outfall screening and sampling results find any one of the following:

i. There is no discharge or, where it is not feasible to measure flow, there is no visible or measurable surface velocity (i.e., stagnant water).
ii. The flow of any discharge is less than 0.005 cfs (2.24 gallons per minute).
iii. The flow of any discharge is less than 0.9 cfs (400 gpm) and the concentration of discharge is less than 7.5 ug/L of SRP (when the daily average White River flow is less than 900 cfs at USGS gage 12100490) or less than 79 ug/L of SRP (when the daily average river flow is between 900 cfs and 2000 cfs at USGS gage 12100490) during the critical period.
iv. The flow of any discharge is greater than 0.9 cfs (400 gpm) and the load of SRP is less than the WLAs as assigned to the Permittee. The Permittee may calculate a load only if none of the above (2)(d)(i) through (iii) conditions apply.

e. The Permittee may discontinue MS4 outfall screening and sampling at outfalls where the following applies:

i. The Permittee screens all known piped MS4 outfalls owned or operated by the Permittee as described in section (2)(a) every month within the dry season, for two consecutive years in a row, and both years show these MS4 outfalls meeting requirements in section (2)(d).

3. Controlling runoff from new development and redevelopment:
   a. No later than July 1, 2026, Pierce and King Counties shall require Phosphorus Treatment BMPs as described in Ecology's Stormwater Management Manual for Western Washington or an equivalent manual approved by Ecology for all new development and redevelopment projects within the TMDL implementation area that require Minimum Requirement #6, Runoff Treatment.
   b. No later than June 30, 2027, the cities of Auburn, Algona, Buckley, Enumclaw, Pacific and Sumner shall require Phosphorus Treatment BMPs as described in Ecology's Stormwater Management Manual for Western Washington or an equivalent manual approved by Ecology for all new development and redevelopment projects within the TMDL implementation area that require Minimum Requirement #6, Runoff Treatment.

Name of TMDL	WRIA 10 - PUYALLUP WATERSHED WATER QUALITY IMPROVEMENT PROJECT
Document(s) for TMDL	*Puyallup River Watershed Fecal Coliform Total Maximum Daily Load – Water Quality Improvement Report and Implementation Plan*, June 2011, Ecology Publication No. 11-10-040. https://fortress.wa.gov/ecy/publications/publications/1110040.pdf
Location of Original 303(d) Listings	Puyallup River 16712, 7498, White River 16711, 16708, 16709, Clear Creek 7501, Swan Creek 7514, Boise Creek 16706, Deer Creek 45616, Salmon Creek 45601, Unnamed Creek (Tributary to the Puyallup River) 45688
Area Where TMDL Requirements Apply	Requirements apply in all areas regulated under the Permittee's municipal stormwater permit and discharging to water bodies listed within the specific requirement in this TMDL section.
Parameter	Fecal Coliform
EPA Approval Date	September 2011
MS4 Permittee	Phase I Permit: King County, Pierce County Phase II Permit: Auburn, Bonney Lake, Edgewood, Enumclaw, Puyallup, Sumner

CITY OF AUBURN

Actions Required

Business Inspections:

Permittee shall inspect facilities with SIC Industry Group no. 074, 075, including NAICS Major Group 1152xx, and NAICS 325315 (composting facilities) as part of their ongoing inspection program identified in S5.C.8. If the Permittee determines, through inspections or otherwise, that a facility has failed to adequately implement BMPs to prevent bacteria source potential, the Permittee shall re-inspect the facility at least once more during the permit term to verify compliance, and/or initiate enforcement action.

Public Education and Outreach:

Permittee shall include public education and outreach activities that increase awareness of bacterial pollution problems and promote proper pet waste management as a BMP under General Awareness.

Operations and Maintenance:

Permittee shall maintain pet waste collection stations at Permittee owned or operated lands that are reasonably expected to have domestic animal (dog and horse) use and the potential for pollution to stormwater.

Illicit Discharge Detection and Elimination

Designate areas discharging via MS4 to the TMDL area as high priority areas for illicit discharge detection and elimination. Complete IDDE screening for bacteria sources in 100% of these sub-basins by July 31, 2029, and implement the schedules and activities identified in S5.C.5 of the Western Washington Phase II Permit in response to any illicit connections and illicit discharges found. Each annual report's TMDL summary shall include, where applicable, qualitative, and quantitative information about IDDE field screening activities for bacteria sources, including source identification and elimination activities and stormwater sampling results.

CITY OF BONNEY LAKE

Actions Required

- Designate areas discharging via MS4 to Fennel Creek as high priority areas for illicit discharge detection and elimination.
- No later than July 31, 2029, complete IDDE screening for bacteria sources in 100% of these MS4 sub-basins, and implement the schedule and activities identified in S5.C.5 of the Western Washington Phase II Permit in response to any illicit connections and illicit discharges found. IDDE screening for bacteria sources includes the inspection of city owned MS4 outfalls that are safely accessible, or the next safely accessible drainage access point that discharge to Fennel Creek.
- The results of all bacterial screening conducted in these sub-basins shall be included in the annual reports submitted to Ecology. Each annual report's TMDL summary shall include, where applicable, qualitative, and quantitative information about IDDE field screening activities for bacteria sources, including source identification and elimination activities and sampling results.

CITY OF EDGEWOOD

Actions Required

- Designate areas discharging via the MS4 to Jovita Creek as high priority areas for illicit discharge detection and elimination.
- Complete IDDE screening for bacteria sources in 100% of these MS4 sub-basins by July 31, 2029, and implement the schedules and activities identified in S5.C.5 of the Western Washington Phase II Permit in response to any illicit connections and illicit discharges

found. IDDE screening for bacteria sources includes the inspection of city owned MS4 outfalls that are safely accessible, or the next safely accessible drainage access point that discharge to Jovita Creek.

- The results of all bacterial screening conducted in these sub-basins shall be included in the annual reports submitted to Ecology. Each annual report's TMDL summary shall include, where applicable, qualitative, and quantitative information about IDDE field screening activities for bacteria sources, including source identification and elimination activities and stormwater sampling results.

CITY OF ENUMCLAW

Actions Required

- Designate areas discharging via the MS4 to:
  - Boise Creek from creek mile 1.7 to 1.0.
  - The flume and laterals approximately 1 mile north of the confluence with the mainstem, north of SE 456th Street, between Highway 410 to the west and Watson Street N. to the east.

  These locations are high priority areas for illicit discharge detection and elimination. Complete IDDE screening for bacteria sources in 100% of these MS4 sub-basins by July 31, 2029, and implement the schedules and activities identified in S5.C.5 of the Western Washington Phase II Permit in response to any illicit connections and illicit discharges found. Investigation must include activities for both the dry season (May through September) and the wet season (October through April). IDDE screening for bacteria sources includes the inspection of city owned MS4 outfalls that are safely accessible, or the next safely accessible drainage access point that discharge to the abovementioned receiving waters.

  The results of all bacterial screening conducted in these sub-basins shall be included in the annual reports submitted to Ecology. Each annual report's TMDL summary shall include, where applicable, qualitative, and quantitative information about IDDE field screening activities for bacteria sources, including source identification and elimination activities and sampling results.
- Permittee shall inspect commercial animal handling areas and commercial composting facilities to ensure implementation of source control BMPs for bacteria. Commercial animal handling areas are associated with Standard Industrial Code (SIC) 074 and 075 and include veterinary and pet care/boarding services, animal slaughtering, and support activities for animal production. Facilities where the degradation and transformation of organic solid waste takes place under controlled conditions designed to promote aerobic decomposition are considered composting facilities (definition in accordance with Chapter 173-350 WAC). Implement an ongoing inspection program to re-inspect facilities or areas with bacteria source control problems at least every three years.
- Conduct public education and outreach activities to increase awareness of bacterial pollution problems and promote proper pet waste management behavior.
- Install and maintain animal waste education signage and/or pet waste bag dispenser stations at municipal parks and other Permittee owned and operated lands reasonably expected to have substantial domestic animal (dog and horse) use and where stormwater runoff can enter the MS4.

KING COUNTY

Actions Required

Business Inspections:

Permittee shall continue their ongoing inspection programs for facilities with SIC Industry Group no. 074, 075, including NAICS Major Group 1152xx, and NAICS 325315 (composting facilities). If the Permittee determines, through inspections or otherwise, that a facility has failed to adequately implement BMPs to prevent bacteria source potential, the Permittee shall re-inspect the facility at least once more during the permit term to verify compliance, and/or initiate enforcement actions.

Public Education and Outreach:

Permittee shall include public education and outreach activities that increase awareness of bacterial pollution problems and promote proper pet waste management as a BMP under General Awareness.

Operations and Maintenance:

Permittee shall maintain Pet Waste collection stations at Permittee owned or operated lands that are reasonably expected to have domestic animal (dog and horse) use and the potential for pollution of stormwater.

Illicit Discharge Detection and Elimination

When conducting IDDE-related field screening under S5.C.9 of the Phase I Permit, King County shall screen for bacteria sources in any MS4 sub-basins which discharge to surface waters in the TMDL area. Implement the schedules and activities identified in S5.C.9 of the Phase I Permit for response to any illicit connections and illicit discharges found. The results of all bacterial screening conducted in these sub-basins shall be included in the annual reports submitted to Ecology. Each annual report's TMDL summary shall include, where applicable, qualitative, and quantitative information about IDDE field screening activities for bacteria sources, including source identification and elimination activities and stormwater sampling results.

PIERCE COUNTY

Actions Required

- Designate areas discharging via the MS4 to Swan Creek as high priority areas for illicit discharge detection and elimination. Complete IDDE screening for bacteria sources in 100% of these MS4 sub-basins by July 31, 2029, and implement the schedules and activities identified in S5.C.5 of the Western Washington Phase II Permit in response to any illicit connections and illicit discharges found. IDDE screening for bacteria sources includes the inspection of city

owned MS4 outfalls that are safely accessible, or the next safely accessible drainage access point that discharge to Swan Creek. The results of all bacterial screening conducted in these sub-basins shall be included in the annual reports submitted to Ecology. Each annual report's TMDL summary shall include, where applicable, qualitative, and quantitative information about IDDE field screening activities for bacteria sources, including source identification and elimination activities and stormwater sampling results.

- Designate areas discharging via the MS4 to Salmon Creek as high priority areas for illicit discharge detection and elimination. Complete IDDE screening for bacteria sources in 100% of these MS4 sub-basins by July 31, 2029, and implement the schedules and activities identified in S5.C.5 of the Western Washington Phase II Permit in response to any illicit connections and illicit discharges found. IDDE screening for bacteria sources includes the inspection of city owned MS4 outfalls that are safely accessible, or the next safely accessible drainage access point that discharge to Salmon Creek. The results of all bacterial screening conducted in these sub-basins shall be included in the annual reports submitted to Ecology. Each annual report's TMDL summary shall include, where applicable, qualitative, and quantitative information about IDDE field screening activities for bacteria sources, including source identification and elimination activities and stormwater sampling results.
- Designate areas discharging via the MS4 to Alderton Creek as high priority areas for illicit discharge detection and elimination. Complete IDDE screening for bacteria sources in 100% of these MS4 sub-basins by July 31, 2029, and implement the schedules and activities identified in S5.C.5 of the Western Washington Phase II Permit in response to any illicit connections and illicit discharges found. IDDE screening for bacteria sources includes the inspection of city owned MS4 outfalls that are safely accessible, or the next safely accessible drainage access point that discharge to Alderton Creek. The results of all bacterial screening conducted in these sub-basins shall be included in the annual reports submitted to Ecology. Each annual report's TMDL summary shall include, where applicable, qualitative, and quantitative information about IDDE field screening activities for bacteria sources, including source identification and elimination activities and stormwater sampling results.
- Designate areas discharging via the MS4 to Fennell Creek as high priority areas for illicit discharge detection and elimination. Complete IDDE screening for bacteria sources in 100% of these MS4 sub-basins by July 31, 2029, and implement the schedules and activities identified in S5.C.5 of the Western Washington Phase II Permit in response to any illicit connections and illicit discharges found. IDDE screening for bacteria sources includes the inspection of city owned MS4 outfalls that are safely accessible, or the next safely accessible drainage access point that discharge to Fennell Creek. The results of all bacterial screening conducted in these sub-basins shall be included in the annual reports submitted to Ecology. Each annual report's TMDL summary shall include, where applicable, qualitative, and quantitative information about IDDE field screening activities for bacteria sources, including source identification and elimination activities and stormwater sampling results.

CITY OF PUYALLUP

Action Required

Designate areas discharging via the MS4 to Deer Creek as high priority areas for illicit discharge detection and elimination. Complete IDDE screening for bacteria sources in 100% of these MS4 sub-basins by July 31, 2029, and implement the schedules and activities identified in S5.C.5 of the Western Washington Phase II Permit in response to any illicit connections and illicit discharges found. IDDE screening for bacteria sources includes the inspection of city owned MS4 outfalls that are safely accessible, or the next safely accessible drainage access point that discharge to Deer Creek. The results of all bacterial screening conducted in these sub-basins shall be included in the annual reports submitted to Ecology. Each annual report's TMDL summary shall include, where applicable, qualitative, and quantitative information about IDDE field screening activities for bacteria sources, including source identification and elimination activities and stormwater sampling results.

CITY OF SUMNER

Action Required

Designate areas discharging via the MS4 to Salmon Creek as high priority areas for illicit discharge detection and elimination. Complete IDDE screening for bacteria sources in 100% of these MS4 sub-basins by July 31, 2029, and implement the schedules and activities identified in S5.C.5 of the Western Washington Phase II Permit in response to any illicit connections and illicit discharges found. IDDE screening for bacteria sources includes the inspection of city owned MS4 outfalls that are safely accessible, or the next safely accessible drainage access point that discharge to Salmon Creek. The results of all bacterial screening conducted in these sub-basins shall be included in the annual reports submitted to Ecology. Each annual report's TMDL summary shall include, where applicable, qualitative, and quantitative information about IDDE field screening activities for bacteria sources, including source identification and elimination activities and stormwater sampling results.

Name of TMDL	WRIA 10 - CLARKS CREEK FECAL COLIFORM TMDL
Document(s) for TMDL	*Clarks Creek Watershed Fecal Coliform Bacteria Total Maximum Daily Load (Water Quality Improvement Report)*, May 2008, Ecology Publication No. 07-10-110. https://fortress.wa.gov/ecy/publications/documents/0710110.pdf *Clarks Creek Watershed Fecal Coliform Bacteria Total Maximum Daily Load (Water Quality Implementation Plan)*, December 2009, Ecology Publication No. 09-10-081. https://apps.ecology.wa.gov/publications/documents/0910081.pdf
Location of Original 303(d) Listings	Clarks Creek 7497, 7501, Meeker Creek 7508, 7507
Area Where TMDL Requirements Apply	Requirements apply in all areas regulated under the Permittee's municipal stormwater permit and discharging to water bodies listed within the specific requirement in this TMDL section.
Parameter	Fecal Coliform
EPA Approval Date	June 4, 2008
MS4 Permittee	Phase II Permit: Puyallup

CITY OF PUYALLUP

Actions Required

- **Education and Outreach**: No later than July 1, 2026, conduct public education and outreach activities to increase awareness of proper pet waste management and other fecal bacterial pollution problems, such as the negative impacts of waterflow feeding.
- **IDDE**: Designate areas discharging via MS4 to Meeker Creek and Clarks Creek as high priority areas for illicit discharge detection and elimination. Complete IDDE screening for bacteria sources in 100% of these MS4 sub-basins by July 31, 2029, and implement the schedules and activities identified in S5.C.5 of the Western Washington Phase II Permit in response to any illicit connections and illicit discharges found. IDDE screening for bacteria sources includes the inspection of city owned MS4 outfalls that are safely accessible, or the next safely accessible

drainage access point that discharge to Meeker and Clarks Creeks. The results of all bacterial screening conducted in these sub-basins shall be included in the annual reports submitted to Ecology. Each annual report's TMDL summary shall include, where applicable, qualitative, and quantitative information about IDDE field screening activities for bacteria sources, including source identification and elimination activities and sampling results.

- **Operations and Maintenance**:
    - No later than June 30, 2027, install and maintain pet waste education signage and bag dispenser stations at municipal parks and other Permittee owned and operated lands reasonably expected to have substantial dog use and where stormwater runoff can enter the MS4 and discharge to surface waters.
    - If a concentrated waterfowl presence is found at a city-owned stormwater pond during routine inspection, the Permittee shall implement waterfowl deterrence measures where appropriate (e.g., signage to discourage feeding, landscaping to discourage waterfowl presence). If a city-owned stormwater pond has a concentrated Canada geese presence, where feasible and as needed, periodically pick up and dispose of geese droppings in the garbage during routine facility maintenance completed per S5.C.9.c of this Permit.

Name of TMDL	WRIA 10 - CLARKS CREEK DISSOLVED OXYGEN AND SEDIMENT TOTAL MAXIMUM DAILY LOAD
Document(s) for TMDL	*Clarks Creek Dissolved Oxygen and Sediment Total Maximum Daily Load – Water Quality Improvement Report and Implementation Plan*, December 2014, Ecology Publication No. 14-10-030. https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Total-Maximum-Daily-Load-process/Directory-of-improvement-projects/Clarks-Creek
Location of Original 303(d) Listings	Clarks Creek 35407 47590 47591 47592 Meeker Creek 7510 47578 47579 Rody Creek 47593 Silver Creek
Area Where TMDL Requirements Apply	Requirements apply in all areas regulated under the Permittee's municipal stormwater permit and discharging to water bodies listed within the specific requirement in this TMDL section.
Parameter	Dissolved Oxygen and Sediment
EPA Approval Date	May 27, 2015
MS4 Permittee	Phase I Permit: Pierce County Phase II Permit: Puyallup

PIERCE COUNTY

Actions Required

1. The Permittee shall operate, inspect, and maintain the water quality improvement projects (WQIPs) prescribed in the Permittee's TMDL Restoration Plan (hereafter, the July 2022 Plan).[5] The July 2022 Plan estimated that existing WQIPs reduce the annual average sediment load by approximately 38.8 tons per year (29 percent of the TMDL target) and treat or remove approximately 13.7 million gallons (MG) of stormwater runoff per year based on the critical (October 21, 2003) storm event (46 percent of the TMDL target).[6] The Permittee shall apply crediting methodologies described in the July 2022 Plan, or an Ecology accepted updated Plan, to estimate the annual sediment load removal and the annual stormwater volume treated or removed by each WQIP. Any updates to the July 2022 Plan shall comply with the WLAs in the TMDL and align with previous Ecology Plan approvals.

[5] "TMDL Restoration Plan" means Pierce County's Clarks Creek Restoration Plan, July 2022 Update. Ecology reviewed and accepted the municipal stormwater permit components of the TMDL Restoration Plan, as revised in 2022, as communicated in our letter dated August 2, 2022, Re: Clarks Creek Restoration Plan, Updated July 1, 2021.

[6] Existing WQIPs are stormwater treatment facilities/BMPs constructed and operational after October 21, 2003. These include treatment facilities/BMPs implemented through retrofit or redevelopment.

2. Permittee shall operate, inspect, and maintain existing WQIPs in the updated five-year Plan (2024-2029); and construct, operate, inspect, and maintain new WQIPs in this updated Plan. The updated 2024-2029 Plan takes effect when Ecology accepts it. Ecology reserves the right to require changes to the updated Plan. The Permittee shall implement a project delivery program to meet the estimated annual average sediment load reduction and stormwater volume treated or reduced targets identified in this updated Plan. The municipal stormwater permit components and WQIPs in the July 2022 Plan remain in effect until Ecology accepts these components and WQIPs in the Permittee's 2024-2029 Plan.

3. No later than November 1, 2028, the Permittee shall submit an updated Plan (2029-2034) that includes existing and proposed WQIPs for the next five-year TMDL reporting period estimated to begin August 1, 2029. The updated Plan shall include sediment load reduction and stormwater volume treated or removed credit estimated for each WQIP, and it shall identify the 75 percent compliance milestone for the sediment WLA and the 75 percent compliance milestone for the stormwater volume treated/removed credit estimates for all existing and proposed WQIPs. Estimates of sediment load reduction and stormwater volumes treated or removed by each stormwater BMP and facility shall be consistent with the TMDL WLAs for Dissolved Oxygen Deficit (DOD) and sediment. The Permittee shall include anticipated project schedules, construction timelines, estimated costs, and funding strategies, where available, for proposed WQIPs in their updated Plan (2029-2034). Ecology reserves the right to require changes to the updated Plan.

4. The Permittee shall submit a reporting ledger to Ecology that quantifies the annual sediment load reduction (tons) credits and stormwater volume treated or removed (MG) credits awarded to all operational WQIPs during calendar years (CYs) 2023 and 2024 by March 31, 2025. The Permittee shall submit an updated reporting ledger annually thereafter by March 31st for CYs 2025 through 2028. This ledger serves as the reporting instrument to track each year's WLA compliance credits as they relate to the Permittee's assigned numeric WLAs. Stormwater retrofit or redevelopment projects constructed since October 21, 2003, may receive sediment reduction (tons) and stormwater volume treated/removed (MG) credits for each year the project was inspected, maintained, and determined to be operational. All WQIPs must be inspected, maintained, and determined to be operational to receive annual sediment load reduction and stormwater volume treated or removed credits.

5. The Permittee shall inspect WQIPs annually at a minimum during May, June, or July to assess whether the facilities are functioning as designed. If the Permittee's inspection records show a stormwater facility or BMP is in functional disrepair and is not operational, then the Permittee has 90 days from the time of the inspection to complete the corrective actions necessary to restore the BMP's functionality to receive annual pollution reduction credit for that facility/BMP for the reporting year. The Permittee will not receive sediment load reduction and stormwater volume treated or removed credit for a facility or BMP that has not received the corrective actions necessary to restore functionality within 90 days of the inspection. The Permittee's BMP inspection pertains to the calendar year for which the BMP credits are awarded. WQIPs/BMPs that exceed maintenance standards must perform required maintenance in accordance with schedules identified under S5.C.10.

6. Public Education and Outreach: The Permittee shall conduct public education and outreach activities that increase awareness among residents of the sources of polluted runoff affecting Clarks Creek and its tributaries.

CITY OF PUYALLUP

Actions Required

1. The Permittee shall operate, inspect, and maintain the water quality improvement projects (WQIPs) prescribed in the Permittee's TMDL Retrofit Plan (hereafter, the December 2022 Plan).[7] The December 2022 Plan estimated the existing and new WQIPs to be implemented by July 31, 2024, will reduce the annual average sediment load by approximately 52.95 tons per year (32 percent of the TMDL target) and treat or remove approximately 22.75 million gallons (MG) of stormwater runoff per year based on the critical (October 21, 2003) storm event (98 percent of the TMDL target).[8] The Permittee shall apply crediting methodologies described in the December 2022 Plan, or an Ecology accepted updated Plan, to estimate the annual sediment load removal and the annual stormwater volume treated or removed by each WQIP. Any updates to the December 2022 Plan shall comply with the WLAs in the TMDL and align with previous Ecology Plan approvals.

2. The Permittee shall operate, inspect, and maintain existing WQIPs in the updated five-year Plan (2024-2029); and construct, operate, inspect, and maintain new WQIPs in this updated Plan. The updated 2024-2029 Plan takes effect when Ecology accepts it. Ecology reserves the right to require changes to the updated Plan. The Permittee shall implement a project delivery program to meet the estimated annual average sediment load reduction and stormwater volume treated or reduced targets identified in this updated Plan. The municipal stormwater permit components and WQIPs in the December 2022 Plan remain in effect until Ecology accepts these components and WQIPs in the Permittee's 2024-2029 Plan.

3. No later than November 1, 2028, the Permittee shall submit an updated Plan (2029-2034) that includes existing and proposed WQIPs for the next five-year TMDL reporting period estimated to begin August 1, 2029, and the sediment load reduction and stormwater volume treated or removed credit estimated for each WQIP. Estimates of sediment load reduction and stormwater volumes treated or removed by each stormwater BMP and facility shall be consistent with the TMDL WLAs for Dissolved Oxygen Deficit (DOD) and sediment. The goal is to achieve TMDL reductions needed to meet WLAs by 2034. The Permittee shall include anticipated project schedules, construction timelines, estimated costs, and funding strategies, where available, for proposed WQIPs in their updated Plan (2029-2034). Ecology reserves the right to require changes to the updated Plan.

---

[7] "TMDL Retrofit Plan" means the Clarks Creek Retrofit Plan Update, Prepared for City of Puyallup, WA, Revised December 2022, by Brown and Caldwell. Ecology reviewed and accepted the municipal stormwater permit components of the TMDL Retrofit Plan in December 2022, as conditioned in our letter dated December 19, 2022, Re: Clarks Creek Retrofit Plan, Revised December 2022.

[8] Existing WQIPs are stormwater treatment facilities/BMPs constructed and operational after October 21, 2003. These include treatment facilities/BMPs implemented through retrofit or redevelopment.

4. The Permittee shall submit a reporting ledger to Ecology that quantifies the annual sediment load reduction (tons) credits and stormwater volume treated or removed (MG) credits awarded to all operational WQIPs during calendar years (CYs) 2023 and 2024 by March 31, 2025. The Permittee shall submit an updated reporting ledger annually thereafter by March 31st for CYs 2025 through 2028. This ledger serves as the reporting instrument to track each year's WLA compliance credits as they relate to the Permittee's assigned numeric WLAs. Stormwater retrofit or redevelopment projects constructed since October 21, 2003, may receive sediment reduction (tons) and stormwater volume treated/removed (MG) credits for each year the project was inspected, maintained, and determined to be operational. All WQIPs must be inspected, maintained, and determined to be operational to receive annual sediment load reduction and stormwater volume treated or removed credits.

5. The Permittee shall inspect WQIPs annually at a minimum during May, June, or July to assess whether the facilities are functioning as designed. If the Permittee's inspection records show a stormwater facility or BMP is in functional disrepair and is not operational, then the Permittee has 90 days from the time of the inspection to complete the corrective actions necessary to restore the BMP's functionality to receive annual pollution reduction credit for that facility/BMP for the reporting year. The Permittee will not receive sediment load reduction and stormwater volume treated or removed credit for a facility or BMP that has not received the corrective actions necessary to restore functionality within 90 days of the inspection. The Permittee's BMP inspection pertains to the calendar year for which the BMP credits are awarded. WQIPs/BMPs that exceed maintenance standards must perform required maintenance in accordance with schedules identified under S5.C.9.

6. Street Sweeping Program: The Permittee can only include sediment load reduction credit for its street sweeping program under an Ecology-approved QAPP.[9] The Permittee shall not credit sediment removal from sweeping until their pilot study on sweeping is completed and their updated 2024-2029 Plan takes effect.

7. Public Education and Outreach: The Permittee shall conduct public education and outreach activities that increase awareness among residents of the sources of polluted runoff affecting Clarks Creek and its tributaries.

[9] Ecology approved the City of Puyallup's Clarks Creek Street Sweeping Study Quality Assurance Project Plan (QAPP), Prepared by Brown and Caldwell on January 20, 2022.

Name of TMDL	WRIA 10 - SOUTH PRAIRIE CREEK WATER QUALITY IMPROVEMENT PROJECT
Document(s) for TMDL	*South Prairie Creek Bacteria and Temperature Total Maximum Daily Load (Water Cleanup Plan): Submittal Report*, June 2003, Ecology Publication No. 03-10-055. https://fortress.wa.gov/ecy/publications/publications/0310055.pdf *South Prairie Creek Bacteria and Temperature Total Maximum Daily Load (Water Cleanup Plan): Detailed Implementation Plan*, July 2006, Ecology Publication No. 06-10-018. https://fortress.wa.gov/ecy/publications/documents/0610018.pdf
Location of Original 303(d) Listings	South Prairie Creek VC19MO (WA-10-1085), Wilkeson Creek NX07HW (WA-10-1087)
Area Where TMDL Requirements Apply	Requirements apply in all areas regulated under the Permittee's municipal stormwater permit and discharging to water bodies listed within the specific requirement in this TMDL section.
Parameter	Fecal Coliform
EPA Approval Date	August 6, 2003
MS4 Permittee	Phase I Permit: Pierce County Phase II Permit: Buckley

PIERCE COUNTY

Actions Required

- Designate areas discharging via the MS4 to Tributary 1 upstream of SR162 as high priority areas for illicit discharge detection and elimination. No later than July 31, 2029, complete IDDE screening for bacteria sources in 100% of these sub-basins and implement the schedules and activities identified in S5.C.9 of the Phase I Permit in response to any illicit connections and illicit discharges found. Investigation must include activities for both the dry season (May through September) and the wet season (October through April). IDDE screening for bacteria sources includes the inspection of county owned MS4 outfalls that are safely accessible, or the next safely accessible upstream drainage access point that

discharge to creeks in the TMDL area. The results of all bacterial screening conducted in these sub-basins shall be included in the annual reports submitted to Ecology. Each annual report's TMDL summary shall include, where applicable, qualitative, and quantitative information about IDDE field screening activities for bacteria sources, including source identification and elimination activities and sampling results.

- Designate areas discharging via the MS4 upstream of SR165 along Spiketon Road, Mundy Loss Road, and Spiketon Ditch Road as high priority areas for illicit discharge detection and elimination. No later than July 31, 2029, complete IDDE screening for bacteria sources in 100% of these sub-basins and implement the schedules and activities identified in S5.C.9 of the Phase I Permit, in response to any illicit connections and illicit discharges found. Investigation must include activities for both the dry season (May through September) and the wet season (October through April). IDDE screening for bacteria sources includes the inspection of county owned MS4 outfalls that are safely accessible, or the next safely accessible upstream drainage access point that discharge to creeks in the TMDL area. The results of all bacterial screening conducted in these sub-basins shall be included in the annual reports submitted to Ecology. Each annual report's TMDL summary shall include, where applicable, qualitative and quantitative information about IDDE field screening activities for bacteria sources, including source identification and elimination activities and sampling results.

CITY OF BUCKLEY

Action Required

Designate areas discharging via the MS4 to Spiketon Creek as high priority areas for illicit discharge detection and elimination. No later than July 31, 2029, complete IDDE screening for bacteria sources in 100% of these sub-basins and implement the schedules and activities identified in S5.C.5 of the Western Washington Phase II Permit, in response to any illicit connections and illicit discharges found. Investigation must include activities for both the dry season (May through September) and the wet season (October through April). IDDE screening for bacteria sources includes the inspection of city owned MS4 outfalls that are safely accessible, or the next safely accessible upstream drainage access point that discharge to Spiketon Creek. The results of all bacterial screening conducted in these sub-basins shall be included in the annual reports submitted to Ecology. Each annual report's TMDL summary shall include, where applicable, qualitative, and quantitative information about IDDE field screening activities for bacteria sources, including source identification and elimination activities and sampling results.

Name of TMDL	WRIA 11 - NISQUALLY RIVER BASIN WATER QUALITY IMPROVEMENT PROJECT
EPA Approved Document(s) for TMDL	*Nisqually Watershed Bacteria and Dissolved Oxygen Total Maximum Daily Load (Water Cleanup Plan): Submittal Report*, May 2005, Ecology Publication No. 05-10-040. https://fortress.wa.gov/ecy/publications/documents/0503002.pdf *Nisqually River Basin Fecal Coliform Bacteria and Dissolved Oxygen Total Maximum Daily Load: Water Quality Implementation Plan (WQIP)*, June 2007, Ecology Publication No. 07-10-016. https://fortress.wa.gov/ecy/publications/documents/0710016.pdf
Location of Original 303(d) Listings	Nisqually Reach 390KRD (WA-PS-0290), Nisqually River OE72JI (WA-11-1010), McAllister Creek LD26OX (WA-11-2000), Ohop Creek MW64EV (WA-11-1024), Red Salmon Creek NoID (WA-PS-0290)
Area Where TMDL Requirements Apply	Requirements apply in all areas regulated under the Permittee's municipal stormwater permit and discharging to water bodies listed within the specific requirement in this TMDL section.
Parameter	Fecal Coliform, Dissolved Oxygen
EPA Approval Date	August 5, 2005
MS4 Permittee	Phase I Permit: Pierce County Phase II Permit: Thurston County

PIERCE COUNTY

Action Required

- Designate areas discharging via the MS4 to Ohop Creek and Lynch Creek as high priority areas for illicit discharge detection and elimination. No later than July 31, 2029, complete IDDE screening for bacteria sources in 100% of these sub-basins and implement the schedules and activities identified in S5.C.9 of the Phase I Permit in response to any illicit connections and illicit discharges found. Investigation must include activities for both the dry season (May through September) and the wet season (October through April). IDDE screening for bacteria sources includes the inspection of county owned MS4 outfalls that

are safely accessible, or the next safely accessible upstream drainage access point that discharge to Ohop and Lynch Creeks. The results of all bacterial screening conducted in these sub-basins shall be included in the annual reports submitted to Ecology. Each annual report's TMDL summary shall include, where applicable, qualitative, and quantitative information about IDDE field screening activities for bacteria sources, including source identification and elimination activities and sampling results.

THURSTON COUNTY

Action Required

- Annually implement the following best management practices for reducing fecal coliform bacteria in areas discharging to the Nisqually Reach and McAllister Creek via the MS4 in accordance with S5.C.2 and S5.C.9 of the Western Washington Phase II Permit:
    - Reach households in the targeted watersheds through mailings, door hangers, etc. to increase awareness of the sources of bacteria pollution.
    - Adequately maintain vegetation around stormwater facilities, ditches, and ponds.
    - Install and maintain pet waste education signage and bag dispenser stations at municipal parks and other Permittee owned and operated lands reasonably expected to have substantial dog use, and where stormwater runoff can enter the MS4 and discharge to surface waters and/or marine shorelines.
    - Distribute pet waste stations (i.e., bag dispensers and educational signage) for installation in residential neighborhood locations where people commonly walk their dogs and stormwater runoff can enter the MS4 and discharge to surface waters and/or marine shorelines.

Name of TMDL	WRIA 13 - HENDERSON INLET WATERSHED FECAL COLIFORM BACTERIA WATER QUALITY IMPROVEMENT PROJECT
Document(s) for TMDL	*Henderson Inlet Watershed Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Temperature Total Maximum Daily Load Study*, March 2006, Ecology Publication No. 06-03-012. https://fortress.wa.gov/ecy/publications/documents/0603012.pdf *Henderson Inlet Watershed Fecal Coliform Bacteria, Dissolved Oxygen, and pH Total Maximum Daily Load: Water Quality Improvement Report Implementation Strategy*, October 2006, Ecology Publication No. 06-10-058. https://fortress.wa.gov/ecy/publications/documents/0610058.pdf *Henderson Inlet Watershed Fecal Coliform Bacteria Total Maximum Daily Load: Water Quality Implementation Plan*, July 2008, Ecology Publication No. 08-10-040. https://fortress.wa.gov/ecy/publications/documents/0810040.pdf
Location of Original 303(d) Listings	Henderson Inlet (WA-13-0010), Dobbs Creek (WA-13-1400), Sleepy Creek (WA-13-1700), Woodard Creek (WA-13-1600), Woodland Creek (WA-13-1500)
Area Where TMDL Requirements Apply	Requirements apply in all areas regulated under the Permittee's municipal stormwater permit and discharging to water bodies listed within the specific requirement in this TMDL section.
Parameter	Fecal Coliform, Dissolved Oxygen, pH, Temperature
EPA Approval Date	January 8, 2007
MS4 Permittee	Phase II Permit: Lacey, Olympia, Thurston County

THURSTON COUNTY

Actions Required

1. Annually implement the following best management practices in areas discharging to the Henderson Inlet via the MS4 in accordance with S5.C.6 of the Western Washington Phase II Permit:

a. Require phosphorus control for new and redevelopment projects that discharge via the MS4 to Woodard Creek and meet the project thresholds in Appendix 1, Minimum Requirement #6: Runoff Treatment of the Western Washington Phase II Permit.

2. Annually implement the following best management practices for reducing fecal coliform in areas discharging to the Henderson Inlet via the MS4 in accordance with S5.C.2 of the Western Washington Phase II Permit.

   a. Continue offering public education and outreach efforts for fecal coliform reduction such as brochures, signage, and pet waste stations to homeowner associations.

3. Annually produce a report that details all actions completed as part of Appendix 2 requirements.

CITY OF LACEY

Actions Required

1. Annually implement the following best management practices in areas discharging to the Henderson Inlet via the MS4 in accordance with S5.C.2 of the Western Washington Phase II Permit:

   a. Continue the Private Stormwater Facilities Maintenance Program, providing commercial and residential stormwater facility/BMP owners educational resources for facility function and maintenance requirements.

   b. Offer bacteria pollution reduction brochures, signage, and pet waste stations to homeowners associations.

   c. Maintain pet waste bag dispenser units in city parks.

   d. Install educational signage at City facilities/property.

   e. Submit a summary of actions completed with each annual report.

2. Implement the Fecal Coliform Bacteria Wet Weather Sampling Program for the College Regional Stormwater Facility in accordance with the illicit discharge detection and elimination efforts and activities identified in S5.C.5 of the Western Washington Phase II Permit.

   a. Continue to use the Fecal Coliform Wet Weather Sampling Plan. The sampling program shall establish a regularly scheduled sampling schedule (at least two times per year), during the wet season (November through April), specific sampling locations, sampling protocols, parameters, analytical methods, and timelines for implementation.

   b. If sampling results indicate potential illicit discharges, conduct an investigation in accordance with S5.C.5 of the Western Washington Phase II Permit.

   c. Submit a summary of sampling and investigations with each annual report.

3. Continue to communicate with the City of Olympia to monitor and reduce fecal coliform bacteria discharges from the Fones/Taylor wetland treatment facilities by December 31, 2024, in accordance with S5.C.5 of the Western Washington Phase II Permit.
    a. If sampling results indicate potential illicit discharges, conduct an investigation in accordance with S5.C.5 of the Western Washington Phase II Permit.
    b. Submit a summary of efforts with sampling, investigation, and enforcement actions taken with the annual reports.
4. Annually implement the following best management practices in areas discharging to the Henderson Inlet via the MS4 in accordance with S5.C.9 of the Western Washington Phase II Permit:
    a. Continue re-vegetation and nuisance vegetation management along Woodland Creek and its tributaries. Submit a summary of actions completed with each annual report.

CITY OF OLYMPIA

Actions Required

1. Annually implement the following BMPs in areas discharging to the Henderson Inlet via the MS4 in accordance with S5.C.6 of the Western Washington Phase II Permit:
    a. Require phosphorus control for new and redevelopment projects that discharge via MS4 to Woodard Creek and meet the project thresholds in Appendix 1, Minimum Requirement #6: Runoff Treatment of the Western Washington Phase II Permit.
2. Continue to communicate with the City of Lacey to monitor and reduce fecal coliform bacteria discharges from the Fones/Taylor wetland treatment facilities by December 31, 2024 in accordance with S5.C.5 Illicit Discharge Detection and Elimination of the Western Washington Phase II Permit.
    a. Continue fecal coliform sampling. The sampling program shall require at least one sampling event during the wet season (November through April) in each of Year 1 and Year 3 of the permit cycle. The sampling program shall also require specific sampling locations, sampling protocols, parameters, analytical methods, and timelines for implementation.
    b. If sampling results indicate potential illicit discharges, conduct an investigation in accordance with S5.C.5 of the Western Washington Phase II Permit.
    c. Submit a summary of efforts with sampling, investigation and enforcement actions taken with each annual report.

Name of TMDL	WRIA 13 - DESCHUTES RIVER WATERSHED
Document(s) for TMDL	*Deschutes River, Percival Creek, and Budd Inlet Tributaries Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load Technical Report: Water Quality Study Findings.* Ecology Publication No. 12-03-008. https://fortress.wa.gov/ecy/publications/documents/1203008.pdf *Deschutes River, Percival Creek, and Budd Inlet Tributaries Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load: Water Quality Improvement and Implementation Plan.* Ecology Publication No. 15-10-012. https://fortress.wa.gov/ecy/publications/documents/1510012.pdf
Location of Original 303(d) Listings	Deschutes River 6576 7590 48710 48711 48712 48713 48714 48715 48717 48718 9439 7588 7592 7593 7595 48720 48721 48724 48726. Huckleberry Creek 3757. Reichel Creek 48666. Tempo Lake Outlet 48696. Unnamed Creek (Trib to Deschutes River) 7591. Unnamed Spring (Trib to Deschutes River) 48923. Black Lake Ditch 48733 48734 48735. Percival Creek 42321 48249 48727 48729.
Area Where TMDL Requirements Apply	Requirements apply in all areas regulated under the Permittee's municipal stormwater permit and discharging to water bodies listed within the specific requirement in this TMDL section.
Parameter	Temperature
EPA Approval Date	Temperature approved: June 29, 2018
MS4 Permittee	Phase II Permit: Thurston County, Olympia, Lacey, Tumwater

Cities of Olympia; Lacey; Tumwater; and Thurston County

Actions Required

- Annually report on temperature reduction measures in the watershed.

Name of TMDL	WRIA 13 – BUDD INLET
Document(s) for TMDL	*Budd Inlet Dissolved Oxygen Total Maximum Daily Load* Publication No. 22-10-012. Budd Inlet Total Maximum Daily Load for Dissolved Oxygen (wa.gov)
Location of Original 303(d) Listings	Budd Inlet (inner): 5852, 5853, 5862, 5863, 5864. Budd Inlet (outer): 7582, 7583, 7584, 7585, 7586, 7587, 10188, 81727
Area Where TMDL Requirements Apply	Requirements apply in all areas regulated under the Permittee's municipal stormwater permit and discharging to water bodies listed within the specific requirement in this TMDL section.
Parameter	Dissolved Oxygen
EPA Approval Date	Approved:December 16, 2022
MS4 Permittee	Phase II Permit: Thurston County, Olympia, Lacey, Tumwater

CITY OF OLYMPIA, LACEY, TUMWATER, & THURSTON COUNTY

Actions required

- No later than March 31, 2025, annually report on municipal stormwater BMPs implemented (in addition to those already required by S5 of the permit) since the effective date of this permit (August 1, 2024) to help control nutrients for areas discharging to Budd Inlet via the MS4.
- No later than December 31, 2027, begin using existing data to conduct spatial analysis of nutrient loading from the MS4. This analysis shall consider land use sources of nutrients, existing municipally owned/operated BMPs, and privately owned BMPs regulated by the Permit that provide management of nutrients and which drain to and are discharged from the MS4.
- No later than August 1, 2028, develop and implement priority BMPs to minimize the transport of nutrients via the MS4.
- Designate areas discharging via the MS4 to Budd Inlet as high priority areas for illicit discharge detection and elimination. Complete IDDE screening for nutrient sources in 100% of these areas by July 31, 2029, and implement the schedules and activities

identified in S5.C.5 of the Western Washington Phase II Permit in response to any illicit discharges found.

- For the actions described above, prioritize work and implementation actions within areas identified as priorities by the TMDL that are within the applicable jurisdiction, including East Bay Drive, West Bay Drive and Deschutes Parkway, tributaries draining directly to Budd Inlet, with extra emphasis on Schneider Creek, Ellis Creek, Mission Creek, Moxlie Creek, Percival Creek, Black Lake, and Black Lake Ditch.

Name of TMDL	**WRIA 14 - OAKLAND BAY, HAMMERSLEY INLET, AND SELECTED TRIBUTARIES FECAL COLIFORM TMDL**
Document(s) for TMDL	*Oakland Bay, Hammersley Inlet, and Selected Tributaries Fecal Coliform Bacteria Total Maximum Daily Load (Water Quality Improvement Report)*, June 2011, Ecology Publication No. 11-10-039. https://apps.ecology.wa.gov/publications/SummaryPages/1110039.html
Location of Original 303(d) Listings	Campbell Creek 24239 7596 Uncle John Creek 40618 Malaney Creek 24237 Goldsborough Creek 6659 Shelton Creek 6660 Inner Shelton Harbor 6658 Oakland Bay 39857 39861 39862 39872 45159 45215 53164 Hammersley Inlet/mouth of Mill Creek 39800 Hammersley Inlet 39801 39803 39804 39810 45220 45915 53178
Area Where TMDL Requirements Apply	Requirements apply in all areas regulated under the Permittee's municipal stormwater permit and discharging to water bodies listed within the specific requirement in this TMDL section.
Parameter	Fecal Coliform
EPA Approval Date	August 18, 2011
MS4 Permittee	Phase II Permit: Shelton

CITY OF SHELTON

Actions Required

- Designate areas discharging via MS4 to Goldsborough Creek, Inner Shelton Harbor, and Oakland Bay as high priority areas for illicit discharge detection and elimination and implement the schedules and activities identified in S5.C.5 of the Western Washington Phase II Permit. IDDE screening for bacteria sources includes the inspection of city owned MS4 outfalls that are safely accessible, or the next safely accessible upstream drainage access point that discharge to Goldsborough Creek, Inner Shelton Harbor, and Oakland Bay. Bacterial screening results shall be included in annual reporting submitted to Ecology. Each annual report's TMDL summary shall include, where applicable, qualitative, and quantitative information about IDDE field screening activities for bacteria sources, including source identification and elimination activities and sampling results.
- Conduct public education and outreach activities to increase awareness of bacterial pollution problems and promote proper pet waste management behavior.
- Install and maintain animal waste education signage and/or pet waste bag dispenser stations at municipal parks and other Permittee owned and operated lands reasonably expected to have substantial domestic animal (dog and horse) use where stormwater runoff can enter the MS4 and discharge to surface waters and/or marine shorelines.

Name of TMDL	WRIA 15 - SINCLAIR AND DYES INLETS FECAL COLIFORM BACTERIA TOTAL MAXIMUM DAILY LOAD
Document(s) for TMDL	*Sinclair and Dyes Inlets Fecal Coliform Bacteria Total Maximum Daily Load (TMDL) Water Quality Implementation Plan*, In Draft, Ecology Publication No. 11-10-051. https://fortress.wa.gov/ecy/publications/publications/1110051.pdf
Location of Original 303(d) Listings	Dyes Inlet & Port Washington Narrows (WA-15-0020) Gorst Creek (WA-15-4000) Blackjack Creek (WA-15-4200) Annapolis Creek (WA-15-4400) Beaver Creek (WA-15-4900) Clear Creek (WA-15-5000) Barker Creek (WA-15-5100) Sinclair Inlet (WA-15-0040)
Area Where TMDL Requirements Apply	These requirements apply to areas served by MS4s listed below within the TMDL coverage area.
Parameter(s)	Fecal coliform bacteria
EPA Approval Date	July 5, 2012
MS4 Permittee	Phase II Permit: City of Bainbridge Island, WAR04-5503; City of Bremerton, WAR04-5507; City of Port Orchard, WAR04-5536; Kitsap County, WAR04-5546

CITY OF BAINBRIDGE ISLAND

Actions Required

Business Inspections:

The Permittee shall inspect facilities with SIC Industry Group no. 074, 075, including NAICS Major Group 1152xx, and NAICS 325315 (composting facilities) as part of their ongoing inspection program identified in S5.C.8. If the Permittee determines, through inspections or otherwise, that a facility has failed to adequately implement BMPs to prevent bacteria source potential, the Permittee shall re-inspect the facility at least once more during the permit term to verify compliance, and/or initiate enforcement action.

***Public Education and Outreach**:* Each Permittee shall include public education and outreach activities that increase awareness of bacterial pollution problems and promote proper pet waste management as a BMP under General Awareness.

Operations and Maintenance: Each Permittee shall maintain Pet Waste collection stations at Permittee owned or operated lands that are reasonably expected to have domestic animal (dog and horse) use and the potential for pollution to stormwater.

Illicit Connection/ Illicit Discharge Detection and Elimination:

When conducting IDDE field screening during normal course of business (as required by S5.C.5.d for Phase II Permittees, and IC/IDDE as required by S5.C.9.c for Phase I Permittees) in a TMDL area, Permittees are shall screen for bacteria sources when at the drainage circuit's most downstream sampling location. For the purposes of IC/IDDE, stormwater quality sampling is defined as obtaining grab samples of stormwater within the conveyance system of the MS4, at discharge points, and/or outfalls (if there is flow) at each drainage circuit's most downstream accessible sampling location. Permittees shall follow their adopted IDDE procedures to conduct source tracing efforts if bacteria levels and/or observations trigger a response (see IDDE guidance manual for bacteria trigger levels).

Qualitative and quantitative information about the source identification and elimination activities, including procedures followed, sampling locations, and results shall be annually documented in TMDL reporting as required in the Permittees' Annual Report.

CITY OF BREMERTON

Actions Required

***Business Inspections**:*

The Permittee shall inspect facilities with SIC Industry Group no. 074, 075, including NAICS Major Group 1152xx, and NAICS 325315 (composting facilities) as part of their ongoing inspection program identified in S5.C.8. If the Permittee determines, through inspections or otherwise, that a facility has failed to adequately implement BMPs to prevent bacteria source potential, the Permittee shall re-inspect the facility at least once more during the permit term to verify compliance, and/or initiate enforcement action.

***Public Education and Outreach**:* Each Permittee shall include public education and outreach activities that increase awareness of bacterial pollution problems and promote proper pet waste management as a BMP under General Awareness.

Operations and Maintenance: Each Permittee shall maintain Pet Waste collection stations at Permittee owned or operated lands that are reasonably expected to have domestic animal (dog and horse) use and the potential for pollution to stormwater.

Illicit Connection/ Illicit Discharge Detection and Elimination:

When conducting IDDE field screening during normal course of business (as required by S5.C.5.d for Phase II Permittees, and IC/IDDE as required by S5.C.9.c for Phase I Permittees) in a TMDL area, Permittees are shall screen for bacteria sources when at the drainage circuit's most downstream sampling location. For the purposes of IC/IDDE, stormwater quality sampling is defined as obtaining grab samples of stormwater within the conveyance system of the MS4, at discharge points, and/or outfalls (if there is flow) at each drainage circuit's most downstream accessible sampling location. Permittees shall follow their adopted IDDE Procedures to conduct source tracing efforts if bacteria levels and/or observations trigger a response (see IDDE guidance manual for bacteria trigger levels).

Qualitative and quantitative information about the source identification and elimination activities, including procedures followed, sampling locations, and results shall be annually documented in TMDL reporting as required in the Permittees' Annual Report.

CITY OF PORT ORCHARD

Actions Required

Business Inspections:

The Permittee shall inspect facilities with SIC Industry Group no. 074, 075, including NAICS Major Group 1152xx, and NAICS 325315 (composting facilities) as part of their ongoing inspection program identified in S5.C.8. If the Permittee determines, through inspections or otherwise, that a facility has failed to adequately implement BMPs to prevent bacteria source potential, the Permittee shall re-inspect the facility at least once more during the permit term to verify compliance, and/or initiate enforcement action.

Public Education and Outreach: Each Permittee shall include public education and outreach activities that increase awareness of bacterial pollution problems and promote proper pet waste management as a BMP under General Awareness.

Operations and Maintenance: Each Permittee shall maintain Pet Waste collection stations at Permittee owned or operated lands that are reasonably expected to have domestic animal (dog and horse) use and the potential for pollution to stormwater.

Illicit Connection/ Illicit Discharge Detection and Elimination:

When conducting IDDE field screening during normal course of business (as required by S5.C.5.d for Phase II Permittees, and IC/IDDE as required by S5.C.9.c for Phase I Permittees) in a TMDL area, Permittees are shall screen for bacteria sources when at the drainage circuit's most downstream sampling location. For the purposes of IC/IDDE, stormwater quality sampling is defined as obtaining grab samples of stormwater within the conveyance system of the MS4, at discharge points, and/or outfalls (if there is flow) at each drainage circuit's most downstream accessible sampling location. Permittees shall follow their adopted IDDE Procedures to conduct

source tracing efforts if bacteria levels and/or observations trigger a response (see IDDE guidance manual for bacteria trigger levels).

Qualitative and quantitative information about the source identification and elimination activities, including procedures followed, sampling locations, and results shall be annually documented in TMDL reporting as required in the Permittees' Annual Report.

KITSAP COUNTY

Actions Required

Business Inspections:

The Permittee shall inspect facilities with SIC Industry Group no. 074, 075, including NAICS Major Group 1152xx, and NAICS 325315 (composting facilities) as part of their ongoing inspection program identified in S5.C.8. If the Permittee determines, through inspections or otherwise, that a facility has failed to adequately implement BMPs to prevent bacteria source potential, the Permittee shall re-inspect the facility at least once more during the permit term to verify compliance, and/or initiate enforcement action.

Public Education and Outreach: Each Permittee shall include public education and outreach activities that increase awareness of bacterial pollution problems and promote proper pet waste management as a BMP under General Awareness.

Operations and Maintenance: Each Permittee shall maintain Pet Waste collection stations at Permittee owned or operated lands that are reasonably expected to have domestic animal (dog and horse) use and the potential for pollution to stormwater.

Illicit Connection/ Illicit Discharge Detection and Elimination:

When conducting IDDE field screening during normal course of business (as required by S5.C.5.d for Phase II Permittees, and IC/IDDE as required by S5.C.9.c for Phase I Permittees) in a TMDL area, Permittees are shall screen for bacteria sources when at the drainage circuit's most downstream sampling location. For the purposes of IC/IDDE, stormwater quality sampling is defined as obtaining grab samples of stormwater within the conveyance system of the MS4, at discharge points, and/or outfalls (if there is flow) at each drainage circuit's most downstream accessible sampling location. Permittees shall follow their adopted IDDE Procedures to conduct source tracing efforts if bacteria levels and/or observations trigger a response (see IDDE guidance manual for bacteria trigger levels).

Qualitative and quantitative information about the source identification and elimination activities, including procedures followed, sampling locations, and results shall be annually documented in TMDL reporting as required in the Permittees' Annual Report.

Name of TMDL	WRIA 22 - GRAYS HARBOR/CHEHALIS WATERSHED FECAL COLIFORM BACTERIA TOTAL MAXIMUM DAILY LOAD
Document(s) for TMDL	*Grays Harbor/Chehalis Watershed Fecal Coliform Bacteria Total Maximum Daily Load Submittal Report*, December 2001, Ecology Publication No. 01-10-025. https://fortress.wa.gov/ecy/publications/documents/0110025.pdf *Quality Assurance Project Plan: Grays Harbor Fecal Coliform Bacteria Monitoring to Characterize Water Quality in Urban Stormwater Drains*, October 2010, Ecology Publication No. 10-10-066. https://fortress.wa.gov/ecy/publications/documents/1010066.pdf
Location of Original 303(d) Listings	Outer Grays Harbor (WA-22-0020), Inner Grays Harbor (WA-22-030), Inner Grays Harbor (WA-22-0030), Chehalis River (WA-22-4040)
Area Where TMDL Requirements Apply	Requirements apply in all areas regulated under the Permittee's municipal stormwater permit and discharging to water bodies listed within the specific requirement in this TMDL section.
Parameter	Fecal Coliform
EPA Approval Date	December 2002
MS4 Permittee	Phase II Permit: Aberdeen

CITY OF ABERDEEN

Actions Required

1. Implement the schedules and activities identified in S5.C.2 of the Western Washington Phase II Permit. Continue to implement the Public Education and Outreach and Involvement Plan (Plan). The Plan shall target the reduction of fecal coliform pollution by increasing public awareness, effecting behavior changes and shall include: goals, target audiences, messages, format, distribution, and evaluation methods.
    a. The Plan shall include at least the following elements:
        i. Target the residents of the three high priority water bodies identified under the 2024-2029 Permit.

ii. Reach households in targeted watersheds through mailings, door hangers, or similar outreach tools.

iii. Reach 4-6th grade students.

b. Continue program which notifies residents, in a timely manner, when bacteria pollution that poses a public health concern (such as a wastewater overflow) reaches the MS4.

c. Conduct two public education surveys gauging 4-6th grade student knowledge of general stormwater knowledge, the sources of bacteria and preventing bacteria pollution. One survey should measure resident's knowledge of bacteria pollution before outreach and the other should measure knowledge and likelihood of action after outreach.

d. Continue to implement the City's stream team program and work cooperatively with Grays Harbor Stream Team.

e. Maintain pet waste bag dispenser units and explanatory signs in public areas with dog usage.

f. Maintain an inventory of sources that have potential for bacteria runoff such as manure-composting facilities, stables, and kennels.

i. Continue to use the City's targeted manure management educational plan for such facility owners. Send one letter annually that outlines compliance requirements. Maintain a resource webpage on the City's website. Submit a summary of actions completed with each annual report.

2. Designate areas discharging to the MS4 urban drains identified in the TMDL, as the highest priority areas for illicit discharge detection and elimination routine field screening efforts and implement the schedules and activities identified in S5.C.5 of the Western Washington Phase II Permit. Field screening and source tracing methodology (see S5.C.5.d) must be consistent with the *Quality Assurance Project Plan: Grays Harbor Fecal Coliform Bacteria Monitoring to Characterize Water Quality in Urban Stormwater Drains,* October 2010.

a. Enforce the City's regulatory mechanism to control pet waste.

b. Designate areas discharging via MS4 to the following discharge points: 501-ABDN, 510-MST, and 514-MST as high priority areas for illicit discharge detection and elimination efforts.

i. Complete field screening and implement the schedules and priority area for illicit discharge detection and elimination field screening identified in S5.C.5 of the Western Washington Phase II Permit. Investigation must include activities for both the dry season (May through October) and the wet season (November through April).

ii. Conduct twice monthly wet weather sampling of the discharge points 501-ABDN, 510-MST, and 514-MST to determine if specific discharges from Aberdeen's MS4 exceed the water quality criteria for fecal coliform bacteria.

- Data shall be collected for two wet seasons.
- Data shall be collected in accordance with an Ecology-approved QAPP.
- Samples must be analyzed using an Ecology accredited lab.
- If sampling results indicate potential illicit discharges, conduct an investigation in accordance with S5.C.5 – *Illicit Discharge Detection and Elimination* of the Western Washington Phase II Permit.
- Data shall be submitted to Ecology in an approved format with the annual reports.

APPENDIX 3 - Annual Report Questions for Cities, Towns, and Counties

Permittees are required to submit the following information in an online annual report form, or an alternative format provided by Ecology if requested, pursuant to Special Condition S9.

Reporting Requirements and SWMP

1. **Attach** a map of any annexations, incorporations, or boundary changes resulting in an increase or decrease in the Permittee's geographic area of permit coverage during the reporting period, per S9.D.6.
2. **Attach** updated annual Stormwater Management Program Plan (SWMP Plan). (S5.A.2)
3. Implemented an ongoing program to gather, track, and maintain information per S5.A.3, including costs or estimated costs of implementing the SWMP.
    a. What was the annual expenditure or estimate to develop and implement the SWMP this reporting period?
    b. What was the annual expenditure or estimate to develop and implement Appendix 2 TMDL requirements, if applicable?
    c. What were your source(s) of funding for the stormwater program?
4. Continued to coordinate among departments within the jurisdiction for permit compliance. (S5.A.5.b)
    a. **Attach** a written description of internal coordination mechanisms. (S5.A.5.b) no later than March 31, 2026
5. If applicable, identify other entities relied on to satisfy any of the obligations under the Permit. (S9.D.4)

Stormwater Planning

6. Continue to convene an interdisciplinary team to inform and assist in the development, progress, and influence of the stormwater planning program? (S5.C.1.a.)

Coordination with long-range plan updates

7. List the relevant land use planning efforts that have taken place in your jurisdiction (land use plans that are used to accommodate growth, stormwater management, or transportation). (S5.C.1.b.i. – Required by March 31, 2027.)
8. List of stormwater capital projects (currently in or slated for future design and construction) that resulted from this planning. (S5.C.1.b.i. – Required by March 31, 2027.)

9. Describe watershed protection measures associated with stormwater management and land use planning actions that resulted from this planning. (S5.C.1.b.i. – Required by March 31, 2027.)

10. Were land acquisitions identified (or are planning ahead for) that are useful for stormwater facilities to: accommodate growth or to better serve an existing developed area? (S5.C.1.b.i. – Required by March 31, 2027.)

    a. If yes, for what purpose?

11. Updates to goals and policies related to investment in stormwater management facilities/BMPs? (yes/no) (S5.C.1.b.i. – Required by March 31, 2027)

    a. If yes, briefly describe.

Low impact development code-related requirements

12. Continue to design and implement local development-related codes, rules, standards, or other enforceable documents to minimize impervious surfaces, native vegetation loss, and stormwater runoff, where feasible? See S5.C.1.c.i. (Required annually)

13. From the assessment described in S5.C.1.c.i.(a), did you identify any administrative or regulatory barriers to implementation of LID Principles or LID BMPs? (Required annually)

    a. If yes, describe the barrier(s) and the measures taken to address them**.** (S5.C.1.c.i.(a))

14. Adopted and implemented tree canopy goals and policies to support stormwater management. (S5.C.1.c.iii; December 31, 2028)

    a. **Attach** goals and policies and documented considerations, reasoning, and rationale for tree canopy goals and policies.

Stormwater Management Action Planning

15. Shelton Only: Developed a watershed inventory as outlined in Appendix 14? (Submitted by March 31, 2027)

    a. **Attach** watershed inventory as described in S5.C.1.d.i.

16. Shelton Only: Developed a receiving water prioritization method and process as described in Appendix 14? (Required by June 30, 2027)

    a. **Attach** receiving water priority ranking process as described in Appendix 14.

17. Shelton Only: Developed a Stormwater Action Plan (SMAP) for at least one high priority area? (Appendix 14, March 31, 2028)

    a. **Attach** SMAP(s).

18. Developed a Stormwater Management Action Plan (SMAP) for at least one new high priority area or additional actions for an existing SMAP? (S.5.C.1.d.i; Required by March 31, 2027)

- **a. Attach** SMAP(s).

Education and Outreach

19. Did you choose to adopt one or more elements of a regional program? (S5.C.2)

- **a.** If yes, list the elements, and the regional program.

20. **Attach** a description of general awareness efforts conducted, including your priority audiences and subject areas, per S5.C.2.a.i.

21. Developed a behavior change campaign that is tailored to the community in accordance with S5.C.2.a.ii(b)? (Required no later than July 1, 2025)

- **a. Attach** the strategy and schedule developed in accordance with S5.C.2.a.ii.(b).

22. Began implementing strategy outlined in S.5.C.2.a.ii(b). (S5.C.2.a.ii(c)) – Required by September 1, 2025)

23. **Attach** the report developed in accordance with S5.C.2.a.ii.(d), which evaluated the changes in understanding and adoption of targeted behaviors resulting from the implementation of the strategy and any planned or recommended changes to the program in order to be more effective. (Required to submit no later March 31, 2029)

24. Provided, partnered, or promoted stewardship opportunities to encourage resident participation in activities such as those described in S5.C.2.a.iii.

- **a. Attach** a list of stewardship opportunities.

Public Involvement and Participation

25. Describe in *Comments* field the opportunities created for the public to participate in the decision-making processes involving the development, implementation, and updates of the Permittee's SWMP and the SMAP.

- **a.** Describe specific public involvement and participation opportunities provided to overburdened communities and specifically, highly impacted communities. (S5.C.3.a.i)
- **b.** Document methods used to identify overburdened communities. (No later than December 31, 2026, S5.C.3.a.ii)

26. Posted the updated SWMP Plan and latest annual report on your website no later than May 31 of each year? (S5.C.3.b)

a. List the website address in *Comments* field.

MS4 Mapping and Documentation

27. Maintained an electronic map of the MS4 including the requirements listed in S5.C.4.?

28. **Attach** file with all known outfall locations, size, and materials no later than March 31, 2026, in accordance with S5.C.4.b.i. The data shall be in one of the following formats:

- ESRI file geodatabase template[1] (feature class in a .gdb).
- Shapefile template[2]
- ArcGIS Online template (sharing template a or b via ArcGIS Online).
- Excel template[3]

29. No later than December 31, 2026, mapped tree canopy to support stormwater management on Permittee-owned or operated properties, using available, existing data (S5.C.4.b.ii).

30. Mapped and assessed acreage of MS4 tributary basins to 24-inch outfalls (or equivalent) that have stormwater treatment and flow control BMPs/facilities owned or operated by the Permittee per S5.C.4.b.iii (no later than March 31, 2028).

a. **Attach** map of the MS4 tributary basins (.pdf file format).

b. **Attach** a table with a breakdown of MS4 tributary basins quantifying estimated acres managed or unmanaged by stormwater treatment and flow control BMPs/facilities owned or operated by the Permittee (.xlsx file format).

31. No later than December 31, 2028, use available, existing data to map overburdened communities in relation to stormwater treatment and flow control BMPs/facilities, outfalls, discharge points, and tree canopy on Permittee-owned or operated properties. (S5.C.2.b.iv)

Illicit Discharge Detection and Elimination

32. Informed public employees, businesses, and the general public of hazards associated with illicit discharges and improper disposal of waste. (S5.C.5.b)

a. Describe actions in *Comments* field. (S5.C.5.b)

[1] https://fortress.wa.gov/ecy/ezshare/wq/permits/MS4GP.Mapoutfall.prelim.gdb.zip
[2] https://fortress.wa.gov/ecy/ezshare/wq/permits/MS4GP.Mapoutfall.prelim.shape.zip
[3] https://fortress.wa.gov/ecy/ezshare/wq/permits/MS4GP.Mapoutfall.prelim.excel.xlsx

33. Continued to implement an ordinance or other regulatory mechanism to effectively prohibit stormwater, illicit discharges, as described in S5.C.5.c.

34. Updated an ordinance or other regulatory mechanism, if necessary, to effectively prohibit non-stormwater, illicit discharges, as described in S5.C.5.c. Required no later than July 1, 2027.

35. Implemented procedures for conducting illicit discharge investigations in accordance with S5.C.5.d.i.

- **a.** Cite field screening methodology in *Comments* field.

36. Percentage of MS4 coverage area screened in the reporting year per S5.C.5.d.i.(a). (Required to screen 12% on average each year.)

- **a.** Cite field screening techniques used to determine percent of MS4 screened.

37. Describe how you publicized a hotline telephone number for public reporting of spills and other illicit discharges in the *Comments* field (S5.C.5.d.ii).

38. Implemented an ongoing illicit discharge training program for all municipal field staff, per S5.C.5.d.iii.

39. Implemented an ongoing program to characterize, trace, and eliminate illicit discharges, including spills and illicit discharges, into the MS4, per S5.C.5.e.

- **a.** No later than December 31, 2026, coordinated with firefighting agencies/departments to be notified when PFAS-containing AFFFs are used, per S5.C.5.e.ii.(a)?
- **b.** No later than January 1, 2027, updated procedures to minimize discharge of PFAS-containing AFFFs during post-emergency clean-up, per S5.C.5.e.ii.(b)?

40. Implemented an ongoing illicit discharge training program for all staff responsible for implementing the procedures and program described in S5.C.5.f.

41. **Attach** a report with data describing the actions taken to characterize, trace, and eliminate each illicit discharge reported to, or investigated by, the Permittee, as described in S5.C.5.g. The submittal must include all of the applicable information and must follow the instructions, timelines, and format described in Appendix 13.

Controlling Runoff from New Development, Redevelopment, and Construction Sites

42. Continued to implement an ordinance or other enforceable mechanism to effectively address runoff from new development, redevelopment, and construction sites, per the requirements of S5.C.6.b.i-iii.

43. Updated ordinance or other enforceable mechanism to effectively address runoff from new development, redevelopment, and construction sites, per the requirements of S5.C.6.b.i-iii. (Required no later than June 30, 2027)

- **a.** Cite code reference in *Comments* field.

44. Does the ordinance or other enforceable mechanism follow a Phase I program approved by Ecology (S5.C.6.b.i)?

- **a.** If yes, state the title of the Stormwater Management Manual and which Phase I Program.

45. Number of adjustments granted to the Minimum Requirements in Appendix 1. (S5.C.6.b.i and Section 5 of Appendix 1)

- **a.** Number of adjustments granted to Minimum Requirement #5?

46. Number of exceptions granted to the Minimum Requirements in Appendix 1. (S5.C.6.b.i and Section 6 of Appendix 1)

- **a.** Number of exceptions granted to the Minimum Requirements #5?

47. Reviewed *Stormwater Site Plans* for all proposed development activities that meet the thresholds adopted pursuant to S5.C.6.b.i. (S5.C.6.c.i)

- **a.** Number of site plans reviewed during the reporting period.

48. Inspected, prior to clearing and construction, permitted development sites, per S5.C.6.c.ii

49. Inspected permitted development sites during construction to verify proper installation and maintenance of required erosion and sediment controls, per S5.C.6.c.iii.

- **a.** Number of construction sites inspected, per S5.C.6.c.iii.
- **b.** Inspected stormwater treatment and flow control BMPs/facilities and catch basins in new residential developments at least twice per 12-month period with no less than 4 months between inspections, per S5.C.6.c.iv?

50. Inspected all permitted development sites upon completion of construction and prior to final approval or occupancy to ensure proper installation of permanent stormwater facilities. (S5.C.6.c.v)

51. Verified a maintenance plan is completed and responsibility for maintenance is assigned for stormwater treatment and flow control BMPs/facilities prior to final approval and occupancy being granted. (S5.C.6.c.v)

52. Number of enforcement actions taken during the reporting period (based on construction phase inspections at new development and redevelopment projects, per S5.C.6.c.ii-iv). (S5.C.6.c.viii)

53. Achieved at least 80% of scheduled construction-related inspections. (S5.C.6.c.vi)

54. Made online links to Ecology's *Construction Stormwater General Permit* Notice of Intent, the *Industrial Stormwater General Permit* Notice of Intent, and the registration requirements for Underground Injection Control (UIC) available to representatives of proposed new development and redevelopment? (S5.C.6.d)

55. All staff whose primary job duties are implementing the program to control stormwater runoff from new development, redevelopment, and construction sites including permitting, plan review, construction site inspections, and enforcement are trained to conduct these activities. (S5.C.6.e)

Stormwater Management for Existing Development

56. **Attach** a list of projects that are fully funded, started, completed and/or scheduled for implementation during this permit term for the purpose of meeting S5.C.7.b, with the information and formatting specified in Appendix 12. **Attach** an updated list annually. (S5.C.7.b,)

Source Control Program for Existing Development

57. Updated inventory to identify institutional, commercial and industrial properties which have the potential to generate pollutants to the Permittee's MS4 per S5.C.8.b? (Required at least once every five years)

- **a.** Number of total sites identified for the inventory.

58. **Attach** a summary of actions taken to implement the source control program, per S5.C.8.a-d.

59. **Attach** a list of inspections, per S5.C.8.c.v, organized by the business category, noting the number of times each business was inspected and if enforcement actions were taken, per S5.C.8.d.

60. Implemented an ongoing source control training program, per S5.C.8.e?

Operations and Maintenance

61. Implemented maintenance standards that are as protective, or more protective, of facility function than those specified in the *Stormwater Management Manual for Western Washington,* or a Phase I program approved by Ecology, per S5.C.9.a.?

62. Updated maintenance standards specified in *Stormwater Management Manual for Western Washington,* or a Phase I program approved by Ecology, per S5.C.9.a? (Required no later than June 30, 2027)

63. Applied a maintenance standard for a facility or facilities which do not have maintenance standards specified in the *Stormwater Management Manual for Western Washington*?

- **a.** If so, note in the *Comments* field what kinds of facilities are covered by this alternative standard. (S5.C.9.a)

64. Verified that maintenance was performed per the schedule in S5.C.9.a.ii, when an inspection identified an exceedance of the maintenance standard.

- **a. Attach** documentation of maintenance time frame exceedances that were beyond the Permittee's control.

65. Implemented an ordinance, or other enforceable mechanisms, to verify long-term operation and maintenance of stormwater treatment and flow control BMPs/facilities regulated by the Permittee per S5.C.9.b.i(a)?

66. Inspected stormwater treatment and flow control BMPs/facilities regulated by the Permittee, per S5.C.9.b.i(b).

- **a.** Are you using a reduced stormwater treatment and flow control BMPs/facilities inspection frequency?
- **b.** If using a reduced inspection frequency on stormwater facilities regulated by the Permittee for the first time during this permit cycle, **attach** documentation per S5.C.9.b.i.(b).

67. Achieved at least 80% of required inspections to verify adequate long-term O&M. (S5.C.9.b.ii)

68. Annually inspected municipally owned or operated stormwater treatment and flow control BMPs/facilities, as per S5.C.9.c.i.

- **a.** Number of known stormwater treatment and flow control BMPs/facilities owned or operated by the Permittee.
- **b.** Number of facilities inspected during the reporting period.
- **c.** Number of facilities for which maintenance was performed during the reporting period.

69. If using a reduced inspection frequency, **attach** documentation per S5.C.9.c.i.

70. Conducted spot checks and inspections of potentially damaged stormwater facilities after major storms as per S5.C.9.c.ii.

71. Inspected catch basins owned or operated by the Permittee every two years or used an alternative approach? (S.5.C.9.c.iii)

- **a.** Number of known catch basins and inlets?
- **b.** Number of catch basins and inlets inspected during the reporting period?
- **c.** Number of catch basins and inlets cleaned during the reporting period?

72. **Attach** documentation of alternative catch basin inspection approach for those owned or operated by the Permittee, if used, per S5.C.9.c.iii.

73. Implemented practices, policies, and procedures to reduce stormwater impacts associated with runoff from all lands owned or maintained by the Permittee, and road maintenance activities under the functional control of the Permittee. (S5.C.9.d)

74. Updated documented practices, policies, and procedures to reduce stormwater impacts associated with runoff from all lands owned or maintained by the Permittee, and road maintenance activities under the functional control of the Permittee. (S5.C.9.d –No later than December 31, 2027)

- **a.** Cite documentation in *Comments.*

75. No later than July 1, 2027, developed and implemented a municipal street sweeping program to focus on priority areas and times during the year that would reasonably be expected to result in the maximum water quality benefits to receiving waters (S5.C.9.e, required to report beginning March 31, 2028).

76. **Attach** documentation if implementing an alternative sweeping timing and frequency based on local conditions. (S5.C.9.e.ii.b.)

77. Document the following information for the sweeping program's priority areas (S5.C.9.e.v, Beginning no later than March 31, 2028):

- **a.** **Attach** priority areas swept on a map
- **b.** Sweeping dates
- **c.** Sweeping frequency
- **d.** Type of sweeper
- **e.** Total curb miles of priority areas and curb miles swept
- **f.** Approximation of street waste solids removed for each sweeping event, with unit of weight and wet or dry weight, where available.

78. Disposed of sweeper waste material in accordance with Appendix 6- *Street Waste Disposal* (S5.C.9.e.iv)?

79. Implemented a *Stormwater Pollution Prevention Plan* (SWPPP) for all heavy equipment maintenance or storage yards, and material storage facilities owned or operated by the Permittee in areas subject to this Permit that are not required to have coverage under an NPDES permit that covers stormwater discharges associated with the activity. (S5.C.9.f)

80. Implemented an ongoing training program for Permittee employees whose primary construction, operations or maintenance job functions may impact stormwater quality. (S5.C.9.g)

Compliance with Total Maximum Daily Load Requirements

81. Complied with the Total Maximum Daily Load (TMDL)-specific requirements identified in Appendix 2. (S7.A)

- **a**. List any requirements that were not met.

82. For TMDLs listed in Appendix 2: **Attach** a summary of relevant SWMP and Appendix 2 activities to address the applicable TMDL parameter(s). (S7.A)

Monitoring and Assessment

83. Submitted payment for cost-sharing for Stormwater Action Monitoring (SAM) status and trends monitoring no later than December 1, 2024 (S8.A.1); and no later than August 15 of each subsequent year. (S8.A.2.a)

84. Notified Ecology in writing by December 1, 2024, which option you selected: S8.A.2.a, or S8.A.2.b.

85. Submitted payment for cost-sharing for SAM effectiveness and source identification studies no later than December 1, 2024 (S8.B.1); and no later than August 15 of each subsequent year. (S8.B.3.a)

86. Notified Ecology by December 1, 2024, which option you selected: S8.B.2.a, or S8.B.2.b.

87. If conducting stormwater discharge monitoring in accordance with S8.C.1, submitted a QAPP to Ecology no later than February 1, 2025? (S8.C.1.b and Appendix 9)

88. If conducting stormwater discharge monitoring in accordance with S8.C.1, **attach** a data and analysis report, per S8.C.1.d and Appendix 9. (Due annually beginning March 31, 2026)

General Conditions and Compliance with Standards

89. Notified Ecology in accordance with G3 of any discharge into or from the Permittee's MS4 which could constitute a threat to human health, welfare, or the environment. (G3)

90. Took appropriate action to correct or minimize the threat to human health, welfare, and/or the environment, per G3.A.

91. Notified Ecology within 30 days of becoming aware that a discharge from the Permittee's MS4 caused or contributed to a known or likely violation of water quality standards in the receiving water. (S4.F.1)

92. If requested, submitted an *Adaptive Management Response* report in accordance with S4.F.3.a.

93. **Attach** a summary of the status of implementation of any actions taken pursuant to S4.F.3 and the status of any monitoring, assessment, or evaluation efforts conducted during the reporting period. (S4.F.3.d)

94. Notified Ecology of the failure to comply with permit terms and conditions within 30 days of becoming aware of the non-compliance. (G20)

95. Number of non-compliance notifications (G20) provided in reporting year. List permit conditions described in non-compliance notification(s) in *Comments* field.

This page intentionally left blank

APPENDIX 4 – Annual Report Questions for Secondary Permittees

Permittees are required to submit annual reports online or in a format provided by Ecology, upon request, pursuant to Permit condition S9.

S6.D Stormwater Management Program

1. **Attach** a map of any jurisdictional boundary changes resulting in an increase or decrease in the Secondary Permittee's geographic area of coverage during the reporting period. (Required annually, S9.E.6)
2. **Attach** updated annual Stormwater Management Program Plan (SWMP Plan). (S6.A.2)
3. If applicable, identify other entities relied on to satisfy any of the obligations under the Permit. (S9.E.4)

S6.D.1 Public Education and Outreach

4. Labeled all storm drain inlets owned or operated by the Secondary Permittee that are located in maintenance yards, in parking lots, along sidewalks, and at pedestrian access points. (New Secondary Permittees – Required no later than four years from initial date of Permit coverage, S6.D.1.a)
5. Re-labeled all storm drain inlets with labels when no longer clearly visible and/or easily readable within 90 days. (Required no later than four years from initial date of Permit coverage, S6.D.1.a)
6. (***Public ports, colleges, and universities only***) Distributed educational information to tenants and residents about the impact of stormwater discharges on receiving waters and steps that can be taken to reduce pollutants in stormwater runoff. (Required no later than three years from initial date of Permit coverage, S6.D.1.b)

S6.D.2 Public Involvement and Participation

7. Made the annual report and SWMP Plan available on website. (Required annually no later than May 31, S6.D.2.a and b.)

S6.D.3 Illicit Discharge Detection and Elimination

8. Complied with all relevant ordinances, rules, and regulations of the local jurisdiction(s) that govern non-stormwater discharges. (Required after initial date of Permit coverage, S6.D.3.a)

9. Implemented policies to prohibit illicit discharges and identified enforcement mechanisms. (New Secondary Permittees – Required no later than one year from initial date of Permit coverage, S6.D.3.b)

10. Updated policies to prohibit illicit discharges and identified enforcement mechanisms. (Required no later than July 1, 2027, S6.D.3.b)

11. Implemented an enforcement plan to ensure compliance with policies to prohibit illicit discharges. (New Secondary Permittees – Required no later than 18 months from initial date of Permit coverage, S6.D.3.b)

12. Developed and maintained a map of the storm sewer system showing all known storm drain outfalls, receiving waters, and areas contributing runoff to each outfall. (New Secondary Permittees – Required no later than four and one half years from initial date of Permit coverage, S6.D.3.c)

13. Maintained an electronic map of the MS4 showing all known storm drain outfalls, receiving waters, and areas contributing runoff to each outfall. Made the map available on request to Ecology or others. (Required by December 31, 2026; S6.D.3.c)

14. Submitted locations of all known MS4 outfalls, including size and material, (S5.D.3.c.ii. March 31, 2027). The data shall be in one of the following formats and templates:

- ESRI file geodatabase template[1] (feature class in a .gdb)
- Shapefile template[2]
- ArcGIS Online template (sharing template a or b via ArcGIS Online)
- Excel template[3]

15. Conducted field inspections and visually inspected for illicit discharges at approximately one third of all known MS4 outfalls. (Required no later than two years from initial date of Permit coverage, S6.D.3.d)

16. Implemented procedures to identify and remove illicit discharges. (Required no later than two years from initial date of Permit coverage, S6.D.3.d)

17. **Attach** a summary of each illicit discharge discovered and actions taken to eliminate each of the discharges. (S6.D.3.d).

[1] https://fortress.wa.gov/ecy/ezshare/wq/permits/MS4GP.Mapoutfall.prelim.gdb.zip
[2] https://fortress.wa.gov/ecy/ezshare/wq/permits/MS4GP.Mapoutfall.prelim.shape.zip
[3] https://fortress.wa.gov/ecy/ezshare/wq/permits/MS4GP.Mapoutfall.prelim.excel.xlsx

18. Implemented a spill response plan that includes coordination with a qualified spill responder. (Required no later than four and one-half years from initial date of Permit coverage, S6.D.3.e)

19. Provided staff training or coordinated with existing training to educate staff on proper BMPs for preventing illicit discharges, including spills, as described in S6.D.3.f. (Required no later than two years from initial date of Permit coverage)

S6.D.4 Construction Site Stormwater Control

20. Complied with all relevant ordinances, rules, and regulations of the local jurisdiction(s) that govern construction phase stormwater pollution prevention activities, if applicable. (Required after initial date of Permit coverage, S6.D.4.a)

21. Ensured that all applicable construction projects under the functional control of the Secondary Permittee obtained NPDES Permit coverage. (Required after initial date of Permit coverage, S6.D.4.b)

22. Coordinated with local jurisdictions on construction projects owned or operated by other entities that discharge into Secondary Permittee's MS4, as per S6.D.4.c. (Required after initial date of Permit coverage)

23. Provided training for relevant staff in erosion and sediment control BMPs and requirements or hired trained contractors to perform the work for all construction projects owned and operated by the Secondary Permittee. (Required after initial date of permit coverage, S6.D.4.d)

24. Provided access, as requested, for inspection of construction sites under the control of the Secondary Permittee during the land disturbing activity and/or construction period. (Required after initial date of Permit coverage, S6.D.4.e)

S6.D.5 Post-Construction Stormwater Management for New Development and Redevelopment

25. Complied with all relevant ordinances, rules, and regulations of the local jurisdiction(s) that govern post-construction stormwater pollution prevention activities, including proper operation and maintenance of the MS4. (Required after initial date of Permit coverage, S6.D.5.a)

26. Coordinated with local jurisdiction regarding projects owned or operated by other entities which discharge into the Secondary Permittee's MS4. (Required after initial date of Permit coverage, S6.D.5.b)

S6.D.6 Pollution Prevention and Good Housekeeping for Municipal Operations

27. Implemented an Operation and Maintenance program. (New Secondary Permittees – Required no later than three years from initial date of Permit coverage, S6.D.6.a)

28. Updated O&M Plan, as needed, no later than July 1, 2027 (S6.D.6.a).

29. Established and implemented maintenance standards for stormwater collection and conveyance systems, as described in S6.D.6.a.i. (New Secondary Permittees – Required no later than three years from initial date of Permit coverage.)

30. Conducted spot checks of potentially damaged stormwater treatment and flow control BMPs/facilities after major storms. (New Secondary Permittees – Required no later than three years from initial date of Permit coverage, S6.D.6.a.i)

31. Developed and implemented a Stormwater Pollution Prevention Plan (SWPP) for material storage areas, heavy equipment maintenance or storage yards not covered by another NPDES Permit that authorizes stormwater discharges associated with the activity. (New Secondary Permittees – Required no later than three years from initial date of Permit coverage, S6.D.6.a.viii)

32. Have NPDES Permit coverage for *Industrial Stormwater General Permit* for all applicable industrial facilities operated by the Permittee, or another NPDES Permit that authorizes surface water discharges associated with the activity. (Required after initial date of Permit coverage, S6.D.6.b)

33. Implemented a program designed to train staff to carry out the Operations and Maintenance plan as described in S6.D.6.d. (Required no later than three years from initial date of Permit coverage)

S7. Compliance with Total Maximum Daily Load Requirements

34. Is there an approved Total Maximum Daily Load (TMDL) applicable to stormwater discharges from a MS4 owned or operated by the Permittee? (S7)

35. Complied with the specific requirements identified in Appendix 2. (S7.A)

36. **Attach** status report of TMDL implementation. (S7.A)

General Conditions

37. Notified Ecology of the failure to comply with the Permit terms and conditions within 30 days of becoming aware of the non-compliance. (G20)

38. Notified Ecology immediately in cases where the Permittee becomes aware of a discharge into or from the Permittee's MS4 which may constitute a threat to human health, welfare, or the environment. (G3)

39. Took appropriate action to correct or minimize discharges into or from the MS4 which could constitute a threat to human health, welfare, or the environment. (G3.A)

S4 Compliance with Standards

40. If applicable, **attach** a summary of the status of implementation of any actions taken pursuant to S4.F, and the status of any monitoring, assessment, or evaluation efforts conducted during the reporting period. (S4.F.3.d)

This page intentionally left blank

APPENDIX 5 – Annual Report Questions for New Permittees

New Permittees that are Cities, Towns, or Counties are required to submit the following information in an online annual report form, or an alternative format provided by Ecology, upon request, pursuant to Special Condition S9.

Reporting Requirements and SWMP

1. **Attach** annual Stormwater Management Program Plan (SWMP). (Required no later than March 31, 2029, S5.A.2)
2. **Attach** a notification of any annexations, incorporations, or boundary changes resulting in an increase or decrease in the Permittee's geographic area of Permit coverage during the reporting period per S9.D.6.
3. Implemented an ongoing program to gather, track, and maintain information per S5.A.3, including costs or estimated costs of developing and implementing the SWMP. (Required to begin no later than January 1, 2026)
4. Provide a breakdown of average annual costs (or estimates) to implement the SWMP and permit programs (S5.A.3.a, required to be submitted no later than March 31, 2027):
    a. What was the annual expenditure or estimate to develop and implement the SWMP this reporting period?
    b. What was the annual expenditure or estimate to develop and implement Appendix 2 TMDL requirements, if applicable?
    c. What were your source(s) of funding for the stormwater program?
5. Coordinated among departments within the jurisdiction to eliminate barriers to Permit compliance. (S5.A.5.b)
    a. **Attach** a written description of internal coordination mechanisms. (Required no later than March 31, 2026, S5.A.5.b)
6. If applicable, identify other entities relied on to satisfy any of the obligations under the Permit. (S9.D4).

Stormwater Planning

7. Have you convened an interdisciplinary team to inform and assist in the development, progress, and influence of the stormwater planning program? (Required by August 1, 2025, S.5.C.1.a)

Coordination with Long-range Plan Updates

8. List the relevant land use planning efforts that have taken place in your jurisdiction (i.e., land use plans that are used to accommodate growth, stormwater management, or transportation). (S5.C.1.b.i.- Required by March 31, 2027)

9. List of stormwater capital projects (currently in or slated for future design and construction) that resulted from this planning. (S5.C.1.b.i – Required by March 31, 2027)

10. Describe watershed protection measures associated with stormwater management and land use planning actions that resulted from this planning. (S5.C.1.b.i– Required by March 31, 2027)

11. Were land acquisitions identified (or are planning ahead for) that are useful for stormwater facilities to accommodate growth or to better serve an existing developed area? (S5.C.1.b.i– Required by March 31, 2027,)

- **a.** If yes, for what purpose?

12. Updates to goals and policies related to investment in stormwater management facilities/BMPs? (yes/no) (S5.C.1.b.i– Required by March 31, 2027)

- **a.** If yes, briefly describe in *Comments*.

Low Impact Development Code-related Requirements

13. Reviewed, revised and made effective the low impact development-related enforceable documents per S5.C.1.c.ii. (Required by December 31, 2028)

- **a.** **Attach** a summary of the LID review and revision process that includes the requirements listed in S.5.C.1.c.ii. (Required no later than March 31, 2029)

14. Adopted and implemented tree canopy goals and policies to support stormwater management and water quality improvement in receiving waters. (S5.C.1.c.iii; December 31, 2028)

Education and Outreach

15. **Attach** a description of general awareness efforts conducted per S5.C.2.a.i, including what, if any, regional program you are participating in. (Required to begin no later than August 1, 2027)

16. Developed a behavior change program that is tailored to the community in accordance with S5.C.2.a.ii.(c)? (Required no later than August 1, 2025)

a. **Attach** the strategy and schedule developed in accordance with S5.C.2.a.ii(c).

17. Began implementing strategy outlined in S.5.C.2.a.ii.(c). (Required by October 1, 2025)

18. Provided stewardship opportunities (or partnered with others) to encourage resident participation. (Required to begin no later than August 1, 2027, S5.C.2.a.iii)

Public Involvement and Participation

19. Describe in *Comments* field the opportunities created for the public, including overburdened communities, to participate in the decision-making processes involving the development, implementation, and updates of the Permittee's SWMP. (Required to begin no later than August 1, 2025, S5.C.3.a)

20. Describe specific public involvement opportunities provided to overburdened communities. (S5.C.3.a.i)

21. Document methods used to identify overburdened communities. (No later than December 31, 2026, S5.C.3.a.ii)

22. Posted the updated SWMP Plan and latest annual report on your website no later than May 31. List the website address in *Comments* field. (Required to begin posting no later than May 31, 2026, S5.C.3.b)

MS4 Mapping and Documentation

23. Developed a map of the MS4 that includes the requirements listed in S5.C.4. (Required no later than March 31, 2029)

24. Met the requirements of S5.C.4.a.vii for all connections to the MS4 authorized after August 1, 2024. (Required to begin no later than August 1, 2024)

25. No later than March 31, 2027, submitted locations of all known MS4 outfalls, including size and material, in accordance with S5.D.4.b.i. The data shall be in one of the following formats:

- ESRI file geodatabase template[1] (feature class in .gdb)
- Shapefile template[2]
- ArcGIS Online template (sharing template a or b via ArcGIS Online)
- Excel template[3]

Illicit Discharge Detection and Elimination

26. Informed public employees, businesses, and the general public of hazards associated with illicit discharges, per S.5.C.5.b? (Required no later than August 1, 2026)

27. Adopted and implemented an ordinance or other regulatory mechanism to effectively prohibit illicit discharges, per the requirements in S5.C.5.c.i-iv. (Required no later than August 1, 2026)

a. Cite reference for ordinance or other regulatory mechanism to meet this requirement in *Comments* field.

28. Developed and implemented procedures for conducting illicit discharge investigations in accordance with S5.C.5.d.i? Cite methodology used in the *Comments* sections. (Required no later than August 1, 2028)

29. Screened the MS4 within coverage area each year in accordance with S5.C.5.d.i.(a) (Required to screen 40% no later than December 31, 2028; 12% on average each year, thereafter)

30. How are you publicizing your hotline? (Required to be available no later than August 1, 2026, S5.C.5.d.ii)

31. Developed and implemented an ongoing illicit discharge training program for all municipal field staff per S5.C.5.d.iii. (Required to begin no later than March 31, 2026)

32. Developed and implemented a program to characterize, trace, and eliminate illicit discharges into the MS4 found by or reported to the Permittee. (Required no later than August 1, 2028, S5.C.5.e)

33. Trained municipal illicit discharge detection staff to conduct illicit discharge detection and elimination activities referenced in S5.C.5.f. (Required no later than March 31, 2026)

[1] https://fortress.wa.gov/ecy/ezshare/wq/permits/MS4GP.Mapoutfall.prelim.gdb.zip
[2] https://fortress.wa.gov/ecy/ezshare/wq/permits/MS4GP.Mapoutfall.prelim.shape.zip
[3] https://fortress.wa.gov/ecy/ezshare/wq/permits/MS4GP.Mapoutfall.prelim.excel.xlsx

34. **Attach** a report with data describing the actions taken to characterize, trace, and eliminate each illicit discharge reported to, or investigated by, the Permittee, as described in S5.C.5.g. The submittal must include all of the applicable information and must follow the instructions, timelines, and format described in Appendix 13.

Controlling Runoff from New Development, Redevelopment and Construction Sites

35. Developed and implemented a program to reduce pollutants in stormwater runoff to the MS4 from new development, redevelopment and construction site activities. (Required no later than June 30, 2027, S5.C.6)

36. Adopted and implemented an ordinance or other enforceable mechanism to address runoff from new development, redevelopment and construction sites per the requirements of S5.C.6.a. (Required no later than June 30, 2027)

- **a.** Cite the jurisdiction code reference used to meet this requirement in *Comments* field.

37. Number of exceptions granted to the minimum requirements in Appendix 1. (Required March 31, 2028, S5.C.6.b.i and Section 6 of Appendix 1)

38. Number of adjustments granted to the minimum requirements in Appendix 1. (Required March 31, 2028, S5.C.6.b.i and Section 6 of Appendix 1)

39. Reviewed Stormwater Site Plans for all proposed development activities that meet the thresholds adopted pursuant to S5.C.6.b.ii. (Required no later than June 30, 2027, S5.C.6.c.i)

- **a**. Number of site plans reviewed during the reporting period.

40. Inspected, prior to clearing and construction, all permitted development sites, per S5.C.6.c.ii. (Required no later than June 30, 2027)

41. Inspected all permitted development sites during construction to verify proper installation and maintenance of required erosion and sediment controls. (Required no later than June 30, 2027, S5.C.6.c.iii)

- **a.** Inspected new residential stormwater treatment and flow control BMPs/facilities and catch basins at least twice per 12-month period, with no less than 4 months between inspections, per S5.C.6.c.iv, to identify maintenance needs and enforce compliance with maintenance standards.

42. Number of enforcement actions taken during the reporting period based on construction phase inspections at new development and redevelopment projects. (Required no later than June 30, 2027, S5.C.6.c.ii-iv)

43. Inspected all permitted development sites upon completion of construction and prior to final approval or occupancy to ensure proper installation of stormwater facilities. (Required no later than June 30, 2027, S5.C.6.c.v)

44. Verified a maintenance plan is completed, and responsibility for maintenance is assigned for projects. (Required no later than June 30, 2027, S5.C.6.c.v)

45. Achieved at least 80% of scheduled construction-related inspections. (Required no later than June 30, 2027, S5.C.6.c.vi)

46. Made Ecology's Construction Stormwater General Permit *Notice of Intent* and Industrial Stormwater General Permit *Notice of Intent* available to representatives of proposed new development and redevelopment? (Required no later than August 1, 2024, S5.C.6.d)

47. All staff whose primary job duties are implementing the program to control stormwater runoff from new development, redevelopment, and construction sites are trained to conduct these activities? (Required no later than December 31, 2027, S5.C.6.e)

Source Control Program for Existing Development

48. Adopted ordinance(s), or other enforceable documents, requiring the application of source control BMPs for pollutant generating sources associated with existing land uses and activities, per S.5.C.8.a. (Required by August 1, 2026)

- **a**. Cite ordinance in *Comments* field.

49. Established an inventory per S5.C.8.b. (Required by August 1, 2027)

- **a.** Number of total sites identified for the inventory.

50. Implemented an inspection program, per S5.C.8.c. (Required by January 1, 2028)

51. Implemented a progressive enforcement policy, per S5.C.8.d. (Required by January 1, 2028)

52. **Attach** a summary of actions taken to implement the Source Control program, per S5.C.8.d.iii (March 31, 2029)

- **a.** **Attach** a list of inspections, per S5.C.8.d, organized by the business category, noting the amount of times each business was inspected, and if enforcement actions were taken.

53. Implemented a Source Control training program, per S5.C.8.e. (December 31, 2027)

Operation and Maintenance

54. Developed and implemented maintenance standards as protective, or more protective, of facility function as those specified in the *Stormwater Management Manual for Western Washington*. (Required no later than June 30, 2027, S5.C.9.a)

55. Applied a maintenance standard for a facility or facilities which do not have maintenance standards specified in the *Stormwater Management Manual for Western Washington*. (Required to report, if applicable, no later than June 30, 2027, S5.C.9.a)

- **a**. Note in the *Comments* field what kinds of facilities are covered by this alternative maintenance standard.

56. Verified that maintenance was performed per the schedule in S5.C.9.a.ii when an inspection identified an exceedance of the maintenance standard. (June 30, 2027)

- **a.** **Attach** documentation of any maintenance delays.

57. Implemented an ordinance or other enforceable mechanisms to verify long-term operation and maintenance of stormwater treatment and flow control BMPs/facilities regulated by the Permittee, per S5.C.9.b.i?

58. Annually inspected stormwater treatment and flow control BMPs/facilities regulated by the Permittee, per S5.C.9.b.i(b).

- **a.** If using reduced inspection frequency for the first time during this permit cycle, **attach** documentation, per S5.C.9.b.i(b).

59. Achieved at least 80% of scheduled inspections to verify adequate long-term O&M. (S5.C.9.b.ii)

60. Annually inspected all municipally owned or operated permanent stormwater treatment and flow control BMPs/facilities. (Required no later than June 30, 2027, S5.C.9.c.i)

- **a.** Number of municipally owned or operated stormwater treatment and flow control BMPs/facilities.
- **b.** Number of facilities inspected during the reporting period.
- **c**. Number of facilities for which maintenance was performed during the reporting period.

61. **Attach** documentation of a reduced stormwater treatment and flow control BMPs/facilities inspection frequency as per S5.C.9.c.i. (Required, if applicable)

62. Conducted spot checks and inspections of potentially damaged stormwater facilities after major storms. (Required no later than June 30, 2027, S5.C.9.c.ii)

63. Inspected all municipally owned or operated all catch basins and inlets owned or operated by the Permittee at least once every two years, or used an alternative approach. (Required no later than December 31, 2028, S5.C.9.c.iii)

a. Number of known catch basins.

b. Number of catch basins inspected.

c. Number of catch basins cleaned.

64. **Attach** documentation of alternative catch basin inspection approach, if used. (Required, if applicable, S5.C.9.c.iii)

65. Developed and implemented practices, policies, and procedures to reduce stormwater impacts associated with runoff from all lands owned or maintained by the Permittee, and road maintenance activities under the functional control of the Permittee. (Required no later than December 31, 2027, S5.C.9.d)

66. No later than July 1, 2027, developed and implemented a municipal street sweeping program to focus on priority areas and times during the year that would reasonably be expected to result in the maximum water quality benefits to receiving waters (S5.C.9.e, required to report beginning March 31, 2028).

67. Attach documentation if implementing an alternative sweeping timing and frequency, based on local conditions (S5.C.9.e.ii.b.)

a. **Attach** priority areas swept on a map
b. Sweeping dates
c. Sweeping frequency
d. Type of sweeper
e. Total curb miles of priority areas and curb miles swept
f. Approximation of street waste solids removed for each sweeping event, with unit of weight and wet or dry weight, where available.

68. Disposed of sweeper waste material in accordance with Appendix 6- Street Waste Disposal (S5.C.9.e.iv)?

69. Developed and implemented a Stormwater Pollution Prevention Plan (SWPPP) for all heavy equipment maintenance or storage yards, and material storage facilities owned or operated by the Permittee in areas subject to this Permit, as described in (Required no later than June 30, 2027, S5.C.9.f)

70. Developed and implemented an ongoing training program for Permittee employees whose primary construction, operations or maintenance job functions may impact stormwater quality. (Required no later than June 30, 2027, S5.C.9.g)

Compliance with Total Maximum Daily Load Requirements

71. Complied with the Total Maximum Daily Load (TMDL) - specific requirements identified in Appendix 2, if applicable. (S7.A)

a. List and requirements that were not met.

72. For TMDLs listed in Appendix 2, **attach** a summary of relevant SWMP and Appendix 2 activities to address the applicable TMDL parameter. (S7.A.1)

General Conditions and Compliance with Standards

73. Notified Ecology in accordance with G3 of any discharge into or from the Permittee's MS4 which could constitute a threat to human health, welfare, or the environment. (G3)

74. Took appropriate action to correct or minimize the threat to human health, welfare, and/or the environment, per G3.A.

75. Notified Ecology within 30 days of becoming aware that a discharge from the Permittee's MS4 caused or contributed to a known or likely violation of water quality standards in the receiving water. (S4.F.1)

76. If requested, submitted an *Adaptive Management Response* report in accordance with S4.F.3.a.

77. **Attach** a summary of the status of implementation of any actions taken pursuant to S4.F.3 and the status of any monitoring, assessment, or evaluation efforts conducted during the reporting period? (S4.F.3.d)

78. Notified Ecology of the failure to comply with the permit terms and conditions within 30 days of becoming aware of the non-compliance? (G20)

79. Number of non-compliance notifications (G20s) provided in reporting year. List Permit conditions described in non-compliance notification(s) in *Comments* field.

This page intentionally left blank

APPENDIX 6 – Street Waste Disposal

Street Waste Liquids General Procedures

Street waste collection should emphasize retention of solids in preference to liquids. Street waste solids are the principal objective in street waste collection and are substantially easier to store and treat than liquids.

Street waste liquids require treatment before their discharge. Street waste liquids, which include, but are not limited to, eductor and street sweeping truck decant and drainage from piles and containers, usually contain high amounts of suspended and total solids and absorbed metals. Treatment requirements depend on the discharge location.

Discharges to sanitary sewer and storm sewer systems must be approved by the entity responsible for operation and maintenance of the system. Ecology will not generally require waste discharge permits for discharge of stormwater decant to sanitary sewers or to stormwater treatment BMPs constructed and maintained in accordance with Ecology's *Stormwater Management Manual for Western or Eastern Washington,* as appropriate.

The following order of preference, for disposal of liquid from collection of street waste and water removed from stormwater treatment BMPs, is ***required***.

1. **Discharge of street waste decant liquids to a municipal sanitary sewer connected to a Publicly Owned Treatment Works (POTW) is the *preferred disposal option*.** Discharge to a municipal sanitary sewer requires the approval of the sewer authority. Approvals for discharge to a POTW will likely contain pretreatment, quantity, and location conditions to protect the POTW.

2. **Discharge of street waste decant liquids may be allowed into a Basic or Metals Runoff Treatment BMP, if option 1 is not available.** Street waste liquid may be discharged back into the storm sewer system under the following conditions only when ***all*** of the following apply:
   - The preferred disposal option of discharge to sanitary sewer is not reasonably available;
   - The liquid comes from street waste only. Do not send liquids decanted from sanitary wastes to stormwater BMPs;
   - The discharge is to a Basic or Metals Runoff Treatment BMP. If pretreatment does not remove visible sheen from oils, the Runoff Treatment BMP must be able to prevent the discharge of oils causing a visible sheen;

- The discharge from the eductor or sweeper truck is as near to the inlet of the Runoff Treatment BMP as is practical, to minimize contamination or recontamination of the collection system;
- The storm sewer system owner/operator has granted approval and has determined that the Runoff Treatment BMP will accommodate the increased loading. Pretreatment conditions to protect the Runoff Treatment BMP may be issued as part of the approval process. Following local pretreatment conditions is a requirement of this Permit; and
- Ecology must approve in advance flocculants for the pretreatment of street waste liquids. The liquids must be non-toxic under the circumstances of use. If the owner/operator adds flocculants to street waste liquids, they must follow the requirements of BMP C250/C250E: Construction Stormwater Chemical Treatment and BMP C251/251E: Construction Stormwater Filtration.

The reasonable availability of sanitary sewer discharge will be determined by the Permittee, by evaluating such factors as distance, time of travel, load restrictions, and capacity of the Runoff Treatment BMP.

3. **Operators may temporarily place portable tanks (e.g. Baker Tanks) near where sweeping is taking place to temporarily hold water and solids from the sweeper**. Transfer this water/solid mixture to the decant facility at a later time.
4. **Operators may discharge liquids removed from the street while sweeping during rain events, if the designated decant facility is a distance away (i.e., travel time would significantly impact the amount of sweeping).** When sweeping during rain events, the sweeper will fill with water quickly.

   Discharge to Wastewater Collection System: Operators may discharge water from eductor or sweeper trucks to the wastewater collection system through manholes located in the street that is swept with approval from the Sewer Authority. The method used to move water from the sweeper to the wastewater collection system should be developed by the Sewer Authority.

   Discharge to Stormwater Collection System: Operators may discharge clear decanted water to the stormwater collection system for the roadway being swept when all of the conditions listed below apply. Operators cannot deposit decanted water into a collection system different from the system for the roadway being swept. Conditions to discharge:

   - The catch basin receiving the decanted water already receives runoff from the swept street.
   - The water entering the sweeper storage tank is runoff from the street and not water placed on the street by a water truck or the sweeper during the sweeping operation.

- The sweeper stays in place for a minimum of 15 minutes at the discharge location to allow solids to settle prior to decanting the water from the storage tank.
- The operator places an appropriately sized catch basin filter in the catch basin or a filter sock attached to the end of the outlet hose allowing for a slow release of water. Remove the catch basin filter or filter sock following its use.
- The operator stops discharging liquids to the catch basin when there is a concentration of solids leaving the tank.
- The storm sewer system owner/operator shall approve the discharge.

5. **Operators may return water removed from stormwater ponds, vaults, and oversized catch basins to the storm sewer system.** Stormwater ponds, vaults, and oversized catch basins contain substantial amounts of liquid, which hampers the collection of solids and poses problems if the removed waste must be hauled away from the site. Water removed from these facilities may be discharged back into the pond, vault, or oversized catch basin provided:
   - Clear water removed from a stormwater treatment structure may be discharged directly to a down gradient cell of a treatment pond or into the storm sewer system.
   - Turbid water may be discharged back into the structure it was removed from if:
     - The removed water has been stored in a clean container (eductor truck, Baker tank, or other appropriate container or facility used specifically for handling stormwater or clean water); ***and***
     - There will be no discharge from the pond, vault, or oversized catch basin for at least 24 hours.
   - The discharge must be approved by the storm sewer system owner/operator.

Street Waste Solids

Soils generated from maintenance of the MS4 may be reclaimed, recycled or reused when allowed by local codes and ordinances. Street Wastes are defined in Chapter 173-350 WAC[1]. Soils that are identified as contaminated, pursuant to Chapter 173-350 WAC, shall be disposed of at a qualified solid waste disposal facility.

Typically, the County Health Department produces permits for disposal of solid waste and not Ecology. Ecology's authority does not extend to actual disposal of street waste material.

[1] https://apps.leg.wa.gov/wac/default.aspx?cite=173-350

This page intentionally left blank

APPENDIX 7 – Determining Construction Site Sediment Damage Potential

The following rating system allows objective evaluation of a particular development site's potential to discharge sediment. Permittees may use the rating system below or develop alternative process designed to identify site-specific features which indicate that the site must be inspected prior to clearing and construction. Any alternative evaluation process must be documented and provide for equivalent environmental review.

Step 1 is to determine if there is a sediment/erosion sensitive feature downstream of the development site. If there is such a site downstream, complete Step 2, assessment of hydraulic nearness. If there is a sediment/erosion sensitive feature and it is hydraulically near the site, go to Step 3 to determine the construction site sediment transport potential.

STEP 1 – Sediment/Erosion Sensitive Feature Identification

Sediment/erosion sensitive features are areas subject to significant degradation due to the effect of sediment deposition or erosion. Special protection must be provided to protect them. Sediment/erosion sensitive features include but are not limited to:

i. Salmonid bearing fresh water streams and their tributaries or freshwater streams that would be Salmonid bearing if not for anthropogenic barriers;
ii. Lakes;
iii. Category I, II, and III wetlands;
iv. Marine near-shore habitat;
v. Sites containing contaminated soils where erosion could cause dispersal of contaminants; and
vi. Steep slopes (25% or greater) associated with one of the above features.

Identify any sediment/erosion sensitive features, and proceed to Step 2. If there are none, the assessment is complete.

STEP 2 – Hydraulic Nearness Assessment

Sites are hydraulically near a feature if the pollutant load and peak quantity of runoff from the site will not be naturally attenuated before entering the feature. The conditions that render a site hydraulically near to a feature include, but are not limited to, the following:

i. The feature or a buffer to protect the feature is within 200 feet downstream of the site.
ii. Runoff from the site is tight-lined to the feature or flows to the feature through a channel or ditch.

A site is not hydraulically near a feature if one of the following takes place to provide attenuation before runoff from the site enters the feature:

i. Sheet flow through a vegetated area with dense ground cover
ii. Flow through a wetland not included as a sensitive feature
iii. Flow through a significant shallow or adverse slope, not in a conveyance channel, between the site and the sensitive feature.

Identify any of the sediment/erosion sensitive features from Step 1 that are hydraulically near the site, and proceed to Step 3. If none of the sediment/erosion sensitive features are hydraulically near the site, the assessment is complete.

STEP 3 – Construction Site Sediment Transport Potential

Using the worksheet below, determine the total points for each development site. Assign points based on the most critical condition that affects 10% or more of the site.

If soil testing has been performed on site, the results should be used to determine the predominant soil type on the site. Otherwise, soil information should be obtained from the county soil survey to determine Hydrologic Soil Group (Table of Engineering Index Properties for step 1.D) and Erosion Potential (Table of Water Features for step 1.E).

When using the county soil survey, the dominant soil type may be in question, particularly when the site falls on a boundary between two soil types or when one of two soil types may be present on a site. In this case, the soil type resulting in the most points on the rating system will be assumed unless site soil tests indicate that another soil type dominates the site.

Use the point score from Step 3 to determine whether the development site has a high potential for sediment transport off of the site.

Total Score	**Transport Rating**
<100	Low
≥100	High

A high transport rating indicates a higher risk that the site will generate sediment contaminated runoff.

Construction Site Sediment Transport Potential Worksheet

A. Existing slope of site (average, weighted by aerial extent): Points

2% or less 0

>2-5% 5

>5-10% 15

>10-15% 30

>15% 50

B. Site Area to be cleared and/or graded:

<5,000 sq. ft. 0

5,000 sq. ft. – 1 acre 30

>1 acres 50

C. Quantity of cut and/or fill on site:

<500 cubic yards 0

500 – 5,000 cubic yards 5

>5,000 – 10,000 cubic yards 10

>10,000 – 20,000 cubic yards 25

>20,000 cubic yards 40

D. Runoff potential of predominant soils (Soil Conservation Service):

Hydrologic soil group A 0

Hydrologic soil group B 10

Hydrologic soil group C 20

Hydrologic soil group D 40

E. Erosion Potential of predominant soils (Unified Classification System):

GW, GP, SW, SP soils 0

Dual classifications (GW-GM, GP-GM, GW-GC,

GP-GC, SW-SM, SW-SC, SP-SM, SP-SC) 10

GM, GC, SM, SC soils 20

ML, CL, MH, CH soils 40

F. Surface or Groundwater entering site identified and intercepted1:

Yes 0

No 25

G. Depth of cut or height of fill >10 feet:

Yes 25

No 0

H. Clearing and grading will occur in the wet season (October 1 – May 1):

Yes 50

No 0

TOTAL POINTS ..... _____

[1] If no surface or ground water enters the site, assign 0 points.

This page intentionally left blank

APPENDIX 8 – Businesses and Activities that are Potential Sources of Pollutants

Use this appendix to help identify businesses and/or activities with potential outdoor pollutant-generating sources that discharge to the MS4 and should be included in the Permittee's source control inventory, developed pursuant to S5.C.8.b.ii. The Standard Industrial Code (SIC), Major Group, and NAICS numbers are provided for reference. Permittees may include additional outdoor pollutant-generating sources that are located within their jurisdictions.

Group Description	SIC Major Group	SIC Industry Group No.	NAICS Major Group
Support Activities for Animal Production		074, 075	1152xx,
Construction of Buildings	15		236
Heavy and Civil Engineering Construction	16		237
Specialty Trade Contractors	17		238
Beverage, Food, and Tobacco Manufacturing	20		311, 312
Wood Product Manufacturing	24		321
Paper Manufacturing	26		3221xx, 3222xx
Printing and Related Support Activities	27		323
Chemical Manufacturing	28		325
Petroleum and Coal Products Manufacturing	29		3241xx
Plastics and Rubber Product Manufacturing	30		326
Leather and Allied Product Manufacturing	31		316
Nonmetallic Mineral Product Manufacturing	32		327
Primary Metal Manufacturing	33		331
Fabricated Metal Product Manufacturing	34		332
Machinery, Computer, and Electronic Product manufacturing	35		333, 334
Electrical Equipment, Appliance, and Component Manufacturing	36		335
Transportation Equipment Manufacturing	37		336
Rail Transportation	40		482

Group Description	SIC Major Group	SIC Industry Group No.	NAICS Major Group
Transit and Ground Passenger Transportation	41		485
Truck Transportation and Warehousing	42		484, 493
Support Activities for Transportation		473, 474, 478	4881xx, 4882xx, 4884xx, 4889xx,
Utilities	49		2211xx
Wholesale Trade – Durable Goods		501, 503, 505, 506, 507, 509	423140, 423930, 423110, 4233xx, 4237xx, 4238xx,
Wholesale Trade – Nondurable Goods		514, 515, 516, 517, 518, 519	424930, 4244xx, 4246xx, 4247xx, 4248xx,
Building Materials, Hardware, Garden Supplies Dealers		521, 523, 526	444
Food and Beverage Stores	54		445
Automotive Dealers and Gasoline Service Stations	55		441, 447
Food Services and Drinking Places	58		722
Rental and Leasing Services		735	5321xx, 5324xx
Repair and Maintenance	75		811192, 8111xx, 8112xx, 8113xx, 8114xx,
Ambulatory Health Care Services and Hospitals		806, 807	621910,
Educational Services	82		6111xx, 6112xx, 6113xx, 6115xx
Museums, Historical Sites, and Similar Institutions		842	712

APPENDIX 9 – Stormwater Discharge Monitoring

This Appendix applies to Phase I and II Permittees with requirements pursuant to Special Condition S8.C – Stormwater Discharge Monitoring.

Stormwater discharge monitoring is intended to characterize stormwater runoff quantity and quality at a limited number of locations in a manner that allows analysis of loadings and changes in conditions over time and generalization across the Permittee's jurisdiction.

QAPP PREPARATION

Permittees shall prepare a Quality Assurance Project Plan (QAPP). The QAPP shall be developed by qualified staff or contractors with experience in applying Ecology or U.S. Environmental Protection Agency (EPA) QAPP Guidelines. General Ecology guidelines can be found at https://ecology.wa.gov/ and in the *Quality Assurance Project Plan Guidance*, Special Condition S8.D, *Phase I Municipal Stormwater Permit,* December 2010 (Ecology Publication no. 10-10-075, https://apps.ecology.wa.gov/publications/documents/1010075.pdf).

A stormwater discharge monitoring QAPP shall be submitted to Ecology in accordance with the deadlines in S8.C. The QAPP shall describe field collection methods and sample preparation methods appropriate to each group of analytes, reporting limits, and field conditions.

Permittees are responsible for maintaining an up-to-date approved QAPP for stormwater discharge monitoring. Significant changes shall be reviewed by Ecology and reflected in a revised QAPP. Significant changes include, but are not limited to:

- Land disturbing activities over 10 acres in size within the sampled drainage area;
- Relocating a monitoring station;
- Introducing new sampling equipment;
- Unanticipated back water conditions, base flow, or tidal influences; and
- Changes in laboratories, analytical methods, or reporting limits.

Permittees continuing their stormwater monitoring discharge programs from prior permits are required to update their QAPP to reflect the changes of this Appendix and extend the timeframe. Locations, methodology, and laboratory techniques previously approved by Ecology should be discussed in the QAPP.

DISCHARGE MONITORING LOCATION SELECTION

Stormwater monitoring discharge monitoring locations shall have mapped tributary conveyance systems and drainage areas and be suitable for permanent installation and operation of flow-weighted composite sampling equipment. Additional monitoring location selection guidance and information about how to estimate a rainfall to runoff relationship is available in *Standard Operating Procedure for Automatic Sampling for Stormwater Monitoring*, WQP002, https://apps.ecology.wa.gov/publications/SummaryPages/1810024.html.

Permittees may identify a discharge monitoring location upstream in the conveyance system (*i.e.*, up- gradient of the outfall) in order to achieve the desired land use, to accommodate the installation of sampling equipment, and/or to avoid or minimize back water or tidal interference.

The QAPP shall describe each stormwater discharge monitoring location and associated drainage basin in detail. The QAPP must describe how each discharge monitoring location was selected, the size of the drainage basin, and the percentage of area in the drainage basin representing the following land uses: high density residential, low density residential, commercial, industrial, agriculture, and transportation right-of-way. Table A9-1, below, provides characteristics to consider for some of these land uses. However, density definitions can vary from jurisdiction to jurisdiction and may be defined locally in codes and comprehensive plans. Report the residential density definitions used if they differ from these.

Table A9-1 Land Use Selection Characteristics

Land use category	Characteristics
High density residential	4 dwelling units per acre or greater
Medium to high density residential	2 to 4 dwelling units per acre
Low density residential	1 to 2 dwelling units per acre
Commercial	Includes multi-family residential
Industrial	Not predominated by one facility with a few operators

FLOW MONITORING

Discharge monitoring locations must be evaluated for a rainfall to runoff relationship in order to ensure that the discharge monitoring location will receive enough runoff for sufficient sample volume. This rainfall to runoff relationship will also assist in programming the automatic sampling equipment. In order to establish the rainfall to runoff relationship, one year of continuous flow recording (including base flow and all storm events) is necessary.

MONITORING FREQUENCY

Permittees shall sample each stormwater discharge monitoring location according to the frequency described below. Documented good faith efforts with good professional practice by the Permittee which do not result in collecting a successful sample for the full number of required storms may be considered as contributing toward compliance with this requirement.

For each location, the Permittee shall sample and analyze a minimum of eleven (11) qualifying storm events per water year. Qualifying storm event sampling must be distributed throughout the year, approximately reflecting the distribution of rainfall between the wet and dry seasons (with a goal of 60- 80% of the samples collected during the wet season and a goal of 20-40% of the samples collected in the dry season).

Ecology may approve a reduced sampling frequency if the Permittee provides a statistical analysis demonstrating that monitoring and reporting goals can be met with fewer samples.

QUALIFYING STORM EVENT CRITERIA

The wet season is from October 1 through April 30. A qualifying wet season storm event is defined as follows when all of these conditions apply:

- Rainfall volume: 0.20” minimum, no fixed maximum;
- Rainfall duration: No fixed minimum or maximum;
- Antecedent dry period: Less than or equal to 0.05” rain in the previous 6 hours, unless more time is needed to return to baseflow at the sampling point; and
- Inter-event dry period: 6 hours.

The dry season is from May 1 through September 30. A qualifying dry season storm event is defined as follows when all of these conditions apply:

- Rainfall volume: 0.20” minimum, no fixed maximum;
- Rainfall duration: No fixed minimum or maximum;
- Antecedent dry period: less than or equal to 0.02” rain in the previous 24 hours; and
- Inter-event dry period: 6 hours.

TYPES OF SAMPLING

Storm events shall be sampled using flow-weighted composite sampling techniques. Automatic samplers shall be programmed to begin sampling as early in the runoff event as practical and to continue sampling past the longest estimated time of concentration for the tributary area. Refer to *Standard Operating Procedure for Automatic Sampling for Stormwater Monitoring,* WQP002, https://apps.ecology.wa.gov/publications/SummaryPages/1810024.html.

For storm events lasting less than 24 hours, samples shall be collected for at least 75% of the storm event hydrograph. For storm events lasting longer than 24 hours, samples shall be collected for at least 75% of the hydrograph of the first 24 hours of the storm.

Each composite sample shall be targeted to contain at least 10 aliquots. Composite samples with 7 to 9 aliquots are acceptable if they meet the other sampling criteria and help achieve a representative balance of wet season/dry season events and storm sizes.

Continuous flow recording of all storm events (not just sampled storm events) is necessary for at least one complete water year to establish a baseline rainfall/runoff relationship. Ongoing continuous flow monitoring is required for each of the sampled storm events as necessary to properly conduct the flow- weighted composite sampling. Precipitation data shall be collected from the nearest rain gauge reporting at least hourly rainfall amounts.

Grab samples are necessary for some parameters (Table A9-2) and shall be collected early in the storm event. Refer to *Standard Operating Procedure for Grab Sampling for Stormwater Monitoring,* WQP001, https://apps.ecology.wa.gov/publications/SummaryPages/1810023.html.

Stormwater solids samples shall be collected twice per water year at each stormwater discharge monitoring location, or in the vicinity of each stormwater monitoring location. Ecology may approve reducing this requirement to a once per year frequency if the Permittee provides evidence demonstrating that insufficient material is present in the conveyance. In-line conveyance system locations are the target for stormwater solids sampling (e.g., catch basin sumps), not receiving waters nor BMPs where soils could be inadvertently sampled. Use of in-line traps or similar collection system is needed for stormwater solids sampling; refer to *Standard Operating Procedure for Collection of Stormwater Solids using In-Line Traps,* WQP003*,* https://apps.ecology.wa.gov/publications/SummaryPages/1810025.html. The QAPP will need to specify the sampling approach for the selected sampling sites.

PARAMETERS

Flow-weighted composite samples shall be analyzed for the following parameters utilizing an Ecology- or EPA-accredited laboratory and the methods and reporting limits as provided in table A9-2 or otherwise approved by Ecology.

- Conventional parameters;
- Methylene blue activating substances (MBAS);
- Nutrients;
- Metals; and
- Organics:
  - Polycyclic aromatic hydrocarbons (PAHs)
  - Pesticides
  - Phthalates

If the volume of the stormwater sample collected from a qualifying storm is insufficient to allow analysis for all of the parameters listed above, the sample shall be analyzed for as many parameters as possible in the following priority order: (1) metals and hardness; (2) conductivity; (3) TSS; (4) nutrients; (5) organics: PAHs, phthalates, insecticide, and herbicides; (6) BOD_5; and (7) remaining conventional parameters. If insufficient sample exists to run the next highest priority pollutant, that analysis may be bypassed, and analyses run on lower priority pollutants in accordance with the remaining priority order to the extent possible. Parameters that are below reporting limits after two years of data may be dropped from the analysis.

Grab samples shall be analyzed for the following parameters utilizing an Ecology- or EPA-accredited laboratory and the methods and reporting limits listed in Table A9-2 at the end of this Appendix.

- Fecal coliform bacteria; and
- Total petroleum hydrocarbons – diesel fraction

Stormwater solids samples shall be analyzed for the following parameters utilizing an Ecology- or EPA- accredited laboratory and the methods and reporting limits listed in table A9-3 or otherwise approved by Ecology.

- Conventional parameters;
- Metals;
- Organics:
    - Pesticides
    - PAHs
    - Phthalates
    - Phenolics
    - Polychlorinated biphenyls (PCBs)
    - Polybrominated diphenyl ethers (PBDEs)
    - Total petroleum hydrocarbon – diesel fraction (TPH-Dx)

If the stormwater solids sample volume is insufficient to analyze for all of the parameters listed below, the sample shall be analyzed for as many parameters as possible in the following priority order: (1) conventional parameters; (2) metals; (3) TPH-Dx; (4) Phenolics; (5) PAHs and phthalates; (6) pesticides; (7) PBDEs; and (8) PCBs. If insufficient sample exists to run the next highest priority pollutant, that analysis may be bypassed, and analyses run on lower priority pollutants in accordance with the remaining priority order to the extent possible. Additional samples shall be collected if insufficient sample exists from a single sample to run all of the organic pollutants listed above. A visual, qualitative determination of grain size shall be reported for all stormwater solids samples (in addition to the quantitative analysis for all samples with sufficient volume). Parameters that are below reporting limits after two years of data may be dropped from the analysis.

RECORDKEEPING AND REPORTING

An "Annual Stormwater Discharge Monitoring Report" shall be submitted with each Annual Report beginning in 2025. Each report shall summarize all monitoring data collected during the preceding water year (October 1 – September 30). The first annual monitoring report submitted will include data from a partial water year. Each report shall integrate data from earlier years into the analysis of results, as appropriate. Permittees continuing their stormwater monitoring discharge programs at the same locations will continue summarizing data from prior permit periods.

ANNUAL MONITORING REPORTS

Annual Stormwater Discharge Monitoring Reports shall provide all monitoring data collected during the preceding water year (October 1 – September 30). Concentration data shall be provided in the same units that are specified for Reporting Limits in Tables A9-2 and A9-3. Flow data shall be provided in gallons per minute. Loading data for each water year shall be provided in total pounds and in pounds per acre. Annual Stormwater Discharge Monitoring Reports shall consist of a narrative report, an Excel spreadsheet with concentration data (summary statistics: minimum, maximum, mean, median and standard deviation), pollutant loading calculations, and a submittal to Ecology's Environmental Information Management (EIM) database for applicable data. For the Annual Stormwater Discharge Monitoring Report to be considered on time, the EIM data submission process must be initiated before April 1 of each relevant year and completed by June 15 of each relevant year.

The report shall include:

- A brief summary of each monitored drainage basin (full details of the monitoring drainage basin shall be in the QAPP), including any changes within the contributing drainage area or changes to the monitoring station that could affect hydrology and/or pollutant loading.
- A description of each flow-weighted composite and grab sampled storm event, including:
    - General summary about storm event criteria, including:
        - Precipitation data (in inches) including antecedent dry period and rainfall distribution throughout the event;
        - Flow and hydrograph data including sampled and total runoff time periods and volumes;
        - Total number of qualifying storm events captured and analyzed at each monitoring location;
        - Distribution of storms collected between wet and dry seasons (permit goals include 60-80% of storms during the wet season and 20-40% of storms during the dry season); and
        - Logistical problems associated with any storm event criterion.
    - A hyetograph and a hydrograph for each sampled storm event. Include properly labeled graphs that display the following:
        - Date of the storm event;

        - Time of day versus precipitation information;
        - Time versus flow rate (in gallons per minute);
        - Time versus aliquot collection; and
        - Display the total duration of the storm event, not just the duration when samples were collected (remember your pollutant load calculation must include flow for the entire storm event, not just the water quality sampled portion).
    - A summary of (or in the graph) the total runoff volume in gallons.
    - A rainfall/runoff relationship table used to estimate the un-sampled storm events (when water quality samples were not collected). This is used for future estimations of annual and seasonal loads.
    - Whether or not any chemicals were removed from the list of analysis due to two years of non-detect data.
    - A brief summary with storm event dates where insufficient volumes were collected. Include the parameters analyzed.
- A description of the stormwater solids sampling event, including:
    - Timeframe for the sampling event.
    - A summary of stormwater solids sampling (including dates) where insufficient volumes were collected. Include the parameters analyzed.
    - Whether or not any chemicals were removed from the list of analysis due to two years of non-detect data.
- Event Mean Concentrations (EMCs).
- The wet and dry season pollutant loads and annual pollutant load based on water year for each discharge monitoring location expressed in total pounds, and pounds per acre. The loadings must take into account potential pollutant load from base flow. Loadings shall be calculated following *Standard Operating Procedure for Calculating Pollutant Loads for Stormwater Discharges, WQP004* https://apps.ecology.wa.gov/publications/SummaryPages/1810026.html. Pollutant loading calculations and reporting are required only for the nutrients, metals, and organics parameters in stormwater. Include the following:
    - For storm events where water quality samples were collected, the load in pounds per day for each parameter for each sampled storm event, include date of storm events.
    - An estimated seasonal pollutant load for each parameter at each discharge monitoring location. This is calculated using all storm events (when water quality samples were collected and when samples were not collected).
    - A total annual pollutant load (wet season load + dry season load) for each parameter (include estimated events).
    - The rainfall/runoff relationship including your pollutant load estimates for un-sampled events.
    - Note that if any data is unavailable to effectively estimate your rainfall to runoff relationship due to an incomplete water year, submit this information in the next year's stormwater monitoring report.

- Quality Assurance/Quality Control information for each successfully sampled qualifying storm event at each discharge monitoring location and solids sample collection event at each discharge monitoring location, including:
  - A narrative summary of your field and laboratory verification, validation results and quality control checks performed.
  - A narrative analysis of your field and laboratory quality control sample results and how they compare with your data quality objectives/indicators in your QAPP.
  - Corrective actions reported/taken.
- An explanation and discussion of results from each successfully sampled qualifying storm event at each discharge monitoring location and solids sample collection event collected at each discharge monitoring location, including:
  - A statistical analysis of the event means concentrations for each parameter and a narrative description of significant findings from this analysis.
  - Any conclusions based on data from this study including analyses of previously collected data from these discharge monitoring locations.
- A description of activities currently taking place or planned within the monitoring station's drainage area that may have affected or may potentially affect future monitoring results.

If the Permittee monitors any pollutant more frequently at the stormwater discharge monitoring locations, the results of this monitoring shall be included in the annual monitoring report reflecting the water year in which the monitoring occurred.

After three (3) water years of data, the Annual Monitoring Report shall include:

- Trend analyses;
- An evaluation of the data as it applies to the Stormwater Management Program (SWMP); and
- Any stormwater management activities the Permittee has identified that can be implemented or adjusted to respond to this data.

LABORATORY METHODS

The Permittee's stormwater discharge monitoring program shall use the following analytical methods or other methods approved by the U.S. Environmental Protection Agency or Ecology with similar reporting limits unless alternative methods are approved by Ecology. Any alternative method proposed by a Permittee must have a similar reporting limit, or must be justified as adequate for the likely, expected range of concentrations. Permittees are not guaranteed approval of alternative methods or reporting limits.

In cases where smaller volumes of water are expected to be collected, or to save analytical costs, Permittees may propose that some of the analyses be optimized for specific parameters or groups. The Permittee must, in consultation with a qualified chemist, define the exact volumes and optimization steps and include them in the QAPP.

The QAPP shall identify Ecology- or EPA-approved methods with appropriate reporting limits. An individual sample that could not be run at a reporting limit because of matrix interference or other such reasons would not be called into question for compliance purposes. All results shall be reported. This includes positive detections between the method detection limit (MDL) and the reporting limit (RL), with the appropriate lab qualifier, and the non-detected concentrations at the value of the MDL or lower limit of quantitation (LLOQ) with the appropriate lab qualifier of "U" for undetected at that concentration. Non-detections must be reported and analyzed in the dataset. Results must be evaluated and censored for blank contamination (e.g., organic parameters should consider a censor threshold of less than 5x the laboratory blank contamination). All data gathering and data handling approaches should be explained in the QAPP.

Table A9-2 Analytical Procedures in Stormwater

Analyte	Method in Water	Method Detection Limit Target[a]	Reporting Limit or Lower Limit of Quantitation (LLOQ)[b]
Conventional Parameters			
Total suspended solids[c]	SM2540B or SM2540D		1.0 mg/L
Turbidity	EPA Method 180.1 or SM2130B		± 0.2 NTU
Conductivity	EPA Method 120.1 or SM2510B		± 1 µmhos/cm
Chloride	EPA Method 300.0, EPA Method 325.2, or SM4110B or SM4500 Cl-B, SM4500 Cl-C, SM4500 Cl-D, SM4500 Cl- EPAHS		0.2 mg/L
BOD5	SM5210B		2.0 mg/L
pH	EPA Method 150.2 or SM4500H+ B		0.2 units
Hardness as CaCO3	EPA Method 200.7, SM2340B(ICP), SM2340C (titration), or SM3120B		1.0 mg/L
Methylene blue activated substances (MBAS)	CHEMetrics Colorimetric or SM5540C		0.025 mg/L
Bacteria			
Fecal Coliform	SM9221E		Specified in method -

Analyte	Method in Water	Method Detection Limit Target[a]	Reporting Limit or Lower Limit of Quantitation (LLOQ)[b]
			sample aliquot dependent
E.coli (freshwater)	SM9221 B, SM9221 F, SM9223 B		Specified in method - sample aliquot dependent
Enterococci (marine)	EPA Method 1600, SM9230 B, SM9230 C, SM9230D		Specified in method - sample aliquot dependent
Nutrients			
Orthophosphate as P	EPA Method 365.3, EPA Method 365.1, SM4500-P E, SM4500-P F, or SM4500- P G	0.003 mg/L	0.01 mg/L
Total phosphorus as P	EPA Method 365.3, EPA Method 365.4, or SM4500-P-B followed by SM4500-P E or P F	0.003 mg/L	0.01 mg/L
Total Kjeldahl nitrogen as N or Total Nitrogen	EPA Method 351.2, EPA Method 351.1, SM4500 Norg-B, SM4500 Norg-C, SM4500 NH3-D, SM4500 NH3-G, SM4500 NH3-E, SM4500 NH3-F, SM4500 NH3-G, SM4500 NH3-H, SM4500 N-B, SM4500 N-C, SM4500 N-E		0.3 mg/L
Ammonia as N	SM4500 NH3-D, SM4500 NH3-G, SM4500 NH3-E, SM4500 NH3-F, SM4500 NH3-G, or SM4500 NH3-H		0.02 mg/L
Nitrate-Nitrite as N	EPA Method 353.2, SM4500 -$NO3^-$ E, SM4500 -$NO3^-$ F, or SM4500 -$NO3^-$ H		0.1 mg/L
Metals			

Analyte	Method in Water	Method Detection Limit Target[a]	Reporting Limit or Lower Limit of Quantitation (LLOQ)[b]
Total zinc	EPA Method 200.8 or SM 3125B		5.0 µg/L
Dissolved zinc	EPA Method 200.8 or SM 3125B		1.0 µg/L
Total lead, copper and cadmium	EPA Method 200.8 or SM 3125B		0.1 µg/L, 0.5 µg/L, and 0.2 µg/L
Dissolved lead, copper, and cadmium	EPA Method 200.8 or SM 3125B	0.05, 0.02, and 0.03 µg/L	0.1 µg/L
Organics			
PAHs[d]	EPA Method 8270D SIM or EPA 8270E SIM		0.1 µg/L
Pesticides: Bifenthrin (pyrethroid insecticide) and dichlobenil (herbicide)	EPA Method 8270D SIM, EPA 8270E SIM, or EPA Method 625.1	0.02 µg/L	0.05 µg/L
Phthalates[e]	EPA Method 8270D SIM or EPA 8270E SIM	0.5 µg/L	1 µg/L
Petroleum Hydrocarbons			
NWTPH-Dx (diesel, heavy oil, and summed total)	Ecology, 1997	0.1 mg/L	0.25-0.5 mg/L

NA – Not applicable
SM – Standard Methods
SIM – Selective Ion Monitoring mode

a. If a value is not present in this column, then the target MDL is not published or not different from reporting limit target.
b. The QAPP shall identify Ecology- or EPA-approved methods with appropriate reporting limits. An individual sample that could not be run at a reporting limit because of matrix interference or other such reasons would not be called into question for compliance purposes.
c. Research results indicate that errors may be introduced by decanting a subsample, care and use of tools like a funnel splitter may help.
d. Polycyclic aromatic hydrocarbons (PAH), total and these individual compounds: acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, pyrene, and retene. Report the individual compound concentrations, and their summed total.
e. Phthalates, total and these individual compounds: bis(2-ethylhexyl)phthalate, butyl benzyl phthalate, di-n-octyl phthalate, dibutyl phthalate, and diethyl phthalate. Report the individual compound concentrations, and their summed total.

Table A9-3 Analytical Procedures in Stormwater Solids

Analyte	Method for Solid/Sediment	Reporting Limit or LLOQ[a]
Conventional Parameters		
Percent solids	SM 2540G	0.1 %
Total organic carbon	Puget Sound Estuary Protocols (PSEP 1997), SM5310B, SM5310C, SM5310D, or EPA Method 9060	0.1%
Grain size	Sieve and Pipette (ASTM 1997), ASTM F312-97, ASTMD422, or PSEP 1986/2003	Not Applicable
Total phosphorus	EPA Method 365.3, EPA Method 365.4, SM4500 P E, or SM4500 P F	0.01 mg/kg
Total volatile solids	EPA Method 160.4 or SM2540G	0.1%
Analyte	**Method for Solid/Sediment**	**Reporting Limit or LLOQ[a]**
Metals, dry weight		
Total zinc	EPA Method 200.8, EPA Method 6010D, EPA Method 6020B, or SM3125B	5.0 mg/kg
Total lead	EPA Method 200.8, EPA Method 6010D, EPA Method 6020B, or SM 3125B	0.1 mg/kg
Total copper	EPA Method 200.8, EPA Method 6010D, EPA Method 6020B, or SM 3125B	0.1 mg/kg
Total cadmium	EPA Method 200.8, EPA Method 6010D, EPA Method 6020B, or SM 3125B	0.1 mg/kg
Organics, dry weight		
Pesticides: Bifenthrin and dichlobenil	EPA Method 8270D, EPA 8270E, or EPA Method 1660	1.0 µg/kg
PAHs[b]	EPA Method 8270D or EPA 8270E SIM	70 µg/kg
Phthalates[c]	EPA Method 8270D or EPA 8270E SIM	70 µg/kg Except di-n-octlyphthalate (250 µg/kg)
Phenolics[d]	EPA Method 8270D or EPA 8270E SIM	660 µg/kg

PCBs[e]	EPA Method 608.3 or EPA Method 8082A	0.195 µg/kg or 5-20 ng/kg
PBDEs[f]	EPA Method 1614	5-10 ng/kg Except PBDE 209: (200 ng/kg)
Petroleum Hydrocarbons		
TPH-Dx (diesel, heavy oil, and summed total)	Ecology, 1997 or EPA Method 8015B	25-100 mg/kg

NA – Not applicable

SM – Standard Methods

SIM – Selective Ion Monitoring mode

a. The QAPP shall identify Ecology- or EPA-approved methods with appropriate reporting limits. An individual sample that could not be run at a reporting limit because of matrix interference or other such reasons would not be called into question for compliance purposes.
b. Polycyclic aromatic hydrocarbon (PAH) compounds, total and these individual compounds: acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, pyrene, and retene. Report the individual compound concentrations, and their summed total.
c. Phthalates: bis(2-ethylhexyl)phthalate, butyl benzyl phthalate, di-n-octyl phthalate, dibutyl phthalate, and diethyl phthalate. Report the individual compound concentrations, and their summed total.
d. Phenolics: pentachlorophenol, p-cresol, and o-cresol. Report the individual compound concentrations.
e. PCBs. EPA Methods 608.3 or EPA Method 8082A for Aroclors: 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, 1268 are suitable starting points for stormwater solids characterization. If a more sensitive congener analysis is conducted (EPA Method 8082A or EPA Method 1668C) then those individual compound concentrations should also be reported in the annual report.
f. Polybrominated diphenyl ethers (PBDEs): congener numbers 47, 49, 66, 71, 99, 100, 138, 153, 154, 183, 184, 191, and 209. Report the individual compound concentrations, and their summed total.

REFERENCES

ASTM. 1997. *Standard test methods for determining sediment concentration in water samples. Method D 3977.* American Society for Testing and Materials, Philadelphia, PA.

PSEP. 1986. *Recommended Protocols for measuring conventional sediment variables in Puget Sound.* Prepared by Tetra Tech, Inc. for U.S. Environmental Protection Agency and Puget Sound Water Quality Authority. Tetra Tech Inc., Bellevue, WA.

Ecology, 1997. *Analytical Methods for Petroleum Hydrocarbons*. Washington State Department of Ecology, Toxics Cleanup Program. Olympia, WA. Publication No. 97-602.

This page intentionally left blank

APPENDIX 10 – Equivalent Programs for Runoff Controls for New and Redevelopment and Construction Sites

Ecology determined that the following list shall be used to amend any enforceable documents, including codes, ordinances, director's rules, public rules and/or manuals, to be functionally equivalent to Appendix I in the *Western Washington Phase II Municipal Stormwater Permit* (effective August 1, 2024) and the required portions of Ecology's 2024 *Stormwater Management Manual for Western Washington.*

1. **Redevelopment Project Level Thresholds:** The "Project Level" thresholds for applying the Minimum Requirements to redevelopment projects have been updated.

    - Project Level - Redevelopment Thresholds / Road Related Projects

      The updated threshold for road related projects states that all Minimum Requirements apply to the new and replaced hard surfaces and converted vegetation areas if the project adds 5,000 square feet of new plus replaced hard surfaces AND the new plus replaced hard surfaces total 50% or more of the existing hard surfaces on the Site (underline shows the new language).
    - Project Level - Redevelopment Thresholds / Commercial or Industrial Projects

      The updates include a new threshold for commercial or industrial Sites. The new threshold states that all Minimum Requirements apply to the new and replaced hard surfaces and converted vegetation areas if the Project adds more than 5,000 square feet of new plus replaced hard surfaces AND the new plus replaced hard surfaces total 50% or more of the existing hard surfaces within the Site.

    See **Section 3** of Appendix 1.

2. **Project Exemptions:** The text describing the exemptions from Minimum Requirements has been updated to ensure that the project scope does not exceed the intention of these limited exemptions.

    See **Section 1** of Appendix 1.

3. **Wetland Hydroperiod Protection Method 2:** The hydroperiod protection requirements for Criteria 2 in Method 2 have been updated. The updates include an increase from 15% to 20% allowable monthly discharge volume deviations during October, November, and December, and an "allowable exception" for summer months.

    See **I-C.4 Wetland Hydroperiod Protection** in the 2024 SWMMWW.

4. **Definitions Related to Minimum Requirements:** Multiple definitions related to the Minimum Requirements have been updated for statewide consistency and/or to reflect updated requirements.

An example of a term with an updated definition to reflect an updated requirement is "vehicular use". The definition for "vehicular use" has been updated to identify Light Rail tracks (both elevated and non-elevated) as a pollution generating impervious surface.

See **Section 2** of Appendix 1.

5. **Runoff Treatment Performance Goal Thresholds:** Some thresholds for Runoff Treatment BMP types (i.e. basic, metals, oil, and/or phosphorus) have been updated for statewide consistency and/or to reflect updated requirements.

   An example of an edit to the Runoff Treatment Performance Goal Thresholds that reflects an updated requirement is identifying Light Rail guideways as a Site type that requires metals treatment.
   See **Section 4.6** of Appendix 1.

6. **Source Control BMPs - PCB Edits:** The following Source Control BMPs have been updated to include guidance for preventing pollution from PCBs in building materials:

   - S424 BMPs for Roof / Building Drains at Manufacturing and Commercial Buildings
   - S431 BMPs for Washing and Steam Cleaning Vehicles / Equipment / Building Structures
   - S438 BMPs for Construction Demolition
   - S451 BMPs for Building Repair, Remodeling, Painting, and Construction

   See **Volume IV** in the 2024 SWMMWW.

7. **Bioretention:** The guidance within **BMP T7.30: Bioretention** has been updated to include the option to use the High Performance Bioretention Soil Mix (HPBSM). The design guidance was also updated to clarify the design infiltration rate to use for all three bioretention soil mix options.

   See **BMP T7.30: Bioretention** in the 2024 SWMMWW.

Appendix 11 - Annual contribution amounts for Stormwater Action Monitoring Collective Funds

Western Washington

Permittee *Permittees are grouped by County and listed alphabetically*	**Population used for cost allocation** [1]	**Annual amount for S8.A**	**Annual amount for S8.B**
Clallam			
Port Angeles	20,200	$5,050	$7,474
Clark			
Unincorporated	237,650	$78,425	$87,931
Battle Ground	21,780	$7,187	$8,059
Camas	27,250	$8,993	$10,083
Vancouver	197,600	$65,208	$73,112
Washougal	17,390	$5,739	$6,434
Cowlitz			
Unincorporated	13,059	$4,309	$4,832
Kelso	12,720	$4,198	$4,706
Longview	37,780	$12,467	$13,979
Grays Harbor			
Aberdeen	17,040	N/A	$6,305
Island			
Oak Harbor	24,760	$6,190	$9,161
King			
Unincorporated	248,160	$62,040	$91,819
Algona	3,300	$825	$1,221
Auburn	88,750	$22,188	$32,838
Bellevue	153,900	$38,475	$56,943
Black Diamond	6,145	$1,536	$2,274
Bothell	48,940	$12,235	$18,108
Burien	52,490	$13,123	$19,421
Clyde Hill	3,110	$778	$1,151
Covington	21,200	$5,300	$7,844
Des Moines	33,160	$8,290	$12,269
Duvall	8,320	$2,080	$3,078
Enumclaw	12,910	$3,228	$4,777
Federal Way	101,800	$25,450	$37,666
Issaquah	40,950	$10,238	$15,152
Kenmore	24,090	$6,023	$8,913
Kent	137,900	$34,475	$51,023
Kirkland	93,570	$23,393	$34,621
Lake Forest Park	13,620	$3,405	$5,039

Permittee *Permittees are grouped by County and listed alphabetically*	**Population used for cost allocation** [1]	**Annual amount for S8.A**	**Annual amount for S8.B**
Maple Valley	28,920	$7,230	$10,700
Medina	2,915	$729	$1,079
Mercer Island	25,780	$6,445	$9,539
Newcastle	13,560	$3,390	$5,017
Normandy Park	6,790	$1,698	$2,512
Pacific	7,270	$1,818	$2,690
Port of Seattle	20,196	$5,049	$7,473
Redmond	75,270	$18,818	$27,850
Renton	107,500	$26,875	$39,775
Sammamish	68,150	$17,038	$25,216
SeaTac	31,910	$7,978	$11,807
Seattle	762,500	$190,625	$282,125
Shoreline	60,320	$15,080	$22,318
Snoqualmie	14,490	$3,623	$5,361
Tukwila	22,620	$5,655	$8,369
Woodinville	13,450	$3,363	$4,977
Kitsap			
Unincorporated	55,271	$13,818	$20,450
Bainbridge Island	25,060	$6,265	$9,272
Bremerton	45,220	$11,305	$16,731
Port Orchard	16,400	$4,100	$6,068
Poulsbo	12,180	$3,045	$4,507
Lewis			
Centralia	18,360	N/A	$6,793
Mason			
Shelton	10,430	$2,608	$3,859
Pierce			
Unincorporated	440,800	$110,200	$163,096
Bonney Lake	22,990	$5,748	$8,506
Buckley	5,315	$1,329	$1,967
DuPont	10,180	$2,545	$3,767
Edgewood	13,520	$3,380	$5,002
Fife	11,130	$2,783	$4,118
Fircrest	7,215	$1,804	$2,670
Gig Harbor	12,540	$3,135	$4,640
Lakewood	63,800	$15,950	$23,606
Milton	8,695	$2,174	$3,217
Orting	9,055	$2,264	$3,350
Port of Tacoma	20,196	$5,049	$7,473
Puyallup	43,260	$10,815	$16,006

Permittee *Permittees are grouped by County and listed alphabetically*	**Population used for cost allocation** [1]	**Annual amount for S8.A**	**Annual amount for S8.B**
Steilacoom	6,790	$1,698	$2,512
Sumner	10,800	$2,700	$3,996
Tacoma	220,800	$55,200	$81,696
University Place	35,420	$8,855	$13,105
Skagit			
Unincorporated	11,396	$2,849	$4,217
Burlington	9,800	$2,450	$3,626
Anacortes	17,880	$4,470	$6,616
Mount Vernon*	35,500	$8,875	$13,135
Sedro-Woolley	12,590	$3,148	$4,658
Snohomish			
Unincorporated	371,915	$92,979	$137,609
Arlington	21,260	$5,315	$7,866
Brier	6,590	$1,648	$2,438
Edmonds	42,980	$10,745	$15,903
Everett	113,300	$28,325	$41,921
Granite Falls	4,705	$1,176	$1,741
Lake Stevens	40,700	$10,175	$15,059
Lynnwood	38,740	$9,685	$14,334
Marysville	72,380	$18,095	$26,781
Mill Creek	21,510	$5,378	$7,959
Monroe	19,700	$4,925	$7,289
Mountlake Terrace	22,070	$5,518	$8,166
Mukilteo	21,590	$5,398	$7,988
Snohomish	10,200	$2,550	$3,774
Thurston			
Unincorporated	55,887	$13,972	$20,678
Lacey	58,180	$14,545	$21,527
Olympia	56,370	$14,093	$20,857
Tumwater	26,360	$6,590	$9,753
Whatcom			
Unincorporated	18,942	$4,736	$7,009
Bellingham	93,910	$23,478	$34,747
Ferndale	15,970	$3,993	$5,909
Lynden	16,150	$4,038	$5,976
WSDOT			
Lower Columbia	37,780	$12,467	N/A
Puget Sound	137,900	$34,475	N/A

*Mount Vernon name added 7/3/24 .

Permittee *Permittees are grouped by County and listed alphabetically*	**Population used for cost allocation** [1]	**Annual amount for S8.A**	**Annual amount for S8.B**
Totals	5,302,795	$ 1,419,123[3]	$1,976,984

[1] Populations are based on Office of Financial Management data for 2022, accessed in April 2023. The derivation of the populations used to calculate the cost allocations for Phase II counties, Ports of Seattle and Tacoma, and WSDOT are explained in the permit fact sheet.

[2] The first S8.A and S8.B payments are not due until the second year of permit (2025) for Shelton in Mason County. These were new permittees/permit coverage areas in the 2019- 2024 Western Washington Phase II permit.

[3] The total annual S8.A amount for Lower Columbia is $198,993 and the total annual S8.A amount for Puget Sound is $1,220,130. These pooled funding contributions will be managed in separate accounts.

Eastern Washington

Permittee *Permittees are grouped by County and listed alphabetically*	**Population used for cost allocation** [1]	**Annual amount for S8.B**
Asotin County		
Unincorporated	20,000	$7,400
Asotin	1,220	$451
Clarkston	7215	$2,670
Benton County		
Kennewick	85320	$31,568
Richland	62220	$23,021
West Richland	17410	$6,442
Chelan County		
Unincorporated	5395	$1,996
Wenatchee	35650	$13,191
Douglas County	16509	$6,108
East Wenatchee	14180	$5,247
Franklin County		
Pasco	80180	$29,667
Grant County		
Moses Lake	26040	$9,635
Kittitas County		
Ellensburg	20940	$7,748
Spokane County		
Unincorporated	64879	$24,005
Spokane	230900	$85,433
Spokane Valley	107100	$39,627
Walla Walla County		
Unincorporated	2944	$1,089
College Place	9855	$3,646
Walla Walla	34020	$12,587
Whitman County		
Pullman	32790	$12,132
Yakima County		
Unincorporated	17984	$6,654
Selah	8365	$3,095
Sunnyside	16500	$6,105
Union Gap	6640	$2,457
Yakima	98200	$36,334
Totals	1,022,456	$378,308

[1] Populations are based on Office of Financial Management data for 2022, accessed in April 2023. The derivation of the populations used to calculate the cost allocations for Phase II counties are explained in the permit fact sheet. Since Asotin County unincorporated UGA population is not available, Ecology used Local information (NOI).

This page intentionally left blank

APPENDIX 12 –Stormwater Management for Existing Development Program Reporting

Each Permittee shall implement a Stormwater Management for Existing Development (SMED) Program to control or reduce stormwater discharges to waters of the state from areas of existing development.[1] The Program shall aim to focus on strategic stormwater investments over longer planning timeframes.

This Appendix describes project criteria, assigned area required to be managed by Permittees, and reporting SMED requirements associated with Permit Section S5.C.7.

Permittee Assignment of Equivalent Acres

Permittees are required to fully fund, start construction, or completely implement projects that meet the assigned equivalent acres listed in Table 1. Equivalent acres are calculated as described below and is intended to be a measure that compares the project area and BMPs with Appendix 1 standards for LID, flow control, or runoff treatment BMPs where appropriate.

Table 1: Assigned Equivalent Acres according to population for Phase II Permittees.

PERMITTEE	POPULATION[2]	ASSIGNED EQUIVALENT ACRES BASED ON 8 ACRES/50,000 POP.
CITY OF MEDINA	2,915	0.5
CITY OF CLYDE HILL	3,110	0.5
CITY OF ALGONA	3,300	0.5
CITY OF GRANITE FALLS	4,705	0.8
CITY OF BUCKLEY	5,315	0.9
CITY OF BLACK DIAMOND	6,145	1
CITY OF BRIER	6,590	1.1
CITY OF STEILACOOM	6,790	1.1
CITY OF NORMANDY PARK	6,790	1.1
CITY OF FIRCREST	7,215	1.2
CITY OF PACIFIC	7,270	1.2
CITY OF DUVALL	8,320	1.3
CITY OF MILTON	8,695	1.4
CITY OF ORTING	9,055	1.4
CITY OF BURLINGTON	9,800	1.6
CITY OF DUPONT	10,180	1.6

[1] New Permittees are exempt from this permit section.
[2] Populations are based on Office of Financial Management data for 2022, accessed in April 2023.

PERMITTEE	POPULATION[2]	ASSIGNED EQUIVALENT ACRES BASED ON 8 ACRES/50,000 POP.
CITY OF SNOHOMISH	10,200	1.6
CITY OF SHELTON	10,430	1.7
CITY OF SUMNER	10,800	1.7
CITY OF FIFE	11,130	1.8
COUNTY OF SKAGIT	11,396	1.8
CITY OF POULSBO	12,180	1.9
CITY OF GIG HARBOR	12,540	2
CITY OF SEDRO-WOOLLEY	12,590	2
CITY OF KELSO	12,720	2
CITY OF ENUMCLAW	12,910	2.1
COUNTY OF COWLITZ	13,059	2.1
CITY OF WOODINVILLE	13,450	2.2
CITY OF EDGEWOOD	13,520	2.2
CITY OF NEWCASTLE	13,560	2.2
CITY OF LAKE FOREST PARK	13,620	2.2
CITY OF SNOQUALMIE	14,490	2.3
CITY OF FERNDALE	15,970	2.6
CITY OF LYNDEN	16,150	2.6
CITY OF PORT ORCHARD	16,400	2.6
CITY OF ABERDEEN	17,040	2.7
CITY OF WASHOUGAL	17,390	2.8
CITY OF ANACORTES	17,880	2.9
CITY OF CENTRALIA	18,360	2.9
COUNTY OF WHATCOM	18,942	3
CITY OF MONROE	19,700	3.2
CITY OF PORT ANGELES	20,200	3.2
CITY OF COVINGTON	21,200	3.4
CITY OF ARLINGTON	21,260	3.4
CITY OF MILL CREEK	21,510	3.4
CITY OF MUKILTEO	21,590	3.5
CITY OF BATTLE GROUND	21,780	3.5
CITY OF MOUNTLAKE TERRACE	22,070	3.5
CITY OF TUKWILA	22,620	3.6
CITY OF BONNEY LAKE	22,990	3.7

PERMITTEE	POPULATION[2]	ASSIGNED EQUIVALENT ACRES BASED ON 8 ACRES/50,000 POP.
CITY OF KENMORE	24,090	3.9
CITY OF OAK HARBOR	24,760	4
CITY OF BAINBRIDGE ISLAND	25,060	4
CITY OF MERCER ISLAND	25,780	4.1
CITY OF TUMWATER	26,360	4.2
CITY OF CAMAS	27,250	4.4
CITY OF MAPLE VALLEY	28,920	4.6
CITY OF SEATAC	31,910	5.1
CITY OF DES MOINES	33,160	5.3
CITY OF UNIVERSITY PLACE	35,420	5.7
CITY OF MOUNT VERNON	35,500	5.7
CITY OF LONGVIEW	37,780	6
CITY OF LYNNWOOD	38,740	6.2
CITY OF LAKE STEVENS	40,700	6.5
CITY OF ISSAQUAH	40,950	6.6
CITY OF EDMONDS	42,980	6.9
CITY OF PUYALLUP	43,260	6.9
CITY OF BREMERTON	45,220	7.2
CITY OF BOTHELL	48,940	7.8
CITY OF BURIEN	52,490	8.4
COUNTY OF KITSAP	55,271	8.8
COUNTY OF THURSTON	55,887	8.9
CITY OF OLYMPIA	56,370	9
CITY OF LACEY	58,180	9.3
CITY OF SHORELINE	60,320	9.7
CITY OF LAKEWOOD	63,800	10.2
CITY OF SAMMAMISH	68,150	10.9
CITY OF MARYSVILLE	72,380	11.6
CITY OF REDMOND	75,270	12
CITY OF AUBURN	88,750	14.2
CITY OF KIRKLAND	93,570	15
CITY OF BELLINGHAM	93,910	15
CITY OF FEDERAL WAY	101,800	16.3
CITY OF RENTON	107,500	17.2

PERMITTEE	POPULATION[2]	ASSIGNED EQUIVALENT ACRES BASED ON 8 ACRES/50,000 POP.
CITY OF EVERETT	113,300	18.1
CITY OF KENT	137,900	22.1
CITY OF BELLEVUE	153,900	24.6
CITY OF VANCOUVER	197,600	25

SMED Stormwater Investments

Permit section S5.C.7.a states:

Permittees shall implement stormwater facility retrofits, or tailored SWMP actions that meet the criteria described in Appendix 12, using one or a combination of the following:

i. *Strategic stormwater investments identified in Stormwater Management Action Plan(s) (SMAPs, S5.C.1.d.), or similar stormwater planning process; and/or*

ii. *Opportunistic stormwater investments identified by leveraging projects outside of SMAP areas to improve stormwater management and infrastructure.*

The following describes the eligible project types for SMAP and Opportunistic stormwater investment to be used to meet the assigned acreage in Table 1, how to calculate credit to project types, and a standard reporting method.

Stormwater Management Action Plan - background

During the 2019 Permit term, where applicable, Permittees were required to develop a Stormwater Management Action Plan (SMAP) for a high priority catchment area.

The SMAP is required to identify:

1. A description of the stormwater facility retrofits needed for the area, including the BMP types and preferred locations.
2. Land management/development strategies and/or actions identified for water quality management.
3. Focused, enhanced, or customized implementation of stormwater management actions related to permit sections within S5, including:
    a. IDDE field screening,
    b. Prioritization of Source Control inspections,
    c. O&M inspections or enhanced maintenance, or
    d. Public Education and Outreach behavior change programs.

Identified actions shall support other specifically identified stormwater management strategies for the basin overall, or for the catchment area in particular.

- If applicable, identification of changes needed to local long-range plans, to address SMAP priorities.
- A proposed implementation schedule and budget sources for:
    - Short-term actions (i.e., actions to be accomplished within six years), and
    - Long-term actions (i.e., actions to be accomplished within seven to 20 years).
- A process and schedule to provide future assessment and feedback to improve the planning process and implementation of procedures or projects.

Opportunistic stormwater investments – background

Aimed at encouraging eligible project types to improve stormwater management infrastructure. These projects do not need to be included in an SMAP to help address the stormwater runoff issues in the area. This is intended to drive stormwater investment wherever feasible and needed. This provision is modeled after the Phase I SMED Program (formerly named Structural Stormwater Control (SSC)), including the list of eligible project types. Opportunistic projects are stormwater projects planned or leveraged outside of the SMAP planning area that meet project eligibility as described below.

SMAP Project Types

Stormwater Facility Retrofits

Stormwater facility retrofits means both projects that retrofit existing treatment and/or flow control facilities and new flow control or treatment facilities or BMPs that will address impacts from existing development. SMAPs were intended to identify the needed flow control or runoff treatment BMP types and preferred locations. BMPs or project types included in this section match the Opportunistic Project types for stormwater facility retrofits:

New Flow Control Facilities

Flow control facilities need not be regional. These facilities do not have to meet the "standard flow control requirement" (refer to Appendix 1, Section 4.7) but they shall be new facilities designed to control stormwater flow from existing development. Project proponents that don't follow design criteria from the SWMMWW, or equivalent manual, should be prepared to provide additional project details at Ecology's request to support calculations for equivalent area. Qualifying projects in this category will be compared against the Flow Control Standard (Minimum Requirement #7).

New Runoff Treatment Facilities

Runoff treatment facilities include facilities that provide oil control, phosphorus treatment, enhanced (dissolved metals) treatment, and basic treatment. Facilities in this category do not have to meet runoff treatment requirements (e.g., treat 91% of the average annual runoff) but they shall be new facilities that provide a treatment benefit for existing development. Project proponents that don't follow design criteria from the SWMMWW, or equivalent manual, should be prepared to provide additional project details at Ecology's request to support calculations for equivalent area. Qualifying

projects in this category will be compared against the Runoff Treatment Standard (Minimum Requirement #6).

New LID BMPs

These facilities are consistent with the lists of On-Site Stormwater Management BMPs of Minimum Requirement 5 and reduce the volume of runoff by infiltrating runoff from the small, more frequent storms. Qualifying new LID BMP projects result in the reduction or prevention of hydrologic changes through use of on-site (e.g., infiltration, dispersion, evapotranspiration, rainwater harvesting) stormwater management BMPs. Qualifying projects in this category will be compared against the LID Performance Standard (Minimum Requirement #5).

Retrofitting of Existing Treatment and/or Flow Control Facilities

Retrofitting is expected to occur on previously constructed stormwater facilities that, if modified, would provide additional hydrologic or runoff treatment benefits. For example, Ecology considers the retrofit of a stormwater pond to provide a settling area and more storage, a retrofit to a stormwater facility.

Land Management/Development Strategies

SMAPs may include identification of lands to protect or conserve from impervious surface conversions or native vegetation removal, and the strategic means for providing the needed protection, which could be addressed via purchase or zoning or land use policy changes, to name a few options. SMAP may also include other zoning or land use policy changes deemed necessary to prevent the water body from maintaining its current designated uses.

Focused, Enhanced, or Customized Stormwater Management Actions

SMAP may include implementation of focused, enhanced, or customized implementation of stormwater management actions related to the following Permit provisions within S5.C in addition to the other required SMAP actions:

- Focused or more frequent IDDE field screening;
- Prioritization of Source Control inspections;
- O&M inspections or enhanced maintenance of facilities you own or operate;
- Maintenance that requires capital construction of more than $25,000; and/or
- Public Education and Outreach behavior change programs to support SMAP actions for the receiving water overall, or for the catchment area in particular.

Opportunistic Stormwater Investments

Below is a listing of eligible opportunistic project types, outside of SMAPs, that Permittees may implement to receive credits toward managed acres. Project types listed as 2-8 are non-structural BMPs that will receive limited credit for this permit term.

Project Types

(1) Stormwater facility retrofits (as described above):

a. New flow control facility

b. New runoff treatment facility (or treatment and flow control facility)

c. New LID BMPs

d. Retrofit of existing treatment and/or flow control facility

(2) Maintenance with capital construction costs ≥ $25,000

This project type applies to maintenance or repair projects that improve the hydrologic or treatment performance of stormwater facilities. This project type is directly related to Operations and Maintenance Program requirements at S5.C.9.a.ii. which reflects that maintenance projects, including repairs, which require capital construction ≥ $25,000 are not subject to the required 2-year window for completing the maintenance. These projects typically compete with the other types of retrofit projects for limited capital construction funding. Ecology intends that these projects be reflected in the SMED program to provide a comprehensive view of MS4 maintenance activities and requirements. Permittees may develop criteria for identifying maintenance projects that reach the capital construction cost threshold on an area-wide or system-wide basis as part of the project prioritization process. A maintenance project that removes sediment from an existing pond to re-establish the original design volume, will qualify under this project type.

(3) Property Acquisition for Water Quality and/or Flow Control Benefits

This category excludes the purchase of property for the siting of a stormwater facility. Instead, purchase of a likely development site to permanently prevent it from being developed would qualify under this category. This category includes forest protection and conservation easements. Riparian habitat acquisition qualifies under this project type. Property used for dispersion does not qualify under this project type; it is considered a New LID BMP.

(4) Restoration of Riparian Buffers

This project type describes planting and restoring of riparian buffers above the ordinary high watermark that can reduce the discharge of pollutants and reduce impacts to waters of the state by protecting or restoring hydrologic capacity.

(5) Restoration of Forest Cover

This project type describes planting and restoring of forest cover that can reduce the discharge of pollutants and reduce impacts to waters of the state by protecting or restoring hydrologic capacity.

(6) Floodplain Reconnection Projects on Water Bodies That Are Not Flow Control Exempt Per Appendix 1

Qualifying floodplain reconnection projects will provide flow reduction and runoff treatment benefits.

(7) Permanent Removal of Impervious Surfaces

This project type describes permanent removal of impervious surfaces and replacement with pervious vegetated surfaces meeting BMP T5.13 or trees that promote infiltration, dispersion, and uptake by plants or reduce the amount of pollution generating impervious surfaces.

(8) Sweeping and line cleaning

Sweeping and line cleaning shall be documented to be in addition to the requirements established in S5.C.9 Operation and Maintenance.

Non-Qualifying Project Types

1. Projects that do not have a nexus with the current MS4 or do not prevent future MS4 impacts.
2. Projects that occur within the receiving water do not qualify, including but not limited to:
    a. In-channel habitat and stream restoration
    b. Fish barrier removal
    c. Stabilization of down cutting
    d. In-stream culvert replacement
    e. Mitigation projects otherwise required to compensate for problems caused by excessive stormwater runoff peak flows and geomorphologically significant flows

How to Calculate Equivalent Acres

Use this section to determine how to credit project types to meeting the assigned Equivalent Acres in Table 1. Counties may implement projects outside of Permit coverage areas to meet their assignment where benefits to receiving waters within the Permit coverage are identified and anticipated.

Stormwater Facility Retrofits

Use the following procedures to calculate the areas managed by stormwater facility retrofits. These may be SMAP or Opportunistic projects. A single project may be eligible to gain equivalent area credit for LID, Runoff Treatment, and Flow Control, based on the water quality benefits provided by the project.

How to Calculate Area for Small Projects under 1 Acre

Small stormwater facility retrofit projects can receive equivalent acres through a simpler calculation, by determining the total area (in acres) draining to the project.

This procedure only applies to projects whose total basin area is one (1.0) acre or less. Projects with basin areas larger than 1 acre must follow the Equivalent Area Calculation process for each appropriate BMP type.

LID Performance Standard Equivalent Area Process

1. Determine the total area (in acres) draining to the project. This is called the "full basin" in these steps.
2. Run the Western Washington Hydrology Model (WWHM, 2012), or other approved continuous simulation model, to determine if the BMP meets the LID Performance Standard for the full basin area.
    - If the project meets the LID Performance Standard, the Equivalent Area equals the area draining to the BMP.
    - If the project uses Full Dispersion functionally equivalent to BMP T 5.30 in Chapter 5 of Volume V of the *Stormwater Management Manual for Western Washington*, the Equivalent Area equals the area draining to the BMP.
3. If the project does not meet the LID Performance Standard for the full basin use the Western Washington Hydrology Model (WWHM 2012), or other approved continuous simulation model to calculate the infiltration area of the BMP required to meet the LID Performance Standard Requirement (refer to Permit Appendix 1, Section 4.5) (e.g., match developed discharge durations to applicable pre-developed durations for the range of pre-developed discharge rates from 8% of the 2-year peak flow up to 50% of the 2-year peak flow). Identify the area available for infiltration in the new facility. This is the "required" New/Redevelopment infiltration area for a new BMP project, or the "required" area added through a project that retrofits an existing BMP.
4. Determine the infiltration area provided by the project under consideration. This is the "actual" infiltration area.
5. Divide the actual infiltration area (4) by required New/Redevelopment infiltration area (3) to get the LID Benefit ratio.
6. Multiply the LID Benefit ratio (5) by the full basin area (1) to get LID Equivalent area. The equivalent area cannot be greater than the full basin area.

Runoff Treatment Equivalent Area Process

1. Determine the total area (in acres) draining to the project. This is called the "full basin" in these steps.
2. Use an approved continuous simulation model to determine the required New/Redevelopment Runoff Treatment flow (cfs) or Volume (ac-ft) for the full basin using WWHM 2012.
3. Determine the flow rate or volume provided by the project. This is the "actual" runoff treatment flow rate or volume of a new BMP project, or the "actual" flow rate or volume added through a project that retrofits an existing BMP.
4. Divide the actual flow rate or volume (3) by the full basin required flow rate or volume (2) to get the Runoff Treatment Benefit ratio.

5. Multiply the Runoff Treatment Benefit ratio (4) by the full basin area (1) to get the MR #6 Runoff Treatment Equivalent area. The equivalent area cannot be greater than the full basin area.

Flow Control Equivalent Area Process

1. Determine the total area (in acres) draining to the project. This is called the "full basin" in these steps. This area can include basins upstream of the new pond that are upstream of other retention/detention facilities if there is a series of facilities that work together to control stormwater flows.
2. Use an approved continuous simulation model, to calculate the amount of retention/detention storage required to meet the Standard Flow Control Requirement (refer to Permit Appendix 1, Section 4.7) (e.g., match developed discharge durations to applicable pre-developed durations for the range of pre-developed discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow) for the full basin.
3. Identify the volume of retention/detention at the overflow installed for the project (ac-ft). This is the "actual" retention/detention volume of a new BMP project, or the "actual" volume added through a project that retrofits an existing BMP.
4. Divide the actual retention/detention volume (3) by the full basin required New/Redevelopment retention/detention volume (2) to get the Flow Control Benefit ratio. If the ratio is greater than 1.0, use 1.0 as your Flow Control Benefit ratio.
5. Multiply the Flow Control Benefit ratio (4) by the full basin area (1) to get the Flow Control Equivalent area. The equivalent area cannot be greater than the full basin area.

SMAP: Land Management/Development Strategies and Focused, Enhanced, Custom SWMP (Non-structural BMPs)

Permittees that continue to engage in or complete these project types may receive 25% of their assigned equivalent acres from Table 1 by implementing one or both project types. For each of these project types, Permittees shall document actions taken, planned, and estimated/anticipated stormwater benefits of actions each reporting year.

For land management or development strategies, Permittees must document the process to develop, adopt or implement (or both) the strategy. Permittees must describe and document the public process, meetings, and method of implementation.

Focused, Enhanced, Custom SWMP actions shall be actions applied to the SMAP area and exceeds the requirements described in the respective program Permit section. For example, a behavior change program applied to the SMAP area must be in addition to another behavior change campaign being implemented during the same permit term.

Opportunistic project types (non-structural)

Permittees that implement these project types may receive up to 25% of the assigned equivalent acres. Actions above the 25% may still be reported, but will not receive credit. For these project types, the total project area is multiplied by the factor shown below.

Table 2: Non-structural project type multipliers

Project type	Project type factor
Maintenance with capital construction costs ≥ $25,000	0.5 times the acres served by the maintenance activity
Property acquisition	0.5 times acres acquired
Restoration of riparian buffer	0.35 times acres restored
Restoration of forest cover	0.25 times acres restored
Floodplain reconnection projects	0.10 times acres reconnected
Removal of impervious surfaces	1.0 times sq. ft of impervious surface removed
Sweeping and line cleaning	0.1 times curb miles swept 0.01 times the linear feet of lines cleaned

Street Sweeping Programs – Permittees may include street sweeping area, only if they are above and beyond the sweeping requirements in S5.C.9 Operations and Maintenance. They must be designed, executed, and documented to have the following characteristics:

- Only using a high efficiency sweeper.
- Only street sweeping routes from applicable MS4 service areas can be used to support runoff treatment benefit calculations.
- Qualifying street sweeping program is based on curb miles or acres swept (as documented through broom use and tracking of parked cars, vegetation, and other conditions that prevent the sweeper from reaching the edge of the roadway) and frequency of sweeping that is in addition to the street sweeping requirements in S5.C.9 Operations and Maintenance Program.

Stormdrain Line Cleaning Programs – Equivalent Area is based solely on linear-feet cleaned during the specified time. Line cleaning of the same section of stormwater conveyance pipe within a 5-year permit cycle does not qualify. Portions of lines that were inaccessible during line cleaning cannot be included in the calculation. If line cleaning is used to comply with S5.C.9 Catch Basin Inspection Alternative (c), it cannot be counted here.

How to Calculate Credit for Regional Collaboration

If a regional collaborative project reaches a cross-jurisdictional agreement or committed funding stage (but doesn't yet meet 'fully funded'), Phase II permittees may receive up to 25 percent of their assigned acreage credit from these collaborative projects. Once a project is complete, the Permittee will receive credit for their individual assignment. Document actions taken, planned, and estimated/anticipated stormwater benefits.

Instructions for Appendix 12 Reporting

Each year, City and County Permittees must submit an updated list of SMED projects to Ecology with their Annual Reports. The submittal shall be in .xlsx (Excel) file and include the information in this Appendix. This section provides additional information and instructions for Permit section S5.C.7.

Annual Reporting of projects provides the opportunity to track and report progress. Fill in all values as completely as possible each year. In subsequent years, Permittees should update the values for each project and add projects to new rows, as needed. You may remove projects that are cancelled or otherwise will not be used toward achieving the defined level of effort (as expressed in equivalent acres as shown in Table 1). Projects that were started on or after January 1, 2023, and are fully funded, started construction, completed, or regional collaboration by March 31, 2028, may be included.

Enter project status of stormwater facility retrofits on separate lines.

Report the following:

Project List & Project Name

Permittees shall assign each project its own row. Project names may change over time. If a project name changes, include a note or parenthetical that ties the new name to the old name. Maintenance actions with a recurring event frequency over multiple years must be named uniquely for each year (*e.g.*, Sweeping for WQ 2025).

Project Type

Project type shall be reported as described in this Appendix, distinguish between SMAP and opportunistic project types, stormwater facility retrofit type or non-structural project type.

SMAP land management/development strategies or Focused, Enhanced, or Customized SWMP actions must be fully described, including completed and anticipated actions.

Transportation-related Project Type

Describe how a project is transportation related and addressing high traffic areas. Describe in Comments how high traffic is determined locally. Note here whether the project is managing stormwater from road surfaces or other transportation-related surfaces.

Status

Report the status of the project type as follows:

- Fully Funded is for stormwater facility retrofit projects that are at or beyond design report stage and there is a documented source of funding and commitment to complete the project during the next permit cycle by March 31, 2028. Design Report Stage means project feasibility is established, BMP(s) are selected and their location(s) identified, site lay-out established, project cost developed, and proposed schedule is created.

- The started construction stage is for stormwater retrofit facilities that have begun a construction activities.
- Complete/Implementation stage is for completed stormwater facility retrofit projects, for SMAP land management/development strategies or Focused, enhanced, or customized SWMP actions, fully executed property purchases, implemented maintenance actions (as described herein), and completed restoration projects. A restoration project is not considered completed until any maintenance warranty times established with the construction contract have been completed, or vegetation establishment can be verified.
- For tracking purposes, update the status of projects for each yearly submittal.

Latitude/Longitude

If your project has multiple locations, include a Lat/Long for each location and describe the reason why in an explanatory note. Report Lat/Long in decimal degrees to six decimal places, and include the Geographic Coordinate System (e.g., WGS84). Maintenance actions that cover a geographic area shall provide zip codes for the area addressed and attach a map with the final reporting period.

Receiving Waterbody Name

List the waterbody to which the stormwater from the project discharges. If a receiving water body is unnamed, also include the name of the water body that the unnamed creek/lake is a tributary. Also indicate if the stormwater from the project is infiltrated wholly or partially to groundwater.

Cost Estimate

Estimate total project costs and update costs over the course of the project where known.

Where known, include local/state/federal funding sources by percentage in the 'Comments' field. Once a project is complete, the comments should reflect the accurate funding source distribution. For projects still underway, you may want to include an explanatory note to distinguish between funding sources that are secured and funding sources that you estimate.

Basin Area

Enter the total area served by the stormwater retrofit facility project (e.g., the full basin area). For stormwater facilities, this is the catchment area contributing runoff to the facility, including upstream facilities working as a system.

If the project serves an area under one acre, enter the total area for the basin. There are more detailed instructions in the "How to Calculate Area for Small Projects Under One Acre".

LID Equivalent Area

For each stormwater retrofit facility project that you expect to result in a hydrologic benefit for small storms, use the LID Performance Standard Equivalent Area process described in the section titled 'How to Calculate Equivalent Area.'

Runoff Treatment (RT) Equivalent Area

For each stormwater retrofit facility project that you expect to result in a runoff treatment benefit (e.g., TSS, dissolved Copper, dissolved Zinc, or Total Phosphorus), calculate Runoff Treatment Equivalent Area as described in the section titled, "How to Calculate Equivalent Area."

Flow Control (FC) Equivalent Area

For each stormwater retrofit facility project that you expect to result in a hydrologic benefit for larger storms, use the Flow Control Equivalent Area process described in the section titled 'How to Calculate Equivalent Area'.

Non-structural or Regional Collaboration Project Area

For opportunistic non-structural project types, that are not a stormwater retrofit facility, report the area for the relevant project type, up to 25% of assigned acreage:

- The area purchased or otherwise conserved or restored.
- For line cleaning projects, this is the line miles cleaned.
- For street sweeping projects, enter the amount for curb miles or acres swept.

Specify the units used for any area. For street sweeping, one curb mile for an 8.25 ft wide sweep from the curb would cover an area equal to one acre. If you use curb miles as the unit, but your sweeper width is different than this, specify the sweeper width.

For non-structural SMAP projects, report 25% of assigned acreage if implementing SMAP: Land Management/Development Strategies and/or Focused, Enhanced, Custom SWMP actions.

Permittees may receive a maximum of 50% of their assigned acreage for implementing opportunistic and SMAP non-structural project types this permit term.

For regional collaboration, report 25% of assigned acreage when a regional collaborative project reaches a cross-jurisdictional agreement, or committed funding stage, but doesn't yet meet 'fully funded.' This may only be applied one time per permit term.

Tribal benefits

Identify Project types that intend to provide stormwater management benefits to tribal waters or resources.

Overburdened Communities

Identify Project types that intend to provide stormwater management benefits to overburdened communities including specifically Vulnerable Populations and Highly Impacted Communities.

Total Equivalent Acres

Provide the calculated value of the Equivalent Acres for each Project type. For Project types receiving a percentage of the assigned acres, provide the total acres based on the calculation.

If the project provides benefits for standard flow control and/or runoff treatment, and/or LID, calculate equivalent areas for each benefit. **The Equivalent Acres for LID, runoff treatment, and flow control can be totaled.** For example, a bioretention facility would get equivalent acres for LID, based on the LID performance standard, Runoff Treatment Equivalent Acres for the amount that infiltrates through the bioretention soil media, and Flow Control Equivalent Acres based on the amount that does not overflow.

Opportunistic non-structural projects in addition to 25% (acreage, and project type)

Report opportunistic non-structural project which exceeds the 25% limit. These projects will not receive credit but may still be reported.

Completed Stormwater Facility Retrofit Acreage in excess to be applied for next permit term

Stormwater facility retrofit projects which are completely implemented by the expiration date of this Permit that will exceed the area required for this Permit term may apply the excess as a credit to be used for the next Permit term (e.g. 2029-2034 Permit term), not to exceed 50% of the next Permit's requirement.

Stormwater facility retrofits planning and projections

Report the amount of estimated or projected equivalent acres managed by stormwater facility retrofits for the next Permit term (e.g. 2029-2032).

Comments

This section can also be used to note any other information you feel is relevant, that is not addressed in other columns.

This page intentionally left blank

APPENDIX 13 – IDDE Reporting Data and Format

Permittees are required to submit the following information with the online annual report form, pursuant to Special Condition S9.A.

This is the complete list of information that all Permittees are required to report for each IDDE incident found, reported to, or investigated by the Permittee. Each Permittee may use either their own system or the WQWebIDDE form for recording this data.

The form is *required* for reporting, unless you are using your own tracking system.

If using your own tracking system, this information must be provided in an electronic format that follows the data schema provided at the end of this document and is easily transferred to a database. For annual reports due on March 31, 2025, a .xml submittal that follows the schema is required.

A complete report will include a separate entry (even if left blank) for every line below and must use the precise verbiage and spelling below. For all incidents where the answer to #6 is no, #7-12 are not required. All dates are in MM/DD/YYYY format.

1. Jurisdiction name and permit number
2. Date incident discovered or reported to you
3. Date of beginning your response
4. Date of end of your response
5. How was the incident discovered or reported to you? *(select **all** that apply)*
    - Pollution hotline (phone, web, app)
    - Direct report to your staff
    - Staff referral
    - Other agency referral
    - ERTS referral
    - Business inspection
    - Construction inspection
    - MS4 inspection or screening
    - Other *(Explanation required)*

6. Discharge to MS4? *(select **one**)*

- Yes – notified Ecology
- Yes – notified DOH and Ecology
- Yes – did not notify
- Yes – allowable or conditionally allowable
- No – none found
- No – cleaned up before reached MS4
- No – discharge to Underground Injection Control (UIC) well
- Unknown
- Other *(Explanation required)*

7. Incident Location

- Address/Intersection
- City
- Zip *(optional)*

And/Or

- Latitude
- Longitude

8. Pollutants Identified *(select **all** that apply)*

- Unconfirmed, unspecified, or not identified
- Fuel and/or vehicle related fluids
- Food-related oil/grease
- Sediment/soil
- Solid waste/trash
- Sewage/septage/pet waste/human waste
- Other wastewater
- Paint
- Firefighting foam
- Soap or cleaning chemicals
- Other *(Explanation required)*

9. Source or Cause *(select **all** that apply)*

- Unconfirmed, unspecified, or not identified
- Vehicle-related business
- Food-related business
- Landscape-related business
- Mobile business
- Construction activity
- Other commercial/industrial activity
- Vehicle collision
- Other accident/spill
- Intentional dumping
- Illicit connection
- Other *(Explanation required)*

10. Source tracing approach(es) used *(select **all** that apply)*

- Not applicable
- Observation (color/sheen/turbidity/floatables/odor)
- Map analysis
- Dye, smoke, or pressure testing
- Field indicator measurements
- Analytical laboratory indicators
- Other *(Explanation required)*

11. Correction/elimination methods used *(select **all** that apply)*

- Clean-up
- Education/technical assistance
- Add or modify operational source control BMP
- Add or modify structural source control BMP
- Add or modify treatment BMP
- Enforcement
- Referred to other agency or department
- Other *(Explanation required)*

12. Field notes, explanations, and/or other comments

IDDE XML Schema Document (IDDE.xsd)

```
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">

  <xs:annotation>

    <xs:documentation>

        The documentation for each element will start with the question as stated in
the online form, and implementation details will follow.

      </xs:documentation>

  </xs:annotation>

  <xs:element name="IDDEEvents" type="IDDEEvents" />


  <xs:complexType name="IDDEEvents">

    <xs:annotation>

      <xs:documentation>

        A list of IDDEs.

      </xs:documentation>

      <xs:documentation>

        Ecology's IDDE processing can handle an empty list

      </xs:documentation>

    </xs:annotation>

    <xs:sequence>

      <xs:element maxOccurs="unbounded" name="IDDEEvent" type="IDDEEvent" />

    </xs:sequence>

  </xs:complexType>


  <xs:complexType name="IDDEEvent">

    <xs:annotation>

      <xs:documentation>

        One particular IDDE event

      </xs:documentation>

      <xs:documentation>
```

```
        Everything in the IDDE form is in this type.

      </xs:documentation>

    </xs:annotation>

    <xs:all>

      <xs:element maxOccurs="1" minOccurs="1" name="Jurisdiction">

        <xs:annotation>

          <xs:documentation>

            1. Jurisdiction name and permit number

          </xs:documentation>

          <xs:documentation>

            Report the full 9 character Permit Number (ex: WAR043000), Jurisdiction
name is redundant and displayed for the sake of the user on the web.

          </xs:documentation>

        </xs:annotation>

        <xs:simpleType>

          <xs:restriction base="xs:string">

            <xs:length value="9"/>

          </xs:restriction>

        </xs:simpleType>

      </xs:element>

      <xs:element maxOccurs="1" minOccurs="0" nillable="true" name="IncidentId">

        <xs:annotation>

          <xs:documentation>

            No Question: Incident ID

          </xs:documentation>

          <xs:documentation>

            This is a unique ID code for all IDDEs on your permit, but not globally
unique.  The usual sequence counting from 1 works very well.

            WQWebIDDE uses the time and username to create this value (ex:
190702174507842WQWebPortal) when an IDDE is started.

            If omitted, IDDE processing can't identify IDDEs to update and will
simply insert all IDDEs as fresh records for reporting.
```

```
          </xs:documentation>
        </xs:annotation>
        <xs:simpleType>
          <xs:restriction base="xs:string">
            <xs:maxLength value="30"/>
          </xs:restriction>
        </xs:simpleType>
      </xs:element>
      <xs:element maxOccurs="1" minOccurs="0" nillable="true" name="DateReported"
type="SqlDate">
        <xs:annotation>
          <xs:documentation>
            2. Date incident discovered or reported to you
          </xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element maxOccurs="1" minOccurs="0" nillable="true"
name="DateResponseBegin" type="SqlDate">
        <xs:annotation>
          <xs:documentation>
            3. Date of beginning your response
          </xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element maxOccurs="1" minOccurs="0" nillable="true" name="DateResponseEnd"
type="SqlDate">
        <xs:annotation>
          <xs:documentation>
            4. Date of end of your response
          </xs:documentation>
        </xs:annotation>
```

```
      </xs:element>

      <xs:element maxOccurs="1" minOccurs="0" nillable="true" name="Discovereds"
type="Discovered">

        <xs:annotation>

          <xs:documentation>

            5. How was the incident discovered or reported to you?

          </xs:documentation>

          <xs:documentation>

            Select all that apply, explain if "Other"

          </xs:documentation>

        </xs:annotation>

      </xs:element>

      <xs:element maxOccurs="1" minOccurs="0" nillable="true" name="MS4Discharge"
type="Discharge">

        <xs:annotation>

          <xs:documentation>

            6. Discharge to MS4?

          </xs:documentation>

          <xs:documentation>

            Select one, explain if "Other"

          </xs:documentation>

        </xs:annotation>

      </xs:element>

      <xs:element maxOccurs="1" minOccurs="0" nillable="true" name="Location"
type="Location">

        <xs:annotation>

          <xs:documentation>

            7. Incident Location

          </xs:documentation>

          <xs:documentation>
```

```
            At least one form of location is required.  Entering both is allowed and
acceptable.  Enter a street address or nearest intersection in the Address element,
it is not going to be verified to be a mailing address.

          </xs:documentation>

        </xs:annotation>

      </xs:element>

      <xs:element maxOccurs="1" minOccurs="0" nillable="true" name="Pollutants"
type="Pollutant">

        <xs:annotation>

          <xs:documentation>

            8. Pollutants Identified

          </xs:documentation>

          <xs:documentation>

            Select all that apply, explain if "Other"

          </xs:documentation>

        </xs:annotation>

      </xs:element>

      <xs:element maxOccurs="1" minOccurs="0" nillable="true" name="Sources"
type="Source">

        <xs:annotation>

          <xs:documentation>

            9. Source or cause

          </xs:documentation>

          <xs:documentation>

            Select all that apply, explain if "Other"

          </xs:documentation>

        </xs:annotation>

      </xs:element>

      <xs:element maxOccurs="1" minOccurs="0" nillable="true" name="Traces"
type="Trace">

        <xs:annotation>

          <xs:documentation>
```

```
            10. Source tracing approach(es) used

          </xs:documentation>

          <xs:documentation>

            Select all that apply, explain if "Other"

          </xs:documentation>

        </xs:annotation>

      </xs:element>

      <xs:element maxOccurs="1" minOccurs="0" nillable="true" name="Corrections"
type="Correction">

        <xs:annotation>

          <xs:documentation>

            11. Correction/elimination methods used

          </xs:documentation>

          <xs:documentation>

            Select all that apply, explain if "Other"

          </xs:documentation>

        </xs:annotation>

      </xs:element>

      <xs:element maxOccurs="1" minOccurs="0" nillable="true" name="Notes"
type="xs:string">

        <xs:annotation>

          <xs:documentation>

            12. Field notes, explanations, and/or other comments

          </xs:documentation>

        </xs:annotation>

      </xs:element>

    </xs:all>

  </xs:complexType>


  <xs:simpleType name="SqlDate">

    <xs:annotation>
```

```
      <xs:documentation>
        xs:date limited to SQL Server's operating range
      </xs:documentation>
    </xs:annotation>
    <xs:restriction base="xs:date">
      <xs:minInclusive value="1753-01-01" />
      <xs:maxInclusive value="9999-12-31" />
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="Discharge">
    <xs:annotation>
      <xs:documentation>
        Responses for Question 6, Discharge to MS4?
      </xs:documentation>
    </xs:annotation>
    <xs:choice>
      <xs:element name="YesNotifiedECY" type="YesNotifiedECYDischarge">
        <xs:annotation>
          <xs:documentation>
            Yes – notified Ecology
          </xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element name="YesNotifiedDOH" type="YesNotifiedDOHDischarge">
        <xs:annotation>
          <xs:documentation>
            Yes – notified DOH and Ecology
          </xs:documentation>
        </xs:annotation>
```

```
</xs:element>
<xs:element name="YesNoNotice" type="YesNoNoticeDischarge">
  <xs:annotation>
    <xs:documentation>
      Yes – did not notify
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="YesAllowable" type="YesAllowableDischarge">
  <xs:annotation>
    <xs:documentation>
      Yes – allowable or conditionally allowable
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="NoNoneFound" type="NoNoneFoundDischarge">
  <xs:annotation>
    <xs:documentation>
      No – none found
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="NoCleanedUp" type="NoCleanedUpDischarge">
  <xs:annotation>
    <xs:documentation>
      No – cleaned up before reached MS4
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="NoToUIC" type="NoToUICDischarge">
```

```
      <xs:annotation>
        <xs:documentation>
          No – discharge to Underground Injection Control (UIC) well
        </xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="Unknown" type="UnknownDischarge">
      <xs:annotation>
        <xs:documentation>
          Unknown
        </xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="Other" type="OtherDischarge">
      <xs:annotation>
        <xs:documentation>
          Other
        </xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:choice>
</xs:complexType>

<xs:complexType name="Discovered">
  <xs:sequence>
    <xs:element maxOccurs="unbounded" name="Discovered">
      <xs:complexType>
        <xs:sequence>
          <xs:element maxOccurs="1" minOccurs="0" name="Explain" type="xs:string">
            <xs:annotation>
```

```
            <xs:documentation>
              Explain
            </xs:documentation>
            <xs:documentation>
              Required if the chosen type's xs:appinfo is Explain
            </xs:documentation>
          </xs:annotation>
        </xs:element>
      </xs:sequence>
      <xs:attribute name="type" type="DiscoveredType"/>
    </xs:complexType>
  </xs:element>
 </xs:sequence>
</xs:complexType>

<xs:complexType name="Location">
 <xs:all>
  <xs:element maxOccurs="1" minOccurs="0" name="Address" type="AddressType" />
  <xs:element maxOccurs="1" minOccurs="0" name="LatLong" type="LatLongType" />
 </xs:all>
</xs:complexType>

<xs:complexType name="Pollutant">
 <xs:sequence>
  <xs:element maxOccurs="unbounded" name="Pollutant">
   <xs:complexType>
    <xs:sequence>
     <xs:element maxOccurs="1" minOccurs="0" name="Explain" type="xs:string">
      <xs:annotation>
       <xs:documentation>
```

```
                Explain
              </xs:documentation>
              <xs:documentation>
                Required if the chosen type's xs:appinfo is Explain
              </xs:documentation>
            </xs:annotation>
          </xs:element>
        </xs:sequence>
        <xs:attribute name="type" type="PollutantType"/>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="Source">
  <xs:sequence>
    <xs:element maxOccurs="unbounded" name="Source">
      <xs:complexType>
        <xs:sequence>
          <xs:element maxOccurs="1" minOccurs="0" name="Explain" type="xs:string">
            <xs:annotation>
              <xs:documentation>
                Explain
              </xs:documentation>
              <xs:documentation>
                Required if the chosen type's xs:appinfo is Explain
              </xs:documentation>
            </xs:annotation>
          </xs:element>
        </xs:sequence>
```

```
        <xs:attribute name="type" type="SourceType"/>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="Trace">
  <xs:sequence>
    <xs:element maxOccurs="unbounded" name="Trace">
      <xs:complexType>
        <xs:sequence>
          <xs:element maxOccurs="1" minOccurs="0" name="Explain" type="xs:string">
            <xs:annotation>
              <xs:documentation>
                Explain
              </xs:documentation>
              <xs:documentation>
                Required if the chosen type's xs:appinfo is Explain
              </xs:documentation>
            </xs:annotation>
          </xs:element>
        </xs:sequence>
        <xs:attribute name="type" type="TraceType"/>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="Correction">
  <xs:sequence>
```

```
    <xs:element maxOccurs="unbounded" name="Correction">
      <xs:complexType>
        <xs:sequence>
          <xs:element maxOccurs="1" minOccurs="0" name="Explain" type="xs:string">
            <xs:annotation>
              <xs:documentation>
                Explain
              </xs:documentation>
              <xs:documentation>
                Required if the chosen type's xs:appinfo is Explain
              </xs:documentation>
            </xs:annotation>
          </xs:element>
        </xs:sequence>
        <xs:attribute name="type" type="CorrectionType"/>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="YesNotifiedECYDischarge">
  <xs:annotation>
    <xs:documentation>
      Discharge reached MS4, Notified Ecology
    </xs:documentation>
  </xs:annotation>
</xs:complexType>

<xs:complexType name="YesNotifiedDOHDischarge">
  <xs:annotation>
```

```
    <xs:documentation>
      Discharge reached MS4, Notified Departments of Ecology and Health
    </xs:documentation>
  </xs:annotation>
</xs:complexType>

<xs:complexType name="YesNoNoticeDischarge">
  <xs:annotation>
    <xs:documentation>
      Discharge reached MS4, Did not notify Ecology
    </xs:documentation>
  </xs:annotation>
</xs:complexType>

<xs:complexType name="YesAllowableDischarge">
  <xs:annotation>
    <xs:documentation>
      Discharge reached MS4, but it was allowable
    </xs:documentation>
  </xs:annotation>
</xs:complexType>

<xs:complexType name="NoNoneFoundDischarge">
  <xs:annotation>
    <xs:documentation>
      No discharge found
    </xs:documentation>
  </xs:annotation>
</xs:complexType>
```

```
<xs:complexType name="NoCleanedUpDischarge">
  <xs:annotation>
    <xs:documentation>
      Discharge cleaned up and did not reach MS4
    </xs:documentation>
  </xs:annotation>
</xs:complexType>

<xs:complexType name="NoToUICDischarge">
  <xs:annotation>
    <xs:documentation>
      Discharge to Underground Injection Control (UIC) well
    </xs:documentation>
  </xs:annotation>
</xs:complexType>

<xs:complexType name="UnknownDischarge">
  <xs:annotation>
    <xs:documentation>
      Unknown if discharge reached MS4
    </xs:documentation>
  </xs:annotation>
</xs:complexType>

<xs:complexType name="OtherDischarge">
  <xs:annotation>
    <xs:documentation>
      Something else happened, tell us what
    </xs:documentation>
    <xs:appinfo>
```

```
        Explain
      </xs:appinfo>
    </xs:annotation>
    <xs:sequence>
      <xs:element maxOccurs="1" minOccurs="0" name="Explain" type="xs:string"/>
    </xs:sequence>
  </xs:complexType>

  <xs:simpleType name="DiscoveredType">
    <xs:annotation>
      <xs:documentation>
        Responses for Question 5, How was this incident discovered or reported to
you?
      </xs:documentation>
    </xs:annotation>
    <xs:restriction base="xs:string">
      <xs:enumeration value="0">
        <xs:annotation>
          <xs:documentation>
            Pollution hotline (phone, web, app)
          </xs:documentation>
        </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="1">
        <xs:annotation>
          <xs:documentation>
            Direct report to your staff
          </xs:documentation>
        </xs:annotation>
      </xs:enumeration>
```

```
<xs:enumeration value="2">
  <xs:annotation>
    <xs:documentation>
      Staff referral
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="3">
  <xs:annotation>
    <xs:documentation>
      Other agency referral
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="4">
  <xs:annotation>
    <xs:documentation>
      ERTS referral
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="5">
  <xs:annotation>
    <xs:documentation>
      Business inspection
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="6">
  <xs:annotation>
```

```
          <xs:documentation>
            Construction inspection
          </xs:documentation>
        </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="7">
        <xs:annotation>
          <xs:documentation>
            MS4 inspection or screening
          </xs:documentation>
        </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="8">
        <xs:annotation>
          <xs:documentation>
            Other
          </xs:documentation>
          <xs:appinfo>
            Explain
          </xs:appinfo>
        </xs:annotation>
      </xs:enumeration>
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="AddressType">
    <xs:annotation>
      <xs:documentation>
        Responses for Question 7. Incident Location
      </xs:documentation>
```

```
    </xs:annotation>
    <xs:sequence>
      <xs:element maxOccurs="1" minOccurs="0" name="Address" type="xs:string">
        <xs:annotation>
          <xs:documentation>
            Address/Intersection
          </xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element maxOccurs="1" minOccurs="0" name="City" type="xs:string">
        <xs:annotation>
          <xs:documentation>
            City
          </xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element maxOccurs="1" minOccurs="0" name="PostalCode" type="xs:string">
        <xs:annotation>
          <xs:documentation>
            Zip
          </xs:documentation>
        </xs:annotation>
      </xs:element>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="LatLongType">
    <xs:annotation>
      <xs:documentation>
        Latitude Longitude pair.
```

```
      </xs:documentation>
    </xs:annotation>
    <xs:sequence>
      <xs:element name="Latitude" type="LatNumber">
        <xs:annotation>
          <xs:documentation>
            Latitude
          </xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element name="Longitude" type="LongNumber">
        <xs:annotation>
          <xs:documentation>
            Longitude
          </xs:documentation>
        </xs:annotation>
      </xs:element>
    </xs:sequence>
  </xs:complexType>

  <xs:simpleType name="LatNumber">
    <xs:annotation>
      <xs:documentation>
        Latitude, 6 decimal digits.
      </xs:documentation>
    </xs:annotation>
    <xs:restriction base="xs:decimal">
      <xs:totalDigits value="8" />
      <xs:fractionDigits value="6" />
      <xs:minInclusive value="-90" />
```

```
    <xs:maxInclusive value="90" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="LongNumber">
  <xs:annotation>
    <xs:documentation>
      Longitude, 6 decimal digits.
    </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:decimal">
    <xs:totalDigits value="9" />
    <xs:fractionDigits value="6" />
    <xs:minInclusive value="-180" />
    <xs:maxInclusive value="180" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="PollutantType">
  <xs:annotation>
    <xs:documentation>
      Responses for Question 8, Pollutants Identified
    </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:string">
    <xs:enumeration value="0">
      <xs:annotation>
        <xs:documentation>
          Unconfirmed, unspecified, or not identified
        </xs:documentation>
```

```
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="1">
  <xs:annotation>
    <xs:documentation>
      Fuel and/or vehicle related fluids
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="2">
  <xs:annotation>
    <xs:documentation>
      Food-related oil/grease
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="3">
  <xs:annotation>
    <xs:documentation>
      Sediment/soil
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="4">
  <xs:annotation>
    <xs:documentation>
      Solid waste/trash
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
```

```
<xs:enumeration value="5">
  <xs:annotation>
    <xs:documentation>
      Sewage/septage/pet waste/human waste
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="6">
  <xs:annotation>
    <xs:documentation>
      Other wastewater
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="7">
  <xs:annotation>
    <xs:documentation>
      Paint
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="8">
  <xs:annotation>
    <xs:documentation>
      Firefighting foam
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="9">
  <xs:annotation>
```

```
          <xs:documentation>
            Soap or cleaning chemicals
          </xs:documentation>
        </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="10">
        <xs:annotation>
          <xs:documentation>
            Other
          </xs:documentation>
          <xs:appinfo>
            Explain
          </xs:appinfo>
        </xs:annotation>
      </xs:enumeration>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="SourceType">
    <xs:annotation>
      <xs:documentation>
        Responses for Question 9, Source or cause
      </xs:documentation>
    </xs:annotation>
    <xs:restriction base="xs:string">
      <xs:enumeration value="0">
        <xs:annotation>
          <xs:documentation>
            Unconfirmed, unspecified, or not identified
          </xs:documentation>
```

```
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="1">
  <xs:annotation>
    <xs:documentation>
      Vehicle-related business
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="2">
  <xs:annotation>
    <xs:documentation>
      Food-related business
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="3">
  <xs:annotation>
    <xs:documentation>
      Landscape-related business
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="4">
  <xs:annotation>
    <xs:documentation>
      Mobile business
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
```

```
<xs:enumeration value="5">
  <xs:annotation>
    <xs:documentation>
      Construction activity
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="6">
  <xs:annotation>
    <xs:documentation>
      Other commercial/industrial activity
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="7">
  <xs:annotation>
    <xs:documentation>
      Vehicle collision
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="8">
  <xs:annotation>
    <xs:documentation>
      Other accident/spill
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="9">
  <xs:annotation>
```

```
          <xs:documentation>
            Intentional dumping
          </xs:documentation>
        </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="10">
        <xs:annotation>
          <xs:documentation>
            Illicit connection
          </xs:documentation>
        </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="11">
        <xs:annotation>
          <xs:documentation>
            Other
          </xs:documentation>
          <xs:appinfo>
            Explain
          </xs:appinfo>
        </xs:annotation>
      </xs:enumeration>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="TraceType">
    <xs:annotation>
      <xs:documentation>
        Responses for Question 10, Source tracing approach(es) used
      </xs:documentation>
```

```
</xs:annotation>
<xs:restriction base="xs:string">
  <xs:enumeration value="0">
    <xs:annotation>
      <xs:documentation>
        Not applicable
      </xs:documentation>
    </xs:annotation>
  </xs:enumeration>
  <xs:enumeration value="1">
    <xs:annotation>
      <xs:documentation>
        Observation (color/sheen/turbidity/floatables/odor)
      </xs:documentation>
    </xs:annotation>
  </xs:enumeration>
  <xs:enumeration value="2">
    <xs:annotation>
      <xs:documentation>
        Map analysis
      </xs:documentation>
    </xs:annotation>
  </xs:enumeration>
  <xs:enumeration value="3">
    <xs:annotation>
      <xs:documentation>
        Dye, smoke, or pressure testing
      </xs:documentation>
    </xs:annotation>
  </xs:enumeration>
```

```
      <xs:enumeration value="4">
        <xs:annotation>
          <xs:documentation>
            Field indicator measurements
          </xs:documentation>
        </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="5">
        <xs:annotation>
          <xs:documentation>
            Analytical laboratory indicators
          </xs:documentation>
        </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="6">
        <xs:annotation>
          <xs:documentation>
            Other
          </xs:documentation>
          <xs:appinfo>
            Explain
          </xs:appinfo>
        </xs:annotation>
      </xs:enumeration>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="CorrectionType">
    <xs:annotation>
      <xs:documentation>
```

```
    Responses for Question 11, Correction/elimination methods used
  </xs:documentation>
</xs:annotation>
<xs:restriction base="xs:string">
  <xs:enumeration value="0">
    <xs:annotation>
      <xs:documentation>
        Clean-up
      </xs:documentation>
    </xs:annotation>
  </xs:enumeration>
  <xs:enumeration value="1">
    <xs:annotation>
      <xs:documentation>
        Education/technical assistance
      </xs:documentation>
    </xs:annotation>
  </xs:enumeration>
  <xs:enumeration value="2">
    <xs:annotation>
      <xs:documentation>
        Add or modify operational source control BMP
      </xs:documentation>
    </xs:annotation>
  </xs:enumeration>
  <xs:enumeration value="3">
    <xs:annotation>
      <xs:documentation>
        Add or modify structural source control BMP
      </xs:documentation>
```

```
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="4">
  <xs:annotation>
    <xs:documentation>
      Add or modify treatment BMP
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="5">
  <xs:annotation>
    <xs:documentation>
      Enforcement
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="6">
  <xs:annotation>
    <xs:documentation>
      Referred to other agency or department
    </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="7">
  <xs:annotation>
    <xs:documentation>
      Other
    </xs:documentation>
    <xs:appinfo>
      Explain
```

```
          </xs:appinfo>
        </xs:annotation>
      </xs:enumeration>
    </xs:restriction>
  </xs:simpleType>
</xs:schema>
```

This page intentionally left blank

APPENDIX 14 – Stormwater Management Action Planning for New Permittees

Stormwater Management Action Planning[1] (SMAP). Permittees shall conduct a similar process and consider the range of issues outlined in the *Stormwater Management Action Planning Guidance* (Ecology, 2024; Publication no. 24-10-027). Permittees may rely on another jurisdiction to meet all or part of SMAP requirements at a watershed-scale, provided a SMAP is completed for at least one priority catchment located within the Permittee's jurisdiction.

1. **Receiving Water Assessment**. Permittees shall document and assess existing information related to their local receiving waters and contributing area conditions to identify which receiving waters are most likely to benefit from stormwater management planning.

   By March 31, 2027, Permittees shall submit a watershed inventory and include a brief description of the relative conditions of the receiving waters and the contributing areas. The watershed inventory shall be submitted as a table with each receiving water name, its total watershed area, the percent of the total watershed area that is in the Permittee's jurisdiction, and the findings of the stormwater management influence assessment for each basin. Indicate which receiving waters will be included in the prioritization process. Include a map of the delineated basins with references to the watershed inventory table.

   a) Identify which basins are expected to have a relatively low Stormwater Management Influence for SMAP. See the guidance document for definition and description of this assessment. Basins having relatively low expected Stormwater Management Influence for SMAP do not need to be included in 2-3.

2. **Receiving Water Prioritization**. Informed by the assessment of receiving water conditions in 1), above, and other local and regional information, Permittees shall develop and implement a prioritization method and process to determine which receiving waters will receive the most benefit from implementation of stormwater facility retrofits, tailored implementation of SWMP actions, and other land/development management actions (different than the existing new and redevelopment requirements). The retrofits and actions shall be designed to:

   a) conserve, protect, or restore receiving waters through stormwater and land management strategies that act as water quality management tools,

   b) reduce pollutant loading, and

   c) address hydrologic impacts from existing development as well as planned for and expected future buildout conditions.

[1] New Permittees are exempt from S5.C.1.d. for this permit term.

No later than June 30, 2027, document the prioritized and ranked list of receiving waters.

d) The Permittee shall document the priority ranking process used to identify high priority receiving waters. The Permittee may reference existing local watershed management plan(s) as source(s) of information or rationale for the prioritization.

e) The ranking process shall include the identification of high priority catchment area(s) for focus of the Stormwater Management Action Plan (SMAP) in (3), below.

3. **Stormwater Management Action Plan (SMAP)**. No later than March 31, 2028, Permittees shall develop a SMAP for at least one high priority catchment area from (2), above, that identifies all of the following:

   a) A description of the stormwater facility retrofits needed for the area, including the BMP types and preferred locations. Include projects that address transportation-related runoff from high traffic areas.

   b) Land management/development strategies and/or actions identified for water quality management.

   c) Focused, enhanced, or customized implementation of stormwater management actions related to permit sections within S5, including:

      (1) IDDE field screening,
      (2) Prioritization of Source Control inspections,
      (3) O&M inspections or enhanced maintenance, or
      (4) Public Education and Outreach behavior change programs.
      (5) Identified actions shall support other specifically identified stormwater management strategies and actions for the basin overall, or for the catchment area.

   d) If applicable, identification of changes needed to local long-range plans, to address SMAP priorities.

   e) A proposed implementation schedule and budget sources for:

   f) Short-term actions (i.e., actions to be accomplished within six years), and

   g) Long-term actions (i.e., actions to be accomplished within seven to 20 years).

4. Actions in the SMAP that may benefit overburdened communities, including specifically Vulnerable Populations and Highly Impacted Communities.

5. A process and schedule to provide future assessment and feedback to improve the planning process and implementation of procedures or projects.

Appendix B

Hydrologic and Hydraulic Modeling Analysis

Brown AND Caldwell

701 Pike Street, Suite 1300
Seattle, WA 98101-2310

T: 206.624.0100

Technical Memorandum

Prepared for: Parametrix

Project Title: 2024 Comprehensive Storm Drainage Plan

Project No.: 158561

Technical Memorandum

Subject: Hydrologic and Hydraulic Modeling for Capital Improvement Projects

Date: November 19, 2024

To: Paul Fendt, PE

Alex Van Kirk, EIT

From: Margaret Ales, PE

Copy to: Madison Thompson, EIT

Prepared by: Margaret Ales, PE 

Reviewed by: Mike Milne

Limitations:

This document was prepared solely for Parametrix, Inc. in accordance with professional standards at the time the services were performed and in accordance with the contract between Parametrix, Inc. and Brown and Caldwell dated 5/23/2022. This document is governed by the specific scope of work authorized by Parametrix, Inc.; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by Parametrix, Inc. and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

Table of Contents

Section 1: Introduction B-1
Section 2: Input Data and Model Updates B-2
2.1 Precipitation Record Extension B-2
2.2 Model Refinement B-2
2.2.1 GHI Subbasin Model B-3
2.2.2 BCDF Subbasin Model B-4
2.2.3 AZ Subbasin Model B-4
2.2.4 R Subbasin Model B-4
2.3 Flow Frequency and Design Storms B-4
2.4 Potential Project Evaluations B-6
2.4.1 Included Projects B-7
2.4.2 Excluded Projects B-12
References B-17

List of Figures

Figure B-1. Subbasin Models Updated on Behalf of Auburn's 2024 Comprehensive Storm Drainage Plan B-3
Figure B-2. R Street SE Widening Project Subbasins B-8
Figure B-3. Plan View of R Street SE Widening and Future CIP (BCDF Subbasin Model, 25-year storm flows [1/9/1990]) B-9
Figure B-4. Hydraulic Grade Line Profile View of R Street SE Widening and Future CIP (BCDF Subbasin Model, 25-year storm flows [1/9/1990]) B-9
Figure B-5. Plan View of R Street SE Widening and Future CIP (AZ Subbasin Model, 25-year storm flows [9/7/2019]) B-10
Figure B-6. Hydraulic Grade Line Profile View of R Street SE Widening and Future CIP (AZ Subbasin Model, 25-year storm flows [9/7/2019]) B-10
Figure B-7. Plan View of R Street SE Widening and Future CIP (R Subbasin Model, 25-year storm flows [10/20/2003]) B-11
Figure B-8. Hydraulic Grade Line Profile View of R Street SE Widening and Future CIP (R Subbasin Model, 25-year storm flows [10/20/2003]) B-11
Figure B-9. Flooding impacts of 30th Street NE Area Flooding, Phase 3 Project at the Airport Property Low Area (catch basin 409-I51) B-13
Figure B-10. Hydraulic Grade Line in 30th Street NE (from the Airport Property to I Street NE) Comparison of Existing Conditions and Proposed Conditions from the 30th Street NE Area Flooding, Phase 3 Project B-14
Figure B-11. Comparison of Hydraulic Grade Line in Vicinity of Auburn Way South and SR 18 Westbound Off-Ramp Intersection for Evaluation Scenarios B-15
Figure B-12. Flooding at Low Inlet (809-B33) near Auburn Way South and SR 18 Westbound Offramp Intersection for Evaluation Scenarios B-16

List of Tables

Table B-1. 2024 Plan Potential Project Modeling Summary B-1
Table B-2. Auburn Composite Precipitation Record Summary B-2
Table B-3. GHI Subbasin Frequency Analysis Summary B-5
Table B-4. BCDF Subbasin Frequency Analysis Summary B-5
Table B-5. AZ Subbasin Frequency Analysis Summary B-6
Table B-6. R Subbasin Frequency Analysis Summary B-6
Table B-7. Design Storms by Subbasin Summary B-6
Table B-8. 2024 Plan Potential Projects and Evaluation Status B-7
Table B-9. R Street SE Widening Project and Future CIP Recommendations B-12

Section 1: Introduction

As part of the City of Auburn (City) 2024 Comprehensive Storm Drainage Plan (Plan) update, Brown and Caldwell (BC) performed hydrologic and hydraulic (H&H) modeling analysis to evaluate existing drainage problems and capital solutions. BC performed the analysis with updated existing models and an extended meteorological time series.

The City initiated an extensive drainage system data inventory and H&H modeling effort to support the 2009 and 2015 Comprehensive Storm Drainage Plans (2009 Plan and 2015 Plan, respectively). After the 2009 and 2015 Plans, the City refined and developed new H&H models. As a result, 16 storm drainage system models have been created or refined for areas throughout the City. Each model is identified by the lettered subbasin drainage area(s) covered with the model extent. For example, the GHI model covers three subbasins: G, H, and I. Two of the 16 models (BCDF and GHI) were calibrated as part of the 2015 Plan and then updated after the 2015 Plan with new stormwater infrastructure, refined subbasin delineations, and refined calibration with monitored flow data.

The City reviewed the projects from the 2015 Plan and other more recent potential projects considered on behalf of this Plan. Of these, six potential projects were chosen for H&H modeling to evaluate whether they should be included as capital improvement projects (CIP) in the 2024 Plan.

Table B-1 summarizes the potential projects modeled as part of the 2024 Plan.

Table B-1. 2024 Plan Potential Project Modeling Summary

2024 Project ID [a]	Project Name	Subbasin Model Name	Project Description and Status
CP2116	R Street SE Widening - 22nd Street SE to 33rd Street SE	BCDF, AZ, and R	Stormwater capacity project evaluated as part of a comprehensive roadway improvement project. Currently at 60% design.
9	30th Street NE Area Flooding, Phase 2	GHI	Stormwater capacity capital improvement project (CIP) identified in the 2015 Plan (2015 Plan CIP ID is 4A). Minor piping improvements in 2018 may have reduced flooding problem.
-	30th Street NE Area Flooding, Phase 3	GHI	Stormwater capacity CIP previously identified in the 2015 Plan (2015 Plan CIP ID is 4B).
-	West Hills Drainage Improvements near S 314th Street & 54th Avenue S	No model	Relocate stormwater flows to public conveyance. CIP was previously identified in 2015 Drainage Plan (2015 Plan CIP ID is 5B).
11	Christa Ministries Facility Retrofit	GHI	New water quality improvement CIP identified as part of the 2024 Plan.
-	17th Street Pond Capacity	BCDF	New stormwater system capacity improvement project identified as part of the 2024 Plan.

[a] If the project was selected to carry forward as one of the capital improvement projects (CIP) within the 2024 Plan, it was given a numerical ID ranging from 1-16. Projects that were included within the City's capital facilities plan (CFP) follow the format of CPXXXX for their project IDs, where the Xs represent numeric placeholders. Line items with neither a CIP ID on behalf of the 2024 Plan, nor a CFP ID were evaluated as part of the modeling effort but were not chosen to carry forward as a 2024 CIP or within the CFP.

Section 2: Input Data and Model Updates

This section describes updates to the precipitation record and H&H models used to evaluate the potential projects listed in Table B-1.

2.1 Precipitation Record Extension

Auburn's H&H models use historical meteorological data to estimate stormwater flows and storage within the City's storm drainage system. The data consists of monthly evaporation and 15-minute precipitation depth. As part of the 2024 Plan, BC extended the 15-minute precipitation record to September 30, 2022, creating a 75-year precipitation record.

The Auburn precipitation record used for modeling is a composite from several rain gauges. The preferred rain gauge is located at Auburn City Hall and is maintained and operated by King County (King County 2022). Rainfall is used from other gauges when the City Hall gauged data is not available. Table B-2 summarizes the data sources for the composite precipitation record.

Table B-2. Auburn Composite Precipitation Record Summary

Source	Period	Notes
SeaTac Rainfall from WWHM2012	10/01/1948 00:00 to 11/30/2007 23:45	
Lakeland Hills	12/01/2007 00:00 to 12/06/2007 23:45	SeaTac 15-minute data not representative of Auburn hourly data.
SeaTac Rainfall from WWHM2012	12/07/2007 00:00 to 12/31/2009 23:45	
City of Auburn 15-minute rainfall	01/01/2010 00:00 to 12/31/2010 23:45	
City of Auburn aggregated 5-minute	01/01/2011 00:00 to 11/14/2012	
Lakeland Hills	11/14/2012 to 12/05/2012	City Hall rain gauge error (rain gauge top blew off).
City of Auburn aggregated 5-minute	12/05/2012 00:00 to 09/30/2022 23:45	

WWHM2012 = Western Washington Hydrology Model

2.2 Model Refinement

Auburn's H&H models have been updated and refined since the calibration efforts performed on behalf of the 2015 Plan. Updates include refining basin delineation and adding storm drainage features (conveyance and structures) from recently constructed projects. Four subbasin models were updated as part of the 2024 Plan or under a separate modeling contract, GHI, BCDF, AZ, and R. The model updates are described below. Figure B-1 shows the four subbasin models updated as part of the 2024 Plan relative to the City extent.

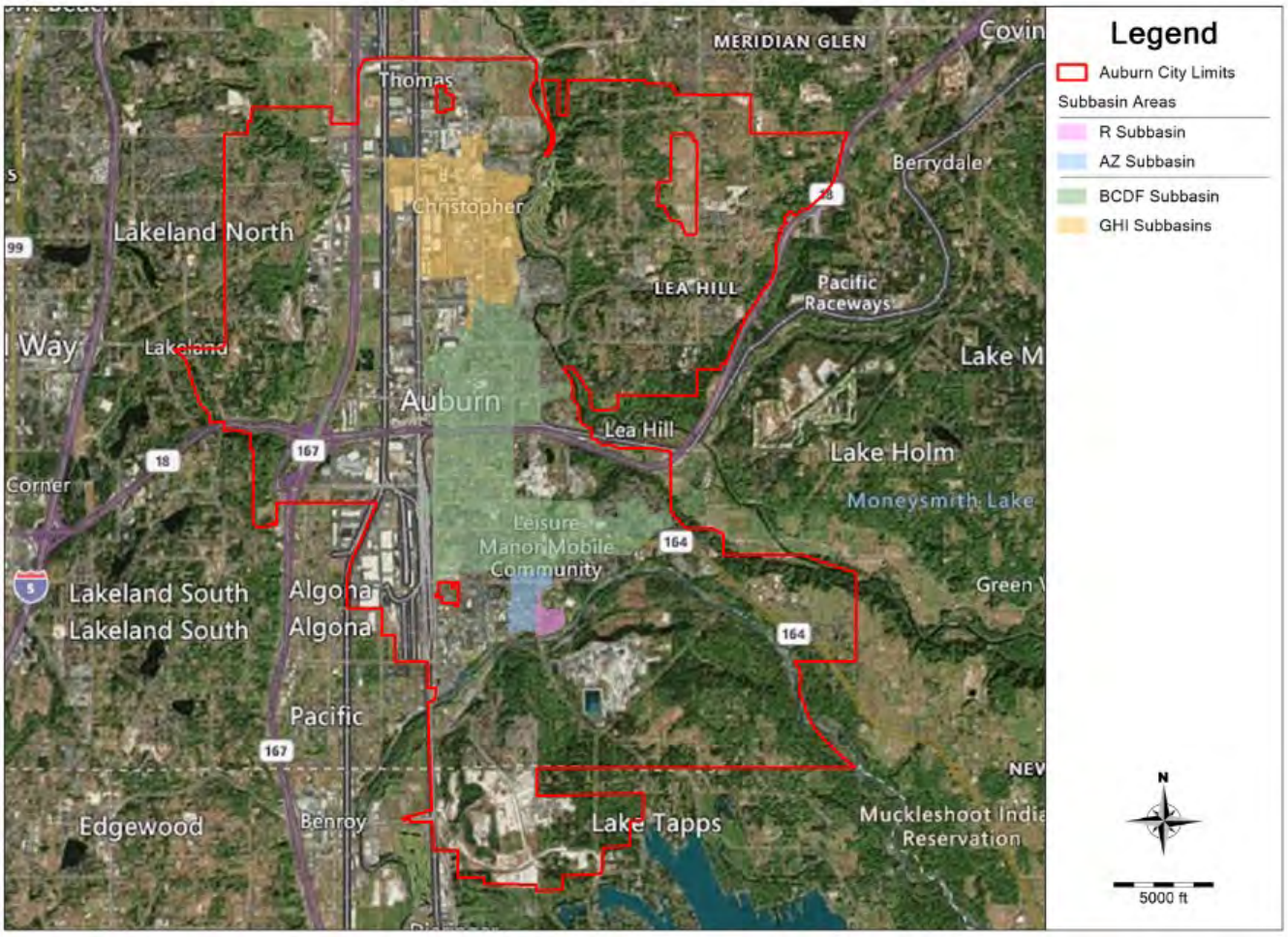


Figure B-1. Subbasin Models Updated on Behalf of Auburn's 2024 Comprehensive Storm Drainage Plan

2.2.1 GHI Subbasin Model

Since the 2015 Plan, BC has updated the calibrated GHI subbasin model with new stormwater projects at the City of Auburn Airport and used updated geographic information system (GIS) data to refine subbasin boundaries in the vicinity of the Brannan Park pump station.

Airport Area Updates. Model updates at the airport include those associated with CP1516 Runway 16-34 Extension and Change Order #2 and CP2118 North Airport Stormwater Improvements Phase 2. Key model updates from these projects included:

- Adding new impervious area, refining subbasin boundaries, and adding ChamberMaxx stormwater detention for the 16-34 runway extension.
- Isolating Pond I and the low elevation area (north hangar area) on airport property from the stormwater system in 30th Street NE so that high flows in the 30th Street NE system do not backwater to the pond and flood the low north hangar area.
- Making better use of storage in Pond I by reconfiguring connecting airport property stormwater pipes.
- Filling in Pond F and routing the Corporate Park Pump Station flows to Pond G.

Brannan Park Pump Station Area Updates. BC refined the GHI model in the vicinity of Brannan Park Pump Station. Upstream of the pump station near I Street NE and 32nd Place NE, new storm pipe was added that routes roadway runoff to the main trunk line in 30th Street NE. Downstream of the pump station, the model was updated from a simplified outfall to a force main connection to the outfall at Reddington wet biofiltration swale.

2.2.2 BCDF Subbasin Model

BC updated the calibrated BCDF model to reflect recent or imminent stormwater conveyance projects.

- **CP1726–2019 Local Street Reconstruction As-Builts** (M Street between 25th Street SE and 29th Street SE, and 28th Street SE between M Street SE and T Street SE). This project was part of a street improvement project that helped improve conveyance capacity. The project included new pipe alignments and changes to the drainage basin delineation adding 7 acres to the B subbasin from the adjacent AZ subbasin.
- **CP1614–2017 Local Street Reconstruction and Preservation As-Builts** (R Street from 28th Street SE to 25th Street SE, 28th Street SE from R Street SE to T Street SE and portions of T Street SE, U Street SE, 27th Street SE and 26th Street SE). This project was part of a street improvement project that helped improve conveyance capacity. The project resulted in a new pipe alignment and changes to the drainage basin delineation. In addition, approximately 1.9 acres of the CIP1614 project is routed to infiltration facilities. The effective impervious area of the model was reduced by the amount of area routed to infiltration pipes and facilities.
- **CP2125–D Street SE and 23rd Street SE Storm Improvements 90% Submittal**. This project, identified as Project 7 and Project 8 in the 2015 Plan, will improve system capacity by constructing new conveyance in D Street SE (Project 7) from 27th Street SE to 21st Street SE, in 21st Street SE near D Street SE and in 25th Street SE near D Street SE. Improvements in 23rd Street SE and K Street SE (Project 8) were included in the plan set but may not be included in the imminent bid set. However, Project 8 improvements were included in the model update to reflect ultimate post-project conditions. These include conveyance improvements in 23rd Street SE near F Street SE and in K Street SE between 23rd Street SE and 21st Street SE.

2.2.3 AZ Subbasin Model

BC updated the uncalibrated AZ model to reflect recent improvements associated with CP1726 and CP1614 projects described above.

2.2.4 R Subbasin Model

BC updated the uncalibrated R basin model conveyance, hydrologic parameters, and basin delineation to be current with other adjacent models (AZ subbasin model). The City has not used the R Basin for any existing or proposed condition evaluations since the subbasin model was developed as part of the 2009 Plan.

2.3 Flow Frequency and Design Storms

After the basin models were updated to reflect existing and imminent CIP conditions, a frequency analysis was completed for each model by performing a long-term simulation (from 1948 to 2022). The long-term flow timeseries were then used to determine the 2% and 4% exceedance storms (one-in-50-year and one-in-25-year flows, respectively) per subbasin model. These storms are used as design storms to evaluate the potential projects listed in Table B-1.

For the long-term simulations, the hydraulic networks of the models were modified so that there were no restrictions to flow and there was free discharge at outfalls. As a result, all simulated runoff could be conveyed without substantial system storage and attenuation.

The event peak flows from the simulations were selected in PCSWMM[1] using two event-based criteria: Minimum inter-event time (time between peak storms) of 12 hours and a flow threshold (varies by subbasin). The peak flows were ranked, and the flow frequencies were established with estimators derived from Cunnane plotting position formulae. The events associated with the 25-year peak flows were used to size storm drainage conveyance to meet the relevant level of service. The results of the flow frequency analysis for the GHI, BCDF, AZ, and R subbasin models are provided in Tables B-3, B-4, B-5, and B-6, respectively. Table B-7 lists the storms that generated the 100-, 50-, and 25-year flows for the subbasin models.

Flow frequencies are unique to each subbasin because of the different hydrologic and hydraulic characteristics of each subbasin. As a result, the storms associated with the return periods are different for each basin.

Table B-3. GHI Subbasin Frequency Analysis Summary

Peak flow rank	Event start date/time	Peak event flow (cubic feet per second) [a]	Return period (year)
1	10/20/2003 4:30	105.0	123.7
2	9/18/2021 15:25	88.6	46.4
3	11/6/2006 0:20	88.5	28.5
4	1/9/1990 4:35	87.4	20.6
5	11/18/2003 10:25	86.0	16.1
6	11/4/2006 15:15	84.4	13.3
7	11/24/1990 4:50	80.1	11.2
8	10/5/1981 23:20	76.4	9.8

[a] *Peak flow measured at inflow to Brannan Park pump station.*

Table B-4. BCDF Subbasin Frequency Analysis Summary

Peak flow rank	Event start date/time	Peak event flow (cubic feet per second) [a]	Return period (year)
1	10/20/2003 4:15	109.6	125.3
2	11/6/2006 0:20	94.5	47.0
3	1/9/1990 4:30	73.8	28.9
4	10/5/1981 23:15	61.3	20.9
5	11/4/1998 19:30	45.5	16.3
6	11/4/2006 16:05	44.6	13.4
7	11/18/2003 10:25	39.9	11.4
8	11/24/1990 4:45	39.5	9.9

[a] *Peak flow measured at inflow to 17th Street Pond.*

[1] PCSWMM is a GIS-based hydraulic and hydrologic modeling platform developed by Computational Hydraulics International (CHI). The software fully supports the Environmental Protection Agency (EPA) SWMM5 hydrology and hydraulics engine, thus providing comparable computation between EPA SWMM and PCSWMM models. Information about PCSWMM software can be found at https://www.pcswmm.com/.

Table B-5. AZ Subbasin Frequency Analysis Summary			
Peak flow rank	Event start date/time	Peak event flow (cubic feet per second) [a]	Return period (year)
1	9/18/2021 15:20	35.8	125.3
2	10/20/2003 4:25	33.1	47.0
3	9/7/2019 20:40	32.7	28.9
4	9/12/2004 1:20	32.3	20.9
5	11/4/1998 19:20	32.2	16.3
6	11/4/2006 15:15	31.15	13.4
7	1/9/1990 4:45	31.08	11.4
8	12/14/1979 21:05	31.07	9.9

a. Peak flow measured at inflow to 36th Street Pond at M Street.

Table B-6. R Subbasin Frequency Analysis Summary			
Peak flow rank	Event start date/time	Peak event flow (cubic feet per second) [a]	Return period (year)
1	9/18/2021 15:15	27.7	125.3
2	9/7/2019 20:35	26.3	47.0
3	10/20/2003 9:20	25.5	28.9
4	9/12/2004 1:15	25.0	20.9
5	12/14/1979 21:00	23.7	16.3
6	7/6/2018 18:30	23.1	13.4
7	11/4/2006 15:10	23.0	11.4
8	1/9/1990 5:00	22.8	9.9

a. Peak flow measured at outfall to White River at R Street and 37th Way SE.

Table B-7. Design Storms by Subbasin Summary							
	100-year		50-year		25-year		
Basin	Start Date	Peak Flow Duration (hour)	Start Date	Peak Flow Duration (hour)	Start Date	Peak Flow Duration (hour)	Flow Measurement Location
GHI	10/20/2003	32	9/18/2021	1	11/6/2006	38	Inflow to Brannan Park Pump Station
BCDF	10/20/2003	20	11/6/2006	17	1/9/1990	8	Inflow to 17th Street Pond
AZ	9/18/2021	1	10/20/2003	16	9/7/2019	1	Inflow to 36th Street Pond
R	9/18/2021	1	9/7/2019	1	10/20/2003	11	Outfall to White River at R Street

2.4 Potential Project Evaluations

Of the six projects considered for inclusion in the 2024 Plan (see Table B-1), two were evaluated with the updated subbasin models and considered viable projects. Another two were evaluated but considered not viable because the proposed project would provide little improvement to capacity or reduce conveyance capacity. The City initially decided to defer the remaining two projects to the next planning period, so BC did

not evaluate them. However, after reevaluation, the City decided to include one of these two projects, the 30th Street NE Area Flooding, Phase 2 project, as a CIP in the 2024 Plan.

Table B-8 lists the potential projects, associated model(s), and status.

Table B-8. 2024 Plan Potential Projects and Evaluation Status

2024 Project ID [a]	Project Name	Associated Model Name	Project Evaluation Status
CP2116	R Street SE Widening - 22nd Street SE to 33rd Street SE	BCDF, AZ, and R	Evaluated and included in 2024 Plan.
11	Christa Ministries Facility Retrofit	GHI	
-	30th Street NE Area Flooding, Phase 3	GHI	Evaluated and not included in 2024 Plan.
-	17th Street Pond Capacity	BCDF	
-	West Hills Drainage Improvements near S 314th Street & 54th Avenue S	No model	Not evaluated. Deferred to later planning period.
9	30th Street NE Area Flooding, Phase 2	GHI	Not evaluated but included in 2024 Plan.

[a] If the project was selected to carry forward as one of the capital improvement projects (CIP) within the 2024 Plan, it was given a numerical ID ranging from 1-16. Projects that were included within the City's capital facilities plan (CFP) follow the format of CPXXXX for their project IDs, where the Xs represent numeric placeholders. Line items with neither a CIP ID on behalf of the 2024 Plan, nor a CFP ID were evaluated as part of the modeling effort but were not chosen to carry forward as a 2024 CIP or within the CFP.

2.4.1 Included Projects

Two projects were evaluated with H&H models and determined to be viable projects for inclusion in the 2024 Plan.

2.4.1.1 CP2116–R Street SE Widening - 22nd Street SE to 33rd Street SE

The R Street SE Widening project CP2116 is currently in design and estimated to begin construction in 2025. The project will improve the R Street SE/29th Street SE intersection, add a new southbound lane from 22nd Street NE to 33rd Street NE, and provide new roadway surface from 22nd Street SE to the White River bridge. As part of the project, the City is improving underground utilities as needed, including storm drainage, sewer pipe, and water lines.

The project lies within three drainage subbasins (B, A, and R subbasins) and, as a result, is represented in three of the City's subbasin models (BCDF, AZ, and R). Figure B-2 shows the project extent and the modeled subbasin delineation.

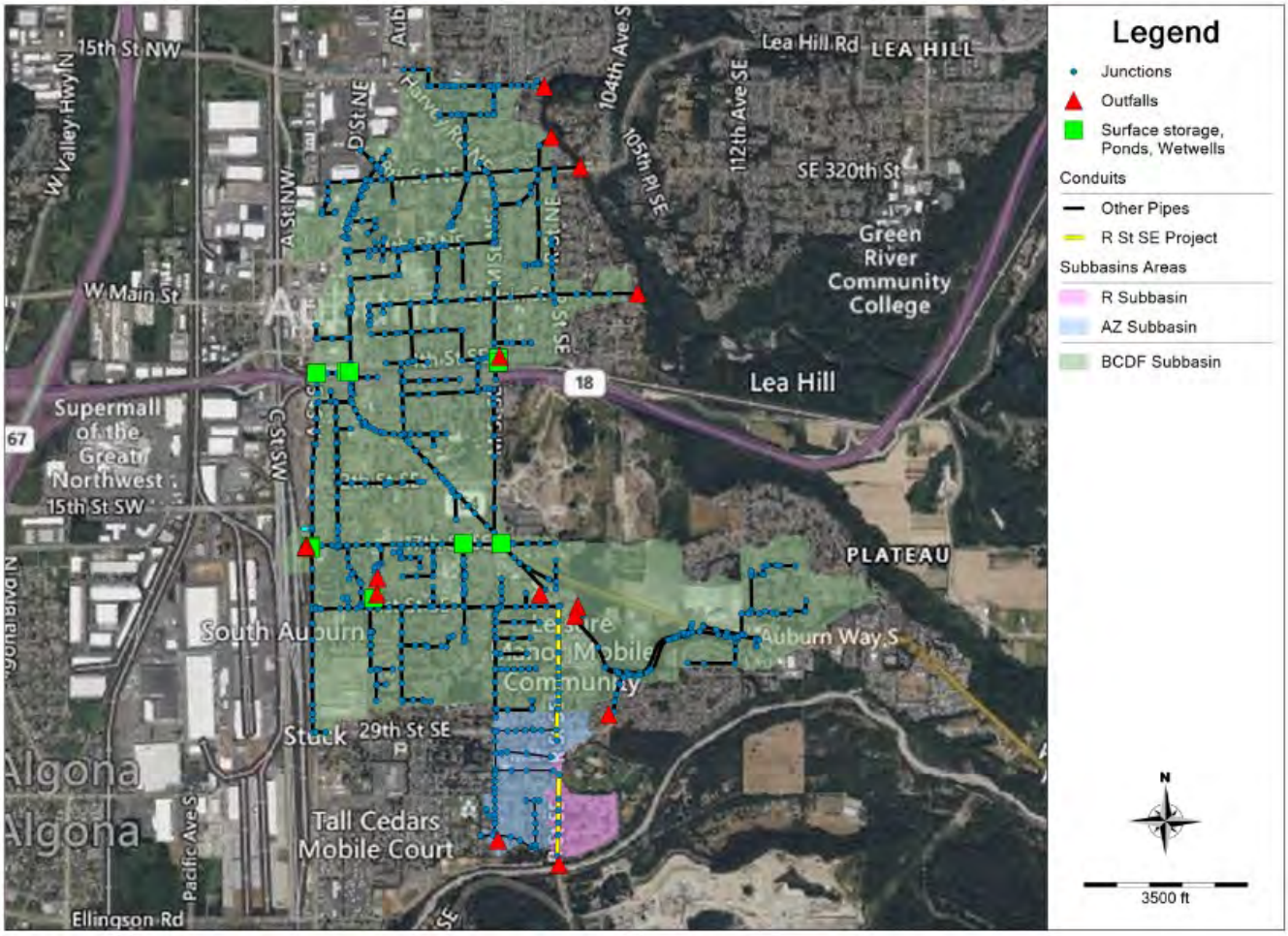


Figure B-2. R Street SE Widening Project Subbasins

BC evaluated the project at the 60% design phase with the 25-year storm flows developed for the BCDF, AZ, and R subbasin models. For all three model evaluations, the design storm simulation showed flooding within the project area resulting from downstream backwater. City staff recommended sizing the R Street SE project pipes assuming downstream impacts are alleviated as part of a future CIP. This evaluation resulted in increased pipe sizes for the R Street SE Project and the identification of the need for a future downstream CIP.

Figures B-3 through B-8 show the plan and profile for the 25-year design storm of the R Street SE Widening project and the future CIP needed to alleviate flooding in the project area from backwater. Table B-9 summarizes the recommended pipe sizes for the R Street SE Widening project and the future CIP.

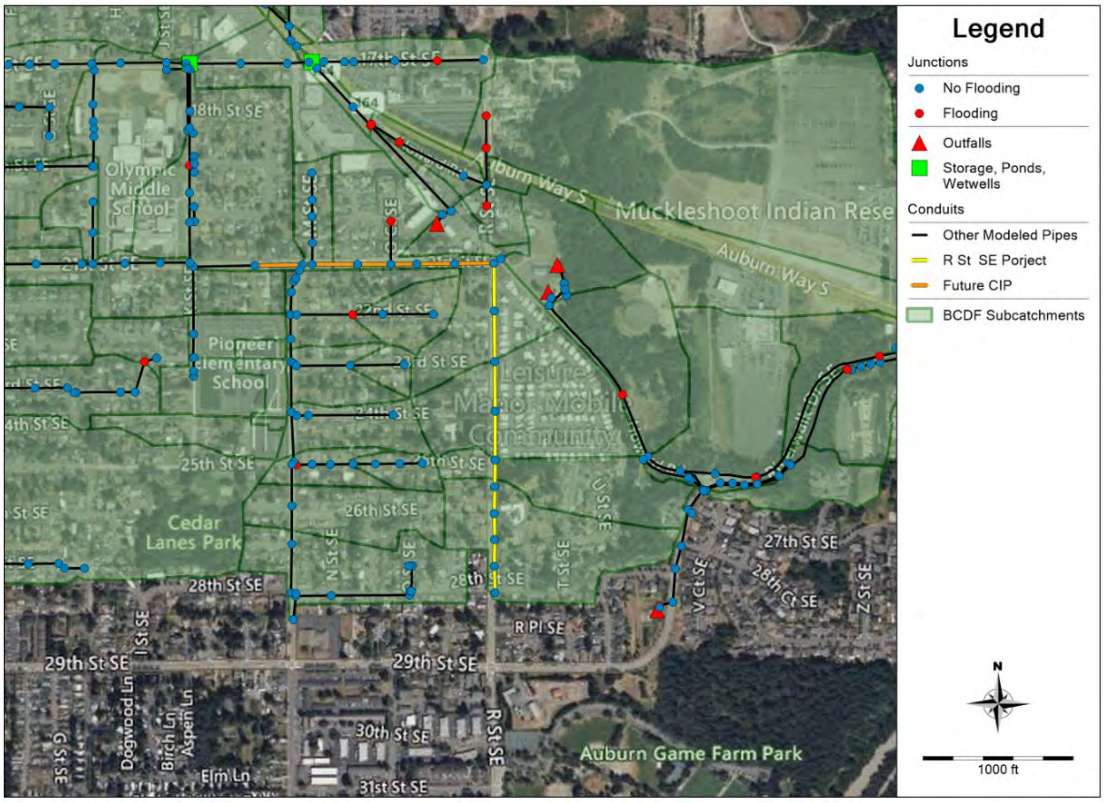


Figure B-3. Plan View of R Street SE Widening and Future CIP (BCDF Subbasin Model, 25-year storm flows [1/9/1990])

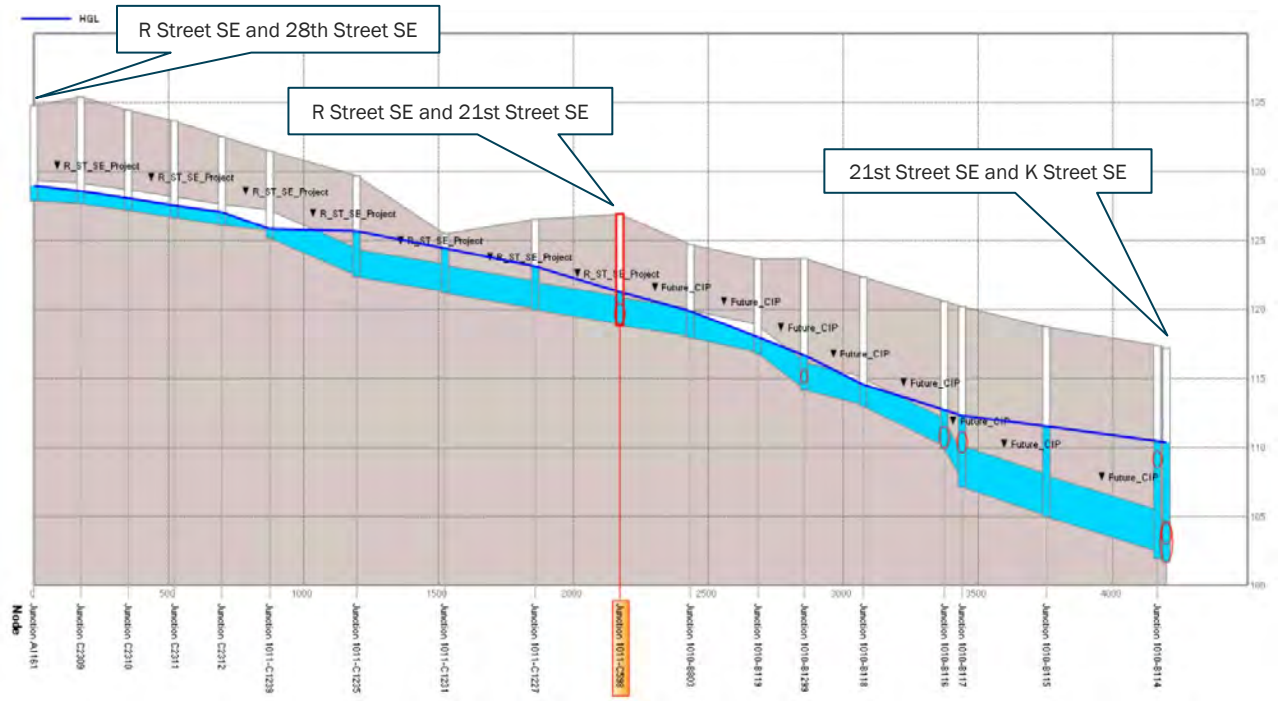


Figure B-4. Hydraulic Grade Line Profile View of R Street SE Widening and Future CIP (BCDF Subbasin Model, 25-year storm flows [1/9/1990])

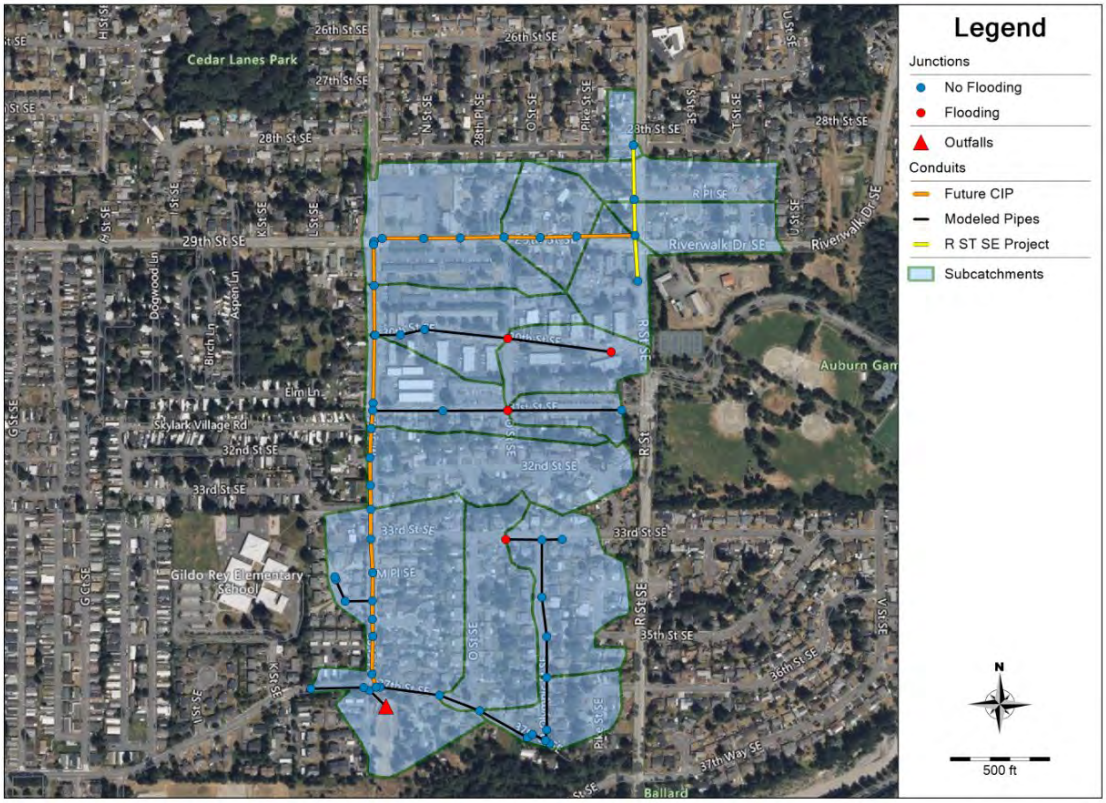


Figure B-5. Plan View of R Street SE Widening and Future CIP (AZ Subbasin Model, 25-year storm flows [9/7/2019])

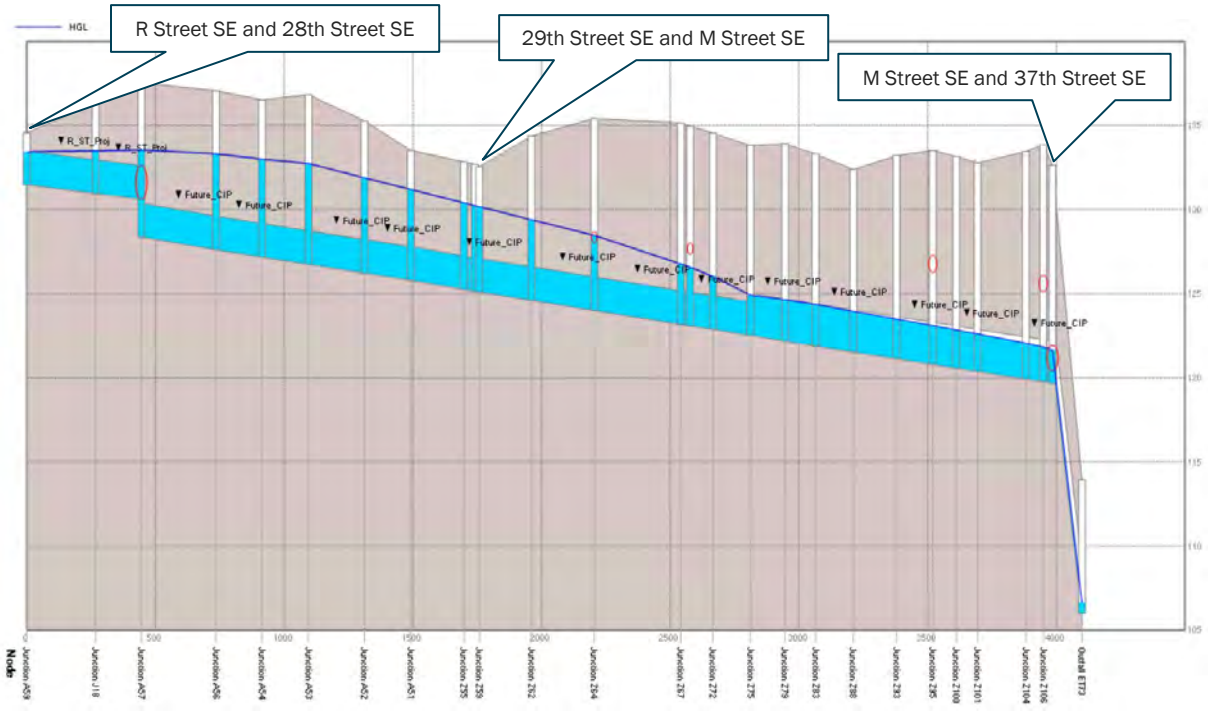


Figure B-6. Hydraulic Grade Line Profile View of R Street SE Widening and Future CIP (AZ Subbasin Model, 25-year storm flows [9/7/2019])

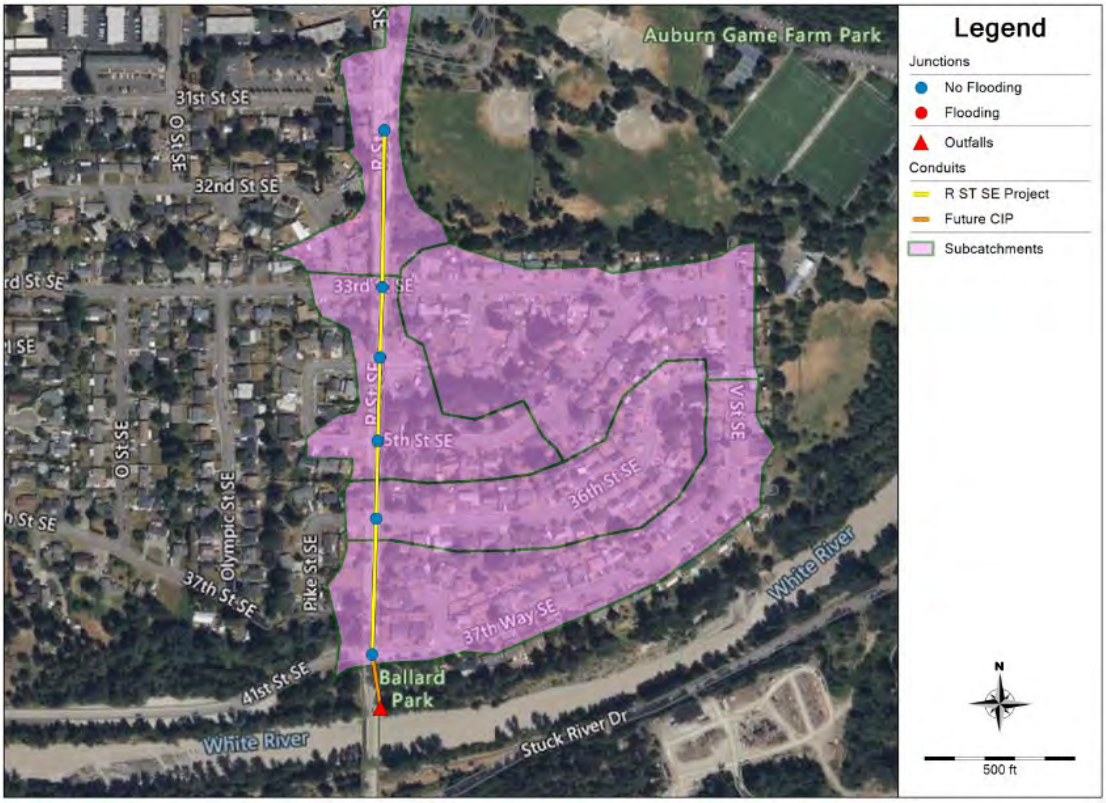


Figure B-7. Plan View of R Street SE Widening and Future CIP (R Subbasin Model, 25-year storm flows [10/20/2003])

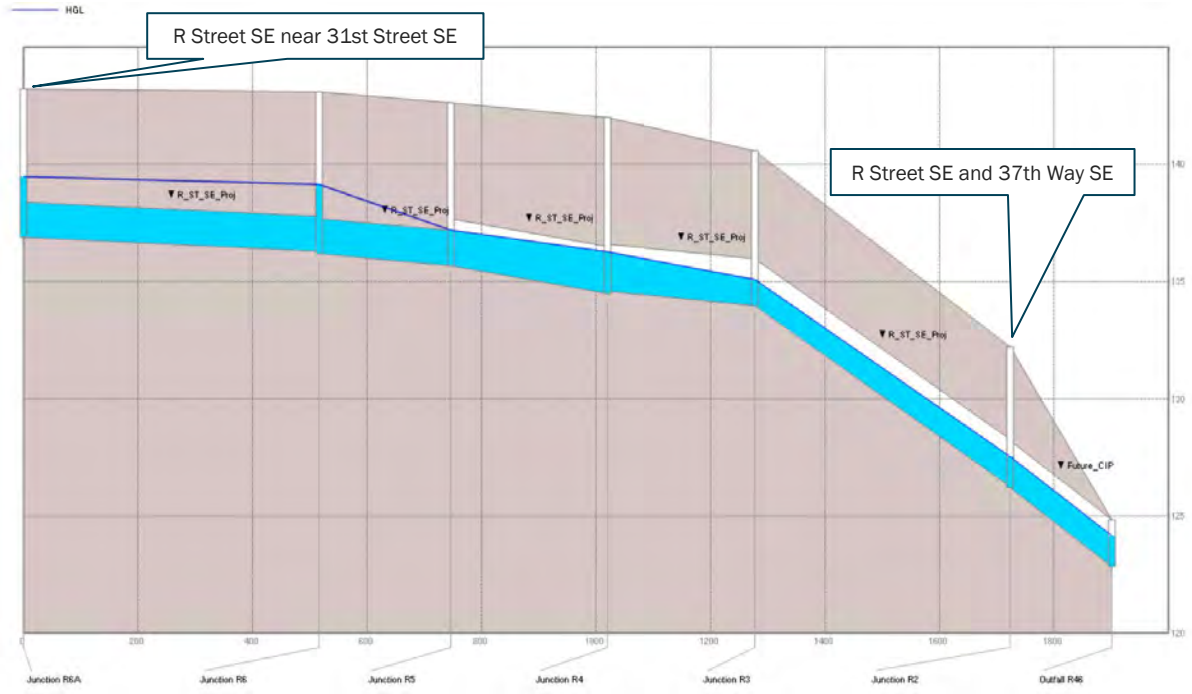


Figure B-8. Hydraulic Grade Line Profile View of R Street SE Widening and Future CIP (R Subbasin Model, 25-year storm flows [10/20/2003])

Table B-9. R Street SE Widening Project and Future CIP Recommendations				
Street Location	Subbasin Model Name	25-year Design Storm Start Date	2024 CIP Recommendations	Future CIP Recommendations
R Street SE from 28th Street SE to 25th Street SE R Street SE from 25th Street SE to 22nd Street SE	BCDF	1/9/1990	Upgrade pipe from 12-inch diameter to 18-inch diameter in R Street SE from 28th Street SE to 25th Street SE Upgrade pipe from 18-inch diameter to 24-inch diameter in 1st Street SE	Upgrade pipe from 18-inch diameter to 24-inch diameter in 21st Street SE from R Street SE to M Street SE Upgrade pipe from 24-inch diameter to 36-inch diameter in 21st Street SE from M Street SE to K Street SE
R Street SE from 28th Street SE to 29th Street SE	AZ	9/7/2019	Upgrade pipe from 10-inch diameter to 24-inch diameter in R Street SE from 28th Street SE south to approximately 225 ft of 29th Street SE	Upgrade pipe from 10-inch diameter to 24-inch diameter in 29th Street SE from R Street SE to M Street SE Upgrade pipe from 18-inch diameter to 24-inch diameter in M Street SE from 29th Street SE to 32nd Street SE Upgrade pipe from 24-inch diameter to 30-inch diameter in M Street SE from 32nd Street SE to 37th Street SE
33rd Street SE to White River Outfall	R	10/20/2003	Upgrade pipe from 10-inch/12-inch diameter to 18-inch diameter in R Street SE from 31st Street SE to 34th Street SE Upgrade pipe from 12-inch diameter to 24-inch diameter in R Street SE from 34th Street SE to 37th Way SE	Upgrade pipe from 18-inch diameter to 24-inch diameter south of 37th Way SE to the White River outfall

2.4.1.2 CIP 11 - Christa Ministries Facility Retrofit

The Christa Ministries Facility Retrofit project is a retrofit of an existing swale resized to meet the water quality flow volume for flows discharging from the Brannan Park pump station. Currently, the swale is part of a wetland and detention pond system on a City-owned parcel.

Modeling efforts for the project consisted of estimating the water quality flow volume discharged from the Brannan Park pump station force main using the Continuous Simulation Method from the 2019 Stormwater Management Manual for Western Washington (2019 SWMMWW) (Ecology 2019). The 2019 SWMMWW describes the methodology as "Using an approved continuous runoff model, the water quality design volume shall be the simulated daily volume that represents the upper limit range of daily volumes that accounts for 91% of the entire runoff volume over a multi-decade period of record."

BC ran the existing conditions GHI model for the 1949 to 2022 period of record to generate daily flow volumes from the Brannan Park pump station. To determine the 91% flow volume, BC removed the days without flow from the daily record and then used the Excel function PERCENTRANK.EXC to determine the rank percentile for each day's flow volume (100 to 0). The Excel formula PERCENTILE.INC was then used to return the flow volume associated with the 91% rank. The resulting water quality flow volume is 375,448 cubic feet or 8.6 acre-feet.

2.4.2 Excluded Projects

Two potential projects were evaluated with H&H models and determined to be not viable because the proposed changes did not provide sufficient benefit or exacerbated simulated downstream flooding conditions during design storms.

2.4.2.1 30th Street NE Area Flooding, Phase 3 (2015 Plan CIP ID 4B)

The 30th Street NE Area Flooding, Phase 3 project was identified in the 2009 and 2015 Plans to reduce flooding along C Street NE between 30th Street NE and 37th Street NE in the GHI subbasin. The area experienced significant flooding during the December 3, 2007, storm and previous model results indicate the system's capacity may be limited by low pipe gradient and shallow inverts. The proposed project would collect stormwater from C Street NE in a new larger and higher gradient pipe and then pump flows to the 42-inch-diameter trunk line in 30th Street NE. The force main connection to the 30th Street NE pipe is also where the airport stormwater system connects to the 42-inch-diameter trunk line.

BC evaluated the impact of this project on the hydraulic grade line (HGL) in the 30th Street NE trunk with the updated GHI subbasin model (update described in Section 2.2) for the 25-year design storm (11/6/2006). The project raised the simulated HGL in the 30th Street NE trunkline by approximately 1 foot, which resulted in flooding at the airport property's lowest inlet rim (409-I51) near the north hangar. In addition, Figure B-9 shows the airport property flooding that resulted from the project. Figure B-10 compares the HGL in the 30th Street NE trunkline with and without this project.

Because of the simulated flooding during the design storm and the lack of reports of flooding on C Street NE since the December 2007 storm, the City opted to remove the 30th Street NE Area Flooding, Phase 3 project from consideration in the 2024 Plan.

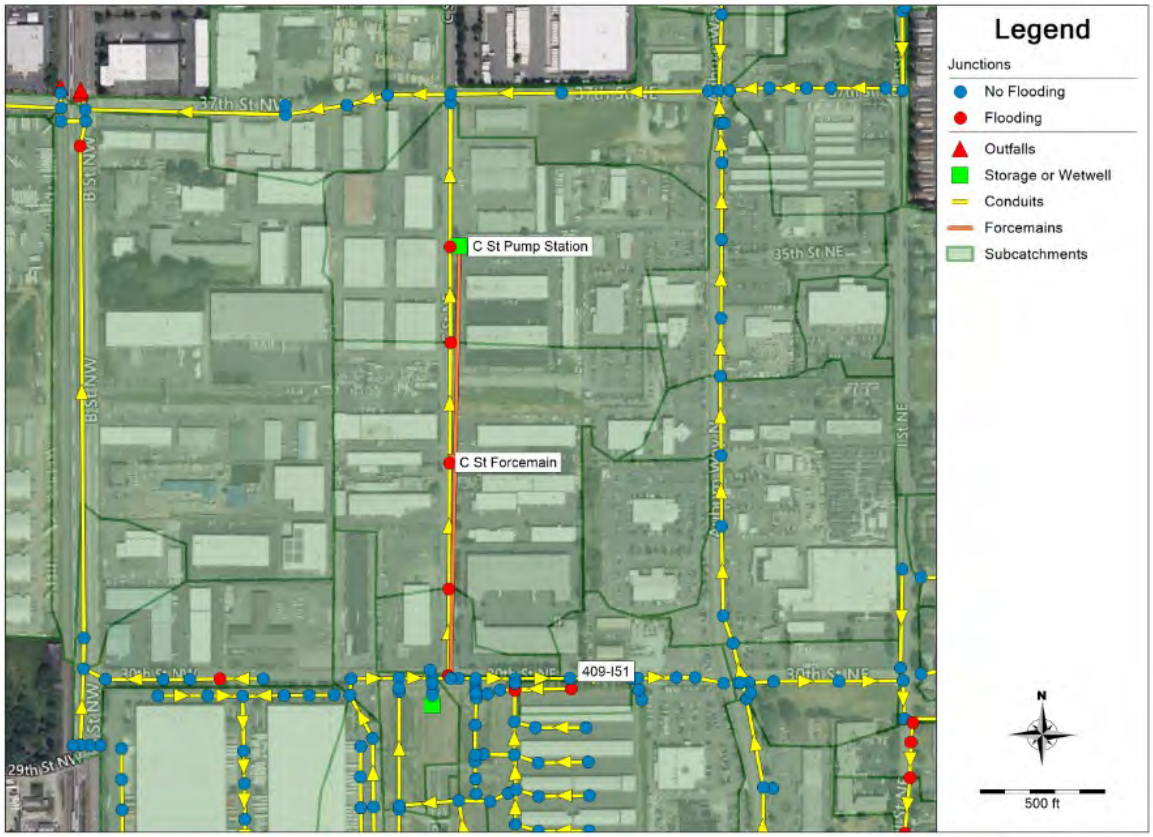


Figure B-9. Flooding impacts of 30th Street NE Area Flooding, Phase 3 Project at the Airport Property Low Area (catch basin 409-I51)

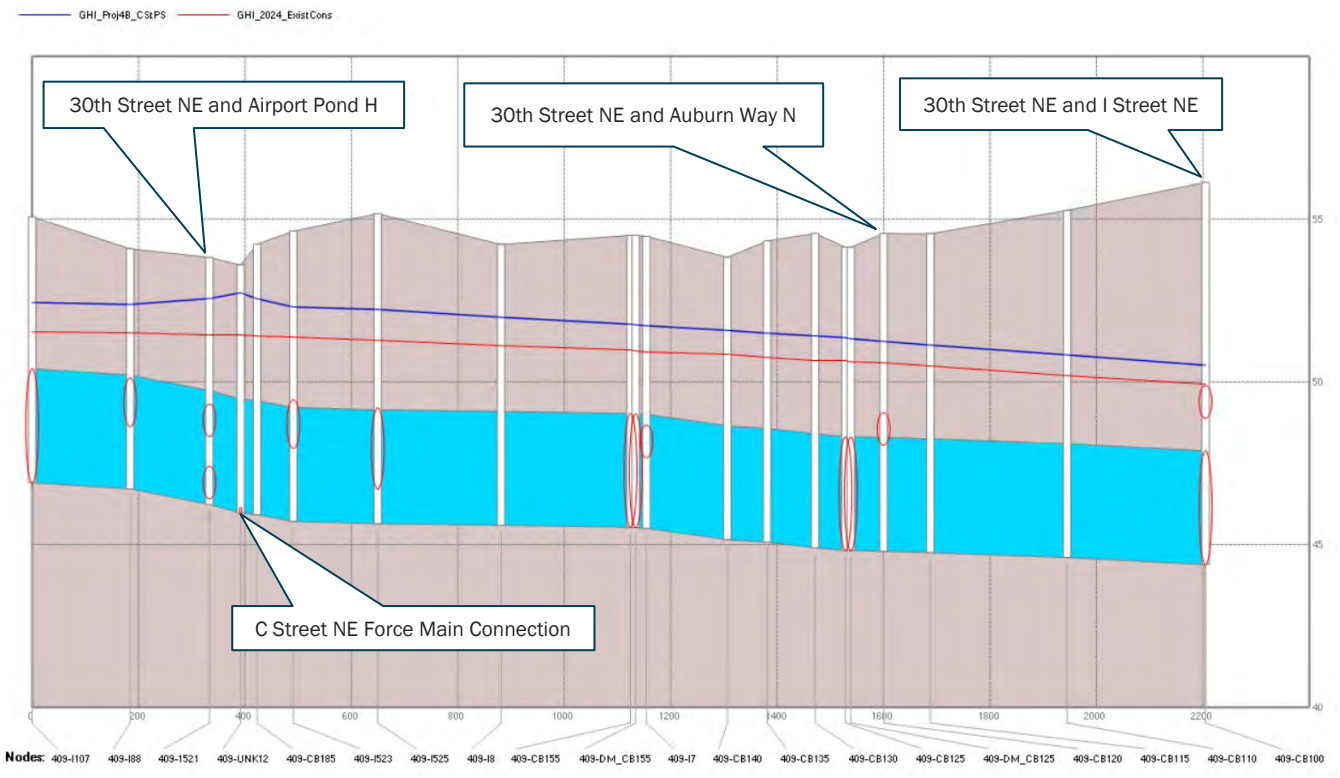


Figure B-10. Hydraulic Grade Line in 30th Street NE (from the Airport Property to I Street NE) Comparison of Existing Conditions and Proposed Conditions from the 30th Street NE Area Flooding, Phase 3 Project

2.4.2.2 17th Street Pond Improvements Project

The 17th Street Pond is one of several infiltration ponds in the BCDF subbasin. Currently, the control structure manhole for the 17th Street Pond is in the right-of-way (ROW) downstream of the pond outlet pipe. The standpipe portion of the control structure is dislodged, allowing stored water to discharge from the pond without control. Also, without the standpipe, model simulations show that downstream capacity limitations during large events cause water to back up in the system and into the ponds, allowing the pond to act as backwater storage. Prior to repairing the pond control, the City asked BC to review several scenarios to optimize the storage and operation of the 17th Street Pond to help reduce flooding in the downstream system, specifically at the low area near the intersection of Auburn Way S and the State Route (SR) 18 overpass. To help compare existing and proposed conditions, BC modeled several 17th Street Pond configurations:

1) Scenario 1: Outlet control as designed (control structure in ROW).
2) Scenario 2: Outlet control under current conditions (no control structure).
    a) Scenario 2a: Scenario 2 plus an increase in pond volume.
    b) Scenario 2b: Scenario 2 plus double the pond volume (as a sensitivity test only, does not represent space available to expand pond).
3) Scenario 3: Outlet control moved inside pond.
    a) Scenario 3a: Scenario 3 plus an increase in pond volume by replacing sloped sides with walls around the entire pond perimeter.

Figure B-11 shows the HGL in Auburn Way South at the SR 18 westbound offramp for the various scenarios. The HGL varies slightly between the scenarios. Figure B-12 shows the flooding rate and volume during the 25-year storm for the scenarios at the low area. The difference in the amount of flooding between the scenarios is minimal.

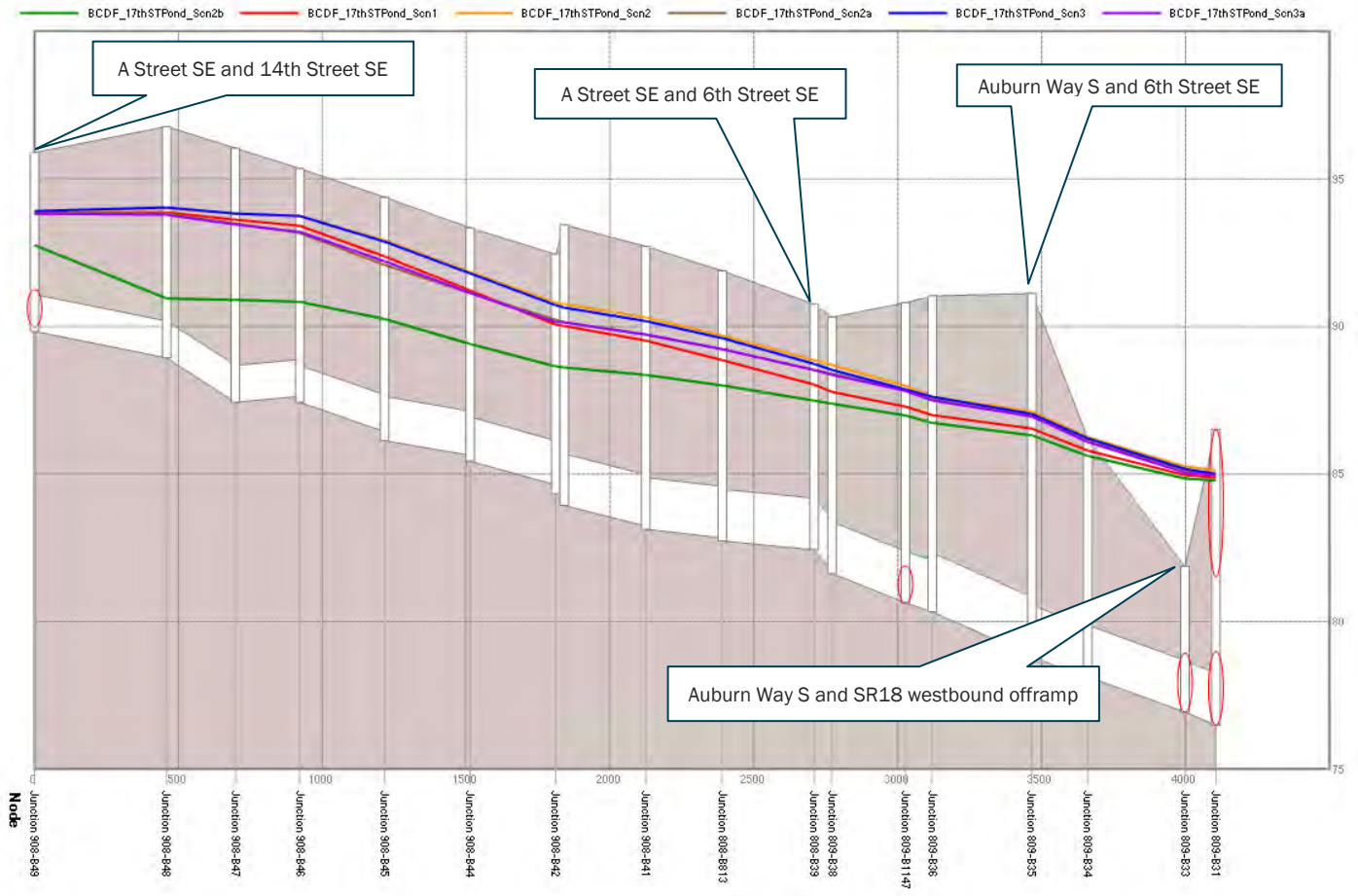


Figure B-11. Comparison of Hydraulic Grade Line in Vicinity of Auburn Way South and SR 18 Westbound Off-Ramp Intersection for Evaluation Scenarios

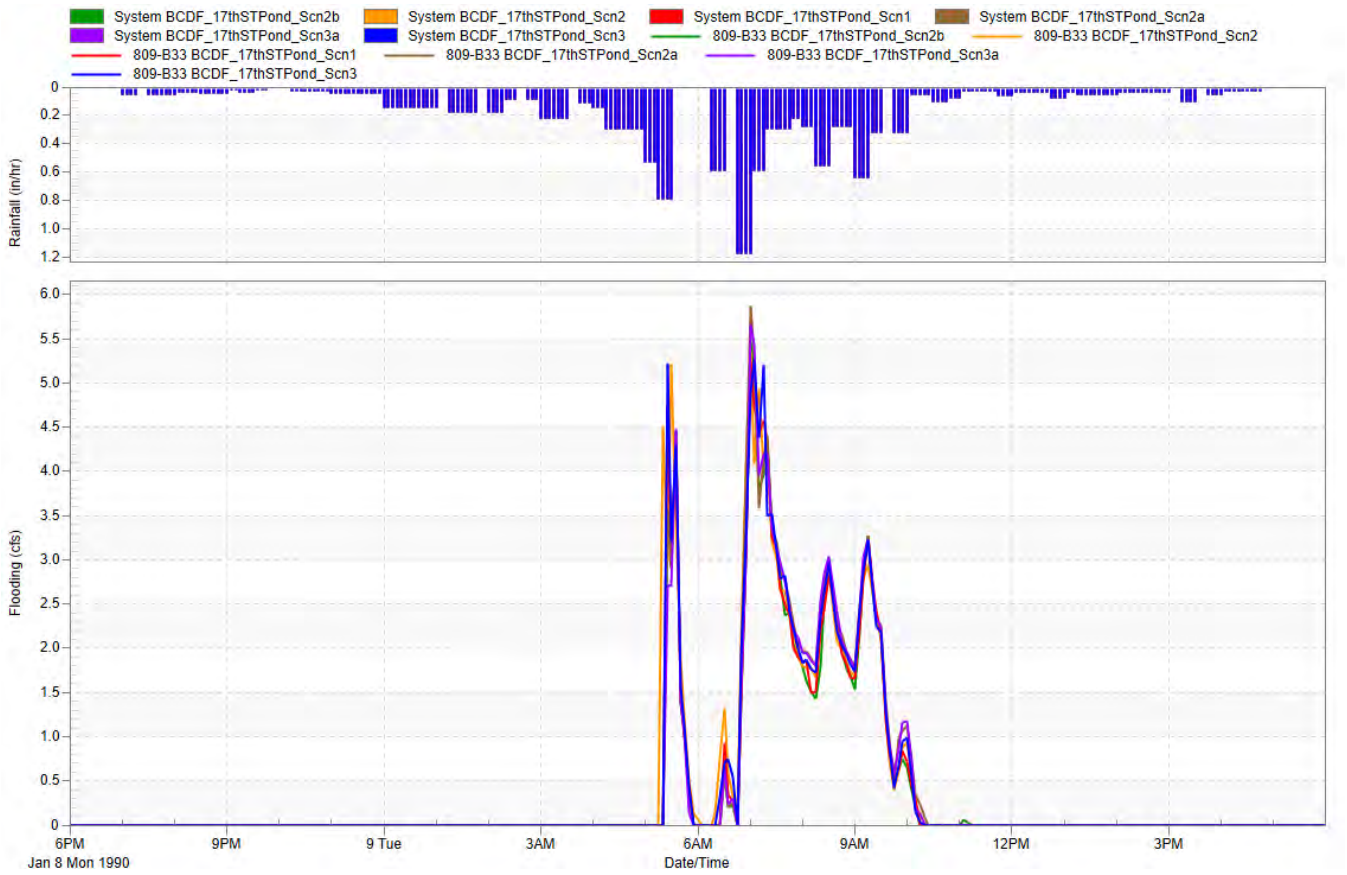


Figure B-12. Flooding at Low Inlet (809-B33) near Auburn Way South and SR 18 Westbound Offramp Intersection for Evaluation Scenarios

References

Brown and Caldwell. 2009. City of Auburn Comprehensive Stormwater Drainage Plan, amended December 2011. Prepared for the City of Auburn by Brown and Caldwell.

Brown and Caldwell. 2015. City of Auburn Comprehensive Stormwater Drainage Plan. Prepared for the City of Auburn by Brown and Caldwell.

Ecology (Washington State Department of Ecology). 2019. Stormwater Management Manual for Western Washington.

King County. 2022. Hydrologic Information Center. Last updated November 2, 2016. https://green2.kingcounty.gov/hydrology/GaugeMap.aspx. Accessed October 5, 2022.

Appendix C

Asset Management Evaluation

1. Condition Assessment and Data Gaps Analysis

1.1 Existing Conditions

The City uses Cartegraph, a computerized maintenance management system (CMMS), to manage its active asset inventory. Cartegraph may be used to develop work requests, document the time and cost of the work performed, keep track of resources available, and produce reports of various kinds related to asset management. The City uses a Cartegraph mobile app during field assessments, but any further updates/changes to the asset is done on the desktop in a geographic information system (GIS). The City assured that the information between GIS and Cartegraph is universal for active assets.

Figure C-1 shows the City's Cartegraph Asset dashboard. The type and count of stormwater assets within the City's asset inventory is listed on the lefthand side of the figure. Each stormwater asset has several attributes that may be tracked and documented alongside the feature. Some assets have an overall condition index (OCI) rating set up in Cartegraph. However, it is not universal to all stormwater assets, and the City expressed interest in reviewing and revising how the rating was generated.

City field staff noted the Cartegraph mobile app allows users a few options for scoring or making notes, but not all conditions can be accurately noted in the field. For example, one staff member noted that an aspect of a pipe was observed to be failing in the field, but since the failure condition wasn't explicitly asked for in the Cartegraph mobile app, the condition was rated as 100% (signifying an excellent condition). Staff must ensure the conditions are accurately conveyed and update them as necessary after returning from the field.

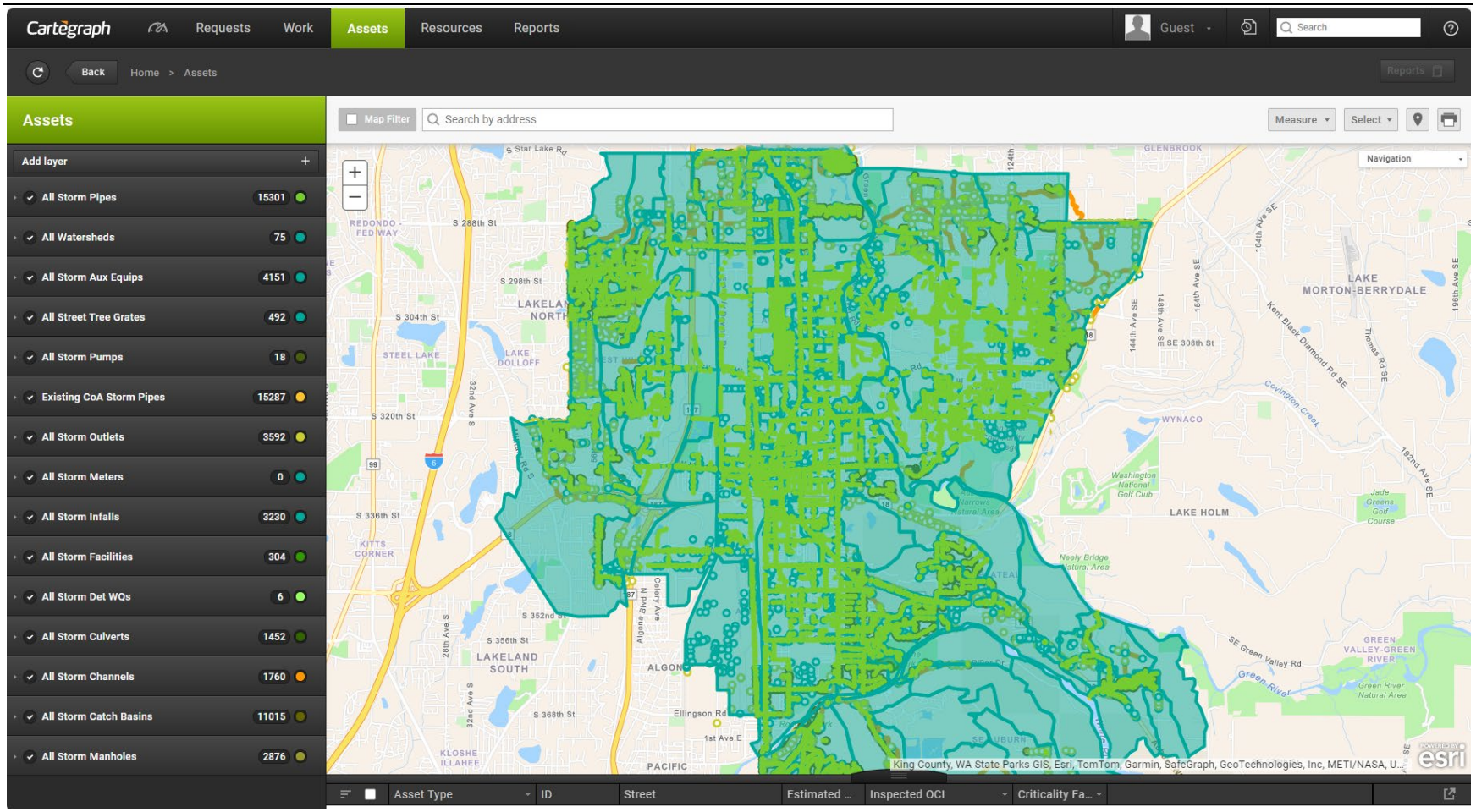


Figure C-1. City's Cartegraph Asset Dashboard and Stormwater Asset Inventory

Screenshot was taken June 4, 2024. Because most of the asset management review was performed more than 6 months prior to taking the screenshot, it is likely there may be some differences in total asset count shown in Figure C-1 and total counts reported elsewhere in this document.

1.2 Critical Attribute Data

One of the goals of this evaluation is to develop criteria for preparing a criticality and risk analysis for the City's stormwater assets. This involved preparing a method for scoring the likelihood of failure and criticality of failure of each type of asset. The likelihood of failure score reflects the expected asset condition based on specified attributes, and the criticality of failure score is demonstrative of the anticipated response should the asset fail.

Each stormwater asset was reviewed, and the criteria necessary for developing its scores was determined based on professional judgment and considered the data available. Some asset types were grouped together because they were anticipated to require similar levels of management/maintenance from the Storm Drainage Utility. Other asset types listed in Cartegraph, specifically fences, infalls, outlets, meters, and auxiliary equipment, were not grouped because they are linked to one of the greater asset types reviewed and should be assigned the same likelihood of failure and criticality of failure as the greater asset it is linked to (as work/inspection is anticipated to occur at the same time).

Another asset type listed in Cartegraph, Storm Channels (ditches), was not assigned criteria for criticality scores either because its condition is based on maintenance and will not be repaired or replaced (see the Ditch Maintenance and Operations Program).

Details regarding the critical attributes used in assigning the criticality scores are listed below. Scoring is discussed in the Criticality Review section.

- Age: Based on the installation date of the asset (current year minus installation year).
- Useful life: The expected amount of time an asset is expected to perform its function. Based on either the material (pipes, culverts, network structures) or type of asset (pumps, ponds). Useful life estimates are given in the Criticality Review section.
- Previous inspection data: The previously inspected condition of the asset.
- Proximity to critical facilities: Based on a GIS analysis where a buffer was placed around critical facilities within the City. Assets were assumed to have a higher criticality of failure if they were closer to a critical facility.
- Adjacency to critical roadways: Based on a GIS analysis where a buffer was placed around critical roadways within the City. Assets were assumed to have a higher criticality of failure if they were adjacent to a critical roadway.
- Adjacency to priority roadways: Based on a GIS analysis where a buffer was placed around priority roadways within the City. Assets were assumed to have a higher criticality of failure if they were adjacent to a priority roadway.

Table C-1 lists the recommended criteria to consider in calculating the likelihood of failure and criticality of failure scores for each category of stormwater asset.

Table C-1. Recommended Criteria for Calculating Criticality Scores of Stormwater Assets

Asset Name in Cartegraph	Asset Category	Likelihood of Failure Attributes	Criticality of Failure Attributes
Storm Pipes	Pipes	Age Useful life Previous inspection data	Proximity to critical facilities Adjacency to critical roadways Adjacency to priority roadways
Storm Culverts	Culverts	Age Useful life Previous inspection data	Proximity to critical facilities Adjacency to critical roadways Adjacency to priority roadways
Storm Pumps	Pumps	Installation date Useful life	Proximity to critical facilities Adjacency to critical roadways Adjacency to priority roadways
Street Tree Grates Storm Manholes Storm Catch Basins	Network structures	Age Useful life Previous inspection data	Proximity to critical facilities Adjacency to critical roadways Adjacency to priority roadways
Storm Facilities Storm Det WQs	Ponds	Installation date Type	Proximity to critical facilities Adjacency to critical roadways Adjacency to priority roadways

1.3 Data Gaps

After the critical attributes were identified for stormwater assets, a data gaps analysis was performed to see what needed to be addressed. This followed a previous effort led by the City to address data gaps in its stormwater asset inventory using a high precision antenna. As there were several stormwater assets, stormwater pipes and culverts were used as examples to demonstrate the completeness of the asset inventory.

Figure C-2 shows the distribution and availability of data for several attributes in the pipe dataset (namely, material, size, start elevation, and installation date). Figure C-3 shows the same for the culvert dataset (with the addition of end elevation). The figures demonstrate a fair amount of the attributes reviewed had <Null> entries. Most significantly, stormwater pipes are missing approximately 10% of their installation dates, while culverts are missing 75%.

Installation date was deemed to be a critical attribute for all of the stormwater assets in determining criticality scores. Lacking this attribute would then have the potential to prioritize an asset for work, even if it were expected to have been installed recently (and more likely to be in good condition), over an asset that is expected to have been installed 50 years ago. The goal of the criticality review is to simplify and provide reasoning for the prioritization of work, so it was deemed beneficial to perform a desktop GIS analysis to provide placeholder estimates for installation year. The stormwater pipe dataset was used for this process.

A copy of the stormwater pipes layer was made, and a new attribute column created for the estimated installation date. This was to make sure that the estimated installation dates entered could be distinguished from the installation dates in the dataset previously. Professional judgment was used to estimate installation dates by considering adjacent infrastructure, parcel build-out years, and historical imagery, as needed. Another attribute column was also created to provide notes as to why the estimated installation date was chosen for that feature. In this way, the remaining pipe dataset was assigned estimated installation dates and used to carry forward in the criticality review.

pipe (material)

Row Labels	Sum of Count
<Null>	338
ADS	27
CAST IRON	5
CLAY	15
CMP	1015
CONCRETE	3212
CPEP	1506
DUCTILE IRON	1360
HDPE	99
LCPE	12
PERFORATED	4
POLYETHYLENE	11
PVC	6683
RCP	710
RPVC	4
STEEL	1
Grand Total	**15002**

pipe (size)

Row Labels	Sum of Count
3	5
4	87
6	542
7	1
8	2314
10	234
12	8012
15	571
16	15
18	1441
20	1
21	121
22	3
24	722
26	2
27	12
28	2
29	3
30	288
36	293
42	116
48	66
49	1
54	4
57	2
60	4
64	1
71	2
72	9
77	2
78	2
81	2
87	4
95	3
96	5
108	3
117	1
120	4
142	1
<Null>	101
Grand Total	**15002**

SELEVATION	(Multiple Items)
pipes without start elevations	
Sum of Count	
3315	

INSTALLED	<Null>
pipes without install date	
Sum of Count	
1523	

Figure C-2. Stormwater Pipe Attribute Data Available in Cartegraph

Note: Attribute data were reviewed prior to capturing a screenshot of Cartegraph (Figure C-1), hence there may be some differences in asset count.

Culvert (material)

Row Labels	Sum of Count
<Null>	79
ADS	1
CAST IRON	2
CLAY	4
CMP	183
CONCRETE	714
CPEP	182
DUCTILE IRON	71
HDPE	4
PVC	97
RCP	33
RPVC	6
STEEL	1
UNKNOWN	2
Grand Total	**1379**

Culvert (size)

Row Labels	Sum of Count
4	2
6	9
8	54
9	2
10	21
12	864
14	1
15	23
18	134
20	5
21	1
24	86
27	1
28	3
29	1
30	12
32	1
33	2
36	39
42	3
48	19
49	1
54	8
60	5
66	2
72	3
76	1
77	1
84	4
96	4
120	2
144	1
180	1
240	1
660	1
<Null>	61
Grand Total	**1379**

Start Elevation	(Multiple Items)
Culverts without start elevations	
Sum of Count	
277	

Installed	<Null>
Culverts without install date	
Sum of Count	
1037	

End Elevation	(Multiple Items)
Culverts without end elevations	
Sum of Count	
285	

Figure C-3. Culvert Attribute Data Available in Cartegraph

Note: Attribute data were reviewed prior to capturing a screenshot of Cartegraph (Figure C-1), hence there may be some differences in asset count.

1.4 Recommendations

The findings from the condition assessment and data gaps analysis resulted in the following recommendations for the program:

- City field staff should be able to accurately report/enter asset conditions in the field. If there are features that are consistently being scored incorrectly due to issues with the Cartegraph app, this should be reviewed and amended to simplify the entry process from the field.
- The OCI rating should be reviewed and revised.
- The likelihood of failure and criticality of failure attributes from Table C-1 should be used as the criteria for criticality scoring.
- A similar GIS desktop analysis may be beneficial for other asset types with missing installation dates. Specifically, culverts are expected to benefit as they were missing 75% of their installation dates.

2. Criticality Review

2.1 Likelihood of Failure

To develop the likelihood of failure score, assumptions had to be made regarding the critical attributes listed in Table C-1.

2.1.1 Useful Life

The useful life estimates based on pipe material are given in Table C-2 below.

Table C-2. Useful Life Estimates for Pipe Material

Pipe Material (Cartegraph)	Description	Useful Life Estimate
<Null>	No material listed	50
ADS	Advanced drainage system (type of high density polyethylene pipe)	50
CAST IRON	Cast iron pipe	75
CLAY	Vitrified clay pipe	100
CMP[1]	Corrugated metal pipe	50
CONCRETE[1]	Concrete pipe	100
CPEP	Corrugated polyethylene pipe	50
DUCTILE IRON[1]	Ductile iron pipe	75
HDPE[1]	High density polyethylene pipe	100
LCPE	Line corrugated polyethylene pipe	50
PERFORATED	Perforated pipe	50
POLYETHYLENE	Polyethylene pipe	50
PVC[1]	Polyvinyl chloride pipe	100

Pipe Material (Cartegraph)	Description	Useful Life Estimate
RCP[1]	Reinforced concrete pipe	100
RPVC	Rigid polyvinyl chloride pipe	50
STEEL[1]	Ductile steel pipe	75

1 Useful life estimates were sourced from a similar process performed for the Multnomah County Drainage District. The remaining materials were not included in this process and were assigned a conservative estimate of 50 years as a placeholder value. This value may be updated by the City as they see fit.

Useful life estimates can be made in a similar way for culverts and network structures based on their material. These have not been prepared as a part of this assessment.

Useful life estimates for the ponds category from Table C-1 are given in Table C-3. The possible components for each type of facility was listed, and an estimate of useful life given using professional judgment. The most conservative useful life of one of the facility's components should be used to assign the useful life of the facility. These estimates were given as a basis for developing a likelihood of failure score for the ponds asset category. The useful life of pumps can be estimated in a similar manner as shown in Table C-3, but has not been estimated as a part of this assessment.

Table C-3. Useful Life Estimates for Ponds (Stormwater Facilities and Detention/Water Quality Treatment Facilities)

	Total[1]	Useful Life of Components Assumption (Years)[2]						
Facility Type	Useful Life Assumption (Years)	Control Structure Replacement	Mechanism Replacement	In-Place Soil Media	Media Box Replacement	Vault	Rebuild	Notes
<Null>	–	–	–	–	–	–	–	–
BAFFLE OIL/WATER SEPARATOR	20	–	20	–	–	50	–	–
BASIC BIOFILTRATION SWALE	N/A[3]	–	–	–	–	–	–	Maintenance based
BIORETENTION	25	–	–	25	–	–	–	Full media replacement
CARTRIDGE FILTER	20	–	–	–	20	50	–	–
CP OIL/WATER SEPARATOR	20	–	20	–	–	50	–	–
DETENTION POND	25	25	–	–	–	–	–	Assume 25 years for control structure
DETENTION TANK	25	25	–	–	–	50	–	Assume 25 years for control structure
DETENTION VAULT	25	25	–	–	–	50	–	Assume 25 years for control structure
FILTER STRIPS	25	–	–	25	–	–	–	Full media replacement
FLOOD STORAGE	25	25	–	–	–	–	–	Assume 25 years for control structure
HYDRODYNAMIC SEPARATOR	10	–	10	–	–	50	–	–
INFILTRATION	20	–	–	20	–	–	–	Full media replacement
INFILTRATION POND	20	–	–	20	–	–	–	Full media replacement
MODULAR WETLAND	20	–	–	–	20	–	–	–
PERMEABLE PAVEMENT	10	–	–	–	–	–	10	–
TREE BOX	20	–	–	–	20	–	–	–
WET BIOFILTRATION SWALE	N/A[3]	–	–	–	–	–	–	Maintenance based
WET POND	25	25	–	–	–	–	–	Assume 25 years for control structure
WET VAULT	25	25	–	–	–	50	–	Assume 25 years for control structure

1 Total useful life is based on the most conservative estimate listed for one of the facility's component parts.

2 Estimates were made using professional judgment regarding the useful life expectancy for the components of each facility. There is not a value listed for each facility for the possible components as they do not apply to each facility listed.

3 Facilities that do not have a useful life assumption are maintenance based and should be managed as part of routine maintenance rather than a repair and replacement program.

2.1.2 Remaining Useful Life

The remaining useful life is calculated using its age and its useful life, as shown below.

$$Remaining\ useful\ life = asset\ age - useful\ life$$

This is the basis for the likelihood of failure score for the stormwater assets.

2.1.3 Previous Inspection Data

The previous condition of the asset feature was used to make an adjustment to the likelihood of failure score, if it was available, since this would be the most reliable source of data regarding its condition.

Thus, the remaining useful life equation would be:

$$Remaining\ useful\ life = asset\ age - useful\ life + previous\ inspection\ data\ adjustment$$

Table C-4 shows the adjustment to the useful life based on the previous OCI assigned. These estimated adjustments were only considered for stormwater pipes and should be evaluated to see whether a similar adjustment can be made for network structures. This is not recommended for ponds and pumps.

Table C-4. Remaining Useful Life Adjustment for Pipes and Culverts Based on Previous Inspection Data

Overall Condition Index	Description	Useful Life Year Adjustment
0	Failed	0
20	Poor	10
40	Fair	20
60	Good	30
80	Excellent	40

2.1.4 Likelihood of Failure Score

Table C-5 shows how the likelihood of failure score was assigned based on remaining useful life. A score of 5 is the most likely to fail, while a score of 1 is the least likely to fail.

Table C-5. Likelihood of Failure Score

Score	Description	Useful Life Years Remaining with Updated Inspection Results
5	Structure is greater than 25 years beyond useful life and should be prioritized for inspection	-75
4	Structure is past end of useful life and must be inspected	-25
3	Structure is nearing end of useful life and should be inspected	0
2	Failure not expected for 25+ years	25
1	Unlikely failure in foreseeable future	75

2.2 Criticality of Failure Score

To develop the criticality of failure score, assumptions had to be made regarding the critical attributes listed in Table C-1. Each critical attribute metric was scored independently and then averaged to result in the criticality of failure score.

2.2.1 Proximity to Critical Facilities

A 1,000-foot buffer was placed around the critical facilities within the City of Auburn in GIS. If any asset was within 1,000 feet of a critical facility, then its failure was assumed to be most critical. The score for this assessment is shown in Table C-6 below.

Table C-6. Proximity to Critical Facilities Score

Distance from Critical Facility	Proximity to Critical Facilities Score
0–1000 feet	5
Greater than 1000 feet	1

This GIS analysis was only performed for stormwater pipes for this assessment but can be easily performed for other stormwater assets by applying the same GIS buffer.

2.2.2 Adjacency to Critical Roadways

The roadways considered as critical in this assessment are listed below.

- Emergency evacuation route.
- Snow plow route.
- King County Metro bus route.
- Sound Transit bus route.
- Pierce Transit bus route.

A buffer was placed around the critical roadways in the City in GIS. If any asset was within this buffer, it was deemed to be most critical of failure. The score for this assessment is shown in Table C-7 below.

Table C-7. Adjacency to Critical Roadways Score

Distance from Critical Roadway	Proximity to Critical Roadways Score
Within right-of-way buffer of critical roadway	5
Outside of critical roadway buffer	1

This GIS analysis was only performed for stormwater pipes for this assessment but can be easily performed for other stormwater assets by applying the same GIS buffer.

2.2.3 Proximity to Priority Roadways

A priority rank was assigned to the different functional classifications of roads within the City. A GIS analysis was performed where a buffer was placed around each street. Assets were then assigned a proximity to priority roadways score equal to the priority rank of the street right-of-way where it lay. The priority rank (and proximity to priority roadways score) based on street functional classification is shown in Table C-8 below.

Table C-8. Priority Rank based on Street Functional Classification

Street Functional Classification	Priority Rank
ALLEY	4
HIGHWAY	5
LOCAL	3
MINOR ARTERIAL	1
NON RESIDENTIAL COLLECTOR	2
PRINCIPAL ARTERIAL	1
RAMP	4
RESIDENTIAL COLLECTOR	2
RURAL COLLECTOR	4
#N/A	3
<Null>	3

This GIS analysis was only performed for stormwater pipes for this assessment but can be easily performed for other stormwater assets by applying the same GIS buffer.

2.2.4 Criticality of Failure Score

The criticality of failure score was calculated by taking the average of the proximity to critical facilities score, adjacency to critical roadways score, and adjacency to priority roadways score. The criticality of failure score is summarized in Table C-9 below.

Table C-9. Criticality of Failure Score

Criticality of Failure Score	Description
5	Structure has critical facilities <1000 ft away, is adjacent to a critical roadway, and adjacent to a higher priority roadway functional classification
4	
3	
2	
1	Structure is not adjacent to critical facilities, critical roadways, or higher priority roadways.

2.3 Results

The criticality of failure and likelihood of failure scores can be summed to create a combined score or used independently. A spreadsheet was created to score the stormwater pipes inventory using the methods described above. A screenshot is shown in Figure C-4 below of the first page of results. This spreadsheet may be used as an example for the other stormwater assets in creating a likelihood of failure and criticality of failure score.

| | | |

2.4 Recommendations

The following actions are recommended after the criticality review:

- Estimate useful life for culverts, pumps, and network structures
- Consider whether previous inspection data should be used in adjusted useful life for network structures
- Perform GIS desktop analysis needed for the other stormwater assets in Table C-1 based on the methods described for the criticality of failure score.
- Enact the criticality of failure and likelihood of failure scores in Cartegraph for stormwater pipes, then follow suit with the stormwater assets listed in Table C-1.

3. Pipe Depreciation Analysis

The resulting failure scores allow for the City to rank different assets both on likelihood and criticality of failure. It is recommended to use this ranking strategy to develop an inspection program where inspections of different types of assets are prioritized based on their rank. The asset inspection program will serve to fill data gaps, update the likelihood of failure score based on field verification, and identify asset features requiring repair or replacement. After inspection data are input for an asset feature, the results of the inspection will supersede the use of estimated remaining useful life and installation date (where applicable) in calculating a likelihood of failure score. Using this system to prioritize maintenance allows resources to be used more efficiently and fills in data gaps resulting in a more robust asset inventory.

3.1 Inspection of Pipes, Culverts, and Network Structures

For the City's pipe system, the recommended program would prioritize inspection based on likelihood of failure and then criticality of failure. In this way, pipes with likelihood of failure scores greater than or equal to 4 (or a negative useful life estimate) will be inspected first. The next tier of inspections should address pipes with likelihood of failure scores equal to 3 and pipes with unknown installation dates. After pipes are inspected, they should be assigned a condition score, which will supersede the installation date and useful life expectancy in determining the likelihood of failure. The likelihood of failure for a pipe will increase over time, and this prioritization method will take this into account while integrating field inspection data. Table C-10 summarizes the length of pipe requiring inspection using this method.

Table C-10. Pipes Requiring Inspection Summary

	Feet	Miles	Relative to Existing City Total (%)	Notes
Total length of pipe in Cartegraph	2,439,196	461.97		This includes all jurisdictions and statuses.
Total length of pipe in City	1,292,737.73	244.84	100%	Jurisdiction = "CoA" and Status = "Existing"
Total pipe length requiring inspection	52,954.92	10.03	4.10%	Applies for any pipe whose Likelihood of Failure Score = 4 or 5 (Useful Life <0)

Since storm catch basins and storm manholes are related to pipes, it is recommended to inspect these at the same time as adjacent pipes. The same inspection prioritization method is recommended for culverts because the failure consequences are similar.

3.2 Inspection of Remaining Stormwater Assets

For storm pumps, it is recommended to closely evaluate their condition as their useful life nears the end (e.g., 5 or fewer years) and upgrade or replace them before probable failure. Stormwater control facilities should be routinely inspected and prioritized for inspection when critical feature data are unavailable.

4. Pipe Replacement Cost Projection

A brief review of costs were included in the asset management evaluation for consideration in setting the repair and replacement budget and resource planning goals for the 2024 Plan. A comprehensive cost estimate was prepared for both pipe replacement and the replacement of catch basins and manholes within the City. The assumptions and results of this analysis are noted below.

4.1 Method and Assumptions

The cost estimate for pipe replacement is meant to function as a generic cost estimate for the as opposed to being based off a particular project or area. The primary cost estimation calculations assume the replacement of 5,000 linear feet of pipe as well as the associated conveyance structures, such as manholes and catch basins. The estimate also includes work commonly associated with a pipe replacement project, including temporary erosion and sediment control (TESC); site prep, such as the removal of surface pavement and existing structures; the installation of the conveyance system structures, such as trenching and backfill; surface/pavement repair; and project costs, such as design contingency and permitting.

Additional assumptions and further explanation of cost breakdown for the cost of pipe replacement are as follows:

- General:
  - → All pipes and structures are assumed to be within the same/connecting system.
  - → Pipes and structures are under existing asphalt, cement concrete, or landscaping that would need to be replaced in kind.
  - → The City of Auburn GIS map was used to provide information about average pipe sizes, pipe lengths, types of catch basins, and land surface cover in the area that was used to make a general calculation of cost to replace 5,000 linear of pipe.
  - → The City of Auburn Engineering Design Standards (February 2024) as well as the Standard Details (February 2024) was used to inform typical design for the purpose of cost and quantity calculations.
- TESC and site prep: Site prep costs include the removal and cutting of surfaces that may be over the top of existing conveyance systems as well as Utility Conflict Resolution. Other costs for site prep, such as TESC, mobilization, and project temporary traffic control are calculated based on percentages commonly used in projects of a similar nature. Project temporary traffic control for the replacement of conveyance systems may vary depending on the

amount of work done in arterials or heavily trafficked areas. For this cost estimate, it was assumed that the work will need a medium amount of traffic control.

- Conveyance system and structural/asphalt repair: For the simplification of calculations, certain generalizations were made in calculating quantities and costs, such as the assumption that all pipes are the same size, material, and depth. See Figures C-5 through C-8 for assumptions.
- Project costs: Project costs percentages were based off the percentages used for the Stormwater Management Action Plan "One Sheets" completed for the City of Auburn in 2023. They include project costs for design contingency, permitting, design, City project management administration, and construction management.
- Unit costs: Unit costs were based off the assumption of 5,000 or 10,000 linear feet of pipe replacement and associated quantities for other conveyance system replacement appurtenances. Unit costs were estimated using the Washington State Department of Transportation Unit Bid Analysis tabs as well as other project cost estimates that have similar attributes to the general cost estimate of replacing conveyance system structures and pipes.

4.2 Results

Cost estimates were made to show the average cost of replacing 5,000 feet of pipe within the City of Auburn (Figure C-5), replacing 5,000 linear feet of pipe in downtown (Figure C-6), and 10,000 linear feet of pipe in rural areas (Figure C-7). A cost estimate was also made for replacing catch basins without replacing any adjacent pipes (Figure C-8).

Replace 5000 ft Storm Pipe Cost Breakdown 5000 LF

Key: Manual Input of Assumed Value | Calculated Value | Referencing Price Sheet

Assumptions			Reasoning
Pipes and structures are under existing asphalt, cement concrete, or landscaping which needs to be replaced in kind			
Use of 12" PVC piping - City prefers PVC SDR-35 or PS46			
Avg length of pipe between structures (not to exceed 400)	86	LF	Based off average taken from City of Auburn GIS map
Avg size of pipe (used for trenching/volume calculations)	14	in D	Based off average taken from City of Auburn GIS map
Avg length of Type I CBs (used for trenching/volume calculations)	24	in L	Based off average taken from City of Auburn GIS map
Avg size of Type II CBs (used for trenching/volume calculations)	54	in D	Based off average taken from City of Auburn GIS map
Percent of structures Type I CBs	80%		Based off average taken from City of Auburn GIS map
Percent of structures Type II CBs	20%		
Number of Type I CBs	47		
Number of Type II CBs	12		
Number of structures per specified length of system	59		
Total length of system	5148	ft	
Percent of system under street (asphalt)	30%		
Percent of system under sidewalk (cement conc.)	10%		
Percent of system under curb and gutter	60%		
Percent of system under landscaped/pervious area	0%		
Total area of surface restoration (trench width+1ft offset per Auburn s	30406	sf	
Total length of surface restoration	5150	LF	

SITE PREP AND TESC % COSTS

				Reasoning
Total Materials Cost		$2,442,900.00		
Mobilization	10%	$ 244,290.00	$ 244,290.00	Based off of City of Auburn SMAP OneSheet Examples
TESC	5%	$ 122,145.00	$ 122,145.00	Based off of City of Auburn SMAP OneSheet Examples
Project Temporary Traffic Control	10%	$ 244,290.00	$ 244,290.00	
May be 5-20% depending on amount of work done in arterials				
Cost			**$610,700.00**	**/ 5000 LF**

SITE PREP

	Quantities	Unit Costs		Total Cost
Utility Conflict Resolution (Medium)		$ 50,000.00	LS	$ 50,000.00
Choose from Small, Medium, or Large				
Removing Asphalt Conc. Pavement	1770	$ 75.00	SY	$ 132,800.00
Assumed for only percent of system under asphalt and partial area of Curb and Gutter				
Removing Cement Conc. Pavement	1094	$ 55.00	SY	$ 60,200.00
Assumed for only percent of system under sidewalk or concrete and partial area of Curb and Gutter				
Removing Cement Conc. Curb and Gutter	3090	$ 34.00	LF	$ 105,100.00
Assumed for only percent of system under curb and gutter				
Assumed to only account for 1.5 ft of width of surfacing, remaining area categorized as Asphalt and Pavement				
Clearing and Grubbing	0.0000	$ 10,300.00	ACRE	$ -
Assumed for only percent of system under pervious areas				
Cost				**$348,100.00** **/ 5000 LF**

CONVEYANCE SYSTEM

Structure Excavation Class A Incl. Haul	$ 47.00	CY	
Shoring or Extra Excavation Class B	$ 3.00	SF	
Crushed Surfacing Top Course	$ 41.00	TN	$ 75.85 /CY

	Unit Cost			Inside Pipe Diameter (in)	Avg Cover Depth (ft)	Outside Diameter (in)	Trench Width (ft)	Trench Depth (ft)	Structure Excavation (CY/LF)	Structure Excavation ($/LF)	Shoring ($/LF)	Backfill (CY/LF)	Backfill ($/LF)	Cumulative Cost (inl. Pipe ($/LF)	Total Cost
Schedule A Storm Sewer Pipe 12 IN. Diam.	5000	$ 71.00	LF	14	4	16.5	3.667	5.875	0.797839506	$37.50	$ 17.63	0.742843454	$ 56.34	$190.00	$ 950,000.00
Includes removal of existing pipe															
For simplification of calculations, 12 in pipe assumed for Unit Cost but trenching and excavation calculated from average pipe size															
Trench depth and width per typical pipe trench calculations and using City of Auburn Standard Detail T-01.6															

	Unit Cost			CB Inside Diam (in)	Wall Thickness (in)	Area Excavation (sf) =Area CB + 1 ft offsets	Base Thickness (in)	Average Depth Rim to sump (ft)	Structure Excavation (CY)	Structure Excavation ($/EA)	Backfill Cost ($/EA)	Crushed surface base needed (CY)	Crushed surface base needed ($/EA)	Cumulative Cost ($/EA)	Total Cost
CATCH BASIN TYPE 1	47	$ 2,600.00	EACH	N/A	N/A	21.750	4	4.667	4.833	$227.17	$ 257.16	0.402777778	$ 42.47	$3,130.00	$ 147,110.00
Includes removal of existing structure															
CATCH BASIN TYPE 2 48 IN. DIAM.	12	$ 5,300.00	EACH	54	6	44.179	6	6.000	12.272	$576.78	$ 544.70	0.818123087	$ 86.27	$6,510.00	$ 78,120.00

Figure C-5. Average Cost of Replacing 5,000 Feet of Stormwater Pipe in the City of Auburn

Includes removal of existing structure
For simplification of calculations, 48 in MH assumed for Unit Cost but excavation calculated from average MH size

CONNECTION TO DRAINAGE STRUCTURE	8	$ 3,500.00	EA	$ 28,000.00	
Assuming there is a connection to existing structures for 1/8 of the new CBs					
Cost				**$1,203,200.00**	**/ 5000 LF**

STRUCTURAL/ASPHALT REPAIR

		Unit Cost		Depth (IN)	Area (SF)	Volume (CF)	Volume (CY)	Ton multiplier (p	Tons	Total Cost
Crushed Surfacing Base Course	1519	$ 57.00	TN	8.75	30406.17	22171.17	821.15	1.85	1519.14	$ 86,590.72
Full Depth Asphalt Replaced										
Depth is determined by average required per City of Auburn for Asphalt Pavement Design										
Assumed same depth of CSBC under cement concrete pavement and Curb and Gutter is the same depth as under the asphalt pavement										
HMA CL 1/2 In PG 58H-22	697	$ 185.00	TN	6.92	15926.20	9179.69	339.99	2.05	697.0	$ 128,940.59
Full Depth Asphalt Replaced over open cut area										
Depth is determined by average required per City of Auburn for Asphalt Pavement Design										
CEMENT CONCRETE PAVEMENT	304	$ 1,340.00	CY	10.00	9844.97	8204.14	303.86			$ 407,168.42
Full depth cement concrete replaced over open cut area										
Depth per City of Auburn Standard Detail T-27.2										
CEMENT CONC. TRAFFIC CURB AND GUTTER	3090	$ 87.00	LF	$ 268,900.00						
Cost				**$891,600.00**						**/ 5000 LF**

SUBTOTAL COST	**$3,053,600.00 / 5000 LF**

PROJECT COSTS
Project costs % based off of City of Auburn SMAP OneSheet Examples

Design Contingency	50%	$ 1,526,800.00	$ 1,526,800.00
Contingency is multiplied into other % costs			
Permitting	5%	$ 229,020.00	$ 229,020.00
Design	25%	$ 1,145,100.00	$ 1,145,100.00
City Project Mgmt. Admin	5%	$ 229,020.00	$ 229,020.00
Construction Managements	25%	$ 1,145,100.00	$ 1,145,100.00
Cost			**$4,275,000.00** / 5000 LF

PROJECT TOTAL COST	**$7,328,600.00 / 5000 LF**
	$1,465.72 /LF

Figure C-5 (continued). Average Cost of Replacing 5,000 Feet of Stormwater Pipe in the City of Auburn

Replace 5000 ft Storm Pipe City Center Cost Breakdown 5000 LF

Key:		
Manual Input of Assumed Value	Calculated Value	Referencing Price Sheet

Assumptions		Reasoning
Pipes and structures are under existing asphalt, cement concrete, or landscaping which needs to be replaced in kind		
Use of 12" PVC piping - City prefers PVC SDR-35 or PS46		
Avg length of pipe between structures (not to exceed 400)	64 LF	Based off of stats from window of City of Auburn GIS Map of downtown area
Avg size of pipe (used for trenching/volume calculations)	14 in D	Based off of stats from window of City of Auburn GIS Map of downtown area
Avg length of Type I CBs (used for trenching/volume calculations)	24 in L	
Avg size of Type II CBs (used for trenching/volume calculations)	50 in D	Based off visual of looking at City of Auburn GIS map
Percent of structures Type I CBs	84%	Based off visual of looking at City of Auburn GIS map
Percent of structures Type II CBs	16%	
Number of Type I CBs	66	
Number of Type II CBs	13	
Number of structures per specified length of system	79	
Total length of system	5186.167 ft	
Percent of system under street (asphalt)	20%	Based off visual of looking at City of Auburn GIS map
Percent of system under sidewalk (cement conc.)	20%	Based off visual of looking at City of Auburn GIS map
Percent of system under curb and gutter	60%	Based off visual of looking at City of Auburn GIS map
Percent of system under landscaped/pervious area	0%	
Total area of surface restoration (trench width+1ft offset per Auburn s	30964 sf	
Total length of surface restoration	5188 LF	

SITE PREP AND TESC % COSTS

				Reasoning
Total Materials Cost		$2,629,600.00		
Mobilization	10%	$ 262,960.00	$ 262,960.00	Based off of City of Auburn SMAP OneSheet Examples
TESC	5%	$ 131,480.00	$ 131,480.00	Based off of City of Auburn SMAP OneSheet Examples
Project Temporary Traffic Control	15%	$ 394,440.00	$ 394,440.00	Based off of City of Auburn SMAP OneSheet Examples and assumption of higher traffic areas in city center of Auburn
May be 5-20% depending on amount of work done in arterials				
Cost			**$788,900.00**	**/ 5000 LF**

SITE PREP

	Quantities	Unit Costs		Total Cost
Utility Conflict Resolution (Medium)		$ 50,000.00 LS	$ 50,000.00	
Choose from Small, Medium, or Large				
Removing Asphalt Conc. Pavement	1461	$ 75.00 SY	$ 109,600.00	
Assumed for only percent of system under asphalt and partial area of Curb and Gutter				
Removing Cement Conc. Pavement	1461	$ 55.00 SY	$ 80,400.00	
Assumed for only percent of system under sidewalk or concrete and partial area of Curb and Gutter				
Removing Cement Conc. Curb and Gutter	3113	$ 34.00 LF	$ 105,900.00	
Assumed for only percent of system under curb and gutter				
Assumed to only account for 1.5 ft of width of surfacing, remaining area categorized as Asphalt and Pavement				
Clearing and Grubbing	0.0000	$ 10,300.00 ACRE	$ -	
Assumed for only percent of system under pervious areas				
Cost			**$345,900.00**	**/ 5000 LF**

CONVEYANCE SYSTEM

Structure Excavation Class A Incl. Haul	$ 47.00 CY		
Shoring or Extra Excavation Class B	$ 3.00 SF		
Crushed Surfacing Top Course	$ 41.00 TN	$ 75.85 /CY	

	Unit Cost		Inside Pipe Diameter (in)	Avg Cover Depth (ft)	Outside Diameter (in)	Trench Width (ft)	Trench Depth (ft)	Structure Excavation (CY/LF)	Structure Excavation ($/LF)	Shoring ($/LF)	Backfill (CY/LF)	Backfill ($/LF)	Cumulative Cost (inl. Pipe ($/LF)	Total Cost
Schedule A Storm Sewer Pipe 12 IN. Diam.	5000 $ 71.00 LF		14	4	16.5	3.667	5.875	0.797839506	$37.50	$ 17.63	0.742843454	$ 56.34	$190.00	$ 950,000.00
Includes removal of existing pipe														
For simplification of calculations, 12 in pipe assumed for Unit Cost but trenching and excavation calculated from average pipe size														
Trench depth and width per typical pipe trench calculations and using City of Auburn Standard Detail T-01.6														

	Unit Cost		CB Inside Diam (in)	Wall Thickness (in)	Area Excavation (sf) =Area CB + 1 ft offsets	Base Thickness (in)	Average Depth Rim to sump (ft)	Structure Excavation (CY)	Structure Excavation ($/EA)	Backfill Cost ($/EA)	Crushed surface base needed (CY)	Crushed surface base needed ($/EA)	Cumulative Cost ($/EA)	Total Cost
CATCH BASIN TYPE 1	66 $ 2,600.00 EACH		N/A	N/A	21.750	4	4.667	4.833	$227.17	$ 257.16	0.402777778	$ 42.47	$3,130.00	$ 206,580.00
Includes removal of existing structure														
CATCH BASIN TYPE 2 48 IN. DIAM.	13 $ 5,300.00 EACH		50	6	40.339	6	6.000	11.205	$526.65	$ 463.80	0.74701708	$ 78.77	$6,370.00	$ 82,810.00

Figure C-6. Average Cost of Replacing 5,000 Feet of Stormwater Pipe in Downtown Auburn

Includes removal of existing structure
For simplification of calculations, 48 in MH assumed for Unit Cost but excavation calculated from average MH size

CONNECTION TO DRAINAGE STRUCTURE	10	$ 3,500.00	EA	$ 35,000.00	
Assuming there is a connection to existing structures for 1/8 of the new CBs					
Cost				**$1,274,400.00**	**/ 5000 LF**

STRUCTURAL/ASPHALT REPAIR

		Unit Cost		Depth (IN)	Area (SF)	Volume (CF)	Volume (CY)	Ton multiplier (p	Tons	Total Cost
Crushed Surfacing Base Course	1547	$ 57.00	TN	8.75	30964.11	22577.99	836.22	1.85	1547.01	$ 88,179.61
Full Depth Asphalt Replaced										
Depth is determined by average required per City of Auburn for Asphalt Pavement Design										
Assumed same depth of CSBC under cement concrete pavement and Curb and Gutter is the same depth as under the asphalt pavement										
HMA CL 1/2 In PG 58H-22	575	$ 185.00	TN	6.92	13147.38	7578.00	280.67	2.05	575.4	$ 106,442.87
Full Depth Asphalt Replaced over open cut area										
Depth is determined by average required per City of Auburn for Asphalt Pavement Design										
CEMENT CONCRETE PAVEMENT	406	$ 1,340.00	CY	10.00	13147.38	10956.15	405.78			$ 543,749.56
Full depth cement concrete replaced over open cut area										
Depth per City of Auburn Standard Detail T-27.2										
CEMENT CONC. TRAFFIC CURB AND GUTTER	3113	$ 87.00	LF	$ 270,900.00						
Cost				**$1,009,300.00**						**/ 5000 LF**

SUBTOTAL COST	**$3,418,500.00 / 5000 LF**

PROJECT COSTS
Project costs % based off of City of Auburn SMAP OneSheet Examples

Design Contingency	50%	$ 1,709,250.00	$ 1,709,250.00
Contingency is multiplied into other % costs			
Permitting	5%	$ 256,387.50	$ 256,387.50
Design	25%	$ 1,281,937.50	$ 1,281,937.50
City Project Mgmt. Admin	5%	$ 256,387.50	$ 256,387.50
Construction Managements	25%	$ 1,281,937.50	$ 1,281,937.50
Cost			**$4,785,900.00** / 5000 LF

PROJECT TOTAL COST	**$8,204,400.00 / 5000 LF**
	$1,640.88 /LF

Figure C-6 (continued). Average Cost of Replacing 5,000 Feet of Stormwater Pipe in Downtown Auburn

Replace 10,000 ft Storm Backroad Pipe Cost Breakdown 10,000 LF

Key:		
Manual Input of Assumed Value	Calculated Value	Referencing Price Sheet

Assumptions		Reasoning
Pipes and structures are under existing asphalt, cement concrete, or landscaping which needs to be replaced in kind		
Use of 12" PVC piping - City prefers PVC SDR-35 or PS46		
Avg length of pipe between structures (not to exceed 400)	114 LF	Based off of stats from window of City of Auburn GIS Map of downtown area
Avg size of pipe (used for trenching/volume calculations)	14 in D	Based off of stats from window of City of Auburn GIS Map of downtown area
Avg length of Type I CBs (used for trenching/volume calculations)	24 in L	
Avg size of Type II CBs (used for trenching/volume calculations)	48 in D	Based off visual of looking at City of Auburn GIS map
Percent of structures Type I CBs	60%	Based off visual of looking at City of Auburn GIS map
Percent of structures Type II CBs	40%	
Number of Type I CBs	53	
Number of Type II CBs	36	
Number of structures per specified length of system	89	
Total length of system	10250 ft	
Percent of system under street (asphalt)	10%	Based off visual of looking at City of Auburn GIS map
Percent of system under sidewalk (cement conc.)	20%	Based off visual of looking at City of Auburn GIS map
Percent of system under curb and gutter	40%	Based off visual of looking at City of Auburn GIS map
Percent of system under landscaped/pervious area	30%	
Total area of surface restoration (trench width+1ft offset per Auburn s	60006 sf	
Total length of surface restoration	10252 LF	

SITE PREP AND TESC % COSTS

				Reasoning
Total Materials Cost		$4,031,000.00		
Mobilization	10%	$ 403,100.00	$ 403,100.00	Based off of City of Auburn SMAP OneSheet Examples
TESC	5%	$ 201,550.00	$ 201,550.00	Based off of City of Auburn SMAP OneSheet Examples
Project Temporary Traffic Control	10%	$ 403,100.00	$ 403,100.00	Based off of City of Auburn SMAP OneSheet Examples and assumption of lower traffic areas in city center of Auburn
May be 5-20% depending on amount of work done in arterials				
Cost			**$1,007,800.00**	**/ 10000 LF**

SITE PREP

	Quantities	Unit Costs		Total Cost
Utility Conflict Resolution (Medium)		$ 50,000.00	LS	$ 50,000.00
Choose from Small, Medium, or Large				
Removing Asphalt Conc. Pavement	1658	$ 71.00	SY	$ 117,800.00
Assumed for only percent of system under asphalt and partial area of Curb and Gutter				
Removing Cement Conc. Pavement	2325	$ 52.00	SY	$ 121,000.00
Assumed for only percent of system under sidewalk or concrete and partial area of Curb and Gutter				
Removing Cement Conc. Curb and Gutter	4101	$ 32.00	LF	$ 131,300.00
Assumed for only percent of system under curb and gutter				
Assumed to only account for 1.5 ft of width of surfacing, remaining area categorized as Asphalt and Pavement				
Clearing and Grubbing	0.4133	$ 9,785.00	ACRE	$ 4,100.00
Assumed for only percent of system under pervious areas				
Cost				**$424,200.00** **/ 10000 LF**

CONVEYANCE SYSTEM

Structure Excavation Class A Incl. Haul	$ 45.00	CY	
Shoring or Extra Excavation Class B	$ 3.00	SF	
Crushed Surfacing Top Course	$ 39.00	TN	$ 72.15 /CY

		Unit Cost			Inside Pipe Diameter (in)	Avg Cover Depth (ft)	Outside Diameter (in)	Trench Width (ft)	Trench Depth (ft)	Structure Excavation (CY/LF)	Structure Excavation ($/LF)	Shoring ($/LF)	Backfill (CY/LF)	Backfill ($/LF)	Cumulative Cost (inl. Pipe ($/LF)	Total Cost
Schedule A Storm Sewer Pipe 12 IN. Diam.	10000	$ 68.00	LF		14	4	16.5	3.667	5.875	0.797839506	$35.90	$ 17.63	0.742843454	$ 53.60	$180.00	$ 1,800,000.00
Includes removal of existing pipe																
For simplification of calculations, 12 in pipe assumed for Unit Cost but trenching and excavation calculated from average pipe size																
Trench depth and width per typical pipe trench calculations and using City of Auburn Standard Detail T-01.6																

		Unit Cost		CB Inside Diam (in)	Wall Thickness (in)	Area Excavation (sf) =Area CB + 1 ft offsets	Base Thickness (in)	Average Depth Rim to sump (ft)	Structure Excavation (CY)	Structure Excavation ($/EA)	Backfill Cost ($/EA)	Crushed surface base needed (CY)	Crushed surface base needed ($/EA)	Cumulative Cost ($/EA)	Total Cost
CATCH BASIN TYPE 1	53	$ 2,470.00	EACH	N/A	N/A	21.750	4	4.667	4.833	$217.50	$ 244.62	0.402777778	$ 40.98	$2,980.00	$ 157,940.00
Includes removal of existing structure															
CATCH BASIN TYPE 2 48 IN. DIAM.	36	$ 5,035.00	EACH	48	6	38.485	6	6.000	10.690	$481.06	$ 404.01	0.712676111	$ 72.51	$6,000.00	$ 216,000.00

Figure C-7. Average Cost of Replacing 10,000 Feet of Stormwater Pipe in Rural Auburn

Includes removal of existing structure
For simplification of calculations, 48 in MH assumed for Unit Cost but excavation calculated from average MH size

CONNECTION TO DRAINAGE STRUCTURE	12	$ 3,325.00	EA	$ 39,900.00	
Assuming there is a connection to existing structures for 1/8 of the new CBs					
Cost				**$2,213,800.00**	**/ 10000 LF**

STRUCTURAL/ASPHALT REPAIR

		Unit Cost		Depth (IN)	Area (SF)	Volume (CF)	Volume (CY)	Ton multiplier (p	Tons	Total Cost
Crushed Surfacing Base Course	2099	$ 55.00	TN	8.75	42003.95	30627.88	1134.37	1.85	2098.58	$ 115,421.72
Full Depth Asphalt Replaced										
Depth is determined by average required per City of Auburn for Asphalt Pavement Design										
Assumed same depth of CSBC under cement concrete pavement and Curb and Gutter is the same depth as under the asphalt pavement										
HMA CL 1/2 In PG 58H-22	653	$ 176.00	TN	6.92	14926.09	8603.23	318.64	2.05	653.2	$ 114,964.69
Full Depth Asphalt Replaced over open cut area										
Depth is determined by average required per City of Auburn for Asphalt Pavement Design										
CEMENT CONCRETE PAVEMENT	646	$ 1,273.00	CY	10.00	20926.66	17438.88	645.88			$ 822,210.86
Full depth cement concrete replaced over open cut area										
Depth per City of Auburn Standard Detail T-27.2										
CEMENT CONC. TRAFFIC CURB AND GUTTER	4101	$ 83.00	LF	$ 340,400.00						
Cost				**$1,393,000.00**						**/ 10000 LF**

SUBTOTAL COST	**$5,038,800.00 / 10000 LF**

PROJECT COSTS
Project costs % based off of City of Auburn SMAP OneSheet Examples

Design Contingency	50%	$ 2,519,400.00	$ 2,519,400.00
Contingency is multiplied into other % costs			
Permitting	5%	$ 377,910.00	$ 377,910.00
Design	25%	$ 1,889,550.00	$ 1,889,550.00
City Project Mgmt. Admin	5%	$ 377,910.00	$ 377,910.00
Construction Managements	25%	$ 1,889,550.00	$ 1,889,550.00
Cost			**$7,054,300.00** **/ 10000 LF**

PROJECT TOTAL COST	**$12,093,100.00 / 10000 LF**
	$1,209.31 /LF

Figure C-7 (continued). Average Cost of Replacing 10,000 Feet of Stormwater Pipe in Rural Auburn

Replacing Catch Basin Cost Breakdowns

Key:		
Manual Input of Assumed Value	Calculated Value	Referencing Price Sheet

Structure Excavation Class A Incl. Haul	$	45.00	CY	
Shoring or Extra Excavation Class B	$	3.00	SF	
Gravel Backfill for Pipe Zone Bedding	$	60.00	CY	
Crushed Surfacing Base Course	$	55.00	TN	1.85 Ton Multiplier

	Unit Cost		CB Inside Diam (in)	Wall Thickness (in)	Area Excavation (sf) =Area CB + 1 ft offsets	Base Thickness (in)	Average Depth Rim to sump (ft)	Structure Excavation (CY)	Structure Excavation ($/EA)	Backfill Cost ($/EA)	Crushed surface base needed (CY)	Crushed surface base needed ($/EA)	Cumulative Cost ($/EA)	Total Cost
CATCH BASIN TYPE 1 Includes removal of existing structure	$ 2,470.00	EACH	N/A	N/A	21.750	4	4.667	4.833	$217.50	$ 203.43	0.402777778	$ 40.98	$2,940.00	**$2,940.00**
CATCH BASIN TYPE 2 48 IN. DIAM. Includes removal of existing structure	$ 5,035.00	EACH	48	6	38.485	6	6.000	10.690	$481.06	$ 335.98	0.712676111	$ 72.51	$5,930.00	**$5,930.00**
CATCH BASIN TYPE 2 60 IN. DIAM. Includes removal of existing structure	$ 8,075.00	EACH	60	6	50.265	6	6.000	13.963	$628.32	$ 532.33	0.930842268	$ 94.71	$9,340.00	**$9,340.00**

Figure C-8. Average Cost of Replacing Catch Basins in Rural Auburn

4.3 Discussion

The resulting cost opinion is intentionally conservative, approximately $1,500 per linear foot, to account for the wide range of generalizations and assumptions inherent in the process. Notably, the analysis indicated that pipe replacement in rural areas is expected to be less costly than in the City center. Additionally, replacing a larger quantity of pipe is only marginally more cost-effective.

As a prudent practice, it is recommended to diligently track the costs associated with installation, repair, and replacement of asset features on an annual basis. This data serve as valuable reference information for future asset replacement budget planning. As additional data are collected, cost opinions can be updated to enhance accuracy.

5. Pipe Depreciation Analysis

A life cycle analysis was performed for stormwater pipes to demonstrate the expected depreciation rate of each asset and provide background for the recommended maintenance frequency of the entire system. To do so, a spreadsheet was created to analyze the remaining useful life estimate for the City's pipe database over time. A screenshot of the first page of the spreadsheet is shown in Figure C-9. This shows the existing condition dataset of the stormwater pipes. In the spreadsheet, a cumulative total was calculated for the pipes whose remaining useful life score had gone negative. This represented the total linear feet of pipe "lost." As shown in Figure C-9, at the time of this assessment, approximately 53,000 feet of pipe is expected to be beyond its useful life.

An average rate of pipe loss was calculated by dividing each pipe's useful life from its length and then summing to find the total for the system. As shown in Figure C-9, the average rate of pipe value "lost" is approximately 15,700 feet per year.

To show the sensitivity of the results, a copy of the spreadsheet was created, and all useful life estimates were increased by 20 years. A screenshot of the first page is shown in Figure C-10. This scenario shows the total linear feet of pipe beyond its useful life to be approximately 14,500 feet, and the average rate of pipe loss per year to be approximately 12,500 feet.

Both scenarios were used to project the amount of pipe replacement needed over 10-, 20-, and 50-year replacement durations. The costs estimated in the previous section were used to provide estimates for these replacements for reference. Figure C-11 shows the results of this projection.

Cartegraph Exported Data	Metrics Updated for Use in Determining Inspection Requirement						Structures With Useful Life Indicating Need for Inspection				
							Count UL<0:			Avg pipe ft/year pipe value lost	Total Pipe Length w/ UL<0
							527.00	1,295,237.73		15,707.14	52,954.92
STRUCTURE *	Known Pipe Install Yr	Estimated Pipe Install Yr	Pipe Age	Material Data	Useful Life	Final Year of Life	Remaining Useful Life	Pipe Length	Cumulative Pipe Length	Pipe Length/Useful Life (ft per year of pipe value lost)	Pipe Length w/ Useful Life<0
406-M640_306-M641	0	1905	119	CPEP	50	1955	-69	39.56	39.56	0.79	39.56
406-M639_406-M640	0	1905	119	CMP	50	1955	-69	143.9	183.46	2.88	143.90
406-M638_406-M639	0	1905	119	CMP	50	1955	-69	102.48	285.94	2.05	102.48
406-M637_406-M638	0	1905	119	CPEP	50	1955	-69	101.8	387.74	2.04	101.80
406-M636_406-M637	0	1905	119	CPEP	50	1955	-69	81.57	469.31	1.63	81.57
306-M650_306-M652	0	1905	119	CMP	50	1955	-69	77.95	547.26	1.56	77.95
306-M649_306-M650	0	1905	119	CMP	50	1955	-69	115.61	662.87	2.31	115.61
306-M648_306-M649	0	1905	119	CMP	50	1955	-69	127.62	790.49	2.55	127.62
306-M647_306-M648	0	1905	119	CMP	50	1955	-69	124.02	914.51	2.48	124.02
306-M646_306-M647	0	1905	119	CMP	50	1955	-69	94.19	1008.70	1.88	94.19
306-M645_306-M646	0	1905	119	CMP	50	1955	-69	122.93	1131.63	2.46	122.93
306-M644_306-M645	0	1905	119	CMP	50	1955	-69	117.4	1249.03	2.35	117.40
306-M643_306-M644	0	1905	119	CMP	50	1955	-69	81.33	1330.36	1.63	81.33
306-M642_306-M643	0	1905	119	CPEP	50	1955	-69	117.54	1447.90	2.35	117.54
306-M641_306-M642	0	1905	119	CPEP	50	1955	-69	84.46	1532.36	1.69	84.46
709-B876_709-B3453	0	1912	112		50	1962	-62	50	1582.36	1.00	50.00
709-B1074_709-B3454	0	1912	112		50	1962	-62	50	1632.36	1.00	50.00
810-C845_810-C1691	0	1912	112	PVC	100	2012	-12	16.35	1648.71	0.16	16.35
810-C776_810-C114F	0	1912	112	CONCRETE	100	2012	-12	13.3	1662.01	0.13	13.30
810-C1691_810-C114F	0	1912	112	CONCRETE	100	2012	-12	16.67	1678.68	0.17	16.67
810-C114F_810-C114E	0	1912	112	CONCRETE	100	2012	-12	325.17	2003.85	3.25	325.17
810-C114E_810-C114C	0	1912	112	CONCRETE	100	2012	-12	594.46	2598.31	5.94	594.46
810-C114C_809-C114B	0	1912	112	CONCRETE	100	2012	-12	329.55	2927.86	3.30	329.55
809-C995_809-C114B	0	1912	112	CONCRETE	100	2012	-12	31.76	2959.62	0.32	31.76
809-C874_809-C114B	0	1912	112	CONCRETE	100	2012	-12	4.71	2964.33	0.05	4.71
809-C114B_809-C2961	0	1912	112	CONCRETE	100	2012	-12	312.26	3276.59	3.12	312.26
709-B827_709-B876	0	1912	112	CONCRETE	100	2012	-12	43.75999832	3320.35	0.44	43.76
709-B3014_709-B876	0	1912	112	CONCRETE	100	2012	-12	12.78889179	3333.14	0.13	12.79
709-B1002_709-B827	0	1912	112	CONCRETE	100	2012	-12	33.16999817	3366.31	0.33	33.17
909-B96A_909-B96	1951	1913	111	CONCRETE	100	2013	-11	39.04	3405.35	0.39	39.04
909-B1069_909-B96A	1951	1913	111	CONCRETE	100	2013	-11	36.65	3442.00	0.37	36.65
314-ZZ1633_314-ZZ1622	0	1918	106	CPEP	50	1968	-56	10.57	3452.57	0.21	10.57
314-ZZ1622_314-ZZ1620	0	1918	106	CPEP	50	1968	-56	112.19	3564.76	2.24	112.19
314-ZZ1619_314-ZZ1618	0	1918	106	CPEP	50	1968	-56	46.92	3611.68	0.94	46.92
314-ZZ1620_314-ZZ1619	0	1918	106	DUCTILE IRON	75	1993	-31	41.01	3652.69	0.55	41.01
314-ZZ1618_314-ZZ1617	0	1918	106	DUCTILE IRON	75	1993	-31	200.35	3853.04	2.67	200.35
314-ZZ1617_314-ZZ1616	0	1918	106	DUCTILE IRON	75	1993	-31	13.05	3866.09	0.17	13.05
314-ZZ1616_314-ZZ1615	0	1918	106	DUCTILE IRON	75	1993	-31	42.42	3908.51	0.57	42.42
314-ZZ1615_314-ZZ917	0	1918	106	DUCTILE IRON	75	1993	-31	74.03	3982.54	0.99	74.03
910-C2737_910-C127A	0	0	104		50	1970	-54	403.74	4386.28	8.07	403.74
910-C2652_910-C2654	0	0	104		50	1970	-54	51.07	4437.35	1.02	51.07
910-C2643_910-C2643	0	0	104	CPEP	50	1970	-54	40	4477.348888	0.80	40.00

Figure C-9. Screenshot of Stormwater Pipe Depreciation Spreadsheet

									51		24.90	Total Pipe Length that can be inspected per year:
												Dif. of UL<0 & Pipe Length that can be inspected
												-14,550.84
Cartegraph Exported Data	Metrics Updated for Use in Determining Inspection Requirement							Structures With Useful Life Indicating Need for Inspection				
								Count UL<0:			Avg pipe ft/year pipe value lost	Total Pipe Length w/ UL<0
								527.00	1,295,237.73		12,448.63	14,550.84
STRUCTURE *	Known Pipe Install Yr	Estimated Pipe Install Yr	Pipe Age	Material Data	Useful Life	Adjusted Useful Life	Final Year of Life	Remaining Useful Life	Pipe Length	Cumulative Pipe Length	Pipe Length/Useful Life (ft per year of pipe value lost)	Pipe Length w/ UL<0
406-M640_306-M641	0	1905	119	CPEP	50	70	1975	-49	39.56	39.56	0.57	39.56
406-M639_406-M640	0	1905	119	CMP	50	70	1975	-49	143.9	183.46	2.06	143.90
406-M638_406-M639	0	1905	119	CMP	50	70	1975	-49	102.48	285.94	1.46	102.48
406-M637_406-M638	0	1905	119	CPEP	50	70	1975	-49	101.8	387.74	1.45	101.80
406-M636_406-M637	0	1905	119	CPEP	50	70	1975	-49	81.57	469.31	1.17	81.57
306-M650_306-M652	0	1905	119	CMP	50	70	1975	-49	77.95	547.26	1.11	77.95
306-M649_306-M650	0	1905	119	CMP	50	70	1975	-49	115.61	662.87	1.65	115.61
306-M648_306-M649	0	1905	119	CMP	50	70	1975	-49	127.62	790.49	1.82	127.62
306-M647_306-M648	0	1905	119	CMP	50	70	1975	-49	124.02	914.51	1.77	124.02
306-M646_306-M647	0	1905	119	CMP	50	70	1975	-49	94.19	1008.7	1.35	94.19
306-M645_306-M646	0	1905	119	CMP	50	70	1975	-49	122.93	1131.63	1.76	122.93
306-M644_306-M645	0	1905	119	CMP	50	70	1975	-49	117.4	1249.03	1.68	117.40
306-M643_306-M644	0	1905	119	CMP	50	70	1975	-49	81.33	1330.36	1.16	81.33
306-M642_306-M643	0	1905	119	CPEP	50	70	1975	-49	117.54	1447.9	1.68	117.54
306-M641_306-M642	0	1905	119	CPEP	50	70	1975	-49	84.46	1532.36	1.21	84.46
709-B876_709-B3453	0	1912	112		50	70	1982	-42	50	1582.36	0.71	50.00
709-B1074_709-B3454	0	1912	112		50	70	1982	-42	50	1632.36	0.71	50.00
810-C845_810-C1691	0	1912	112	PVC	100	120	2032	8	16.35	1648.71	0.14	0.00
810-C776_810-C114F	0	1912	112	CONCRETE	100	120	2032	8	13.3	1662.01	0.11	0.00
810-C1691_810-C114F	0	1912	112	CONCRETE	100	120	2032	8	16.67	1678.68	0.14	0.00
810-C114F_810-C114E	0	1912	112	CONCRETE	100	120	2032	8	325.17	2003.85	2.71	0.00
810-C114E_810-C114C	0	1912	112	CONCRETE	100	120	2032	8	594.46	2598.31	4.95	0.00
810-C114C_809-C114B	0	1912	112	CONCRETE	100	120	2032	8	329.55	2927.86	2.75	0.00
809-C995_809-C114B	0	1912	112	CONCRETE	100	120	2032	8	31.76	2959.62	0.26	0.00
809-C874_809-C114B	0	1912	112	CONCRETE	100	120	2032	8	4.71	2964.33	0.04	0.00
809-C114B_809-C2961	0	1912	112	CONCRETE	100	120	2032	8	312.26	3276.59	2.60	0.00
709-B827_709-B876	0	1912	112	CONCRETE	100	120	2032	8	43.75999832	3320.349998	0.36	0.00
709-B3014_709-B876	0	1912	112	CONCRETE	100	120	2032	8	12.78889179	3333.13889	0.11	0.00
709-B1002_709-B827	0	1912	112	CONCRETE	100	120	2032	8	33.16999817	3366.308888	0.28	0.00
909-B96A_909-B96	1951	1913	111	CONCRETE	100	120	2033	9	39.04	3405.348888	0.33	0.00
909-B1069_909-B96A	1951	1913	111	CONCRETE	100	120	2033	9	36.65	3441.998888	0.31	0.00
314-ZZ1633_314-ZZ1622	0	1918	106	CPEP	50	70	1988	-36	10.57	3452.568888	0.15	10.57
314-ZZ1622_314-ZZ1620	0	1918	106	CPEP	50	70	1988	-36	112.19	3564.758888	1.60	112.19
314-ZZ1619_314-ZZ1618	0	1918	106	CPEP	50	70	1988	-36	46.92	3611.678888	0.67	46.92
314-ZZ1620_314-ZZ1619	0	1918	106	DUCTILE IRON	75	95	2013	-11	41.01	3652.688888	0.43	41.01
314-ZZ1618_314-ZZ1617	0	1918	106	DUCTILE IRON	75	95	2013	-11	200.35	3853.038888	2.11	200.35
314-ZZ1617_314-ZZ1616	0	1918	106	DUCTILE IRON	75	95	2013	-11	13.05	3866.088888	0.14	13.05

Figure C-10. Screenshot of Stormwater Pipe Depreciation Spreadsheet Adding 20 Years to Useful Life

Base Scenario					
Rate of Pipe Loss	=	15,700	ft pipe lost/yr (function of useful life/material & pipe age)		Preliminary Cost Opinion Est. / Year
Starting Pool of Dead Pipe					
For year	=	2022	year to source pool of dead pipe data		
Length of pipe needing replacement for entered year	=	52,000	ft starting pool of dead pipe needing replacement		
10 Replacement Duration	=	10	years duration to catch up on dead pipe		
Rate of Pipe Replacement Needed	=	20,900	ft pipe needing replacement/year	$	31,350,000
25 Replacement Duration	=	25	years duration to catch up on dead pipe		
Rate of Pipe Replacement Needed	=	17,780	ft pipe needing replacement/year	$	26,670,000
50 Replacement Duration	=	50	years duration to catch up on dead pipe		
Rate of Pipe Replacement Needed	=	16,740	ft pipe needing replacement/year	$	25,110,000
Adding +20 years to useful life					
Rate of Pipe Loss	=	12,500	ft pipe lost/yr (function of useful life/material & pipe age)		
Starting Pool of Dead Pipe					
For year	=	2022	year to source pool of dead pipe data		
Length of pipe needing replacement for entered year	=	15,000	ft starting pool of dead pipe needing replacement		
10 Replacement Duration	=	10	years duration to catch up on dead pipe		
Rate of Pipe Replacement Needed	=	14,000	ft pipe needing replacement/year	$	21,000,000
25 Replacement Duration	=	25	years duration to catch up on dead pipe		
Rate of Pipe Replacement Needed	=	13,100	ft pipe needing replacement/year	$	19,650,000
50 Replacement Duration	=	50	years duration to catch up on dead pipe		
Rate of Pipe Replacement Needed	=	12,800	ft pipe needing replacement/year	$	19,200,000

Figure C-11. Cost Projection Results for 10-,20-, and 50-Year Pipe Replacement Durations

5.1 Discussion

The depreciation analysis was performed to provide a point of comparison on which to base the City's resource planning recommendations. Though the costs of pipe replacement are conservative, the anticipated cost of the various replacement durations was considered too great for the asset repair and replacement program. Thus, the escalated budget for repair and replacement from previous years was used as the basis for the asset repair and replacement program for the 2024 Plan. However, the results from this analysis can be used to inform the budget for future plans should it be of interest to expand the scope of the repair and replacement program. A similar depreciation analysis could be done for culverts.

6. Future Work & Maintenance

This asset management assessment provides a starting point from which the City can base its asset management program. The following actions will be needed to implement the discussed variables into the City's program.

- Review issues with scoring in the Cartegraph app. Ensure that any features being scored incorrectly are reviewed and amended to simplify the entry process from the field.
- The OCI rating should be reviewed and revised as needed.
- Enact the criticality of failure and likelihood of failure scores in Cartegraph for stormwater pipes and use these to prioritize inspections for pipes and adjacent network structures.
- The criticality of failure metrics should be periodically run in GIS and updated in Cartegraph for criticality of failure score.

Future actions that should be considered to expand upon the work described in this assessment are listed below.

- A GIS desktop analysis to fill in estimated installation dates should be considered for other asset types (specifically, culverts are expected to benefit, as they were missing 75% of their installation dates.
- Perform a GIS desktop analysis needed for the other stormwater assets in Table C-1 based on the methods described for the criticality of failure score.
- Estimate useful life for culverts, pumps, and network structures.
- Consider whether previous inspection data should be used in adjusted useful life for network structures.
- Enact the criticality of failure and likelihood of failure scores in Cartegraph for the remaining stormwater assets. Then follow suit with the stormwater assets listed in Table C-1.

Appendix D

Noted Changes to the NPDES MS4 Permit

Changes in Regulation

This table has been prepared to document the changes of note between the previous NPDES MS4 permit from 2019, the draft NPDES MS4 permit prepared in 2024, and the final NPDES MS4 permit released in 2024. The Plan was initially prepared using the draft NPDES MS4 permit prepared in 2024 as guidance and updated accordingly once the final NPDES MS4 permit was released. New language that has been added between versions of the NPDES MS4 permit is shown in red in the table below. Important dates have been highlighted in yellow.

Section	2019 NPDES MS4 Permit Language	Draft 2024 NPDES MS4 Permit Language	Final 2024 NPDES MS4 Permit Language	Changes (From 2019 to 2024 Draft)	Changes (From 2024 Draft to 2024 Final)	Topic
S2.B. Non-Stormwater Discharges	**S2.B.** This permit authorizes discharges of non-stormwater flows to surface waters and to groundwaters of the State from MS4s owned or operated by each Permittee covered under this Permit, in the geographic area covered pursuant to S1.A, only under one or more of the following conditions:				*No changes, included as context for changes to S2.B.2 and S2.B.3,*	Discharges Containing Per- and Polyfluoroalkyl Substances (PFAS)
S2.B.2. Non-Stormwater Discharges	**S2.B.2.** The discharge is from emergency firefighting activities.	**S2.B.2.** The discharge is from emergency firefighting activities and does not involve PFAS-containing aqueous film-forming foams (AFFFs). After the emergency has ceased, non-stormwater discharges (e.g., discharges associated with cleanup) to the MS4 are prohibited. Determination of cessation of the emergency is at the discretion of the emergency on-scene coordinator.	**S2.B.2.** The discharge is from emergency firefighting activities. See Special Conditions S5.C.5, S6.D.3 to address non-stormwater discharges (e.g., discharges associated with cleanup after the emergency).	Added language regarding emergency firefighting activities that do not involve PFAS.	Removed language regarding emergency firefighting activities that do not involve PFAS and redirected the reader to Special Conditions S5.C.5 and S6.D.3 to address non-stormwater discharges.	PFASs Discharges Containing PFAS
S2.B.3. Non-Stormwater Discharges	**S2.B.3.** The discharge is from another illicit or non-stormwater discharge that is managed by the Permittee as provided in Special Condition S5.C.5 or S6.D.3.	**S2.B.3.** The discharge is from emergency firefighting activities and involves PFAS-containing AFFFs, the following conditions apply: **S2.B.3.a.** No later than December 31, 2026, the Permittee shall coordinate with firefighting agencies/departments that	**S2.B.3.** The discharge is from another illicit or non-stormwater discharge that is managed by the Permittee as provided in Special Condition S5.C.5 or S6.D.3.	Added language regarding emergency firefighting activities that involve PFAS.	Removed language regarding emergency firefighting activities that involve PFAS and redirected the reader to Special Conditions S5.C.5 and S6.D.3 to address non-stormwater discharges.	Discharges Containing PFAS

Section	2019 NPDES MS4 Permit Language	Draft 2024 NPDES MS4 Permit Language	Final 2024 NPDES MS4 Permit Language	Changes (From 2019 to 2024 Draft)	Changes (From 2024 Draft to 2024 Final)	Topic
		serve the areas that drain to the MS4 to develop a PFAS management plan which will implement measures to minimize discharges of PFAS via the MS4 during emergency firefighting activities. The Permittee is not expected to deploy control measures during an emergency. The Permittee is not expected to deploy control measures during an emergency. The Permittee shall implement the PFAS management plan to minimize discharges of PFAS via the MS4 during post-emergency activities, including immediate clean-up in all situations where AFFFs have been used, diversions, and other measures that prevent discharges via the MS4. **S2.B.3.b.** No later than December 31, 2027, the Permittee shall implement specific protocols for minimizing the resuspension, conveyance, and discharge of PFAS already in the MS4, both during normal operations and during all maintenance.				
S2.E. Indian Country	**S2.E.** This Permit does not authorize discharges of stormwater to waters within Indian Country as defined in 18 U.S.C. §1151, or to waters subject to water quality standards of Indian Tribes, including portions of the Puyallup River and other waters on trust or restricted lands within the 1873 Survey Area of the Puyallup Tribe of Indians Reservation, except where authority has been specifically delegated to Ecology by the U.S. Environmental Protection Agency. The exclusion of such discharges from this Permit does not waive any	**S2.E.** This Permit does not authorize discharges of stormwater to waters within Indian Country as defined in 18 U.S.C. §1151, or to waters subject to water quality standards of Indian Tribes, including portions of the Puyallup River and other waters on trust or restricted lands within the 1873 Survey Area of the Puyallup Tribe of Indians Reservation, except where	**S2.E.** This Permit does not authorize discharges of stormwater to waters within Indian Country as defined in 18 U.S.C. §1151, or to waters subject to water quality standards of Indian Tribes, including portions of the Puyallup River and other waters on trust or restricted lands within the 1873 Survey Area of the Puyallup Tribe of Indians Reservation, except where authority has been specifically	Added language specifying what is included in “Indian Country.”	No change from draft.	Discharges to Indian Country

Section	2019 NPDES MS4 Permit Language	Draft 2024 NPDES MS4 Permit Language	Final 2024 NPDES MS4 Permit Language	Changes (From 2019 to 2024 Draft)	Changes (From 2024 Draft to 2024 Final)	Topic
	rights the State may have with respect to the regulation of the discharges.	authority has been specifically delegated to Ecology by the U.S. Environmental Protection Agency. The exclusion of such discharges from this Permit does not waive any rights the State may have with respect to the regulation of the discharges. Indian Country includes: **S2.E.1.** All land within any Indian Reservation notwithstanding the issuance of any patent, and including rights-of-way running through the reservation. This includes all federal, tribal, and Indian and non-Indian privately owned land within the reservation. **S2.E.2.** All off-reservation Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same. **S2.E.3.** All off-reservation federal trust lands held for Native American Tribes. Puyallup Exception: Following the "Puyallup Tribes of Indians Land Settlement Act of 1989," 25 USC §1773; the permit does apply to land within the Puyallup Reservation except for discharges to surface water on land held in trust by the federal government.	delegated to Ecology by the U.S. Environmental Protection Agency. The exclusion of such discharges from this Permit does not waive any rights the State may have with respect to the regulation of the discharges. Indian Country includes: **S2.E.1.** All land within any Indian Reservation notwithstanding the issuance of any patent, and including rights-of-way running through the reservation. This includes all federal, tribal, and Indian and non-Indian privately owned land within the reservation. **S2.E.2.** All off-reservation Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same. **S2.E.3.** All off-reservation federal trust lands held for Native American Tribes. Puyallup Exception: Following the "Puyallup Tribes of Indians Land Settlement Act of 1989," 25 USC §1773; the permit does apply to land within the Puyallup Reservation except for discharges to surface water on land held in trust by the federal government.			
S.5.A.3 Stormwater Management	**S5.A.3.** The SWMP shall include an ongoing program for gathering, tracking, maintaining, and using information to evaluate SWMP development,	**S5.A.3.** The SWMP shall include an ongoing program for gathering, tracking, maintaining, and using	**S5.A.3.** The SWMP shall include an ongoing program for gathering, tracking, maintaining, and using	Added language to track the cost of implementing the SWMP in the annual report.	Added language to track the source of funding for implementing the SWMP in the annual report.	Annual Report Update

Section	2019 NPDES MS4 Permit Language	Draft 2024 NPDES MS4 Permit Language	Final 2024 NPDES MS4 Permit Language	Changes (From 2019 to 2024 Draft)	Changes (From 2024 Draft to 2024 Final)	Topic
Program for Cities, Towns, and Counties – Stormwater Management Program General Requirements	implementation, permit compliance and to set priorities. **S5.A.3.a**. Each Permittee shall track the cost or estimated cost of development and implementation of each component of the SWMP. This information shall be provided to ~~Ecology upon request.~~	information to evaluate SWMP development, implementation, permit compliance and to set priorities. **S5.A.3.a.** Each Permittee shall track the cost or estimated cost of development and implementation of each component of the SWMP. This information shall be provided with the Annual Report due no later than March 31, 2027. Permittees shall provide annual average costs (or estimates) to implement the SWMP and TMDL requirements.	information to evaluate SWMP development, implementation, permit compliance and to set priorities. **S5.A.3.a.** Each Permittee shall track the cost or estimated cost of development and implementation of each component of the SWMP and sources of funding. This information shall be provided with the Annual Report due no later than March 31, 2027. Permittees shall provide annual average costs (or estimates) to implement the SWMP and TMDL requirements.			
S5.C.1.b.i. Stormwater Management Program Components – Stormwater Planning	**S5.C.1. Stormwater Planning** Each Permittee shall implement a Stormwater Planning program to inform and assist in the development of policies and strategies as water quality management tools to protect receiving waters. The minimum performance measures are: *(Language for S5.C.1.a has not been included)* **S5.C.1.b. Coordination with long-range plan updates.** **S5.C.1.b.i.** Each Permittee shall describe how stormwater management needs and protection/ improvement of receiving water health are (or are not) informing planning update processes and influencing policies and implementation strategies in their jurisdiction. The report shall describe the water quality and watershed protection policies, strategies, codes, and other measures intended to protect and improve local receiving water health through planning, ~~or taking into account~~ stormwater management needs or limitations.	**S5.C.1. Stormwater Planning** Each Permittee shall implement a Stormwater Planning program to inform and assist in the development of policies and strategies as water quality management tools to protect receiving waters. The minimum performance measures are: *(Language for S5.C.1.a has not been included)* **S5.C.1.b. Coordination with long-range plan updates.** **S5.C.1.b.i.** Each Permittee shall describe how stormwater management needs and protection/ improvement of receiving water health are (or are not) informing the long-range or comprehensive planning update processes and influencing policies and implementation strategies in their jurisdiction in the Annual Report due March 31, 2027.	**S5.C.1. Stormwater Planning** Each Permittee shall implement a Stormwater Planning program to inform and assist in the development of policies and strategies as water quality management tools to protect receiving waters. The minimum performance measures are: *(Language for S5.C.1.a has not been included)* **S5.C.1.b. Coordination with long-range plan updates.** **S5.C.1.b.i.** Each Permittee shall describe how stormwater management needs and protection/ improvement of receiving water health are (or are not) informing the long-range or comprehensive planning update processes and influencing policies and implementation strategies in their jurisdiction in the Annual Report due March 31, 2027. The report shall describe the water quality and watershed protection	Added language to include how stormwater management is influencing long-range planning in the annual report.	No change from draft.	Annual Report Update

Section	2019 NPDES MS4 Permit Language	Draft 2024 NPDES MS4 Permit Language	Final 2024 NPDES MS4 Permit Language	Changes (From 2019 to 2024 Draft)	Changes (From 2024 Draft to 2024 Final)	Topic
		The report shall describe the water quality and watershed protection policies, strategies, codes, and other measures intended to protect and improve local receiving water health through planning, considering ~~stormwater~~ management needs or limitations.	policies, strategies, codes, and other measures intended to protect and improve local receiving water health through planning, considering ~~stormwater~~ management needs or limitations.			
S5.C.1.c.iii. Stormwater Management Program Components – Low Impact Development (LID) code-related requirements	*No language in previous NPDES MS4 permit from 2019.*	**S5.C.1.c.iii.** No later than December 31, 2028, Permittees shall adopt and implement tree canopy goals and policies to support stormwater management and water quality improvements in receiving waters.	**S5.C.1.c.iii.** No later than December 31, 2028, Permittees shall adopt and implement tree canopy goals and policies to support stormwater management. Permittees shall consider how existing or future tree canopy can support stormwater management and water quality improvements in receiving waters. Establish a long-term (e.g. 5, 10 year or longer) goal of canopy, existing or future projection, to be used for stormwater management that is appropriate to the jurisdiction. Specific considerations for canopy for stormwater management on Permittee-owned or operated lands shall include (but are not limited to): **S5.C.1.c.iii. (a)** Maintaining or increasing canopy in overburdened communities. **S5.C.1.c.iii. (b)** Maintaining existing mature canopy. **S5.C.1.c.iii. (c)** Document considerations, reasoning, and rationale for goals and policies.	New language added to adopt and implement tree canopy goals and policies.	Additional detail added.	Tree Canopy Goals and Policies
S5.C.1.d. Stormwater	**S5.C.1.d. Stormwater Management Action Planning (SMAP).**	**S5.C.1.d. Stormwater Management Action Planning (SMAP).**	**S5.C.1.d. Stormwater Management Action Planning (SMAP).**	Changed language to indicate a new SMAP will be required.	Added language to indicate that additional actions for an	SMAP

Section	2019 NPDES MS4 Permit Language	Draft 2024 NPDES MS4 Permit Language	Final 2024 NPDES MS4 Permit Language	Changes (From 2019 to 2024 Draft)	Changes (From 2024 Draft to 2024 Final)	Topic
Management Action Planning (SMAP)	Permittees shall conduct a similar process and consider the range of issues outlined in the Stormwater Management Action Planning Guidance (Ecology, 2019; Publication no. 19-10-010). ~~Permittees may rely on another jurisdiction to meet all or part of SMAP requirements at a watershed scale, provided a SMAP is completed)~~ for ~~at least~~ one priority catchment ~~located within the Permittee's jurisdiction~~.	Permittees shall conduct a similar process and consider the range of issues outlined in the Stormwater Management Action Planning Guidance (Ecology, 2019; Publication no. 19-10-010) for one new priority catchment.	Permittees shall conduct a similar process and consider the range of issues outlined in the Stormwater Management Action Planning Guidance (Ecology, 2024; Publication no. 24-10-027) for one new priority catchment or additional actions for an existing SMAP. A purpose of the SMAP is to support implementation in the Stormwater Management for Existing Development (SMED) Program with identification of strategic investments through the identification of projects and actions.		existing SMAP will be sufficient for meeting the requirement.	
S5.C.1.d.iii. Stormwater Management Action Planning (SMAP)	**S5.C.1.d. Stormwater Management Action Planning (SMAP).** *S5.C.1.d.i and S5.C.1.d.ii. have not been included in this table. Additionally, S5.C.1.d.iii.(b) through S5.C.1.d.(g) were unchanged and have not been included in this table.* **S5.C.1.d.iii. ~~Stormwater Management Action Plan (SMAP).~~** No later than ~~March~~ 31, ~~2023~~, Permittees shall ~~develop~~ a SMAP for at least one ~~new~~ high priority catchment area ~~from (ii), above~~, that identifies all of the following: **~~S5.C.1.d.iii~~(a)** A description of the stormwater facility retrofits needed for the area, including the BMP types and preferred locations.	**S5.C.1.d. Stormwater Management Action Planning (SMAP).** *S5.C.1.d.i and S5.C.1.d.ii. from the original permit were stricken and the text below was updated to S5.C.1.d.i.* **S5.C.1.d.i.** No later than December 31, 2026, Permittees shall complete a SMAP for at least one new high priority catchment area, or additional actions for an existing SMAP, that identifies all of the following: **S5.C.1.d.i.(a)** A description of the stormwater facility retrofits needed for the area, including the BMP types and preferred locations. Include projects that address transportation-related runoff, such as projects that address tire wear runoff.	**S5.C.1.d. Stormwater Management Action Planning (SMAP).** **S5.C.1.d.i. Stormwater Management Action Plan (SMAP).** No later than March 31, 2027, Permittees shall complete and submit SMAP for at least one new high priority catchment area, or additional actions for an existing SMAP, that identifies all of the following: **S5.C.1.d.i.(a)** A description of the stormwater facility retrofits needed for the area, including the BMP types and preferred locations. Include projects that address transportation-related runoff from high traffic areas.	Receiving water assessment and prioritization language was removed. The date for the new or updated SMAP was updated. Transportation-related runoff project language was added.	The date for the new or updated SMAP was delayed. The language regarding transportation-related runoff projects was amended.	SMAP
S5.C.2.a.i.(b) Public Education and Outreach- General awareness	**S5.C.2.a.i.(b) ~~Target~~ audiences:** Engineers contractors, developers, or land use planners. Subject areas:	**S5.C.2.a.i.(b) Priority audiences:** Engineers contractors, developers, property	**S5.C.2.a.i.(b) Priority audiences:** Engineers contractors, developers, property owners/managers, or land use planners. Subject areas:	Updated audiences and added public education for source control BMPs for building materials.	No change from draft.	Public Education Changes

Section	2019 NPDES MS4 Permit Language	Draft 2024 NPDES MS4 Permit Language	Final 2024 NPDES MS4 Permit Language	Changes (From 2019 to 2024 Draft)	Changes (From 2024 Draft to 2024 Final)	Topic
	• Technical standards for stormwater site and erosion control plans. • LID principles and LID BMPs. • Stormwater treatment and flow control BMPs/facilities.	owners/managers, or land use planners. Subject areas: • Technical standards for stormwater site and erosion control plans; • LID principles and LID BMPs; • Stormwater treatment and flow control BMPs/facilities; or • Source control BMPs for building materials to reduce pollution to stormwater, including but not limited to stormwater pollution from PCB-containing materials.	• Technical standards for stormwater site and erosion control plans; • LID principles and LID BMPs; • Stormwater treatment and flow control BMPs/facilities; or • Source control BMPs for building materials to reduce pollution to stormwater, including but not limited to stormwater pollution from PCB-containing materials.			
S5.C.2.a.iii. Public Education and Outreach-Stewardship	**S5.C.2.a.iii. Stewardship.** Each Permittee shall provide and advertise stewardship opportunities ~~and/or partner with existing organizations (including non-permittees)~~ to encourage residents to participate in activities or events planned and organized within the community, such as: stream teams, storm drain marking, volunteer monitoring, ~~riparian plantings, and education activities.~~	**S5.C.2.a.iii. Stewardship.** Each Permittee shall partner or promote (or both) stewardship opportunities to encourage residents or businesses to participate in activities or events planned and organized within the community, such as: stream teams, storm drain marking, volunteer monitoring, and riparian plantings. Permittees may partner or promote (both) stewardship opportunities created or organized by existing organizations (including non-permittees).	**S5.C.2.a.iii. Stewardship.** Each Permittee shall provide, partner with, or promote stewardship opportunities to encourage residents or businesses to participate in activities or events planned and organized within the community, such as: stream teams, storm drain marking, volunteer monitoring, riparian plantings, and education activities watershed habitat improvement. Permittees may partner or promote (or both) stewardship opportunities created or organized by existing organizations (including non-permittees).	Stewardship opportunities were updated.	Watershed habitat improvement was added to stewardship opportunities.	Public Education Changes
S5.C.4.b. MS4 Mapping and Documentation	**S5.C.4.b. New Mapping:** Each Permittee shall: **S5.C.4.b.(i)** No later than ~~January 1, 2020, begin to collect size and material for~~ all known MS4 outfalls ~~during normal course of business (e.g., during field screening inspection, or maintenance) and update records.~~ **S5.C.4.b.(ii)** ~~No later than August 1, 2023, complete mapping of all know connections from the MS4 to a privately owned stormwater system.~~	**S5.C.4.b. New Mapping:** Each Permittee shall: **S5.C.4.b.(i)** No later than March 31, 2026, Permittees shall submit locations of all known MS4 outfalls according to the standard templates and format provided in the Annual Report. This reporting shall include the size and material of the outfalls.	**S5.C.4.b. New Mapping:** Each Permittee shall: **S5.C.4.b.(i)** No later than March 31, 2026, submit locations of all known MS4 outfalls according to the standard templates and format provided in the Annual Report. ~~This reporting shall~~ Include the size and material of the outfalls, where known. **S5.C.4.b.(ii)**	Added mapping requirements for outfalls, tree canopy, and acreage of managed stormwater area.	Updated dates for mapping of tree canopy and acreage of managed stormwater area. Added mapping requirement for overburdened communities.	Required Mapping Updates

Section	2019 NPDES MS4 Permit Language	Draft 2024 NPDES MS4 Permit Language	Final 2024 NPDES MS4 Permit Language	Changes (From 2019 to 2024 Draft)	Changes (From 2024 Draft to 2024 Final)	Topic
		S5.C.4.b.(ii) No later than December 31, 2027, develop a methodology to map and assess acreage of MS4 tributary basins to outfall or discharge points that have stormwater treatment and flow control BMPs/facilities owned or operated by the Permittee. Submit with the Annual Report a map and breakdown of acres managed or unmanaged by stormwater treatment and flow control BMPs/facilities. **S5.C.4.b.(iii)** No later than December 31, 2028 begin mapping of Permittee-owned or operated properties with tree canopy based on available, existing data.	No later than December 31, 2026, using available, existing data, map tree canopy to support stormwater management on Permittee-owned or operated properties. Permittees shall develop and follow a methodology to intentionally identify canopy for stormwater management purposes, which may be updated annually or as needed. **S5.C.4.b.(iii)** No later than March 31, 2028, implement a methodology to map and assess acreage of MS4 tributary basins to outfalls with a 24-inch nominal diameter or larger, or an equivalent cross-sectional area for non-pipe systems that have stormwater treatment and flow control BMPs/facilities owned or operated by the Permittee. Submit with the March 31, 2028 Annual Report a map(s) (.pdf) and table (.xlsx) with a breakdown of the MS4 tributary basins quantifying estimated acres managed or unmanaged by stormwater treatment and flow control BMPs/facilities owned or operated by the Permittee. **S5.C.4.b.(iv)** No later than December 31, 2028, using available, existing data map overburdened communities in relation to stormwater treatment and flow control BMPs/facilities, outfalls, discharge points, and tree canopy on Permittee-owned or operated properties.			
S5.C.5.c.ii.(e)	**S5.C.5.c.ii. Conditionally allowable discharges.** *S5.C.5.c.ii.(a) through (d) have not been included in this table.*	**S5.C.5.c.ii. Conditionally allowable discharges.** *S5.C.5.c.ii.(a) through (d) have not been included in this table.* **S5.C.5.c.ii.(e)**	**S5.C.5.c.ii. Conditionally allowable discharges.** *S5.C.5.c.ii.(a) through (d) have not been included in this table.* **S5.C.5.c.ii.(e)**	Added requirements regarding runoff from PCB-containing building materials.	Made minimal updates to language.	Runoff from Polychlorinated Biphenyls (PCB)-Containing

Section	2019 NPDES MS4 Permit Language	Draft 2024 NPDES MS4 Permit Language	Final 2024 NPDES MS4 Permit Language	Changes (From 2019 to 2024 Draft)	Changes (From 2024 Draft to 2024 Final)	Topic
		Routine external building washdown that does not use detergents for buildings built or renovated before 1950 and after 1980. The Permittee shall reduce these discharges through, at minimum, public education activities or water conservation efforts, or both. To avoid washing pollutants into the MS4 Permittees shall minimize the amount of wash water used. Commercial, industrial, and multi-story residential structures constructed or remodeled between the years 1950 and 1980 (i.e. those most likely to have PCB containing building materials), shall be assessed for PCB-containing materials consistent with How to find and address PCBs in building materials (Ecology, 2024, Publication No. 22-04-024) prior to routine building washdown. Structures confirmed or suspected to have PCB-containing materials shall not discharge washdown to the MS4. Single-family residential buildings are exempt from PCB assessment. Structures built or renovated between 1950-1980 and determined to be without PCB- containing materials may conduct routine building washdown (without detergents) as described above.	Routine external building washdown that does not use detergents for buildings built or renovated before 1950 and after 1980. These discharges shall be reduced through, at minimum, public education activities and water conservation efforts. Commercial, industrial, and multi-story residential structures constructed or remodeled between the years 1950 and 1980 (i.e. those most likely to have PCB containing building materials), shall be assessed for PCB-containing materials consistent with How to find and address PCBs in building materials (Ecology, 2024, Publication No. 22-04-024) prior to routine building washdown to the MS4. Structures confirmed or suspected to have PCB-containing materials shall not discharge washdown to the MS4. Single-family residential buildings are exempt from PCB assessment prior to building washdown, for the purposes of this section. Structures built or renovated between 1950-1980 and determined to be without PCB-containing materials may conduct routine building washdown (without detergents) as described above.			Building Materials
S5.C.5.e.ii. Procedures for the post-emergency clean-up of firefighting activities	*Language added in final permit is new.*	*Language added in final permit is new.*	**S5.C.5.e.ii. Procedures for the post-emergency clean-up of firefighting activities** **S5.C.5.e.ii.(a)** No later than December 31, 2026, the Permittee shall coordinate with	Section was not included in draft.	Added dates for requirements related to discharges from firefighting activities.	Discharges Containing PFAS

Section	2019 NPDES MS4 Permit Language	Draft 2024 NPDES MS4 Permit Language	Final 2024 NPDES MS4 Permit Language	Changes (From 2019 to 2024 Draft)	Changes (From 2024 Draft to 2024 Final)	Topic
			firefighting agencies/departments that serve the areas that discharge to the MS4 to be notified when PFAS-containing AFFFs are used during emergency firefighting activities. **S5.C.5.e.ii.(b)** No later than January 1, 2027, Permittee shall update and implement procedures to minimized discharges to the MS4 during post-emergency clean-up and disposal activities including, but not limited to, the immediate clean-up in all situations where PFAS-containing AFFFs have been used, diversions, and other measures that prevent discharges to the MS4. The Permittee is not expected to deploy control measures during an emergency.			
S5.C.7.b. Stormwater Management for Existing Development	*New section added.*	**S5.C.7. Stormwater Management for Existing Development** Each Permittee shall implement a Program to control or reduce stormwater discharges to waters of the State from areas of existing development. The Program shall aim to focus on strategic stormwater investments over longer planning timeframes. Minimum performance measures: **S5.C.7.a.** Permittees shall implement stormwater facility retrofits, or tailored SWMP actions that meet the criteria described in Appendix 12, using one or a combination of the following: **S5.C.7.a.i.**	**S5.C.7. Stormwater Management for Existing Development** Each Permittee shall implement a Program to control or reduce stormwater discharges to waters of the State from areas of existing development. The Program shall aim to focus on strategic stormwater investments over longer planning timeframes. Minimum performance measures: **S5.C.7.a.** Permittees shall implement stormwater facility retrofits, or tailored SWMP actions that meet the criteria described in Appendix 12, using one or a combination of the following: **S5.C.7.a.i.** Strategic stormwater investments identified in Stormwater Management Action Plan(s)	New section.	Added language regarding overburdened communities. Increased minimum acreage to 0.5.	Stormwater Management for Existing Development

Section	2019 NPDES MS4 Permit Language	Draft 2024 NPDES MS4 Permit Language	Final 2024 NPDES MS4 Permit Language	Changes (From 2019 to 2024 Draft)	Changes (From 2024 Draft to 2024 Final)	Topic
		Strategic stormwater investments identified in Stormwater Management Action Plan(s) (SMAPs, S5.C.1.d.), or similar stormwater planning process; and/or **S5.C.7.a.ii.** Opportunistic stormwater investments identified by leveraging projects outside of SMAP areas to improve stormwater management and infrastructure. **S5.C.7.b.** No later than March 31, 2028, Permittees shall fully fund, start construction, or completely implement project(s) that meet the assigned equivalent acreage and submit documentation with the Annual Report as described in Appendix 12. **S5.C.7.b.i.** Projects that started construction on or after January 1, 2023, may be included towards achieving the acres required. **S5.C.7.b.ii.** Permittees may contribute to meeting an overall regional goal to satisfy this permit requirement as described in S5.C.7.c. **S5.C.7.b.iii.** Permittees that completely implement stormwater facility retrofit projects by the expiration date of this Permit that will exceed the area required for this Permit term may apply the excess as a	(SMAPs, S5.C.1.d.), or similar stormwater planning process; and/or **S5.C.7.a.ii.** Opportunistic stormwater investments identified by leveraging projects outside of SMAP areas to improve stormwater management and infrastructure. **S5.C.7.b.** With each Annual Report, each Permittee shall provide a list of planned individual projects scheduled for funding or implementation during this Permit term for the purpose of meeting the assigned equivalent acreage in Appendix 12. This list shall include at a minimum the information and use the formatting specified in Appendix 12 (.xlsx file format). **S5.C.7.c.** No later than March 31, 2028, Permittees shall fully fund, start construction, or completely implement project(s) that meet the assigned equivalent acreage and submit documentation with the Annual Report as described in Appendix 12. **S5.C.7.c.i.** Projects that started construction on or after January 1, 2023, may be included towards achieving the acres required. **S5.C.7.c.ii.** Permittees may contribute to meeting an overall regional goal to satisfy this permit requirement as described in S5.C.7.d. **S5.C.7.c.iii.** Permittees that completely implement stormwater facility retrofit projects by the expiration			

Section	2019 NPDES MS4 Permit Language	Draft 2024 NPDES MS4 Permit Language	Final 2024 NPDES MS4 Permit Language	Changes (From 2019 to 2024 Draft)	Changes (From 2024 Draft to 2024 Final)	Topic
		credit to be used for the next Permit term (e.g. 2029-2034 Permit term), not to exceed 50% of the next Permit's requirement. **S5.C.7.c.** Permittees may collaborate to meet a regional goal. **S5.C.7.c.i** Each Permittee is required to manage at least 0.3 acres within their own jurisdiction but may receive acreage credit for contributing to meet an overall regional goal outside their defined MS4 Permit coverage area. For Permittees assigned 0.3 acres, participation and in-kind services to regional collaboration projects may count as the contribution for this permit term if there is a regional agreement on the strategy. **S5.C.7.c.ii.** Permittees may contribute to a regional goal, that is the sum of Phase II partners assigned acreage from Appendix 12. Projects may be implemented outside of permit coverage areas to meet their individual requirement as part of a regional goal where benefits to receiving waters within the permit coverage are identified and anticipated. **S5.C.7.d.** Permittees shall develop a method and report the amount of estimated or projected equivalent acres managed by stormwater facility retrofits and SMAP project costs for the	date of this Permit that will exceed the area required for this Permit term may apply the excess as a credit to be used for the next Permit term (e.g. 2029-2034 Permit term), not to exceed 50% of the next Permit's requirement. **S5.C.7.d.** Permittees may collaborate to meet a regional goal. **S5.C.7.d.i** Each Permittee is required to manage at least 0.5 acres within their own jurisdiction but may receive acreage credit for contributing to meet an overall regional goal outside their defined MS4 Permit coverage area. For Permittees assigned 0.5 acres, participation and in-kind services to regional collaboration projects may count as the contribution for this permit term if there is a regional agreement on the strategy. **S5.C.7.d.ii.** Permittees may contribute to a regional goal, that is the sum of Phase II partners assigned acreage from Appendix 12. Projects may be implemented outside of permit coverage areas to meet their individual requirement as part of a regional goal where benefits to receiving waters within the permit coverage are identified and anticipated. **S5.C.7.e.** Permittees shall develop a method and report the amount of estimated or projected equivalent acres managed by stormwater facility retrofits and SMAP project costs for the 2029 permit term.			

Section	2019 NPDES MS4 Permit Language	Draft 2024 NPDES MS4 Permit Language	Final 2024 NPDES MS4 Permit Language	Changes (From 2019 to 2024 Draft)	Changes (From 2024 Draft to 2024 Final)	Topic
		2029 permit term. This report shall be submitted to Ecology no later than March 31, 2028.	This report shall be submitted to Ecology no later than March 31, 2028.			
S5.C.9.e. Operations and Maintenance	*New language added.*	**S5.C.9.e.** No later than July 1, 2027, develop and implement a municipal street sweeping program to target high priority areas and times during the year that would reasonably be expected to result in the maximum water quality benefits to receiving waters. The following program elements shall be included: **S5.C.9.e.i.** Apply street sweeping program to publicly owned roads in MS4 drainage areas that discharge to outfalls, Within those areas, sweep the following high priority areas, where applicable: **S5.C.9.e.i.(a)** High traffic roads, such as arterials; **S5.C.9.e.i.(b)** Accessible curb and gutter streets – permittees may need to implement parking restrictions or other effective methods to optimize pollutant removal; **S5.C.9.e.i.(c)** Areas with significant tire wear, e.g. roundabouts, high traffic intersections, municipal-operated parking lots; **S5.C.9.e.i.(d)** Areas with significant tree canopy with seasonal leaf litter drop; **S5.C.9.e.i.(a)**	**S5.C.9.e.** No later than July 1, 2027, develop and implement a municipal street sweeping program to target high priority areas and times during the year that would reasonably be expected to result in the maximum water quality benefits to receiving waters. The following program elements shall be included: **S5.C.9.e.i.** Priority areas: Apply street sweeping program to curbed municipal streets that discharge to outfalls and meet any of the following criteria: **S5.C.9.e.i.(a)** High traffic streets, such as arterials or collectors; **S5.C.9.e.i.(b)** Streets that serve commercial or industrial land use areas **S5.C.9.e.ii.** Program timing: Sweep priority areas at least once between July and September each year and at least two additional times a year as determined by the Permittee to provide additional water quality benefits. For calendar year 2027, only one sweeping event is required between July and December. **S5.C.9.e.ii.(a)** Compliance during this Permit term shall be determined by records of a sweeping program designed to sweep all priority areas identified and sweeping at	Added requirements for street sweeping.	Cut back on what defines a priority sweeping area, added more specific requests for reporting, and moved up annual reporting by one year.	Street Sweeping

Section	2019 NPDES MS4 Permit Language	Draft 2024 NPDES MS4 Permit Language	Final 2024 NPDES MS4 Permit Language	Changes (From 2019 to 2024 Draft)	Changes (From 2024 Draft to 2024 Final)	Topic
		Municipal roads that serve commercial or industrial land use areas; and **S5.C.9.e.i.(b)** MS4 basins that discharge to surface receiving waters that support salmonids. **S5.C.9.e.ii.** Sweep high priority areas at least once between July and September each year and two additional times a year as determined by the Permittee to provide additional water quality benefits. For calendar year 2027, only one sweeping event is required. **S5.C.9.e.ii.(a)** Permittees may document reasoning for alternative sweeping timing and frequency based on local conditions (e.g., climate) and estimated pollutant deposition quantities. Documentation shall also be based on actual maintenance experience and be certified in accordance with G19 – Certification and Signature. **S5.C.9.e.ii.(b)** If a Permittees' existing overall street sweeping program provides equivalent or greater street sweeping frequency relative to the requirements above, the Permittee may continue to implement its existing street sweeping program. Documentation shall be certified in accordance with G19 – Certification and Signature. **S5.C.9.e.iii.**	least 90% of priority areas each sweeping event. **S5.C.9.e.ii.(b)** Permittee may document reasoning for alternative sweeping timing and frequency based on local conditions (e.g., climate) and estimate pollution deposition quantities. Documentation shall also be based on actual maintenance experience and be certified in accordance with G19 – Certification and Signature. **S5.C.9.e.iii.** Annually sweep at least 90% of high priority areas within the MS4 drainage areas, **S5.C.9.e.iv.** Follow equipment design performance specifications to ensure that street sweeping equipment is operated at the proper design speed with appropriate verification, and that it is properly maintained. **S5.C.9.e.v.** Permittee shall dispose of street sweeper waste material in accordance with Appendix 6-Street Waste Disposal. **S5.C.9.e.vi.** Document the road type and level of traffic served (e.g., AADT or estimated # of vehicles served) of roads swept, frequency, type of sweeper, lane miles, a map of the areas and land uses swept, and approximation of street waste removed. Begin reporting with the Annual Report March 31, 2029. **S5.C.9.e.v. Reporting** No later than March 31, 2028, submit with the Annual Report the			

Section	2019 NPDES MS4 Permit Language	Draft 2024 NPDES MS4 Permit Language	Final 2024 NPDES MS4 Permit Language	Changes (From 2019 to 2024 Draft)	Changes (From 2024 Draft to 2024 Final)	Topic
		Annually sweep at least 90% of high priority areas within the MS4 drainage areas, **S5.C.9.e.iv.** Follow equipment design performance specifications to ensure that street sweeping equipment is operated at the proper design speed with appropriate verification, and that it is properly maintained. **S5.C.9.e.v.** Permittee shall dispose of street sweeper waste material in accordance with Appendix 6-Street Waste Disposal. **S5.C.9.e.vi.** Document the road type and level of traffic served (e.g., AADT or estimated # of vehicles served) of roads swept, frequency, type of sweeper, lane miles, a map of the areas and land uses swept, and approximation of street waste removed. Begin reporting with the Annual Report March 31, 2029.	following information about the priority areas: **S5.C.9.e.ii.(a)** Priority areas swept identified on a map (i.e., streets that are considered high traffic [estimated number of vehicles served/or arterials or collectors], and streets serving commercial or industrial land use). **S5.C.9.e.ii.(b)** Sweeping date(s). **S5.C.9.e.ii.(c)** Sweeping frequency. **S5.C.9.e.ii.(d)** Type of sweeper. **S5.C.9.e.ii.(e)** Total curb miles of priority areas and curb miles swept. **S5.C.9.e.ii.(f)** Approximation of street waste solids removed for each sweeping event (indicate unit of measurement and wet or dry weight, where available).			

Other changes to note:

The dates for the behavior change campaign development, implementation, and evaluation were changed (see S5.C.2.a.ii).

The Permittee's updated ordinance for allowable and conditionally allowable discharges (including those from emergency firefighting activities) must be revised no later than July 1, 2027 (see S5.C.5.c).

Appendix E

Ditch Maintenance and Operations Program - Development and Recommended Actions

DATE:	June 6, 2024
TO:	Tim Carlaw, PE
FROM:	Paul Fendt, PE
SUBJECT:	Ditch Maintenance and Operations Program
CC:	Michael Murray, PE
	Alex Van Kirk, EIT
PROJECT NUMBER:	553-1931-052
PROJECT NAME:	Comprehensive Storm Drainage Plan Update

Overview and Introduction

This memorandum documents the proposed ditch maintenance and operations (M&O) program of the Stormwater Programs Task for the Comprehensive Storm Drainage Plan (Plan) for the City. This effort has been implemented to improve the M&O of the City's ditch inventory to control stormwater runoff and improve the quality of downstream receiving waters. The analysis considers the existing ditch M&O program and determines if additional controls and resources are required to meet needs and address potential liabilities. This technical memorandum discusses the City's ditch inventory, existing ditch M&O program, an outline for the proposed ditch M&O program, and future recommendations for consideration.

Ditch Inventory Evaluation

The evaluation of the City's existing ditch M&O program began with an assessment of its asset inventory. The City's ditch inventory is mapped under the "Channels" layer in the City's computerized maintenance management system, Cartegraph. At the time of investigation, there were 1,698 features within the Channels layer. Figure E-1 at the end of this memorandum demonstrates the extent of the channel inventory within Cartegraph.

The evaluation of the inventory included reviewing the available attribute and location data for the Channels layer features. The feature attribute review revealed an incomplete dataset with several attributes having little to no data inputs. While the data may be incomplete for the entire inventory, the following attribute fields were available for input and were either beneficial during evaluation or are anticipated to be of use in the program once data is made available.

- Owner: The jurisdiction responsible for M&O of the feature.
- Installed: The date the feature was constructed.
- Channel type: Labels the feature as a ditch or a stream.
- Channel shape: Identifies the feature as having a parabolic, v-bottom, or trapezoidal shape.
- Bottom width: The width of the bottom face of the feature.
- Bottom material: Identifies the feature as having a concrete, grass, plastic, riprap, or soil bottom.
- Slope: The longitudinal slope of the feature from inlet to outlet.
- Length: The length of the feature from inlet to outlet.
- Easement: A yes/no field that indicates whether the feature is within an easement.

Having feature data for these attributes would help with determining maintenance needs and options for water quality retrofits, making an educated guess for the useful life of component parts, and identifying the parties responsible for feature M&O. It is recommended to update features with these attributes upon implementing the ditch M&O program.

Channel features were further evaluated to determine whether they should be considered ditches and, consequently, whether they should be included in the City's ditch M&O program. A copy of the Channels layer was created to classify features accordingly. Attachment E1 describes the process used in classifying layer features and demonstrates the different categories created within the copied layer. The result of this process was a copy of the Channels layer broken into four categories based on expectations from the City's M&O program. These categories are summarized below.

- Roadside conveyance: Ditches within road right-of-way that are assumed to be capturing road runoff. This is the most common form of ditch.
- Facility-related: Ditches within close proximity to stormwater facilities that solely convey stormwater to and from the stormwater facilities.
- Collection (other): The remaining City-owned channel features that are expected to be maintained by the Storm Drainage Utility. This excludes any surface water linework (streams, rivers, etc.), ditches owned by other jurisdictions (including private ownership), and ditches maintained by other divisions within the City (for example, ditches within the median of the airport).
- N/A: All features not included in the preceding categories and not maintained by the City's Storm Drainage Utility.

The tasks proposed on behalf of each of these categories are discussed in a later section of this memorandum.

Existing Ditch Maintenance and Operation Program

The City was consulted regarding the existing M&O program for their ditch inventory. Maintenance activities include regrading and removal of sediment; nuisance vegetation; and isolated obstructions such as trash, trees, and accumulated debris. Because vegetation is important for erosion control, removal of beneficial vegetation is minimized.

Maintenance of the City's ditch inventory is time intensive. Six M&O staff are required for a single ditch maintenance crew to operate the City-owned excavator, control traffic, and manually regrade or remove obstructions. While the City aims to implement a ditch maintenance program, the City's ditch inventory is only maintained on an as-needed basis.

Proposed Ditch Maintenance and Operation Program

The components of the program are listed and discussed below.

Incorporation of Ditch Classifications

Depending on the type of ditch, there may be a specific inspection regime and go-to maintenance activities. It is recommended that the City incorporate the earlier-listed classifications as feature attributes in their Channels layer in Cartegraph.

As detailed in Attachment E1, all channels classified as streams were shown to overlap with surface water linework in the geographic information system (GIS) and assumed to be streams. No streams are included in the ditch M&O program; however, complaints and observations, such as erosion around structures, may be addressed and included in customer service. For the purpose of this technical memorandum, none of the stream features will be discussed further.

Inspection and Routine Maintenance

All ditches will need to be inspected regularly to determine whether further maintenance or construction is required. Routine maintenance will occur during inspection and will include smaller-scale tasks, such as picking up trash, clearing out shopping carts, addressing spot complaints, and mowing. A full inspection will involve evaluating the system for any structural or vegetation issues and documenting the results to determine whether a work order is needed. Ditches identified in a work order should result in a follow up within 15 days.

Roadside ditches are expected to require constant maintenance. The collection ditches will require additional routine maintenance, such as annual mowing and sediment removal. Facility-related ditches are recommended to be maintained and inspected with the facilities they are related to. A checklist for the full inspection and routine maintenance task, along with any additional tasks required for certain types of ditches, should be developed as a follow-up to this memorandum.

Overall System Management

A general management system will be needed to ensure features are mapped, add new ditches to the City inventory, investigate encroachments, develop capital items, coordinate complaint response, make recommendations for water quality retrofits, promote general environmentally friendly practices, and facilitate the generation of work orders. These items are covered in more detail below.

Mapping Update

In addition to updating the Channels layer with the attribute classifications described earlier, the mapped features will need to be evaluated for accuracy after field inspection and confirm they are classified correctly. Similarly, attributes and linework for the feature should be reviewed and modified after field work.

It is recommended that in addition to the attributes listed in the Ditch Inventory Evaluation section, the following attributes be defined and verified for each feature as work orders are developed.

- Inverts (as available).
- Average bottom and top width.
- Permitted encroachments (utility structures, driveways, etc.).
- Ownership and easements.

Some of the attributes may be field verified during inspection, while others may involve desktop research.

Adding New Ditches

There should be a protocol in place where any ditches observed in the field should be noted and then verified of their existence in the City's ditch inventory. This will aim to pick up on any unmapped ditches within the City to ensure features are maintained and operated appropriately. Newly added ditches will require ownership and responsibility research and subsequent easements or purchase.

Encroachment Investigation

Any encroachments observed in the ditch features while in the field must be documented. Examples of encroachments include utility boxes, utility poles, driveway locations, and driveway pipes. These items will need to be investigated and handled appropriately.

Capital Development

The results of the feature inspection may warrant minor capital repairs or replacement. The projects should be added as a program to the Storm Drainage Utility's capital improvement plan. Items noted during inspection that may require capital repair or replacement include sedimentation, erosion, and system/structural failures.

Responding to Complaints

The program does not deal with private ditches. However, if a complaint is received, the City may need to respond. The City may either notify the owner of the complaint and insist they handle it appropriately, or the City may handle the complaint and then bill the owner for the work.

Water Quality Retrofits

As part of the program, the City's ditches should be evaluated for potential water quality retrofits, focusing on roadside ditches. Retrofits would implement strategies to provide treatment for the various pollutants found in road runoff (6PPD-quinone, road maintenance chemicals, heavy metals, eroded soil, etc.). Determining potential retrofits to consider and deciding how a ditch is chosen for retrofit should be determined as a follow-up to this memorandum.

General Environmentally Friendly Practices

It is recommended to follow general environmentally friendly practices when performing ditch maintenance. A few of these practices have been listed below and can be researched further in Volume IV of the Pierce County Stormwater and Site Development Manual.

- Encourage vegetation by not mowing too low.
- Avoid using chemicals where possible.
- Perform regular inspections.
- Conduct vegetative maintenance in the late spring or early fall.

Work Order Development

The following items will need to be addressed and managed in incorporating the proposed ditch M&O program.

- How does inspection turn into a work order?
- How often should ditches be inspected?
- What are the thresholds for action?

Recommendations

It is recommended to implement the proposed ditch maintenance program as detailed above. Further work to develop the inspection checklists, decide on how to implement water quality retrofits, and address the work order development items is necessary as a follow-up to this memorandum. It is recommended to reflect upon the program after 5 years to assess whether any adjustments would be beneficial to the program.

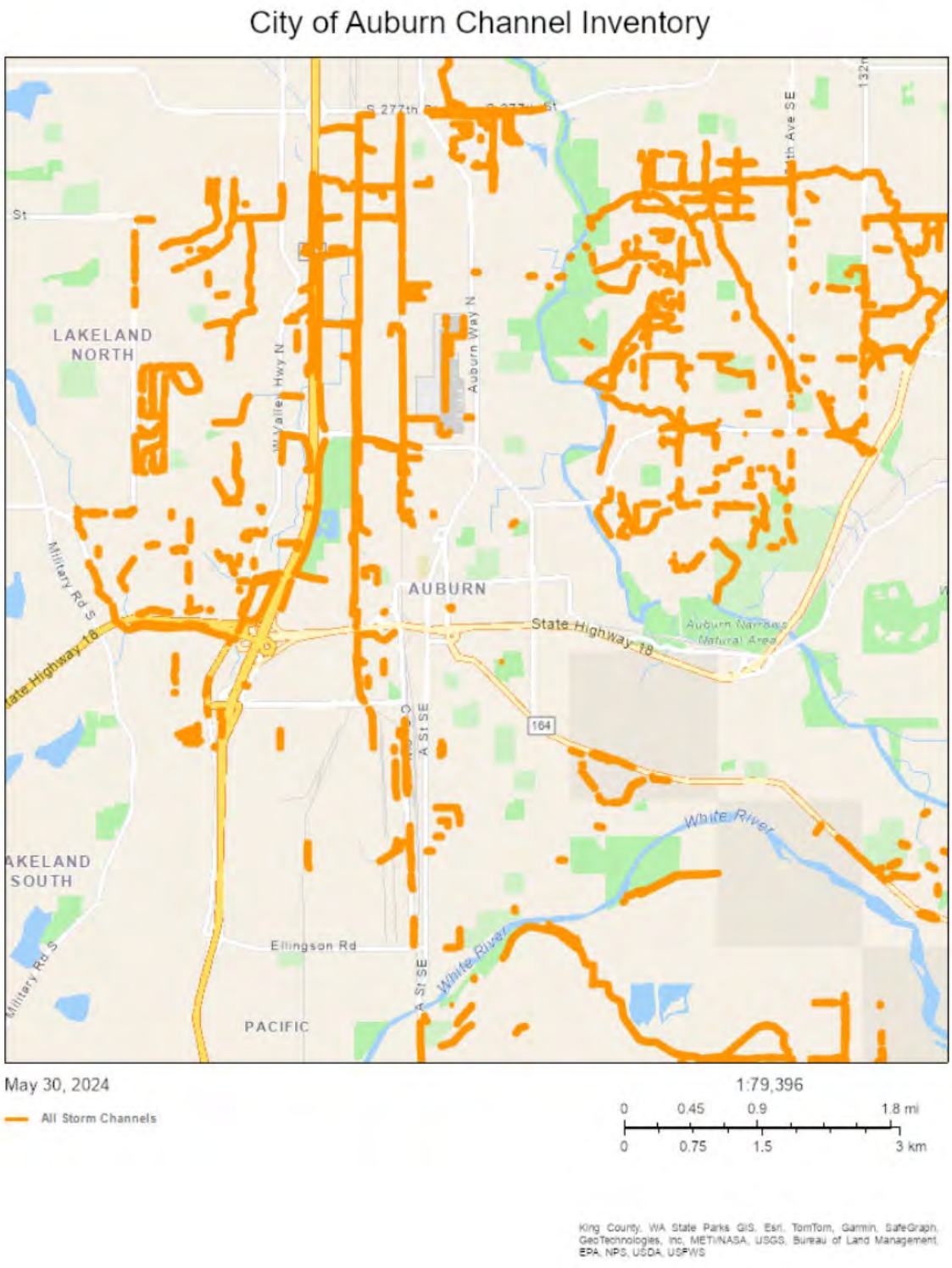


Figure E-1. Extent of Channels Layer in Cartegraph

Attachment E1

Channel Classification

Attachment E1

Channel Classification

The Channel layer was exported from the City's Cartegraph inventory and was used as the basis for the data review. At the time of export, there were 1,698 features with a total of more than 440,000 feet in summed length.

After reviewing the channel inventory, it was determined that a categorization of the channels by type would be beneficial in developing the required inspection criteria, frequency, and maintenance needs. Two attribute columns were added to the Channel layer, named "Source_Drainage" and "Source_Drainage_Note" to ease this process. Features were assigned a common category in the "Source_Drainage" attribute column, and any notes or reasoning for the assignment were justified in the "Source_Drainage_Note" attribute column. The process for classification of the channel inventory (and filling out the Source_Drainage attribute column) is detailed in the following sections.

The characteristics evaluated for classification along with a description of the process for each are listed below.

Ownership

The channels were first broken down using the feature's Owner attribute. The process for this breakdown is listed below.

- Any ditches marked as Owner = "COA"[1] or "0" or blanks were assumed to be City owned and broken down further.
- Any ditches marked as Owner = "Private" were marked as "Private – Ditch."
- Any ditches marked as Owner = "WSDOT" were marked as "WSDOT – Ditch."
- Any ditches marked as any owner not previously identified were marked as "Other Jurisdiction – Ditch."

Surface Water

The Channels layer was overlaid in GIS with linework from surface water and stream network layers. Any features from the Channels layer that overlapped with the surface water and stream network linework were marked as "Streams." These features would not be considered in the ditch maintenance and operations program.

If any features appeared to be visually similar to streams in GIS but did not overlap with any surface water linework, they were marked as "COA – Channelized Streams." An example of this instance is shown in Figure E1-1 below.

[1] Where COA is an abbreviation for City of Auburn.

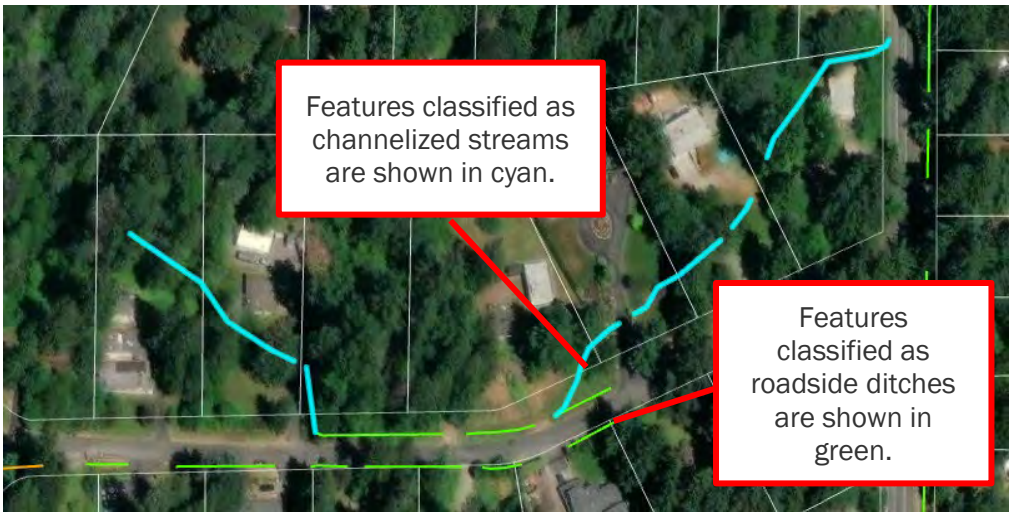


Figure E1-1. COA – Channelized Streams and Roadside Ditches Example

Roadside Ditch

A buffer was applied around roadways in GIS to capture any of the channel features within right-of-way. Any ditches within this buffer were marked as "COA – Roadside Ditch." These features are assumed to be capturing road runoff and are anticipated to be the most common form of a ditch. Examples of these features are shown in green in Figure E1-1.

Stormwater Facility

In a similar fashion to roadside ditches, a buffer was applied around the City's existing stormwater facilities. Any channels that lay within this buffer were visually evaluated to confirm that they seemed to be associated with a stormwater facility. Channel features that were confirmed to be associated with a stormwater facility were marked as "COA – Facility." Maintenance for ditches associated with an existing facility are anticipated to follow a schedule dictated by maintenance of the overall facility. An example of this feature type is shown below in Figure E1-2.

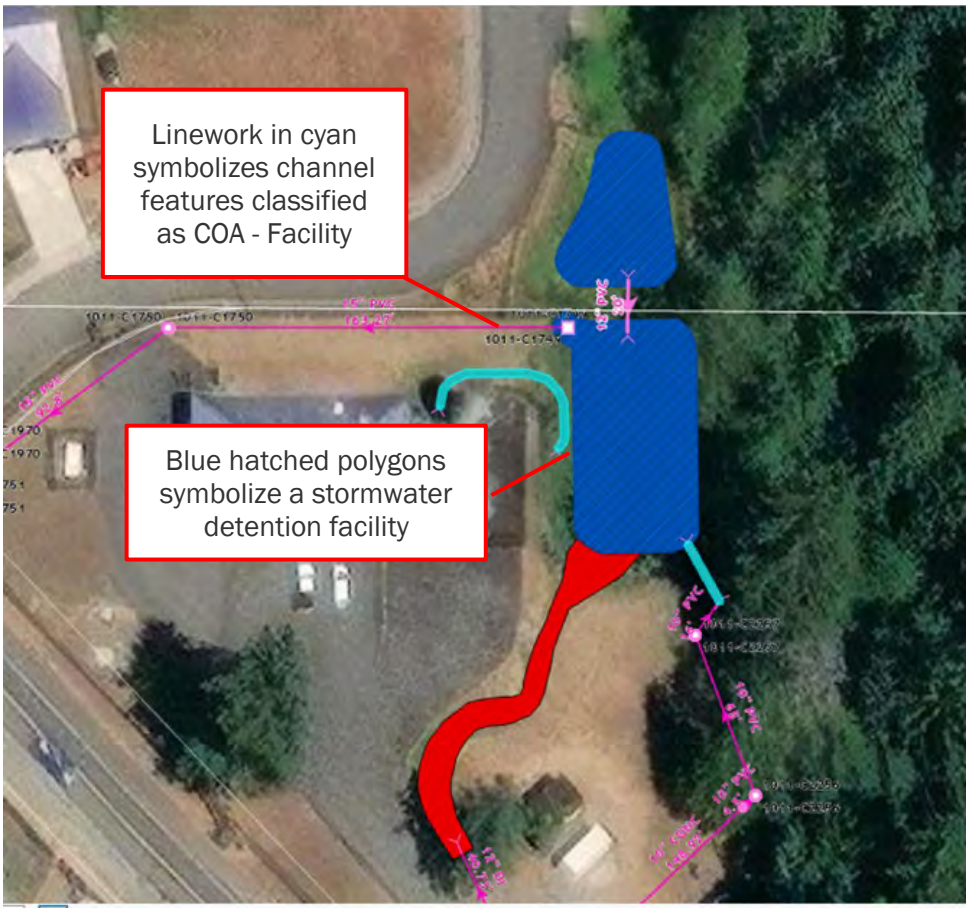


Figure E1-2. COA – Facility Features Example

Airport Median

There were three channel features shown in the airport median that were classified separately. These features were marked as "COA – Other." These are likely not ditches and would follow a different maintenance schedule than what is recommended elsewhere. Maintenance would be dictated by airport requirements. The three channel features of this type are shown below in Figure E1-3.



Figure E1-4. COA – Other Features

Public Ditches

The remaining channel features that were City owned and not surface water, not receiving roadside drainage, not associated with a stormwater facility, and not within the airport median were classified as “COA – Public.” These features will require different inspection and maintenance techniques than the roadside ditches because access may be more challenging and captured runoff is anticipated to be sourced from more than roadways. An example of a channel feature classified as “COA – Public” is shown below in Figure E1-4.



Figure E1-4. COA – Public Feature Example

Results

After classifying the Channels layer as detailed above, the resulting breakdown of features in each category is demonstrated below in Table E1-1.

Table E1-1. Channel Classification Breakdown

Owner[1]	Classification[2]	Length[3] (feet)	Length (miles)	Percent of City-Owned Channels	Percent of Total Channels
Various	Stream	84,000	16	-	19%
WSDOT	WSDOT - Ditch	29,000	5	-	6%
Other Jurisdictions	Other Juris - Ditch	9,000	2	-	2%
Private	Private - Ditch	101,000	19	-	23%
COA	COA - Channelized Stream	14,000	3	6%	3%
COA	COA - Roadside Ditch	176,000	33	79%	39%
COA	COA - Facility	5,000	~1	2%	1%
COA	COA - Other	3,000	~1	1%	1%
COA	COA - Public	26,000	5	12%	6%
-	**COA Total**	**224,000**	**42**	**100%**	**50%**
-	**Total**	**447,000**	**85**	-	**100%**

1 Owner corresponds to the data for the feature attribute of the same name. COA = City of Auburn; WSDOT = Washington Department of Transportation. "Other Jurisdictions" includes any other ownership not included in COA, WSDOT, or Private. Other jurisdictions listed as owners of channel features include City of Algona, City of Kent, King County, and the Muckleshoot Indian Tribe.

2 Classification also refers to the "Source_Drainage" attribute column developed for this evaluation.

3 Length has been rounded up to the nearest thousand. The columns to the right have all been calculated based on this rounded number.

Work Implications

The review of the channel inventory layer was conducted as part of a larger effort to develop a drainage ditch maintenance program for the City. Breaking down the layer into the classifications identified in Table 1 allow for resources to be evaluated appropriately. While the channel classifications aid in giving additional context for the features within the Channel layer, some of the classifications are expected to require the same work items and maintenance frequencies, while others are not maintained by the storm drainage utility and will not be included within the ditch maintenance program. To simplify drainage ditch M&O needs, features can be split into broader categories based on expected work. Table E1-2 shows the groupings for ditch M&O work as they relate to the COA channel classifications.

Table E1-2. COA Drainage Ditch M&O Categories Relative to Channel Classifications

COA Drainage Ditch M&O Category	Channel Classification	Length (feet)	Length (miles)
Roadside Conveyance	COA - Roadside Ditch	176,000	33
Facility-Related	COA - Facility	5,000	~1
Collection (Other)[1]	COA - Channelized Stream	40,000	8
	COA - Public		
Total Maintained by Storm Drainage Utility		221,000	42
N/A[2]	COA - Other	226,000	43

COA = City of Auburn; M&O = maintenance and operation

1 This grouping combines all other COA ditches maintained by the storm drainage utility collecting stormwater. For the purposes of this preliminary ditch maintenance program, these ditches are expected to have the same maintenance needs and frequency of work.

2 N/A includes all features in the channel classifications layer not sorted into one of the other three M&O categories, and not included in the City's ditch maintenance program. COA-Other is included in this category as it is not expected to be maintained by the storm drainage utility. It is expected to have different maintenance expectations dictated by the airport. If this is proven otherwise, it should be sorted into one of the other M&O categories based on expected level of need.

Facility-related ditches will largely be maintained alongside the facilities they correspond with. This may require a first step in associating facility-related features with the respective facility they serve in Cartegraph to ensure that these features are not missed. After this exercise, facility maintenance may include maintenance of any associated ditches (depending on recommended maintenance frequency, facilities may be maintained several times per year, while facility-related ditches may not need as many visits). While these features are still included within the ditch maintenance program, the frequency and scheduling of work is dependent on timing for associated facilities. Though, the work associated with ditch inspection and maintenance will be dictated by the ditch inspection program.

In terms of M&O tasks, features classified as COA-Channelized Stream are expected to have the same inspection and maintenance requirements as those in COA-Public, so these will be treated the same in terms of recommended M&O actions.

Appendix F

SEPA Compliance Documentation

DETERMINATION OF NON-SIGNIFICANCE (DNS)
City of Auburn Comprehensive Storm Drainage Plan Update
SEP24-0010

The City of Auburn is issuing a Determination of Non-Significance (DNS) for the following described project. The permit applications and listed studies may be reviewed at the Auburn Department of Community Development at One E Main St., 2nd Floor, Customer Service Center, Auburn, WA 98001 and by visiting www.auburnwa.gov/landuse.

Proposal: The proposed non-project action includes adoption of the Comprehensive Sewer Plan as an element of the city's Comprehensive Plan. The City of Auburn's 2024 Comprehensive Storm Drainage Plan replaces the City of Auburn's 2015 Comprehensive Storm Drainage Plan. The purpose of the Plan is to guide the City's Storm Drainage Utility with respect to future activities and improvements. The plan reviews the existing stormwater drainage areas which includes both areas within the city limits and potential annexation areas for the City of Auburn. It addresses policies, design criteria, and recommends improvements to the system. The plan analyzes the current level of service and identifies important projects necessary to meet city and state standards regarding public health, facility efficiency, and operations and maintenance. The Comprehensive Storm Drainage Plan is an ongoing element of the city's Comprehensive Plan and serves as a guide for the operation, maintenance and expansion of the stormwater system within the City, in accordance with the local, County, and State requirements.

Location: City-wide

Notice of Application:
Not applicable
Application Complete:
August 1, 2024
Permit Application:
July 18, 2024

File Nos.
SEP24-0010

Property Owner:
City of Auburn
25 W Main St.
Auburn WA, 98001

Applicant:
City of Auburn
Tim Carlaw
25 W Main St.
Auburn WA, 98001

Studies/Plans Submitted with Application:
SEPA Environmental Checklist, prepared by City of Auburn, dated July 18, 2024
Draft Comprehensive Storm Drainage Plan Update, prepared by Parametrix, dated May 2024

Other Permits, Plans, and Approvals Needed:
Not Applicable.

Statement of Consistency and List of Applicable Development Regulations: This proposal is subject to and shall be consistent with the Auburn City Code, Comprehensive Plan, and Public Works Design and Construction Standards.

Lead Agency: City of Auburn. The lead agency for this proposal has determined that it does not have probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request.

SEPA Environmental Review: This DNS is issued under WAC 197-11-340(2); the lead agency will not act on this proposal for 14 days from the date below.

Public Comment Period: This may be your only opportunity to comment on the environmental impact of the proposal. All persons may comment on this application. Comments must be in writing and submitted by **5:00 p.m. on September 3, 2024** to the mailing address of 25 W Main St., Auburn, WA, 98001 or emailed to the contact below. Any person wishing to become a party of record, shall include in their comments that they wish to receive notice of and participate in any hearings, if relevant, and request a copy of decisions once made. *The responsible official will reconsider the DNS based on timely comments and may retain, modify, or, if significant adverse impacts are likely, withdraw the DNS.* ***If the DNS is retained, it will be final after the expiration of the comment deadline.***

Any person aggrieved of the City's determination may file an appeal with the Auburn City Clerk at 25 West Main Street, Auburn, WA 98001-4998 within 14 days of the close of the comment period, or by 5:00 p.m. on September 9, 2024.

For questions regarding this project, please contact Dinah Reed, Senior Planner, at planning@auburnwa.gov or 253-931-3092.

Public Hearing: N/A

RESPONSIBLE SEPA OFFICIAL:
Alexandria D. Teague, Planning Services Manager

ADDRESS:
25 West Main St.
Auburn, WA 98001
253-931-3090

DATE ISSUED: August 19, 2024 SIGNATURE: Alexandria D. Teague

Note: This determination does not constitute approval of the proposal. Approval of the proposal can only be made by the legislative or administrative body vested with that authority. The proposal is required to meet all applicable regulations.