Water System Plan Update

September 2026 / DRAFT

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Abbreviations

µg/L	micrograms per liter
2010 WSP	City of Camas 2010 Water System Plan
2019 WSP	City of Camas 2019 Water System Plan
ADD	average day demand
ADU	accessory dwelling unit
AFY	acre-feet per year
AL	action level
ALE	action level exceedance
AMI	advanced metering infrastructure
Army	United States Army
ASR	Annual Summary Report
AWIA	American Water Infrastructure Act
AWWA	American Water Works Association
BAT	Backflow Assembly Testers
BPS	booster pump station
Carollo	Carollo Engineers
CCC	Cross-connection control
CCL	Contaminant Candidate List
CCR	Consumer Confidence Report
CCS	Cross-Connection Control Specialist
CCT	corrosion control treatment
CDC	Centers for Disease Control and Prevention
CEU	Continuing Education Units
CFR	Code of Federal Regulations
cfs	cubic feet per second
CI	Cast Iron
CIP	Capital Improvement Plan
City	City of Camas
CMC	City of Camas Municipal Code
CMP	coliform monitoring plan
Corps	United States Army Corps of Engineers
CPU	Clark Public Utilities
Cr(VI)	hexavalent chromium
CT	contact time
CWA	Clean Water Act
CWSP	Coordinated Water System Plan
D	Distribution System Improvements

DBP	disinfection byproducts
DBPR	Disinfection Byproducts Rule
DI	ductile iron
DOH	Washington State Department of Health
DSL	distribution system leakage
DSN	determination of non-significance
Ecology	Department of Ecology
EDC	endocrine disrupting compounds
EIS	Environmental Impact Statement
ELA	Engineering, Legal, and Administration
EPS	extended period simulation
ERP	Emergency Response Plan
ERU	equivalent residential unit
ESA	Endangered Species Act
ESWTR	Enhanced Surface Water Treatment Rule
FBRR	Filter Backwash Recycling Rule
FF	fire flow
fps	feet per second
FSS	Fire-suppression storage
FTE	full-time-equivalent
G	General
G&O	Gray & Osborne
GenX or HFPO-DA	hexafluoropropylene oxide dimer acid
GIS	Geographic Information System
GMA	Growth Management Act
GME	Green Mountain Estates
GP	Georgia Pacific
gpd	gallons per day
gpm	gallons per minute
GWI	Groundwater under the Direct Influence of Surface Water
GWR	Groundwater Rule
HAA5	haloacetic acids
HAL	health advisory level
HGL	hydraulic grade line
HI	Hazard Index
HPA	hydraulic project approval
HPC	heterotrophic plate count
IDSE	Initial Distribution System Evaluation
IMT	Industrial Metal Technology

IOC	inorganic contaminants
IRIS	Integrated Risk Information System
LCR	Lead and Copper Rule
LCRI	Lead and Copper Rule Improvements
LF	linear feet
LID	low impact development
LPH	Lower Prune Hill
LRAA	locational running annual average
LSL	Lead Service Line
LT1ESWTR	Long Term 1 Enhanced Surface Water Treatment Rule
LT2ESWTR	Long Term 2 Enhanced Surface Water Treatment Rule
LWWF	Lower Washougal Wellfield
MCC	Motor Control Center
MCLG	maximum contaminant level goals
MDBP	Microbial and Disinfection-by-Products
MDD	maximum day demand
MFR	Multifamily Residential
MG	million gallons
mg/L	milligrams per liter
mgd	million gallons per day
mL	milliliters
MPA	microscopic particulate analysis
MRDL	Maximum Residual Disinfectant Levels
MRDLG	Maximum Residual Disinfectant Level Goals
MWS	municipal water suppliers
N/A	not applicable
NDMA	Nitrosamines/N-nitrosodimethylamine
NEPA	National Environmental Policy Act
ng/L	nanograms per liter
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDWR	National Primary Drinking Water Regulation
NTU	nephelometric turbidity unit
NWPR	Navigable Water Protection Rule
O&M	operations and maintenance
PAA	Project Approval Application
PCB	Polychlorinated biphenyls
pCi/L	picocurie per liter

PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutane sulfonic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctyl sulfonate
PHD	peak hour demand
PNR	Public Notification Rule
PPCP	pharmaceutical and personal care products
ppt	parts per trillion
PRV	pressure reducing valve
PS	pump station
psi	pounds per square inch
PVC	polyvinyl chloride
PWS	public water systems
PZ	pressure zone
Qa	annual water right
Qi	instantaneous water right
R	Annual Repair and Replacement Programs
R&R	Repair and Replacement
RAA	running annual average
RCW	Revised Code of Washington
RRA	risk and resilience assessments
RTCR	Revised Total Coliform Rule
RTL	rule trigger level
RUL	Remaining Useful Life
RWSA	retail water service area
S	Supply and Treatment
SAL	State Action Levels
SCA	Sanitary Control Area
SCADA	supervisory control and data acquisition
SDC	system development charges
SDWA	Safe Drinking Water Act
SEPA	State Environmental Policy Act
SFR	single-family residence
SMA	Satellite Management Agency
SMCL	secondary maximum contaminant levels
SMP	Shoreline Master Program
SOC	synthetic organic chemicals

SRF	State Revolving Fund
SS	Standby storage
SS	Standby storage
SSF Plant	slow sand filtration treatment plant
ST	Storage
SWTR	Surface Water Treatment Rule
T	Transmission Pipe
TAZ	transportation analysis zones
TCR	Total Coliform Rule
TL	trigger level
TNW	traditional navigable waters
TOrC	Toxic Organic Chemicals
TSMC	Taiwan Semiconductor Manufacturing Company
TTHM	trihalomethanes
UCMR	Unregulated Contaminant Monitoring Regulation
UCMR	Unregulated Contaminants Monitoring Rule
UGA	urban growth area
UPH	Upper Prune Hill
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Services
Vancouver	City of Vancouver
VBLM	Vacant Buildable Lands Model
VOC	volatile organic compounds
WAC	Washington Administrative Code
WDM	Water Distribution Manager
WFI	Water Facilities Inventory
WHP	wellhead protection
WHPA	wellhead protection area
WHPP	wellhead protection plans
WLCAP	Water Loss Control Action Plan
WQM	water quality monitoring
WQMS	Water Quality Monitoring Schedule
WQP	water quality parameter
WRIA	Water Resource Inventory Areas
WRIA Plan	Salmon-Washougal and Lewis Watershed Management Plan
WSDM	Water System Design Manual
WSDOT	Washington Department of Transportation
WSP	Water System Plan
WSPU	Water System Plan Update

WTPO	Water Treatment Plant Operator
WUE	Water Use Efficiency
WWTF	wastewater treatment facility
WWTP	wastewater treatment plant

EXECUTIVE SUMMARY

ES.1 Introduction

This Water System Plan Update (WSPU) updates the City of Camas' (City) 2019 WSPU. It was developed collaboratively by City staff, Carollo Engineers (Carollo), Strata Geosciences, and FCS Group. This WSPU documents the water system's current status and evaluates the water City's future needs. The data used for this WSPU was current as of 2024. The WSPU was developed between November 2024 and September 2026 for approval in 2026. This WSPU will be used as a guide for maintaining and improving the water system in the short-term over the next 10 years, while also providing a framework for the 20-year, long-term planning horizon.

The purpose of this WSPU is to document changes to the City's water system, identify required system improvements, and appropriately outline capital improvement projects to meet future water demands. Maintaining a current Water System Plan is required to meet the regulations of the Washington State Department of Health (DOH) and the requirements of the Washington State Growth Management Act. The WSPU complies with the requirements of DOH as set forth in the Washington Administrative Code (WAC) 246-290-100, Water System Plan.

This WSPU contains timeframes, which are the intended framework for future funding decisions and within which future actions and decisions are designed to occur. However, these timeframes are estimates and depending on factors involved in the processing of applications and project work, as well as the availability of funding, the timing may change. The framework presented in this WSPU does not represent actual commitments by the City.

Key points of the WSPU including analysis results and recommendations are summarized below, with more details provided in the specific chapters.

ES.2 Planning Considerations

Chapter 2 summarizes the City's water planning considerations that influence the WSPU, including background on the study area, policies, criteria, and related documents. The City maintains a Duty to Serve customers within the retail water service area (RWSA):

> *The City will exercise reasonable diligence and care to furnish and deliver a continuous and sufficient supply of pure water to the customer, and to avoid any shortage or interruption of delivery of the same. The City will meet all regulatory requirements for management of its water system and provision of water to its customers, including water quality, system pressure, and adequate supply. The City will conserve and protect groundwater resources to provide safe, clean, high-quality drinking water to residents.*

The City's Retail Water Service Area is shown in Figure ES.1. Retail service area is the specific area, defined by the municipal supplier, where the supplier has a duty to provide service to new service connections, as set forth in Revised Code of Washington (RCW) 43.20.260, if:

1. Its service can be available in a timely and reasonable manner;
2. The municipal water supplier has sufficient water rights to provide the service;
3. The municipal water supplier has sufficient capacity to serve the water in a safe and reliable manner as determined by the department of health; and
4. It is consistent with the requirements of any comprehensive plans or development regulations adopted under chapter 36.70A RCW or any other applicable comprehensive plan, land use plan, or development regulation adopted by a city, town, or county for the service area and, for water service by the water utility of a city or town, with the utility service extension ordinances of the city or town.

Water system planning is based on a careful analysis of a water utility's responsibility to comply with applicable regulatory requirements while providing service to existing and future customers. These laws are monitored and enforced by a number of federal, state, and local agencies. The WSPU incorporates several regional and local plans of the southwest region of Washington, such as Clark County, that affect the water utility.

The City has adopted many resolutions regarding water system planning that are included in the City Code. The City manages its water utility in accordance with established water system policies. The policies provide a consistent framework for the design, operation, maintenance, and service of the water system for appropriately implementing programs, designing new infrastructure, and serving additional customers. The Plan summarizes many of these policies and provides criteria needed to evaluate the water system.

ES.3 Existing System

The City owns and operates a multi-source municipal water system- summarized in Chapter 3 - which includes supply, treatment, storage, and distribution of potable water to residential and commercial customers. The City currently obtains its water from 10 groundwater wells and two surface water sources that are treated to provide high quality water to customers. The City owns over 159 miles of pipelines in its water transmission and distribution system. Service is provided to customers across 26 pressure zones, 10 booster pumping stations, and seven storage facilities with a combined total of 9.95 million gallons (MG) to provide storage for normal and emergency conditions, such as fire suppression. Additionally, distribution system includes numerous meters, isolation valves, and hydrants. Major elements of the water system are shown in Figure ES.2.

ES.4 Operations and Maintenance

The water system is operated and maintained (O&M) by the City staff, with contractors providing services that City staff are not trained or equipped to perform. O&M of the water system requires the combined effort of the Public Works Department, Engineering Department, and Finance Department. The City's water system operators are experienced and well trained, exceeding the minimum state requirements (WAC 246-292-050). The City provides opportunities for staff professional growth and training to maintain up-to-date knowledge. The City has a well-operated and maintained system, as documented in Chapter 4. Additionally, the City has updated their system wide O&M manual as part of this WSPU, which describes the assets, operations, and preventative maintenance for each of their major distribution system facilities.

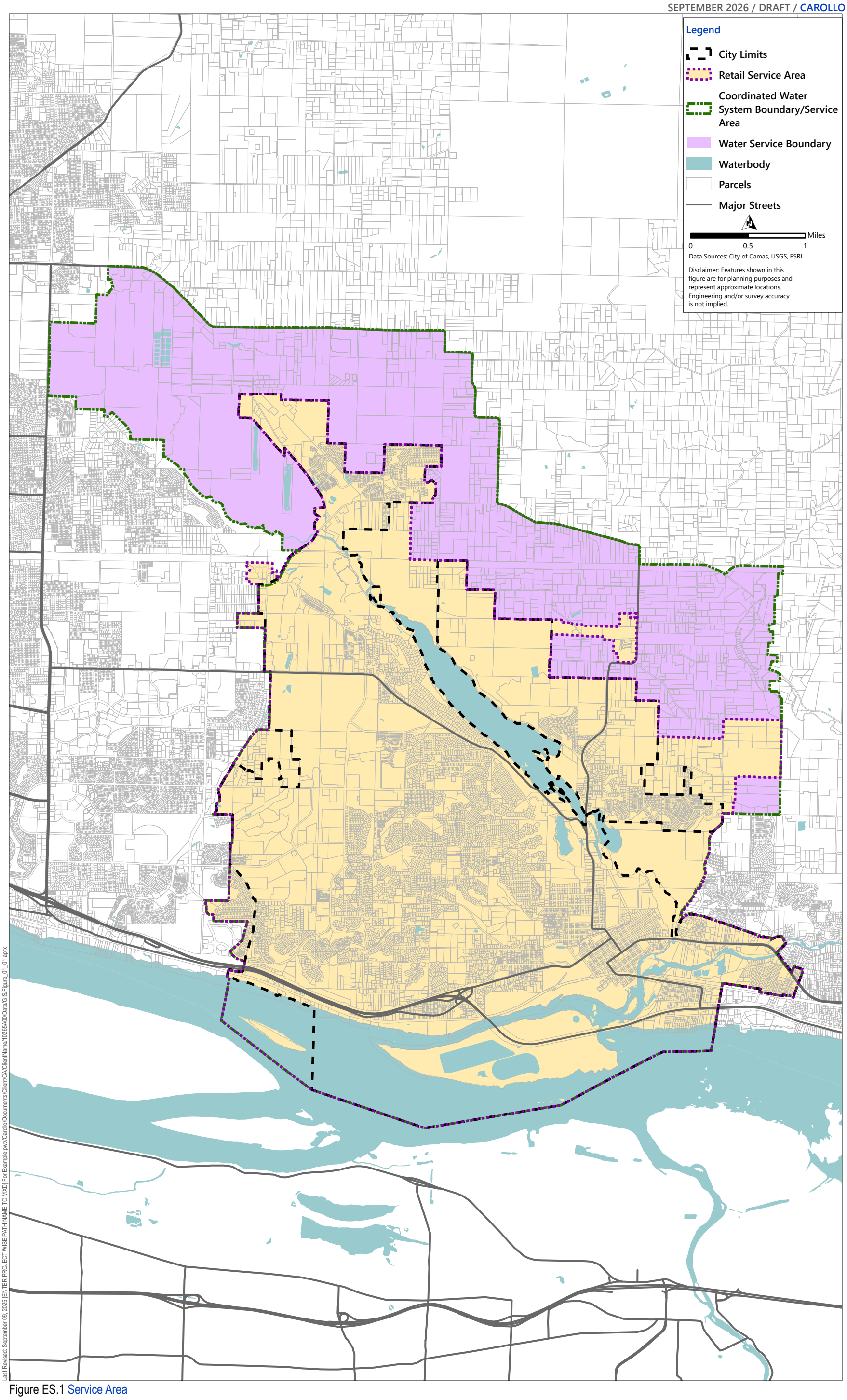

Figure ES.1 Service Area

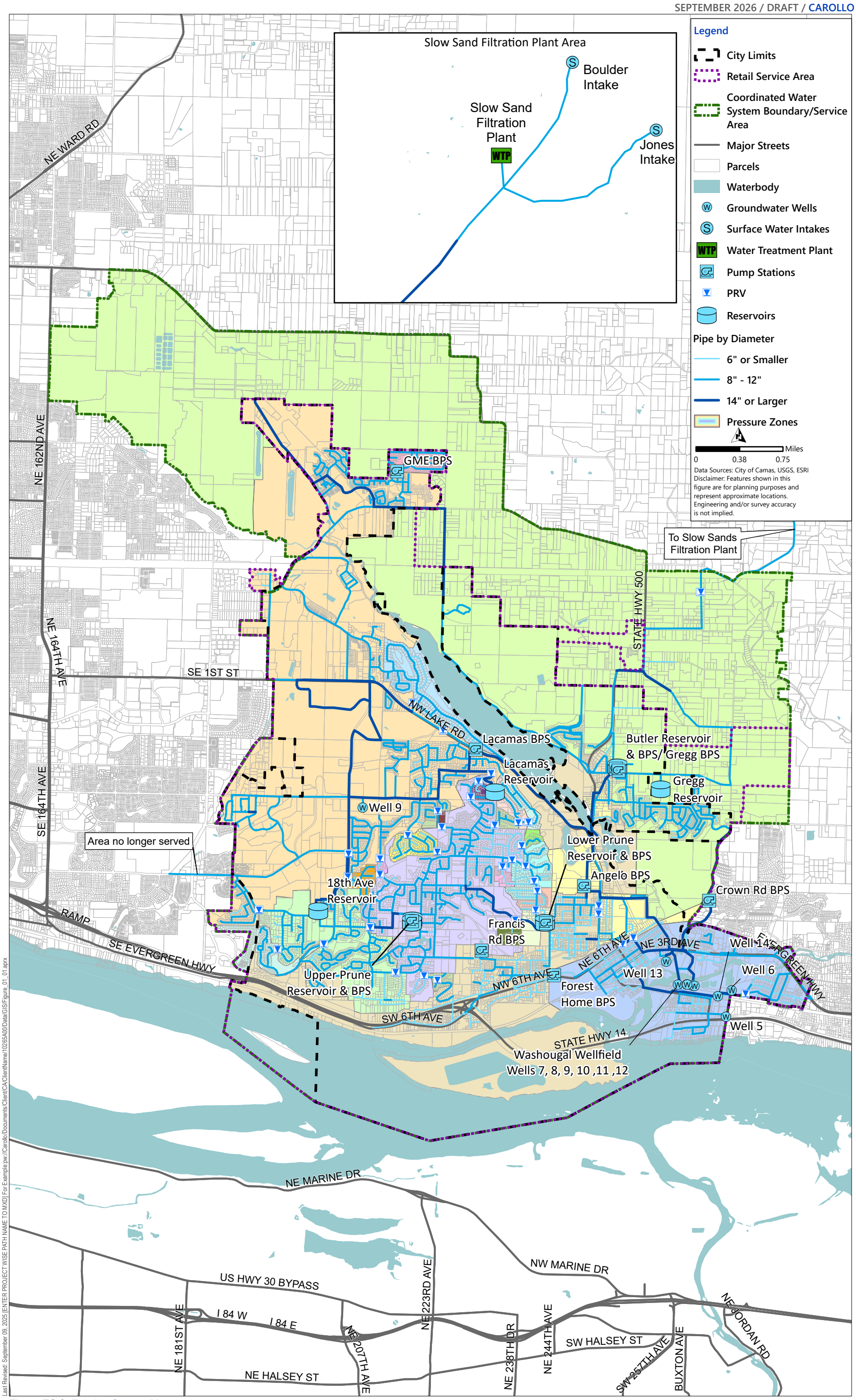

Figure ES.2 Existing System Map

ES.5 Water Requirements

Projecting realistic future water demand is necessary for planning infrastructure projects and securing adequate water supply to meet future growth. Chapter 5 projects the water system requirements, i.e., demand, for the next 20 years. Demographic projections were used to predict where and how much growth will occur in the water system based on the City's comprehensive planning. The resulting future accounts were converted to projected demands using the historical water use patterns and parameters.

Three future water demand scenarios (low, medium, and high) were projected for the planning period between 2026 to 2046 for the City's established RWSA. The medium scenario's predictions most closely resemble the City's future demands, while the low and high demand projection scenarios provide a range within which the City's future water demands are expected to fall. The medium scenario was used for the distribution system analysis in Chapter 9, which identifies future pumping, storage, and distribution system requirements. The high scenario was used for the supply evaluation in Chapter 8, which identifies future water rights and supply capacity requirements. Demand projections were expressed as average day demand (ADD), and maximum day demand (MDD). The ADD is typically used in operational evaluations. The MDD represents the single largest day water demand during the year and is a key parameter for infrastructure sizing.

Figure ES.3 is a chart of the system-wide demand projections for the 20-year planning period. By 2036, the City's ADD is projected to be between 6.2 and 7.4 million gallons per day (mgd) and with MDD projected to be between 11.6 and 15.1 mgd for the low and high scenarios, respectively. By 2046, the City's ADD is projected to be between 7.4 and 9.6 mgd and with MDD projected to be between 14.2 and 20.2 mgd for the low and high scenarios, respectively.

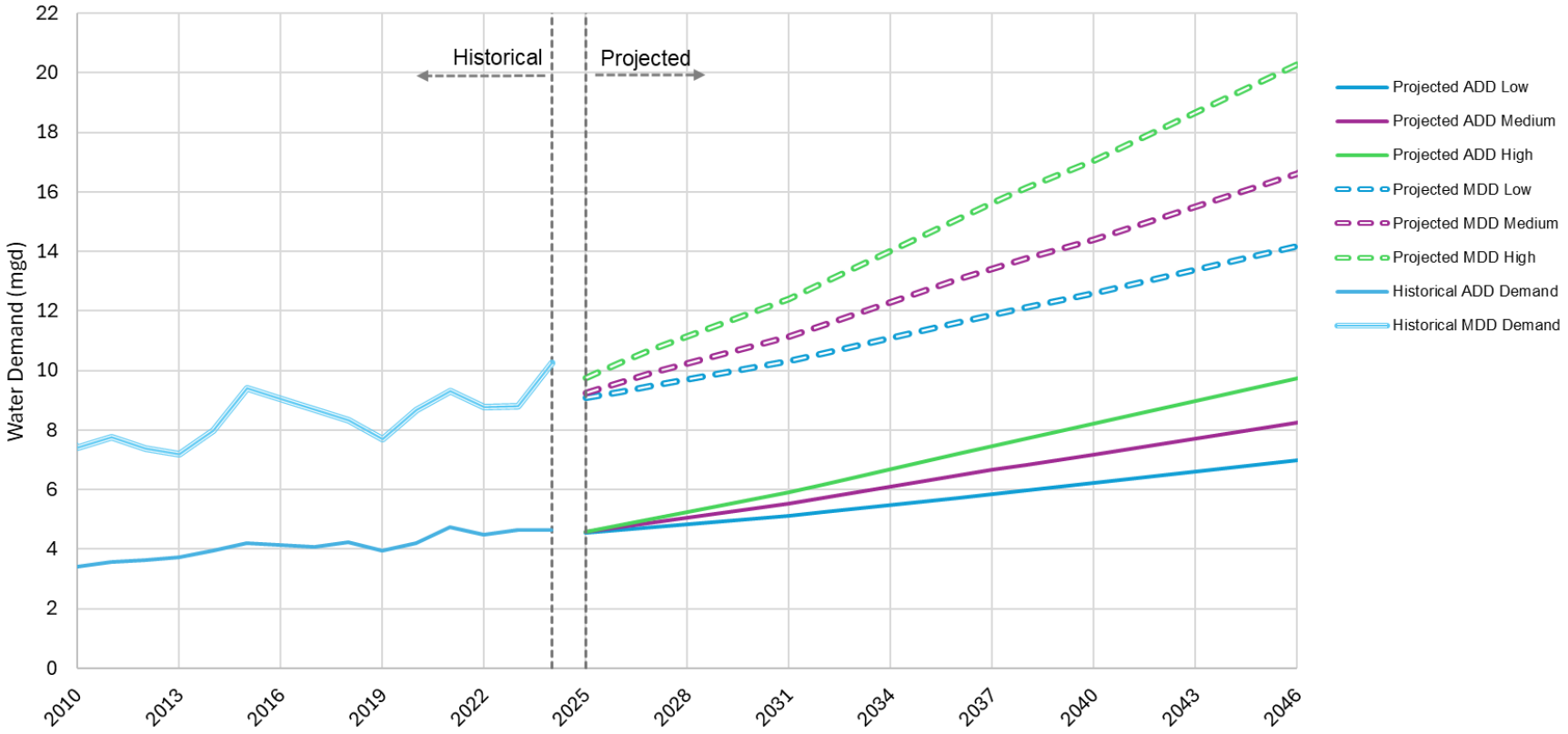

Figure ES.3 Average and Max Day Demand Projections

ES.6 Water Use Efficiency

In 2003, the Washington State Legislature passed the Engrossed Second Substitute House Bill 1338, known as the Municipal Water Law or the Water Use Efficiency (WUE) rule, to address the increasing demand on Washington's water resources. This law established that all municipal water suppliers (MWS) must use water more efficiently in exchange for water right certainty and flexibility to help them meet future demand.

Table ES.1 summarizes the mandatory WUE measures the City completes. As part of this WSPU, the City has completed a Water Loss Control Action Plan (WLCAP) as historical billing data has indicated that distribution system leakage (DSL) is above the DOH standard of 10 percent. Background of the City's current and future WUE programs are detailed in Chapter 6.

Table ES.1 WUE Mandatory Measures

WUE Mandatory Measure	Status
Must implement the following WUE measures:	
Install production (source) meters	Implemented
Install consumption (service) meters	Implemented
Perform meter calibration	Implemented/Ongoing
Implement a WLCAP to control leakage if exceeds 10%	Ongoing
Educate customers about water efficiency at least once per year	Implemented/Ongoing
Must evaluate or implement these WUE measures:	
Evaluate rates that encourage water demand efficiency	Implemented
Evaluate reclamation	Implemented

ES.7 Water Quality

The City is defined as a Group A - Community Water System and must comply with the drinking water standards of the federal Safe Drinking Water Act and its amendments, as regulated by the United States Environmental Protection Agency. The DOH adopted the updated federal standards under WAC 246-290, of which the most recent version became effective June 17, 2025.

The quality of the City's drinking water is of primary concern to the City. As described in Chapter 7, the City is in compliance with all monitoring and reporting requirements. Additionally, the City publishes an annual consumer confidence report that keeps their customers informed of the quality of their water. Based on available water quality, the City has not had issues meeting current regulatory requirements and does not anticipate any issues meeting future regulatory requirements with the exception of per- and polyfluoroalkyl substances (PFAS). Preliminary risk assessments and mitigation screenings indicate uncertainty about PFAS impacts on the City's water supply. As a result, the City will likely need some form of treatment to meet future maximum contaminant levels. To support planning and budgeting, source development and PFAS mitigation will be incorporated into the Capital Improvement Plan (CIP), detailed in Chapters 8 and 10. These projects typically require significant capital investment and will guide the City in securing necessary funding sources.

ES.8 Water Resources

An evaluation was conducted on the City's current water resources to identify deficiencies and propose improvements related to the City's water supply. Chapter 8 outlines the City's sources of supply and existing water rights and makes recommendations for future supply-related improvements. The City expects to have sufficient annual water rights (Qa) and physical capacity to serve projected High scenario ADD over the 20-year planning period. However, to serve project High scenario MDD, the City will need to acquire additional instantaneous water rights (Qi) and increase physical supply capacity as shown in Figure ES.4.

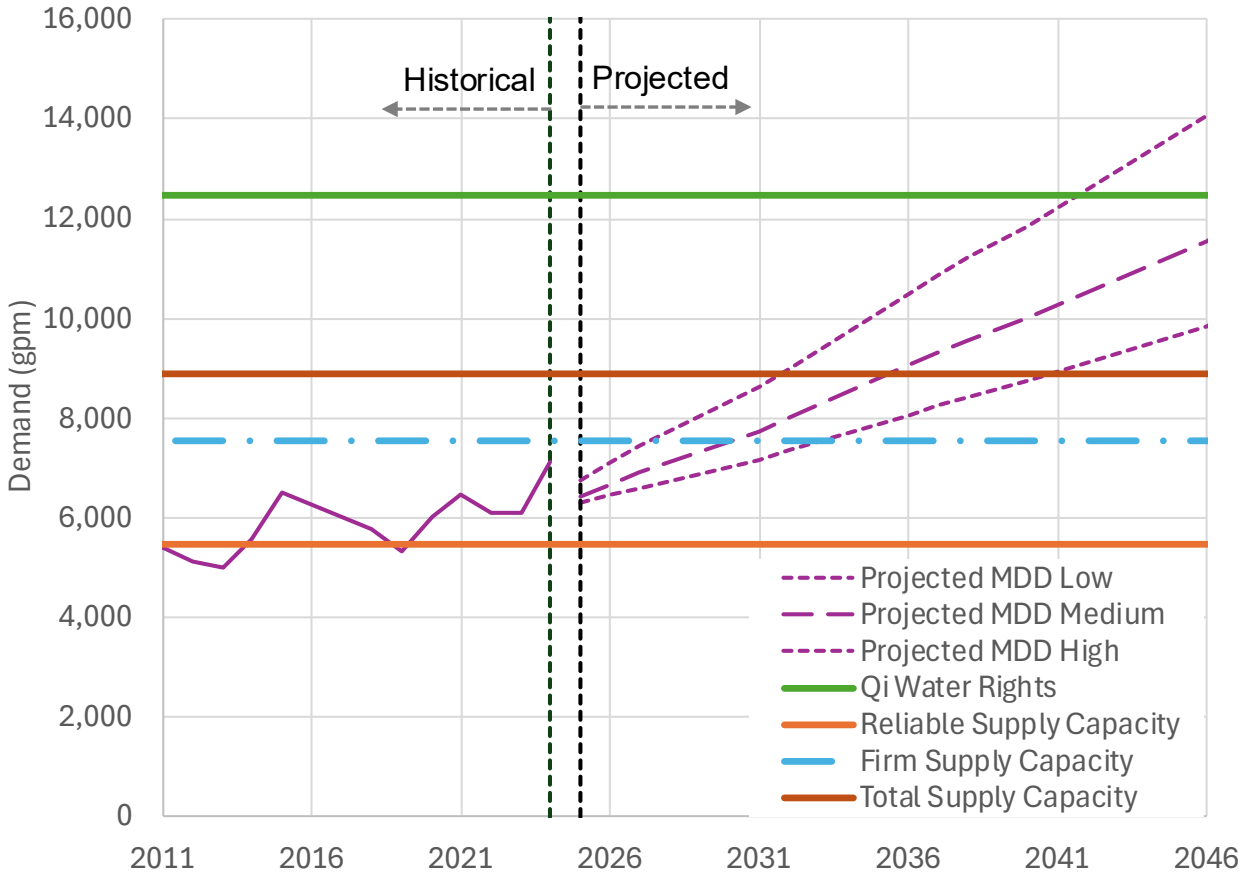

Figure ES.4 MDD Ability to Pump

To address supply related deficiencies, a water supply strategy was developed and is comprised of four parts:

- Lower Washougal Wellfield Expansion.
- Construct Wells for Existing Water Rights.
- Secure Additional Water Rights.
- Continue a WUE Program.

The City anticipates additional supply capacity may be available in the Lower Washougal Wellfield. As such, the water supply strategy focuses efforts on acquiring additional water rights and developing additional physical supply in the Lower Washougal Wellfield (LWWF). However, the development of physical capacity in the LWWF will be dependent on the availability of additional water rights for the wellfield. Should additional water rights in the LWWF be unavailable, a water resources decision making framework summarizes potential next steps to address the City's supply capacity deficits. Both the water supply strategy and water resources decision making framework are further discussed in Chapter 8.

ES.9 System Analysis

The City's water system was evaluated for its ability to meet both DOH and City specific performance criteria under existing, 2031, 2036, and 2046 demand projections. The distribution system analysis identified existing and potential future system deficiencies in the City's water system. Based on the results of the analysis, improvements were recommended to address these deficiencies. Capacity of the pipelines within the distribution system were evaluated under peak hour demands (PHD) and MDD + fire flow (FF) using the City's updated and calibrated hydraulic model. Evaluations of storage reservoirs, booster pump stations and supply sources were conducted in Microsoft Excel. The supply evaluation is discussed previously in Section ES.8. The system analysis identified a number of recommended improvements for pump stations, storage reservoirs, distribution system pipelines and pressure zones, which are shown in Figure ES.5.

ES.9.1 Distribution System Model Analysis

Under projected 2046 demands, several areas of low pressure and fire flow deficiencies were identified. In general, the majority of these deficiencies occurred on dead-end mains or areas of high elevation. These deficient areas will be addressed through distribution pipeline and booster pump station projects, which are outlined in Chapter 9. Additionally, within the planning period the City expects development in their North Shore area. Future pipelines were sized for this development and included in the distribution system model analysis.

ES.9.2 Pumping Analysis

To evaluate pump station capacities, the City's water distribution system was divided into seven different pumping areas containing nine total pump stations. The 343 pumping area is supplied by groundwater wells and although not considered a pump station, was evaluated under both supply specific and pumping criteria. Three pumping areas were flagged as deficient and three different pump station projects are described in Chapter 9 to meet future pumping capacity needs. The 343 pumping area was identified as deficient, however these deficiencies are related to the City's water supply capacity and are described in Chapter 8.

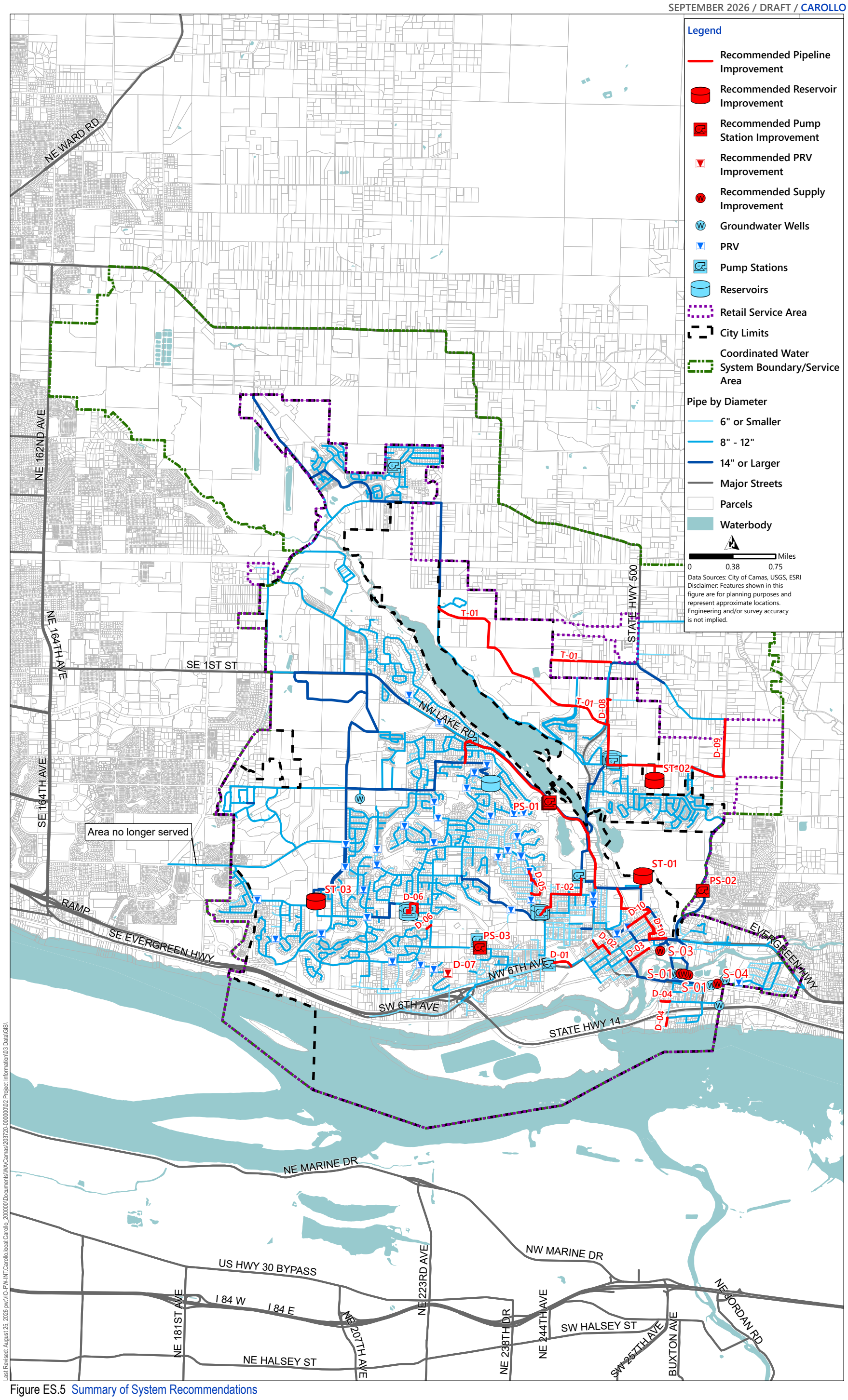

Figure ES.5 Summary of System Recommendations

ES.9.3 Storage Analysis

The City's reservoir storage requirements depend on the water system's configuration, seasonal and daily variations in water-use patterns, and the reliability of various water system components. Water storage volumes are comprised of five components:

- Operational storage.
- Equalizing storage.
- Fire-suppression storage (FSS).
- Standby storage (SS).
- Dead storage.

DOH requires that operational and equalizing storage are available to all customers at a residual pressure of at least 30 pounds per square inch (psi) under PHD flow conditions. The City has an increased level of service goal to provide standby and fire suppression storage to all customers at a residual pressure of at least 30 psi under MDD, which is above the DOH requirement of 20 psi. Therefore, all reservoir volumes above the 30 psi hydraulic grade line are considered available storage. Dead storage is the volume in the reservoir that cannot be used to serve the highest customer in the storage area with a pressure of at least 30 psi. The City also combines fire and standby into a single band for planning (i.e., nesting) and only the larger of the two volumes is used for analysis.

To evaluate storage capacities, the City's distribution system was divided into five different storage areas containing 26 total pressure zones. A summary of existing storage and storage needs in the 5-, 10-, and 20-year planning periods is shown in Table ES.2. Storage deficits were identified in the 343, 542, and 544 storage areas. Additional storage will be needed in these storage areas to address the deficits. All recommended storage projects are summarized in Chapter 9.

Table ES.2 Storage Requirements by Planning Year

Storage Area	Total Available Storage at 30 psi (MG)	2031		2036		2046	
		Required Storage (MG)	Storage Surplus/Deficit (MG)	Required Storage (MG)	Storage Surplus/Deficit (MG)	Required Storage (MG)	Storage Surplus/Deficit (MG)
343	1.20	1.20	0	1.22	-0.02	1.24	-0.04
455	1.50	0.5	1.0	0.51	0.99	0.52	0.98
542	0.05	1.05	-1.0	1.11	-1.06	1.33	-1.28
544	3.46	2.87	0.59	3.25	0.21	4.09	-0.63
852	2.42	1.85	0.57	1.91	0.51	2.06	0.36

Notes:
MG - million gallons.

ES.10 Capital Improvement Plan

The City's CIP summarizes the recommended improvements over the 10- (short-term) and 20-year (long-term) planning period with the purpose of providing the City with a guideline for the planning and budgeting of their water system. The improvements developed in the CIP address the deficiencies identified as part of the supply and distribution analysis described above in Sections ES.8 and ES.9.

The CIP is projected to cost approximately $317 million over the course of the next 20 years. Tables ES.3, ES.4, and ES.5 summarize the CIP projects by project category, priority and allocation, respectively. Figures ES.6, ES.7, and ES.8 summarize the percent of each project identified by project category, priority, and allocation, respectively. Additionally, Figure ES.9 presents a breakdown of annual costs for the City's CIP for each year of the 20-year planning period. Specific project details are discussed further in Chapter 10. The cost allocation designation differentiates how CIP projects may be funded. In general, CIP projects needed to support future growth and development are funded by developers and connection fees while projects needed to support existing infrastructure deficiencies or repair and replacement are funded by existing rate payers.

The WSPU's CIP projects are categorized as follows:

- Distribution System Improvements (D).
- Transmission Pipeline (T).
- Annual Repair and Replacement Programs (R).
- Pump Station (PS).
- Storage (ST).
- Supply and Treatment (S).
- General (G).

The CIP cost estimates presented in this chapter are consistent with American Academy of Cost Engineers Class 5 estimates, which are considered planning level estimates. Actual costs may vary from -50 percent to +100 percent of the estimated cost. These costs were determined based on the City and Carollo's perception of current conditions at the project locations.

Table ES.3 CIP Summary Table by Cost Category

Project Category	Total Cost	Average Annual Cost	Percentage
Distribution System	$4,340,000	$220,000	1.4%
Annual Programs	$87,000,000	$4,350,000	27.4%
Transmission Pipeline	$23,200,000	$1,160,000	7.3%
Pump Station	$42,020,000	$2,100,000	13.3%
Storage	$63,800,000	$3,190,000	20.1%
General	$1,500,000	$80,000	0.5%
Supply and Treatment	$95,130,000	$4,760,000	30.0%
Total Cost	**$317,000,000**	**$15,860,000**	**100.0%**

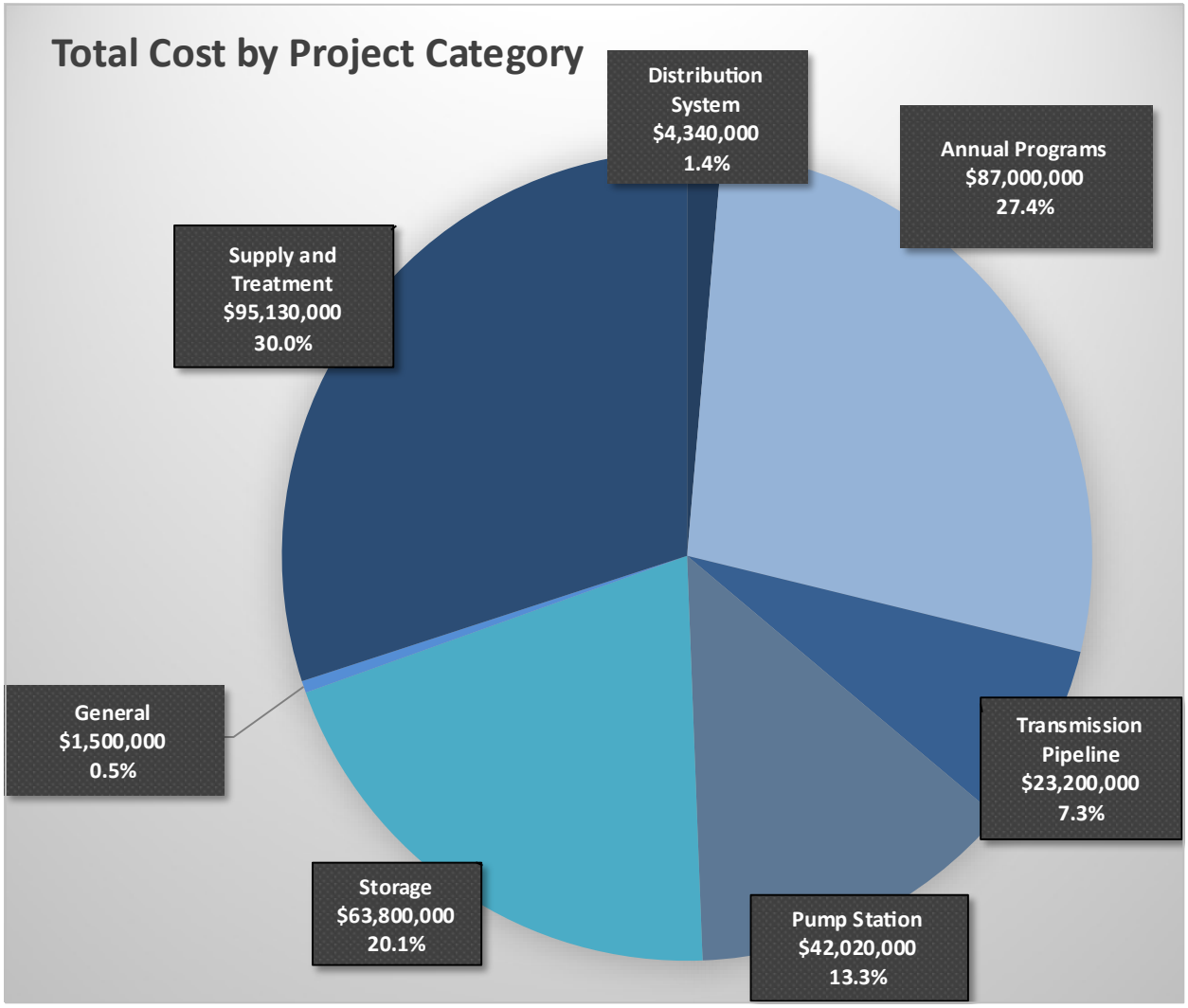

Figure ES.6 CIP Summary Table by Project Category

Table ES.4 CIP Summary Table by Project Priority

Project Priority	Total Cost	Percentage
0-10 years	$177,000,000	55.8%
10-20 years	$53,000,000	16.7%
Annual	$87,000,000	27.4%
Total Cost	**$317,000,000**	**100.0%**

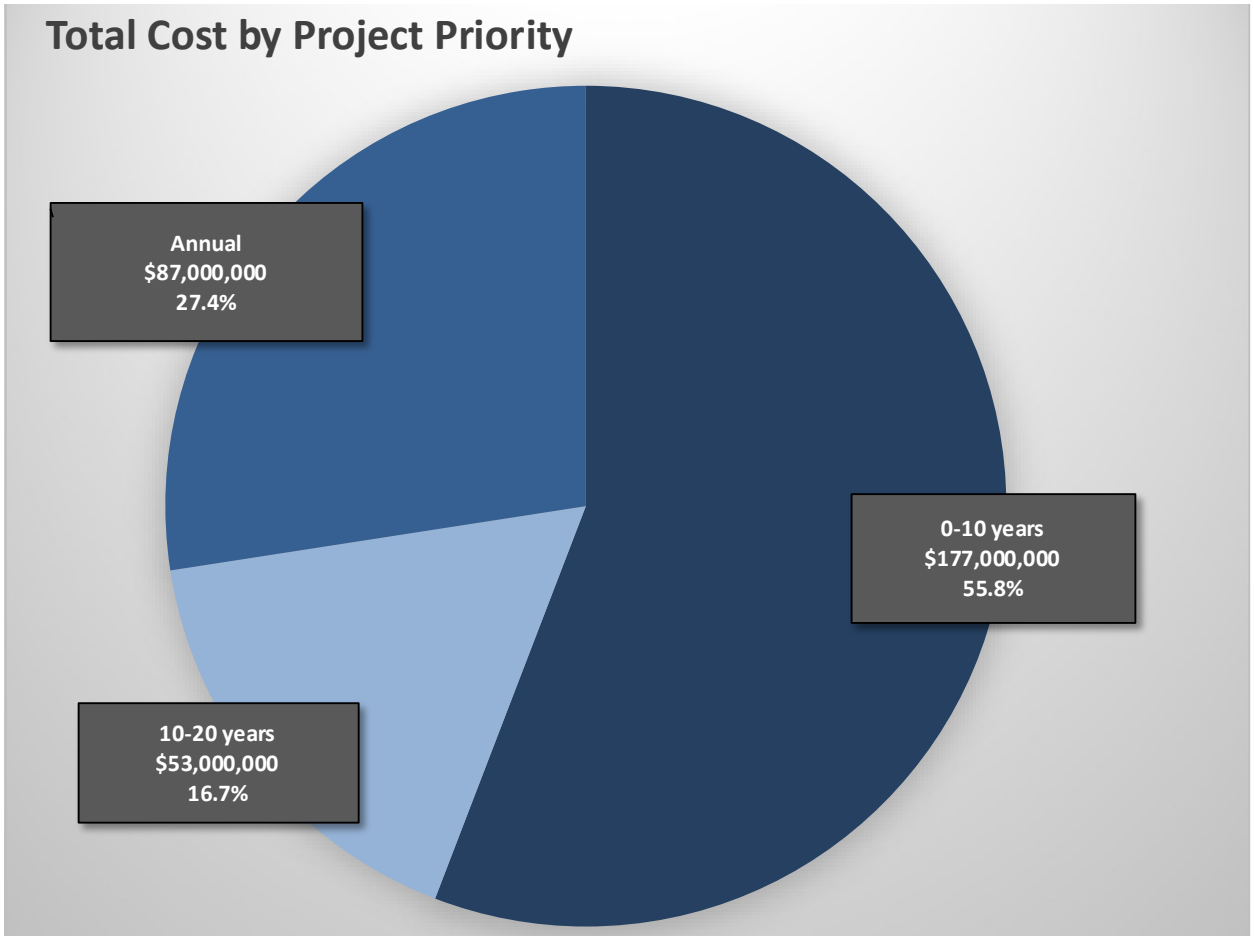

Figure ES.7 CIP Summary Table by Project Priority

Table ES.5 CIP Summary Table by Cost Allocation

Cost Allocation	Total Cost	Percentage
SDC	$148,900,000	47.0%
Rates	$168,100,000	53.0%
Total Cost	**$317,000,000**	**100.0%**

Notes:
SDC - system development charges.

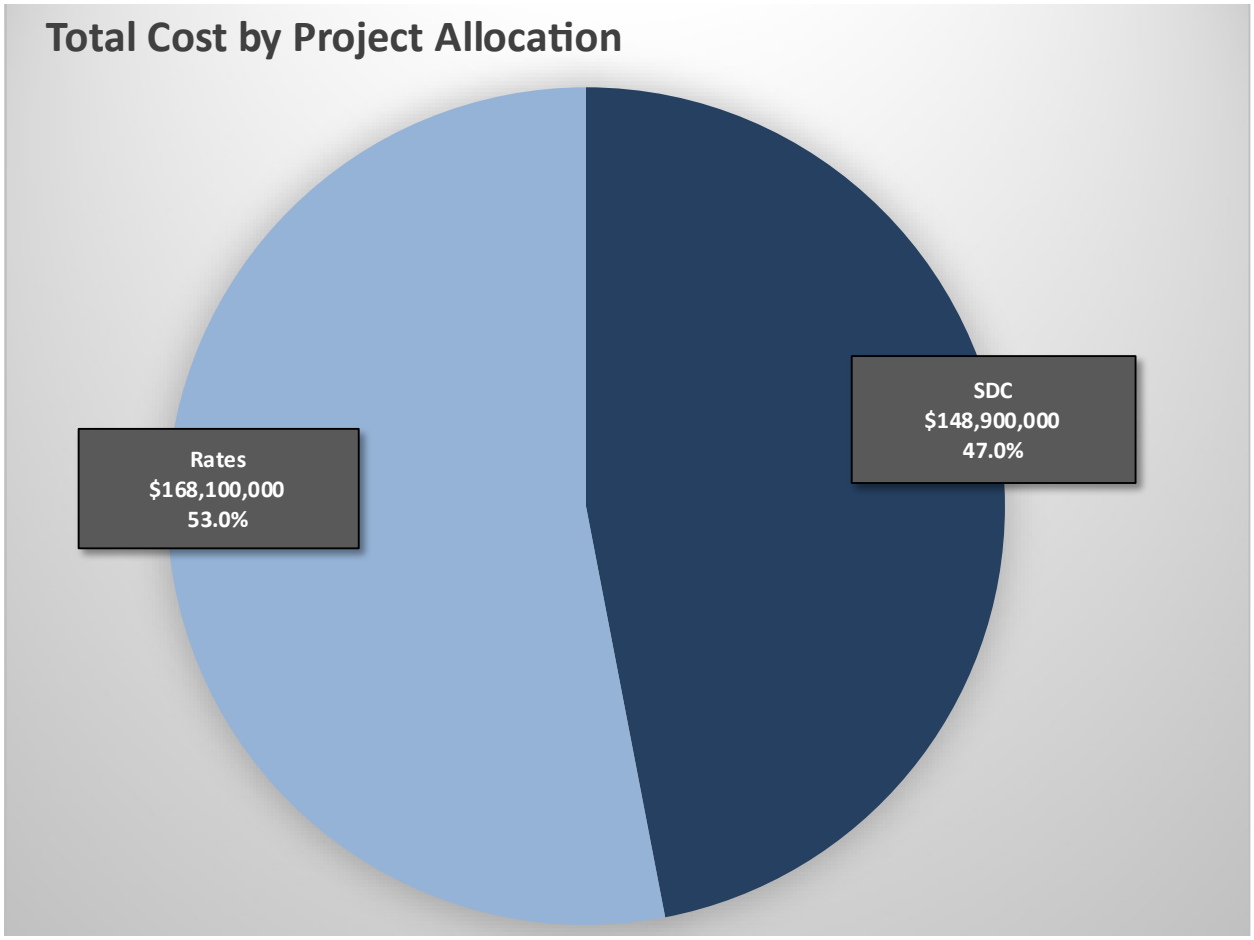

Figure ES.8 CIP Summary Table by Cost Allocation

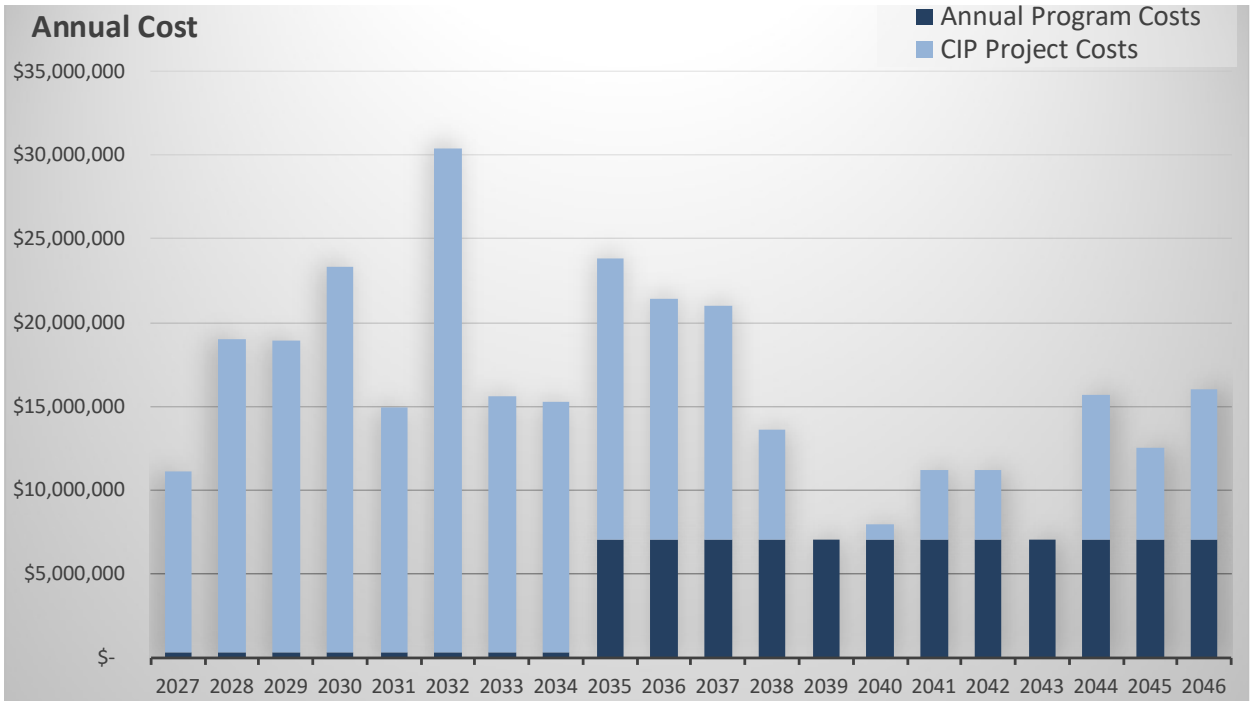

Figure ES.9 CIP Annual Cost

The major projects to be completed in the next several years of this WSPU include the following:

- Well 8, 11, and 12 expansion, and PFAS treatment of LWWF.
- 343 Zone storage improvements.
- 544 Pumping area improvements (with 343 zone transmission pipeline).
- 542 Zone storage improvements (and pipelines).
- North Shore transmission pipeline.

ES.11 Financial Plan

This chapter is still in progress and is not included in this draft of this WSPU.

CHAPTER 1 INTRODUCTION

1.1 Purpose

This Water System Plan Update (WSPU) updates the City of Camas' (City) 2019 WSPU. It was developed collaboratively by City staff, Carollo Engineers (Carollo), Strata Geosciences, and FCS Group. This WSPU documents the water system's current status and evaluates the City's future water needs. The data used for this WSPU was current as of 2024. The WSPU was developed between November 2024 and September 2026 for approval in 2026. This WSPU will be used as a guide for maintaining and improving the water system in the short-term over the next 10 years, while also providing a framework for the 20-year, long-term planning horizon.

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This WSPU contains timeframes, which are the intended framework for future funding decisions and within which future actions and decisions are designed to occur. However, these timeframes are estimates and depending on factors involved in the processing of applications and project work, as well as the availability of funding, the timing may change. The framework presented in this WSPU does not represent actual commitments by the City.

1.2 Authorization

Recognizing the importance of planning, developing, and financing water system facilities to provide reliable service for the existing customers and to serve anticipated growth, the City initiated the preparation of this WSPU. In November 2024, the City selected the Carollo team to assist in the preparation of the WSPU in accordance with applicable rules and regulations governing planning for water utility systems.

1.3 Objectives

This WSPU has been prepared to serve as a guide for the planning and design of future water system facilities. Identified in this WSPU are system improvements intended to meet the needs for expected growth in the City. Specific objectives of this WSPU are addressed within individual chapters presented herein and include the following.

- Develop a document that can be updated periodically as additional information on the water system is obtained.
- Planning Considerations (Chapter 2): Establish the study area, policies and criteria, standards, and documents relating to water service within the City's water system.

- Existing System (Chapter 3): Document the existing water system supply, storage, and distribution facilities.
- Operations and Maintenance (Chapter 4): Provide a comprehensive review of operations and maintenance of the City's water system facilities.
- Water Requirements (Chapter 5): Identify and estimate the effect of future land uses and population trends on the water system. Document historical water use and project future demands based on growth projections.
- Water Use Efficiency (Chapter 6): Determine the City's current and proposed actions to comply with conservation planning requirements and to promote using water efficiently.
- Water Quality (Chapter 7): Summarize water quality regulations, monitoring, and reporting requirements. Evaluate the City's historical water quality against regulatory requirements, summarize violations, and recommend improvements, if necessary to meet anticipated or future water quality regulations.
- Water Resources (Chapter 8): Conduct a water supply evaluation that describes the City's available sources of supply and existing water rights. Develop a water supply strategy with recommendations to develop the supply capacity needed to satisfy the City's future water system demands. Update the wellhead protection plan for the City's groundwater supply sources.
- Distribution System Analysis (Chapter 9): Evaluate the capacity of the distribution system using the City's updated and calibrated hydraulic model. Conduct a desktop analysis to evaluate the capacity of storage reservoirs and booster pump stations against DOH criteria. Summarize existing and potential future system deficiencies in the City's distribution system and offer recommended improvements to the system.
- Capital Improvement Plan (Chapter 10): Develop a program of capital improvements, including priorities for design and construction.
- Financial Analysis (Chapter 11): Develop a plan for financial backing of required system improvements.
- Prepare the WSPU in accordance with the DOH Water System Plan Checklist in Section 1.8 to comply with all requirements of DOH and WAC.

Additionally, the DOH Project Approval Application (PAA) Form for this WSPU is included in Appendix F.

1.4 Location

The City is located in Clark County, WA and is considered part of the greater Portland, OR metropolitan area. The City is bordered to the south by the Columbia River, the west by the City of Vancouver, WA water system, the City of Washougal, WA water system to the east, and unincorporated Clark County to the north.

1.5 Ownership and Management

The City owns and manages its water system for municipal water supply purposes, including a broad range of water uses, including residential, commercial, industrial, irrigation, and government. The DOH water system identification number for the City's system is 108002.

The City is governed by a mayor and seven council members, all of which are elected officials and manages its water system through its Public Works Department. The Public Works Director is hired by the mayor and city administrator and oversees the entire Public Works Department, which is divided into two branches: Engineering and Operations. Daily maintenance and operational responsibilities fall under the Water Division of the Operations branch within the Public Works Department.

Contact information for the City's Public Works Department is provided below:

- Public Works Address: 616 NE 4th Avenue, Camas, WA 98607.
- Operations Center Address: 1620 SE 8th Avenue, Camas, WA 96807.
- Email: publicworks@cityofcamas.us.
- Phone: (360) 817-1563.

1.6 Environmental Assessment

The State Environmental Policy Act (SEPA), chapter 43.21C Revised Codes of Washington (RCW), requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. A SEPA Checklist and determination of non-significance (DNS) have been prepared for this WSPU in Appendix B and C. The City anticipates the WSPU does not have probable significant adverse impacts on the environment in accordance with the DNS under WAC 197-11-340(2). Many of the projects proposed within the WSPU will require subsequent project specific environmental review and SEPA checklists as part of their design process.

1.7 Approval Process

This WSPU is required to meet state, county, and local requirements. The City will submit the WSPU to DOH, Clark County, and adjacent utilities as part of the Agency Review process. See Appendix D for Agency comment letters, responses, and approvals. As required by WAC 246-290-108, a local government consistency review checklist has been prepared and is included in Appendix E. The Adopting Resolution will be included in Appendix A, upon City Council approval of the WSPU.

1.8 DOH Water System Plan Checklist

To assist in review of the WSPU, the DOH Water System Plan checklist from the pre-plan agreement meeting in May 2025 is provided in Table 1.1 with references to the required information. A copy of the checklist will be provided in Appendix G.

Table 1.1 DOH Water System Plan Checklist

Required	Content Description	WSPU Location
(✓)	Project Approval Application (PAA, DOH Pub 331-149 F)	Appendix F
(✓)	Signed and dated stamp from a Professional Engineer licensed in the State of Washington	
Description of Water System		
(✓)	Ownership and management, including Satellite Management Agency (SMA), if applicable	1.5, 2.2.2
(✓)	System history and background	2.2.1
(✓)	Related Plans	2.6
(✓)	Service area and land uses: ▪ Service area map including retail service area, service area, future service area, water rights place of use. ▪ DOH Pub. 331-432 – Service Area Guidance ▪ Existing zoning map(s) for all jurisdictions within future service area ▪ Future land use map(s) for all jurisdictions within future service area (Coordinated Water System Plan [CWSP] Counties Only)	2.2.3
(✓)	Service area and other applicable policies	2.7
(✓)	Duty to serve statement for the retail service area ▪ How does the system define "timely and reasonable"? ▪ Are there appeals processes for when a customer disagrees with a timely and reasonable determination?	Table 2.3
(✓)	Consistency with the watershed plan for Salmon/Washougal Water Resource Inventory Areas (WRIA) No. 28	2.6.8
Basic Planning Data		
(✓)	Existing population, service connections, and equivalent residential units (ERU) ▪ ERUs must be based on full-time residential connections only	Chapter 5
(✓)	Existing production/usage: monthly/annual per source, annual usage by customer class, distribution system leakage (DSL) ▪ Authorized Use and DSL, rather than "unaccounted-for water". ▪ Additional information is available in our WUE Guidebook, Chapter 6, beginning on page 28 (PDF page 33)	5.1
(✓)	Season variations in use by customer class (1000+ connections)	5.2
(✓)	Water supply characteristics	3.3
(✓)	Water supply reliability evaluation: Include depth-to-water measurements	3.3
(✓)	Interties: agreements, existing/proposed, emergency, metering	3.9
(✓)	Plan approval period and 20-year projections for: Population, service connections, and ERUs (recommend 13- and 23-year)	5.5, 5.6
(✓)	Projections and land use discussion	5.4
(✓)	Future water demand without water use efficiency savings	5.6
(✓)	Water rights self-assessment: Consult with the Department of Ecology (Ecology) prior to plan submittal ▪ Describe water rights and complete water rights self-assessment form for existing, plan approval period, and 20 years.	**Need to complete**
System Analysis		
(✓)	Provide assumptions and basis of analysis:	
(✓)	System design standards	9.2.2
(✓)	Policies on operations and expected level of service (such as standby storage, pumping restrictions and emergency back-up power)	9.3, 9.4
(✓)	Fire flow requirements and if nesting is allowed. May need confirmation from local fire authority.	9.2.2.2, 9.4.1.3, Figure 9.2,
(✓)	Asset Management Inventory: text description and facilities map of major assets, asset management table or spreadsheet	Chapter 3
(✓)	Asset condition assessment and criticality ratings (recommended) – RCAC Template (optional format)	Chapter 3
(✓)	Water quality analysis	Chapter 7
(✓)	Capacity analysis (Must include WSDM Worksheet 4-1, ERU Capacity Summary)	9.5
(✓)	Hydraulic analysis	9.2
(✓)	Summary of system deficiencies	9.6
Water Use Efficiency (WUE)		
(✓)	Metering Program: sources, services, and non-emergency interties	6.1.1.1
(✓)	Distribution System Leakage (DSL) ▪ Summarize DSL and compare to WUE annual reports; discuss DSL calculation methodology, leak detection plan	6.1.2
(✓)	Water Loss Control Action Plan (WLCAP) ▪ If DSL exceeds 10 percent (3-year average), submit the WLCAP per WAC 246-290-820(4) ▪ Include implementation schedule and budget items, as applicable	Appendix O
Water Use Efficiency (WUE) Program		
(✓)	▪ Describe the current WUE program	6.1
(✓)	Updated WUE goal(s). Document public adoption process (include public notice, signed minutes, signed resolution). ▪ Consider doing this after DOH review of first draft	At a later date
(✓)	Describe measure(s) that will be implemented to achieve the goal(s). Include schedule and costs in the budget – 10,000 to 49,999 connections requires 9 additional measures	6.2
(✓)	Describe the process used to evaluate WUE measure(s) you did not implement	6.2
(✓)	Describe or provide an example of yearly consumer education (cannot count as a measure)	6.2
(✓)	Estimate projected water savings from selected WUE measure(s)	6.2.4
(✓)	Describe process that will be used to determine effectiveness of the WUE program	6.2.5
(✓)	Additional WUE for systems with 1000+ Connections ▪ Estimate water saved from implemented WUE measure(s) during the previous plan approval period ▪ Water demand forecast (if all cost-effective WUE measure(s) are implemented) ▪ For WUE measure(s) evaluated but not implemented: » Quantitative evaluation of WUE measure(s) cost-effectiveness, including marginal costs of water production » Evaluate WUE measure(s) for cost-effectiveness if shared with other systems » Quantitative/qualitative evaluation of measure(s) to determine cost-effectiveness from societal perspective ▪ Explore reclaimed water opportunities	Appendix P

Required	Content Description	WSPU Location
Source Water Protection		
(✓)	Sanitary Control Area (SCA): description of physical and legal protections for each groundwater source, including deeds, covenants, easements, restrictions, fencing, signage, etc.	8.4
(✓)	Wellhead protection program/update: must include updated Time-of-Travel map, contaminant source inventory, and notifications ▪ WAC 246-290-135: Source Water Protection ▪ 331-106 Wellhead Protection Requirements	8.4
(✓)*	Watershed control program for all surface water/GWI sources ▪ Include watershed and other information relative to the City's two emergency surface water sources (Boulder and Jones Creek)*	8.4
Operation and Maintenance (O&M) Program		
(✓)	Water system management and personnel, including operator certification and Cross-Connection Control Specialist (CCS)	4.1, 4.2
(✓)	Operations and preventative maintenance schedule	4.5
(✓)	Comprehensive water quality monitoring: ▪ Water Quality Monitoring Schedule (WQMS) ▪ Provide Lead and Copper Rule (LCR) and disinfection byproduct (DBP) monitoring schedule(s), map(s), and letters ▪ Coliform monitoring plan, including addresses and map. Update for Revised Total Coliform Rule (RTCR)	Chapter 7
(✓)	Emergency response program, including Water Shortage Response Plan per WAC 246-290-420 ▪ Consider Tier 1 Public Notification process, and multiple channels for notification	4.8
(✓)	Cross-connection control (CCC) program ▪ Systems with 1000+ connections: provide a copy of your CCC annual summary report form	4.9
(✓)	Sanitary survey findings	4.7
(✓)	Recordkeeping, reporting, and customer complaint program	4.4
(✓)	Water treatment (surface, disinfection, contaminant) operations	4.6
(✓)	Summary of O&M deficiencies; include cost in budget	4.11
Distribution Facilities Design and Construction Standards		
(✓)	Project review procedures	Appendix X
(✓)	Policies and requirements for outside parties	Appendix X
(✓)	Design and construction standards for distribution-related projects	Appendix X
(✓)	Construction certification	Appendix X
Capital Improvement Program (CIP)		
(✓)	CIP summary and schedule for the plan approval period (discuss prioritization, project assessment and value planning) ▪ Include any items that were identified as required for addressing capacity-related deficits	Chapter 10
(✓)	20-year (minimum) CIP for projects beyond the plan approval period	Chapter 10
Financial Program		
(✓)	Financial viability (discuss full cost of service, cost recovery, reserves)	Chapter 11
(✓)	Summary of past income and expenses, sufficient to establish trends (previous plan approval period or minimum 3 years)	Chapter 11
(✓)	Balanced operational and capital budget projections for plan approval period	Chapter 11
(✓)	Show operational, capital, and emergency reserve goals. Describe the revenue requirements to achieve them. Demonstrate annual progress toward goals.	Chapter 11
(✓)	Debt-financed capital improvements	Chapter 11
(✓)	Water rate evaluation: ▪ Describe current rate structure: Block rate based on meter size and rate class. (Not inclining block rate.) ▪ Evaluate the feasibility of implementing a rate structure that encourages water demand efficiency. ▪ Evaluate rate affordability and customer assistance programs. Provide rate that would be unaffordable, income below which current and future rates are unaffordable, and programs available for low income customers.	Chapter 11
Miscellaneous Documents		
(✓)	Updated Water Facilities Inventory (WFI) with authorized signature	Appendix R
(✓)	Local Government Consistency Determination Forms: City and County planning departments.	At a later date
(✓)	Informational meeting for the consumers (include public notice and signed minutes)	At a later date
(✓)	Adjacent utilities notice, review, and comment of draft Water System Plan. Attach notice and comments received.	At a later date
(✓)	SEPA: Signed Environmental Checklist and Threshold Determination. The water system is lead agency.	At a later date
(✓)	Agreements: SMA, intertie, service area, franchise, wheeling, mutual aid, inter-local and other agreements	Appendix H
(✓)	Correspondence	
(✓)	Supporting documents	
Miscellaneous Documents - Post DOH Review		
(✓)	Plan approval by water system governing body. Include signed meeting minutes or signed resolution. NOTE: DO NOT approve the plan until after the draft review is completed and you have received authorization to proceed with approval from the Regional Planner.	At a later date

CHAPTER 2 PLANNING CONSIDERATIONS

2.1 Introduction

The objective of this chapter is to document the City water system planning considerations that influence the WSPU including background on the study area, policies, criteria, and related documents.

2.2 Study Area

The study area for this WSPU encompasses the municipal boundaries of the City covering all residential, commercial, and industrial zones. It also extends to adjacent regions within the retail water service boundary, which are anticipated to be incorporated due to comprehensive land use changes over the next 20 years as shown on Figure 2.1.

2.2.1 Water System History

The first known settler, David Parker, came to the City in 1845. In 1883 the Lacamas Colony Company of Portland purchased 2,600 acres encompassing Lacamas, Round, and Dead Lakes (renamed as Fallen Leaf Lake), the stream connecting them to the Columbia River, and constructed dams for hydropower for new flour and paper mills, a sawmill, and a furniture factory in the area. The City was incorporated in 1906. In 1913, the City's first water system was storing Jones Creek supply in Butler Reservoir. The system has continued to expand and adapt to new challenges and regulations, as described in Table 2.1. This WSPU provides a roadmap to continue to provide high-quality water into the future.

Table 2.1 Water System Historical Timeline

Water System Historical Timeline	
1845	Camas first settled
1913	Jones Creek Intake constructed
1913	0.6 MG Butler Reservoir, South Half
1923	0.6 MG Butler Reservoir, North Half (1.2 MG total)
1931	Boulder Creek Intake constructed
1935	0.5 MG Lower Prune Hill Reservoir
1936	Wells 1 and 2 constructed
1945	Well 3 constructed
1948	Butler BPS - 800 gpm
1949	Forest Home BPS- 450 gpm
1952	Chlorination Plant - injects chlorine into water from Jones Creek and Boulder Creek before it goes to the Filter Plant
1959	Well 4 constructed
1965	Filter Plant - 1,200 gpm - filters water from Jones Creek and Boulder Creek intakes
1965	10th Street BPS

Water System Historical Timeline	
1968	Well 5 constructed
1969	Well 6 constructed
1971	Well 7 constructed
1971	1.5 MG Lower Prune Hill Reservoir
1971	0.75 MG Upper Prune Hill Reservoir
1971	Lower Prune Hill BPS - 500 gpm, 500 gpm, 750 gpm
1977	Well 8 constructed 1,350 gpm
1978	0.1 MG Gregg Reservoir
1978	Old Gregg BPS - 500 gpm
1988	SCADA System installed
1993	2.0 MG La Camas Reservoir
1993	La Camas BPS - 500 gpm, 500 gpm, 1,500 gpm
1998	Forest Home BPS Upgrade - 1,000 gpm
1999	Butler BPS Upgrade
2000	Well No. 9 constructed - 650 gpm
2001	Angelo BPS constructed - 3,000 gpm capacity
2001	Lower Prune Hill BPS Upgrade - 1,000 gpm replacement pump
2002	Upper Prune Hill Reservoir (2.4 MG) and BPS (2,900 gpm capacity) construction
2002	New Gregg Zone BPS Constructed, 1,500 gpm
2002	Lower Prune Hill Upgrade, 2,000 gpm
2002	Jones and Boulder Creek intake metering
2002	Chlorine and CT improvements
2002	Well 1 and 2 abandoned
2003	Well 3 decommissioned
2003	Well 11 (1,200 gpm) and Well 12 (900 gpm) constructed, Washougal Wellfield Chemical Feed Facility installed
2003	New Gregg BPS - 1,500 gpm
2004	Well 10 constructed - 900 gpm
2007	Well 4 decommissioned
2008	Well 13 constructed, 1,325 gpm
2008	Washougal River 24-inch pipe crossing installed
2008	Ostenson Canyon Pipeline installed
2008	City and Ecology sign agreement regarding use of service water sources and increased water rights associated with groundwater
2009	Well 14 constructed - 1,000 gpm
2009	Sodium hypochlorite disinfection system installed at Well 5 and 9
2011	Crown Road BPS installed - 1,600 gpm
2015	Slow Sand Filtration Plant constructed

Water System Historical Timeline	
2021	2.0 MG 18th Avenue Reservoir constructed
2026	Lower Prune Hill Reservoir and BPS replaced and upgraded

Notes:
BPS - Booster Pump Station; CT - contact time; gpm - gallons per minute; MG - million gallons; SCADA - supervisory control and data acquisition.

2.2.2 Ownership and Management

The City's water system is owned and operated by the City. The City is governed by a mayor and seven council members, all of which are elected officials. The Public Works Director is hired by the mayor and city administrator, and oversees the entire Public Works Department, which is divided into two branches: Engineering and Operations. Water system responsibilities fall under the Water Division of the Operations branch within Public Works.

The City has both surface water and groundwater sources. The surface water sources, Boulder and Jones Creeks, are located on the south side of Larch Mountain, northeast of Camas. The ground water sources include nine wells near the Washougal River, and one well in Grass Valley. The City treats all of its water with chlorine for disinfection and fluoride. Water pressure and fire flows are maintained throughout the service area with seven distribution reservoirs, 10 BPS, and over 159 miles of piping to serve their approximately 29,000 and growing customers.

2.2.3 Service Area

In accordance with the Municipal Water Law, the City is required to designate a retail service area within that it has a duty to serve all customers meeting the City's stated conditions of service - the City's service policies are summarized in Table 2.3 - and also designate a service area. The City's retail water service area and service area are shown in Figure 2.1. The City is temporarily serving the area northwest outside of the service area boundary under an agreement with the City of Vancouver (Vancouver), until Vancouver installs its own pipeline. Additional details of this interlocal agreement are provided in Appendix **[X]**. The retail water service area is largely defined by the City's urban growth boundary. The City's service area, defined by the Clark County CWSP, expands the retail service area to the urban growth boundary. The Regional planning does not anticipate the entire service area to develop during the planning period (next 20-years); however, the City reserves the first right of refusal for providing water service to developments in its service area.

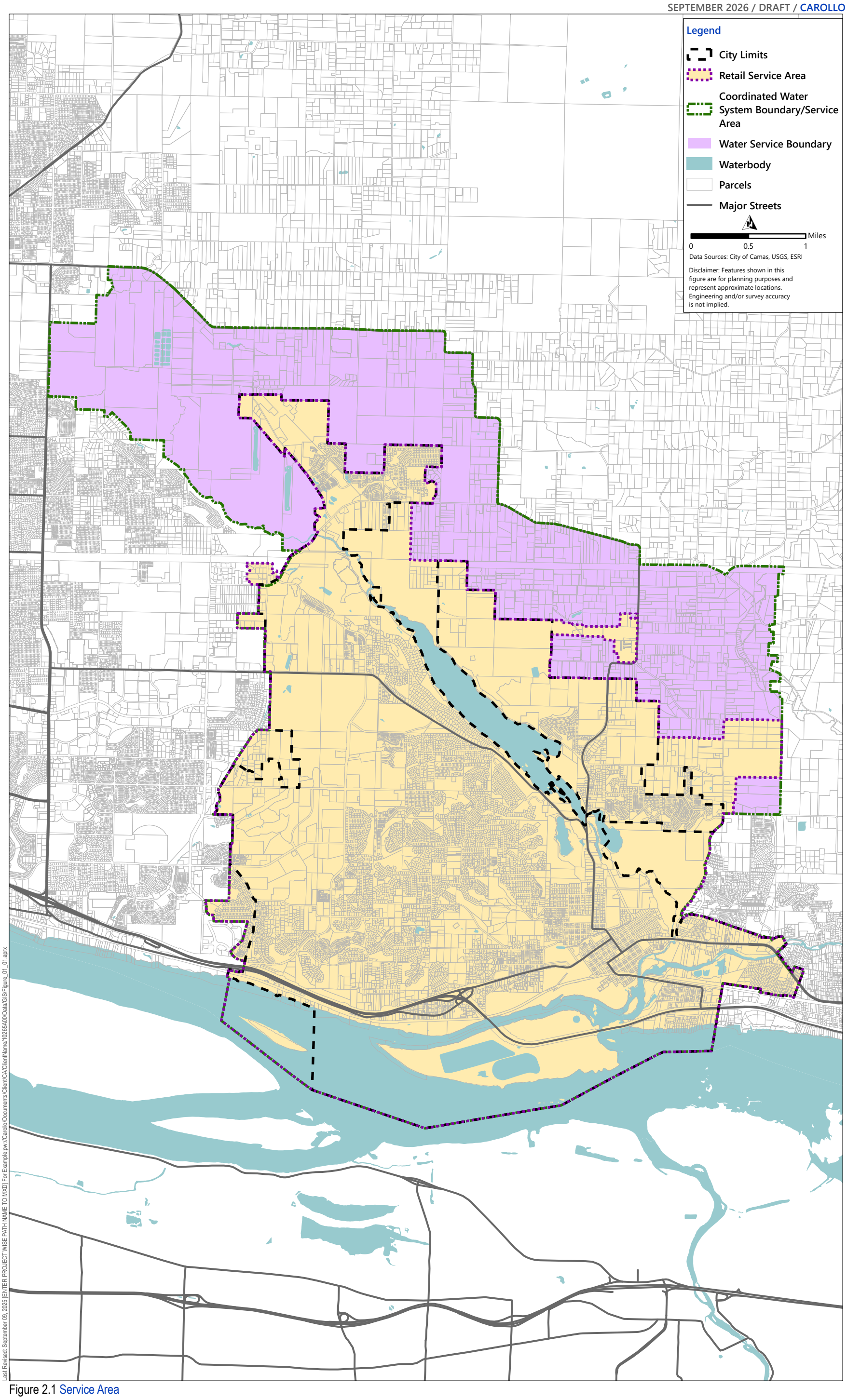


Figure 2.1 Service Area

2.2.4 Regional Environment

2.2.4.1 Climate

The climate in the City and the surrounding greater Clark County area is influenced by the Coast Mountain Range to the west and the Cascade Mountain Range to the east. The Coast Mountain Range provides some limited protection from the direct influence of the Pacific Ocean. Moist heavy air from the Pacific is cooled as it rises over the Coast Mountain Range and releases moisture as rainfall. The air is further cooled as it approaches the Cascade Mountain Range, resulting in moderate rainfall for lower lying area, and heavier precipitation along the west slopes of the Cascades. This results in a large variation of rainfall across the county. The Cascade Mountains also provide a barrier against continental air masses originating over the Columbia Basin to the east.

According to the Weather Atlas, Clark County has wet, mild winters and warm, dry summers. The City of Camas receives an average of about 37 inches of precipitation annually, while the northeastern portion of the county can receive averages approximately 150 inches per year, based on the data from the Washington Department of Transportation (WSDOT). Approximately 80 to 85 percent of the precipitation occurs between the months of October and May, and the City receives 173 days of sunshine per year.

Based on data from National Oceanic and Atmospheric Administration (NOAA), the average January temperature across Clark County between 2000 and 2025 was 40.2 degrees Fahrenheit, increasing to a 78-degree high in July. Winter storms come generally from the southwest, with infrequent snowstorms originating from the Gulf of Alaska. Fall and winter storms can be accompanied by high winds, resulting in power outages.

2.2.4.2 Topography

Clark County is located in the Willamette-Puget Trough, a geographic basin formed by the Cascade and Coast Mountain Ranges. The county is bounded on the south and west by the Columbia River, on the north by the Lewis River, and on the east by the foothills of the Cascades. The City itself resides in the Southeast side of the county, with Vancouver to the west and Washougal to the east.

The ground slope and natural drainage features within the City play a significant role in the planning and design of the water distribution storage facilities. The elevation within the City ranges from about 20 feet above sea level along the shores of the Columbia and Washougal Rivers, to approximately 752 feet (NGVD 29) at the Upper Prune Hill Standpipe located at the top of Prune Hill. The terrain in the City includes a flat plateau in the Downtown area and generally increasing elevations to the North, except where Lacamas Lake forms a valley through the City as shown in Figure 2.2.

2.2.4.3 Surface Water

The surface water features within the City urban growth area (UGA) boundary include the Columbia River, Washougal River, Little Washougal River, Lacamas Creek, Lacamas Lake, Fallen Leaf Lake, and Round Lake. The City also owns the majority of the watershed for the Jones and Boulder Creeks north of the City's intakes for these sources. Jones and Boulder Creek are tributaries of the Little Washougal River, which is a tributary of the Washougal River. The basin characteristics for the creeks, streams, and rivers discussed below were obtained from stream gauging published by the U.S. Geological Survey.

The Columbia River begins in Canada, enters the United States in northeastern Washington, continues traveling southwest through eastern Washington, where it travels over a series of dams until it empties into the Pacific Ocean. The Columbia River forms the border between the states of Washington and Oregon from the point where it crosses the 46th Parallel until it empties into the Pacific Ocean. The Columbia River drainage area is approximately 241,000 square miles, with an average flow of 603,000 cubic feet per second (cfs).

The Washougal River flows southwest from the Cascade Mountains to the City, where it empties into the Columbia River. The Washougal River drainage basin is approximately 108 square miles in size and historical records report average flows at approximately 9,000 cfs.

The Little Washougal River, of which Jones and Boulder Creeks are tributaries, flows to the southwest out of the Cascade Mountains. The Little Washougal turns to the southeast before it crosses into the City UGA and empties into the greater Washougal River. The Little Washougal drainage basin covers approximately 23 square miles with historical average daily peak flows of approximately 1,317 cfs.

Lacamas Lake is over 60 feet deep in places. It receives flow from Lacamas Creek and Dwyer Creek. The Lake then discharges into Lacamas Creek, which flows into the Washougal River. The water level is controlled by dam located at the south end of the lake. Round Lake is a reservoir and is a smaller part of Lacamas Lake, separated from Lacamas Lake by Everett Street.

2.2.4.4 Critical Areas

Critical areas within the City include those classified as Critical Aquifer Recharge Areas, Fish and Wildlife habitat conservation areas, frequently flooded areas, geologically hazardous areas and wetlands. Given its importance to the water system, the City's Critical Aquifer Recharge area map is included as Figure 2.3. Please refer to the City's website for the up-to-date description and mapping of its Critical Areas.

2.2.4.5 Geology

The Clark County area exhibits traces of its geologic history, including repeated inundation by fluctuating sea levels during glacial epochs, the sedimentary processes of repeated flooding of the Columbia River, volcanic activity, periodic earthquakes, and other tectonic activity. The geologic units in Clark County reflect this varied history and can be placed into two general categories: older consolidated rocks and volcanic rocks. These include Columbia River Basalts and Skamania and Goble volcanic series, and sedimentary rocks incorporating unconsolidated gravels, silts, sands, and clays created by glacial and alluvial processes.

The main geological feature of Camas is Prune Hill, which is an extinct volcanic vent that much of the residential area resides on. Prune Hill is at the Northwest end of Camas, and the City elevation drops off to the west and the Columbia River Gorge to the south. Lady Island, in the Columbia River Gorge, is separated from the mainland by the Camas Slough, and is mostly used for industrial purposes.

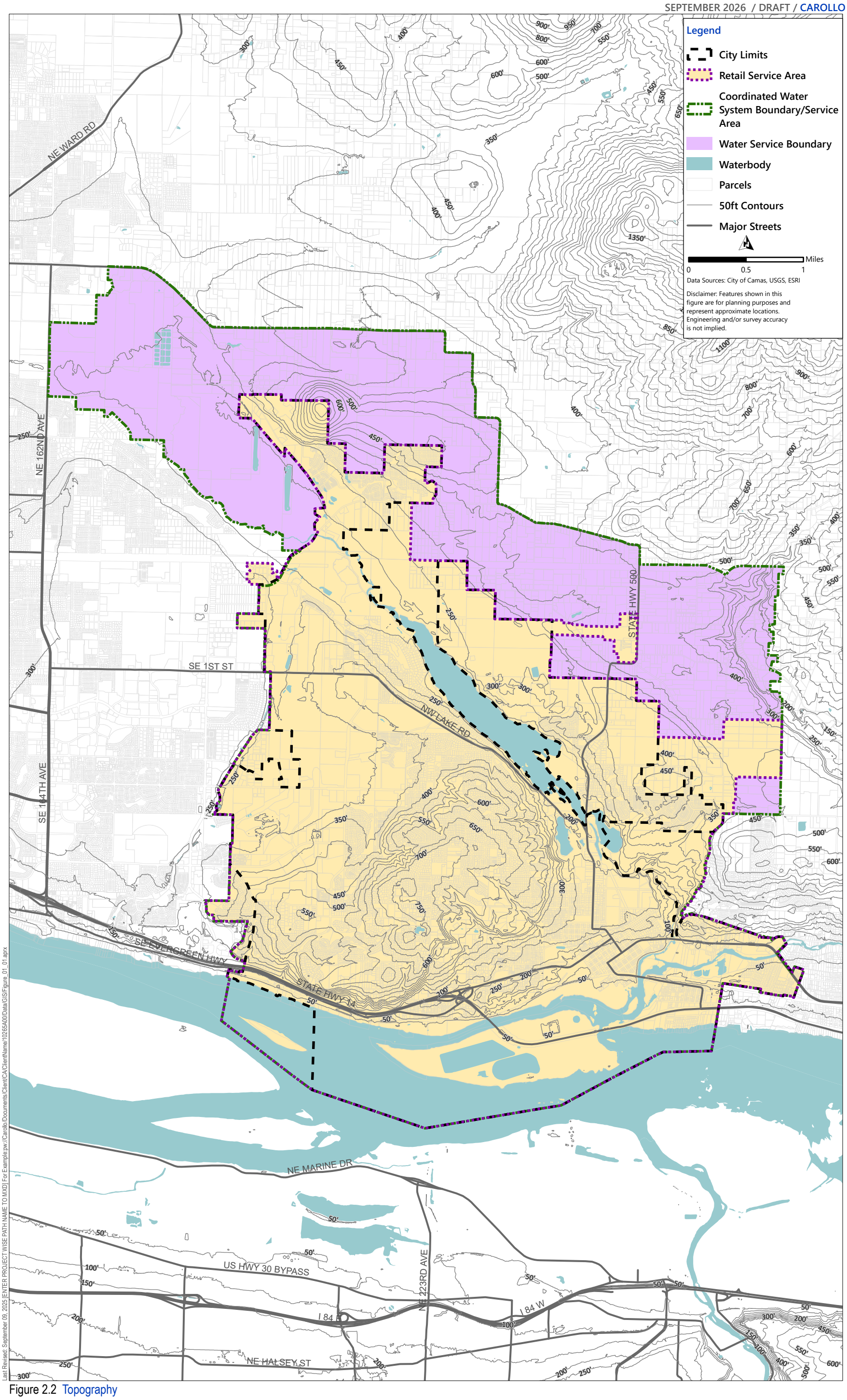
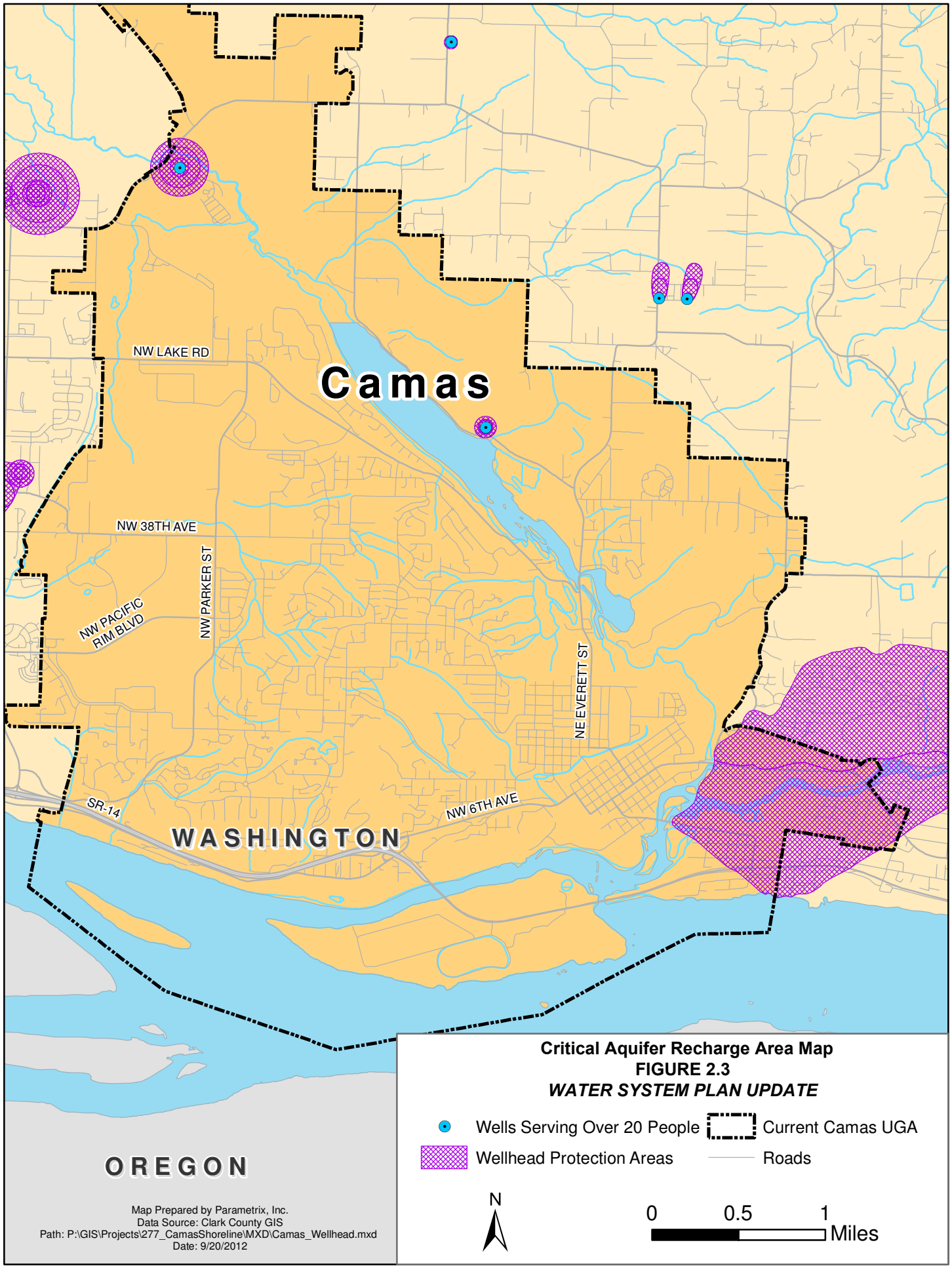


Figure 2.2 Topography


Camas
NW LAKE RD
NW 38TH AVE
NW PARKER ST
NW PACIFIC RIM BLVD
NE EVERETT ST
SR-14
NW 6TH AVE
WASHINGTON
OREGON
Critical Aquifer Recharge Area Map
FIGURE 2.3
WATER SYSTEM PLAN UPDATE
Wells Serving Over 20 People
Current Camas UGA
Wellhead Protection Areas
Roads
N
0
0.5
1
Miles
Map Prepared by Parametrix, Inc.
Data Source: Clark County GIS
Path: P:\GIS\Projects\277_CamasShoreline\MXD\Camas_Wellhead.mxd
Date: 9/20/2012

2.3 Legislation, Regulations, and Permits

Water system planning is based on a careful analysis of a water utility's responsibility to comply with applicable regulatory requirements while providing service to existing and future customers. These regulatory requirements are the result of a number of state and federal laws. These laws are monitored and enforced by a number of federal, state, and local agencies.

In this section, the various state and federal legislation that may affect City operations are discussed, as well as other relevant permits, programs, and regulations.

2.3.1 Federal Clean Water Act

The Federal Water Pollution Control Act is the principal law regulating the water quality of the nation's waterways. Although originally enacted in 1948, it was significantly revised in 1972 and 1977, when it was given the common title of the "Clean Water Act." (CWA) The CWA has been amended several times since 1977. The 1987 amendments replaced the Construction Grants program with the State Revolving Fund (SRF) which provides low-cost financing for a range of water quality infrastructure projects.

A CWA Section 401 Water Quality Certification is required for any activity that may result in discharge to surface waters including excavation activities that occur in streams, wetlands, or other Waters of the United States. In Washington State, CWA Section 401 responsibility has been assumed by Ecology, and is required for projects with CWA Section 404 Permits.

Section 404 of the CWA regulates discharges of fill or dredged materials in wetlands, including any related draining, flooding, and excavation. Pipeline and pump station projects in wetlands will require a Section 404 Permits, in addition to any related local permits. CWA Section 404 Permits require Endangered Species Act (ESA), Section 7 consultation with the United States Fish and Wildlife Services (USFWS) and the National Marine Fisheries Service (NMFS) as a result of recent listings of salmonids. Biological Assessments, Biological Opinions, and their review have significantly lengthened the time required for issuance of CWA Section 404 Permits.

The Navigable Water Protection Rule (NWPR), implemented by the United States Environmental Protection Agency (USEPA) and the United States Department of the Army (Army) recognizes and outlines four clear categories of waters that are considered “waters of the United States”. These four categories protect the nation’s navigable waters and the core perennial and intermittent tributary systems that flow into those waters. These categories are territorial seas and traditional navigable waters (TNW), tributaries, lakes, ponds, and impoundments or jurisdictional waters, and adjacent wetlands.

2.3.2 Safe Drinking Water Act

The Federal 2.3.2Safe Drinking Water Act (SDWA) was passed in 1974 and amended in 1986 and 1996. The DOH adopted the federal standards under WAC 246-290, which became effective April 27, 2003. All public water systems as defined by the USEPA are affected by the SDWA. A public water system is defined as one that serves piped water to at least 25 people, or 15 connections for at least 60 days per year. The SDWA contains regulations regarding water quality, sampling, treatment, and public notification requirements that are applicable to the City. Water quality regulations are discussed further in Chapter 7.

The American Water Infrastructure Act (AWIA) was signed into law on October 23, 2018, and amended sections of the SDWA. Under Section 2013 of the AWIA, water systems serving more than 3,300 people are

required to develop or update risk and resilience assessments (RRA) and emergency response plans (ERP). An RRA looks at risks to a system and a system's resilience to those risks. An ERP covers strategies to improve system resilience as well as plans, actions, and procedures to be implemented to mitigate or lessen the impact of an emergency event. Submission cycles for RRAs and ERPs are every five years, and the deadlines are based on the size of the population served by the water system. The next five-year RRA submission cycle deadline for the City is June 30, 2026, and the ERP update deadline is December 31, 2026. It is important to note that ERP certifications are due six months from the date of the RRA certification.

2.3.3 Endangered Species Act

The purpose of the 1972 ESA is to "provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved…" In pursuit of this goal, the ESA authorizes USFWS and NMFS to list species as endangered or threatened, and to identify and protect the critical habitat of listed species. USFWS has jurisdiction over terrestrial and freshwater plants and animals such as bull trout and cutthroat trout, while NMFS is responsible for protection of marine species including anadromous salmon. Under the ESA, endangered status is conferred upon "any species within the foreseeable future throughout all or a significant portion of its range." The ESA defined critical habitat as the "geographical area containing physical and biological features essential to the conservation of species."

The Table 2.2 lists the Evolutionarily Significant Units of salmonid species present in the Camas area listed, or proposed for listing, under the authority of the ESA.

Table 2.2 Evolutionarily Significant of Listed Salmonid Species

Species	Listing Status	Date Listed
Columbia River Bull Trout	Threatened	June 1998
Lower Columbia River Chinook	Threatened	March 1999
Lower Columbia River Chum	Threatened	March 1999
Lower Columbia River Coho	Threatened	June 2005
Lower Columbia River Steelhead	Threatened	March 1998

Once a species is listed as endangered or threatened, the ESA makes it illegal for the government or individuals to "take" a listed species. "Take" has been interpreted by the federal courts to include "significant modification or degradation of critical habitat" that impairs essential behavior patterns. For species listed as endangered, the blanket prohibitions against "take" are immediate. However, threatened species may be protected through a more flexible Section 4(d) rule describing specific activities that are likely to result in a "take."

Since 2007, The City has updated its ordinance on critical areas and has adopted the Shoreline Master Program (SMP). These updates helped to clarify the specific activities in Section 4(d) and to increase the focus on migratory species.

2.3.4 Reclaimed Water Standards

The standards for the use of reclaimed water are outlined in the Revised Code of Washington (RCW) Section 90.46 and in a separate document published by Ecology and DOH entitled "Water Reclamation and Reuse Standards." Reclaimed water is "the effluent derived in any part from sewage from a

wastewater treatment system that has been adequately and reliably treated, such that it is no longer considered wastewater and is suitable for a beneficial use or a controlled use that would not otherwise occur" (Water Reclamation and Reuse Standards). The legislature has declared that "the utilization of reclaimed water by local communities for domestic, agricultural, industrial, recreational, and fish and wildlife habitat creation and enhancement purposes (including wetland enhancement) will contribute to the peace, health, safety, and welfare of the people of the State of Washington."

2.3.5 National Environmental Policy Act

The National Environmental Policy Act (NEPA) was established in 1969 and requires federal agencies to conduct environmental review or assessments of projects to determine impacts on all projects requiring federal permits or funding. If the project is determined to be environmentally insignificant, a Finding of No Significant Impact is issued, otherwise an Environmental Impact Statement (EIS) is required. City activities requiring CWA Section 404 permits fall under the jurisdiction of NEPA.

The National Historic Preservation Act (NHPA) regulates federal activities with the potential to impact materials of historic, cultural, or archaeological significance under Section 106, which requires consultation with affected Native American Tribes and the Washington State Department of Archaeology and Historic Preservation. Documentation of this consultation is included in NEPA Environmental Reports and Assessments. Recent decisions by the United States Army Corps of Engineers (Corps) require an independent NHPA Section 106 consultation process for projects permitted by the Corps, which can result in significant delays to project implementation.

The State of Washington regulates state funded projects with the potential to impact material of historic, cultural, or archaeological significance under Governor's Executive Order 05-05, which requires consultation with the Department of Archaeology and Historic Preservation and affected Tribes similar to the NHPA Section 106 process.

2.3.6 State Environmental Policy Act

The SEPA that environmental issues are taken into consideration during the planning and process for Non-Federal projects. An EIS is required if a project will have a significant adverse environmental impact. The EIS looks at potential environmental problems that would be caused by the project; ways the project could be changed to minimize the impact; and mitigation options. The City is currently pursuing alternate source of supply, which may require an EIS depending on the type of projects that are involved. Most projects, including water right applications and transfers, typically do not require an EIS. A SEPA checklist is prepared, and a Determination of Non-significance is issued instead. This WSPU will fall under the SEPA Checklist Non-Project Action requirement. The water system projects listed in the capital improvement plan will each be completed under a separate SEPA checklist. A SEPA checklist and DNS for the WSPU is indicated in Appendix B.

2.3.7 Growth Management Act

The Washington State Growth Management Act (GMA) was enacted in 1990 and requires certain local governments to plan for the population growth that will occur over the next 20 years within an established UGA. The GMA also requires cities to classify critical areas (wetlands, aquifer, recharge areas, fish and wildlife habitat areas, geologically hazardous areas, and frequently flooded areas) and to establish

development regulations to protect these areas. Clark County is updating its current plan, which will be adopted in December 2025, to extend through 2045. The update will include changes regarding population and employment growth for the next 20 years.

2.3.8 Shoreline Management Act Permit

A Shoreline Permit is required on all projects of $8,500 or more that are located on the water or shoreline area. Shorelines are lakes of reservoirs of 20 acres or greater, streams with a mean annual flow of 20 cfs or greater, marine waters, and an area within 200 feet of the ordinary high water mark. Areas within the City that are classified as shoreline are those areas along Lake Lacamas, Washougal River, Little Washougal River, and Columbia River.

2.3.9 Floodplain Development Permit

Local governments that are participating in the National Flood Insurance Program are required to review projects (including water system facilities) in a mapped flood plain and impose conditions to reduce potential damage from flood water. A Floodplain Development Permit is required prior to construction.

2.3.10 Hydraulic Project Approval

Under WAC 220-110, the Washington State Department of Fish and Wildlife requires a hydraulic project approval (HPA) for activities that will "use, divert, obstruct, or change the natural flow or bed" of any waters of the state. For City activities such as pipeline crossings of streams or outfall and intake improvements, an HPA will be required, and must include provisions necessary to minimize project specific and cumulative impacts to fish.

Because of ESA listings throughout Washington, the Washington State Department of Fish and Wildlife and the NMFS revised the Hydraulic Code to protect species listed as threatened or endangered. The revisions to the code specifically aimed to "incorporate up-to-date fish science technology, simplify the permitting of certain types of projects, improve procedural and administrative requirements to better align with statutory changes and, establish a structure for adaptive management that responds to changing science and technology and/or the results of effectiveness monitoring".

If NMFS determines that the revisions are sufficient to protect listed species, the State hopes the revised Code will constitute an accepted Habitat Conservation Plan under Section 10 of the ESA. If the Habitat Conservation Plan is approved, NMFS may issue an Incidental Take Permit allowing incidental take of a listed species if the permittee has complied with the Habitat Conservation Plan. This Incidental Take Permit expires after an agreed upon period of time, and may then be revised by NMFS.

2.3.11 Local Permits

The City has agreements with Clark County for the construction and maintenance of facilities in their respective rights-of-way. Under these agreements, an Encroachment Permit is issued that specifies construction standards such as traffic control, work hours, and safety issues, as well as design and restoration standards.

2.4 Water Rights

A water right is the legal authorization to use a specified amount of public water for a certain beneficial purpose. Washington State law requires that permission in the form of a water right permit or certificate be granted for most appropriations of public water. Water rights are issued by Ecology and are required to ensure proper allocation and management of water resources. The following sections provide definitions of key terms with regards to water rights.

2.4.1 Water Right Claim

A water right claim is a statement of claim to water use that began before the State Water Codes were adopted and is not covered by a permit or certificate. A claim may represent a valid water right if it describes the use of a surface water source that began before 1917 or the use of groundwater source that began before 1945. It can also represent a water right claim that was filed with the State during an open filing period designated under RCW 90.14 or is covered by the groundwater exemption.

2.4.2 Water Right Permit

A water right permit is issued by the State for water right applicants to begin developing their water right. A water right is developed when the applicant follows the provisions outlined in their permit such as using the water for the purposes and limits stated in the permit. A water right permit will remain in effect until the water right certificate is issued, if all terms of the permit are met, or the permit is canceled.

2.4.3 Water Right Certificate

A water right certificate is issued by Ecology to certify that the water user has the authority to withdraw a specific amount of water under certain conditions. The conditions are based on the beneficial use of the water under the water right permit. The water right certificate is a legal document recorded at the county auditor's office. Issuance of the water right certificate is the final step in obtaining a water right.

2.5 Regulatory Agencies

The above regulations, permits, and programs are administered by various local, state, and federal agencies. The history, purpose, and authority of these agencies are discussed below.

2.5.1 United States Environmental Protection Agency

The stated mission of the USEPA is to protect human health and to safeguard the natural environment upon which life depends. The USEPA's purpose includes protecting all Americans from significant human health risks, ensuring that national environmental efforts are based on the best available scientific information, ensuring that federal laws are enforced fairly, and that the environmental protection contributes to making our communities and ecosystems diverse, sustainable, and economically productive. Ecology currently administers the SRF loans for the USEPA.

2.5.2 United States Fish and Wildlife Service

Under the ESA, USFWS is responsible for the protection of all non-marine life including birds, mammals, and non-anadromous fish, including bull trout and sea-run cutthroat. Although USFWS may choose to invoke the blanket prohibitions of Section 9, the "threatened" status of Bull Trout allows more flexibility to establish regulations designed to protect these species. These regulations, known collectively as Section 4(d) rule, online activities likely to result in a "take" of a threatened species, as well as exempted activities.

2.5.3 The National Marine Fisheries Service

Under the ESA, the NMFS is responsible for the protection of marine life, including anadromous salmon such as the Columbia River Chinook, Chum, and Steelhead. When a species is listed as "endangered" the prohibitions against "take" of the species are immediate under Section 9 of the ESA of the Act. Although NMFS may choose to invoke the blanket prohibitions of Section 9, the "threatened" status of the Columbia River Chinook, Coho, Chum, and Steelhead allows more flexibility to establish regulations designed to protect these species. These regulations, known collectively as a Section 4(d) rule, outline activities likely to result in a "take" of a threatened species, as well as exempted activities. The final 4(d) Rule was adopted on June 20, 2000.

2.5.4 United States Army Corps of Engineers

Under Section 404 of the CWA, the Corps is authorized to regulate discharge of fill and dredged material to waters of the United States, including wetlands. A similar review process is employed for projects with the potential to impact navigable waters, including the Columbia River, under Section 10 of the Rivers and Harbors Act of 1899. This process applies to any work on outfalls to the Columbia River. The Corps employs a system of General or Nationwide Permits for blanket authorization of activities such as utility lines that have minimal adverse impact on the environment. In situations where projects are large and complex, or adverse impact is probable, the Corps may issue an Individual Permit after reviewing an alternatives analysis. Enforcement actions may be brought by the Corps or the USEPA. Activities subject to Corps jurisdiction require NEPA and ESA review and consultation.

2.5.5 Washington State Department of Health

DOH has three primary functions: to regularly assess the State's health needs and resources; to develop and implement sound public policy; and to ensure the capacity of public health agencies to manage daily operations and respond to public health emergencies. The DOH was granted full authority and responsibility for the regulation and enforcement of the SDWA by the federal government in 1976. DOH also publishes guidelines for the preparation of water system plans, water conservation programs, design and drinking water quality standards, and watershed control programs. Water system comprehensive plans must be reviewed and approved by DOH. Construction plans and specifications must also be reviewed by DOH unless they are the transmission or distribution improvements included in the Water System Comprehensive Plan, CIP.

2.5.6 Washington State Department of Ecology

The mission of the Ecology Water Quality Program is to protect, preserve, and enhance the State's surface and ground water quality and to promote the wise management of water for the benefit of current and future generations. Ecology performs various functions under State and federal authority and has both local and regional offices. Ecology oversees the allocation of water rights.

2.5.7 Washington State Department of Fish and Wildlife

Under the updated Hydraulic Code Rules WAC 220-660, and RCW 75.20, any form of work that uses, diverts, obstructs, or changes the natural flow or bed of any fresh water of the State requires hydraulic project approval from the Department of Fish and Wildlife. Approval would be required for all City construction projects that cross or otherwise take place in streams or shorelines.

2.5.8 Watershed Resource Inventory Area

Under WAC 173-500-040, Washington State was divided into 62 geographic areas, defined on the basis of surface water resource. These 62 geographic areas are defined as WRIA. The purpose of WRIA is to implement effective planning involving all jurisdictions that fall within WRIA, including county, city, and other local, state, and national agencies.

The City and the Jones and Boulder Creek watersheds reside within WRIA 28. The City owns and controls a majority of the Jones and Boulder Creek watersheds, Figure 1.2, which are both tributaries of the Washougal River. The City is an active participant in regional watershed planning efforts.

2.5.9 Local Health Departments

The Clark County DOH is the local health department governing the City. In general, local health departments may adopt and enforce local regulations when they are consistent with and more stringent than state regulations.

2.5.10 County Planning Policies

City planning policies should be consistent with those of Clark County. Accordingly, this WSPU will require approval by Clark County.

2.6 Related Planning Documents

The City recognizes that planning activities of governmental entities can affect the water utility. These include several regional and local plans of the southwest region of Washington, such as Clark County. Some related plans affect how Camas operates its water system and how it plans to meet future growth. The following section summarizes these related plans.

2.6.1 Clark County Coordinated Water System Plan

Amended and adopted in 2012, the CWSP serves as a primary planning document for water purveyors within Clark County. Since the adoption of the 2012 CWSP, an addendum was incorporated in 2021 to reflect a 2017 interlocal agreement between the Cities of Camas and Vancouver. This agreement adjusted

the water services boundaries and water service shut-offs provisions, as referenced in Exhibit 2 of the 2012 CWSP. The CWSP was developed to fulfill the requirements of the 1977 Public Water System Coordination Act (RCW 70.116) and the 1971 Water Resource Act (RCW 90.54). The plan is in accordance with the Lewis and Salmon-Washougal Water Resources Management Program rules (WAC 173-527 and WAC 173-528). These acts work together to create a framework for water utilities, which allows for coordinated planning and construction programs among adjacent water utilities. Also, these acts allow utilities in a specified geographical area to reserve water rights required to meet projected municipal and industrial needs for a 50 year period. In order for reservation of water rights and coordination of water system planning to occur, a CWSP is required to be developed.

A Clark County Water Utility Coordinating Committee was created in 1977 and requested that the DOH assess the need for a designation of a Critical Water Supply Service Area. Such designation represents the first step toward the development of a CWSP. The assessment, which was completed in 1980, addressed problems within the county related to inadequate water quality, unreliable service, and the lack of coordinated planning by the water utilities. Based on the findings of the assessment, the County Commissioners declared Clark County a Critical Water Supply Service Area. Following that determination, development of the 1983 CWSP was initiated.

The Coordination Act requires that the CWSP be reviewed and updated by the water utility coordinating committee, if the water utility coordinating committee feels it necessary; the last major update occurring in 2012. The update serves as the regional supplement to local water system plans that have been or will be approved by DOH.

The 2012 CWSP:

- Addresses local legislative and CWSP policies.
- Updates water utility service area boundaries.
- Requires consistent water utility design standards.
- Adopts a utility service review procedure.
- Establishes a satellite system management agency.
- Assesses water resources.
- Reviews water supplies.

The 2012 CWSP addressed recent changes to Washington State's satellite system management agency regulations and the Lewis and Salmon-Washougal Water Resources Management Program rules.

2.6.2 Clark County Comprehensive Plan (2015-2035)

In response to rapid growth and growth-related pressures in the late 1980s, the State Legislature enacted the Washington State GMA to establish a framework for comprehensive planning efforts by local governments to accommodate anticipated growth and development. Under the GMA, each county is required to adopt a comprehensive plan and to do so in consultation with its cities.

The intent of the comprehensive plan is to build on the Community Framework Plan and the 20-Year Plan revised in 1997, 2004, 2007, and 2016 to present a clear vision for Clark County's future through 2035. The Clark County Comprehensive Plan Update is anticipated to be completed by December 2025.The plan includes comprehensive planning elements addressing issues of land use, housing, rural and natural

resources, environmental goals, transportation, capital facilities and utilities, parks and open space, historic preservation, economic development, school policies and goals, community design, annexation, SMP goals and policies, and procedures for planning for a twenty-year planning horizon. For each element included there is an introduction, a discussion of that element's relationship to other elements, a description of existing conditions, estimates and projections of future needs, and goals and policies. Additionally, the plan contains strategies for implementation of these goals and policies.

The Vacant Buildable Lands Model (VBLM) is a planning tool developed to analyze residential, commercial, and industrial lands within UGA. The model serves as a tool for evaluating urban area alternatives during Comprehensive Plan updates and for monitoring growth patterns during interim periods. The most recent data available online is from 2023. However, current efforts to update the Clark County Comprehensive Plan in coordination with the cities includes more recent analyses using the VBLM. The demographic analysis and water demand projections, documented in Chapter 5, were developed based on the best available VBLM information at the time (2025).

2.6.3 Clark County Public Utilities Water System Plan

Clark Public Utilities (CPU) 2024 Water System Plan (Consor) evaluates the long-term water supply needs and resources available for CPU. The following studies and investigations are included in the CPU Plan: an inventory of existing wells, water supply systems, and interties in the County; an analysis of the population, history, and water needs to the year 2042; and supplies to serve future water needs. Future supplies are expected to come from CPU's Well 36, Carol J. Curtis and Paradise Point Wellfields.

2.6.4 Metropolitan Transportation Plan for Clark County

The Southwest Washington Regional Transportation Council is the region's principal transportation planning organization. As a means to link transportation and land use, the Council periodically produces a regional transportation plan for the metropolitan area of Clark County. The plan is developed through a coordinated process between local jurisdictions in order to develop regional solutions to transportation needs for the next 20 years and to direct the metropolitan transportation planning process.

In order to establish transportation needs over the 20-year planning period, the Council used a regional travel forecasting model. The model is based on historic and future demographic data allocated by Clark County to 2,162 individual transportation analysis zones (TAZ) within Clark County. Each TAZ was populated with 2020 and future (2040) population, household, and employment demographic data. Historic demographic data was obtained from Census 2020 and future data was based on the results of forecasts performed by the Washington State Office of Financial Management.

2.6.5 City of Vancouver Comprehensive Water System Plan

Vancouver's Comprehensive Water System Plan is updated every 10 years; most recently in 2015. The next updated plan is expected to be adopted in 2026. The purpose of the plan is to develop a planning strategy for the city's retail water service area by evaluating the existing system and its ability to meet the anticipated requirements for water source, quality, transmission, storage, and distribution over a 20-year planning period. Water system improvements were identified to meet changes in regulatory impacts, and population growth, as well as infrastructure repair and replacement. The plan also identified planning level

costs of the improvement projects and provided a financial plan for funding the projects. The plan was prepared in accordance with DOH WAC 246-290 requirements.

2.6.6 City of Washougal Water System Plan Update

The City of Washougal's WSPU was completed in 2021. The Plan states its purpose "is to document key water system information and provides analysis and recommendations that inform infrastructure development and operational decisions by City staff". This plan includes an inventory of existing facilities, establishing criteria for water system analysis and analyzing the hydraulic capacity of the system, developing a CIP based on the hydraulic analysis and developing a financial plan to fund the proposed CIP and assess existing revenue and expenses. This plan also includes an assessment of the City of Washougal's groundwater resources, water rights, and water use efficiency program." The plan was prepared in accordance with DOH WAC 246-290 requirements.

2.6.7 Salmon-Washougal and Lewis Watershed Management Plan (Lower Columbia Fish Recovery Board, July 21, 2006)

The Watershed Management Act (RCW Chapter 90.82) provides a framework to address and resolve water resource issues in each of the state's 62 WRIAs. Planning units created for each WRIA are responsible for developing a watershed plan. The planning units consist of citizens, tribes, interest groups, and government agencies where appropriate. Camas's water system boundaries and the boundaries of surrounding water providers are within the Salmon-Washougal and Lewis watersheds (WRIAs 27 and 28). The Salmon-Washougal and Lewis Watershed Management Plan (WRIA Plan) was adopted in 2006. The WRIA Plan addresses a range of issues related to water resources, including water supply, stream flow management, water quality, and fish habitat. It reviews alternative approaches for managing water resources in the area and recommends select strategies for implementation.

The Salmon-Washougal and Lewis Water Resources Management Program rules were adopted in 2008 (WAC 173-527 and WAC 173-528). These rules were based on the WRIA Plan and had five key elements:

- Setting Instream Flows.
- Closing sub-basins to future withdrawals.
- Designating "regional supply areas" for future water supply.
- Establishing reservations for water for future use, and
- Specifying conditions of use for access to the water reserves.

2.6.8 City of Camas 2019 Water System Plan Update (Carollo Engineers)

Camas' Water System Comprehensive Plan was developed to meet the City's water system needs for a 20-year planning period. The plan was prepared in accordance with DOH WAC 246-290 requirements and includes:

- A water system description.
- Historical and future water use.
- Service area population and water demand projections.
- Water quality and SDWA impacts.

- A water system analysis, including a computer simulation model.
- CIP.

The base 6-year CIP includes pipeline, pumping, control, storage, and source improvements. These improvements include the development of multiple well sites and future sources, developing or replacing storage reservoirs throughout the system, transmission and distribution improvements, and booster station improvements. New water sources will be required by the end of the planning period to provide redundant supply to its customers. The elements and the direction of Camas' plan were consistent with activities and plans of this WSPU.

2.6.9 Jones and Boulder Creek Watershed Forest Management Plan

The City Boulder Creek and Jones Creek watershed consists of roughly 1,700 acres of forest where the City collects its water. There has been minimal work done in the area to keep it managed. The largest work was in 2011 when AKS Engineering and Forestry performed a timber inventory. This document summarizes the work that was done so that the City could periodically receive timber income while still protecting and maintaining water quality. The contents consist of an assessment of existing resources, a timber harvesting plan, an access and road plan, and implementation methods, guidelines and management recommendations.

2.7 Policies, Criteria, and Standards

The City manages its water utility in accordance with established water system policies. The policies provide a consistent framework for the design, operation, maintenance, and service of the water system for appropriately implementing programs, designing new infrastructure, and serving additional customers. The policies and planning considerations set forth herein pertain solely to the water system; the City has additional land use, development, and finance policies that may specify additional requirements for development or extension of a water service.

The following documents were reviewed for this update of the City's water policies:

- The City of Camas Municipal Code (CMC).
- The City of Camas 2010 Water System Plan (2010 WSP).
- The City of Camas 2019 Water System Plan (2019 WSP).
- The City of Camas Design Standards.
- The City Draft Comprehensive Plan 2045.
- Clark County CWSP.
- Clark County Coordinated Water System Minimum Standards and Specifications. (Appendix V-A to the CWSP).
- Clark County Code.
- RCW.
- Uniform Plumbing Code.
- International Fire Code.

2.7.1 Service Policies and Standards

The service policies and standards outlined in Table 2.3 consist of policies relating to the growth, management, and service of the water system. The extension of water service to any future service area would only occur in accordance with the policies and standards detailed in this section.

Table 2.3 Service Policies and Criteria

Subject Name	Policy and Criteria	Reference	Action Items
Duty to Serve	The City will exercise reasonable diligence and care to furnish and deliver a continuous and sufficient supply of pure water to the customer, and to avoid any shortage or interruption of delivery of same The City will meet all regulatory requirements for management of its water system and provision of water to its customers, including water quality, system pressure, and adequate supply. Conserve and protect groundwater resources to provide safe, clean, high quality drinking water to residents. The City will respond to parcels requesting service within 120 days beginning on the date the applicant and water system complete a formal agreement.	CMC 13.16.010, 2025 WSP, Comprehensive Plan 2045 Policy PFS-4.8	
Government Consistency	The City's Water System Comprehensive Plan will be consistent with local, county, and state land use authorities and plans and will comply with the Washington State GMA.	2019 WSP	
Retail Water Service Area	The City will provide water service to all customers within its RWSA meeting the City's requirements.		City to update text to be consistent with Comp Plan.
Future Water Service Area	The City's future water service area shall be determined through the CWSP and adopted through the "Interlocal Agreement for Adjusting or Confirming Future Water Service Area Boundaries Between The Cities of Battle Ground, Camas, Ridgefield, Vancouver, and Washougal, and Clark Public Utilities".	2019 WSP	
Condition of Service	It is unlawful for any person, except duly authorized city employees, to make connections with any water main or water pipe belonging to the municipal water supply system, without first obtaining written permission to do so from the public works director or his designated representative.	CMC 13.32.030	
Annexation	Do not extend utilities without annexation or commitment for annexation. Exceptions may be made in cases where human health is threatened. In areas where utilities presently extend beyond City limits, but are within UGAs, plan development jointly with the County. A joint development must be consistent with City standards.	Comprehensive Plan 2045 Policy PFS-4.4	
Service to customers outside of UGA boundary	The City will continue to provide water service to [existing] customers outside of the City's UGA Boundary but within the established Water Service Area. The City is not required to provide fire flow to such customers. The City reserves the right to deny service to new customers outside the UGA that do not meet City requirements.	2010 WSP	City to review highlighted text.
Water Main Extensions	All extensions shall extend to and across the full width of the property served with water. No property shall be served with City water unless the water main is extended to the extreme boundary limit of the property line extending the full length of the front footage of the property. ▪ Extensions to water mains will be made only upon proper petitions to the City. The City shall have the right to reject such petitions or enter into contract with the petitioners under such conditions as the City may elect. ▪ All water main extensions installed, whether within or without the corporate limits of the City, shall be ~~six~~ [eight] inches in diameter or larger. ▪ All extensions of mains required to serve new customers shall be constructed at the expense of such customers. Ensure water infrastructure is designed to City standards and is in place prior to land development.	CMC 13.48.010, 2016 WSP recommended change, Comprehensive Plan 2045 Policy PFS-4.9	City to review and update "to and through" language
Oversizing	The City Council may enter into a development agreement pursuant to RCW 36.70(b).170 whereby it agrees to set aside and reserve capacity in the municipal water system for a prospective development. Such development agreement shall be permitted only if the city council makes a specific finding that the public good and general welfare will benefit by such agreement.	CMC 13.12.085 (A)	
	If in the judgment of the water department of the city, it is in the best interest of the City and of the general area where a new main is contemplated to install a larger main than that required by the immediate development, the city may install such larger main and shall pay the increased difference in cost between installation of the smaller and of the larger main. ▪ The City may participate to the extent permitted by law, through SDC credits, Local Improvement District, or other payback agreements to assist in the financing of such improvements. ▪ Water system extensions needed to serve new development shall be built prior to or simultaneous with such development, according to the size and configuration identified by the Comprehensive Water Plan as necessary to serve future planned development. ▪ The location and design of these facilities shall give full consideration to the ease of operation and maintenance of these facilities by the City. ▪ Wherever any form of City finance is involved in a water line extension, lines that promote a compact development pattern will be favored over lines traversing large undeveloped areas where future development plans are uncertain.	CMC 13.48.010 (D), 2016 WSP	City to review and update to be consistent with current practices.
Latecomer Agreements	The City may choose to allow reimbursement contracts in exchange for permission to develop and allow for reimbursement to the initial developer by future users in the area who will benefit from the system expansion. The developer must be willing to front the initial expense of system expansion.		

Subject Name	Policy and Criteria	Reference	Action Items
Satellite Management Area	The City may assume the operation of a water district or private water system within the City limit, at the water system's request, if the following conditions are met and subject to approval of the City Council: ▪ The district or private system is adjacent to or within the City's current or future RWSA as identified in the City's comprehensive plan. ▪ The assumption of the district or private system is permitted by State law. ▪ The district's or private system's facilities meet the City's performance criteria and engineering standards, or a plan is in place to assure that they will be brought up to City standards without adversely impacting City's existing customers financially or with regard to level of service. ▪ Any extension of the City's system to connect the newly accepted system will be paid for by the district or private system. ▪ The City shall require the district or private system to transfer the ownership of its water supply sources and associated water rights to the City. Water rights must be successfully transferred to the City and approved for municipal water use by Ecology prior to commitment from the City for water service.	2019 WSP	City to review and update to be consistent with current practices
Developer Extensions outside of City UGA Boundary	The City will provide water service to developer extensions outside the City's existing UGA but within the established RWSA whenever reasonably possible. Developer extensions shall adhere to the established SDC.	2010 WSP	
New Customers with Existing Wells	Developer extensions shall adhere to the established SDC and shall abandon all private wells and relinquish associated water rights to the City as a provision of the SDC. Water rights procured in this manner will be used to accommodate growth in the Retail Water Service Area.	2010 WSP	
Metering	All services to the water system shall be metered.	CMC 13.40.010 (A)	
Source Metering	All supply sources will be metered either at individual wells or at a common flow meter.	2019 WSP	

Notes:
RWSA - Retail Water Service Area.

2.7.2 Coordination with Other Agencies

Table 2.4 summarizes policies regarding the City's coordination with other agencies, which includes but is not limited to Vancouver, City of Washougal, Clark County, federal and state agencies, other public and private utilities.

Table 2.4 Coordination with Other Agencies

Subject	Policy	Reference
Coordination with Other Agencies	Coordinate with Clark County and other purveyors to eliminate private systems in accordance with the Clark County CWSP.	Comprehensive Plan 2045 Policy PFS-4.10
	Coordinate with the County and the cities of Vancouver and Washougal to protect groundwater from contamination.	Comprehensive Plan 2045 Policy PFS-4.11
Intergovernmental Cooperation	To adequately plan for growth and implement policies for the GMA, Clark County has implemented the Coordination Act which provides a legal mechanism for municipalities, special purpose districts and private water utilities to establish future water service areas within unincorporated areas.	Clark County CWSP Update 2011

2.7.3 Environmental Policies and Criteria

Table 2.5 summarizes the City's environmental policies, criteria, and goals that relate to the City's water system.

Table 2.5 Environmental Policies

Subject	Policy/Goal	Reference
SMP	Shorelines are a specifically designated environmental feature and are protected and managed by the City's SMP. Adopted in 2013, the SMP implements the Washington State Shoreline Management Act and its policies. These policies include protecting the ecological function of the state's shorelines and their associated natural resources by identifying areas for preferred uses and economic development, restoring previously impacted shorelines, and providing opportunities for the general public to have access to and enjoy shorelines.	Camas SMP 2021
Goal NE-1 Environmental Stewardship	Preserve Camas' natural environment citywide by developing a sustainable urban environment and protecting natural areas and open space, including critical areas.	Comprehensive Plan 2045
Policy NE-1.1	Support a cleanup of the Camas Mill and other contaminated sites to protect natural resources and the city's water supply.	Comprehensive Plan 2045
Policy NE-1.2	Support programs and regulations that monitor, maintain, conserve and protect water quality in Camas, including watersheds, Lacamas Lake Basin, Columbia River Basin, and Washougal River Basin.	Comprehensive Plan 2045
Policy NE-1.4	Support and implement actions identified in adopted plans, including adaptive management of natural resources that is consistent with best available science and climate guidance to improve climate resiliency.	Comprehensive Plan 2045
Policy NE-1.5	Protect and restore natural resources, valuable historic and cultural areas, climate refugia, habitat areas and corridors to provide biological and hydrological connectivity that fosters resilience to climate impacts.	Comprehensive Plan 2045

Subject	Policy/Goal	Reference
Policy NE-1.6	Create and support natural resource management plans that consider climate change impacts and guide adaptive management.	Comprehensive Plan 2045
Policy NE-1.7	Include immediate and long-term environmental impacts in the policy and regulatory decision-making process. Identify and quantify the ecosystem services benefits of natural systems and include these natural capital assets in cost-benefit assessments for community and development planning.	Comprehensive Plan 2045
Policy NE-1.9	Regulate land use and development to protect natural topographic, geologic, vegetative, and hydrologic features of undeveloped properties.	Comprehensive Plan 2045
Policy NE-1.10	Promote soil stability and minimize and control soil erosion using best management practices, best available science, ecologically sustainable site design, natural drainage systems and protection of existing native vegetation.	Comprehensive Plan 2045
Policy NE-2.1	Use best management practices and best available science to preserve, protect, and restore the biological health and diversity of Camas' critical areas.	Comprehensive Plan 2045
Policy NE-2.2	Preserve and restore aquatic and riparian habitats consistent with applicable regulations.	Comprehensive Plan 2045
Policy NE-2.4	Ensure that development throughout the City meets or exceeds standards and practices for long-term wetland protection and mitigation.	
Policy NE-3.1	Adopt the goals and policies as outlined in the current Camas Shoreline Master Program.	Comprehensive Plan 2045
Goal NE-3 Shorelines	Use the full potential of shoreline in accordance with the opportunities presented by their relationship to the surrounding area, their natural resource values, and their unique aesthetic qualities offered by water, topography, and views. Develop a physical environment that is both ordered and diversified, and which integrates water and shoreline uses while achieving a net gain of ecological function.	Comprehensive Plan 2045

2.7.4 System Reliability and Maintenance Policies and Standards

Table 2.6 outlines the City's maintenance standards and policies, as well as system reliability policies.

Table 2.6 System Reliability and Maintenance Policies and Standards

Subject	Policy/Standard	Reference
Water Shortage Response Plan	The City created a City ordinance CMC Chapter 13.14. This allows the City to promote the public interest by conserving the city's water supply in order to protect the health, welfare and safety of water users. To accomplish this declared purpose, the city reserves the right to exercise its police powers through emergency measures as set forth in this chapter.	2019 Camas WSP
Water System ERP	The City has a Disaster Manual, which identifies the emergency response functions within the City using an "all hazards" approach. Within the City's emergency response framework, the City has developed a Water System ERP which describes alternative operations for the interruption of each major water supply facility (i.e., loss of a well, reservoir, or booster pump station).	2019 Camas WSP
System Maintenance	The City proactively operates and maintains its water system as an effective means of system management. The City has an O&M manual which gets updated regularly and adds material as necessary. The manual provides detailed information on operator certification and training, water quality monitoring, operation and control, cross-connection control, and emergency planning/response.	2019 Camas WSP

Subject	Policy/Standard	Reference
Cross Connection	The control or elimination of cross-connections shall be in accordance with the rules and regulations of the Washington State Board of Health regarding public water supplies, WAC 248-54-285 as it now exists or as it may hereinafter be amended, and with any requirements set forth by the "U.S. EPA" as authorized by the "SDWA" PL 93-523, as it presently exists or as it may hereinafter be amended, and with any manual of standard practice pertaining to cross-connection control approved by the public works director or his designated representative.	CMC Section 13.32.04 Cross Connection Control or elimination
Pump Station Redundancy	With the largest pump in each booster pump station out of service, the remaining pumps should provide MDD whole concurrently replenishing fire suppression storage within 72 hours.	2019 Camas WSP
Pump Station Reliability	Wells and booster pumps with back-up power should be capable of supplying max day demand for the water system while concurrently replenishing fire suppression storage within 72 hours.	2019 Camas WPS
Supply Reliability	Wells should be capable of supplying MDD for the water system while concurrently replenishing fire suppression storage within 72 hours	2019 Camas WPS
Supply Redundancy	Largest source out of service	2019 Camas WSP

Notes:
MDD - max day demand.

2.7.5 Financial Policies

The City's financial policies related to the Water Utility are summarized in Table 2.7

Table 2.7 Financial Policies

Subject	Policy	Reference
Combined residential and commercial uses	Where a single service is provided to a combination of residential and commercial uses, the commercial rates shall be charged for all water and sewer service.	CMC Section 13.36.030
Monthly service charge and rate for automatic sprinkler systems	The monthly flat-rate charge for automatic sprinkler systems with fire hydrants and for standpipes in conjunction with fire protection shall be as provided in CMC Section 13.36.010.	CMC Section 13.36.040
Connection charges	1. Charges for connection to the city water system including setting the meter, installing a service line and tapping the water main shall be computed as follows: a. Except as hereinafter provided, the connection charge shall be the cost of materials, the labor costs for city personnel billed at then existing rates for such personnel, and any fees or charges that were necessary to be paid to third parties in order to make such connection. b. For installing a water meter for services one inch or smaller, the connection charge shall be as per the fee schedule established by the city council per resolution. c. For installing a water meter, service line, and tapping the water main for a service one inch or smaller, the connection charge shall be as per the fee schedule established by the city council per resolution or the actual cost to the city calculated in accordance with subsection (A)(1) of this section, whichever is greater. 2. There shall be no charge for connecting a sprinkler system to a water main for fire protection other than the installation cost of the same, providing that such system shall include a detector to record water usage.	CMC Section 13.36.050
Temporary water service	For temporary irrigation or commercial hydrant use, all connections shall pay a deposit as per the fee schedule established by the city council per resolution, with the nonrefundable amount established as per the fee schedule established by the city council per resolution. Water usage shall be deducted from the deposit of the then current applicable commercial rate per Section 13.36.010 of this chapter. The city reserves the right to remove the meter for nonuse or misuse at its discretion. Any remaining deposit will be returned to the applicant, or the remaining balance will be billed to the applicant. The applicant shall notify the city when use is complete. The applicant will be responsible for any damage to the equipment, and shall be invoiced for repairs or replacement of the equipment.	CMC Section 13.36.060
Utility charge – Governmental Users	The following designated governmental users shall pay for water and sewer utilities as follows: 1. Rental by the Camas fire department of all fire hydrants within the city shall be as per the fee schedule established by the city council per resolution. 2. Rental of fire hydrants, per hydrant, outside the limits of the city by any other municipality or fire district shall be as per the fee schedule established by the city council per resolution. 3. All other utility services for governmental users shall be charged at the regular meter rate.	CMC Section 13.36.070
Meters – Installation – Reading – Accuracy	1. All services to the water system shall be metered. 2. All meters up to and including one inch in size will be owned, installed and maintained by the city water department. Meters larger than one inch shall be paid for by the customer. All services shall have the meter installed before the service is connected. The type and make of all meters purchased and paid for by any customer or applicant must be approved by the water superintendent before being installed. 3. The city will not furnish or read auxiliary or submeters used for the customer's convenience. 4. The city will keep an accurate account on its books of the reading of meters, and such account, so kept, shall be offered at all times, places and courts as prima facie evidence of the use of water service by the customer, and shall be the basis on which all bills are calculated. 5. Should any meter fail to register correctly the use of that part of the water service which the meter should properly register, the service shall be estimated by the city from a corresponding period. 6. The city will, upon written request, test any customer's meter, and where circumstances require, adjust for wrong charges for a period not to exceed three months' previous. 7. When a customer requests a meter test, a deposit as per the fee schedule established by the city council per resolution to cover the cost of the test may be required of the customer. 8. The amount so deposited will be returned to the customer if the meter is found upon test to overregister more than two percent under conditions of normal operation. 9. A customer shall have the right to require the city to conduct the test in his presence, or if he so desires, in the presence of an expert or other representative appointed by him. 10. All meters will be tested before installation, and no meter will be placed in service or allowed to remain in service which is known to have an error in registration in excess of two percent under conditions of normal operation. 11. For the purpose of making charges, all meters serving the customer's premises will be considered separately, and the readings will not be combined, except that where the city, for operating necessity, elects to install two or more meters instead of one at a central location to service the customer's premises, the readings of two or more meters will be combined for the purpose of making charges. 12. The location of the meter or meters used in measuring the customer's use of water must be in a place satisfactory to the city before service will be supplied. Ordinarily, this site shall be the property line and curb. Where meters are at present or may be installed within a building, the city will not be held responsible for damage from water seepage through the wall, nor for damage from leaking meter, pipe or fittings. 13. No rent or other charge whatever shall be made by the customer against the city for placing or maintaining meters upon the customer's premises. 14. If a meter underregisters the amount of water due to tampering with the meter, and/or piping, or in any other way causing underregistration, the service may be discontinued and will not be reconnected until the customer immediately makes the necessary corrections in his own water lines to prevent further damage to the city's meters. 15. Meter readings are to be averaged during any period when it will be impossible or impracticable to read any meter on the regular reading date. 16. It is unlawful to place any material on or to otherwise obstruct any water meter. a. Separate water meters shall be installed for each dwelling unit in a townhouse, condominium or other multifamily dwelling configuration where individual dwelling units are separately owned. Single meters may be installed to serve multifamily residential structures when said structures and the units therein remain under a single ownership. b. Water connection shall be charged beginning on the date of installation. All connections will be billed continuously for the base charge even during periods of non-use, including vacancy and disconnection for nonpayment.	CMC Section 13.40.010
Meter – Reading	1. Meters shall be read as nearly as possible at regular thirty-day intervals or sixty-day intervals, and the bill rendered will be based on consumption to the nearest hundred cubic feet. 2. Other than regularly scheduled reading of water meters, water meters may be read by the city on the day a notice of change of tenancy or ownership is delivered to the city or as close as possible to such day as required in CMC 13.44.040.	CMC Section 13.40.020
Meter – Multiple - Determination	When one customer is served by more than one meter on separate service lines, the minimum for each service or the meter minimums for each meter and the surcharges for water supplied may be calculated and billed separately.	CMC Section 13.40.030

Subject	Policy	Reference
Meter – Shared - Liability	When more than one family, business or other customer receives water through one service line in one building and it is found impractical to separate the water piping for each customer, the owner of the premises shall be responsible for payment of all water served to the premises. In the event of a delinquent bill where several consumers receive water from a common service, the water superintendent shall not cause the service to be shut off until ten days after mailing written notice of such fact to all the joint consumers and owner of the premises.	CMC Section 13.40.040
Meter – Shared – Notice to separate service - Shutoff	When two or more houses, buildings or other premises occupied by separate consumers are supplied from a single-service connection, the owner or owners shall immediately, upon notice from the water superintendent, separate each customer's line and connect up to individual services and if separate services are not established within a reasonable time thereafter, the service shall be shut off and further service refused. The joint service may, however, be continued at the option of the water superintendent, providing one owner is responsible and agrees to pay the total water bill for both premises. Computation of the total bill for the services shall be by adding the total of the separate use classifications of the premises.	CMC Section 13.40.050
Charges – Meter service – Billing intervals	1. All residential and most commercial water services shall be billed at regular intervals and shall be due and payable on the twenty-first day of each month following billing. Such billings shall be delinquent on the twenty-sixth day of the month following billing. 2. All industrial and some commercial services shall be charged monthly and shall be due and payable on the tenth day of each month following billing. Such billing shall be delinquent on the eighteenth day of each month following billing. 3. A customer shall be charged the sum as per the fee schedule established by the city council per resolution for each nonsufficient fund check, or a check written on a closed account and returned by the bank to the city. 4. There shall be a penalty on all delinquent accounts assessed at the rate of five percent of the outstanding balance.	CMC Section 13.44.010
Billing liability – rental properties	1. The record owner of any real property provided utility services by the city shall be and act as the sole customer of the city. All utility services provided to the real property shall be the responsibility of the record owner of the subject property. The city shall not be responsible for unpaid billings resulting from tenants moving in or out without paying charges due, nor the collection thereof, and said charges shall be a lien on the real property until paid. 2. Except as hereinafter provided, all billings for utility services provided by the city shall be mailed to the record owner of the subject property at the record owner's address. In the event that billings are sent to a tenant or agent of the owner, the billing will become the responsibility of the tenant or agent as well as the property owner, and each can be held jointly and severally liable for such billing. 3. In the event a record owner requests billings of non-owner occupied real property be mailed to an address other than that of the record owner, including, but not limited to, any management company or to the premise address, the record owner must complete, sign, and have notarized a form provided by the finance department agreeing to the regulations and provisions associated with the request for an exception. Such form shall provide in part that the record owner agrees to be responsible for any prorating of utility billings between any tenants or lessees, any utility billings which remain unpaid, and any disconnect charges otherwise imposed pursuant to the Camas Municipal Code that may be due in the event of any delinquency associated with any tenancy.	CMC Section 13.44.015
Nonpayment—Shutoff—Hearing—Disconnection fees.	1. Whenever any charge for furnishing water and/or sewer services to any premises is not paid in full by the twenty-sixth day of the month following billing, the finance department shall give notice to the person or persons billed for such services at the address shown in the city's billing records of the city's intent to discontinue service if payment is not made. Such notice shall contain the following information: a. The amount of the charges owing. b. A statement that the person billed may request a hearing to contest the amount or validity of the charges. c. A statement that if the charges are not paid in full or a hearing requested within ten days of the notice, the city will disconnect the service of water to such premises. 2. The notice of intent to disconnect shall also contain a request for hearing form to be utilized by any person desiring to contest the amount or validity of such charges. Any person desiring such a hearing shall file the request for hearing with the finance department within ten days of the date of the notice, and shall accompany such request with a tender of the amount of charges billed. Failure to file a request for hearing and tender the amount of charges owing within such time limit shall be deemed a waiver of the right to a hearing. 3. In the event the charges are not paid, or a hearing requested accompanied with a tender of the amount owing within 10 days of the date of the date of the notice, or if the customer's check is tendered and then is returned unpaid by the bank, then the city shall proceed to disconnect the water service to the premises. 4. In the event a hearing is requested, the amount tendered by the customer shall be deposited into the customer account. If all or a portion of the charges are found not to be owing, such amount shall be refunded to the customer or credited to the customer's account. 5. Whenever a disconnection is made at the owner's request, the sum as per the fee schedule established by the city council per resolution shall be charged for the cost of disconnecting. Whenever a disconnection is made for nonpayment, the sum as per the fee schedule established by the city council per resolution shall be charged for disconnecting. 6. If service personnel is required to go to the premises for the purpose of disconnecting the service for nonpayment, the disconnection fee shall be charged even if the service has not been physically disconnected. 7. There shall be an additional charge as per the fee schedule established by the city council per resolution for each time a service is found wrongfully or illegally reconnected after being disconnected for nonpayment. 8. If a meter or spacer must be removed, padlocked, or other means used to prevent illegal reconnection of a service, then there shall be an additional charge as per the fee schedule established by the city council per resolution for removal of such meter or spacer 9. All disconnection charges and outstanding obligations for water and/or sewer furnished to such premises must be paid in full prior to reconnection. 10. If a customer's meter has been turned off for nonpayment and the customer requests reconnection after the hours of five p.m. or on a weekend or holiday, the customer shall be charged an additional turn-on fee as per the fee schedule established by the city council per resolution.	CMC Section 13.44.020

Subject	Policy	Reference
Adjustments for broken pipes	When a property owner, in any given billing period because of a broker water pipe on the owner's premises, has used, according to the meter, a quantity of water which is more than double the most recent average without leak as set forth in Section 13.64.060(A), a written application may be made to the finance director for a reduction in said billing. If the application states that the main underground service line between the meter and house or inside a crawlspace was broken on the owner's premises which caused the large consumption of water, and it is established that such broken pipe has been repaired and documentation in the form of a bill from a certified plumber or receipt for parts is attached, the finance director shall authorize a credit to such billing as follows: 1. Average water consumption will be determined by the customer's most recent winter average without leak as set forth in Section 13.64.060(A). Customers with no winter average will have the most recent two meter reads without leak used to define an average. Customers with no prior billing, or whose prior reads are zero, will use the city's default as set forth in Section 13.64.060(B). 2. The average consumption will then be deducted from the consumption which occurred at the time of the broken water pipe. 3. A credit shall be permitted only once per customer account in a five-year period. The credit shall apply to a single billing cycle and only up through the day of repair. No additional credit shall be given for a delay in repair of pipes beyond one billing period. 4. The reduction provided for by this section shall not be allowed if such excess water consumption is due to the owner's neglect or failure to repair the water system of the premises. A reduction shall not be permitted if such excess consumption is due to leaking faucets, other plumbing fixtures or irrigation systems.	CMC Section 13.44.030
Service termination	1. Each customer about to vacate any premises supplied with water service by the city shall give notice of their intended removal at least two days prior thereto; specifying the date change-in-ownership or tenancy actually occurred, otherwise, they will be responsible for all water supplied to the premises until the city water department has notice of such removal. 2. At the time specified by the customers of the termination of the service, a reading of the water meter will be made and a bill shall be rendered based on the proportionate days of usage.	CMC Section 13.44.040
Water System Development Charges	13.52.010 - Purpose. Pursuant to the authority conferred upon cities and towns by RCW 35.92.025, the city council of the city finds that property owners who seek to connect their property to the water works system of the city should be assessed a charge in order that such property shall bear its equitable share of the cost of the water works system. The city council further finds that the charge should be based upon the property owners' anticipated use of the water works system as related to the historical cost of the water works system's capacity available to meet their demands. It is the intent of the city council that the charge imposed by this chapter shall be derived from the historical cost of the system as measured by the undepreciated value of the water works system and plant in service at the time the charge is imposed and the projected cost of additions to the system to meet new demands. The charge imposed by this chapter shall be denominated a "water system development charge" and shall be in addition to any water connection, installation, or permit fees imposed by other ordinances of the city. 13.52.020 - Definitions. Unless otherwise specifically defined, the terms used in this chapter shall have the following meanings: 1. "Accessory dwelling unit" means one or more rooms with a private bath and kitchen facilities comprising an independent, self-contained dwelling unit within or attached to a single-family dwelling or in a detached building on the same lot as the primary dwelling unit. An accessory dwelling unit is distinguishable in that it is clearly subordinate to the primary dwelling unit, both in use and appearance. 2. "Industrial or unusual requirement customer" means that use classification of a nonresidential property owner who uses a meter equal to or greater than three inches in size and has a non-standard peak flow, uses a significantly large daily volume of water that is in excess of the City's typical commercial customer, or who otherwise have an unusual water usage pattern. 3. "Water system" means all facilities for collecting, transporting, pumping, treating and providing water. 13.52.030 - Imposition. 1. Except as provided herein, there is imposed on all properties in the city and all properties outside the boundaries of the city that connect to the water system of the city a water system development charge, which charge shall be assessed in accordance with the rates set forth in Section 13.52.070. 2. There shall be no water system development charge imposed for the installation of an additional meter installed to an existing residential customer service line which meter is installed for irrigation purposes. 3. Property owners that install a residential fire sprinkler system, which requires that the water meter size be increased to make the fire sprinkler system operational, shall not be charged the increased system development charge for the larger meter. 13.52.040 - Credits. 1. Development credit: a. A developer (as defined in CMC 3.88.030.K) shall be entitled to a credit against the applicable system development charge for the dedication of land or for the design or engineering or construction of an "eligible improvement". For purposes of this section, an eligible improvement shall mean an improvement or real property that is: required as a condition of development approval; identified in the water system plan or capital improvement plan; and included in the current system development charge calculation as being funded by system development charges. b. The amount of the credit shall be the dollar amount assigned to the improvement or to the land in the system development charge calculation. Where only a portion of the improvement is constructed, or a portion of the land is dedicated, the amount of the credit shall be pro-rated. c. Credits earned for one category of system development charge, e.g. water, may not be applied against a different system development charge, e.g. sewer. d. Approval from the city council shall be required prior to the start of construction or dedication of any eligible improvement. "Approval" in the context of this subsection shall be satisfied if the city requires the construction or dedication of the eligible improvement as a condition of approval for a land use application. If a developer wishes to construct an eligible improvement that is not otherwise a condition to an approved land use application, prior approval must be obtained from the city council. No system development charge credit shall be granted until either the eligible improvements have been designed, engineered, or constructed by the developer, and such work has been accepted by the city; or until the land has been dedicated by the developer and such dedication has been accepted by the city. e. If system development charges become due and payable prior to the developer becoming eligible for the issuance of credits as provided in section (4), the developer may apply to the public works director to defer collection of the charges until construction or dedication is completed. The public works director may condition deferral upon: i. The developer posting a bond or other financial security satisfactory to the city in an amount equal to one hundred twenty-five percent (125%) of the deferred system development charges, which bond or other financial security shall be conditioned upon the developer either paying the deferred system development charges or completing construction or dedication within a specified time, ii. The withholding of an occupancy permit. iii. Such other conditions acceptable to the city. f. If the developer is dissatisfied with the decision of the public works director, the developer may seek to have that decision reviewed by the city council	CMC Chapter 13.52

Subject	Policy	Reference
	2. Upon acceptance of the eligible improvement, the developer may submit an application for the system development charge credit to the public works department. After submission of the application and verification of entitlement thereto, the public works director shall submit to the City Council for concurrence. Upon ratification, the finance department shall issue a credit voucher to the developer specifying the amount of the system development charge credit and the type of credit. 3. The credit may, at the option of the developer, be applied all or in part to the system development charges owing for the developer's project. 4. To the extent the credit exceeds the amount of the system development charges owed by the developer, or the developer chooses not to apply the credit to the developer's project, the unused credit may be applied to a different project of the developer or to the project of a different developer. 5. Before the system development charge can be transferred to a different project or a different developer, the holder of the system development charge credit shall file with the finance department an application to transfer the credit on a form to be created by the finance department. The application shall identify the transferee, and the amount of the system development charge credit being transferred. The transfer application shall be accompanied by an administrative fee in an amount as may be set by resolution of the city council. 6. When credits are to be redeemed, the holder of the system development charge credit shall file an application for redemption on a form to be created by the finance department. Redemption shall be permitted only in increments equal to a whole system development charge, or when redemption will exhaust the entire system development charge credit. The application for redemption shall be accompanied by an administrative fee in such amount as may be set by resolution of the city council. When system development charge credits are being redeemed, such redemption shall not allow for system development charge credits to be pro-rated among more than one residential lot in amounts that are less than the existing system development charge per lot. For example, where system development charges are five thousand dollars per residential lot and a developer wishes to redeem eleven thousand dollars' worth of credits, the developer shall not be allowed to apply one thousand dollars per residential lot over eleven lots. The developer may apply five thousand dollars to two residential lots and the remaining one thousand dollars to one residential lot. 7. The finance department shall be responsible for maintaining appropriate records documenting the issuance, transfer, and redemption of system development charge credits. 8. Expiration of credits. Any credits issued after the effective date of this ordinance shall expire and become null and void ten years from the date of approval of the original credit by the city council. Transfer of credits or partial use of credits shall in no event extend the expiration date of those credits. 13.52.050 - Accessory dwelling units. 1. There shall be no water system development charge for connection of accessory dwelling units to the city water system. 13.52.060 - Application for connection—Use classification of property. 1. Any property owner seeking to connect his property to the water system of the city shall file with the city an application to be on a form provided by the city. The application shall contain the name and address of the property owner, the location of the property to be connected to the water system, the nature of the structure to be constructed on the subject property, the proposed use of the subject property, and any relevant information deemed necessary by the city to process the application. 2. Upon receipt of the completed application, the applicant shall then be informed by the city of the amount of the water system development charge, which shall be based upon the use classification of the property and shall be in accordance with the rates set forth in section 13.52.070. 13.52.070 - Rates. 1. The rates for water system development charges shall be determined based on the meter size installed as set forth in Table 13.52.070. 2. The water system development charge shall be indexed yearly on January 1st to address inflation based on the Engineering News Record Construction Cost Index for the City of Seattle. Effective January 1, 2020, and annually thereafter, the water system development charge shall be adjusted pursuant to the adopted cost index as set forth herein. 3. The water system development charge for properties classified as industrial or unusual requirement customer shall be based on a separate engineering study completed by the applicant and approved by the city. The factors used in the study to determine the system development charge shall include the size of meter, the average and peak volumes of water used by the customer, seasonal variations, the calculated meter customer equivalents as compared to the city's current system development charge calculation and other pertinent factors deemed necessary by the city. 13.52.080 - Payment of water system development charge. 1. The water system development charge owing under the provisions of this chapter shall be paid by the applicant at the time of issuance of the plumbing permit or building permit, whichever shall first occur, or as scheduled by a separate agreement with the city. The amount of the charge shall be based on the system development charge in effect at the time of permit application. 2. No water service shall be furnished to the property of any person seeking to connect to the water system of the city until the water system development charge imposed by this chapter has been paid to the city or until such time as the city and the applicant have entered into a separate agreement providing for the payment of such water system development charge. 13.52.090 - Revenue disposition. 1. All revenues collected pursuant to this chapter shall be paid into the water and sewer capital reserve fund and shall be used for the purpose of financing system improvements. Such revenues shall not be used to offset current operation or maintenance costs. 13.52.100 - Appeals. 1. Any applicant aggrieved by the amount of the water system development charge found by the city to be required under the provisions of this chapter, may appeal to the board of adjustment from such finding by filing a written notice of appeal with the city clerk within twenty days from the time such property owner is given notice of such amount. The chairman of the board of adjustment shall cause a notice of the time and place of hearing to be mailed to the applicant. At such hearing, the applicant shall be entitled to be heard and to introduce evidence on his own behalf. The board of adjustment shall thereupon ascertain the correct amount of the water system development charge, and the city clerk shall immediately notify the appellant thereof, by mail, which amount, together with the costs of appeal, if appellant is unsuccessful therein, must be paid within ten days after such notice is given. 2. The chairman of the board of adjustment may, by subpoena, require him to produce any pertinent books and records. Any person served with such subpoena shall appear at the time and place therein stated, and shall produce the books and records required, if any, and shall testify truthfully under oath administered by the chairman in charge of the hearing on appeal, as to any matter required of him pertinent to the appeal, and it is unlawful for him to fail or refuse to do so.	

2.7.6 Design Standards

Table 2.8 describes the City's general design standards associated with the management of the water utility and design of the water system.

Table 2.8 General Design Standards

Subject Name	Standard	Reference
Pipeline Material	Water mains shall be ductile iron.	City of Camas Water Details Water Construction Notes
Minimum Pipeline Size	Water mains shall be 8-inch diameter minimum line size. Larger line sizes may be required.	City of Camas Water Details Water Construction Notes
Valve Spacing	Valves are to be installed at all branches, for long main runs, inline valve spacing not to exceed 500 feet.	City of Camas Water Detail No. W13
Fire Hydrant Spacing	Fire hydrant spacing number and spacing shall be minimum 500 feet spacing and based on International Fire Code Appendix C, Table C.102.1.	City of Camas Code of Ordinances Chapter 17.19.040, Section C.4.a.
Fire Hydrant Specification	Hydrants shall be designed per standard detail No. W11.	City of Camas Water Detail No. W11
Looping	Water mains shall be looped wherever possible. Keep dead ends to a minimum.	City of Camas Water Details Water Construction Notes and Detail No. W13

2.7.7 Distribution System Criteria and Standards

The City's distribution system criteria and standards are summarized below in Table 2.9.

Table 2.9 Distribution System Criteria and Standards

Subject Name	Standard	Reference
Supply Components and Government Criteria	Following the Washington State DOH storage volume requirements (WAC 246-290-235(3)) and the WSDM, Chapter 9, the five components of storage listed below and illustrated in Figure 9.6 must be considered for any water system: 1. Operational storage. 2. Equalizing storage. 3. Standby storage. 4. Fire Suppression storage. 5. Dead storage.	2019 WSPU
Standby Storage	Following the Washington State DOH storage volume requirements (WAC 246-290-235(3)) and the WSDM, Chapter 9, the five components of storage listed below and illustrated in Figure 9.6 must be considered for any water system: 1. Operational storage. 2. Equalizing storage. 3. Standby storage. 4. Fire Suppression storage. 5. Dead storage.	2019 WSPU

Subject Name	Standard	Reference
Service Pressure and Fire Flow	The distribution system was evaluated for the following criteria, which match the requirements of the DOH WSDM and WAC 246-290. 1. PHD Pressure. a. Minimum allowed pressure is 30 psi during PHD. 2. Available Fire Flow. a. While delivering the required fire flow during MDD conditions, system pressures must remain above 20 psi.	2019 WSPU
Maximum Pipeline Velocities	Water main non-fire condition maximum velocity is limited to 8 feet per second according to the DOH WSDM	DOH WSDM
Minimum System Pressure	In accordance to the DOH WSDM, the City must design a water system to provide PHD while maintaining a minimum pressure of 30 psi throughout the distribution system (WAC 246-290-230(5)).	DOH WSDM
Excess Pressure	Excessive water system pressure can increase the risk of pipe failure and result in increased distribution system leakage. Working pressure in the distribution system should be limited to 80 psi unless the design engineer can justify the need for higher pressure (to reduce capital and/or pumping costs, increase fire flow reliability, or for other reasons), and verify that the pipe material is appropriate for the design working pressure.	DOH WSDM

Notes:
PHD - peak hourly demand; psi – pounds per square inch; WSDM - Water System Design Manual.

CHAPTER 3 EXISTING SYSTEM

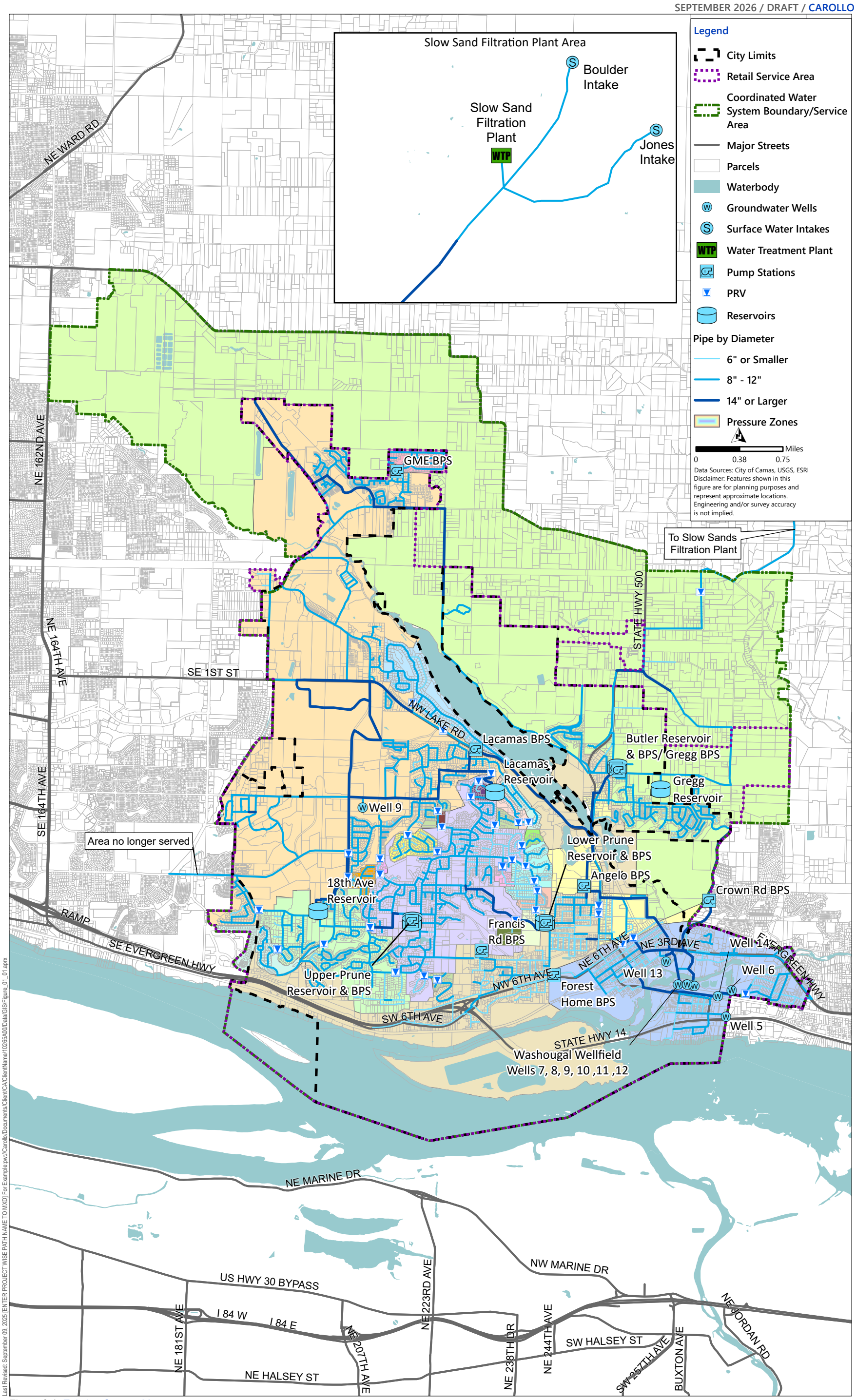
3.1 Introduction

The City owns and operates a multi-source municipal water system (DOH) System Number 108002), which includes supply, treatment, storage, and distribution of potable water to residential and non-residential customers. Service is provided to customers across 26 pressure zones (PZ). The locations of PZ and key elements of the water system are shown in Figure 3.1. A detailed hydraulic profile of the City's water system, including each PZ are shown in Figure 3.2A and Figure 3.2B. A simplified hydraulic profile showing only key facilities and PZ is shown in Figure 3.3. This chapter reviews all of the system components incorporated in the water supply system and provides a brief summary of each facility as shown below:

- PZ.
- Sources of Supply.
- Water Treatment.
- Storage Facilities.
- Transmission and Distribution Facilities.
- BPS.
- Interties.
- SCADA.

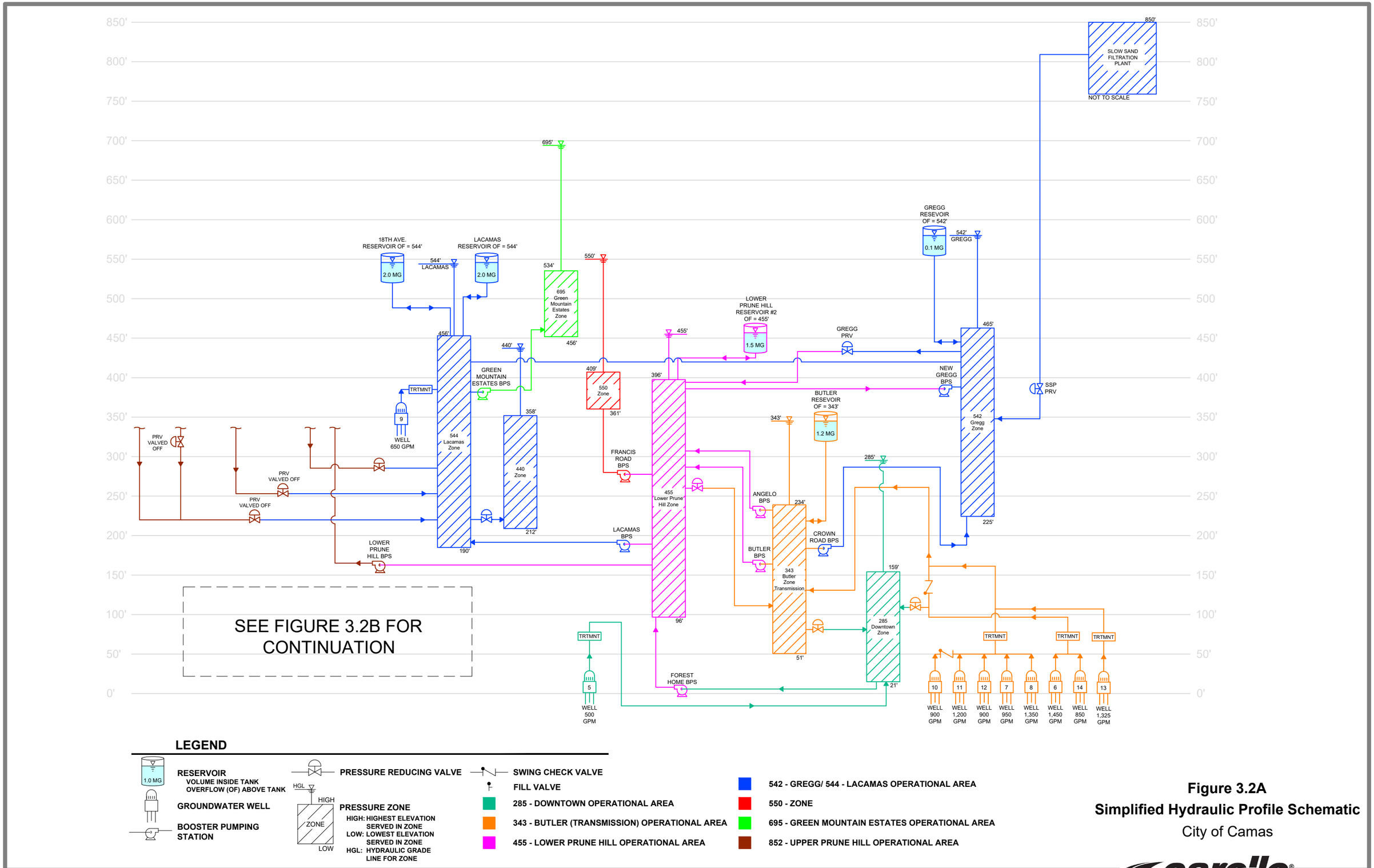
3.2 Pressure Zones

The City's water system has 26 distinct PZ. The hydraulic profile shown in Figure 3.2A and Figure 3.2B displays how PZ are connected and illustrates water moves throughout the system between each pressure zone. Although the system has 26 distinct PZs, not all of them have separate storage facilities. A PZ that does not have a storage reservoir located in it is classified as a "closed" PZ, while a PZ that does have a storage reservoir is classified as an "open" PZ. Zones that are served by a pressure reducing valve (PRV) from a PZ with gravity storage are also classified as an "open" PZ. Table 3.1 describes each PZ, noting minimum and maximum elevations served within each zone and boundaries for each PZ are delineated in Figure 3.4.



Last Revised: September 09, 2025 [ENTER PROJECT WISE PATH NAME TO MXD] For Example:pw://Carollo/Documents/Client/CA/ClientName/10265A00/Data/GIS/Figure_01_01.aprx

Figure 3.1 Existing System Map



LEGEND

- RESERVOIR — VOLUME INSIDE TANK; OVERFLOW (OF) ABOVE TANK (1.0 MG)
- GROUNDWATER WELL
- BOOSTER PUMPING STATION
- PRESSURE REDUCING VALVE
- PRESSURE ZONE — HIGH: HIGHEST ELEVATION SERVED IN ZONE; LOW: LOWEST ELEVATION SERVED IN ZONE; HGL: HYDRAULIC GRADE LINE FOR ZONE
- SWING CHECK VALVE
- FILL VALVE
- 285 - DOWNTOWN OPERATIONAL AREA
- 343 - BUTLER (TRANSMISSION) OPERATIONAL AREA
- 455 - LOWER PRUNE HILL OPERATIONAL AREA
- 542 - GREGG/ 544 - LACAMAS OPERATIONAL AREA
- 550 - ZONE
- 695 - GREEN MOUNTAIN ESTATES OPERATIONAL AREA
- 852 - UPPER PRUNE HILL OPERATIONAL AREA

Figure 3.2A
Simplified Hydraulic Profile Schematic
City of Camas

carollo

Fig_3.3-3.2A-3.2B.dwg
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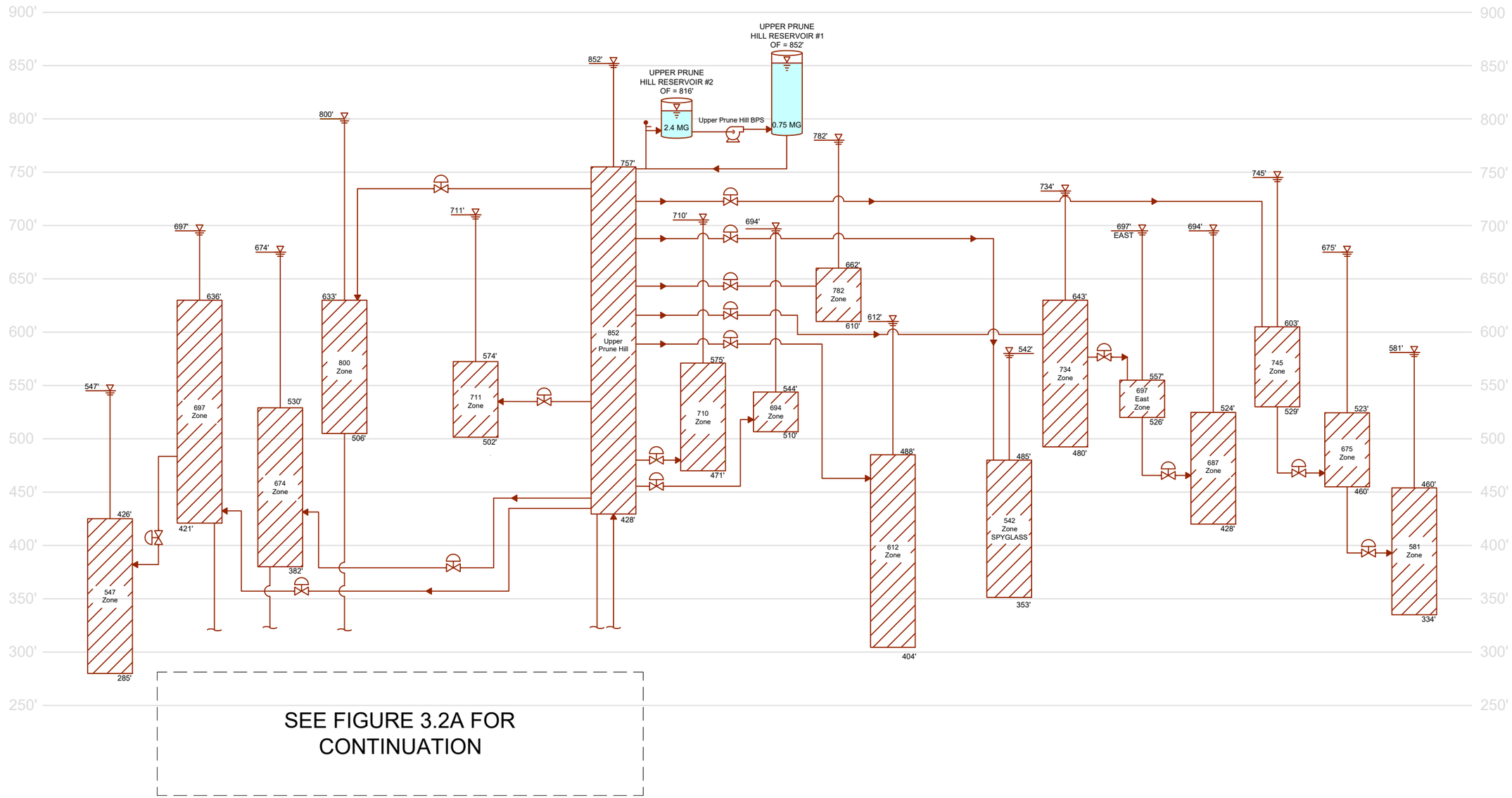

SEE FIGURE 3.2A FOR CONTINUATION

LEGEND

- **RESERVOIR** — VOLUME INSIDE TANK; OVERFLOW (OF) ABOVE TANK (1.0 MG)
- **GROUNDWATER WELL**
- **BOOSTER PUMPING STATION**
- **PRESSURE REDUCING VALVE**
- **PRESSURE ZONE** — HGL; HIGH; ZONE; LOW
  - HIGH: HIGHEST ELEVATION SERVED IN ZONE
  - LOW: LOWEST ELEVATION SERVED IN ZONE
  - HGL: HYDRAULIC GRADE LINE FOR ZONE
- **SWING CHECK VALVE**
- **FILL VALVE**
- **852 - UPPER PRUNE HILL OPERATIONAL AREA**

Figure 3.2B
Simplified Hydraulic Profile Schematic
City of Camas

carollo

Fig_3.3-3.2A-3.2B.dwg
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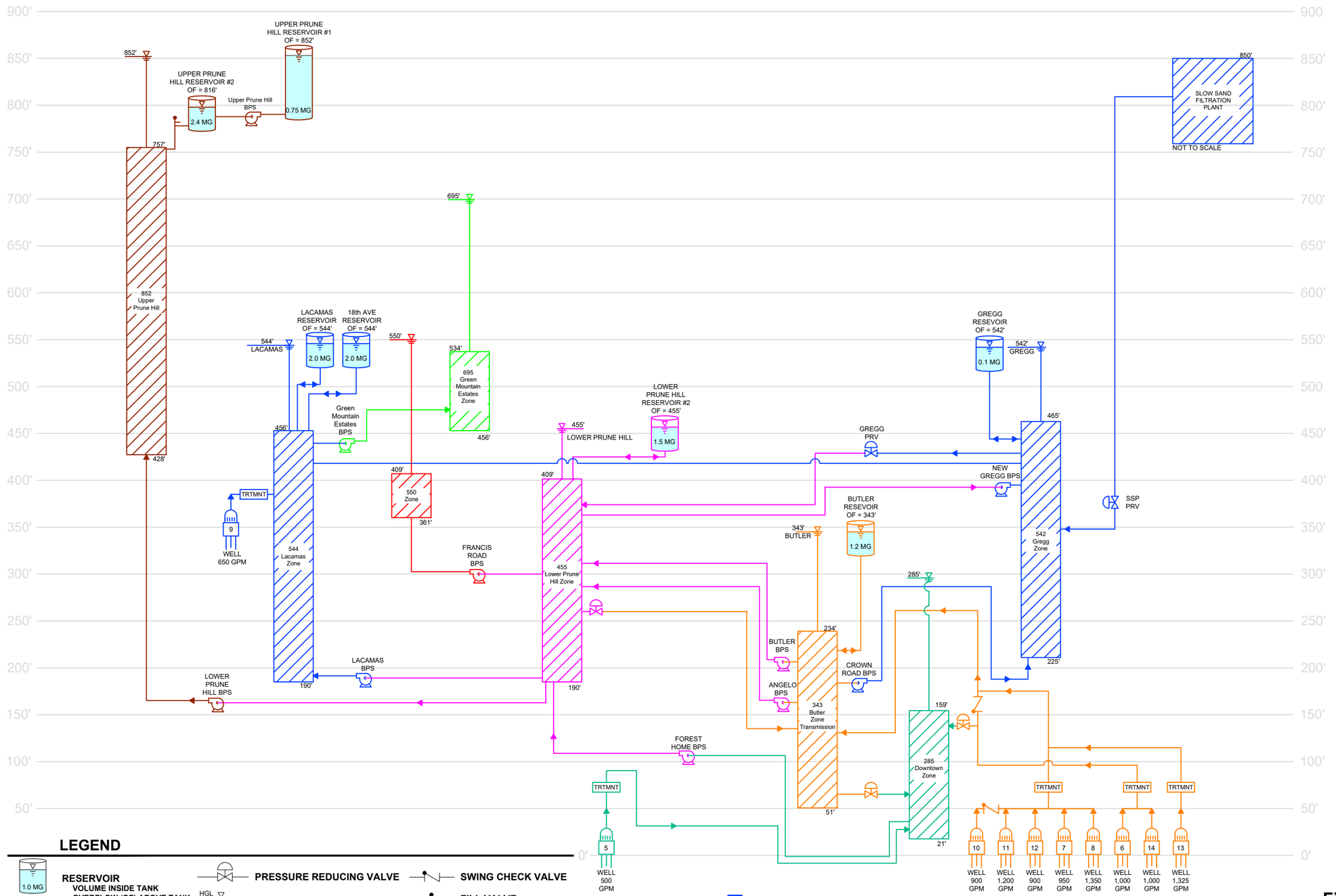

Figure 3.3
Simplified Hydraulic Profile Schematic
City of Camas

carollo

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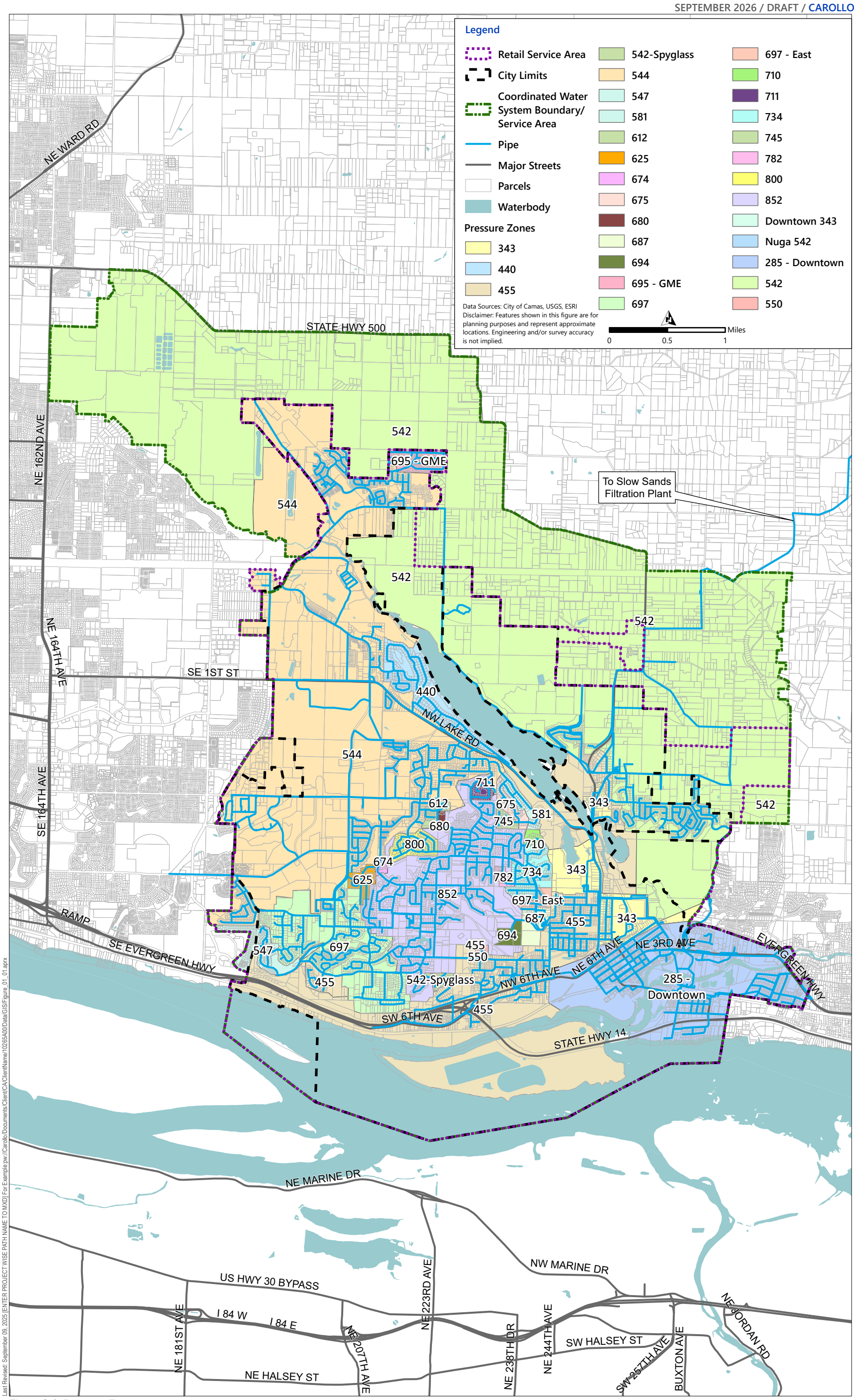


Figure 3.4 Pressure Zones

Table 3.1 Pressure Zones

Zone ID[1] (feet)	Supplying Pressure Zone	Open or Closed?	Minimum Elevation[2][3] (feet)	Maximum Elevation[2][3] (feet)
285 - Downtown	343 – Butler (Transmission)	Open	21	159
343 - Butler (Transmission)	N/A	Open	51	234
455 - LPH	N/A	Open	96	409
542 - Gregg	N/A	Open	225	465
544 - Lacamas	N/A	Open	190	456
440 - Lacamas Shores	544 – Lacamas	Open	212	358
852 - UPH	N/A	Open	428	757
542 - Spyglass	852 - UPH	Open	353	485
547	852 – UPH	Open	285	426
550	455 - LPH	Closed	361	409
581	852 – UPH	Open	334	460
612	852 – UPH	Open	404	488
625	852 – UPH	Open	399	549
674	852 – UPH	Open	382	530
675	852 – UPH	Open	460	523
687	852 – UPH	Open	428	524
694	852 – UPH	Open	510	544
695 - GME	542 – Gregg / 544 - Lacamas	Closed	456	534
697	852 – UPH	Open	421	636
697 - East	852 – UPH	Open	526	557
710	852 – UPH	Open	471	575
711	852 – UPH	Open	502	574
734	852 – UPH	Open	480	634
745	852 – UPH	Open	529	603
782	852 – UPH	Open	610	662
800	852 – UPH	Open	506	633

Notes:
(1) Zone ID is based on HGL.
(2) Elevation data based on interpolation of 3 foot contours.
(3) Location of service connections based on hydraulic model junction location.
GME - Green Mountain Estates; HGL - hydraulic grade line; LPH - Lower Prune Hill; N/A - not applicable; UPH - Upper Prune Hill.

3.3 Sources of Supply

The City currently obtains its water from ten groundwater wells and two surface water sources. Nine of the ten groundwater sources are located in the downtown area, in the Downtown 285 Zone, and Well 9 is

located in the Lacamas 544 Zone. The City's seasonal surface water sources are from Jones and Boulder Creeks to the north of the City as shown in Figure 3.1.

3.3.1 Surface Water Sources

Jones Creek has been providing the City of Camas with water since 1913. The Boulder Creek source was added in 1931. The intakes at Boulder and Jones Creeks consist of small settling basins and screens. Surface water sources may be operated between November 1st and May 15th. Seasonal raw water from the Boulder and Jones Creek intakes is conveyed to the recently constructed slow sand filtration treatment plant (SSF Plant) where the water is filtered prior to chemical treatment and discharge to the distribution system.

The SSF Plant has the capacity to treat the entire permitted flow of 1,570 gpm from the City's surface water sources. The surface water sources have lower operating expenses because they can provide flow toward two PZ without pumping, and have low silica content, which makes these sources more desirable to light industrial customers and their water quality sensitive industrial processes. However, these surface water sources are not available during peak water demand months. The City calls its groundwater sources only after demands cannot be met by production from the SSF Plant.

3.3.2 Groundwater Sources

The City currently operates ten groundwater wells. All of these wells are physically located in the Downtown 285 Zone except for Well 9. Wells 7, 8, 10, 11, and 12 are located on SE 6th Avenue, in the eastern downtown area, and are referred to as the Washougal Wellfield. Wells 6 and 14 are located further east along SE 6th Avenue near the Camas/Washougal border. The wellfield supply is conveyed across the Washougal River via a 14-inch diameter steel line under the river and a 24-inch diameter ductile iron (DI) pipe on a bridge over the river. The two pipes join, and an 18-inch diameter 343 Zone transmission line carries water from the Washougal Wellfield up toward the Angelo BPS. Well 5 is located south of Well 6 on SE 8th Street and pumps directly into the Downtown 285 zone. Well 13 is located in the Downtown 285 Zone on SE Cramer Lane and pumps into the same 18-inch diameter transmission line as the Washougal Wellfield. Well 9 is located in the 544 Zone on NW 38th Avenue near Parker Street. Table 3.2 lists the City's groundwater sources and the typical pumping rates observed in SCADA data. The City is currently investigating additional groundwater sources within its service area in anticipation of future demands.

Several of the City's groundwater sources must be operated with a booster pumping station in service to prevent over pressurization:

- When Well 5 is called into service, the Forest Home BPS must also be called on to prevent over-pressurization of the downtown zone.
- Washougal Wellfield operations are matched by pumping at the Angelo BPS. For each well that is called on at the wellfield, for up to four total wells, a corresponding pump must be called on at the Angelo BPS. The City will be adding a 5th temporary pump as a backup to the four pumps at Angelo while an additional booster station is designed and construction along Lake Road.
- There are currently piping restrictions that prevent the City from operating Well 6 and Well 14 at the same time. A planned waterline project to connect these wells to allow them to operate at the same time will be completed by the summer of 2026.

Table 3.2 Groundwater Sources

	Depth(1) (feet)	Rated Capacity (gpm)	Motor (hp)	Casing (inch)	Control Valve	Auxiliary Power
Well 5	71	675	75	8	3-inch waste valve	No
Well 6	85	1,200	150	16	4-inch waste valve	No
Well 7	84	950	100	14	3-inch waste valve	No
Well 8	87	1,250	150	14	4-inch waste valve	Yes
Well 9	253	575	100	16	4-inch waste valve	No
Well 10	92	900	150	16	8-inch	No
Well 11	106	1,000	150	16	8-inch	Yes
Well 12	106	1,000	150	16	8-inch	Yes
Well 13	103	1,350	200	20	8-inch	Yes
Well 14	75	850	200	20	8-inch	Yes
Total Groundwater Source Capacity				9,750 gpm		

Notes:
(1) Drilled depth of completed well below ground surface.
hp - horsepower.

3.4 Water Treatment

The City currently has approximately 15.5 million gallons per day (mgd) of total source water treatment capacity. A discussion of the treatment facilities is provided in the following sections. A summary of treatment facilities is provided in Table 3.3 and facility locations are shown in Figure 3.1.

3.4.1 Surface Water

The City's surface water is chlorinated and filtered. Chlorination of the surface water occurs at the City's slow sand facility with 0.840 percent sodium hypochlorite. The distance between the slow sand plant and the first customer provides 2.5 hours of CT.

In 2013, the City began construction of the SSF Plant. This plant has a design capacity of 1,570 gpm and filter beds are comprised entirely of sand. The City also treats with sodium fluoride for dental benefits.

3.4.2 Groundwater

Treatment of the City's groundwater sources includes on-site chlorination, fluoridation, and caustic soda addition. A single chemical feed facility provides treatment for Wells 7, 8, 10, 11, and 12 due to their proximity to one another. Water from Wells 6 and 14 are treated at the Well 14 site. The remaining wells each have individual treatment facilities at the well locations. Fluoridation always occurs downstream of the well pump and sodium fluoride is used at all facilities. Sodium hydroxide, also known as caustic soda, is added for corrosion control at each of the treatment facilities except for Well 9 due to natural pH. The existing treatment facilities for the City's sources are shown in Table 3.3. The residual chlorine target for all facilities is 0.8 milligrams per liter (mg/L) with alarms if the concentration is above 2 mg/L or below 0.2 mg/L. The fluoridation target for all facilities is 0.7 mg/L for all facilities with alarms if the concentration is above 2.5 mg/L or below 0.25 mg/L.

Table 3.3 Treatment Facilities

Treatment Facility	Sources Treated	Filtration	Chemical Addition
SSF Plant	Boulder Creek, Jones Creek	Yes	▪ Sodium Hypochlorite ▪ Sodium Hydroxide ▪ Sodium Fluoride
Washougal Wellfield - Site 519	Well 7, Well 8, Well 10, Well 11, and Well 12	No	▪ Sodium Hypochlorite ▪ Sodium Hydroxide ▪ Sodium Fluoride
Well 14 - Site 518	Well 6 and Well 14	No	▪ Sodium Hypochlorite ▪ Sodium Hydroxide ▪ Sodium Fluoride
Well 13 Site	Well 13	No	▪ Sodium Hypochlorite ▪ Sodium Hydroxide ▪ Sodium Fluoride
Well 9 Site	Well 9(1)	No	▪ Sodium Hypochlorite ▪ Sodium Fluoride
Well 5 Site	Well 5	No	▪ Sodium Hypochlorite ▪ Sodium Hydroxide ▪ Sodium Fluoride

Notes:
(1) Well 9 pH is above the treatment limit.

3.4.3 Groundwater Under the Direct Influence of Surface Water

The federal definition of ground water under the direct influence of surface water (GWI) is a groundwater source located near a surface water such that it has significant occurrence of contamination from pathogens such as Giardia lamblia which is not normally found in groundwater. A GWI receives direct surface water recharge and is subject to rapid changes in water characteristics that correlate to surface water conditions. Sources determined as GWI are required to achieve 99.9 percent removal of Giardia lamblia and viruses by filtration and disinfection.

A hydraulic connection to nearby surface water is a potential GWI source. In order to determine if a hydraulic connection exists, a water system may conduct a hydrogeologic investigation or use the water quality monitoring (WQM) method. The WQM method requires monitoring the groundwater and surface water source for 1 year for temperature and conductivity. If a significant correlation is determined from statistical analysis of the data, then the source is determined to be hydraulically connected to surface water. Less demanding requirements are required for hydraulically connected sources. These include eliminating the surface water influence, developing an alternate source, meeting criteria to remain unfiltered, or installing filtration.

A microscopic particulate analysis (MPA) is conducted in order to determine if a groundwater source is a GWI source. The City has completed MPA testing on Wells 6, 7, 8, 10, 11, 12, and 14 which indicate that these sources are hydraulically connected to surface water. Therefore, these sources are required by DOH to achieve a CT of 6. An evaluation by Pacific Groundwater Group in 2006 states that Well 13 is not under the direct influence of surface water but is hydraulically connected to surface water. Wells 5 and 9 are not hydraulically connected to surface water, so no CT is required.

3.5 Storage Facilities

The City currently maintains and operates seven storage facilities with a combined total of 9.95 MG. A discussion of each storage facility is provided in the following sections. A summary of the storage facilities is provided in Table 3.4. A map showing the location of the key elements of the City's water system is provided as Figure 3.1.

Table 3.4 Existing Storage Facilities

Reservoir	Capacity (MG)	Diameter (feet)	Base Elevation (feet)	Overflow Elevation (feet)	Year Constructed and Type
Butler	1.2	100x100	328	343	1913, Concrete
LPH No. 2	1.5	105	432	455	1971, Concrete
UPH No. 1	0.75	36	752	852	1971, Steel
UPH No. 2	2.4	78	748	816	2002, Steel
Gregg	0.1	16	472	542	1978, Steel
Lacamas	2.0	84	496	544	1993, Steel
18th Avenue	2.0	94	504	547	2020, Steel

3.5.1 Butler Reservoir

The Butler Reservoir consists of two adjacent, partially buried concrete reservoirs. The two reservoirs share a common wall, with the north half being constructed in 1913, and the south half being completed in 1923. The reservoirs are covered and have a total storage capacity of 1.2 MG. The base elevation of the reservoir is approximately 328 feet, and the overflow elevation is 343 feet. The entire capacity of the Butler Reservoir is usable storage. Under normal operating conditions, the Butler Reservoir is supplied through 6,420 lineal feet of 12-inch diameter cast iron (CI) transmission main. This transmission main connects with the 18-inch diameter main from Wells 6, 7, 8, 10, 11, 12, 13, and 14 at NE 22nd Avenue and NE Everett Street. The Butler Reservoir is shown in Figure 3.5 and capacity details are summarized in Table 3.4.

Figure 3.5 Butler Reservoir

3.5.2 Gregg Reservoir

The Gregg Reservoir, a 100,000-gallon capacity steel standpipe, was constructed in 1978. It has a base elevation of approximately 472 feet, an overflow elevation of 542 feet, and is the only storage facility for the 542 Zone. The reservoir provides equalization and operational storage for the 542 Zone but does not provide fire suppression storage. Fire flow demand is instead supplied by the two 1,500 gpm fire pumps at the New Gregg BPS. The Gregg Reservoir is typically supplied by a small jockey pump at the New Gregg BPS and the Crown Road BPS. The Gregg Reservoir can also be supplied by the City's SSF Plant, when it is operated during the winter months. The Gregg Reservoir is shown in Figure 3.6 and capacity details are summarized in Table 3.4.

Figure 3.6 Gregg Reservoir

3.5.3 Lacamas Reservoir

The Lacamas Reservoir, constructed in 1993, has a total capacity of 2.0 MG. It has a base elevation of approximately 496 feet, and an overflow elevation of 544 feet. The Lacamas Reservoir is a ground level reservoir. The Lacamas Reservoir is primarily supplied from the LPH Zone via the Lacamas BPS or from Well 9. PRV stations from the UPH zone can also provide fire flow to the Lacamas Zone. The Lacamas Reservoir is shown in Figure 3.7 and capacity details are summarized in Table 3.4.

Figure 3.7 Lacamas Reservoir

3.5.4 18th Avenue Reservoir

The 18th Avenue Reservoir, constructed in 2020, is a ground level steel reservoir that has a total capacity of 2.0 MG. It has a base elevation of approximately 504 feet and an overflow elevation of 547 feet. The 18th Avenue Reservoir is primarily supplied by the Lacamas Reservoir through a fill valve that opens once the Lacamas Reservoir is full. The 18th Avenue Reservoir is shown in Figure 3.8 and capacity details are summarized in Table 3.4.

Figure 3.8 18th Avenue (Anderson) Reservoir

3.5.5 Lower Prune Hill Reservoirs

Storage in the LPH Zone is currently provided by a single concrete ground level reservoir (LPH Reservoir 2) with a base elevation of 423 feet and overflow elevation of 455 feet. LPH reservoir 2 was constructed in 1971 and has a total capacity of 1.5 MG. LPH Reservoir 1, a 0.5 MG concrete ground level reservoir

originally constructed in 1935 was recently taken offline to be replaced. Once construction is completed, the new welded steel reservoir will provide an additional 0.57 MG of storage and will be plumbed together with LPH Reservoir 2 to act as one reservoir, increasing total storage capacity for the LPH Zone to 2.07 MG. Storage in the LPH Reservoir is accessible via gravity to the 455 Zone, or is pumped to the UPH Zone through the LPH BPS. Under normal system operation, water from the SSF Plant supplies the 455 Zone and the reservoirs. The 455 Zone can also be supplied through pumping from the 343 Zone via the Forest Home, Butler, and Angelo BPS. The LPH Reservoirs can also supply the 544 Zone through the Lacamas BPS. When SSF is running the surface water can supply the 544 Zone through Lacamas BPS. The LPH Reservoir 2 is shown in Figure 3.9 and capacity details are summarized in Table 3.4.

Figure 3.9 LPH Reservoirs

3.5.6 Upper Prune Hill Standpipe and Reservoir

The UPH Reservoir 1 and Reservoir 2 were constructed in 1971 and 2001, respectively. Reservoir 1 has an overflow elevation of 852 feet, stands 100-feet tall, and has a total capacity of 0.75 MG. This reservoir sets the HGL for the 852 Zone. The UPH Reservoir 2 is below the HGL of the 852 Zone and serves the zone by pumping through the UPH BPS to the UPH Reservoir 1. It has an overflow elevation of 816 feet, stands 68-feet tall, and has a total capacity of 2.4 MG. The BPS has a total pumping capacity of 2,900 gpm. Including the standpipe and reservoir, the 852 Zone is supplied by the LPH BPS, 12-inch diameter transmission line, and 16-inch diameter Ostenson Canyon transmission line. The UPH Reservoirs are shown in Figure 3.10 and capacity details are summarized in Table 3.4.

Figure 3.10 UPH Reservoirs

3.6 Pipe Network

The City owns over 159 miles of pipe in its distribution system. An inventory of existing pipelines in the system, as reported from the City's hydraulic model, is summarized in Table 3.5. The system is predominately looped and located within public rights-of-way, giving the City access for repair and maintenance. The City replaces aging and undersized pipes to serve the City's growing demands on an ongoing basis. Pipe materials within the City currently include the following:

- CI Pipe.
- Polyvinyl chloride (PVC) Pipe.
- DI Pipe.
- Steel (ST) Pipe.

Table 3.5 Pipe Diameter and Material

Diameter	DI (feet)	CI (feet)	ST (feet)	PVC (feet)	Unknown	Total (feet)	Percent
6-inch	77,204	69,979	20,210	903	9,108	180,065	21%
8-inch	156,044	20,937	7,943	0	7,943	365,424	43%
10-inch	7,560	0	2,014	0	10,690	20,264	2%
12-inch	67,301	21,432	1,922	3,891	63,523	162,810	19%
14-inch	11,923	0	6,934	5,037	7,207	32,881	4%
16-inch	1,170	2,467	0	0	9,641	13,278	2%
18-inch	37,679	0	179	0	12,394	50,251	6%
20-inch	0	0	0	1,859	57	57	< 1%
24-inch	1,817	0	0	0	14,455	16,272	2%
Total	360,697	114,815	39,203	11,612	277,723	841,303	100%
Percent	43%	14%	5%	1%	33%	100%	

3.7 Pressure Reducing Stations

The City maintains numerous pressure reducing stations as shown in Table 3.6 and Figure 3.1 to help maintain pressure in low elevations and minimize potential risks from high pressures. In most cases, there are two PRVs at each station. The smaller valve operates to provide the average daily demand to the zone that it serves. The larger valve, which is generally set 5 psi lower than the small valve, is primarily used for fire protection or large demand situations. The City's PRVs have pressure sustaining features, which are set to ensure that upstream pressures are maintained. The City has a contract with GC Systems to service the 71 PRVs located within the water system. This contract allows GC Systems to perform general maintenance and ensure that the valves are operating correctly, both on an individual and system-wide level.

Table 3.6 PRV

PRV Station	PRV Model ID	Size (inches)	Downstream Zone	Downstream Setting (psi)	Upstream Pressure (psi)
NW McIntosh	PRV-1	6	697	27	120
	PRV-2	2	697	32	120
NW Payne Road. and SE 201st Avenue	PRV-3	8	544	Closed	Closed
	PRV-4	4	544	Closed	Closed
NW 16th Avenue and Klickitat	PRV-5	10	697	12	105
	PRV-6	4	697	22	105
NW Ivy and Fargo	PRV-7	4	734	45	90
NW 22nd and Fargo	PRV-8	4	697E	65	130
NW 19th Avenue and Fargo	PRV-9	6	687	70	157
NE 21st and Everett	PRV-10	8	343	45	110
NE 19th and Everett	PRV-11	6	343	40	110
2349 NW 32nd Circle	PRV-12	8	680	25	120
	PRV-13	2	680	30	120
NW Brady Road and Deer Creek	PRV-14	8	547	25	105
	PRV-15	3	547	30	105
NW Parker Street and Linear	PRV-16	8	544	Closed	Closed
NW Astor and 36th (Applewood)	PRV-17	8	612	55	90
	PRV-18	2	612	65	90
NW 43rd and Sierra	PRV-19	8	544	30	190
NW 23rd Avenue and Fargo	PRV-20	4	734	45	130
2666 NW Logan Street off NW 28th	PRV-21	6	782	50	90
	PRV-22	2	782	55	90
2929 NW 31st and NW Dahlia Drive	PRV-23	6	544	Closed	Closed
	PRV-24	2	544	Closed	Closed
NW 29th Avenue and NW Astor Street	PRV-25	2	800	58	90
	PRV-26	6	800	53	90
NW Sierra Drive and NW 38th Avenue	PRV-27	6	711	35	115
	PRV-28	2	711	40	115
Currawong Court and NW 40th Avenue	PRV-29	6	711	75	145
	PRV-30	2	711	80	145
NW 23rd Avenue and Iris	PRV-31	8	656	58	130
	PRV-32	2	656	63	130
NW Julia Street	PRV-33	8	544	Closed	Closed
	PRV-34	2	544	Closed	Closed
NW Fern Ridge Drive	PRV-35	2	547	40	110
	PRV-36	8	547	35	110
NE 6th and NE Hayes Street	PRV-37	4	343	68	94
	PRV-38	12	343	58	94

PRV Station	PRV Model ID	Size (inches)	Downstream Zone	Downstream Setting (psi)	Upstream Pressure (psi)
East End Walden	PRV-41	2	442	37	84
	PRV-42	6	442	32	84
West End Walden	PRV-43	1.5	442	72	118
	PRV-44	6	442	67	118
NE 6th and Joy	PRV-45	6	343	55	92
Goot Park	PRV-46	3	343	115	138
	PRV-47	10	343	110	138
Lake Ridge Lower	PRV-48	2	581	55	98
	PRV-49	6	581	50	98
Lake Ridge Middle	PRV-50	2	675	63	91
	PRV-51	6	675	58	91
Lake Ridge Upper	PRV-52	2	745	68	123
	PRV-53	6	745	63	123
702 NW View Ridge Strett (Dovehill) Upper	PRV-54	2	542S	30	100
	PRV-55	6	542S	25	100
NW 7th and Valley (Dovehill) View Ridge Lower	PRV-56	2	542S	40	110
	PRV-57	6	542S	35	110
NW Fargo and 27th (Drewf's Farm Upper)	PRV-58	2	734	Open	63
	PRV-59	6	734	Open	63
905 NW 30th Avenue and NW Ivy Lane (Drewf's Farm Lower)	PRV-60	2	710	60	130
	PRV-61	6	710	55	130
NW Ivy and Ostenson Canyon	PRV-62	2	694	65	140
	PRV-63	6	694	60	140
NW 24th Avenue and NW Brady Road	PRV-64	6	625	70	124
	PRV-65	2	625	75	124
2011 NW Larkspur Street	PRV-66	6	625	45	132
	PRV-67	2	625	50	132
Wellfield East	PRV-69	12	343	100	125
	PRV-70	4	343	Closed	Closed
NE 277th and NE 14th Street	PRV_SSP	6	542	78	140
	V9093	3	542	88	140

3.8 Booster Pumping Stations

The City currently maintains and operates ten booster pumping stations to move water between PZ. A description of each BPS is included in the following sections. Table 3.7 provides a summary of each pump station and details the rated capacity of each pump. Locations for each of the City's BPS are shown in Figure 3.1.

Table 3.7 BPS Summary

Name	From Zone	To Zone	Year Constructed	Auxiliary Power	Pump Information		
					Pump No.	Power (hp)	Design Capacity (gpm)
Angelo BPS	343 Transmission	455 - LPH	2001	Yes	1	75	1,000
					2	75	1,000
					3	75	1,000
					4	75	1,000
Butler BPS	343 – Transmission	455 - LPH	1948(2)	No	1	50	800
					2	60	600
Crown Road BPS	343 – Transmission	542 - Gregg	2011	Yes	1	75	800
					2	75	800
					3	75	800
Forest Home BPS	343 - Lower (Downtown)	455 - LPH	1949(3)	No	1	50	1,000
GME BPS	544 - Lacamas	695 - GME	2023	Yes		15	180
					2	15	180
					3	15	180
					4	60	650
					5	60	650
New Gregg BPS	455 - LPH	542 - Gregg	2003	Yes	1	100	1,500
					2	100	1,500
					3	15	500
Lacamas BPS	455 - LPH	544 - Lacamas	1993	Yes	1	25	500
					2	25	500
					3	100	1,500
LPH BPS	455 - LPH	852 - UPH	1971(4)	Yes	1	150	1,000
					2	150	1,000
					3	100	750
UPH BPS	852 - UPH	852 - UPH	2002	Yes	1	20	750
					2	20	750
					3	40	1,400
					4	40	1,400
Francis Road BPS	455 - LPH	550	1942	No	1	7.5	80

Notes:
(1) Source: The City.
(2) Pumps were replaced in 1998.
(3) Pump was replaced in 1999.
(4) Pumps were replaced in 2002 and 2004.

3.8.1 Butler Booster Pump Station

The Butler BPS is located at the Butler Reservoir site and pumps from the 343 Zone to the 455 Zone. The Butler BPS has one end suction centrifugal 50-hp pump and one end suction centrifugal 40-hp pump that are capable of supplying 800 and 600 gpm, respectively. When one of the larger two pumps in the New Gregg BPS is called on, one of the Butler pumps is also turned on to feed the 14-inch diameter suction line of the New Gregg BPS. This station does not have the capacity for an additional pump. Figure 3.11 shows the interior of the Butler BPS and capacity details are summarized in Table 3.7.

Figure 3.11 Butler BPS

3.8.2 New Gregg Booster Pump Station

The New Gregg BPS is also located at the Butler Reservoir site and pumps water from the 455 Zone to the 542 Zone. The New Gregg BPS is equipped with two 100-hp double end suction split case pumps, each with a capacity of 1,500 gpm. In 2013 a third 500 gpm pump was added for domestic service and to maintain the level in the Gregg Reservoir. The two larger pumps are typically only called on when fire flow demands occur. The New Gregg BPS has suction side flow limitations due to insufficient head provided by the Butler Reservoir. When one of the larger two pumps in the New Gregg BPS is called on, a pump in the Butler BPS must also be called on to supply adequate pressure for the Station's 14-inch diameter suction line. Figure 3.12 shows the interior of the New Gregg BPS and capacity details are summarized in Table 3.7.

Figure 3.12 New Gregg BPS

3.8.3 Forest Home Booster Pump Station

The Forest Home BPS, located at 418 NW 10th Avenue, pumps from the Downtown 343 Zone to the 455 Zone. This station contains one pump with a rated capacity of 1,000 gpm. When Well 5 is called into service, this BPS is also called on to prevent over-pressurization of the Downtown 285 Zone. Figure 3.13 shows the Forest Home BPS and capacity details are summarized in Table 3.7.

Figure 3.13 Forest Home BPS

3.8.4 Lower Prune Hill Booster Pump Station

The LPH BPS is located at the LPH Reservoir site and pumps water from the 455 Zone to the 852 Zone. This station has three pumps with two 150-hp split case double end suction pumps capable of providing 1,000 gpm each and a 100-hp vertical turbine pump capable of providing 750 gpm for a total rated station capacity of 2,500 gpm. This station has does not have capacity for an additional pumping unit. With the improvements to LPH Reservoir 1, the City is also replacing the LPH BPS. Construction is expected to be completed in 2026. Once operational, the new LPH BPS will utilize three 250-hp vertical turbine pumps capable of providing 1,600 gpm each to supply the 852 Zone. The upgrades at LPH BPS will increase the total station capacity to 4,800 gpm. The LPH BPS is shown in Figure 3.14 and current capacity details are summarized in Table 3.7.

Figure 3.14 LPH BPS

3.8.5 Lacamas Booster Pump Station

The Lacamas BPS, located at 4620 NW Sierra Street, pumps water from the 455 Zone to the 544 Zone. This station has two 25-hp turbine pumps that are capable of supplying 500 gpm each and one 100-hp turbine pump equipped with a VFD capable of supplying up to 1,500 gpm. The VFD is required for the largest pump due to suction side limitations. The Lacamas BPS is shown in Figure 3.15 and capacity details are summarized in Table 3.7.

Figure 3.15 Lacamas BPS

3.8.6 Angelo Booster Pump Station

The Angelo BPS is located at Fallen Leaf Park and is the primary BPS supplying the 455 Zone. It pumps from the 18-inch diameter transmission main in the 343 Zone to serve the 455 Zone and feeds the suction side of the Lacamas BPS. This station has four 75-hp split case double end suction pumps capable of pumping 1,000 gpm each. A selected well is called on with the first pump of the Angelo BPS to provide adequate suction side supply. If additional wells are called on to meet demand, a corresponding pump is also called on at the station to prevent over pressurization of the 343 Zone. The Angelo BPS is shown in Figure 3.16 and capacity details are summarized in Table 3.7.

Figure 3.16 Angelo BPS

3.8.7 Upper Prune Hill Booster Pump Station

The UPH BPS is located at 2822 NW 18th Avenue and is used to maintain level in the UPH Standpipe, which sets the HGL for the 852 Zone. This station has four pumps with two 20-hp split case double end suction pumps capable of providing 750 gpm each and two 40-hp split case double end suction pumps capable of providing 1,400 gpm each. The UPH BPS suction line is fed from the 2.4 MG reservoir. The 2.4-MG reservoir is fed from the LPH BPS. The UPH BPS is shown in Figure 3.17 and capacity details are summarized in Table 3.7.

Figure 3.17 UPH BPS

3.8.8 Crown Road Booster Pump Station

The Crown Road BPS is located at 3700 SE Crown Road and pumps from the 343 Zone to the 542 Zone. This station has three pumps capable of providing 800 gpm each for a total station capacity of 2,400 gpm. There is one pedestal open for an additional pumping unit within the station. When the station is called into service, a selected well is called on simultaneously to provide sufficient suction side supply. The Crown Road BPS is shown in Figure 3.18 and capacity details are summarized in Table 3.7.

Figure 3.18 Crown Road BPS

3.8.9 Green Mountain Estates Booster Pump Station

The GME BPS is the City's newest BPS and is located at 9046 N Hargrave Street. This station pumps from the 542/544 Zones to the GME Zone through three pumps capable of providing 180 gpm each and two fire pumps each capable of providing 650 gpm for a total station capacity of 1,840 gpm. This station is the sole source of supply for the GME Zone (closed zone), which has no storage instead utilizes a hydropneumatic tank to prevent constant cycling of pumps and maintain a constant discharge pressure downstream of the pumps. The GME BPS is shown in Figure 3.19 and capacity details are summarized in Table 3.7.

Figure 3.19 GME BPS

3.8.10 Francis Road Booster Pump Station

The Francis Road BPS is located at the intersection of 1514 NW 10th Avenue and NW Francis Road. This station was constructed in 1942 and has one 7.5-hp pump capable of supplying 80 gpm to a few customers in the 455 LPH Zone at higher elevations. The Francis Road BPS is shown in Figure 3.20 and capacity details are summarized in Table 3.7.

Figure 3.20 Francis Road BPS

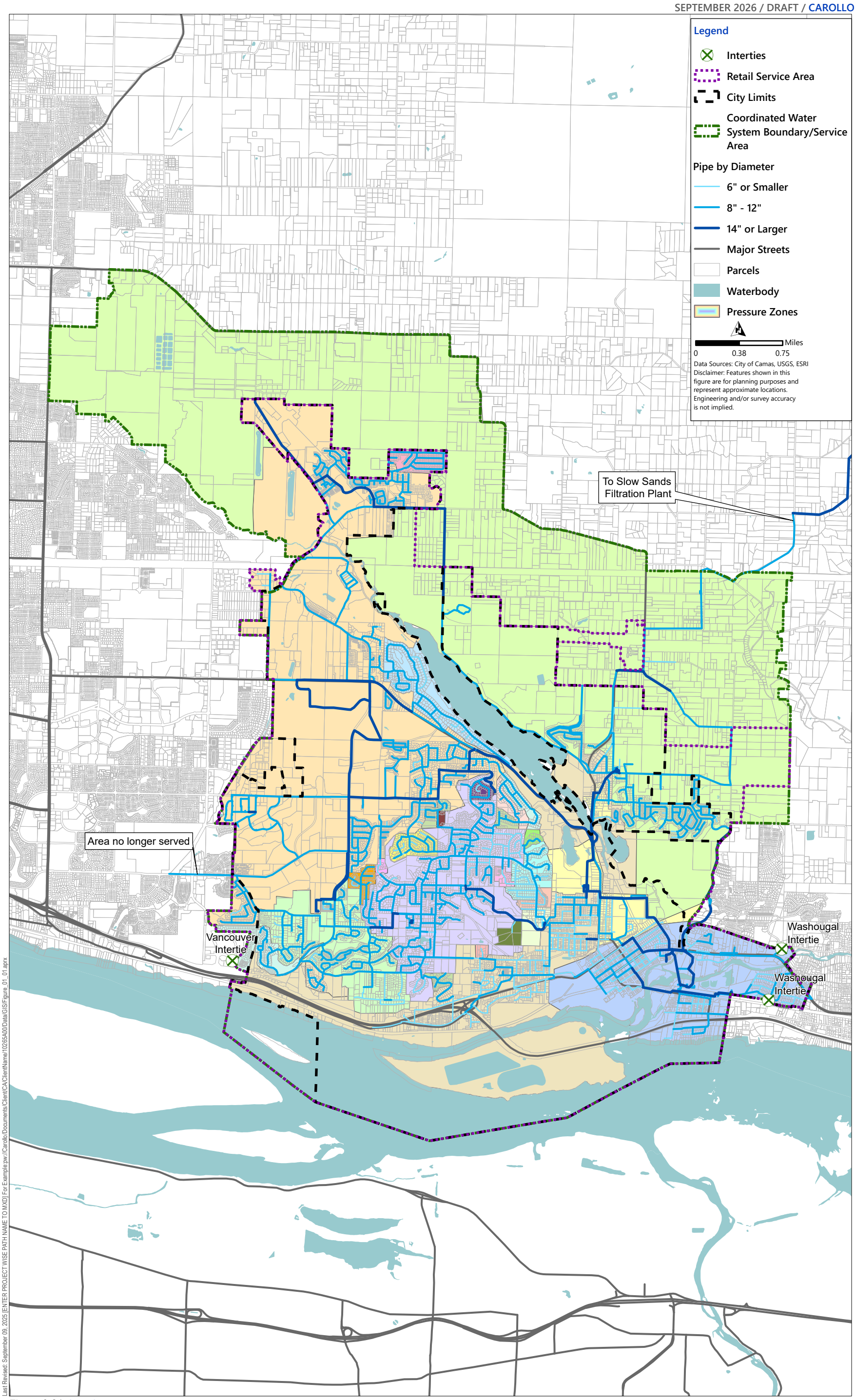
3.9 Interties

The City currently has emergency intertie agreements with the City of Washougal and the City of Vancouver, which are detailed in Table 3.8. The City has two one-way emergency PRV interties with Washougal, located on SE Shepherd Road and at the intersection of SE 3rd Street and Whitney Street. These interties provide water from the City of Camas to the City of Washougal under low pressure conditions. The City's intertie with Vancouver is located at the intersection of SE Columbia Palisades Drive and SE Brady Road. Additionally, the City has an agreement for emergency use of two fire hydrants located at SE 1st and Friberg for firefighting purposes. Intertie locations are shown on Figure 3.21 and interlocal agreements are provided in Appendix C.

Table 3.8 Interties

Location	Other System	Flow Direction	Valve/Meter Size (inches)	Max Flow Rate (gpm)	Type of Service
SE Shepherd Road	City of Washougal	To Washougal	8 1.5	1500 gpm at 100 psi	Emergency
SE 3rd Street and Whitney Street	City of Washougal	To Washougal	8 1.5	1500 gpm at 100 psi	Emergency
SE Columbia Palisades Drive and SE Brady Road	City of Vancouver	To Vancouver			Emergency
SE 1st and Friberg	City of Vancouver	N/A	N/A	N/A	Emergency

Notes:
(1) Not a physical intertie. Agreement is for the emergency use of two fire hydrants owned/maintained by the City of Vancouver.



Last Revised: September 09, 2025 [ENTER PROJECT WISE PATH NAME TO MXD] For Example:pw://Carollo/Documents/Client/CA/ClientName/10265A00/Data/GIS/Figure_01_01.aprx

Figure 3.21 Interties

3.10 Supervisory Control and Data Acquisition

The City has a SCADA system with master control located at the City Operations Center. The system uses programmable control software, which can be controlled by a personal computer at the operations center, or from remote by a modem connected to a remote computer. The system monitors reservoir levels, well status, well flow rate, booster pump flow rates, pump status, run time, power usage, and alarm conditions. The system is able to record and display trending data for everything the City monitors. The City continually rotates well and booster pump calls to exercise the pumps and to evenly distribute wear on the pumps.

CHAPTER 4 OPERATION AND MAINTENANCE

4.1 Water System Management and Personnel

The water system is operated and maintained by the City staff, with contractor-provided services that City staff are not trained or equipped to perform. The organization of the City's water utility is shown in Figure 4.1. This section includes a brief discussion of the responsibilities of positions in the Public Works Department.

The City is governed by a mayor and seven council members, all of which are elected officials. The Public Works Director reports to the mayor and council and directs the City's utilities, including water. The City's organization combines water and sewer operation to furnish domestic water and sanitary sewage disposal service to industrial, commercial, and residential areas within the City and surrounding areas. The following subsections discuss the roles and responsibilities of the water system personnel.

4.1.1 Public Works Director

The City's water system is operated by the Public Works Department. The Public Works Director is responsible for overseeing Camas' water, sewer, and solid waste services. The Engineering Manager, Operations Manager, and Utilities Manager all report to the Public Works Director.

4.1.2 Capital Engineering

The City's Capital Engineering Department is lead by the Engineering Manager and is responsible for engineering services, including capital planning, project implementation, development review, construction management, and operational support. Field engineering support is supplied by both City staff and contracted private parties such as engineering consultant firms.

4.1.3 Utility Manager

The water system is one of several utilities within the Public Works Department that is managed by the Utilities Manager, who reports directly to the Public Works Director. The Utilities Manager is responsible for the management of the operation and maintenance of the City's water supply, water treatment, water distribution, wastewater collection, and wastewater treatment systems. For the City's water supply system, the Utility Manager has budgetary responsibility and directs the Lead Water System Operator in carrying out daily operations and maintenance, water quality monitoring, and asset management and facility inspection. The Utilities Manager works with the Engineering Manager to develop the City's Water System Plan (WSP) and supports engineering design review. The Utilities Manager is also responsible for all aspects of the water system during an emergency, including damage assessments, assessing customer impacts, coordinating with jurisdictional public health agencies and adjacent water utilities, keeping the public and media informed through the Director of Communications and Public Affairs, and working with the Public Works Engineering Manager for design and construction services required for repair and recovery operations.

4.1.4 Water System Operators

The Water System Operators perform all field maintenance and operation functions for the City's water utility. The Water System Operator responsibilities include the operation, maintenance, and repair of the following assets:

- Pump stations.
- PRVs.
- Reservoirs.
- Wells.
- Treatment systems.
- SCADA systems.

Further responsibilities include, but are not limited to, the following water system activities:

- Main flushing.
- Tank and reservoir cleaning.
- Valve and hydrant maintenance, repair, and replacement.
- Leak detection and emergency water main repairs.
- Meter reading and repair.

4.1.4.1 Cross-Connection Control Specialist

The CCS performs inspections of construction projects and existing facilities to ensure compliance with specification and standards for cross connection control. They perform recordkeeping to ensure that state regulations are met, and results are compiled to meet the appropriate department's standards. As a secondary focus, the CCS performs construction, maintenance, and repair of the City's water distribution system.

4.1.4.2 Water Quality Specialist

Within the water division a water system operator is assigned responsibility for source and distribution water quality monitoring. The responsibilities for water quality monitoring for routine compliance sampling and testing are outlined in the O&M manual. Other responsibilities include water quality data verification, reporting to the DOH, and conducting sanitary surveys. Positive coliform events of the water system require the water quality monitoring operator to follow procedures as outlined in the Emergency Response Plan in Appendix **[D]**.

4.1.5 Emergency Public Communication

The City's Director of Communications and Public Affairs is the designated media contact. Additional responsibilities include issuing a health advisory as part of a Tier 1 public notice during an emergency.

4.2 Operator Certification

The City's operators are experienced and well trained, exceeding the minimum state requirements (WAC 246-292-050). As a Class 3 system (population between 15,000 and 50,000 people) the City is required to have at a minimum, a Water Treatment Plant Operator (WTPO) Level 3, a Water Distribution Manager (WDM) Level 3, and a CCS. The City certified operators are shown in Table 4.1. As staff changes, the Water Works Certification Board is notified of any changes to the mandatory or supporting certificated personnel.

4.2.1 Professional Growth and Training

Public Works Leads and administrative staff ensure operators receive the necessary training and continuing education to effectively operate the water system. The City provides opportunities for staff professional growth and training; planning for approximately 25 hours per year of professional growth and training for each employee. Through these activities, City staff are able to obtain the required continuing education unit (CEU) requirements for their operators' certifications. City staff are regular attendees of training programs sponsored by both Washington Environmental Training Resources Center and the Pacific Northwest Section of the American Water Works Association (AWWA). The professional growth requirement may also be met by advancement by examination or certification by examination to a different classification.

Table 4.1 Certified Operators

Name	Title	Certification			
		WDM	WTPO	Certificate Number	CCS
Brandon Prather	Lead	3	2	11124	Yes
Derek Engler	Senior	2		11703	No
Allen Nelson	Water Operator	4	3	8187	Yes
Will Weglege	Senior	2	2	12451	No
Henry Erickson	MW2	2		11540	Yes
Nick Mettler	CCS	2		16006	Yes

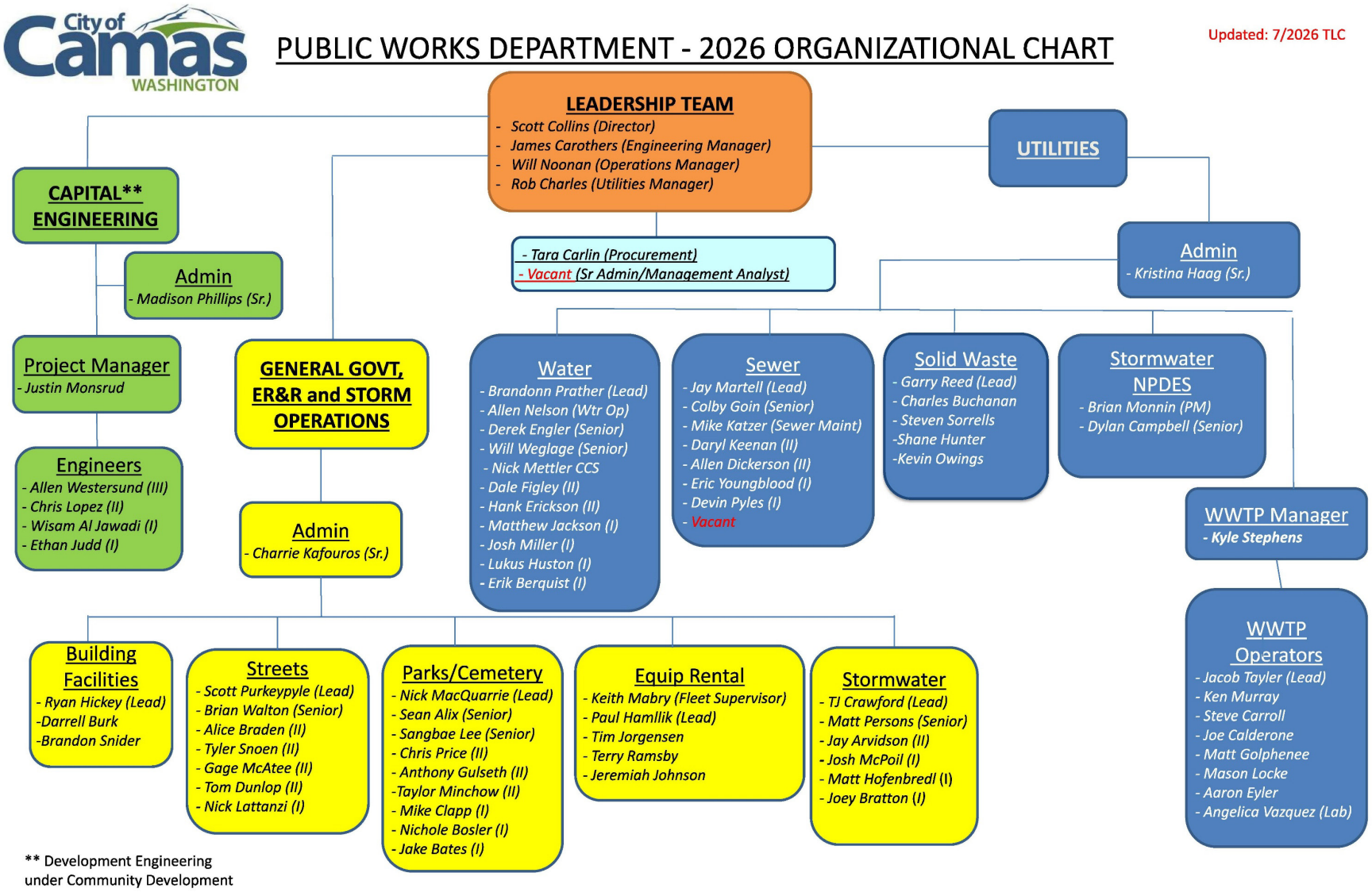


Figure 4.1 2026 Organizational Chart

4.3 Customer Complaint Response Reporting

Customers interact with the City through a variety of methods. Customer service representatives are available by phone and through an online Utility Service Request system on the City's website. Customer service agents are trained to answer typical questions and route service requests (complaints) to the appropriate department (Operations, Finance, Engineering, etc.). Calls are tracked by customer service agents, and the resulting activities are documented in the maintenance management system if a work order is issued. The finance department also tracks billing-related requests.

City operators also routinely interact with customers during maintenance activities. Often, these interactions are directly related to ongoing system maintenance such as hydrant flushing, and customer inquiries or concerns are resolved on the spot. Operators direct additional requests to customer service representatives, as needed. The Utilities Manager is responsible for responding to more complex and time-sensitive customer complaints.

4.4 Record Keeping and Reporting

The City maintains detailed records of the water system. Substantial record keeping activities are required to record and report customer water usage, water production, water quality information, and maintenance activities. All recordkeeping and reporting follows DOH regulations as specified in WAC 426-290-480.

The City's Finance Department is responsible for billing customers for water use. The billing records include customer account data for classes of customers, water use, billing, service, and comments. Water production for the City's surface water sources and wells are tracked in real time via SCADA, which maintains approximately a year of historical data. Operators record production daily and report the production monthly to DOH. Based on these records and water consumption records, the City develops and submits an annual WUE Report to DOH.

The City conducts substantial water quality testing, as summarized in Chapter 7. Hard copies of the water quality laboratory reports from the testing are kept at the City. In addition, analytical laboratories also submit reports directly to DOH. This data is summarized annually in the City's consumer confidence report that is available on its website.

The City maintains a maintenance management system to manage work order requests and document maintenance activities. Historically, the City has recorded work efforts on hard copy maintenance cards that are available for reference to City staff.

The City submits all required construction completion reports to DOH. Construction completion reports for distribution main projects are maintained on file at the City and are available upon request by DOH.

4.5 Routine System Operating Procedures and Preventative Maintenance

Basic system operation and major system components are described in Chapter 3 - Existing System and Chapter 9 - System Analysis. Detailed documentation of the system operation procedures and preventive maintenance can be found in the City's O&M Manual. The manual provides detailed information on operator certification and training, water quality monitoring, operation and control, cross-connection

control, and emergency planning/response. Routine operating procedures and preventative maintenance aspects of the O&M Manual are summarized below.

4.5.1 Routine Operating Procedures

The City is updating its O&M Manual in 2026 to reflect recent changes in the system and capture the institutional knowledge of retiring operators. The O&M Manual provides the following types of operation and control information for wells, reservoirs, pump stations, and pipelines:

- Facility/process components, such as booster pumps, SCADA telemetry, valves, chemical metering pumps, storage tanks, etc.
- Description of facilities/processes, including area served and relationship to other facilities/processes.
- Operation and control, including set points and chemical usage guidelines.
- Guidance on performing maintenance activities such as cleaning, pump isolation, and meter/pump calibration.
- Alarm responses.
- Emergency operation, including use of safety equipment (i.e., emergency showers and eyewash, etc.) and facility operations on auxiliary power.

To aid in accessing the detailed information, the O&M Manual provides annotated pictures identifying all facility equipment.

A hard copy of the O&M Manual is kept at the City's operations center and is available electronically on the City's network. The slow sand filtration plant operations and control are documented in a separate O&M Manual that is kept onsite at the plant and available electronically on the City's network.

4.5.2 Preventative Maintenance

The City staff are responsible for daily operation of the City's surface water sources, wells, treatment facilities, booster stations, PRVs, storage facilities, and distribution system. In addition to daily operation, they also perform preventative maintenance on the system based on City goals. These preventative maintenance goals help the City maintain its assets at an acceptable level of risk, while meeting the City's desired level of service goals. An activity's complexity and level of effort is generally greater the less frequently it is performed. Daily and weekly activities can likely be completed in an hour or less. In general, activities are intended to be grouped (i.e., weekly, semi-weekly, monthly, and quarterly during a single visit) to reduce inefficiencies in travel and site setup (i.e., traffic control at PRVs, etc.). Some activities may take several days and require specialized contractors.

Daily preventative maintenance focuses on inspections of the general condition and function of the facilities and maintaining and recording chemical levels. Frequency of inspections is based on industry practices and professional judgement. Weekly and monthly maintenance activities include more detailed inspections and cleaning of assets, as well as maintenance of the surface water sources. Annual preventative activities include basic maintenance of equipment (i.e., oil and filter changes, exercising infrequently used valves and pumps, cleaning cooling systems on generators, etc.). All activities are completed to the extent possible based on available staff and resources. A more detailed description of the preventative maintenance activities is provided in Appendix **[E]**.

4.6 Facility Maintenance

A high-level condition assessment was prepared for the City's water system facilities in 2016. The assessment included review of information for the existing facilities and inspection of the facilities on January 5 and 6, 2016. The assessment included each supply well and BPS. The City's storage reservoirs, PRV stations, and piping were not included in the assessment.

4.6.1 Booster Pump Stations and Supply Wells

Overall, the City's BPSs and supply wells were found to be in generally good condition. The facilities have been well-maintained with regularly scheduled maintenance and CIP work being performed. Electrical equipment conditions were the most common deficiency observed, primarily due to equipment age.

Table 4.2 lists the projects identified in the 2016 condition assessment that have been completed in the years following.

Table 4.2 Completed CIP Projects from 2016 Condition Assessment

Asset	Project Description	Year Completed
Well No. 6	Replace starter cabinet and RTU	2018
	Well casing, motor, and pump rebuild	2026
Well No. 7	Replace well pedestal grout and install two additional anchor bolts	2024
	Well casing, motor, and pump rebuild	2026
Well No. 8	Replace starter cabinet	2024
	Well casing, motor, and pump rebuild	2024
Well No. 10	Well casing, motor, and pump rebuild	2025
Well No. 11	Well casing, motor, and pump rebuild	2025
Well No. 12	Well casing, motor, and pump rebuild	2025
Well No. 13	Well casing, motor, and pump rebuild	2022
Lower Prune Hill BPS	Replacement	2026
Washougal Wellfield	Chlorine generator replacement	2017
Lacamas BPS	Motor and IR testing	2026

Notes:
RTU - remote terminal unit.

In addition to the improvements noted above, the City constructed the Green Mountain Estates BPS in 2022.

4.6.2 Reservoirs

The City has previously assessed the condition of its reservoirs for the 2010 WSP. The City's reservoirs are generally in good condition. The Butler Reservoir, the City's oldest reservoir, has reached the end of its usable life. The City intends to abandon the Butler Reservoir as soon as a replacement is constructed in the 343 Zone. The City's second oldest reservoir, the 0.5 MG reservoir at the Lower Prune Hill reservoir site was replaced in 2025 per the 2010 WSP's recommendation and is currently in service. Additional upgrades to the City's water storage systems include the new 2.0 MG 18th Avenue Reservoir constructed in 2020 and the implementation of cathodic protection to all steel reservoirs in 2023. Steel reservoirs require regular recoating and is considered routine maintenance.

4.6.3 Recommended CIP Summary

Not all projects identified in the 2016 condition assessment have been planned or completed as of August 2026. A list of the outstanding recommended projects is provided in Table 4.3. Improvement projects have been separated into BPS improvements, which are denoted "RP-" and supply projects, which are denoted "RS-". It should be noted that projects were identified for the Lacamas BPS but seeing as how the City intends to abandon the Lacamas BPS in the next 5-10 years, there does not appear to be much benefit in going through with these upgrades and has therefore be omitted from the CIP summary in Table 4.3. As seen in the table, the remaining condition assessment projects are anticipated to cost approximately $2.1 million. It is anticipated that future project designs will further revise the cost estimates and prioritization of projects. Costs for these projects have been incorporated into the miscellaneous facility projects annual program for reporting in the CIP, which is shown in Chapter 10.

The cost estimates presented in this section are opinions developed from bid tabulations, cost curves, information obtained from previous studies, City estimates, and Carollo's experience on other projects. The cost estimates have been prepared for general planning purposes and for guidance in project evaluation and implementation. Final costs of a project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors.

All costs are escalated from 2016 to 2026 dollars with a 5D Handy Whitman Index factor of 1.89. Cost estimates were developed using a Class 4 budget estimate, as established by the American Association of Cost Estimators. This level of estimate is used for budgeting and feasibility studies and assumes a 1 percent to 15 percent level of project definition. The expected accuracy range is -30 percent to +50 percent, meaning the actual cost should fall in the range of 30 percent below the estimate to 50 percent above the estimate.

Table 4.3 Outstanding Booster Pump Station and Well CIP Summary

Asset	Project ID	Project Type	Estimated Cost	Project Description
Butler BPS	RP - 1	Strategic Replacement	$100,000	Replace or refurbish pumps 1 and 2.
	RP - 2	Condition	$6,000	The motor starter(s) at the Butler BPS were recommended for replacement during the condition assessment.
	RP - 3	Condition	$4,000	The check valve(s) at the Butler BPS were recommended for replacement during the condition assessment.
Angelo BPS	RP - 4	Strategic Replacement	$180,000	Replace or refurbish pumps 1, 2, 3, and 4.
Crown Road BPS	RP - 5	Condition	$9,000	Remove vent caps and install new vent piping for the emergency generator's diesel tank as part of routine maintenance.
	RP - 6	Strategic Replacement	$260,000	Replace or refurbish pumps 1 and 2.
Upper Prune Hill BPS	RP - 7	Condition	$9,000	Add lateral support to the pump discharge header.
	RP - 8	Strategic Replacement	$380,000	Replace or refurbish pumps 1, 2, 3, and 4.
	RP - 9	Condition	$80,000	MCC and RTU require general maintenance.
Gregg BPS	RP - 10	Strategic Replacement	$275,000	Replace or refurbish pumps 1 and 2.
	RP - 11	Strategic Replacement	$105,000	Replace or refurbish pump 3.
Booster Pump Station Projects (RP) Total			**$1,408,000**	
Well 7	RS - 1	Condition	$40,000	Replace panelboard and starter cabinet.
Well No. 9(1)	RS - 2	Strategic Replacement	$100,000	Well casing, motor, and pump rebuild.
	RS - 3	Condition	$45,000	pH, Chlorine, Fluoride.
	RS - 4	Condition	$155,000	Replace Starter cabinet and RTU.
Well 11 and 12(1)	RS - 5	Condition	$12,000	Tie rods across flexible coupling at pump discharge to prevent flexing. Air release is locating on discharge header for wells 11/12 rather than for each well.
	RS - 6	Condition	$12,000	MCC requires general maintenance.
Well No. 14(2)	RS - 7	Strategic Replacement	$100,000	Well casing, motor, and pump rebuild.
Washougal Wellfield Salt Storage Building(1)	RS - 8	Condition	$260,000	Replace existing storage building and provide anchorage for the two NaOH storage tanks.
Supply Projects (RS) Total			**$724,000**	
Total All Projects			$2,132,000	

Notes:
(1) Planned for 2027 or later.
MCC - motor control center.

4.7 Sanitary Survey

A sanitary survey of the City's water system was completed by DOH in January 2025. No significant deficiencies were identified. All recommendations and required submittals by DOH have been completed.

4.8 Emergency Response Program

The City has a Disaster Manual, which identifies the emergency response functions within the City using an "all hazards" approach. Within the City's emergency response framework, the City has developed a Water System ERP following a RRA according to AWIA requirements. The ERP defines risks, water system roles and responsibilities during an emergency, communication procedures, personal safety, alternative water sources, equipment replacement procedures, property protection procedures, and water sampling and monitoring procedures. The ERP also describes alternative system operations for the interruption of each major water supply facility (i.e., loss of a well, reservoir, or booster pump station). Further, it documents an incident specific response plan for major risks, such as drought, earthquake, flood, cyber-attack, etc. The ERP is provided in Appendix **[D]**). The sensitive nature of information included in the RRA necessitated its exclusion from the WSP; however, the RRA is on file with the City and DOH.

4.9 Cross-Connection Control Program

As required by WAC 246-290-490, cross-connection control, utilities have the responsibility to protect customers from water contamination due to cross-connections. A cross-connection is any actual or potential physical connection between a public water system or the consumer's water system and any source of non-potable liquid, solid, or gas that could contaminate the potable water supply by backflow. City Ordinance 10504 addresses cross-connections and their prevention, which can be found as part of the Camas Municipal Code under Water Use Regulations 13.32.

This ordinance and corresponding Municipal Code provide the City's water department the ability to protect the water supply from contamination by prohibiting cross-connections, requiring backflow prevention devices, establishing fees for the inspection of cross-connection assemblies, and adopting State standards for cross-connection regulations. The ordinance and corresponding Municipal Code provides procedures for the abatement of cross-connections and the installation of backflow prevention devices.

The City has four employees certified as cross-connection control specialists. The City's CCC program and records are continually updated and information on each cross-connection device are on file with the City. The Public Works Department and the Building Department coordinate notification to customers who have devices that need to be tested. The City's backflow program management software was upgraded XC2 to SAMS in 2019, which will allow for higher efficiency when entering test report data and sending notifications to water customers regarding their backflow devices.

Per WAC 246-290-490(8), all water systems must complete Annual Summary Report (ASR) forms documenting the status of the water system's CCC program and submit to the DOH upon request. The previous five years of water system ASRs are provided in Appendix **[F]**.

The City maintains the following information on file for its cross-connection control program:

- Date of last inspection.
- Results of inspection.
- Recommended protection.
- List of approved assemblies.
- Test and maintenance reports.
- List of certified testers.
- Customer account number, billing address, service address, phone numbers, device history and maintenance records.

The City's Cross-Connection Control Program requires the inspection of backflow prevention devices at the time of installation. These devices are also scheduled to be inspected annually after installation, after the device is repaired, after the device is relocated or reinstated, and as necessary if tests indicate repeated failure.

Owners of backflow prevention devices are notified by mail that their devices are due for inspection. Three notices are provided, with an example of the first backflow prevention postcard that is sent out to owners being shown in Figure 4.2. However, it is the responsibility of the customer to see that their device is tested. Failure to provide the City with a backflow prevention device inspection report from a certified cross-connection control specialist within 30 days of the third notification will result in the customer's water service being terminated. This termination is then reported to DOH. The City's list of certified backflow testers as of 2025 is provided in Figure 4.3.

The CCS and assistant host an informational backflow booth at the City's annual Camas Days event to educate consumers. They answer questions regarding backflow and provide general knowledge to the public on the issues. Updated informational brochures with current contact information are distributed at the event, online, and at various City facilities. An example brochure is provided in Appendix **[G]**.

ANNUAL BACKFLOW TEST REMINDER

Public Works Department

First Notice: «LTR_Letter_Sent_Date »

Response due by: «LTR_Letter_Response_Date »

«Mailing_Address »

For service address: **«[Facility]Service Address (Full)»**

Camas Water Customer,

Our records indicate that you have a backflow prevention device(s) at the service address above for either lawn sprinkler irrigation or fire suppression. That backflow device listed below is **due or past due** for its annual testing. Please provide the City of Camas with the results of your test no later than **30 days** from the date of this letter.

«LTR_Assembly_List »

Per Washington State Law (WAC 246-290) and Camas Municipal Code (CMC) section 13.32, backflow prevention assemblies are **required to be annually tested** by a Certified Backflow Assembly Tester (BAT). A list of Certified BAT can be found on our website: cityofcamas.us
Please Note: Noncompliance can result in the City taking appropriate actions to protect the drinking water, up to and including terminating your water service to this address, according to Washington State Law, WAC 246-290-490.

City of Camas
1620 SE 8th Ave
Camas, WA 98607
backflow@cityofcamas.us
360-817-1569

City of Camas, 1620 SE 8th Avenue, Camas, Washington 98607 | www.cityofcamas.us | 360.817.1563 | Fax: 360.834.0215

Figure 4.2 Annual Backflow Protection Device Testing First Notification

WASHINGTON STATE CERTIFIED BACKFLOW TESTERS & COMPANIES

The City of Camas makes no representation regarding the abilities, performance, or quality of service of the testers listed below. The City of Camas does not assume of accept any responsibilities for the actions or performances of testers. This list is provided for the convenience of our residents. Customers are to use their own judgement with respect to contracting with these or any other testers.

COMPANY NAME	EMAIL	PHONE
1ST CHOICE BACKFLOWS	office@1stchoicetesting.com	(425)273-3106
A1 BACKFLOWS LLC	a1backflows98601@gmail.com	(360) 907-1519
AAA BACKFLOW NW LLC	aaabackflownw@gmail.com	(360) 263-4840
AC IRRIGATION LLC	acibackflows@gmail.com	(360) 241-9981
ALL PRO BACKFLOW | RON HENDRICKSON, LLC	ron@allprobackflowtesting.com	(360) 448-8285
ASHLAND BROTHERS LANDSCAPING	jordan@ablandscapes.net	(503) 981-6131
BACKFLOWS BY THE BEST	hammrichdale@gmail.com	(360) 606-0870
BACKFLOWS NORTHWEST, INC.	office@backflowsnorthwest.com	(425) 277-2888
BEACON BACKFLOW LLC	beaconbackflow@comcast.net	(360) 694-0587
BRUCE BOYLAN	batbruce57@gmail.com	(360) 993-1772
C & E LAWN SPRINKLERS INC.		(360) 694-2035
CERTIFIED TESTING SERVICES INC.	testing@clarkcobackflow.com	(360) 600-3273
CLARK COUNTY SPRINKLER REPAIR	ccsprinklerrepair@gmail.com	(360) 772-3396
COLUMBIA CROSS-CONNECTION CONTROL	office@columbiacross.com	(503) 235-6141
DRAKE'S 7 DEES, INC.	leads@drakes7dees.com	(503) 292-9121
EMORY SANTACRUZ	emory.santacruz@yahoo.com	(564) 653-1621
FRONTIER LANDSCAPING, INC.	terry@frontierlandscaping.com	(360) 574-8979
JRT MECHANICAL	servicesolutions@jrtmechanical.com	(360) 667-4159
KENNETH EBERT	shaman6891@gmail.com	(562) 673-6741
LANDSCAPE MANAGEMENT & SERVICES INC	irene@landscapemgmt.com	(360) 553-9872
LANDSCAPE MANAGEMENT 2 LLC	andrea@landscapemgmt.com	(360) 256-0706
MATHEWSON'S BACKFLOW	mathewsontgk@gmail.com	(360) 828-8483
PERFORMANCE SYSTEM INTEGRATION	info@psintegrated.com	(877) 857-6174
PNW BACKFLOW	rick.pnwbackflow@gmail.com	(360) 409-3109

Figure 4.3 List of Certified Backflow Testers

4.10 Pipeline Repair and Replacement

The City currently has a modest water main repair and replacement (R&R) program to address O&M and capacity concerns as opportunities arise, such as during redevelopment or in conjunction with other utility projects. While much of the City's distribution system was constructed after 1990, the distribution piping near downtown was constructed in the 1950s and early 1960s and is expected to begin reaching the end of its useful life during the next 20 years.

Useful life is the length of time that a pipe is anticipated to remain in service. Useful life depends largely on the pipe material, but can also depend on soil conditions, water constituents, and installation. When a pipe is in service beyond its useful life, the increasing costs of maintenance associated with a failing pipe typically exceed the cost of replacement. Useful life analyses do not predict exactly when and where failures will occur, rather it is a method to identify the pipes for inclusion in an ongoing R&R program.

Remaining useful life (RUL) is simply the period of time remaining before the end of useful life is reached. A pipeline replacement schedule can be developed by looking at the remaining useful life of all the pipes

in the distribution system. This replacement schedule is often reported in terms of average annual feet of pipe replacement over a ten-year replacement period due to limitations in historical installation records and difficulties in assessing the impact of environmental conditions and other factors limiting useful life. Within a given replacement period, pipes near or exceeding their useful life should be prioritized based on the criticality of the pipe to the system. For example, a large diameter transmission main or pipes that can be included in redevelopment or transportation projects may be a higher priority. By incorporating criticality, the City will be able to address existing priorities and adapt to changing priorities while maintaining an annual replacement program.

4.10.1 Pipe Material and Age

Pipe material was available from the City's records. The information was reviewed by City staff and recent replacement projects were incorporated into the data. The City does not have a reliable pipe age inventory. As a rule of thumb, pipes installed before or during the 1970s were classified as CI pipes installed after the 1970s were classified as DI pipe.

4.10.2 Useful Life

Useful life in combination with pipe age provides the basis for the RUL calculations. The estimated useful life of each pipe material based on industry standards and City staff knowledge, as presented in Table 4.4. The City chose a 75-year useful life for CI pipes, polyvinyl chloride (PVC) and steel pipes. Cast iron and steel useful life were conservatively selected at the lower end of the typical range. The PVC useful life is within industry ranges; however, it has little overall impact given less than 1 percent of the system is PVC. DI pipes were considered to have an 85-year useful life, which was the median of the industry range. It is important to note that the actual useful life of an individual pipe can vary widely due to soil, groundwater, and installation conditions. It is recommended that the condition of pipes being replaced be noted for consideration in future analyses, which will increase the accuracy of the useful life estimates.

Table 4.4 Useful Life of Pipes

Pipe Material	Useful Life (years)
CI	75
DI	85
PVC	75
Steel	75

4.10.3 Remaining Useful Life Analysis

RUL is defined as the length of time left before a pipe's maintenance costs will likely exceed its cost of replacement. The period of time between the end of the useful life and today is the RUL. For example, a DI pipe installed in 2000 has a useful life of 85 years, where it will reach the end of its useful life by 2085. From the current year, 2026, this DI pipe's RUL would be 59 years. Due to the limited pipe age information available, a thorough RUL analysis could not be completed. However, it is understood that much of the City's CI and Steel piping was installed prior to 1960 and therefore, based on the chosen useful life for these materials, are expected to reach the end of their useful life by end of the planning period (2046). It is recommended that all CI and steel piping, approximately 20 percent of the distribution system pipeline,

be replaced over the 20-year planning period. The majority of the City's DI and PVC pipe are not anticipated to reach the end of their useful life until after the planning period.

The pipe recommended for replacement represents the majority of the City's downtown and surrounding areas. Pipes reaching their RUL serve all types of customers, including commercial, industrial, and residential customers. Pipes that exceed their useful life will continue to provide service but are at a greater risk for pipe breaks and may have increased leakage. Therefore, replacement should be prioritized based on criticality to the system to best manage the aging distribution infrastructure within the City's available budget.

4.10.4 Pipeline Repair and Replacement Program

Over the 20-year planning period, the City should replace all the CI and steel piping. This amounts to approximately 20 percent of the entire distribution system, or 1 percent system replacement per year over the 20 years. Further discussion of the pipe replacement CIP is provided in Chapter 10. Additionally, small diameter mains (2-inch to 6-inch) should be upsized to 8-inch to meet current City standards. To gain economies of scale, the City should consider geographically concentrated projects that incorporate other utilities, such as sewer main R&R and roadway resurfacing.

4.11 Operations and Maintenance Improvements

The City has a well operated and maintained system. Condition assessments identified repair and replacement projects for above ground assets (i.e., pump stations, wells, and reservoirs, etc.). The majority of projects were necessary due to aging electrical equipment and normal replacement of pumps and motors. Having recently replaced the Lower Prune Hill reservoir, the Butler reservoir is the only other reservoir built prior to 1940 which has reached the end of its usable life and is due to be replaced. A PRV study conducted in 2024 identified various solutions to fire-flow deficiencies and PRV operational inefficiencies.

It is anticipated that the piping in Downtown and surrounding areas will begin to reach the end of their life in the short-term planning horizon (2026 to 2035). The City's long-term goal is to create a risk prioritized water infrastructure rehabilitation program that addresses above and below ground assets. However, at this time, the City's financial resources are focused on meeting the rapid growth occurring in Camas.

To gain economies of scale during the replacement, the City should consider geographically concentrated projects that incorporate other utilities, such as sewer main R&R and roadway resurfacing.

CHAPTER 5 WATER REQUIREMENTS

Projecting realistic future water requirements, i.e., 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 Plan and in the City's 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.

Historical data provides the City's unique water use over a long period of time, which captures the range of water use due to weather, economic conditions, conservation practices, and other factors. This Chapter presents an analysis of historical water use from 2017 to 2024 based on customer billing and production records. This data provide information on the City's different types of customers, as well as water use parameters on an average annual basis, seasonally, and for the maximum day. Historical water use patterns and parameters were established from these data to predict future water use for existing and new customers.

The City's draft 2045 Comprehensive Plan was used to predict where and how much demand will occur in the water system. The number and type of future customer accounts were determined based on developable vacant parcels and future land use. The resulting future accounts were converted to projected demands using the historical water use patterns and parameters.

Demand projections were generated for the planning period of 2026 to 2046 for the City's established RWSA. The projections were divided into three planning scenarios:

- Short-term, 5-year (2027-2031).
- Medium-term, 10-year (2032-2036).
- Long-term, 20-year (2037-2046).

Dividing the planning period into three scenarios aids in the development and phasing of improvement projects and the CIP, as well as being consistent with DOH requirements.

Demand projections were expressed as ERU, average day demand (ADD), and MDD. One ERU is defined as the average quantity of water beneficially used by one average, full-time, single-family residence (SFR) per day. The quantity of water used by other customer classes, and by the whole system, can be expressed in terms of ERUs. The ADD is typically used in operational evaluations. It is calculated by dividing the total water produced by the number of days per year (2020 and 2024 were leap years and include 366 days per year). The MDD represents the single largest day water demand during the year and is a key parameter for infrastructure sizing.

Changes in water use, conservation activities, system growth, and other factors may result in higher or lower than projected water use. Planning for the potential changes allows the City to better manage potential risks from these changes. For example, lower than projected water use may be a concern for the City's financial planning, while higher than projected water use may be a concern for water supply planning. Therefore, three demand scenarios were developed: low, medium, and high demand scenarios. The low demand scenario represents future demand with conservation; the high demand scenario generally reflects the highest demands in the last eight years; the medium demand scenario is a

conservative projection between the low and high projections. Details on the historical water use, demographic projections, and demand calculations used to develop these projections are presented in this Chapter.

5.1 Historical Water Use

Historical water use data, i.e., consumption data, was obtained from City records to characterize the demands of the City's customers. Annual water use data for the years 2017 to 2024 were used to develop historical demand patterns and parameters, which represent current and expected future water use. Two key demand parameters were generated from the data: typical water use per customer class, and typical water use per ERU. These parameters were used as the basis of future demand projections.

5.1.1 Historical Accounts

The City customers were divided into seven customer classes. These customer classes are:

- Accessory Dwelling Unit (ADU) Shared.
- City Accounts.
- Commercial.
- Industrial.
- Irrigation.
- Multifamily Residential (MFR).
- SFR.

The number of accounts for each customer class is summarized in Table 5.1. As seen in the table, SFR makes up approximately 91 percent of accounts. The total number of accounts has increased by approximately 21 percent from 2017 to 2024 due to growth and development in the City.

Table 5.1 Historical Number of Accounts by Customer Class

Year	SFR	MFR	Commercial	Industrial	City	Irrigation	ADU Shared	Total
2017	7,539	334	239	30	45	96	8	8,291
2018	7,730	332	249	30	46	109	13	8,509
2019	8,147	337	248	27	46	106	14	8,925
2020	8,489	352	253	24	46	106	15	9,285
2021	8,877	354	264	24	50	121	16	9,706
2022	8,974	356	268	23	48	106	18	9,793
2023	9,031	357	273	22	49	121	22	9,875
2024	9,191	356	272	22	50	122	21	10,034
Average Annual Growth Rate	2.9%	0.9%	1.9%	-4.3%	1.5%	3.5%	14.8%	2.8%
Average Percent per Class	91.3%	3.7%	2.8%	0.3%	0.5%	1.2%	0.2%	100%

5.1.2 Large Users

The City's top 10 water users in 2024, herein termed "large users," were also evaluated in this study. The large users class includes the following customers:

- Taiwan Semiconductor Manufacturing Company (TSMC) Washington (formerly known as "Wafertech Industries").
- Analog Devices (formerly known as "Linear Technologies").
- Georgia Pacific Mill.
- Camas School District No. 117.
- City of Camas.
- Bodycote Industrial Metal Technology (IMT).
- Fisher Creek Investments.
- Hills at Round Lake Homeowner's Associate (HOA).
- Prestige Care and Rehabilitation.
- Clara Street Block Building.

These large users represent 34 percent of the total consumption; therefore, it is typical to separate them (number of accounts and consumption) from the rest of the system as to not skew any system-wide ERU values for these customer classes. Individual demand projections were developed for each large user to provide additional accuracy in the demand projections, as well as the system analyses. The development of the large user demand projections is detailed in Section 5.6.2.

5.1.3 Historical Consumption

The City's historical annual water consumption was provided for each customer class based on City billing data, as presented in Table 5.2 in units of mgd. The table also includes the average, 75th percentile, 3-year average, and maximum statistics on historical consumption. The SFR customer class has the highest water demand and the industrial class has the second highest water demand for all years.

Table 5.2 Historical Water Demand by Customer Class (mgd)

Year	SFR	MFR	Commercial	Industrial	City	Irrigation	ADU Shared	Total(1)
2017	1.85	0.11	0.13	1.21	0.10	0.23	0.003	3.67
2018	1.88	0.10	0.15	1.18	0.07	0.28	0.003	3.69
2019	1.80	0.10	0.15	1.07	0.07	0.24	0.004	3.45
2020	2.00	0.12	0.13	1.06	0.07	0.18	0.005	3.58
2021	2.31	0.14	0.17	1.15	0.10	0.28	0.005	4.17
2022	2.08	0.14	0.17	1.22	0.08	0.22	0.005	3.94
2023	2.29	0.16	0.20	1.16	0.10	0.26	0.007	4.19
2024	2.22	0.14	0.21	1.11	0.19	0.43	0.006	4.33
Average (all years)	**2.06**	**0.13**	**0.16**	**1.15**	**0.10**	**0.26**	**0.005**	**4.25**
75th Percentile	**2.24**	**0.14**	**0.18**	**1.19**	**0.10**	**0.28**	**0.006**	**4.18**
3-Year Average (2022-2024)	**2.20**	**0.15**	**0.19**	**1.16**	**0.12**	**0.30**	**0.006**	**4.16**
Maximum	**2.31**	**0.16**	**0.21**	**1.22**	**0.19**	**0.43**	**0.007**	**4.33**

Notes:
(1) Totals may not equal due to rounding.

The average percentage of accounts and annual water consumption by customer class from 2017 to 2024 are presented in Figure 5.1 and Figure 5.2. Comparing accounts and water consumption illustrates the differences in water use between the customer classes. As seen in these figures, SFR customers represent 91 percent of the accounts yet only comprise 53 percent of the total consumption. By contrast, industrial customers represent less than one percent of the accounts, but account for 30 percent of the total demand. This difference in proportional water use was quantified by comparing the historical water use per account for each customer class (in Table 5.3), as described in Section 5.1.3.

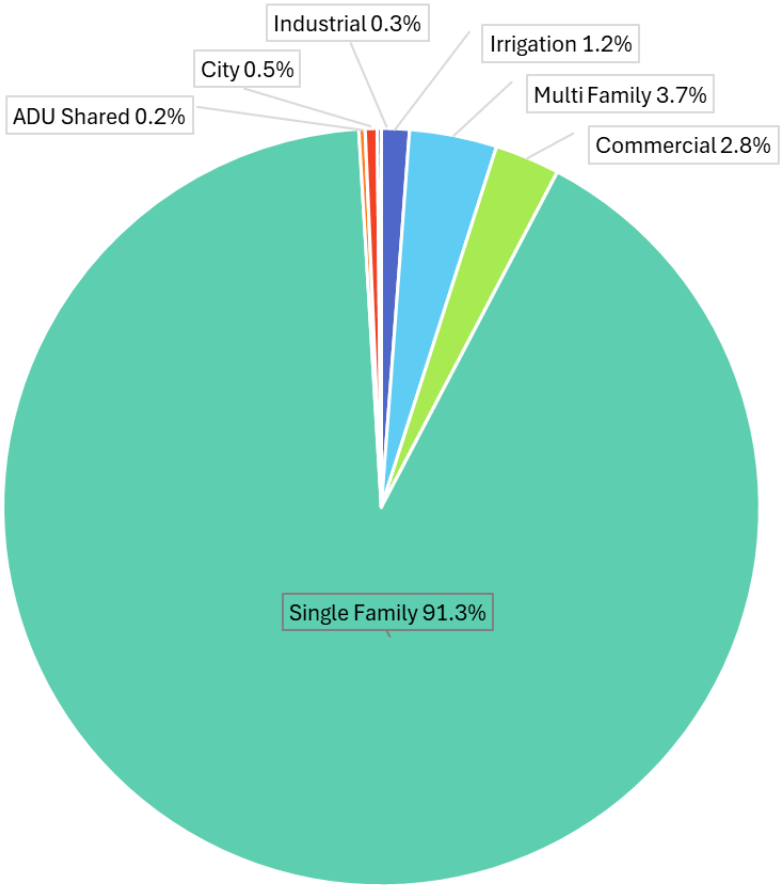


Figure 5.1 Average Number of Accounts by Customer Class

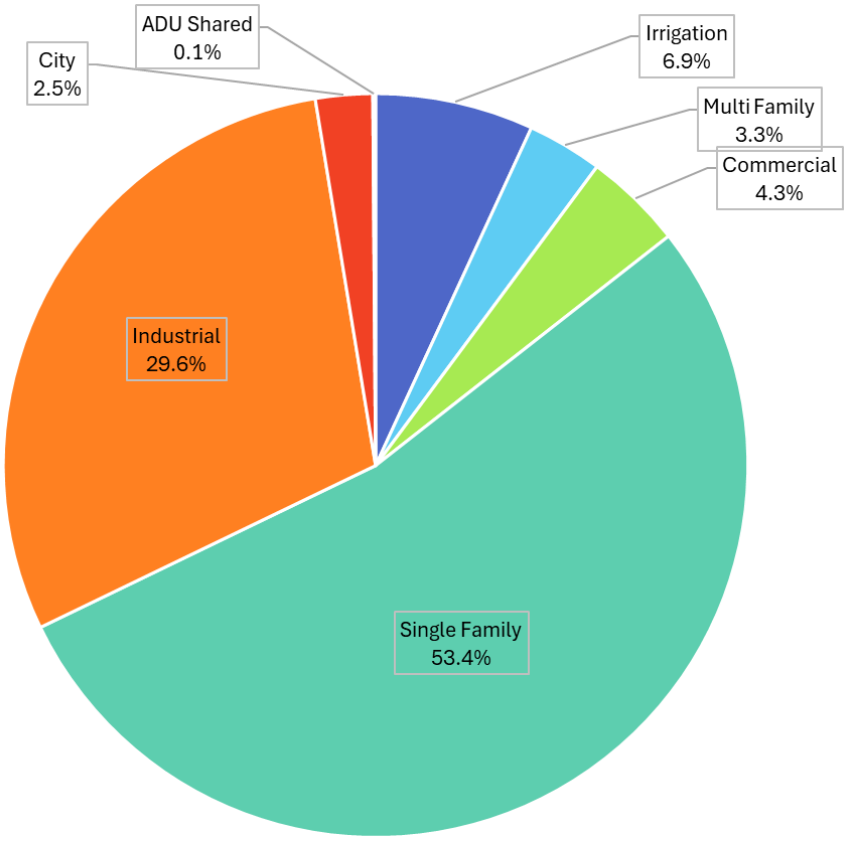


Figure 5.2 Average Amount Consumed by Customer Class

5.1.4 Water Use per Account and Equivalent Residential Units

The demand of each customer class can be expressed in terms of ERUs for forecasting and planning purposes. As discussed previously, one ERU is the amount of water consumed by a typical SFR. According to the Washington Administrative Code 246-290-010, non-residential customer water consumption is expressed as a multiple of SFR ERU. In this case, consumption data from 2017-2024 was used to establish the "single-family residence" ERU. Importantly, the ERU calculation is based on historical consumption (i.e., billing records) and therefore does not include distribution system leakage.

To calculate ADD water use per ERU, the total annual volume of water consumed by SFRs is divided by the total number of active SFR accounts. The resulting value, also called the ERU planning value, is the average SFR's annual water use per account. To determine the number of ERUs in other customer class, the volume of water used by those customer categories is divided by the ERU value.

Table 5.3 shows the historical annual average water consumption by customer class. The table also includes the average, 75th percentile, three-year average, and maximum consumption statistics. The 3-year average (2022 to 2024) quantity of water used by one typical, full-time SFR ERU is equal to 242 gallons per day (gpd). From 2017 through 2024, the 75th percentile of water consumption per ERU was 248 gpd.

Table 5.3 Historical Annual Water Use per Account (gpd/account)

Year	SFR	MFR	Commercial	Industrial	City	Irrigation	ADU Shared
2017	246	315	564	40,338	2,143	2,402	315
2018	244	309	611	39,230	1,459	2,541	198
2019	221	303	624	39,651	1,511	2,247	259
2020	236	338	520	44,258	1,487	1,677	303
2021	260	400	639	48,029	1,988	2,295	332
2022	232	387	628	53,183	1,657	2,082	286
2023	253	437	716	52,933	1,974	2,186	304
2024	242	399	778	50,262	3,711	3,507	297
Average	**242**	**361**	**635**	**45,986**	**1,991**	**2,367**	**287**
75th Percentile	**248**	**400**	**658**	**50,930**	**2,027**	**2,437**	**307**
3-Year Average (2022-2024)	**242**	**408**	**707**	**52,126**	**2,447**	**2,591**	**295**
Maximum	**260**	**437**	**778**	**53,183**	**3,711**	**3,507**	**332**
ERUs per Account(1)	**1.0**	**1.5**	**2.6**	**190.2**	**8.2**	**9.8**	**1.2**

Notes:
(1) ERUs per Account based on average of annual water consumption.

Compared to other Washington utilities evaluated by Carollo, the City's water use per SFR account appears slightly high, possibly indicating larger properties requiring irrigation or lower than usual replacement rates of high-flow appliances and fixtures. Additionally, the City's MFR water use per account appears low, possibly due to a higher percentage of low-density MFR accounts (such as tri-plexes or quad-plexes), or due to monitoring MFR irrigation demands in separate irrigation meters (under the "Irrigation" customer class).

Calculating the City's water use in terms of ERUs provides a means to express water use by non-residential customers as an equivalent number of SFR accounts. The ERUs per account for MFR and all non-residential accounts are obtained by dividing the average water use per account for each customer class by the ERU water use. For example, the average Commercial account uses approximately 2.6 times the water use of an average SFR account; therefore, each Commercial account is equivalent to 2.6 ERUs. Table 5.3 presents the average number of ERUs per account for each customer class based on average historical water use. The number of ERUs per account ranges from 1.2 for ADU accounts to 190.2 for Industrial accounts.

5.2 Seasonal Demands

The pattern of water consumption differs between the customer classes. Figure 5.3 presents average total monthly consumption by customer class from 2017 through 2024. Note that, with exceptions, the City has historically conducted bi-monthly meter reading; therefore, the water consumption was averaged between months to better reflect the actual water consumed in the month. As of June 2025, the City has started monthly reads. SFR and irrigation accounts show a significant peak in total consumption during the summer months. 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 and recreation, are also at their highest during summer months. By contrast, industrial users do not demonstrate significant seasonal variation in demand. These monthly variations in demand for each customer class can be used to target water use efficiency efforts and/or to project future water-use patterns for planning purposes.

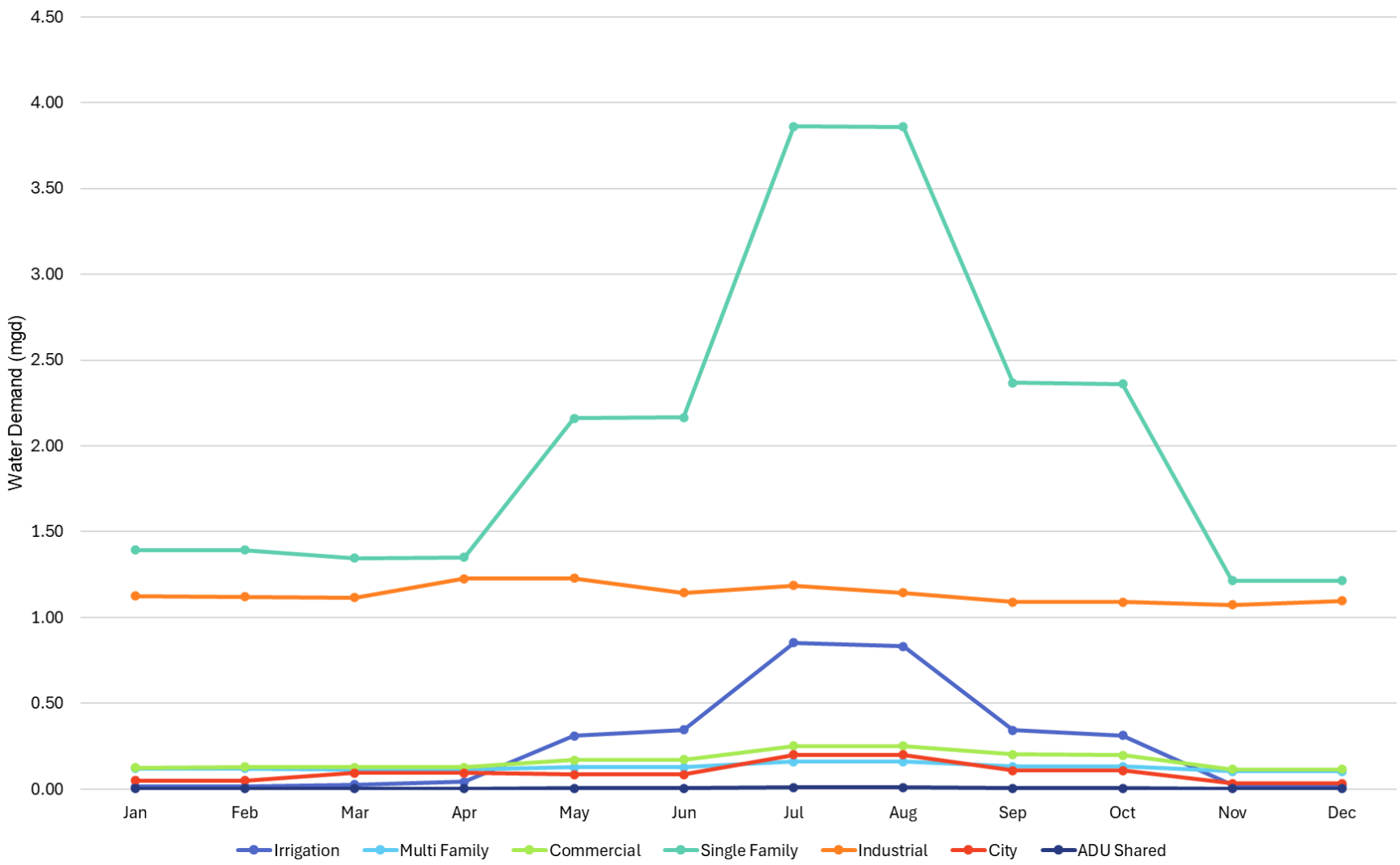


Figure 5.3 Average Seasonal Demand by Customer Class

5.3 Historical 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 such as leakage. For this reason, the City's production data, which accounts for all water demand, was used to calculate the ADD and MDD for each year. Additionally, historical production allows the City to track system-wide demands on a daily basis, rather than monthly or bi-monthly as is the case with billing records. Note that as of June 2025, the City has started monthly reads. Table 5.4 lists the historical annual production from 2017 through 2024. As shown, the annual production ranged from 1,448 million gallons (MG) to 1,729 MG.

5.3.1 Distribution System Leakage and Non-Revenue Water

DSL is equal to the total water produced minus the total authorized consumption. Aging water infrastructure leads to real losses such as water main breaks, reservoir leaks or overflows, and general distribution system leakage. It is important to note though that DSL includes apparent losses other than leakage as well, such as data handling errors, water theft, meter inaccuracy or failure, and untracked authorized water use. Authorized Non-Revenue Water that is not metered by the City contributes to the DSL as well.

The City's total water production and consumption in millions of gallons, or MG, as well as estimates of DSL for 2017 through 2024 are shown in Table 5.4 and presented graphically in Figure 5.4. The City's average annual DSL over the three-year period from 2022 to 2024 was 10.3 percent. There is a slight discrepancy in the DSL calculated from the historical billing records and the value reported on the Water Use Efficiency reports submitted annually to DOH. In early 2025, the City transitioned to a new data management and billing software, Tyler Technology's Utilities Pro, to improve data quality, management, and reporting. While the two sources are generally consistent, minor differences are present, which are likely due to errors introduced during the transition of historical data to the new software or to the timing of report preparation and subsequent revisions made to ensure accuracy.

Table 5.4 Historical Distribution System Leakage

Year	Historical Billing Data(1)				Annual Water Used Efficiency Reports(2)			
	Total Production (MG)	Total Consumption (MG)	DSL (MG)(3)	DSL (%)	Total Production (MG)	Total Consumption (MG)	DSL (MG)	DSL (%)
2017	NA	1,338.8	NA	NA	1,493.4	1,339.0	154.4	10.3%
2018	1,541.2	1,346.5	194.7	12.6%	1,545.9	1,348.9	197.1	12.7%
2019	1,447.6	1,259.6	188.1	13.0%	1,447.6	1,253.3	194.3	13.4%
2020	1,537.3	1,309.0	228.3	14.9%	1,537.3	1,314.8	222.5	14.5%
2021	1,729.0	1,522.0	207.0	12.0%	1,733.0	1,478.4	254.6	14.7%
2022	1,639.4	1,439.5	199.9	12.2%	1,639.4	1,406.0	233.4	14.2%
2023	1,699.2	1,530.3	168.9	9.9%	1,699.2	1,524.2	175.0	10.3%
2024	1,697.5	1,547.2	150.3	8.9%	1,697.5	1,540.9	154.6	9.2%
Average				**11.9%(4)**				**12.4%**
3-Year Average (2022-2024)				**10.3%**				**11.2%**

Notes:
(1) Historical production and consumption data were calculated based on the data provided by the City in July 2025.
(2) Historical production and consumption shown are based on the Water Use Efficiency report submitted to Washington's Department of Health (DOH).
(3) Distribution System Loss (DSL) was determined by subtracting total consumption from total production.
(4) 2017 Water Total Production was not provided for this analysis, therefore the DSL's average percentage excluded the year of 2017.

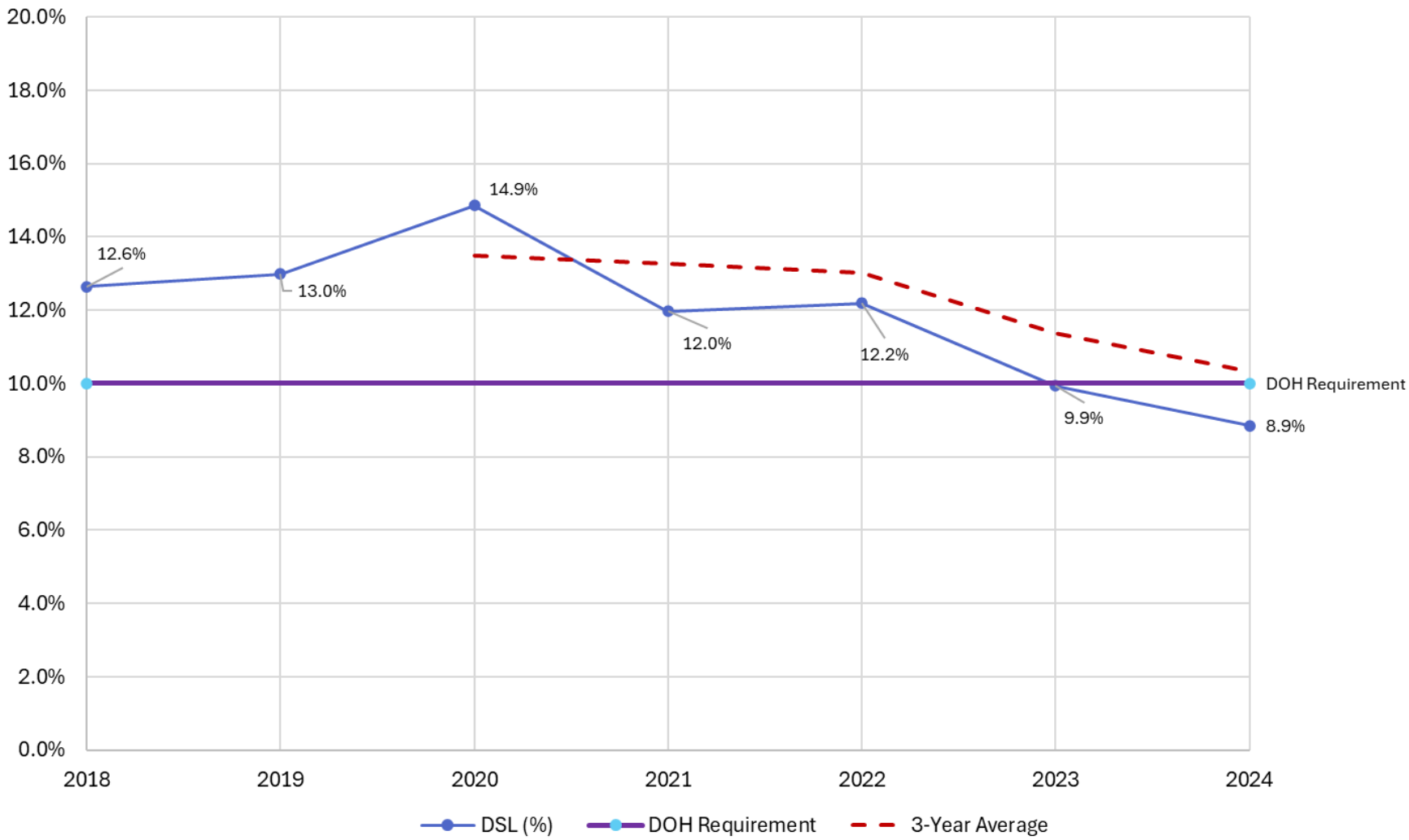


Figure 5.4 Historical Distribution System Leakage Trend

5.3.2 Historical Average and Maximum Demands

The City produces water for its customers through ten wells and two surface water sources. Table 5.5 presents the ADD and MDD (based on production) for the period of 2018 through 2024. The average annual water produced from 2018 through 2024 was 1,613 MG per year. The average ADD over the period was 4.42 mgd. The annual ADD trends increases slightly over this period, reflecting the growing number of City water customers.

Table 5.5 Historical Average Production, Maximum Day Demand, and Peaking Factor

Year	Date of MDD	MDD (mgd)	MDD without Top 2 Large User	ADD (mgd)	ADD without Top 2 Large Users	MDD:ADD Peaking Factor with Top 2 Large Users	MDD:ADD Peaking Factor(1)
2018	July 28	8.3	7.2	4.2	3.3	2.0	2.2
2019	July 15	7.7	6.6	4.0	3.0	1.9	2.2
2020	August 16	8.7	7.5	4.2	3.3	2.1	2.3
2021	July 29	9.3	8.1	4.8	3.8	2.0	2.2
2022	July 29	8.8	7.5	4.5	3.5	2.0	2.2
2023	August 21	8.8	7.6	4.7	3.7	1.9	2.1
2024	July 8	10.2	8.9	4.7	3.6	2.2	2.5
Average		**8.8**	**7.6**	**4.4**	**3.4**	**2.0**	**2.2**
3-Year Average (2022-2024)		**9.3**	**8.0**	**4.6**	**3.6**	**2.0**	**2.2**
75th Percentile		**9.3**	**8.1**	**4.7**	**3.7**	**2.1**	**2.3**
Maximum		**10.2**	**8.9**	**4.7**	**3.8**	**2.2**	**2.5**

Notes:
(1) Peaking factor excludes large user demand. Large user demands were removed from both MDD and ADD values to calculate the peaking factor.
(2) Totals may not equal due to rounding.

The MDD is a key benchmark for supply capability, pump station discharge rates, reservoir capacity, and pump sizes. The MDD is the highest daily production in a given year and typically occurs during the summer when irrigation is prevalent. Table 5.5 presents the historical MDD from 2018 to 2024. MDD is less dependent on indoor water use (which drives the ADD), and more dependent on irrigation. The highest MDD value (10.2 mgd) occurred in 2024, which had record-setting high temperatures and low rainfall. The next highest MDD occurred in 2021, three years earlier during COVID-19, when many individuals were still working from home.

The second to last column of Table 5.5 presents the historical MDD to ADD peaking factor including the top two large users, which reflects systemwide demand patterns. The last column presents the MDD to ADD peaking factor with the top two large users removed, providing a comparison of typical residential and commercial demand trends across different years. Large user demands are excluded from the peaking factor by removing large user demands from both ADD and MDD. This is because large user demands do not typically exhibit the same daily variation and peaks as other customers. Because of their significant demands, including large user demands in peaking factors can skew peaking factors intended to represent the majority of customers. The peaking factor is also a key parameter in developing the future MDD projections, as discussed later in this chapter. The maximum peaking factor of 2.46 occurred in 2024

and the minimum peaking factor of 2.17 occurred in 2021 and 2022. The MDD to ADD peaking factor over the period is shown graphically in Figure 5.5. Figure 5.5 illustrates the variability in the peaking factor over the period. Section 5.6.4 discusses the peaking factor to be used for future projections.

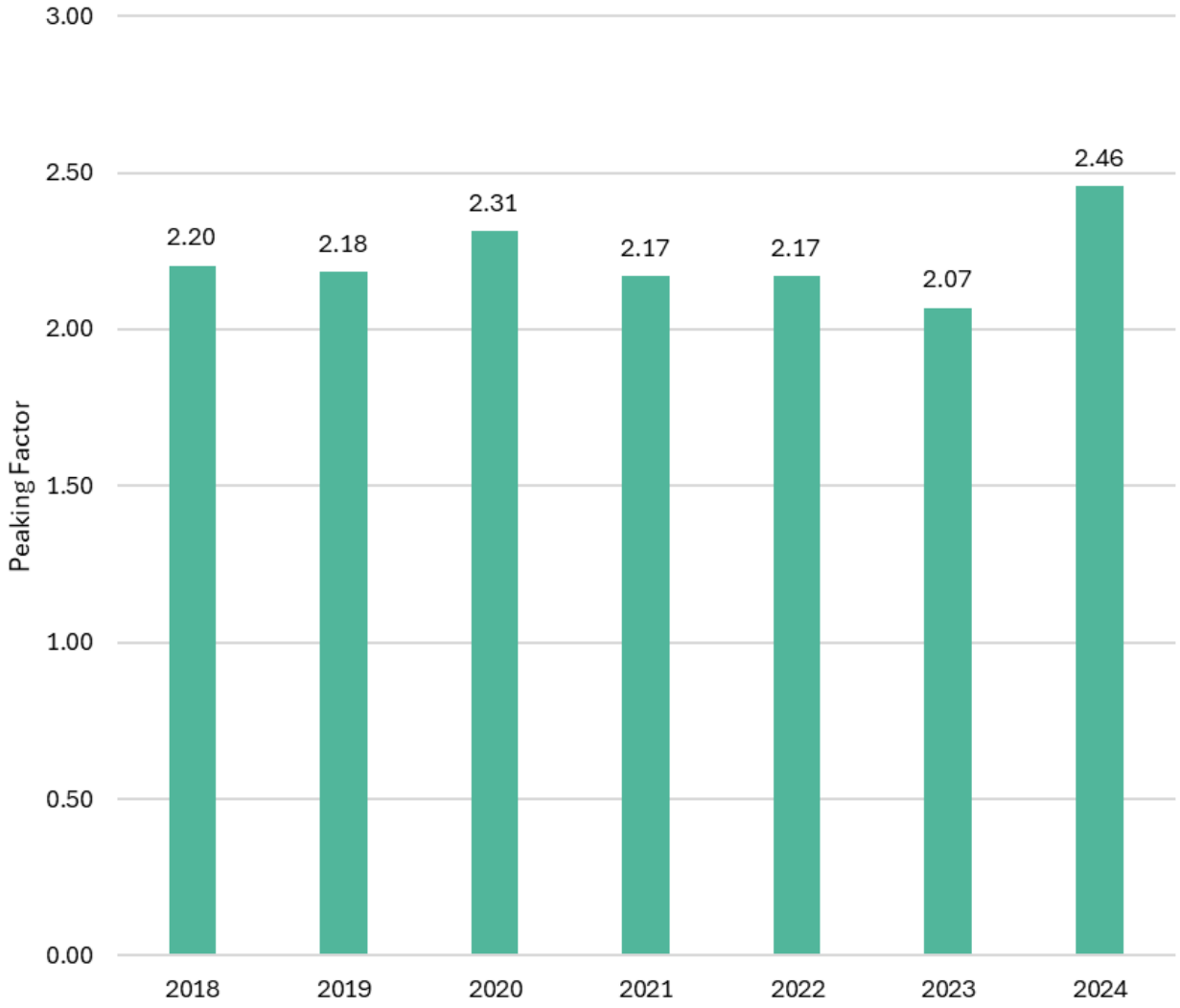


Figure 5.5 MDD/ADD Peaking Factor

5.4 Demographic Forecast

Demand projections depend on the future number of customers to be served by the City's water system. Thus, demographic forecasts of future population and employment must be made to establish an estimate of the future number of customers. A demographic analysis consistent with regional growth planning was performed to estimate the number and type of future customer accounts served by the City's water system. Converting the number of accounts into demand projections is discussed in Section 5.6.

5.4.1 Land Use

Land use designations and regulations provide important information in determining future water requirements. Land use 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.

5.4.1.1 Existing Land Use

Figure 5.6 depicts the best available data on existing land use based on Clark County Geographic Information System (GIS) data developed for the 1994 GMA and the 2023 VBLM data. While these sources provide the best available information, some parcel records were not up to date. In those cases, a simple check was done to confirm whether the parcels are vacant or developed. Because these GIS data are not up-to-date, existing water customers were derived using the City's billing data and matching it to parcel property IDs thereby providing the geographic location. Each metered account was assigned one of the eight customer classes. Open space, water, agriculture and vacant land uses were also part of the existing land use classes but are not associated with metered accounts.

Figures 5.6 shows the City’s existing land use.

5.4.1.2 Future Land Use

Future land use designations were obtained from the City's 2045 Comprehensive Plan and the Preferred Land Use Alternative Map. (Camas 2025). These future land use designations are depicted in Figure 5.7. The future land use designations are used to evaluate the 20-year development conditions as described below.

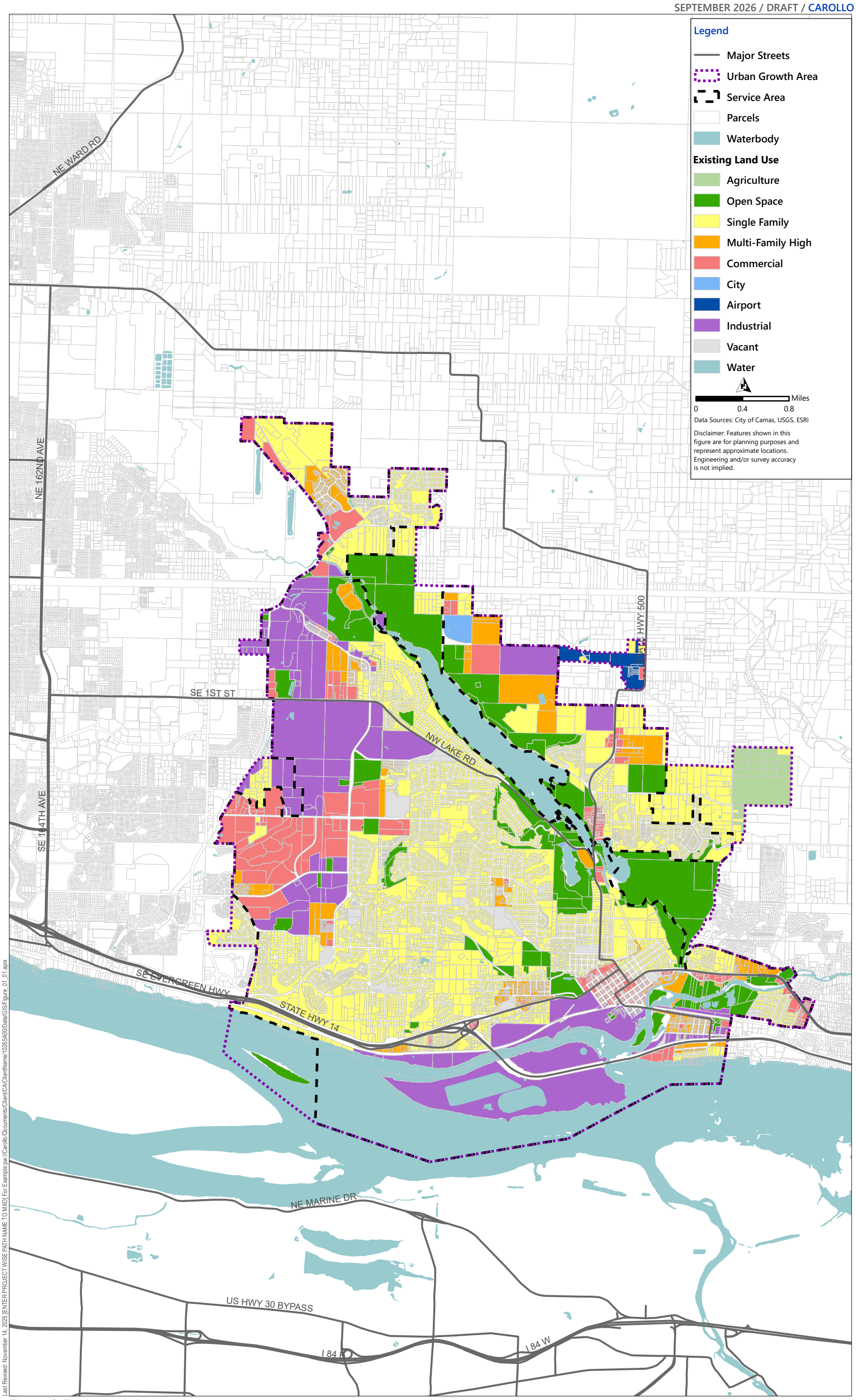


Figure 5.6 Existing Land Use

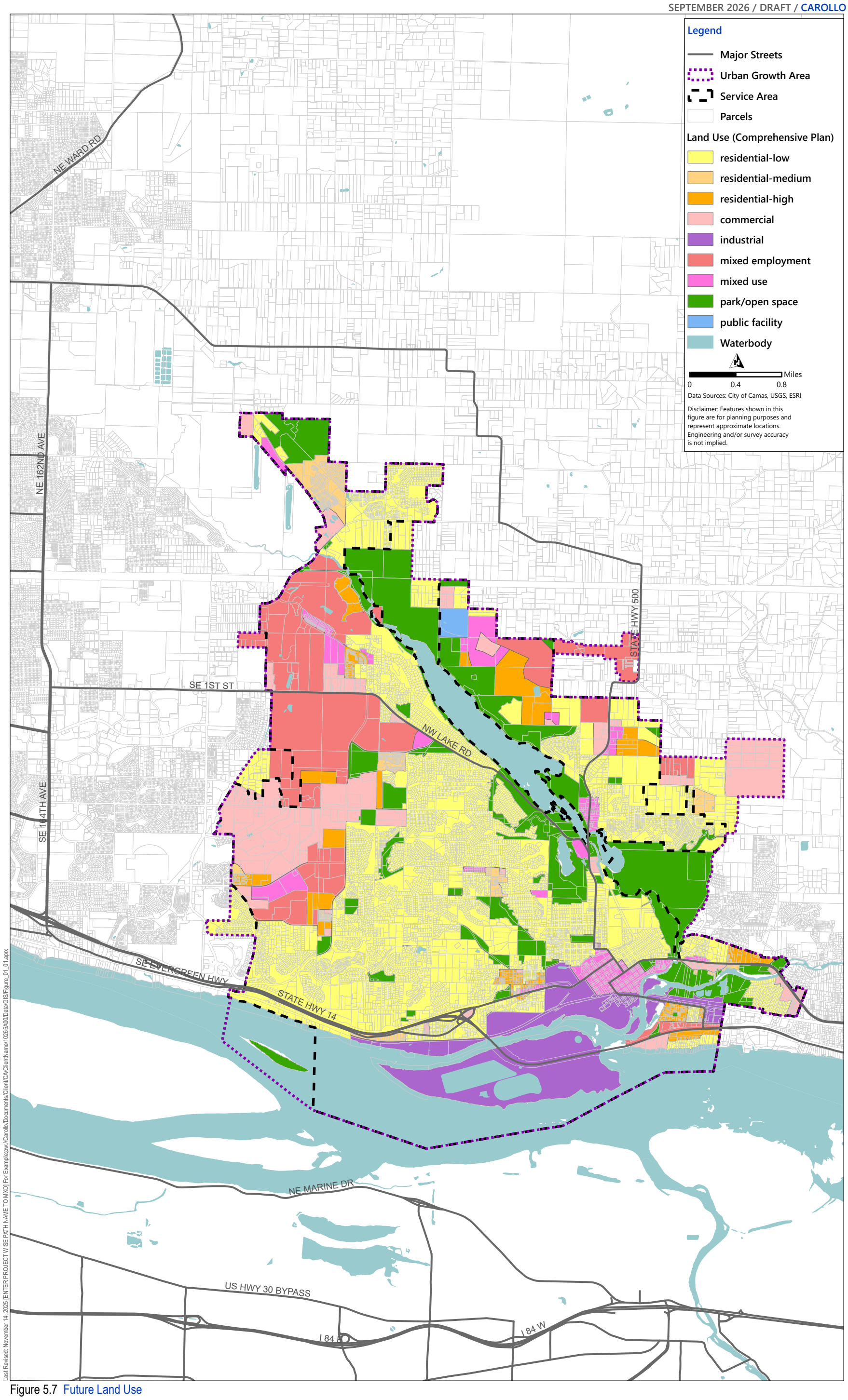


Figure 5.7 Future Land Use

5.4.2 Demographic Projections

To determine future demand for the City's RWSA, current and projected demographic trends provided by the City were used. The number of households in 2025 is based on the number of residential accounts in 2024 provided by the City and an annual growth rate of 2.9 percent. Number of employees in 2025 is from the US Census Bureau data. 2045 projected households and employees were provided by the City's planning department. Years 2036 and 2046 projections are linearly interpolated and extrapolated from the 2031 and 2045 values. Table 5.6 shows the City's household and employment projections.

Table 5.6 System-wide Household and Employment Projections

System-wide Projections	2025	2031(3)	2036(5)	2045(4)	2046(5)
Households	9,824(1)	11,415	12,790	15,443	15,738
Employees	12,600(2)	13,604	18,929	24,098	24,904

Notes:
(1) Existing number of households for 2025 are based on the number of residential accounts in 2024 provided by the City and 2.9% average annual growth rate.
(2) Number of employees in 2025 are estimated based on the U.S. Census Bureau's Data for the 2019-2023 period.
(3) The 2031 Household Projections were based on the City's Current Development Project Dashboard, which identifies parcels currently under review, in construction, on hold, or in the permitting process. Employee projections were estimated based on the anticipated redevelopment of parcels designated for commercial and industrial land uses.
(4) Projections for household and employees for 2045 were provided by the City.
(5) 2036 and 2046 projected values are based on interpolation and extrapolation of the 2031 and 2045 values.

The City's VBLM data does not identify the specific locations where residential and employment growth will occur or when, so projected household and employees were distributed across the service area based on known developments expected to occur within the short term (2031) and using the VBLM parcel constrained/unconstrained classification (2036 and 2046).

- For 2031: Residential units and employments were allocated based on parcels currently under review, in permitting, or under construction per the City's Current Development Project Dashboard, and growth was assigned to these areas.
- For 2036: For residential land uses, approximately 20 percent of each land uses' buildout density was assumed to be added by 2036. 20 percent development of residential demand aligns with the household projections presented in Table 5.6 based on the buildout densities for single family and multifamily parcels obtained from the 2022 Clark County Buildable Lands Report. Buildout densities are 20 dwelling units per acre for MFR and six dwelling units per acre for SFR. For non-residential land uses (commercial, City, and industrial), approximately 50 percent of the 2046 buildout density was assumed to be added by 2035, with commercial and City at 20 employees per acre and industrial at 9 employees per acre. Employment increments for 2036 were calculated as the additional number of employees needed to reach the 2036 total projection, including any employees already accounted for in 2031.
- For 2046: For residential land uses, 95 percent of buildout density was assumed to be added by 2046. Similarly, non-residential land uses were assumed to reach 95 percent of buildout density.

By 2045, the City is expected to have a population of 37,080 people, a 7,729-person increase from the estimated 2023 population of 29,352 (Camas 2045, 2025). This represents an annual average growth rate of 1.2 percent. The 2023 Clark County VBLM information is in Appendix **[X]**. Moreover, projections were prepared specifically for the North Shore area which is expected to add about 1,230 housing units by 2046, which is included in the projected households in 2046. Figure 5.8 shows the City's residential projections for North Shore area.

The City currently serves several accounts located outside the RWSA. These accounts were not grown as expansion of water service in this area is not expected, per the definition of the RWSA. Instead, their 2025 demands were held constant over the entire 20-year planning period.

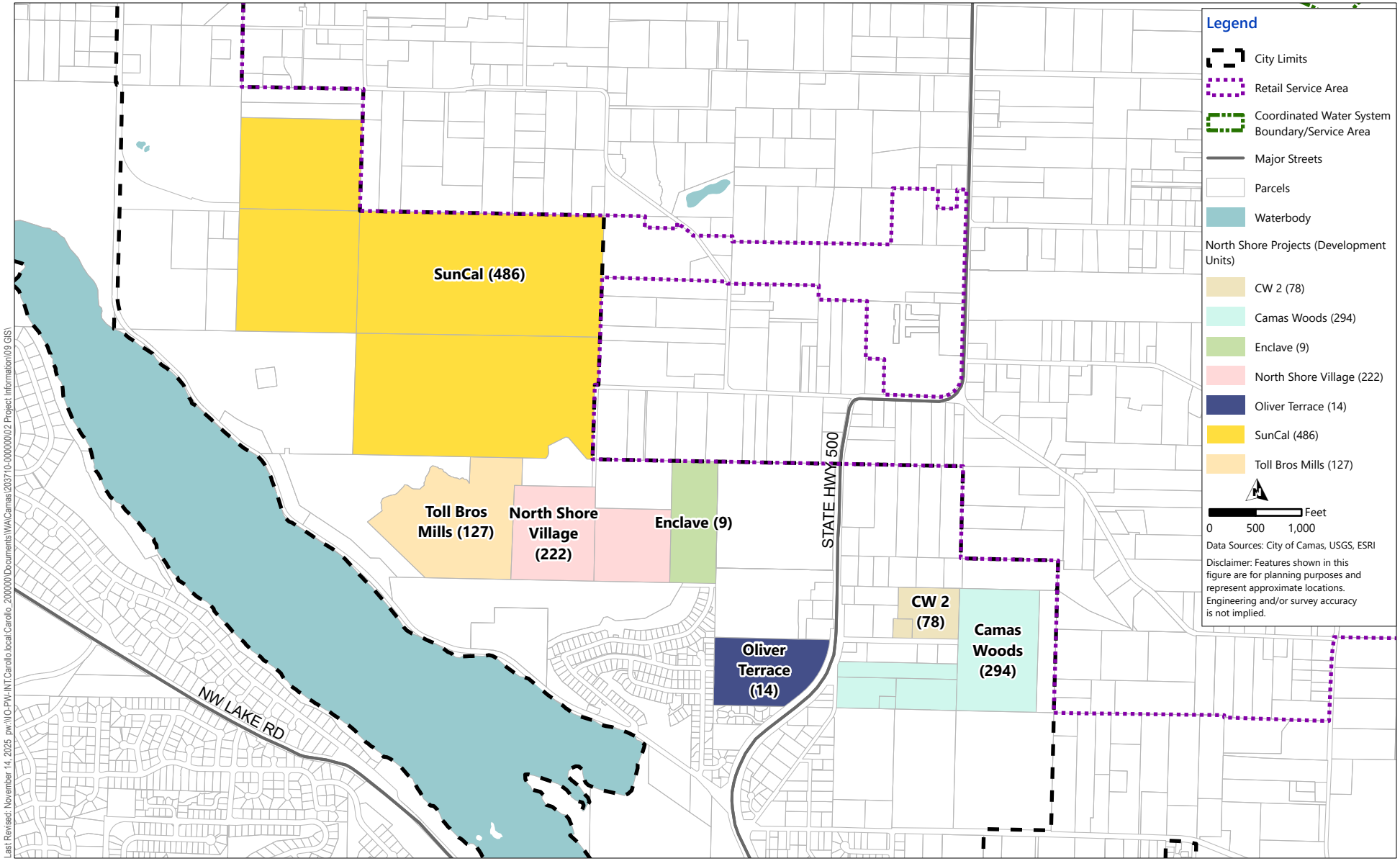


Figure 5.8 Projected Growth in North Shore Area in Number of Units

5.5 Projected Number of Accounts

Water accounts were projected using the GIS data and percent of land developed that meets the household and employee projections presented in Section 5.4. Growth was added to existing accounts to align with the household and employee projections presented in Table 5.6.

Table 5.7 summarizes the projected number of water accounts for each planning year. The projections show increased growth over historical growth in multi-family residential and industrial accounts. These projections form the basis for estimating the City's future water demand. The ERU factors for low, medium, and high demand scenarios were then applied to the account projections to develop the City's future demand estimates.

Table 5.7 Projected Number of Water Accounts

System-wide Projections	2025	2031	2036	2046	Average Annual Growth Rate
Airport	1	1	1	1	0%
SFR(1)	9,350	10,284	11,018	12,808	1.5%
MFR	490	1,303	2,007	3,379	9.6%
Commercial(2)	260	286	347	482	2.9%
Commercial Large Users	12	12	12	12	0%
City	50	50	50	50	0%
Industrial	13	25	68	123	11.5%
Industrial Large Users	10	10	12(3)	12(3)	0.9%
Total of Accounts	10,187	11,971	13,541	16,867	2.4%

Notes:
(1) SFR includes ADU Shared category from historical accounts. ADU Shared are not projected separately from SFR.
(2) Commercial accounts include demand irrigation water demand. The Irrigation category of account from historical accounts are not projected separately.
(3) Two additional large users were assumed to be added, one located in North Shore and one in the STEP Basin.

5.6 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 climate change.

5.6.1 Potential Range in Future Water Demand

Numerous 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 low, medium, and high demand scenarios to provide a range in demands that may be experienced in the future.

The variables considered in developing the range of demand projections are summarized in Table 5.8 and are discussed below.

- **Future Water Accounts:** The future water accounts are shown in Table 5.7 and were projected using VBLM data and planning data from the City. Because the 20-year planning period (2046) of this Water System Plan Update (WSPU) extends beyond the 20-year planning period of the Comprehensive Plan 2045, linear interpolation was used to determine the future water accounts in the planning periods for the WSPU.
- **Water Use per ERU:** Water use per ERU for the low, medium, and high demand projections are based on the City's historical data from 2017 to 2024. The low projection reflects the historical average of 242 gpd/ERU, while the medium projection reflects the 75th percentile value of 248 gpd/ERU. The high demand projection was based on maximum of the historical data presented in Table 5.3, which equals 260 gpd/ERU.
- **ERUs per Account:** The historical ERUs per account by customer class presented in Table 5.3 were used to project the future demands. These ERU per Account values based on the average of the historical data and a water use per ERU value of 242 gpd/ERU.
- **Distribution System Leakage:** The City's three-year running average DSL varied between 10.3 and 13.0 percent of the City's total production between 2022 through 2024, as shown in Table 5.4. For the low demand scenario, a DSL of 9.1 percent was selected to represent the City's conservation goals, based on the most recent 2024 data. For the medium and high demand scenario, 10 percent was used to represent the City's goal of meeting Washington Department of Health threshold.
- **Climate Change Impacts:** Climate models project that the Pacific Northwest will generally experience warmer, wetter winters and hotter, drier summers. To estimate the potential impact on the City's future demands, Carollo evaluated historical and projected maximum temperature data from an ensemble of global climate models under multiple future scenarios.

  A regression analysis was developed between the City's historical consumption and modeled historical climate data. This relationship was then applied to future climate projections. The City elected to assume no change for the low scenario, to use the Shared Socioeconomic Pathway (SSP) 1-2.6 scenario as the basis for the medium demand scenario, and to use the SSP 3-3.7 scenario as the basis for the high demand scenario for its planning assumptions. SSP 1-2.6 represents a sustainably focused future and decreasing rate of change. SSP 3-3.7 represents a world with limited climate policy and higher emissions producing greater warming than SSP 1-2.6 but less than SSP5-8.5. It brackets a plausible upper range of climate stress on demand and supplies for planning.

  Results indicate that by midcentury, climate change may increase overall water demand by approximately 2.93 percent under the SSP 1-2.6 scenario and by approximately 4.49 percent under the SSP 3-3.7 scenario. Seasonal impacts are more pronounced, with the largest increases expected during the spring (February–April) and fall (September–October) shoulder seasons.
- **Maximum Day/Average Day Peaking Factor:** Due to the high projected demands for the City's largest two water users (described in the following section), and the lack of summer peaking in demand, the MDD/ADD peaking factor was not applied to the top two largest users to avoid overly conservative demand projections. Instead, peaking factors for the two largest users were calculated separately and are described in the section below. The MDD/ADD peaking factors developed for all customers excluding the top two large users is based on the historical production data. The MDD/ADD

peaking factors for all customers excluding large users varied from 2.07 to 2.46 between 2018 and 2024 as shown in table 5.5. For the low demand projection, the average peaking factor from 2018 and 2024 of 2.22 was used. For the medium demand projection, the three-year average observed between 2022 and 2024 of 2.23 was used. For the high demand projection, the 75th percentile observed from 2018 and 2024 of 2.31 was used.

- **Large Industrial Users Maximum Day/Average Day Peaking Factor:** The MDD/ADD peaking factor was not applied to large industrial users to avoid overly conservative demand projections. Instead, the two largest users were assigned a peaking factor of 1.25 for the low demand scenarios, which represents a maximum day demand approximately 10 percent above the average day demand. For the medium scenario, a peaking factor of 1.30 was applied to remain consistent with the City's 2022 economic development studies. The high scenario used a conservative peaking factor of 1.50. It is important to note that the remaining eight large users were assigned to the non-large user peaking factor, as their water use pattern aligns more closely with typical business diurnal demands, unlike the top two large industrial users.
- **Future Large Industrial Users:** Additional demand for Future large users was based on individual demand projections that are presented in the following sections.

Table 5.8 Demand Projection Parameters

Demand Scenario	Demographic Growth Scenario	Water Use per ERU (gpd/ERU)	Distribution System Leakage (%)	Maximum Day Peaking Factor	Large Industrial User Peaking Factor(1)
Low	Average	242	9.1%	2.22	1.25
Medium	75th Percentile	248	10.0%	2.23(2)	1.30
High	Maximum	260	10.0%	2.31(3)	1.50

Notes:
(1) The large industrial peaking factors were only applied to the top two large industrial users, as their usage patterns are industrial in nature and do not follow typical business diurnal demand patterns like the other large users.
(2) The three-year average from 2018-2024 was used to determine the maximum day peaking factor for the medium demand scenario.
(3) The 75th percentile from 2018 to 2024 was used to determine the maximum day peaking factor for the high demand scenario.

5.6.2 Large Users Demand Forecast

The City's top 10 water users, or large users, were identified by the City as presented in Section 5.1.1. Low, medium, and high demand forecasts were created for each large user based on historical water use data from 2017 through 2024.

The low demand scenario projections were determined by identifying the lowest projected demand for each large user based on four calculated estimates: the average historical growth rate, the most recent three-year average growth rate, the large users' annual demand with the maximum historic yearly demand held constant, and the current demand. If the current demand is the lowest of these four estimates, it was used as the low demand scenario. The high demand scenario projections were determined by identifying the highest projected demand for each large user based on three calculated estimates: the average historical growth rate, the most recent three-year average growth rate, and the large users' annual demand with the maximum historic yearly demand held constant. The medium demand scenario is an average of the low and high demand projections.

For three large users, however, projections were developed using a different approach. Georgia Pacific demonstrated a decline in average demand from 2017 to 2024 period following a reduction in production and accompanying layoffs in 2018 that eliminated approximately two-thirds of its jobs, according to City staff. Similarly, the City and Camas School District No. 117 have reduced irrigation use due to recent budget cuts. For these three large users, demand projections were conservatively set equal to the maximum observed demand between 2017 and 2024 and applied consistently across all demand scenarios, as increases in demand are not anticipated. Additionally, Clara Street Block Building, LLC presented very limited data with only other data shown in 2021. For planning purposes, it is assumed that its 2024 demand will remain steady over the projection period.

The City has requested future large users demand projections to be included and increase linearly through 2046. Table 5.9 shows the additional future large user demands for 2031, 2036, and 2046.

Table 5.9 Additional Future Large User Demands

Demand Scenario	2031 (mgd)	2036 (mgd)	2046 (mgd)
Low	0.0	0.0	0.25
Medium	0.19	0.375	0.75
High	0.375	0.75	1.50

Additionally, all the existing large users demand projections are presented in Table 5.10. For each of the existing large users, Table 5.10 provides the Service Area, 2025 demand, and the projected 2031, 2036, and 2046 demands.

5.6.3 Projected ERUs

Projected ERUs for single family residential is the projected number of accounts since ERU is defined as water consumption from one single family home. Projected ERUs for all other customer classes is the projected number of accounts multiplied by the number of ERUs per account for that customer class. Table 5.11 presents the projected ERUs for each of the City's Service Areas under different growth scenarios. To spatially allocate demands across the retail water service area, the City's 2023 VBLM data was used to determine whether parcels are constrained or unconstrained, and whether parcels are expected to develop or redevelop by 2045 consistent with the future land use per the Comprehensive Plan 2045.

5.6.4 Projected Average Day and Maximum Day Demands

ADD projections were determined by multiplying the total number of projected ERUs per Service Area by the appropriate water use per ERU for each demand scenario, as listed in Table 5.8. Additionally, the ADD projections incorporate the assumptions for DSL and the unique large users demand projections. To develop MDD projections, the ADD projections for all customers were multiplied by the peaking factors. For the two largest existing users and the future users, the large user peaking factors shown in Table 5.8 were applied depending on the demand scenario.

Tables 5.12 and 5.13 show the projected ADD and MDD, respectively, under the low, medium, and high demand scenarios. These projections, as well as historical ADD and MDD, are visually depicted in Figure 5.8.

Table 5.10 Existing Large Users Demand Projections

Large User	Service Area	Demand - 2025 (mgd)	Demand - 2031 (mgd)			Demand - 2036 (mgd)			Demand - 2046 (mgd)		
			Low	Med	High	Low	Med	High	Low	Med	High
TSMC (formerly "Wafertech Industries")	544	0.74	0.74	0.80	0.87	0.74	0.84	0.94	0.74	0.93	1.12
Analog Devices (formerly "Linear Technologies")	544	0.28	0.28	0.30	0.31	0.28	0.30	0.31	0.28	0.31	0.34
City of Camas	343, 455, 544, 852	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Camas School District No. 117	343, 455, 544, 852	0.10	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Bodycote IMT	544	0.05	0.05	0.07	0.10	0.05	0.09	0.13	0.05	0.12	0.20
Georgia Pacific Mill	343	0.04	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
Fisher Creek Investments	544	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.02	0.03	0.05
Hills at Round Lake Homeowners Association	852	0.02	0.02	0.02	0.03	0.02	0.02	0.03	0.02	0.03	0.04
Prestige Care and Rehabilitation	343	0.01	0.01	0.02	0.02	0.01	0.02	0.03	0.01	0.03	0.05
Clara Street Blocking Building, LLC	343	0.04	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
Total (Existing Large Users)(1)	-	1.44	1.60	1.70	1.80	1.60	1.77	1.95	1.60	1.93	2.28

Notes:
(1) Totals may not equal due to rounding.

Table 5.11 ERU Projections

Service Area	ERUs – 2025	ERUs – 2031	ERUs - 2036	ERUs - 2046
343 - Butler	2,314	3,017	3,430	3,843
455 - Lower Prune Hill	1,653	1,901	1,942	1,983
542 - Gregg	1,198	1,901	3,182	5,413
544 - Lacamas	9,132	11,570	13,223	16,942
695 - Green Mountain Estates	83	289	289	331
852 - Upper Prune Hill	4,876	5,124	5,372	5,909
Total	19,256	23,802	27,438	34,421

Table 5.12 Average Day Demand Projections

Service Area	2025 ADD (mgd)	ADD - 2031 (mgd)			ADD - 2036 (mgd)			ADD - 2046 (mgd)		
		Low	Med	High	Low	Med	High	Low	Med	High
343 – Butler	0.9	1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.4
455 – Lower Prune Hill	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5
542 – Gregg(1)	0.3	0.5	0.5	0.6	0.8	0.9	1.0	1.2	1.4	1.6
544 – Lacamas(1)	2.0	2.3	2.6	2.8	2.4	2.9	3.4	2.9	3.7	4.6
852 – Upper Prune Hill	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.4
695 – Green Mountain Estates	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total Demand(1)	4.6	5.6	5.9	6.3	6.2	6.8	7.4	7.4	8.4	9.6

Notes:
(1) Service areas 542 and 544 include additional future large user demand.
(2) Totals may not equal due to rounding.

Table 5.13 Maximum Day Demand Projections

Service Area	2025 MDD (mgd)	MDD - 2031 (mgd)			MDD - 2036 (mgd)			MDD - 2046 (mgd)		
		Low	Med	High	Low	Med	High	Low	Med	High
343 – Butler	1.9	2.2	2.3	2.4	2.4	2.5	2.7	2.7	2.9	3.1
455 – Lower Prune Hill	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.1
542 – Gregg(1)	0.7	1.0	1.1	1.3	1.6	1.8	2.2	2.6	3.0	3.6
544 – Lacamas(1)	3.2	3.6	4.2	5.1	4.0	4.9	6.3	4.8	6.5	8.9
852 – Upper Prune Hill	2.4	2.4	2.5	2.6	2.5	2.6	2.7	2.9	3.0	3.2
695 – Green Mountain Estates	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total Demand(2)	9.1	10.3	11.1	12.4	11.6	13.0	15.1	14.2	16.6	20.2

Notes:
(1) Service areas 542 and 544 includes additional future large user demand.
(2) Totals may not sum exactly due to rounding.

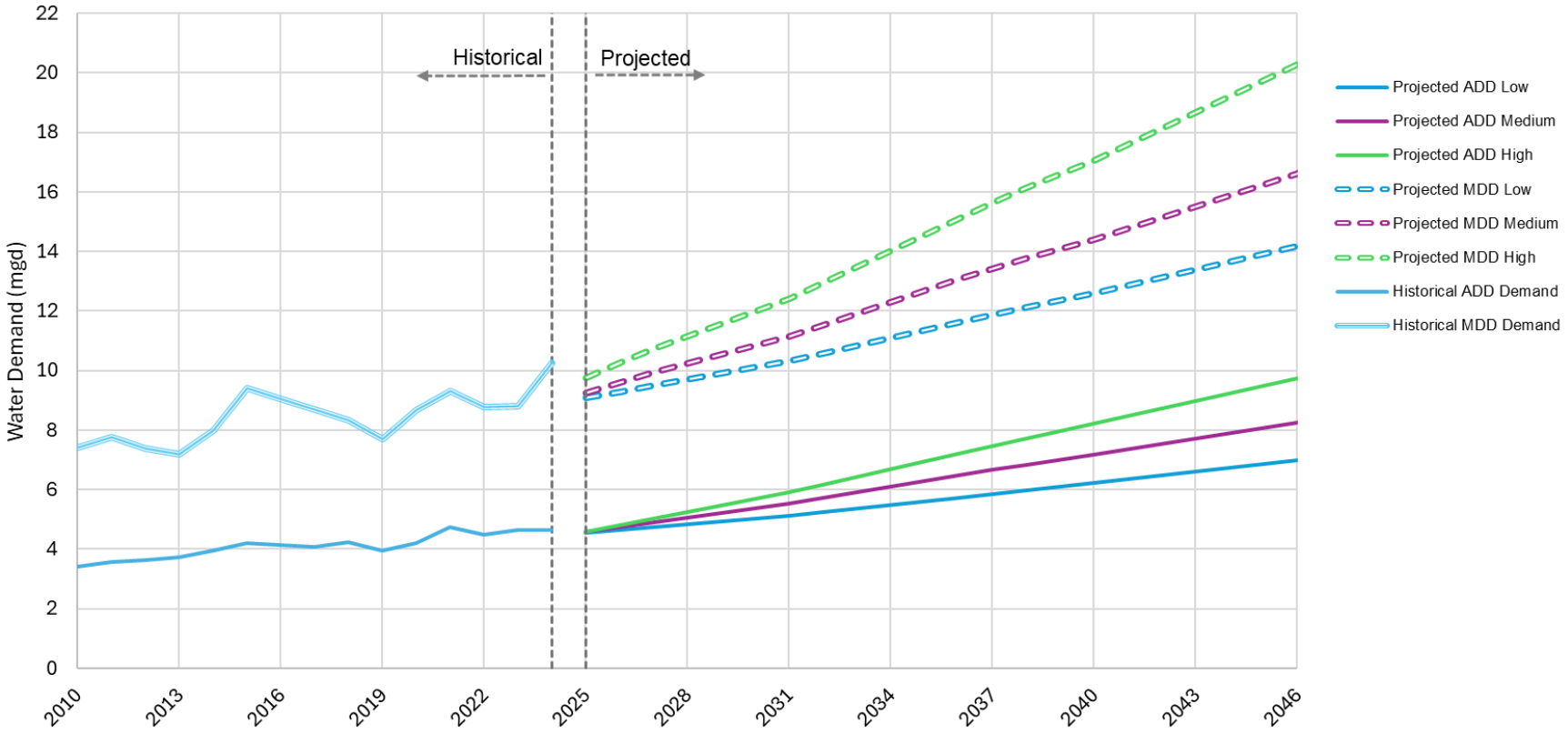


Figure 5.9 Average and Max Day Demand Projections

CHAPTER 6 WATER USE EFFICIENCY

The City promotes efficient water use to conserve and protect their existing water supplies for present and future residents. The City promotes water conservation and efficient use of water through a variety of activities that encompass their WUE Program. The program encourages water conservation and utilizes continued improvements to reduce leakages and water loss in the City's system. This chapter details both the City's existing and future WUE programs.

6.1 WUE Program Background

In 2003, the Washington State Legislature passed the Engrossed Second Substitute House Bill 1338, known as the Municipal Water Law or the WUE rule, to address the increasing demand on Washington's water resources. This law established that all municipal water suppliers (MWS) must use water more efficiently in exchange for water right certainty and flexibility to help them meet future demand.

The WUE rule, which became effective on January 22, 2007, emphasizes the importance of measuring water use and evaluating the effectiveness of the water supplier's WUE program. The intent is to minimize water withdrawals and water use by implementing water saving activities and adopting policies, resolutions, ordinances, or bylaws. This chapter follows the guidelines set forth in the Water Use Efficiency Guidebook, Fourth Edition, (May 2025) as well as the Water System Planning Handbook (June 2025).

6.1.1 Current WUE Program

The City's current WUE Program was established as part of the 2019 WSP. 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 established goals promote water use efficiency for internal operations and for water customers. The past WUE Program goals were established in the 2010 WSP and subsequently re-established in 2013 and 2019:

- **Demand-Side Goal:** Reduce customer consumption per ERU by 1 percent or approximately 2 gpd per year over the next six years.
- **Supply-Side Goal:** Continue to reduce distribution loss to or below 10 percent for the next five years.

The following summarizes the current program.

6.1.1.1 Supply-Side Measures

The City implements the following supply-side measures as part of their WUE Program. A number of these measures are mandated by the DOH per the WUE Guidebook. The following summarizes the City's supply-side measures:

1. Record and monitor supply source production (Mandatory).
2. Record and monitor customer demands through customer water meters (Mandatory).
3. Test and calibrate industrial and commercial meters annually (Mandatory).

4. Replace customer water meters with enhanced advanced metering infrastructure (AMI) meters. Once complete, the City will regularly test and repair residential meters per manufacturer recommendations.
5. Perform annual leak detection surveys through a private contractor. Hydrants and valves are checked as part of leak detection surveys (Mandatory).
6. Repair or replace old distribution system piping with defects as budget allows.
7. Reclaimed Water: Treated wastewater is used for washdown and process use and for landscape irrigation at the wastewater treatment plant (WWTP) (Mandatory to evaluate reclaimed water).

6.1.1.2 Demand-Side Measures

The City implements a number of demand-side measures that previously met the DOH requirement for six WUE measures. These measures are similar to many of the example water use efficiency measures presented in Appendix B of the Water Use Efficiency Guidebook. The City provides an overview of their water use efficiency activities on their Water Services website (http://www.ci.camas.wa.us/index.php/pwwater). The City's various public outreach activities meet the DOH requirement for educating customers about water use efficiency. The following provides a summary of the City's demand-side measures:

1. Include water consumption history on customer's utility bills.
2. City staff alert and visit customers where customer leaks are identified.
3. Promote installation of smart controllers and irrigation timers for the school district and industrial users.
4. Educate the public on conservation and water-saving devices at community events and on the City website (http://www.ci.camas.wa.us/images/DOCS/WATER_SEWER/REPORTS/waterconservation.pdf).
5. Distribute water-saving devices such as shower timers at community events.
6. Require xeriscaping and Low Impact Development (LID) to reduce irrigation requirements for new developments.
7. Work with developers to evaluate their irrigation systems to incorporate drip systems or micro sprayers.
8. Promote odd/even day and late night or early morning irrigation for all customers.

The above supply- and demand-side WUE measures are effective in encouraging WUE for the water system. Additional measures have been evaluated since the requirement increased to nine measures due to the City falling in the range of 10,000 to 49,999 service connections. These are discussed further in Section 6.2.3.

6.1.2 Distribution System Leakage

DSL is a significant element of supply-side WUE requirements. DSL above 10 percent on a three year rolling average is considered excessive and necessitates the creation of a WLCAP. DSL is the difference between total water production and metered water use. The estimate of DSL is dependent on the accuracy of meter readings for supply and customer meters. Table 6.1 presents the City's reported three-year rolling average DSL from 2021 through 2025. From 2021 through 2024, the City's three-year rolling DSL average was above their WUE program goal and DOH standard of 10 percent, but the City is making progress in lowering the DSL as seen from 2022 through 2025.

Table 6.1 Distribution System Leakage (Three-year Rolling Average)

Year	3-Year Rolling Average DSL (%)
2021	14.2
2022	14.5
2023	13.1
2024	11.2
2025	6.7

The DSL in Table 6.1 differs from that calculated in Chapter 5 - Water Requirements, where Chapter 5 evaluates historical billing data for consumption. The City cannot account for the differences; however, it is believed to be related to year end meter reading.

Although the 2025 three-year rolling average is below the 10 percent threshold, the City transitioned billing software in 2025, which required consumption data to be compiled from two sources. This may have contributed to higher reported water use. As a result, the City will complete a WLCAP to address its DSL. This can be found in Appendix **[X].**

6.1.3 Historical Effectiveness of Current Water Use Efficiency Program

The City's current WUE Program includes measures for residential, irrigation, commercial, and industrial customers. The effectiveness of the City's program in meeting their WUE goals can be evaluated considering system-wide water use trends.

The 2019 WSP used a planning ERU of 260 gpd based on average residential use from 2013 to 2015. The current planning ERU value of 242 gpd was based on the average of water use from 2022 to 2024. This equates to a decrease of 0.8 percent annually over the nine-year period, close to the City's goal of 1 percent.

Annual water use per account from 2017 to 2024 was detailed previously in Section 5.1.4. Water use across the City's SFR, MFR, commercial, industrial, city, irrigation, and ADU shared accounts have fluctuated since 2017. Overall, SFR and ADU shared water use have decreased from 2017 to 2014 by 2 and 6 percent, respectively. The City believes these decreases were in part from the WUE Program. Some decreases may have been from requirements in the Washington State Plumbing Code, which limits maximum flow rates for faucets, showers, toilets, and urinals. It is acknowledged that other factors may have played a prominent role, such as weather and economic conditions.

The City does not officially track staff time or project costs associated with WUE. The supply-side WUE measures, such as metering and leak detection, are core activities of the Utility and are funded through Utility Capital Improvement and O&M funds. The City estimates that it dedicates approximately 0.5 full-time-equivalents (FTE) of staff time to conduct demand-side measures across its Water Utility, finances department, and development services staff. It is not possible to estimate the cost of each demand-side measure; therefore, a cost-benefit comparison cannot be calculated.

Water consumption in City billing is based on the following most common meter size for SFR and cost per 100 cubic feet:

- Inside City limits:
  - Base rate for 3/4-inch meter: $15.54.
  - Cost per one hundred cubic feet: $2.76 or 0.37 cents per gallon.
- Outside City limits:
  - Base rate for 3/4-inch meter: $23.31.
  - Cost per one hundred cubic feet: $4.15 or 0.55 cents per gallon.

Because the City's water rates are generally comparable to those of neighboring utilities, its WUE Program appears to be implemented in a cost-effective manner.

6.2 Future WUE Program

The City plans to continue its efforts to encourage efficient water use and has updated its WUE Program, which is included in Appendix **[X]**. Going forward, the program will continue to focus on measures targeted at residential customers. The WUE Program goals established in 2026 are:

- **Demand-Side Goal:** Reduce customer consumption per ERU by 1 percent over the next 6 years.
- **Supply-Side Goal:** Continue to reduce distribution loss to 10 percent or less over the next 5 years.

Public comment on the future WUE program was taken at the **[XXXXXX]** City Council Meeting. An agenda and minutes for the meeting are provided in Appendix **[D]**.

6.2.1 Mandatory Measures

The WUE Program requires certain measures to be implemented, some of which can be incorporated as supply-side measures by the utility as described in Supply-Side Measures as well as in Future WUE Program Supply-Side Measures. The City's WUE Program will continue to meet the following mandatory measures in the future:

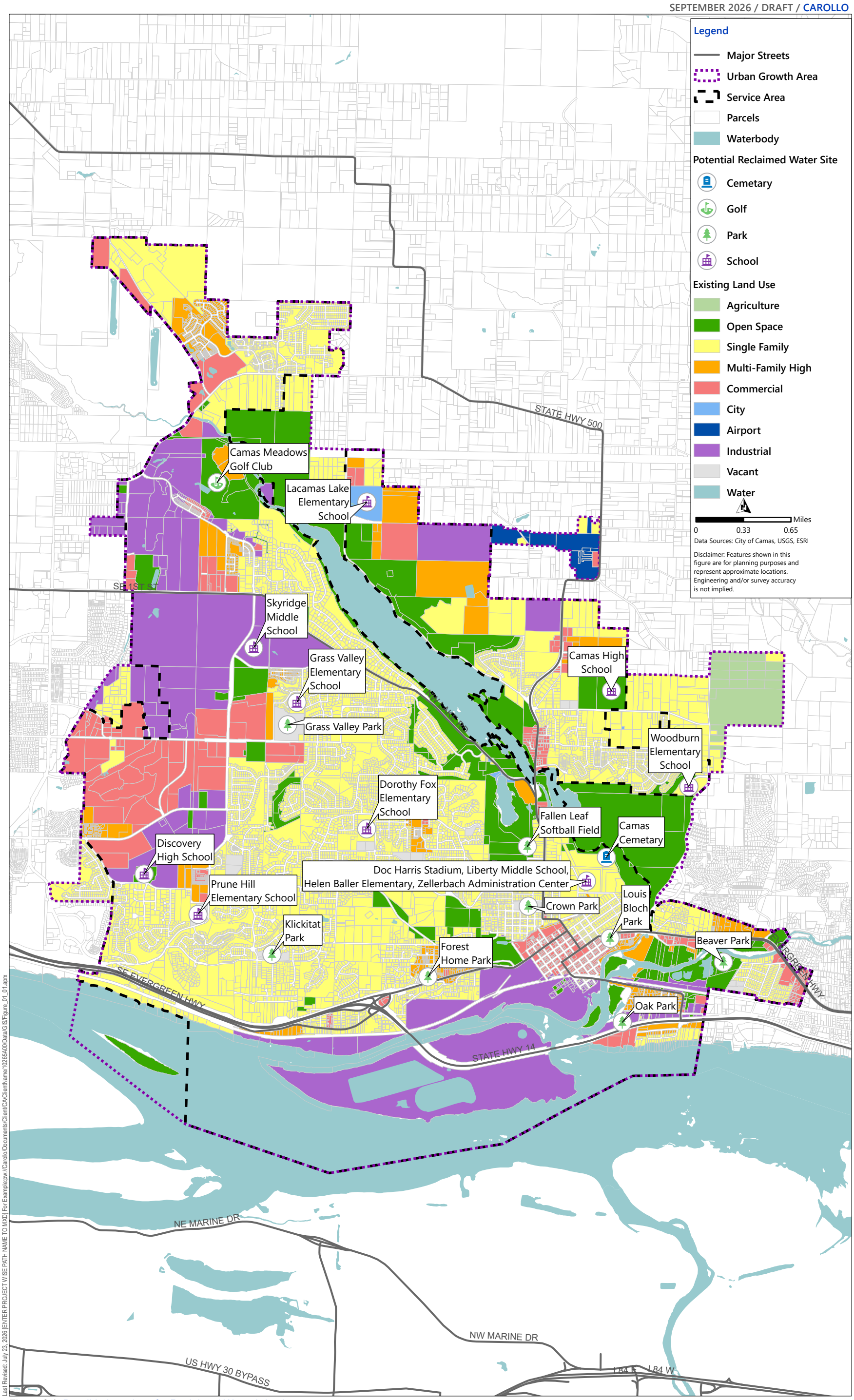
- Install production (source) meters.
- Install consumption (service) meters.
- Perform meter calibration.
- Implement a water loss control action plan to control leakage if the three year rolling average exceeds 10 percent.
- Educate customers about water use efficiency practices.
- Evaluate rates that encourage water demand efficiency, as discussed in a subsequent section.
- Evaluate reclamation opportunities, as discussed in a subsequent section.

6.2.1.1 Rate Structure

The City's current rate structure bills customers on a uniform volumetric charge. In 2010, the City added a consumption-based element to sewer rates based on average winter water consumption, which was thought to encourage water efficiency. In 2023, a rate study was performed that evaluated a tiered rate structure. Ultimately, it was determined that the current rate structure would remain in place. Future rate studies will continue to reevaluate rate structures to encourage conservation.

6.2.1.2 Reclaimed Water

Per WAC 246-290-100 and WUE requirements, water systems with over 1,000 connections must evaluate reclaimed water opportunities. As mentioned previously, the City currently uses treated wastewater at the WWTP. In addition, the City previously evaluated reclaimed water opportunities in 2006 with costs escalated to 2025 dollars in the concurrent effort of updating the General Sewer Plan, considering a multitude of locations to use the water for irrigation; Figure 6.1 displays locations with irrigation connections. Overall, it was concluded that using reclaimed water as irrigation water was not economically feasible, and therefore, the reclaimed water system will not be expanded at this time.



Last Revised: July 23, 2026 [ENTER PROJECT WISE PATH NAME TO MXD] For Example pw://Carollo/Documents/Client/CA/ClientName/10265A00/Data/GIS/Figure_01_01.apx

Figure 6.1 Possible Locations for Reclaimed Water Irrigation

6.2.2 Future WUE Program Supply-Side Measures

The City completed replacing 100 percent of customer water meters with AMI meters in 2025. The AMI meters provide operational benefits, reduces data error and helps identify customer-side leaks. Installation of AMI meters is expected to enhance meter accuracy, leak detection and customer education through the detailed water use data and statistics provided by the AMI system. The City will continue the existing supply-side measures as described in Section 6.1.1.1 and updated fourth supply-side measure to be as follows:

- The City will repair and/or replace residential meters per manufacturer recommendations.

6.2.3 Future WUE Program Demand-Side Measures

Due to an increase in connections, the City must have at least nine demand-side measures. Some of the current measures will continue, some are modified, and three new ones were added. The following list provides the new measures:

1. City staff alert and visit customers where customer leaks are identified.
2. Promote installation of smart controllers for City-wide users.
3. Educate the public on conservation and water-saving devices at community events and on the City website (http://www.ci.camas.wa.us/images/DOCS/WATER_SEWER/REPORTS/waterconservation.pdf).
4. Promote xeriscaping and LID to reduce irrigation requirements for new developments.
5. Promote irrigation systems to incorporate drip systems or micro sprayers.
6. Promote odd/even day and late night or early morning irrigation for all customers.
7. Provide monthly billing to all customers.
8. Send water savings tips to customers in the annual water quality report.
9. Onsite irrigation at the WWTP with treated effluent.

6.2.4 Projected Demands with Water Use Efficiency Goals

The projected water demands considering the water savings from the City's WUE Program were represented with the low demand scenario presented in Chapter 5. Projected demands with WUE savings were compared to the medium demand projection. The low demand projection assumes a 2025 demand based on 242 gpd/ERU while the medium demand projections assumes a 2025 demand based on 248 gpd/ERU. The low demand projection also assumes the WUE Program will help to reduce the MDD to ADD peaking factor by approximately 0.45 percent. The low and medium demand projections assume the City's DSL is 9.1 and 10 percent, respectively. Table 6.2 presents the projected ADD and MDD with and without the WUE Program for the 20-year planning period. The projected demands with the WUE Program are also shown in Figure 6.2. For ADD, WUE measures are projected to provide a reduction of 1.0 mgd, or 11.9 percent, by 2046. For MDD, WUE measures are projected to provide a reduction of 2.4 mgd, or 14.6 percent, by 2046.

Table 6.2 WUE Demand Projections

Demand Scenario	2046 Projection with WUE (mgd)	2046 Projection without WUE (mgd)	Water Savings (mgd)	Percent Savings
ADD	7.4	8.4	1.0	11.9
MDD	14.2	16.6	2.4	14.6

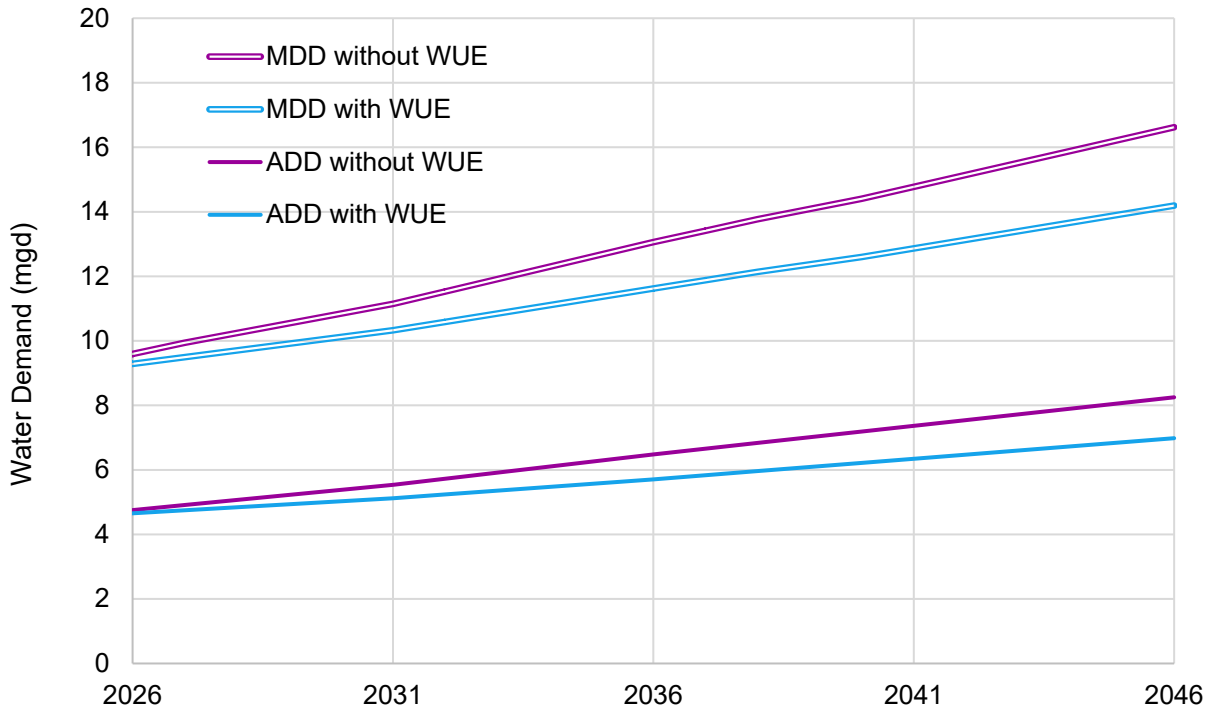


Figure 6.2 Projected Demands With and Without Water Use Efficiency

6.2.5 Future WUE Program Effectiveness

The effectiveness of the existing WUE program was evaluated using system-wide water use data. Measuring the effectiveness of the City's future WUE Program against the established goals could be similarly evaluated using system-wide water use data. Estimating the water savings directly resulting from the City's WUE Program in a single year is difficult. Therefore, long-term trends should be use to more clearly show the impact of the City's WUE Program.

The first step would be to establish a baseline from historical information. The second step is to evaluate the resulting water use after promoting WUE through targeted activities and events to customers. It is recommended that water use be tracked for at least a year to identify trends. Some considerations will need to be given to variations in weather and economic conditions. Another method would be to perform the same before/after water use analysis for WUE Program participants who volunteer and provide their address. The resulting information would be valuable for the City to correlate its WUE Program efforts with direct water savings for its customers.

AMI was implemented in 2025. The City will leverage AMI water usage data in its targeted public education programs to customers in a particular area or user profile, such as heavy irrigators. Using AMI, the City can estimate overall usage, irrigation usage, and peak water use rates.

6.2.6 Budget

The City recognizes the importance of continuing their WUE measures and considers it a core function of the Utility. The WUE program provides cost savings through demand reduction and reduction in DSL. Continuing the WUE Program can assist the City in meeting peak demands and avoiding curtailment periods. The City will continue the following level of effort for demand-side measures: approximately 0.5 FTE of staff time across its Water Utility, finances department, and development services department. Due to AMI capabilities, it is anticipated that the City will further personalize water use communications with customers without increasing staff effort. Future supply-side WUE measures will be funded, as appropriate, through the Capital Improvement and O&M funds. If AMI detects a large number of existing and new leaks, the City will evaluate the need for additional personnel in its meter maintenance group to address leaks.

6.3 Water Shortage Plan

Camas Municipal Code (CMC) Chapter 13.14 has been created to allow the City to impose restrictions during a water shortage. It defines five stages of water emergencies:

- Stage I - Anticipated Water Shortage.
- Stage II - Serious Water Shortage.
- Stage III - Critical Water Shortage.
- Stage IV - Emergency Water Shortage - Mandatory Outdoor Restrictions and Indoor Conservation.
- Stage V - Regional Disaster - Water Rationing.

The Public Works Director is responsible for declaring and implementing the water shortage plans. Stages I or II implement voluntary reductions in water use for customers and some City watering reductions. Stages III and IV further regulate or prohibit nonessential uses of water. Details on the Water Shortage can be found in CMC Chapter 13.14.

CHAPTER 7 WATER QUALITY

7.1 Introduction

The City is defined as a Group A - Community Water System and must comply with the drinking water standards of the federal Safe Drinking Water Act (SDWA) and its amendments, as regulated by the USEPA. The DOH adopted the updated federal standards under WAC 246-290, of which the most recent version became effective June 17, 2025.

The quality of the City's drinking water sources is of primary concern to the City. The City's water is supplied by groundwater aquifers and surface water sources (Jones and Boulder Creeks), which are tested regularly for the presence of contaminants at frequencies prescribed by DOH regulations. The City is in compliance with all DOH reporting requirements, including publication and distribution of an annual Water Quality Report that keeps consumers informed as to the quality of the City's water supply and water delivery systems.

This chapter includes the following components:

- Description of current drinking water quality regulations.
- Summary of anticipated future regulations.
- Summary of current monitoring programs.
- Summary of the City's compliance with USEPA and DOH regulations.
- Recommendations.

This chapter utilizes information from the DOH's website for Drinking Water Regulation and Compliance , the USEPA's website for regulations under the SDWA, the City's annual Water Quality Reports (included in Appendix E), and the City's previous 10 years water quality data.

7.2 Overview of Regulatory Requirements

The SDWA of 1974, amended in 1986 and 1996, established specific roles for the federal government, state government, and water system purveyors, with respect to water quality monitoring. The USEPA is authorized to develop national drinking water regulations and oversee the implementation of the SDWA. State governments are expected to adopt the federal regulations and accept primary responsibility or "primacy" for administration and enforcement of the Act. States can also regulate contaminants and set advisory levels. Public water system purveyors are assigned the day-to-day responsibility of meeting regulations by incorporating monitoring, record-keeping, and sampling procedures into their operation and maintenance programs.

Applicable SDWA regulations are summarized in Table 7.1 and are divided into those that address source water quality, surface water treatment, distribution system water quality, and system-wide requirements, respectively. Monitoring requirements under each rule are noted herein.

Table 7.1 Drinking Water Regulations

Rule	CFR	WAC 246-290	Affected Contaminants	Publication Date of Final Rule
Source Water Quality				
National Primary and Secondary Drinking Water Standards	See below	Part 4, 300, 310, 315 and 320	Bacteriological, IOC, VOC, SOC, Asbestos, Radionuclides, THM, Lead/Copper, Phase II/V	Phases I through V promulgated 1987 through 1992
Radionuclide Rule	40 CFR 141.15 141.25 141.26	Part 4, 300(9) 310(6), and 320	Radionuclides	Promulgated April 4, 1997
Arsenic Rule	40 CFR 141.23 141.24 141.16	Part 4, 300(3) and 310(3)	Arsenic	Promulgated February 2002 Compliance by January 23, 2006
UCMR	N/A		Various contaminants considered for future regulations	UCMR 1 promulgated 1999 UCMR 2 promulgated 2007 UCMR3 promulgated May 2, 2012 UCMR4 promulgated December 20, 2016 UCMR5 promulgated December 27, 2021
Groundwater Rule		Part 4, 300(3) and 320(2)	Fecal indicators in groundwater	Promulgated January 8, 2007
PFAS NPDWR	40 CFR 141.	N/A	PFAS	Promulgated April 10, 2024; features implementation timeline with an initial monitoring phase required by 2027 and compliance with listed MCLs by 2029.
PFAS SAL	N/A	Part 4, 300 (10), 310 (7), 315, 320	PFAS	Promulgated December 8, 2021 Revisions promulgated December 15, 2025.
Surface Water Treatment Rules				
Information Collection Rule	40 CFR, Part 141, Subpart M	Part 6, Subparts A and B	Large Surface Water Systems: Bacteriological, DBP, IOCs	Promulgated June 18, 1996
Interim ESWTR	63 FR 69478	Part 6, Subparts A and B	Large Surface Water Systems: Bacteriological, incorporate *Cryptosporidium* into watershed plans	Promulgated November 1998
LT1ESWTR	40 CFR, Parts 9, 141, 142 67 FR 1812	Part 6, Subparts A and B	Bacteriological, *Cryptosporidium*	Promulgated February 13, 2002, compliance by March 15, 2005

Rule	CFR	WAC 246-290	Affected Contaminants	Publication Date of Final Rule
LT2ESWTR	40 CFR Parts 141, 142 68 FR 47639	Part 6, Subparts A and B	Bacteriological	Promulgated in 2006
Filter Backwash Recycling Rule	40 CFR Parts 9, 141, 142 66 FR 31086	Part 6, Subparts A and B	Bacteriological	Promulgated August 7, 2001, compliance by December 8, 2003
Distribution System Water Quality				
Revised Total Coliform Rule		Part 4, 300, 310(2), 320	Total coliform bacteria	Promulgated February 13, 2013 Compliance by April 2016
Lead and Copper Rule	40 CFR 141.86 141.87 141.88	Part 4, 300(4) and 310(3)	Lead and Copper	Promulgated January 12, 2000 Revised December 4, 2013
Stage 1 Disinfectants/ Disinfection Byproducts Rule	40 CFR, Parts 9, 141, 142 63 FR 69390	Part 4, 300, 310, and 320	THM, HAA5, chlorite, bromate, and disinfectant residuals	Promulgated February 16, 1999
Stage 2 Disinfectants/ Disinfection Byproducts Rule	40 CFR, Parts 9, 141, 142 71 FR 388	Part 4, 300, 310, and 320	THM and HAA5	Promulgated January 4, 2006 Effective March 6, 2006
System-Wide Requirements				
Consumer Confidence Report Rule	40 CFR 141 Part O	Part 7, Subpart B	Reporting only	Published August 19, 1998
Public Notification Rule	40 CFR 141 Part Q	Part 4, 320	Reporting only	Promulgated 2000
Operator Certification Rule		WAC 246-292	N/A	Effective January 4, 2014

Notes:
CFR - Code of Federal Regulations; DBP - disinfection byproducts; ESWTR - Enhanced Surface Water Treatment Rule; HAA5 - haloacetic acids; IOC - inorganic contaminants; LT1ESWTR - Long Term 1 Enhanced Surface Water Treatment Rule; LT2ESWTR - Long Term 2 Enhanced Surface Water Treatment Rule; MCL - maximum contaminant levels; NPDWR - National Primary Drinking Water Regulation; PFAS - per- and polyfluoroalkyl substances; UCMR - Unregulated Contaminants Monitoring Rule; VOC - volatile organic compounds, SAL - State Action Levels; SOC - synthetic organic chemicals; THM - trihalomethanes.

7.3 Source Water Quality

Historically, the City has relied on groundwater supplies from wells and surface water diversions. All of the City's sources are treated with chlorine, fluoride, and sodium hydroxide for pH adjustment (with the exception of Well 9). Surface water is treated via a slow sand filtration plant. Regulations that address source water quality for groundwater and surface water systems are described herein.

7.3.1 National Primary and Secondary Drinking Water Standards

The NPDWRs, established by the USEPA, are legally enforceable primary standards to protect the public from consuming water containing contaminants that present a risk to human health. The current list comprises 87 contaminants, including six microorganisms (two of which are nonpathogenic indictors of potential contamination, total coliform, and Escherichia coli), turbidity, four DBP/byproduct groups, three disinfectants, 16 inorganic contaminants, 53 organic contaminants, and four radionuclides. MCL and maximum contaminant level goals (MCLG) have been set for 73 of these contaminants. Disinfectant MCLs and MCLGs are comprised of Maximum Residual Disinfectant Levels (MRDL) and Maximum Residual Disinfectant Level Goals (MRDLG) have been set for three disinfectants. Ten other contaminants are regulated through treatment technique requirements.

The USEPA has also published secondary regulations which are not legally enforceable and function as guidelines to help utilities provide aesthetically pleasing drinking water (taste, odor, color, etc.). The secondary standards set secondary maximum contaminant levels (SMCL) for 15 compounds. These compounds do not present a health risk at the SMCL. States are not required by the USEPA to enforce any of the secondary standards; however, each state may choose to regulate any or all of the secondary standards. For new community water systems, the DOH requires treatment for secondary MCL exceedances under WAC 246-290-320 (3)(d). For other public water systems, the WAC stipulates that the required follow-up action be determined by the DOH based on the degree of consumer acceptance of the water quality and their willingness to bear the cost of meeting the secondary standard.

Current primary and secondary MCLs for inorganic and organic constituents, respectively, are documented in the following subsections.

7.3.2 Inorganic Chemicals

Regulated IOCs include elemental metals such as mercury, arsenic, and iron. Some non-metallic constituents such as chloride, fluoride, and sulfate are also included in this category. Physical properties of IOCs that affect water quality in this category include turbidity, specific conductivity, total dissolved solids, and color. WAC 246-290-310 specifies primary and secondary MCLs for IOCs, which are summarized in Table 7.2 and Table 7.3, respectively.

Table 7.2 Primary MCLs for Inorganic Chemicals

Chemical	Primary MCL (mg/L)(1)
Antimony (Sb)	0.006
Arsenic (As)	0.01
Asbestos	7 million fibers/liter (length > 10 microns)
Barium (Ba)	2.0

Chemical	Primary MCL (mg/L)(1)
Beryllium (Be)	0.004
Cadmium (Cd)	0.005
Chromium (Cr)	0.1
Copper (Cu)	1.3(2)
Cyanide (HCN)	0.2
Fluoride (F)	4.0
Lead (Pb)	0.015(2)
Mercury (Hg)	0.002
Nickel (Ni)	0.1
Nitrate (as N)	10.0
Nitrite (as N)	1.0
Selenium (Se)	0.05
Sodium (Na)	20(3)
Thallium (Tl)	0.002

Notes:
(1) Source: State DOH Drinking Water Regulations (246-290-310), effective June 2025.
(2) Lead and copper have established Action Levels (AL), rather than MCLs. These are discussed further in the LCR, under the Distribution System Water Quality section.
(3) USEPA has established a recommended level of 20 mg/L for individuals that have restrictions on daily sodium intake. This is not an enforceable standard.

Table 7.3 Secondary MCLs for Inorganic Chemicals

Chemical	Primary MCL (mg/L)(1)
Aluminum	0.05 to 0.2 mg/L
Chloride	250 mg/L
Color	15 (color units)
Copper	1.0 mg/L
Corrosivity	Non-corrosive
Fluoride	2.0 mg/L
Foaming Agents	0.5 mg/L
Iron	0.3 mg/L
Manganese	0.05 mg/L
Odor	3 threshold odor number
pH	6.5-8.5
Silver	0.10 mg/L
Sulfate	250 mg/L
Specific Conductivity	700 (umhos/cm)
Total Dissolved Solids	500 mg/L
Zinc	5 mg/L

Notes:
(1) Source: State DOH Drinking Water Regulations (246-290-310), effective June 2025.

7.3.2.1 Monitoring Requirements

The City has a waiver for IOC testing that reduces the frequency to once every nine years for all its wells. The next IOC samples are required in 2028.

7.3.2.2 Compliance

The City complies with the requirements for monitoring IOCs and has not exceeded any water quality requirements. Water quality data for inorganic chemicals from 2021-2024 is presented in Table 7.4.

Table 7.4 Inorganic Chemicals Monitoring Results

Contaminant	MCL Goal	MCL	2021	2022	2023	2024
Fluoride (mg/L)	1	4	0.34-1.03	0.16-1.1	0.13-1.11	0.12-1.24
Nitrates (mg/L)	10	10	ND-2.9	ND-2.1	ND-1.7	ND-2.0

7.3.3 Volatile Organic and Synthetic Organic Compounds

VOCs are manufactured, carbon-based chemicals that vaporize quickly at normal temperatures and pressures. VOCs include many hydrocarbons associated with fuels, paint thinners, and solvents. This group does not include organic pesticides, which are regulated separately as SOCs. VOCs are divided into the following two groups:

- Regulated VOCs that have been determined to pose a significant risk to human health.
- Unregulated VOCs for which the level of risk to human health has not been established.

There are currently 21 regulated VOCs and 33 regulated SOCs (excluding PFAS). A list of these compounds and their MCLs is included in Table 7.5.

Table 7.5 Regulated Volatile and Synthetic Organic Chemicals

Organic Chemical	Federal Regulation	Primary MCL (mg/L)(1)	Organic Chemical	Federal Regulation	Primary MCL (mg/L)(1)
Volatile Organic Chemicals					
Vinyl chloride	Phase I	0.002	Monochlorobenzene	Phase II	0.1
Benzene	Phase I	0.005	Ortho-Dichlorobenzene	Phase II	0.6
Carbon Tetrachloride	Phase I	0.005	Styrene	Phase II	0.1
1,2-Dichloroethane	Phase I	0.005	Tetrachloroethylene	Phase II	0.005
Trichloroethylene	Phase I	0.005	Toluene	Phase II	1
Para-Dichlorobenzene	Phase I	0.075	Trans-1,2-Dichloroethylene	Phase II	0.1
1,1-Dichloroethylene	Phase I	0.007	Xylenes (total)	Phase II	10
1,1,1-Trichloroethane	Phase I	0.2	Dichloromethane	Phase V	0.005
Cis-1,2-Dichloroethylene	Phase II	0.07	1,2,4-Trichloro-benzene	Phase V	0.07
1,2-Dichloropropane	Phase II	0.005	1,1,2-Trichloroethane	Phase V	0.005
Ethylbenzene	Phase II	0.7			

Organic Chemical	Federal Regulation	Primary MCL (mg/L)(1)	Organic Chemical	Federal Regulation	Primary MCL (mg/L)(1)
Synthetic Organic Chemicals					
Arochlor	Phase II	0.002	Benzo(a)pyrene	Phase V	0.0002
Atrazine	Phase II	0.003	Dalapon	Phase V	0.2
Carbofuran	Phase II	0.04	Di(2-ethylhexyl) adipate	Phase V	0.4
Chlordane	Phase II	0.002	Di(2-ethylhexyl) phthalate	Phase V	0.006
Dibromochloro-propane	Phase II	0.0002	Dinoseb	Phase V	0.007
2,4-D	Phase II	0.07	Diquat	Phase V	0.02
Ethylene dibromide	Phase II	0.00005	Endothall	Phase V	0.1
Heptachlor	Phase II	0.0004	Endrin	Phase V	0.002
Heptachlor epoxide	Phase II	0.0002	Glyphosate	Phase V	0.7
Lindane	Phase II	0.0002	Hexachlorobenzene	Phase V	0.001
Methoxychlor	Phase II	0.04	Hexachloro Cyclopentadiene	Phase V	0.05
PCBs	Phase II	0.0005	Oxamyl (vydate)	Phase V	0.2
Pentachlorophenol	Phase II	0.001	Picloram	Phase V	0.5
Toxaphene	Phase II	0.003	Simazine	Phase V	0.004
2,4,5-TP	Phase II	0.05	2,3,7,8-TCDD (dioxin)	Phase V	$3x10^{-8}$

Notes:
(1) 40 CFR 141.61(a) and (c); adopted by State DOH, effective April 1999.
PCB - Polychlorinated biphenyls.

7.3.3.1 Monitoring Requirements

Per DOH requirements, VOCs and SOCs must be sampled once every three years, unless a waiver is in place. State waivers requiring no monitoring have been issued for dioxin, endothal, diquat, glyphosate, and insecticides. Additionally, the state grants a waiver if a chemical is not in use or previous monitoring indicates contamination would not occur. The City must apply for waivers through DOH. There are two types of waivers, risk-based or area-wide. The risk-based waiver requires a susceptibility analysis and DOH charges a fee for these waivers (purchased waivers). Area-wide waivers are issued if a chemical is not used within a region, thus DOH does not charge for these waivers. While the state issues both types of waivers, an area-wide waiver is referred to as a "State waiver." A waiver is in place for two years, during which time there are no requirements for monitoring. However, once a waiver expires, monitoring frequency for VOCs and SOCs is one sample every three years.

The City is required to sample for VOCs to once every three years at the eastern wellfield (Well 6 and 14) and has waivers at the remaining wells reducing frequency to every six years. The City also has issued waivers reducing sampling frequency for herbicides and pesticides to nine and three years, respectively.

7.3.3.2 Compliance

A review of the City's previous 10 years of water quality data shows that all the City's source wells test below VOC and SOC MCLs or are not detected at all.

7.3.4 Radionuclides

In December 2000, the USEPA announced updated standards for radionuclides. This rule became effective in December 2003. All community water systems are required to meet the MCLs listed in Table 7.6 and requirements for monitoring and reporting. All systems were required to complete initial monitoring and phase in the monitoring requirements between December 8, 2003, and December 30, 2007. Initially, utilities were required to undergo four consecutive quarters of monitoring for gross alpha, combined radium-226/-228, and uranium. Only systems that were considered "vulnerable" were required to monitor for gross beta (quarterly samples), tritium, and strontium-90 (annual samples). The initial monitoring was used to determine if the system would have to perform reduced or increased monitoring.

Table 7.6 Regulated Radionuclides

Radionuclide	MCL(1)
Radium – 226	3 pCi/L
Combined Radium – 226 and 228	5 pCi/L
Uranium	30 µg/L
Gross Alpha (excluding Uranium)	15 pCi/L
Beta Particle and Photon Radioactivity	4 millirem/year(2)
Tritium	20,000 pCi/L(2)
Strontium-90	8 pCi/L(2)

Notes:
(1) Environmental Protection Agency, 40 CFR 141.66.
(2) According to USEPA 40 CFR 141.66, "average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water must not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem/year." The MCLs for tritium and strontium-90 are assumed to produce body organ doses equivalent to 4 millirem/year.
pCi /L - picocurie per liter.

7.3.4.1 Monitoring Requirements

The WAC states "The purveyor may omit analysis for radium-226 and radium-228 if the gross alpha particle is less than 5 pCi/L." The City is required to sample for radium-228 and monitor gross alpha at all wells every six years. The USEPA has adopted a new schedule of sampling once every three years that has not yet been adopted by DOH. In Washington State, natural occurrence levels of the regulated radionuclides have generally been quite low.

7.3.4.2 Compliance

The City is in full compliance with the monitoring requirements and has no exceedances to date.

7.3.5 Arsenic Rule

In January 2001, USEPA promulgated a new standard that requires public water systems to reduce arsenic levels in drinking water. The final rule became effective in 2002 and required compliance by 2006. The rule applies to all community water systems and non-transient, non-community water systems, regardless of size. The rule not only establishes an MCL for arsenic (0.010 mg/L), based on a running annual average (RAA) of quarterly results and an MCLG for arsenic (zero), but also lists feasible and affordable

technologies for small systems that can be used to comply with the MCL. However, systems are not required to use the listed technologies in order to meet the MCL.

Initial monitoring of arsenic required groundwater systems to take one sample between 2005 and 2007. Monitoring requirements decreased to one sample every three years (for groundwater systems) if the initial result is less than the MCL. Monitoring requirements increased to quarterly samples if the initial results were greater than the MCL. Each entry point to the distribution system should have been tested, unless otherwise specified by the State.

The arsenic rule has been adopted by the Washington DOH as a revision to the arsenic MCL under WAC 249-290-310.

7.3.5.1 Monitoring Requirements

Monitoring requirements are once every three years, per requirements for IOCs. Arsenic must be monitored at each entry point to the distribution system as part of the IOC monitoring framework. If any sampling point is in violation of an MCL, the system is in violation.

7.3.5.2 Compliance

The City is in full compliance with the monitoring requirements and has no exceedances to date.

7.3.6 PFAS NPDWR

The USEPA initially announced a finalized National Primary Drinking Water Regulation (NPDWR) for six PFAS in drinking water on April 10, 2024. The final regulations set MCLs for five PFAS as individual components: Perfluorooctanoic acid (PFOA), perfluorooctyl sulfonate (PFOS), perfluorohexanesulfonic acid (PFHxS), perfluorononanoic acid (PFNA), and hexafluoropropylene oxide dimer acid (HFPO-DA commonly known as GenX). Additionally, an MCL was set for PFAS mixtures containing at least two or more of the following: PFHxS, PFNA, GenX, and perfluorobutane sulfonic acid (PFBS). The Hazard Index (HI) is used for the PFAS mixture MCL to account for combined and co-occurring levels of these PFAS compounds in drinking water. MCLGs were also established for these six PFAS compounds.

On May 14, 2025, USEPA announced its intent to modify the already promulgated NPDWR. This change would keep MCLs for PFOA and PFOS but rescind MCLs for the other PFAS under the existing NPDWR. Additionally, the intended changes included an extended timeline for compliance from 2029 to 2031. However, it is unclear at this time if these proposed changes will take effect, as these changes must undergo full rulemaking process under the Administrative Procedure Act, legal review, and potential judicial review. While the USEPA expects to finalize their proposed revision in the spring of 2026, it is unclear if it will ever take effect. The City should plan to operate on the assumption to comply with MCLs by 2029. For the purposes of this document, it is assumed that the currently promulgated NPDWR will remain in effect as it is the more conservative approach to managing the regulations and maintaining compliance.

Prior to issuance of UCMR 5, USEPA concluded there was enough data on the health effects of PFAS to begin the process of regulating certain PFAS compounds. The following describes the sequence of key actions taken by USEPA related to PFAS:

- In February 2021, USEPA issued notice for its intent to enforce limits on PFAS in drinking water to safeguard communities from PFAS contamination, specifically PFOA and PFOS.
- In June 2022, USEPA announced new health advisory levels (HAL) for four PFAS: PFOA, PFOS, GenX, and PFBS. This was the first time HALs had been issued for PFBS and GenX. For PFOA and PFOS, these new HALs are several orders of magnitude below the HAL announced in 2016 (i.e., 70 nanograms per liter [ng/L] for PFOA and PFOS combined). The new HALs for PFOA and PFOS were labelled "interim" because the USEPA's draft analysis of health studies for PFOA and PFOS were still undergoing review by the Science Advisory Board at the time of the announcement.
- On March 14, 2023, USEPA announced a proposed NPDWR to establish legally enforceable levels for not only PFOA and PFOS but also PFNA, GenX, PFHxS, and PFBS.
- On April 10, 2024, USEPA announced the final NPDWR for six PFAS. Under the NPDWR, the USEPA established MCLs for six PFAS in drinking water: PFOA, PFOS, PFHxS, PFNA, and GenX as contaminants with individual MCLs, and PFAS mixtures containing at least two or more of PFHxS, PFNA, GenX, and PFBS using a Hazard Index MCL to account for the combined and co-occurring levels of these PFAS in drinking water. USEPA also finalized health-based, non-enforceable MCLG for these PFAS. A summary of these levels is provided in Table 7.7. An explanation of the HI approach follows the table.

Table 7.7 MCLs and MCLGs for Specific PFAS Compounds in Drinking Water

Compound	Final MCLG	Final MCL (Enforceable Levels)
PFOA	Zero	4.0 ppt(1)
PFOS	Zero	4.0 ppt(1)
PFNA	10 ppt	10 ppt
PFHxS	10 ppt	10 ppt
HFPO-DA (GenX)	10 ppt	10 ppt
Mixtures containing two or more of PFHxS, PFNA, HFPO-DA (GenX), and PFBS	HI of 1.0 (unitless).	HI of 1.0 (unitless).

Notes:
(1) In aqueous matrixes, ppt can also be expressed as ng/L.
ppt - parts per trillion.

While PFOA, PFOS, PFNA, PFHxS, and GenX have their own individual MCLs and MCLGs under the NPDWR, a HI of less than 1.0 must also be met to comply with the rule. The HI is used to reduce the risk of health impacts from a chemical mixture. The HI is calculated via a sum of fractions. Each fraction compares the level of each PFAS measured in the water to the health-based water concentration. The equation below summarizes the HI calculation. It includes indexes for PFHxS, PFNA, and GenX (all of which have their own individual limits as MCLs) and PFBS (which does not have its own individual limit as an MCL).

With the HI approach, the concentration of each of these four PFAS would be divided by a corresponding health-based value (10ppt for PFHxS, PFNA, and GenX; 2000 ppt for PFBS). The sum of these fractions needs to be below 1.0 to comply with the NPDWR. Note, however, that an exceedance must be triggered

by two or more chemicals. For example, a GenX concentration of 11 ppt alone would not cause a HI exceedance, but it would cause an MCL exceedance. A PFBS concentration of over 2,000 ppt alone would not cause a HI exceedance unless another chemical within the calculation exceeded 10 ppt.

$$HI = \frac{[PFHxS]}{10ppt} + \frac{[GenX]}{10ppt} + \frac{[PFNA]}{10ppt} + \frac{[PFBS]}{2000\ ppt}$$ Hazard Index Calculation

7.3.6.1 Monitoring Requirements

Under the NPDWR, public water systems (PWS) will be required to take initial monitoring samples at all entry points to the distribution system based on the frequency outlined in Table 7.8. This initial monitoring must be completed by 2027. The City has already completed this initial monitoring requirement through sampling efforts under the SAL requirements for PFAS, which are discussed more in the following section.

Systems with appropriate, previously acquired monitoring data from UCMR 5, state-led, or other applicable monitoring programs using USEPA Methods 533 or 537.1, will not be required to conduct separate initial monitoring for regulated PFAS.

Table 7.8 PWS Sampling Requirements under USEPA's Proposed PFAS Rule

PWS Type	Monitoring Frequency
Groundwater Systems serving >10,000 persons	Monitor regulated PFAS quarterly within a 12-month period.
Groundwater Systems serving ≤ 10,000 persons	Monitor regulated PFAS twice within a 12-month period, with sampling events conducted at least 90 days apart.
Surface Water Systems	Quarterly within a 12- month period. Samples are required to be collected 2 to 4 months apart.

After initial monitoring, PWS must monitor for rule compliance on a quarterly basis at each entry point to the distribution system. However, based on the initial monitoring results, agencies may reduce compliance monitoring frequency if the monitoring results are below the rule trigger level (RTL). The RTL is half of the MCLs or HI (i.e., 2 ng/L for specific PFAS with an MCL, or an HI of 0.5). Primacy agencies (states) have the flexibility to reduce monitoring to annually or triennially for systems that are consistently below RTLs. Any results above the RTL automatically require a reversion back to quarterly sampling.

For systems required to monitor quarterly, compliance will be determined by running annual averages at the sampling point. When calculating the running annual averages, if a sample result is less than the practical quantitation level for the monitored PFAS, the PWS may use zero as the result on that sample to calculate the average for compliance purposes.

7.3.6.2 Compliance

The PFAS NPDWR has a 5-year compliance window from its year of inception (2024) with specific requirements throughout this timeframe:

- Within three years of rule promulgation (2024-2027):
  - Initial monitoring must be complete.

- Starting three years following rule promulgation (2027-2029):
  - Results of initial monitoring must be included in Consumer Confidence Reports (i.e., Annual Water Quality Report).
  - Regular monitoring for compliance must begin, and results of compliance monitoring must be included in Consumer Confidence Reports.
  - Public notification for monitoring and testing violations.
- Starting five years following rule promulgation (starting 2029):
  - Public notification for MCL violations.
  - Comply with all MCLs (including performing mitigation measures or installing PFAS treatment as required to comply with the MCLs).

All requirements described in this section will supersede current DOH SALs related to PFAS as per the WAC 246-290-315 Subsection (8) unless the State of Washington enacts more stringent or additional requirements beyond those listed in the PFAS NPDWR.

Due to the timeframe in which the PFAS NPDWR requirements are rolled out, the WAC 246-290-315 is temporarily more stringent than the PFAS NPDWR until 2027. Currently in Washington, PWS must report exceedances of certain PFAS above SALs (summarized previously in Table 7.6.1 and Section 7.3.9.1.). The City of Camas has conducted its required initial monitoring as required by the PFAS NPDWR, but will also continue to comply with monitoring and reporting requirements under WAC 246-290-315 and 246-290-320 until 2027, when the reporting requirements under the PFAS NPDWR become more stringent (unless the State of Washington enacts more stringent requirements).

The City is in full compliance with PFAS monitoring requirements, however sampling data collected have indicated certain wells within the City's water supply exceed MCLs. To comply with the PFAS NPDWR by 2029 some form of PFAS mitigation will be needed at these wells. Additionally, the City has taken action to mitigate PFAS by constructing a treatment facility at Well 13 and evaluate mitigation alternatives at other wells of concern.

7.3.7 Washington State Action Levels for PFAS

The State of Washington's DOH has primacy to establish SALs and state MCLs that set more stringent or more encompassing requirements for public water systems than federal requirements. The basis on which SALs or State MCLs may be established is described in WAC 246-290-315.

DOH set SALs for certain PFAS in December of 2021. DOH considers establishment of SALs when human exposure to the contaminant in question can occur through drinking water, and when the contaminant is known or likely to occur in public water systems at levels of public health concern.

DOH may develop a SAL based on the following:

- Evaluation of available peer-reviewed scientific literature and government publications on fate, transport, exposure, toxicity, and health impacts of the contaminant and relevant metabolites;

- An assessment based on the most sensitive adverse effect deemed relevant to humans and considering susceptibility and unique exposures of the most sensitive subgroup such as pregnant women, fetuses, young children, or overburdened and underserved communities; and
- Technical limitations to achieving the SAL such as insufficient analytical detection limit achievable at certified drinking water laboratories.

SAL exceedance requires follow-up action as described in WAC 246-290-320.

- A State MCL may be established by DOH in specific cases where:
- Regulating the contaminant in question presents a meaningful opportunity to reduce exposures of public health concern for persons served by public water systems.
- Where there is a need for an enforceable limit to achieve uniform public health protection in Group A public water systems.
- The need for an enforceable limit to support source water investigation and clean-up of a contaminant in drinking water supplies by responsible parties.

State MCLs would require treatment for the contaminant in question, whereas SALs require specific follow-up actions as described in WAC 246-290-320. DOH has not yet established any State MCLs but has established a series of SALs that were enacted in late 2021 and became effective in 2022. These specific SALs are described further in the Compliance section below. Note that DOH modified the SALs in December of 2025 to more closely align with the federal USEPA MCLs.

7.3.7.1 Monitoring Requirements

The City is in compliance with all monitoring rules associated with constituents subject to SALs. WAC 246 290-300 describes the monitoring requirements for contaminants subject to DOH SALs. These requirements are summarized in Table 7.9.

Table 7.9 Sampling Requirements for WA SALs

Contaminant or Group of Contaminants	Initial Sampling	Routine Sampling Frequency	Sampling Location
PFAS with prescribed SALs (see compliance section below)	One sample on or before December 31, 2025	Once every three years	Per the locations described in WAC 246-290-300.7b.

While one sample is required before the end of 2025, sampling requirements for UCMR 5 will generally fulfill this requirement for large public water systems, as is the case for Camas. UCMR 5 sampling requirements (described in Sections 7.3.8 and 7.3.8.1) include the five PFAS that are subject of the Washington SALs. However, sampling for contaminants with SALs may bring specific follow-up actions. These follow up actions generally include notification of the result to DOH, and public notification. There are also follow-up requirements for samples that do not exceed the SALs but result in a certain percentage of the SAL.

7.3.7.2 Compliance

The City is currently in compliance with existing state regulations regarding PFAS sampling and public notification requirements under WAC 246-290-320. Some sampling efforts at Well 13 showed PFAS levels above the SALs. As a result, the City has taken follow-up actions, including follow up monitoring and

public notification, in accordance with WAC 246-290-320. Although a SAL exceedance does not trigger the need for treatment, the City is also currently constructing a PFAS treatment system for Well 13.

Washington's SALs for PFAS have been in effect since 2022 and currently govern monitoring and follow-up actions for five PFAS. Utilities must complete initial SAL sampling by December 31, 2025, and continue routine monitoring every three years thereafter. In contrast, the USEPA's PFAS NPDWR was finalized in April 2024, with initial monitoring required by 2027 and enforceable MCLs beginning in 2029. This creates an overlap period where SAL requirements remain in force until federal MCLs become effective. Washington's emergency rulemaking in 2024–2025 clarified that SAL protections will continue through this transition to avoid any regulatory gap.

Washington has indicated through emergency rules and recent updates that SALs will effectively transition to match the federal MCLs when they become enforceable in 2029. However, in December 2025, DOH updated the SALs to align with the MCL values. They are effective January 15, 2026.

The following table shows the SAL values that existed from 2022 through 2025, as well as what the updated SAL values are.

Table 7.10 Washington State Action Levels

Compound	Old SAL – Previously Effective 2022 through 2025 (ppt)	Updated SAL - Effective Jan 15, 2026 (ppt)
PFOA	10	4
PFOS	15	4
PFNA	9	10
PFHxS	65	10
PFBS	345	N/A (part of HI)
HFPO-DA (GenX)	N/A	10
Mixtures containing two or more of PFHxS, PFNA, HFPO-DA (GenX), and PFBS	N/A	HI of 1.0 (unitless).

Notes:
(1) Old SAL exceedances were based on a single sample exceedance (with second sample averaging allowed). Updated SAL exceedances are based on annual running averages to be in alignment with federal MCL rules.
(2) The hazard index calculation is the same as the MCL hazard index calculation.

The City does not anticipate any compliance issues with the updated SALs. The Tier 2 notification requirements remain in place, they are just now required for exceedances of the updated SAL values. The City is actively implementing PFAS treatment at Well 13 and is developing a plan for treatment at other well sites in order to maintain compliance with drinking water regulations when the federal MCL enforcement begins in 2029.

7.3.8 Manganese

The USEPA included manganese, a naturally occurring ion, in UCMR4 to help assess if a primary MCL, in addition to the existing secondary MCL, should be established. Manganese is currently regulated by DOH as a secondary standard; any exceedances trigger follow-up actions as directed by DOH. Elsewhere, in 2019, Canada established two new values regulating manganese in drinking water: A health-based

maximum allowable concentration (analogous to the US's primary contaminant MCL) of 0.12 mg/L and an aesthetic objective (analogous to the US's secondary contaminant MCL) of 0.02 mg/L. The aesthetic objective for manganese is below the USEPA's current secondary MCL of 0.05 mg/L.

Manganese was included in sampling for UCMR4 to help assess if it should be moved from a secondary MCL to a primary MCL. As of March 10, 2020, the USEPA determined there was not enough information to proceed to the regulatory determination assessment phase. Manganese was included in Contaminant Candidate List 5, finalized in 2022.

However, USEPA has established HALs for manganese. HALs establish a specific duration and threshold concentration of exposure below which no health effects are anticipated to occur. For all persons, USEPA has a one-day and 10-day HAL of 1 mg/L and a lifetime HAL of 0.3 mg/L. For bottle-fed infants younger than six months, the USEPA also has a 10-day HAL of 0.3 mg/L.

In December 2023, DOH published updated recommendations pertaining to manganese, which included the following:

- Manganese treatment should be installed if levels exceed the 0.05 mg/L secondary MCL.
- Treatment should reduce manganese levels to below 0.02 mg/L.
- Public notification should be provided if manganese levels exceed 0.3 mg/L, consistent with USEPA HALs discussed above.

7.3.8.1 Monitoring Requirements

The City monitors for manganese as part of its complete inorganic chemical test panel which is required once every nine years.

7.3.8.2 Compliance

The City is in full compliance with the monitoring requirements and has no exceedances to date.

7.3.9 Surface Water Treatment Rules

7.3.9.1 Surface Water Treatment Rule

On December 31, 1990, USEPA promulgated the Surface Water Treatment Rule (SWTR) to establish filtration and disinfection as a drinking water treatment technique in lieu of MCLs for Giardia lamblia, viruses, HPC bacteria, Legionella, and turbidity. The SWTR is based on the premise that all surface water and GWI are at risk of microbiological contamination, and the previous requirements were inadequate to prevent waterborne disease outbreaks. The SWTR requires 99.9 percent (3 log) removal and/or inactivation of *Giardia* cysts, and 99.99 percent (4 log) removal and/or inactivation of viruses. To meet these requirements, surface water systems must disinfect according to strict requirements, must filter water unless certain source water-quality and site-specific conditions are met, and must be operated by qualified personnel. To avoid the filtration requirement, the following criteria must be met:

1. 90 percent of the samples taken from the source water must have fewer than 100 total coliform bacteria per 100 milliliters (mL) and fewer than 20 fecal coliform bacteria per 100 mL.
2. The turbidity level prior to disinfection must not exceed 5.0 nephelometric turbidity unit (NTU).

3. *Giardia* and virus inactivation requirements must be met, providing redundant disinfection components and maintaining required disinfection residuals.
4. An approved watershed control program must be implemented with annual onsite inspections.
5. Total Coliform Rule (TCR) requirements in the distribution system and THM requirements must be met.
6. The water system must be free of waterborne disease outbreaks.
7. The purveyor must have alternative operating plans to address high turbidity levels and other water quality issues.

Utilities that use unfiltered water must maintain a disinfectant residual throughout the water distribution system. At entry points to the distribution system, residual disinfectant concentrations cannot be <0.2 mg/L for more than four hours. At distribution system sample locations, residual disinfectant concentrations cannot be undetectable in greater than 5 percent of samples in a month, for any two consecutive months. Heterotrophic plate count (HPC) ≤ 500/mL is deemed to have detectable residual disinfectant.

GWI is regulated by the SWTR. The intent is to provide the same level of treatment for groundwater sources that are at risk for contamination by pathogens as surface water supplies. Examples of water sources that may be classified as GWI are shallow wells, springs, infiltration galleries, and Ranney wells.

7.3.9.2 Long Term 2 Enhanced Surface Water Treatment Rule

The LT2ESWTR is intended to address a number of deficiencies in the original 1990 SWTR, including the following:

1. Cryptosporidium is not addressed in the SWTR.
2. Pathogen reduction may not be adequate in poorer quality waters.
3. Virus disinfection requirements may be greater than indicated in the SWTR.
4. Disinfectants and Disinfection Byproducts Rule (DBPR) may undermine the SWTR by causing utilities to reduce disinfectant residuals.

USEPA developed the ESWTR in two stages. The proposed Interim ESWTR was published in the Federal Register on 29 July 1994. USEPA finalized the Interim ESWTR and Stage 1 DBPR in November 1998, as required by the 1996 Amendments to the SDWA, Section 1412(b)(2)(C). The final rules resulted from formal regulatory negotiations with a wide range of stakeholders that took place in 1992-93 and 1997. On January 16, 2001, USEPA published final revisions to the Interim ESWTR and Stage 1 DBPR. The LT1ESWTR was promulgated in February 2002 and builds on the requirements of the SWTR. The LT1ESWTR specifies treatment requirements to address *Cryptosporidium* and other microbial contaminants in public water systems serving less than 10,000 persons.

The LT2ESWTR proposed rule was promulgated in August 2003 and published in the Federal Register on January 5, 2006. The LT2ESWTR requires PWSs that use surface water or groundwater under the direct influence of surface water to monitor their source water (influent water prior to treatment) for *cryptosporidium*, *E. coli*, and turbidity for a period of two years starting six months after the rule is finalized. Based on the results of this monitoring, water systems will be classified in one of four risk bins. Systems classified in higher risk bins must provide 90 to 99.7 percent (1.0 to 2.5 log) additional reduction

of *Cryptosporidium* levels. The regulation specifies a range of treatment and management strategies, collectively termed the "microbial toolbox," that systems may select to meet their additional treatment requirements. All unfiltered systems must provide at least 99 or 99.9 percent (2 or 3-log) inactivation of *Cryptosporidium*, depending on the results of their monitoring.

7.3.9.3 Monitoring requirements

Monitoring requirements are dictated by source water quality and the selected treatment processes. The City has recently completed construction of a new SSF Plant for its surface water sources. The City's surface water sources have been listed as Bin 1 sources for *Cryptosporidium* removal and do not require additional treatment beyond slow sand filtration. Specific treatment objectives and monitoring for the slow sand facility include:

- Turbidity reduction as required for slow sand filtration processes, providing finished water turbidity less than 1 NTU in 95 percent of samples each month and no turbidity samples greater than 5 NTU.
- Provide 3-log giardia removal and inactivation through a combination of 2-log removal by filtration and 1-log inactivation by chlorine disinfection.
- Provide a total 4-log virus inactivation and removal through filtration and disinfection.
- Provide a continuous free chlorine residual of not less than 1.0 mg/L entering the distribution system at the water quality station and pressure reducing valve vault at NE 277th Avenue and NE 14th Street.
- Provide treated water pH of 7.5 plus or minus 0.2 units (if the optional caustic feed system is installed and used for pH adjustment).
- Provide a fluoride residual of 0.7 mg/L.

7.3.9.4 Compliance

The City has constructed a new slow sand filtration treatment plant that is in full compliance with all surface water treatment rules.

7.3.9.5 Filter Backwash Recycling Rule

The Filter Backwash Recycling Rule (FBRR) regulates the recycling of filter backwash water within the treatment process of public water systems. The purpose of the rule is to require systems to review their recycle practices and, where appropriate, work with the DOH to make any necessary changes to recycle practices that may compromise microbial control. The City's slow sand filter backwash water is wasted to a detention pond rather than recycled to the head of the plant and thus the FBRR does not apply.

7.3.10 Groundwater Rule

The USEPA enacted the final Groundwater Rule (GWR) January 8, 2007, for the purpose of providing increased protection against microbial pathogens in public water systems that use untreated groundwater. The GWR will apply to public water systems that serve groundwater as well as to any system that mixes surface and groundwater, if the groundwater is added directly to the distribution system and is provided to customers without providing disinfection contact time.

To implement the GWR, USEPA is taking a risk-based approach to protect drinking water from groundwater sources that have been identified as being at the greatest risk of fecal contamination. This strategy includes four primary components:

1. **Sanitary Surveys**. Sanitary surveys must be conducted every three years and meet the provisions of the 1998 Interim ESWTR as it relates to populations served. In addition, the sanitary survey shall implement the eight elements of the USEPA/State Joint Guidance on Sanitary Surveys. These elements relate to source protection; identification of the physical components and their condition; and description and implementation of programs for treatment, distribution, storage, pumping, monitoring, operation and maintenance; and operator certification.
2. **Source Water Monitoring**. Source water monitoring is triggered when a system does not sufficiently disinfect drinking water to achieve 4-log (99.99 percent) virus removal and identifies a positive routine sample during its TCR monitoring and hydrogeologic sensitivity assessment monitoring (at the State's discretion) targeted at high-risk systems. Once a total coliform-positive sample is found within a distribution system, the system is required to collect one source water sample per source and monitor for a fecal indicator. Washington State may choose to issue a waiver if the groundwater source has a hydrogeologic barrier.
3. **Corrective Action**. Corrective action is required for any system with a significant deficiency or evidence of source water fecal contamination. Corrective actions must be taken by "groundwater systems that have a significant deficiency or have detected a fecal indicator in their source water." USEPA guidelines recommend that corrective actions take place within 90 days, or longer if approved by the State. The problem should be solved by eliminating the contamination source, correcting the significant deficiencies, or providing an alternate source of water supply.
4. **Compliance Monitoring**. Compliance monitoring ensures that treatment technology installed to treat drinking water reliably achieves 4-log virus inactivation. Compliance monitoring applies to all groundwater systems that disinfect as a corrective action. Systems serving greater than 3,300 individuals must continuously monitor their disinfection treatment process. If disinfection concentrations are below the required level, the system must restore disinfection concentration within fours hours.

The compliance date for triggered source water monitoring and the associated corrective actions, as well as compliance monitoring, was December 1, 2009. Initial sanitary surveys should have been completed by December 31, 2012. However, for community water systems that have been identified by the State as outstanding performers (generally those that have treatment that provides 4-log virus inactivation or removal at all sources), the initial sanitary survey must be completed by December 31, 2014.

Many of the requirements of the GWR are determined by the individual state agencies. The requirements of the GWR were adopted by the Washington DOH into WAC 246-290 in November 2010. In addition, DOH has provided a Fact Sheet for Group A utilities with recommended actions to prepare for the GWR. These actions include the following:

- Correct deficiencies from the last sanitary survey.
- Install a sample tap at each wellhead.
- Know specifically where each well's water goes. Triggered source water monitoring will require monitoring of all sources, unless it can be shown that the area of concern in the distribution system is only served by a limited number of sources.

- Update the emergency response plan, to be ready to provide alternate water, if needed.
- If currently treating groundwater from a well, contact the regional office engineer to confirm whether you currently achieve 4-log virus inactivation. Systems that treat to this level will not be required to conduct triggered source water monitoring but instead will be required to meet treatment technique monitoring requirements.

7.3.10.1 Monitoring Requirements

The DOH is not requiring all systems to perform assessment monitoring. In addition, DOH has indicated that the sanitary surveys completed under the GWR will not differ significantly from those currently required.

Triggered source water monitoring is required at all sources if a distribution system sample tests positive for total coliform (as collected under the total coliform regulations). The federal GWR includes a provision that positive coliform samples attributed to a distribution system source will not trigger source water monitoring. The DOH has not yet decided on the criteria for determining whether a sample can be attributed to the distribution system but may not require triggered source monitoring if they document in writing that the coliform positive sample was attributed to a distribution system deficiency. Source water monitoring will be required at fewer sources if systems can demonstrate the sources impacting each TCR sample site. However, such a plan would need to be pre-approved by the DOH.

The federal GWR also allowed for reduced source water monitoring after 12 non-detect samples. The DOH has not yet established a reduced monitoring standard.

7.3.10.2 Compliance

The City completed its sanitary survey in 2024. No reduction in monitoring resulted from the survey. The City is in full compliance at this time.

7.3.11 Unregulated Contaminant Monitoring Rule

The primary source of occurrence data used to identify emerging contaminants is collected via UCMR. This data is used to support regulatory decision-making regarding contaminants. The SWDA Amendments of 1996 established the following protocols for the UCMR:

- Monitor no more than 30 contaminants every five years.
- Monitor only a representative sample of public water systems serving fewer than 10,000 people (all public water systems serving more than 10,000 people are required to monitor for the selected contaminants).
- Store analytical results in a National Contaminant Occurrence Database.

The Unregulated Contaminant program requires that every five years, the USEPA issues a list of unregulated contaminants for monitoring. Monitoring under this program is conducted using a tiered approach based on the level of development of the selected analytical method. Large water systems (serving more than 100,000 people) are required to monitor for both List 1 and List 2 chemicals:

- Assessment Monitoring (List 1): is conducted for contaminants that have analytical method technologies that are well established.

- Screening Survey (List 2): is conducted for contaminants with more recently developed analytical methods, which employ technologies that are not as widely used, or for which laboratory capacity required to conduct larger-scale Assessment Monitoring may be insufficient.
- Pre-Screen Testing (List 3): is conducted for contaminants that have very new or specialized analytical methods.

The USEPA identified and published unregulated contaminants for the first direct implementation of the UCMR (UCMR1) in 1999, which required some public water systems to monitor for unregulated contaminants from 2001 to 2005. To date, there have been five UCMRs published by the USEPA. The most recent implementation of this rule (UCMR5) was published on December 27, 2021. The implementation period for UCMR5 is 2022 to 2026 with sampling taking place from 2023 through 2025. The final list of 30 contaminants includes 29 PFAS and lithium.

The 1986 amendments to the SDWA require public water systems to monitor for unregulated contaminants every five years and submit these data to the states. The intent of this program is to gather scientific information on unregulated contaminants to determine if regulations are required to protect human health. Both the 1993 and 1996 amendments to the act added new lists of contaminants, which led the USEPA to develop a revised program for monitoring. The new program became known as the Unregulated Contaminant Monitoring Regulations (UCMR 1999). The new UCMR program began in 2001 and produces a new list of unregulated contaminants for monitoring every five years.

Under the UCMR program, USEPA asks large systems to take two sets of samples for unregulated contaminants at six-month intervals. There are two tiers of contaminants in UCMR 1: List 1 - Assessment Monitoring, and List 2 - Survey Screening. List 1 contaminants are sampled by all water systems serving over 10,000 people. There are 10 List 1 contaminants, consisting of flame-retardants and other priority contaminants (USEPA Method 527), and some explosives (USEPA Method 529). List 2 contaminants are analyzed using less common analytical techniques, and only a portion of the purveyors required to test for List 1 contaminants are required to test for List 2. List 2 contaminants include Acetanilide pesticides and degraded products (USEPA Methods 525.2 and 535), and Nitrosamines/N-nitrosodimethylamine (NDMA) (USEPA Method 521).

The UCMR is used as a tool for the USEPA to collect data, and ultimately establish regulations for contaminants that are suspected to be present in drinking water but do not have health-based standards set under the SDWA.

The second cycle (UCMR 2) of monitoring was published in the Federal Register on January 4, 2007. UCMR 2 required monitoring for 25 contaminants using five analytical methods during 2008- 2010. The third cycle (UCMR 3) of monitoring was published on May 2, 2012. UCMR 3 required monitoring for 30 contaminants: 28 chemicals, and 2 viruses. Monitoring occurred during 2012 to 2015. The fourth cycle (UCMR 4) of monitoring was published on December 20, 2016. UCMR 4 required monitoring for 30 chemicals, which included nine cyanotoxins and one cyanotoxin group; two metals; nine pesticides; three brominated HAA5 DBP groups, three alcohols, and three semi-volatile organic chemicals. Monitoring occurred during 2018 to 2020. The fifth cycle (UCMR 5) was published on December 27, 2021, and is currently ongoing, requiring monitoring for applicable systems between 2023 and 2025. UCMR 5 requires monitoring for 29 different PFAS and lithium.

From 2013 to 2015, USEPA's third installment of UCMR sampling efforts measured for six PFAS. These included PFOS and PFOA, two of the most notable and prevalent PFAS compounds. At the time, there

were limited detections nationwide, but laboratory analysis methods could not measure levels low enough to reflect the presence at very low concentrations of these compounds across the US. For the 2023 to 2025 period, the 29 different PFAS compounds can now be measured at relatively low levels through advancements in laboratory analysis methods.

Results from UCMR 5 are currently being reported and compiled as of the date of this report. As of August 2023, around 20 percent of systems have reported results so far and around 8 percent of those systems have seen detections of PFOA and PFOS. However, these results are from Quarter 1 of four quarterly reporting requirements, so some public water systems with no detections may show detections in later reports.

7.3.11.1 Monitoring Requirements

The City has conducted monitoring as required for the previous UCMRs. For systems required to sample under UCMR 5 with a groundwater source (including the City), sampling must occur two times during a consecutive 12-month monitoring period, where sampling events occur 5-7 months apart. For systems with a surface water source, a groundwater source under the direct influence of surface water, or a mixed-source system, sampling must occur four times during a consecutive 12-month monitoring period. Sampling events must occur 3 months apart (quarterly sampling). The City's efforts for UCMR 5 sampling efforts are currently ongoing.

7.3.11.2 Compliance

The City is in compliance with the UCMR 1 through 4 testing requirements and expects to comply with all monitoring requirements of UCMR 5.

7.4 Distribution System Water Quality

Regulations that address distribution system water quality are described herein.

7.4.1 Total Coliform Rule

Coliform bacteria describe a broad category of organisms routinely monitored in potable water supplies. Though not all coliform bacteria are pathogenic in nature, they are relatively easy to identify in laboratory analysis. If coliform bacteria are detected, then pathogenic organisms may also be present. Bacterial contamination in a water supply can cause a number of waterborne diseases; therefore, these tests are strictly monitored and regulated by DOH.

The TCR specifies two types of MCL violations, "monthly" and "acute." A purveyor is required to notify both DOH and system consumers if either a monthly or acute MCL violation occurs. The TCR also requires secondary disinfection in accordance with the following:

- A minimum disinfectant residual of 0.2 mg/L free chlorine or 0.5 mg/L chloramines measured as total chlorine must be continually present at the entrance of the distribution system, with a detectable chlorine residual maintained throughout the distribution system.
- A sample with HPCs less than 500 colony forming units per 100 mL is assumed to carry the required minimum residual.

The original 1989 TCR rule was revised on February 13, 2013. Water systems must comply with the requirements of the Revised Total Coliform Rule (RTCR) by April 1, 2016. The revision requires public water systems that are vulnerable to microbial contamination to identify and fix problems; and establishes criteria for systems to qualify for and stay on reduced monitoring, which could reduce water system burden and provide incentives for better system operation. The rule changes associated with the RTCR are summarized below:

- Monitoring Changes: The RTCR links monitoring frequency to water quality and system performance.
- Public Notification Changes: The RTCR requires public notification when an *E. coli* MCL violation occurs, or when a utility fails to conduct the required assessment and corrective action.
- MCL Changes and Treatment Technique Violation: The RTCR replaces the MCL and MCLG for total coliforms with a MCL and MCLG for *E. coli*, as well as a treatment technique for coliforms.
- New Assessment Requirements: As part of the new treatment technique requirements, all utilities must conduct an assessment to find and fix any vulnerabilities when a treatment technique trigger occurs. Systems must conduct a Level 1 assessment or a more complex Level 2 assessment depending on the level of concern raised by the results of total coliform sampling.
- Corrective Action Requirements: Utilities are responsible for correcting any sanitary defects found through Level 1 or Level 2 assessments within 30 days or on a schedule approved by the DOH if this timeframe is not possible.

7.4.1.1 Monitoring Requirements

Monitoring requirements are described in the City's coliform monitoring plan (CMP). The City currently collects 30 samples per month from 26 locations based on a residential population of 31,794 as provided by the DOH Water Quality Monitoring Schedule as of October 2025.

7.4.1.2 Compliance

Within the last 10 years the City has had three total coliform exceedances; one total coliform exceedance in 2018, 2020, and 2023. All follow-up tests were negative, and no public notification was required. The City is currently in full compliance with the TCR and its RTCR compliant CMP can be found in Appendix E.

7.4.2 Stage 1 Disinfectants and Disinfection Byproducts Rule

The Stage 1 DBPR was promulgated in December 1998 and regulates the concentration of disinfectants such as chlorine, chlorine dioxide, and chloramines, which are oxidants used to control waterborne disease. The DBPR also regulates DBPs such as TTHMs and HAAs, bromate, and chlorite. DBPs are formed when disinfectants used to control microorganisms react with natural organic matter in water.

The MCLs for THMs and HAAs are 0.080 and 0.060 mg/L, respectively. The four regulated trihalomethanes are chloroform, bromodichloromethane, dibromochloromethane, and bromoform. The five regulated HAAs are monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid. Compliance with the TTHM and HAA MCLs is based on a system-wide RAA of quarterly samples taken in the distribution system. The Stage 1 DBPR also introduced MRDL of 4 mg/L for free chlorine and chloramines, and 0.8 mg/L for chlorine dioxide based on an RAA of samples collected concurrent with TCR monitoring.

7.4.2.1 Monitoring Requirements

Monitoring locations under the Stage 1 DBPR were initially identified in an Initial Distribution System Evaluation (IDSE) prepared by the City in 2004. The City's IDSE explains that chlorine and chloramines are monitored as part of the CMP, which currently tests at 40 sites system wide. The City monitors quarterly for disinfectant residuals at each of these locations. Additionally, the IDSE identifies nine locations representing the longest detention time corresponding to each water treatment plant. The IDSE notes that because the City does not use ozone or chlorine dioxide, monitoring for bromate or chlorite is not necessary. Monitoring for DBPs included a TTHM and HAA sample from each site quarterly.

7.4.2.2 Compliance

The City meets the requirements of the Stage 1 DBPR.

7.4.3 Stage 2 Disinfectants and Disinfection Byproducts Rule

The Stage 2 DBPR was promulgated by the USEPA on January 4, 2006. The key provisions of the Stage 2 DBPR consist of:

- An IDSE to identify distribution system locations with high DBP concentrations. Further information is provided below.
- Site-specific locational running annual average (LRAA) instead of system-wide RAAs to calculate compliance data. LRAAs will strengthen public health protection by eliminating the potential for groups of customers to receive elevated levels of DBPs on a consistent basis.

The MCLs for TTHMs and HAA5 remain unchanged from the Stage 1 DBPR at 0.080 and 0.060 mg/L, respectively, although they will now be calculated as LRAAs.

The IDSE is the first step in Stage 2 DBPR compliance. Its intent is to identify sampling locations for Stage 2 DBPR compliance monitoring that represents distribution system sites with high TTHM and HAA levels. For systems serving more than 500 people, three options were available for the IDSE:

- 40/30 Waiver, which allows systems with no samples exceeding TTHM and HAA concentrations of 40 and 30 micrograms per liter (µg/L), respectively, during eight consecutive quarters to apply to waive the IDSE requirements.
- Standard Monitoring Program, which involves a one-year distribution system monitoring effort to determine locations that routinely show high TTHMs and HAA5 concentrations.
- System-Specific Study, based on historical data and a system model.

The Washington DOH adopted the Stage 2 DBPR on January 4, 2010.

7.4.3.1 Monitoring Requirements

The City was approved for a 40/30 waiver in 2006 and is currently required to collect two samples per year for THM and HAA5.

7.4.3.2 Compliance

The City is in compliance with monitoring requirements for the Stage 2 DBPR. Since April 2021, there have been no samples exceeding the MCL for THM or HAA5 as shown in Table 7.9. The results represent the range of samples from all sources sampled in a particular year.

Table 7.11 Disinfection Byproducts Rule Monitoring Results

Contaminant	MCL Goal	MCL	2021	2022	2023	2024
Haloacetic Acids (µg/L)	48	60	ND-1.4	ND	0.87-1.0	ND
Total Trihalomethanes (µg/L)	60	80	2.5-6.5	5.7-7.6	0.5-4.1	–2.9-3.5

7.4.4 Lead and Copper

The USEPA first promulgated the LCR to control lead and copper levels in drinking water in 1991. The LCR was revised in 2000 and 2007. The LCR sets an AL of 0.015 mg/L for lead and 1.3 mg/L for copper. The AL is exceeded if the concentration in more than 10 percent of tap water samples collected during any monitoring period is greater than the action level. If the 90th percentile value for tap water samples is above the action level, it does not signal a violation but may trigger other requirements that include water quality parameter monitoring, corrosion control treatment, source water monitoring/treatment, public education, and/or lead service line replacement. In 2018, the Centers for Disease Control and Prevention (CDC) revised the blood lead reference value for children to 3.5 micrograms per deciliter.

A revised definition of “lead free” was issued and became effective on January 4, 2014. This defines “lead-free” as <0.25 percent lead, and any new meters, pipe fittings, etc., that are installed will have to meet this new definition as well as any parts that are used in repairs.

In January 2021, the LCR was revised again with the effective date postponed to December 16, 2021, and a compliance deadline of October 16, 2024. In 2021, the revised LCR defined a trigger level of 0.01 mg/L for the system's 90th percentile level, additional actions upon system-wide action level exceedance (ALE), and additional actions upon individual tap sample ALE. Now, when the 90th percentile exceeds the trigger level, systems are required to implement additional planning, monitoring, and reevaluation of current treatment. When the 90th percentile exceeds the AL, systems are now required to notify all customers within 24 hours, begin semi-annual sampling, and either install corrosion control treatment (CCT) or reoptimize their system. Lastly, individual tap sample ALE will require 72-hour notice and "find-and-fix" efforts including identifying the lead source and taking action to reduce lead levels. Under the revised LCR, a Lead Service Line Inventory is required of all service lines on both the system and homeowner side of the meter. At a minimum, service lines must be classified as one of the following:

- Lead, where the line is made of lead.
- Non-lead evidence is required to support this determination.
- Galvanized requiring replacement:
  - Replacement is required where a galvanized service line is determined to be downstream of a current or former lead service line.
- Status unknown, where there is no documentation or evidence of the service line material type.

A Lead Service Line (LSL) Replacement Plan is required for systems with lead service lines, galvanized lines requiring replacement, or service lines where the material is unknown. Additionally, partial lead service

line replacement is no longer allowed. Public-side line replacement is now required when a private-side line is replaced. Table 7.10 summarizes the LCRR.

Table 7.12 Comparison of the Major Provisions of the TCR and the RTCR Rule Requirements

Focus Area	Rule Requirement
Identifying Areas Most Impacted	▪ Complete an LSL inventory. ▪ Systems without LSLs must demonstrate their absence.
Strengthening Treatment Requirements	▪ 10 µg/L TL in addition to the current 15 µg/L AL. ▪ If the TL is exceeded based on 90th percentile lead concentrations, systems must re-optimize CCT or conduct a study if CCT is not currently in place. ▪ Calcium hardness adjustment is no longer a lead CCT option and phosphate inhibitors must be orthophosphate. ▪ Calcium, conductivity, and temperature analyses are no longer required as part of the WQP sampling. ▪ If an individual tap sample exceeds 15 µg/L, systems must collect a follow-up sample, conduct WQP monitoring at or near the site (0.5-mile radius, similar pressure zone), and perform a corrective action. This is termed a "find-and-fix" approach.
Systematically Replacing LSL	▪ Systems with lead above the TL must develop a goal for LSL replacement; 3 percent LSL replaced per year with systems above the AL. ▪ No partial LSLs can be conducted. ▪ Utilities must replace their portion of an LSL within 45 days if the customer replaces their portion.
Increasing Sample Reliability	▪ Prioritize sample collection from sites served by LSLs. ▪ For sites with LSLs, the fifth liter should be collected. ▪ Collect samples in wide-mouth bottles with no cleaning, flushing, etc. prior to sample collection.
Improving Risk Communication	▪ Utilities must notify individual tap sample consumers within 3 days of a 15 µg/L sample detection. ▪ Utilities must inform customers served by an LSL or lead status unknown service line. ▪ Consumer Confidence Report must provide updated health effects language and information regarding LSL replacement programs. ▪ Utilities must notify system-wide customers of lead AL exceedance within 24 hours. ▪ Systems must improve public access to lead information, including LSL locations, and respond to requests for LSL information, deliver educational materials to customers during water-related work that could disturb LSLs, and provide increased information to health care providers.
Protecting Children in Schools and Childcare Facilities	▪ Develop a list of schools and childcare facilities by the 2024 compliance deadline. ▪ Test 20 percent of licensed childcare facilities and elementary schools each year. ▪ Provide testing to secondary schools on request. ▪ Provide information and communicate results to users of the facility, parents, Primacy Agency, and the local or state health department.

Notes:
TL - trigger level; WQP - water quality parameter.

On October 8, 2024, the USEPA issued the final Lead and Copper Rule Improvements (LCRI) that requires the identification and replacement of lead service lines within 10 years. In limited situations, systems with high proportion of lead service lines will be allowed additional time to complete service line replacements.

Additionally, under the LCRI water systems are required to regularly update the LSL Inventory that was required under the revised LCR. This rule also changes tap sampling requirements and lowers the lead action level from 15 µg/L to 10 µg/L.

7.4.4.1 Monitoring Requirements

The City must collect 30 samples every three years, based on the standard monitoring schedule. The most recent set of customer tap samples were collected in 2024.

7.4.4.2 Compliance

The City's monitoring results indicate that the City is in compliance with the requirements of the LCR. The City's LCR monitoring results for 2021 and 2024are presented in Table 7.11. Results represent the 90th percentile of all samples taken within a given period.

Table 7.13 Lead and Copper Rule Monitoring Results

Contaminant	MCL Goal (mg/L)	Action Level (mg/L)	2021 Result (mg/L)	2024 Result (mg/L)
Lead	0	0.015	ND	0.014
Copper	0	1.3	0.93	0.73

7.5 Water Quality Monitoring Program

Federal regulations related to system-wide requirements are discussed herein.

7.5.1 Consumer Confidence Report

The Consumer Confidence Report (CCR) Rule was finalized on September 19, 1998. Each July, community water systems must provide an annual report to customers providing information as to the quality of their drinking water supply. These reports are referred to as "Consumer Confidence Reports" or CCRs. These reports let customers know whether their water meets state and federal drinking water standards. The CCR includes information on the water source, the regulated and unregulated contaminants that have been detected during the year, and their concentrations. The report also provides information on DBPs or microbial contaminants and the potential health effects of the contaminants at concentrations greater than the MCL. The likely source of the contaminants is identified, and a summary of any violations in monitoring, reporting, or record-keeping is included. The reports can assist customers with special health needs to make informed decisions regarding their drinking water. CCRs provide references and telephone numbers as to health effects data and available information about the water system in general.

7.5.1.1 Compliance

The City issues an annual Water Quality Report, which includes a basic description of drinking water contaminants, source description, and annual water quality results. The annual Water Quality Reports for 2021 through 2024 are included in Appendix E.

7.5.2 Public Notification Rule

The Public Notification Rule (PNR) requires that public water systems notify their customers when they violate USEPA or State regulations (including monitoring requirements) or otherwise provide drinking

water that may pose a risk to consumers' health. The original public notification requirements were established in the SDWA; the revised PNR was promulgated in 2000 as required by the 1996 SDWA amendments.

The PNR establishes three notification levels:

- Immediate Notice (Tier 1): In a situation where there is the potential for human health to be immediately impacted, notification is required within 24 hours.
- Notice as Soon as Possible (Tier 2). In a situation where an MCL is exceeded or water has not been treated properly, but there is no threat to human health, notification is required as soon as possible and within 30 days.
- Annual Notice (Tier 3). In a situation where a standard is violated that does not directly impact human health, notice must be provided within one year, likely within the system's CCR.

Notification requirements are described in the City's Emergency Response Plan (ERP), available through City Staff. The ERP includes protocol for notifying the DOH and the public when a positive detection of VOCs/SOCs, IOCs, physical characteristics, or bacteriological presence is determined. The ERP maintains current phone numbers and contact information to all relevant utilities, contractors, government agencies, and local cable and radio stations.

7.5.2.1 Compliance

Since the last WSP update, PFAS has been the City's only violation of the PNR. Proper action was taken to notify the public, and the City is currently undergoing efforts to mitigate PFAS in its sources and distribution system.

7.5.3 Operator Certification

The 1996 SDWA amendments require that states develop and implement an operator certification program. Final guidelines were published in February 1999. The regulations set out minimum guidelines for such a certification program including operator classification and qualifications. These sections of the regulation require that:

- Each treatment facility and/or distribution system is placed under the direct supervision of a certified operator.
- Operator certification must be equal to or greater than the system classification being operated.
- At least one certified operator is available on every shift.
- Operators must sit for, and pass, a validated exam demonstrating skills, knowledge, ability, and judgment necessary for the system classification.
- Each operator must have a high school diploma, GED, or state-approved experience and training.

While the responsibility for developing the program lies with DOH, individual systems must bring all operators up to the level of certification as required. The "grandparenting" clause of the regulation will address existing operators; however, new operators will be required to meet the guidelines of the legislation. Washington State issued revised operator certification guidelines in December 2000 (WAC 246-292). A grandparenting clause is also present in this regulation. However, because this clause expired in 2002, full compliance was required by that date.

On December 4, 2013, the DOH adopted the proposed rule changes for the Waterworks Operator Certification rule. The changes of the rule include strengthening the state's authority to enforce regulations, clarify authority to certify Backflow Assembly Testers (BAT) and Cross Connection Control Specialists (CCSs), and other updates to reflect current program practices, move requirements from guidelines into rules, and improve language and readability. Adopted changes pertinent to PWSs include the following:

- Requires purveyors to designate an operator in responsible charge for each operating shift and each major segment of the system, if applicable.
- Requires purveyors to designate and report all mandatory positions to the department within 30 days of starting operations or when a position is vacated.
- Purveyors shall not require operators to perform work that is beyond their skills, abilities, or level of certification.
- Additional requirements for operators, CCSs, and BATs are included.

7.5.3.1 Compliance

Operation, maintenance, cross-connection control, and water quality monitoring functions for the City are accomplished under the direction of the Water/Sewer Superintendent. As a Group A water system, the City presently meets minimum staff certification requirements. To ensure compliance in the future, all certified staff are provided the necessary expenses and leave time to attend classes and seminars in order to meet requirements for certification renewal. Further details on operator certifications are described in Chapter 4.

7.6 Future Regulatory Requirements

The SDWA and its amendments require that the USEPA reevaluate existing drinking water regulations on a periodic basis and develop and promulgate new standards and regulations as necessary to protect public health. At any given time, there may be many contaminants at various stages of the rulemaking and revision process, such as information gathering, regulation development, public comment, or periodic review. Anticipated future regulatory requirements are summarized in Table 7.12. This table includes ongoing programs to introduce new regulatory requirements, under the UCMR and the Contaminant Candidate List (CCL), as well as specific rules and regulations currently under consideration.

The City does not anticipate issues with meeting the other future regulatory requirements listed in the table based on the limited available information. The City will revisit each proposed rule when specific requirements are published. A brief description of anticipated requirements under each rule is provided herein.

Table 7.14 Future Regulatory Requirements

Proposed Rule	Affected Contaminants	Proposed Publication Date(1)
Unregulated Contaminant Monitoring Rule	▪ Unregulated Contaminants	▪ UCMR 6 – 2026
Fifth Regulatory Determination	▪ Fifth Regulatory Determination	▪ Reg-Det 5 - unknown
Contaminant Candidate List	▪ Unregulated Contaminants	▪ CCL4 - unknown
Hexavalent Chromium	▪ Hexavalent Chromium	▪ August 2027
Nitrosamines	▪ Nitrosamines	▪ Unknown

Proposed Rule	Affected Contaminants	Proposed Publication Date(1)
TOrC	▪ Toxic Organic Chemicals	▪ Unknown
1,4-dioxane	▪ 1,4-dioxane	▪ Unknown
DBPs	▪ DBPs	▪ Unknown
MDBP	▪ MDBP	▪ Summer 2027

Notes:
(1) Effective and compliance dates were obtained from the Federal Register and USEPA's Drinking Water Hotline and represent the best information available as of the date of this report.
MDBP - Microbial and Disinfection-by-Products; TOrC - toxic organic chemicals.

7.6.1 Unregulated Contaminant Monitoring Rule (UCMR 6)

The SDWA requires USEPA to issue a list of no more than 30 priority unregulated contaminants in drinking water once every five years. This requires public water systems to monitor for the selected contaminants. The results of current and previous UCMR As of April 2024, the USEPA has identified 68 potential contaminants that may be included in UCMR 6 sampling, which include chlorinated acids, pesticides and degradates, volatile/semivolatile organics, flame retardants, phenols, organic compounds, and pharmaceuticals. The final rule is expected in 2026 with sampling between 2028 and 2030 to follow.

7.6.2 Fifth Regulatory Determination

Under the SDWA, the USEPA must make regulatory determinations (whether to promulgate a new regulation or remove it from consideration) on at least five contaminants every five years. In the first three Regulatory Determinations (Reg-Det 1, Reg-Det 2, and Reg-Det 3 respectively), the USEPA decided not to regulate contaminants under consideration. In the Fourth Regulatory Determination, the USEPA made final determinations to regulate PFOS and PFOS and to not regulate six other contaminants. The USEPA can make "off-cycle" determinations, such as the positive determination to consider a new perchlorate MCL in 2011. The preliminary fifth regulatory determination was announced in January of 2025 and proposes not regulate nine contaminants on CCL 5. The final determination will be released by the USEPA upon review of the input received during the public comment period.

7.6.3 Sixth Contaminant Candidate List

The SDWA requires the USEPA to review its drinking water regulations every six years in light of advances in the fields of health effects, analytical methodologies, treatment, and occurrence data to determine whether any revisions are needed. Any contaminants provided on the CCL are not subject to any proposed or promulgated regulations but are known to occur in public water systems. The USEPA requested nominations of chemicals, microbes, or other substances for consideration on the draft CCL 6 and is currently evaluating nominations and other contaminant data for inclusion on the draft list.

7.6.4 Contaminants of Emerging Concern

Contaminants of emerging concern are a group of priority pollutants that are not typically regulated by the USEPA. This group includes VOCs, 1,4-dioxane, nitrosamines such as NDMA, hexavalent chromium, and perchlorate. Also, among these contaminants are endocrine disrupting compounds (EDC) and pharmaceutical and personal care products (PPCP).

7.6.4.1 Hexavalent Chromium

Total chromium was regulated in 1991 at 100 µg/L. The USEPA has been working over the past several years to develop a draft risk assessment for hexavalent chromium (Cr(VI)). This assessment was extended from its initial 2012 completion date to incorporate the latest health effects research. Total and Cr(VI) monitoring were also included in UCMR3. The USEPA recently finished conducting an Integrated Risk Information System (IRIS) toxicological assessment of Cr-VI and released the final Cr(VI) IRIS on August 1 2024. As the final risk assessment is now published, USEPA will move forward with determining whether or not to promulgate a Cr(VI) MCL. USEPA is required to make this regulatory determination within three years of the release of the final risk assessment, by August 2027.

7.6.4.2 Nitrosamines

Nitrosamines meet the first two of the three SDWA criteria for regulating a new contaminant:

1. NDMA and other nitrosamines are carcinogens.
2. UCMR2 data showed that NDMA and other nitrosamines occur frequently enough to warrant considering regulatory action.

There is still significant debate as to whether this suite of chemicals meets the third criterion, whether their regulation would provide a meaningful opportunity for risk reduction. The contribution of drinking water to the typical person's nitrosamine exposure is small (<0.1 percent) compared to exposure from foods and from what is produced inside the body (endogenous exposure).

Whether or not nitrosamines are regulated will depend largely upon how the USEPA evaluates if regulation would provide a "meaningful opportunity for risk reduction." The agency has adopted a new "life-stages" approach to risk assessment, which focuses more on at risk populations, like infants and toddlers, who drink more water per body weight.

A total of six nitrosamines, including NDMA, were monitored as part of UCMR2. As of March 2011, UCMR2 data indicate that NDMA is the predominant nitrosamine occurring in drinking water. Further, NDMA was detected three times more frequently in surface waters than ground waters and 10 times more frequently in surface water plants using chloramines versus chlorine alone. NDMA was also detected at higher concentrations at maximum residence time locations in the distribution system as compared to entry points. Six nitrosamines, including NDMA, were listed within CCL4.

Current regulatory discussions have focused around regulating nitrosamines as a group; NDMA would almost certainly be included. More than half of the systems that would be impacted by a nitrosamine rule are chloraminated systems. There are many potential treatment options, but many conflict with other regulations. Also, new treatment research at pilot- or full-scale is needed before the risk assessment can be completed. More information on this topic is anticipated to become available over the next few years, but no regulations are anticipated in the near future.

7.6.4.3 Toxic Organic Chemicals

Whether TOrC like PPCPs and EDCs in the environment pose a significant exposure risk to humans or wildlife is still not well understood and the subject of much investigation and debate. Research on these compounds began in the 1990s and the magnitude of the issue is still not fully defined. The use and subsequent release of antibiotics and natural/synthetic steroids to the environment has generated

controversy to date regarding pharmaceuticals as pollutants. However, a plethora of other drug classes, bioactive metabolites, and transformation products, as well as PPCPs have yet to be examined. Certain physiologically active compounds (for example, caffeine, aspirin, and sex steroids) have been known for over 20 years to enter the environment by a variety of routes, primarily via treated and untreated sewage effluents. Available UCMR3 data indicates endocrine disrupting compounds are largely absent in drinking water sources at even very low levels.

Currently, PPCPs are not regulated by USEPA. The USEPA is studying the effect of PPCPs and has not publicly discussed proposing any regulations. A significant portion of on-going research concerns where and how TOrCs should be treated. Options include drug take back programs, treatment at wastewater treatment plants, and treatment at drinking water plants, with the first option being the most practical and cost-effective.

7.6.4.4 1,4-dioxane

1,4-dioxane is a synthetic organic compound commonly used in a variety of commercial and industrial processes such as stabilization of chlorinated solvents and pharmaceutical manufacturing as well as found as a by-product in goods such as paint strippers, dyes, and greases. The USEPA has classified 1,4-dioxane as likely to be carcinogenic to humans, and the compound has been listed in CCL3, CCL4, and CCL5 as well as monitored under UCMR3. USEPA has no established MCL for 1,4-dioxane however, the latest Drinking Water Specific Risk Level Concentration from USEPA is 0.35 µg/L for the 10^{-6} cancer level (one in a million lifetime cancer risk). The USEPA's health advisory level for noncancer toxicity effects is 0.2 mg/L, so the 0.35 µg/L level for cancer effects is the more conservative level. The notable removal difficulty of 1,4-dioxane is one of the key concerns. While no conventional drinking water treatment technologies can reliably remove it at drinking water levels, ultraviolet light-hydrogen peroxide advanced oxidation process (UV AOP) is effective at treating 1,4-dioxane to below the method reporting limit of 0.1 µg/L.

7.6.4.5 Emerging Disinfection Byproducts

The USEPA continually considers whether additional regulation of DBPs is warranted, as illustrated by the inclusion of several unregulated DBPs on the fourth CCL, the decision to consider revisions to the Stage 1 and 2 D/DBPRs based on the Third Six-Year Review cycle, and inclusion of several classes of unregulated DBPs through the UCMR. A number of potentially significant disinfection by-products continue to be the subject of on-going research. For example, both iodo-substituted HAAs and THMs have been shown to form under certain conditions when drinking water is chloraminated. Nitrosamine is under consideration for inclusion in any new DBP regulations. Bromate has been the subject of scrutiny as well. Since more brominated DBPs can be more toxic, the USEPA required monitoring for HAA9 under UCRM4. No regulations have been proposed as of yet, but as more information emerges, the USEPA may regulate some of these emerging DBPs.

7.6.5 Microbial and Disinfection-by-Products

The National Drinking Water Advisory Council presented recommendations to USEPA in December 2023 on additional MDBP regulations, which may lead to potential rules being promulgated. These rules are expected from USEPA in summer 2025. Items that may be covered in these new rules include:

- Adoption of a positive numeric minimum disinfectant residual requirement, with minimum specific values for free chlorine and chloramines.

- Data and analysis requirements associated with DBPs of emerging concern.
- Source water evaluation screening requirement, plus additional mandatory treatment to reduce DBP formation and disinfectant demand.
- Finished water storage tank inspection and cleaning requirements.
- Improvement of chloramination practices to promote microbial control and DBP formation potential with guidance, monitoring, and nitrification control plan requirements.
- Improvement of water quality and regulatory compliance for consecutive systems (wholesale connections), requiring disinfectant sampling at wholesale and consecutive system connections and processes for addressing DBP control in these systems.

7.7 Summary and Recommendations

The City seeks to maintain high-quality water for its customers from source to tap. While the City currently complies with all DOH monitoring and reporting requirements, the PFAS MCLs described in Section 7.3.6 compel the City to develop and implement a compliance framework by 2029. This section summarizes actions taken to date and outlines a roadmap for future efforts.

Preliminary risk assessments and mitigation screenings indicate uncertainty about PFAS impacts on the City's water supply. As a result, the City will likely need some form of treatment to meet future MCLs. To support planning and budgeting, source development and PFAS mitigation will be incorporated into the Capital Improvement Plan, detailed in Chapters 8 and 10. These projects typically require significant capital investment and will guide the City in securing necessary funding sources.

7.7.1 Recommendations for Compliance with PFAS MCLs

The actions presented in this section summarize framework to assist the City in planning PFAS mitigation measures and compliance with the PFAS NPDWR. The City has taken early action on multiple items described below, though it is recommended that the City continue to implement this framework for system wide PFAS compliance and mitigation.

Based on PFAS sampling data as of the date of this report, Wells 5, 6, 11, 13, and 14 have reported PFAS levels that exceed the PFAS NPDWR MCLs. Well 5 and 13 are individual wells. Wells 6 and 14 combine before their EPTDS, comprising Wellfield East. Wells 7, 8, 10, 11, and 12 combine before their EPTDS, comprising Oak Park Wellfield. For the purposes of developing planning-level estimates for PFAS mitigation, it was assumed that Well 13, Oak Park Wellfield, and Wellfield East would require treatment to achieve PFAS levels below the proposed MCLs. Because only certain wells within Oak Park Wellfield have shown PFAS levels above the MCLs, treatment may not be required for the full flow of Oak Park Wellfield. However, due to the uncertainty around PFAS fate and transport within the aquifer below the wells, the remaining wells at Oak Park may become impacted. For the purposes of cost planning, mitigation costs for Oak Park are presented as a range to cover the mitigation costs that may be required given what the City currently knows about the PFAS levels, and to cover the mitigation costs that may be required if all wells in Oak Park become impacted.

The City is currently under contract to design and construct PFAS treatment at Well 13, given it has shown the highest levels of PFAS throughout the wellfield.

It is recommended that an adaptive PFAS response plan be adopted by the City to strategically plan for PFAS mitigation. The goal of a PFAS response plan will be to develop a roadmap to compliance with the MCLs by USEPA's proposed deadline of 2029. The table below summarizes the major elements of the response plan. The following sections describe these elements in more detail.

Table 7.15 PFAS Response Plan Components

Actions		2024 - 2026	2026 - 2029	
1.	Risk Assessment	Confirm and fast track priority risks, build treatment at Well 13.	Continue to develop and modify risk assessment as PFAS mitigation progresses.	
2.	PFAS Mitigation Screening	Evaluation of alternatives to mitigate PFAS system wide by 2026.	Act on mitigation efforts and adapt plan accordingly based on results from PFAS Monitoring efforts.	
3.	Treatment design and construction	Ongoing efforts for treatment, including design, construction, and operations optimization as needed based on results from Risk Assessment and PFAS Mitigation Screening efforts.		
4.	PFAS Monitoring	Develop PFAS Monitoring Plan, continue sampling.	Continued monitoring.	
5.	Source Management	Source Identification Plan.	Identify Sources.	Source Control (if needed).
6.	Capital Needs Planning	Track funding and financing opportunities.		
7.	Communications	Develop and build upon a communications strategy that conveys efforts and progress to obtain and maintain stakeholder support, including from the public and City Council.		
8.	Advocacy	Partner with other agencies when available to advocate for science-based decisions, funding, and innovative treatment solutions. Help support regional efforts to reduce PFAS treatment costs.		

7.7.1.1 Risk Assessment

It is recommended that the City develop a risk assessment that will serve to identify immediate and near-term actions that can be taken to mitigate PFAS and maintain the City's commitment to providing high-quality water by ranking the highest risks facing the City with respect to PFAS. The risk assessment will incorporate system PFAS goals, infrastructure evaluations from all City wells, and latest hydrogeological information, and PFAS sampling results. The resulting risk register will serve to guide and prioritize efforts moving forward but will be adjustable over time to accommodate new information and the rapidly-changing landscape associated with PFAS.

This effort will work concurrently with design of treatment at Well 13, while establishing actions that could be done in tandem to increase system resiliency against PFAS. It is intended that this risk assessment be updated by the City over time to adapt to changes in PFAS concentration and build upon progress from mitigating the highest risks identified.

7.7.1.2 PFAS Mitigation Screening

This effort includes ongoing evaluations to find the best alternative for PFAS mitigation system wide in a manner that will ensure compliance by USEPA's proposed deadline of 2029. Screening options will generally be divided into the categories of treatment-based mitigation or operational-based mitigation. An evaluation of treatment-based mitigation efforts should include a technology evaluation, comparing the efficacy of typical treatment technologies for PFAS: granular activated carbon (GAC), ion exchange (IX), and reverse osmosis (RO). Treatment efficacy depends on many site-specific factors, including water

quality, system hydraulics, and site constraints. Depending on water quality, pre- or post-treatment may be needed, for example. Operational-based mitigation efforts may include source identification, alternative sources of supply, or upgrading the capacity at well stations if PFAS results are below the USEPA's reporting limit at those well stations. Any impacts to operations will need to consider the impacts to the overall system and allow the City to maintain its high level of service to its customers.

The optimal solution for the City will likely be a combination of both technological and operational-based mitigation measures. The plan to screen alternatives and implement recommendations will likely need support from design services, hydrogeological services, and other support. It is intended that this effort be adaptive and updated over time based on latest PFAS sampling results and successful implementation of fast-track measures described in the Risk Assessment section.

Evaluations that involve changes to the hydraulics of a well (introducing treatment may increase headloss and lower pump yield, for example) should consider impacts and changes to the overall system. These considerations may include upgrading well pumps to maintain capacity with higher headloss, or a change of well operational strategies to maintain the same overall yield.

7.7.1.3 Treatment Design and Construction

This effort plans for and executes tasks necessary for the construction of PFAS treatment systems. Should the Risk Assessment or Mitigation Screening efforts identify treatment to be the optimal solution at a well station, this task will be utilized. The design process may vary depending on the well site, procurement approach, and treatment goals, but will generally include some similar elements.

- Site evaluation efforts will review site hydraulic, electrical, and infrastructure capacities.
- Basis of design reports will develop a treatment plan for the site, including any pre- or post-treatment (corrosion control) requirements based on water quality data.
- Design deliverables, such as 30 percent, 60 percent, 90 percent, and final design packages, including drawings and specifications (deliverables may look different if the procurement approach allows for a fast-track delivery).
- Permitting and regulatory support.
- Engineering services during construction, including supporting startup, commissioning, and operations optimization.
- Ongoing systems integration support. This effort will monitor treatment performance and overall PFAS reduction systemwide to help guide next steps for the system.

7.7.1.4 PFAS Monitoring

The City's existing PFAS Monitoring Plan should be continued and built upon so it allows the City to continue to build insight on the fate and transport of PFAS in the aquifers, while also allowing the City to track progress from mitigation measures that have been implemented. This allows for the overall PFAS response plan to adapt to any changes in PFAS concentration. The monitoring program will also ensure compliance with monitoring requirements listed under the PFAS NPDWR.

7.7.1.5 Source Management

A PFAS source identification plan should be developed to gain insight into any potential sources of PFAS. This plan may include additional sampling efforts and can be modified as needed to the needs of the City. The City can follow guidance provided in the Water Research Foundation Report 5082, "Investigation of Alternative Management Strategies to Prevent PFAS from Entering Drinking Water Supplies and Wastewater" to support source identification or source management measures.

7.7.1.6 Capital Planning Needs

Efforts to track funding opportunities will be important to minimize impacts on ratepayers. These efforts should track all available opportunities and ensure the City is in compliance with funding requirements.

7.7.1.7 Communications

Stakeholder engagement and community outreach will be important throughout these PFAS mitigation efforts to obtain and maintain support. This may include continuing upon the City's public outreach efforts or providing updates to City Council on current PFAS status.

7.7.1.8 Advocacy

The PFAS response plan should also include an advocacy component. Actions under this effort could include developing partnerships with neighboring utilities to coordinate sampling efforts or supporting regional efforts within the industry to advocate for utility support and funding for PFAS.

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CHAPTER 8 WATER RESOURCES

The City has a diverse water portfolio, which includes groundwater wells and surface water supplies. To meet future demands, the City will need to fully utilize existing water resources and develop new sources to continue to provide high levels of service. The City currently receives its water from 10 groundwater wells and two surface water diversions. This chapter presents an evaluation of these supplies to identify future deficiencies in the City's water rights or in the ability of its supplies to produce reliable water at the levels needed to meet future demands. These deficiencies are addressed by the City's water supply strategy summarized in this chapter.

The City obtains its water from two surface water sources and 10 wells. Eight of the groundwater sources (Wells 5, 6, 7, 8, 10, 11, 12, 14) are located in the City's Lower Washougal Wellfield (LWWF), in the lower Washougal floodplain near downtown Camas. Wells 7, 8, 10, 11 and 12 are often referred to as the City's "Oak Park" wellfield. Well 13 is north and west of the Oak Park wells and is effectively part of the same wellfield pumping center but is not typically referenced as being part of the LWWF. The remaining well (Well 9) is located in the uplands about two miles north of the Columbia River and 1.5 miles west of Lacamas Lake. The City's Boulder and Jones Creek surface water diversions are located in the headwaters of the Washougal River drainage.

8.1 Water Right Analysis

The City relies upon its groundwater wells and surface water sources to meet its current supply needs. Water rights for these sources are administered by Ecology. The DOH regulates source water protection. This section summarizes the City's existing water rights and analyzes the ability of the rights to meet the City's projected demand.

The City has diverted water from Jones Creek since 1913 and Boulder Creek since 1931. Historically, the surface water sources were the City's primary water supply and operated continuously for 24 hours per day with wells being used to meet higher summer peaks. In evaluating options to meet future demands, the City determined that the expansion of existing surface water diversions was not feasible. The City then began expansion of its groundwater supplies, focusing on the productive aquifers in the Lower Washougal River floodplain.

With the issuance of four new groundwater permits in 2008, came the requirement the City cease their surface water operations between May 15 and October 31 of each year. The requirement further stated "At the State's discretion, the water rights associated with these diversions will be placed into the State's Trust Water Program as permanent, seasonal donations." In 2015, the City attempted to place the rights into the Trust Program but was advised by Ecology that the action was not strictly necessary provided they agreed to operate the surface water supply consistent with the intent of the agreement.

Today, the City's focus is on developing new groundwater sources under its existing water right permits. Additional water rights are also being pursued.

8.1.1 Water Rights Summary

The City's water system (DOH ID 108002) currently has two water right claims which have been modified by Certificates of Change, eleven certificated water rights, and five water right permits. A summary of the City's water rights is provided in Table 8.1. Copies of the water right certificates for each well are included in Appendix G. The City's 2023 Water Facility Inventory is provided in Appendix F. Note, in September 2025, the City requested that Ecology extend the development schedule on each of the City's four water right permits to 2031. These extensions were granted by Ecology in May 2026. The City's current plan for developing the wells is presented in Section 8.4.

The City has limitations on its water rights that complicate the calculation of total instantaneous water right (Qi) and annual water right (Qa) as described below:

- Jones and Boulder Creek surface water sources may only be operated seasonally from October 31 through May 15, as directed by Permit G2-30144. The Qa for periods outside of the operating time window are used to maintain instream flow in the Creeks (not for City use).
- Historically, water right permits and certificates with priority dates before 1979 were limited by Ecology to a "total combined maximum Qa of 5,750 acre-feet per year (AFY)". However, modifications to the City's water right claims resulted in the recognition of an additional 550 AFY which increased the total Qa to 6,300 acre-feet/year with priority dates before 1979.
- Withdrawals from Well 9 are considered non-additive. The certificate does not increase the cumulative annual total of all rights but does increase the Qi.
- Certificate CG2-20938 (an irrigation water right allocating 330 gpm and 106 AFY for use between May 1 to October 1) was acquired by the City in 2015 and transferred into permanent trust as instream baseflow support for Lacamas Creek. The City retains the option to request to apply the consumptive use portion of the right (90.3 AFY) as potential mitigation for future water use within the Lacamas Creek drainage downstream of the water right location.

The City's resulting water rights equate to a Qi of 14,045 gpm (20.2 mgd), an additive Qa of 11,090 AFY (9.9 mgd), and a non-additive Qa of 210 AFY (0.3 mgd) as described by Permit G2-30756 (see Page 2) and Certificate G2-27384 (Well 9).

Table 8.1 Water Right Summary

Source	Water Right Number	Priority Date	Instantaneous Qi (gpm)	Annual Qa (AFY)[1]
Claims				
Well 1	Claim 121022 transferred to Well 10[2]			
Well 3	Claim 121023 transferred to Well 11[2]			
Certificates				
Boulder Creek[3]	C-712	08/22/1923	1,120 (2.5 cfs)	977 (A)
	CS2-SWC 712			843 A (Instream Flow)
Jones Creek[4]	C-711	09/05/1930	450 (1.0 cfs)	393 (A)
	CS2-SWC 711			337 A (Instream Flow)
Well 5	G 6636-A G2-*09325C	03/22/1968	600	920[5] (A)
Well 6	G 6635-A G2-*09325C	03/22/1968	1,500	2,400[5] (A)
Well 7	G2-00501	03/22/1971	1,000	530[6] (A)
Well 8	G2-24400	02/04/1977	900	530[6] (A)
Well 9	G2-27384	08/13/1986	650	210 (N)
Well 10[2] (Well 1)	G2-CV1-2P159	06/11/1974	900	320 (A)
Well 12[2] (Well 2)	G2-CV1-2P160	06/11/1974	1,200	230[6] (A)
Well 11[2] (Well 3)	C-85-A G2-*0004C	07/21/1945	900	118 (A)
Well 13[2] (Well 4)	G2-GWC4079 G2-*05130C	02/12/1959	1,325	1,208[6] (A)
Permits				
Lower Washougal Wellfield	G2-30144	08/21/1986[7]	500 (At Well 8)	2,150 (A) (All 8 wells)
Well 14 (Anderson Site)	G2-30145	08/21/1986[7]	1,000	880 (A)
Parkers Landing	G2-30146	08/21/1986[7]	1,000	880 (A)
Treatment Plant Well	G2-30147	08/21/1986[7]	1,000	880 (A)
Umbrella Wellfield[8]	G2-30756	01/08/2020	6,700	11,090 (All 8 wells)
Total			**14,045[9]**	**11,090 (A)[9]** **210 (N)**
Pending Applications				
Steigerwald Regional Supply[10]	G2-30528		17,213	13,555

Notes:
(1) (A) = Additive water right, additive to other rights. (N) = Non-additive water right, not included when summing a cumulative total of all rights.
(2) Original water rights for Wells 1 through 4 have each been re-assigned to their respective replacement Wells 10 through 13. Well 10, 11, and 12 were installed to replace Well 1, 2 and 3, which have failed due to collapsed well casings; see Pacific Groundwater Group report dated June 9, 2003. Well 13 replaced Well 4 after Well 4 was determined to be groundwater under the influence of surface water; see Pacific Groundwater Group report dated August 14, 2006. G2-CV1-2P160 which is now associated with Well 10 allowed for seasonal between May 1st and August 31st. Year-round operation of Well 10 is authorized under Permit G2-30144 for the LWWF.
(3) This source was formerly known as the Little Washougal River. The certificate refers to an instantaneous quantity (Qi) and does not specify an annual withdrawal. An Ecology Report of Examination for Well 7 (G2-00501) summarizes existing water rights, including 1,820 AFY for Boulder Creek (C-712), based on continuous withdrawal at the instantaneous right specified. The withdrawal from surface water sources is limited to May 15 through October 31.
(4) The certificate refers to an instantaneous quantity (Qi) and does not specify an annual withdrawal. An Ecology Report of Examination for Well 7 (G2-00501) summarizes existing water rights, including 730 AFY for Jones Creek (C-711), based on continuous withdrawal at the instantaneous right specified. The withdrawal from surface water sources is limited to May 15 through October 31.
(5) The Permit and Report of Examination preceding this certificate limited water rights to "the total quantity withdrawn or diverted from all sources is not to exceed 3,300 AFY.
(6) The Permit and Report of Examination preceding this certificate limited water rights to "the total quantity withdrawn or diverted from all sources is not to exceed 5,750 AFY.
(7) The original Ecology Report of Examination for these permits indicated a priority date of 08/21/2003. However, Ecology assigned a priority date of 08/13/1986 via amended permits to match with the date of the Clark County Reservation identified by watershed planning for WRIAs 27/28.
(8) Installation of one future well in the LWWF is included under this permit.
(9) Due to permit and certificate restrictions, the total Qi and Qa do not equal the sum of quantities for each column.
(10) Joint application with City of Camas and City of Washougal.

8.1.2 Water Rights Analysis

The City's water rights were compared to existing, 5-year (2031), 10-year (2036) and 20-year (2046) demand projections to establish water right surplus or deficiency. Both Qi and Qa were considered and are summarized in Table 8.2 and Table 8.3, respectively. The City's Water Rights Self-Assessment is provided in Appendix H.

The City currently has surplus water rights based on the actual well pumping in 2024, which was considered to be the existing condition. Note, the reported values reflect the pumping over the entire year, where not all wells were pumped at the same time.

Table 8.2 Instantaneous Water Rights (Qi) Summary

Year	MDD – High Scenario(1) (gpm)	Instantaneous Water Right (Qi) (gpm)	Surplus/Deficiency (gpm)
Existing	6,765(2)	12,475(3)	5,710
2031	8,620	12,475 (3)	3,855
2036	10,490	12,475 (3)	1,985
2046	14,080	12,475 (3)	-1,605

Notes:
(1) Future values based on high MDD demand projection scenario.
(2) Based on actual 2024 maximum day production data.
(3) Instantaneous water rights of 14,045 gpm shown in Table 8.1 minus 1,570 gpm of surface water rights not available during the summer months.
MDD - maximum day demand.

Table 8.3 Annual Water Rights (Qa) Summary

Year	ADD - High Scenario(1) (AFY)	Annual Water Right (Qa) (AFY)	Surplus/Deficiency (AFY)
Existing	5,230(2)	11,090	5,860
2031	6,610	11,090	4,480
2036	8,070	11,090	3,020
2046	10,910	11,090	180

Notes:
(1) Future values based on high ADD demand projection scenario.
(2) Based on actual 2024 annual production data.

For the future water rights evaluation, the forecasted source production was based on the high demand projection scenario. The high demand scenario generally reflects the water use rates from the period of highest demands in the last eight years, as presented in Chapter 5. Use of the highest projected demands is intended to support the City in planning for sufficient physical supplies to meet demands and provide sufficient time for phasing in new supplies, which is typically a multi-year process.

The City is expected to have sufficient Qa through the next 20 years; however, the City is expected to have a Qi deficiency of 1,605 gpm by 2046. As described in the water supply strategy later in this chapter, the City plans to meet this deficiency by a combination of improving pumping yields from existing well facilities, developing all of its existing water rights, and securing water rights for additional supply sources.

Additionally, the City will continue to encourage water use efficiency including the reduction of irrigation use, which is a major driver for the relatively high projected MDD.

8.2 Ability to Pump

In addition to water rights, each of the City's supply sources physical capacity or "Ability to Pump" was evaluated. The resulting Ability to Pump was compared to demands to determine supply surplus or deficiency. The supply evaluation considered both high scenario projections for ADD and MDD conditions. Further, the Ability to Pump was evaluated for three supply scenarios:

- Standard (all supplies) represents the City's ability to meet demands with all sources pumping continuously (24 hours per day).
- Reliability (only supplies with backup power) represents the City's ability to meet demands during a widespread power outage where only supplies with auxiliary power are available.
- Redundancy (largest source out-of-service) represents the City's ability to meet MDD with the single largest source out of service. For the purposes of this analysis, Well 13 is assumed to be the largest source with a capacity of approximately 1,350 gpm.

Table 8.4 shows the supply sources contributing to ability to pump totals for each supply scenario under MDD and ADD demand conditions. Supply improvements to address all identified deficiencies are summarized in Section 8.4.

Table 8.4 Ability to Pump – Supply Summary

Source	Capacity (gpm)	MDD Standard	MDD Redundancy	MDD Reliability(3)	ADD Standard	ADD Redundancy	ADD Reliability(3)
Boulder Creek(1)	1,120	0	0	0	1,120	1,120	1,120
Jones Creek(1)	450	0	0	0	450	450	450
Well 5	675	675	675	0	675	675	0
Well 6(2)	1,200	1,200	1,200	0	1,200	1,200	0
Well 7	950	950	950	0	950	950	0
Well 8	1,250	1,250	1,250	1,250	1,250	1,250	1,250
Well 9	575	575	575	0	575	575	0
Well 10	900	900	900	0	900	900	0
Well 11	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Well 12	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Well 13	1,350	1,350	0	1,350	1,350	0	1,350
Well 14(2)	850	0	0	850	0	0	850
Total	**11,320**	**8,900**	**7,550**	**5,450**	**10,470**	**9,120**	**7,020**

Notes:
(1) The City's surface water sources are unavailable between May 15 and October 31. MDD typically occurs during these months, therefore capacity is assumed to be zero.
(2) A hydraulic restriction prevents the simultaneous operation of Well 6 and 14. The well with the larger capacity (Well 6 at 1,200 gpm) is considered in the existing and redundancy ability to pump scenario, while the well with the smaller capacity (Well 14 at 850 gpm) is assumed to be zero.
(3) Only supplies with backup power are assumed to have reliable capacity.

8.2.1 MDD Ability to Pump

The MDD ability to pump represents the City's ability to pump under maximum day demand periods, typically during summer months. Demands above the MDD (such as peak hour demands or fire flow) are served by storage and evaluated in Chapter 9. The MDD Ability to Pump was compared with the high scenario projected MDD for the planning period to evaluate supply capacity, as shown in Figure 8.1 and Table 8.5. Note, due to water right restrictions, the City's surface water sources are unavailable during the summer; therefore, are not included in the MDD ability to pump analysis.

Table 8.5 MDD Ability to Pump Analysis

Year	MDD (gpm)(1)	Standard Available Supply (gpm)	Standard Surplus/ Deficiency (gpm)	Redundancy Available Supply (gpm)	Redundancy Surplus/ Deficiency (gpm)	Reliability Available Supply (gpm)	Reliability Surplus/ Deficiency (gpm)
Existing	6,765(2)	8,900	2,135	7,550	785	5,450	-1,315
2031	8,620	8,900	280	7,550	-1,070	5,450	-3,170
2036	10,490	8,900	-1,590	7,550	-2,940	5,450	-5,040
2046	14,080	8,900	-5,180	7,550	-6,530	5,450	-8,630

Notes:
(1) Future values based on high MDD demand projection scenario.
(2) Based on actual 2024 annual production data.

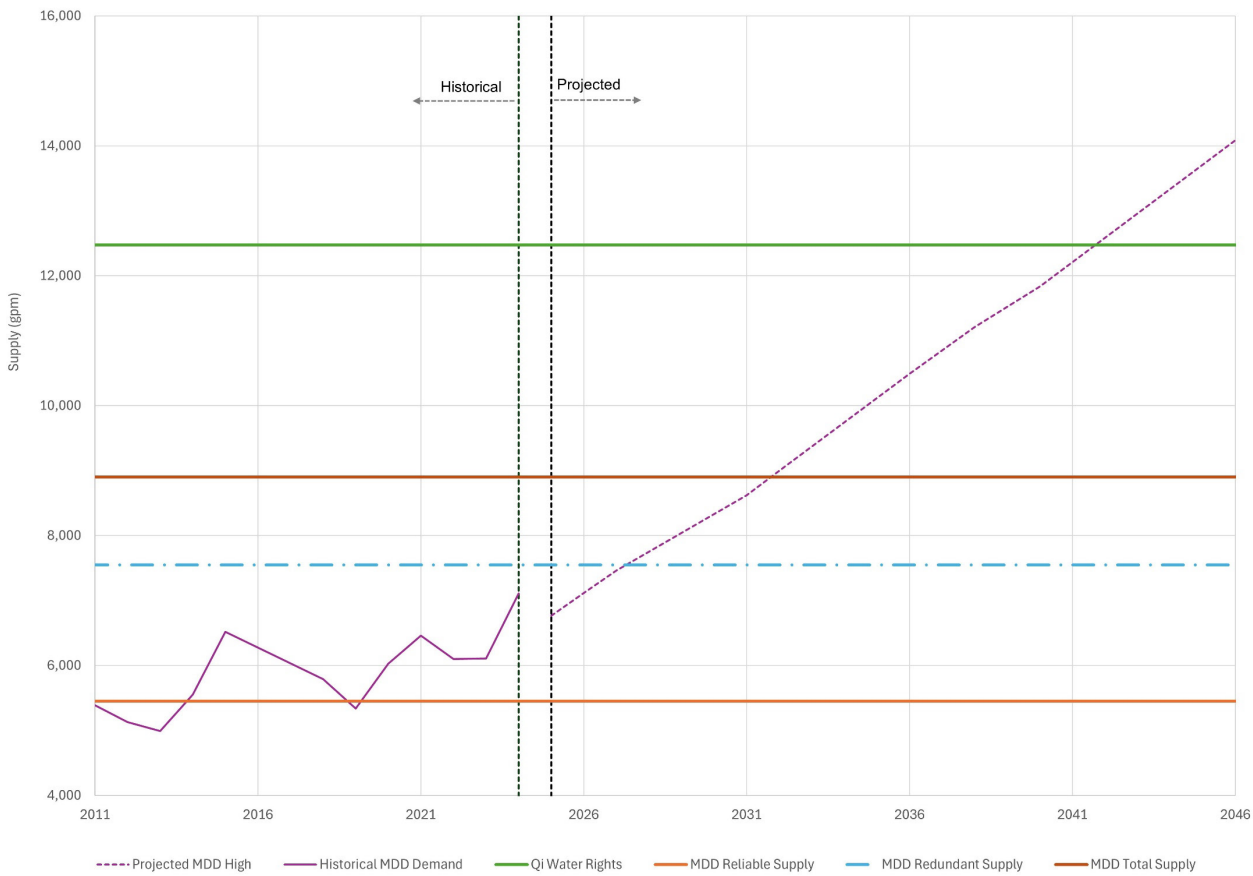

Figure 8.1 MDD Ability to Pump

The City's existing MDD ability to pump is approximately 8,900 gpm (12.8 mgd) in the standard scenario, approximately 7,550 gpm (10.9 mgd) in the redundancy scenario, and approximately 5,450 gpm (7.8 mgd) in the reliability scenario. The MDD Ability to Pump analysis shows a deficiency under the existing reliability scenario and increasing to all scenarios by 2031.

The City needs approximately 5,180 gpm of supply in the standard scenario, approximately 6,530 gpm of supply in the redundancy scenario, and approximately 8,630 gpm of supply in the reliability scenario by the end of the 2046 planning year. Improvements to existing well capacity may increase supply by 3,850 gpm to approximately 12,750 gpm by resolving physical capacity issues in Well 6 and 14 and increasing capacity of Wells 8, 11, and 12. The future construction of Well 18, 19, and 13B add an additional 4,000 gpm of MDD Ability to Pump capacity, allowing the City to meet projected MDD under all scenarios. Additionally, backup power is needed for Wells 5, 6, 7, 9, and 10 to increase reliable MDD Ability to Pump. Recommendations to address MDD supply deficiencies are further detailed in Section 8.4.

8.2.2 ADD Ability to Pump

The ADD Ability to Pump evaluation confirms the City's ability to supply average demand throughout the year. High scenario ADD projections were used to represent typical conditions expected to occur. ADD Ability to Pump was compared with the projected high ADD scenario for the planning period to evaluate supply capacity, as shown in Figure 8.2 and Table 8.7. The City's surface water sources, Jones and Boulder Creek, are included in the ADD Ability to Pump analysis.

Table 8.6 ADD Ability to Pump Analysis

Year	ADD (gpm)(1)	Standard Available Supply (gpm)	Standard Surplus/ Deficiency (gpm)	Redundancy Available Supply (gpm)	Redundancy Surplus/ Deficiency (gpm)	Reliability Available Supply (gpm)	Reliability Surplus/ Deficiency (gpm)
Existing	3,245(2)	10,470	7,225	9,120	5,875	7,020	3,775
2031	4,095	10,470	6,375	9,120	5,025	7,020	2,925
2036	5,005	10,470	5,465	9,120	4,115	7,020	2,015
2046	6,765	10,470	3,705	9,120	2,355	7,020	255

Notes:
(1) Future values based on high ADD demand projection scenario.
(2) Based on actual 2024 annual production data.

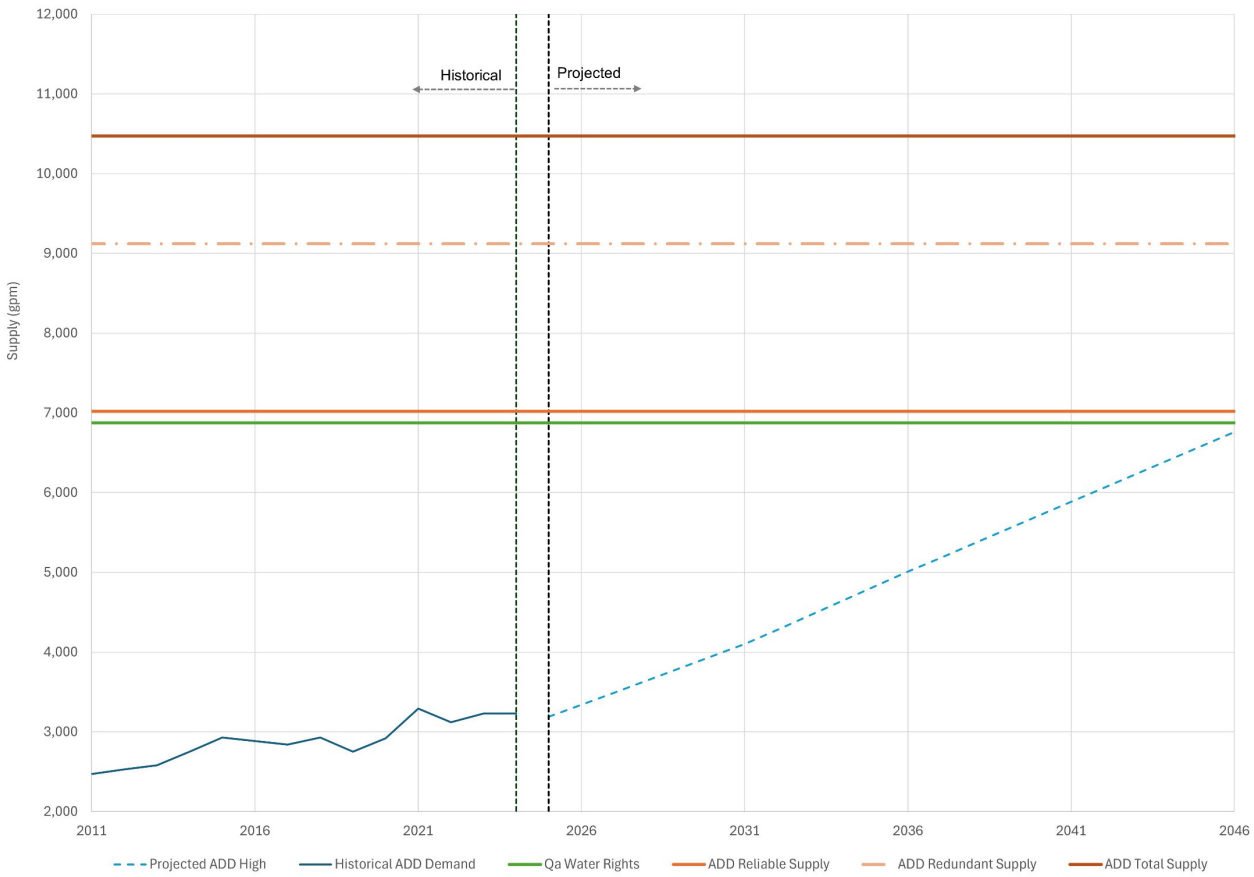

Figure 8.2 ADD Ability to Pump

The City's existing ADD Ability to Pump is approximately 10,470 gpm (15.1 mgd) in the standard scenario, approximately 9,120 gpm (13.1 mgd) in the redundancy scenario, and approximately 7,020 gpm (10.1 mgd) in the reliability scenario. All supply sources have adequate physical capacity under all scenarios and planning years to meet projected ADD.

No additional physical capacity recommendations are necessary to meet future ADD. It is anticipated that projects to address the MDD Ability to Pump deficiencies will concurrently increase ADD Ability to Pump capabilities.

8.3 Water Supply Strategy

The City requires additional supplies or improvements to existing facilities to provide the sought level of service during the planning period, where deficiencies already exist for the MDD ability to pump reliability scenario. To serve the projected 2046 MDD, the City needs a minimum additional supply of 5,180 gpm in the standard scenario, 6,530 gpm in the redundancy scenario, and backup power at all supply facilities to meet reliability level of service goals By the end of the planning period, the City will also need an additional 1,605 gpm of instantaneous water rights (Qi). The City's water supply strategy is comprised of four parts:

- Lower Washougal Wellfield Expansion.
- Construct Wells for Existing Water Rights.

- Secure Additional Water Rights.
- Continue a WUE Program.

The improvements are grouped into either the short-term (2027-2036) or long-term (2037-2046) planning horizons.

8.3.1 Lower Washougal Wellfield Expansion

Improved pumping from existing well facilities to achieve their full water right can provide additional future supply. The Ability to Pump analysis identified 3,850 gpm (5.5 mgd) of MDD supply can be obtained through addressing hydraulic limitations at Well 6 and 14 and increasing pumping capacities through upgrades at Wells 8, 11, and 12. While the pumping capacity will increase, the improved wells will not increase the ADD Ability to Pump due to water right restrictions. The LWWF expansion delays the need for developing additional supply sources.

Potential improvements to existing supply facilities include the following and should be completed by the 2031 planning year:

- The City is currently upsizing the pipeline between Well 6 and Well 14, which resolves an existing transmission deficiency that restricts the wells from operating simultaneously. This project is not included in existing analysis but is assumed to be completed soon as the project is currently in construction.
- Increase the yield of Well 8 to 2,250 gpm (an additional 1,000 gpm) by upgrading existing well screen and pump assemblies. Hydrogeologic investigations indicate additional capacity is available with well redevelopment and upgrades.
- Increase the yield of Wells 11 and 12 to 2,000 gpm each (an additional 1,000 gpm at each well) by upgrading existing pump assemblies. Hydrogeologic investigations indicate additional capacity is available with well upgrades.
- Install backup power for Wells 5, 6, 7, and 10 to increase reliability of the wellfield. It is assumed all new supplies will have backup power available.
- Install per- and polyfluoroalkyl substances (PFAS) treatment for all wells nearing or exceeding federal maximum contaminant levels, with provisions to add wells that may require treatment in the future. Recommendations for projects to address water quality concerns due to PFAS are summarized in Chapter 7.

The City’s ongoing O&M program have kept supply facilities in good condition. R&R activities will be triggered by components reaching the end of their usable life. Additional information on the City's O&M and R&R programs is presented in Chapter 4.

8.3.2 Secure Additional Water Rights

The City is actively pursuing new water sources to meet future deficiencies and to improve supply redundancy. A water rights investigation is recommended to evaluate the transfer or acquisition of additional water rights detailed in this section.

8.3.2.1 Transfer or Acquisition of Additional LWWF Water Rights

On January 8, 2020, the City filed application G2-30756 for a new water right permit with Ecology. The application requested authority to withdraw 6,700 gpm and an unspecified annual quantity from the City's LWWF, non-additive to existing rights. The City also requested authorization for an additional point of withdrawal (well) in the LWWF; however, the requested new well (Well 18) will be authorized by adding a point of withdrawal to one or more existing water rights (e.g., G2-0004C and G2-CV1-2P160) through a showing of compliance with RCW 90.44.100(3).

Additionally, a preliminary hydrogeologic analysis indicated the Washougal River and LWWF aquifer may possibly not be in hydraulic connection during the summer. This could potentially allow for the City to transfer surface water rights for use in the LWWF during the summer months to increase available Qi. However, to verify these conditions additional groundwater modeling and monitoring will be required. Since this approach could be speculative, it is recommended the City complete a water rights investigation and discuss feasibility with Ecology.

8.3.2.2 Use of Lacamas Creek Water Rights

In 2015, water right CG2-20938 was placed into the water rights trust program by the City. The water right is a seasonal irrigation right used for past farming of a property located north of the City between NE Ward Road and NE 172nd Avenue. The donated portion is for 330 gpm and 106 acre-feet, of which 90.3 acre-feet is considered the consumptive quantity. The City requested that they be allowed to apply this consumptive quantity as mitigation for future water right requests in the Lacamas Creek basin. New water resource projects that might have impacts to Lacamas Creek or Lacamas Lake could potentially utilize this water right to help offset in-stream impacts to the Lacamas Creek drainage. Utilizing this water right would require site selection and development of a new groundwater well. Additional discussions with Ecology will be needed to verify the applicability to a given project.

8.3.2.3 Steigerwald Regional Supply Source

In the long-term, the City anticipates obtaining supply from the future Steigerwald Regional Supply Source (Water Right Application G2-30528), as discussed in the Detailed Implementation Plan (Lower Columbia Fish Recovery Board 2008) for the Salmon-Washougal and Lewis Watershed WRIAs. Under (WAC) 173-500-040, WRIAs were formalized and the Ecology was given responsibility for the development and management of these planning boundaries. The Salmon-Washougal and Lewis Watershed Management Plan WRIAs 27 and 28 (Lower Columbia Fish Recovery Board 2006) and subsequent Detailed Implementation Plan were created to address a range of issues related to water resources, including water supply, stream flow management, water quality, and fish habitat. The City and the Jones and Boulder Creek surface water supply watersheds reside within WRIA 28.

The completion of WRIA 27 and 28 watershed plans in 2008 eliminated the water rights reservation established by WAC 173-592 and replaced them with regional water supply areas and some stream allocations in WAC 173-527 for the Lewis River Basin (WRIA 27) and WAC 173-528 for the Salmon Creek-Washougal River Basin (WRIA 28).

The Watershed Management Plan discusses the regional water supply areas for Camas, which was designated as the Steigerwald area near Washougal. Ecology has designated water supplies near the City as "Instream Flow with Closures and Reserves." This designation limits the ability of the City to obtain new water rights outside of the regional water source.

The Steigerwald Regional Supply Source will be jointly developed with the City of Washougal. The Cities have applied for a joint water right (Water Right Application G2-30528) for 17,213 gpm of instantaneous water rights and 13,555 AFY of annual water right. The Place of Use has been designated as the water service area for both cities (as defined by each City's most recent water system plan approved by DOH). It is anticipated that the supply source will include up to 10, 20-inch diameter wells with individual well yields of 2,000 gpm or more. As an entirely new supply source, the Cities will need to permit, design, and construction the proposed wells and related facilities, such as disinfection, auxiliary power, and potentially treatment. To convey the water, the City will need several miles of transmission main.

8.3.2.4 Georgia Pacific Water Rights Acquisition

Additionally, the City may consider purchasing or leasing water rights and wells from Georgia Pacific (GP), if available, to develop an additional future water source closer to the City's water system. If production from the GP site proves problematic (due to the costs of treatment for contaminants for example), the water rights could still represent a value to the City as a mitigative offset for a new water right request. However, GP has expressed the desire to keep their water rights and wells for the entirety of the planning period.

8.3.2.5 Columbia River Surface Water Supply

Should the water sources described above not be available or sufficient to meet future needs, the City should explore development of a surface water supply on the Columbia River. Conversations with Ecology indicate water rights for this source are open to appropriation. The feasibility of this alternative should be further evaluated in the next WSP due to the extensive permitting and planning requirements. Development of a surface water supply also requires surface water treatment, leading to significant capital investments.

8.3.3 Develop Wells for Existing Water Rights

The City has existing water rights that allow for the development of additional wells. Hydrogeologic investigations indicate the Lower Washougal Wellfield is recommended site to develop new wells. To meet projected customer demand under this planning period, three wells are recommended for development. By the end of the long-term planning horizon, development of Wells 18, 13B, and 19 should be completed to increase the ability to pump under MDD conditions by approximately 4,000 gpm if the City has obtained sufficient and/or additional water rights prior to the development of these sources.

8.3.4 Continue Water Use Efficiency Program

The final element of the City's supply strategy is to continue to reduce demand through its water use efficiency program. The City has observed declining per account water use for over a decade. The observed drop in the water use and MDD peaking factor can be attributed in part to the City's water use

efficiency program, which is summarized in Chapter 6. WUE gains, including reductions in distribution system leakage, may delay the need for new supplies presented below.

8.3.5 Summary of Improvements

The City water supply strategy outlines the necessary steps to increasing capacity to meet future demands. The focal point of the strategy is to maximize production from existing supply facilities and fully utilizing available water rights before shifting to developing new facilities and pursuing additional water rights. The identified projects to increase the City's supply capacity are summarized below and incorporated in the CIP in Chapter 10. Desktop calculations indicate these projects will address identified physical supply capacity deficiencies under this planning period if sufficient water rights can be obtained; it is recommended the City reevaluate supply needs again in the next WSP. The City's water supply strategy is comprised of the recommended projects summarized below:

1. Well 6 and 14 Transmission Pipeline (in progress).
2. LWWF Expansion and PFAS Treatment (CIP Project S-01).
3. Water Rights Investigation (CIP Project G-03).
4. Well 18 Development (CIP Project S-02).
5. Well 13B Development (CIP Project S-03).
6. Well 19 Development (CIP Project S-04).

Table 8.9 describes each improvement, timing, increase in supply, and resulting MDD Ability to Pump after project completion. By the end of the planning period, the LWWF Expansion project and proposed new wells are expected to effectively make full use of the City's existing and assume proposed LWWF water rights applications are approved. The completion of the LWWF Expansion project delays the City's need for new supplies until the long-term planning horizon (post 2036). It is anticipated remaining supplies will be developed in phases to meet expected demand growth and distribute capital costs.

Table 8.7 Supply Improvements - MDD Ability to Pump

Improvement	Timing	Additional Supply (gpm)	MDD Ability to Pump (gpm)	Reliable MDD Ability to Pump (gpm)	Redundant MDD Ability to Pump (gpm)
	Existing		8,900	5,450	7,550
Well 6 and 14 Transmission Pipeline(1)	Short-term	850	9,750	5,450	8,400
LWWF Expansion	Short-term	3,000	12,750	12,750	10,500(2)
Well 18 Development	Long-term	2,000	14,750	14,750	12,500
Well 13B Development	Long-term	1,000	15,750	15,750	13,500
Well 19 Development	Long-term	1,000	16,750	16,750	14,500

Notes:
(1) The Well 6 and 14 Transmission Pipeline is in progress and is not included in the City's CIP.
(2) Well 8 capacity will be increased to 2,250 gpm during the LWWF Expansion, becoming the largest source out of service in the redundancy scenarios.

The increase in MDD Ability to Pump for these improvements is shown in Figure 8.4. To maintain redundant MDD Ability to Pump, the City will need to complete all recommended supply projects by the end of the planning period. Therefore, well development and PFAS treatment are anticipated to be a

major element of the City's CIP. Since ADD Ability to Pump is sufficient with existing supply facilities, it is assumed supply improvements to address MDD Ability to Pump will provide additional redundancy for the City's system.

If the City cannot obtain sufficient water rights in LWWF to meet the projected need, the City will need to consider additional water sources. Figure 8.3 outlines the water resources decision making framework and the recommended order of prioritization for pursuing water supply outside of the LWWF. A description for each option is provided in Section 8.3.2.2 through Section 8.3.2.5. It is recommended that the City complete an evaluation to determine the feasibility of each water supply option.

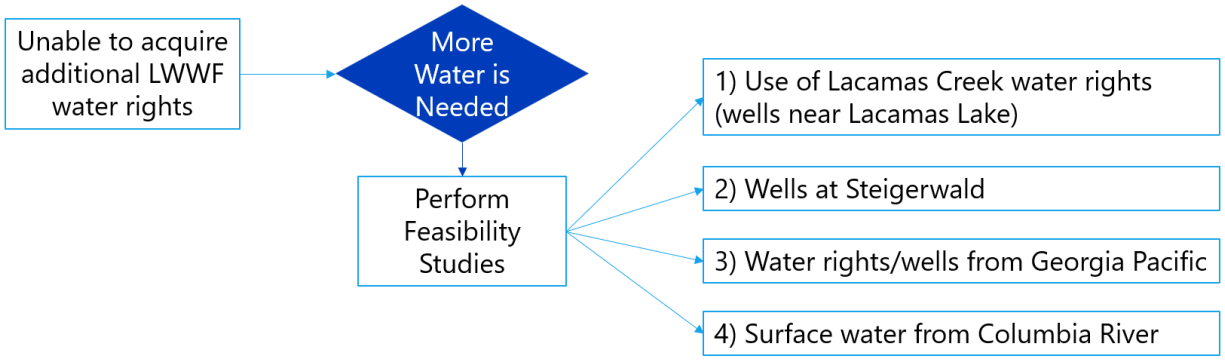

Figure 8.3 Water Resources Decision Making Framework

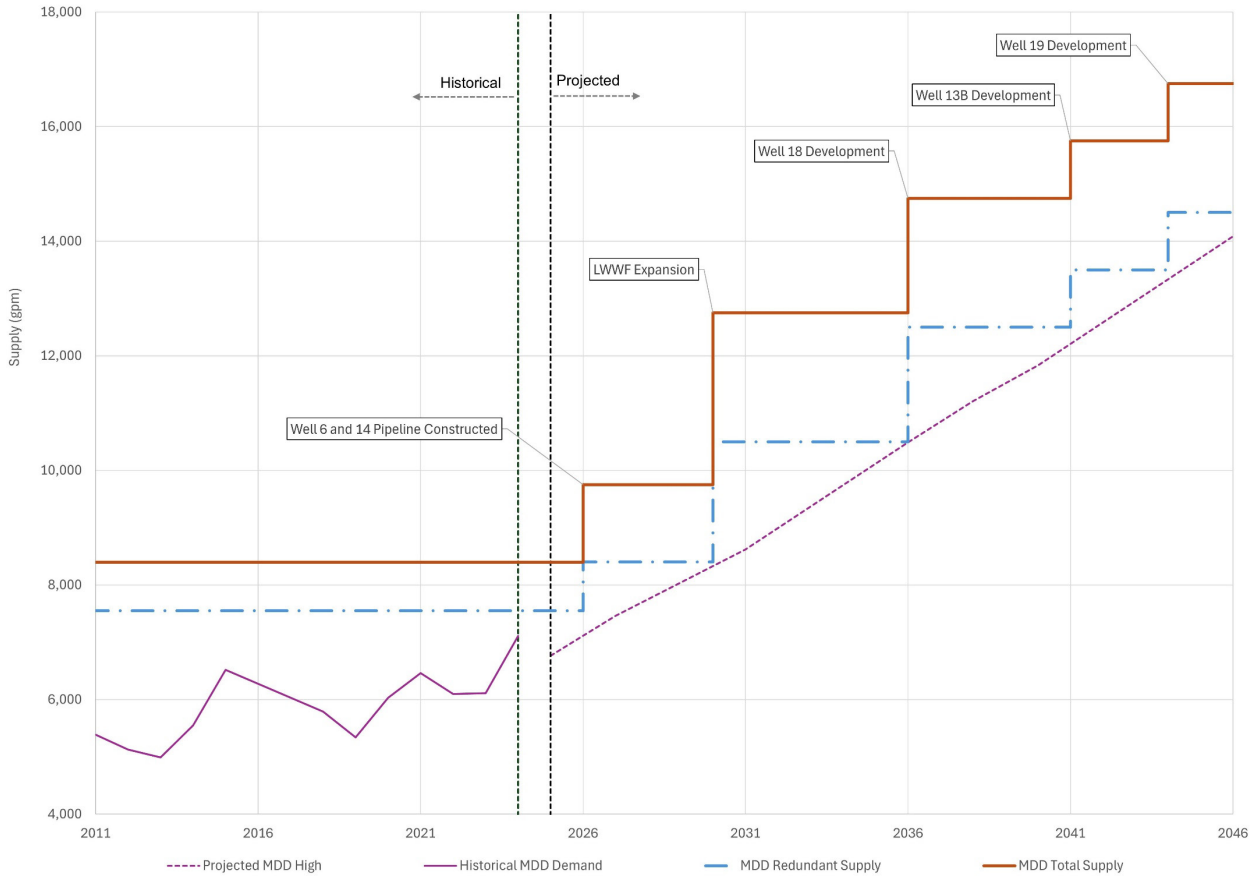

Figure 8.4 MDD Ability to Pump with Improvements

8.4 Groundwater Management

The City's wellhead protection plan was updated as part of the Plan. Section 1428 of the 1986 Amendments to the Federal Safe Drinking Water Act mandates that each state develop a wellhead protection program and that all federally defined public water systems (in Washington, Group A systems) using groundwater as its source implement a wellhead protection plan. In July 1994, the WAC addressed requirements for Group A public water systems (WAC 246-290) and was modified to include mandatory wellhead protection measures. The legislative authority to require wellhead protection (WHP) planning can be found in the RCW Chapters 43.20.050, 70.119A.060, and 70.119A.080.

8.4.1 Wellhead Protection Program

The overall goal of the state WHP program is to prevent the contamination of groundwater used by Group A public water systems. This is to be accomplished by providing management zones around public wells, identifying existing groundwater contamination sources, and managing potential sources of groundwater contamination prior to their entry into the drinking water system. Under the WAC, local public water systems have the primary responsibility for developing and implementing local wellhead protection plans (WHPP). However, due to the limited jurisdictional and regulatory authority afforded most purveyors, coordination with other local, State, and Federal agencies is essential to the successful implementation of a WHPP.

The DOH has developed regulations that require Group A water systems using groundwater sources to develop and implement the WHPP (WAC 246-290-135). The objective is to prevent releases of contaminants to groundwater in areas that contribute water to the public supply systems. The City's Wellhead Protection Report is included in Appendix I.

The basic elements of a WHPP include:

- Assessment of initial groundwater susceptibility for each water supply source.
- Delineation of the wellhead protection area (WHPA) that directly contributes groundwater to each water supply well.
- Inventory of land uses and identification of potential sources of contamination within each WHPA. These include time-of-travel zones (capture zones) representing 6-month, 1-, 5-, and 10-year periods to assess how quickly a potential contaminant might reach a source well.
- Documentation of notification to owner/operators of known or potential hazards.
- Documentation to regulatory agencies and local governments with the known or potential hazards.
- Development of spill prevention plans and water contingency plans that minimize or eliminate the possibility of contamination to the groundwater supply and also development of options for maintaining water supply in the event the aquifer contributing to a source is contaminated.
- Documentation of coordination with local emergency incident responders including notification of WHPA boundaries, susceptibility and inventory findings, and contingency plan.

The State of Washington WHPP applies to the City's wells.

8.4.2 Wellhead Protection Area

The updated WHPP used the WHPA developed in 2016 (PGG 2016). Capture zones for the Lower Washougal Wellfield were estimated using a calibrated MODFLOW groundwater flow model. This included Well 14 and the planned Parkers Landing and Treatment Plant wells. However, these later two wells were not constructed. The model simulations assumed that the City would exercise all of their existing and the two planned future wells. This assumption provides for a fairly conservative assessment of the capture zone extent. In addition, high-range pumping was assumed for the nearby Georgia Pacific Wellfield. Groundwater withdrawals from Georgia Pacific have likely decreased since the 2016 WHPA development due to reduced operations so the interaction between the GP and Camas wellfields may be overstated. In order not to rule out possible contaminant sources to the west of the LWWF, a 'Western Search Area' expansion of the WHPAs was added from the west side of the Washougal River as far west as the Crown Zellerbach Power Ditch (Appendix I). New modeling of the City's WHPAs is underway and may revise some of the assumptions above (Strata Geosciences, in press).

8.4.3 Existing and Potential Contamination Hazard Identification

The City performed a risk assessment within the existing WHPAs and immediate surrounding areas (buffer zone). The inventory of potential contamination sources within the WHPA was performed according to the DOH publication: "Inventory of Potential Contaminant Sources in Washington's Wellhead Protection Areas (1993)." Potential contaminant risks that lie within the vicinity of the LWWF were investigated and mapped using data from multiple sources. The primary source contains data from Ecology's Facility/Site database, including state cleanup sites, federal superfund sites, hazardous waste generators, solid waste facilities, and underground storage tanks. Additional information was gathered from Clark County's (2025) parcel database; septic system and infiltration facilities data on file with Clark County, the City of Camas, and the City of Washougal; Ecology's Environmental Information Management database; DOH's Sentry database; USEPA Enforcement and Compliance History Online PFAS industry sectors analytical tool; and a custom records request from Lightbox Environmental Data Resources. The information from these sources were classified and plotted on GIS coverages to assess whether existing and potential contaminant sources were located within the vicinity of Camas' production wells and WHPA delineations.

Table 7-1a in Appendix A of the WHPP summarizes known environmental sites of potential concern within the LWWF capture zones. Forty-seven contaminant sources of potential concern to the water supply were identified within the wellfield capture zones, and an additional 22 sites of potential concern were identified within the Western Search Area. A previously developed PFAS historic site list (Mott MacDonald 2025) was reviewed in tandem with Table 7-1a and USEPA's PFAS Industry Sectors Analytical tool (USEPA 2025a) to develop a PFAS industry site risk ranking (Table 7-8 in Appendix A). Thirty-six sources of potential PFAS concern to the water supply were identified within the wellfield capture zone, and an additional 18 sites of potential PFAS concern were identified within the Western Search Area.

8.4.4 Contingency Planning Tasks

As described in the WHPP, the nine shallow wells within the LWWF are most susceptible to contaminant risks given the hydrogeology and land surface activities. The capacity of the most productive wells in the Lower Washougal wellfield is about 1,300 gpm. If the supply from one of these wells was lost or compromised, the City would have to rely on a combination of the other sources to meet summertime peak demands (other wells, interties, and emergency use of surface water sources).

Additional risks to the City's supply arise from the fact that five of the City's wells (Wells 7, 8, 10, 11, and 12) are clustered in close proximity to each other. Several, if not all, of these wells could be impacted by a single contaminant release, such as a major railroad spill. Depending on the nature of impact to the wells, the City could perform immediate mitigation with changes in well pumping, treatment, blending of waters between wells, and other operational changes to meet demands; however, should multiple wells become impacted, the City may not be able to support the City's entire water demand on a sustainable basis, particularly during the high demand summer months. If multiple wells are impacted, the City may need to institute short-term rationing and pursue expedited drilling of additional wells.

8.4.5 Management Strategies and Implementation Tasks

[To be added upon completion of the Wellhead Protection Plan.]

CHAPTER 9 DISTRIBUTION SYSTEM ANALYSIS

9.1 Introduction

This chapter summarizes potential future system deficiencies in the City's water distribution system and offers recommended system improvements. Carollo evaluated the capacity of the pipeline system using the City's updated and calibrated hydraulic model. Carollo's hydraulic model development and calibration technical memorandum in Appendix **[X]**, summarizes all model updates made during this plan. Desktop evaluations of storage reservoir and pump station capacities were conducted in Microsoft Excel. Improvements identified in this chapter are summarized in the CIP in Chapter 10.

The analysis presented in this chapter is organized by first identifying high velocity and low-pressure deficiencies through the hydraulic model analysis for PHD and fire flow conditions in Sections 9.2.3 and 9.2.4. Recommendations are then provided to address deficiencies under both conditions. Next, Section 9.3 outlines deficiencies in pumping areas via desktop analysis then discusses pump station recommendations. Then, Section 9.4 outlines the storage deficits determined through desktop analysis. A multi-phased approach to addressing storage deficits is subsequently described, assuming all pumping and low-pressure/dead storage deficiencies have been fixed. The chapter finishes with a summary of all distribution system recommendations that will be included in the CIP.

9.2 Distribution System Model Analysis

The calibrated InfoWater Pro model of the City's distribution system was used to analyze the system for future planning years. Projected system demands (from the medium demand scenario) were added for the 2031, 2036 and 2046 planning years. Projected system demands for 2026 were also added to establish the baseline for existing system deficiencies. The hydraulic model was used to evaluate typical system conditions under MDD with diurnal operations (PHD) and for fire flow availability under MDD conditions.

9.2.1 Modeled Improvement Projects

Since the City expects significant growth, existing supplies do not adequate capacity to meet future projected demands. The hydraulic model will not run under conditions where demand exceeds supply. Therefore, it was necessary to add future supply improvements to the model before the distribution system analysis could be conducted. All supply and booster pumping improvement projects identified in the water supply strategy in Chapter 8 and storage and pumping analysis, including required transmission pipeline improvements associated with these projects were also added to the model. The improvement projects added to the model and used for the distribution system analysis are shown in Figure 9.1.

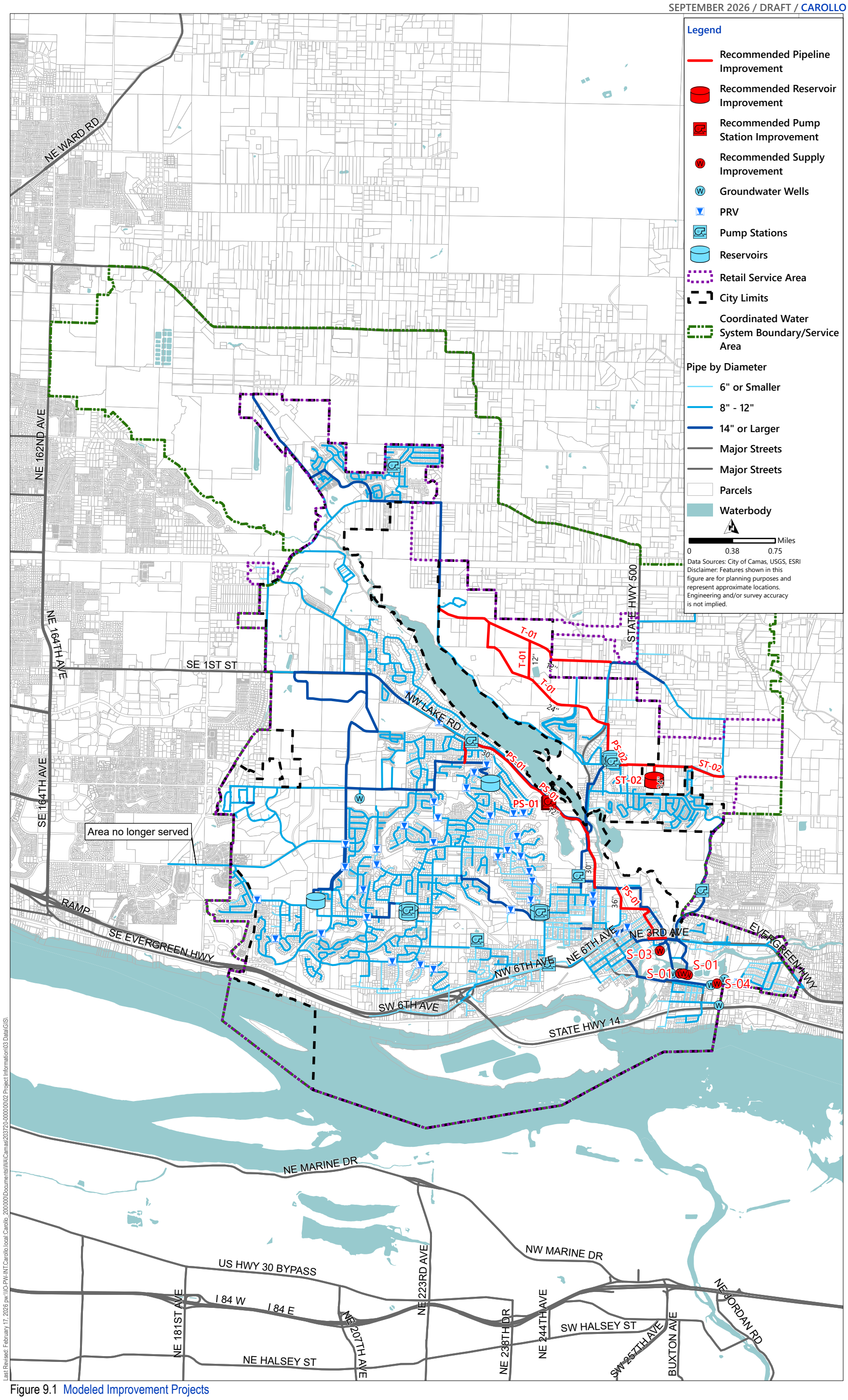

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Figure 9.1 Modeled Improvement Projects

9.2.2 System Criteria

9.2.2.1 Peak Hour Flow Criteria

Chapter 2 discussed system policies and criteria in detail. Key parameters evaluated by the model included system pressure criteria during normal operations and fire flow testing of the system.

During normal operations, the minimum pressure as set by the Washington State Department of Health (DOH) during MDD at PHD is 30 psi at the service meter. DOH velocity criterion is to keep pipeline velocities below 8 feet per second (fps).

9.2.2.2 Fire Flow Criteria

Fire flows are typically the largest flows system's experience and often a major factor in pipeline sizing and network configurations. Using the InfoWater Pro fire flow test feature, the hydraulic model evaluated the fire flow capabilities at all hydrants in the system. Specifically, it systematically simulated a fire at each model node representing a fire hydrant for each of the planning years under MDD conditions. All fire hydrant nodes in the model were simulated with a minimum pressure of 20 psi during the point fire demands, meaning once the node reaches 20 psi, no additional fire flow can be provided. Fire flow demands were allocated based on the land use nearest the hydrant and the following assumptions per land use class:

- Residential with Sprinklers: 500 gpm.
- Residential without Sprinklers: 1,000 gpm.
- Non-Residential: 1,500 gpm.
- The City does not have a record of which houses have sprinklers and which do not. Therefore, for system analysis purposes all existing residential areas are assumed to require 1,000 gpm of fire flow. Recently developed neighborhoods such as Green Mountain Estates were assigned a fire flow of 500 gpm because these homes were confirmed to have sprinklers. Additionally, two neighborhoods not receiving required fire flow were confirmed by City staff to have sprinklers and therefore assigned a fire flow of 500 gpm.
- For specific facilities and customers such as schools, industrial campuses, and churches within the City's service area, the local fire marshal requires fire flow up to 5,000 gpm. These site-specific fire flows were assigned to the respective hydrants neighboring these sites in addition to the required fire flow by land use. Figure 9.2 shows the fire flow requirements within the City's service area.

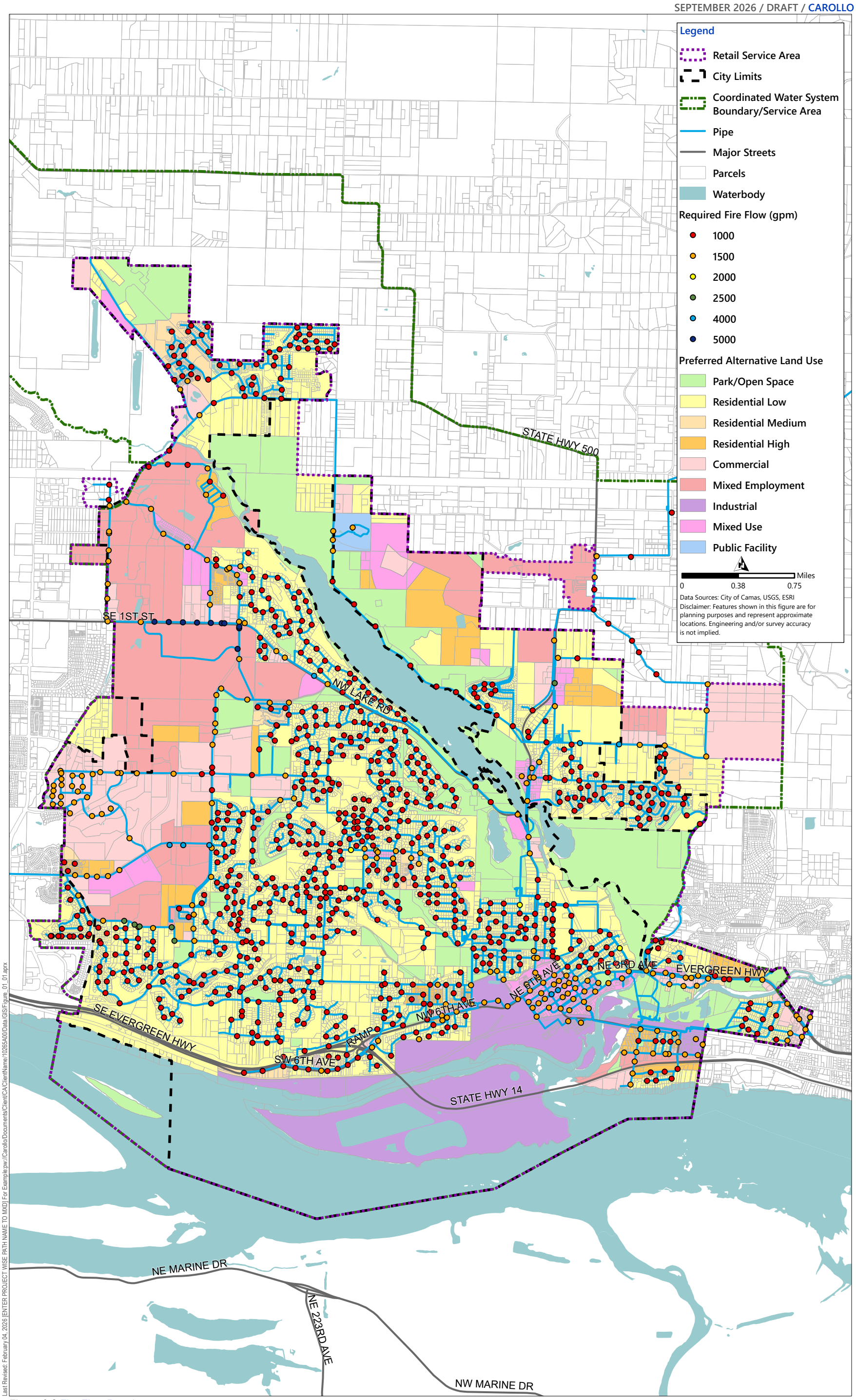

Figure 9.2 Fire Flow Requirements

9.2.3 Peak Hour Flow Evaluation

9.2.3.1 Velocity Results

The model was run in extended period simulation (EPS) for 72 hours at MDD with diurnal operations to evaluate general system velocity conditions for the 2031, 2036 and 2046 planning years. This approach allows the sources, pumps, and reservoirs to operate as their SCADA and controls were set.

Maximum modeled pipeline velocities are shown in Figure 9.3. Note, this figure only shows maximum pipeline velocities for 2046, where existing infrastructure would be most stressed to serve higher demands. Although no pipelines having maximum velocities exceeding DOH minimum criterion of 8 fps were identified, there were multiple transmission pipeline projects needed to serve areas of future development or areas where existing pipelines are undersized causing concerns with high head loss. These pipelines are not shown on Figure 9.3, as they are not deficiencies but are summarized below as recommendations and will be incorporated into the CIP in Chapter 10.

9.2.3.2 North Shore Transmission Pipeline (T-01)

The City expects large development to occur in its North Shore which is located just north of SE Leadbetter Road in the coming years. The development will be a mix of industrial and commercial larger users, as well as single family residences. To serve the projected demands of the area, approximately 6,300 linear feet (LF) of 12-inch diameter pipeline and 12,400 LF of 24-inch diameter pipeline (North Shore Transmission Pipeline) are needed to connect to the existing distribution system. Additionally, to convey water to the development area approximately 4,200 LF of existing pipeline between Gregg Reservoir and the proposed North Shore roundabout needs to be upsized to 24-inch diameter pipeline (Phase 2 Pipeline). The City expects a developer to construct the North Shore Transmission Pipeline by 2030. Since the Phase 2 portion of the pipeline requires upsizing of existing infrastructure, it is recommended for completion in 2033 to evenly distribute CIP funds and further discussed in Chapter 10.

9.2.3.3 Angelo Pump Station Discharge Pipeline (T-02)

Angelo Pump Station is a key facility supplying water to the 455-LPH and 852-UPH pressure zones. The current discharge piping in the distribution system network for this facility consists of various sized pipelines ranging from 6-inch to 14-inch in diameter. These pipelines have been identified as aging, undersized infrastructure causing high head loss and discharge pressures from Angelo Pump Station when demands increase in future planning scenarios. To mitigate these issues, it is recommended to upsize approximately 3,350 LF of various diameter pipeline to 16-inch diameter pipeline. This project is expected to allow more efficient operation at Angelo Pump Station, maximizing available pumping capacity.

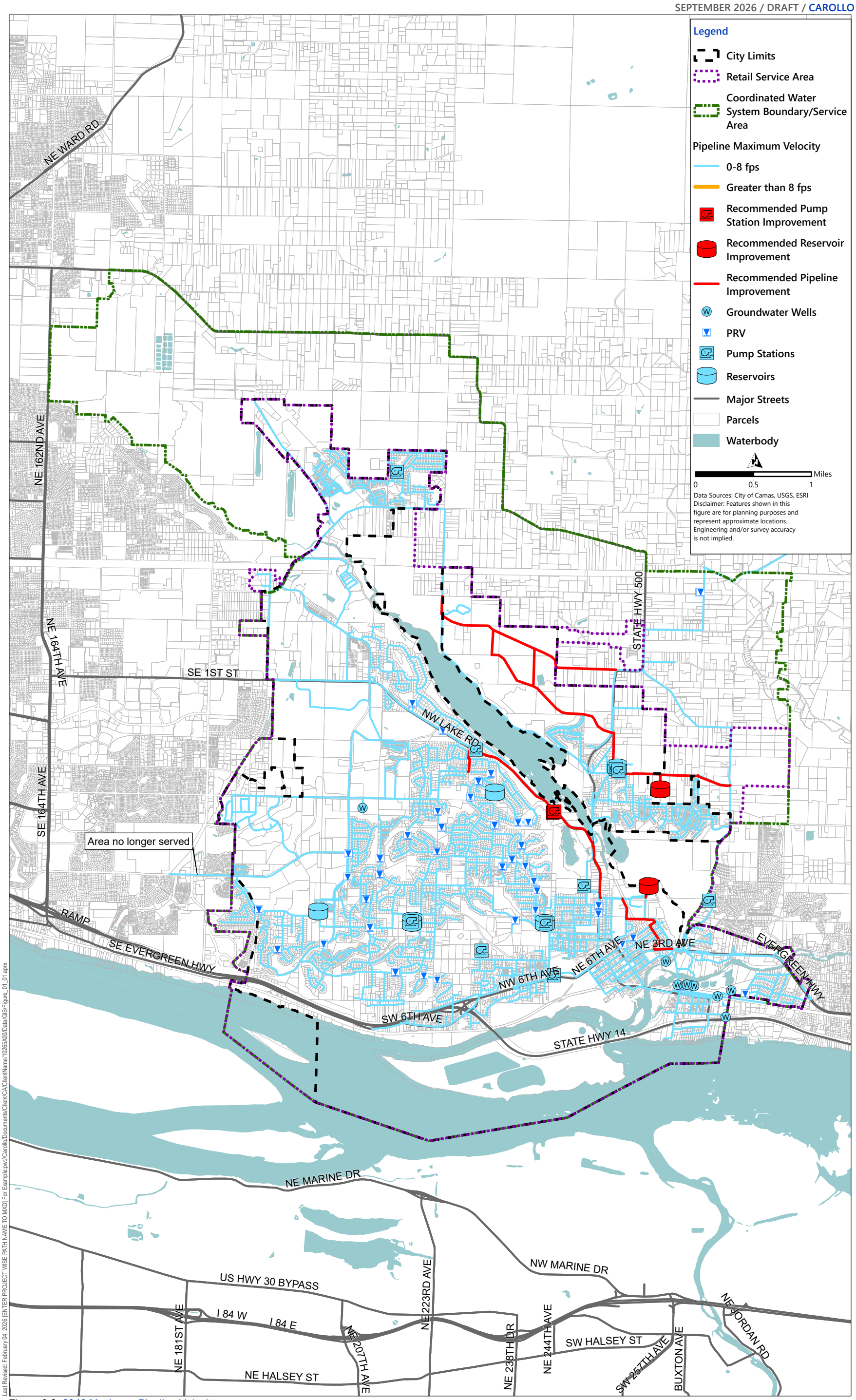

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Figure 9.3 2046 Maximum Pipeline Velocity

9.2.3.4 Pressure Results

The same model run described in Section 9.2.3.1 was run to evaluate pressure results. Using the criteria presented in the preceding section, the hydraulic model provides minimum pressures under PHD conditions.

Figures 9.4, 9.5 and 9.6 show the minimum pressures for 2031, 2036 and 2046 PHD conditions respectively.

As seen in Figure 9.6, the system has a few low pressures below 30 psi. Some of the pressure zones cover large elevation ranges, leading to low pressures at high elevations. The City identified some locations where high elevation customers were served from a higher zone. No projects are recommended for such areas and the hydraulic model was updated accordingly to match these conditions. Customers experiencing lower pressures in the 455 – LPH zone are being served from reservoirs that are not at a high enough elevation, which results in low pressures and large amounts of dead storage within the reservoirs. This is further detailed in the storage analysis section below and a recommendation was made to rezone these customers.

9.2.3.5 High Elevation Customer and Low Pressure Recommendations

This section offers recommendations to address the areas where pressures drop below the minimum criteria of 30 psi identified in the previous Section, 9.2.3.4. The improvement for high elevation customers in the Francis Road area of the 455-LPH zone involves modifying pressure zone boundaries to be served by the new pump station recommended in PS-03. To address low pressures near the UPH Reservoirs, pipeline upsizing is recommended to reduce head loss in the area. Each of the recommended improvements requires further site-specific and project-level engineering analysis before implementation. Figure 9.7 outlines the projects necessary to address these deficiencies and projects are summarized in Table 9.1.

Table 9.1 Low Pressure Area Improvement Projects

Low Pressure Area	CIP Name	Original PZ	Revised PZ	Improvement Type
Area 1	D-06	852	-	Upsize pipeline to reduce head loss.
Area 2	PS-03	455	Francis Road	Increase pump station service area.

Notes:
PS - pump station.

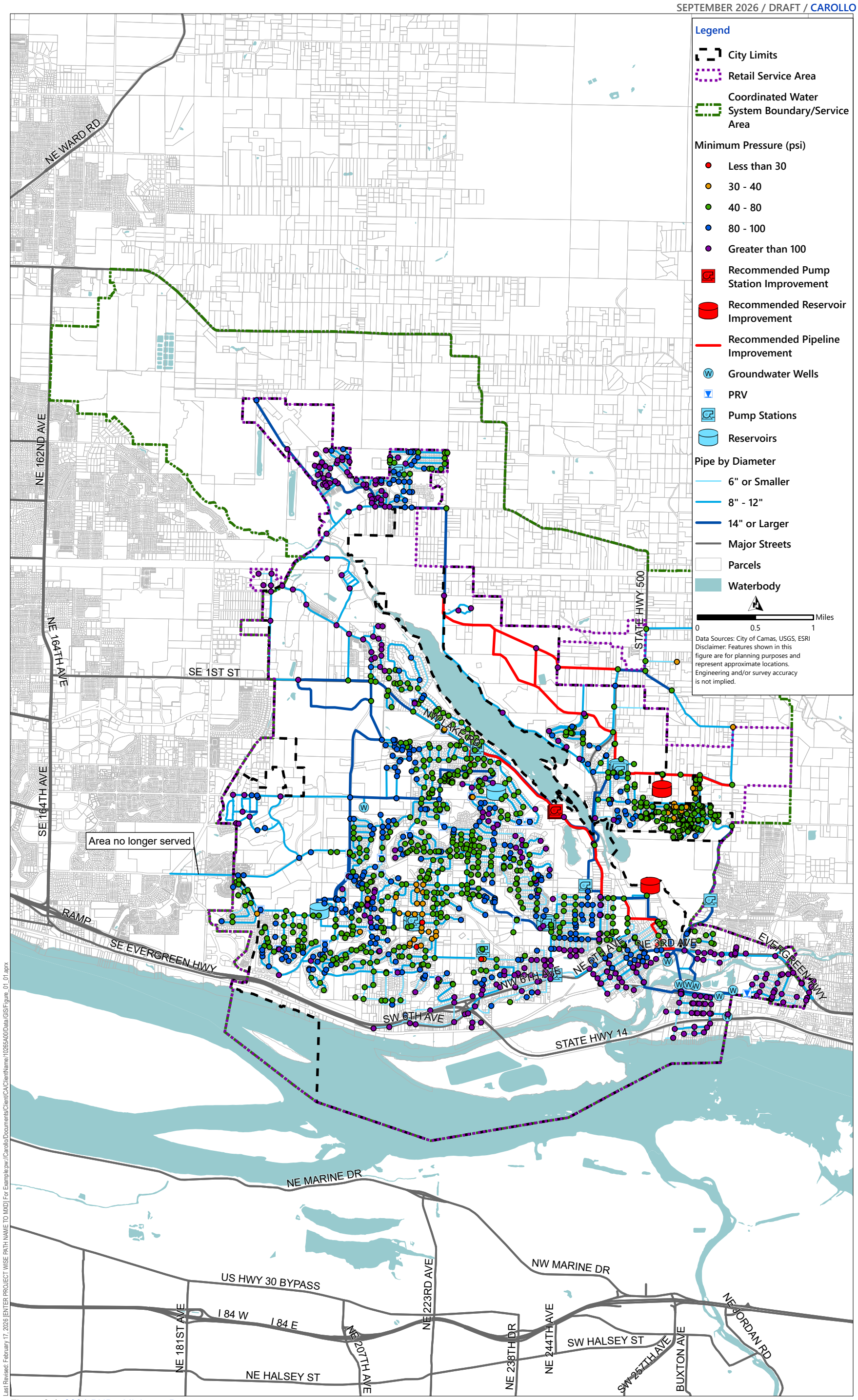

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Figure 9.4 2031 PHD - Minimum Pressures

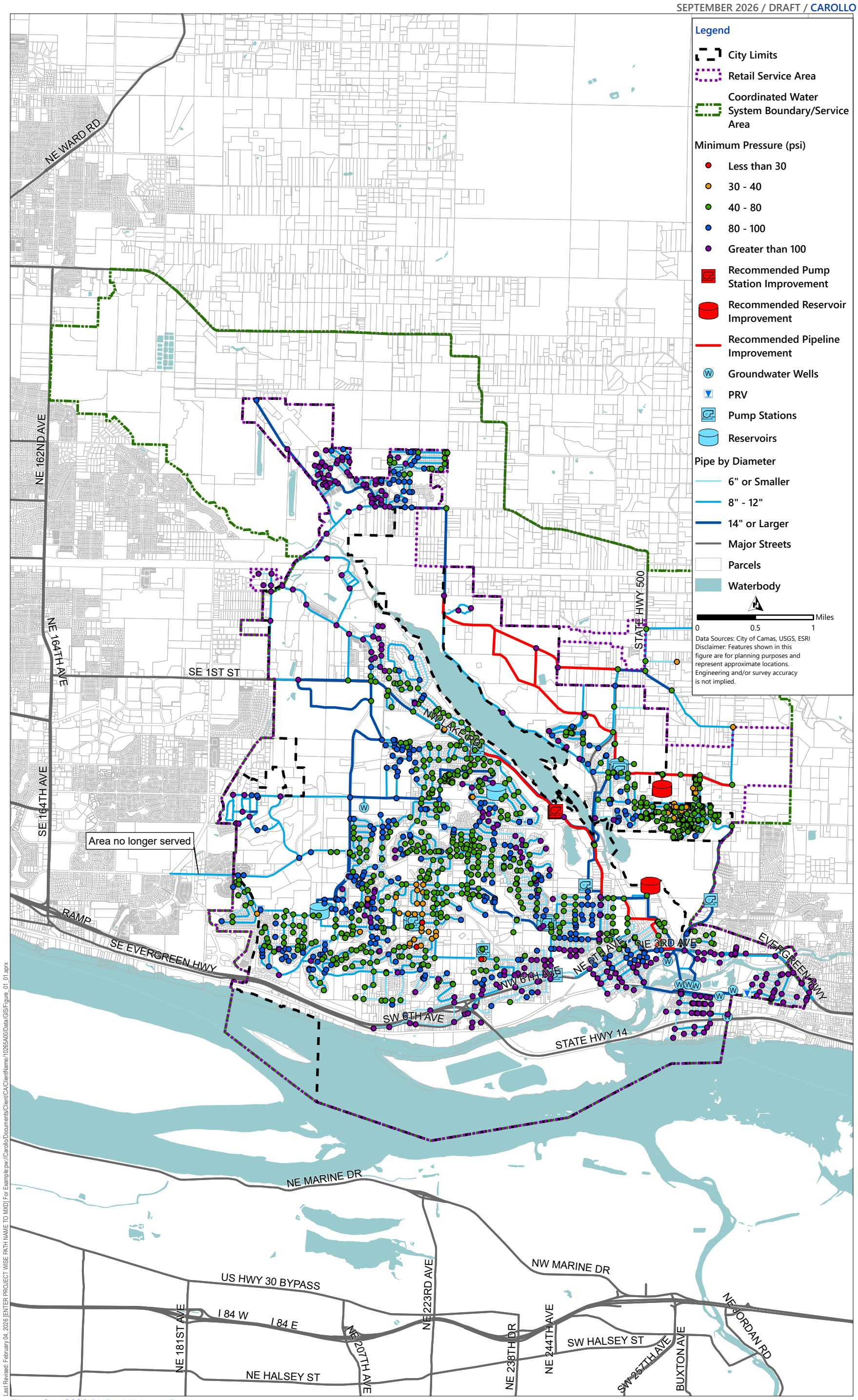

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Figure 9.5 2036 PHD - Minimum Pressures

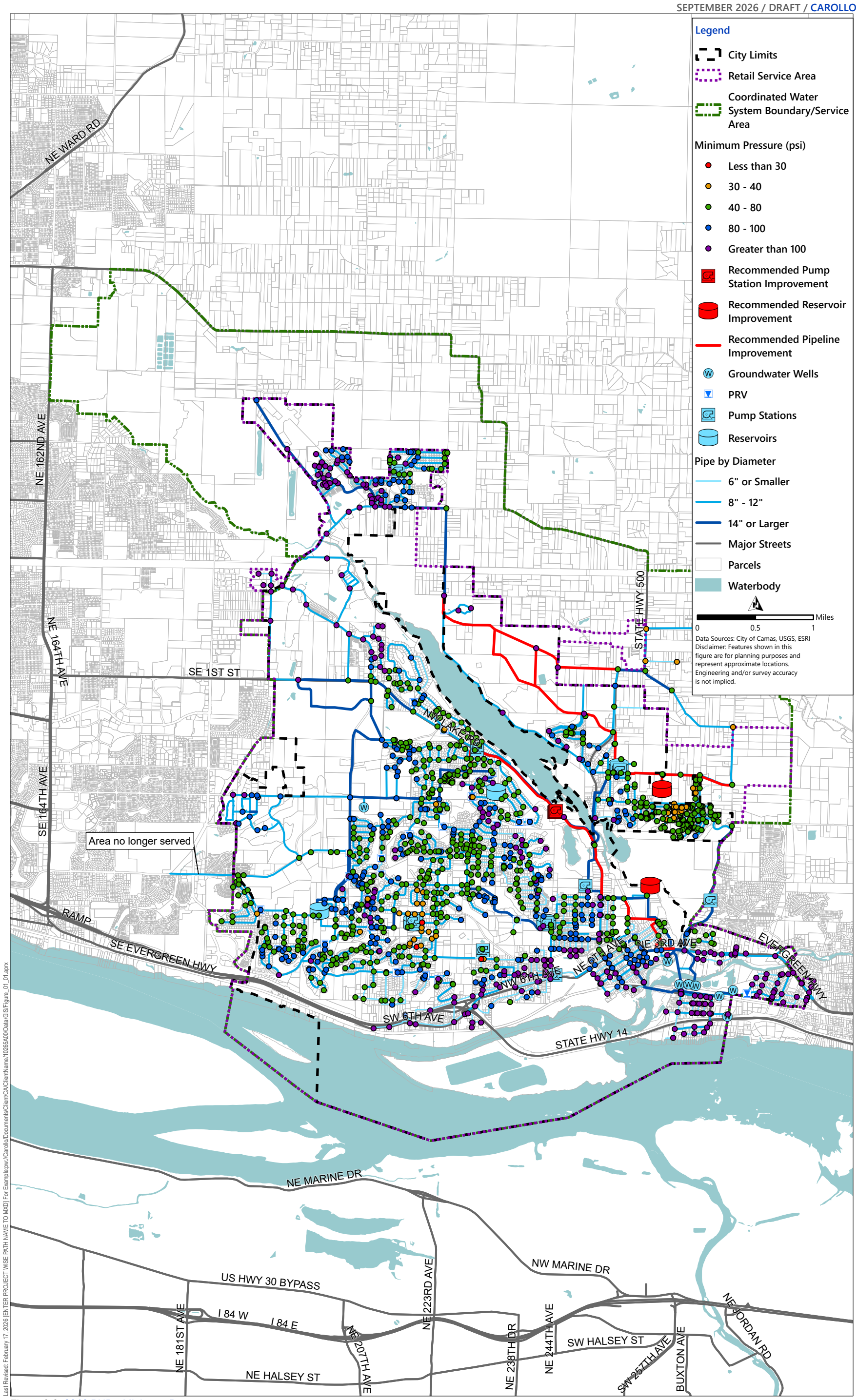

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Figure 9.6 2046 PHD - Minimum Pressures

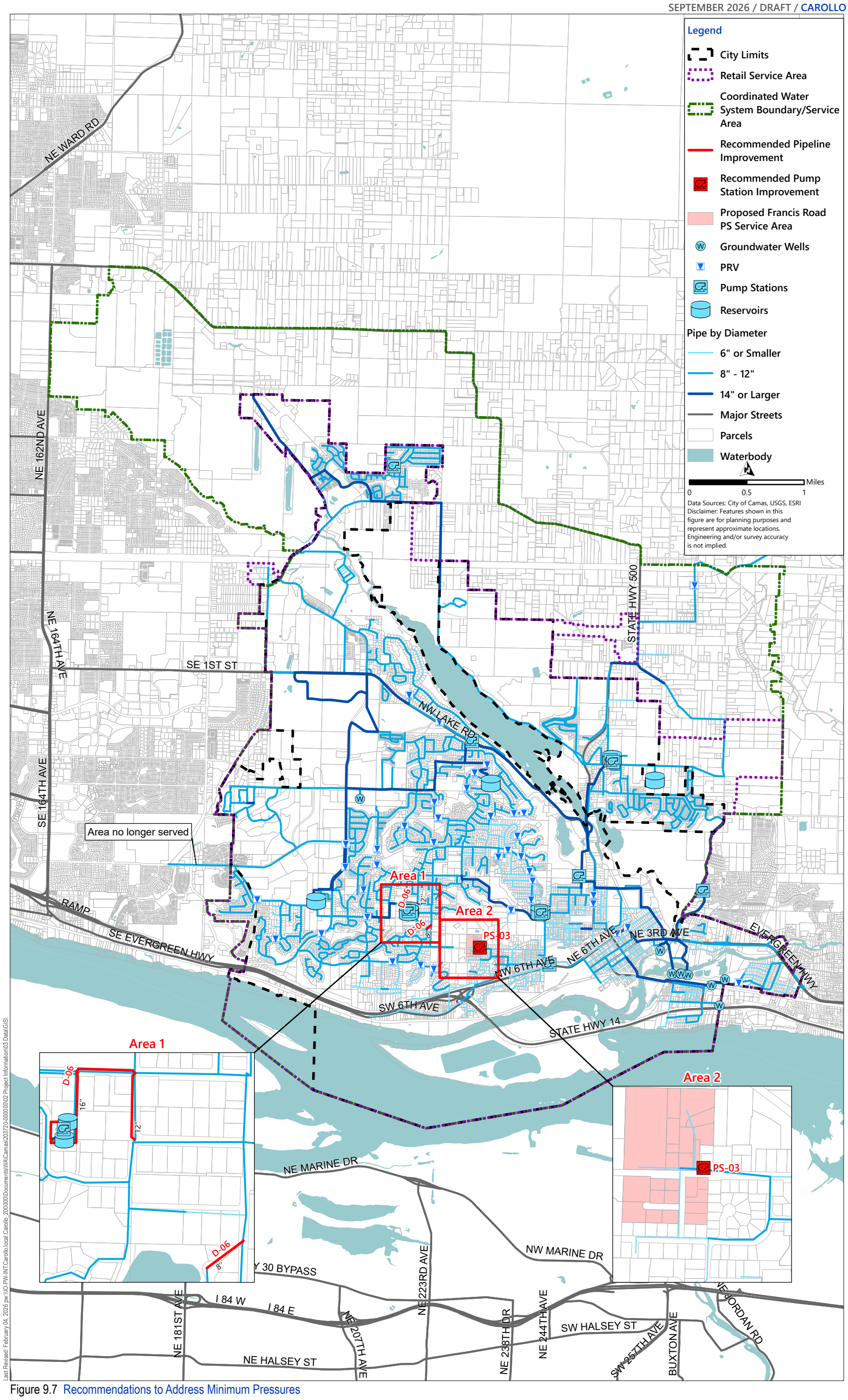

Figure 9.7 Recommendations to Address Minimum Pressures

9.2.4 Fire Flow Evaluation

9.2.4.1 Fire Flow Results

Figures 9.8, 9.9, and 9.10 show the model nodes that do and do not meet the criteria from the fire flow analysis conducted under MDD conditions for the 2031, 2036, and 2046 planning years, respectively.

9.2.4.2 Fire Flow Recommendations

This section outlines the recommendations to address all the fire flow deficiencies predicted in the hydraulic model. Fire flow deficiencies are junctions where the pressure dropped below 20 psi when simulating a fire at their location. Fire flow recommendations are either distribution pipeline upsizing or pump station projects.

- D-01 through D-10: individual distribution system projects upsizing pipeline to address fire flow deficiencies.
- PS-03: pump station project aimed to address fire flow deficiencies and meet the City's level of service goals. This pump station would include the addition of a fire pump with capacity to serve the required fire flow. Additionally, this pump station would have domestic pumps to serve typical demands. More details regarding this project are provided in Section 9.3.

Figure 9.11 outlines all projects recommended to address fire flow deficiencies, showing extent and location for each pipeline upsizing project. Figure 9.12 shows all fire nodes after recommended projects were implemented.

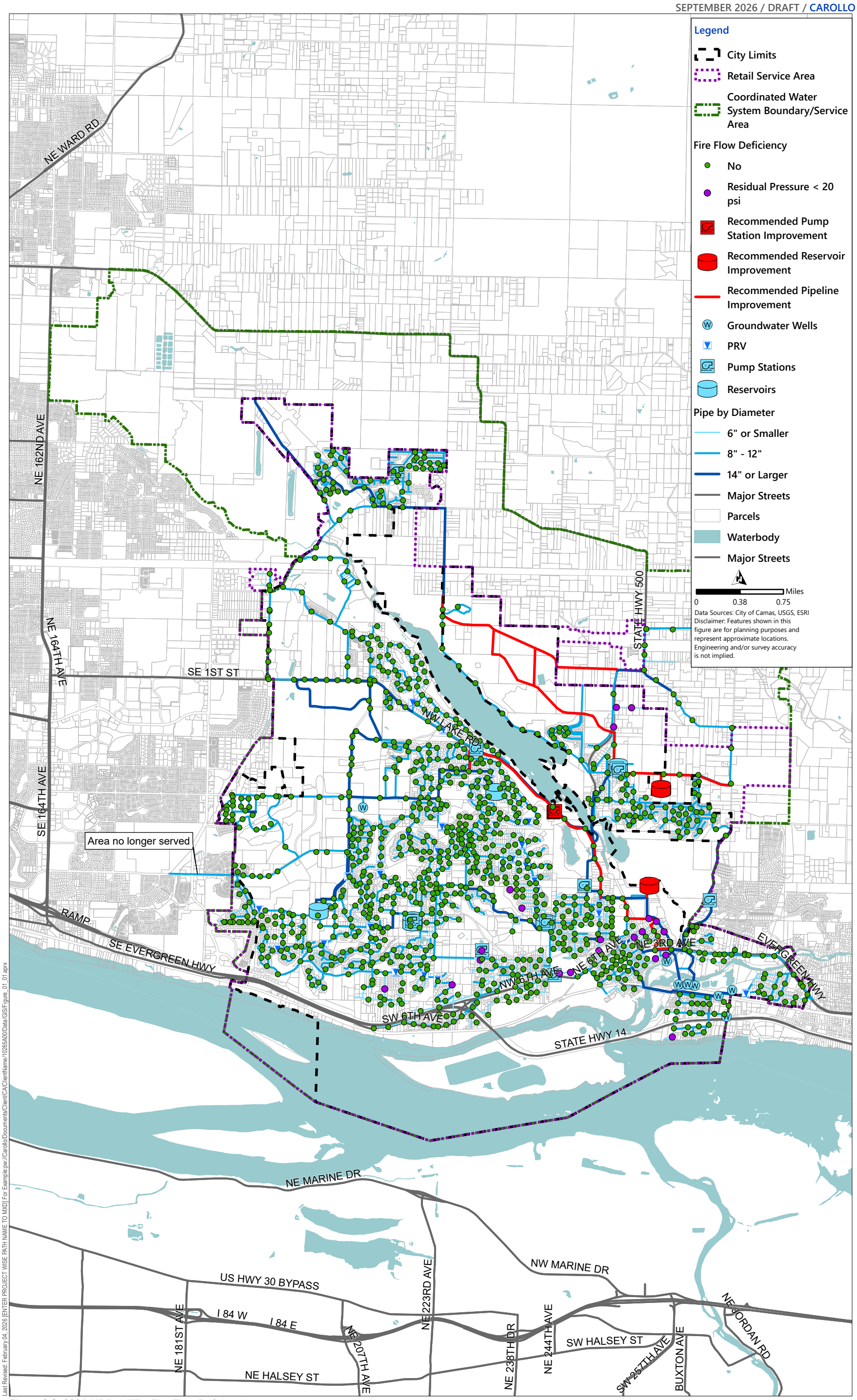

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Figure 9.8 2031 MDD + FF – Fire Flow Deficiencies

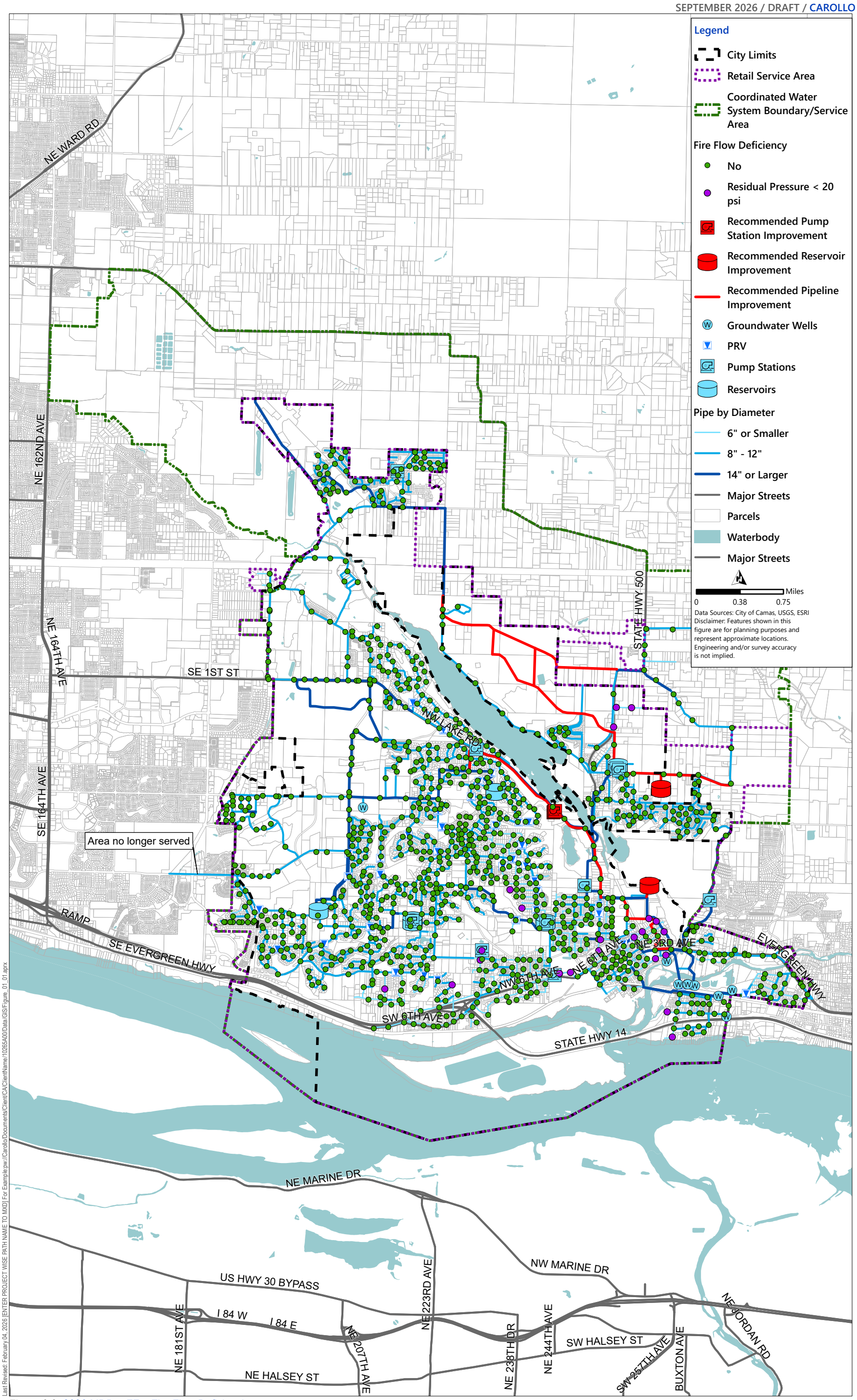

Figure 9.9 2036 MDD + FF – Fire Flow Deficiencies

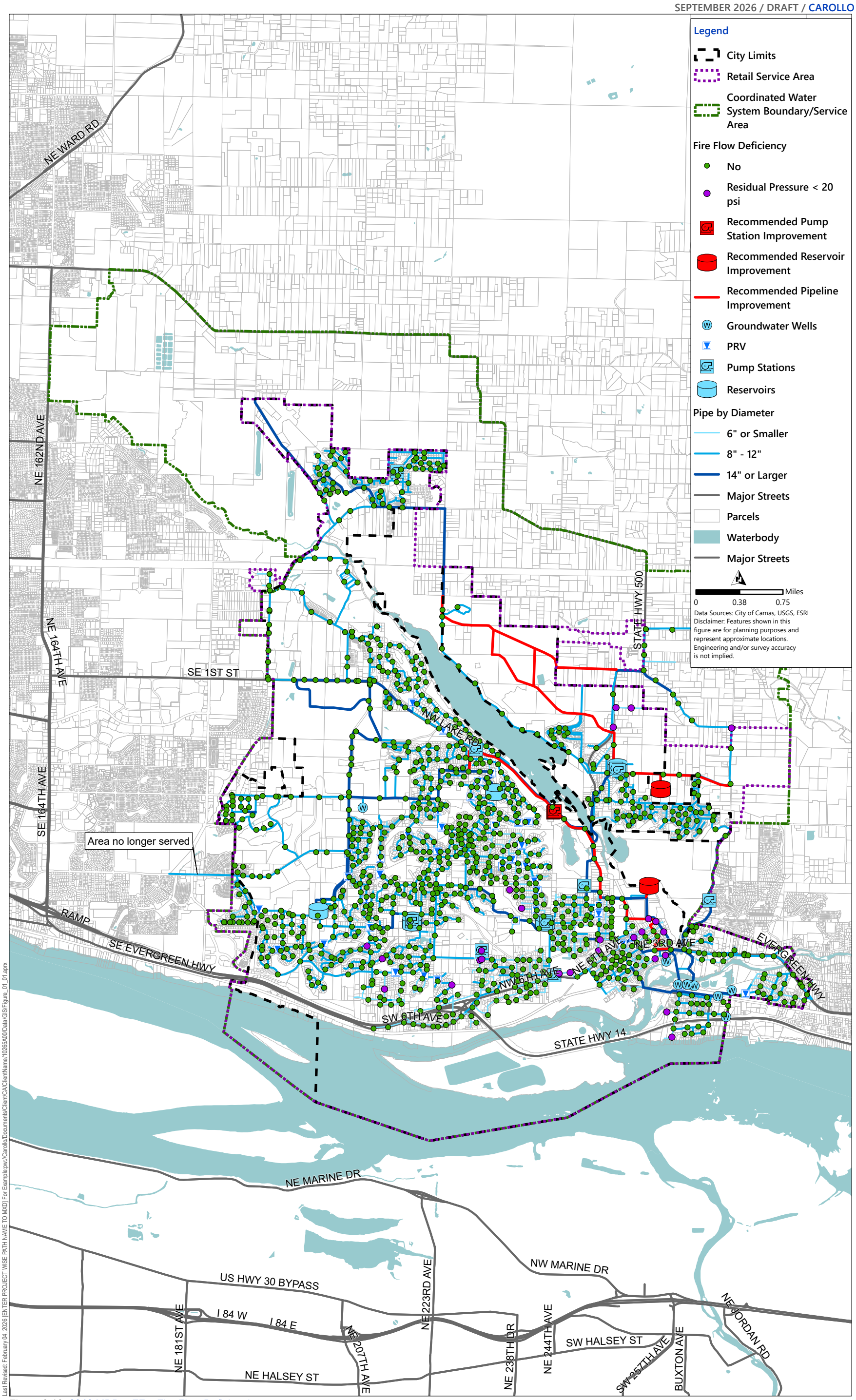

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Figure 9.10 2046 MDD + FF – Fire Flow Deficiencies

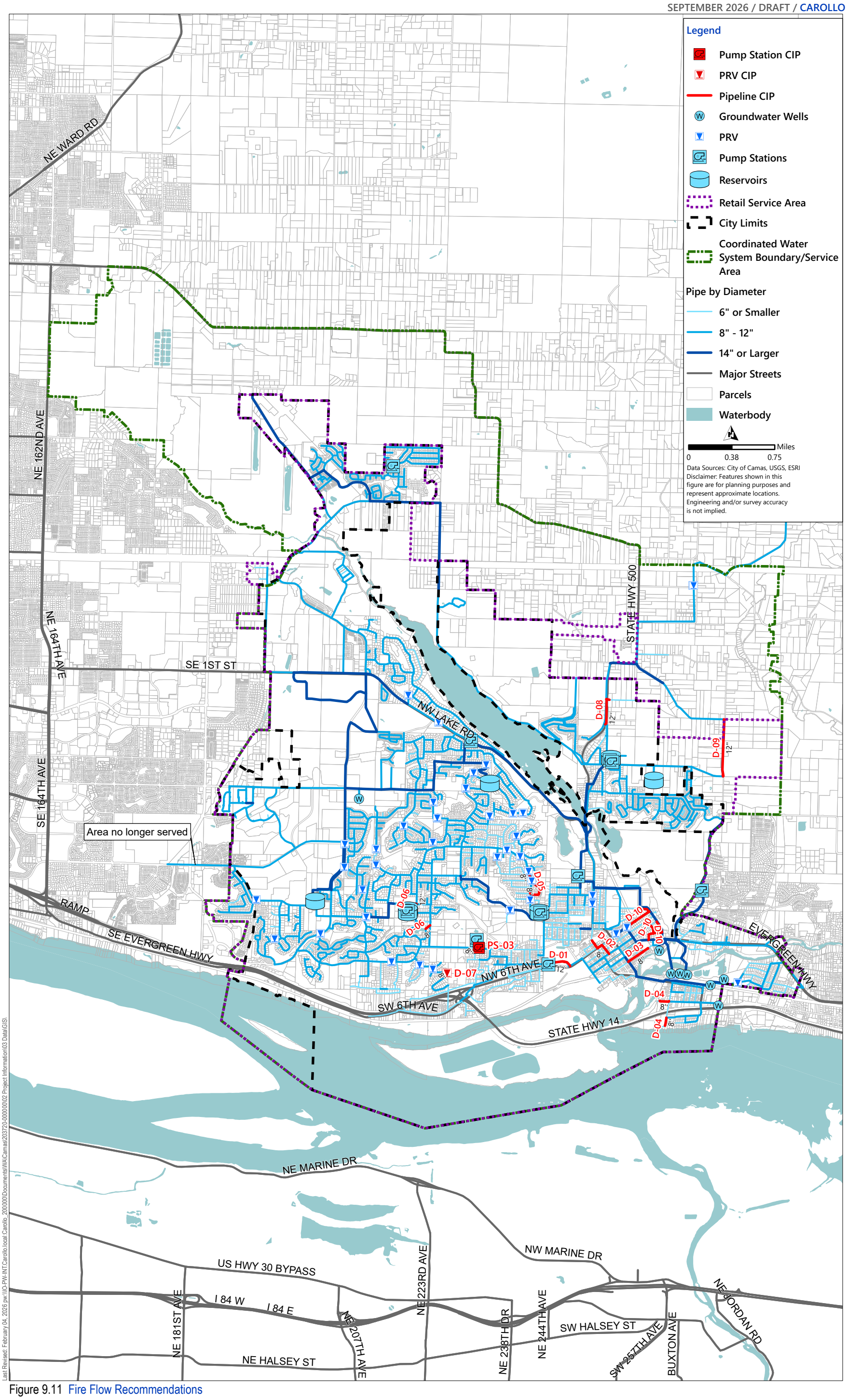


Figure 9.11 Fire Flow Recommendations

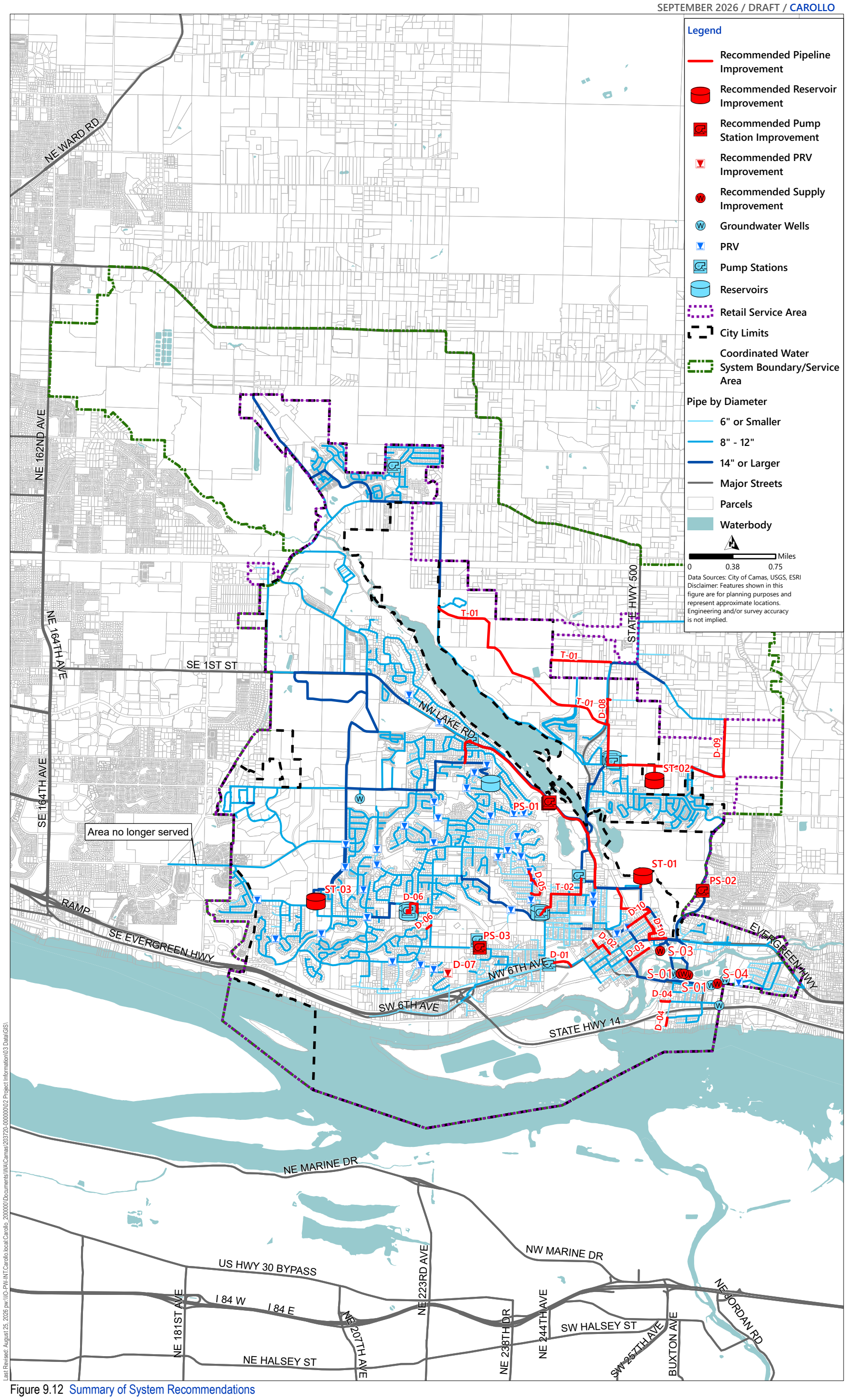


Figure 9.12 Summary of System Recommendations

9.3 Pumping Analysis

To evaluate pump station capacities, the City's water distribution system was divided into seven different pumping areas containing nine total pump stations. The 343 pumping area is supplied by groundwater wells and although not considered a pump station, was evaluated under both supply specific criteria in Chapter 8 and pumping criteria defined herein. For this water system plan update, the City utilized pumping reliability and redundancy criteria described below. A third criterion was added to evaluate wells and/or pump stations supplying closed zones against minimum DOH requirements.

1. Pumping Reliability. Wells and booster pumps with back-up power should be capable of supplying MDD for the water system while concurrently replenishing fire suppression storage within 72 hours.
2. Pumping Redundancy. With the largest pump supplying each service area out of service, the remaining pumps should provide MDD while concurrently replenishing fire suppression storage within 72 hours.
3. For wells or booster pump stations serving closed zones/systems:
    a. Supply MDD + Fire Flow.

Supply PHD with the largest pumping unit out of service. City specific pumping criteria only address MDD conditions. It is assumed if the City meets their MDD pumping reliability and redundancy goals, they will by default also be able to supply ADD reliably and redundantly.

Table 9.2 describes the relationship between pumping areas and pump stations. Pumping areas are defined as open or closed zones. Open zones are ones with adequate equalizing storage, so the pump stations are only required to supply the MDD and replenish fire suppression storage of the pumping area. Closed zones are areas that are supplied solely through a pump station; therefore, the pump station is required to supply PHD and fire flow.

Table 9.2 Pumping Area Summary

Pumping Area	Pump Stations Included	Open or Closed?
343	Lower Washougal Wellfield	Open
455	Forest Home and Angelo	Open
542	Crown Road, Butler, and New Gregg	Open
544	Lacamas	Open
852	Lower Prune Hill	Open
695 – GME	GME	Closed
Francis Road	Francis Road	Closed

9.3.1 343 Pumping Area

The 343 pumping area is an open zone that includes eight production wells: Well 5 (675 gpm), Well 6 (1,200 gpm), Well 7 (950 gpm), Well 8 (1,250 gpm), Well 10 (900 gpm), Well 11 (1,000 gpm), Well 12 (1,000 gpm), Well 13 (1,350 gpm), and Well 14 (850 gpm) with a total pumping capacity of 9,175 gpm. Total firm capacity is reflective of all total pumping capacity less the capacity of Well 13, the largest pump considered offline and Well 14, which was excluded because of a hydraulic limitation restricting the simultaneous operation of Well 6 and Well 14. Since Well 6 has the larger capacity of the two, its production capacity was used in the evaluation. Total reliable capacity is reflective of Well 8, 11, 12, 13, and 14 capacities, which are the facilities with backup power on-site. This pumping area serves the entire

distribution system. Table 9.3 shows the projected demands for the 2031, 2036, and 2046 scenarios compared to the total reliable capacity, with generators, and the total firm pumping capacity, with the largest pump offline. The 343 pumping area supplies show deficiencies for all planning year scenarios. Recommendations to address deficiencies related to the City's water supply are previously detailed in Chapter 8.

Table 9.3 343 Pumping Area Evaluation

343	2031	2036	2046
MDD (gpm)	7,995	9,195	11,685
Fire Replenishment Flow (gpm)	220	220	220
Total Demand(1) (gpm)	8,215	9,415	11,905
Total Firm Capacity (gpm)	6,975	6,975	6,975
Total Reliable Capacity(2) (gpm)	5,450	5,450	5,450
Pumping Redundancy - Surplus/Deficit (gpm)	-1,240	-2,440	-4,930
Pumping Reliability - Surplus/Deficit (gpm)	-2,765	-3,965	-6,455

Notes:
(1) Sum of MDD and Fire Replenishment Flow.
(2) Pumps with backup power. Currently, only Wells 8, 11, 12, 13, and 14 have backup power.

9.3.2 455 Pumping Area

The 455 pumping area is an open zone that includes three pump stations: Angelo, which houses four pumps each with a capacity of 1,000 gpm, Butler, which houses two pumps, one with a capacity of 600 gpm and the other with 800 gpm, and Forest Home, which houses a single 1,000 gpm pump. This pumping area directly serves the 455 pumping area and provides suction to the pump stations serving the 542, 544, 695, and 852 pumping areas. Table 9.4 shows the projected demands for the 2031, 2036, and 2046 scenarios compared to the total reliable capacity, with generators, and the total firm pumping capacity, with the largest pump offline. The 455 area pump stations currently have insufficient capacity for all planning scenarios. Sections 9.3.3.1 and 9.3.4.1 describe the recommended projects and system reconfigurations in the 542 and 544 pumping areas which will eliminate the intermediate pumping demands on this area, therefore, there are no recommendations for the 455 pumping area. Discharge pipeline upsizing described in Section 9.2.3.3 will also increase available pumping capacity at Angelo.

Table 9.4 455 Pumping Area Evaluation

455	2031	2036	2046
MDD (gpm)	6,850	7,890	10,220
Fire Replenishment Flow (gpm)	55	55	55
Total Demand(1) (gpm)	6,905	7,945	10,275
Total Firm Capacity (gpm)	5,400	5,400	5,400
Total Reliable Capacity(2) (gpm)	3,000	3,000	3,000
Pumping Redundancy - Surplus/Deficit (gpm)	-1,505	-2,545	-4,875
Pumping Reliability - Surplus/Deficit (gpm)	-3,905	-4,945	-7,275

Notes:
(1) Sum of MDD and Fire Replenishment Flow.
(2) Angelo PS has backup power to operate at firm capacity (3,000 gpm) and is the only facility in the pumping area with a backup power source.

9.3.3 542 Pumping Area

The 542 pumping area is an open zone including two pump stations: Crown Road and New Gregg, with each containing a total of three pumps. Crown Road has three pumps, each with a capacity of 800 gpm. New Gregg has two fire pumps with a capacity of 1,500 gpm each and a jockey pump with a capacity of 500 gpm. This pumping area serves the 542 pressure zone. Table 9.5 shows the projected demands for the 2031, 2036, and 2046 scenarios compared to the total reliable capacity, with generators, and the total firm pumping capacity, with the largest pump offline. The pump capacities for New Gregg were not considered in this evaluation due to concerns with intermediate pumping from the 455 zone discussed in the previous section. The 542 pumping area shows insufficient capacity for the 2046 redundancy scenario.

Table 9.5 542 Pumping Area Evaluation

542	2031	2036	2046
MDD (gpm)	665	1,130	1,930
Fire Replenishment Flow (gpm)	220	220	220
Total Demand(1) (gpm)	885	1,350	2,150
Total Firm Capacity (gpm)	1,600	1,600	1,600
Total Reliable Capacity(2) (gpm)	2,400	2,400	2,400
Pumping Redundancy - Surplus/Deficit (gpm)	715	250	-550
Pumping Reliability - Surplus/Deficit (gpm)	1,515	1,050	250

Notes:
(1) Sum of MDD and Fire Replenishment Flow.
(2) All pumps at Crown Road have backup power.

9.3.3.1 542 Pumping Area Recommendations - Project PS-02

The 542 pumping area shows insufficient pumping capacity under redundancy criteria in the 2046 scenario. Under normal operating conditions, this area is typically served by the jockey pump at New Gregg PS, which takes suction from the 455 pumping area. As a result, the added demand from the 542 pressure zone creates large deficiencies for the 455 area pump stations.

Additionally, the City has indicated that hydraulic limitations due to undersized pipelines on the discharge side of Crown Road pump station, preventing more than one pump operating at any given time. To reduce the reliance on intermediate pumping from the 455 pumping area and better utilize the available capacity at Crown Road pump station, it is recommended to add an 800 gpm pump in the remaining empty can at Crown Road pump station by 2046 and construct approximately 3,200 LF of 24-inch diameter transmission pipeline from the intersection of SE 283rd Avenue and SE Nourse Road to the new Gregg Reservoir (Phase 1 Pipeline). Phase 1 of the pipeline is recommended for completion in 2031 before the construction of the new storage reservoir in the 542 storage area..

These improvements will address the pumping deficiencies of the 542 area and the 455 area by eliminating intermediate pumping (Crown Road pump station pumps from the 343 zone directly to the 542 zone) and provide capacity for projected growth in the area.

9.3.4 544 Pumping Area

The 544 pumping area is an open zone that includes one pump station, Lacamas, which has three pumps. One pump has a 1,500 gpm capacity while the other two pumps have capacities of 500 gpm each. This pumping area directly serves the 544 pumping area and provides suction to the pump station for the 695 – GME pressure zone. Table 9.6 shows the projected demands for the 2031, 2036, and 2046 scenarios compared to the total reliable capacity, with generators, and the total firm pumping capacity, with the largest pump offline. Lacamas pump station has insufficient capacity for all planning year scenarios.

Table 9.6 544 Pumping Area Evaluation

544	2031	2036	2046
MDD (gpm)	3,530	3,985	5,260
Fire Replenishment Flow (gpm)	280	280	280
Total Demand(1) (gpm)	3,810	4,265	5,540
Total Firm Capacity (gpm)	1,000	1,000	1,000
Total Reliable Capacity(2) (gpm)	2,500	2,500	2,500
Pumping Redundancy - Surplus/Deficit (gpm)	-2,810	-3,265	-4,540
Pumping Reliability - Surplus/Deficit (gpm)	-1,310	-1,765	-3,040

Notes:
(1) Sum of MDD and Fire Replenishment Flow.
(2) All pumps have backup power.

9.3.4.1 544 Pumping Area Recommendation - Project PS-01

The 544 pumping area has insufficient pumping capacity under redundancy and reliability criteria for all planning year scenarios. Like the 542 pumping area, the 544 pumping area relies on intermediate pumping from the 455 pumping area. The City is currently under contract to design a new pump station that will pump directly from the 343 zone to the 544 zone. This project will also include transmission pipeline upgrades needed to increase conveyance capacity for future growth in the area.

9.3.5 695 - Green Mountain Estates Pumping Area

The 695 - GME pumping area is a closed zone that includes one pump station, GME, which contains five pumps. Three pumps are for domestic service and have capacity of 180 gpm each and the remaining two pumps are for fire service and have capacity of 650 gpm each. This pumping area serves the 695 - GME pressure zone. Table 9.7 shows the projected demands for the 2031, 2036, and 2046 scenarios compared to the total pumping capacity and firm capacity, with the largest pump offline. This table shows the GME pump station has adequate capacity for all planning year scenarios.

Table 9.7 695 - Green Mountain Estates Pumping Area Evaluation

695 - GME	2031	2036	2046
MDD + FF Demand (gpm)	1,605	1,610	1,620
PHD Demand (gpm)	520	545	595
Total Capacity (gpm)	1,840	1,840	1,840
Firm Capacity (gpm)	1,190	1,190	1,190
MDD + FF Surplus/Deficit (gpm)	235	230	220
PHD Surplus/Deficit (gpm)	670	645	595

9.3.6 Francis Road Pumping Area

The Francis Road pumping area is a closed zone that includes one pump station, Francis Road, housing a single 80 gpm pump in a small below grade vault. This pumping area serves a few homes along Francis Road. Table 9.8 shows the projected demands for the 2031, 2036, and 2046 scenarios compared to the total pumping capacity and firm capacity, with the largest pump offline. There is a fire hydrant within this pump station's service area therefore fire flow must be provided. Francis Road pump station has insufficient total and firm capacity for all planning year scenarios.

Table 9.8 Francis Road Pumping Area Evaluation

Francis Road	2031	2036	2046
MDD + FF Demand (gpm)	1,001	1,002	1,003
PHD Demand (gpm)	2	3	5
Total Capacity (gpm)	80	80	80
Firm Capacity (gpm)	0	0	0
MDD + FF Surplus/Deficit (gpm)	-921	-922	-923
PHD Surplus/Deficit (gpm)	-2	-3	-5

9.3.6.1 Francis Road Pumping Area Recommendation - Project PS-03

The Francis Road pumping area has insufficient pumping capacity and fire flow capacity for each planning year scenario. Discussion with the City indicated their preference to replace the existing Francis Road pump station with a new above grade pump station. The service area of the new pump station will be expanded to serve nearby customers with low pressures. To meet DOH criteria and the City's level of service goals, the new Francis Road pump station will be equipped with two 75 gpm capacity domestic pumps, two 1,000 gpm capacity fire pumps and a backup generator. These improvements will resolve the current fire flow and pressure deficiencies in this area.

9.4 Storage Analysis

The City's storage facilities were evaluated based on their criteria. To evaluate storage capacities, the City's distribution system was divided into five different storage areas containing 26 total pressure zones. Table 9.9 describes the relationship between pressure zones and storage areas.

Table 9.9 Storage Area

Storage Areas	Pressure Zones
343	285 - Downtown and 343 - Butler
455	455 – LPH and 550 – Francis Road
542	542 - Gregg
544	544 - Lacamas, 695 - GME, and one PRV subzone
852	852 - UPH and 17 PRV Subzones

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

9.4.1 Components of Storage

Following the DOH storage volume requirements (WAC 246-290-235(3)) and the Water System Design Manual, Chapter 7, the five components of storage listed below must be evaluated for all water systems:

- Operational storage.
- Equalizing storage.
- Fire-suppression storage (FSS).
- Standby storage (SS).
- Dead storage.

DOH requires that operational and equalizing storage are available to all customers at a residual pressure of at least 30 psi under PHD flow conditions. The City has an increased level of service goal to provide standby and fire suppression storage to all customers at a residual pressure of at least 30 psi under MDD, which is above the DOH requirement of 20 psi. Therefore, all reservoir volumes above the 30 psi hydraulic grade line (HGL) are considered available storage. Dead storage is the volume in the reservoir that cannot be used to serve the highest customer in the water system with a pressure of at least 30 psi. The City also combines fire and standby into a single band for planning (i.e., nesting) and only the larger of the two volumes is used for analysis. Figure 9.13 schematically shows these components.

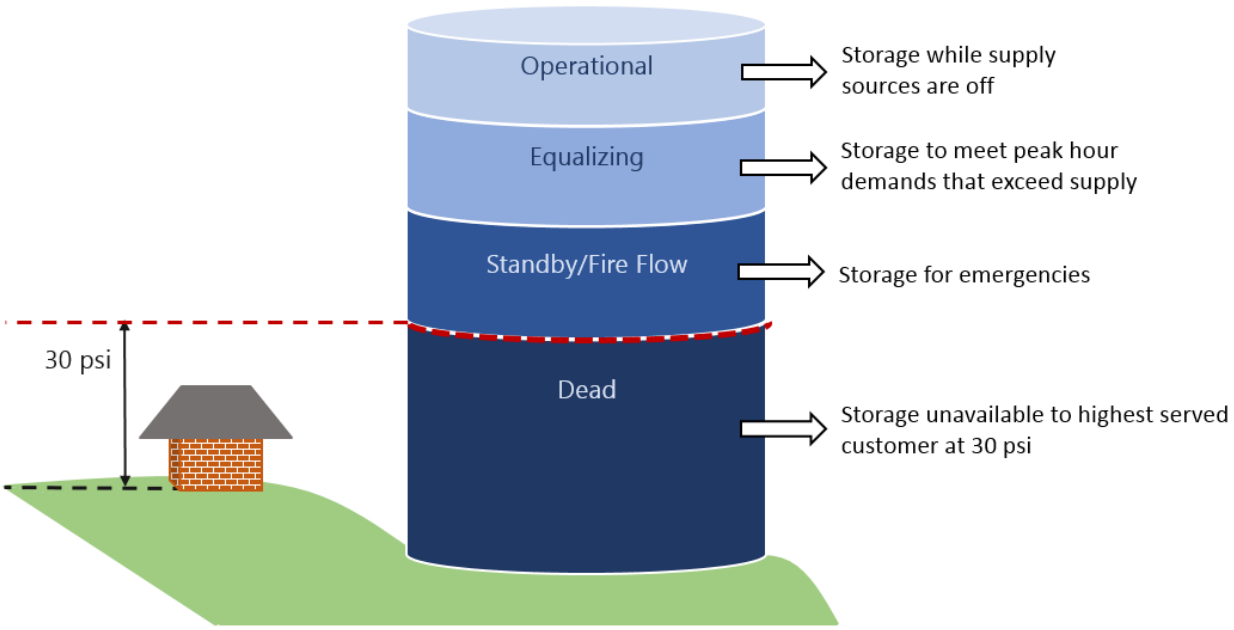


Figure 9.13 Illustration of Storage Components

9.4.1.1 Operational Storage

Operational storage is the volume of water used on a day-to-day basis to supply the water system while the sources of supply are in the "off" position. This volume is dependent on the settings of the water level sensors controlling the pumps and is designed to prevent the pump motors from excessive starts and stops (cycling).

Summarized in Table 9.10, the operational storage volume for reservoirs was determined from SCADA data and pump settings provided by the City and set up within the hydraulic model.

Table 9.10 Operational Storage Volumes

Reservoir	Storage Area	Total Volume (MG)	Operational Band (feet)	Operational Storage (MG)	Percent of Total Storage
Butler	343	1.2	1.3	0.10	9%
Lower Prune Hill #2	455	1.5	0.5	0.03	2%
Gregg	542	0.1	8	0.01	11%
Lacamas	544	2.0	4	0.17	8%
18th Avenue	544	2.0	1.2	0.06	3%
Upper Prune Hill #1	852	0.75	4	0.03	4%
Upper Prune Hill #2	852	2.4	6	0.21	9%
Total		**9.95**		**0.61**	**6%**

9.4.1.2 Equalizing Storage

Equalizing storage is the total volume needed to satisfy the peak hourly demands (PHD) that exceed the supply system's capacity. The WAC 236-290-235 requires that equalizing storage be provided for peak demands.

Equalizing volume requirements were calculated for each reservoir using the following equation using the storage area demands and are summarized in Table 9.11.

$$ES = (PHD - MDD) \times 150 \text{ min, but in no case less than zero}$$

Where:

- ES = Equalizing Storage component, in gallons.
- PHD = Peak hourly demand, in gpm.
- MDD = Sum of all installed and active source of supply capacities, except emergency sources of supply, in gpm.

PHD was calculated using the individual pressure zone peaking factors determined from the diurnal patterns used in system analysis.

Table 9.11 Equalizing Storage Volumes

Storage Area	2031 Equalizing Volume (MG)	2036 Equalizing Volume (MG)	2046 Equalizing Volume (MG)
343	0.14	0.16	0.18
455	0.09	0.09	0.09
542	0.08	0.14	0.24
544	0.33	0.37	0.47
852	0.37	0.39	0.43
Total	**1.01**	**1.15**	**1.41**

9.4.1.3 Standby Storage and Fire-Suppression Storage

Standby Storage volumes are required to supply reasonable system demands during a system emergency, such as the disruption of the water supply caused by a transmission pipeline or equipment failure, power outage, valve failure, or other system interruptions (as discussed in Chapter 2). The computation of emergency/standby storage requirements includes consideration of reasonable system disruptions that can be expected to occur within normal planning contingencies, and does not consider major system emergencies, such as earthquakes, which result in shutdown of water supplies and multiple distribution system breaks. These types of emergencies should be covered under emergency system operation planning. Table 9.12 shows the required standby storage capacity for each operational area.

The DOH Water System Design Manual recommends a minimum standby storage volume of no less than 200 gallons per ERU, which is the criteria adopted into City policy. However, as noted above, City policy states that standby storage should be available to the highest customer in the storage area at 30 psi.

Table 9.12 Standby Storage Volumes

Storage Area	2031 Standby Storage Volume (MG)	2036 Standby Storage Volume (MG)	2046 Standby Storage Volume (MG)
343	0.60	0.69	0.77
455	0.38	0.39	0.40
542	0.38	0.64	1.08
544	2.31	2.65	3.39
852	1.03	1.07	1.18
Total	**4.70**	**5.44**	**6.82**

Fire suppression storage is the quantity of water required for firefighting as defined by applicable water system criteria and fire codes. Firefighting often places the largest demand on a water system because a high volume of water must be supplied over a short time period. Such demands require each component of the system to operate at optimal condition.

DOH requires water systems to have storage reservoirs that can meet fire flow requirements while maintaining a level of 20 psi throughout the distribution system. However, City policy states storage reservoirs should have adequate capacity to supply required fire flow while maintaining a minimum of 30 psi at the highest customer. Table 9.13 outlines the required maximum fire flow, duration, and FSS volume for each operational area.

Table 9.13 Required Maximum Fire Flow

Storage Area	Required Fire Flow (gpm)	Required Duration (hours)	Required FSS (MG)
343	4,000	4	0.96
455	2,000	2	0.24
542	4,000	4	0.96
544	5,000	4	1.20
852	2,500	2	0.30

The City plans for single emergency at time per storage area. Either standby storage or fire-suppression storage, whichever volume is smaller, can be excluded from each zone's total storage requirement (this is also known as "nested" storage). Table 9.14 outlines the nested standby storage and fire-suppression storage requirements for each operational area.

Table 9.14 Nested Standby Storage and Fire-Suppression Storage

Storage Area	Volume (MG)			Controlling Factor (FSS or SS)		
	2031	2036	2046	2031	2036	2046
343	0.96	0.96	0.96	FSS	FSS	FSS
455	0.38	0.39	0.40	SS	SS	SS
542	0.96	0.96	1.08	FSS	FSS	SS
544	2.31	2.65	3.39	SS	SS	SS
852	1.03	1.07	1.18	SS	SS	SS

9.4.1.4 Dead Storage

Dead storage is the volume at the bottom of the storage reservoir that cannot reliably be used because it is physically too low to be withdrawn from the reservoir or, if withdrawn from the reservoir, would result in

water pressures in the distribution system below the acceptable criteria of 30 psi. Storage volume is considered dead if it is located below the outlet pipeline and cannot be used because of system's hydraulic limitations or if high elevations cause low pressures at customer connections.

Table 9.15 summarizes the dead volume calculations for each reservoir. Section 9.4.2 outlines the recommendations to mitigate these low pressure and dead storage issues for high elevation customers.

Table 9.15 Reservoir Dead Storage(1)

Reservoir	Storage Area	Storage Volume (MG)	Maximum Elevation Served (feet)	Available Storage at 20 psi (MG)	Percent Available at 20 psi %)	Available Storage at 30 psi (MG)	Percent Available at 30 psi (%)
Butler	343	1.20	234	1.20	100%	1.20	100%
LPH No. 2	455	1.50	392	1.10	73%	0.00	0%
Gregg	542	0.10	440	0.08	80%	0.05	47%
Lacamas	544	2.0	437	2.0	100	1.57	79%
18th Avenue	544	2.0	437	2.0	100%	1.84	95%
UPH No.1	852	0.75	757	0.37	49%	0.19	26%
UPH No. 2(1)	852	2.40	757	2.22	93%	2.22	93%

Notes:
(1) UPH Reservoir No. 2 has pump station to make all storage usable. The City maintains a minimum of 5 feet in the reservoir.

9.4.2 Storage Recommendations

A summary of the existing storage and storage needs in 2046 is shown in Table 9.16. This table assumes the recommended projects to address low pressures identified in Section 9.2.1 have been completed. Storage deficits were identified in the following storage areas: 343, 542, and 544. The identified storage deficits can be mitigated by constructing additional storage space. While adjustments in operational strategy could mitigate some storage requirements, additional storage construction would still be needed to address deficits in all zones.

All recommended projects are summarized in the sections below.

Table 9.16 2046 Storage Summary

Storage Area	Total Storage Volume (MG)	Available Storage at 20 psi (MG)	Available Storage at 30 psi (MG)	Operational Storage (MG)	Equalizing Storage (MG)	Fire-Suppression Storage (MG)	Standby Storage (MG)	Required Storage (MG)	Storage Volume to Add by 2046 (MG)
343	1.20	1.20	1.20	0.10	0.18	0.96	0.77	1.24	0.04
455(1)	1.50	1.50	1.50	0.03	0.09	0.24	0.40	0.52	0
542	0.10	0.08	0.05	0.01	0.24	0.96	1.08	1.33	1.28
544	4.00	4.00	3.46	0.23	0.47	1.20	3.39	4.09	0.63
852(1)	3.15	2.59	2.42	0.45	0.43	0.30	1.18	2.06	0
Total	**9.95**	**9.37**	**8.45**	**1.08**	**1.41**	**3.63**	**6.82**	**9.24**	**1.92**

Notes:
(1) Assumes projects to address low pressures and high elevation customers causing dead storage have been completed.

Table 9.17 outlines the storage requirements and deficits for each planning year, 2031, 2036, and 2046. The sections to follow outline storage recommendations for each storage area to alleviate identified storage deficits.

Table 9.17 Storage Requirements by Planning Year

Storage Area	Total Available Storage at 30 psi(1) (MG)	2031		2036		2046	
		Required Storage (MG)	Storage Surplus/Deficit (MG)	Required Storage (MG)	Storage Surplus/Deficit (MG)	Required Storage (MG)	Storage Surplus/Deficit (MG)
343	1.20	1.20	0	1.22	-0.02	1.24	-0.04
455	1.50	0.5	1.0	0.51	0.99	0.52	0.98
542	0.05	1.05	-1.0	1.11	-1.06	1.33	-1.28
544	3.46	2.87	0.59	3.25	0.21	4.09	-0.63
852	2.42	1.85	0.57	1.91	0.51	2.06	0.36

Notes:
(1) Assumes projects to address low pressures and high elevation customers causing dead storage have been completed.

9.4.2.1 343 Storage Area Recommendations - Project ST-01

By the 2036 and 2046 planning years there are slight storage deficits of 0.02 and 0.04 MG in the 343 area. The storage in this area is currently provided by Butler Reservoir, which is a 1.2 MG partially buried reservoir originally constructed in the early 1900s. The City has indicated Butler Reservoir is reaching the end of its useful life and will be decommissioned once a new 343 zone reservoir is constructed. The replacement reservoir project is currently in preliminary design phase. An alternatives analysis completed by the City's consultant Gray & Osborne (G&O) indicated the preferred alternative would be an elevated reservoir near the Camas Cemetery. The new reservoir would be sized for buildout and provide a minimum of 1.84 MG of usable storage for the 343 area alleviating deficits identified under this planning period. G&O provided preliminary costs for the project in their September 2025 alternatives analysis, which will be included in the City's CIP.

9.4.2.2 542 Storage Area Recommendations - Project ST-02

In 2031, there is a 1.0 MG deficit in the 542 storage area, increasing to a 1.28 MG deficit in 2046. To alleviate deficits in the area, an additional storage reservoir will need to be constructed. There are multiple alternatives for increasing storage capacity in this area. For planning purposes, an elevated reservoir with a nominal capacity of 1.5 MG was recommended and will be incorporated into the CIP as it was the costliest alternative. The City should complete an alternatives analysis before beginning the design phase of this project to identify the most feasible, cost-effective solution. Due to topography the new reservoir will likely need to be located at the existing Gregg Standpipe site which is the highest point in the area. Additionally, Phase 1 of the transmission pipeline project described in Section 9.3.3.1 should be completed with this storage project to mitigate potential hydraulic bottlenecks associated with filling the new reservoir. Phase 1 would include approximately 3,200 LF of 24-inch diameter transmission pipeline from the intersection SE 283rd Avenue and SE Nourse Road to the new Gregg Reservoir.

9.4.2.3 544 Storage Area Recommendations - Project ST-03

At the end of the planning period in 2046, there will be a deficit of approximately 0.63 MG in the 544 storage area. To address this deficit an additional reservoir with a nominal capacity of 0.75 MG is recommended at the 18th Avenue site, which has space on-site to accommodate the additional reservoir.

9.5 Limiting Capacity Analysis

The limiting capacity of the City's physical water system was determined for the 2031, 2036, and 2046 planning years with existing conditions and infrastructure. The limiting capacity was then calculated for the 2046 planning year with the assumption that all recommended improvement projects will be online. The limiting capacity analysis uses the methodology described in DOH Water System Design Manual (2009) Worksheet 6-1 and Table 6-1. Table 9.18 describes the method used to calculate capacity for each component.

Table 9.18 Limiting Capacity Calculations

Water System Component	Equation / Notes
Sources (ADD)	N = $\frac{Firm\ Source\ Capacity}{ADD\ ERU\ value}$ where: Firm source capacity = source capacity with largest source (Well 13) offline.
Sources (MDD)	N = $\frac{Firm\ Source\ Capacity}{MDD\ ERU\ value}$ where: Firm source capacity = source capacity with largest source (Well 13) offline.
Treatment	The City has designed treatment capacity with sufficient capacity to serve its sources.
Equalizing Storage (ES)	N = $\frac{1}{C}\left[\left(\frac{1440}{MDD}\right)\left(\frac{ES}{150}+Q_s-18\right)-F\right]$ where: MDD = MDD, gpd/ERUs. C = Coefficient associated with ranges of ERUs. F - Factor associated with ranges of ERUs. Q_s = Total source pumping capacity, gpm.
Standby Storage (SB)	N = $\frac{SB_t}{(SB_i)(t_d)}$ where: SB_t = total volume of water in standby storage component (gallons). SB_i = Design level of standby storage to meet reliability considerations per ERU (gpd/ERU). t_d = time that storage is to be used (days).
Distribution	Not considered capacity limited because the City has planned projects to address all identified deficiencies and design standards confirm all new development meets City standards.
Transmission	Assumed to be addressed as part of source and pumping capacity.

The capacity of many water system components can be expressed as the number of ERUs that can be served. As described in Chapter 5, an ERU for the City's system is one that consumes 242 gpd on an average demand day. On a maximum day, an ERU consumes 490 gpd.

To determine how many ERUs the City's sources can serve on a maximum demand day, the supply to each operational area was divided by the MDD ERU value of 490 gpd. The MDD ERU value was also used to calculate the capacity of the City's equalizing storage in ERUs. The ERU capacity of standby storage was calculated by subtracting out each reservoir's equalizing storage and operational storage under 2046 demand conditions from its total available storage capacity.

The capacity of each operational area is either limited by source supply or standby storage. None of the service areas are limited by the amount of equalizing storage available. In total, based on sources, equalizing storage, and standby storage, the City's water system has a limiting capacity of approximately 18,830 ERUs. This is shown in Table 9.19.

As presented in Chapter 5, the City predicts serving approximately 34,420 ERUs in 2046. Considering sources, equalizing storage, and standby storage, the City's water system is anticipated to have insufficient capacity to meet expected growth within the 20-year planning period due to standby storage and supply source capacity. This confirms the storage recommendations presented in Section 9.4.2 and the supply recommendations presented in Chapter 8.

Fire-suppression storage is not a function of ERUs and therefore is not represented in Table 9.19.

Table 9.19 Calculated Capacity in ERUs for Each Water System Component

Water System Component	2031 System-wide ERUs	2036 System-wide ERUs	2046 System-wide ERUs	2046 System-wide ERUs with Improvements
Projected ERUs	23,800	27,440	34,420	34,420
Sources(1) (ADD)	44,495	44,495	44,495	71,720
Sources (MDD)	24,705	24,705	24,705	42,645
Equalizing Storage	81,670	81,670	81,670	161,425
Standby Storage	20,055	19,665	18,830	49,910
Limiting Capacity	Standby/Sources (MDD)	Standby/Sources (MDD)	Standby/Sources (MDD)	None

Notes:
(1) Average day source capacity assumes supply facilities are operated 18 hours per day.

9.6 Summary of Recommendations

The system analysis yielded a number of recommended improvements for pump stations, storage reservoirs, and pipelines which are summarized in Table 9.20 and Figure 9.14. Supply projects identified in Chapter 8 are also shown on this figure. These recommendations are organized into a CIP with associated costs in Chapter 10.

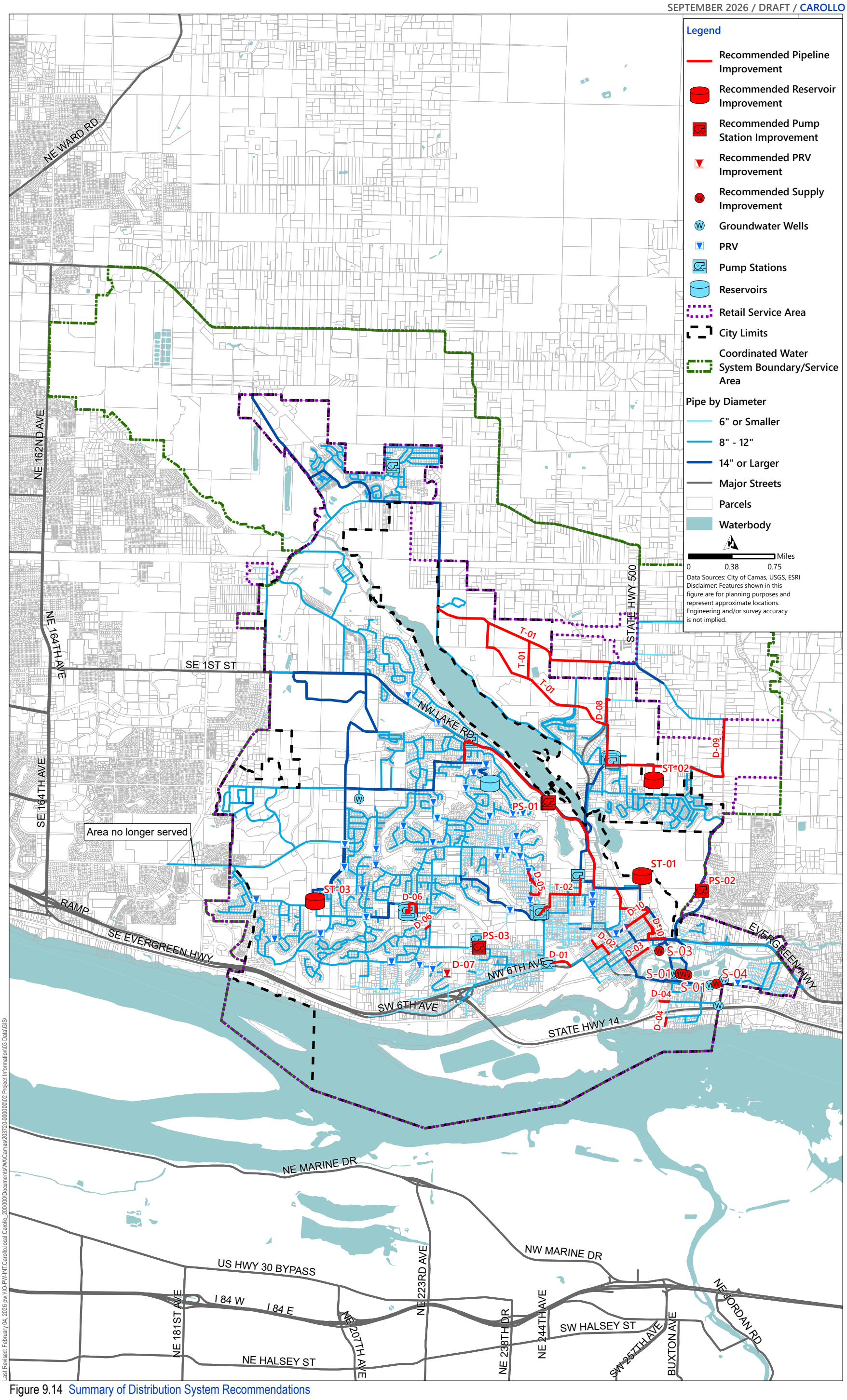


Figure 9.14 Summary of Distribution System Recommendations

Table 9.20 Summary of Recommended Improvement Projects

Project ID	Project Name	Improvement Type	Existing Diameter (inches)	Proposed Diameter (inches)	Description/Purpose
PS-01	544 Pumping Area Improvements	Pump Station and Transmission Pipeline			Construct Lake Road Pump Station, 30-inch suction and discharge pipeline, and 36-inch 343 zone transmission pipeline.
PS-02	542 Pumping Area Improvements	Pump Station Upsize and Transmission Pipeline			Add an additional 800 gpm pump at Crown Road pump station and construct 3,200 LF of 24-inch transmission pipeline.
PS-03	Francis Road Pumping Area Improvements	Pump Station Upsize			Replace Francis Road pump station with a new, above ground pump station sized to serve domestic connections and fire flow.
ST-01	343 Zone Storage Improvements	Storage			A 1.84 MG elevated reservoir in the 343 zone is recommended to address storage deficits in all planning years and replace the aging Butler Reservoir.
ST-02	542 Zone Storage Improvements	Storage			A 1.5 MG elevated reservoir in the 542 zone is recommended to address storage deficits in all planning years.
ST-03	544 Zone Storage Improvements	Storage			A 0.75 MG reservoir in the 544 zone is recommended to address the storage deficit in the 2046 planning year.
D-01	NW 7th Avenue Fire Flow Improvements	Pipeline Upsize	8	12	Upsize approximately 1,300 LF of pipeline from 6-inch to 12-inch to address fire flow deficiencies in the area.
D-02	NE Dallas Street Fire Flow Improvements	Pipeline Upsize	6	12	Upsize approximately 1,150 LF of pipeline from 6-inch to 8-inch to address fire flow deficiencies in the area.
D-03	E 1st Avenue Fire Flow Improvements	Pipeline Upsize	8	12	Upsize approximately 1,150 LF of pipeline from 6-inch to 8-inch to address fire flow deficiencies in the area.
D-04	Operations Center/WWTF Fire Flow Improvements	Pipeline Upsize	6	8	Upsize approximately 850 LF of pipeline from 6-inch to 8-inch to address fire flow deficiencies in the area.
D-05	NW Fargo Street Fire Flow Improvements	Pipeline Upsize	6, 8	12	1,700 LF of pipeline is being upgraded from 6-inch to 8-inch to address fire flow deficiencies in the area.
D-06	Upper Prune Hill Fire Flow Improvements	Pipeline Upsize	4	8	Upsize approximately 750 LF of pipeline from 12-inch to 16-inch and 450 LF of 8-inch pipeline to 12-inch to address fire flow and low-pressure deficiencies in the area.
D-07	Sierra Lane PRV Station	PRV Station	4	8	New PRV station to allow fire flow from the 542_S zone to the 455 zone.
D-08	SE 5th Street and SE Everett Road Fire Flow Improvements	Pipeline Upsize	4	8	Upsize approximately 1,200 LF of pipeline from 10-inch to 12-inch and 50 LF of 8-inch pipeline is recommended to address fire flow deficiencies in the area.
D-09	SE 283rd Avenue Fire Flow Improvements	Pipeline Upsize	16	20	2,700 LF of pipeline is being upgraded from 8-inch to 12-inch to address fire flow deficiencies in the area.
D-10	NE 6th Avenue and NE Nevada Street Fire Flow Improvements	Pipeline Upsize		8	Upsize approximately 3,600 LF of pipeline from 6-inch to 8-inch to address fire flow deficiencies in the area.
T-01	North Shore Transmission Pipeline	Transmission Pipeline		12,24	Construct approximately 6,300 LF of 12-inch pipeline and 16,600 LF of 24-inch pipeline to serve future North Shore development.
T-02	Angelo Pump Station Discharge Pipeline	Transmission Pipeline	Various	16	Upsize approximately 3,350 LF of various diameter pipeline to 16-inch pipeline to address high head loss and discharge pressures at Angelo PS.

CHAPTER 10 CAPITAL IMPROVEMENT PLAN

10.1 Introduction

This chapter combines the various projects recommended in the WSPU for the City's distribution system and presents them as a comprehensive CIP. With this CIP, the City will have guidelines to plan and budget for the distribution system over the next 20 years, along with the recommended timing and cost estimates for each identified project. Project phasing is described as either short-term (0 to 10 years, which corresponds to 2027 through 2036) or long-term (11 to 20 years, which corresponds to 2037 through 2046).

Appendix **[X]** lists each project with cost estimates in 2025 dollars and detailed implementation timing and prioritization.

10.1.1 Capital Project Categories

The WSPU's CIP projects are categorized as follows:

- Distribution System Improvements (D).
- Transmission Pipeline (T).
- Annual Repair and Replacement Programs (R).
- Pump Station (PS).
- Storage (ST).
- Supply and Treatment (S).
- General (G).

The abbreviations presented above were used during project identification to delineate each project category.

10.1.2 Capital Project Types

To support the City's financial evaluation, CIP projects were assigned need based on four types:

- **Growth:** Projects that add system capacity to meet future demand growth. These projects are typically funded with connection fees and are recommended to meet the analysis criteria detailed in Chapter 2.
- **Upgrade**: Projects necessary to improve the level of service (e.g., redundant pumping, backup power, pipe upsizing, fire flow, system reliability) of existing infrastructure. These projects are typically funded with rates and are needed whether demand increases or stays the same.
- **Replace and Repair (R&R)**: Projects that replace or maintain existing infrastructure without increasing capacity or level of service. These projects are typically funded with rates and are meant to renew aging infrastructure that is in poor condition.
- **General/Programmatic**: Projects that are intended to be studies, consisting of future water system plans and water supply feasibility studies.

Individual projects may include elements of multiple capital project types, meaning each project was defined as one or more of the four types and assigned a percentage of the total project cost to each type. The allocations between multiple types were made using professional judgment.

10.1.3 Capital Planning Periods

CIP projects were allocated into the planning periods referenced in previous chapters:

1. Short-term (2027-2036).
2. Long-term (2037-2046).

Projects recommended under this planning period have all been allocated to individual years. To better distribute costs, some larger projects have been spread across multiple years to account for longer design and construction periods. The project timing in this Chapter is subject to change, as the City regularly reviews and updates its CIP based on changing conditions and priorities.

10.1.4 Capital Project Cost Allocation

Discussed in Section 10.1.2, each CIP project was assigned to a capital project type. The allocated project type will help support the City in the development of rates and standard development charges. Each CIP project type was assigned a cost allocation. In general, CIP projects needed to support future growth and development are funded by developers and connection fees while projects needed to support existing infrastructure deficiencies or repair and replacement are funded by existing rate payers.

- Growth: Projects will be funded by developers and SDCs (connection charges).
- Upgrade: Projects will be funded by rates.
- R&R: Projects will be funded by rates.
- General: Projects will typically be funded by rates.

10.2 Cost Estimating Assumptions

10.2.1 Cost Estimate Level

The CIP cost estimates in this chapter are Class 5 (budget-level estimates from a -50 percent to +100 percent range). These costs were determined using both Carollo Engineers' (Carollo) understanding of project locations and current conditions and the City's costs for similar and recently constructed capital projects. Note actual costs may vary by -50 percent to +100 percent from these estimates.

All costs are given in 2025 dollars. The Handy-Whitman Index for Water Utility Construction in the Pacific Region for January 2025 is 1,401. As previously stated, the estimates are subject to change as the project design matures and because costs for labor, materials, and equipment may vary in the future.

10.2.2 Baseline Unit Cost

Baseline construction costs were estimated using unit costs with the assumptions presented in the following subsections.

10.2.3 Cost Estimates Elements

The total CIP cost estimates are based on construction costs that are inflated using cost factors to account for non-construction project elements. The cost factors for the WSPU are shown in Table 10.1. Note for pump station and supply projects, which typically rely heavily on mechanical components, a 25 percent factor for engineering and planning were allocated to account for project complexity. For pipeline and storage projects, 20 percent was allocated for engineering and planning. For pipeline and storage projects, the cost factors would increase the baseline construction costs by 80 percent to represent the total project cost. For pump station and supply projects, the cost factors would increase the baseline construction costs by 85 percent to represent the total project cost, respectively.

Table 10.1 Cost Factors

Adjustment Factors	Description	Factor
Contingency	Costs that may occur due to uncertainty in project scope and conditions.	30%
General Conditions and Overhead	Contractor costs indirectly related to construction.	25%
Engineering/Planning(1)	Cost for planning and design of project.	20%/25%
City Admin	Cost to administer the project.	5%

Note:
(1) Pump station and supply projects were assigned an engineering/planning factor of 25 percent to account for project complexity.

The costs presented in this CIP are high-level planning costs that will help the City make financial decisions.

The sample capital improvement project cost calculation shown below demonstrates how construction contingency as well as design and administrative costs were added to the baseline construction cost to determine the total project cost. The construction contingency plus design and administration costs make up just over 50 percent ($1,015,000/$2,015,000) of the total project cost estimate.

Example, assuming engineering/planning factors for pump stations and supply/treatment:

Baseline Construction Cost	**$1,000,000**
Construction Contingency (30%)	$300,000
Estimated Construction Cost	**$1,300,000**
General Conditions & Overhead (25%)	$325,000
Engineering/Planning (25%)	$325,000
City Admin (5%)	$65,000
Total Capital Improvement Cost	**$2,015,000**

10.2.4 Pipeline Unit Costs

Table 10.2 shows unit cost assumptions for pipelines. These costs were developed using Carollo's understanding of project locations and current conditions and the City's costs of similar and recently constructed capital projects. For planning purposes, these unit costs assume open-trench construction in improved areas. If trenchless construction is possible for some projects, the cost estimates may need to be modified. Costs include pavement cutting, excavation, hauling, shoring, ductile iron pipe, materials (i.e.,

valves, fittings, restraints, etc.) and installation, hydrant assemblies, backfill material and installation, and pavement replacement. The unit costs are for construction in stable soil at standard excavation depths for each pipe size. Additionally, costs reflect increased effort to construct on shallow bedrock that overlays large areas of the City and its Urban Growth Area. Steep slopes, extensive permitting, or acquisition of right of way may result in additional costs. These costs are construction costs only and do not reflect Contingency, General Conditions and Overhead, Engineering/Planning, and City Admin.

Table 10.2 Pipeline Unit Costs

Pipe Size (Inches)	Pipe Unit Cost(1) ($/Linear Foot)
8	$236
10	$268
12	$300
16	$404
20	$481
24	$575
30	$897
36	$1,203

Notes:
(1) Costs represent baseline construction costs and do not include additional cost factors for contingency, general conditions and overhead, engineering/planning, and City admin.

10.2.5 Pump Station Costs

Pump station projects costs were developed based on both site and project specific requirements. The costs account for Carollo's understanding of project locations and current conditions, as well as costs from recently completed Carollo projects.

10.2.6 Well Costs

Well drilling project costs were developed based on typical costs from past Strata Geosciences projects. Costs do not include mechanical equipping of well. Well equipping costs were site specific and developed based on Carollo's understanding of estimated well yields, project location, and the City's ongoing Well 13 construction project. Cost estimates for new well drilling is approximately $150,000.

10.2.7 Reservoir Costs

New reservoir project costs were developed based on typical costs from past Carollo projects. Conceptual costs for reservoirs vary by type: ground and elevated. Costs are estimates based on reservoir volume in gallons, as presented in Table 10.3. Reservoir costs are sensitive to site-specific geotechnical and seismic considerations; therefore, it is recommended that a reservoir siting study that addresses these issues be conducted at the initiation of a new reservoir project.

Table 10.3 Reservoir Unit Costs

Reservoir Type	Cost per gallon(1) ($/gallon)
Ground(2)	$3
Elevated	$10

Notes:
(1) Costs represent baseline construction costs and do not include additional cost factors for contingency, general conditions and overhead, engineering/planning, and City admin.
(2) Unit costs for ground reservoirs are based on welded steel construction.

10.2.8 Additional Costs

Other common costs for the CIP include those associated with onsite generators and PRV stations. Conceptual costs were estimated based on recent Carollo projects and presented in Table 10.4.

Table 10.4 Additional Costs

Reservoir Type	Cost(1)(Lump Sum)
Onsite Generator	$500,000 per generator installation
PRV Station	$400,000 per station

Notes
(1) Costs represent baseline construction costs and do not include additional cost factors for contingency, general conditions and overhead, engineering/planning, and City admin.

10.3 CIP Development and Implementation

The capital improvement implementation was separated into three priorities:

- Short-term: 0 to 10 years.
- Long-term: 10 to 20 years.
- Annual.

Table 10.5 summarizes the priorities associated with all projects and recommendations from this WSPU, based on the City's water system needs.

Table 10.5 CIP Prioritization Summary

Project Types	0-10 years	10-20 years
Pipeline upsize for fire flow only.	X	
Pipeline upsize for fire flow and low pressure.	X	
Pipeline repair and replacement.	Annual	
Transmission pipeline projects	X	X
Pump station projects.	X	X
Storage projects.	X	X
Supply and treatment projects.	X	X
General projects.	X	X

The following sections summarize recommended projects identified in previous chapters and incorporated in the summary in Section 10.5.

10.3.1 Recommended Distribution Projects

Distribution system projects (D) were developed using the hydraulic model and were identified for areas not meeting velocity and pressure criteria, as detailed in Chapter 9. These projects also took City staff input into account during development.

10.3.1.1 D-01 through D-10 - Fire Flow Recommendation Projects

To address the fire flow deficiencies identified in Chapter 9, the projects and recommendations presented in that chapter should be implemented. Namely, projects will upsize pipelines or add piping to create looped piping. Once implemented, these projects will address the identified deficiencies. Appendix **[X]** details each fire flow project and references it according to its respective project identification. In the CIP, these are projects D-01 through D-10.

In summary, these projects will replace or upsize approximately 15,500 LF of pipelines. Projects D-01 through D-05 and project D-10 include replacing aging cast iron or steel pipe to address fire flow deficiencies. Costs for these projects have been incorporated into the pipeline replacement program. The remaining projects, D-06 through D-09 are estimated to be a total of $4.4 million (including all applicable cost factors) and are recommended for completion in 2034 as part of the short-term planning period.

10.3.1.2 Distribution System Recommendations Summary

Table 10.6 summarizes recommended distribution system projects along with their respective priorities and costs. As discussed in the previous section, costs for projects D-01 through D-05 and project D-10 have been incorporated into the pipeline replacement program and therefore are not presented in Table 10.6.

Table 10.6 Distribution System Recommendations

Project Number	Project Name	Timing(2)	Priority	Cost(1)(2)
D-01	NW 7th Avenue Fire Flow Improvements	-	0-10 years	$-
D-02	NE Dallas Street Fire Flow Improvements	-	0-10 years	$-
D-03	E 1st Avenue Fire Flow Improvements	-	0-10 years	$-
D-04	Operations Center/WWTF Fire Flow Improvements	-	0-10 years	$-
D-05	NW Fargo Street Fire Flow Improvements	-	0-10 years	$-
D-06	Upper Prune Hill Fire Flow Improvements	2034	0-10 years	$1.3 million
D-07	Sierra Lane PRV Station	2034	0-10 years	$0.8 million
D-08	SE 5th Street and SE Everett Road Fire Flow Improvements	2034	0-10 years	$0.74 million
D-09	SE 283rd Avenue Fire Flow Improvements	2034	0-10 years	$1.6 million
D-10	NE 6th Avenue and NE Nevada Street Fire Flow Improvements	-	0-10 years	$-

Notes:
(1) The cost includes 30 percent construction contingency and 20 percent Engineering, Legal, and Administration (ELA) contingency.
(2) Costs and timings for projects D-01 through D-05 and D-10 are incorporated into the pipe replacement program and not reported in this table.
WWTF - wastewater treatment facility.

10.3.2 Recommended Transmission Pipeline

Transmission pipe projects (T) were developed using the hydraulic model and input from City staff. Table 10.7 summarizes transmission pipeline projects identified for this planning period.

Table 10.7 Transmission Pipe Recommendations

Project Number	Project Name	Timing	Priority	Cost(1)
T-01	North Shore Transmission Pipeline	2032	0-10 years	$20.5 million
T-02	Angelo Pump Station Discharge Pipeline	2037-2038	10-20 years	$2.7 million

Notes:
(1) The cost includes 30% construction contingency and 20% ELA contingency.

10.3.2.1 T-01 - North Shore Transmission Pipeline

Large development, both residential and commercial, is expected in the City's North Shore area. Geographically located in the area north of Leadbetter Road, the development will be connected to the existing distribution system via transmission pipeline. Detailed in Chapter 9, approximately 1,600 LF of 12-inch diameter pipe and 13,200 LF of 24-inch diameter pipeline will be needed to connect the area to the existing system. Additionally, to convey water to the development area approximately 4,200 LF of existing pipeline between Gregg Reservoir and the proposed North Shore roundabout needs to be upsized to 24-inch diameter pipeline (Phase 2 Pipeline).

The estimated cost for the North Shore transmission pipeline is approximately $20.5 million and recommended for completion when needed to support development in the area. This is expected to be in approximately 2032 as part of the short-term planning period.

10.3.2.2 T-02 - Angelo Discharge Pipeline

Discharge piping for Angelo Pump Station in the distribution system network is undersized for future demands causing concerns with high head loss and discharge pressures. Detailed in Chapter 9, approximately 3,350 LF of 16-inch diameter pipeline will be needed to address these concerns.

The estimated total project cost for the Angelo discharge pipeline is approximately $2.7 million and recommended in the long-term. As this project is due to an existing system deficiency, this project can be completed as soon as funds are available, however, this is a lower priority project. Therefore, to distribute costs for this project across multiple planning years, design is recommended for 2037 and is assumed to be approximately $0.3 million, which is 10 percent of the total project costs. Construction was assumed to be the remaining $2.4 million and would occur the following year in 2038.

10.3.3 Recommended Annual Repair and Replacement Programs

Table 10.8 summarizes the two annual program projects (R) being recommended: pipeline replacement program and miscellaneous facility projects.

Table 10.8 Annual Repair and Replacement Program Recommendations

Project Number	Project Name	Priority	Cost(1)
R-01	Pipeline Replacement Program	Annual	$84 million
R-02	Miscellaneous Facility Projects	Annual	$3 million

Notes:
(1) The cost includes 30% construction contingency and 20 percent ELA contingency.

10.3.3.1 R-01 - Pipeline Replacement Program

The City has approximately 165,000 LF (31.3 miles) of cast iron and steel pipe in their distribution system. These pipes are reaching the end of their useful life and deteriorating conditions have caused the City's distribution system leakage to increase. It is recommended the City implement a pipeline replacement program aimed at replacing these pipes to reduce the risk of failure. Overall, the total estimated cost to replace all cast iron and steel pipe is approximately $84 million. Over the 20 year period of this WSPU, it is recommended the City replace approximately 1.5 miles of pipe and budget approximately $4.2 million per year. However, it was determined that budgeting this amount in the short-term would be difficult given the City's expected short-term CIP project list. To better align the pipeline replacement program with these projects, it is recommended that the City budget $0.2 million for the program per year through 2034. From 2035 through 2046, the City can budget the remaining costs for the program which equates to approximately $6.9 million per year over this twelve year period.

10.3.3.2 R-02 - Miscellaneous Facility Projects

Discussions with the City indicated they complete two R&R type projects annually at major distribution system facilities (wells, reservoirs, pump stations, etc.). On average each of these projects typically cost the City approximately $75,000. The overall CIP allocated $150,000 per year for the completion of two miscellaneous facility "improvement type" projects in each planning year. Over the 20-year period, miscellaneous facility projects are estimated to cost approximately $3 million.

10.3.4 Recommended Pump Station Projects

This section summarizes the recommended pump station projects (PS), identified through the desktop pumping analysis detailed in Chapter 9. Table 10.9 summarizes three PS projects, all of which are prioritized in the short-term.

Table 10.9 Pump Station Recommendations

Project Number	Project Name	Timing	Priority	Cost(1)
PS-01	544 Pumping Area Improvements	Segment 1: 2027-2028 Segment 2: 2031-2033 PS: 2032-2034	0-10 years	$37.9 million
PS-02	542 Pumping Area Improvements	2045	10-20 years	$0.72 million
PS-03	Francis Road Pumping Area Improvements	2035	0-10 years	$3.4 million

Notes:
(1) The cost includes 30% construction contingency and 25% ELA contingency.

10.3.4.1 PS-01 - 544 Pumping Improvements

The 544 pumping area has insufficient pumping capacity for all planning years and scenarios. To address this deficiency, the Lake Road pump station is recommended to pump directly from the 343 Zone to the 544 Zone. Currently in the preliminary design phases, the new pump station will have a firm capacity of 9,000 gpm and include approximately 1,250 LF of 24-inch, 9,850 LF of 30-inch, and 6,000 LF of 36-inch diameter transmission pipeline.

A cost estimate developed by Carollo in summer 2025 for the pump station portion of the project estimated construction costs at $7.3 million. The estimated cost of the transmission pipeline is approximately $31.8 million. Both portions of the project are recommended to be completed in the short-term. Given the City's short-term CIP project list, it will be difficult to construct the entirety of this project in a single phase. Therefore, it was recommended that the pipeline portion of this project be divided into multiple segments to be constructed across various years. Additionally, it was determined that some segments of the pipeline and the pump station could be delayed to allow for other projects to be prioritized. Segment 1 of the pipeline is the highest priority and includes approximately 6,000 LF of 36-inch pipeline between the intersections of NE 3rd Avenue/E 1st Avenue and NE Everett Street/ NE 22nd Avenue. Funds have already been allocated for the design of this pipeline, which is currently in progress. Construction of this segment of pipeline is recommended to start in 2027 and cost approximately $13.7 million with completion in 2028. While the City initially planned on constructing this project in the 2027 and 2028 timeframe, due to other budget priorities, it is recommended that the City considered delaying segments 2 through 4 and the pump station. For purposes of this WSP, approximately $1.8 million has been allocated in 2031 for design of Segments 2 through 4 of the pipeline, which is 10 percent of the cost for these segments. Construction for these segments would occur in 2032 and 2033 and cost approximately $15.7 million. For the pump station portion of the project, approximately $0.7 million would occur in 2032 for design with construction in 2033 and 2034 making up the remaining $6.6 million.

10.3.4.2 PS-02 - 542 Pumping Improvements

The 542 pumping area has insufficient pumping capacity under redundancy criteria in the 2046 scenario. To address this deficiency, an additional 800 gpm pump is recommended at Crown Road pump station.

The total estimated cost of the project is approximately $0.72 million and is recommended for completion in 2045 as part of the long-term planning period.

10.3.4.3 PS-03 - Francis Road Pumping Improvements

The Francis Road pumping area has insufficient pumping capacity and fire flow capacity for each planning year scenario. Discussion with the City indicated their preference to replace the existing Francis Road pump station with a new above grade pump station. The service area of the new pump station will be expanded to serve nearby customers with low pressures. To meet DOH criteria and the City's level of service goals, the new Francis Road pump station will be equipped with two 75 gpm capacity domestic pumps, two 1,000 gpm capacity fire pumps and a backup generator. These improvements will resolve the current fire flow and pressure deficiencies in this area.

As this is an existing deficiency, it is recommended that the City perform this project as budget allows. The estimated cost for the Francis Road pump station replacement is approximately $3.4 million, and for purposes of this WSP is schedule for 2035 as part of the short-term planning period.

10.3.5 Recommended Storage Projects

This section summarizes the recommended storage projects (ST), identified through the desktop storage analysis detailed in Chapter 9. Table 10.10 shows the three recommended storage capacity projects, two of which are prioritized for the short-term and one in the long-term.

Table 10.10 Storage Recommendations

Project Number	Project Name	Timing	Priority	Cost(1)
ST-01	343 Zone Storage Improvements(2)	2030-2031	0-10 years	$25.7 million
ST-02	542 Zone Storage Improvements	Pipeline:2029-2030 Reservoir: 2034-2036	0-10 years	$33.6 million
ST-03	544 Zone Storage Improvements	2045	10-20 years	$4.5 million

Notes:
(1) The cost includes 30% construction contingency and 20% ELA contingency.
(2) The cost was provided in Gray and Osborne's, New 343 Reservoir Alternatives Analysis, September 2025.

10.3.5.1 ST-01 - 343 Zone Storage Improvements

By the 2036 and 2046 planning years there are slight storage deficits of 0.02 and 0.04 MG in the 343 area. The storage in this area is currently provided by Butler Reservoir, which is a 1.2 MG partially buried reservoir originally constructed in the early 1900s. The City has indicated Butler Reservoir is reaching the end of its useful life and will be decommissioned once a new 343 zone reservoir is constructed. The replacement reservoir project is currently in preliminary design phase. An alternatives analysis completed by the City's consultant Gray & Osborne indicated the preferred alternative would be an elevated reservoir near Camas Cemetery. The new reservoir, being sized for buildout conditions, would provide a minimum of 1.84 MG of usable storage for the 343 area alleviating deficits identified under this planning period.

The estimated total project cost for the elevated reservoir (ST-01) is approximately $25.7 million and is expected to be completed in the short-term. Costs for this project were provided in Gray and Osborne's, New 343 Reservoir Alternatives Analysis, completed in September 2025. While the City was planning to construct this project immediately, due to budgetary limitations, this project is scheduled for construction to occur in 2030 and 2031 to balance out the City's CIP, equaling approximately $12.9 million per year. Funds for the design of this project have already been allocated and therefore were not considered in the cost distribution.

10.3.5.2 ST-02 - 542 Zone Storage Improvements

In 2031, there is a 1.0 MG deficit in the 542 storage area, increasing to a 1.28 MG deficit in 2046. To alleviate deficits in the area, an additional storage reservoir will need to be constructed. There are multiple alternatives for increasing storage capacity in this area. For planning purposes, an elevated reservoir with a nominal capacity of 1.5 MG was recommended and will be incorporated into the CIP as it was the

costliest alternative. Additionally, 3,800 LF of 24-inch diameter transmission pipeline is recommended between Crown Road pump station and the new reservoir. This will address the hydraulic limitation and allow for multiple pumps at Crown Road to operate simultaneously to fill the new reservoir.

The estimated cost for the reservoir portion of the project is approximately $29.3 million and approximately $4.3 million for the pipeline. Both elements of the project are recommended for completion in the short-term. However, the pipeline should be prioritized before the reservoir to address the existing hydraulic limitation as previously noted. Since this is an existing deficiency, design of the pipeline is recommended for 2029 and is assumed to be approximately $0.4 million, which is 10 percent of the pipeline cost. Construction was assumed to be the remaining $3.9 million and would occur the following year in 2030. To distribute the total project costs, it is recommended that the design and construction of the reservoir should be delayed, allowing for the completion of other higher priority projects. Under this timeline, design of the reservoir is slated for 2034 and is assumed to be approximately $2.9 million, which is 10 percent of the reservoir cost. Construction of the reservoir is expected to take multiple years, so the remaining reservoir costs are divided across 2035 and 2036, equating to approximately $13.2 million per year.

10.3.5.3 ST-03 - 544 Zone Storage Improvements

At the end of the planning period in 2046, there will be a deficit of approximately 0.63 MG in the 544 storage area. To address this deficit, an additional reservoir with a nominal capacity of 0.75 MG is recommended at the 18th Avenue site, which has space on-site to accommodate the additional reservoir.

The estimated cost for the 544 zone storage improvements (ST-03) is approximately $4.5 million and is recommended in 2045 as part of the long-term planning period.

10.3.6 Recommended Supply and Treatment Projects

This section summarizes the recommended supply and treatment projects that were identified through the supply analysis detailed in Chapter 8 and Chapter 9. Table 10.11 shows the four recommended projects with detailed descriptions in the sections to follow.

Table 10.11 Supply and Treatment Recommendations

Project Number	Project Name	Timing	Priority	Cost(1)
S-01	Well 8, 11, and 12 Expansion and PFAS Treatment	2027-2030	0-10 years	$40.3 million
S-02	Well 18 Development	2037	10-20 years	$9.5 million
S-03	Well 13B Development	2044	10-20 years	$8.7 million
S-04	Well 19 Development	2046	10-20 years	$8.7 million
S-05	LWWF PFAS Treatment Facility Expansion Phase 1	2032-2034	0-10 years	$9.3 million
S-06	LWWF PFAS Treatment Facility Expansion Phase 2	2036-2038	10-20 years	$9.3 million
S-07	LWWF PFAS Treatment Facility Expansion Phase 3	2040-2042	10-20 years	$9.3 million

Notes:
(1) The cost includes 30% construction contingency and 25% ELA contingency.

10.3.6.1 S-01 - Well 8, 11, and 12 Expansion and PFAS Treatment

By 2030, the City will need additional supply capacity to meet projected maximum day demands (MDD). From the water supply strategy detailed in Chapter 8, hydrogeologic investigation identified expansions at Wells 8, 11, and 12 would be capable of providing sufficient capacity and have lower associated risks than developing a new well in the short-term. Additionally, treatment is recommended for wells with the highest PFAS detections. This project is expected to consist of well upgrades, PFAS treatment with an initial capacity of 2,725 gpm, an intermediate reservoir/pump station, chemical facility upgrades, and standby power improvements.

The estimated cost for this project is approximately $40.3 million and recommended for completion in the short-term. This project is expected to be one of the largest projects undertaken by the City to date, and implementation of the project is expected to take multiple years. Due to the need for additional water supply by 2030 and an imminent MCL for PFAS, design is recommended for completion in 2027 and is assumed to be approximately $4 million, which is 10 percent of the total project cost. Construction for this project is expected to occur between 2028 and 2030, making up the remaining $36.3 million. In 2028, it is expected that well upgrades, intermediate reservoir/PS, and chemical facility upgrade components will be in construction, therefore a cost of approximately $11.9 million is expected. In 2029, the well upgrades, intermediate reservoir/PS, and chemical facilities would be completed, and construction would begin on the PFAS treatment and standby power components. Approximately $18.1 million is expected for construction in 2029. In 2030, it is assumed that PFAS treatment and standby power improvements would be completed and therefore the remaining $6.3 million is expected for construction.

10.3.6.2 S-02 - Well 18 Development

By 2037, the City will need an additional supply capacity to meet projected MDD. It is recommended to drill and develop Well 18 in the Lower Washougal Wellfield to increase capacity by approximately 2,000 gpm. This project will include well drilling, mechanical equipping, PFAS treatment, and a generator for backup power.

The estimated cost for this project is approximately $9.5 million and recommended for completion in 2037 as part of the long-term planning period.

10.3.6.3 S-03 - Well 13B Development

By 2044, the City will need additional supply capacity to meet projected MDD. It is recommended to drill and develop Well 13B assumed to be located at the existing Well 13 site or Louis Bloch Park. This project is estimated to increase capacity by 1,000 gpm and will include well drilling, mechanical equipping, PFAS treatment, and a generator for backup power.

The estimated cost for this project is approximately $8.7 million and recommended for completion in 2044 as part of the long-term planning period.

10.3.6.4 S-04 - Well 19 Development

By 2046, the City will need additional supply capacity to meet projected MDD. It is recommended to drill and develop Well 19 assumed to be located near Well 6 and 14, in the City's eastern wellfield. This project

is estimated to increase capacity by 1,000 gpm and will include well drilling, mechanical equipping, PFAS treatment, and a generator for backup power.

The estimated cost for this project is approximately $8.7 million and recommended for completion in 2046 as part of the long-term planning period.

10.3.6.5 S-05 through S-07 - LWWF PFAS Treatment Facility Expansion Phase 1-3

To reduce the initial project cost of the well expansions and PFAS treatment (Project S-01), it was recommended PFAS treatment facility capacity be sized to only treat wells with the highest PFAS detections. Due to the uncertainty around future PFAS detections, the LWWF PFAS treatment facility will be designed to accommodate expansion to an initial buildout capacity of 9,925 gpm. To reach this capacity, expansions to the treatment facility are recommended in three phases, with each phase increasing capacity by approximately 2,400 gpm. Further expansion to ultimate buildout may occur when Well 18 (Project S-02) and Well 19 (Project S-04) are drilled and developed, depending on PFAS concentrations of new wells.

The estimated cost for each phase of expansion is approximately $9.3 million, resulting in a total cost for all three phases of approximately $27.9 million. The implementation for each phase is assumed to take three years, allowing one year for design and two years for construction. For budgetary purposes, design is approximately $0.9 million, which is 10 percent of the cost per phase. Construction for each phase will make up the remaining $8.4 million with $4.2 million allocated per year. For purposes of this CIP, it is assumed that design for Phases 1, 2, and 3 would occur in 2032, 2036, and 2040, with construction occurring in 2033-2034, 2037-2038, and 2040-2041.

10.3.7 Recommended General Projects

Four general projects (G) were recommended for this CIP and are summarized in Table 10.12.

Table 10.12 Recommended General Projects Summary

Project Number	Project Name	Timing	Priority	20-year Total Cost(1)
G-01	2036 WSP	2035-2036	0-10 years	$0.53 million
G-02	2046 WSP	2045-2046	10-20 years	$0.53 million
G-03	Water Rights Investigation	2027-2028	0-10 years	$0.29 million
G-04	Pipe Replacement Prioritization Study	2034	0-10 years	$0.16 million

Notes:
(1) All general project costs include an additional 10% for City costs to administer the project.

10.3.7.1 G-01 and G-02 - Water System Plan Updates

The City's WSP will need to be updated every 10 years to comply with WAC 246-290-100. It is expected an update will occur by 2036 and 2046, respectively. The estimated cost for each WSP update is approximately $0.53 million. These projects are expected to be two year projects, which result in a cost of approximately $0.27 million per year.

10.3.7.2 G-03 - Water Rights Investigation

To fully utilize potential yields from the LWWF, it was recommended the City complete a water rights investigation. The investigation would target acquiring additional groundwater rights for the LWWF or transferring surface water rights to the LWWF for use during the period where surface water withdrawals are prohibited. The estimated cost for the water rights investigation is approximately $0.29 million. This project was recommended to start in 2027 and is expected to be completed by 2028, resulting in cost of $0.15 million per year.

10.3.7.3 G-04 - Pipeline Replacement Prioritization Study

To assist the City in developing a schedule of prioritization of the pipeline replacement program discussed in Section 10.4.3.1, it is recommended a pipeline replacement prioritization study be conducted. The estimated cost for the pipeline replacement prioritization study is approximately $0.16 million and recommended for completion in 2034 under the short-term planning period.

10.4 CIP Program Summary

This section summarizes the City's CIP program described in the previous sections. Tables 10.13 and 10.14 summarize the CIP projects by project category and priority, respectively. Figures 10.1 and 10.2 summarize the percentage of each project identified by project category and project type, respectively.

When considering CIP costs by project category as shown in Table 10.13 and Figure 10.1, the majority of CIP costs are accrued from supply and treatment projects (30 percent) and annual programs (27 percent). Pump station projects and storage projects comprise the other high-cost categories and account for 13 percent and 20 percent of the CIP, respectively.

When considering CIP costs by priority as shown in Table 10.14 and Figure 10.2, approximately 29 percent of the CIP costs are annual programs, as previously stated. The total water CIP cost over the next 20 years is approximately $317 million, which equates to approximately $15.9 million per year for the planning period. Of the total cost, approximately $177 million is budgeted for the short-term, approximately $53 million is budgeted for the long-term, and approximately $87 million is budgeted for the annual category.

When considering CIP costs by cost allocation as shown in Table 10.15 and Figure 10.3, approximately 53 percent of total CIP costs are allocated to existing rate payers. Annual programs account for a large portion of this percentage.

Table 10.13 CIP Summary Table by Cost Category

Project Category	Total Cost	Average Annual Cost	Percentage
Distribution System	$4,340,000	$220,000	1.4%
Annual Programs	$87,000,000	$4,350,000	27.4%
Transmission Pipeline	$23,200,000	$1,160,000	7.3%
Pump Station	$42,020,000	$2,100,000	13.3%
Storage	$63,800,000	$3,190,000	20.1%
General	$1,500,000	$80,000	0.5%
Supply and Treatment	$95,130,000	$4,760,000	30.0%
Total Cost	**$317,000,000**	**$15,860,000**	**100.0%**

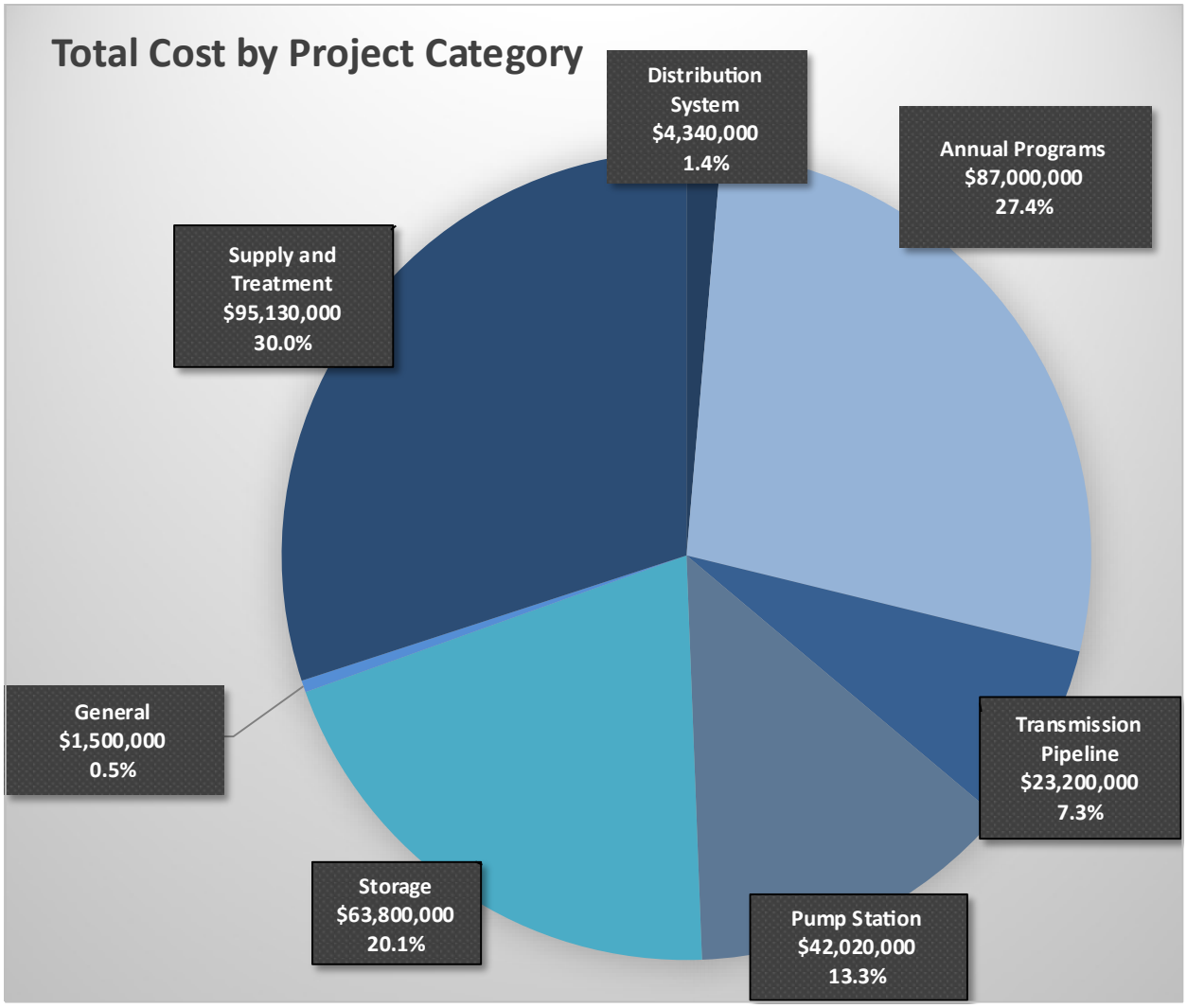


Figure 10.1 CIP Summary Table by Project Category

Table 10.14 CIP Summary Table by Project Priority

Project Priority	Total Cost	Percentage
0-10 years	$177,000,000	55.8%
10-20 years	$53,000,000	16.7%
Annual	$87,000,000	27.4%
Total Cost	**$317,000,000**	**100.0%**

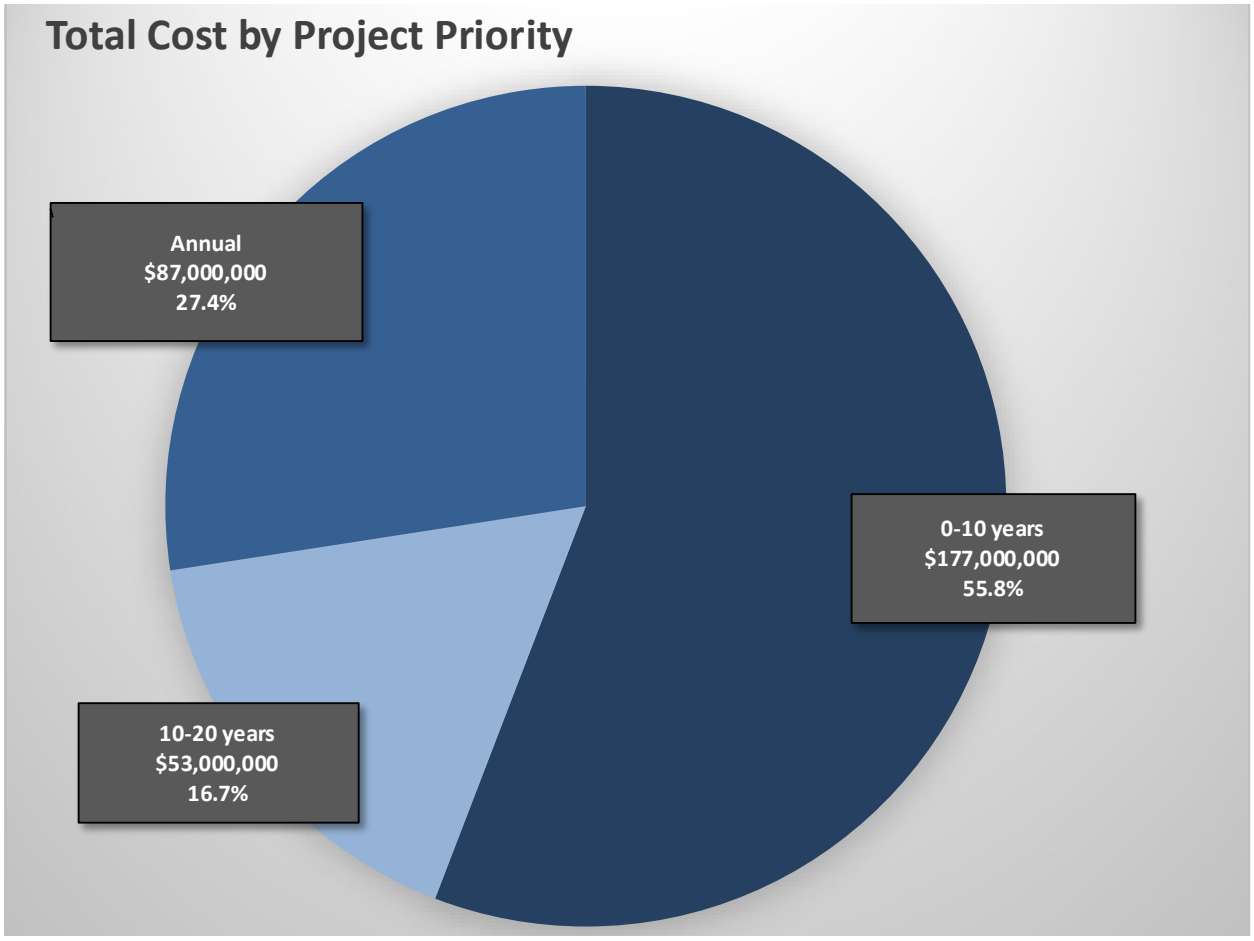


Figure 10.2 CIP Summary Table by Project Priority

Table 10.15 CIP Summary Table by Cost Allocation

Project Priority	Total Cost	Percentage
SDC	$148,900,000	47.0%
Rates	$168,100,000	53.0%
Total Cost		

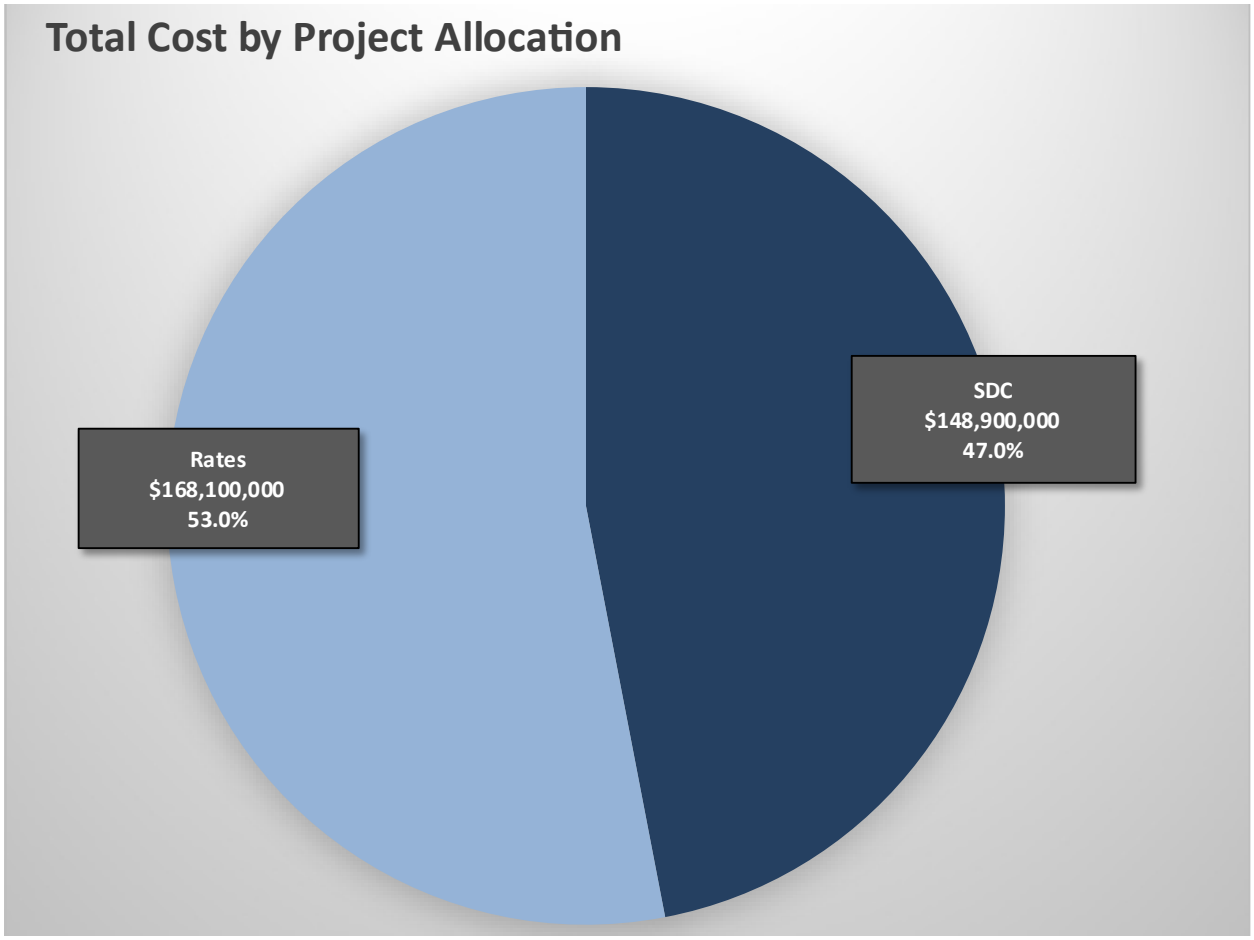


Figure 10.3 CIP Summary Table by Cost Allocation

10.4.1 CIP Project Summary

Section 10.1 summarizes the CIP projects and labels them as D, T, R, PS, ST, S, or G with each project assigned a unique CIP Identification. Table 10.16 shows all CIP projects developed for this WSPU along with associated costs and priority. Figure 10.4 presents annual costs for the City's CIP for each year of this WSPU, while Figure 10.5 illustrates annual cost breakdowns for projects funded by rates and SDCs.

An individual project sheet was generated for each CIP project and includes project identifier, description, costs, project type, timeline, and comments to help with future implementation. To help the City identify individual projects, project sheets are separated by project category. Appendix **[X]** includes all the project sheets.

Table 10.16 CIP Project Summary

Project Number	Project Name	Timing(1)	Priority	20-year Total Cost(1)
D-01	NW 7th Avenue Fire Flow Improvements	-	0-10 years	$-
D-02	NE Dallas Street Fire Flow Improvements	-	0-10 years	$-
D-03	E 1st Avenue Fire Flow Improvements	-	0-10 years	$-
D-04	Operations Center/WWTF Fire Flow Improvements	-	0-10 years	$-
D-05	NW Fargo Street Fire Flow Improvements	-	0-10 years	$-
D-06	Upper Prune Hill Fire Flow Improvements	2034	0-10 years	$1.3 million
D-07	Sierra Lane PRV Station	2034	0-10 years	$0.80 million
D-08	SE 5th Street and SE Everett Road Fire Flow Improvements	2034	0-10 years	$0.74 million
D-09	SE 283rd Avenue Fire Flow Improvements	2034	0-10 years	$1.6 million
D-10	NE 6th Avenue and NE Nevada Street Fire Flow Improvements	-	0-10 years	$-
T-01	North Shore Transmission Pipeline	2032	0-10 years	$20.5 million
T-02	Angelo Discharge Pipeline	2037-2038	10-20 years	$2.7 million
R-01	Pipe Replacement Program	-	Annual	$84 million
R-02	Miscellaneous Facility Projects	-	Annual	$3 million
PS-01	544 Pumping Area Improvements		0-10 years	$37.9 million
PS-02	542 Pumping Area Improvements	2045	10-20 years	$0.72 million
PS-03	Francis Road Pumping Area Improvements	2035	0-10 years	$3.4 million
ST-01	343 Zone Storage Improvements	2030-2031	0-10 years	$25.7 million
ST-02	542 Zone Storage Improvements	Pipeline:2029-2030 Reservoir: 2034-2036	0-10 years	$33.6 million
ST-03	544 Zone Storage Improvements	2045	10-20 years	$4.5 million
S-01	Well 8, 11, and 12 Expansion and PFAS Treatment	2027-2030	0-10 years	$40.3 million
S-02	Well 18 Development	2037	10-20 years	$9.5 million
S-03	Well 13B Development	2044	10-20 years	$8.7 million
S-04	Well 19 Development	2046	10-20 years	$8.7 million
S-05	LWWF PFAS Treatment Facility Expansion Phase 1	2032-2034	0-10 years	$9.3 million
S-06	LWWF PFAS Treatment Facility Expansion Phase 2	2036-2038	10-20 years	$9.3 million
S-07	LWWF PFAS Treatment Facility Expansion Phase 3	2040-2042	10-20 years	$9.3 million
G-01	2036 WSP	2035-2036	0-10 years	$0.53 million
G-02	2046 WSP	2045-2046	10-20 years	$0.53 million
G-03	Water Rights Investigation	2027-2028	0-10 years	$0.29 million
G-04	Pipe Replacement Prioritization Study	2034	0-10 years	$0.16 million

Notes:
(1) Costs and timings for projects D-01 through D-05 and D-10 are incorporated into the pipe replacement program and not reported in this table.

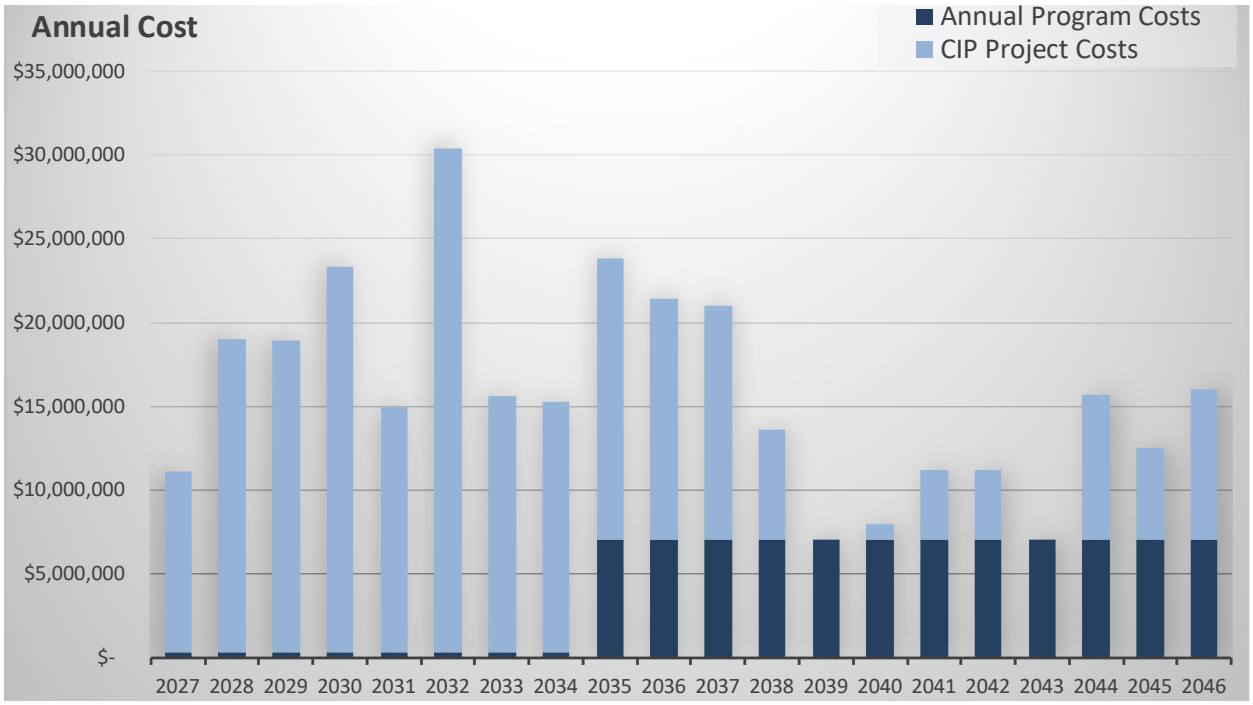


Figure 10.4 CIP Annual Cost

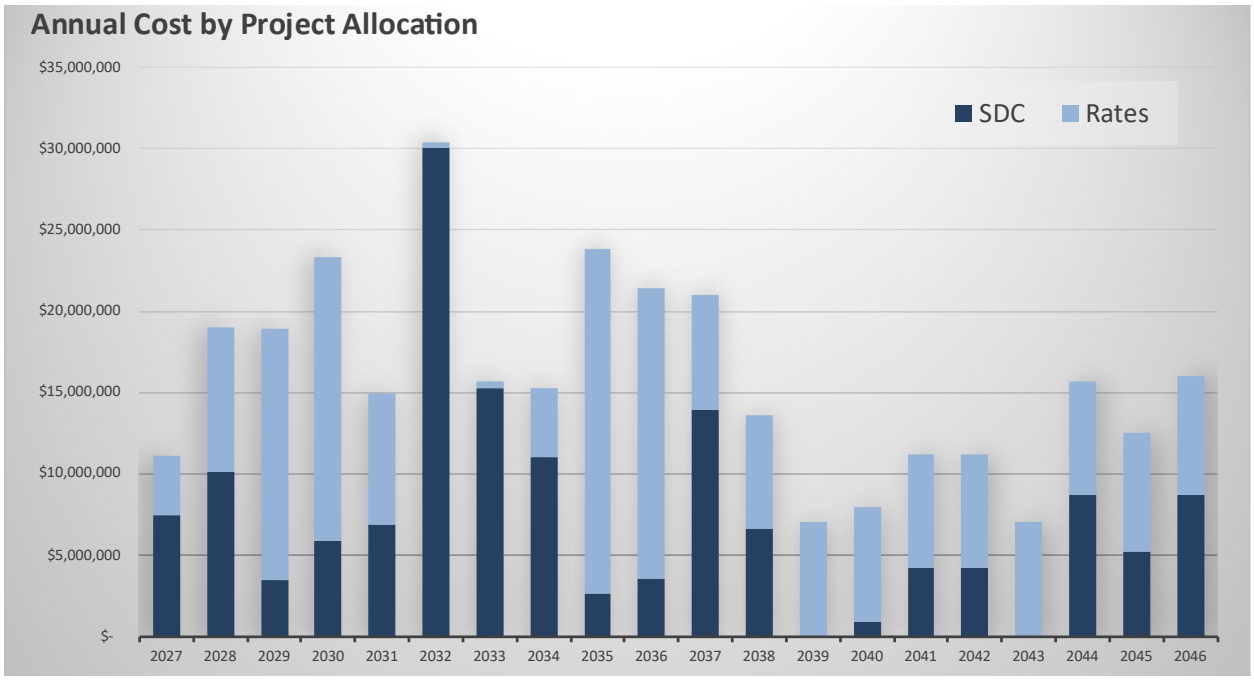


Figure 10.5 CIP Annual Cost by Project Allocation

APPENDIX A ADOPTING RESOLUTION

~ To be included in a future submittal. ~

APPENDIX B SEPA - AGENCY COMMENTS

~ To be included in a future submittal. ~

APPENDIX C

NOTICE OF DETERMINATION OF NON SIGNIFICANCE

~ To be included in a future submittal. ~

APPENDIX D

AGENCY COMMENT LETTERS AND RESPONSES

~ To be included in a future submittal. ~

APPENDIX E

LOCAL GOVERNMENT CONSISTENCY DETERMINATION

~ To be included in a future submittal. ~

APPENDIX F

PROJECT APPROVAL APPLICATION (PAA) FORM

Drinking Water

Project Approval Application (PAA) Form

331-149 F • Revised 3/24/2026

Instructions

Please complete all appropriate sections of this application form and include them with your project. You must submit them electronically. Before submitting your documents and the PAA form, please check with your Drinking Water staff contact. An administrative staff member will set up a free Box.com folder to transfer your project documents to us electronically.

Use the interactive map on our Drinking Water Contacts and Office Location webpage to find program staff assigned to your county. Email ODWOperations@doh.wa.gov Phone 360-236-3100

Water System Information

CAMAS MUNICIPAL WATER SEWER SYSTEM	108002
Water System Name	PWS ID #
2026 Water System Plan Update	Clark
Submittal Description	County
A-Community	10,000 or more
Classification	# of Service Connections

Owner Information

City of Camas		108002	
Name		Owner ID #	
publicworks@cityofcamas.us		360-817-1563	
E-mail address		Phone	
616 NE 4th Ave.	Camas	WA	98607
Mailing address	City	State	Zip

Project Contact Information

Rob Charles		Utilities Manager	
Name/Position			
RCharles@cityofcamas.us		360-817-7003	
E-mail address		Phone	
1620 SE 8th Ave.	Camas	WA	98607
Mailing address	City	State	Zip

Consulting/Design Engineer Information

Enter text		Carollo Engineers, Inc.	
Name/Firm			
Enter text		Enter text	
E-mail address		Phone	
760 SW 9th Ave., Ste 2000	Portland	OR	97205
Mailing address	City	State	Zip

Satellite Management Agency Information

Enter text		Enter text	
Name/SMA		SMA #	
Enter text		Enter text	
E-mail address		Phone	
Enter text	Enter text	WA	Enter Zip
Mailing address	City	State	Zip

Billing Information*

Rob Charles			
Name			
RCharles@cityofcamas.us		360-817-7003	
E-mail address		Phone	
1620 SE 8th Ave.	Camas	WA	98607
Mailing address	City	State	Zip

General Submittal Information

Does this water system or owner have other projects currently under review with unpaid invoices? ☐ Yes ☒ No

Is this a new water system? *(If so, include a completed Water Facilities Inventory Report Form with your project).* ☐ Yes ☒ No

If submitting an engineering project, is it included in an approved plan? (as applicable) ☐ Yes ☐ No ☒ N/A

Select Submittal General Category

(Complete the corresponding section of this form. Planning and engineering submittals must be submitted separately.)

☐ Engineering Submittal for Group A System

☐ Group B Workbook

☒ Water System Plan (WSP)

☐ Small Water System Management Program (SWSMP)

☐ Satellite Management Agency Plan

Is the submittal DWSRF funding related?

☐ Intention to apply for DWSRF Construction Loan (*Contact a regional planner on the timing for review/approval for funding applications.)*

☐ Existing DWSRF Application ..... Enter Application Number

☐ Existing DWSRF Loan ..... Enter Loan Number

Is the submittal related to formal enforcement?

☐ Enforcement Docket #:..... Enter Docket Number

Engineering Submittal Information

Select Type of Engineering Submittal (select one):

☐ Design Project Report
☐ Pre-Design Project Report
☐ Construction Documents
☐ Bid Documents (for SRF funding)
☐ Combined Design Project Report and Construction Documents
☐ Combined Design Project Report and Bid Documents (for SRF Funding)
☐ Non-Design Submittal (i.e. operations plan, pilot study protocol, or watershed plan)

Select Subject Matter (choose all that apply):

☐ Annual Unfiltered Surface Water Report
☐ Blending Plan
☐ Booster Station
☐ Capacity Analysis
☐ Chemical Addition Only (for groundwater)
☐ Corrosion Control Recommendation
☐ Corrosion Control Study
☐ Distribution Mains
☐ Other (Please Describe): _____
☐ Groundwater Filtration Treatment
☐ Group B System Approval
☐ GWI Determination
☐ Major System Modification
☐ Monitoring Plan (DBP, LCR, Coliform)
☐ Operations Plan
☐ Pilot Study Protocol
☐ Pilot Study Report
☐ Sanitary Control Area Mitigation
☐ Source Approval
☐ Storage Reservoir/Tank
☐ Surface Water/GWI Treatment – New
☐ Surface Water/GWI Treatment – Modified
☐ Tracer Study Plan
☐ Watershed Plan
☐ Well Site Inspection
☐ Wellfield Designation

Planning Submittal Information *(Water System Plans and Small Water System Management Programs)*

Date of DOH preplan meeting 5/6/2025. Does your plan follow the preplan checklist? ☒ Yes ☐ No

Is the system regulated by the Utilities and Trade Commission (UTC)? ☐ Yes ☒ No

Is the system proposing to do any of the following:

- Increase in the number of approved connections? ☒ Yes ☐ No
- Expand the service area or water rights place of use? ☒ Yes ☐ No
  (If yes, the plan must include completed Local Government Consistency Determination Forms from all local governments within the proposed water rights place of use, including Coordinated Water System Plan (CWSP) responsible agency, if located within a CWSSA).
- Add a new intertie to a wholesale customer? ☐ Yes ☒ No
- Request approval for distribution main submittal exception? ☐ Yes ☒ No
- Request an "Unspecified" approval designation? ☐ Yes ☒ No

Has the WSP or SWSMP been sent to the following organizations for review/comment:

- Adjacent utilities for review or a letter notifying them that a copy is available for their review? ☐ Yes ☐ No
- All local governments within the service area? ☐ Yes ☐ No
- County and/or city planning department (as applicable)? ☐ Yes ☐ No
- Federal governments, including tribes (as applicable)? ☐ Yes ☐ No

Is the system located in a Critical Water Supply Service Area with a Coordinated Water System Plan (CWSP)? ☐ Yes ☒ No

- If yes, have you sent a copy of the WSP or SWSMP to the county or agency responsible for the CWSP? ☐ Yes ☐ No

What year are the important projections in the plan dated to (water demands, CIP, and budget)? 2046
(WSPs can be approved for up to 10 years from date of approval [not date of submittal], but approval will be limited to the projections provided in the plan. This does not apply to SWSMPs.)

Satellite Management Agency Plan Information

☐ Ownership only ☐ Management and Operations only ☐ Ownership, Management & Operations

Are you requesting approval as a new SMA? ☐ Yes ☐ No

If the SMA plan is combined with a water system plan submittal, where is the SMA Notice of Intent Form located in the plan? *SMA Notice of Intent* 331-590 Enter Location in Plan

List the counties the SMA is requesting approval to serve: Enter Counties

Washington State Department of HEALTH

To request this document in another format, call 1-800-525-0127. Deaf or hard of hearing customers, please call 711 (Washington Relay) or email doh.information@doh.wa.gov. If in need of translation services, call 1-800-525-0127.

APPENDIX G

DOH WATER SYSTEM PLAN CHECKLIST

Department of Health, Office of Drinking Water
Southwestern Regional Office
Pre-Plan Agreement

Water system name:	Camas Municipal Water Sewer System	**Preplan date:**	May 6, 2025
PWS ID#/County:	108002	**WSP submittal due date:**	May 6, 2026
Planning Purpose:	Large System WAC 246-290-100(2)(a)	**Target year of approval:**	2026-2027
Operating Permit Color:	Green	**Existing WSP expiration date:**	August 1, 2030
Initial/Update/Amend:	Update	**End of "plan approval period":**	up to 2038 (last year of all projections)
Number of Connections:	11842		

WAC 246-290-100 requires purveyors of new water systems, systems in a water coordination act area, systems serving 1,000 or more service connections, systems with an unspecified number of approved connections and systems that are growing or experiencing capacity problems to gain approval for a Water System Plan (WSP). The purpose of this preplan is to determine the level of detail of the WSP and establish an approval schedule. This agreement is valid until the WSP submittal due date above. After that date, the agreement will need to be renegotiated. The operating permit color may change to yellow if the WSP is not approved by the existing WSP expiration date noted above.

Planning forms and other resources, including the current Water System Planning Guidebook and additional information can be found HERE.

Water System Representatives:	Consultants	ODW SW Regional Staff:	External Agency Representatives
Rob Charles, Camas Utilities Manager	Jill Kjellsson, Carollo Engineers	Scott Pollock, Regional Engineer	Matthew Kogle, Dept. Of Ecology
	Max Mozer, Carollo Engineers	Meredith Jones, Regional Planner	
	Matt Huang, Carollo Engineers		

Include in plan	**Content Description**	*WSP Page #*
Y	Project Approval Application (PAA, DOH Pub 331-149 F)	
Y	Signed and dated stamp from a Professional Engineer licensed in the State of Washington	
Chapter 1 – Description of Water System		
Y	Ownership and management, including Satellite Management Agency (SMA), if applicable	
Y	System history and background	
Y	Related plans	
Y	Service area and land uses: • Service area map including retail service area, service area, future service area, water rights place of use • DOH Pub. 331-432 – Service Area Guidance • Existing zoning map(s) for all jurisdictions within future service area • Future land use map(s) for all jurisdictions within future service area (CWSP Counties Only)	
Y	Service area and other applicable policies	
Y	Duty to serve statement for the retail service area • How does the system define "timely and reasonable"? • Are there appeals processes for when a customer disagrees with a timely and reasonable determination?	
Y	Consistency with the watershed plan for Salmon/Washougal WRIA #28.	

Chapter 2 – Basic Planning Data		
Y	Existing population, service connections & equivalent residential units (ERUs) • ERUs must be based on full-time residential connections only.	
Y	Existing production/usage: monthly/annual per source, annual usage by customer class, distribution system leakage (DSL) • Authorized Use and DSL, rather than "unaccounted-for water". • Additional information is available in our WUE Guidebook, Chapter 6, beginning on page 28 (PDF page 33).	
Y	Seasonal variations in use by customer class (1000+ connections)	
Y	Water supply characteristics	
Y	Water supply reliability evaluation: Include depth-to-water measurements	
Y	Interties: agreements, existing/proposed, emergency, metering	
Y	**Plan approval period & 20-year projections for:** Population, service connections, & ERUs (Recommend 13- and 23-year)	
Y	Projections and land use discussion	
Y	Future water demand without water use efficiency savings	
Y	**Water rights self-assessment: Consult with Ecology prior to plan submittal** Describe water rights and complete water rights self-assessment form for existing, plan approval period, and 20 years.	
Chapter 3 – System Analysis		
Y	Asset Management Inventory: text description and facilities map of major assets, asset management table or spreadsheet	
Y	Asset condition assessment and criticality ratings (recommended)—RCAC Template (optional format)	
Y	Water quality analysis	
Y	System design standards	
Y	Capacity analysis (Must include WSDM Worksheet 4-1, ERU Capacity Summary)	
Y	Hydraulic analysis	
Y	Summary of system deficiencies	
Chapter 4 – Water Use Efficiency (WUE)		
Y	**Metering Program:** sources, services, and non-emergency interties	
Y	**Distribution System Leakage (DSL)** Summarize DSL and compare to WUE annual reports; discuss DSL calculation methodology, leak detection plan	
Y	**Water Loss Control Action Plan (WLCAP) – 3-year average 13.1% (2021, 2022, 2023)** If DSL exceeds 10 percent (3-year average), submit the WLCAP per WAC 246-290-820(4) • Include implementation schedule and budget items, as applicable.	
Y	**Water Use Efficiency WUE Program**	
Y	Describe the current (WUE) program	
Y	Updated WUE goal(s). Document public adoption process (include public notice, signed minutes, signed resolution). • Consider doing this after our review of your first draft.	
Y	Describe measure(s) that will be implemented to achieve the goal(s). Include schedule & costs in the budget – 10,000 to 49,999 connections: 9 additional measures.	
Y	Describe the process used to evaluate WUE measure(s) you did not implement	
Y	Describe or provide an example of yearly consumer education (cannot count as a measure)	
Y	Estimate projected water savings from selected WUE measure(s)	

Y	Describe process that will be used to determine effectiveness of the WUE program	
Y	Plan approval period and 20-year water demand projection with WUE savings (recommend 13- and 23-year)	

Y	**Additional WUE for systems with 1000+ Connections**
	• Estimate water saved from implemented WUE measure(s) during the previous plan approval period
	• Water demand forecast (if all cost-effective WUE measure(s) are implemented)
	• For WUE measure(s) evaluated, but not implemented:
	  ○ Quantitative evaluation of WUE measure(s) cost-effectiveness, including marginal costs of water production
	  ○ Evaluate WUE measure(s) for cost-effectiveness if shared with other systems
	  ○ Quantitative/qualitative evaluation of measure(s) to determine cost-effectiveness from societal perspective
	• Explore reclaimed water opportunities	

Chapter 5 – Source Water Protection		
Y	Sanitary Control Area (SCA): description of physical and legal protections for each groundwater source, including deeds, covenants, easements, restrictions, fencing, signage, etc.	
Y	Wellhead protection program/update: must include updated TOT map, contaminant source inventory, and notifications • WAC 246-290-135: Source Water Protection • 331-106 Wellhead Protection Requirements	
***N**	Watershed control program for all surface water/GWI sources— *Please include watershed and other information relative to your two emergency surface water sources.	
Chapter 6 – Operation and Maintenance Program		
Y	Water system management and personnel, including operator certification and CCS	
Y	Operations and preventative maintenance schedule	
Y	Comprehensive water quality monitoring: • Water Quality Monitoring Schedule (WQMS) • Provide LCR and DBP monitoring schedule(s), map(s), and letters. • Coliform monitoring plan, including addresses and map. Update for RTCR. DOH Guidance and Template	
Y	Emergency response program, including Water Shortage Response Plan per WAC 246-290-420. • Consider Tier 1 Public Notification process, and multiple channels for notification.	
Y	Cross-connection control (CCC) program • Systems with 1000+ connections: provide a copy of your CCC annual summary report form	
Y	Sanitary survey findings	
Y	Recordkeeping, reporting, and customer complaint program	
Y	Water treatment (surface, disinfection, contaminant) operations	
Y	Summary of O&M deficiencies; include cost in budget	
Chapter 7 – Distribution Facilities Design and Construction Standards (optional)		
Y	Project review procedures	
Y	Policies and requirements for outside parties	
Y	Design and construction standards for distribution-related projects.	
Y	Construction certification	

Chapter 8 – Capital Improvement Program (CIP) (Recommend 13- and 23-year CIP info.)		
Y	CIP summary and schedule for the plan approval period (discuss prioritization, project assessment and value planning) • Include any items that were identified as required for addressing capacity-related deficits.	
Y	20-year (minimum) CIP for projects beyond the plan approval period	
Chapter 9 – Financial Program (Recommend 13- and 23-year financial info.)		
Y	Financial viability (discuss full cost of service, cost recovery, reserves)	
Y	Summary of past income and expenses, sufficient to establish trends (previous plan approval period or minimum 3 years)	
Y	Balanced operational and capital budget projections for plan approval period	
Y	Show operational, capital, and emergency reserve goals. Describe the revenue requirements to achieve them. Demonstrate annual progress toward goals.	
Y	Debt-financed capital improvements	
Y	Water rate evaluation: • Describe current rate structure: **Block rate based on meter size and rate class**. (Not inclining block rate.) • Evaluate the feasibility of implementing a rate structure that encourages water demand efficiency. • Evaluate rate affordability and customer assistance programs. Provide rate that would be unaffordable, income below which current and future rates are unaffordable, and programs available for low income customers.	
N	~~Water system regulated by the Utilities and Transportation Commission (UTC)?~~	
Chapter 10 – Miscellaneous Documents		
Y	Updated Water Facilities Inventory (WFI) with authorized signature	
Y	Local Government Consistency Determination Forms: City and County planning departments.	
Y	Informational meeting for the consumers (include public notice and signed minutes)	
Y	Adjacent utilities notice, review, and comment of draft WSP. Attach notice and comments received.	
Y	SEPA: Signed Environmental Checklist and Threshold Determination. The water system is lead agency.	
Y	Agreements: SMA, intertie, service area, franchise, wheeling, mutual aid, inter-local and other agreements	
Y	Correspondence	
Y	Supporting documents	
Miscellaneous Documents – Post review		
	Plan approval by water system governing body. Include signed meeting minutes or signed resolution. NOTE: DO NOT approve the plan until after the draft review is completed and you have received authorization to proceed with approval from the Regional Planner.	

GENERAL INFORMATION AND REQUIREMENTS:

- **Copies – Provide an electronic copy of the WSP. DOH will send to Ecology. Contact DOH SWRO admin for box.com login swro.admin@doh.wa.gov**
- **Provide this document with first draft.** Use the right side column of the checklist to provide page numbers for required content.
- **Fee – The total review fee for the first and second drafts for 10,000 or more connections is $5,484. Additional drafts are an additional $1,371. Fees are subject to change.**
- **REVIEW TIMELINE – Plans are reviewed in the order received.** DOH will respond within ninety (90) days of receiving draft plans (i.e. 90 days after the first draft, and again, 90 days after the second draft). Dept. of Ecology has 60 days to review, and that is concurrent with the DOH 90-day period.

WAC 246-290-100 – Water System Plans
DOH Pub. 331-432 – Service Area Guidance
DOH Pub. 331-438 – Service Area Policies
DOH Pub. 331-366 – Duty to Provide Service
DOH Pub. 331-568 – Local Government Consistency Determination Form
DOH Pub. 331-370 – Water Right Self-Assessment
WAC 246-290-221 – Water Demand Design Criteria
DOH Pub. 331-123 – Water System Design Manual
DOH Pub. 331-375 – Water Use Efficiency Guidebook
DOH Pub. 331-036 – Preparing a Coliform Monitoring Plan
DOH Pub. 331-211 – Emergency Response Planning Guide
DOH Pub. 331-234 – Cross Connection Control Planning Guide
DOH Pub. 331-355 – Cross Connection Control Rules and Definitions
RCAC Asset Management Interactive Spreadsheet
Customer Assistance Programs website
DOH Pub. 331-134 – Small Water System Management Program
DOH Pub. 331-453 -- SCA Fact Sheet
DOH Pub. 331-048 -- SCA Legal Protections
DOH Pub. 331-106 -- Source Water Protection Requirements
DOH Pub. 331-018 -- Wellhead Protection Program Guide
DOH Pub. 331-368 -- Approval Requirement for Water System Plans
DOH Pub. 331-368 -- Timely and Reasonable Water Service
DOH Pub. 331-445 -- Asset Management for Small Water Systems
DOH Pub. 331-634 -- Wellhead Protection Areas: Protecting Drinking Water
DOH Pub. 331-301—Guide for Preparing Water Shortage Response Plans
DOH Pub. 331-327 -- Water Rates Paying for drinking water

Additional Notes:

- What are 3 things the City has accomplished in this past planning period that you're proud of or that have made a positive impact on the system and/or customers?
  - Wrapping up reservoir reconstruction, with booster station.
  - Working on interconnection between wells 6 and 14, which will enable more water going into distribution system.
  - PFAS treatment system. Project has been approved and going to bid soon.
- What are 3 things the City would like to accomplish in the next planning period?
  - Address water rights issues.
    - New source in existing wellfields.
    - Well 13 or Well 13B.
    - Steigerwald.
- What are your top concerns for this upcoming planning period?
  - Other wellfields that will need PFAS treatment.

APPENDIX H

INTERTIE AGREEMENTS

INTERLOCAL AGREEMENT: EMERGENCY INTERTIE BETWEEN WATER SYSTEM OPERATIONS OF THE CITY OF VANCOUVER AND THE CITY OF CAMAS

THIS AGREEMENT is made and entered into this 2nd day of ~~September~~ October, 2017, by and between the City of Camas, a municipal corporation of the State of Washington, and the City of Vancouver, a municipal corporation of the State of Washington, hereinafter referred to as the "Parties".

IN CONSIDERATION of the mutual promises, agreements, and covenants contained herein, it is hereby agreed, by and between the Parties, as follows:

RECITALS

WHEREAS, the Parties have developed a Coordinated Water System Plan ("CWSP") pursuant to the Public Water System Coordination Act of 1977, RCW Chapter 70.116; and

WHEREAS, the CWSP designates individual water service areas to avoid unnecessary duplication; and

WHEREAS, the CWSP anticipates the development of physical interconnection of those water systems at points known as interties; and

WHEREAS, water system interties provide mutual benefits to water system operators by creating water supply redundancies; and

WHEREAS, the City of Vancouver and the City of Camas are authorized by Chapter 39.34 RCW, the Interlocal Cooperation Act, to enter into cooperative agreements to jointly exercise their powers, privileges and authorities; and

WHEREAS, the Parties are entering into this Agreement to provide water service to each other during emergency conditions.

NOW THEREFORE, the City of Vancouver and the City of Camas having entered into this Agreement by their signature, agree with the following:

Section 1. PURPOSE

The purpose of this Agreement is to provide emergency water service to the requesting Party at a mutually acceptable intertie location. The intertie location is identified on Exhibit 'A.'

Section 2. CONDITIONS OF SERVICE

A. Metering

A water meter that can serve water flowing in both directions will be installed at the intertie location. The City of Vancouver will set, own and maintain the water meter.

B. Other Infrastructure

Each purveyor will own and maintain the intertie infrastructure on its respective side up to the intertie meter, including all fittings, valves, pressure reducing valves, booster pumps, piping, electrical connections, and pressure gauges. The City of Vancouver will own and maintain the meter and the meter vault and all other associated appurtenances within the vault.

C. Cost of Service

The cost of the water supplied though an intertie shall be based on the supplying Party's then current service rates, as follows:

1. When the City of Camas supplies water to the City of Vancouver, the usage charge will be based on the most current schedule of rates for the size of the meter installed based on the Inside City Commercial rate.

2. When the City of Vancouver supplies water to the City of Camas, the usage charge will be based on the inside city limits commercial rate.

Charges will be limited to water usage. There will be no monthly or system development charges.

D. Service Limitations

The Parties will use the intertie only for emergency water service. Emergency water service is defined as service during any event that requires either Party's water supply to be augmented on a temporary emergency basis and is not intended to supply base or peak supply. Because this Agreement covers only emergency water service, there is no specific time period in which water will be provided; emergency water service may be requested at any time.

Either Party can refuse to provide emergency water service if such use could result in a degradation of water quality. The City of Vancouver and the City of Camas will monitor water quality at the intertie and each water purveyor will continue to be responsible for water quality monitoring within their system. Each Party shall immediately notify the other in the event of any failed coliform bacteria sample within the system and shall discuss any potential necessary actions.

Either Party can refuse to provide emergency water service if the water is needed for their own system.

Each Party shall use reasonable efforts to provide an uninterrupted supply of water. However, neither Party guarantees the availability of water through the intertie at all times because of each Party's respective needs and water demands. Further, either Party may close the intertie until sufficient water supply exists to make water available for use by the other Party.

The volume of water made available by the supplying utility will be dependent on the size of the intertie meter and the capacity available from the supplying water system.

Neither Party will be liable for any loss or damage attributed to their failure to provide water through the intertie.

Either Party can choose to abandon the intertie if the cost to alter, maintain or replace the connection exceeds the benefit to either Party.

The City of Vancouver and the City of Camas will work together to design, construct and maintain future interties where financially feasible.

Operation of the intertie shall be under the mutual consent of the City of Vancouver Water Operations Superintendent and City of Camas Utilities Manager. Each Party shall notify the other Party in writing at least twelve (12) hours in advance of the time either party desires to receive water through the intertie. Such notice shall be delivered in person to ensure it is timely received. If an emergency requires immediate use of the intertie, verbal notification and approval will be permitted, with follow-up written notification to occur as soon as practicable under the circumstances. Follow-up written notification of such emergency request shall be made by each Party to the other party within not more than three (3) days after the initiation of such emergency water usage. Upon receiving a request, the responding Party will provide available water service within a reasonable amount of time.

Section 4. GENERAL TERMS

A. Force Majeure

Notwithstanding anything contained in this Agreement to the contrary, neither Party will be deemed liable or to be in default for any delay or failure in performance under this Agreement deemed to result from acts of God, acts of civil and military authority, acts of public enemy, war, or any like cause beyond the Parties reasonable control.

B. Parties' Interests

Neither Party shall by virtue of this Agreement acquire any proprietary or governmental interest in the water system of the other Party. Each Party shall be solely responsible for the operation and maintenance of its own system of water distribution.

C. Water Use Efficiency Programs

Water use efficiency programs, data collection, water demand forecasting and other operational matters will be coordinated between the City of Vancouver and the City of Camas through the CWSP. Additional coordination activities are not necessary for emergency interties.

D. Severability

Should any provision of this Agreement be held by a tribunal of competent jurisdiction to be invalid or unenforceable, the remainder of the Agreement will remain in full force and effect.

E. Assignment

Neither Party shall assign this Agreement, or any rights under it, or delegate any obligations under it, without first obtaining the written consent of the other Party.

F. Amendments

This Agreement may only be changed, modified, or amended upon the unanimous written approval of both parties.

G. Third Parties

The terms of this Agreement are not intended to establish or create any rights in any persons or entities other than the Parties to this Agreement.

H. Employment Status

In providing services under this Agreement, none of the officers, officials, agents or employees of the parties hereto are employees of the other party to this Agreement for any purpose, including responsibility for any Federal or State tax, industrial insurance, or Social Security liability.

I. Administration

No new or separate legal or administrative entity is created to administer the provisions of this Agreement. This Agreement shall be administered by the respective parties to this

Agreement, which shall each be individually responsible for financing its own actions pursuant to this Agreement.

J. Choice of Law

This Agreement is made and entered in the State of Washington. Any dispute concerning its terms shall be determined by the courts of competent jurisdiction in and for Clark County, Washington.

K. Effective Date and Duration

This Agreement shall become effective upon the occurrence of the approval of this Agreement by the Parties' respective governing bodies, execution of this document by their authorized representatives, and recording with the County auditor. This Agreement shall remain in effect until terminated by either Party in accordance with this Agreement.

L. Termination

Either party may terminate this Agreement by providing sixty (60) days prior written notice to the other party. Upon termination, each party continues to own, is responsible for, and may dispose of the intertie infrastructure for which they are the designated owner through this Agreement.

M. Notices

Any notice to be given or any documents to be delivered by any party to the other shall be delivered in person or, if not urgent, sent by regular U.S. mail and addressed to the parties to this Agreement at the following addresses:

For the City of Vancouver:

Director of Public Works
City of Vancouver
415 W. 6th Street
P.O. Box 1995
Vancouver, WA 98668-1995

For the City of Camas:

Public Works Director
City of Camas
616 NE 4th Avenue
Camas, WA 98607

N. Entire Agreement

This Agreement comprises the entire understanding between the City of Vancouver and the City of Camas with respect to the subject matter hereof, and there are no representations, inducements, promises, or agreements, oral or otherwise, not embodied herein. Any and all prior negotiations, discussions, commitments, and understandings relating hereto are merged herein.

O. Counterparts

This Interlocal Agreement may be executed simultaneously in several counterparts, each of which shall be deemed an original, and all of which together shall constitute one and the same instrument.

P. Filing

The Parties agree that there shall be two (2) duplicate originals of this Interlocal Agreement procured and distributed for signature by the necessary officials of the parties. Upon execution, one executed original of this Interlocal Agreement shall be retained by each Party. Within five (5) days from the date of execution of this Interlocal Agreement, the Parties will cause a copy of this Agreement to be filed with the County auditor in accordance with Chapter 32, Laws of Washington 2006 (RCW 39.34.040). Upon execution of the originals and filing of a copy with the County auditor, each such duplicate original shall constitute an agreement binding upon all Parties.

IN WITNESS WHEREOF, the parties have executed this agreement at Vancouver, Washington this 2nd day of ~~September~~ October, 2017.

CITY OF VANCOUVER

By: _____
City Manager

Approved as to form:

_____
City Attorney

Attest:

_____
City Clerk

CITY OF CAMAS

By: _____
Mayor

Approved as to form:

_____
City Attorney

Attest:

_____
City Clerk

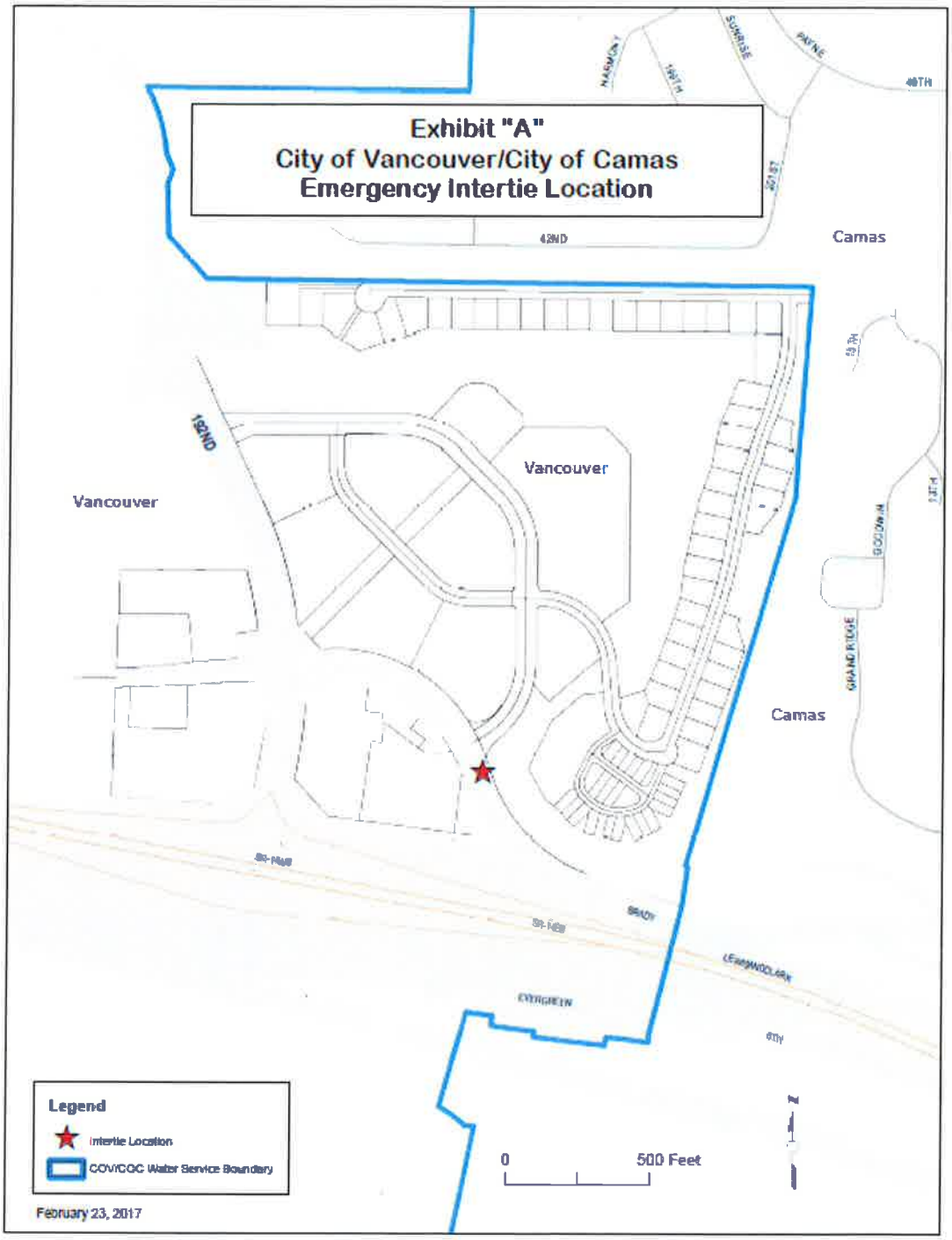


Exhibit "A"
City of Vancouver/City of Camas
Emergency Intertie Location
Camas
Vancouver
Vancouver
Camas
Legend
Intertie Location
COV/COC Water Service Boundary
0
500 Feet
February 23, 2017

INTERLOCAL AGREEMENT FOR ADJUSTING WATER UTILITY SERVICE BOUNDARIES AND WATER SERVICE SHUT OFF

BETWEEN

City of Vancouver and City of Camas

THIS AGREEMENT, entered into by and between City of Vancouver ("Vancouver") and City of Camas ("Camas"), (hereinafter referred to collectively as the Water Purveyors), WITNESS THAT:

WHEREAS, Clark County and the Water Purveyors conduct capital facilities and land use planning under the Growth Management Act as adopted by the State of Washington and subsequently amended; and

WHEREAS, RCW 70.116, *Public Water System Coordination Act*, and WAC 246-293-250 require development of a Coordinated Water System Plan, including establishment of service area boundaries by written agreement among purveyors; and

WHEREAS, the designation of water service area boundaries helps facilitate efficient planning and delivering of water services within Clark County, avoid unnecessary duplication of water services, and provide water operation predictability to the water purveyors, Clark County, and the residents served by the public water system; and

WHEREAS, the designation of water service area boundaries helps assure that available water supply sources of the Water Purveyors will be utilized in an efficient manner; and

WHEREAS, Vancouver and Camas entered an Interlocal Agreement for Adjusting or Confirming Future Water Utility Service Boundaries, effective January 10, 2012, which designated service area boundaries for the east boundary for Vancouver and the west boundary for Camas; and which was reviewed and approved by the Clark County Board of Commissioners pursuant to RCW 70.116.040; WAC 246-293-250; and 246-293-290; and

WHEREAS, without the installation of additional tanks and pumps, Vancouver cannot provide reliable water service at an adequate pressure to a portion of land currently located within Vancouver's water service area boundary, which is shown as the "Area Proposed to be Transferred to Camas" in Exhibit 'A' (hereinafter "Affected Area"); and

WHEREAS, Camas's water system has water supply at adequate pressure to provide the Affected Area with reliable water service; and

WHEREAS, it is in the best interests of Vancouver and Camas to make adjustments to the water service area boundaries such that Camas will now provide water service to the Affected Area; and

WHEREAS, Vancouver will provide sewer, stormwater and other municipal services within the Affected Area; and

WHEREAS, Vancouver engages in a lengthy process including multiple steps and actions to collect delinquent sewer and stormwater service charges. This process consists of the following, (1) past due reminder sent 25 days after the bill date to both the service address and the property owner of record, (2) past due final notice is sent 37 days after the bill date to both the service address and the property owner of record to notify that water service will be shut-off if payment is not received, (3) after the 45th day the account is past due, water service is shut-off, (4) after 12 months of non-payment, a notice of intent to file lien is mailed, (5) 30 days after the intent to file lien is sent, lien is filed with the Clark County Auditor and property owner notified, (8) after 24 months of non-payment, foreclosure process commences; and

WHEREAS, almost all of the delinquent sewer and stormwater service charges are paid during this lengthy collection process, and prior to the filing of a foreclosure action; and

WHEREAS, when other efforts fail, a cost effective mechanism for collecting payment of delinquent sewer and stormwater service charges is Vancouver's ability to shut off (terminate) water service to a property; and

NOW THEREFORE, in consideration of covenants, conditions, performances, and promises hereinafter contained the undersigned Water Purveyors hereto agree as follows:

I. Purpose

The purpose of this Agreement is to adjust Water Service Area boundaries of the Water Purveyors that are parties to this Agreement and to provide a mechanism for shut off of water service by Camas at the request of Vancouver for delinquent sewer and/or stormwater service charges.

II. Effective Date

This Agreement shall become effective upon the occurrence of the approval of this Agreement by the individual Water Purveyors' governing bodies, execution of this document by their authorized representatives, the approval of this Agreement by the Clark County Board of County Council, and recording with the County auditor.

III. Duration

This Agreement shall remain in effect with regard to the individual Water Purveyors until terminated. Such termination shall occur through the establishment of future water service boundaries with the next update of the Coordinated Water System Plan.

IV. Property

Nothing in this Agreement shall create or transfer any interest in real or personal property among Water Purveyors. In the event any adjustment of a Future Water Service Area boundary requires transfer of water facility assets from one Water Purveyor to another Water Purveyor, a separate written agreement shall address the transfer of such assets.

V. Administration

No new or separate legal or administrative entity is created to administer the provisions of this Agreement. This Agreement shall be individually administered by the respective Water Purveyors, which shall each be individually responsible for financing its own actions under this Agreement.

VI. Scope

1. **Service Area Boundaries**. The undersigned acknowledge that the map attached to this agreement identified as Exhibit 'A" clearly identifies the current western water service boundary for Camas and eastern water service boundary for Vancouver as well as the proposed water service boundary to be established through this Agreement. In addition, Exhibits B and C identify the final service boundaries for Vancouver and Camas, respectively, which will become effective upon execution of this Agreement. This signed Interlocal Agreement verifies that there are no service area conflicts with adjacent water utilities.

2. **Boundary Adjustments.** If, at some time in the future, it is in the best interests of the undersigned parties to make service area boundary adjustments, such modifications must have the written concurrence of all involved parties and the proper legislative authority/authorities, and must be noted and filed with Clark County and Washington State Department of Health.

3. **Water Service Shut Off.** After Vancouver has completed its delinquent sewer and/or stormwater service charge collection process for property that has delinquent charges, Vancouver's Public Works Director or designee may file a written request with the Camas Public Works Director or designee to shut off water service for such property. Upon receipt of the request, the Camas Public Works Director or designee will shut off the water service following the Camas procedure and requirements for shutting off water service for nonpayment of Camas water service charges. The water service shall remain shut off until the delinquent sewer and/or stormwater service charges, plus penalties, interest and fees, have been paid in full or the property owner and Vancouver have entered into a payment arrangement. The Vancouver Public Works Director or designee shall notify the Camas Public Works Director or designee when the charges have been

paid in full or the payment arrangement has been entered into. Vancouver estimates that requests to shut off water service will be infrequent.

VII. Interpretation

This Agreement has been and shall be construed as having been made and delivered in the State of Washington and it is mutually agreed and understood by the Water Purveyors that this Agreement shall be governed by the laws of the State of Washington. Venue for any lawsuit arising from or related to this Agreement shall be the Superior Court of Clark County, Washington.

VIII. Amendments/Modification

The provisions of this Agreement may be amended only upon the mutual consent of the Water Purveyors. No amendments to the terms of this Agreement shall be valid unless made in writing and formally approved and executed by the duly authorized agents of the Water Purveyors and Clark County, and recorded with the Clark County Auditor.

IX. Severability

If any section or part of this Agreement is held by a court to be invalid, such action shall not affect the validity of any other part of this Agreement.

X. Entire Agreement

This Agreement contains all of the agreements of the Water Purveyors with respect to the subject matter covered or mentioned herein, and no prior Agreement shall be effective to the contrary.

XI. Counterparts

This Interlocal Agreement may be executed simultaneously in several counterparts, each of which shall be deemed an original, and all of which together shall constitute one and the same instrument.

XII. Document Filing

The Water Purveyors agree that there shall be one (1) original of this Agreement procured and distributed for signature by the necessary officials of the Water Purveyors. Upon execution, this Agreement shall be retained by the Clark County Community Planning and each Water Purveyor shall retain one (1) copy. The Parties shall cause a copy of this Agreement to be recorded with the Clark County Auditor.

As specified in WAC 246-293-250, Service Area Agreements-Requirements, this Agreement shall become effective once this document is approved by the Clark County

Board of County Council. The Parties will ensure this Agreement is filed with the County auditor within five (5) days of approval by the Clark County Board of County Council.

This Interlocal Agreement for Adjusting Water Utility Service Boundaries and Water Service Shut Off is hereby approved.

CITY OF VANCOUVER

By: _____
City Manager

CITY OF CAMAS

By: _____
Mayor

Approved as to form:

_____
City Attorney

Approved as to form:

_____
City Attorney

Attest:

_____
City Clerk

Attest:

_____
City Clerk

APPROVED BY CLARK COUNTY BOARD OF COUNTY COUNCIL, CLARK COUNTY, WASHINGTON

_____
Marc Boldt, Chair

_____
John Blom, Councilor

_____
Jeanne E. Stewart, Councilor

_____
Eileen Quiring, Councilor

_____
Julie Olson, Councilor

APPROVED AS TO FORM ONLY:
Anthony F. Golik, Clark County Prosecutor

By: _____
Christine Cook, Senior Deputy Prosecuting Attorney

Resolution No. —

Date: 10-24-17

CLARK COUNTY, WASHINGTON 1844

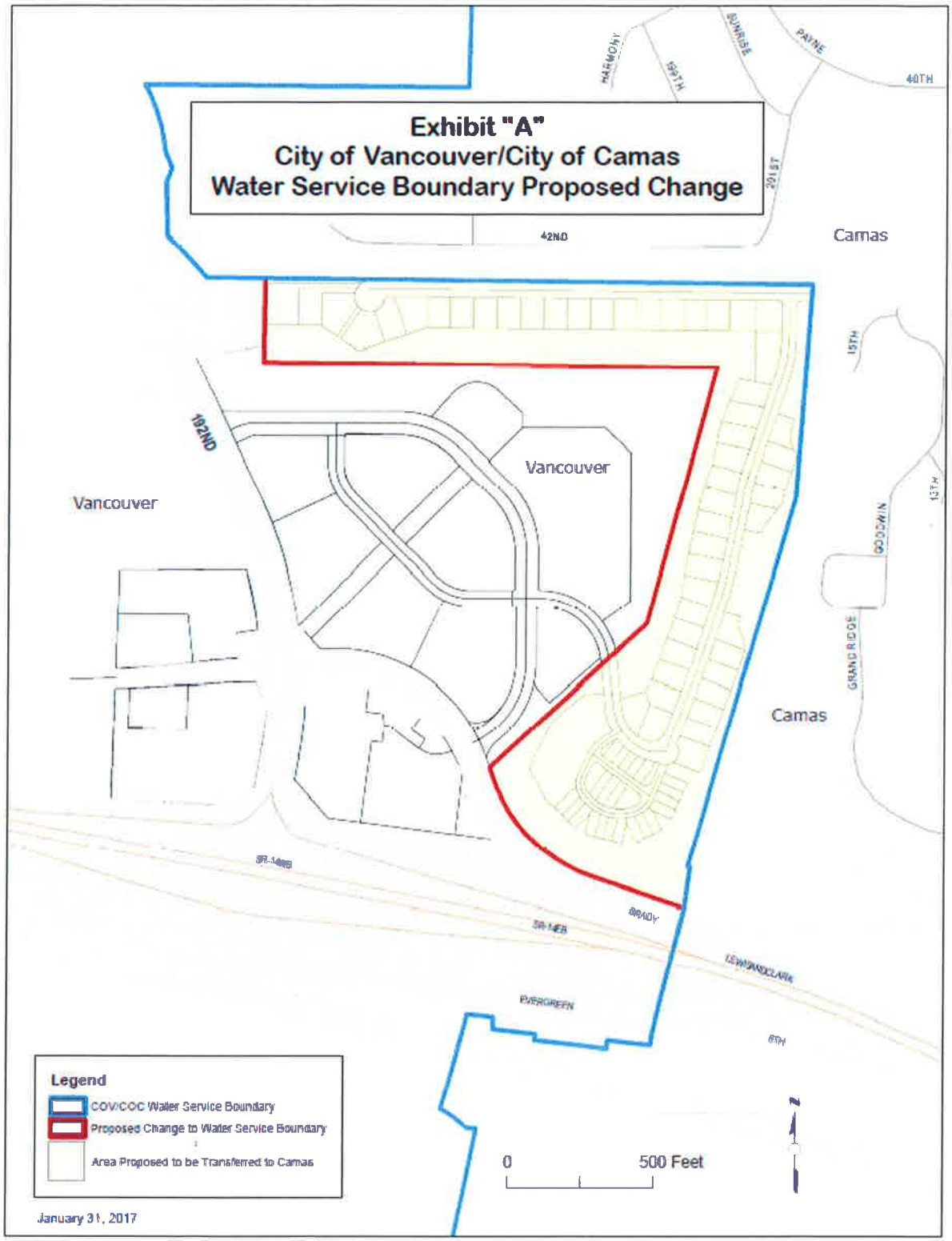
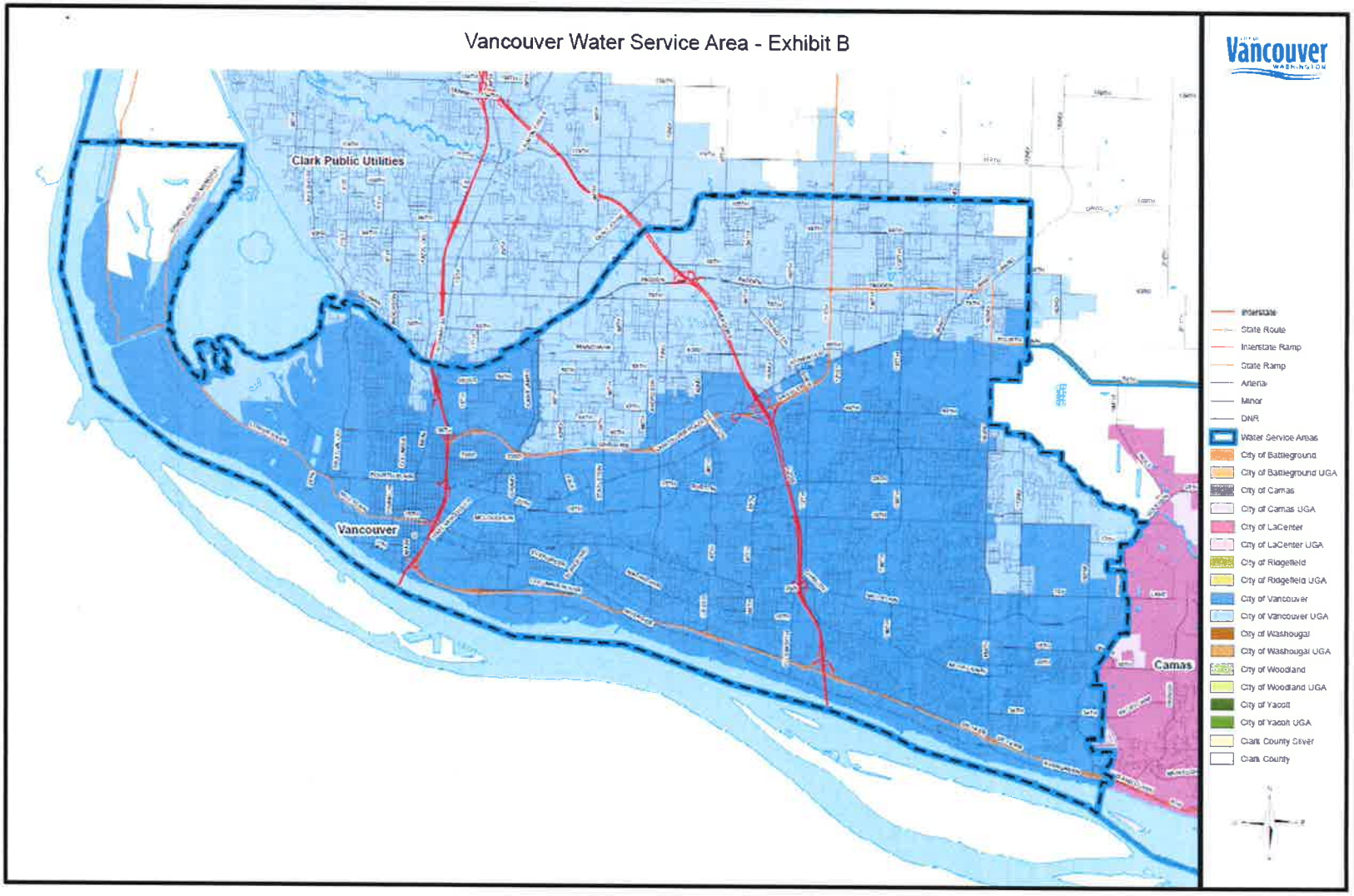
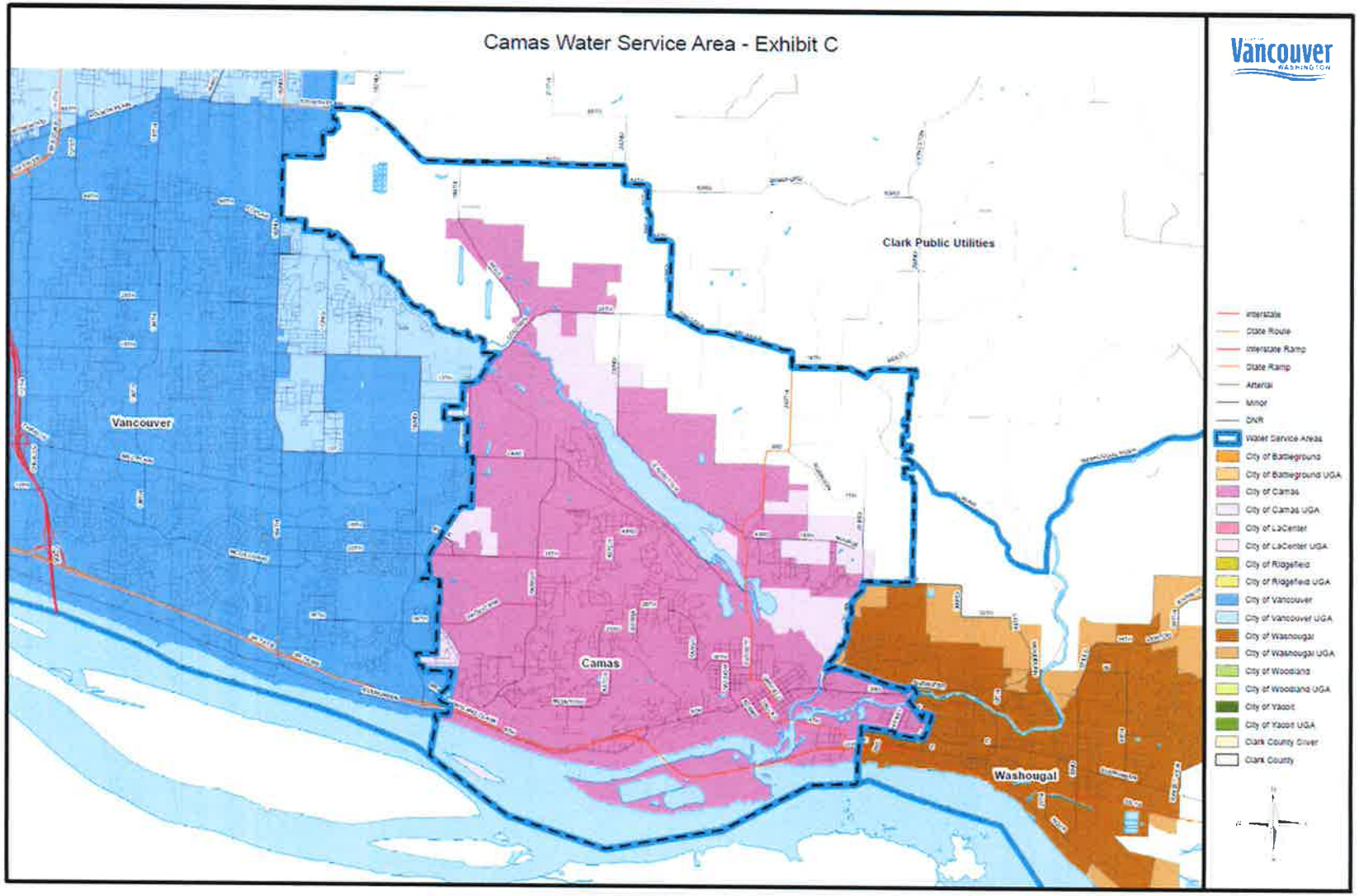


Exhibit "A"
City of Vancouver/City of Camas
Water Service Boundary Proposed Change
HARMONY
197TH
SUNRISE
PAYNE
40TH
201ST
42ND
Camas
15TH
192ND
Vancouver
Vancouver
13TH
GOODWIN
GRAND RIDGE
Camas
BRADY
EVERGREEN
6TH
Legend
COV/COC Water Service Boundary
Proposed Change to Water Service Boundary
Area Proposed to be Transferred to Camas
0
500 Feet
January 31, 2017

Vancouver Water Service Area - Exhibit B




Camas Water Service Area - Exhibit C
Vancouver
WASHINGTON
Clark Public Utilities
Vancouver
Camas
Washougal
Interstate
State Route
Interstate Ramp
State Ramp
Arterial
Minor
DNR
Water Service Areas
City of Battleground
City of Battleground UGA
City of Camas
City of Camas UGA
City of LaCenter
City of LaCenter UGA
City of Ridgefield
City of Ridgefield UGA
City of Vancouver
City of Vancouver UGA
City of Washougal
City of Washougal UGA
City of Woodland
City of Woodland UGA
City of Yacolt
City of Yacolt UGA
Clark County Other
Clark County

INTER-LOCAL COOPERATION AGREEMENT

THIS AGREEMENT made this day by and between the CITY OF CAMAS, a municipal corporation organized under the laws of the State of Washington, hereinafter referred to as "Camas", and the CITY OF WASHOUGAL, a municipal corporation organized under the laws of the State of Washington, hereinafter referred to as "Washougal",

In accordance with the Inter-Local Cooperation Act (RCW Chapter 39.34), Camas and Washougal, in consideration of the payments, covenants and agreements hereinafter mentioned, to be made and performed by the parties, do covenant and agree as follows:

Section 1. **PURPOSE:** The purpose of this agreement is to allow Camas and Washougal to sell water to the other due to the occurrence of an emergency situation where either city is unable to meet their service demands within internal water sources. The designation of an emergency shall be made by the respective Public Works Directors of each city and shall include, but not be limited to, drought conditions or a break in a water main. The delivery of water upon the designation of an emergency shall be through Inter-Ties between the respective water systems of Camas and Washougal at locations approved by the Public Works Directors of each city.

Section 2. **DURATION:** This agreement shall be for an indefinite duration.

Section 3. **ADMINISTRATION:** No new or separate legal or administrative entity is created to administer the provisions of this agreement. This agreement shall be administered jointly by Camas and Washougal by and through the Public Works Directors of both cities, who shall jointly administer this undertaking in accordance with the terms and conditions of this agreement.

Section 4. **FINANCING:** In the event either Camas or Washougal receives water

pursuant the provisions of this agreement then the receiving city shall remit payment in full for the water received at a rate equivalent to the receiving city's residential, inside city, water volume rate at the time of provision of the water. Invoicing shall be on a monthly basis.

Section 5. **WATER QUALITY:** The water supplied by either Camas or Washougal, in accordance with the terms of this agreement, shall be deemed "finished and treated" drinking water at the point of delivery. The city providing water shall have no responsibility to maintain drinking water quality standards once the water has been provided to the receiving city's distribution system. The receiving city shall be solely responsible to maintain drinking water quality standards upon receipt.

Section 6. **INDEMNIFICATION:** Camas and Washougal shall indemnify and hold harmless the other, its officers, agents, and employees, or any of them, from any and all claims, actions, suits, liability, loss, costs, expenses and damage of any nature whatsoever, by reason of or arising out of any action or omission of the respective employees, officers and agents, in the execution and administration of this agreement.

Section 7. **INSURANCE:** Each city shall obtain and keep in full force and effect liability insurance protecting itself and its employees, officers and agents, and the party, its employees, officers and agents, for claims of any persons for injuries to life, person or property by reason of anything done or permitted to be done or suffered or admitted to be done by the parties in the administration of the project. If either party withdraws from the Washington Cities Insurance Authority, that party shall deliver a certificate of insurance showing compliance with this section.

Section 8. **TERMINATION:** Each party shall have the right to terminate this entire agreement, with or without cause, upon 180 days written notice to the other party. Such notice shall be sufficient if it is in writing and deposited in the United States mail, certified mail, return receipt requested, with postage fully prepaid and addressed to the parties at their last known addresses as follows:

City of Camas P.O. Box 1055 Camas, WA 98607	City of Washougal 1701 "C" Street Washougal, WA 98671

Section 9. **FILING:** This agreement shall be filed with the city clerks of Camas and Washougal and with the Clark County Auditor and the Washington Secretary of State.

Section 10. **EFFECTIVE DATE:** This agreement shall be effective upon signing by the respective parties hereto.

DATED this 7 day of August, 2006.

CITY OF CAMAS

By: _____
Mayor

Attest: _____
Clerk

Approved as to form:
_____
City Attorney

CITY OF WASHOUGAL

By: _____
Mayor

Attest: _____
Clerk

Approved as to form:
_____
City Attorney

CITY OF CAMAS
616 Northeast Fourth Avenue
P.O. Box 1055
Camas, Washington 98607

RECEIVED
OCT 09 1997

October 8, 1997

Mike Conway, Director
Department of Public Works
City of Washougal
1701 C Street
Washougal WA 98671

Gentlemen Mike

Enclosed please find an executed copy of the *INTERLOCAL AGREEMENT BETWEEN the CITY OF WASHOUGAL and the CITY OF CAMAS.* Said agreement designates the City of Washougal as the utility service (water and sewer) provider to the land located north of the intersection of Shepherd Road and 3rd Avenue.

Any questions pertaining to this agreement may be directed to Eric Levison, our Assistant City Engineer, at 834-3451.

Sincerely,

Douglas A. Quinn, P.E.
Director

enclosure

RECEIVED
OCT 09 1997

INTERLOCAL AGREEMENT BETWEEN
the
CITY OF WASHOUGAL and the CITY OF CAMAS

The corporate limits of the cities of Camas and Washougal are irregular along their common boundary. In particular, an area within the Camas corporate limits (herein referred to as "subject area", as described in attached Exhibit "A") located north of the intersection of Shepherd Road and 3rd Avenue is currently surrounded on approximately eighty-four (84) percent of its perimeter by Washougal's corporate limits.

Further, the cities have mutually entered into an Interlocal Agreement which designates the City of Washougal as the utility service (water and sewer) provider to the land located within the subject area.

The City of Washougal is in the process of preparing a Comprehensive Subarea Plan for an area lying north of the subject area, including the land surrounding the subject area. The Subarea Plan will address land uses, environmental protection, storm water drainage and infrastructure impacts for the area. Including the subject area would assure the orderly and logical progression of land development under the jurisdiction of the City of Washougal.

The purpose of this agreement is to establish the City of Washougal as the presiding jurisdiction with respect to land use planning and implementation, including, but not limited to the following:

1. Implementation of land division regulations.
2. Imposition and implementation of zoning regulations
3. Implementation of development standards, including streets, storm and sanitary sewer, water and other utility provision.

Pursuant to this, the City of Washougal and the City of Camas hereby agree to the following:

1. Presiding Jurisdiction. The City of Washougal shall be the presiding jurisdiction in all planning programs, land use designations and land use application processing for land within the subject area.

2. Land Use Planning and Implementation. All land use actions shall be processed under the rules and regulations of the City of Washougal, including but not limited to Titles 15 (Building), 16 (Environmental), 17 (Land Divisions) and 18 (Zoning) of the Washougal Municipal Code, the City of Washougal Engineering Standards for Public Works Construction and any and all provisions of the Woodburn Hill Comprehensive Subarea Plan. No provision of this agreement shall preclude future revisions, amendments or addenda to these regulations from being implemented by the City of Washougal within the subject area without prior written consent of the City of Camas.

3. Annexation. Both the City of Camas and the City of Washougal agree to pursue the necessary routes to transfer true corporate jurisdiction for the subject area from the City of Camas to the City of Washougal.

4. Effective Date and Duration. This agreement shall be effective upon signature by the presiding officer of both the City of Camas and the City of Washougal, and shall be in effect until terminated by one of the following methods:

   a. Ninety (90) day written notice of termination by either party subject to the agreement.
   b. Termination of agreement upon formal annexation of the subject area by the City of Washougal, said termination being effective concurrent with the effective date of the annexation.

5. Application Processing Upon Termination. Upon termination of this agreement, the city of Washougal shall complete processing of any technically complete land use application filed with the City of Washougal pursuant to the provisions of this agreement.

APPROVED this 4th day of August, 1997 by:

City of Washougal

Mayor Charles Crumpacker

City of Camas

Mayor Dean Dossett

Approved as to form:

City of Washougal

Don English, City Attorney

City of Camas

Roger Knapp, City Attorney

f:\eric\woodburn\intrlocl

AFTER RECORDING RETURN TO:

_____
City of Washougal
1701 "C" Street
Washougal, WA 98671

CITIES OF CAMAS AND WASHOUGAL, WASHINGTON

UTILITIES COOPERATION AGREEMENT FOR WATER SYSTEM DEVELOPMENT – PHASE 2

2015

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CITIES OF CAMAS AND WASHOUGAL, WASHINGTON
UTILITIES COOPERATION AGREEMENT
FOR WATER SYSTEM DEVELOPMENT
PHASE 2

1. AGREEMENT

This Utilities Cooperation Agreement for Water System Development ("Agreement") is made by and between the CITY OF CAMAS, a Washington municipal corporation ("Camas"), and the CITY OF WASHOUGAL, a Washington municipal corporation ("Washougal"). Camas and Washougal are each a "Party" and collectively the "Parties" (or "Cities") to this Agreement. The Parties agree as follows.

2. RECITALS

2.1 This Agreement is entered by the Parties under their authority to contract, including but not limited to RCW 35A.11.010 and RCW 35.21.210.

2.2 For a number of years, Camas and Washougal have been jointly addressing the Parties' ongoing water supply needs. The Cities participated in Water Resource Inventory Area (WRIA) planning in the Salmon-Washougal (WRIA 28) and Lewis (WRIA 27) watersheds. Clark, Cowlitz and Skamania Counties adopted the Salmon-Washougal & Lewis Watershed Management Plan on July 21, 2006. The Salmon-Washougal & Lewis Watershed Management Plan guides future water rights development in the community, and identifies the Steigerwald area in Clark County as a regional water source.

2.3 Washougal identifies current average daily water demand of approximately 2.0 million gallons per day, with an estimated 50-year need of 10 million gallons per day. Camas identifies current average daily water demand of approximately 3.7 million gallons per day, with an estimated 50-year need of 15 million gallons per day. To meet these needs, the Parties initiated efforts to develop and operate water system wells and well fields near the Steigerwald Wildlife Refuge to be supplied by the Pleistocene Alluvial Aquifer (the "Project").

2.4 The Parties began Project development efforts at Phase 1, in part, by entering into an Option to Purchase Exclusive Easement for Well Site with the Port of Camas-Washougal ("Port," July 17, 2006 (now expired)), and Inter-Local Cooperation Agreement (July 17, 2006) between the Parties to provide for drilling, testing, and evaluation of drinking water wells in the Steigerwald Lake area. The testing revealed sufficient water supplies for the Project. The 2011 Clark County Coordinated Water System Plan Update identifies the Steigerwald well field as a regional water source and further identifies it as a capital project (SR-11).

2.5 As components of the Project, the Parties now are (i) jointly seeking new water rights sufficient for the Project under an Application for Water Right Permit (Washington Ecology No. G2-30528, August 2009); (ii) acquiring from Port the property rights necessary for the Project; (iii) updating their comprehensive water plans; and, (iv) planning to acquire, develop

and operate necessary water system facilities and improvements. Collectively, these efforts and this Agreement are Phase 2 of the Project.

2.6 The Camas 2010 Water System Plan identifies the Steigerwald well field as a regional water source and further identifies it as a capital project (SR-11). The Washougal Water System Plan identifies the Steigerwald well field as a regional water source and further identifies it as a capital project. Camas intends to update its Water System Plan by 2016. Washougal intends to update its Water System Plan, beginning in 2017.

2.7 The Steigerwald well field site is to be acquired and developed by the Parties, with Washougal acting as lead agency and title holder. The general allocation of rights and responsibility for the Project is 60% to Camas and 40% to Washougal.

2.8 In accordance with their history of cooperation and consistent with the 2006 Inter-Local Agreement for good faith negotiations toward a revised agreement to allocate the costs and distribution of Project water resources, the Parties enter into this Agreement to terminate the 2006 Inter-Local Agreement, except as it relates to unreimbursed costs otherwise allocated thereto which shall be subject to further negotiations, and to set forth the rights and obligations of the Parties for the next phase of the Project. This is another in a series of agreements, and the Parties will consider in the future Phase 3 and other forms of management and/or governance of water systems, including the potential of forming a joint municipal services authority under Chapter 39.106 RCW. This Agreement also provides a protocol in the event future agreements are not reached.

3. DEFINITIONS

3.1 "Capacity Allocation" means the percentage of the Steigerwald Water System's design capacity that a Party is authorized by this Agreement to use. A Capacity Allocation does not convey ownership interest in any of the Steigerwald Water System.

3.2 "Steigerwald Water System" or "Project" means the Real Property and System Facilities subject to this Agreement.

3.3 "Real Property" means that certain real property located in Clark County, Washington, identified as Clark County Tax parcel No. 135307000, consisting of approximately 19.65 acres of land, which is legally described and generally depicted in Exhibit A.

3.4 "System Facilities" means all water system facilities and improvements located on the Real Property and, to the extent agreed upon by the Parties in the future, any other facilities that Camas or Washougal may construct for joint use by the Parties, including without limitation facilities not located on the Real Property.

4. OWNERSHIP OF THE STEIGERWALD WATER SYSTEM

4.1 Capacity Interest and Allocation. Each Party owns a capacity interest in the Steigerwald Water System. The Camas capacity interest and Capacity Allocation is 60% and the Washougal capacity interest and Capacity Allocation is 40%.

4.2 Title to Property. Title to the Real Property shall be held in the name of the City of Washougal. Each Party's interest in the Real Property is defined in this Agreement by its Capacity Allocation.

4.3 Sale of Property. The Real Property, the Steigerwald Water System or any part of either the Property or System may be sold or transferred upon the written approval of both Parties, subject to any rights held by the Port of Camas-Washougal, if then applicable.

5. ALLOCATION OF COSTS, SYSTEM CAPACITY, AND WATER RIGHTS

5.1 Purchase Price. Each Party is obligated to pay its portion of the total purchase price for the Real Property (estimated to be $667,619.90 plus costs), divided as follows: Camas – 60% / Washougal – 40%. The allocable share of the Purchase Price shall be included in each Party's capital contributions if the Real Property is purchased over a term of years. Camas shall pay its share to Washougal under Agreement Section 7. Camas' payments for the real property are an obligation of Camas' water system and shall be considered as junior debt for the water utility.

5.2 Capacity Allocation. Subject to modification in future agreement, each Party's Capacity Allocation is divided as follows: Camas – 60% / Washougal – 40%.

5.3 Water Rights. Subject to modification in future agreement, each Party's interest in the water rights associated with the Steigerwald Water System is divided as follows: Camas – 60% / Washougal – 40%.

6. ADMINISTRATION

6.1 Administration.

6.1.1 Lead Agency. No new or separate legal or administrative entity is created by this Agreement. Washougal serves as lead agency for Project. As lead agency, Washougal shall be responsible for continued process for the Application for Water Right Permit, Real Property acquisition, Project design and Development and other Project related actions, all upon consultation with Camas.

6.1.2 Meetings/System Planning. The Public Works Director of each City shall meet regularly, generally monthly, regarding the Project. Additionally, the Parties shall hold regular meetings, to direct planning related to the Steigerwald Water System and to develop and review future actions, including relevant comprehensive plans, other planning documents and budgets. Each Party shall cooperate with the other Party's water comprehensive planning.

6.1.3 Phase 3. Following the adoption by each Party of the Party's updated water comprehensive plan, or earlier as the Parties determine, the Parties shall begin negotiations for development of a Phase 3 agreement. A Phase 3 agreement is to address the next phase of the water resource development and System Facilities, and System management. A Phase 3 agreement is expected to address such issues as organization and governance; budget and finance; water interties and wheeling; System Facilities planning and development; management and operation; repair and replacement of System Facilities; termination of this

Agreement; and related matters. The Parties intend to enter a Phase 3 Agreement no later than eighteen (18) months following the commencement of negotiations. Each Party commits to good faith and diligent effort to reach a Phase 3 agreement.

6.2 Other Uses. The Real Property is acquired by the Parties for development and operation of well fields and other utility purposes. The Parties may, however, agree to make the Real Property available for either or both Parties' general municipal purposes.

6.3 Water Rights Approval Process. In the event the Parties determine to request accelerated review of their Application for Water Right Permit, all costs of such process shall be allocated between the Parties based on Capacity Allocation.

7. BUDGETING AND INVOICING

7.1 Invoicing and Payment. Monthly, as expenses are incurred, Washougal will invoice Camas for its pro rata share of costs for the Project in accordance with Washougal's standard invoicing procedures for public works projects. Camas must remit payment in full for each invoice no later than thirty (30) days after the receipt of the invoice from Washougal.

7.2 Reimbursement. It is the intent of the Parties that Washougal be reimbursed for (and Camas pay for) only Camas' pro rata share of costs reasonably incurred by Washougal in performing its duties under this Agreement.

7.3 Taxes. Washougal shall not assess its utility tax on revenues from any service to Camas under this Agreement. Other taxes such as state, county and those imposed by other third parties related to the Project shall apply. Each Party retains all rights and authority to levy and collect utility taxes associated with retail or contract water service.

8. DISPUTE RESOLUTION

8.1 Negotiations. The Parties agree to make all reasonable efforts to resolve through informal, good faith negotiations any disputes concerning the terms and conditions or performance of this Agreement. In the event of a dispute, including a claimed breach of this Agreement, notice of the dispute shall be provided in writing and shall be delivered in the manner set forth in Section 12.4. The notice shall set forth with reasonable specificity the factual basis for the claimed dispute. Both Parties shall jointly cooperate to informally resolve any disputes as quickly and efficiently as possible, but in any event not more than sixty (60) days from the date of the notice unless extended by mutual agreement of the Parties.

8.2 Voluntary Mediation. If a dispute cannot be resolved through direct discussions, mediation may, by mutual consent, be initiated. In the event the Parties determine to initiate mediation, a mutually acceptable mediator shall be selected by the Parties for the purpose of facilitating the mediation process. The mediator shall be selected based on his or her expertise with the nature of the matter in dispute and their ability to facilitate a settlement. The Parties agree to provide all documentation and information requested by the mediator and in all other regards to cooperate fully with the mediator. The costs of mediation shall be shared equally between the Parties.

8.3 Other Relief. In the event the dispute is not resolved in mediation, or the Parties do not agree to mediation, the Parties may pursue any other form of relief provided by this Agreement.

8.4 Specific Performance. If a Party continues in default in the performance of any material and substantial covenant or agreement herein contained for a period of thirty (30) days after written notice specifying such default, and following such reasonable time under Agreement Sections 8.1 and 8.2; or as is necessary to cure such default or a Party's failure to commence a cure within sixty (60) days of notice, a Party may, at its option, immediately commence an action for specific performance to compel performance or take any other action available at law or in equity, including an action for damages. The Parties agree that the continued delivery of water from the Steigerwald Water System cannot be terminated without jeopardizing the public health and safety. As a result, termination of the Agreement is not an adequate remedy; and an action for specific performance, in addition to other remedies, is authorized to compel performance under this Agreement.

8.5 Compliance with Order. The Parties shall be bound by the outcome of litigation (or other process) under Agreement Section 8, including all appeals, at the conclusion of the litigation (the "Order"). The first remedy available to a Party under an Order shall be specific performance. If a Party does not comply with the Order within the time specified for compliance in the Order, the prevailing Party may elect to terminate the Agreement without further process under this Agreement. If a Party chooses to not terminate the Agreement, the Party may pursue such other remedies as are available under law or this Agreement.

8.6 Force Majeure. No period of performance required by this Agreement shall run during periods of force majeure.

8.7 No Waiver; Prevailing Party Costs. If a Party incurs attorney fees, costs, or other legal expenses to enforce the provisions of this Agreement against another Party, all fees, costs, and expenses are recoverable by the prevailing Party as against the offending Party. The failure of a Party to exercise any right or enforce any provision of this Agreement is not a waiver of that right or enforcement remedy.

8.8 Jurisdiction and Venue. This Agreement must be interpreted in accordance with the laws of the state of Washington. As against the other Party, Camas and Washougal may file suit to enforce this Agreement only in the Superior Court for Clark County, Washington.

9. ASSETS

9.1 Existing Assets. Subject to Agreement Section 4, this Agreement does not transfer any existing assets between the Parties. The Parties retain all rights, title, and interest in their separate municipal water systems, including without limitation all real and personal property, investments, cash accounts and reserves, and contract and intangible rights.

9.2 Steigerwald Water System Assets. The Parties each have an ownership interest in the assets of the Steigerwald Water System based on Capacity Allocation. Upon termination or dissolution of this Agreement, the Parties will work in good faith toward an asset allocation plan for the Steigerwald Water System and to administer the approved plan. In the event the Parties

cannot reach agreement, then Washougal shall pay to Camas the full amount of prior Camas payments to Washougal for the Real Property and any System Facilities constructed prior to Agreement termination. After payment by Washougal, Camas shall have no interest in the Steigerwald Water System.

10. INSURANCE

10.1 Property Insurance. Washougal must insure, at replacement cost value, any Steigerwald Water System Facilities.

10.2 Liability Insurance. Each Party shall obtain and keep in full force and effect liability insurance protecting itself and its employees, officers and agents, and the party, its employees, officers and agents, for claims of any persons for injuries to life, person or property by reason of anything done or permitted to be done or suffered or admitted to be done by the parties in the administration of the project. If either party withdraws from the Washington Cities Insurance Authority, that party shall deliver a certificate of insurance showing compliance with this section.

10.3 Cost. Any additional cost for liability, property or other insurance required for the System will be included as an operating cost and payable by each Party under Capacity Allocation.

11. UTILITY TAXES

The Parties recognize that the Steigerwald Water System is being developed to provide wholesale water supplies to the Parties. Accordingly, revenues generated by the Steigerwald Water System, if characterized as such, are exempt from certain taxes. Each Party will therefore pay its own share of utility taxes, when owed, for revenue generated by their separate municipal water utilities.

12. GENERAL

12.1 Execution of Documents. The Parties will cooperate fully in executing documents that are necessary to develop and implement the Steigerwald Water System.

12.2 Filing. Prior to or on the Effective Date, the City Clerks of Camas and Washougal must list this Agreement by subject on that city's website or other electronically retrievable public sources. Washougal shall record this Agreement with the deed or other documents transferring title to the Real Property.

12.3 Records.

12.3.1 Washougal must maintain accounts and records that sufficiently and properly document its services and costs under this Agreement.

12.3.2 Upon reasonable notice, each Party may inspect and copy, without charge, all non-privileged records held by any other Party relating to this Agreement.

12.4 Notices. All notices required by this Agreement must be in writing by hand delivery, email, regular U.S. mail, or certified mail, return receipt requested.

If to Camas, notice must be sent to:

City Administrator
City of Camas
616 N.E. 4th Avenue
Camas, WA 98607

If to Washougal, notice must be sent to:

City Administrator
City of Washougal
1701 "C" Street
Washougal, WA 98671

Notice is considered given upon delivery or, if mailed, upon the earlier of actual receipt or three (3) business days after the date of mailing.

12.5 Indemnification. To the maximum extent permitted by law, Camas and Washougal indemnify and hold harmless the other Party and all of its officers, officials, employees, and volunteers from any and all claims, demands, injuries, losses, suits, actions, fines, penalties, and liability of any kind, including attorney fees, to the extent they arise out of or are related to the performance of this Agreement by the indemnifying Party or its officers, officials, employees, volunteers, agents, representatives, consultants, contractors, or subcontractors. This indemnity is not limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the indemnifying Party under workers' compensation acts, disability benefit acts, or other employee benefit acts. This indemnity is specifically and expressly intended to constitute a waiver of the indemnifying Party's immunity under Washington Industrial Insurance (Title 51 RCW) with respect to only the other Party, and only to the extent allowable by law and necessary to provide the indemnified Party with a full and complete indemnity of claims made by the indemnifying Party's employees. This waiver has been mutually negotiated. The provisions of this Subsection 12.5 survive the expiration or termination of this Agreement.

12.6 Non-Waiver. The failure on the part of any Party to enforce its right as to any provision of the Agreement shall not be construed as a waiver of its rights to enforce such provision in the future.

12.7 Force Majeure. If a Party is rendered unable by Force Majeure, to carry out, in whole or part, its obligations under this Agreement and such Party gives notice and full details of the event to the other Party as soon as practicable after such occurrence, the obligations of the Party affected by the event (other than the obligation to make payments due for performance prior to the event) shall be suspended to the extent required. Under this Agreement, "force majeure" shall mean acts of God, wars, strikes, lockouts, labor disputes, civil disorder, acts of terrorism, fires, floods, volcanic eruptions, earthquakes or other causes beyond the reasonable control of the affected Party.

terrorism, fires, floods, volcanic eruptions, earthquakes or other causes beyond the reasonable control of the affected Party.

12.8 Entire Agreement; Amendment. This Agreement contains the entire written agreement among the Parties and supersedes all prior discussions and agreements. This Agreement may be amended only in writing, signed by all Parties.

12.9 Termination of Existing Agreement. On the Effective Date, that 2006 Inter-Local Cooperation Agreement between the City of Camas and the City of Washougal (July 17, 2006) terminates. All cost and responsibility allocations with respect to the Steigerwald Water System are governed by this Agreement.

12.10 Authorship. This Agreement reflects the Parties' joint drafting efforts. In the event any dispute, disagreement, or controversy arises regarding this Agreement, the Parties will consider each other as joint authors and no provision may be interpreted against any Party because of authorship.

12.11 Successors and Assigns. All of the provisions contained in this Agreement are binding upon the successors and assigns of the Parties.

12.12 No Third Party Rights. This Agreement is solely for the benefit of the Parties and does not confer rights to any other individual or person.

12.13 No Joint Venture. This Agreement does not form any joint venture, partnership, administrative entity, or separate municipal corporation between the Parties. Washougal's officers, officials, employees, volunteers, agents, representatives, consultants, contractors, and subcontractors will not be deemed, and may not represent themselves as, employees of Camas.

12.14 Severability. If any section or part of this Agreement is held by a court of competent jurisdiction to be invalid or unenforceable, that action will not affect the validity or enforceability of any other section or part of this Agreement.

13. TERM AND TERMINATION

13.1 Effective Date. This agreement shall be effective upon last signature by the respective Parties hereto.

13.2 Term. The term of this Agreement is ten (10) years plus the remainder of the calendar year in which it becomes effective, ending on December 31, 2025. The term will automatically extend for two (2) consecutive terms of ten (10) years unless at least one Party gives the other Party notice of intent to terminate the Agreement on or before December 31 of the year prior to the year in which the Agreement will expire. Upon expiration of the second extension of ten (10) years, this Agreement will automatically extend for additional calendar-year terms until at least one Party gives the other Party notice of intent to terminate the Agreement on or before December 31 of the year prior to the year in which the Agreement will expire.

13.3 Termination. Either Party may terminate this Agreement for a default by the other Party if the defaulting Party has not cured the default or complied with the Order as provided in Agreement Section 8. Prior to termination, the Public Works Directors of the Parties will propose for approval by the governing bodies of each Party a plan to wind up the Project affairs, allocate assets of the Steigerwald Water System and administer the approved plan. Failure to agree on a plan is governed by Agreement Section 9.2. All applicable costs generated up to and including the date of termination shall be and remain the responsibility of the terminated Party to pay.

13.4 Withdrawal. Either Party may elect to withdraw from this Agreement as follows. The withdrawing Party shall provide at least five (5) years' advance written notice of its intent to withdraw. Such notice shall be delivered consistent with Section 14.4. The effective date of withdrawal shall be 11:59 PM on December 31 of the year following the five (5) years' notice is issued. Withdrawal has the same effect as termination and shall be governed by Agreement Sections and 9.2 and 13.3.

CITY OF CAMAS

By:_____
Mayor

Date: 9-8-2015

Attest: PETER CAPEN
Clerk

Approved as to form:

_____
City Attorney

CITY OF WASHOUGAL

By:_____
Mayor

Date: 8-24-2015

Attest:_____
Clerk

Approved as to form:

_____
City Attorney

EXHIBIT A:
REAL PROPERTY

A tract of land together with an easement for access and transmission main located in portions of Sections 17, 20 and 21, Township 1 North, Range 4 East, Willamette Meridian, Clark County, Washington; said tract is a portion of that particular parcel shown on the official record of survey recorded in Book 43 at Page 9, Records of Clark County, Washington, being more particularly described as follows:

Beginning at the Northwest corner of said Section 21 per said record of survey in Book 43 at Page 9; Thence South 62°02'18" East a distance of 3,104 . 73 feet to the northerly right of way line of the dike road as shown in said survey and the point of beginning of this description; Thence along the following described courses:
North 10°34'45" East a distance of 461 . 58 feet;
South 88°36'01" East a distance of 347 . 39 feet;
South 68°07'52" East a distance of 343.29 feet;
South 73°19'26" East a distance of 198.86 feet;
South 73°26'56" East a distance of 160.51 feet;
North 17°28'45" East a distance of 102.65 feet;
South 67°16'49" East a distance of 31. 65 feet;
South 65°33'04" East a distance of 376.31 feet;
North 63°42 ' 19" East a distance of 112.43 feet;
South 01°23'59" West a distance of 292.78 feet to a point here and after referred to as Point "A" said point also being located on the northerly dike road right of way line; Thence following along said northerly line the following described courses:
North 88°35'14" West a distance of 850.42 feet to the beginning of a curve concave to the north having a radius of 2,782.47 feet;
Thence northwesterly 113.96 feet along said curve through a central angle of 2°20'10";
Thence North 86°15'03" West a distance of 141.48 feet;
Thence North 03°44'56" East a distance of 30.00 feet;
Thence North 86°15'03" West a distance of 516.09 feet to the TRUE POINT OF BEGINNING.

Together with an easement beginning at said Point "A"; Thence South a distance of 35.00 feet to the centerline of said dike road and the beginning of this easement description; being 20 feet in width and lying 10 feet on each side of the following described centerline: Following westerly and northwesterly on and along the centerline of said dike road to a point due South of said Northwest corner of Section 21; Thence North 38°03'10" West leaving said dike road centerline a distance of 432 . 82 feet to a concrete monument with brass cap located in the centerline of Index Street as shown on Record of Survey recorded in Book 14 at Page 50, Records of Clark County, Washington, and the terminus of this easement description.

APPENDIX I

EMERGENCY RESPONSE PLAN

OCTOBER 2019

WATER SYSTEM EMERGENCY RESPONSE PLAN

FEDERAL AND STATE REQUIREMENTS

FEDERAL REQUIREMENTS

Under the Public Health Security and Bioterrorism Preparedness and Response Act (Bioterrorism Act), Public Law 107-122 of June 12, 2002, drinking water systems serving more than 3,300 but less than 50,000 customers must complete a vulnerability assessment by June 30, 2004 and an emergency response plan (ERP) by December 30, 2004.

The U.S. Environmental Protection Agency (EPA) considers completion to mean the date on which the vulnerability assessment and certification were sent to EPA. The City submitted its vulnerability assessment on June 30, 2004, and the City completed its ERP certification by December 30, 2004.

The Bioterrorism Act requires the ERP to incorporate the results of the vulnerability assessment and include the following:

- Plans, procedures and equipment that can be implemented or utilized in the event of a terrorist or other intentional attack on the public water system.

- Actions, procedures and identification of equipment that can obviate or significantly lessen the impact of terrorist attacks or other intentional actions on the public health and the safety and supply of drinking water provided to communities and individuals.

STATE REQUIREMENTS

The operations and maintenance section of Chapter 246-290-415 (2)(b) WAC requires public water systems in Washington to have an emergency response plan as part of a water system plan. It also requires that systems employ reasonable security measures to protect the raw water intake facilities, water treatment processes, storage facilities, pump houses, and distribution systems from possible damage or intruders. The State requirements for emergency response must address all applicable hazards that could lead to abnormal operating conditions, such as flood, fire, unscheduled power outages, facility failure and system maintenance.

WATER SYSTEM EMERGENCY RESPONSE PLAN OUTLINE

Both the EPA and Washington State Department of Health (DOH) have prepared guides to develop emergency response plans that will comply with the Bioterrorism Act.

- *Emergency Response Guidance for Small and Medium Community Water Systems to Comply with the Public Health Security and Bioterrorism Preparedness and Response Act of 2002*, EPA 816-R-04-002, April 2004.

- *Emergency Response Planning Guide for Public Drinking Water Systems*, DOH Publication 331-211, May 2003.

The City's water system emergency response plan is based primarily upon the EPA guidance document, which establishes eight basic elements for an ERP:

1. System Specific Information
2. Community Water System Roles and Responsibilities
3. Water System Communication Procedures
4. Personal Safety
5. Identification of Alternative Water Sources
6. Replacement of Equipment and Chemicals
7. Property Protection
8. Water Sampling and Monitoring

The DOH planning guidance has been utilized to develop the eight elements of this ERP. Whenever possible, terminology used by the Department of Homeland Security and its sub-agency, the Federal Emergency Management Agency (FEMA) as well as the Occupational Safety and Health Administration (OSHA) and the National Fire Protection Association (NFPA) has been used relative to emergency management principles, hazardous materials response, mass casualty response and emergency medical response.

The following documents from EPA Water Security website were a technical resource for this ERP as well:

(Reference: http://cfpub.epa.gov/safewater/watersecurity/index.cfm)

Planning for and Responding to Drinking Water Contamination Threats and Incidents Response Protocol Toolbox (December 2003)

- Overview and Application
- Module 1: Water Utility Planning Guide
- Module 2: Contamination Threat Management Guide
- Module 3: Site Characterization and Sampling Guide
- Module 4: Analytical Guide
- Module 5: Public Health Response Guide

- Module 6: Remediation and Recovery Guide

EMERGENCY PLANNING AND OPERATION PRECEPTS

To be effective in a resource-constrained environment where multiple response agencies are involved, emergency planning for a water system must be considered in the context of the community's overall planning for emergency operations. The following sections identify and discuss the various plans that the City utilizes in its "all hazards" emergency management program.

CITY OF CAMAS DISASTER MANUAL

The City's Disaster Manual identifies the Emergency Response functions within the City based on a modified Incident Command System. The City Fire Chief is designated as the Incident Commander. The five functions coordinated by the incident commander are as follows:

- Police
- Public Information Officer
- Resource Officer (includes Public Works)
- Communications
- Disaster Control Officer

Emergency Operations Center (EOC)

The EOC is located at the City Police Department Headquarters building and provides overall direction, control and coordination of an incident. The EOC is primarily concerned with resource management and coordination between City Departments and other County/Regional, State and Federal emergency response and management agencies.

On-Scene Emergency Management

On scene management of emergencies is the responsibility of the Disaster Control Officer, who has a number of functions to coordinate, including:

- Suppression (includes rescue and control)
- Safety
- Triage

The City does not have its own hazardous materials response capability. This response capability is available from the City of Vancouver and the Georgia Pacific paper mill through a coordinated response plan that was development by the County Regional Emergency Services Agency.

CLARK COUNTY REGIONAL EMERGENCY SERVICES AGENCY (CRESA)

The City utilizes the Clark County Regional Emergency Services Agency (CRESA) as its emergency management agency. CRESA also serves as the Local Emergency Planning Authority under the Superfund Amendments and Reauthorization Act (SARA) Title III (also known as the Emergency Planning and Community Right to Know Act – EPCRA) for communities in Clark County, including the City of Camas, the City of Washougal and the City of Vancouver. The CRESA website is:

http://www.cresa911.org/

RELATED COUNTY AND REGIONAL PLANS

In the event local capabilities to manage an incident are exceeded, the City will utilize mutual aid partners through the following plans and guidance documents:

- Clark County Regional Hazardous Materials Response Plan
- Washington State Department of Transportation Public Works Emergency Response Mutual Aid Agreement
- Interlocal Agreement between the City of Camas and the City of Washougal for Equipment Acquisition
- Reimbursable Services Agreement between Clark County Department of Public Works and the City of Camas

HAZARD IDENTIFICATION AND VULNERABILITY ANALYSIS

The City of Camas utilizes the Clark County Hazard Identification and Vulnerability Analysis as the primary means for identifying hazards and vulnerabilities. The Clark County HIVA was last updated in 2003.

To comply with the Bioterrorism Act, the City completed a water system vulnerability assessment (WSVA) in June 2004. The results of the WSVA are considered confidential and will not be addressed as to their specific finding and recommendations in the ERP. However, the ERP must incorporate the WSVA results in terms of providing response plans that address the general categories of vulnerabilities identified in the WSVA.

Table 5-1 summarizes all hazards identified in the County HIVA and the City's WSVA that have been considered in the development of the City's ERP; the final column identifies those hazards considered significant enough to address in the City's water system ERP. Clark County has assigned probability, vulnerability and risk levels to each hazard. Each of these parameters is discussed in greater detail below.

Probability

An adjective description (High, Moderate, or Low) of the probability of a hazard impacting Clark County within the next 25 years is assigned to each hazard. Probability is based on an assessment of a hazard's frequency using information provided by relevant sources, observations and trends.

- HIGH: There is great likelihood that a hazardous event will occur within the next 25 years.

- MODERATE: There is moderate likelihood that a hazardous event will occur within the next 25 years.

- LOW: There is little likelihood that a hazardous event will occur within the next 25 years.

Vulnerability

An adjective description (High, Moderate, or Low) of the potential impact a hazard could have on Clark County is assigned to each hazard. It is the ratio of population, property, commerce, infrastructure and services at risk relative to the entire County.

- HIGH: The total population, property, commerce, infrastructure and services of the county are uniformly exposed to the effects of a hazard of potentially great magnitude. In a worst case scenario there could be a disaster of major to catastrophic proportions.

- MODERATE**:** The total population, property, commerce, infrastructure and services of the county are exposed to the effects of a hazard of moderate influence;

  or

  The total population, property, commerce, infrastructure, and services of the county are exposed to the effects of a hazard, but not all to the same degree;

  or

  An important segment of population, property, commerce, infrastructure, or service is exposed to the effects of a hazard. In a worse case scenario there could be a disaster of moderate to major, though not catastrophic proportions.

- LOW: A limited area or segment of population, property, commerce, infrastructure, or service is exposed to the effects of a hazard. In a worse case scenario there could be a disaster of minor or moderate proportions.

Risk Rating

An adjective description (High, Moderate, or Low) of the overall threat posed by a hazard over the next 25 years. It is a subjective estimate of the combination of probability of occurrence and vulnerability.

- HIGH: There is strong potential for a disaster of major proportions during the next 25 years;

  or

  History suggests the occurrence of multiple disasters of moderate proportions during the next 25 years. The threat is significant enough to warrant major program effort to prepare for, respond to, recover from, and mitigate against this hazard. This hazard should be a major focus of the emergency management training and exercise program.

- MODERATE: There is moderate potential for a disaster of less than major proportions during the next 25 years. The threat is great enough to warrant modest effort to prepare for, respond to, recover from, and mitigate against hazard. This hazard should be included in an emergency management training and exercise program.

- LOW: There is little potential for a disaster during the next 25 years. The threat is such as to warrant no special effort to prepare for, respond to, recover from, or mitigate against this hazard. This hazard need not be specifically addressed in the county's emergency management training and exercise program except as generally dealt with during hazard awareness training.

TABLE 5-1

Hazard Identification and Vulnerability Assessment Summary City of Camas

Hazard Classification	Hazard	Probability	Vulnerability	Risk	Applies to City of Camas Water System
Drinking Water Unique	Bacteriological Contamination	MODERATE	MODERATE	MODERATE	X
Natural Disaster	Drought	HIGH	MODERATE	MODERATE	X
	Earthquake	HIGH	HIGH	HIGH	X
	Flood	HIGH	MODERATE	HIGH	X
	Forest/Wildland Fire	MODERATE	MODERATE	MODERATE	X
	Landslide	HIGH	LOW	MODERATE	X
	Severe Local Storm	HIGH	HIGH	HIGH	X
	Tornado	HIGH	LOW	LOW	X
	Volcano	LOW	MODERATE	LOW	X
Technological Hazards	Airplane Crash	MODERATE	LOW	MODERATE	X
	Dam Failure	LOW	LOW	LOW	X
	Hazardous Materials	HIGH	MODERATE	HIGH	X
	Energy Emergency	MODERATE	MODERATE	MODERATE	X
	Transportation Accident	MODERATE	LOW	MODERATE	X
	Urban Fire	MODERATE	MODERATE	MODERATE	X
Criminal Activity	Terrorist Use of Chemical, Biological, Radiological, Nuclear Agents and Explosives	LOW	MODERATE	MODERATE	X
	Cyber Attack	LOW	MODERATE	MODERATE	X
	Vandalism	LOW	MODERATE	MODERATE	X

SYSTEM SPECIFIC INFORMATION

Chapter 3 of this manual provides a complete description of the City's water system facilities.

Interties

The City currently has an emergency intertie agreement with the City of Washougal to the east. The City has two one-way PRV interties with Washougal, located on SE Shepherd Street and at the intersection of SE 3rd Street and Whitney Street. These interties provide water from the City of Camas to the City of Washougal under low pressure conditions. The City also has an intertie agreement with the City of Vancouver located east of SE 192nd Ave just north of Brady Road in the Columbia Palisades development.

Telemetry and Control System

The City's telemetry system monitors levels in the storage facilities and the status of the booster pump stations and groundwater wells. Installed in 1988 and continually upgraded, the system allows the City to record various systems such as pump runs, reservoir drain and fill and other metering information. The system also has the capability of reading instantaneous flow from individual pumps. The system allows the City to monitor and control the operation of these facilities from the office and over the Internet from home. The chemical feed system for the Washougal wellfield and can be remotely monitored in its operations in the same manner as the wells, reservoirs and booster stations.

Supervisory Control and Data Acquisition (SCADA) System

The City has a SCADA system with master control located at the City Operations Center. The system uses programmable control software, which can be controlled by a personal computer at the operations center or remotely by a modem connected to a remote computer. The system monitors reservoir levels, well status, well flow rate, booster pump flow rate when metered, pump status, run time and alarm conditions. Reservoir levels are recorded on circular charts on a continual basis. The City also has the ability to monitor the drawdown level in the aquifer at Washougal Well field.

WATER SYSTEM ROLES AND RESPONSIBILITIES

PUBLIC WORKS DIRECTOR

The City water system is operated by the Public Works Department. In the event of an emergency sufficient to activate the EOC, the City's Public Works Director or designated representative will locate to the EOC at the Police Department. The Public Works EOC representative is responsible for coordinating all public works functions with other

members of the EOC Operations Group. The Public Works Director also serves as the Public Information Officer for all Public Works matters.

UTILITIES MANAGER

The water system is one of several utilities within the Public Works Department that is managed by the Utilities Manager, who reports directly to the Public Works Director. In the event of an emergency involving the water system, the Utilities Manager will serve as the on-scene Incident Commander until properly relieved by an appropriate Police or Fire Department representative. The Utilities Manager is responsible for all aspects of the water system during an emergency, including damage assessments, assessing customer impacts, coordinating with jurisdictional public health agencies and adjacent water utilities, keeping the public and media informed through the City's Public Information Officer, and working with the Public Works Engineering Manager for design and construction services required for repair and recovery operations.

OPERATIONS LEAD

The water utility has a Lead operator reporting to the Utilities Manager, who is responsible for operating the water system during an emergency. The Lead Operator assists the Utilities Manager in damage assessments and coordinating repair and recovery operations.

WATER QUALITY MONITOR

Within the water division a water system operator is assigned responsibility for water quality monitoring. The responsibilities for water quality monitoring for routine compliance sampling and testing are outlined in the Operations and Maintenance manual. Positive coliform events of the water system require the water quality monitoring operator to follow procedures as outlined in the water sampling and monitoring section within this plan. Intentional contamination of the water system is covered in a separate incident specific plan at the end of this plan.

WATER SYSTEM COMMUNICATION PROCEDURES

The City Disaster Manual establishes communications procedures during an emergency. The City utilizes a 911 call service operated by CRESA, which provides dispatch services for fire police and emergency medical services.

The City maintains emergency phone number lists for use by City personnel. The list contains City staff home phone numbers, addresses and cell phone numbers. The second list includes the numbers for emergency services, generator rentals, adjacent utilities, fuel suppliers, parts supplies, safety equipment, pumper trucks, and contractors. The emergency phone numbers are updated frequently as phone numbers change. These lists are provided in the Appendix G.

The employee on-call will be the first person notified in the event of an emergency, disaster, or incident. The responding party shall report to the command center for a briefing and further instructions. The on-call employee shall be in charge of all Public Works functions until relieved by a higher-ranking Public Works employee.

At the command center, the on-call employee will receive a "Public Works Department Duty Checklist." A copy of this form is provided in the Appendix H. The employee is to fill out the checklist. The employee is to determine if it is within the employee's capabilities to handle the incident requirements of the Public Works Department. If the employee is unable to fill the needs of the incident, the employee shall notify the Water/Sewer Supervisor. The Water/Sewer Lead Operator shall notify the Public Works Utilities Manager of the incident.

The City of Camas Disaster Manual provides additional procedures for Public Works response. A copy of this document can be found in the offices of the Public Works Director and the Public Works Operations Manager. It is an orange manual and all Public Works employees should be familiar with the contents and procedures.

In the event that public notification is required during a water system emergency, the Public Works Director provides information to the media for this purpose.

Liaison with the Washington State Department of Health (DOH) is normally the responsibility of the Public Works Director. An emergency contact list for DOH is presented in Table 5-2.

TABLE 5-2

Emergency Contact List for DOH

Agency/Contact	Contact Telephone Number	Purpose
DOH Hot Line DOH SWRO After Hours	(877) 481-4901 (360) 236-3030	After Hours Emergencies.
DOH/Regional Engineer	(360) 236-3018	Regulatory Assistance
DOH/Coliform Program Manager - SWRO	(360) 236-3044	Coliform Monitoring

The City has entered into a mutual aid agreement with the City of Vancouver and several other public works organizations. The contact names and phone numbers for the responsible individuals for those purveyors are presented in Table 5-3.

TABLE 5-3

Mutual Aid Water Utility and Public Works Contacts

Utility	Contact Person	Contact Number	
		Phone	FAX
City of Vancouver	Tyler Clary	(360) 487-7169 (360) 989-6381	(360) 696-8002
City of Washougal	Trevor Evans	(360) 835-2662 (360) 835-8501	(360) 835-8808
Clark County	Ahmad Quayomi	(564) 397-4358	(360) 397-6051
Clark Public Utilities	Doug Quinn	(360) 992-8022 (360) 992-3000(1)	(360) 992-8027
Washington State Department of Transportation	Bob Kofstad	(360) 905-2007 (360) 921-9119(1)	(360) 905-2075

(1) After hours

PERSONAL SAFETY

EVACUATION PLANS

The City's Disaster Manual provides limited guidance for evacuation operations. The Police Department has overall responsibility for evacuation operations. Each City Department and Division is responsible for developing emergency evacuation plans for its department/division.

The on-scene incident commander will normally direct evacuation operations. The Incident Commander at the scene will initially be the senior City employee at the scene; the on-scene incident commander duties will eventually be assumed by a Police or Fire Department representative depending upon the nature of the emergency.

The Occupational Safety and Health Administration (OSHA) provides guidance on developing evacuation plans for terrorist incidents:

http://www.osha.gov/dep/evacmatrix/index.html

Per the City's Disaster Manual, the Fire Department will be responsible for incident command during a hazardous materials (HAZMAT) release as this duty requires specific training and certification under federal regulations. City and Regional Emergency Plans for terrorist incident response also require that HAZMAT protocols and procedures be followed for incidents involving the intentional release of chemical and biological agents.

EVACUATION ROUTES AND EXITS

Evacuation routes and exits for City facilities are to be posted at each facility. In the event of an evacuation from an area that encompasses more than one facility, the City Police or Fire Department will identify additional evacuation routes as needed. During an incident involving the release of hazardous materials, the Fire Department is responsible for identifying evacuation routes that mitigate hazards to evacuees. In the absence of direction from the Fire Department, the general rule for evacuation during a hazardous materials release is to travel uphill and upwind of the release.

ASSEMBLY AREAS AND ACCOUNTABILITY

Assembly areas for evacuation from City facilities are posted along with evacuation routes and exits at City facilities. In the event of an evacuation from an area that encompasses more than one facility, the City Police or Fire Department will identify additional assembly areas as needed. The senior water division employee is responsible for ensuring that all personnel are accounted for at the assembly area after an evacuation has been conducted.

SHELTER

Sheltering is not addressed in the City's Disaster Manual. The City defers to CRESA for emergency sheltering operations. The City is responsible for sheltering of City employees; this responsibility includes identifying City facilities that may be used for sheltering during a emergency.

TRAINING AND INFORMATION

All water utility employees are provided with the following training:

- Blood borne pathogens
- Cardiopulmonary resuscitation (CPR)
- Defensive driving
- Emergency first aid
- Emergency response awareness (including FEMA ICS - IS195)
- Equipment lock-out/tag-out procedures
- Fall protection
- Fire extinguishers/evacuation
- Hazard communication
- Hearing conservation and testing
- Protection from water borne pathogens

When appropriate for their duties, water utility employees are provided training in:

- Bucket truck
- Confined space (aerial platform)

- Forklift operation
- Respiratory protection and fit testing
- Trenching and shoring

Water utility employees are issued protective equipment appropriate to their job responsibilities including hard hats, safety goggles, work gloves and safety boots.

Recommended training: The water quality monitor should be trained in hazardous materials awareness (reference: 29 CFR 1910.120). This training is available from the City Fire Department.

Emergency Equipment

The water utility has a hoist, harness and gas detection equipment for confined space entry. All employees are issued hard hats and reflective safety vests. All trucks are equipped with emergency first aid kits.

FIRST AID

Water utility employees are trained in emergency first aid that includes the following:

- How to determine the safe response to an emergency situation.
- Recognizing and caring for life-threatening emergencies in adults, such as respiratory, choking, and cardiac problems.
- Caring for injuries including severe cuts and burns, sprains and strains.
- Caring for sudden illnesses such as poisonings, bites, and stings.
- Recognizing and caring for heat- and cold-related emergencies.
- Workplace emergency procedures, including notifications for medical emergencies.

The Fire Department provides emergency medical services for trauma victims whose injuries exceed emergency first aid treatment.

IDENTIFICATION OF ALTERNATIVE WATER SOURCES

INTERTIES

The City has interties with the City of Washougal and the City of Vancouver that would normally be used to supply water to either City. The City has no other interties and therefore, must generally be self-sufficient in the event of a water shortage or water system failure. If necessary, the City would consider attempting to pump (boost) water from either Washougal or Vancouver into the City's system.

REDUNDANCY IN CITY WATER SYSTEM

The City has several wells and a surface water source that provide some redundancy in the event certain elements of the water system fail. For example, if the Washougal Wellfield is flooded, the surface water source may serve as a backup, with water conservation measures in place to offset the loss of the wellfield.

Emergency Water Supplies

Under the County's CEMP, citizens are urged to keep a 72-hour supply of food and water in the event of an emergency. The City will endeavor to supply potable water to support emergency operations within its capabilities.

TRANSPORT OF POTABLE WATER DURING EMERGENCIES

If the City obtains potable water by transporting from another source, DOH has issued guidelines for water system utilities that deliver potable water to the public during emergencies. This guidance is found at the following website and are summarized below:

http://www.doh.wa.gov/ehp/dw/Publications/Truck_Transport.htm

General

- DOH recommends that someone with water treatment expertise be responsible for the operation and management of trucked potable water.

- The City should contact the regional office of the DOH Division of Drinking Water (DOH-DDW) or local health department to discuss current requirements and approve the proposed operation. [see WAC 246-290-415(2)(d) and 246-290-451(4)]. Northwest Regional Office (Kent) – (253) 395-6750.

Truck Container

- The truck container must be contaminant-free and capable of being maintained so that water contamination is prevented.

- If a truck container has been previously used only for potable water and has been protected from possible contamination, it may be used without disinfection and testing for bacteria.

- Truck containers that cannot pass the initial testing criteria after disinfection (i.e. absence of coliforms) shall not be used.

- Trucks previously used for substances other than potable water will be evaluated on an individual basis. Consult with DOH before using trucks that may have previously carried toxic or other non-potable liquids.

- All truck containers must be filled or emptied through an air gap or approved double-check valve assembly, in accordance with WAC 246-290-490.

Initial Truck Disinfection

- The tank and all hoses, pumps, and other equipment used in handling water should disinfected by filling with water containing at least 50 to 60 parts per million (ppm) of chlorine and then held in the tank for at least 24 hours.

- One gallon of liquid bleach is required in every 1,000 gallons of water to produce 50 to 60 ppm. Bleach should be 5.25 to 6 percent hypochorite with no additives. Bleach should be added in proportion to the water as the tank is being filled, e.g., add approximately one-half gallon of bleach with each 500 gallons of water.

- The chlorine solution must be flushed from the tank after 24 hours.

- Once the tank is emptied, refill it with the water to be transported, and test for coliform bacteria. If coliforms are present, repeat the process. If the tank cannot be disinfected to eliminate coliforms, it must not be used.

- Water to be transported by tank trucks should contain a free chlorine residual of about one part per million (1 ppm or 1 mg/L) at the beginning of the haul.

Source of Water

- The source for emergency trucked water must come from an approved public water supply, unless otherwise approved by DOH.

- Every precaution should be taken to ensure that the water remains potable once it is collected and transported.

Receiving Tank

- The water system's receiving tanks must be inspected to assure that water quality issues will not occur during filling and later distribution to consumers.

- Receiving tanks must be cleaned and disinfected using the procedures for truck containers (see "Initial Truck Disinfection" guidelines).

- The receiving tanks must be kept secure and protected from contamination throughout the emergency response.

- The customer's receiving tank must be filled through an air gap or an approved double-check valve assembly in accordance with WAC 246-290-490.

Documentation and Record Keeping

- The receiving water system is responsible for documenting and keeping proper records of the emergency trucked water operation.

- Records should be retained for at least 6 months for review upon request by health agencies, haulers, or the supplying water system.

REPLACEMENT OF EQUIPMENT AND CHEMICALS

EQUIPMENT AND SUPPLIES

A list of equipment suppliers that the City has access to for emergencies is provided in Appendix I.

CHEMICALS

Table 5-4 lists chemicals used by the City in its water treatment processes. Appendix J provides a list of chemical suppliers.

To assist the City in identifying chemicals with emergency planning implications, threshold quantities under EPCRA, the Comprehensive Environmental Response

Compensation and Liability Act (CERCLA), and the Clean Air Act (CAA) are also shown in Table 5-4, where applicable.

The applicability of each regulation is briefly discussed below.

Use and Storage – EPCRA governs reporting requirements for chemicals, either in use or in storage, that pose a significant environmental or health hazard.

Liquid Spill – In the event of a spill where the quantity exceeds the CERCLA threshold, certain reporting requirements will be in effect.

Risk of Air Release – Gaseous chemicals will require a risk management plan if they exceed threshold quantities.

Explanatory notes following Table 5-4 provide greater detail regarding reporting requirements.

The City should coordinate all EPCRA, CERCLA and CAA planning and reporting requirements with CRESA.

Hazardous substance releases should be reported to the Washington State Department of Ecology (Ecology) and responses coordinated with CRESA through the City Fire Department.

CRESA Phone: (360) 737-1911

Ecology 24-Hour Spill Response Phone:	(800) 258-5990
National Response Center	(800) 424-8802

TABLE 5-4

Water Treatment Chemicals used by the City of Camas

Name(1)	Use(2)	CAS/EPCRA Section 313 Category Codes(3)	EPCRA Section 302 EHS TPQ(4) (pounds)	EPCRA Section 304 EHS RQ(5) (pounds)	CERCLA RQ(6) (pounds)	EPCRA Section 313(7)	CAA 112(r) TQ(8) (pounds)
Sodium fluoride (> 99%)	F	7681-49-4	N/A	N/A	**1,000**	N/A	N/A
Sodium hydroxide (20 – 30%)	CO/pH	1310-73-2	N/A	N/A	**1,000**	N/A	N/A
Sodium hypochlorite (5-12.5%)	DI	7681-52-9	N/A	N/A	**100**	N/A	N/A

All reporting quantities noted in **bold** font n/a = not applicable.

(1) The chemicals listed above were taken from an extensive inventory of chemicals provided in a document titled *List of Lists, Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112(r) of the Clean Air Act (consolidated list), EPA,550-B-01-003, October 2001.* EPA put the list together to help chemical handling firms determine what reporting requirements apply under sections 302, 304, or 313 of EPCRA and if they are subject to the accident prevention regulations under CAA section 112(r). The chemical names are those that are generally used in the regulatory programs developed under EPCRA, CERCLA, and CAA section 112(r)

(2) Use Definitions: Coagulant (CG); Corrosion Control (CO); Disinfection (DI); Fluoridation (F); pH Adjustment (pH).

(3) The chemicals above are organized under the Chemical Abstracts Service (CAS) registry number and the EPCRA Section 313 category codes.

(4) EPCRA Section 302 includes a list of *Extremely Hazardous Substances* (EHSs). The presence of EHSs in quantities at or above the Threshold Planning Quantity (TPQ) require local emergency planning committees to develop emergency response plans and notify State emergency response committees. Facilities with a listed EHS are subject to the reporting requirements of EPCRA section 311. The facility must provide a material safety data sheet or a list of covered chemicals to State and local emergency response committees and the local fire department. The minimum TPQ for section 311 reporting is 500 pounds or the TPQ, whichever is less. EHS TPQ and RQ are represented in pounds.

(5) Under EPCRA Section 304, releases of reportable quantities (RQ) of EHSs are subject to State and local reporting.

(6) Under Section 304 of EPCRA, releases of hazardous substances listed in the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) are to be reported to the National Response Center, as well as to the State and local emergency response committees. The CERCLA RQ column shows the reportable quantities (in pounds) for chemicals that are CERCLA hazardous substances as listed in 40 CFR Part 302, Table 302.4. Solid metals listed under CERCLA, with mean diameters greater than 100 micrometers, are not reported. The CERCLA RQs listed above apply to smaller particles.

(7) Under the column titled Section 313, the notation "313" means that the chemical is required to report under section 313 and 6607 of the Pollution Prevention Act. An "X" indicates that this chemical may have a second name or that the same chemical may have the same CAS number listed under a different name. The lower case "c" indicates that a chemical must report under one or more of the EPCRA section 313 chemical categories even though it has no CAS number.

(8) Under CAA section 112(r) EPA identified 77 toxic substances and 63 flammable substances, including their threshold quantities (TQs), which are subject to accident prevention provisions. The requirements for risk management programs for accidental release prevention are found in 40 CFR Part 68. CAA section 112(r) lists several substances in solution that are covered only in concentrations above a specific level. Most of these chemicals are listed above and include ammonia CAS #7664-41-7 (concentrations 20 percent or greater); hydrochloric acid CAS #7647-01-0 (concentrations 37 percent or greater); hydrogen fluoride/hydrofluoric acid CAS #7664-39-3 (concentrations 50 percent or greater); and nitric acid CAS #76997-37-2 (concentrations 80 percent or greater). CAA section 112(r) TQs are in pounds and apply to those quantities within a process and not at the facility as a whole.

PROPERTY PROTECTION

The City controls access to its water facilities using barriers and locks. Reservoirs are fenced, with access controlled by locked gates. Utility vaults are covered and locked. The City maintains strict control over its keys. Employees are issued keys only to those facilities they are required to access to perform their duties. The City has also partnered with residential customers to be vigilant of the areas around its well and reservoir sites to alert the City if they notice any suspicious activity.

WATER SAMPLING AND MONITORING

Water sampling for routine compliance is described in Chapter 2 of this manual.

Water sampling and monitoring for a coliform incident is described below under incident specific plans (bacteriological contamination).

Water sampling and testing for a suspected intentional contamination incident is described below under incident specific plans.

MAJOR WATER SUPPLY INTERRUPTIONS

WATER MAIN BREAKS

Depending on the location where the main break occurs, if susceptible populations are impacted, use contact list in Appendix B (Coliform Monitoring Plan) for notification. City will provide bottled water for lengthy outages. Depending on circumstances, portable toilets may be supplied as well. Trucked potable water may be provided. If the City uses trucked potable water, the guidelines in DOH Publication #331-063 will be followed.

The City maintains an inventory of piping and fittings to address most emergency repair requirements and has a list of vendor telephone numbers to obtain supplies when existing material stocks are inadequate for emergencies. When repairs are too large for City crews to manage, the City will contact contractors from its small works roster.

When water supply interruptions for a pressure zone are expected to be lengthy, the City will consider instituting measures to allow customers to come to a reservoir and obtain water directly from a reservoir. Any water dispensed in this manner will be done under the supervision of a City employee.

BOOSTER STATIONS

The City has developed detailed written procedures for operating the water system when booster stations are not in service and has figures showing locations of pumps, piping, meters, shut off valves and other key features of each facility, such as valve size/type, motor manufacturer/type/hp and pump capacity/type. Copies of these procedures, technical details and figures are kept at each facility.

A brief summary of the booster station emergency procedures follows.

Butler Booster Station

Auxiliary Power

The Butler Booster Station does not have an auxiliary power system.

HOA Setting

Emergency operation of the booster station may require the pump to be operated in the HAND mode to compensate for distribution system problems in other areas of the system during a power outage.

Backup Operations

Angelo Booster Station serves as a backup for feeding the Lower Prune Hill (455) Zone if the Butler Booster Station is out of service. The City has a standby pump for the 455 Zone at the Angelo Booster Station in the event that a pump is out of service. There is sufficient pumping capacity to the 455 Zone to operate with the largest pump out of service under normal system demands, including fire flow.

Gregg Booster Station

Auxiliary Power

The New Gregg Booster Station has a diesel powered 300-kW generator with automatic transfer switch capable of operating the New Gregg Booster Station pumps during a power outage.

HOA Setting

Emergency operation of the booster station may require the pump to be operated in HAND mode to compensate for distribution system problems in other areas.

Backup Operations

There is no back up in the event Gregg Booster Stations are out of service; however, there is sufficient pumping capacity at the Gregg Booster Stations to operate with the largest pump out of service under normal system demands, including fire flow.

Angelo Booster Station

Auxiliary Power

The Angelo Booster Station is equipped with a 200-kW diesel generator with an automatic transfer switch. This generator is capable of providing power to three of the pumps, the lighting, and the HVAC system.

Backup Operations

If Angelo Booster Station is out of service, Butler Booster Station and Forest Home Booster Station serve as back up to feed the upper zones (Lower Prune Hill, Lacamas, Upper Prune Hill) from the lower zone (Butler). The City has a standby pump at the Angelo Booster Station in the event that a pump is out of service. There is sufficient pumping capacity to the 455 Zone to operate with the largest pump out of service under normal system demands, including fire flow.

Lower Prune Hill Reservoir Out of Service

If the Lower Prune Hill Reservoir is out of service, one pump at the station will be placed into hand mode and operated with the reservoir isolated. The pressure relief valve at the station will bleed excess pressure to the inlet piping. This will allow the system to maintain a constant pressure in the zone. During this operation, the pump and pressure need to be monitored every two hours.

Forest Home Booster Station

Auxiliary Power

Auxiliary power is not available for the Forest Home Booster Station.

HOA Settings

During emergencies the booster station may need to be operated in the HAND mode to compensate for distribution system problems in other areas of the system.

Backup Operations

If the Forest Home Booster Station is out of service, Butler Booster Station and Angelo Booster Station serve as back up to feed the upper zones (Lower Prune Hill, Lacamas, Upper Prune Hill) from the lower zone (Butler). The City has a standby pump at the Angelo Booster Station in the event that a pump is out of service. There is sufficient pumping capacity to the 455 Zone to operate with the largest pump out of service under normal system demands, including fire flow.

Lacamas Booster Station

Auxiliary Power

The Lacamas Booster Station has an auxiliary generator with automatic transfer switch available to provide power. This generator is a 60 kW natural gas generator and is capable of running the two 500-gpm pumps, the building lights and ventilation system. This generator is able to provide the Lacamas Booster Station with power as long as natural gas service is not interrupted. If the generator fails during a power outage, water service can be maintained through the pressure reducing valve (PRV) stations that that connected to the system that feeds down from the Upper PruneHill Reservoir. Well No. 9 also serves the area supplied by Lacamas Booster Station, but since it does not have auxiliary power, it is more than likely unavailable during a power outage.

Lacamas Reservoir Out of Service

When the Lacamas Reservoir is out of service, pressure to the Lacamas (544) Zone can be maintained by operating one of the pumps in the Lacamas Booster Station. The pressure relief valve will return excess pressure to the inlet piping while maintaining the downstream pressure. Under this operating condition, the pump operation and pressure need to be checked every 2 hours. The 544 Zone can also be served from Upper Prune Hill through PRV stations.

Backup Operations

When the Lacamas Booster Station is out of service Well No. 9 and the Lower Prune Hill Booster Station can be used to feed the Lacamas (544) Zone.

Lower Prune Hill Booster Station

Auxiliary Power

This facility is equipped with a 300-kW diesel powered generator with an automatic transfer switch to operate the three pumps in the event of a power failure.

Temporary Pump

During high seasonal demands a mobile skid mounted pump is rented by the City to supplement the LPH Booster Station. This pump is installed via connections constructed for this purpose near the entrance to the pump station. It is operated in a manual mode and has a capacity between 600 and 700 gpm. This pump is not powered by the auxiliary power generator. The City also has pumping capacity available at the Upper Prune Hill Booster Station to serve the Upper Prune Hill area for temporary losses of service at the Lower Prune Hill Booster Station, but this is limited and cannot provide supply for extended interruptions in service or extended periods of high demands.

Upper Prune Hill Booster Station

Auxiliary Power

The Upper Prune Hill Booster Station is equipped with a manual transfer switch to allow the City to bring in a portable generator to supply power to the booster station. The portable generator used by the City can operate two of the 20-hp pumps.

RESERVOIR EMERGENCY PROCEDURES

General

The City has developed detailed written procedures for operating the water system when reservoirs are not in service. These procedures are kept at each facility. If a reservoir must be taken off line isolation valves are used to prevent water from being pumped into the reservoirs and the reservoirs are allowed to empty into the distribution system.

A brief summary of the reservoir emergency procedures follows.

Butler Reservoir

Water service is maintained to the system during cleaning / draining / disinfection of the reservoir with the following procedures.

- Connect 6-inch overflow piping to the 12-inch main in the Butler Yard.
- Open the 6-inch overflow valve.
- Open the 4-inch main connecting line valve between the 12-inch and 14-inch mains until water comes out of the 6-inch overflow.
- Close the two 12-inch valves in the reservoir valve pit to take the Butler Reservoir offline.

- Adjust the 4-inch connecting valve to maintain a small amount of water flow from the 6-inch overflow. As long as water flows from the overflow, water service will be maintained to the 343 Zone.

- Depending on the season and the demand, a well may need to be in operation to maintain system pressure in the 343 Zone.

- The pressure reducers on NE 22nd Avenue and NE Everett Street regulate pressure and keep the 343 Zone served.

Reverse the order to place the reservoir back online.

Gregg Reservoir

Water service can be maintained to the Gregg area by running a pump in the HAND position in the Gregg Booster Station. The pressure relief/bypass valve at the Gregg Booster Station will maintain pressure in the service area and also keep it from over pressurizing the zone. The Gregg Reservoir can be isolated after the pump in the Booster Station is placed into operation. Close attention will be paid to the system pressure and the pump to provide uninterrupted service.

Lacamas Reservoir

The Lacamas Reservoir is supplied from the Upper Prune Hill Zone via PRVs, from the Lower Prune Hill Zone via the Lacamas Booster Station, or from Well No. 9. As long as one of these facilities is in operation, the reservoir can be filled.

Water service can be maintained to the Lacamas area (544 Zone) by running a pump in the HAND position in the Lacamas Booster Station or Well No. 9. The pressure relief/bypass valve at the Lacamas Booster Station will maintain pressure in the service area and also keep it from over pressurizing the zone. The Lacamas Reservoir can be isolated after the pump in the Booster Station is placed into operation. Close attention must be paid to the system pressure and the pump to provide uninterrupted service.

Lower Prune Hill (LPH) Reservoirs

Emergency operation of the reservoir would be required if a problem were to occur with one of the reservoirs. If a reservoir were to experience a physical or water quality problem, one reservoir could be taken out of service and the remaining one could be used to supply water until the problem is solved. If the smaller of the two tanks was used alone, the start levels for the Butler, Forest Home, and the Angelo Booster will be raised to keep the reservoir full at all times.

Upper Prune Hill (UPH) Reservoirs

UPH 2.4-MG Reservoir

The 2.4-MG reservoir inlet has an altitude valve that closes to allow the UPH standpipe to fill when the reservoir is full (63-foot level). The UPH 2.4-MG reservoir outlet valve is normally opened, but is seismically controlled and will close in a seismic event. The UPH booster pumps will also be turned off in a seismic event.

If both the Lower Prune Hill and Upper Prune Hill Booster Stations are out of service and the Upper Prune Hill Standpipe level drops low enough, site valves can be opened to allow both the standpipe and the 2.4-MG Reservoir to float on the system.

Two of the booster pumps (No. 2 and No. 3) are equipped with modified pump control valves that employ two valves that are adjusted to drain the UPH 2.4-MG reservoir. Detailed procedures for using these pump control valves are provided at the UPH booster station.

UPH Standpipe

The UPH standpipe inlet valve is a spring-activated altitude valve that is designed to shut off when the standpipe is full. This valve is not controlled by the telemetry system. When the UPH standpipe altitude valve is closed, the UPH booster pumps operate based on the pump discharge pressure.

If the Upper Prune Hill Standpipe is out of service, the UPH area can be supplied by the UPH Booster Station and the LPH Booster Station. The LPH Booster Station operates based on reservoir level in the 2.4 MG UPH Reservoir. If the LPH Booster Station flows exceed system demands, the 2.4 MG UPH Reservoir will fill. If the 2.4 MG UPH Reservoir is full, the LPH Booster Station will shut off and the UPH Booster Station will be called in pressure mode and will supply the system. If system demands exceed the supply of the LPH Booster Station while it is in operation, the UPH Booster Station will be called in pressure mode to provide additional supply. Pressure mode for the UPH Booster Station is discussed below.

At the Upper Prune Hill Pump Control Panel Screen, the operator selects this setting at the pump control panel, which is a six step operating sequence (numbered 0 to 5) that is based satisfying a minimum pressure of the pump discharge. The operator sets the pressure at 40 psi, which simulates a full standpipe.

- Step 0 – no pumps on (40 psi is satisfied)
- Step 1 – pump 1 on and runs till 40 psi is satisfied
- Step 2 – pump 1 and 2 on if 40 psi is not satisfied after Step 1
- Step 3 – pump 1 and 3 on if 40 psi is not satisfied after Step 2
- Step 4 – pump 1, 2 and 3 on if 40 psi is not satisfied after Step 3
- Step 5 – all pumps on if 40 psi not satisfied after step 4

There is a 15 second delay built in between each step. Pumps turn off sequentially in 15 second intervals once 40 psi is satisfied.

WELLS

Detailed written operating instructions are maintained at each well. These instructions cover normal operations as well as response to pump and power failure. For wells with treatment facilities, written descriptions of shutdown and start up of treatment equipment is included with the written procedures. A brief summary of emergency operations at each well is provided below.

Well No. 5

There is neither a generator nor an angle drive to operate Well No. 5 during a power outage. Well No. 5 can be used to maintain pressure in the lower grid when the Butler Reservoir is out of service. Under these conditions, Well No. 5 has to be run from the HAND position from the pump house or the Operation Center master telemetry unit.

Well No. 6

There is neither a generator nor an angle drive to operate Well No. 6 during a power outage. Well No. 6 can be used to maintain pressure in the lower grid when the Butler Reservoir is out of service. Well No. 6 has to be run from the HAND position from the pump house or the Operation Center master telemetry unit.

Well No. 7

There is not a generator or an angle drive to operate Well No. 7 during a power outage. Well No. 7 can be used to maintain pressure in the lower grid when the Butler Reservoir is out of service. Well No. 7 has to be run from the HAND position from the well facility or the Operations Center master telemetry unit.

Well No. 8

During a power outage, Well No. 8 has an auxiliary engine and angle drive. Well No. 8 can be used to maintain pressure in the lower grid when the Butler Reservoir is out of service. Well No. 8 has to be run from the HAND position from the pump house or the Operation Center master telemetry unit during a power outage. The backup chlorination system is also run by the generator.

Well No. 9

There is neither a generator nor angle drive to operate Well No. 9 during a power outage.

Well No. 10

There is neither a generator nor angle drive to operate Well No. 10 during a power outage.

Well Nos. 11 and 12

The Washougal Wellfield Facility has its own diesel powered auxiliary generator with an automatic transfer switch. This generator is 350 kW and is designed to serve the Washougal Wellfield Treatment Facility during a power outage, to include the two well pumps, chemical feed pumps, controls for the well pumps and chemical feed system, HVAC system and lighting.

Well No. 13

The Well No. 13 Facility has its own diesel powered auxiliary generator with an automatic transfer switch and acoustical enclosure. This generator is 250 kW and is designed to serve the Well 13 Facility during a power outage, to include the well pump, chemical feed pumps, controls for the well pump and chemical feed system, HVAC system and lighting.

Well 14

The Well No. 14 Facility has its own diesel powered auxiliary generator with an automatic transfer switch and acoustical enclosure. This generator is 250 kW and is designed to serve the Well 14 Facility during a power outage, to include the well pump, chemical feed pumps, controls for the well pump and chemical feed system, HVAC system and lighting.

SURFACE WATER FILTRATION PLANT

Detailed written operating instructions are maintained at the Slow Sand Water Treatment Facility. These instructions cover normal operations as well as start up and shut down procedures. The plant is equipped with a 45 kW propane powered auxiliary generator in event of a power outage.

INCIDENT SPECIFIC RESPONSE PLANS

Per the hazard assessment summarized in Table 5-1, the following incident specific response plans are outlined below:

- Drinking Water Unique: bacteriological contamination

- Natural Disasters: drought, earthquake, flood, landslide/mudflow/debris flow, severe snow storm, tsunami, volcano

- Technological Hazards: power failure, dam failure, hazardous materials, urban fire, transportation accident

- Criminal Acts: Terrorism, cyber attack, vandalism

BACTERIOLOGICAL CONTAMINATION

WAC 246-290-320 establishes specific procedures for water utilities to follow should bacteriological contamination be detected in the water system. These procedures are outlined in Figure 5-1. If the chlorine disinfection residual in the distribution system is lost, it may be necessary to batch chlorinate the reservoirs and flush distribution piping.

For every 1.0 million gallons of storage, approximately 17 lbs. of 70 percent calcium hypochlorite (HTH) is necessary to provide a 1.0 mg/L chlorine residual. As an alternative, 18 gallons of 5.25 percent sodium hypochlorite, available as household bleach in the supermarket, can be added to 1.0 million gallons to provide a dose of 1.0 mg/L.

In the event of a suspected intentional contamination with a microbial agent, the protocols for intentional contamination shall be followed in addition to the procedures outlined here. Law enforcement authorities will need to be consulted prior to making public notifications as discussed further in the intentional contamination incident plan.

Boil Water Notification

Emergencies such as floods, earthquakes, and other disasters can result in damage to water system infrastructure, thereby warranting a boil water notice as a cautionary measure. A suggested boil water notification form is presented in Appendix K. The City would issue the order through radio, television and newspapers serving the local area. Prior to the issuance of a boil water notice, the City should consider the experience gained by other communities in the past. A summary of pertinent information follows:

- An initial press conference should be held following issuance of the boil water notice to advise the public of the situation. All press releases will go the City's Public Information Officer.

- Consolidated press releases, announced on morning and evening television and radio news broadcasts, can also be used to keep the public informed.

- A 24-hour telephone hotline will be established to respond to public and media inquiries regarding the notice. The hotline should be staffed with knowledgeable representatives from the City and other governmental

agencies. In order to maintain the consistency of information released, hotline operators should be provided with standard question and answer sheets and briefed as new information becomes available. The hotline should remain available for 24 hours after the boil water notice has been rescinded to provide relevant information and reassurance for concerned customers. All media inquiries shall be directed to the Public Information Officer.

- Other State, County, and City agencies will be consulted prior to release of information to the public, including DOH and the Clark County Health Agency. A consensus will be reached among the jurisdictional agencies regarding information to be released and actions to be taken. It is important not to release conflicting information so as not to confuse the public.

- Agencies and hot line phone operators should be aware of difficult questions that could be asked by the public or the press. A few examples follow:

    1. What other utilities are affected?

    2. What should be done about coffee and ice machines that use water directly from the system?

    3. How did the system get contaminated and what is being done about it?

- Protocol should be developed for rescinding the boil water notice. One example includes two consecutive days of no detection of Cryptosporidium, Giardia, or coliform bacteria in the system.

- Once the boil water notice is rescinded, a notice should be developed to inform the public regarding appropriate measures for use of the water supply including flushing of pipes and fixtures as required.

A thorough investigation of the contamination source should be conducted and strategies developed to avoid similar future occurrences. The public should be informed and given updates regarding investigation findings in order to restore confidence in the quality of water provided by the water system.

DROUGHT

The Clark County Hazard Identification and Vulnerability Analysis states that nearly all areas of the county are vulnerable to drought.

History suggests a high probability of occurrence in Clark County. Although the entire population of the county is considered vulnerable to the effects of drought, severity has historically been low. Actual drought conditions have been limited to a few days, even during extended dry periods.

The hazard of a short-term drought will be addressed through water conservation measures outlined in the Water Conservation Chapter of the Water System Plan. The City will need to coordinate with adjacent water users in developing an effective drought response. This type of coordination will become essential with longer drought periods when more stringent water conservation measures may become necessary. Additionally, extended droughts may also increase fire hazards, particularly in the heavily wooded areas of the City.

EARTHQUAKE

The County's assessment indicates that of all potential disasters, the City is most vulnerable to a severe earthquake. However, the ability of the City's water system facilities to withstand a major earthquake has not been fully characterized.

The Northridge earthquake, which struck on January 17, 1994, left the Metropolitan Water District of Southern California (MWDSC) facing a major disaster. Fortunately, the MWDSC had established emergency planning procedures that proved to be essential to restoring water service to its customers. Two essential components were an Emergency Response Center and pre-established reconnaissance patrols that were able to quickly conduct damage inspections. The MWDSC had also stockpiled considerable repair parts and materials in order to be virtually self-sufficient in an emergency. Following the Northridge earthquake, however, the MWDSC found that most parts and equipment were readily available via overnight shipping from around the nation, indicating that stockpiling does not need to be wholly relied on for effecting repairs.

The Pacific Northwest is a very seismically active area. The Clark County HIVA states that potential earthquake sources in Clark County are not well characterized because of their infrequent occurrence compared to California. Estimations of possible earthquake sources are limited to studies of many small earthquakes, investigations of known faults, and other geological surveys.

CRESA indicates that earthquakes in Clark County are most likely to originate from three sources: (1) the Mt. St. Helens seismic Zone; (2) the Portland/Vancouver Seismic Zone; and (3) the Cascadia Subduction Zone. Descriptions of each of these seismic zones are summarized from the Clark County HIVA below.

1. <u>Mt. St. Helens Seismic Zone</u> – This seismic zone is most commonly a source of several small earthquakes (<4 M). The strongest earthquake associated with this zone was the Elk Lake earthquake of February 13, 1981. This was approximately 5.5 M magnitude earthquake. While this

was just a moderate earthquake it was felt over an area of about 104,000 km^2 that ran as far north as Ferndale, Washington and as far South as Salem, Oregon. Geologists suggest that the possibility exist for an earthquake as great as 6.5 M originating from this zone.

2. Portland/Vancouver – The Portland metropolitan area is the most seismically active region in Oregon in historic times. In the past 150 years there have been six earthquakes of magnitude 5 or greater. The Washington side of the seismic area is the second most seismically active area in Washington (the Puget Sound area is the most seismically active area in the state). The area between the Lacamas Creek Fault and the Portland Hills Fault borders this seismic region. The existence of the Portland Hills fault was only recently confirmed by the digging of the light rail tunnel through the West Hills of Portland. This discovery, matched with other geophysical studies suggest that earthquakes as large as 6 M or larger should occur in the Portland region every 300 to 350 years and an event of M 6.5 or larger about every 800 to 900 years. Earthquakes in this area present what may be the worst-case scenario for Clark County because the epicenters may be quite close. Geologists theorize there may be faults directly underneath the cities of Portland and Vancouver. Recent studies suggest that the epicenter for the 5.5 M earthquake in November 5, 1962, was located underneath the City of Vancouver.

3. Cascadia Subduction Zone – The Cascadia Subduction Zone lies about 50 miles offshore, extending from near Vancouver Island to northern California. The zone is where the oceanic Juan de Fuca plate dives beneath the continental North American plate. These plates are converging at a rate of 1 to 1.5 inches per year.

CRESA considers the entire county population, property, commerce, infrastructure and services as vulnerable to an earthquake. The scope of damage will be a function of earthquake magnitude and level of preparedness. Damage could range from minimal to extreme loss of life and destruction of property.

Most injury, death, and property damage in an earthquake result from seismic impacts on structural and non-structural materials. The vulnerability of certain areas partially depends on the types of structures in that area. A wood frame residential structure that is adequately secured to the foundation is relatively safe. An un-reinforced masonry building is at greatest risk from seismic impacts. Most injuries in earthquakes result from non-structural materials such as light fixtures, equipment, and furniture, falling on people and causing injury.

Another factor in earthquake vulnerability is soil type. Water-saturated loose sand and silt lose their ability to support structures in an earthquake. Areas in Clark County that

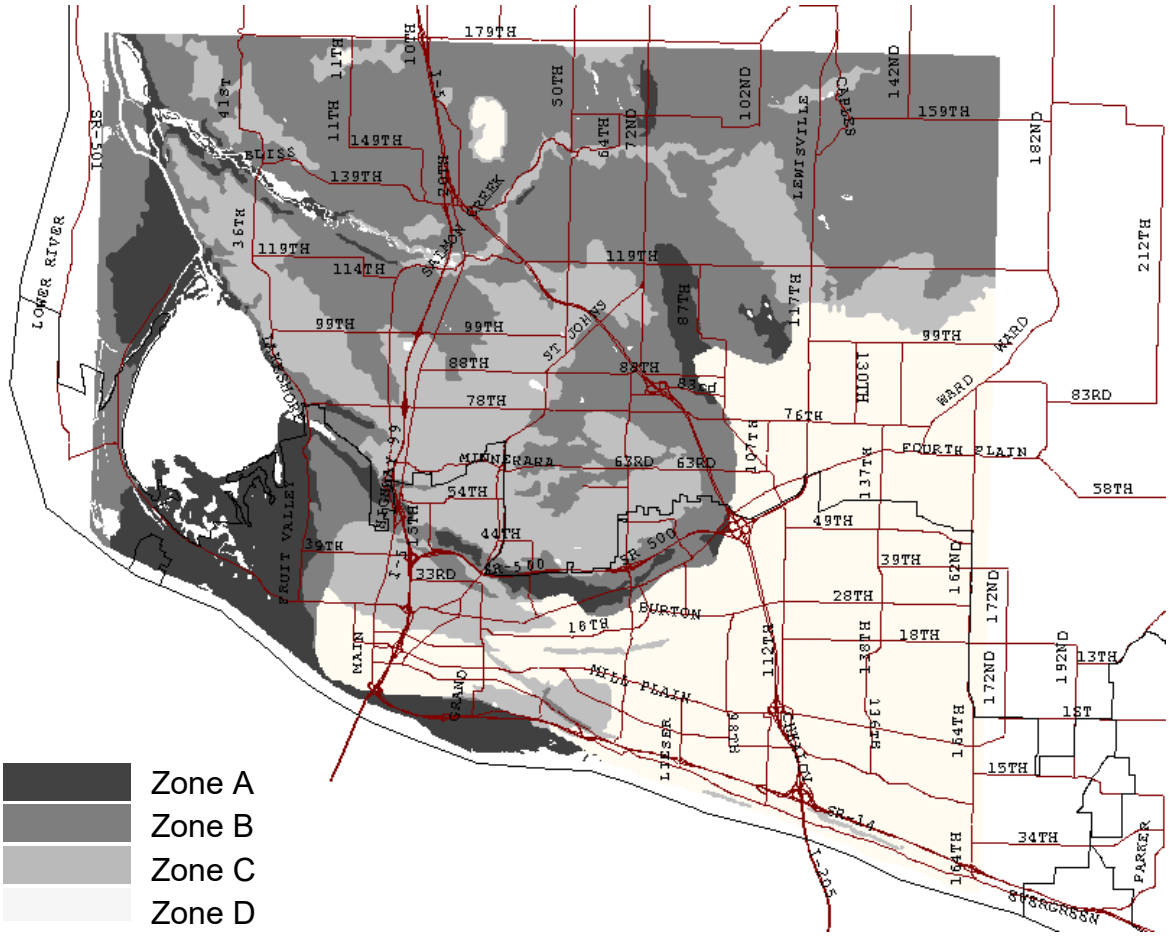
are near flood plains or areas with silt deposits are at the greatest risk during an earthquake.

Within the limits of predictability, CRESA assigns a high probability of occurrence for a damaging earthquake during the next 25 years. A large earthquake could have a catastrophic impact on Clark County suggesting high vulnerability. Accordingly, a high-risk rating is assigned.

Figure 5-2 shows a map of Clark County with zones of relative hazards for earthquakes. Based on evaluation of soil liquifaction, ground amplification, and earthquake induced landsliding hazards. Zone A is area of greatest relative hazard. Zone D is area of least relative hazard. The City of Camas is primarily in Zone D.

FIGURE 5-2

Relative Earthquake Hazard Map, Clark County, Washington



Earthquake response measures for the City's water system are shown in Table 5-5.

TABLE 5-5

Earthquake Response City of Camas Water System

Water System Component	Potential Effects	Recommended Actions
Transmission and Distribution System	Transmission and distribution system mains may be broken and the City's ability to monitor and respond to these incidents may be limited.	Isolate the major broken sections of piping throughout the system as they are located and repair as necessary and possible. Contact DOH.
Storage Facilities	Reservoirs may be leaking or structurally damaged	Inspect each reservoir for structural damage or cracks and leaks. Seal or drain these reservoirs as required. Contact DOH.
Booster Stations	Booster stations may be structurally damaged or mechanical damage to pumps and piping may have occurred.	Check booster stations and shut down pumps as required. If zones can be fed by alternate methods, implement those procedures. Contact DOH.
Wells	Unable to supply additional water to system. Well casings may be broken. Pumping capacity may be lost.	Investigate situation. Determine which wells can be utilized. Determine if surface water source still available. Contact DOH.
Treatment Facilities	Damage may have occurred to the treatment building, piping, or filters at the Slow Sand filter plant. May be unable to supply water from surface water source.	Shut down the equipment at the treatment facility. Attempt to repair. Check possibility of supplying City with groundwater sources. Contact DOH.

FLOOD

The Clark County HIVA states that floods are the most common disaster in Washington State and Clark County. The County's climate, topography, and geology are conducive to flooding. Normal annual precipitation ranges from 38 inches on the western floodplains to over 114 inches in the mountainous northeastern part of the county.

History of Flooding in Clark County and Adjacent Areas

- **December 1933** – The largest flood of record on the Lewis River.

- **May 30, 1948** – Columbia River crested at 34.4 ft. Flood stage at that time was 15 ft. This is the flood that destroyed the City of Vanport. Vanport, with a population at the time of the disaster of 18,500, was the second largest City in Oregon. The destruction of the town occurred when a 600-foot section of dike protecting the settlement from the rising Columbia River broke. Unfortunately, few people evacuated Vanport prior to the dam rupture. Evacuation was hampered by the fact that there were very few good evacuation routes. Fifteen people died in the flood.

- **June 1956** – Columbia River flooded due to snowmelt runoff.

- **January 1972** – A combination of intense rainfall and snowmelt caused major East Fork of the Lewis River floods.

- **December 1977** – Heavy rainfall and snowmelt caused flooding on the East Fork of the Lewis River. Salmon Creek had largest flood since gages were placed on Salmon Creek. The Washougal River also received its largest flood since gages were placed in 1944. This flood was an extremely rare event, greater than a 500-year flood.

- **February 8, 1996** – The Columbia River crested at 27.1 feet on February 9. This flood produced some of the worst flooding seen in the County since 1948. Approximately 1,500 people were evacuated, and 177 homes were destroyed. This flood occurred because of the confluence of several factors. The winter of 1995/96 was extremely rainy. Prior to the flooding period, the region experienced a cold snap with low elevation freezing, ice, and snow. This was followed by a strong warming trend with heavy precipitation.

In Clark County, the weather that produces the most serious flooding events are extensive wet conditions that follow a period of mid and high elevation ice and snow pack development. Many rivers in Clark County historically flood every few years. These include the East Fork of the Lewis River, Washougal River, Salmon Creek, and the Columbia River. Flooding on these rivers usually occurs between October and February. Long periods of heavy rainfall and mild temperatures coupled with snowmelt contribute to flooding.

There are three types of flood threats:

- Riverine
- Tidal
- Flash and Surface

The greatest threat of flooding in the City will be flash and surface flooding due to inundation of stormwater collection and conveyance systems. This may impact the water system operation through a number of mechanisms, including:

- Restricting access to water system facilities due to flooded streets
- Flooded valve and meter vaults
- Flooded City facilities
- Increasing groundwater levels that threaten contamination of leaking underground water lines

Actions the City will consider depending on the extent of flooding and the risks that might be mitigated include:

Pre-Flood

- Sandbagging around City facilities, such as the Public Works Operations Center
- Securing large pieces of equipment and materials that could be carried off by floodwaters
- Raising electronic equipment and computers off the floor
- Moving valuable records to locations expected to remain dry

Post-Flood

- Checking coliform levels in the water system for contamination (see incident specific plan for bacteriological contamination)
- Inspecting meters and PRV stations to ensure proper operation
- Cleaning debris from around reservoirs

Figure 5-3 includes a flood map of the City of Camas. As the flood map indicates areas susceptible to flooding include the Washougal Wellfield (Well Nos. 5, 6, 7, 8, 10 and 12 as well as the new chemical feed building).

Historically, flooding occurs along one or more of the County's waterways every few years, suggesting a high probability of occurrence. Because of the relative land area and population affected, the County is exposed to moderate vulnerability. Although the vulnerability is moderate, the frequency of flooding, the potential for simultaneous flooding events, plus the historical record of recurrent flooding and cumulative costs, all suggest the assignment of a high risk rating.

Table 5-6 lists flood response measures specific to the City's water system.

TABLE 5-6

Flood Response City of Camas Water System

Water System Component	Potential Effects	Recommended Actions
Transmission and Distribution System	Transmission and distribution mains could be affected by landslides or high water levels. City staff transportation for monitoring the system and making repairs may be limited.	Monitor possible areas of concern for waterline conditions. Monitor waterline bridge crossings for possible damage. Prepare to valve off any washed out or damaged waterlines. Contact DOH.
Storage Facilities	Minimum physical/structural impact due to locations. Flooding could cause elevated coliform levels in water system.	Monitor coliform levels. Contact DOH to advise of acute of non-acute coliform violations.
Booster Stations	Minimal operational impact.	None.
Wells	Facilities could be overwhelmed by flood waters.	Prepare to disconnect any well affected by flood waters. Contact DOH.
Treatment Facilities	Heavy rainfall or snow melt may overwhelm the capacity of the water treatment facility. Flooding in the vicinity of the plant is a risk.	Allow the water to bypass the filtration plant by closing intake facilities. Use wells as source of water for City. Contact DOH.

LANDSLIDE/MUDFLOW/DEBRIS FLOW

The term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Landslides commonly occur on water-saturated slopes when the base of the slope can no longer support the weight of the soil above it, thus their frequency increases during or after periods of heavy rain and flooding. Though commonly associated with heavy rain and flooding conditions, landslides may also be associated with earthquakes (the 1994 Northridge Earthquake caused an estimated 11,000 landslides) and volcanic activity.

CRESA indicates that Clark County experienced the greatest number of landslides from 1996 to 1997. One of the largest landslides in the area occurred just outside of Clark

County, two miles north of Woodland on February 8 and 9 when 32,000 yd^3 of earth fell across all lanes of I-5 and the adjacent railroad tracks, disrupting traffic until February 19. In the same flooding period there were also several landslides that disrupted railroad operations in the area adjacent to Vancouver Lake. The following year, which was marked by heavy rains but no significant flooding, there were several landslides. Clark County has several areas where landslides have taken place and several areas that are susceptible to landslides. The hills north of La Center and the slopes north of Camas and Washougal are particularly susceptible.

Slides in Clark County generally range in size from thin masses of soil of a few yards wide to deep-seated bedrock slides more than six miles across. Travel rate may range in velocity from a few inches per month to many feet per second, depending largely on slope, material, and water content. The recognition of ancient dormant slide masses is important as they can be reactivated by earthquakes or unusually wet winters. Also, because they consist of broken materials and disrupted ground water, they are more susceptible to construction-triggered sliding than adjacent undisturbed material.

CRESA states that typical effects of landslides include damage or destruction of portions of roads and railroads, sewer lines, pipelines, and water lines, electrical and communications distribution lines, and destroyed homes and public buildings, but the most significant effect of landslides is the disruption of transportation and the destruction of private and public property.

The Clark County HIVA indicates the County has a history of landslides and their numbers are increasing, suggesting a high probability of occurrence. Landslides tend to occur in isolated, sparsely developed areas threatening individual structures and remote sections of the transportation, energy and communications infrastructure suggesting low vulnerability. Because of the high probability of occurrence and the trend to more frequent landslides, a moderate risk rating is assigned.

The risk to the water system is considered low because of the lack of steep slopes in the Camas area. Flooding and Earthquakes will increase the risk of landslides. Refer to Tables 5-5 and 5-6 for response measures that may be appropriate for landslides induced by those event categories.

SEVERE SNOWSTORM

The most significant anticipated impact of a severe snowstorm is limiting access to the City's facilities. City personnel may not be able to access water mains, reservoirs or valves for maintenance and/or manual operation of system components. During a severe snowstorm the City will rely on the telemetry system for information on the major system components. Additional hazards to be considered with severe winter storms include:

- Freezing in City Reservoirs – Mitigated by ensuring continuous turnover.

- Water service line breaks – Mitigated by asking customers to be vigilant for flooding around homes and businesses.
- Roof Collapse on City buildings and reservoirs – Mitigated by observing snow levels and having City crews remove when snow load may be exceeded.

Table 5-7 lists water system response measures associated with winter storms.

TABLE 5-7

Severe Snowstorm Response City of Camas Water System

Water System Component	Potential Effects	Recommended Actions
Transmission and Distribution System	City staff transportation for monitoring system and making repairs will be limited.	Contact City street department to expedite plowing of critical water system component access. Maintain chains and other snow gear for maintenance equipment on hand. Be able to provide accurate locations of valving for maintenance purposes.
Storage Facilities	Snow may prevent access.	Clear snow from access roads. Three 4 x 4 vehicles are available for water department use to access critical sites.
Booster Stations	Snow may prevent access.	Clear snow from access roads. Three 4 x 4 vehicles are available for water department use to access critical sites.
Wells	Snow may prevent access.	Clear snow from access roads. Three 4 x 4 vehicles are available for water department use to access critical sites.
Treatment Facilities	Snow may prevent access.	Clear snow from access roads. Three 4 x 4 vehicles are available for water department use to access critical sites.

TORNADO

Tornadoes are characterized by funnel clouds of varying sizes that generate winds as fast as 500 miles per hour. They can affect an area of 1/4 to 3/4 of a mile and seldom more than 16 miles long. Tornadoes normally descend from the large cumulonimbus clouds that characterize severe thunderstorms. They form when a strong crosswind (sheer) intersects with strong warm updrafts in these clouds causing a slowly spinning vortex to

form within a cloud. Eventually, this vortex may develop intensity and then descend to form a funnel cloud. When this funnel cloud touches the ground or gets close enough to the ground to affect the surface it becomes a tornado. Tornadoes can come from lines of cumulonimbus clouds or from a single storm cloud. Tornado hazards are measured using the Fujita Scale ranging from F0 to F6.

A history of tornadoes in Clark County follows:

- October 1951 – Battle Ground (F0 on the Fujita Scale). 8-miles long and 25-yards wide, which uprooted trees and destroyed a two-story barn.

- August 26, 1953 – Ridgefield (F0 on the Fujita Scale). Lasted 3 minutes and severely damaged a farm.

- April 5, 1972 – Vancouver (F3 on the Fujita Scale). This was the most disaster to occur in Clark County and the most serious tornado in Washington State. Six people died and 300 were injured when a tornado cut a swath of destruction through East Vancouver. The tornado's path was 9-miles long, from the Columbia River, just east of Andresen Road up to Fourth Plain Blvd. Peter S. Ogden Elementary, a shopping center, and a bowling alley were severely damaged.

- December 1974 – Camas (F0 on the Fujita Scale). Windows were broken and walls collapsed but there was no serious damage.

- October 1984 – Woodland (F1 on the Fujita Scale). A funnel cloud touched down several times, snapping and overturning trees, and ripping up fence lines. A barn roof was torn off, corrals flattened and a pump house lifted and exploded.

- June 29, 1989 – La Center (F1 on the Fujita Scale). Uprooted several trees and tossed one car off the road causing minor injuries to the driver.

- May 31, 1997 – Vancouver (F0 on the Fujita Scale). Caused $10,000 in property damage.

- September 15, 1997 – Yacolt (F0 on the Fujita Scale). No reported damage.

- May 11, 2000 – Battleground (F0 on the Fujita Scale). Caused $10,000 in property damage.

- May 27, 2004 – La Center (F0 on the Fujita Scale). No reported damage.

- September 2004 – Ridgefield (F0 on the Fujita Scale). No reported damage.

- January 10, 2008 – Vancouver, (F1 on the Fujita Scale). Damage reports showed widespread downed power lines, malfunctioning traffic lights, and roofing that had been ripped off. Although the majority of damage was light in nature, in at least one case a home was completely demolished. At least 2,500 homes and businesses had lost power because of the storm. Property damage estimated to total $525,000.

- December 2015 – Battle Ground (F1 on the Fujita Scale). Damage reports showed downed power lines, malfunctioning traffic lights, damaged fences and roofing that had been ripped off. Although the majority of damage was light in nature, two businesses were damaged and deemed to be unsafe. No injuries were reported.

Table 5-8 provides definitions of tornado hazards.

TABLE 5-8

Tornado Hazard Scale

F-Scale Number	Intensity Phase	Wind Speed	Type of Damage Done
F0	Gale Tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
F1	Moderate Tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant Tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	Severe Tornado	158-206 mph	Roof and some walls torn off well constructed houses; trains overturned; most trees in forest uprooted.

Tornadoes are not normal occurrence in the Northwest as they require a confluence of warm surface temperatures and warm fronts coming from the south with cold fronts coming from the north. Northwest climates do not normally generate the temperature variations conducive to tornado formation. Washington is ranked 43 in the US for total number of tornadoes. Nonetheless, CRESA states that the tornado threat should be taken very seriously. The conditions conducive to tornado formation may develop in Southwest Washington and it is common for funnel clouds to be reported in this region. During severe thunderstorms it is possible for tornadoes to occur.

With the exception of the April 1972 disaster, tornadoes in Washington and Oregon tend to be light or moderate, with winds ranging from 40 to 112 mph. There are a notable

minority of tornadoes that cause significant to severe damage with winds going as high as 200 mph. The peak season for tornadoes is April through July. However, in Washington tornadoes may occur in the late summer months and, in a few rare cases, may occur in the winter months. While tornadoes are sometimes formed in association with large Pacific storms, most of them are caused by intense local thunderstorms. Tornadoes almost exclusively occur in the late afternoon and early evening.

It is possible for a tornado to occur anywhere in the lower elevations of Clark County. Normally, Pacific Northwest tornadoes are moderate but it is possible for serious tornadoes to develop, causing death and serious injury as well as property damage.

Water systems most vulnerable to tornadoes will be reservoirs, booster stations and treatment facilities. Reservoirs are not designed to withstand the high winds possible with tornadoes and buildings that house well pumps, booster pumps and treatment facilities may be damaged or destroyed by a severe tornado.

VOLCANO

According to the Clark County HIVA, the most likely scenarios for volcanic eruptions that will impact the County are as follows:

- Ashfall and *tephra* (the ash, rock and boulder-sized debris from an exploding volcano) from Mt. St. Helens.

- Ashfall and the generation of *lahars* (volcanic mud/debris flows) from the Sandy River in Oregon due to volcanic activity at Mt. Hood.

The most severe impacts in Southwest Washington from another major eruption from Mt. St. Helens eruption would be in Cowlitz County. In this event, Clark County emergency managers and responders may support Cowlitz County agencies and the Forest Service in assisting in evacuation, perimeter control, search and rescue and other operations. Drawing from these resources may leave the City of Camas potentially vulnerable to an inability to respond should emergencies arise that require local response assets.

The vulnerability to damage from lahars is greatest in southern Clark County, due to potential impacts from lahars in the Sandy River. Since the Sandy River empties into the Columbia across from Camas, lahar deposits could influence the flow of the Columbia River and possibly affect low lying areas of Camas near the Columbia. However, the potential exists for ashfall from volcanic activity to impact the entire county by creating a respiratory hazard and potentially adding weight to the roofs of City facilities (including the water reservoirs) that will increase significantly if it becomes wet. Wet ash also creates a slipping hazard and will create traffic problems and make water system maintenance hazardous.

URBAN FIRE

In the 2019 Water System Plan, a hydraulic analysis was conducted in several areas throughout the system to determine if the water system had adequate capacity to provide fire flow. Deficiencies were noted in the following areas:

- PRV Systems – Lacking pressure-sustaining features to prevent fire flows in lower pressure zones from causing unacceptable service pressures in upper pressure zones.
- West of Fargo (19th thru 22 Ave) – Fire flow limitations.
- Various pockets in Downtown – Fire flow limitations.
- Pacific Rim Blvd near Parker Street – Fire Flow limitations

The modeling of the water system is generally based on single event structural fires. In addition to the areas with fire flow deficiencies noted above, multiple structural fires occurring simultaneously in the same pressure zone could conceivably overwhelm the water system's capacity. If mutual aid agreements are invoked, the City would need to consider the potential for a water shortage in a coordinated fire response.

However, in the event of a fire City personnel monitor reservoir levels and system performance with the telemetry system, which allows the Fire Department to understand the limitations of water supplies available for fire suppression and to operate accordingly. It is also important to note that the City's Municipal Code also requires that all buildings, including residential structures, are required to be sprinklered, which significantly reduces the potential for large structure fires.

Other issues to consider with fires include:

- Creating a vacuum on waterlines due to high fire demand; this may create a cross-contamination hazard.
- Water quality complaints from customers due to high pipe velocities scouring inner pipe surfaces.

Table 5-9 lists water system response measures for urban fires.

TABLE 5-9

Urban Fire Response City of Camas Water System

Water System Component	Potential Effects	Recommended Actions
Transmission and Distribution System	Low pressure may result in the extremities of the system depending on the extent of the fire incident.	Monitor system and adjust pumps if applicable.
Storage Facilities	Draw down will occur in the reservoirs with increased demand.	Monitor reservoir levels.
Booster Stations	Additional pumps called on.	Monitor pump station to ensure proper operation.
Treatment Facilities	Fire in watershed could cause increased sediment in the surface water source. Turbidity levels may exceed acceptable levels.	Use groundwater sources until surface water sources available. Provide silt fences along areas that have lost vegetation due to fire. Contact DOH.

POWER FAILURE

Various types of severe weather can cause loss of electrical power. In order to alleviate the effects of a power outage, the City has installed auxiliary generators at the Chlorination Plant, the Filter Plant, Butler/Gregg Booster Stations, Angelo Booster Station, Lacamas Booster Station and the Lower Prune Hill Pump Station. Well Nos. 8, 11 and 12 also have an auxiliary power source to allow the wells to operate during an electrical outage. The Washougal Wellfield Treatment Facility obtains auxiliary power from the generator for Wells 11 and 12.

Table 5-10 presents the potential effects of a lengthy power failure on the water system components.

TABLE 5-10

Power Failure Response City of Camas Water System

Water System Component	Potential Effects	Recommended Actions
Transmission and Distribution System	No effect	None.
Storage Facilities	Telemetry system may be inoperable.	Manually check reservoir levels. Some reservoirs can provide water to lower areas.
Booster Stations	Booster stations inoperable without auxiliary power.	Operate booster station with auxiliary power.
Wells	Unable to supply additional water to system.	Well Nos. 8, 11 and 12 Auxiliary Power
Treatment Facilities		Auxiliary generator.

DAM FAILURE

Dam failures are the release of impounded water due to structural deficiencies, which can affect lives and property downstream. Dam failures are caused by flooding, earthquakes, lack of maintenance and repair, misoperation, poor construction, vandalism, or terrorism.

According to the Clark County HIVA, several dam failures have occurred in Washington State over the last 40 years, some of which been catastrophic, but none have occurred in or has impacted Clark County.

There are 36 dams in Clark County. These dams are used for hydroelectric power generation, irrigation, and recreation. Table 5-11 shows dams that could potentially impact the City of Camas.

TABLE 5-11

Clark County Dams Upstream of the City of Camas

Name of Dam	Year Built	Type	Nearest City Downstream	Distance in Miles	River	Downstream Hazard Category
Clark Reservoir Dam	1948	RE	Camas	4	Robinson Creek	3
Lacamas and Round Lakes, Lower Dam	1936	BU	Camas	1	Lacamas Creek	2
Lacamas and Round Lakes, Upper Dam	1936	BU	Camas	1	Lacamas Creek	2
Price Reservoir Dam	1950	RE	Camas	3	Tributary - Lacamas Creek	3

Dam Type: BU – Buttressed Dam, RE – Reinforced Earth Dam.
Hazard Category:
1 = High; 2 = Significant; 3 = Low
(reference: Washington State Department of Ecology Dam Safety Guidelines, July 1992, revised Sept 2004)
2 = 1 to 6 lives at risk, appreciable economic loss, limited or short term water quality degradation
3 = No lives at risk, minimal economic losses, no significant water quality impacts

Washington State uses a Downstream Hazard Classification system for dams, which assigns a Low, Significant or High rating for populations at risk of economic loss and environmental damage should the dam fail. In Clark County, most dams are rated low, three are significant and three high. (The three potential high hazard dams are the Merwin Dam on the Lewis River, Erickson on Rock Creek and Tsugawa Brothers Reservoir Dam on Mason Creek.) The three potential significant hazard dams are the Elmer Dam on Mason Creek and the Lacamas and Round Lakes, upper and lower dams on Lacamas Creek; these latter two dams pose a downstream hazard to the City of Camas.

In addition to the dams located in Clark County, the county can also be affected by dam failures of dams on the Columbia River upstream from Clark County. CRESA considers these dams to be well maintained, operated with 24-hour staffing and inspected on a regular basis.

CRESA states that Washington experiences a dam failure on a frequency of approximately once every two years. The majorities of failures were in whole or part the result of a failure to perform adequate maintenance and monitoring of the facilities. Dam failure can have many effects such as loss of life, damage to structures, roads, utilities, and crops. Economic losses can also result from a lowered tax base and lack of power profits.

History suggests a low probability of occurrence. The failure of a high hazard dam would threaten a small segment of the County suggesting low vulnerability. Because there has not been a major dam failure in Clark County, and the three high hazard dams are well maintained and operated providing no reason to suspect a compromise in

structural integrity baring a natural disaster or terrorist action, a low risk rating is assigned.

For response measures in the event of a dam failure, refer to Table 5-7 (flood response).

TRANSPORTATION ACCIDENT (AIRPLANE CRASH)

Although there have been no major airplane crashes in Clark County, the scope of the impact of such an event and the potential complexities of the response require the City to consider how such an incident could impact the water system operation.

The City of Vancouver is across the river from Portland International Airport. The airspace over the Columbia River and Vancouver is heavily used by all types of aircraft flying into Pearson Airpark, Portland Air National Guard Base and Portland International Airport. Most airplane accidents occur during arrival and departure so the City of Vancouver is at a greater risk than any other area in the County. Considering the flight paths of aircraft into and out of Portland International Airport, Vancouver has the potential for a major airplane crash with mass casualties, hazardous materials incidents, and fires. Accordingly, response assets from the City of Camas may be drawn to a crash site and leave the City potentially vulnerable if another emergency arises that requires those assets. Additionally, an airplane crash could cause major transportation routes to be closed for significant periods of time, resulting in significant delays for contractors, equipment and chemical suppliers to access the City of Camas.

TRANSPORTATION ACCIDENT (HIGHWAY OR RAIL)

City water lines cross a number of well-trafficked thoroughfares through the City, including SR 14 and the railroad that runs parallel to SR14. It is conceivable that a major accident on one of these thoroughfares would damage a water line. The Public Works component of the response to a transportation incident includes the following:

- Coordinate damage assessments, emergency road clearing and road repair activities
- Provide contracts for repair and recover work, including damaged utilities
- Provide maps for transportation route planning

The water utility will need to be assessed rapidly in the event of a major transportation incident to determine if water lines have either been damaged or are at risk of being damaged due to the incident. It may become necessary to isolate damaged or at-risk water lines until the incident has been cleared and emergency repairs have been made to allow recovery efforts to proceed.

HAZARDOUS MATERIALS (HAZMAT) INCIDENT

According to the Clark County HIVA, as of 1998, Clark County had approximately 77 entities, at 117 facility locations, which filed an Emergency and Hazardous Chemical Inventory Form (known as a Tier Two Form) with Washington State Department of Ecology. Of these 117 facilities about 58 of them use chemicals on the Environmental Protection Agencies list of Extremely Hazardous Substances.

The City may obtain Clark County Tier Two Hazardous Chemical Inventories from CRESA:

Phone: (360) 737-1911 Email: cresa@clark.wa.gov

Statistics show that nearly half of all hazardous materials incidents occur during transit. Large quantities of HAZMAT are transported through and in the close vicinity of the City via the interstate highway and by rail. In the event of a HAZMAT spill, the Fire Department will be the City's lead department for incident response within the City limits. A large spill will trigger the need for mutual response under the Regional HAZMAT response agreement.

The City of Camas Fire Department has no HAZMAT response capability. A HAZMAT response capability permits offensive operations necessary to perform the following operations:

- Preliminary hazard characterization
- Safely enter the hazardous area
- Mitigate the effects of the release prior to recovery operations
- Exit the hazard area employing a deliberate and thorough decontamination process

The above capabilities can only be provided by HAZMAT teams that are equipped and trained to Occupational Safety and Health Agency regulations (29 CFR 1910.120) and National Fire Protection Association competency levels (NFPA 471 and 472). The City of Vancouver and the Georgia Pacific Mill have such response capabilities. The City Fire Department will coordinate all HAZMAT support with this units working with CRESA under the regional HAZMAT response plan. Telephone numbers for the City of Vancouver and Georgia Pacific HAZMAT teams leaders are as follows:

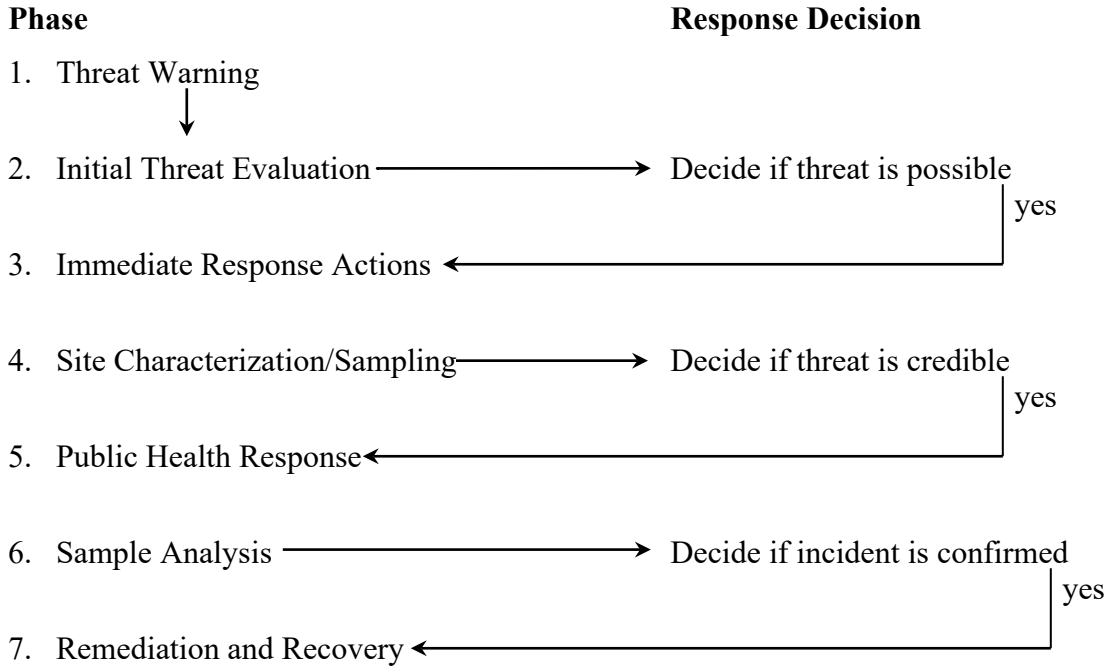
City of Vancouver (360) 619-4165
Georgia Pacific (360) 834-8465

The Public Works and Fire Departments will communicate during a HAZMAT spill to determine if the incident poses a hazard to water system personnel and facilities. It may become necessary to isolate water lines that are at risk of contamination due to a HAZMAT spill in order to prevent contamination of the water system.

INTENTIONAL CONTAMINATION

This type of incident could accompany a terrorist incident involving chemical, biological or radiological agents as well as vandalism. It is treated as a unique class of incident due to the complexities of the response from an operational, public health, law enforcement and physical recovery standpoint.

The EPA recommended protocols for managing a suspected intentional contamination incident are summarized in Figure 5-4. The EPA protocol has seven phases with three response decision points:

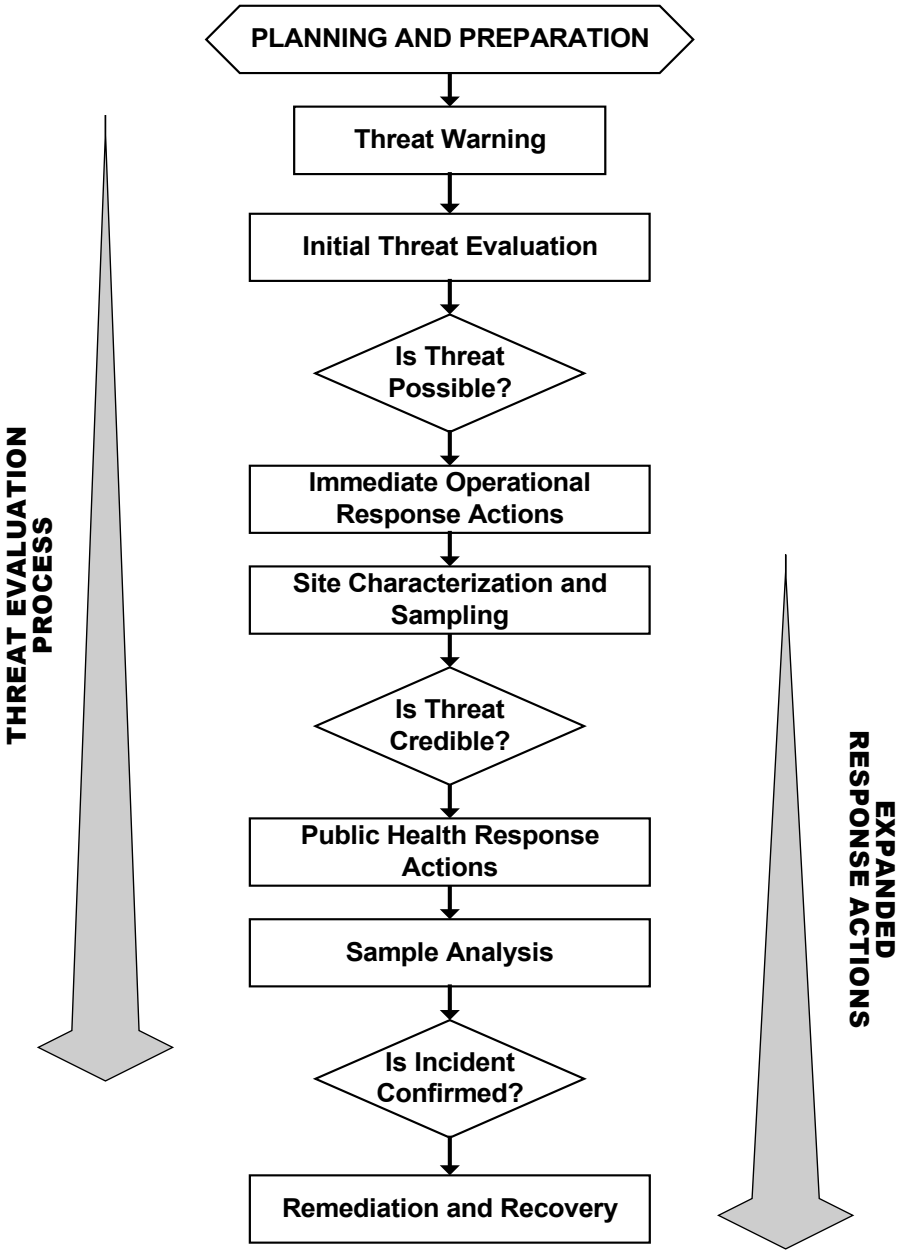


In no case should the utility pursue these actions unilaterally. Jurisdictional law enforcement agencies and public health agencies must be involved in each phase of the process. There are legal and practical requirements for this involvement, including rules of evidence for criminal investigations, balancing the need to protect law-enforcement sensitive information with public-right-to-know provisions in the Safe Drinking Water Act, obtaining specialized technical advice for sampling procedures and protecting the safety and health of water system personnel when taking water samples to test for suspected contamination.

Terrorism is a Federal crime and will require the involvement of federal law enforcement (Federal Bureau of Investigation).

FIGURE 5-4

Protocol for Managing an Intentional Contamination Incident



Reference: Planning for and Responding to Drinking Water Contamination Threats and Incidents Response Protocol Toolbox, USEPA, December 12, 2003.

Additionally, it is always recommended that the water utility consult with the HAZMAT team leader during the characterization and sampling process since, depending on the exposure hazard, it may become necessary for HAZMAT technician trained personnel to perform the site assessment and collect samples wearing OSHA compliant personal protective equipment.

Threat Warning

This is any unusual occurrence, observation, or discovery that indicates a potential contamination incident and initiates actions to address this concern. Such a warning would typically come in the form of an apparent security breach in the water system. Evidence of a security breach could come in the form of a telephone call threatening contamination or stating that intentional contamination has occurred; statements by witnesses who have seen water facilities being tampered with or broken into; physical evidence at a water facility indicating water facilities have been intentionally damaged or tampered with; and reports of increased illnesses from local hospitals or the Clark County Health Department.

Initial Threat Evaluation

This is the part of the threat management process in which all available and relevant information about the threat is evaluated to determine if the threat is possible. This is an iterative process in which the threat evaluation is revised as additional information becomes available. The conclusions from the threat evaluation are considered when making *response decisions*.

Immediate Response Actions

These are actions taken in response to a possible contamination threat in an attempt to minimize the potential for exposure to the potentially contaminated water. Immediate operational response actions will generally have a negligible impact on consumers. These actions will include estimating the potential area(s) within the water system that may have been subject to contamination and isolating these areas from the system to contain the contamination. This process must be performed quickly and generally will not allow modeling tools to be used unless the scenarios have been developed and modeled prior to the suspected contamination event.

Immediate Characterization and Sampling

This is the process of collecting information from an *investigation site* in order to support the evaluation of a drinking water contamination threat. Site characterization activities include the site investigation, *field safety screening*, *rapid field testing* of the water, and sample collection.

Field Safety Screening

Screening performed to detect any environmental hazards (i.e., in the air and on surfaces) that might pose a threat to the *site characterization* team. Monitoring for radioactivity as the team approaches the site is an example of field safety screening.

Rapid Field Testing

Analysis of water during *site characterization* using rapid field water testing technology in an attempt to tentatively identify contaminants or unusual water quality.

Public Health Response

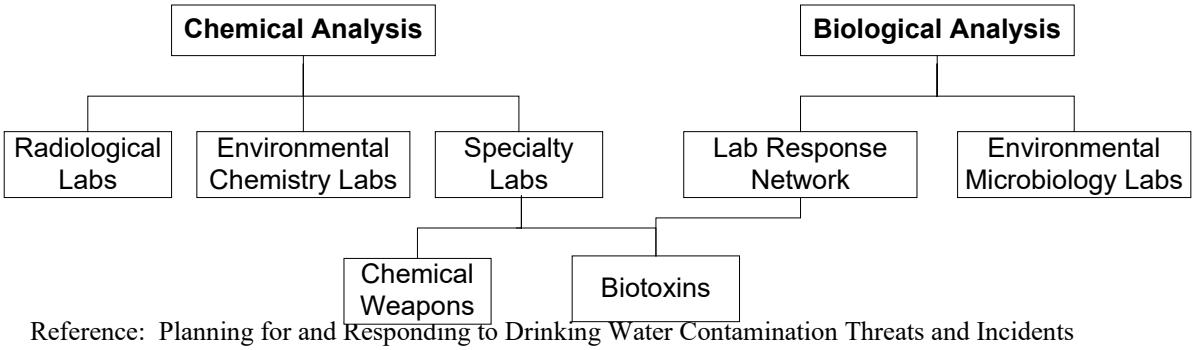
This encompasses all actions taken to mitigate consequences resulting from threats or incidents involving biological, chemical, or radiological contaminants. These actions include public notification, using an alternative water supply, boil water notices and chemical sterilization.

Sample Analysis

This step involves laboratory analysis that is undertaken to confirm the presence/absence of contamination such that specific decisions can be made by law enforcement and public health officials and allow the water utility to proceed with definitive response and recovery actions. It is important to keep in mind that not all labs can definitively confirm a potential contamination agent. Figure 5-5 shows the types of laboratories and their general capabilities.

FIGURE 5-5

Types of Laboratories by Contaminant Class



Reference: Planning for and Responding to Drinking Water Contamination Threats and Incidents Response Protocol Toolbox, Module 4: Analytical Guide, USEPA, December 12, 2003

Definitions for terms used in Figure 5-5 are provided below. The EPA Environmental Laboratory Compendium provides a national listing of laboratories and their capabilities. The City may sign up for this list by going to the EPA's water security website:

http://cfpub.epa.gov/safewater/watersecurity/index.cfm

Environmental Chemistry Laboratory

This is any laboratory, either commercial or government-operated that is able to perform analysis of water samples for compliance with the Safe Drinking Water, Clean Water Acts, or other applicable environmental regulation, as well as other chemical parameters that are important to system operation and overall water quality. These laboratories have the instrumentation necessary to implement methods for chemical analysis of a water sample.

Environmental chemistry laboratories perform water analyses to support regulatory compliance and they are familiar with the need to treat samples with precautions necessary for legal defensibility. Analysis for regulatory compliance purposes, however, may proceed differently than analysis of emergency samples in response to a contamination threat, which has the dual role of both providing an emergency response to protect public health and also providing legally defensible evidence to support a criminal investigation. Additionally, no commercial environmental chemistry laboratories can analyze chemical warfare agents (e.g., nerve, mustard and blood/choking agents); this latter type of analysis can only be performed by a small number of government-operated laboratories in the United States whose access is restricted to law enforcement and military agencies.

Environmental Microbiological Labs

These labs include those of EPA, state environmental agencies, and the commercial sector, that typically perform analyses for waterborne pathogens. Most of these laboratories have the equipment and staff necessary to analyze for indicators of fecal contamination such as fecal and total coliforms and *E. coli*. Culture techniques are available for many of the more common waterborne pathogens such as *Vibrio cholerae, Salmonella enteriditis,* Typhi, and *Shigella* spp.; however, analyses for these pathogens are not routinely performed in most environmental microbiological laboratories. While some environmental microbiological laboratories have expanded capabilities to analyze for parasites such as *Cryptosporidium* and *Giardia* or to perform molecular assays for some organisms, these capabilities are not widespread.

Only laboratories registered for the analysis of select agents are legally permitted to analyze for those agents, and currently most registered labs reside in the LRN. Thus, even if environmental microbiological laboratories develop additional capabilities for pathogen analysis, they could not perform such analyses without registering for select agents.

Laboratory Response Network (LRN)

This is a network of laboratories developed by the Centers for Disease Control (CDC), Association of Public Health Laboratories (APHL), and the Federal Bureau of Investigation (FBI) for the express purpose of dealing with bioterrorism threats, including pathogens and some biotoxins.

Radiological Labs

These laboratories specialize in the analysis and handling of radiological materials. For radionuclides, analytical confirmation may be viewed differently than most chemicals because radionuclide analysis can take the form of screens for gross alpha, beta, or gamma radiation, and/or it can take the form of analysis for the specific radionuclides themselves, such as strontium-90. Thus, analytical confirmation may involve the process of confirming quantity of gross radiation or identifying the radionuclide. The type of analysis that is performed will be based on the analytical goals. For example, radionuclides in drinking water regulation are often characterized by their gross alpha and gross beta emissions.

For the purpose of emergency analysis of water contaminants, a tiered approach is suggested, with screening for gross radiation in the field or upon receipt by the laboratory followed by identification of the radionuclide, which may be important for a more complete understanding of risks to public health as well as potential criminal actions against perpetrators.

Specialty Labs

These are laboratories that are capable of analyzing samples for chemical, biological and radiological agents that cannot be analyzed by commercial laboratories. These labs require special safety certifications for operation and their access is controlled by law enforcement agencies and the military.

Remediation and Recovery

The remediation process involves: system characterization; selection of remedy options; provision of an alternate drinking water supply during remediation; and monitoring to demonstrate that the system has been remediated. This process will follow a process similar to the US EPA's Superfund program's approach to hazardous waste site cleanup to include *risk assessment*, *system characterization*, *feasibility study*, analysis of alternatives, *remedy* selection, *remedial design*, *remedial action*, and post-remedial monitoring and operations.

EXPLOSIVES INCIDENT

A bomb threat will be handled by the City Police Department. If the call is received at the CRESA 911 call center, the call center staff is trained regarding information to be obtained and questioning techniques. If the call is received by a City employee they will follow procedures as shown in Appendix L.

In the event of an attack on the water system with explosive devices, the response will, like a contamination incident, be complex and multidisciplinary (police, fire, public works, emergency medical services (EMS), public information, etc.). Important issues to be considered in the response include:

- Assignment of the Incident Commander (will depend on the situation/risks) – the incident commander is responsible for overall command and control at the incident scene and the health and safety of all response personnel.

- Presence of casualties and proper procedures for casualty extraction and emergency medical treatment at the incident site.

- The risk of fire/explosion presented by flammable materials in the vicinity of the explosion.

- Threat of a secondary device (a device that is placed at the scene to kill or injure emergency responders after their arrival).

- Physical hazards associated with collapsed structures.

- Evidence preservation requirements.

- Respiratory, ocular and skin hazards associated with vapors and fine particulate matter generated by the explosion and subsequent fires and what personal protective equipment (PPE) levels are appropriate for the hazards – note that "escape" respirators (e.g., Quickmask 2000), are <u>not</u> designed for prolonged exposures necessary for intentional entry into a hazardous area, they are designed solely to allow movement away from the incident site to a safer location. Additionally, as of late 2004, no escape masks have received federal certification (the approval agency is NIOSH – National Institute of Occupational Safety and Health) for an independently recognized and tested level of performance.

- The need to maintain communication between all response units (especially police, fire, public works and EMS) to ensure different response units all have the same hazard assessment and understand which response units are being allowed at the incident site, their locations and

basic tasks; this becomes even more critical as mutual aid from other agencies and jurisdictions arrive at the site.

- The need to isolate damaged elements of the water system to make emergency repairs and minimize impact to undamaged elements of the water system.

- The need to maintain a single spokesperson for the City to release information to the public and the news media.

CYBER ATTACK

The City maintains an IT network separate from the water system SCADA network. The network is used for intracity business and is password protected. Firewall protection is used and no outside access for third parties is allowed.

If a cyber attack is successful, the response will require the IT-System Administrator to assess the extent of impact and develop a plan to restore damaged or compromised files and attempt to recover lost files.

If the SCADA system is compromised it will become necessary to monitor the water facilities by periodic and direct visual contact until the system is restored to normal operations.

DOCUMENTATION PROCEDURES

During an emergency, precise documentation of actions taken and materials used will greatly increase the efficiency with which the City handles the situation. Detailed recording and reporting of events, such as shut downs, valve isolations, sampling events and reservoir operations, enables repairs to be made quickly keeping down time to a minimum. The detailed reports are invaluable in making certain that the system is quickly and efficiently returned to pre-emergency operating status. To aid employees, an Operating and Damage Report form is included in Appendix M.

The Federal Emergency Management Agency (FEMA) requires proper documentation of damage for the City to file claims in the event the City is covered by a Presidential Disaster Declaration. Photographic evidence of “before” and “after” an event as well as equipment purchase records will strengthen any justification for compensation from the Federal government.

The FEMA disaster assistance website for public agencies can be consulted for further information:

http://www.disasterassistance.gov/daip_en.portal

Federal and State Requirements 1
Federal Requirements 1
State Requirements 1
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APPENDIX J

MAINTENANCE ACTIVITIES

Daily Maintenance Activities

Well No. 5, 6, 9, 13, 14, and Washougal Wellfield (Wells 7, 8, 10, 11, 12)

- Check motor oil level at each well.
- Verify proper pumping operations.
    - Read upstream and downstream pressure gauges to see if pressures are in normal operating range.
    - Read flow meters for instantaneous and totalized flow to verify flow.
    - Observe well pump and motor while operating for abnormal vibrations.
    - Check for signs of loose fittings (water on floor).
- Record sodium hypochlorite level in drum (Well 5, and 9 only).
- Test chlorine residual and record. Chlorine residual should be between 0.7 and 1.0 mg/L at the sample point.
- Check fluoride level in the saturator and fill as necessary.
- Test fluoride concentration and record. Fluoride concentration shall be between 0.5 and 0.9 mg/L at well sample point and in the distribution system.
- Record totalized flow meter reading from fluoride saturator.
- Check for proper operation of surge valves at each well. Inspect blow off discharge points to check if standing water is accumulating anywhere in the surge discharge system.
- Check for proper operation of chlorinator for each well.
- Check for proper operation of the fluoride system for each well.

Diesel Powered Auxiliary Generators (Washougal Wellfield Facility, Well No. 13, Well No. 14, Crown Road Booster Station, New Gregg Booster Station, Angelo Booster Station, Lower Prune Hill Pump Station)

- Perform general inspection.
- Perform Coolant heater inspection.
- Check oil level.
- Check coolant level.
- Check fuel level.
- Record hour meter.

Weekly Maintenance Activities

Jones and Boulder Creek Surface Water Sources

Twice per week (when in operation)

- Check impoundment structure for stability at both surface water intakes.
- Check for debris accumulation at intake screens at both sources.
- Read and record totalized flow on flowmeter.

Weekly

- Perform security check of facilities.

Reservoirs: Butler, Gregg, Upper & Lower Prune Hill, 18th Avenue, & Lacamas

- Perform full security check.
- Perform full structural check.

Booster Pump Stations: Butler, Old & New Gregg, Upper & Lower Prune Hill, Angelo Forest Home, Green Mountain Estates, Lacamas, & Francis Rd

- Perform full security check.
- Verify proper pumping operations.

    - Read upstream and downstream pressure gauges to see if pressures are in normal operating range.
    - Read flow meters for instantaneous and totalized flow to verify flow.
    - Observe well pump and motor while operating for abnormal vibrations.
    - Check for signs of loose fittings (water on floor).

Diesel Powered Auxiliary Generators (Washougal Wellfield Facility, Well No. 13, New Gregg Booster Station, Angelo Booster Station, Lower Prune Hill Pump Station)

- Air cleaner inspection.
- Air pipe inspection.
- Battery charger inspection.
- Drain fuel filters.
- Check block heater connections.

Monthly Maintenance Activities

Well No. 5, 6, 9, Washougal Wellfield (7, 8, 10, 11, 12) and Well 13

- Inspect property for security purposes.
- Check fluoride pump gear oil.
- Inspect pump packing lubrication for proper operation.
- Inspect cooling screens on Vertical Turbine pumps for blockage.

On-Site Sodium Hypochlorite Generation System (Washougal Wellfield and Well 13)

- Clean blower inlet screen.
- Check hardness of water from water softener – should be less than 10 mg/L.

Diesel Powered Auxiliary Generators (Washougal Wellfield Facility, Well No. 13, New Gregg Booster Station, Angelo Booster Station, Lower Prune Hill Pump Station)

- Drain exhaust condensate trap.
- Check starting batteries.
- Check antifreeze and DCA concentration.
- Drive belt inspection.
- Check block heater connections.

Semi-Annual Maintenance Activities

On-Site Sodium Hypochlorite Generation System (Washougal Wellfield and Well 13)

- Level switch – remove and clean calcification.
- Clean cells if needed.

Annual Maintenance Activities

Jones and Boulder Creek Surface Water Sources

- Jones Creek - close inlet valve to screen house so that no water is diverted to surface water filtration plant from May 15th to November 1.
- Boulder Creek - close outlet valve from screen house so no water is diverted to surface water filtration plant from May 15th to November 1.

Well No. 5, 6, 9, Washougal Wellfield (Wells 7, 8, 10, 11, 12) and Well 13

- Change oil on all oil lubricated equipment.
- Clean out fluoride saturator.
- Clean filter bags on ventilation fan.
- Infrared scan electrical panels.

- Exercise pump.
- Sample water.
- Inspect roof and building for maintenance requirements.
- Check control valves and piping for proper operation.

On-Site Sodium Hypochlorite Generation System (Washougal Wellfield and Well 13)

- Temperature switch – confirmation that the bi metal opens at 60º C when immersed in hot water.
- Replace bellows and poppets on water pump.
- Inspect water heater and perform the following as needed:
    - Descale the heating element
    - Change anode rod
    - Change heating element
    - Change thermostat
    - Reset high limit switch

Reservoirs: Butler, Gregg, Upper & Lower Prune Hill, 18th Avenue, & Lacamas

- Visually inspect inside of reservoir using Liquivision and/or Tank Divers.
- Inspect and remove sediment.

Booster Pump Stations: Butler, Old & New Gregg, Upper & Lower Prune Hill, Angelo Forest Home, Green Mountain Estates, Lacamas, & Francis Rd

- Pump and motor maintained per manufacturer's instructions.
- Check control valves for proper operation.
- Check Operations Center files for each of the booster stations for instructions concerning equipment at pump station.

Diesel Powered Auxiliary Generators (Washougal Wellfield Facility, Well No. 13, New Gregg Booster Station, Angelo Booster Station, Lower Prune Hill Pump Station)

- Inspect radiator hoses.
- Change air cleaner element.
- Change crankcase oil and filter.
- Change coolant filter.
- Change fuel filters.
- Clean cooling system.
- Check block heater connections.

Distribution System

- Leak detection survey (as determined by maintenance staff).

Five Year Maintenance Activities

Pressure Reducing Valves

- Perform a comprehensive evaluation of the PRVs in the system. This is contracted through GC Systems.
- Quarterly inspect each station.

The City of Camas has two sources that require disinfection with a CT of 6 per the Washington State Department of Health. These are the Washougal Wellfield, Well No. 13, and the Slow Sand Filtration Treatment Plant. A summary of the CT calculations for each source is provided below.

Wells 7, 8, 10, 11 and 12

The Washougal Wellfield disinfection system must be capable of treating all flows from Wells 7, 8, 10, 11 and 12, which totals 5,300 gpm if all wells are operated at their full capacity simultaneously. In reality the total capacity of these five wells is approximately 4,700 gpm, when Well 6 and 13 are not in operation, due to wellfield and transmission main limitations. For the Washougal Wellfield Treatment Facility, a CT of 6 is obtained from a chlorine residual of not less than 1.0 mg/L and a minimum CT volume of 31,800 gallons in the transmission pipeline up to the connection to the distribution system at NE 22nd Avenue and Everett Street.

$$1.0 \text{ mg/L} \times 31{,}800 \text{ gal} \div 5{,}300 \text{ gal/min} = 6 \text{ mg-min/L}$$

CT Volume from the Washougal Wellfield Treatment Facility to NE 22nd Avenue and Everett Street is calculated as follows:

From Washougal Wellfield Treatment Facility toward Well No. 10:

$$(24\text{-inch}/(2 \times 12 \text{ inch/ft}))^2 \times \pi \times 286.6 \text{ feet} \times 7.48 \text{ gal/ft}^3 = 900 \text{ gallons}$$

North under/across Washougal river to connection with the 12-in line going east to connect to new 24-inch river crossing:

$$(14\text{-inch}/(2 \times 12 \text{ inch/ft}))^2 \times \pi \times 1{,}566.9 \text{ feet} \times 7.48 \text{ gal/ft}^3 = 12{,}512 \text{ gallons}$$

North to the intersection of NE 3rd Ave and E 1st Ave

$$(14\text{-inch}/(2 \times 12 \text{ inch/ft}))^2 \times \pi \times 820.3 \text{ feet} \times 7.48 \text{ gal/ft}^3 = 6{,}550 \text{ gallons}$$

North from NE 3rd Ave and E 1st Ave, to intersection of NE 22nd Ave and NE Everett Street:

$$(18\text{-inch}/(2 \times 12 \text{ inch/ft}))^2 \times \pi \times 5{,}111.7 \text{ feet} \times 7.48 \text{ gal/ft}^3 = 67{,}472 \text{ gallons}$$

$$\text{Total} = 87{,}434 \text{ gallons}$$

Thus the pipeline between the Washougal Wellfield and the first connection at NE 22nd Avenue and Everett Street provides adequate CT volume.

Well No. 13

Water from Well No. 13 and all other groundwater sources from the Washougal wellfield will first enter the distribution system either at the pressure reducing valve on NE 21st and Everett.

$$1.0 \text{ mg/L} \times 7{,}950 \text{ gal} \div 1{,}325 \text{ gal/min} = 6 \text{ mg-min/L}$$

CT Volume from Well 13 to 3rd Avenue is calculated as follows:

12-inch DI line from Well No. 13 injection point to existing 18-inch water line on SE Cramer:

$$(12\text{-inch}/(2 \times 12 \text{ inch/ft}))^2 \times \pi \times 50 \text{ ft} \times 7.48 \text{ gal /ft}^3 = 330 \text{ gal}$$

18-inch DI water line from SE Cramer connection to 18-inch water transmission line on 3rd Avenue:

$$(18\text{-inch}/(2 \times 12 \text{ inch/ft}))^2 \times \pi \times (140 \text{ ft} + 500 \text{ ft}) \times 7.48 \text{ gal}/\text{ft}^3 = 9{,}386 \text{ gal}$$

Total = 9,716 gallons

The total CT volume between the injection point inside the Well No. 13 facility to the connection at the 18-inch transmission line in 3rd Avenue is 9,716 gallons, therefore, the required CT volume of 7,950 gallons is provided prior to the 14-inch transmission line connection when a chlorine dose of 1.0 mg/L is provided.

Slow Sand Filtration Treatment Plant

The transmission mains connecting the new Slow Sand Filtration Treatment Plant to the distribution system will provide a CT of 60. The transmission pipeline will comprise approximately 15,500 feet of existing 10-inch transmission pipeline and approximately 7,300 feet of new 12-inch transmission pipeline. The point of connection to the distribution system will be at the intersection of NE 14th street and NE 277th Avenue. At 1,570 gpm, the transmission pipelines will provide a total of approximately 66 minutes of contact time for disinfection. The required CT is based on a chlorine residual of 1 mg/L at the point of connection to the distribution system.

$$1.0 \text{ mg/L} \times 106{,}122 \text{ gal} \div 1{,}570 \text{ gal/min} = 67 \text{ mg-min/L}$$

CT Volume from the Washougal Wellfield Treatment Facility to NE 22nd Avenue and Everett Street is calculated as follows:

From Slow Sand Filtration Treatment Plant to new 12-inch transmission pipeline:

$$(10\text{-inch}/(2 \times 12 \text{ inch/ft}))^2 \times \pi \times 15{,}500 \text{ feet} \times 7.48 \text{ gal}/\text{ft}^3 = 63{,}236 \text{ gallons}$$

North under/across Washougal river to connection with the 12-in line going east to connect to new 24-inch river crossing:

$$(12\text{-inch}/(2 \times 12 \text{ inch/ft}))^2 \times \pi \times 7{,}300 \text{ feet} \times 7.48 \text{ gal}/\text{ft}^3 = 42{,}886 \text{ gallons}$$

Total = 106,122 gallons

APPENDIX K

ANNUAL SUMMARY REPORTS (2021-2025)

Cross-Connection Control Activities (Blue)
Annual Summary Report (ASR) for 2021

PWS ID: **108002** PWS Name: **CAMAS MUNICIPAL WATER SEWER SYSTEM** County: **CLARK**

Part 1: Designated Cross-Connection Control Specialist (CCS) Information

CCS Name	Allen Nelson	**CCS Phone**	360-817-7287	**CCS Cert. #**	8187	**BAT Cert. #**	
CCS is: PWS owner or employee							

Part 2: Status of Cross-Connection Control (CCC) Program at End of 2021

Provide information about the status of your CCC Program at the end of the reporting year.

PWS has:	**A written CCC Program Plan**[1] ◉ Yes ○ No **CCC implementation activities**[2] ◉ Yes ○ No	**Program Plan Last Updated**[3] 10/04/2019

[1] Enter "Yes" if PWS has **any** type of written CCC Program Plan, policies, or procedures. Written CCC Program Plan must be part of a Water System Plan (WSP) or Small Water System Management Program (SWSMP).

[2] Enter "Yes" if PWS implemented **any** CCC Program activities during the reporting year, such as establishing legal authority, conducting hazard evaluations, requiring installation of backflow assemblies to protect the PWS, requiring assembly testing, maintaining CCC records, or enforcing the PWS's or CCC Program requirements.

[3] PWS can update the CCC Program Plan at any time (independent of WSP or SWSMP update).

Provide information regarding PWS's specific CCC Program Elements

Program Element Number	Description of Element [See WAC 246-290-490(3)]	This Program Element is:	
		Included in Written Program Plan	Being Implemented or Is Completed
1	**Legal Authority Established**	◉ Yes ○ No	◉ Yes ○ No
2	**Hazard Evaluation Procedures and Schedules**	◉ Yes ○ No	◉ Yes ○ No
3	**Procedures/Schedules for Ensuring Installation of Backflow Preventers**	◉ Yes ○ No	◉ Yes ○ No
4	**Certified CCS Provided**	◉ Yes ○ No	◉ Yes ○ No
5	**Backflow Preventer Inspection and Testing**	◉ Yes ○ No	◉ Yes ○ No

6	**Assembly Testing Quality Assurance/Quality Control (QA/QC) Program**	◉ Yes ○ No	◉ Yes ○ No
7	**Backflow Incident Response Procedures**	◉ Yes ○ No	◉ Yes ○ No
8	**Public Education Program**	◉ Yes ○ No	◉ Yes ○ No
9	**CCC Records**	◉ Yes ○ No	◉ Yes ○ No
10	**Reclaimed Water Permit**	○ Yes ○ No ◉ N/A	○ Yes ○ No ◉ N/A

Part 3A: PWS Characteristics at End of 2021

Enter the number of connections (new and existing) served by the PWS by type.

Type of Service Connection	Number
Residential (As defined by PWS)	9722
All Other (include dedicated fire lines, dedicated irrigation lines, and PWS-owned facilities such as water and wastewater treatment plants and pumping stations, parks, piers, and docks)	228
Total Number of Connections	9950

Part 3B: Cross-Connection Control for Severe and High-Hazard Premises and High-Hazard Dedicated Lines Served by the PWS

Answer the following questions carefully. These answers control your access to pages 2 and 3 for data entry.

1. Does your PWS serve any severe or high-hazard premises or any high-hazard dedicated fire or irrigation lines? ◉ Yes ○ No

2. Does PWS serve any high-hazard medical premises? ◉ Yes ○ No

- If you answer Yes to both questions, you must enter data in at least one row on page 2 and one row on page 3.
- If you answer Yes to Question 1 and No to Question 2, you must enter data on page 2 only.
- If you answer No to both questions, pages 2 and 3 will be grayed out to prevent data entry.

- Count only premises PWS serves water to.
- Report data as accurately as possible. **DOH currently bases CCC compliance actions on this information.**

Type of Severe or High-Hazard Premises or Dedicated Lines [WAC 246-290-490(4)(b)]	**Number of Connections at end of 2021**			
	A. Being Served Water by PWS[1]	**B. With Premises Isolation by AG/RP[2]**	**C. With Column B AG Inspected or RP Tested[3]**	**D. Granted Exception from Premises Isolation**
Agricultural (farms and dairies)				
Beverage bottling plants (including breweries)				
Car washes	2	2	2	0
Chemical plants				
Commercial laundries and dry cleaners	2	2	2	0
Both reclaimed water and potable water provided				
Film processing facilities				
Dedicated fire lines with chemical addition or using unapproved auxiliary supplies				
Food processing plants (including canneries, slaughter houses, rendering plants)				
Hospitals, medical centers, medical, dental and veterinary clinics, mortuaries, nursing homes, etc., reported on Part 3C page 3 (totals imported from page 3)	20	6	6	0
Dedicated irrigation systems using purveyor's water supply and chemical addition[4]				

Laboratories	1	1	1	0
Metal plating industries				
Petroleum processing or storage plants	4	4	4	0
Piers and docks				
Radioactive material processing plants or nuclear reactors				
Survey access denied or restricted				
Wastewater lift/pump stations (non-residential only)	9	9	9	0
Wastewater treatment plants	1	1	1	
Unapproved auxiliary water supply interconnected with potable water supply				
Other				
Commercial	26	26	26	0
Manufacturing	75	75	75	0
Totals	140	126	126	0

[1] Count multiple connections or parallel installations to the same premises as **separate** connections.

[2] Count only connections with premises isolation AGs or RPs. Don't include connections with in-premises preventers only or connections with DCVAs or DCDAs installed for premises isolation. The number in Column B can't be larger than the number in Column A in the same row.

[3] Count only connections whose premises isolation preventers were inspected (AGs) or tested (RPs) during the reporting year.

[4] For example, dedicated irrigation lines to parks, playgrounds, golf courses, cemeteries, estates, etc.

[5] Premises with hazardous materials or processes (requiring isolation by AG or RP), such as aircraft and automotive manufacturers, pulp and paper mills, metal manufacturers, military bases, and wholesale customers that pose a high hazard to the PWS. May be grouped together in categories, for example:"Other manufacturing" or "Other commercial".

Part 3C: Cross-Connection Control for High-Hazard Medical Premises Served by the PWS

- Count only medical premises PWS serves water to.
- Don't count the same premises more than once. If you serve different medical category premises through a single connection, count the connection under the medical category you consider to pose the highest hazard to PWS.
- Report data as accurately as possible. **DOH currently bases CCC compliance actions on this information**

Type of High-Hazard Medical Premises [WAC 246-290-490(4)(b)]	Number of Connections at end of 2021			
	A. Being Served Water by PWS[1]	B. With Premises Isolation by AG/RP[2]	C. With Column B AG Inspected or RP Tested[3]	D. Granted Exception from Premises Isolation
Hospitals				
Hospitals (include psychiatric hospitals and alcohol and drug treatment centers)				
Facilities for Treatment and Care of Patients Not Located in Hospitals Counted Above				
Same day surgery centers				
Out-patient clinics and offices				
Alternative health out-patient clinics and offices				
Psychiatric out-patient clinics and offices				
Chiropractors with water-connected X-ray equipment	6	0	0	0
Hospice care centers				
Childbirth centers				
Kidney dialysis centers				
Blood centers				
Dental clinics and offices	6	1	1	0
Facilities for Housing Patients				
Nursing homes	2	2	2	0
Assisted Living Facilities (formerly Boarding Homes)	3	0	0	0
Residential treatment centers				
Other Medical-Related Facilities				
Mortuaries with embalming equipment	2	2	2	0
Morgues and autopsy facilities (not in hospitals)				

Veterinarian offices, clinics and hospitals	1	1	1	0
Totals	20	6	6	0

[1] Count multiple connections or parallel installations to the same premises as **separate** connections.

[2]Count only connections with premises isolation AGs or RPs. Don't include connections with in-premises preventers only or connections with DCVAs or DCDAs installed for premises isolation. The number in Column B can't be larger than the number in Column A in the same row.

[3]Count only connections with premises isolation AGs or RPs. Don't include connections with in-premises backflow preventers only or connections with premises isolation DCVAs or DCDAs isolation.

Part 4A: Backflow Preventer Inventory and Testing Information for 2021

- Complete all fields. Enter **zero (0)**, if no backflow preventers in a specific category.
- Count only backflow preventers relied on to protect the PWS.
- Count AVBs on *irrigation systems only*. Select No to AVB question above Table 2 if PWS doesn't track AVBs.
- Count multiple tests (or failures) for the same backflow preventer as one test (or failure) for that backflow preventer.
- For multiple service connections or parallel installations, count each assembly separately.
- Count RPDAs and DCDAs as ***single*** assemblies. Count the tests of the mainline assembly and bypass assembly as ***one test***. Count the failure of either the mainline or bypass assembly (or the failure of both) as ***one failure***. Count an entire detector assembly taken out of service as ***one assembly removed from service***.
- Count assemblies installed on dedicated fire or irrigation lines as **Premises Isolation Assemblies** in Table 1.

	Backflow Preventer Category and Inspection/Testing Information	Air Gap	RPBA	RPDA	DCVA	DCDA	PVBA	SVBA	AVB
Table 1: Premises Isolation Preventers (include preventers isolating PWS-owned facilities)									
Existing Premises Isolation Backflow Preventers									
1	In service at beginning of 2021	0	63	1	2201	23			
2	Inspected and/or tested in 2021[1]	0	44	0	1557	18			
3	Failed inspection or test in 2021	0	6	0	14	0			
New Premises Isolation Backflow Preventers									
4	Installed in 2021[2]	0	0	0	26	0			
5	Inspected and/or tested in 2021[1]	0	0	0	26	0			
6	Failed inspection or test in 2021	0	0	0	0	0			
Premises Isolation Backflow Preventers (existing or new)									
7	Removed from service in 2021[3]	0	0	0	16	0			
Total Premises Isolation Preventers at End of 2021		0	63	1	2211	23	0	0	0
	Does PWS track AVBs on irrigation systems? ○ Yes ◉ No								
Table 2: In-Premises Preventers (include preventers within PWS-owned facilities)									
Existing In-Premises Backflow Preventers									
8	In service at beginning of 2021	0	126	1	1104	21	10	1	unk
9	Inspected and/or tested in 2021[1]	0	109	1	907	18	10	0	unk
10	Failed inspection or test in 2021	0	8	0	9	0	0	0	unk

New In-Premises Backflow Preventers									
11	Installed in 2021[2]	0	3	0	167	2	1	0	unk
12	Inspected and/or tested in 2021[1]	0	3	0	164	2	1	0	unk
13	Failed inspection or test in 2021	0	2	0	0	0	0	0	unk
In-Premises Backflow Preventers (existing or new)									
14	Removed from service in 2021[3]	0	0	0	5	0	1	0	unk
Total In-Premises Preventers at End of 2021[4]		**0**	**129**	**1**	**1266**	**23**	**10**	**1**	**0**
Grand Totals at End of 2021		**0**	**192**	**2**	**3477**	**46**	**10**	**1**	**0**

[1] Initial and/or routine annual inspection (for proper installation and approval status) and/or test (for testable assemblies only, using DOH-approved USC field test procedures).

[2] Includes preventers installed on connections where backflow prevention was not previously required and any preventers that replaced those in service at the beginning of the reporting year. Replacement preventers may be of a different type than the originals.

[3] Existing or new preventers taken out of service, whether or not they were replaced by the same or a different type of preventer.

Part 4B: Other Implementation Activities in 2021

Complete all cells. Enter zero if not applicable.

Water Use Questionnaires	
Did your PWS send any water use questionnaires to customers during 2021?	○ Yes ◉ No

On-site Hazard Surveys			
Did your CCS conduct any on-site hazard surveys during 2021?			○ Yes ◉ No
	Service Connection Type		
	New	**Existing**	**Total**
1. Number of connections surveyed for cross-connection hazards to PWS.			0
2. Number of connections requiring backflow prevention to protect PWS.[1,2]			0

New Exceptions to Premises Isolation	
Did your CCS grant any new premises isolation exceptions in 2021 to high-hazard premises?[3]	○ Yes ◉ No

CCC Enforcement Actions	
Did your PWS take any enforcement actions during 2021?[4]	○ Yes ◉ No

[1] Include services where either premises isolation or in-premises preventers were required to protect the PWS.
[2] Include existing services that need new, additional or higher level backflow prevention.
[3] Submit a completed DOH Exception Form (green) for each new exception granted in the reporting year.
[4] "Enforcement actions" means actions taken by the PWS (such as water shut-off, PWS installation or testing of backflow preventer, assessment of fines, etc.) when the customer fails to comply with the PWS's CCC requirements.

Part 5: Backflow Incidents and "Off-Normal" Events in 2021

	Backflow Incidents, Risk Factors, and Indicators during 2021	Number
Backflow Incidents during 2021		
1	Backflow incidents that contaminated the PWS[5].	0
2	Backflow incidents that contaminated the customer's drinking water system ***only***[5].	0

Risk Factors for Backflow during 2021		
3	Distribution main breaks per 100 miles of pipe.	10.00
4	Low pressure events (<20 psi in PWS distribution system).	0
5	Water outage events.	0
Indicators of Possible Backflow during 2021		
6	Total health-related complaints received by PWS.[6]	0
7	Received during BWA or PN events.[7]	0
8	Received during low pressure or water outage events.	0
9	Total aesthetic complaints (color, taste, odor, air in lines, etc.).	6
10	Received during BWA or PN events.[7]	0
11	Number of these complaints received during low pressure or water outage events.	0

[5] Purveyors must submit a Backflow Incident Report form for each backflow incident known to have contaminated the public water system. DOH is also interested in receiving incident report forms for backflow incidents that contaminated the customer's drinking water system only.

[6] Such as stomach ache, headache, vomiting, diarrhea, skin rashes, etc.

[7] **"BWA"** means **Boil Water Advisory** and **"PN"** means **Public Notification** for water quality reasons.

Part 6: Comments and Clarifications

- Enter comments to:
  - Explain or clarify information in this report.
  - Describe challenges faced or accomplishments made in this reporting year.
  - Share your goals and objectives for the coming reporting year.
- Delete comments that are no longer valid.

Part No.	Date Added	Comments
Pt 1	04-18-2019	Updated back flow software to XC2. in March 2019.Still working on migrating and merging.
Pt 1	05-07-2021	The numbers reflecting 2019 service connections is believed to have been an estimate. The actual number of service connections at the end of 2020 were obtained from our financial analyst who deals directly with the tracking of new and existing service connections.
Pt 1	05-07-2021	The actual number of service connections for 2019 is: Residential-8635 All Other: 273 esidential 8635
Pt 1	05-18-2021	Our previous Backflow manager just recently retired. And since I do not yet have a complete understanding of our new XC2 tracking program and I am unable to locate some of the information that may need to be 100% confident in my report for the 2020 ASR. My plan for 2021 is to ensure that we have at least one more CCS on board, dedicated to the cross connection program as well as finding classes for those who are not up to speed with all the regulations pertaining to cross connection control. And to begin conducting surveys at some the various facilities around the City. , in or to be as accurate as possible with our CCC program.
Pt 1	03-18-2022	We are still trying to get up to speed with our CCC program. Previous information beyond 2020 is still being corrected and numbers on record aren't entirely correct with what we are finding in the field when we are able to access. We are still working on building a stronger more stringent program and I hope to have a couple of certified operators this year dedicated to the program and begin overdo hazard assessments as well as working closer with the building department on new construction.

Part 7: Report Certification and Contact Information

I, Allen Nelson , certify that the information in this form is true, complete and accurate to the best of my knowledge.

Last Saved	03/21/2022	**All ASR Forms Certified/Submitted**	03/21/2022

Designated CCS/CCC Program Manager[1]					
Name	Allen Nelson	**Title**	Water Supply Operator	**CCS Cert #**	8187
Email Address	anelson@cityofcamas.us	**Phone**	360-817-7287	**Phone Ext**	

PWS Manager[2]					
Name	Allen Nelson	**Title**	Water Supply Operator	**Operator Cert #**	8187
Email Address	anelson@cityofcamas.us	**Phone**	360-817-7287	**Phone Ext**	

[1] The CCS responsible for developing and implementing the PWS's CCC program (CCC Program Manager).

[2] The person the designated CCS/CCC Program Manager reports to or other manager having direct oversight of the CCC Program.

Cross-Connection Control Activities (Blue)
Annual Summary Report (ASR) for 2022

PWS ID: **108002** PWS Name: **CAMAS MUNICIPAL WATER SEWER SYSTEM** County: **CLARK**

Part 1: Designated Cross-Connection Control Specialist (CCS) Information

CCS Name	Allen Nelson	**CCS Phone**	360-817-7287	**CCS Cert. #**	8187	**BAT Cert. #**	
CCS is: PWS owner or employee							

Part 2: Status of Cross-Connection Control (CCC) Program at End of 2022

Provide information about the status of your CCC Program at the end of the reporting year.

PWS has:	**A written CCC Program Plan**[1] ◉ Yes ○ No **CCC implementation activities**[2] ◉ Yes ○ No	**Program Plan Last Updated**[3] 10/04/2019

[1] Enter "Yes" if PWS has **any** type of written CCC Program Plan, policies, or procedures. Written CCC Program Plan must be part of a Water System Plan (WSP) or Small Water System Management Program (SWSMP).

[2] Enter "Yes" if PWS implemented **any** CCC Program activities during the reporting year, such as establishing legal authority, conducting hazard evaluations, requiring installation of backflow assemblies to protect the PWS, requiring assembly testing, maintaining CCC records, or enforcing the PWS's or CCC Program requirements.

[3] PWS can update the CCC Program Plan at any time (independent of WSP or SWSMP update).

Provide information regarding PWS's specific CCC Program Elements

Program Element Number	Description of Element [See WAC 246-290-490(3)]	This Program Element is:	
		Included in Written Program Plan	Being Implemented or Is Completed
1	**Legal Authority Established**	◉ Yes ○ No	◉ Yes ○ No
2	**Hazard Evaluation Procedures and Schedules**	◉ Yes ○ No	◉ Yes ○ No
3	**Procedures/Schedules for Ensuring Installation of Backflow Preventers**	◉ Yes ○ No	◉ Yes ○ No
4	**Certified CCS Provided**	◉ Yes ○ No	◉ Yes ○ No
5	**Backflow Preventer Inspection and Testing**	◉ Yes ○ No	◉ Yes ○ No

6	**Assembly Testing Quality Assurance/Quality Control (QA/QC) Program**	◉ Yes ○ No	◉ Yes ○ No
7	**Backflow Incident Response Procedures**	◉ Yes ○ No	◉ Yes ○ No
8	**Public Education Program**	◉ Yes ○ No	◉ Yes ○ No
9	**CCC Records**	◉ Yes ○ No	◉ Yes ○ No
10	**Reclaimed Water Permit**	○ Yes ○ No ◉ N/A	○ Yes ○ No ◉ N/A

Part 3A: PWS Characteristics at End of 2022

Enter the number of connections (new and existing) served by the PWS by type.

Type of Service Connection	Number
Residential (As defined by PWS)	9722
All Other (include dedicated fire lines, dedicated irrigation lines, and PWS-owned facilities such as water and wastewater treatment plants and pumping stations, parks, piers, and docks)	228
Total Number of Connections	9950

Part 3B: Cross-Connection Control for Severe and High-Hazard Premises and High-Hazard Dedicated Lines Served by the PWS

Answer the following questions carefully. These answers control your access to pages 2 and 3 for data entry.

1. Does your PWS serve any severe or high-hazard premises or any high-hazard dedicated fire or irrigation lines? ◉ Yes ○ No

2. Does PWS serve any high-hazard medical premises? ◉ Yes ○ No

- If you answer Yes to both questions, you must enter data in at least one row on page 2 and one row on page 3.
- If you answer Yes to Question 1 and No to Question 2, you must enter data on page 2 only.
- If you answer No to both questions, pages 2 and 3 will be grayed out to prevent data entry.

- Count only premises PWS serves water to.
- Report data as accurately as possible. **DOH currently bases CCC compliance actions on this information.**

Type of Severe or High-Hazard Premises or Dedicated Lines [WAC 246-290-490(4)(b)]	Number of Connections at end of 2022			
	A. Being Served Water by PWS[1]	B. With Premises Isolation by AG/RP[2]	C. With Column B AG Inspected or RP Tested[3]	D. Granted Exception from Premises Isolation
Agricultural (farms and dairies)				
Beverage bottling plants (including breweries)				
Car washes	2	2	2	0
Chemical plants				
Commercial laundries and dry cleaners	2	2	2	0
Both reclaimed water and potable water provided				
Film processing facilities				
Dedicated fire lines with chemical addition or using unapproved auxiliary supplies				
Food processing plants (including canneries, slaughter houses, rendering plants)				
Hospitals, medical centers, medical, dental and veterinary clinics, mortuaries, nursing homes, etc., reported on Part 3C page 3 (totals imported from page 3)	20	6	6	0
Dedicated irrigation systems using purveyor's water supply and chemical addition[4]				

Laboratories	1	1	1	0
Metal plating industries				
Petroleum processing or storage plants	4	4	4	0
Piers and docks				
Radioactive material processing plants or nuclear reactors				
Survey access denied or restricted				
Wastewater lift/pump stations (non-residential only)	9	9	9	0
Wastewater treatment plants	1	1	1	
Unapproved auxiliary water supply interconnected with potable water supply				
Totals	39	25	25	0

[1] Count multiple connections or parallel installations to the same premises as **separate** connections.

[2] Count only connections with premises isolation AGs or RPs. Don't include connections with in-premises preventers only or connections with DCVAs or DCDAs installed for premises isolation. The number in Column B can't be larger than the number in Column A in the same row.

[3] Count only connections whose premises isolation preventers were inspected (AGs) or tested (RPs) during the reporting year.

[4] For example, dedicated irrigation lines to parks, playgrounds, golf courses, cemeteries, estates, etc.

[5] Premises with hazardous materials or processes (requiring isolation by AG or RP), such as aircraft and automotive manufacturers, pulp and paper mills, metal manufacturers, military bases, and wholesale customers that pose a high hazard to the PWS. May be grouped together in categories, for example:"Other manufacturing" or "Other commercial".

Part 3C: Cross-Connection Control for High-Hazard Medical Premises Served by the PWS

- Count only medical premises PWS serves water to.
- Don't count the same premises more than once. If you serve different medical category premises through a single connection, count the connection under the medical category you consider to pose the highest hazard to PWS.
- Report data as accurately as possible. **DOH currently bases CCC compliance actions on this information**

Type of High-Hazard Medical Premises [WAC 246-290-490(4)(b)]	Number of Connections at end of 2022			
	A. Being Served Water by PWS[1]	B. With Premises Isolation by AG/RP[2]	C. With Column B AG Inspected or RP Tested[3]	D. Granted Exception from Premises Isolation
Hospitals				
Hospitals (include psychiatric hospitals and alcohol and drug treatment centers)				
Facilities for Treatment and Care of Patients Not Located in Hospitals Counted Above				
Same day surgery centers				
Out-patient clinics and offices				
Alternative health out-patient clinics and offices				
Psychiatric out-patient clinics and offices				
Chiropractors with water-connected X-ray equipment	6	0	0	0
Hospice care centers				
Childbirth centers				
Kidney dialysis centers				
Blood centers				
Dental clinics and offices	6	1	1	0
Facilities for Housing Patients				
Nursing homes	2	2	2	0
Assisted Living Facilities (formerly Boarding Homes)	3	0	0	0
Residential treatment centers				
Other Medical-Related Facilities				
Mortuaries with embalming equipment	2	2	2	0
Morgues and autopsy facilities (not in hospitals)				

Veterinarian offices, clinics and hospitals	1	1	1	0
Totals	20	6	6	0

[1] Count multiple connections or parallel installations to the same premises as **separate** connections.

[2]Count only connections with premises isolation AGs or RPs. Don’t include connections with in-premises preventers only or connections with DCVAs or DCDAs installed for premises isolation. The number in Column B can’t be larger than the number in Column A in the same row.

[3]Count only connections with premises isolation AGs or RPs. Don't include connections with in-premises backflow preventers only or connections with premises isolation DCVAs or DCDAs isolation.

Part 4A: Backflow Preventer Inventory and Testing Information for 2022

- Complete all fields. Enter **zero (0)**, if no backflow preventers in a specific category.
- Count only backflow preventers relied on to protect the PWS.
- Count AVBs on *irrigation systems only*. Select No to AVB question above Table 2 if PWS doesn't track AVBs.
- Count multiple tests (or failures) for the same backflow preventer as one test (or failure) for that backflow preventer.
- For multiple service connections or parallel installations, count each assembly separately.
- Count RPDAs and DCDAs as ***single*** assemblies. Count the tests of the mainline assembly and bypass assembly as ***one test***. Count the failure of either the mainline or bypass assembly (or the failure of both) as ***one failure***. Count an entire detector assembly taken out of service as ***one assembly removed from service***.
- Count assemblies installed on dedicated fire or irrigation lines as **Premises Isolation Assemblies** in Table 1.

	Backflow Preventer Category and Inspection/Testing Information	Air Gap	RPBA	RPDA	DCVA	DCDA	PVBA	SVBA	AVB
Table 1: Premises Isolation Preventers (include preventers isolating PWS-owned facilities)									
Existing Premises Isolation Backflow Preventers									
1	In service at beginning of 2022	0	63	1	2677	49			
2	Inspected and/or tested in 2022[1]	0	44	0	2275	22			
3	Failed inspection or test in 2022	0	6	0	109	1			
New Premises Isolation Backflow Preventers									
4	Installed in 2022[2]	0	6	0	419	0			
5	Inspected and/or tested in 2022[1]	0	6	0	419	0			
6	Failed inspection or test in 2022	0	0	0	2	0			
Premises Isolation Backflow Preventers (existing or new)									
7	Removed from service in 2022[3]	0	1	0	25	0			
Total Premises Isolation Preventers at End of 2022		0	68	1	3071	49	0	0	0
	Does PWS track AVBs on irrigation systems? ○ Yes ◉ No								
Table 2: In-Premises Preventers (include preventers within PWS-owned facilities)									
Existing In-Premises Backflow Preventers									
8	In service at beginning of 2022	0	72	1	510	21	10	1	unk
9	Inspected and/or tested in 2022[1]	0	70	1	499	18	10	1	unk
10	Failed inspection or test in 2022	0	2	0	11	0	0	0	unk

New In-Premises Backflow Preventers									
11	Installed in 2022[2]	0	0	0	11	0	0	0	unk
12	Inspected and/or tested in 2022[1]	0	0	0	11	0	0	0	unk
13	Failed inspection or test in 2022	0	0	0	2	0	0	0	unk
In-Premises Backflow Preventers (existing or new)									
14	Removed from service in 2022[3]	0	0	0	0	0	0	0	unk
Total In-Premises Preventers at End of 2022[4]		**0**	**72**	**1**	**521**	**21**	**10**	**1**	**0**
Grand Totals at End of 2022		**0**	**140**	**2**	**3592**	**70**	**10**	**1**	**0**

[1] Initial and/or routine annual inspection (for proper installation and approval status) and/or test (for testable assemblies only, using DOH-approved USC field test procedures).

[2] Includes preventers installed on connections where backflow prevention was not previously required and any preventers that replaced those in service at the beginning of the reporting year. Replacement preventers may be of a different type than the originals.

[3] Existing or new preventers taken out of service, whether or not they were replaced by the same or a different type of preventer.

Part 4B: Other Implementation Activities in 2022

Complete all cells. Enter zero if not applicable.

Water Use Questionnaires	
Did your PWS send any water use questionnaires to customers during 2022?	○ Yes ◉ No

On-site Hazard Surveys			
Did your CCS conduct any on-site hazard surveys during 2022?			○ Yes ◉ No
	Service Connection Type		
	New	**Existing**	**Total**
1. Number of connections surveyed for cross-connection hazards to PWS.			0
2. Number of connections requiring backflow prevention to protect PWS.[1,2]			0

New Exceptions to Premises Isolation	
Did your CCS grant any new premises isolation exceptions in 2022 to high-hazard premises?[3]	○ Yes ◉ No

CCC Enforcement Actions	
Did your PWS take any enforcement actions during 2022?[4]	○ Yes ◉ No

[1] Include services where either premises isolation or in-premises preventers were required to protect the PWS.
[2] Include existing services that need new, additional or higher level backflow prevention.
[3] Submit a completed DOH Exception Form (green) for each new exception granted in the reporting year.
[4] "Enforcement actions" means actions taken by the PWS (such as water shut-off, PWS installation or testing of backflow preventer, assessment of fines, etc.) when the customer fails to comply with the PWS's CCC requirements.

Part 5: Backflow Incidents and "Off-Normal" Events in 2022

	Backflow Incidents, Risk Factors, and Indicators during 2022	Number
Backflow Incidents during 2022		
1	Backflow incidents that contaminated the PWS[5].	0
2	Backflow incidents that contaminated the customer's drinking water system ***only***[5].	0

Risk Factors for Backflow during 2022		
3	Distribution main breaks per 100 miles of pipe.	7.00
4	Low pressure events (<20 psi in PWS distribution system).	0
5	Water outage events.	0
Indicators of Possible Backflow during 2022		
6	Total health-related complaints received by PWS.[6]	0
7	Received during BWA or PN events.[7]	0
8	Received during low pressure or water outage events.	0
9	Total aesthetic complaints (color, taste, odor, air in lines, etc.).	1
10	Received during BWA or PN events.[7]	0
11	Number of these complaints received during low pressure or water outage events.	0

[5] Purveyors must submit a Backflow Incident Report form for each backflow incident known to have contaminated the public water system. DOH is also interested in receiving incident report forms for backflow incidents that contaminated the customer's drinking water system only.

[6] Such as stomach ache, headache, vomiting, diarrhea, skin rashes, etc.

[7] **"BWA"** means **Boil Water Advisory** and **"PN"** means **Public Notification** for water quality reasons.

Part 6: Comments and Clarifications

- Enter comments to:
  - Explain or clarify information in this report.
  - Describe challenges faced or accomplishments made in this reporting year.
  - Share your goals and objectives for the coming reporting year.
- Delete comments that are no longer valid.

Part No.	Date Added	Comments
Pt 1	04-18-2019	Updated back flow software to XC2. in March 2019.Still working on migrating and merging.
Pt 1	05-07-2021	The numbers reflecting 2019 service connections is believed to have been an estimate. The actual number of service connections at the end of 2020 were obtained from our financial analyst who deals directly with the tracking of new and existing service connections.
Pt 1	05-07-2021	The actual number of service connections for 2019 is: Residential-8635 All Other: 273 esidential 8635
Pt 1	05-18-2021	Our previous Backflow manager just recently retired. And since I do not yet have a complete understanding of our new XC2 tracking program and I am unable to locate some of the information that may need to be 100% confident in my report for the 2020 ASR. My plan for 2021 is to ensure that we have at least one more CCS on board, dedicated to the cross connection program as well as finding classes for those who are not up to speed with all the regulations pertaining to cross connection control. And to begin conducting surveys at some the various facilities around the City. , in or to be as accurate as possible with our CCC program.
Pt 1	03-18-2022	We are still trying to get up to speed with our CCC program. Previous information beyond 2020 is still being corrected and numbers on record aren't entirely correct with what we are finding in the field when we are able to access. We are still working on building a stronger more stringent program and I hope to have a couple of certified operators this year dedicated to the program and begin overdo hazard assessments as well as working closer with the building department on new construction.
Pt 1	01-19-2023	We are looking at a dedicated CCCS to hire this year that will begin a more in-depth investigation on the commercial and industrial side of our customers. We have also begun working closer with our building department regarding new construction.
Pt 1	04-10-2023	There are numbers this year that don't coincide with last year's numbers because we have someone dedidcated to data entry for our CCC program and she has been digging into past information and doing a bit of updating.

Part 7: Report Certification and Contact Information

I, Allen Nelson , certify that the information in this form is true, complete and accurate to the best of my knowledge.

Last Saved	04/10/2023	**All ASR Forms Certified/Submitted**	04/10/2023

Designated CCS/CCC Program Manager[1]					
Name	Allen Nelson	**Title**	Water Supply Operator	**CCS Cert #**	8187
Email Address	anelson@cityofcamas.us	**Phone**	360-817-7287	**Phone Ext**	

PWS Manager[2]					
Name	Allen Nelson	**Title**	Water Supply Operator	**Operator Cert #**	8187
Email Address	anelson@cityofcamas.us	**Phone**	360-817-7287	**Phone Ext**	

[1] The CCS responsible for developing and implementing the PWS's CCC program (CCC Program Manager).
[2] The person the designated CCS/CCC Program Manager reports to or other manager having direct oversight of the CCC Program.

Cross-Connection Control Activities (Blue)
Annual Summary Report (ASR) for 2023

PWS ID: **108002** PWS Name: **CAMAS MUNICIPAL WATER SEWER SYSTEM** County: **CLARK**

Part 1: Designated Cross-Connection Control Specialist (CCS) Information

CCS Name	Allen Nelson	**CCS Phone**	360-817-7287	**CCS Cert. #**	8187	**BAT Cert. #**	
CCS is: PWS owner or employee							

Part 2: Status of Cross-Connection Control (CCC) Program at End of 2023

Provide information about the status of your CCC Program at the end of the reporting year.

PWS has:	**A written CCC Program Plan**[1] ◉ Yes ○ No **CCC implementation activities**[2] ◉ Yes ○ No	**Program Plan Last Updated**[3] 10/04/2019

[1] Enter "Yes" if PWS has **any** type of written CCC Program Plan, policies, or procedures. Written CCC Program Plan must be part of a Water System Plan (WSP) or Small Water System Management Program (SWSMP).

[2] Enter "Yes" if PWS implemented **any** CCC Program activities during the reporting year, such as establishing legal authority, conducting hazard evaluations, requiring installation of backflow assemblies to protect the PWS, requiring assembly testing, maintaining CCC records, or enforcing the PWS's or CCC Program requirements.

[3] PWS can update the CCC Program Plan at any time (independent of WSP or SWSMP update).

Provide information regarding PWS's specific CCC Program Elements

Program Element Number	Description of Element [See WAC 246-290-490(3)]	This Program Element is:	
		Included in Written Program Plan	Being Implemented or Is Completed
1	**Legal Authority Established**	◉ Yes ○ No	◉ Yes ○ No
2	**Hazard Evaluation Procedures and Schedules**	◉ Yes ○ No	◉ Yes ○ No
3	**Procedures/Schedules for Ensuring Installation of Backflow Preventers**	◉ Yes ○ No	◉ Yes ○ No
4	**Certified CCS Provided**	◉ Yes ○ No	◉ Yes ○ No
5	**Backflow Preventer Inspection and Testing**	◉ Yes ○ No	◉ Yes ○ No

6	**Assembly Testing Quality Assurance/Quality Control (QA/QC) Program**	◉ Yes ○ No	◉ Yes ○ No
7	**Backflow Incident Response Procedures**	◉ Yes ○ No	◉ Yes ○ No
8	**Public Education Program**	◉ Yes ○ No	◉ Yes ○ No
9	**CCC Records**	◉ Yes ○ No	◉ Yes ○ No
10	**Reclaimed Water Permit**	○ Yes ○ No ◉ N/A	○ Yes ○ No ◉ N/A

Part 3A: PWS Characteristics at End of 2023

Enter the number of connections (new and existing) served by the PWS by type.

Type of Service Connection	Number
Residential (As defined by PWS)	9722
All Other (include dedicated fire lines, dedicated irrigation lines, and PWS-owned facilities such as water and wastewater treatment plants and pumping stations, parks, piers, and docks)	228
Total Number of Connections	9950

Part 3B: Cross-Connection Control for Severe and High-Hazard Premises and High-Hazard Dedicated Lines Served by the PWS

Answer the following questions carefully. These answers control your access to pages 2 and 3 for data entry.

1. Does your PWS serve any severe or high-hazard premises or any high-hazard dedicated fire or irrigation lines? ◉ Yes ○ No

2. Does PWS serve any high-hazard medical premises? ◉ Yes ○ No

- If you answer Yes to both questions, you must enter data in at least one row on page 2 and one row on page 3.
- If you answer Yes to Question 1 and No to Question 2, you must enter data on page 2 only.
- If you answer No to both questions, pages 2 and 3 will be grayed out to prevent data entry.

- Count only premises PWS serves water to.
- Report data as accurately as possible. **DOH currently bases CCC compliance actions on this information.**

Type of Severe or High-Hazard Premises or Dedicated Lines [WAC 246-290-490(4)(b)]	Number of Connections at end of 2023			
	A. Being Served Water by PWS[1]	B. With Premises Isolation by AG/RP[2]	C. With Column B AG Inspected or RP Tested[3]	D. Granted Exception from Premises Isolation
Agricultural (farms and dairies)				
Beverage bottling plants (including breweries)				
Car washes	2	2	2	0
Chemical plants				
Commercial laundries and dry cleaners	2	2	2	0
Both reclaimed water and potable water provided				
Film processing facilities				
Dedicated fire lines with chemical addition or using unapproved auxiliary supplies				
Food processing plants (including canneries, slaughter houses, rendering plants)				
Hospitals, medical centers, medical, dental and veterinary clinics, mortuaries, nursing homes, etc., reported on Part 3C page 3 (totals imported from page 3)	20	6	6	0
Dedicated irrigation systems using purveyor's water supply and chemical addition[4]				

Laboratories	1	1	1	0
Metal plating industries				
Petroleum processing or storage plants	4	4	4	0
Piers and docks				
Radioactive material processing plants or nuclear reactors				
Survey access denied or restricted				
Wastewater lift/pump stations (non-residential only)	9	9	9	0
Wastewater treatment plants	1	1	1	
Unapproved auxiliary water supply interconnected with potable water supply				
Totals	39	25	25	0

[1] Count multiple connections or parallel installations to the same premises as **separate** connections.

[2] Count only connections with premises isolation AGs or RPs. Don't include connections with in-premises preventers only or connections with DCVAs or DCDAs installed for premises isolation. The number in Column B can't be larger than the number in Column A in the same row.

[3] Count only connections whose premises isolation preventers were inspected (AGs) or tested (RPs) during the reporting year.

[4] For example, dedicated irrigation lines to parks, playgrounds, golf courses, cemeteries, estates, etc.

[5] Premises with hazardous materials or processes (requiring isolation by AG or RP), such as aircraft and automotive manufacturers, pulp and paper mills, metal manufacturers, military bases, and wholesale customers that pose a high hazard to the PWS. May be grouped together in categories, for example:"Other manufacturing" or "Other commercial".

Part 3C: Cross-Connection Control for High-Hazard Medical Premises Served by the PWS

- Count only medical premises PWS serves water to.
- Don't count the same premises more than once. If you serve different medical category premises through a single connection, count the connection under the medical category you consider to pose the highest hazard to PWS.
- Report data as accurately as possible. **DOH currently bases CCC compliance actions on this information**

Type of High-Hazard Medical Premises [WAC 246-290-490(4)(b)]	Number of Connections at end of 2023			
	A. Being Served Water by PWS[1]	B. With Premises Isolation by AG/RP[2]	C. With Column B AG Inspected or RP Tested[3]	D. Granted Exception from Premises Isolation
Hospitals				
Hospitals (include psychiatric hospitals and alcohol and drug treatment centers)				
Facilities for Treatment and Care of Patients Not Located in Hospitals Counted Above				
Same day surgery centers				
Out-patient clinics and offices				
Alternative health out-patient clinics and offices				
Psychiatric out-patient clinics and offices				
Chiropractors with water-connected X-ray equipment	6	0	0	0
Hospice care centers				
Childbirth centers				
Kidney dialysis centers				
Blood centers				
Dental clinics and offices	6	1	1	0
Facilities for Housing Patients				
Nursing homes	2	2	2	0
Assisted Living Facilities (formerly Boarding Homes)	3	0	0	0
Residential treatment centers				
Other Medical-Related Facilities				
Mortuaries with embalming equipment	2	2	2	0
Morgues and autopsy facilities (not in hospitals)				

Veterinarian offices, clinics and hospitals	1	1	1	0
Totals	20	6	6	0

[1] Count multiple connections or parallel installations to the same premises as **separate** connections.

[2]Count only connections with premises isolation AGs or RPs. Don’t include connections with in-premises preventers only or connections with DCVAs or DCDAs installed for premises isolation. The number in Column B can’t be larger than the number in Column A in the same row.

[3]Count only connections with premises isolation AGs or RPs. Don't include connections with in-premises backflow preventers only or connections with premises isolation DCVAs or DCDAs isolation.

Part 4A: Backflow Preventer Inventory and Testing Information for 2023

- Complete all fields. Enter **zero (0)**, if no backflow preventers in a specific category.
- Count only backflow preventers relied on to protect the PWS.
- Count AVBs on *irrigation systems only*. Select No to AVB question above Table 2 if PWS doesn't track AVBs.
- Count multiple tests (or failures) for the same backflow preventer as one test (or failure) for that backflow preventer.
- For multiple service connections or parallel installations, count each assembly separately.
- Count RPDAs and DCDAs as ***single*** assemblies. Count the tests of the mainline assembly and bypass assembly as ***one test***. Count the failure of either the mainline or bypass assembly (or the failure of both) as ***one failure***. Count an entire detector assembly taken out of service as ***one assembly removed from service***.
- Count assemblies installed on dedicated fire or irrigation lines as **Premises Isolation Assemblies** in Table 1.

	Backflow Preventer Category and Inspection/Testing Information	Air Gap	RPBA	RPDA	DCVA	DCDA	PVBA	SVBA	AVB
Table 1: Premises Isolation Preventers (include preventers isolating PWS-owned facilities)									
Existing Premises Isolation Backflow Preventers									
1	In service at beginning of 2023	0	183	3	4020	48			
2	Inspected and/or tested in 2023[1]	0	147	2	3418	37			
3	Failed inspection or test in 2023	0	21	1	91	3			
New Premises Isolation Backflow Preventers									
4	Installed in 2023[2]	0	3	0	100	0			
5	Inspected and/or tested in 2023[1]	0	3	0	100	0			
6	Failed inspection or test in 2023	0	0	0	6	0			
Premises Isolation Backflow Preventers (existing or new)									
7	Removed from service in 2023[3]	0	0	0	13	0			
Total Premises Isolation Preventers at End of 2023		0	186	3	4107	48	0	0	0
	Does PWS track AVBs on irrigation systems? ○ Yes ◉ No								
Table 2: In-Premises Preventers (include preventers within PWS-owned facilities)									
Existing In-Premises Backflow Preventers									
8	In service at beginning of 2023	0	0	0	12	0	22	0	unk
9	Inspected and/or tested in 2023[1]	0	0	0	9	0	17	0	unk
10	Failed inspection or test in 2023	0	0	0	0	0	2	0	unk

New In-Premises Backflow Preventers									
11	Installed in 2023[2]	0	0	0	0	0	0	0	unk
12	Inspected and/or tested in 2023[1]	0	0	0	0	0	0	0	unk
13	Failed inspection or test in 2023	0	0	0	0	0	0	0	unk
In-Premises Backflow Preventers (existing or new)									
14	Removed from service in 2023[3]	0	0	0	0	0	0	0	unk
Total In-Premises Preventers at End of 2023[4]		**0**	**0**	**0**	**12**	**0**	**22**	**0**	**0**
Grand Totals at End of 2023		**0**	**186**	**3**	**4119**	**48**	**22**	**0**	**0**

[1] Initial and/or routine annual inspection (for proper installation and approval status) and/or test (for testable assemblies only, using DOH-approved USC field test procedures).

[2] Includes preventers installed on connections where backflow prevention was not previously required and any preventers that replaced those in service at the beginning of the reporting year. Replacement preventers may be of a different type than the originals.

[3] Existing or new preventers taken out of service, whether or not they were replaced by the same or a different type of preventer.

Part 4B: Other Implementation Activities in 2023

Complete all cells. Enter zero if not applicable.

Water Use Questionnaires	
Did your PWS send any water use questionnaires to customers during 2023?	○ Yes ◉ No

On-site Hazard Surveys			
Did your CCS conduct any on-site hazard surveys during 2023?			○ Yes ◉ No
	Service Connection Type		
	New	**Existing**	**Total**
1. Number of connections surveyed for cross-connection hazards to PWS.			0
2. Number of connections requiring backflow prevention to protect PWS.[1,2]			0

New Exceptions to Premises Isolation	
Did your CCS grant any new premises isolation exceptions in 2023 to high-hazard premises?[3]	○ Yes ◉ No

CCC Enforcement Actions	
Did your PWS take any enforcement actions during 2023?[4]	○ Yes ◉ No

[1] Include services where either premises isolation or in-premises preventers were required to protect the PWS.
[2] Include existing services that need new, additional or higher level backflow prevention.
[3] Submit a completed DOH Exception Form (green) for each new exception granted in the reporting year.
[4] "Enforcement actions" means actions taken by the PWS (such as water shut-off, PWS installation or testing of backflow preventer, assessment of fines, etc.) when the customer fails to comply with the PWS's CCC requirements.

Part 5: Backflow Incidents and "Off-Normal" Events in 2023

	Backflow Incidents, Risk Factors, and Indicators during 2023	Number
Backflow Incidents during 2023		
1	Backflow incidents that contaminated the PWS[5].	0
2	Backflow incidents that contaminated the customer's drinking water system ***only***[5].	0

Risk Factors for Backflow during 2023		
3	Distribution main breaks per 100 miles of pipe.	7.00
4	Low pressure events (<20 psi in PWS distribution system).	0
5	Water outage events.	0
Indicators of Possible Backflow during 2023		
6	Total health-related complaints received by PWS.[6]	0
7	Received during BWA or PN events.[7]	0
8	Received during low pressure or water outage events.	0
9	Total aesthetic complaints (color, taste, odor, air in lines, etc.).	5
10	Received during BWA or PN events.[7]	0
11	Number of these complaints received during low pressure or water outage events.	0

[5] Purveyors must submit a Backflow Incident Report form for each backflow incident known to have contaminated the public water system. DOH is also interested in receiving incident report forms for backflow incidents that contaminated the customer's drinking water system only.

[6] Such as stomach ache, headache, vomiting, diarrhea, skin rashes, etc.

[7] **"BWA"** means **Boil Water Advisory** and **"PN"** means **Public Notification** for water quality reasons.

Part 6: Comments and Clarifications

- Enter comments to:
  - Explain or clarify information in this report.
  - Describe challenges faced or accomplishments made in this reporting year.
  - Share your goals and objectives for the coming reporting year.
- Delete comments that are no longer valid.

Part No.	Date Added	Comments
Pt 1	04-18-2019	Updated back flow software to XC2. in March 2019.Still working on migrating and merging.
Pt 1	05-07-2021	The numbers reflecting 2019 service connections is believed to have been an estimate. The actual number of service connections at the end of 2020 were obtained from our financial analyst who deals directly with the tracking of new and existing service connections.
Pt 1	05-07-2021	The actual number of service connections for 2019 is: Residential-8635 All Other: 273 esidential 8635
Pt 1	05-18-2021	Our previous Backflow manager just recently retired. And since I do not yet have a complete understanding of our new XC2 tracking program and I am unable to locate some of the information that may need to be 100% confident in my report for the 2020 ASR. My plan for 2021 is to ensure that we have at least one more CCS on board, dedicated to the cross connection program as well as finding classes for those who are not up to speed with all the regulations pertaining to cross connection control. And to begin conducting surveys at some the various facilities around the City. , in or to be as accurate as possible with our CCC program.
Pt 1	03-18-2022	We are still trying to get up to speed with our CCC program. Previous information beyond 2020 is still being corrected and numbers on record aren't entirely correct with what we are finding in the field when we are able to access. We are still working on building a stronger more stringent program and I hope to have a couple of certified operators this year dedicated to the program and begin overdo hazard assessments as well as working closer with the building department on new construction.
Pt 1	01-19-2023	We are looking at a dedicated CCCS to hire this year that will begin a more in-depth investigation on the commercial and industrial side of our customers. We have also begun working closer with our building department regarding new construction.
Pt 1	04-10-2023	There are numbers this year that don't coincide with last year's numbers because we have someone dedidcated to data entry for our CCC program and she has been digging into past information and doing a bit of updating.
Pt 1	04-15-2024	Our new CCCS and data entry person working together found approximately 400 assemblies that were already in the system, that we didn't know about. As we continue to strengthen our program, we will begin to conduct more hazard assessments in 2024 and hopefully start getting a better understanding of what we need to have a more complete program.

Part 7: Report Certification and Contact Information

I, Allen Nelson , certify that the information in this form is true, complete and accurate to the best of my knowledge.

Last Saved	04/15/2024	**All ASR Forms Certified/Submitted**	04/15/2024

Designated CCS/CCC Program Manager[1]					
Name	Allen Nelson	**Title**	Water Supply Operator	**CCS Cert #**	8187
Email Address	anelson@cityofcamas.us	**Phone**	360-817-7287	**Phone Ext**	

PWS Manager[2]					
Name	Allen Nelson	**Title**	Water Supply Operator	**Operator Cert #**	8187
Email Address	anelson@cityofcamas.us	**Phone**	360-817-7287	**Phone Ext**	

[1] The CCS responsible for developing and implementing the PWS's CCC program (CCC Program Manager).
[2] The person the designated CCS/CCC Program Manager reports to or other manager having direct oversight of the CCC Program.

Cross-Connection Control Activities (Blue)
Annual Summary Report (ASR) for 2025

PWS ID: **108002** PWS Name: **CAMAS MUNICIPAL WATER SEWER SYSTEM** County: **CLARK**

Part 1: Designated Cross-Connection Control Specialist (CCS) Information

CCS Name	Nick Mettler	**CCS Phone**	360-833-3188	**CCS Cert. #**	16006	**BAT Cert. #**	B8057
CCS is: PWS owner or employee							

Part 2: Status of Cross-Connection Control (CCC) Program at End of 2025

Provide information about the status of your CCC Program at the end of the reporting year.

PWS has:	**A written CCC Program Plan**[1]	◉ Yes ○ No	**Program Plan Last Updated**[3] 12/04/2023
	CCC implementation activities[2]	◉ Yes ○ No	

[1] Enter "Yes" if PWS has **any** type of written CCC Program Plan, policies, or procedures. Written CCC Program Plan must be part of a Water System Plan (WSP) or Small Water System Management Program (SWSMP).

[2] Enter "Yes" if PWS implemented **any** CCC Program activities during the reporting year, such as establishing legal authority, conducting hazard evaluations, requiring installation of backflow assemblies to protect the PWS, requiring assembly testing, maintaining CCC records, or enforcing the PWS's or CCC Program requirements.

[3] PWS can update the CCC Program Plan at any time (independent of WSP or SWSMP update).

Provide information regarding PWS's specific CCC Program Elements

Program Element Number	Description of Element [See WAC 246-290-490(3)]	This Program Element is:	
		Included in Written Program Plan	Being Implemented or Is Completed
1	**Legal Authority Established**	◉ Yes ○ No	◉ Yes ○ No
2	**Hazard Evaluation Procedures and Schedules**	◉ Yes ○ No	◉ Yes ○ No
3	**Procedures/Schedules for Ensuring Installation of Backflow Preventers**	◉ Yes ○ No	◉ Yes ○ No
4	**Certified CCS Provided**	◉ Yes ○ No	◉ Yes ○ No
5	**Backflow Preventer Inspection and Testing**	◉ Yes ○ No	◉ Yes ○ No

6	**Assembly Testing Quality Assurance/Quality Control (QA/QC) Program**	◉ Yes ○ No	◉ Yes ○ No
7	**Backflow Incident Response Procedures**	◉ Yes ○ No	◉ Yes ○ No
8	**Public Education Program**	◉ Yes ○ No	◉ Yes ○ No
9	**CCC Records**	◉ Yes ○ No	◉ Yes ○ No
10	**Reclaimed Water Permit**	○ Yes ○ No ◉ N/A	○ Yes ○ No ◉ N/A

Part 3A: PWS Characteristics at End of 2025

Enter the number of connections (new and existing) served by the PWS by type.

Type of Service Connection	Number
Residential (As defined by PWS)	9645
All Other (include dedicated fire lines, dedicated irrigation lines, and PWS-owned facilities such as water and wastewater treatment plants and pumping stations, parks, piers, and docks)	585
Total Number of Connections	10230

Part 3B: Cross-Connection Control for Severe and High-Hazard Premises and High-Hazard Dedicated Lines Served by the PWS

Answer the following questions carefully. These answers control your access to pages 2 and 3 for data entry.

1. Does your PWS serve any severe or high-hazard premises or any high-hazard dedicated fire or irrigation lines? ◉ Yes ○ No

2. Does PWS serve any high-hazard medical premises? ◉ Yes ○ No

- If you answer Yes to both questions, you must enter data in at least one row on page 2 and one row on page 3.
- If you answer Yes to Question 1 and No to Question 2, you must enter data on page 2 only.
- If you answer No to both questions, pages 2 and 3 will be grayed out to prevent data entry.

- Count only premises PWS serves water to.
- Report data as accurately as possible. **DOH currently bases CCC compliance actions on this information.**

Type of Severe or High-Hazard Premises or Dedicated Lines [WAC 246-290-490(4)(b)]	Number of Connections at end of 2025			
	A. Being Served Water by PWS[1]	B. With Premises Isolation by AG/RP[2]	C. With Column B AG Inspected or RP Tested[3]	D. Granted Exception from Premises Isolation
Agricultural (farms and dairies)				
Beverage bottling plants (including breweries)	1	1	1	0
Car washes	1	1	1	0
Chemical plants				
Commercial laundries and dry cleaners	2	1	1	0
Both reclaimed water and potable water provided				
Film processing facilities				
Dedicated fire lines with chemical addition or using unapproved auxiliary supplies				
Food processing plants (including canneries, slaughter houses, rendering plants)				
Hospitals, medical centers, medical, dental and veterinary clinics, mortuaries, nursing homes, etc., reported on Part 3C page 3 (totals imported from page 3)	16	11	11	2
Dedicated irrigation systems using purveyor's water supply and chemical addition[4]				

Laboratories	0	0	0	0
Metal plating industries				
Petroleum processing or storage plants	4	4	4	0
Piers and docks				
Radioactive material processing plants or nuclear reactors				
Survey access denied or restricted				
Wastewater lift/pump stations (non-residential only)	9	9	9	0
Wastewater treatment plants	1	1	1	
Unapproved auxiliary water supply interconnected with potable water supply	1	1	1	0
Totals	35	29	29	2

[1] Count multiple connections or parallel installations to the same premises as **separate** connections.

[2]Count only connections with premises isolation AGs or RPs. Don't include connections with in-premises preventers only or connections with DCVAs or DCDAs installed for premises isolation. The number in Column B can't be larger than the number in Column A in the same row.

[3] Count only connections whose premises isolation preventers were inspected (AGs) or tested (RPs) during the reporting year.

[4] For example, dedicated irrigation lines to parks, playgrounds, golf courses, cemeteries, estates, etc.

[5] Premises with hazardous materials or processes (requiring isolation by AG or RP), such as aircraft and automotive manufacturers, pulp and paper mills, metal manufacturers, military bases, and wholesale customers that pose a high hazard to the PWS. May be grouped together in categories, for example:"Other manufacturing" or "Other commercial".

Part 3C: Cross-Connection Control for High-Hazard Medical Premises Served by the PWS

- Count only medical premises PWS serves water to.
- Don't count the same premises more than once. If you serve different medical category premises through a single connection, count the connection under the medical category you consider to pose the highest hazard to PWS.
- Report data as accurately as possible. **DOH currently bases CCC compliance actions on this information**

Type of High-Hazard Medical Premises [WAC 246-290-490(4)(b)]	Number of Connections at end of 2025			
	A. Being Served Water by PWS[1]	B. With Premises Isolation by AG/RP[2]	C. With Column B AG Inspected or RP Tested[3]	D. Granted Exception from Premises Isolation
Hospitals				
Hospitals (include psychiatric hospitals and alcohol and drug treatment centers)				
Facilities for Treatment and Care of Patients Not Located in Hospitals Counted Above				
Same day surgery centers				
Out-patient clinics and offices				
Alternative health out-patient clinics and offices				
Psychiatric out-patient clinics and offices				
Chiropractors with water-connected X-ray equipment	0	0	0	0
Hospice care centers				
Childbirth centers				
Kidney dialysis centers	1	1	1	0
Blood centers				
Dental clinics and offices	6	4	4	2
Facilities for Housing Patients				
Nursing homes	1	1	1	0
Assisted Living Facilities (formerly Boarding Homes)	5	2	2	0
Residential treatment centers				
Other Medical-Related Facilities				
Mortuaries with embalming equipment	2	2	2	0
Morgues and autopsy facilities (not in hospitals)				

Veterinarian offices, clinics and hospitals	1	1	1	0
Totals	16	11	11	2

[1] Count multiple connections or parallel installations to the same premises as **separate** connections.

[2]Count only connections with premises isolation AGs or RPs. Don’t include connections with in-premises preventers only or connections with DCVAs or DCDAs installed for premises isolation. The number in Column B can’t be larger than the number in Column A in the same row.

[3]Count only connections with premises isolation AGs or RPs. Don't include connections with in-premises backflow preventers only or connections with premises isolation DCVAs or DCDAs isolation.

Part 4A: Backflow Preventer Inventory and Testing Information for 2025

- Complete all fields. Enter **zero (0)**, if no backflow preventers in a specific category.
- Count only backflow preventers relied on to protect the PWS.
- Count AVBs on *irrigation systems only*. Select No to AVB question above Table 2 if PWS doesn't track AVBs.
- Count multiple tests (or failures) for the same backflow preventer as one test (or failure) for that backflow preventer.
- For multiple service connections or parallel installations, count each assembly separately.
- Count RPDAs and DCDAs as ***single*** assemblies. Count the tests of the mainline assembly and bypass assembly as ***one test***. Count the failure of either the mainline or bypass assembly (or the failure of both) as ***one failure***. Count an entire detector assembly taken out of service as ***one assembly removed from service***.
- Count assemblies installed on dedicated fire or irrigation lines as **Premises Isolation Assemblies** in Table 1.

	Backflow Preventer Category and Inspection/Testing Information	Air Gap	RPBA	RPDA	DCVA	DCDA	PVBA	SVBA	AVB
Table 1: Premises Isolation Preventers (include preventers isolating PWS-owned facilities)									
Existing Premises Isolation Backflow Preventers									
1	In service at beginning of 2025	0	39	0	1366	32			
2	Inspected and/or tested in 2025[1]	0	24	0	881	17			
3	Failed inspection or test in 2025	0	1	0	30	1			
New Premises Isolation Backflow Preventers									
4	Installed in 2025[2]	0	5	0	5	3			
5	Inspected and/or tested in 2025[1]	0	5	0	5	3			
6	Failed inspection or test in 2025	0	0	0	0	0			
Premises Isolation Backflow Preventers (existing or new)									
7	Removed from service in 2025[3]	0	0	0	2	0			
Total Premises Isolation Preventers at End of 2025		0	44	0	1369	35	0	0	0
	Does PWS track AVBs on irrigation systems? ○ Yes ◉ No								
Table 2: In-Premises Preventers (include preventers within PWS-owned facilities)									
Existing In-Premises Backflow Preventers									
8	In service at beginning of 2025	0	156	3	2909	15	18	0	unk
9	Inspected and/or tested in 2025[1]	0	46	2	1805	8	13	0	unk
10	Failed inspection or test in 2025	0	7	1	43	0	2	0	unk

New In-Premises Backflow Preventers									
11	Installed in 2025[2]	0	13	0	276	0	0	0	unk
12	Inspected and/or tested in 2025[1]	0	13	0	272	0	0	0	unk
13	Failed inspection or test in 2025	0	1	0	2	0	0	0	unk
In-Premises Backflow Preventers (existing or new)									
14	Removed from service in 2025[3]	0	0	0	9	0	0	0	unk
Total In-Premises Preventers at End of 2025[4]		**0**	**169**	**3**	**3176**	**15**	**18**	**0**	**0**
Grand Totals at End of 2025		**0**	**213**	**3**	**4545**	**50**	**18**	**0**	**0**

[1] Initial and/or routine annual inspection (for proper installation and approval status) and/or test (for testable assemblies only, using DOH-approved USC field test procedures).

[2] Includes preventers installed on connections where backflow prevention was not previously required and any preventers that replaced those in service at the beginning of the reporting year. Replacement preventers may be of a different type than the originals.

[3] Existing or new preventers taken out of service, whether or not they were replaced by the same or a different type of preventer.

Part 4B: Other Implementation Activities in 2025

Complete all cells. Enter zero if not applicable.

Water Use Questionnaires	
Did your PWS send any water use questionnaires to customers during 2025?	○ Yes ◉ No

On-site Hazard Surveys			
Did your CCS conduct any on-site hazard surveys during 2025?			◉ Yes ○ No
	Service Connection Type		
	New	**Existing**	**Total**
1. Number of connections surveyed for cross-connection hazards to PWS.	302	28	330
2. Number of connections requiring backflow prevention to protect PWS.[1,2]	302	10	312

New Exceptions to Premises Isolation	
Did your CCS grant any new premises isolation exceptions in 2025 to high-hazard premises?[3]	○ Yes ◉ No

CCC Enforcement Actions	
Did your PWS take any enforcement actions during 2025?[4]	○ Yes ◉ No

[1] Include services where either premises isolation or in-premises preventers were required to protect the PWS.
[2] Include existing services that need new, additional or higher level backflow prevention.
[3] Submit a completed DOH Exception Form (green) for each new exception granted in the reporting year.
[4] "Enforcement actions" means actions taken by the PWS (such as water shut-off, PWS installation or testing of backflow preventer, assessment of fines, etc.) when the customer fails to comply with the PWS's CCC requirements.

Part 5: Backflow Incidents and "Off-Normal" Events in 2025

	Backflow Incidents, Risk Factors, and Indicators during 2025	Number
Backflow Incidents during 2025		
1	Backflow incidents that contaminated the PWS[5].	0
2	Backflow incidents that contaminated the customer's drinking water system ***only***[5].	0

Risk Factors for Backflow during 2025		
3	Distribution main breaks per 100 miles of pipe.	0.00
4	Low pressure events (<20 psi in PWS distribution system).	0
5	Water outage events.	0
Indicators of Possible Backflow during 2025		
6	Total health-related complaints received by PWS.[6]	0
7	Received during BWA or PN events.[7]	0
8	Received during low pressure or water outage events.	0
9	Total aesthetic complaints (color, taste, odor, air in lines, etc.).	3
10	Received during BWA or PN events.[7]	0
11	Number of these complaints received during low pressure or water outage events.	0

[5] Purveyors must submit a Backflow Incident Report form for each backflow incident known to have contaminated the public water system. DOH is also interested in receiving incident report forms for backflow incidents that contaminated the customer's drinking water system only.

[6] Such as stomach ache, headache, vomiting, diarrhea, skin rashes, etc.

[7] **"BWA"** means **Boil Water Advisory** and **"PN"** means **Public Notification** for water quality reasons.

Part 6: Comments and Clarifications

- Enter comments to:
  - Explain or clarify information in this report.
  - Describe challenges faced or accomplishments made in this reporting year.
  - Share your goals and objectives for the coming reporting year.
- Delete comments that are no longer valid.

Part No.	Date Added	Comments
Pt 1	04-18-2019	Updated back flow software to XC2. in March 2019.Still working on migrating and merging.
Pt 1	05-07-2021	The numbers reflecting 2019 service connections is believed to have been an estimate. The actual number of service connections at the end of 2020 were obtained from our financial analyst who deals directly with the tracking of new and existing service connections.
Pt 1	05-07-2021	The actual number of service connections for 2019 is: Residential-8635 All Other: 273 esidential 8635
Pt 1	05-18-2021	Our previous Backflow manager just recently retired. And since I do not yet have a complete understanding of our new XC2 tracking program and I am unable to locate some of the information that may need to be 100% confident in my report for the 2020 ASR. My plan for 2021 is to ensure that we have at least one more CCS on board, dedicated to the cross connection program as well as finding classes for those who are not up to speed with all the regulations pertaining to cross connection control. And to begin conducting surveys at some the various facilities around the City. , in or to be as accurate as possible with our CCC program.
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Pt 1	01-19-2023	We are looking at a dedicated CCCS to hire this year that will begin a more in-depth investigation on the commercial and industrial side of our customers. We have also begun working closer with our building department regarding new construction.
Pt 1	04-10-2023	There are numbers this year that don't coincide with last year's numbers because we have someone dedidcated to data entry for our CCC program and she has been digging into past information and doing a bit of updating.
Pt 1	04-15-2024	Our new CCCS and data entry person working together found approximately 400 assemblies that were already in the system, that we didn't know about. As we continue to strengthen our program, we will begin to conduct more hazard assessments in 2024 and hopefully start getting a better understanding of what we need to have a more complete program.
Pt 1	03-27-2025	As I am new to the CCCS position as of last June 2024 there will some changes coming to enforce testing coming the reporting year of 2025. We will be getting new Backflow Management Software installed and running within the next couple months. This outdated XC2 has been glitching and is time to replace. Information from the past has been getting corrected and updated to get the most accurate data. We now have in our municipal code that any non-compliance to test we can send a tester to test then bill the utility account for the test, that should help get our compliance percentage up as well. Looking forward to all the new changes coming into 2025. The 2 new exceptions/ green forms I filled out during some hazard surveys were both from dentist offices that

		both have self-contained chairs not connected to our PWS. I will be checking back on those annually for continued hazard surveys to ensure nothing has changed.
Pt 1	04-06-2026	this past year I have been correcting information within our backflow prevention management software, trying to get the information as correct as possible for our new software that went live at the beginning of 2026. This last year I have been busy combing through the data correcting information from the past several years of input, also doing several hazard surveys at all the new sites and few dozen existing high/severe health hazard sites. The new software is going to help with the organizing of the customer test reminders and failed assemblies to ensure that customers are staying compliant with the testing and maintenance for passing test reports per WAC and CMC. This last year has been a challenge to stay on top of everything as the software change has been rather time consuming and customer addresses have not been changed over to the new software as of today's date 4/6/2026. This next year (2026) is going to be a transition year for the customers to get used to the new testing schedule and non-compliance enforcement action. Good things are happening to ensure safe water for the City of Camas The new software will make tracking it easier, the Camas Municipal Code will make it easier to keep customers compliant on the Backflow assembly testing.

Part 7: Report Certification and Contact Information

I, Nick Mettler , certify that the information in this form is true, complete and accurate to the best of my knowledge.

Last Saved	04/14/2026	**All ASR Forms Certified/Submitted**	04/14/2026

Designated CCS/CCC Program Manager[1]					
Name	Nick Mettler	**Title**	Cross Connection Control Specialist	**CCS Cert #**	16006
Email Address	nmettler@cityofcamas.us	**Phone**	360-833-3188	**Phone Ext**	

PWS Manager[2]					
Name	Allen Nelson	**Title**	Water Supply Operator	**Operator Cert #**	8187
Email Address	anelson@cityofcamas.us	**Phone**	360-817-7287	**Phone Ext**	

[1] The CCS responsible for developing and implementing the PWS's CCC program (CCC Program Manager).
[2] The person the designated CCS/CCC Program Manager reports to or other manager having direct oversight of the CCC Program.

Cross-Connection Control Activities (Blue)
Annual Summary Report (ASR) for 2024

PWS ID: **108002** PWS Name: **CAMAS MUNICIPAL WATER SEWER SYSTEM** County: **CLARK**

Part 1: Designated Cross-Connection Control Specialist (CCS) Information

CCS Name	Nick Mettler	**CCS Phone**	360-833-3188	**CCS Cert. #**	16006	**BAT Cert. #**	
CCS is: PWS owner or employee							

Part 2: Status of Cross-Connection Control (CCC) Program at End of 2024

Provide information about the status of your CCC Program at the end of the reporting year.

PWS has:	**A written CCC Program Plan**[1] ◉ Yes ○ No **CCC implementation activities**[2] ◉ Yes ○ No	**Program Plan Last Updated**[3] 12/04/2023

[1] Enter "Yes" if PWS has **any** type of written CCC Program Plan, policies, or procedures. Written CCC Program Plan must be part of a Water System Plan (WSP) or Small Water System Management Program (SWSMP).

[2] Enter "Yes" if PWS implemented **any** CCC Program activities during the reporting year, such as establishing legal authority, conducting hazard evaluations, requiring installation of backflow assemblies to protect the PWS, requiring assembly testing, maintaining CCC records, or enforcing the PWS's or CCC Program requirements.

[3] PWS can update the CCC Program Plan at any time (independent of WSP or SWSMP update).

Provide information regarding PWS's specific CCC Program Elements

Program Element Number	Description of Element [See WAC 246-290-490(3)]	This Program Element is: Included in Written Program Plan	This Program Element is: Being Implemented or Is Completed
1	**Legal Authority Established**	◉ Yes ○ No	◉ Yes ○ No
2	**Hazard Evaluation Procedures and Schedules**	◉ Yes ○ No	◉ Yes ○ No
3	**Procedures/Schedules for Ensuring Installation of Backflow Preventers**	◉ Yes ○ No	◉ Yes ○ No
4	**Certified CCS Provided**	◉ Yes ○ No	◉ Yes ○ No
5	**Backflow Preventer Inspection and Testing**	◉ Yes ○ No	◉ Yes ○ No
6	**Assembly Testing Quality Assurance/Quality Control (QA/QC) Program**	◉ Yes ○ No	◉ Yes ○ No
7	**Backflow Incident Response Procedures**	◉ Yes ○ No	◉ Yes ○ No
8	**Public Education Program**	◉ Yes ○ No	◉ Yes ○ No
9	**CCC Records**	◉ Yes ○ No	◉ Yes ○ No
10	**Reclaimed Water Permit**	○ Yes ○ No ◉ N/A	○ Yes ○ No ◉ N/A

Part 3A: PWS Characteristics at End of 2024

Enter the number of connections (new and existing) served by the PWS by type.

Type of Service Connection	Number
Residential (As defined by PWS)	10151
All Other (include dedicated fire lines, dedicated irrigation lines, and PWS-owned facilities such as water and wastewater treatment plants and pumping stations, parks, piers, and docks)	308
Total Number of Connections	10459

Part 3B: Cross-Connection Control for Severe and High-Hazard Premises and High-Hazard Dedicated Lines Served by the PWS

Answer the following questions carefully. These answers control your access to pages 2 and 3 for data entry.

1. Does your PWS serve any severe or high-hazard premises or any high-hazard dedicated fire or irrigation lines? ◉ Yes ○ No

2. Does PWS serve any high-hazard medical premises? ◉ Yes ○ No

- If you answer Yes to both questions, you must enter data in at least one row on page 2 and one row on page 3.
- If you answer Yes to Question 1 and No to Question 2, you must enter data on page 2 only.
- If you answer No to both questions, pages 2 and 3 will be grayed out to prevent data entry.

- Count only premises PWS serves water to.
- Report data as accurately as possible. **DOH currently bases CCC compliance actions on this information.**

Type of Severe or High-Hazard Premises or Dedicated Lines [WAC 246-290-490(4)(b)]	Number of Connections at end of 2024			
	A. Being Served Water by PWS[1]	B. With Premises Isolation by AG/RP[2]	C. With Column B AG Inspected or RP Tested[3]	D. Granted Exception from Premises Isolation
Agricultural (farms and dairies)				
Beverage bottling plants (including breweries)	1	1	1	0
Car washes	2	2	2	0
Chemical plants				
Commercial laundries and dry cleaners	2	2	2	0
Both reclaimed water and potable water provided				
Film processing facilities				
Dedicated fire lines with chemical addition or using unapproved auxiliary supplies				
Food processing plants (including canneries, slaughter houses, rendering plants)				
Hospitals, medical centers, medical, dental and veterinary clinics, mortuaries, nursing homes, etc., reported on Part 3C page 3 (totals imported from page 3)	16	11	11	0
Dedicated irrigation systems using purveyor's water supply and chemical addition[4]				
Laboratories	0	0	0	0
Metal plating industries				
Petroleum processing or storage plants	4	4	4	0
Piers and docks				
Radioactive material processing plants or nuclear reactors				
Survey access denied or restricted				
Wastewater lift/pump stations (non-residential only)	9	9	9	0
Wastewater treatment plants	1	1	1	
Unapproved auxiliary water supply interconnected with potable water supply				
Totals	35	30	30	0

[1] Count multiple connections or parallel installations to the same premises as **separate** connections.

[2] Count only connections with premises isolation AGs or RPs. Don't include connections with in-premises preventers only or connections with DCVAs or DCDAs installed for premises isolation. The number in Column B can't be larger than the number in Column A in the same row.

[3] Count only connections whose premises isolation preventers were inspected (AGs) or tested (RPs) during the reporting year.

[4] For example, dedicated irrigation lines to parks, playgrounds, golf courses, cemeteries, estates, etc.

[5] Premises with hazardous materials or processes (requiring isolation by AG or RP), such as aircraft and automotive manufacturers, pulp and paper mills, metal manufacturers, military bases, and wholesale customers that pose a high hazard to the PWS. May be grouped together in categories, for example:"Other manufacturing" or "Other commercial".

Part 3C: Cross-Connection Control for High-Hazard Medical Premises Served by the PWS

- Count only medical premises PWS serves water to.
- Don't count the same premises more than once. If you serve different medical category premises through a single connection, count the connection under the medical category you consider to pose the highest hazard to PWS.
- Report data as accurately as possible. **DOH currently bases CCC compliance actions on this information**

Type of High-Hazard Medical Premises [WAC 246-290-490(4)(b)]	Number of Connections at end of 2024			
	A. Being Served Water by PWS[1]	B. With Premises Isolation by AG/RP[2]	C. With Column B AG Inspected or RP Tested[3]	D. Granted Exception from Premises Isolation
Hospitals				
Hospitals (include psychiatric hospitals and alcohol and drug treatment centers)				
Facilities for Treatment and Care of Patients Not Located in Hospitals Counted Above				
Same day surgery centers				
Out-patient clinics and offices				
Alternative health out-patient clinics and offices				
Psychiatric out-patient clinics and offices				
Chiropractors with water-connected X-ray equipment	0	0	0	0
Hospice care centers				
Childbirth centers				
Kidney dialysis centers	1	1	1	0
Blood centers				
Dental clinics and offices	6	4	4	0
Facilities for Housing Patients				
Nursing homes	1	1	1	0
Assisted Living Facilities (formerly Boarding Homes)	5	2	2	0
Residential treatment centers				
Other Medical-Related Facilities				
Mortuaries with embalming equipment	2	2	2	0
Morgues and autopsy facilities (not in hospitals)				
Veterinarian offices, clinics and hospitals	1	1	1	0
Totals	16	11	11	0

[1] Count multiple connections or parallel installations to the same premises as **separate** connections.

[2] Count only connections with premises isolation AGs or RPs. Don't include connections with in-premises preventers only or connections with DCVAs or DCDAs installed for premises isolation. The number in Column B can't be larger than the number in Column A in the same row.

[3] Count only connections with premises isolation AGs or RPs. Don't include connections with in-premises backflow preventers only or connections with premises isolation DCVAs or DCDAs isolation.

Part 4A: Backflow Preventer Inventory and Testing Information for 2024

- Complete all fields. Enter **zero (0)**, if no backflow preventers in a specific category.
- Count only backflow preventers relied on to protect the PWS.
- Count AVBs on *irrigation systems only*. Select No to AVB question above Table 2 if PWS doesn't track AVBs.
- Count multiple tests (or failures) for the same backflow preventer as one test (or failure) for that backflow preventer.
- For multiple service connections or parallel installations, count each assembly separately.
- Count RPDAs and DCDAs as ***single*** assemblies. Count the tests of the mainline assembly and bypass assembly as ***one test***. Count the failure of either the mainline or bypass assembly (or the failure of both) as ***one failure***. Count an entire detector assembly taken out of service as ***one assembly removed from service***.
- Count assemblies installed on dedicated fire or irrigation lines as **Premises Isolation Assemblies** in Table 1.

	Backflow Preventer Category and Inspection/Testing Information	Air Gap	RPBA	RPDA	DCVA	DCDA	PVBA	SVBA	AVB
Table 1: Premises Isolation Preventers (include preventers isolating PWS-owned facilities)									
Existing Premises Isolation Backflow Preventers									
1	In service at beginning of 2024	0	29	0	1962	22			
2	Inspected and/or tested in 2024[1]	0	19	0	1533	15			
3	Failed inspection or test in 2024	0	4	0	32	1			
New Premises Isolation Backflow Preventers									
4	Installed in 2024[2]	0	2	0	4	0			
5	Inspected and/or tested in 2024[1]	0	2	0	4	0			
6	Failed inspection or test in 2024	0	0	0	0	0			
Premises Isolation Backflow Preventers (existing or new)									
7	Removed from service in 2024[3]	0	0	0	2	0			
Total Premises Isolation Preventers at End of 2024		0	31	0	1964	22	0	0	0
	Does PWS track AVBs on irrigation systems? ○ Yes ◉ No								
Table 2: In-Premises Preventers (include preventers within PWS-owned facilities)									
Existing In-Premises Backflow Preventers									
8	In service at beginning of 2024	0	164	3	2194	28	22	0	unk
9	Inspected and/or tested in 2024[1]	0	101	2	1526	20	13	0	unk
10	Failed inspection or test in 2024	0	24	1	39	1	0	0	unk
New In-Premises Backflow Preventers									
11	Installed in 2024[2]	0	3	0	130	2	0	0	unk
12	Inspected and/or tested in 2024[1]	0	3	0	130	2	0	0	unk
13	Failed inspection or test in 2024	0	0	0	1	0	0	0	unk
In-Premises Backflow Preventers (existing or new)									
14	Removed from service in 2024[3]	0	0	0	8	0	0	0	unk
Total In-Premises Preventers at End of 2024[4]		0	167	3	2316	30	22	0	0
Grand Totals at End of 2024		0	198	3	4280	52	22	0	0

[1] Initial and/or routine annual inspection (for proper installation and approval status) and/or test (for testable assemblies only, using DOH-approved USC field test procedures).

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Part 4B: Other Implementation Activities in 2024

Complete all cells. Enter zero if not applicable.

Water Use Questionnaires	
Did your PWS send any water use questionnaires to customers during 2024?	○ Yes ◉ No

On-site Hazard Surveys			
Did your CCS conduct any on-site hazard surveys during 2024?			◉ Yes ○ No
	Service Connection Type		
	New	**Existing**	**Total**
1. Number of connections surveyed for cross-connection hazards to PWS.	5	12	17
2. Number of connections requiring backflow prevention to protect PWS.[1,2]	5	12	17

New Exceptions to Premises Isolation	
Did your CCS grant any new premises isolation exceptions in 2024 to high-hazard premises?[3]	◉ Yes ○ No Number 2

CCC Enforcement Actions	
Did your PWS take any enforcement actions during 2024?[4]	○ Yes ◉ No

[1] Include services where either premises isolation or in-premises preventers were required to protect the PWS.
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Part 5: Backflow Incidents and "Off-Normal" Events in 2024

	Backflow Incidents, Risk Factors, and Indicators during 2024	Number
Backflow Incidents during 2024		
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Risk Factors for Backflow during 2024		
3	Distribution main breaks per 100 miles of pipe.	7.00
4	Low pressure events (<20 psi in PWS distribution system).	0
5	Water outage events.	0
Indicators of Possible Backflow during 2024		
6	Total health-related complaints received by PWS.[6]	0
7	Received during BWA or PN events.[7]	0
8	Received during low pressure or water outage events.	0
9	Total aesthetic complaints (color, taste, odor, air in lines, etc.).	8
10	Received during BWA or PN events.[7]	0
11	Number of these complaints received during low pressure or water outage events.	0

[5] Purveyors must submit a Backflow Incident Report form for each backflow incident known to have contaminated the public water system. DOH is also interested in receiving incident report forms for backflow incidents that contaminated the customer's drinking water system only.
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I, [Certified by] , certify that the information in this form is true, complete and accurate to the best of my knowledge.

Last Saved	03/28/2025	**All ASR Forms Certified/Submitted**	

Designated CCS/CCC Program Manager[1]					
Name	Nick Mettler	**Title**	Cross Connection Control Specialist	**CCS Cert #**	16006
Email Address	nmettler@cityofcamas.us	**Phone**	360-833-3188	**Phone Ext**	

PWS Manager[2]					
Name	Allen Nelson	**Title**	Water Supply Operator	**Operator Cert #**	8187
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APPENDIX L

EXAMPLE BACKFLOW BROCHURE

WHAT IS A BACKFLOW ASSEMBLY TESTER (BAT)?

A person who has shown competence to test and maintain backflow prevention assemblies and who is certified in accordance with Washington State. Also referred to as Certified or Licensed BAT. The City of Camas makes no representation regarding the abilities, performance, or quality of service of the testers listed below.

ANNUAL REMINDER NOTICES ARE SENT BY THE PUBLIC WORKS DEPARTMENT AND TEST RESULTS MUST BE RETURNED TO THE CITY (WAC 246-290-490).

Submit test reports to backflow@cityofcamas.us

Learn more

Washington Administrative Code: Chapter 246-290
Camas Municipal Code: Chapter 13.32

BACKFLOW CONTACTS

1620 SE 8th Ave, Camas, WA 98607
Tel: 360-817-1569

Email: backflow@cityofcamas.us
Website: www.cityofcamas.us/pwwater

City of Camas WASHINGTON

BACKFLOW

& Cross Connection

WHAT IS BACKFLOW?

Backflow may occur due to either "backsiphonage" or "backpressure", in which the flow of water reverses from the normal direction of flow in a piping system. When water or other substances flow in the opposite direction than intended, this allows contaminants to enter the public water system or consumer's plumbing causing a backflow incident.

WHAT IS A BACKFLOW INCIDENT?

A backflow incident occurs anytime there is a water reversal in the drinking water supply (under backflow conditions) via unprotected cross connections. Backflow incidents may cause injury, illness, or death.

WHAT IS CROSS CONNECTION?

A cross connection is any actual or potential physical connection between a "potable water" line and any pipe, vessel, or machine containing a non potable fluid, solid or gas, allowing possible entry to the water system by backflow. This would include, but is not limited to, sewers, drains, conduits, pools, storage reservoirs, plumbing fixtures, or any other device. The non-potable or unapproved water supply system may contain contaminated liquids, solids, or gases, of unknown or unsafe quality. Bypass arrangements such as jumper connections, removable sections, swivel or changeover devices are considered to be a cross connection.

WHAT ARE BACKFLOW PREVENTION ASSEMBLIES?

Backflow Prevention Assemblies are installed on water service lines (or at plumbing fixtures) to prevent backflow of contaminants into drinking water through cross connections. Improper installation or failure to meet testing requirements are grounds for termination of water service. The three basic approved types of assemblies that follow are required to be installed per City of Camas standards and must be tested by a Washington State Certified Backflow Assembly Tester upon installation and yearly thereafter.

REDUCED PRESSURE BACKFLOW ASSEMBLIES (RPBA)

An RPBA is a mechanical backflow preventer that consists of two independently acting, spring-loaded check valves with a mechanically independent, hydraulically operated, spring-loaded pressure differential relief valve between the check valves and below the first check valve.
This assembly is designed to protect against low to high health hazards.

DOUBLE CHECK VALVE ASSEMBLIES (DCVA)

A DCVA is a mechanical backflow preventer that consists of two independently acting, spring-loaded check valves. This assembly should only be used to protect against low health hazards.

PRESSURE VACUUM BREAKER ASSEMBLIES (PVBA)

A PVBA is a mechanical backflow preventer that consists of an independently acting, spring-loaded check valve and an independently acting, spring-loaded, air inlet valve on the discharge side of the check valve. This assembly is designed to protect against a low health hazards under backsiphonage only.

WITHOUT PROPER BACKFLOW PROTECTION, YOUR IRRIGATION SYSTEM COULD ENDANGER THE HEALTH OF YOUR FAMILY, NEIGHBORS, AND OTHERS IN THE COMMUNITY WHO ARE USING THE PUBLIC WATER SYSTEM.

NOTE: Atmospheric Vacuum Breaker's (AVB) are not allowed in the City of Camas.

APPENDIX M

2023 CLARK COUNTY VACANT BUILDABLE LANDS MODEL

VBLM 2023
(LandUseAlternative2)

Capacity and Yield by Jurisdiction

Jurisdiction Label	Housing Units	(%)	Jobs	(%)	Gross Acres	(%)	Buildable Acres	(%)
Battle Ground	6,603	*4.3%*	7,571	*10.2%*	3,307	*11.4%*	1,422	*11.9%*
Camas	5,553	*3.6%*	16,201	*21.9%*	3,278	*11.3%*	1,559	*13.0%*
La Center	2,301	*1.5%*	3,011	*4.1%*	1,058	*3.7%*	479	*4.0%*
Ridgefield	11,810	*7.7%*	7,513	*10.1%*	3,434	*11.9%*	1,520	*12.7%*
Vancouver (City)	61,602	*40.1%*	21,691	*29.3%*	6,753	*23.4%*	2,367	*19.8%*
Vancouver UGA (Clark County)	58,009	*37.8%*	15,823	*21.4%*	8,932	*30.9%*	3,718	*31.1%*
Washougal	7,349	*4.8%*	1,887	*2.5%*	1,846	*6.4%*	770	*6.4%*
Woodland	101	*0.1%*			95	*0.3%*	23	*0.2%*
Yacolt	268	*0.2%*	307	*0.4%*	206	*0.7%*	103	*0.9%*
Total	153,595	*100.0%*	74,004	*100.0%*	28,909	*100.0%*	11,961	*100.0%*

Capacity by Housing Type

Jurisdiction Label	High Density Residential Housing Units	(%)	Low Density Residential Housing Units	(%)
Battle Ground	2,840	*43.0%*	3,763	*57.0%*
Camas	3,444	*62.0%*	2,109	*38.0%*
La Center	1,178	*51.2%*	1,124	*48.8%*
Ridgefield	8,516	*72.1%*	3,293	*27.9%*
Vancouver (City)	55,676	*90.4%*	5,926	*9.6%*
Vancouver UGA (Clark County)	26,845	*46.3%*	31,164	*53.7%*
Washougal	2,412	*32.8%*	4,937	*67.2%*
Woodland			101	*100.0%*
Yacolt	0	*0.0%*	268	*100.0%*
Total	100,911	*65.7%*	52,684	*34.3%*

Notes:
• Yield estimate for the Town of Yacolt is dependent on development of sewer infrastructure.
• Yield estimate for the City of Woodland is exclusively residential housing units (there is neither commercial nor industrial zoning in the Clark County portion of the city).

CLARK COUNTY WASHINGTON
COMMUNITY PLANNING

CLARK COUNTY WASHINGTON
GEOGRAPHIC INFORMATION SERVICES

VBLM Tools Version: 2023-3.0.1-beta

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VBLM 2023
(LandUseAlternative2)

Capacity and Yield by Zoning: City, UGA

	Housing Units	(%)	Jobs	(%)	Gross Acres	(%)	Buildable Acres	(%)
Battle Ground	6,603	4.3%	7,571	10.2%	3,307	11.4%	1,422	11.9%
Incorporated City	5,391	3.5%	5,375	7.3%	2,256	7.8%	986	8.3%
Unincorporated UGA	1,212	0.8%	2,196	3.0%	1,050	3.6%	436	3.6%
Camas	5,553	3.6%	16,201	21.9%	3,278	11.3%	1,559	13.0%
Incorporated City	4,676	3.0%	13,821	18.7%	2,795	9.7%	1,309	10.9%
Unincorporated UGA	877	0.6%	2,379	3.2%	482	1.7%	251	2.1%
La Center	2,301	1.5%	3,011	4.1%	1,058	3.7%	479	4.0%
Incorporated City	2,144	1.4%	2,088	2.8%	828	2.9%	383	3.2%
Unincorporated UGA	157	0.1%	923	1.3%	230	0.8%	96	0.8%
Ridgefield	11,810	7.7%	7,513	10.2%	3,434	11.9%	1,520	12.7%
Incorporated City	5,748	3.7%	5,935	8.0%	2,353	8.1%	1,067	8.9%
Unincorporated UGA	6,062	4.0%	1,578	2.1%	1,081	3.7%	453	3.8%
Vancouver (City)	61,602	40.1%	21,691	29.3%	6,753	23.4%	2,367	19.8%
Incorporated City	61,602	40.1%	21,691	29.3%	6,753	23.4%	2,367	19.8%
Vancouver UGA (Clark County)	58,009	37.8%	15,823	21.4%	8,932	30.9%	3,718	31.1%
Unincorporated UGA	58,009	37.8%	15,823	21.4%	8,932	30.9%	3,718	31.1%
Washougal	7,349	4.8%	1,887	2.6%	1,846	6.4%	770	6.4%
Incorporated City	4,912	3.2%	1,378	1.9%	1,032	3.6%	416	3.5%
Unincorporated UGA	2,437	1.6%	509	0.7%	814	2.8%	354	3.0%
Woodland	101	0.1%	0	0.0%	95	0.3%	23	0.2%
Incorporated City	9	0.0%			5	0.0%	1	0.0%
Unincorporated UGA	91	0.1%			90	0.3%	22	0.2%
Yacolt	268	0.2%	307	0.4%	206	0.7%	103	0.9%
Incorporated City	130	0.1%	163	0.2%	98	0.3%	47	0.4%
Unincorporated UGA	138	0.1%	145	0.2%	108	0.4%	56	0.5%

Battle Ground (City)

	Gross	Constrained	Market	Infrastructure	Buildable	Housing Units	Jobs
	Acres of Land						
Residential							
Residential 3 units/acre (R3)	174	58	30	27	59	194	0
Redevelopment	10	3	7	0	0	1	
Underutilized	85	25	18	13	29	87	
Vacant	79	30	5	14	30	106	
Residential 5 units/acre (R5)	358	98	54	65	141	959	0
Redevelopment	12	4	8	0	0	2	
Underutilized	135	30	32	23	51	253	
Vacant	211	64	15	41	90	704	
Residential 7 units/acre (R7)	593	191	72	104	226	1,617	0
Redevelopment	21	8	12	0	1	4	
Underutilized	170	61	33	24	52	364	
Vacant	402	121	28	80	173	1,248	
Residential 10 units/acre (R10)	321	73	44	64	139	1,393	0
Redevelopment	9	1	7	0	1	8	
Underutilized	98	32	20	15	32	318	
Vacant	214	41	17	49	107	1,067	
Residential 12 units/acre (R12)	108	33	20	17	38	457	0
Redevelopment	7	1	5	0	1	7	
Underutilized	53	14	12	9	19	223	
Vacant	48	18	3	9	19	228	
Residential 16 units/acre (R16)	92	17	10	20	45	712	0
Redevelopment	1	0	1	0	0	2	
Underutilized	12	2	3	2	4	70	
Vacant	79	14	6	18	40	640	
Residential 20 units/acre (R20)	10	4	2	1	3	59	0
Redevelopment	2	1	1	0	0	2	
Underutilized	5	2	1	1	1	25	
Vacant	4	1	0	1	2	32	
Residential Subtotal	1,655	474	232	298	651	5,391	0
Commercial							
Community Center (CC)	0	0	0	0	0	0	3
Underutilized	0	0	0	0	0	0	3
Downtown (D)	16	3	0	3	10	0	194
Underutilized	12	2	0	2	7	0	141
Vacant	4	1	0	1	3	0	53
Regional Center (RC)	318	45	0	68	204	0	4,087
Underutilized	318	45	0	68	204	0	4,087
Commercial Subtotal	334	48	0	71	214	0	4,284
Industrial							

Battle Ground (City)

	Gross	Constrained	Market	Infrastructure	Buildable	Housing Units	Jobs
	Acres of Land						
Industrial							
Light Industrial (ML)	197	85	0	28	85	0	761
Underutilized	189	81	0	27	81	0	732
Vacant	8	4	0	1	3	0	29
Westside Employment (WE)	70	21	0	12	37	0	330
Underutilized	70	21	0	12	37	0	330
Industrial Subtotal	267	106	0	40	121	0	1,091
Total	2,256	628	232	410	**986**	**5,391**	**5,375**

Camas (City)

	Gross	Constrained	Market	Infrastructure	Buildable	Housing Units	Jobs
	Acres of Land						
Residential							
North Shore Higher Density Residential (HD-NS)	106	35	14	18	39	707	0
Underutilized	57	23	10	7	16	289	
Vacant	49	12	4	11	23	418	
North Shore Lower Density Residential (LD-NS)	138	37	25	24	52	316	0
Redevelopment	13	0	12	0	1	4	
Underutilized	34	13	6	5	10	60	
Vacant	91	24	7	19	42	252	
Residential-6,000 (R-6)	22	8	3	3	7	54	0
Redevelopment	2	1	1	0	0	1	
Underutilized	5	2	1	1	1	10	
Vacant	15	5	1	3	6	43	
Residential-7,500 (R-7.5)	157	44	40	22	50	316	0
Redevelopment	38	11	25	0	1	8	
Underutilized	45	11	10	7	16	96	
Vacant	74	22	5	15	32	211	
Residential-10,000 (R-10)	232	69	27	43	93	486	0
Redevelopment	8	3	5	0	0	1	
Underutilized	51	19	10	7	15	62	
Vacant	173	47	13	36	78	423	
Residential-12 (R-12)	75	21	20	11	24	97	0
Redevelopment	17	4	13	0	1	3	
Underutilized	22	5	5	4	8	34	
Vacant	36	12	2	7	15	61	
Residential-15,000 (R-15)	391	132	104	48	108	331	0
Redevelopment	89	27	59	0	3	9	
Underutilized	192	66	38	28	61	182	
Vacant	110	39	7	20	44	140	
Multifamily Residential-10 (MF-10)	37	10	4	7	16	162	0
Redevelopment	2	1	1	0	0	1	
Underutilized	1	1	0	0	0	4	
Vacant	34	8	3	7	16	156	
Multifamily Residential-18 (MF-18)	43	13	7	7	16	286	0
Redevelopment	5	2	3	0	0	6	
Underutilized	9	2	2	1	3	56	
Vacant	29	9	2	6	12	224	
Multifamily Residential-24 (MF-24)	33	5	4	8	17	399	0
Underutilized	9	4	1	1	2	54	
Vacant	24	1	2	7	14	345	
Multifamily Residential-38 (MF-38)	6	0	2	1	3	113	0
Underutilized	6	0	2	1	3	113	
Single Family Residential (R1-6)	16	1	3	4	8	0	0
Underutilized	8	0	2	2	4	0	
Vacant	8	1	1	2	4	0	

Camas (City)

	Gross	Constrained	Market	Infrastructure	Buildable	Housing Units	Jobs
	Acres of Land						
Residential Subtotal	1,256	375	253	196	433	3,265	0
Commercial							
Community Commercial (CC)	63	10	0	13	40	0	804
Underutilized	63	10	0	13	40	0	801
Vacant	0	0	0	0	0	0	3
Downtown Commercial (DC)	8	1	0	2	5	0	109
Underutilized	8	1	0	2	5	0	109
Mixed Use (MX)	67	5	0	15	46	555	462
Underutilized	62	5	0	14	43	520	433
Vacant	5	1	0	1	3	35	29
Neighborhood Commercial (NC)	2	0	0	0	1	0	20
Underutilized	2	0	0	0	1	0	20
North Shore Commercial (C-NS)	46	6	0	10	30	0	595
Underutilized	46	6	0	10	30	0	595
North Shore Mixed Use (MX-NS)	103	8	0	24	71	856	713
Underutilized	103	8	0	24	71	856	713
Regional Commercial (RC)	319	43	0	69	206	0	4,127
Underutilized	279	38	0	60	181	0	3,621
Vacant	39	5	0	8	25	0	506
Mixed Employment (ME)	368	39	0	82	246	0	4,927
Underutilized	368	39	0	82	246	0	4,927
Commercial Subtotal	975	113	0	216	647	1,411	11,757
Industrial							
Business Park (BP)	19	2	0	4	13	0	116
Underutilized	19	2	0	4	13	0	116
Heavy Industrial (HI)	545	257	0	72	216	0	1,948
Underutilized	545	257	0	72	216	0	1,944
Vacant	1	0	0	0	0	0	4
Industrial Subtotal	564	259	0	76	229	0	2,064
Total	2,795	746	253	488	**1,309**	**4,676**	**13,821**

La Center (City)

	Gross	Constrained	Market	Infrastructure	Buildable	Housing Units	Jobs
	Acres of Land						
Residential							
Low Density Residential (LDR-7.5)	503	152	81	85	186	999	0
Redevelopment	9	3	6	0	0	2	
Underutilized	285	84	60	44	96	482	
Vacant	210	65	14	41	89	515	
Medium Density Residential (MDR-16)	91	20	13	18	39	527	0
Redevelopment	1	0	1	0	0	1	
Underutilized	35	6	9	7	14	170	
Vacant	55	14	4	12	25	356	
Residential Subtotal	595	172	94	103	225	1,525	0
Commercial							
Downtown Commercial (C-1)	2	0	0	0	1	0	22
Underutilized	1	0	0	0	1	0	19
Vacant	0	0	0	0	0	0	3
Mixed Use (MX)	27	2	0	6	19	179	74
Underutilized	27	2	0	6	19	179	74
Residential/Professional (RP)	12	2	0	2	7	48	30
Underutilized	10	1	0	2	6	41	26
Vacant	2	0	0	0	1	7	4
Junction Plan (JP)	193	19	0	44	131	392	1,961
Underutilized	170	18	0	38	114	342	1,712
Vacant	23	1	0	6	17	50	249
Commercial Subtotal	233	23	0	53	158	619	2,088
Total	828	195	94	156	**383**	**2,144**	**2,088**

Ridgefield (City)

	Gross	Constrained	Market	Infrastructure	Buildable	Housing Units	Jobs
	Acres of Land						
Residential							
Residential Medium Density - Mixed Use (RMD-MU)	36	11	5	6	13	0	0
Underutilized	22	7	4	3	7	0	
Vacant	14	4	1	3	6	0	
Residential Low Density - 4 (RLD-4)	711	233	109	116	254	1,531	0
Redevelopment	47	9	36	0	2	10	
Underutilized	214	72	43	31	68	368	
Vacant	450	152	30	85	184	1,152	
Residential Low Density - 6 (RLD-6)	201	68	32	31	69	659	0
Redevelopment	24	7	16	0	1	6	
Underutilized	37	13	7	5	12	83	
Vacant	141	49	9	26	57	570	
Residential Low Density - 8 (RLD-8)	80	17	11	16	36	340	0
Redevelopment	5	0	4	0	0	2	
Underutilized	6	2	1	1	2	17	
Vacant	68	14	5	15	33	321	
Residential Medium Density (RMD-16)	46	9	5	10	22	475	0
Redevelopment	2	0	1	0	0	2	
Underutilized	3	1	0	0	1	13	
Vacant	42	7	3	10	21	460	
Single Family Residential (R1-6)	144	30	24	28	62	0	0
Redevelopment	1	0	1	0	0	0	
Underutilized	74	14	18	13	29	0	
Vacant	69	16	5	15	33	0	
Single Family Residential (R1-7.5)	128	41	25	20	43	0	0
Redevelopment	2	0	2	0	0	0	
Underutilized	102	30	22	16	35	0	
Vacant	24	11	1	4	8	0	
Single Family Residential (R1-10)	39	18	5	5	11	0	0
Underutilized	22	10	4	3	6	0	
Vacant	17	8	1	2	5	0	
Residential Subtotal	1,385	427	216	233	510	3,005	0
Commercial							
Commercial Community Business (CCB)	20	1	0	5	14	0	285
Underutilized	20	1	0	5	14	0	285
Commercial Neighborhood Business (CNB)	14	2	0	3	9	0	185
Underutilized	14	2	0	3	9	0	185
Commercial Regional Business (CRB)	123	11	0	28	84	0	1,678
Underutilized	123	11	0	28	84	0	1,678
Central Mixed Use – High Density (CMU-H)	3	0	0	1	2	39	18
Underutilized	3	0	0	1	2	38	18

Ridgefield (City)

	Gross	Constrained	Market	Infrastructure	Buildable	Housing Units	Jobs
	Acres of Land						
Commercial							
Central Mixed Use – High Density (CMU-H)	3	0	0	1	2	39	18
Vacant	0	0	0	0	0	1	1
Commercial Community Business - Mixed Use (CCB-	34	3	0	8	23	390	186
Underutilized	30	3	0	7	20	339	161
Vacant	4	0	0	1	3	51	25
Commercial Regional Business - Mixed Use (CRB-	138	16	0	30	91	1,536	731
Underutilized	133	15	0	29	88	1,481	705
Vacant	5	1	0	1	3	55	26
Waterfront Mixed Use (WMU)	4	1	0	1	3	36	20
Underutilized	4	1	0	1	3	36	20
Waterfront Mixed Use – High Density (WMU-H)	35	6	0	7	22	368	175
Underutilized	35	6	0	7	22	368	175
Commercial Subtotal	372	40	0	83	249	2,369	3,279
Industrial							
Employment (E)	493	153	0	85	255	0	2,296
Underutilized	461	145	0	79	237	0	2,135
Vacant	32	8	0	6	18	0	161
Employment – Mixed Use (E-MU)	103	31	0	18	53	374	361
Underutilized	101	31	0	17	52	365	352
Vacant	2	0	0	0	1	9	9
Industrial Subtotal	596	184	0	103	308	374	2,656
Total	2,353	651	216	419	**1,067**	**5,748**	**5,935**

Vancouver (City)

	Gross	Constrained	Market	Infrastructure	Buildable	Housing Units	Jobs
	Acres of Land						
Residential							
Medium Scale Neighborhood (MSN)	505	84	155	40	225	10,650	43
Redevelopment	118	8	99	0	11	514	
Underutilized	144	17	38	14	75	3,560	43
Vacant	244	60	18	26	139	6,577	
Low Scale Neighborhood (LSN)	1,328	262	591	142	333	5,926	0
Redevelopment	593	97	471	0	25	434	
Underutilized	400	89	94	69	149	2,616	
Vacant	334	76	26	73	159	2,876	
Residential Subtotal	1,833	346	746	182	558	16,575	43
Commercial							
Regional Activity Center - City Center (RAC-CX)	978	49	568	44	316	23,397	4,605
Redevelopment	594	20	568	0	6	437	86
Underutilized	374	28	0	43	302	22,432	4,415
Vacant	10	1	0	1	8	528	104
Institutional/Campus (IC)	123	0	103	2	19	134	374
Redevelopment	108	0	103	0	5	39	108
Underutilized	15	0	0	2	13	95	265
Mixed-Use (MU)	2,031	55	1,296	76	603	20,429	8,833
Redevelopment	1,382	18	1,296	0	68	2,315	1,023
Underutilized	628	37	0	74	517	17,487	7,533
Vacant	22	0	0	3	18	627	277
Commercial Subtotal	3,132	104	1,967	123	938	43,960	13,812
Industrial							
Heavy Industrial (IH)	1,037	391	0	162	485	0	4,366
Underutilized	1,013	381	0	158	474	0	4,265
Vacant	24	9	0	4	11	0	101
Industrial/Employment (IE)	751	237	0	129	386	1,066	3,470
Underutilized	722	236	0	121	364	1,008	3,280
Vacant	29	1	0	7	21	59	190
Industrial Subtotal	1,788	627	0	290	871	1,066	7,836
Total	6,753	1,078	2,713	595	2,367	61,602	21,691

Washougal (City)

	Gross	Constrained	Market	Infrastructure	Buildable	Housing Units	Jobs
	Acres of Land						
Residential							
Multiple-family Residential (AR-16)	9	5	0	1	3	84	0
Redevelopment	0	0	0	0	0	0	
Vacant	9	5	0	1	3	84	
Multiple-family Residential (AR-22)	6	2	2	1	2	36	0
Redevelopment	2	1	2	0	0	4	
Underutilized	1	0	0	0	0	9	
Vacant	2	1	0	0	1	23	
Single-family Residential (R1-5)	51	11	13	9	19	406	0
Redevelopment	10	1	9	0	0	9	
Underutilized	8	2	2	1	3	49	
Vacant	34	8	3	7	16	349	
Single-family Residential (R1-7.5)	312	89	70	48	106	1,328	0
Redevelopment	60	14	43	0	2	27	
Underutilized	65	22	13	10	21	249	
Vacant	187	53	13	38	83	1,052	
Single-family Residential (R1-10)	105	28	26	16	35	311	0
Redevelopment	23	8	14	0	1	6	
Underutilized	41	12	9	6	14	113	
Vacant	41	9	3	9	20	193	
Single-family Residential (R1-15)	288	92	47	47	103	578	0
Redevelopment	34	12	21	0	1	6	
Underutilized	62	21	12	9	20	98	
Vacant	191	58	13	38	82	474	
Single Family Residential (R1-7.5)	8	4	0	1	3	0	0
Vacant	8	4	0	1	3	0	
Single Family Residential (R1-10)	1	0	1	0	0	0	0
Redevelopment	1	0	1	0	0	0	
Residential Subtotal	780	229	159	122	270	2,745	0
Commercial							
Community Commercial (CC)	16	1	0	4	12	173	116
Underutilized	15	1	0	4	11	160	107
Vacant	1	0	0	0	1	14	9
Convenience Commercial (CV)	0	0	0	0	0	4	3
Underutilized	0	0	0	0	0	4	3
Highway Commercial (CH)	45	5	0	10	30	1,185	356
Underutilized	43	5	0	10	29	1,170	346
Vacant	1	0	0	0	1	15	10
Town Center Core (TC-C)	14	2	0	3	9	170	76
Underutilized	2	0	0	1	2	28	12
Vacant	12	2	0	2	7	142	63

Washougal (City)

	Gross	Constrained	Market	Infrastructure	Buildable	Housing Units	Jobs
	Acres of Land						
Commercial							
Town Center East Village (TC-EV)	53	8	0	11	34	620	276
Underutilized	53	8	0	11	34	620	276
Town Center West Village (TC-WV)	2	0	0	0	1	15	10
Underutilized	2	0	0	0	1	15	10
Commercial Subtotal	131	16	0	29	86	2,167	835
Industrial							
Heavy Industrial (HI)	121	44	0	14	60	0	543
Underutilized	119	43	0	13	59	0	535
Vacant	2	1	0	0	1	0	7
Industrial Subtotal	121	44	0	14	60	0	543
Total	1,032	289	159	164	**416**	**4,912**	**1,378**

Woodland (City)

	Gross	Constrained	Market	Infrastructure	Buildable	Housing Units	Jobs
	Acres of Land						
Residential							
Low Density Residential (LDR-6)	5	3	1	1	1	9	0
Underutilized	5	3	1	1	1	9	
Vacant	0	0	0	0	0	1	
Residential Subtotal	5	3	1	1	1	9	0
Total	5	3	1	1	**1**	**9**	**0**

Yacolt (Town)

	Gross	Constrained	Market	Infrastructure	Buildable	Housing Units	Jobs
	Acres of Land						
Residential							
Single-family Residential (R1-10)	9	1	2	2	4	18	0
Redevelopment	2	0	2	0	0	0	
Vacant	7	0	1	2	4	18	
Single-family Residential (R1-12.5)	73	14	13	14	31	112	0
Redevelopment	10	3	7	0	0	1	
Underutilized	6	2	1	1	2	7	
Vacant	56	9	5	13	29	104	
Residential Subtotal	81	14	15	16	36	130	0
Commercial							
Community Commercial (C2)	5	0	0	1	3	0	69
Underutilized	4	0	0	1	3	0	58
Vacant	1	0	0	0	1	0	11
Neighborhood Commercial (C1)	2	0	0	1	2	0	35
Underutilized	2	0	0	1	2	0	35
Commercial Subtotal	7	0	0	2	5	0	104
Industrial							
Light Industrial (ML)	10	1	0	2	7	0	59
Underutilized	10	1	0	2	7	0	59
Industrial Subtotal	10	1	0	2	7	0	59
Total	98	15	15	20	**47**	**130**	**163**

Unincorporated UGA

Residential

	Gross	Constrained	Market	nfrastructure	uildable	Housing Units	Jobs
	Acres of Land						
Battle Ground (Unincorporated UGA)	**729**	**167**	**198**	**113**	**251**	**1,212**	**0**
Residential 3 units/acre (R3)	430	93	135	63	140	419	0
Redevelopment	81	22	57	0	3	9	
Underutilized	317	65	75	55	121	362	
Vacant	32	6	3	7	16	48	
Residential 5 units/acre (R5)	90	25	20	14	31	155	0
Redevelopment	1	0	0	0	0	0	
Underutilized	87	24	19	14	30	152	
Vacant	1	0	0	0	1	3	
Residential 7 units/acre (R7)	148	39	21	28	60	421	0
Redevelopment	1	0	0	0	0	0	
Underutilized	67	17	15	11	24	170	
Vacant	80	22	6	16	36	250	
Residential 10 units/acre (R10)	56	10	22	7	17	172	0
Redevelopment	16	2	13	0	1	14	
Underutilized	36	7	8	6	14	136	
Vacant	4	1	0	1	2	22	
Residential 16 units/acre (R16)	5	0	0	1	3	46	0
Vacant	5	0	0	1	3	46	
Camas (Unincorporated UGA)	**312**	**54**	**68**	**60**	**130**	**844**	**0**
North Shore Higher Density Residential (HD-NS)	30	0	6	8	17	299	0
Redevelopment	1	0	1	0	0	1	
Underutilized	12	0	4	3	6	101	
Vacant	18	0	2	5	11	197	
North Shore Lower Density Residential (LD-NS)	23	2	5	5	11	67	0
Redevelopment	1	0	1	0	0	0	
Underutilized	11	2	3	2	4	26	
Vacant	11	0	1	3	7	41	
Residential-10,000 (R-10)	44	5	12	9	19	75	0
Redevelopment	1	0	1	0	0	0	
Underutilized	41	5	11	8	17	68	
Vacant	3	0	0	1	2	6	
Residential-12 (R-12)	88	20	14	17	38	150	0
Redevelopment	3	0	2	0	0	1	
Underutilized	33	9	7	5	12	46	
Vacant	52	10	4	12	26	104	
Multifamily Residential-10 (MF-10)	10	0	4	1	3	35	0
Redevelopment	3	0	2	0	0	2	
Underutilized	7	0	2	1	3	32	
Single Family Residential (R1-6)	116	26	28	20	43	218	0
Redevelopment	6	0	5	0	0	1	
Underutilized	94	22	21	16	34	175	
Vacant	17	4	1	4	8	41	

Unincorporated UGA

Residential

	Gross	Constrained	Market	nfrastructure	uildable	Housing Units	Jobs
	Acres of Land						
La Center (Unincorporated UGA)	**125**	**46**	**24**	**17**	**38**	**157**	**0**
Residential (R-12)	12	3	3	2	4	32	0
Underutilized	12	3	3	2	4	32	
Single Family Residential (R1-6)	29	10	6	4	9	33	0
Underutilized	29	10	6	4	9	33	
Single Family Residential (R1-7.5)	52	20	10	7	15	57	0
Underutilized	52	20	10	7	15	57	
Vacant	0	0	0	0	0	0	
Single Family Residential (R1-10)	3	1	1	1	1	5	0
Underutilized	3	1	1	1	1	5	
Single Family Residential (R1-20)	30	13	5	4	8	30	0
Underutilized	30	13	5	4	8	30	
Ridgefield (Unincorporated UGA)	**748**	**218**	**149**	**120**	**261**	**3,654**	**208**
Residential Medium Density - Mixed Use (RMD-MU)	281	80	49	48	104	2,622	208
Underutilized	213	67	44	32	70	1,768	140
Vacant	68	13	6	16	34	854	68
Residential Medium Density - MU, PF (RMD-MU-PF)	14	3	3	2	5	110	0
Underutilized	13	3	3	2	5	99	0
Vacant	1	0	0	0	1	12	0
Residential Low Density - 6 (RLD-6)	65	28	11	8	18	129	0
Redevelopment	1	0	0	0	0	0	
Underutilized	57	24	10	7	16	114	
Vacant	6	3	0	1	2	15	
Residential (R-12)	37	14	6	6	12	158	0
Underutilized	27	9	5	4	9	114	
Vacant	10	4	1	2	3	44	
Single Family Residential (R1-6)	120	30	22	21	46	242	0
Underutilized	85	20	20	14	31	162	
Vacant	35	11	2	7	15	79	
Single Family Residential (R1-7.5)	123	34	27	19	42	220	0
Redevelopment	1	0	1	0	0	0	
Underutilized	120	33	26	19	42	216	
Vacant	2	1	0	0	1	4	
Single Family Residential (R1-10)	108	29	32	15	33	173	0
Redevelopment	17	2	14	0	1	4	
Underutilized	78	23	16	12	26	136	
Vacant	13	3	1	3	6	33	
Vancouver (Unincorporated UGA)	**6,278**	**1,227**	**1,880**	**857**	**2,314**	**51,313**	**0**
Multifamily Residential (R-24)	609	136	133	53	288	6,518	0
Redevelopment	37	3	30	0	3	74	
Underutilized	368	75	88	32	173	3,799	

Unincorporated UGA

Residential

	Gross	Constrained	Market	nfrastructure	uildable	Housing Units	Jobs
	Acres of Land						
Vancouver (Unincorporated UGA)	**6,278**	**1,227**	**1,880**	**857**	**2,314**	**51,313**	**0**
Vacant	205	58	15	21	112	2,645	
Multifamily Residential (R-32)	409	76	102	35	195	5,317	0
Redevelopment	69	13	51	0	6	152	
Underutilized	137	20	35	13	69	1,875	
Vacant	202	44	16	22	120	3,290	
Multifamily Residential (R-40)	34	7	9	3	15	576	0
Redevelopment	8	0	7	0	1	28	
Underutilized	7	3	1	0	2	81	
Vacant	20	4	2	2	12	468	
Multifamily Residential (R-45)	166	17	38	17	94	4,030	0
Redevelopment	9	1	7	0	1	33	
Underutilized	100	14	26	10	51	2,185	
Vacant	57	2	6	8	42	1,812	
Multifamily Residential (R-50)	16	1	11	0	3	158	0
Redevelopment	12	1	10	0	1	56	
Underutilized	4	1	1	0	2	85	
Vacant	1	0	0	0	0	17	
Multifamily Residential (HWY99/MF)	27	7	7	2	11	1,114	0
Redevelopment	6	1	4	0	1	50	
Underutilized	6	2	1	0	2	224	
Vacant	15	4	1	2	8	840	
Office Residential (OR-24)	1	0	1	0	0	2	0
Redevelopment	1	0	1	0	0	2	
Office Residential (OR-32)	3	1	0	0	2	46	0
Vacant	3	1	0	0	2	46	
Office Residential (OR-40)	91	15	17	9	49	1,864	0
Redevelopment	1	0	1	0	0	3	
Underutilized	50	7	13	5	26	970	
Vacant	39	8	3	4	23	891	
Office Residential (OR-45)	24	8	2	2	12	525	0
Underutilized	3	1	1	0	1	59	
Vacant	21	7	1	2	11	466	
Single Family Residential (R1-5)	523	106	131	89	197	4,398	0
Redevelopment	71	8	60	0	3	69	
Underutilized	225	46	54	39	86	1,864	
Vacant	228	52	18	50	108	2,465	
Single Family Residential (R1-6)	1,706	225	636	260	585	13,083	0
Redevelopment	459	46	393	0	21	451	
Underutilized	795	114	204	150	326	7,113	
Vacant	452	65	39	110	239	5,519	
Single Family Residential (R1-7.5)	1,253	261	352	198	441	9,848	0
Redevelopment	230	30	190	0	10	218	
Underutilized	552	137	124	91	199	4,336	

Unincorporated UGA

Residential

	Gross	Constrained	Market	nfrastructure	uildable	Housing Units	Jobs
	Acres of Land						
Vancouver (Unincorporated UGA)	**6,278**	**1,227**	**1,880**	**857**	**2,314**	**51,313**	**0**
Vacant	472	95	38	107	232	5,294	
Single Family Residential (R1-10)	1,016	242	337	135	303	3,171	0
Redevelopment	259	51	198	0	10	106	
Underutilized	552	140	124	91	198	2,015	
Vacant	205	51	15	44	95	1,049	
Single Family Residential (R1-20)	400	123	104	53	119	665	0
Redevelopment	72	6	63	0	3	18	
Underutilized	143	40	31	23	49	266	
Vacant	184	77	11	30	66	381	
Washougal (Unincorporated UGA)	**761**	**163**	**153**	**140**	**305**	**2,313**	**0**
Single-family Residential (R1-5)	88	16	21	16	35	601	0
Redevelopment	1	0	0	0	0	0	
Underutilized	77	11	20	15	32	601	
Vacant	10	4	1	2	3	0	
Single-family Residential (R1-7.5)	98	20	24	17	36	437	0
Redevelopment	3	0	2	0	0	1	
Underutilized	91	19	22	16	35	418	
Vacant	4	1	0	1	1	18	
Single-family Residential (R1-10)	142	21	33	28	61	433	0
Redevelopment	4	1	3	0	0	1	
Underutilized	103	11	28	20	44	355	
Vacant	36	9	3	8	16	77	
Single-family Residential (R1-15)	294	59	47	59	129	648	0
Redevelopment	1	0	1	0	0	0	
Underutilized	134	21	34	25	54	271	
Vacant	159	37	12	34	75	377	
Single Family Residential (R1-7.5)	35	10	7	6	12	53	0
Redevelopment	0	0	0	0	0	0	
Underutilized	30	9	6	5	10	44	
Vacant	4	1	0	1	2	9	
Single Family Residential (R1-10)	104	37	21	14	31	140	0
Redevelopment	7	2	4	0	0	1	
Underutilized	84	29	16	12	26	116	
Vacant	14	6	1	2	5	23	
Woodland (Unincorporated UGA)	**90**	**45**	**14**	**10**	**22**	**91**	**0**
Single Family Residential (R1-10)	90	45	14	10	22	91	0
Underutilized	90	45	14	10	22	91	
Yacolt (Unincorporated UGA)	**85**	**16**	**11**	**18**	**40**	**138**	**0**
Single-family Residential (R1-12.5)	76	15	8	17	36	126	0
Underutilized	15	3	4	3	6	20	
Vacant	61	12	5	14	30	106	

Unincorporated UGA

	Gross	Constrained	Market	nfrastructure	uildable	Housing Units	Jobs
	Acres of Land						
Residential							
Yacolt (Unincorporated UGA)	**85**	**16**	**11**	**18**	**40**	**138**	**0**
Single Family Residential (R1-20)	10	2	2	2	4	13	0
Underutilized	8	1	2	2	3	11	
Vacant	2	1	0	0	1	2	
Residential Subtotal	9,128	1,936	2,496	1,336	3,361	59,723	208
Commercial							
Battle Ground (Unincorporated UGA)	**72**	**8**	**0**	**16**	**48**	**0**	**965**
Regional Center (RC)	63	7	0	14	42	0	838
Underutilized	56	7	0	12	37	0	745
Vacant	7	1	0	2	5	0	93
Neighborhood Commercial (NC)	9	1	0	2	6	0	128
Underutilized	9	1	0	2	6	0	128
Camas (Unincorporated UGA)	**171**	**10**	**0**	**40**	**120**	**33**	**2,379**
Community Commercial (CC)	21	1	0	5	15	0	304
Underutilized	21	1	0	5	15	0	304
North Shore Commercial (C-NS)	12	0	0	3	9	0	178
Underutilized	12	0	0	3	9	0	178
North Shore Mixed Use (MX-NS)	4	0	0	1	3	33	27
Underutilized	4	0	0	1	3	33	27
Mixed Employment (ME)	134	9	0	31	94	0	1,870
Underutilized	134	9	0	31	94	0	1,870
La Center (Unincorporated UGA)	**57**	**8**	**0**	**12**	**37**	**0**	**734**
Downtown Commercial (C-1)	57	8	0	12	37	0	734
Underutilized	57	8	0	12	37	0	734
Ridgefield (Unincorporated UGA)	**63**	**7**	**0**	**14**	**42**	**595**	**375**
Commercial Neighborhood Business (CNB)	4	0	0	1	2	0	0
Underutilized	4	0	0	1	2	0	
Commercial Neighborhood Business - MU (CNB-MU)	53	6	0	12	35	595	284
Underutilized	53	6	0	12	35	595	284
Neighborhood Commercial (NC)	7	1	0	2	5	0	91
Underutilized	7	1	0	2	5	0	91
Vancouver (Unincorporated UGA)	**1,008**	**70**	**290**	**133**	**515**	**6,696**	**7,829**
Community Commercial (CC)	162	8	0	38	115	0	2,305
Underutilized	138	7	0	33	98	0	1,958
Vacant	24	1	0	6	17	0	347

Unincorporated UGA

	Gross	Constrained	Market	nfrastructure	uildable	Housing Units	Jobs
	Acres of Land						
Commercial							
Vancouver (Unincorporated UGA)	**1,008**	**70**	**290**	**133**	**515**	**6,696**	**7,829**
General Commercial (GC)	243	22	0	55	166	0	3,324
Underutilized	226	20	0	52	155	0	3,099
Vacant	17	2	0	4	11	0	225
Neighborhood Commercial (NC)	17	1	0	4	12	0	238
Underutilized	17	1	0	4	12	0	238
Klineline, 99 Commons, and Totem TC (HWY99/K9T)	150	12	92	0	46	2,322	697
Redevelopment	104	7	92	0	5	241	72
Underutilized	44	5	0	0	40	1,991	597
Vacant	2	0	0	0	2	90	27
Parks Common, and Minnehaha GV (HWY99/PM)	35	2	22	0	11	285	171
Redevelopment	25	2	22	0	1	28	17
Underutilized	11	1	0	0	10	256	154
Tenny Creek, and Totem TC (HWY99/TNT)	11	0	6	0	5	179	72
Redevelopment	6	0	6	0	0	11	5
Underutilized	2	0	0	0	2	71	28
Vacant	3	0	0	0	3	97	39
Transitional Area (HWY99/T)	240	14	171	0	54	1,353	812
Redevelopment	191	11	171	0	9	225	135
Underutilized	47	3	0	0	43	1,084	650
Vacant	2	0	0	0	2	44	26
Mixed Use (MX)	150	10	0	35	105	2,557	210
Underutilized	114	6	0	27	81	1,960	161
Vacant	37	4	0	8	25	596	49
Washougal (Unincorporated UGA)	**43**	**2**	**0**	**10**	**31**	**125**	**349**
Community Commercial (CC)	12	0	0	3	8	125	83
Underutilized	12	0	0	3	8	125	83
Community Commercial - Schools (CC-S)	31	1	0	8	23	0	266
Underutilized	31	1	0	8	23	0	266
Yacolt (Unincorporated UGA)	**0**	**0**	**0**	**0**	**0**	**0**	**0**
General Commercial (GC)	0	0	0	0	0	0	0
Underutilized	0	0	0	0	0	0	0
Commercial Subtotal	1,414	104	290	226	794	7,448	12,631
Industrial							
Battle Ground (Unincorporated UGA)	**249**	**67**	**0**	**46**	**137**	**0**	**1,231**
Westside Employment (WE)	249	67	0	46	137	0	1,231
Underutilized	249	67	0	46	137	0	1,231

Unincorporated UGA

	Gross	Constrained	Market	nfrastructure	uildable	Housing Units	Jobs
	Acres of Land						
Industrial							
La Center (Unincorporated UGA)	**48**	**20**	**0**	**7**	**21**	**0**	**189**
Light Industrial (IL)	48	20	0	7	21	0	189
Underutilized	48	20	0	7	21	0	189
Ridgefield (Unincorporated UGA)	**270**	**71**	**0**	**50**	**149**	**1,812**	**995**
Employment – Mixed Use, 3-way Split (E-MU-3)	196	52	0	36	108	1,812	626
Underutilized	196	52	0	36	108	1,812	626
Business Park (BP)	74	19	0	14	41	0	369
Underutilized	70	18	0	13	39	0	353
Vacant	4	2	0	1	2	0	16
Light Industrial (IL)	0	0	0	0	0	0	0
Underutilized	0	0	0	0	0	0	0
Vancouver (Unincorporated UGA)	**1,645**	**461**	**0**	**296**	**888**	**0**	**7,994**
Business Park (BP)	794	240	0	139	416	0	3,740
Underutilized	731	229	0	125	376	0	3,385
Vacant	63	11	0	13	39	0	355
Heavy Industrial (IH)	0	0	0	0	0	0	2
Underutilized	0	0	0	0	0	0	2
Light Industrial (IL)	851	221	0	157	472	0	4,252
Underutilized	810	215	0	149	446	0	4,014
Vacant	41	6	0	9	27	0	238
Washougal (Unincorporated UGA)	**10**	**0**	**0**	**0**	**18**	**0**	**160**
Heavy Industrial (IH)	10	0	0	0	18	0	160
Underutilized	10	0	0	0	18	0	160
Yacolt (Unincorporated UGA)	**23**	**2**	**0**	**5**	**16**	**0**	**145**
Light Industrial (IL)	23	2	0	5	16	0	145
Underutilized	23	2	0	5	16	0	145
Industrial Subtotal	2,246	621	0	404	1,229	1,812	10,715
Total	12,789	2,661	2,786	1,965	**5,384**	**68,984**	**23,554**

APPENDIX N

WATER USE EFFICIENCY MEETING MINUTES AND AGENDA

~ To be included in a future submittal. ~

APPENDIX O

WATER LOSS CONTROL ACTION PLAN

Water System Plan Update

Water Loss Control Action Plan

September 2026 / DRAFT

SECTION 1 INTRODUCTION

From 2022 to 2024, the average distribution system leakage (DSL) was approximately 11.2 percent for the City of Camas (City), triggering the requirement of a completion of a Water Loss Control Action Plan (WLCAP). In successive years, the DSL has decreased, and the standard of 10 percent or less is believed to be achievable within the next 10 years. This plan addresses how the City will mitigate DSL, sets a goal of when it will meet the regulation, and how it intends to fund necessary projects to support controlling water loss.

SECTION 2 WATER LOSS CONTROL METHODS

As mentioned above, the City is slightly over the 10 percent standard based on their Annual Water Use Efficiency Report data. Note that the 2025 DSL brings the three-year rolling average DSL under the 10 percent threshold; however, the data collected for 2025 seems unreliable. In 2025 the City underwent a billing system software change. Consumption data for 2025 is from two different sources which is believed to be the reason why consumption may be over-reported. Therefore, the City elected to complete a WLCAP to show their commitment to ensuring that DSL is consistently 10 percent or less.

To control water loss, the City intends to continue implementing leak detection and mitigation by alerting and visiting customers where leaks are detected as well as leveraging the advanced metering infrastructure (AMI) meters that have been installed for 100 percent of the City's customers. AMI meters collect and transmit data in real time to the finance department at the City, which will aid in detecting leaks quickly. Furthermore, these meters will be repaired and/or replaced per manufacturer recommendations as needed. Leakage has been decreasing in the distribution system already based on the Annual Water Use Efficiency Reports as outlined in Table 1.

Table 1 The City's Yearly DSL

Year	DSL (%)	3-Year Rolling Average DSL (%)
2021	14.7	14.2
2022	14.2	14.5
2023	10.3	13.1
2024	9.2	11.2
2025	0.7	6.7

Additionally, a pipeline replacement program will be included in the City's Capital Improvement Program (CIP) to replace aging cast iron and steel pipe installed before 1960, the majority of which were installed prior to 1940. This piping accounts for 19 percent of the system. By replacing the aging infrastructure, leakage should decrease further, improving the City's DSL.

With these measures and projects implemented, the City is committed to meeting the DSL standard on a consistent basis by 2036.

SECTION 3 DATA ACCURACY AND COLLECTION EVALUATION

As mentioned above, the AMI meters should improve the data accuracy and collection for the distribution system since data is collected in real time and transmitted to the finance department at the City. This reduces data errors caused by human error, such as manually inputting or collecting data. Furthermore, the City switched to monthly billing instead of bi-monthly billing, making it more manageable to verify data accuracy.

Data accuracy could be further improved simply by installing new meters when they start to fail since meters are designed to read low when this occurs. This could potentially lead to under reporting of consumption. The City will repair and/or replace meters in a timely manner to mitigate this implication.

It is believed that the low DSL value in 2025 was primarily due to a switch in billing systems. This could have led to errors in accounting of consumption and possibly double counting. The 92 percent reduction in DSL from 2024 to 2025 does not seem plausible. Therefore, the City considered the 2024 three-year rolling average instead of the 2025 three-year rolling average to err on the side of caution. Moving forward, it is expected that the data accuracy should be stable since continuity will be established using the new billing system.

SECTION 4 FUNDING FOR WATER LOSS CONTROL PROGRAM

The City realizes that funding is critical to apply successful measures and programs. Currently, it is not anticipated that alerting customers about leakage will need additional funding as this is a current practice done by the City. Also, the meters have been replaced with AMI meters recently as well, so this measure is also not expected to be a significant additional cost to the City in the near future.

The costliest method for controlling water loss is the pipe replacement program. By including this in the CIP, as mentioned above, the City is preparing a funding strategy for this program. Possible options that can be considered are modifying customer rates and applying for funding to replace the aging infrastructure. The City will assess which is the best option once the cost of the program is determined.

APPENDIX P

WATER USE EFFICIENCY PROGRAM

Water System Plan Update

Water Use Efficiency Program

September 2026 / DRAFT

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Abbreviations

2026 WSP	2026 Water System Plan Update
ADD	average day demand
AFY	acre-feet per year
cfs	cubic feet per second
City	City of Camas
DOH	Department of Health
DSL	distribution system leakage
Ecology	Department of Ecology
ERU	equivalent residential unit
gpm	gallons per minute
LWWF	Lower Washougal Wellfield
mgd	million gallons per day
MMD	maximum day demand
O&M	operations and maintenance
Qa	annual water right
Qi	instantaneous water right
SFR	single-family residential
WAC	Washington Administrative Code
WLCAP	Water Loss Control Action Plan
WUE	Water Use Efficiency
WWTP	wastewater treatment plant

SECTION 1 INTRODUCTION

The City of Camas (City) promotes efficient water use to conserve and protect their existing water supplies for present and future residents. The City promotes water conservation and efficient use of water through a variety of activities that encompass their Water Use Efficiency (WUE) Program. The WUE Program encourages water conservation and utilizes continued improvements to reduce leakages and water loss in the City's system. This report details both the City's existing WUE programs.

SECTION 2 WUE PROGRAM BACKGROUND

In 2003, the Washington State Legislature passed the Engrossed Second Substitute House Bill 1338, known as the Municipal Water Law or the WUE rule, to address the increasing demand on Washington's water resources. This law established that all municipal water suppliers must use water more efficiently in exchange for water right certainty and flexibility to help them meet future demand.

The WUE rule, which became effective on January 22, 2007, emphasizes the importance of measuring water use and evaluating the effectiveness of the water supplier's WUE program. The intent is to minimize water withdrawals and water use by implementing water saving activities and adopting policies, resolutions, ordinances, or bylaws. This report follows the guidelines set forth in the *Water Use Efficiency Guide Book*, Fourth Edition, (January 2025) as well as the *Water System Planning Handbook* (April 1997).

SECTION 3 WATER SUPPLY CHARACTERISTICS

3.1 Source

The City obtains its water from two surface water sources and 10 wells. Eight of the groundwater sources (Wells 5, 6, 7, 8, 10, 11, 12, 14) are located in the City's Lower Washougal Wellfield (LWWF), in the lower Washougal floodplain near downtown Camas. Wells 7, 8, 10, 11 and 12 are often referred to as the City's "Oak Park" wellfield. Well 13 is north and west of the Oak Park wells and is effectively part of the same wellfield pumping center but is not typically referenced as being part of the LWWF. The remaining well (Well 9) is located in the uplands about two miles north of the Columbia River and 1.5 miles west of Lacamas Lake. Groundwater sources receive disinfection and other water quality treatment before entering the distribution system.

The City's Boulder and Jones Creek surface water diversions are located in the headwaters of the Washougal River drainage. These sources are treated at the City's slow sand filtration plant.

3.2 Water Rights Summary

The City's water system (Department of Health [DOH] ID 108002) currently has 2 water right claims which have been modified by Certificates of Change, 11 certificated water rights, and 5 water right permits. A summary of the City's water rights is provided in Table 1. Note, the City requested in March 2026 that the

Department of Ecology (Ecology) extend the development schedule on each of the City's five water right permits to 2031. The City's current plan for developing the wells is presented in Section 8.4 of the 2026 Water System Plan Update (2026 WSP).

The City has limitations on its water rights that complicate the calculation of total instantaneous water right (Qi) and annual water right (Qa) as described below:

- Jones and Boulder Creek surface water sources may only be operated seasonally from October 31 through May 15, as directed by Permit G2-30144. The Qa for periods outside of the operating time window are used to maintain instream flow in the Creeks (not for City use).
- Historically, water right permits and certificates with priority dates before 1979 were limited by Ecology to a "total combined maximum Qa of 5,750 acre-feet per year (AFY)". However, modifications to the City's water right claims resulted in the recognition of an additional 550 AFY which increased the total Qa to 6,300 AFY with priority dates before 1979.
- Withdrawals from Well 9 are considered non-additive. The certificate does not increase the cumulative annual total of all rights but does increase the Qi.
- Certificate CG2-20938 (an irrigation water right allocating 330 gallons per minute (gpm) and 106 AFY for use between May 1 to October 1) was acquired by the City in 2015 and transferred into permanent trust as instream baseflow support for Lacamas Creek. The City retains the option to request to apply the consumptive use portion of the right (90.3 AFY) as potential mitigation for future water use within the Lacamas Creek drainage downstream of the water right location.

The City's resulting water rights equate to a Qi of 14,045 gpm (20.2 million gallons per day [mgd]), an additive Qa of 11,090 AFY (9.9 mgd), and a non-additive Qa of 210 AFY (0.3 mgd) as described by Permit G2-30756 (see Page 2) and Certificate G2-27384 (Well 9).

Table 1 Water Right Summary

Source	ID Number	Priority Date	Instantaneous Qi (gpm)	Annual Qa (AFY)
Claims				
Well 1	Claim 121022 transferred to Well 10[6]			
Well 2	Certificate C-85-A transferred to Well 12[6]			
Well 3	Claim 121023 transferred to Well 11[6]			
Well 4	Certificate G2-GWC4079 transferred to Well 13[6]			
Certificates				
Boulder Creek[7]	C-712	08/22/1923	1,120 (2.5 cfs)	977[2] (A)[9]
	CS2-SWC 712			843 A (Instream Flow)
Jones Creek[7]	C-711	09/05/1930	450 (1.0 cfs)	393[3] (A)[9]
	CS2-SWC 711			337 A (Instream Flow)
Well 5	G 6636-A G2-*09325C	03/22/1968	600	920[4] (A)[9]
Well 6	G 6635-A G2-*09325C	03/22/1968	1,500	2,400[4] (A)[9]
Well 7	G2-00501	03/22/1971	1,000	530[5] (A)[9]

Source	ID Number	Priority Date	Instantaneous Qi (gpm)	Annual Qa (AFY)
Well 8	G2-24400	02/04/1977	900	530(5) (A)(9)
Well 9	G2-27384	08/13/1986	650	210 (N)(10)
Well 10	G2-CV1-2P159	06/11/1974	900	320 (A)(9)
Well 11	G2-CV1-2P160	06/11/1974	1,200	230(5) (A)(9)
Well 12	C-85-A G2-*0004C	07/21/1945	900	118 (A)(9)
Well 13	G2-GWC4079 G2-*05130C	02/12/1959	1,325	1,208(5) (A)(9)
Permits				
Lower Washougal Wellfield	G2-30144	08/21/1986(11)	500 (At Well 8)	2,150 (A)(9) (All 8 wells)
Well 14 (Anderson Site)	G2-30145	08/21/1986(11)	1,000	880 (A)(9)
Parkers Landing	G2-30146	08/21/1986(11)	1,000	880 (A)(9)
Treatment Plant Well	G2-30147	08/21/1986(11)	1,000	880 (A)(9)
Umbrella Wellfield	G2-30756	01/08/2020	6,700	11,090(12) (All 8 wells)
Total(13)			**14,045**	**11,090 (A)(9)** **210 (N)**
Pending Applications				
Steigerwald Regional Supply(8)	G2-30528		17,213	13,555

Notes:
(1) Claims are considered valid until proven otherwise through an adjudication process.
(2) This source was formerly known as the Little Washougal River. The certificate refers to an Qi and does not specify an annual withdrawal. An Ecology Report of Examination for Well 7 (G2-00501) summarizes existing water rights, including 1,820 AFY for Boulder Creek (C-712), based on continuous withdrawal at the instantaneous right specified.
(3) The certificate refers to an Qi and does not specify an annual withdrawal. An Ecology Report of Examination for Well 7 (G2-00501) summarizes existing water rights, including 730 AFY for Jones Creek (C-711), based on continuous withdrawal at the Qi specified.
(4) The Permit and Report of Examination preceding this certificate limited water rights to “the total quantity withdrawn or diverted from all sources is not to exceed 3,300 AFY.
(5) The Permit and Report of Examination preceding this certificate limited water rights to “the total quantity withdrawn or diverted from all sources is not to exceed 5,750 AFY.
(6) Well 10, 11, and 12 were installed to replace Well 1, 2 and 3, which have failed due to collapsed well casings; see Pacific Groundwater Group report dated June 9, 2003. Well 13 replaced Well 4 after Well 4 was determined to be groundwater under the influence of surface water; see Pacific Groundwater Group report dated August 14, 2006. G2-CV1-2P160, which is now associated with Well 10, allowed for seasonal between May 1st and August 31st. Year-round operation of Well 10 is authorized under Permit G2-30144 for the LWWF.
(7) See Ecology agreement that limits withdrawal from the surface water sources from May 15 through October 31.
(8) Joint application with City of Camas and City of Washougal.
(9) (A) = Additive water right, additive to other rights.
(10) (N) = Non-additive water right, not included when summing a cumulative total of all rights.
(11) The original Ecology Report of Examination for these permits indicated a priority date of 08/21/2003. However, Ecology assigned a priority date of 08/13/1986 via amended permits to match with the date of the Clark County Reservation identified by watershed planning for WRIAs 27/28.
(12) Installation of one future well in the LWWF is included under this permit.
(13) Due to permit and certificate restrictions, the total Qi and Qa do not equal the sum of quantities for each column.
cfs - cubic feet per second.

3.3 Water Rights Analysis

The City's water rights were compared to existing, 5-year (2031), 10-year (2036), and 20-year (2046) demand projections to establish water right surplus or deficiency. Both Qi and Qa were considered and are summarized in Tables 2 and 3, respectively.

The City currently has surplus water rights based on the actual well pumping in 2024, which was considered to be the existing condition. Note, the reported values reflect the pumping over the entire year, where not all wells were pumped at the same time.

Table 2 Instantaneous Water Rights (Qi) Summary

Year	MDD – High Scenario(1) (gpm)	Instantaneous Water Right (Qi) (gpm)	Surplus/Deficiency (gpm)
Existing	6,765(2)	12,475(3)	5,710
2031	8,620	12,475 (3)	3,855
2036	10,490	12,475 (3)	1,985
2046	14,080	12,475 (3)	-1,605

Notes:
(1) Future values based on high MDD demand projection scenario.
(2) Based on actual 2024 maximum day production data.
(3) Instantaneous water rights of 14,045 gpm shown in Table 8.1 minus 1,570 gpm of surface water rights not available during the summer months.
MDD - maximum day demand.

Table 3 Annual Water Rights (Qa) Summary

Year	ADD - High Scenario(1) (AFY)	Annual Water Right (Qa) (AFY)	Surplus/Deficiency (AFY)
Existing	5,230(2)	11,090	5,860
2031	6,610	11,090	4,480
2036	8,070	11,090	3,020
2046	10,910	11,090	180

Notes:
(1) Future values based on high ADD demand projection scenario.
(2) Based on actual 2024 annual production data.
ADD - average day demand.

For the future water rights evaluation, the forecasted source production was based on the high demand projection scenario. The high demand scenario generally reflects the water use rates from the period of highest demands in the last eight years. Use of the highest projected demands is intended to support the City in planning for sufficient physical supplies to meet demands and provide sufficient time for phasing in new supplies, which is typically a multi-year process.

The City is expected to have sufficient Qa through the next 20 years; however, the City is expected to have a Qi deficiency of 1,605 gpm by 2046. The City plans to meet this deficiency by a combination of improving pumping yields from existing well facilities, developing all of its existing water rights, and securing water rights for additional supply sources. Additionally, the City will continue to encourage water use efficiency including the reduction of irrigation use, which is a major driver for the relatively high projected MDD.

3.4 Production and Delivery System

The City's water system has an available water production capacity of approximately 15.5 mgd and delivers potable water throughout 26 pressure zones. Water is conveyed through more than 159 miles of transmission and distribution pipelines and supported by seven storage reservoirs with a combined capacity of approximately 9.95 million gallons. Ten booster pumping stations and numerous pressure control facilities help move water between service areas, maintain system pressures, and meet varying customer demands across the system. System operations are monitored and controlled through the City's SCADA system, which provides real-time oversight of storage levels, pumping operations, flows, and other critical system functions.

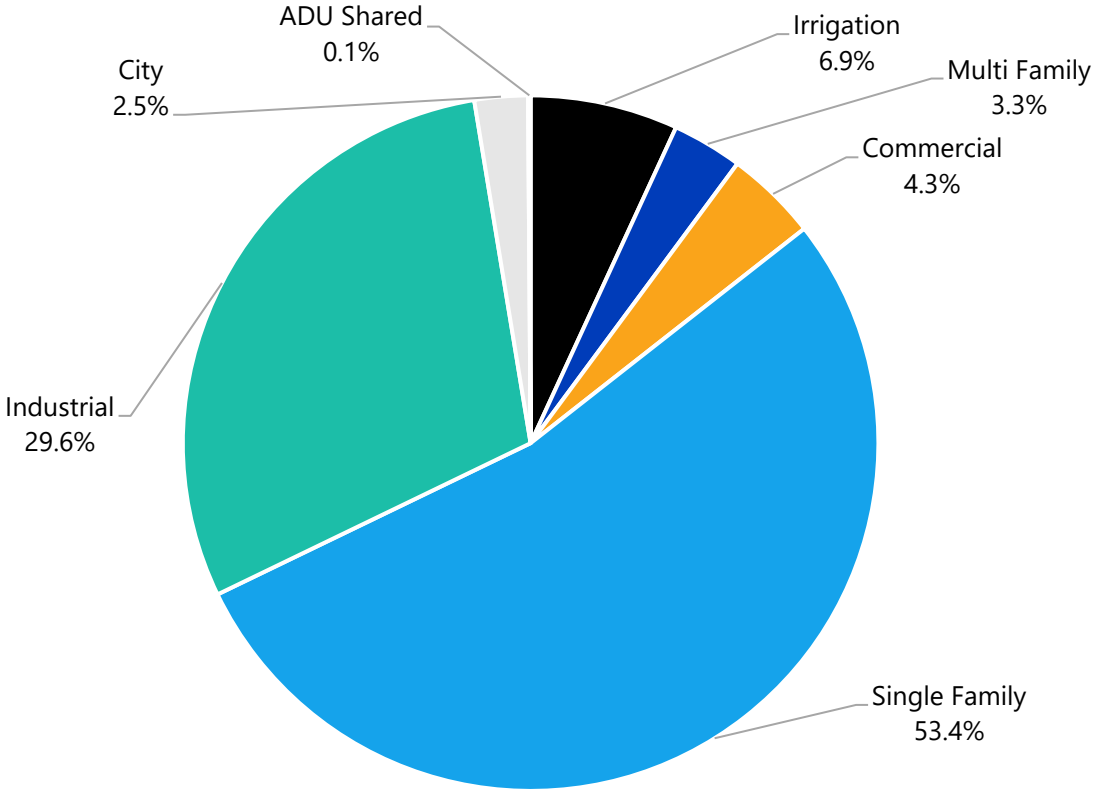


Figure 1 2017 to 2024 Average Water Demand by Customer Class

SECTION 4 2013 TO 2024 WUE PROGRAM SUMMARY

The previous program's demand-side goals were to reduce customer consumption per equivalent residential unit (ERU) by 1 percent or approximately 2 gpd per year over the next six years. Figure 2 compares the City's actual single-family residential (SFR) demand to the demand-side WUE goal to demonstrate the effectiveness of the City's WUE Program. The goal demand begins at 260 gpd/ERU, which represents the 2013 to 2015 average demand used as the planning ERU in the 2019 Water System Plan. The goal demand was then reduced by 2 gpd each year, consistent with the City's goal. As shown in Figure 2, actual SFR demand has generally remained below or near the goal demand, indicating that the

City has been successful in meeting its demand-side WUE objective. Note that the 2016 data is represented with a dashed bar. This is because 2016 data was not available; therefore, the 2016 demand is estimated as the average of 2015 and 2017 demands.

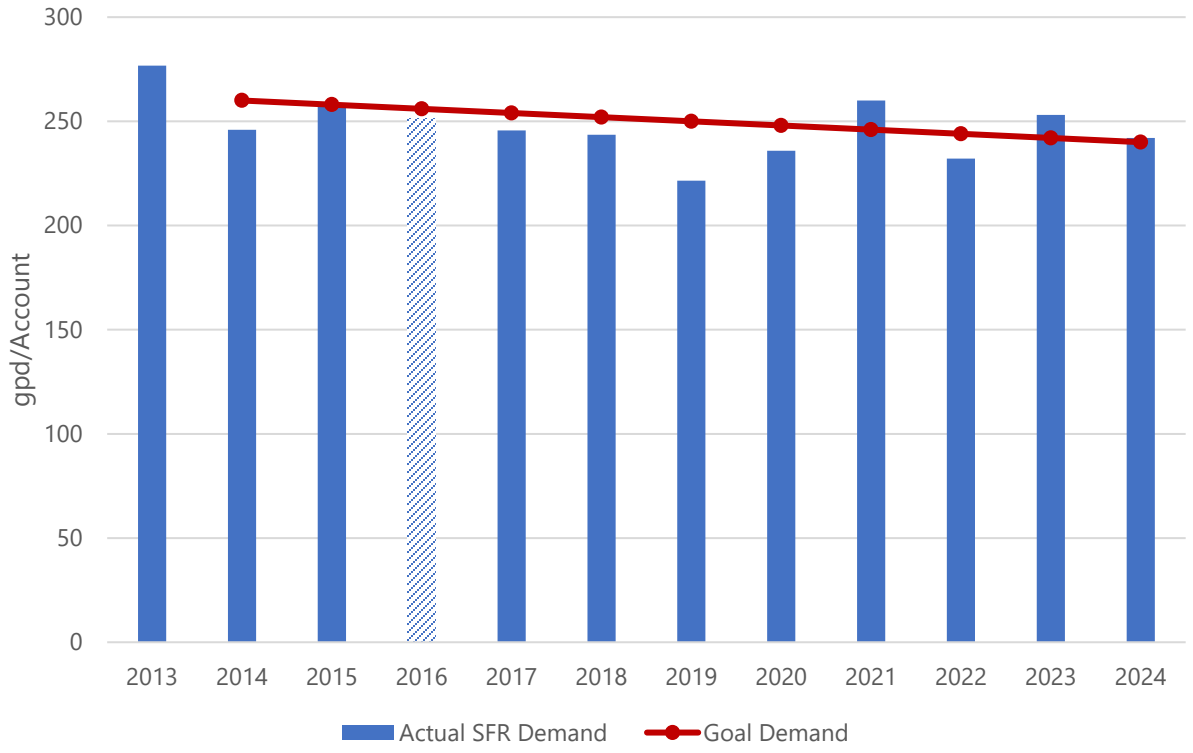


Figure 2 Actual Compared to Goal Single-Family Residential Demand

SECTION 5 DISTRIBUTION SYSTEM LEAKAGE

Distribution system leakage (DSL) is a significant element of supply-side WUE requirements. DSL above 10 percent on a three year rolling average is considered excessive and necessitates the creation of a Water Loss Control Action Plan (WLCAP). DSL is the difference between total water production and metered water use. The estimate of DSL is dependent on the accuracy of meter readings for supply and customer meters. Table 4 presents the City's reported three year rolling average DSL from 2021 through 2025. The City has averaged above their WUE program goal and DOH standard of 10 percent, but the City is making progress in mitigating DSL with it decreasing in successive years. Note that the 2025 three year rolling average is under the 10 percent threshold; however, it is possible that there may be inaccuracies in the data collected for 2025 as the billing system shifted to a new one. Therefore, the City will complete a WLCAP to address their DSL.

Table 4 Distribution System Leakage (3-year Rolling Average)

Year	3-Year Rolling Average DSL (%)
2021	14.2
2022	14.5
2023	13.1
2024	11.2
2025	6.7

The DSL in Table 4 differs from that calculated in Chapter 5 - Water Requirements of the 2026 WSP, where Chapter 5 evaluated historical billing data for consumption. The City is not able to account for the differences; however, it is believed to be related to year end meter reading. In 2025 the City transitioned its billing software. Consumption data for 2025 was compiled from two sources which may account for the low reported water consumption.

SECTION 6 2027 TO 2032 WUE PROGRAM

The City's current WUE Program was established as part of the 2026 WSP. Per the Washington Administrative Code (WAC) 246-290-830(4)(a), all water purveyors with 1,000 or more connections are required to set efficiency goals through a public process. The established goals promote WUE for internal operations and for water customers. The past WUE Program goals were established in the 2010 WSP and subsequently re-established in 2013, 2019, and 2026:

- **Demand-Side Goal:** Reduce customer consumption per ERU by 1 percent over the next six years.
- **Supply-Side Goal:** Continue to reduce distribution loss to 10 percent or less over the next five years.

6.1 Supply-Side Measures

The City implements the following supply-side measures as part of their WUE Program. A number of these measures are mandated by Washington State DOH per the WUE Guidebook. The following summarizes the City's supply-side measures:

1. Record and monitor supply source production (Mandatory).
2. Record and monitor customer demands through customer water meters (Mandatory).
3. Test and calibrate industrial and commercial meters annually (Mandatory).
4. The City will repair and/or replace residential meters per manufacturer recommendations.
5. Perform annual leak detection surveys through a private contractor. Hydrants and valves are checked as part of leak detection surveys (Mandatory).
6. Repair or replace old distribution system piping with defects as budget allows.
7. Reclaimed Water: Treated wastewater is used for washdown and process use and for landscape irrigation at the wastewater treatment plant (WWTP) (Mandatory to evaluate reclaimed water).

6.2 Demand-Side Measures

The City implements a number of demand-side measures. These measures are similar to many of the example WUE measures presented in Appendix B of the *Water Use Efficiency Guidebook*. The City provides an overview of their WUE activities on their Water Services website (http://www.ci.camas.wa.us/index.php/pwwater). The City's various public outreach activities meet the DOH requirement for educating customers about WUE. The following provides a summary of the City's demand-side measures:

1. City staff alert and visit customers where customer leaks are identified.
2. Promote installation of smart controllers for City-wide users.
3. Educate the public on conservation and water-saving devices at community events, such as Camas Days, and on the City website (http://www.ci.camas.wa.us/images/DOCS/WATER_SEWER/REPORTS/waterconservation.pdf).
4. Promote xeriscaping and Low Impact Development to reduce irrigation requirements for new developments.
5. Promote irrigation systems to incorporate drip systems or micro sprayers.
6. Promote odd/even day and late night or early morning irrigation for all customers.
7. Provide monthly billing to all customers.
8. Send water savings tips to customers in the annual water quality report.
9. Onsite irrigation at the WWTP with treated effluent.

The above supply- and demand-side WUE measures are effective in encouraging WUE for the water system.

6.3 Mandatory Measures

The WUE Program includes supply side measures that the City implements to understand and control leakage including new meters and leak detection surveys. The City's WUE Program will continue to meet the following mandatory measures in the future:

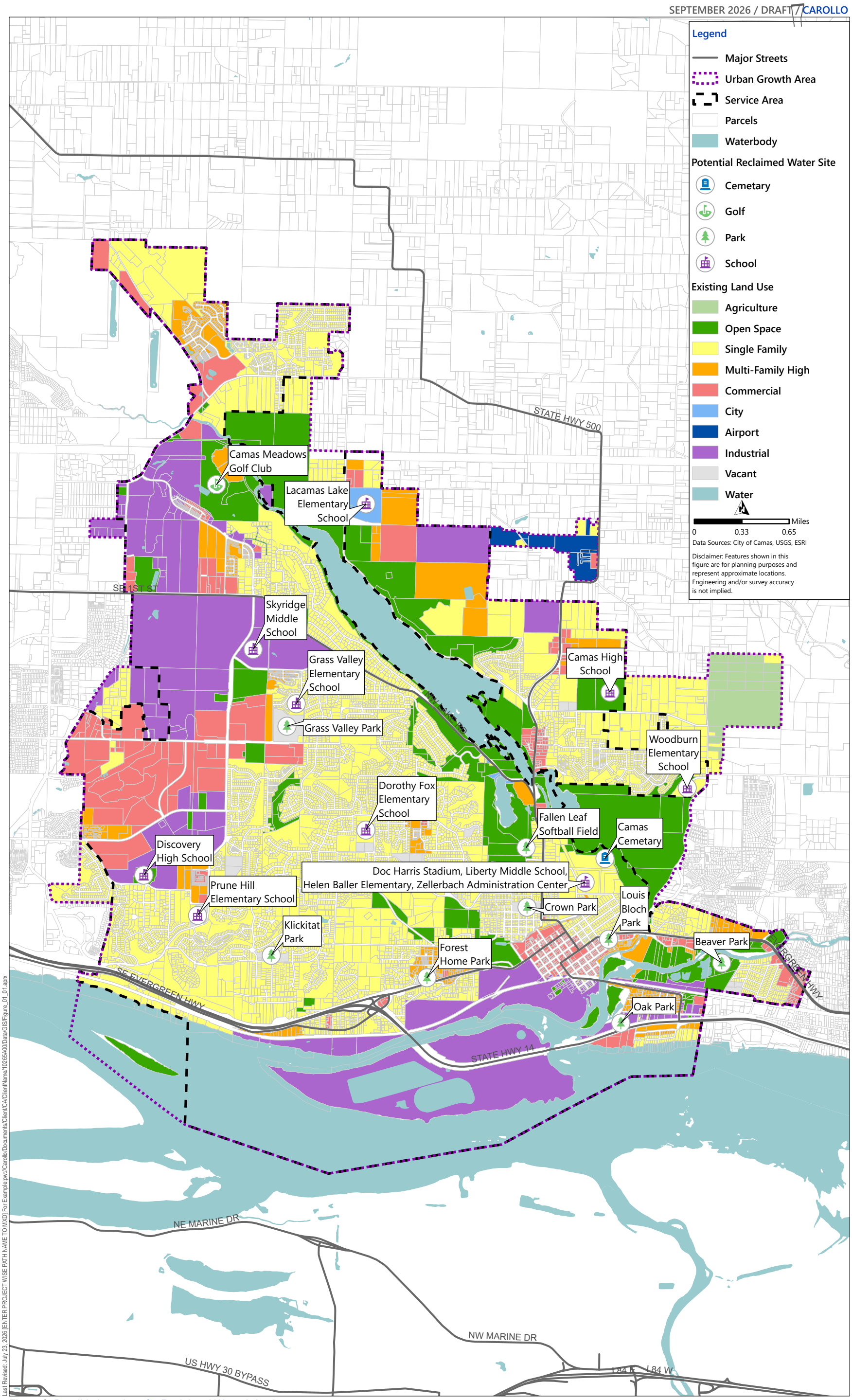
- Install production (source) meters.
- Install consumption (service) meters.
- Perform meter calibration.
- Implement a water loss control action plan to control leakage if the three year rolling average exceeds 10 percent.
- Educate customers about WUE practices.
- Evaluate rates that encourage water demand efficiency, as discussed in a subsequent section.
- Evaluate reclamation opportunities, as discussed in a subsequent section.

6.3.1 Rate Structure

The City's current rate structure bills customers on a uniform volumetric charge. In 2010, the City added a consumption-based element to sewer rates based on average winter water consumption, which was thought to encourage water efficiency. In 2023, a rate study was performed that evaluated a tiered rate structure. Ultimately, it was determined that the current rate structure would remain in place. Future rate studies will continue to reevaluate rate structures to encourage conservation.

6.3.2 Reclaimed Water

Per WAC 246-290-100 and WUE requirements, water systems with over 1,000 connections must evaluate reclaimed water opportunities. As mentioned previously, the City currently uses treated wastewater at the WWTP. In addition, the City previously evaluated reclaimed water opportunities in 2006 with costs escalated to 2025 dollars in the concurrent effort of updating the General Sewer Plan, considering a multitude of locations to use the water for irrigation; Figure 1 displays locations with irrigation connections. Overall, it was concluded that using reclaimed water as irrigation water was not economically feasible, and therefore, the reclaimed water system will not be expanded at this time.



Last Revised: July 23, 2026 [ENTER PROJECT WISE PATH NAME TO MXD] For Example:pw://Carollo/Documents/Client/CA/ClientName/10265A00/Data/GIS/Figure_01_01.apx

Figure 3 Possible Locations for Reclaimed Water Irrigation

6.3.3 Projected Demands with WUE Goals

The projected water demands considering the water savings from the City's WUE Program were represented with the low demand scenario presented in Chapter 5 of the 2026 WSP. Projected demands with WUE savings were compared to the medium demand projection. The low demand projection assumes a 2025 demand of 242 gpd/ERU while the medium demand projections assume a 2025 demand of 248 gpd/ERU. The low demand projection also assumes the WUE Program will help to reduce the MDD to ADD peaking factor by approximately 0.45 percent. The low and medium demand projections assume the City's DSL is 9.1 and 10 percent, respectively. Table 5 presents the projected ADD and MDD with and without the WUE Program for the 20-year planning period. The projected demands with the WUE Program are also shown in Figure 4. For ADD, WUE measures are projected to provide a reduction of 1.0 mgd), or 11.9 percent, by 2046. For MDD, WUE measures are projected to provide a reduction of 2.4 mgd, or 14.6 percent, by 2046.

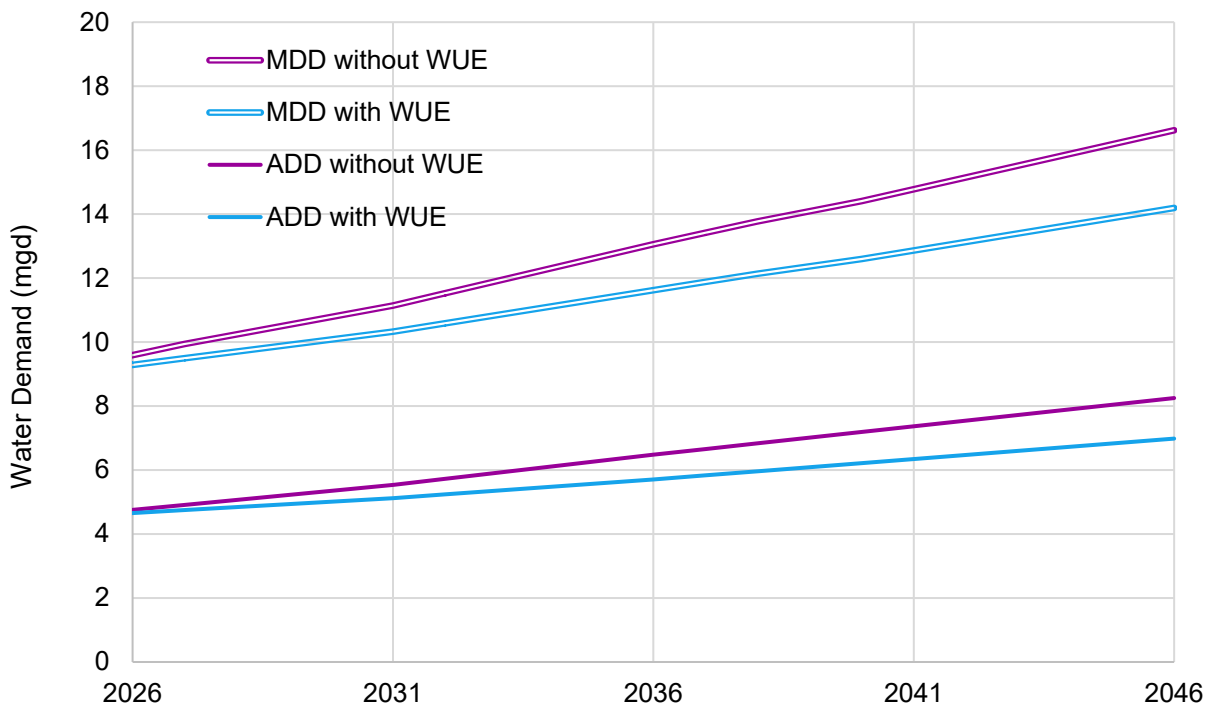


Figure 4 Projected Demands With and Without Water Use Efficiency

Table 5 WUE Demand Projections

Demand Scenario	2046 Projection with WUE (mgd)	2046 Projection without WUE (mgd)	Water Savings (mgd)	Percent Savings
ADD	7.4	8.4	1.0	11.9
MDD	14.2	16.6	2.4	14.6

6.4 WUE Program Effectiveness

The effectiveness of the existing WUE program was evaluated using system-wide water use data. Measuring the effectiveness of the City's future WUE Program against the established goals could be similarly evaluated using system-wide water use data. Estimating the water savings directly resulting from the City's WUE Program in a single year is difficult. Therefore, long-term trends should be use to more clearly show the impact of the City's WUE Program.

The first step would be to establish a baseline from historical information. The second step is to evaluate the resulting water use after promoting WUE through targeted activities and events to customers. It is recommended that water use be tracked for at least a year to identify trends. Some consideration needs to be given to variations in weather and economic conditions. Another method would be to perform the same before/after water use analysis for WUE Program participants who volunteer and provide their address. The resulting information would be valuable for the City to correlate its WUE Program efforts with direct water savings for its customers.

Advanced Metering Infrastructure (AMI) was implemented in 2025. The City plans to leverage this data in its targeted public education programs to customers in a particular area or user profile, such as heavy irrigators. Using AMI, the City can estimate overall usage, irrigation usage, and peak water use rates.

6.5 Budget

The City recognizes the importance of continuing their WUE measures and considers it a core function of the Utility. The WUE program provides cost savings through demand reduction and reduction in DSL. Continuing the WUE Program can assist the City in meeting peak demands and avoiding curtailment periods.

The City does not officially track staff time or project costs associated with WUE. The supply-side WUE measures, such as metering and leak detection, are core activities of the Utility and are funded through Utility Capital Improvement and operations and maintenance (O&M) funds. The City estimates that it dedicates approximately 0.5 full-time-equivalents of staff time to conduct demand-side measures across its Water Utility, finances department, and development services staff. It is not possible to estimate the cost of each demand-side measure; therefore, a cost-benefit comparison cannot be calculated.

Due to AMI capabilities, it is anticipated that the City will further personalize water use communications with customers without increasing staff effort. Future supply-side WUE measures will be funded, as appropriate, through the Capital Improvement and O&M funds. If AMI detects a large number of existing and new leaks, the City will evaluate the need for additional personnel in its meter maintenance group to address leaks.

APPENDIX Q

CONSUMER CONFIDENCE REPORTS 2017-2024

ANNUAL WATER QUALITY REPORT

2017 Consumer Confidence Report

CONTACT US:

Public Works
Water Department:
360-817-1563

Backflow Prevention:
360-817-1569
Email: backflow@cityofcamas.us

Water Billing
616 NE Fourth Avenue
Camas, WA 98607
360-834-2462

After Hours/Holiday
Water Emergency
360-737-0592

Camas Connect 24/7:
Stay Connected! Make service requests and follow the work flow.

Download our new mobile app, or visit online:
www.cityofcamas.us/index.php/service-request

City of Camas Website:
www.cityofcamas.us

Water is a precious and limited resource. Use it wisely.

Attention Non-English Speaking Customers

This report contains important information about your drinking water. Translate it or speak with someone who can translate it for you.

Russian
Это сообщение содержит важную информацию о вашей питьевой воде. Переведите это или говорите с кем - то, кто может перевести это для Вас.

Spanish
Este informe contiene información importante acerca de su agua potable. Haga que alguien lo traduzca para usted, o hable con alguien que lo entienda.

Water Quality Results

At the City of Camas we understand how important it is to ensure we provide high quality water. The health of our consumers and their families is paramount and our goal is to provide you with a safe and dependable supply of drinking water. We work diligently to provide top quality water to a residential population of 23,080.

Our drinking water is safe and surpasses all State and Federal health standards.

We ask that all of our customers help us protect our water sources, which are the heart of our community, our way of life, and our children's future. This report provides a summary of the tests and processes performed to ensure the safety of your drinking water. For more information or questions about this report, please contact Public Works call 360-817-1563, or email publicworks@cityofcamas.us

Public Water System ID 108002

Water Conservation

The average daily water consumption in Camas for 2017 was 4.01 million gallons (mg/d) per day. During our peak usage day on July 22nd, 2017 we consumed 8.3 million gallons. Most of this increase in the summer months is due to irrigation demand. We are once again asking for your help to implement a voluntary odd/even lawn watering program for residential customers. Water on odd days if your house number ends in an odd number, and even days if it ends in an even number.

To view more water saving tips for residential use visit the following websites: www.irrigationtutorials.com/faq/save-water.htm and www.home-water-works.org/water-conservation-tips/home

Voluntary Odd/Even Watering Program

Water Use Facts

A leaky faucet can waste 100 gallons a day.

An average bath requires 37 gallons of water.

What's Ahead

The City of Camas Cross Connection Control Program is being updated. Be on the look out for increased information regarding backflow regulations and testing requirements.

Approximately 65% of the City's water meters have been replaced with advanced radio read meters. The City is continuing the replacement project and will be upgrading approximately 600 additional meters in 2017.

Important Health Information

Drinking water, including bottled water, may reasonably be expected to contain small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline 800-426-4791.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and in some cases, radio-active material. It can also pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water before we treat it include:

- Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, and mining or farming.
- Pesticides and herbicides, which may come from a variety of sources such as agriculture and residential uses.
- Radioactive contaminants, which are naturally occurring.
- Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.

In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. We treat our water according to the EPA's regulations. Food and Drug Administration regulations establish limits for contaminants in bottled water which must provide the same protection for public health. Some people may be more vulnerable to contaminants in drinking water than the general population.

Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by cryptosporidium and other microbiological contaminants are available from the Safe Drinking Water Hotline at 1-800-426-4791.

EPA Statement for Lead and Copper

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Camas is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to two minutes before using water for drinking or cooking. The EPA requires the City to conduct lead testing every three years.

Copper is a mineral component naturally found in solids. In the correct amounts, it is an essential nutrient for humans and plants. In Washington State, most copper in drinking water comes from corrosion of household plumbing. Plumbing sources can include copper pipe and brass fixtures. Copper from plumbing corrosion can accumulate overnight. Although copper is an essential mineral in the diet, too much copper can cause health problems. Copper is widely distributed within the tissues of the body, but accumulates primarily in the liver and kidneys. A single dose of 15 mg of copper can cause nausea, vomiting, diarrhea, and intestinal cramps.

If you are concerned about lead or copper in your water, you may wish to have your water tested. Information on lead and copper in your drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead

To Reduce Lead and Copper Exposure

1. When your water has been sitting for several hours, flush the pipe by running the cold water tap until the water is noticeably colder before using the water for drinking or cooking.

2. Use only cold water for drinking, cooking, and making baby formula. Hot water may contain higher levels of copper.

3. Frequently clean the filter screens and aerators in faucets to remove captured particles.

4. If building or remodeling, only use "lead free" or low lead piping and materials. Avoid using copper piping or brass fixtures for locations where water will be consumed or used in food preparation.

Contaminants Inorganic	Maximum Contaminant Level Goal mg/L	Action Level (AL) mg/L	Camas Water Results g/L	Sample Year	# of Samples Exceeding AL	Violation	Typical Sources
Lead (ppb) at Consumers Tap	0	0.015	0.0026	2015	0 of 30	NO	Corrosion of household plumbing systems; erosion of natural deposits
Copper	0	1.30	0.6100	2015	0 of 30	NO	

Unregulated Contaminants Monitoring

Unregulated contaminants are those for which the EPA has not established drinking water standards. The purpose of unregulated contaminant monitoring is to help EPA determine their occurrence in drinking water and potential need for future regulation. For more information, go to:

http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/ucmr3/ or contact the Safe Drinking Water Hotline at 1-800-426-4791, or at: http://water.epa.gov/drink/contact.cfm

2017 Water Quality Test Results

The City of Camas has its water analyzed for more than 200 different regulated and unregulated contaminants. Only the samples that have detectable levels of contaminants are required by law to be reported to the public. The contaminants listed below are REGULATED and were in our water during 2017. All samples taken are from treated water that is delivered to the distribution system. All contaminants tested were below levels allowed by Federal and State agencies. We have provided definitions below to help you understand the terms and abbreviations that are used in the Test Results.

In some cases, certain contaminants are granted waivers from monitoring. This is due to past consecutive years of non-detectable results, or results lower that the State Reporting Level (SRL).

Important Terms and Abbreviations

Maximum Contaminant Level (MCL): The "Maximum Allowed" is the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Maximum Contaminant Level Goal (MCLG) : The "Goal" is the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Milligrams Per Liter (MG/L): A unit of measurement used in reporting the concentration of matter in water as determined by water analyses.

Nephelometric Turbidity Unit (NTU): Nephelometric Turbidity Unit is a measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

Parts Per Million (ppm): A unit of measurement used in reporting the concentration of matter in water as determined by water analyses.

pCi/L: Picocuries per liter is a unit for measuring radioactive concentrations. The curie (Ci) unit is the activity of 1 gram of pure radium.

N/A (Not applicable): Means EPA has not established MCLGs for these substances.

Ug/L: Units of measurement in micrograms/liter. A unit of concentration for dissolved substances based on their weights.

Regulated Contaminants Unit Measurement	Violation	Range of Level Detected	Ideal Goal (MCLG)	MAX Allowed (MCL)	Description & Origin of Substance
Health Related (Primary) Standards: Inorganic					
Fluoride (MG/L)	No	0.31-1.13	1	4	Sodium fluoride added to Camas water to maintain good dental hygiene.
Nitrates (MG/L) (As Nitrogen)	No	1.30-1.60	10	10	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural products.
Health Related Standards: Radiological					
Radium 228	No	.0366 -.313	0.00	5 pCi/L	Erosion of natural deposits leaching into the groundwater.
Other Substances					
Total Hardness (ppm)	No	22	N/A	N/A	Hardness units are in ppm as $CaCO^3$ (calcium carbonate equivalent units).
Turbidity (NTU)	No	0.33	N/A	N/A	Turbidity is a measure of the cloudiness of water.
Disinfection By-Products and Residuals within the Distribution System					
Haloacetic Acids (UG/L)	No	6.9	48	60	By-product of drinking water disinfection.
Total Trihalomethanes (UG/L) *	No	4.50-10.00	60	80	Chlorination by-product caused by the reaction of chlorine with organic matter.

New Water System Supply

As the City of Camas continues to grow, our water system serves a greater population each year. The City is currently seeking new water system supply to meet the needs of our growing population. You may hear about a new groundwater well called "Well 17", which the City is in the active planning stages. This includes finding a suitable location, testing for water availability and quality and seeking new water rights from the Department of Ecology. This process will take at least two years to complete but the City is committed to delivering clean and reliable drinking water to our citizens and meeting growing demands.

Our Water System

The City of Camas has multiple water sources that include surface and ground water. The surface water sources, Boulder and Jones Creeks, are located on the south side of Larch Mountain, northeast of Camas. Surface water was not used in 2017. The ground water sources include nine wells near the Washougal river and one well in Grass Valley. All water sources are treated with chlorine for disinfection, fluoride for good dental health and sodium hydroxide to reduce the corrosion of copper piping to meet State and EPA standards. Water pressure and fire flows are maintained throughout the service area with seven distribution reservoirs, nine pump stations, and over 160 miles of pipeline.

Water Leaks

Locate your master water supply valve and label it. The master supply valve can be turned off in case of a major leak or broken pipe.

The majority of leaks in residential plumbing systems are found at the toilet tank (fill and flapper valves).

Other common areas for leaks include:

- Lawn irrigation valves and lines
- Hose in yard turned on or leaking
- Ornamental fountains, fish ponds
- Relief valve or fittings on water heater
- Leaking pipes or fittings in the house
- Line between the meter and the house
- Dripping faucets in bathrooms or sinks
- Outside faucet open or dripping

The City is actively working to reduce system leaks. If you suspect a leak in your neighborhood please call 360-817-1563.

Check out this helpful website at www.epa.gov/watersense/fixaleak

City of Camas Numbers
Residential population served: 23,080
The Camas water system contains:
Seven reservoirs
Nine pump stations
8,649 water meters
Ten wells
More than 500 fire hydrants

Five Simple Water Conservation Tips

1. Fix leaks inside and outside, including old leaky faucets, toilets, hoses, and sprinkler systems.
2. Choose water saving fixtures and appliances and you will use 30% less water.
3. Sweep porches, driveways and sidewalks rather than hosing, to not only conserve water, but to avoid runoff.
4. Water late at night or early in the morning (10:00 pm to 6:00 am).
5. Take a short shower instead of a bath.

An inch of water per week is enough to keep lawns green.

For more water saving ideas see our newsletters, news releases, and/or printed material available at City Hall and the Operations Center, or visit our website at : www.cityofcamas.us/pwwater

It's Yearly Backflow Testing Time!

Make sure to schedule your yearly backflow inspection. If you are a property owner and have an in-ground sprinkler system you are required by State and local laws to install and maintain a backflow prevention device on your service line, and have it inspected yearly by a certified backflow tester. If you have more questions call our Backflow Cross Connection Hotline at 360-817-1569, or email us at backflow@cityofcamas.us. For more information and a current list of certified backflow testers visit www.cityofcamas.us/index.php/pwwater#backflowirrigation

Water Quality Monitoring

The City of Camas routinely monitors for constituents in your drinking water according to Federal and State laws. Field and laboratory analyses include tests for bacteria, as well as chemical and physical indicators. Reports are submitted monthly to the Department of Health to report that your water meets all drinking water standards. Should there ever be a public health concern, you would be notified immediately.

Please report possible water pollution (illicit discharge) to the City of Camas 360-817-1563, or the Department of Ecology SW Regional Office 360-407-6300

2018 CONSUMER CONFIDENCE REPORT

City of Camas Annual Water Quality Report

Public Water System ID: 108002

CONTACT US

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360-834-2462
www.cityofcamas.us

Public Works
360-817-1563
publicworks@cityofcamas.us

After-Hours/Holiday Water Emergency: 360-737-0592

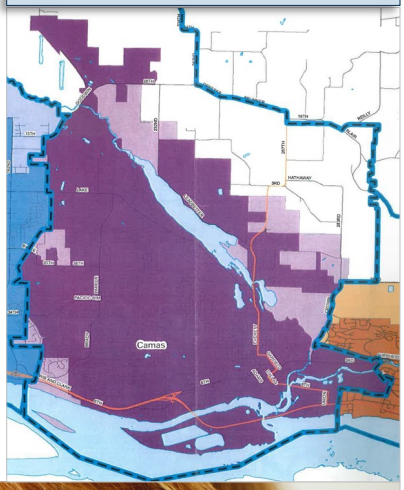
Cross-Connection Control
backflow@cityofcamas.us
360-817-1569

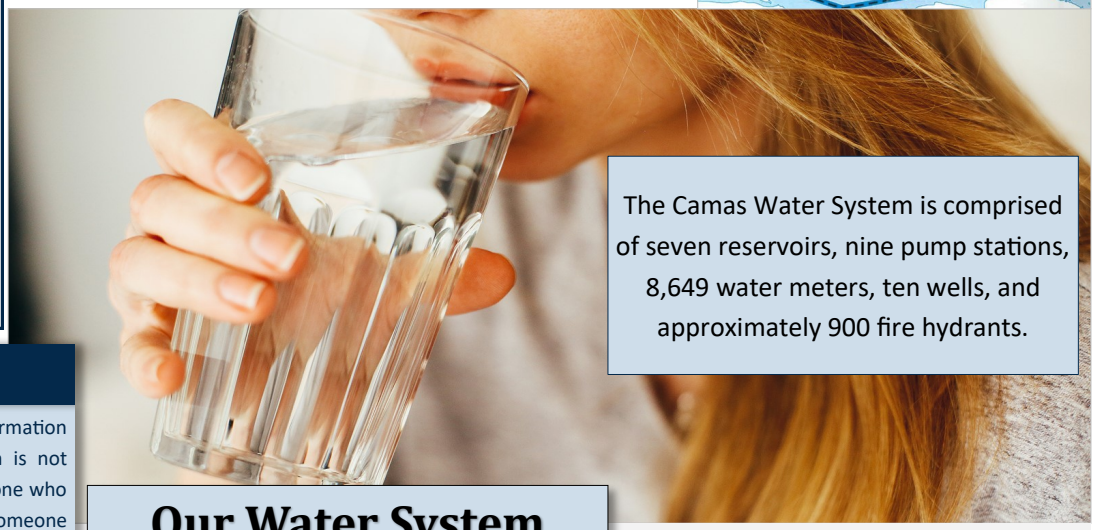
Camas Connect 24/7
Download our city app to make service requests, or go to www.cityofcamas.us/service-request

The City of Camas is pleased to present the annual Water Quality Report, which provides the public with water testing results. The health of our consumers and their families is paramount and our goal is to provide the community with a safe and dependable supply of drinking water.

At the City of Camas we understand how important it is to ensure we provide high quality water. We work diligently to provide top quality water to a growing residential population of 23,770.

More information about Camas drinking water and what we're doing to keep your water safe can be found online at www.cityofcamas.us/pwwater





The Camas Water System is comprised of seven reservoirs, nine pump stations, 8,649 water meters, ten wells, and approximately 900 fire hydrants.

IMPORTANT!

This report contains important information about your drinking water. If English is not your first language, please have someone who can translate it for you, or speak with someone who understands it.

Este informe contiene información importante sobre su agua potable. Si el inglés no es su primer idioma, tenga a alguien que pueda traducirlo por usted o hable con alguien que lo entienda.

Ce rapport contient des informations importantes sur votre eau potable. Si l'anglais n'est pas votre langue maternelle, demandez à quelqu'un de le traduire à votre place ou de parler à quelqu'un qui le comprend.

Этот отчет содержит важную информацию о вашей питьевой воде. Если английский не является вашим родным языком, попросите кого-нибудь, кто может перевести его для вас, или поговорить с кем-то, кто понимает его.

Our Water System

The City of Camas has multiple water sources that include surface and ground water. The surface water sources (Boulder and Jones Creeks) are located on the south-side of Larch Mountain, northeast of Camas. Surface water was not used in 2018. The ground water sources include nine wells near the Washougal river and one well in Grass Valley. All water sources are treated with chlorine for disinfection, fluoride for good dental health and sodium hydroxide to reduce the corrosion of copper piping to meet State and EPA standards. Water pressure and fire flows are maintained throughout the service area with seven distribution reservoirs, nine pump stations, and over 160 miles of pipeline.

We've got news!

Follow City of Camas on social media and on the city's website for the latest in updates and alerts:

Website: www.cityofcamas.us
Twitter: www.twitter.com/CityofCamas— @CityofCamas
Facebook: www.facebook.com/cityofcamas

2018 Water Quality Summary

Our drinking water is safe and surpasses all State and Federal health standards!

The City of Camas routinely monitors for contaminants in your drinking water according to Federal and State laws. Field and laboratory analyses include tests for bacteria, as well as chemical and physical indicators. Reports are submitted monthly to the Department of Health to report that City water meets all drinking water standards. Contaminants that were detected are listed in the following tables.

Should there ever be a public health concern, you would be notified immediately. Please report possible water pollution (illicit discharge) to the City of Camas 360-817-1563, or the Department of Ecology-SW Regional Offices 360-407-6300.

Definitions

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as possible using the best available treatment technologies.

MCLG (Maximum Contaminant Level Goal): The maximum level of a contaminant in drinking water below which there is no known or expected health risk. MCLGs allow for a margin of safety.

AL (Action Level): The concentration of a contaminant which, if exceeded, triggers treatments or other requirements that a waster system must follow.

Milligram Per Liter (mg/L): A unit of measurement used in reporting the concentration of matter in water as determined by water analyses.

NTU (Nephelometric Turbidity Unit): Turbidity is a measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

Definitions

ug/L: Units of measurement in micrograms/liter. A unit of concentration for dissolved substances based on their weights.

ppm: (1 parts per million = 1 mh/L = 1 milligram per liter)

ppb: (1 parts per billion = 0.001 mg/L = 1 microgram per liter)

pCi/L: Picocuries per liter is a unit for measuring radioactive concentrations. The curie (Ci) unit is the activity of 1 gram of pure radium.

NA (Not Applicable): Means that the U.S. EPA has not established MCLGs for these substances.

ND (Not Detected): A compound that was analyzed and not detected at a level greater than or equal to the state reporting level.

2018 Detected Contaminants

		EPA Regulations		City of Camas Water Quality Results	
Regulated Contaminants	**Units**	**Ideal Level/Goal (MCLG)**	**Maximum Level (MCL)**	**Range of Level Detected**	**Violation**
Fluoride	mg/L	.5—2.9	4	.42—.9	No
Fluoride is added to your water in carefully controlled levels for dental health. In May 2016, the Washington State Department of Health changed the fluoridation requirement to a target of 0.7 mg/L from the previous target of 0.7-1.2 mg/L.					
Nitrates ***(as nitrogen)***	mg/L	10	10	Not Detected—1.7	No
Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural products.					
Haloacetic Acid (5)	ug/L	48	60	2.9	No
Trihalomethanes	ug/L	60	80	4.5	No
Haloacetic acids (HAA5) and trihalomethanes form as by-products of the chlorination process that is used to kill or inactivate disease-causing microbes.					

Unregulated contaminants are those for which the EPA has not established drinking water standards. The purpose of unregulated contaminant monitoring is to help EPA determine their occurrence in drinking water and potential need for future regulation. For more information, go to: https://www.epa.gov/dwucmr/third-unregulated-contaminant-monitoring-rule or contact the Safe Drinking Water Hotline at 1-800-426-4791 or via website https://www.epa.gov/home/epa-hotlines.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and in some cases, radio-active material. It can also pick up substances resulting from the presence of animals or from human activity. To ensure that tap water is safe to drink, the Washington Department of Health and the United State Environmental Protection Agency (EPA) prescribes regulations that limit the amount of certain contaminants in the water provided by public water systems. Contaminants that may be present in source water before we treat it include:

- **Microbial Contaminants**, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- **Inorganic Contaminants**, such as salts and metals, which can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, and mining or farming.
- **Pesticides and Herbicides**, which may come from a variety of sources such as agriculture and residential uses.
- **Organic Chemicals**, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems.

Mandatory EPA Statement for All Community Water Systems

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (1-800-426-4791).

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The US EPA-Center for Disease Control guidelines on appropriate means to lessen the risk of infection by cryptosporidium and other microbiological contaminants are from the EPA's Safe Drinking Water website.

Lead & Copper

In 2018, the City tested thirty residences for lead and copper. The highest result was 0.0026 mg/L for Lead, and 0.6100 mg/L in Copper. No households exceeded the action level. The next sampling event is scheduled for 2021.

Parameter	Major Source	Units	(MCLG) mg/L	(AL) mg/L	City Results mg/L	Violation
Lead *(at consumers tap)*	Plumbing, erosion of natural deposits.	ppb	0	0.015	.0010—.0034	No
Copper		ppm	0	1.30	.027—.55	No

To Reduce Lead and Copper Exposure

1. When your water has been sitting for several hours, flush the pipe by running the cold water tap until the water is noticeably colder before using the water for drinking or cooking.
2. Use only cold water for drinking, cooking, and making baby formula. Hot water may contain higher levels of copper.
3. Frequently clean the filter screens and aerators in faucets to remove captured particles.
4. If building or remodeling, only use "lead free" or low lead piping and materials. Avoid using copper piping or brass fixtures for locations where water will be consumed or used in food preparation.

EPA STATEMENT

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Camas is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to two minutes before using water for drinking or cooking. The EPA requires the City to conduct lead testing every three years.

Copper is a mineral component naturally found in solids. In the correct amounts, it is an essential nutrient for humans and plants. In Washington State, most copper in drinking water comes from corrosion of household plumbing. Plumbing sources can include copper pipe and brass fixtures. Copper from plumbing corrosion can accumulate overnight. Although copper is an essential mineral in the diet, too much copper can cause health problems. Copper is widely distributed within the tissues of the body, but accumulates primarily in the liver and kidneys. A single dose of 15 mg of copper can cause nausea, vomiting, diarrhea, and intestinal cramps.

If you are concerned about lead or copper in your water, you may wish to have your water tested. Information on lead and copper in your drinking water, testing methods, and steps you can take to minimize exposure is available from the **Safe Drinking Water Hotline 1-800-426-4791, or at www.epa.gov/safewater/lead.**

Water Conservation

In 2018, the **average daily water consumption in Camas was 4.2 million gallons**. Our **peak usage day was on August 19, 2018, when 8,335,000 gallons were consumed**. Most of this increase in the summer months, is due to irrigation demands. We are once again asking for the publics help to implement a voluntary odd/even lawn watering program for residential customers. Water on odd days for home addresses that end in an odd number, and even days if it ends in an even number.

In 2018, the City replaced approximately 470 advanced radio read water meters. We will be continuing the water meter replacement project and upgrading approximately 529 additional meters in 2019.

City Water Saving Commitments

- To reduce the customer consumption per ERU by one percent or approximately two gallons-per-day per year over the next six years. The City will continue to reduce distribution system loss at-or-below ten percent for the next five years.
- Replacing industrial, commercial, and residential service meters with the new radio read meters, which will allow the City to log usage more effectively to notify customers about continuous leaks or high consumption.
- Encourage the installation of smart controllers on irrigation systems for the school district and industrial users.
- Educate the public on water-saving devices, and distribute water conservation kits and water-saving devices to homeowners. Continue metering all sources.
- Replace water mains and service lines in problematic areas and complete Capital Projects in accordance with the new Water System Plan Update.

Community Involvement to Reduce Water Leaks

Locate your master water supply valve and label it. The master supply valve can be turned off in case of a major leak or broken pipe. The majority of leaks in residential plumbing systems are found at the toilet tank (fill and flapper valves).

CONSERVATION TIPS

Fix leaks on old leaky faucets, toilets, hoses, and sprinkler systems.

Choose water saving fixtures and appliances and you will use 30% less water.

Sweep porches, driveways & sidewalks rather than hosing, to not only conserve water, but to avoid runoff.

Water late at night or early in the morning (10:00 pm or 6:00 am).

Take a short shower instead of a bath.

Other common leaks include:

- Lawn irrigation valves and lines
- Yard hose turned on or leaking
- Ornamental fountains & fish ponds
- Water heater relief valve or fittings
- Leaking house pipes or fittings
- Leaking between the house and meter
- Inside and outside dripping faucets

The City is actively working to reduce system leaks. If you suspect a leak in your neighborhood please call City of Camas at 360-817-1563.

Cross Connection Program

What is backflow?

Backflow is the undesirable reversal of the flow of water from the intended direction of flow. When this occurs, other liquids, mixtures, gases or substances can enter the potable water piping through cross connection. Under the right hydraulic conditions, backflow can result in contamination of the water supply, which is called backsiphonage and backpressure.

How to keep our drinking water clean and safe

Locate or install a backflow device

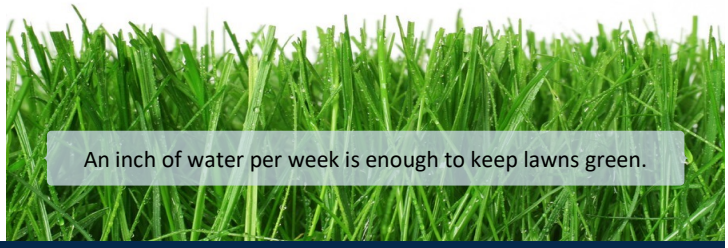
If you have an underground irrigation system, check to see if you have a backflow assembly. The backflow assembly is a brass valve usually found between your water meter and the point where your water service line enters your home, usually in a small green box similar to a meter box. If your irrigation system does not include backflow assembly or if you are installing a new underground irrigation system, City of Camas plumbing code requires you to install a *Double Check Valve Assembly (DCVA)* at a minimum.

Test your backflow assembly device annually

Once you have your backflow assembly installed or located, make sure to have it tested annually by a state-certified backflow assembly tester. If you are a property owner and have an in-ground sprinkler system you are required by state and local laws (WAC 246-290) to install and maintain a backflow prevention device on your service line, and have it inspected yearly by a Washington State Certified Backflow Assembly Tester (BAT). If you have more questions call our Backflow Hotline at 360-817-1569, or email us at backflow@cityofcamas.us

Properly winterizing your irrigation system

During the fall, most irrigation systems will need to be winterized to prevent pipes from freezing and breaking. Many times this involves using compressed air to blow out the excess water left in the irrigation piping. Although this is the best method, backflow of compressed air and contaminants may enter the drinking water distribution system and cause damage and or health risks if not performed properly. Make sure the compressed air is connected to a properly installed blowout connection to avoid inadvertently introducing air into our water system.



Stop these biggest water consumers first! Look for the Water Sense label on new plumbing fixtures; Repair leaky toilets or install high efficiency low flow toilets; Consider purchasing a water-energy-efficient washer and use water-savings habits such as washing full loads only. Repair leaky faucets, and turn off water when you shave or brush your teeth, Install low flow showerheads and take shorter showers. **For more information Visit City Hall to pick up printed material or visit our website at www.cityofcamas.us/pwwater, or check out this the EPA's website at www.epa.gov/watersense/fixaleak.**

2019 CONSUMER CONFIDENCE REPORT

City of Camas Annual Water Quality Report

Public Water System ID: 108002

CONTACT US

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Public Works
360-817-1563
publicworks@cityofcamas.us

After-Hours/Holiday Water Emergency: 360-737-0592

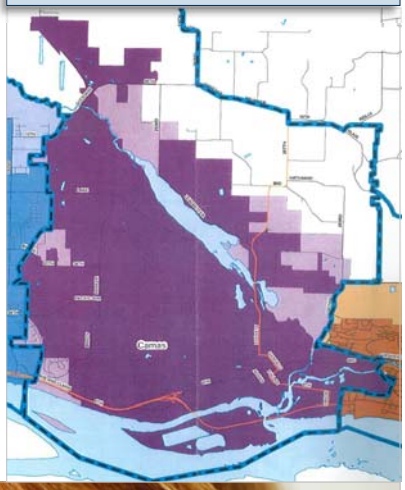
Cross-Connection Control
backflow@cityofcamas.us
360-817-1569

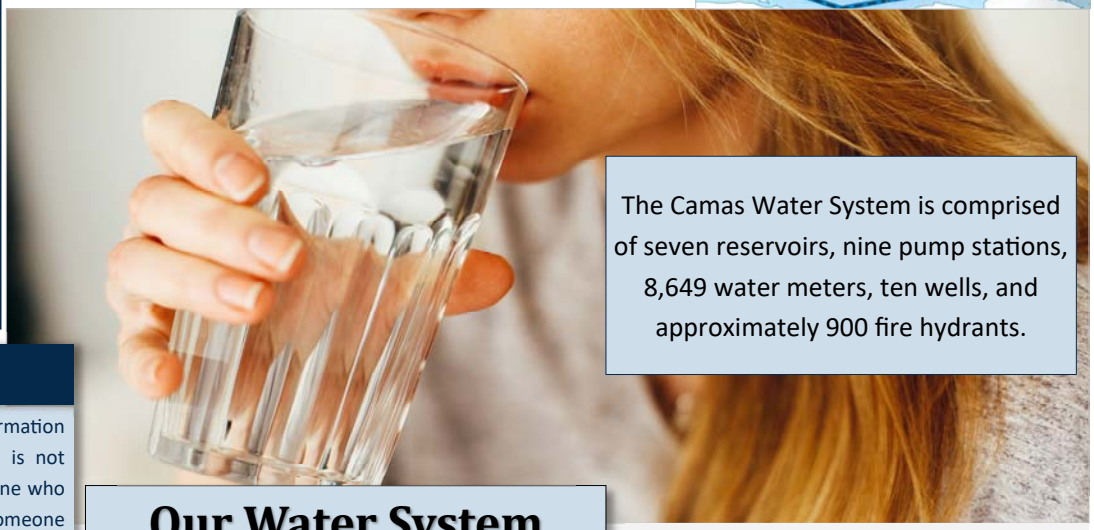
Camas Connect 24/7
Download our city app to make service requests, or go to www.cityofcamas.us/service-request

The City of Camas is pleased to present the annual Water Quality Report, which provides the public with water testing results. The health of our consumers and their families is paramount and our goal is to provide the community with a safe and dependable supply of drinking water.

At the City of Camas we understand how important it is to ensure we provide high quality water. We work diligently to provide top quality water to a growing residential population of approximately 25,000.

More information about Camas drinking water and what we're doing to keep your water safe can be found online at www.cityofcamas.us/pwwater.





The Camas Water System is comprised of seven reservoirs, nine pump stations, 8,649 water meters, ten wells, and approximately 900 fire hydrants.

IMPORTANT!

This report contains important information about your drinking water. If English is not your first language, please have someone who can translate it for you, or speak with someone who understands it.

Este informe contiene información importante sobre su agua potable. Si el inglés no es su primer idioma, tenga a alguien que pueda traducirlo por usted o hable con alguien que lo entienda.

Ce rapport contient des informations importantes sur votre eau potable. Si l'anglais n'est pas votre langue maternelle, demandez à quelqu'un de le traduire à votre place ou de parler à quelqu'un qui le comprend.

Этот отчет содержит важную информацию о вашей питьевой воде. Если английский не является вашим родным языком, попросите кого-нибудь, кто может перевести его для вас, или поговорить с кем-то, кто понимает его.

Our Water System

The City of Camas has multiple water sources that include surface and ground water. The surface water sources (Boulder and Jones Creeks) are located on the south-side of Larch Mountain, northeast of Camas. Surface water was not used in 2019. The ground water sources include nine wells near the Washougal river and one well in Grass Valley. All water sources are treated with chlorine for disinfection, fluoride for good dental health and sodium hydroxide to reduce the corrosion of copper piping to meet State and EPA standards. Water pressure and fire flows are maintained throughout the service area with seven distribution reservoirs, nine pump stations, and over 160 miles of pipeline.

We've got news!

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Twitter: www.twitter.com/CityofCamas— @CityofCamas
Facebook: www.facebook.com/cityofcamas

2019 Water Quality Summary

Our drinking water is safe and surpasses all State and Federal health standards!

The City of Camas routinely monitors for contaminants in your drinking water according to Federal and State laws. Field and laboratory analyses include tests for bacteria, as well as chemical and physical indicators. Reports are submitted monthly to the Department of Health to report that City water meets all drinking water standards. Contaminants that were detected are listed in the following tables.

Should there ever be a public health concern, you would be notified immediately. Please report possible water pollution (illicit discharge) to the City of Camas 360-817-1563, or the Department of Ecology-SW Regional Offices 360-407-6300.

Definitions

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as possible using the best available treatment technologies.

MCLG (Maximum Contaminant Level Goal): The maximum level of a contaminant in drinking water below which there is no known or expected health risk. MCLGs allow for a margin of safety.

AL (Action Level): The concentration of a contaminant which, if exceeded, triggers treatments or other requirements that a waster system must follow.

Milligram Per Liter (mg/L): A unit of measurement used in reporting the concentration of matter in water as determined by water analyses.

NTU (Nephelometric Turbidity Unit): Turbidity is a measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

Definitions

ug/L: Units of measurement in micrograms/liter. A unit of concentration for dissolved substances based on their weights.

ppm: (1 parts per million = 1 mh/L = 1 milligram per liter)

ppb: (1 parts per billion = 0.001 mg/L = 1 microgram per liter)

pCi/L: Picocuries per liter is a unit for measuring radioactive concentrations. The curie (Ci) unit is the activity of 1 gram of pure radium.

NA (Not Applicable): Means that the U.S. EPA has not established MCLGs for these substances.

ND (Not Detected): A compound that was analyzed and not detected at a level greater than or equal to the state reporting level.

2019 Detected Contaminants

		EPA Regulations		City of Camas Water Quality Results	
Regulated Contaminants	Units	Ideal Level/Goal (MCLG)	Maximum Level (MCL)	Range of Level Detected	Violation
Fluoride	mg/L	.5—.9	4	.45—.84	No
Fluoride is added to your water in carefully controlled levels for dental health. In May 2016, the Washington State Department of Health changed the fluoridation requirement to a target of 0.7 mg/L from the previous target of 0.7-1.2 mg/L.					
Nitrates ***(as nitrogen)***	mg/L	10	10	Not Detected—1.4	No
Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural products.					
Haloacetic Acid (5)	ug/L	48	60	1.0-1.1	No
Trihalomethanes	ug/L	60	80	2.3-4.1	No
Haloacetic acids (HAA5) and trihalomethanes form as by-products of the chlorination process that is used to kill or inactivate disease-causing microbes.					

Unregulated contaminants are those for which the EPA has not established drinking water standards. The purpose of unregulated contaminant monitoring is to help EPA determine their occurrence in drinking water and potential need for future regulation. For more information, go to: https://www.epa.gov/dwucmr/third-unregulated-contaminant-monitoring-rule or contact the Safe Drinking Water Hotline at 1-800-426-4791 or via website https://www.epa.gov/home/epa-hotlines.

In general, the sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and in some cases, radio-active material. It can also pick up substances resulting from the presence of animals or from human activity. To ensure that tap water is safe to drink, the Washington Department of Health and the United State Environmental Protection Agency (EPA) prescribe regulations that limit the amount of certain contaminants in the water provided by public water systems. Contaminants that may be present in source water before we treat it include:

Mandatory EPA Statement for All Community Water Systems

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (1-800-426-4791).

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The US EPA-Center for Disease Control guidelines on appropriate means to lessen the risk of infection by cryptosporidium and other microbiological contaminants are from the EPA's Safe Drinking Water website.

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- **Inorganic Contaminants**, such as salts and metals, which can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, and mining or farming.
- **Pesticides and Herbicides**, which may come from a variety of sources such as agriculture and residential uses.
- **Organic Chemicals**, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems.

Lead & Copper

In 2018, the City tested thirty residences for lead and copper. The highest result was 0.0026 mg/L for Lead, and 0.6100 mg/L in Copper. No households exceeded the action level. The City was not required to test for lead or copper in 2019. The next sampling event is scheduled for 2021.

Parameter	Major Source	Units	(MCLG) mg/L	(AL) mg/L	City Results mg/L	Violation
Lead *(at consumers tap)*	Plumbing, erosion of natural deposits.	ppb	0	0.015	.0010—.0034	No
Copper		ppm	0	1.30	.027—.55	No

To Reduce Lead and Copper Exposure

1. When your water has been sitting for several hours, flush the pipe by running the cold water tap until the water is noticeably colder before using the water for drinking or cooking.
2. Use only cold water for drinking, cooking, and making baby formula. Hot water may contain higher levels of copper.
3. Frequently clean the filter screens and aerators in faucets to remove captured particles.
4. If building or remodeling, only use "lead free" or low lead piping and materials. Avoid using copper piping or brass fixtures for locations where water will be consumed or used in food preparation.

EPA STATEMENT

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Camas is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to two minutes before using water for drinking or cooking. The EPA requires the City to conduct lead testing every three years.

Copper is a mineral component naturally found in solids. In the correct amounts, it is an essential nutrient for humans and plants. In Washington State, most copper in drinking water comes from corrosion of household plumbing. Plumbing sources can include copper pipe and brass fixtures. Copper from plumbing corrosion can accumulate overnight. Although copper is an essential mineral in the diet, too much copper can cause health problems. Copper is widely distributed within the tissues of the body, but accumulates primarily in the liver and kidneys. A single dose of 15 mg of copper can cause nausea, vomiting, diarrhea, and intestinal cramps.

If you are concerned about lead or copper in your water, you may wish to have your water tested. Information on lead and copper in your drinking water, testing methods, and steps you can take to minimize exposure is available from:

Safe Drinking Water Hotline 1-800-426-4791, or at www.epa.gov/safewater/lead.

Water Conservation

In 2019, the average daily water consumption in Camas was 3.96 million gallons. Our peak usage day was on June 15, 2019, when 7,693,000 gallons were consumed. Most of this increase in the summer months is due to irrigation demands. We are once again asking for the public's help to implement a voluntary odd/even lawn watering program for residential customers. Water on odd days for home addresses that end in an odd number, and even days if it ends in an even number.

In 2019, the City replaced approximately 596 advanced radio read water meters. We will be continuing the water meter replacement project and upgrading additional meters in 2020.

City Water Saving Commitments

- To reduce the customer consumption per home by one percent or approximately two gallons-per-day per year over the next six years. The City will maintain distribution system loss at-or-below ten percent for the next five years.
- Replacing industrial, commercial, and residential service meters with the new radio read meters, which will allow the City to log usage more effectively to notify customers about continuous leaks or high consumption.
- Encourage the installation of smart controllers on irrigation systems for the school district and industrial users.
- Educate the public on water-saving devices, and distribute water conservation kits and water-saving devices to homeowners. Continue metering all sources.
- Replace water mains and service lines in problematic areas and complete Capital Projects in accordance with the new Water System Plan Update.

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Locate your master water supply valve and label it. The master supply valve can be turned off in case of a major leak or broken pipe. The majority of leaks in residential plumbing systems are found at the toilet tank (fill and flapper valves).

Other common leaks include:

- Lawn irrigation valves and lines
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- Inside and outside dripping faucets

The City is actively working to reduce system leaks. If you suspect a leak in your neighborhood please call City of Camas at 360-817-1563.

CONSERVATION TIPS

Fix leaks on old leaky faucets, toilets, hoses, and sprinkler systems.

Choose water saving fixtures and appliances and you will use 30% less water.

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An inch of water per week is enough to keep lawns green.

Cross Connection Program

What is Backflow?

Backflow is the undesirable reversal of the flow of water from the intended direction of flow. When this occurs, other liquids, mixtures, gases or substances can enter the potable water piping through cross connection. Under the right hydraulic conditions, backflow can result in contamination of the water supply, which is called back siphonage and backpressure.

How to keep our drinking water clean and safe:

Locate or install a backflow device

If you have an underground irrigation system, check to see if you have a backflow assembly. The backflow assembly is a brass valve usually found between your water meter and the point where your water service line enters your home, usually in a small green box similar to a meter box. If your irrigation system does not include backflow assembly or if you are installing a new underground irrigation system, City of Camas plumbing code requires you to install a *Double Check Valve Assembly (DCVA)* at a minimum.

Test your backflow assembly device annually

Once you have your backflow assembly installed or located, make sure to have it tested annually by a state-certified backflow assembly tester. If you are a property owner and have an in-ground sprinkler system you are required by state and local laws (WAC 246-290) to install and maintain a backflow prevention device on your service line, and have it inspected yearly by a Washington State Certified Backflow Assembly Tester (BAT).

If you have more questions call our Backflow Hotline at 360-817-1569, or email us at backflow@cityofcamas.us

Properly winterizing your irrigation system

During the fall, most irrigation systems will need to be winterized to prevent pipes from freezing and breaking. Many times this involves using compressed air to blow out the excess water left in the irrigation piping. Although this is the best method, backflow of compressed air and contaminants may enter the drinking water distribution system and cause damage and or health risks if not performed properly. Make sure the compressed air is connected to a properly installed blowout connection to avoid inadvertently introducing air into our water system.

Stop these biggest water consumers first! Look for the Water Sense label on new plumbing fixtures; Repair leaky toilets or install high efficiency low flow toilets; Consider purchasing a water-energy-efficient washer and use water-savings habits such as washing full loads only. Repair leaky faucets, and turn off water when you shave or brush your teeth, Install low flow showerheads and take shorter showers. **For more information Visit City Hall to pick up printed material or visit our website at www.cityofcamas.us/pwwater, or check out this the EPA's website at www.epa.gov/watersense/fixaleak.**

2020 Consumer Confidence Report

CONTACT US

City Hall
616 NE Fourth Ave
Camas, WA 98607
360-834-2462
www.cityofcamas.us

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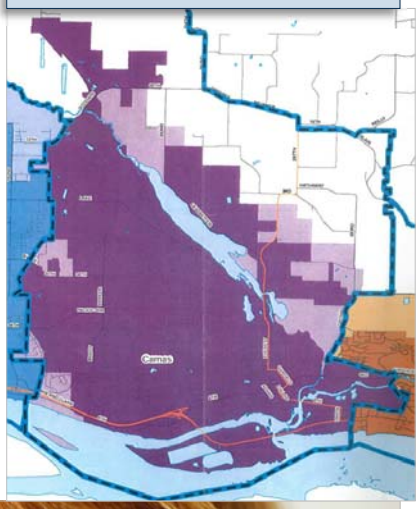
City of Camas Annual Water Quality Report

Public Water System ID: 108002



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2020 Detected Contaminants

		EPA Regulations		City of Camas Water Quality Results	
Regulated Contaminants	**Units**	**Ideal Level/Goal (MCLG)**	**Maximum Level (MCL)**	**Range of Level Detected**	**Violation**
Fluoride	mg/L	.50 -.90	4	.48 - 1.09	No
Fluoride is added to your water in carefully controlled levels for dental health. In May 2016, the Washington State Department of Health changed the fluoridation requirement to a target of 0.7 mg/L from the previous target of 0.7-1.2 mg/L.					
Nitrates ***(as nitrogen)***	mg/L	10	10	Not Detected - 1.30	No
Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural products.					
Haloacetic Acid (5)	ug/L	48	60	.64 - 1.90	No
Trihalomethanes	ug/L	60	80	.29 - .54	No
Haloacetic acids (HAA5) and trihalomethanes form as by-products of the chlorination process that is used to kill or inactivate disease-causing microbes.					
Radionuclides - Naturally Occurring Substances In Drinking Water					
Gross Alpha	pCil	0	15	2.34 -2.95	No
Radium 228	pCil	0	5	.974 -.713	No
Total Coliform Bacteria	%	0	<5% Positive/Mo.	0	No

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- **Radioactive Contaminants**, which are naturally occurring as a result of mining and/or gas production.

Lead & Copper

In 2018, the City tested thirty residences for lead and copper. The highest result was 0.0026 mg/L for Lead, and 0.6100 mg/L in Copper. No households exceeded the action level. The City was not required to test for lead or copper in 2020. The next sampling event is scheduled for 2021.

Parameter	Major Source	Units	(MCLG) mg/L	(AL) mg/L	City Results mg/L	Violation
Lead *(at consumers tap)*	Plumbing, erosion of natural deposits.	ppb	0	0.015	.0010—.0034	No
Copper		ppm	0	1.30	.027—.55	No

To Reduce Lead and Copper Exposure

- When your water has been sitting for several hours, flush the pipe by running the cold water tap until the water is noticeably colder before using the water for drinking or cooking.
- Use only cold water for drinking, cooking, and making baby formula. Hot water may contain higher levels of copper.
- Frequently clean the filter screens and aerators in faucets to remove captured particles.
- If building or remodeling, only use "lead free" or low lead piping and materials. Avoid using copper piping or brass fixtures for locations where water will be consumed or used in food preparation.

EPA STATEMENT

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Camas is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to two minutes before using water for drinking or cooking. The EPA requires the City to conduct lead testing every three years.

Copper is a mineral component naturally found in solids. In the correct amounts, it is an essential nutrient for humans and plants. In Washington State, most copper in drinking water comes from corrosion of household plumbing. Plumbing sources can include copper pipe and brass fixtures. Copper from plumbing corrosion can accumulate overnight. Although copper is an essential mineral in the diet, too much copper can cause health problems. Copper is widely distributed within the tissues of the body, but accumulates primarily in the liver and kidneys. A single dose of 15 mg of copper can cause nausea, vomiting, diarrhea, and intestinal cramps.

If you are concerned about lead or copper in your water, you may wish to have your water tested. Information on lead and copper in your drinking water, testing methods, and steps you can take to minimize exposure is available from:

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Water Conservation

In 2020 the average daily water consumption in Camas was 4.22 million gallons. Our peak usage day was on August 16, 2020, when 8,686,000 gallons were consumed. Most of this increase in the summer months is due to irrigation demands. We are once again asking for the public's help to implement a voluntary odd/even lawn watering program for residential customers. Water on odd days for home addresses that end in an odd number, and even days if it ends in an even number.

City Water Saving Commitments

- To reduce the customer consumption per home by one percent or approximately two gallons-per-day per year over the next six years. The City will maintain distribution system loss at-or-below ten percent for the next five years.
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Locate your master water supply valve and label it. The master supply valve can be turned off in case of a major leak or broken pipe. The majority of leaks in residential plumbing systems are found at the toilet tank (fill and flapper valves).

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Locate or install a backflow device

If you have an underground irrigation system, check to see if you have a backflow assembly. The backflow assembly is a brass valve usually found between your water meter and the point where your water service line enters your home, usually in a small green box similar to a meter box. If your irrigation system does not include backflow assembly or if you are installing a new underground irrigation system, City of Camas plumbing code requires you to install a *Double Check Valve Assembly (DCVA)* at a minimum.

Test your backflow assembly device annually

Once you have your backflow assembly installed or located, make sure to have it tested annually by a state-certified backflow assembly tester. If you are a property owner and have an in-ground sprinkler system you are required by state and local laws (WAC 246-290) to install and maintain a backflow prevention device on your service line, and have it inspected yearly by a Washington State Certified Backflow Assembly Tester BAT). View our Certified Backflow Tester List on the City website: https://www.cityofcamas.us/publicworks/page/backflow-and-cross-connection-prevention.

If you have more questions call our Backflow Hotline at 360-817-1569, or email us at backflow@cityofcamas.us

Properly winterizing your irrigation system

During the fall, most irrigation systems will need to be winterized to prevent pipes from freezing and breaking. Many times this involves using compressed air to blow out the excess water left in the irrigation piping. Although this is the best method, backflow of compressed air and contaminants may enter the drinking water distribution system and cause damage and or health risks if not performed properly. Make sure the compressed air is connected to a properly installed blowout connection to avoid inadvertently introducing air into our water system.

For more water-leak information, check the EPA's website at www.epa.gov/watersense/fixaleak.

2021 Consumer Confidence Report

CONTACT US

City Hall
616 NE Fourth Ave
Camas, WA 98607
360-834-2462
www.cityofcamas.us

Public Works
360-817-1563
publicworks@cityofcamas.us

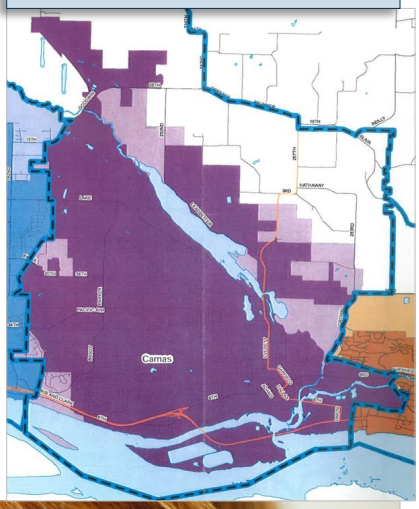
After-Hours/Holiday Water Emergency: 360-737-0592

Cross-Connection Control
backflow@cityofcamas.us
360-817-1569

Camas Connect 24/7
Download our city app to make service requests, or go to www.cityofcamas.us/service-request

City of Camas Annual Water Quality Report

Public Water System ID: 108002



The City of Camas is pleased to present the annual Water Quality Report, which provides the public with water testing results. The health of our consumers and their families is paramount and our goal is to provide the community with a safe and dependable supply of drinking water.

At the City of Camas we understand how important it is to ensure we provide high quality water. We work diligently to provide top quality water to our growing residential population.

More information about Camas drinking water and what we're doing to keep your water safe can be found online at www.cityofcamas.us/publicworks/page/water-services

IMPORTANT!

This report contains important information about your drinking water. If English is not your first language, please have someone who can translate it for you, or speak with someone who understands it.

Este informe contiene información importante sobre su agua potable. Si el inglés no es su primer idioma, tenga a alguien que pueda traducirlo por usted o hable con alguien que lo entienda.

Ce rapport contient des informations importantes sur votre eau potable. Si l'anglais n'est pas votre langue maternelle, demandez à quelqu'un de le traduire à votre place ou de parler à quelqu'un qui le comprend.

Этот отчет содержит важную информацию о вашей питьевой воде. Если английский не является вашим родным языком, попросите кого-нибудь, кто может перевести его для вас, или поговорить с кем-то, кто понимает его.

Our Water System

The City of Camas has multiple water sources that include surface and ground water. The surface water sources (Boulder and Jones Creeks) are located on the south-side of Larch Mountain, northeast of Camas. Surface water was not used in 2021. The ground water sources include nine wells near the Washougal river and one well in Grass Valley. All water sources are treated with chlorine for disinfection, fluoride for good dental health and sodium hydroxide to reduce the corrosion of copper piping to meet State and EPA standards. Water pressure and fire flows are maintained throughout the service area with eight distribution reservoirs, nine pump stations, and over 160 miles of pipeline.

We've got news!

Follow City of Camas on social media and on the city's website for the latest in updates and alerts:

Website: www.cityofcamas.us
Twitter: www.twitter.com/CityofCamas— @CityofCamas
Facebook: www.facebook.com/cityofcamas

2021 Water Quality Summary

Our drinking water is safe and surpasses all State and Federal health standards!

The City of Camas routinely monitors for contaminants in your drinking water according to Federal and State laws. Field and laboratory analyses include tests for bacteria, as well as chemical and physical indicators. Reports are submitted monthly to the Department of Health to report that City water meets all drinking water standards. Contaminants that were detected are listed in the following tables.

Should there ever be a public health concern, you would be notified immediately. Please report possible water pollution (illicit discharge) to the City of Camas 360-817-1563, or the Department of Ecology-SW Regional Offices 360-407-6300.

Definitions

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as possible using the best available treatment technologies.

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AL (Action Level): The concentration of a contaminant which, if exceeded, triggers treatments or other requirements that a waster system must follow.

Milligram Per Liter (mg/L): A unit of measurement used in reporting the concentration of matter in water as determined by water analyses.

NTU (Nephelometric Turbidity Unit): Turbidity is a measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

ug/L: Units of measurement in micrograms/liter. A unit of concentration for dissolved substances based on their weights.

ppm: (1 parts per million = 1 mh/L = 1 milligram per liter)

ppb: (1 parts per billion = 0.001 mg/L = 1 microgram per liter)

pCi/L: Picocuries per liter is a unit for measuring radioactive concentrations. The curie (Ci) unit is the activity of 1 gram of pure radium.

NA (Not Applicable): Means that the U.S. EPA has not established MCLGs for these substances.

ND (Not Detected): A compound that was analyzed and not detected at a level greater than or equal to the state reporting level.

2021 Detected Contaminants

		EPA Regulations		City of Camas Water Quality Results	
Regulated Contaminants	**Units**	**Ideal Level/Goal (MCLG)**	**Maximum Level (MCL)**	**Range of Level Detected**	**Violation**
Fluoride	mg/L	.50 -.90	4	.34—1.03	No
Fluoride is added to your water in carefully controlled levels for dental health. In May 2016, the Washington State Department of Health changed the fluoridation requirement to a target of 0.7 mg/L from the previous target of 0.7-1.2 mg/L.					
Nitrates ***(as nitrogen)***	mg/L	10	10	Not Detected—2.9	No
Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural products.					
Haloacetic Acid (5)	ug/L	48	60	Not Detected—1.4	No
Trihalomethanes	ug/L	60	80	2.5-6.5	No
Haloacetic acids (HAA5) and trihalomethanes form as by-products of the chlorination process that is used to kill or inactivate disease-causing microbes.					
Radionuclides - Naturally Occurring Substances In Drinking Water					
Gross Alpha	pCil	0	15	2.67	No
Radium 228	pCil	0	5	.670	No
Total Coliform Bacteria	%	0	<5% Positive/Mo.	0	No

Unregulated contaminants are those for which the EPA has not established drinking water standards. The purpose of unregulated contaminant monitoring is to help EPA determine their occurrence in drinking water and potential need for future regulation. For more information, go to: https://www.epa.gov/dwucmr/third-unregulated-contaminant-monitoring-rule or contact the Safe Drinking Water Hotline at 1-800-426-4791 or via website https://www.epa.gov/home/epa-hotlines.

Sources of Drinking Water

In general, the sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and in some cases, radio-active material. It can also pick up substances resulting from the presence of animals or from human activity. To ensure that tap water is safe to drink, the Washington Department of Health and the United State Environmental Protection Agency (EPA) prescribe regulations that limit the amount of certain contaminants in the water provided by public water systems. Contaminants that may be present in source water before we treat it include:

Mandatory EPA Statement for All Community Water Systems

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (1-800-426-4791).

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The US EPA-Center for Disease Control guidelines on appropriate means to lessen the risk of infection by cryptosporidium and other microbiological contaminants are from the EPA's Safe Drinking Water website.

- **Microbial Contaminants**, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- **Inorganic Contaminants**, such as salts and metals, which can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, and mining or farming.
- **Pesticides and Herbicides**, which may come from a variety of sources such as agriculture and residential uses.
- **Organic Chemicals**, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems.
- **Radioactive Contaminants**, which are naturally occurring as a result of mining and/or gas production.

Lead & Copper

In 2021, the City tested thirty two residences for lead and copper. The highest level for copper was 0.93 mg/L. The highest level for lead was .019mg/L. To be in compliance with the Lead and Copper Rules, our system must fall within the 90th percentile of samples collected, where sample results are less than or equal to the action level for lead and copper. The action level for Lead is .015 mg/L and the action level for Copper is 1.3mg/L.

Parameter	Major Source	Units	(MCLG) mg/L	(AL)	City Results mg/L	Violation
Lead *(at consumers tap)*	Plumbing, erosion of natural deposits.	ppb	0	0.015	Not Detected —.019	No
Copper		ppm	0	1.30	.021—.93	No

To Reduce Lead and Copper Exposure

- When your water has been sitting for several hours, flush the pipe by running the cold water tap until the water is noticeably colder before using the water for drinking or cooking.
- Use only cold water for drinking, cooking, and making baby formula. Hot water may contain higher levels of copper.
- Frequently clean the filter screens and aerators in faucets to remove captured particles.
- If building or remodeling, only use "lead free" or low lead piping and materials. Avoid using copper piping or brass fixtures for locations where water will be consumed or used in food preparation.

EPA STATEMENT

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Camas is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to two minutes before using water for drinking or cooking. The EPA requires the City to conduct lead testing every three years.

Copper is a mineral component naturally found in solids. In the correct amounts, it is an essential nutrient for humans and plants. In Washington State, most copper in drinking water comes from corrosion of household plumbing. Plumbing sources can include copper pipe and brass fixtures. Copper from plumbing corrosion can accumulate overnight. Although copper is an essential mineral in the diet, too much copper can cause health problems. Copper is widely distributed within the tissues of the body, but accumulates primarily in the liver and kidneys. A single dose of 15 mg of copper can cause nausea, vomiting, diarrhea, and intestinal cramps.

If you are concerned about lead or copper in your water, you may wish to have your water tested. Information on lead and copper in your drinking water, testing methods, and steps you can take to minimize exposure is available from:

Safe Drinking Water Hotline 1-800-426-4791, or at www.epa.gov/safewater/lead.

Water Conservation

In 2021 the average daily water consumption in Camas was 4.75 million gallons. Our peak usage day was on July 22, 2021, when 11,670,000 gallons were consumed. Most of this increase in the summer months is due to irrigation demands. We are once again asking for the public's help to implement a voluntary odd/even lawn watering program for residential customers. Water on odd days for home addresses that end in an odd number, and even days if it ends in an even number.

City Water Saving Commitments

- To reduce the customer consumption per home by one percent or approximately two gallons-per-day per year over the next six years. The City will maintain distribution system loss at-or-below ten percent for the next five years.
- Replacing industrial, commercial, and residential service meters with the new radio read meters, which will allow the City to log usage more effectively to notify customers about continuous leaks or high consumption.
- Encourage the installation of smart controllers on irrigation systems for the school district and industrial users.
- Educate the public on water-saving devices, and distribute water conservation kits and water-saving devices to homeowners. Continue metering all sources.
- Replace water mains and service lines in problematic areas and complete Capital Projects in accordance with the new Water System Plan Update.

Community Involvement to Reduce Water Leaks

Locate your master water supply valve and label it. The master supply valve can be turned off in case of a major leak or broken pipe. The majority of leaks in residential plumbing systems are found at the toilet tank (fill and flapper valves).

Other common leaks include:

- Lawn irrigation valves and lines
- Yard hose turned on or leaking
- Ornamental fountains & fish ponds
- Water heater relief valve or fittings
- Leaking house pipes or fittings
- Leaking between the house and meter
- Inside and outside dripping faucets

The City is actively working to reduce system leaks. If you suspect a leak in your neighborhood please call City of Camas at 360-817-1563.

CONSERVATION TIPS

Fix leaks on old leaky faucets, toilets, hoses, and sprinkler systems.

Choose water saving fixtures and appliances and you will use 30% less water.

Sweep porches, driveways & sidewalks rather than hosing, to not only conserve water, but to avoid runoff.

Water late at night or early in the morning (10:00 pm or 6:00 am).

Take a short shower Instead of a bath.

An inch of water per week is enough to keep lawns green.

Cross Connection Program

Annual Backflow Test Required - Cross-Connection Prevention

Backflow is the undesirable reversal of the flow of water from the intended direction of flow. When this occurs, other liquids, mixtures, gases or substances can enter the potable water piping through cross connection. Under the right hydraulic conditions, backflow can result in contamination of the water supply, which is called back siphonage and back pressure.

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Engage Camas
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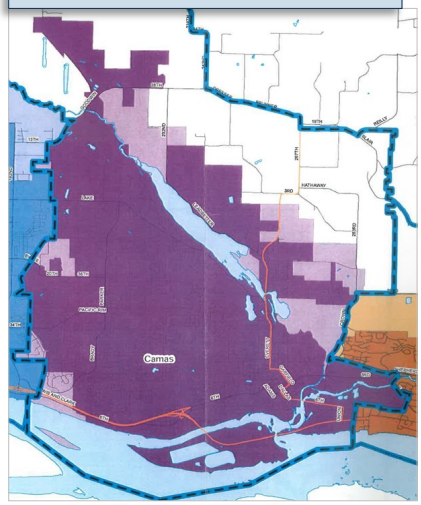
Public Water System ID: 108002



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2022 Detected Contaminants

		EPA Regulations		City of Camas Water Quality Results	
Regulated Contaminants	**Units**	**Ideal Level/Goal (MCLG)**	**Maximum Level (MCL)**	**Range of Level Detected**	**Violation**
Fluoride	mg/L	.50 -.90	4	.16-1.10	No
Fluoride is added to your water in carefully controlled levels for dental health. In May 2016, the Washington State Department of Health changed the fluoridation requirement to a target of 0.7 mg/L from the previous target of 0.7-1.2 mg/L.					
Nitrates ***(as nitrogen)***	mg/L	10	10	Not Detected—2.1	No
Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural products.					
Haloacetic Acid (5)	ug/L	48	60	Not Detected	No
Trihalomethanes	ug/L	60	80	5.7-7.6	No
Haloacetic acids (HAA5) and trihalomethanes form as by-products of the chlorination process that is used to kill or inactivate disease-causing microbes.					
Radionuclides - Naturally Occurring Substances In Drinking Water					
Gross Alpha	pCil	0	15	2.68	No
Radium 228	pCil	0	5	.739	No
Total Coliform Bacteria	%	0	<1% Positive/Mo.	0	No

2022 Detected Contaminants continued...

A Volatile Organic Chemical (VOC) sample was inadvertently missed at the Washougal Wellfield (source 5-18) in 2022. Through coordination with The Department of Health, the sample was taken in March 2023 resulting in a non-detect.

Sources of Drinking Water

In general, the sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and in some cases, radio-active material. It can also pick up substances resulting from the presence of animals or from human activity. To ensure that tap water is safe to drink, the Washington Department of Health and EPA prescribe regulations that limit the amount of certain contaminants in the water provided by public water systems. Contaminants that may be present in source water before we treat it include:

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Lead & Copper

In 2022, the City tested thirty two residences for lead and copper. The highest level for copper was 0.93 mg/L. The highest level for lead was .019mg/L. To be in compliance with the Lead and Copper Rules, sample results must be less than or equal to the action level for lead and copper. The action level for Lead is .015 mg/L and the action level for Copper is 1.3mg/L.

Parameter	Major Source	Units	(MCLG) mg/L	(AL) mg/L	City Results mg/L	Violation
Lead *(at consumers tap)*	Plumbing, erosion of natural deposits.	ppb	0	0.015	Not Detected —	No
Copper		ppm	0	1.30	.021—.93	No

To Reduce Lead and Copper Exposure

- When your water has been sitting for several hours, flush the pipe by running the cold water tap until the water is noticeably colder before using the water for drinking or cooking.
- Use only cold water for drinking, cooking, and making baby formula. Hot water may contain higher levels of copper.
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- If building or remodeling, only use "lead free" or low lead piping and materials. Avoid using copper piping or brass fixtures for locations where water will be consumed or used in food preparation.

EPA Statement

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Copper is a mineral component naturally found in solids. In the correct amounts, it is an essential nutrient for humans and plants. In Washington State, most copper in drinking water comes from corrosion of household plumbing. Plumbing sources can include copper pipe and brass fixtures. Copper from plumbing corrosion can accumulate overnight. Although copper is an essential mineral in the diet, too much copper can cause health problems. Copper is widely distributed within the tissues of the body, but accumulates primarily in the liver and kidneys. A single dose of 15 mg of copper can cause nausea, vomiting, diarrhea, and intestinal cramps.

If you are concerned about lead or copper in your water, you may wish to have your water tested. Information on lead and copper in your drinking water, testing methods, and steps you can take to minimize exposure is available from:

Safe Drinking Water Hotline 1-800-426-4791, or at www.epa.gov/safewater/lead.

PFAS

In 2021, the Washington State Board of Health (SBOH) adopted a rule that requires water system utilities, including the City of Camas, to test for Per and Polyfluoroalkyl substances (PFAS). PFAS are a new class of contaminants not currently regulated by the EPA which include Perfluorooctanoic acid (PFOA) and Perfluorooctanioc Sulfonic Acid (PFOS). The rule requires the City to notify you if any test results exceed a State Action Level. EPA has not yet set an action level but one is expected sometime in 2024 that is anticipated to be lower than the state action level (SAL).

The City recently completed another sampling for PFAS at all of its wells in March of 2023. The testing resulted in no detection for PFOA or PFOS at any of the City wells. PFAS detection below 4 parts per trillion is considered a non-detect. The City will continue to sample for PFAS as required by the Washington Department of Health on a quarterly basis at all of its wells. Complete information for 2023 will be provided in next years Annual Water Quality Report.

Source	PFOA Result (ppt)	PFOA SAL 10ppt	PFOS Result (ppt)	PFOS SAL 15ppt
Well 5 (S-06)	3.6	Below	6.9	Below
WFW (S-19)	ND	NA	3.1	Below
WFE (S-18)	ND	NA	3.3	Below
Well 13 (S-16)	3.6	Below	21	Above

ND: None Detected **NA:** Not Applicable

The City continues to monitor the water system, coordinate with the Department of Health, and investigate options for treatment of PFAS in the City's water system. For more information, please visit the City's website.

Water Conservation

In 2022 the average daily water consumption in Camas was 4.49 million gallons. Our peak usage day was on July 29, 2022, when 8,781,000 gallons were consumed. Most of this increase in the summer months is due to irrigation demands. We are once again asking for the public's help to implement a voluntary odd/even lawn watering program for residential customers. Water on odd days for home addresses that end in an odd number, and even days if it ends in an even number.

City Water Saving Commitments

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- Encourage the installation of smart controllers on irrigation systems for the school district and industrial users.
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Choose water saving fixtures and appliances and you will use 30% less water.

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Water late at night or early in the morning (10:00 pm or 6:00 am).

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Backflow is the undesirable reversal of the flow of water from the intended direction of flow. When this occurs, other liquids, mixtures, gases or substances can enter the potable water piping through cross connection. Under the right conditions, backflow can result in contamination of the water supply, which is called back siphonage and back pressure.

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Test your backflow assembly device annually

Once you have your backflow assembly installed or located, make sure to have it tested annually by a state-certified backflow assembly tester. If you are a property owner and have an in-ground sprinkler system you are required by state and local laws (WAC 246-290) to install and maintain a backflow prevention device on your service line, and have it inspected yearly by a Washington State Certified Backflow Assembly Tester (BAT). View our Certified Backflow Tester List on the City website: Backflow and Cross-Connection Prevention | Camas WA (cityofcamas.us).

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For more water-leak information, check the EPA's website at www.epa.gov/watersense/fixaleak.

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Facebook: www.facebook.com/cityofcamas
Engage Camas: www.Engagecamas.com

2023 Consumer Confidence Report

CONTACT US

City Hall
616 NE Fourth Ave
Camas, WA 98607
360-834-2462
www.cityofcamas.us

Public Works
360-817-1563
publicworks@cityofcamas.us

After-Hours/Holiday Water Emergency: 360-737-0592

Cross-Connection Control
backflow@cityofcamas.us
360-817-1569

Camas Connect 24/7
Download our city app to make service requests, or go to www.cityofcamas.us/service-request

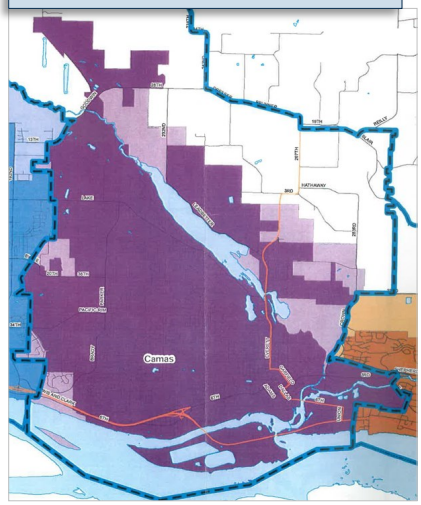
City of Camas Annual Water Quality Report

The City of Camas is pleased to present the annual Water Quality Report, which provides the public with water testing results. The health of our consumers and their families is paramount and our goal is to provide the community with a safe and dependable supply of drinking water.

At the City of Camas we understand how important it is to ensure we provide high quality water. We work diligently to provide top quality water to our growing residential population.

More information about Camas drinking water and what we're doing to keep your water safe can be found online at www.cityofcamas.us/publicworks/page/water-services

Public Water System ID: 108002



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Ce rapport contient des informations importantes sur votre eau potable. Si l'anglais n'est pas votre langue maternelle, demandez à quelqu'un de le traduire à votre place ou de parler à quelqu'un qui le comprend.

Этот отчет содержит важную информацию о вашей питьевой воде. Если английский не является вашим родным языком, попросите кого-нибудь, кто может перевести его для вас, или поговорить с кем-то, кто понимает его.

Our Water System

The City of Camas has multiple water sources that include surface and ground water. The surface water sources (Boulder and Jones Creeks) are located on the south-side of Larch Mountain, northeast of Camas. Surface water was not used in 2022. The ground water sources include nine wells near the Washougal river and one well in Grass Valley. All water sources are treated with chlorine for disinfection, fluoride for good dental health and sodium hydroxide to reduce the corrosion of copper piping to meet State and EPA standards. Water pressure and fire flows are maintained throughout the service area with eight distribution reservoirs, nine pump stations, and over 160 miles of pipeline.

2023 Water Quality Summary

Our drinking water is safe and surpasses all State and Federal health standards!

The City of Camas routinely monitors for contaminants in your drinking water according to Federal and State laws. Field and laboratory analyses include tests for bacteria, as well as chemical and physical indicators. Reports are submitted monthly to the Department of Health to report that City water meets all drinking water standards. Contaminants that were detected are listed in the following tables.

Should there ever be a public health concern, you would be notified immediately. Please report possible water pollution (illicit discharge) to the City of Camas 360-817-1563, or the Department of Ecology-SW Regional Offices 360-407-6300.

Definitions

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µg/L: Units of measurement in micrograms/liter.

ppm: (1 parts per million = 1 mg/L = 1 milligram per liter)

ppb: (1 parts per billion = 0.001 µg/L = 1 microgram per liter)

ppt: (1 parts per trillion = 1 ng/L = 1 nanogram per liter)

pCi/L: Picocuries per liter is a unit for measuring radioactive concentrations. The curie (Ci) unit is the activity of 1 gram of pure radium.

NA (Not Applicable): Means that the U.S. EPA has not established MCLGs for these substances.

ND (Not Detected): A compound that was analyzed and not detected at a level greater than or equal to the state reporting level.

Ng/L: Nanograms per liter

2023 Detected Contaminants

		EPA Regulations		City of Camas Water Quality Results	
Regulated Contaminants	**Units**	**Ideal Level/Goal (MCLG)**	**Maximum Level (MCL)**	**Range of Level Detected**	**Violation**
Fluoride	mg/L	.50 -.90	4	.13 - 1.11	No
Fluoride is added to your water in carefully controlled levels for dental health. In May 2016, the Washington State Department of Health changed the fluoridation requirement to a target of 0.7 mg/L from the previous target of 0.7-1.2 mg/L.					
Nitrates ***(as nitrogen)***	mg/L	10	10	Not Detected—1.7	No
Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural products.					
Haloacetic Acid (5)	ug/L	48	60	.87—1.0	No
Trihalomethanes	ug/L	60	80	.50—4.1	No
Haloacetic acids (HAA5) and trihalomethanes form as by-products of the chlorination process that is used to kill or inactivate disease-causing microbes.					
Radionuclides - Naturally Occurring Substances In Drinking Water					
Gross Alpha	pCil	0	15	2.16	No
Radium 228	pCil	0	5	.760	No
Total Coliform Bacteria	%	0	<1% Positive/Mo.	0	No

Unregulated contaminants are those for which the EPA has not established drinking water standards. The purpose of unregulated contaminant monitoring is to help EPA determine their occurrence in drinking water and potential need for future regulation. For more information, go to: https://www.epa.gov/dwucmr/third-unregulated-contaminant-monitoring-rule or contact the Safe Drinking Water Hotline at 1-800-426-4791 or via website https://www.epa.gov/home/epa-hotlines.

2023 Detected Contaminants continued...

A VOC was missed at WFE (5-18) which caused a non-compliance letter for 2022. The sample was taken in March 2023 resulting in a non-detect. This brought the source back into compliance.

Sources of Drinking Water

In general, the sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and in some cases, radio-active material. It can also pick up substances resulting from the presence of animals or from human activity. To ensure that tap water is safe to drink, the Washington Department of Health and the United State Environmental Protection Agency (EPA) prescribe regulations that limit the amount of certain contaminants in the water provided by public water systems. Contaminants that may be present in source water before we treat it include:

- **Microbial Contaminants**, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- **Inorganic Contaminants**, such as salts and metals, which can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, and mining or farming.
- **Pesticides and Herbicides**, which may come from a variety of sources such as agriculture and residential uses.
- **Organic Chemicals**, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems.
- **Radioactive Contaminants**, which are naturally occurring as a result of mining and/or gas production.

Mandatory EPA Statement for All Community Water Systems

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (1-800-426-4791).

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The US EPA-Center for Disease Control guidelines on appropriate means to lessen the risk of infection by cryptosporidium and other microbiological contaminants are from the EPA's Safe Drinking Water website.

Lead & Copper

In 2022, the City tested thirty two residences for lead and copper. The highest level for copper was 0.93 mg/L. The highest level for lead was .019mg/L. To be in compliance with the Lead and Copper Rules, our system must fall within the 90th percentile of samples collected, where sample results are less than or equal to the action level for lead and copper. The action level for Lead is .015 mg/L and the action level for Copper is 1.3mg/L. Lead & Copper sampling for 2024 will begin in the fall.

Parameter	Major Source	Units	(MCLG) mg/L	(AL) mg/L	City Results mg/L	Violation
Lead *(at consumers tap)*	Plumbing, erosion of natural deposits.	ppb	0	0.015	Not Detected —	No
Copper		ppm	0	1.30	.021—.93	No

To Reduce Lead and Copper Exposure

- When your water has been sitting for several hours, flush the pipe by running the cold water tap until the water is noticeably colder before using the water for drinking or cooking.
- Use only cold water for drinking, cooking, and making baby formula. Hot water may contain higher levels of copper.
- Frequently clean the filter screens and aerators in faucets to remove captured particles.
- If building or remodeling, only use "lead free" or low lead piping and materials. Avoid using copper piping or brass fixtures for locations where water will be consumed or used in food preparation.

EPA Statement

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Camas is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to two minutes before using water for drinking or cooking. The EPA requires the City to conduct lead testing every three years.

Copper is a mineral component naturally found in solids. In the correct amounts, it is an essential nutrient for humans and plants. In Washington State, most copper in drinking water comes from corrosion of household plumbing. Plumbing sources can include copper pipe and brass fixtures. Copper from plumbing corrosion can accumulate overnight. Although copper is an essential mineral in the diet, too much copper can cause health problems. Copper is widely distributed within the tissues of the body, but accumulates primarily in the liver and kidneys. A single dose of 15 mg of copper can cause nausea, vomiting, diarrhea, and intestinal cramps.

If you are concerned about lead or copper in your water, you may wish to have your water tested. Information on lead and copper in your drinking water, testing methods, and steps you can take to minimize exposure is available from:

Safe Drinking Water Hotline 1-800-426-4791, or at www.epa.gov/safewater/lead.

PFOS

In 2021, the Washington State Board of Health (SBOH) adopted a rule that requires water system utilities, including the City of Camas, to test for PFAS. PFAS are a new class of contaminants not currently regulated by the Environmental Protection Agency (EPA). The rule also requires the City to notify you if any test results exceed a State Action Level. EPA has not yet set an action level but one is expected sometime in 2024.

The City recently completed another sampling for PFOS at all its wells in March of 2023. The testing resulted in no detection for PFOA or PFOS at any of the sites sampled in 2022. Detection below 4 parts per trillion is considered a non-detect. The City will continue to sample for PFAS as requested by the Washington Department of Health on a quarterly basis at all of its wells.

Source	PFOA Result	PFOA SAL 10ppt	PFOS Result	PFOS SAL 15ppt
Well 5 (S-06)	3.6	Below	6.9	Below
WFW (S-19)	ND	NA	3.1	Below
WFE (S-18)	ND	NA	3.3	Below
Well 13 (S-16)	3.6	Below	21	Above

ND: None Detected **NA:** Not Applicable

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2024 Consumer Confidence Report

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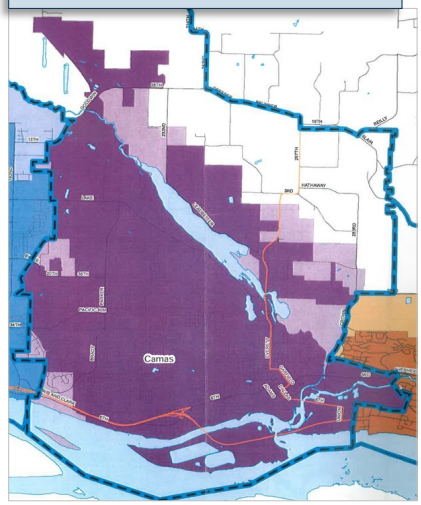

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		EPA Regulations		City of Camas Water Quality Results	
Regulated Contaminants	**Units**	**Ideal Level/Goal (MCLG)**	**Maximum Level (MCL)**	**Range of Level Detected**	**Violation**
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Fluoride is added to your water in carefully controlled levels for dental health. In May 2016, the Washington State Department of Health changed the fluoridation requirement to a target of 0.7 mg/L from the previous target of 0.7-1.2 mg/L.					
Nitrates ***(as nitrogen)***	mg/L	10	10	Not Detected—2.0	No
Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural products.					
Haloacetic Acid (5)	ug/L	48	60	No Detected	No
Trihalomethanes	ug/L	60	80	2.9-3.5	No
Haloacetic acids (HAA5) and trihalomethanes form as by-products of the chlorination process that is used to kill or inactivate disease-causing microbes.					
Radionuclides - Naturally Occurring Substances In Drinking Water					
Gross Alpha	pCil	0	15	.102	No
Radium 228	pCil	0	5	.954	No
Total Coliform Bacteria	%	0	<1% Positive/Mo.	0	No

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2024 Detected Contaminants continued...

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Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (1-800-426-4791).

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The US EPA-Center for Disease Control guidelines on appropriate means to lessen the risk of infection by cryptosporidium and other microbiological contaminants are from the EPA's Safe Drinking Water website.

Lead & Copper

In 2024, the City tested thirty two residences for lead and copper. The highest level for copper was 0.73 mg/L. The highest level for lead was .014mg/L. To be in compliance with the Lead and Copper Rules, our system must fall within the 90th percentile of samples collected, where sample results are less than or equal to the action level for lead and copper. The action level for Lead is .015 mg/L and the action level for Copper is 1.3mg/L. The next round of lead sampling will occur in fall of 2027.

Parameter	Major Source	Units	(MCLG) mg/L	(AL) mg/L	City Results mg/L	Violation
Lead *(at consumers tap)*	Plumbing, erosion of natural deposits.	ppb	0	0.015	ND –.014	No
Copper		ppm	0	1.30	ND-.73	No

To Reduce Lead and Copper Exposure

- When your water has been sitting for several hours, flush the pipe by running the cold water tap until the water is noticeably colder before using the water for drinking or cooking.
- Use only cold water for drinking, cooking, and making baby formula. Hot water may contain higher levels of copper.
- Frequently clean the filter screens and aerators in faucets to remove captured particles.
- If building or remodeling, only use "lead free" or low lead piping and materials. Avoid using copper piping or brass fixtures for locations where water will be consumed or used in food preparation.

EPA Statement

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Camas is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to two minutes before using water for drinking or cooking. The EPA requires the City to conduct lead testing every three years.

Copper is a mineral component naturally found in solids. In the correct amounts, it is an essential nutrient for humans and plants. In Washington State, most copper in drinking water comes from corrosion of household plumbing. Plumbing sources can include copper pipe and brass fixtures. Copper from plumbing corrosion can accumulate overnight. Although copper is an essential mineral in the diet, too much copper can cause health problems. Copper is widely distributed within the tissues of the body, but accumulates primarily in the liver and kidneys. A single dose of 15 mg of copper can cause nausea, vomiting, diarrhea, and intestinal cramps.

If you are concerned about lead or copper in your water, you may wish to have your water tested. Information on lead and copper in your drinking water, testing methods, and steps you can take to minimize exposure is available from:

Safe Drinking Water Hotline 1-800-426-4791, or at www.epa.gov/safewater/lead.

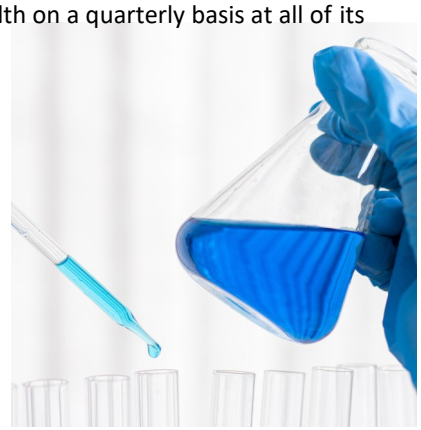
PFOS

In 2021, the Washington State Board of Health (SBOH) adopted a rule that requires water system utilities, including the City of Camas, to test for PFAS. PFAS are a new class of contaminants not currently regulated by the Environmental Protection Agency (EPA). The rule also requires the City to notify you if any test results exceed a State Action Level (SAL). EPA adopted limits of 4 ppt for PFOA and PFOS in April of 2024.

The City recently completed another sampling for PFOS at all its wells in June and July 2024 of 4 ppt. The testing resulted in no detection for PFOA or PFOS at any of the sites sampled in 2022. Detection below 4 parts per trillion is considered a non-detect. The City will continue to sample for PFAS as requested by the Washington Department of Health on a quarterly basis at all of its

Source	PFOA Result	PFOA SAL 10 ppt	PFOS Result	PFOS SAL 15 ppt
Well 5 (S-06)	5.	Below	7.2	Below
WFW (S-19)	ND	Below	3.2	Below
WFE (S-17)	ND	NA	ND	Below
Well 13 (S-16)	ND	NA	8.3	Below

ND: None Detected **NA:** Not Applicable



Water Conservation

In 2024 the average daily water consumption in Camas was 4.66 million gallons. Our peak usage day was on July 8, 2024, when 10,243,000 gallons were consumed. Most of this increase in the summer months is due to irrigation demands. We are once again asking for the public's help to implement a voluntary odd/even lawn watering program for residential customers. Water on odd days for home addresses that end in an odd number, and even days if it ends in an even number.

City Water Saving Commitments

- To reduce the customer consumption per home by one percent or approximately two gallons-per-day per year over the next six years. The City will maintain distribution system loss at-or-below ten percent for the next five years.
- Replacing industrial, commercial, and residential service meters with the new radio read meters, which will allow the City to log usage more effectively to notify customers about continuous leaks or high consumption.
- Encourage the installation of smart controllers on irrigation systems for the school district and industrial users.
- Educate the public on water-saving devices, and distribute water conservation kits and water-saving devices to homeowners. Continue metering all sources.
- Replace water mains and service lines in problematic areas and complete Capital Projects in accordance with the new Water System Plan Update.

Community Involvement to Reduce Water Leaks

Locate your master water supply valve and label it. The master supply valve can be turned off in case of a major leak or broken pipe. The majority of leaks in residential plumbing systems are found at the toilet tank (fill and flapper valves).

Other common leaks include:

- Lawn irrigation valves and lines
- Yard hose turned on or leaking
- Ornamental fountains & fish ponds
- Water heater relief valve or fittings
- Leaking house pipes or

CONSERVATION TIPS

Fix leaks on old leaky faucets, toilets, hoses, and sprinkler systems.

Choose water saving fixtures and appliances and you will use 30% less water.

Sweep porches, driveways & sidewalks rather than hosing, to not only conserve water, but to avoid runoff.

Water late at night or early in the morning (10:00 pm or 6:00 am).

An inch of water per week is enough to keep lawns green.

Take a short shower instead of a bath

Cross Connection Program

Annual Backflow Test Required

Cross-Connection Prevention

Backflow is the undesirable reversal of the flow of water from the intended direction of flow. When this occurs, other liquids, mixtures, gases or substances can enter the potable water piping through cross connection. Under the right hydraulic conditions, backflow can result in contamination of the water supply, which is called back siphonage and back pressure.

How to keep our drinking water clean and safe:

Locate or install a backflow device

If you have an underground irrigation system, check to see if you have a backflow assembly. The backflow assembly is a brass valve usually found between your water meter and the point where your water service line enters your home, usually in a small green box similar to a meter box. If your irrigation system does not include backflow assembly or if you are installing a new underground irrigation system, City of Camas plumbing code requires you to install a *Double Check Valve Assembly (DCVA)* at a minimum.

Test your backflow assembly device annually

Once you have your backflow assembly installed or located, make sure to have it tested annually by a state-certified backflow assembly tester. If you are a property owner and have an in-ground sprinkler system you are required by state and local laws (WAC 246-290) to install and maintain a backflow prevention device on your service line, and have it inspected yearly by a Washington State Certified Backflow Assembly Tester (BAT). View our Certified Backflow Tester List on the City website: Backflow and Cross-Connection Prevention | Camas WA (cityofcamas.us).

If you have more questions call our Backflow Hotline at 360-817-1569, or email us at backflow@cityofcamas.us

Properly winterizing your irrigation system

During the fall, most irrigation systems will need to be winterized to prevent pipes from freezing and breaking. Many times this involves using compressed air to blow out the excess water left in the irrigation piping. Although this is the best method, backflow of compressed air and contaminants may enter the drinking water distribution system and cause damage and or health risks if not performed properly. Make sure the compressed air is connected to a properly installed blowout connection to avoid inadvertently introducing air into our water system.

For more water-leak information, check the EPA's website at www.epa.gov/watersense/fixaleak.

We've got news!

Follow City of Camas on social media and on the city's website for the latest in updates and alerts:

Website: www.cityofcamas.us
Twitter: www.twitter.com/CityofCamas— @CityofCamas
Facebook: www.facebook.com/cityofcamas

APPENDIX R

WATER FACILITY INVENTORY

WATER FACILITIES INVENTORY (WFI) FORM

ONE FORM PER SYSTEM

Quarter: 1
Updated: 12/20/2023

Printed: 3/6/2026
WFI Printed For: On-Demand
Submission Reason: Pop/Connect Update

RETURN TO: Central Services - WFI, PO Box 47822, Olympia, WA, 98504-7822 or email wfi@doh.wa.gov

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
10800 2	CAMAS MUNICIPAL WATER SEWER SYSTEM	CLARK	A	Comm

6. PRIMARY CONTACT NAME & MAILING ADDRESS	7. OWNER NAME & MAILING ADDRESS
ALLEN J. NELSON [WATER SUPPLY] CITY HALL 1620 SE 8TH AVE CAMAS, WA 98607	CAMAS, CITY OF ROB CHARLES 616 NE 4TH AVE CAMAS, WA 98607 ACTING PUBLIC WORKS DI
STREET ADDRESS IF DIFFERENT FROM ABOVE	**STREET ADDRESS IF DIFFERENT FROM ABOVE**
ATTN	ATTN
ADDRESS	ADDRESS
CITY STATE ZIP	CITY STATE ZIP

9. 24 HOUR PRIMARY CONTACT INFORMATION		10. OWNER CONTACT INFORMATION	
Primary Contact Daytime Phone:	(360) 817-7287	Owner Daytime Phone:	(360) 817-7899
Primary Contact Mobile/Cell Phone:	(360) 690-5095	Owner Mobile/Cell Phone:	
Primary Contact Evening Phone:	(xxx)-xxx-xxxx	Owner Evening Phone:	
Fax:	E-mail: AxxxxxN@CITYOFCAMAS.US	Fax: (360) 834-1535	E-mail: rxxxxxxs@cityofcamas.us

11. SATELLITE MANAGEMENT AGENCY - SMA (check only one)

- [x] Not applicable (Skip to #12)
- [ ] Owned and Managed
- [ ] Managed Only
- [ ] Owned Only

SMA NAME: _____ SMA Number:

12. WATER SYSTEM CHARACTERISTICS (mark all that apply)

[ ] Agricultural	[x] Hospital/Clinic	[x] Residential
[x] Commercial / Business	[x] Industrial	[x] School
[x] Day Care	[x] Licensed Residential Facility	[ ] Temporary Farm Worker
[x] Food Service/Food Permit	[x] Lodging	[x] Other (church, fire station, etc.):
[ ] 1,000 or more person event for 2 or more days per year	[x] Recreational / RV Park	[ ] RTCR Seasonal System

13. WATER SYSTEM OWNERSHIP (mark only one)				14. STORAGE CAPACITY (gallons)
[ ] Association	[ ] County	[ ] Investor	[ ] Special District	
[x] City / Town	[ ] Federal	[ ] Private	[ ] State	8,500,000

- SEE NEXT PAGE FOR A COMPLETE LIST OF SOURCES -

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
10800 2	CAMAS MUNICIPAL WATER SEWER SYSTEM	CLARK	A	Comm

15	16 SOURCE NAME	17 INTERTIE	18 SOURCE CATEGORY										19 USE			20	21 TREATMENT						22 DEPTH	23	24 SOURCE LOCATION			
Source Number	LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER. Example: WELL #1 XYZ456 IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME Example: SEATTLE	INTERTIE SYSTEM ID NUMBER	WELL	WELL FIELD	WELL IN A WELL FIELD	SPRING	SPRING FIELD	SPRING IN SPRINGFIELD	SEA WATER	SURFACE WATER	RANNEY / INF. GALLERY	OTHER	PERMANENT	SEASONAL	EMERGENCY	SOURCE METERED	NONE	CHLORINATION	FILTRATION	FLUORIDATION	IRRADIATION (UV)	OTHER	DEPTH TO FIRST OPEN INTERVAL IN FEET	CAPACITY (GALLONS PER MINUTE)	1/4, 1/4 SECTION	SECTION NUMBER	TOWNSHIP	RANGE
S01	BOULDER CREEK									X					X	Y		X	X	X		X		500	SW NE	04	02N	04E
S02	JONES CREEK									X					X	Y		X	X	X		X		500	SE SW	03	02N	04E
S06	DEEP WELL #5 AFP623		X											X		Y		X		X		X	71	600	SW SE	12	01N	03E
S07	DEEP WELL #6 AFP624				X								X			Y	X						85	1400	NE SW	12	01N	03E
S08	DEEP WELL #7 AFP628				X								X			Y	X						49	950	NW SW	12	01N	03E
S09	DEEP WELL #8 AFP629				X								X			Y	X						44	1350	NW SW	12	01N	03E
S11	WELL #9 AFP631 16"		X											X		Y		X		X			145	650	NE NW	04	01N	03E
S13	WELL #11 AHM259				X								X			Y	X						80	1200	NW SW	12	01N	03E
S14	WELL #12 AHM266				X								X			Y	X						81	1300	NW SW	12	01N	03E
S15	WELL #10 AGP495				X								X			Y	X						82	1300	NW SW	12	01N	03E
S16	WELL #13 ALL997		X										X			Y		X		X		X	80	1325	NE SE	47	01N	03E
S17	WELL #14 BAM409				X								X			Y	X						58	1000	NE SW	12	01N	03E
S18	Eastern WF(S07, S17)			X									X			N		X		X		X	58	2400	NW SW	12	01N	03E
S19	Western WF (S08, 9, 13,14,15)			X									X			N		X		X		X	44	6100			00N	00E

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
10800 2	CAMAS MUNICIPAL WATER SEWER SYSTEM	CLARK	A	Comm

	ACTIVE SERVICE CONNECTIONS	DOH USE ONLY! CALCULATED ACTIVE CONNECTIONS	DOH USE ONLY! APPROVED CONNECTIONS
25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)		11254	Unspecified
A. Full Time Single Family Residences (Occupied 180 days or more per year)	9075		
B. Part Time Single Family Residences (Occupied less than 180 days per year)	0		
26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)			
A. Apartment Buildings, condos, duplexes, barracks, dorms	372		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	2179		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	0	0	
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	588	588	
28. TOTAL SERVICE CONNECTIONS		11842	

29. FULL-TIME RESIDENTIAL POPULATION

A. How many residents are served by this system 180 or more days per year? 27703

30. PART-TIME RESIDENTIAL POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many part-time residents are present each month?												
B. How many days per month are they present?												

31. TEMPORARY & TRANSIENT USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many total visitors, attendees, travelers, campers, patients or customers have access to the water system each month?	1794	1482	1638	1716	1716	1560	1560	1716	1560	1794	1482	1560
B. How many days per month is water accessible to the public?	23	19	21	22	22	20	20	22	20	23	19	20

32. REGULAR NON-RESIDENTIAL USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, or businesses connected to your water system, how many students, daycare children and/or employees are present each month that are NOT already included in the residential population?	4013	4013	4013	4013	4013	4013	2148	2148	4013	4013	4013	4013
B. How many days per month are they present?	20	20	22	21	22	21	21	23	20	23	19	20

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	30	30	30	30	30	30	30	30	30	30	30	30

34. NITRATE SCHEDULE	QUARTERLY	ANNUALLY	ONCE EVERY 3 YEARS
(One Sample per source by time period)			

35. Reason for Submitting WFI:

☐ Update - Change ☐ Update - No Change ☐ Inactivate ☐ Re-Activate ☐ Name Change ☐ New System ☐ Other _____

36. I certify that the information stated on this WFI form is correct to the best of my knowledge.

SIGNATURE: _____ **DATE:** _____

PRINT NAME: _____ **TITLE:** _____

Intentionally left blank

WS ID	WS Name
10800	CAMAS MUNICIPAL WATER SEWER SYSTEM

Total WFI Printed: 1

Division of Environmental Public Health
Washington State Department of
HEALTH

Water Facilities Inventory (WFI)

Report Create Date:	3/6/2026		
Water System Id(s):	108002		
Print Data on Distribution Page:	ALL		
Print Copies For:	DOH Copy		
Water System Name:	ALL		
County:	-- Any --		
Region:	ALL		
Group:	ALL		
Type:	ALL		
Permit Renewal Quarter:	ALL		
Water System Is New:	ALL		
Water System Status:	ALL		
Water Status Date From:	ALL	**To**	ALL
Water System Update Date	ALL	**To**	ALL
Owner Number:	ALL		
SMA Number:	ALL		
SMA Name:	ALL		
Active Connection Count From:	ALL	**To:**	ALL
Approved Connection Count	ALL	**To:**	ALL
Full-Time Population From:	ALL	**To:**	ALL
Water System Expanding	ALL		
Source Type:	ALL		
Source Use:	ALL		
WFI Printed For:	On-Demand		

APPENDIX S

WATER RIGHT DOCUMENTATION

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
WATER RIGHT CLAIMS REGISTRATION

WATER RIGHT CLAIM

RECEIVED
ECOLOGY
JUN 21 1974 32-272
NONE

1. NAME CITY OF CAMAS, WASHINGTON

ADDRESS 616 N.E. 4th Avenue

Camas, Washington ZIP CODE 98607

2. SOURCE FROM WHICH THE RIGHT TO TAKE AND MAKE USE OF WATER IS CLAIMED: Ground (SURFACE OR GROUND WATER)

W.R.I.A. 28 (LEAVE BLANK)

A. IF GROUND WATER, THE SOURCE IS Deep Well No. 1

B. IF SURFACE WATER, THE SOURCE IS

3. THE QUANTITIES OF WATER AND TIMES OF USE CLAIMED:

A. QUANTITY OF WATER CLAIMED 900 gpm PRESENTLY USED 900 gpm (CUBIC FEET PER SECOND OR GALLONS PER MINUTE)

B. ANNUAL QUANTITY CLAIMED 320 PRESENTLY USED Average 300 (ACRE FEET PER YEAR)

C. IF FOR IRRIGATION, ACRES CLAIMED PRESENTLY IRRIGATED

D. TIME(S) DURING EACH YEAR WHEN WATER IS USED: All Year

4. DATE OF FIRST PUTTING WATER TO USE: MONTH Unknown YEAR Before 1942

5. LOCATION OF THE POINT(S) OF DIVERSION/WITHDRAWAL: 2159 FEET North AND 667 FEET East FROM THE Southwest CORNER OF SECTION 12

BEING WITHIN Southwest quarter OF SECTION 12 T. 1 N., R. 3 E (E.OR W.) W.M.

IF THIS IS WITHIN THE LIMITS OF A RECORDED PLATTED PROPERTY, LOT BLOCK OF

Within the City limits of the City of Camas
(GIVE NAME OF PLAT OR ADDITION)

6. LEGAL DESCRIPTION OF LANDS ON WHICH THE WATER IS USED: Municipal supply

Clark COUNTY Washington

7. PURPOSE(S) FOR WHICH WATER IS USED: Municipal - Domestic Supply

8. THE LEGAL DOCTRINE(S) UPON WHICH THE RIGHT OF CLAIM IS BASED:

DO NOT USE THIS SPACE
THE FILING OF A STATEMENT OF CLAIM DOES NOT CONSTITUTE AN ADJUDICATION OF ANY CLAIM TO THE RIGHT TO USE OF WATERS AS BETWEEN THE WATER USE CLAIMANT AND THE STATE OR AS BETWEEN ONE OR MORE WATER USE CLAIMANTS AND ANOTHER OR OTHERS. THIS ACKNOWLEDGEMENT CONSTITUTES RECEIPT FOR THE FILING FEE.
DATE RETURNED. THIS HAS BEEN ASSIGNED WATER RIGHT CLAIM REGISTRY NO.
FEB 7 1975 21022
DIRECTOR - DEPARTMENT OF ECOLOGY

I HEREBY SWEAR THAT THE ABOVE INFORMATION IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

X CITY OF CAMAS, WASHINGTON

DATE June 11, 1974

IF CLAIM FILED BY DESIGNATED REPRESENTATIVE, PRINT OR TYPE FULL NAME AND MAILING ADDRESS OF AGENT BELOW.

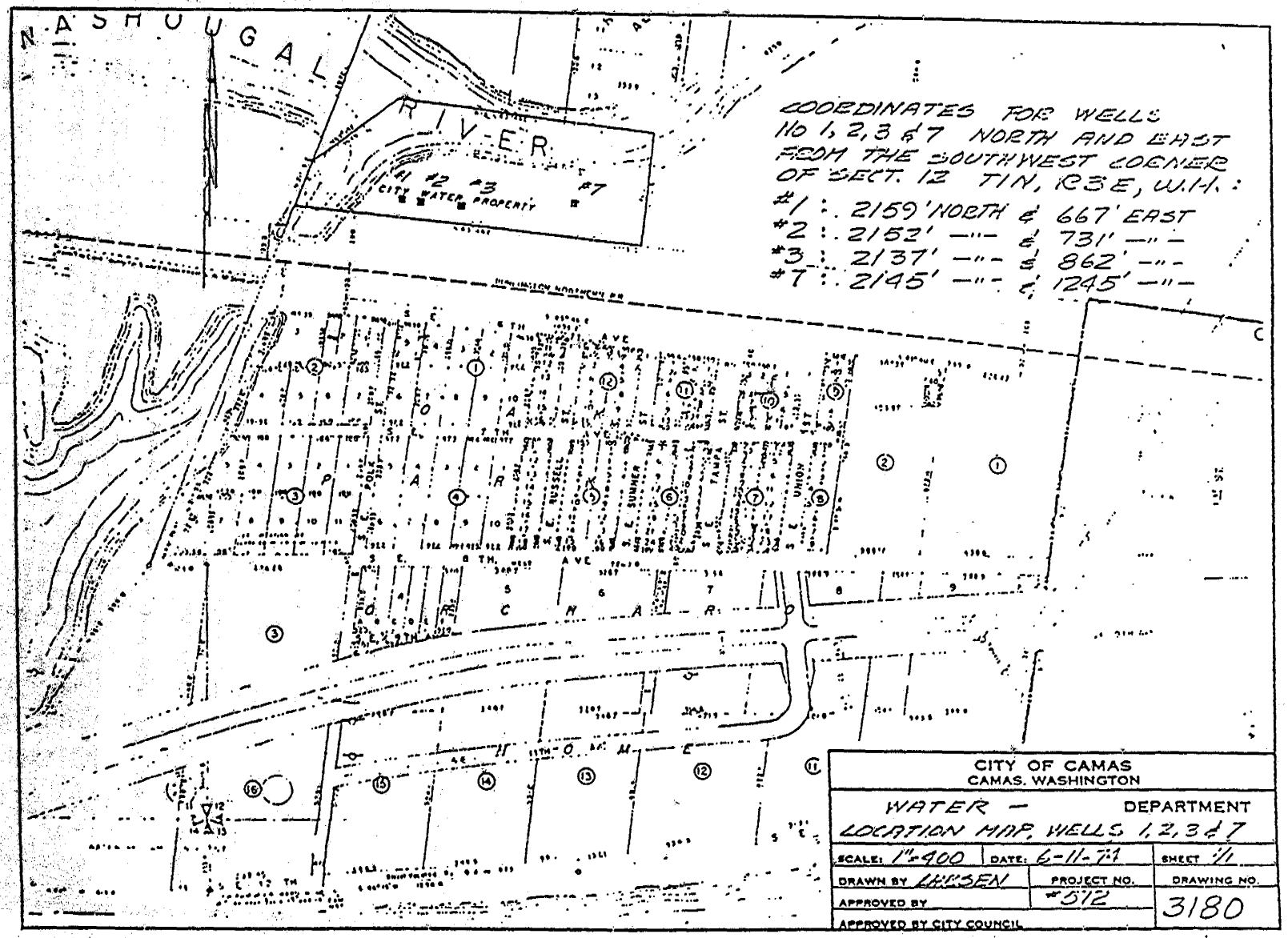
BY: Lewis Angelo
Lewis Angelo, Director of Public Works

☐ ADDITIONAL INFORMATION RELATING TO WATER QUALITY AND/OR WELL CONSTRUCTION IS AVAILABLE.

A FEE OF $2.00 MUST ACCOMPANY THIS WATER RIGHT CLAIM

ORIGINAL DWR

RETURN ALL THREE COPIES WITH CARBONS INTACT, ALONG WITH YOUR FEE TO:
DEPARTMENT OF ECOLOGY
WATER RIGHT CLAIMS REGISTRATION
P.O. BOX 829 OLYMPIA, WASHINGTON 98504


N. ASHOUGAL RIVER
#1 #2 #3 #7
CITY WATER PROPERTY
COORDINATES FOR WELLS
No 1, 2, 3 & 7 NORTH AND EAST
FROM THE SOUTHWEST CORNER
OF SECT. 12 T1N, R3E, W.M.:
#1 : 2159' NORTH & 667' EAST
#2 : 2152' —"— & 731' —"—
#3 : 2137' —"— & 862' —"—
#7 : 2145' —"— & 1245' —"—
CITY OF CAMAS
CAMAS, WASHINGTON
WATER — DEPARTMENT
LOCATION MAP, WELLS 1, 2, 3 & 7
SCALE: 1"=400
DATE: 6-11-71
SHEET 1/1
DRAWN BY LARSEN
PROJECT NO. #512
DRAWING NO. 3180
APPROVED BY
APPROVED BY CITY COUNCIL

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
WATER RIGHT CLAIMS REGISTRATION

WATER RIGHT CLAIM

RECEIVED
DEPARTMENT OF ECOLOGY
JUN 21 1974 132273
CASH___ CHECK___ NONE___

1. NAME CITY OF CAMAS, WASHINGTON

ADDRESS 616 N.E. 4th Avenue

Camas, Washington ZIP CODE 98607

2. SOURCE FROM WHICH THE RIGHT TO TAKE AND MAKE USE OF WATER IS CLAIMED: Ground (SURFACE OR GROUND WATER)

W.R.I.A. 28 (LEAVE BLANK)

A. IF GROUND WATER, THE SOURCE IS Deep Well No. 2

B. IF SURFACE WATER, THE SOURCE IS

3. THE QUANTITIES OF WATER AND TIMES OF USE CLAIMED:

A. QUANTITY OF WATER CLAIMED 900 gpm PRESENTLY USED 900 gpm
(CUBIC FEET PER SECOND OR GALLONS PER MINUTE)

B. ANNUAL QUANTITY CLAIMED 230 PRESENTLY USED 200
(ACRE FEET PER YEAR)

C. IF FOR IRRIGATION, ACRES CLAIMED PRESENTLY IRRIGATED

D. TIME(S) DURING EACH YEAR WHEN WATER IS USED: The months of May through August

4. DATE OF FIRST PUTTING WATER TO USE: MONTH Unknown YEAR Before 1945

5. LOCATION OF THE POINT(S) OF DIVERSION/WITHDRAWAL: 2152 FEET North AND 731

FEET East FROM THE Southwest CORNER OF SECTION 12

BEING WITHIN Southwest quarter OF SECTION 12 T. 1 N., R. 3 E (E.OR W.) W.M.

IF THIS IS WITHIN THE LIMITS OF A RECORDED PLATTED PROPERTY, LOT ____ BLOCK ____ OF
Within the City limits of the City of Camas
(GIVE NAME OF PLAT OR ADDITION)

6. LEGAL DESCRIPTION OF LANDS ON WHICH THE WATER IS USED: Municipal supply

Clark COUNTY Washington

7. PURPOSE(S) FOR WHICH WATER IS USED: Municipal - Domestic Supply

8. THE LEGAL DOCTRINE(S) UPON WHICH THE RIGHT OF CLAIM IS BASED:

DO NOT USE THIS SPACE
THE FILING OF A STATEMENT OF CLAIM DOES NOT CONSTITUTE AN ADJUDICATION OF ANY CLAIM TO THE RIGHT TO USE OF WATERS AS BETWEEN THE WATER USE CLAIMANT AND THE STATE OR AS BETWEEN ONE OR MORE WATER USE CLAIMANTS AND NOTHING OTHERWISE. ACKNOWLEDGEMENT CONSTITUTES RECEIPT FOR THE FILING.
DATE RETURNED THIS HAS BEEN ASSIGNED WATER RIGHT CLAIM REGISTRY NO.
FILED JUN 24 10 28
DIRECTOR, DEPARTMENT OF ECOLOGY

I HEREBY SWEAR THAT THE ABOVE INFORMATION IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

X CITY OF CAMAS, WASHINGTON

DATE June 11, 1974

IF CLAIM FILED BY DESIGNATED REPRESENTATIVE, PRINT OR TYPE FULL NAME AND MAILING ADDRESS OF AGENT BELOW.

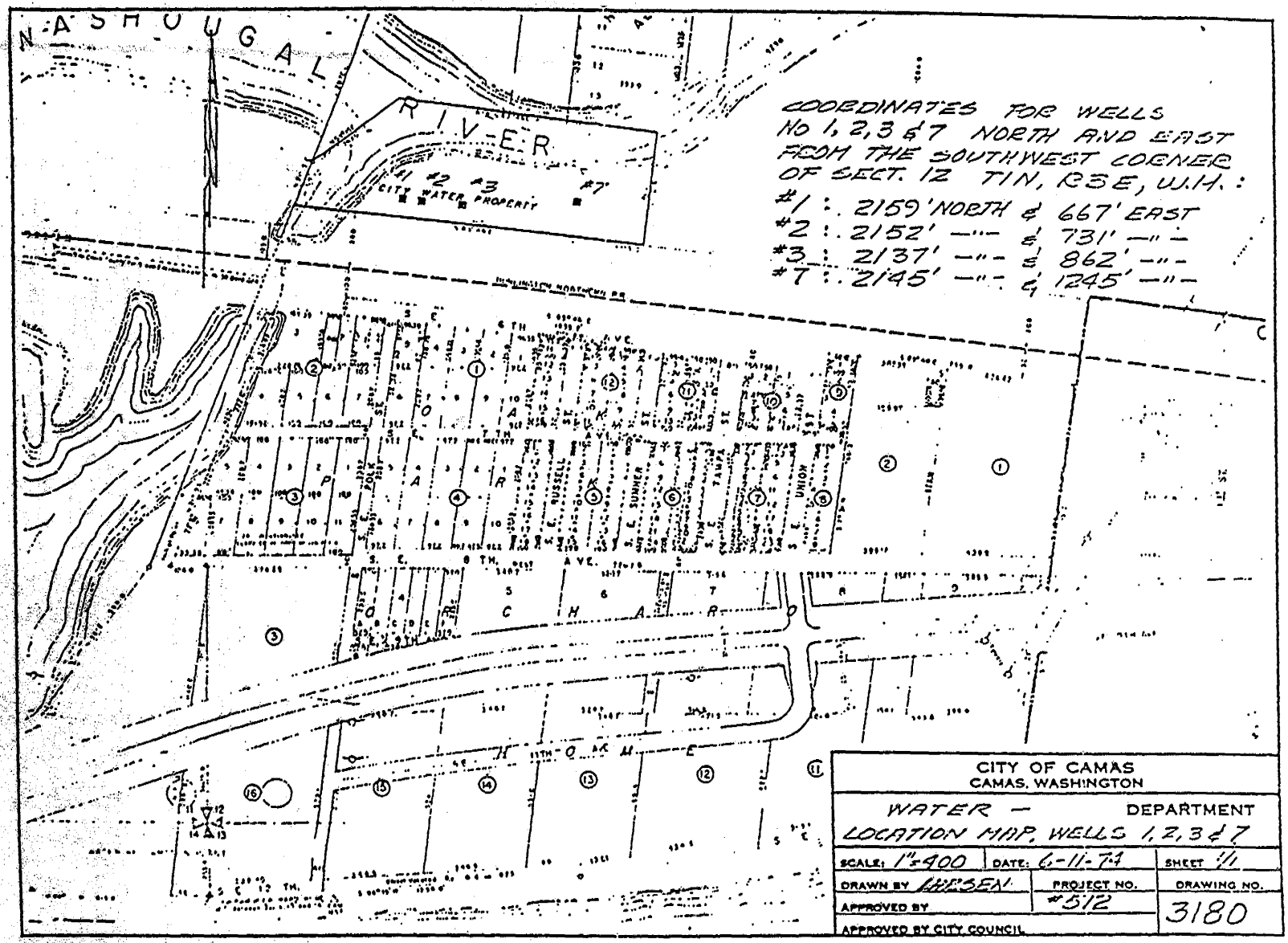
BY: Lewis Angelo
Lewis Angelo, Director of Public Works

☐ ADDITIONAL INFORMATION RELATING TO WATER QUALITY AND/OR WELL CONSTRUCTION IS AVAILABLE.

A FEE OF $7.00 MUST ACCOMPANY THIS WATER RIGHT CLAIM

ORIGINAL DWR

RETURN ALL THREE COPIES WITH CARBONS INTACT, ALONG WITH YOUR FEE TO:
DEPARTMENT OF ECOLOGY
WATER RIGHT CLAIMS REGISTRATION
P.O. BOX 829 OLYMPIA, WASHINGTON 98504


NASHOUGAL
RIVER
#1 #2 #3 #7
CITY WATER PROPERTY
COORDINATES FOR WELLS
No 1, 2, 3 & 7 NORTH AND EAST
FROM THE SOUTHWEST CORNER
OF SECT. 12 T1N, R3E, W.M.:
#1 : 2159' NORTH & 667' EAST
#2 : 2152' —"— & 731' —"—
#3 : 2137' —"— & 862' —"—
#7 : 2145' —"— & 1245' —"—
CITY OF CAMAS
CAMAS, WASHINGTON
WATER — DEPARTMENT
LOCATION MAP, WELLS 1, 2, 3 & 7
SCALE: 1"=400
DATE: 6-11-74
SHEET 1/1
DRAWN BY HIRSEN
PROJECT NO. #512
DRAWING NO. 3180
APPROVED BY
APPROVED BY CITY COUNCIL

No. 369.—1923. Approved as to Form by Dept. of Efficiency. 8509.

CERTIFICATE RECORD No. 2, PAGE No. 711

STATE OF WASHINGTON, COUNTY OF Clark

CERTIFICATE OF WATER RIGHT

(For rights perfected under original, enlargement or secondary permits.)

(In accordance with the provisions of Chapter 117, Laws of Washington for 1917, and the regulations of the State Hydraulic Engineer thereunder.)

This is to certify, that City of Camas, *of* Camas, *State of* Washington, *has made proof to the satisfaction of the State Supervisor of Hydraulics of Washington, of a right to the use of the waters of* Jones Creek, *a tributary of* Little Washougal River *for the purposes of* domestic supplies, *under* Appropriation *Permit No.* 1575, *of the State Supervisor of Hydraulics, and that said right to the use of said waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Hydraulics of Washington and entered of record in Volume* 2, *at Page* 711, *on the* 28th *day of* July, *19* 33; *that the right hereby confirmed dates from* September 5th, *19* 30; *that the amount of water to which such right is entitled and hereby confirmed, for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed* 1.0 *cubic feet per second.*

A description of the lands under such right, and to which the water hereby confirmed is appurtenant, or if for other purposes, the place where such water is put to beneficial use, is as follows:

PLACE OF USE			LEGAL SUBDIVISION		
Section	Township	Range			
			City of Camas		

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Section 39, Chapter 117, Session Laws 1917.

WITNESS the seal and signature of the State Supervisor of Hydraulics affixed this 28th *day of* July, *19* 33.

Chas. L. Patterson
State Supervisor of Hydraulics.

ENGINEERING DATA

NOTICE OF PETITION FOR CHANGE OF
POINT OF DIVERSION OF WATER.

TO WHOM IT MAY CONCERN:

Notice is hereby given that the City of Camas, Clark County, Washington, has filed a petition with the State Supervisor of Hydraulics, Olympia, Washington, for a permit to change the point of diversion of one cubic foot per second of the waters of Jones Creek from a point set out in water right permit 1575 as NW¼ of NW¼ of Sec. 10, Twp. 2 N., Rge. 4 E.W.M., to a point within the SW¼ of SW¼ of Sec. 3, Twp. 2 N., Rge. 4 E.W.M., such point being approximately one-half mile above the point of diversion described in permit, all in Clark County, Wash.

Any person, firm or corporation whose right will be injuriously affected by the granting of said petition may file with the Supervisor of Hydraulics, at Olympia, Washington, such objections or representations, in writing, as he may desire to make within thirty (30) days after the date of last publication, which date is _____.

Witness my hand and official seal this 24th day of April, 1933.

CHAS. J. BARTHOLET
State Supervisor of Hydraulics

PERMIT

This is to certify that I have examined the foregoing application and do hereby grant the same, subject to the following limitations and conditions. ~~If for irrigation, this appropriation shall be subject to such reasonable rotation system as may be ordered by the State Supervisor of Hydraulics.~~ And is further subject to rights of C. W. Cottrell under certificate #121, for the appropriation and use of waters of Little Washougal River of which Jones Creek is a tributary.

The amount of water appropriated shall be limited to the amount which can be applied to beneficial use and not to exceed 1.0 *cubic feet per second, or its equivalent in case of rotation.*

The priority date of this permit is September 5th, 1930.

Actual construction work shall begin on or before December 1st, 1931 *and shall thereafter be prosecuted with reasonable diligence and be completed on or before* December 1st, 1932

Complete application of the water to the proposed use shall be made on or before December 1st, 1937.

Given under my hand and the seal of this office at Olympia, Washington, this 2nd *day of* December, *1930*

Chas. J. Bartholet
State Supervisor of Hydraulics.

Application No. 3756
Permit No. 1575

PERMIT
To Appropriate Public Waters of the State of Washington

Filed by City of Camas
County of Clark

This instrument was first received in the office of the State Supervisor of Hydraulics, Olympia, Washington, on the 5th *day of* September, *19* 30, *at* 8:30 *o'clock* A. M.

Approved December 2nd, 1930
Recorded in Book No. 7 *of Permits, on Page* 1575

CHAS. J. BARTHOLET
State Supervisor of Hydraulics.

JAY E. BOWLES, PUBLIC PRINTER

Before your certificate of water right is issued it will be necessary for you to file with the State Supervisor of Hydraulics a copy of each of the following reports:

1st. Progress reports (in case temporary permit is issued).
2nd. Affidavit of publication of notice of water right application.
3rd. Notice of beginning of construction.
4th. Notice of prosecution of work with diligence.
5th. Notice of completion of construction.
6th. Notice of application of water to a beneficial use.
7th. Proof of appropriation of water.

Upon a satisfactory showing that the appropriation has been perfected as provided by statute the State Supervisor of Hydraulics will issue a water right certificate.

Blanks will be furnished by the office of State Supervisor of Hydraulics.

APPLICATION NO. 5126

CITY OF CAMAS

Examination made November 3rd & 4th, 1930

This application is for 1.0 c.f.s. for domestic use from Jones Creek a tributary of Washougal River.

November 3rd I talked to Mr. R. C. Sugg, Attorney for Mr. C. W. Cottrell who is making protest against the issuance of permit on this application. He stated he questioned the City of Camas right to Jones Creek but suggested I go over the ground with Mr. Cottrell.

November 4th I went over the ground with Mr. W. H. Barber, City Clerk and Superintendent of Water for City of Camas, also, in reference to application No. 924. Mr. Barber stated that a survey was made in 1925 and this system installed same year from the Little Washougal consisting of two reservoirs on hill above Camas and approximately 11 miles of pipe line. The main from reservoirs to "Y" is of 10 inch steel pipe the portion from "Y" to diversion of Little Washougal is of 8 inch steel pipe. The "Y" was installed for the purpose of diverting a portion of Jones Creek when the city needed the additional water.

There is approximately 6.0 c.f.s. in Jones Creek today.

I then went with Mr. Cottrell over the ground on Washougal River. There is approximately 15.0 c.f.s. in the Little Washougal at the mouth. Mr. Cottrell has a 75 K.W. plant on Washougal River about one-half mile below mouth of Little Washougal which is a part of supply. There is approximately 12.0 c.f.s. going over dam not utilized today.

Mr. Cottrell has another 2 unit hydro plant on Washougal River above mouth of Little Washougal which this application does not affect, it develops 362 K.W. He also has a 340 K.W. Diesel plant at Washougal.

Mr. Barber stated that the water supply from Little Washougal was so inadequate this summer that rigid restrictions were necessary and if they would of had fires the storage supply would have been exhausted.

Mr. Cottrell stated that shortage was experienced only at extreme low water.

The City of Camas has no other means of water supply. A permit should be issued the applicant for 1.0 c.f.s. subject to existing rights.

A. E. Hanson

Signed this 15 day of Nov. 1930.

OK. for Permit + Sub to Permit 465

Form No. 319—1933. Approved as to Form by Dept. of Efficiency. 8189.

CERTIFICATE RECORD NO. 2, PAGE NO. 712

STATE OF WASHINGTON, COUNTY OF Clark

CERTIFICATE OF WATER RIGHT

(For rights perfected under original, enlargement or secondary permits.)

(In accordance with the provisions of Chapter 117, Laws of Washington for 1917, and the regulations of the State Hydraulic Engineer thereunder.)

This is to certify, that City of Camas, *of* Camas, *State of* Washington, *has made proof to the satisfaction of the State Supervisor of Hydraulics of Washington, of a right to the use of the waters of* Little Washougal River, *tributary of* Washougal River, *for the purposes of* municipal supply, *under* Appropriation Permit No. 1576, *of the State Supervisor of Hydraulics, and that said right to the use of said waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Hydraulics of Washington and entered of record in Volume* 2, *at Page* 712, *on the* 28th *day of* July, *19*33, *that the right hereby confirmed dates from* August 22nd, *19*23, *that the amount of water to which such right is entitled and hereby confirmed, for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed* 2.5 *cubic feet per second.*

A description of the lands under such right, and to which the water hereby confirmed is appurtenant, or if for other purposes, the place where such water is put to beneficial use, is as follows:

PLACE OF USE			LEGAL SUBDIVISION		
Section	Township	Range			
			City of Camas		

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Section 39, Chapter 117, Session Laws 1917.

WITNESS the seal and signature of the State Supervisor of Hydraulics affixed this 28th *day of* July, *19*33.

Chas. Barnhart

State Supervisor of Hydraulics.

PERMIT

STATE OF WASHINGTON,
COUNTY OF THURSTON. } ss.

This is to certify that I have examined the foregoing application and do hereby grant the same, subject to the following limitations and conditions. ~~If for irrigation this appropriation shall be subject to such reasonable rotation system as may be ordered by the State Hydraulic Engineer~~ and is further subject to rights of C. W. Cottrell under certificate #121, for the appropriation and use of waters of Little Washougal River of which Jones Creek is a tributary.

The amount of water appropriated shall be limited to the amount which can be applied to beneficial use and not to exceed 2½ *cubic feet per second, or its equivalent in case of rotation.*

The priority date of this permit is August 22nd, 1923

Actual construction work shall begin on or before December 1st, 1951 *and shall thereafter be prosecuted with reasonable diligence and be completed on or before* December 1st, 1952

Complete application of the water to the proposed use shall be made on or before December 1st, 1955

WITNESS my hand this 2nd *day of* December *19* 50

Chas. J. Barnhart
State Hydraulic Engineer.

This form approved by the State Hydraulic Engineer, 1917.

Application No. 924
Permit No. 1576

PERMIT
To Appropriate the Public Waters of the State of Washington

~~Issued to~~ City of Camas

County of Clark

This instrument was first received in the office of the State Hydraulic Engineer, Olympia, Washington, on the 22nd *day of* August, *19* 23, *at* 1:45 *o'clock* P. M.

Returned to applicant for correction

Corrected Application received

Approved December 2nd, 1950

Recorded in Book No. 7 *of Permits, on Page* 1576

CHAS. J. BARNHART
State Hydraulic Engineer,

PLANE M. LARSON, PUBLIC PRINTER, OLYMPIA

Before your certificate of water right is issued it will be necessary for you to fill out and file with the State Hydraulic Engineer a copy of each of the following reports:

1st. Progress report.
2nd. Notice of water right application.
3rd. Notice to begin construction.
4th. Notice of prosecution of work with diligence.
5th. Notice of completion of construction.
6th. Notice of application of water to a beneficial use.
7th. Proof of appropriation of water.

Upon a satisfactory showing that the appropriation has been perfected as provided by statute the State Hydraulic Engineer will issue a water right certificate.

(Blanks will be furnished by the office of State Hydraulic Engineer.)

APPLICATION NO. 924

CITY OF CAMAS

Examination made November 4, 1950

This application is for 2.5 c.f.s. from Little Washougal a tributary to Washougal River for domestic and municipal supply.

Mr. Sugg stated he did not question in his mind the legal right of this application.

I went over the ground with Mr. W. H. Barber, City Clerk and Superintendent of City Water and found the following:

This system was installed in 1925 after a survey had been made, a part of which included a survey for pipe line extended to Jones Creek. The main is of 10" steel pipe from the two reservoirs on a hill about a mile above town of Camas a distance of about 9 miles to a "Y" then approximately 2 miles of 8" pipe to point of diversion. There is approximately 2.5 c.f.s. now running in pipe line and approximately 1.5 c.f.s. going past intake.

Mr. Barber stated that they were taking all of the water up to the recent rains about a week ago and was not filling the pipe and the City of Camas was under a dangerous water shortage.

This application is in reference to application No. 5126.

A G Strunk

Signed this 15 day of Nov. 1950.

J.K.
Subject to prior Permit #465

WELL No3

CERTIFICATE RECORD No. 1 PAGE No. 85-A

STATE OF WASHINGTON, COUNTY OF Clark

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and the rules and regulations of the State Supervisor of Hydraulics thereunder.

THIS IS TO CERTIFY *That* THE CITY OF CAMAS

of Camas, Washington, *has made proof to the satisfaction of the State Supervisor of Hydraulics of Washington, of a right to the use of the ground waters of a* Well

located within the NW¼ of SW¼ of Sec. 12, Twp. 1 N., Rge. 3 E.W.M.

for the purpose of Municipal Supply

under Ground Water Permit No. 2 *issued by the State Supervisor of Hydraulics, and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Hydraulics of Washington and entered of record in Volume* 1 *at page* 85-A *; that the quantity of ground water to which such right is entitled and hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed* 1200 gallons per minute; 118 acre-feet per year; That the right hereby confirmed dates from July 21, 1945.

~~for irrigation of xxxx

S. F. No. 7334—6-45—5C. 9235.

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION AND DEVELOPMENT
DIVISION OF HYDRAULICS

Permit to Appropriate Public Ground Waters of the State of Washington

Book No. 1 of Ground Water Permits, on page 2 under Application No. 4

The City of Camas

of City Hall, Camas, Washington

is hereby granted a permit to appropriate the following described public ground waters of the State of Washington, subject to existing rights, and to the limitations and provisions set out herein.

Priority date of this permit is July 21, 1945

Source of the proposed ground water appropriation is a well

within area, sub-area

zone. Name or number of works is

Quantity of water appropriated shall be limited to the amount which can be beneficially applied and not to exceed 1200 gallons per minute; 118 acre-feet per year, to be used for the following purposes: Municipal supply

as more definitely set out below.

Location of the well, tunnel, or infiltration trench is North 7°31' East 480 feet and South 83°46' East 112 feet from the Northwest corner of Block 1 of Oak Park Addition to the City of Camas,
being within NW¼ of SW¼ of Sec. 12, Twp. 1 N., Rge. 3 E.W.M.,

county of Clark

Use, or uses to which water is to be applied:

For municipal supply: 1200 gallons per minute; acre-feet per year,

to supply The City of Camas

For irrigation: gallons per minute; acre-feet per year,

for the irrigation of acres.

For miscellaneous uses: gallons per minute; acre-feet per year,

for

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

City of Camas, Clark County, Washington

DESCRIPTION OF WORKS FROM WHICH WATER IS TO BE WITHDRAWN

The well will be Drilled and have a diameter of 14 inches, and depth of 95 feet.
(Dug or drilled)

Description of tunnel or infiltration trench:

(Please read carefully provisions below)

Particular specifications required by the Supervisor of Hydraulics for the purpose of preventing waste of public waters:

Construction work shall begin on or before July 1, 1946
and shall thereafter be prosecuted with reasonable diligence and completed on or before
October 1, 1946
and complete application of water to proposed use shall be made on or before
October 1, 1947

Given under my hand and the seal of this office at Olympia, Washington, this 20th day of September 1945

CLARENCE B. SHAIN
State Supervisor of Hydraulics

By: Chas J. Carthart
Deputy.

GROUND WATER

APPLICATION NO. 4

... City of Camas.

The application of the City of Camas for the appropriation of 1200 gallons per minute from ground water through a well, which will be designated Well No. 3, was approved for a permit on September 6.

On September 21 the undersigned visited the locality, accompanied by Mr. Arthur K. Piper, Ground Water Geologist.

The City has a gravity water supply and an additional water supply from two wells. The supply from both of which sources does not furnish sufficient water for the town during the dry months. It was therefore found by the City officials that additional water had to be obtained in order to meet its requirements. For that reason they planned a third well to augment the water supply during critical periods.

Judging from the wells now in use, the amount of water applied for will be available and will be put to an important beneficial use.

Permit has been approved.

Signed this 25th day of September, 1945.

Chas. J. Bartholet

CHAS. J. BARTHOLET
Consulting Engineer

S. F. No. 1361—5-60—3M. 63304.

CERTIFICATE RECORD NO. 9 PAGE NO. 4072-A

STATE OF WASHINGTON, COUNTY OF Clark

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 163, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY THAT CITY OF CAMAS, WASHINGTON

~~X~~ _____, has made proof

to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of a well

located within ~~W½NW¼~~

Sec. 12, Twp. 1 N., R. 3 ~~W~~ E W.M.,

for the purpose of municipal supply

under and subject to provisions contained in Ground Water Permit No. 4804 issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume 9 at page 4072-A that the right hereby confirmed dates from February 12, 1959; that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 1325 gallons per minute; 1208 acre-feet per year for municipal supply.

Special provisions required by the Supervisor of Water Resources:

A description of the lands to which such ground water right is appurtenant:

City of Camas, Clark County, Washington.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 24th day of November, 19 61.

M Burkhart

S. F. No. 7336—12-58—30M. 5812F.

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES

Permit to Appropriate Public Ground Waters of the State of Washington

Book No. 10 of Ground Water Permits, on page [illegible] under Application No. 5130

CITY OF CAMAS, WASHINGTON

is hereby granted a permit to appropriate the following described public ground waters of the State of Washington, subject to existing rights, and to the limitations and provisions set out herein.

Priority date of this permit is February 12, 1959

Source of the proposed ground water appropriation is a well

within _____ area, _____ sub-area, _____ zone. Name or number of works is _____

Quantity of water appropriated shall be limited to the amount which can be beneficially applied and not to exceed 1500 gallons per minute; 1206 acre-feet per year, to be used for the following purposes: municipal supply

as more definitely set out below.

Location of the well, tunnel, or infiltration trench is N.10°E. 350 feet from west quarter corner of sec.12

being within W½NW¼, sec.12, T.1 N., R.3 E.W.M.

county of Clark

Use, or uses to which water is to be applied:

For municipal supply: 1500 gallons per minute; 1206 acre-feet per year, to supply the City of Camas.

For irrigation: _____ gallons per minute; _____ acre-feet per year, for the irrigation of _____ acres.

For miscellaneous uses: _____ gallons per minute; _____ acre-feet per year for _____

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

City of Camas, Clark County, Washington.

DESCRIPTION OF WORKS FROM WHICH WATER IS TO BE WITHDRAWN

The well will be drilled and have a diameter of 16 inches and depth of 115 feet.
(Dug or drilled)

Description of tunnel or infiltration trench:

(Please read carefully provisions below)

Particular specifications required by the Supervisor of Water Resources for the purpose of preventing waste of public waters:

Construction work shall begin on or before May 1, 1960

and shall thereafter be prosecuted with reasonable diligence and completed on or before November 1, 1960

and complete application of water to proposed use shall be made on or before November 1, 1961

Given under my hand and the seal of this office at Olympia, Washington, this 6th day of May, 1959.

M. W. Wilkie
State Supervisor of Water Resources

RETURN TO:
DIVISION OF WATER RESOURCES
335 GENERAL ADMINISTRATION BLDG
OLYMPIA

RECEIVED
JUL 15 1959

RECORD BY WELL DRILLER OR OTHER CONSTRUCTOR OF WORKS FOR WITHDRAWAL OF GROUND WATER

Under Permit No. G. W. 4804

("The well driller or other constructor of works for the withdrawal of public ground waters shall be obligated to furnish the permittee a certified record of the factual information necessary to show compliance with the provisions of this section." Sec. 8, Chap. 283, Laws of 1945.)

1. City of Camas, Washington
(Name and address of owner of well or other works for withdrawal of water)

2. Type; name or number of works where water is taken Well
(Well, tunnel or infiltration trench)

3. Date on which work on well or other structure was started June 2, 1959

4. Date on which work was completed July 7, 1959

5. If work on well or other structure was abandoned, give date _____

and reason for abandonment _____

6. DESCRIPTION OF WORKS:

(a) WELL: Depth 112 ft. Diameter 16 in. or ft. Dug or drilled Drilled

Flowing or pump well _____ Water Temp. 46 degrees

IF PUMP WELL: Type and size of pump is Test pump: 1500 g.p.m. pump 11½" bowl 9" pump column.

Type and size of motor or engine is Guiberson Diesel 210 h.p.

Depth from ground surface to water level before pumping 25 ft.

After continuous operation for 8 (At least four) hours, the measured discharge of the pump is 1500 g.p.m., and the drawdown of water level is 24 ft. (Pumping level minus static water level)

Recovery data (taken after pump has been shut off) (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level
Immediate recovery.			

Date of test June 29, 1959

IF FLOWING WELL: Measured discharge _____ g.p.m. on _____ (Date)

Shut-in pressure at ground surface _____ lbs. per sq. in. on _____ (Date)

Water is controlled by _____ (Cap, valve, etc.)

CASING: (Give diameter, commercial specifications and depth below ground surface of each casing size.)

16 in. diameter _____ from 0 to 112 ft.

_____ in. diameter _____ from _____ to _____ ft.

_____ in. diameter _____ from _____ to _____ ft.

_____ in. diameter _____ from _____ to _____ ft.

Describe and show depth of shoe, plug, adapter, liner or other details:

Grout seal from 32-35.
Grout seal from 15-18

OK

Perforated casing or screens:

80 perf. per ft. each perf. 1&3/8 by 3/8" from 82 to 102 ft.
(Number per foot and size of perforations or describe screen)

from ____ to ____ ft.

from ____ to ____ ft.

from ____ to ____ ft.

from ____ to ____ ft.

LOG OF WELL OR TUNNEL: (Describe each stratum or formation clearly, indicate if water bearing, and give thickness and depth as indicated.)

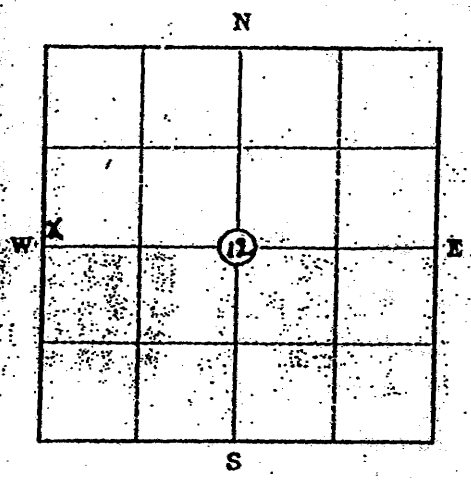
MATERIAL	Thickness (Feet)	Depth to bottom (Feet)
~~Top soil~~	3	3
Gravel and boulders	9	12
~~Gravel, some binder~~	9	21
~~Gravel and boulders~~	11	32
Cemented gravel	21	53
Loose sand and gravel, some silt	22	75
Loose sand and gravel, water-bearing	24	99
Large gravel and sand	11	110
Clay and gravel	2	112

(b) INFILTRATION TRENCH OR TUNNEL: Type ____

Dimensions: ____
(Tunnel—length, course, and cross-sectional size) (Trench—minimum and maximum depths)

Bottom width ____ ft. Discharge ____ g.p.m. Date of test ____

Position of water bearing stratum with reference to portal of tunnel ____



Scale: 1" = 2000'

Sec. 12 Twp. 1N Rge. 3E

Show approximate location of well or other works with (X) on section plat at left.

M. L. Strauss
Signature of well driller or other constructor

8110 S.E. Sunset Lane, Portland, Ore.
Address

STATE PRINTING PLANT OLYMPIA, WASH., 1957

well #4

Report of Examination on Ground Water

Received date 2-5-59 Date of exam 2-12-59 Appl. No. 5130

Name City of Camas Address Camas, Washington

Type of works well Dimensions 16"x125'

Progress of works not begun

Quantity applied for 1500 g.p.m. acre-feet per year

Legal sub. W½NW¼ Sec. 12 Twp. 1 N. Rge. 3 E. County Clark

Use municipal water supply

Irrigation-acreage: Present Planned Feasible

Municipal: Population 5391 as of 1959

Industrial

Time pump will be operated

Other water rights appurtenant to this land Cert's. 711, 712 & 85 A

Proximity to existing works, springs, wells, or streams approximately 300' to Washougal River; approx. 35' above river level

Area Sub-area Zone

RECOMMENDATIONS

Approved for 1500 g.p.m. 1208 acre-feet per year, subject to existing water rights. (1 acre-foot 325,850 gallons.)

The water requirement for municiapl supply is calculated on a per capita consumption of 200 gallons a day or 0.224 acre-feet per year, a total of 1208 acre-feet per year for 5391 persons, less any quantity diverted to this use under existing water rights.

The installation of an access port to well as described in attached Ground Water Bulletin No. 1 is recommended.

Signed this 13th day of April, 1959.

DEE MOLENAAR, Geologist
Division of Water Resources

S. F. No. 2361—(Rev. 10-69)—10-60—534 1500.

CERTIFICATE RECORD NO. 14, PAGE NO. 6636-A

STATE OF WASHINGTON, COUNTY OF Clark

CERTIFICATE OF GROUND WATER RIGHT

(Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Water Resources thereunder.)

THIS IS TO CERTIFY *That* CITY OF CAMAS

of Camas, Washington, *has made proof to the satisfaction of the Department of Water Resources of a right to the use of the public ground waters of the State of Washington from* a well

located within Lot 9, Plat of Orchard Home within the City of Camas and road right of way abutting thereto to the east, of

Sec. 12, *Twp.* 1 *N., R.* 3 E, *W.M.,*

for the purpose(s) of Municipal supply

under and specifically subject to provisions contained in Ground Water Permit No. 8627

issued by the Department of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the Department of Water Resources and entered of record in Volume 14 *at page* 6636-A; *that the priority of the right hereby confirmed dates from* March 22, 1968; *that the quantity of ground water under the right hereby confirmed for the aforesaid purposes, is limited to an amount actually beneficially used for said purposes, and shall not exceed* 600 gallons per minute, 920 acre-feet per year for municipal supply continuously during entire year to supply an estimated population of 8550 by 1970.

A description of the lands to which such ground water right is appurtenant is as follows:

City of Camas

The right to use of water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390 and 90.44.020.

This certificate of ground water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

WITNESS the seal and signature of the Assistant Director, Division of Water Management, Department of Water Resources, affixed this 17th *day of* November, *19*69

Glen H. Lidden

Assistant Director
Division of Water Management
Department of Water Resources

Engineering Data

S. F. No. 7334—OS—4-67.

STATE OF WASHINGTON
DEPARTMENT OF WATER RESOURCES
DIVISION OF WATER MANAGEMENT

Permit to Appropriate Public Ground Waters of the State of Washington

Book No. 18 of Ground Water Permits, on page 8627 under Application No. 9326

CITY OF CAMAS

of Camas, Washington

is hereby granted a permit to appropriate the following described public ground waters of the State of Washington, subject to existing rights, and to the limitations and provisions set out herein.

Priority date of this permit is March 22, 1968

Source of the proposed ground water appropriation is a well

within _____ area, _____ sub-area

_____ zone. Name or number of works is _____

Quantity of water appropriated shall be limited to the amount which can be beneficially applied and not to exceed 700 gallons per minute; 1120 acre-feet per year, to be used for the following purposes: municipal supply

as more definitely set out below.

Location of the well, tunnel, or infiltration trench is 2760 feet east and 840 feet north of southwest corner of Sec. 12

being within Lot 9, Plat of Orchard Home within City of Camas and road right-of-way abutting thereto to the east, of Sec. 12, T. 1 N., R. 3 W.W.M.

county of Clark

Use, or uses to which water is to be applied:

For municipal supply: 700 gallons per minute; 1120 acre-feet per year, to supply municipal supply for estimated population of 8500 by 1970

For irrigation: _____ gallons per minute; _____ acre-feet per year, for the irrigation of _____ acres.

For miscellaneous uses: _____ gallons per minute; _____ acre-feet per year, for _____

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

City of Camas

DESCRIPTION OF WORKS FROM WHICH WATER IS TO BE WITHDRAWN

The well will be drilled and have a diameter of 8 inches, and depth of 70 feet.
(Dug or drilled)

Description of tunnel or infiltration trench:

Please read carefully provisions below)

Particular specifications required by the Department of Water Resources for the purpose of preventing waste of public waters:

Issued as a supplementary supply to Surface Water Certificates 711 and 712, Ground Water Certificates 85-A and 4072-A and concurrent Ground Water Application 9325, for 700 gallons per minute and 1120 acre-feet per year; the total quantity withdrawn or diverted from all sources is not to exceed 3300 acre-feet per year.

Construction work shall begin on or before Started

and shall thereafter be prosecuted with reasonable diligence and completed on or before

September 1, 1969

and complete application of water to proposed use shall be made on or before

September 1, 1970

Given under my hand and the seal of this office at Olympia, Washington, this 21st day of August, 19 68.

Glen H. Fuller
Assistant Director
Division of Water Management
Department of Water Resources

File Original and First Copy with the Division of Water Resources
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No. 9326
Permit No. 8627

(1) OWNER: Name City of Camas Address 616 N.E. 4th Avenue

(2) LOCATION OF WELL: County Clark - Lot 9, Plat of Orchard SW ¼ SE ¼ Sec. 12 T. 1 N., R. 3 E W.M.

Bearing and distance from section or subdivision corner: Home within City of Camas& road right of way abutting thereto to the East of Sec. 12 T1N R3 East of WM

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☒ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) 5
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 71 ft. Depth of completed well 71 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 8" Diam. from ft. to ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☒ No ☐
Type of perforator used
SIZE of perforations 3/8" in. by 1-1/4" in.
408 perforations from 44'6" ft. to 65 ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☐ No ☐ To what depth? 22 ft.
Material used in seal Concrete grout
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off gravity

(7) PUMP: Manufacturer's Name Johnson
Type: V.H.S. Turbine H.P. 75

(8) WATER LEVELS: Land-surface elevation above mean sea level 38 ft.
Static level 36 ft. below top of well Date 7-25-68
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? O.J. Norris
Yield: 450 gal./min. with 1 ft. drawdown after 8 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test 3-16-68
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water 53° Was a chemical analysis made? Yes ☒ No ☐

See attached copy

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Surface dirt with small boulder	0	3
Gravel & Bouxlers, very little binder	3	7
Gravel & boulders w/ clay binder	7	21
Large gravel & small boulders, loose	21	24
Med. size gravel, fairly loose	24	33
Med size gravel	33	35
Large to fine gravel, some red gravel	35	45
Started making water at 35 feet		
Med. to fine gravel, clean some red - very little sand	45	48
Some larger gravel	48	56
Med. to fine gravel, clean & loose	56	60
Med to fine gravel clean, loose	60	65
Med to fine gravel, clean, loose	65	67' 6"
Loose gravel formation	67'6"	68' 6"
Loose gravel formation	68'6"	69' 6"
Fine yellow sand	69'6"	71
Sealed bottom with concrete	71	

Work started Feb. 14, 19 68. Completed Mar. 19, 19 68

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME O.J. NORRIS - WATER WELL DRILLING (Person, firm, or corporation) (Type or print)
Address 4411 N.E. 59th Avenue Vancouver, Washington

[Signed] O. J. Norris (Well Driller)

License No. 223 02 4069 Date Sept. 9, 19 68

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7154—(Rev. 2-66)—2-66—5M—(16) 25/WRB

Report of Examination on Ground Water

Received date March 22, 1968 Date of exam May 28, 1968 Appl. No. 9326

Name City of Camas Address 616 N.E. 4th Ave., Camas, Wash. 98607

Type of works a well Dimensions 8" x 70'

Progress of works Started

Quantity applied for 700 g.p.m. acre-feet per year

Lot 9, Plat of Orchard Home within City of Camas & road right of way abutting thereto to the east

Legal sub / Sec. 12 Twp. 1 N. Rge. 3 E. County Clark

Use Municipal supply

Irrigation-acreage: Present Planned Feasible

Municipal: Population 8500 as of 1970

Industrial

Time pump will be operated May 1st through September 30th

Other water rights appurtenant to this land SW Cert. 711 for 1.0 cfs from Jones Cr. for dom. supply; SW Cert. 712 for 2.5 cfs from Little Washougal R. for Munic. supply; GW Cert. 85-A for 1200 gpm, 118 ac-ft/yr for munic. supply; GW Cert. 4072-A for 1325 gpm; 1208 ac-ft/yr for mun. sup.; and concurrent GW App. 9325 for 1500 gpm for mun. supply.

Proximity to existing works, springs, wells, or streams City of Washougal, northeasterly 1200 feet

Area Sub-area Zone

RECOMMENDATIONS

Approved for 700 g.p.m. 1120 acre-feet per year, subject to existing water rights. (1 acre-foot 325,850 gallons.)

It is noted that the well site and water transmission facilities therefrom are not located upon the land owned by the applicant. Applicant is, accordingly, advised that the issuance of permit by this department for appropriation of the waters in question does not convey a right of access to, or other right to use, land which the applicant does not legally possess. Obtainment of such right is a private matter between applicant and owner of that land.

Use of the waters to be appropriated under this application will be for a public water supply. State Board of Health rules require every owner of a public water supply to obtain written approval from the State Director of Health prior to any new construction or alterations of a public water supply. The applicant is advised to contact the Washington State Department of Health, 304 Public Health Building, Olympia, with regard to the need for compliance.

The following water rights are appurtenant to this land:

Certificate Number	c.f.s./g.p.m.
Surface Water Cert. 711	1.0 c.f.s.
Surface Water Cert. 712	2.5 c.f.s.
Ground Water Cert. 85-A	1200 g.p.m.
Ground Water Cert. 4072-A	1325 g.p.m.
Concurrent Ground Water Appli. 9325	1500 g.p.m.

(over)

The total requirement based on an engineering study is 345 gallons per capita per day for all purposes for an estimated population of 8500 by 1970, or approximately 3300 acre-feet per year.

The quantity recommended under this application is 700 gallons per minute pumping continuously, or 1120 acre-feet per year.

The permit when issued will carry the following provision: "Issued as a supplementary supply to Surface Water Certificates 711 and 712, Ground Water Certificates 85-A and 4072-A and concurrent Ground Water Application 9225, for 700 gallons per minute and 1120 acre-feet per year, the total quantity withdrawn or diverted from all sources is not to exceed 3300 acre-feet per year."

Signed at Olympia, Washington
this 5 day of June, 1968

B. A. Cameron

B. A. CAMERON, Engineer
Division of Water Management

R. F. No. 7341—(Rev. 10-001—10-00—33M 12000.

CERTIFICATE RECORD NO. 14, PAGE NO. 6635-A

STATE OF WASHINGTON, COUNTY OF Clark

CERTIFICATE OF GROUND WATER RIGHT

(Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Water Resources thereunder.)

THIS IS TO CERTIFY *That* CITY OF CAMAS

of Camas, Washington, *has made proof*

to the satisfaction of the Department of Water Resources of a right to the use of the public ground waters of the State of Washington from a well

located within David C. Parker D.L.C. No. 48

Sec. 12, *Twp.* 1 *N., R.* 3 E. *W.M.,*

for the purpose(s) of Municipal supply

under and specifically subject to provisions contained in Ground Water Permit No. 8544

issued by the Department of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the Department of Water Resources and entered of record in Volume 14 *at page* ~~6635-A~~ 6635-A; *that the priority of the right hereby confirmed dates from* March 22, 1968; *that the quantity of ground water under the right hereby confirmed for the aforesaid purposes, is limited to an amount actually beneficially used for said purposes, and shall not exceed* 1500 gallons per minute, 2400 acre-feet per year for municipal supply to supply a population of 8500 by 1970 continuously during entire year.

A description of the lands to which such ground water right is appurtenant is as follows:

City of Camas

The right to use of water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390 and 90.44.020.

This certificate of ground water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

WITNESS the seal and signature of the Assistant Director, Division of Water Management, Department of Water Resources, affixed this 17th *day of* November, *19*69

Glen H. Lillie

S. F. No. 7334—OS—4-61.

STATE OF WASHINGTON
DEPARTMENT OF WATER RESOURCES
DIVISION OF WATER MANAGEMENT

Permit to Appropriate Public Ground Waters of the State of Washington

Book No. 18 of Ground Water Permits, on page 8544 under Application No. [illegible]

CITY OF CAMAS

of Camas, Washington

is hereby granted a permit to appropriate the following described public ground waters of the State of Washington, subject to existing rights, and to the limitations and provisions set out herein.

Priority date of this permit is March 22, 1968

Source of the proposed ground water appropriation is a well

within _____ area, _____ sub-area

_____ zone. Name or number of works is _____

Quantity of water appropriated shall be limited to the amount which can be beneficially applied and not to exceed 1500 gallons per minute; 2400 acre-feet per year, to be used for the following purposes: municipal supply

as more definitely set out below.

Location of the well, tunnel, or infiltration trench is 2300 feet east and 1800 feet north of southwest corner of Sec. 12

being within David C. Parker D.L.C. No. 48 of Sec. 12, T. 1 N., R. 3 E.W.M.

county of Clark

Use, or uses to which water is to be applied:

For municipal supply: 1500 gallons per minute; 2400 acre-feet per year, to supply a population of 8500 by 1970 continuously during entire year.

For irrigation: _____ gallons per minute; _____ acre-feet per year, for the irrigation of _____ acres.

For miscellaneous uses: _____ gallons per minute: _____ acre-feet per year, for _____

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

City of Camas

DESCRIPTION OF WORKS FROM WHICH WATER IS TO BE WITHDRAWN

The well will be drilled (Dug or drilled) and have a diameter of 16 inches, and depth of 85 feet.

Description of tunnel or infiltration trench:

Please read carefully provisions below)

Particular specifications required by the Department of Water Resources for the purpose of preventing waste of public waters: 1) The installation of an access port as described in attached Ground Water Bulletin No. 1 shall be required prior to issuance of final Certificate of Water Right. 2) Issued as a supplementary supply to Surface Water Certificates 711 and 712, Ground Water Certificates 85-A and 4072-A and concurrent Ground Water Application 9126, for 1500 gallons per minute and 2400 acre-feet per year; the total quantity withdrawn or diverted from all sources is not to exceed 3300 acre-feet per year.

Gallons Min.

2400

Construction work shall begin on or before July 1, 1969

and shall thereafter be prosecuted with reasonable diligence and completed on or before July 1, 1970

and complete application of water to proposed use shall be made on or before July 1, 1971

Given under my hand and the seal of this office at Olympia, Washington, this 20th day of June, 1968

Glen H. Fuller

Assistant Director
Division of Water Management
Department of Water Resources

WELL #6

Report of Examination on Ground Water

Received date March 22, 1968 Date of exam May 28, 1968 Appl. No. 9325

Name City of Camas Address 616 N.E. 4th Ave., Camas, Wash. 98607

Type of works a well Dimensions 16" x 85'

Progress of works Not started

Quantity applied for 1500 g.p.m. 2300 acre-feet per year

Legal sub. / Sec. 12 Twp. 1 N. Rge. 3 E. County Clark
David C. Parker D.L.C. No. 48

Use Municipal supply

Irrigation-acreage: Present Planned Feasible

Municipal: Population 8500 as of 1970

Industrial

Time pump will be operated Continuously

Other water rights appurtenant to this land SW Cert. 711 for 1.0 cfs from Jones Cr. for dom. supply; SW Cert. 712 for 2.5 cfs from Little Washougal R. for munic. supply; GW Cert. 85-A for 1200 gpm, 118 ac-ft/yr for munic. supply; GW Cert. 4072-A for 1325 gpm; 1208 ac-ft/yr for mun. sup.; and concurrent GW App. 9326 for mun. supply, 700 gpm.

Proximity to existing works, springs, wells, or streams
City of Camas, west 1300 feet:
City of Washougal, east 1300 feet

Area Sub-area Zone

RECOMMENDATIONS

Approved for 1500 g.p.m. 2400 acre-feet per year, subject to existing water rights. (1 acre-foot 325,850 gallons.)

It is noted that the well site and water transmission facilities therefrom are not located upon the land owned by the applicant. Applicant is, accordingly, advised that the issuance of permit by this department for appropriation of the waters in question does not convey a right of access to, or other right to use, land which the applicant does not legally possess. Obtainment of such right is a private matter between applicant and owner of that land.

Use of the waters to be appropriated under this application will be for a public water supply. State Board of Health rules require every owner of a public water supply to obtain written approval from the State Director of Health prior to any new construction or alterations of a public water supply. The applicant is advised to contact the Washington State Department of Health, 304 Public Health Building, Olympia, with regard to the need for compliance.

The installation of an access port as described in attached Ground Water Bulletin No. 1 shall be required prior to issuance of final Certificate of Water Right. The applicant may, for his own convenience, wish to install an air-line and gage in addition to the access port.

(over)

The following water rights are appurtenant to this land:

Certificate Number	c.f.s./g.p.m.
Surface Water Cert. 711	1.0 c.f.s.
Surface Water Cert. 712	2.5 c.f.s.
Ground Water Cert. 85-A	1200 g.p.m.
Ground Water Cert. 4072-A	1325 g.p.m.
Concurrent Ground Water Appli. 9326	700 g.p.m.

The total requirement based on an engineering study is 345 gallons per capita per day for all purposes for an estimated population of 8500 by 1970, or approximately 3300 acre-feet per year.

The quantity recommended under this application is 1500 gallons per minute pumping continuously, or 2400 acre-feet per year.

The permit when issued will carry the following provision: "Issued as a supplementary supply to Surface Water Certificates 711 and 712, Ground Water Certificates 85-A and 4072-A and concurrent Ground Water Application 9326, for 1500 gallons per minute and 2400 acre-feet per year; the total quantity withdrawn or diverted from all sources is not to exceed 3300 acre-feet per year."

Signed at Olympia, Washington
this 2 day of June, 1968

B. A. Cameron

B. A. CAMERON, Engineer
Division of Water Management

File Original and First Copy with the Division of Water Resources
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No. 9325

Permit No. 8544

(1) OWNER: Name City of Camas Address 616 N.E. 4th Avenue

(2) LOCATION OF WELL: County Clark David C Parker D.L.C. #48 NE ¼ SW ¼ Sec. 12 T. 1 N. R. 3E W.M.

Bearing and distance from section or subdivision corner.

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☒ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) 6

New well ☒ Deepened ☐ Reconditioned ☐ Method: Dug ☐ Cable ☒ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 16 inches. Drilled 85 ft. Depth of completed well 85 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 16" OD Diam. from 0 ft. to 85 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☒ No ☐
Type of perforator used Mill knife
SIZE of perforations 5/16 in. by 3-1/2 in.
perforations from ft. to ft.
552 perforations from 56 ft. to 80 ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 22 ft.
Material used in seal Concrete grout
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata 27
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level 48 ft.
Static level 45 ft. below top of well Date 6-29-68
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? City
Yield: 1600 gal./min. with 5 ft. drawdown after 12 hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test June 29, 1968
Bailer test gal./min. with ft drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water 53° Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Surface Soil	0	2
Gravel & Small Boulders	2	6
Gravel & Boulders	6	10
Gravel & Small Boulders	10	14
Boulders	14	15
Pea Gravel	15	17
Boulders	17	19
Boulders	19	21
Large to Medium gravel	21	26
Medium to fine gravel, some sand	26	30
Medium to fine gravel with a few boulders	30	40
Med. to fine gravel with fine sand	40	48'6"
Med to fine gravel with some sand	48'6"	53
Water bearing gravel and sand	53	55
Med to fine gravel, water bearing	55	59
Med to fine gravel, water bearing	59	69
Med to fine gravel, some black sand water bearing	69	76
Med to large gravel	76	80
Gravel & small boulders, very tight formation	80	83'9"
Med hard gray rock	83'9"	85

Work started June 5, 1968. Completed 6-27-68, 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME O.J. NORRIS-WATER WELL DRILLING (Person, firm, or corporation) (Type or print)
Address 4411 N.E. 59th Avenue Vancouver, Washington

[Signed] O. J. Norris (Well Driller)

License No. 223 02 4069 Date Sept. 9, 1968

See Enclosed

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 1336—(Rev. 2-66)—2-66—5M. 4516

CK/WB

S. F. No. 2361—(Rev. 6-70).

WELL No 7

CERTIFICATE RECORD NO. ——, PAGE NO. G 2-00501 C

STATE OF WASHINGTON, COUNTY OF Clark

CERTIFICATE OF GROUND WATER RIGHT

(Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology thereunder.)

THIS IS TO CERTIFY THAT CITY OF CAMAS

of Camas, Washington, has made proof to the satisfaction of the Department of Ecology of a right to the use of the public ground waters of the State of Washington from a well

located within a portion of David C. Parker D.L.C. #48 lying within the SW¼ within the city limits of Camas

Sec. 12, Twp. 1 N., R. 3 E., W.M.,

for the purpose(s) of municipal supply

under and specifically subject to provisions contained in Ground Water Permit No. 10513

issued by the Department of Ecology and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the Department of Ecology and entered of record in Volume — at page G 2-00501 C; that the priority of the right hereby confirmed dates from March 22, 1971; that the quantity of ground water under the right hereby confirmed for the aforesaid purposes, is limited to an amount actually beneficially used for said purposes, and shall not exceed 1000 gallons per minute; 530 acre-feet per year, during entire year for municipal supply.

A description of the lands to which such ground water right is appurtenant is as follows:

Area served by the City of Camas.

The right to use of water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390 and 90.44.020.

This certificate of ground water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and seal of this office at Olympia, Washington, this 16th day of February, 19 73

JOHN A. BIGGS, Director
Department of Ecology

Engineering Data
TM

C-43 by R. L. Bolton

S. F. No. 7354—(Rev. 6-70)

Well No 7

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Permit to Appropriate Public Waters of the State of Washington

Book No. 22 of Ground Water Permits, on page 10515 under Application No. 11718

CITY OF CAMAS

of CAMAS, WASHINGTON

is, pursuant to the Report of Examination which has been accepted by the applicant, hereby granted a permit to appropriate the following described public ground waters of the State of Washington, subject to existing rights and to the limitations and provisions set out herein.

Priority date of this permit is March 22, 1971

Source(s) of the proposed ground water appropriation is/~~are~~ a well

The quantity of water appropriated shall be limited to the amount which can be beneficially applied and not to exceed 1000 gallons per minute; 530 acre-feet per year, to be used for the following purposes: municipal supply

as more definitely set out below.

Approximate location(~~s~~) of the point(~~s~~) of withdrawal is/~~are~~ 1245 feet east and 2145 feet north of southeast corner of Sec. 12

being within A portion of David C. Parker D.L.C. # 48 lying within the SW¼ within the city limits of Camas

of Sec. 12, Twp. 1 N., Rge. 3 E. W.M., Clark County.

The use, or uses, to which water is to be applied:

~~Domestic~~ municipal supply: 1000 gallons per minute; 530 acre-feet per year, during entire year.

Irrigation: gallons per minute; acre-feet per year from to , each year, for the irrigation of acres.

Other use(s): gallons per minute: acre-feet per year, from to each year, for

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by the City of Camas

ADDITIONAL LIMITATIONS AND PROVISIONS: The installation and maintenance of an access port as described in Ground Water Bulletin No. ' shall be required prior to issuance of final Certificate of Water Right.

The total amount of water to be withdrawn or diverted, which includes the amounts as approved in Surface Water Certificates No. 711 and 712 and Ground Water Certificates Nos. 85, 4072, 6635 and 6636 shall not exceed 5750 acre-feet per year.

Nothing in this permit shall **be construed as excusing the permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations including those administered by local agencies under the Shoreline Management Act of 1971.**

DESCRIPTION OF PROPOSED WORKS:

The well will be **drilled** (Dug or drilled) and have a diameter of **14** inches, and depth of **85** feet.

Description of tunnel or infiltration trench: _____

DEVELOPMENT SCHEDULE:

Construction work shall begin on or before **Started**

and shall thereafter be prosecuted with reasonable diligence and completed on or before **November 1, 1972**

and complete application of water to proposed use shall be made on or before **November 1, 1973**

This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or fail to give notice to the Department of Ecology on forms provided by that Department documenting such compliance.

Given under my hand and the seal of this office at Olympia, Washington, this **10th**

day of **November** 19 **71**

JOHN A. BIGGS, *Director*
Department of Ecology

by R. Jerry Bollen

ENGINEERING DATA
OK R.T.

File Original and First Copy with the Division of Water Resources
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. 11716
Permit No. .....

(1) OWNER: Name CITY OF CAMAS, WASH Address 616 NE. 4TH AVE CAMAS, WASH

(2) LOCATION OF WELL: County CLARK — NE ¼ SW ¼ Sec. 12 T. 1 N. R. 3E W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☒ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) 7
New well ☒ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Cable ☒ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 14 inches.
Drilled 84 ft. Depth of completed well 84 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 14" Diam. from +5 ft. to 84 ft.
Threaded ☐ ..." Diam. from ... ft. to ... ft.
Welded ☒ ..." Diam. from ... ft. to ... ft.

Perforations: Yes ☒ No ☐
Type of perforator used STAR
SIZE of perforations 3/8 in. by 1 1/4 in.
520 perforations from 49 ft. to 77 ft.
... perforations from ... ft. to ... ft.
... perforations from ... ft. to ... ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type ... Model No.
Diam. ... Slot size ... from ... ft. to ... ft.
Diam. ... Slot size ... from ... ft. to ... ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:
Gravel placed from ... ft. to ... ft.

Surface seal: Yes ☒ No ☐ To what depth? 20 ft.
Material used in seal CEMENT GROUT
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? ... Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: Submersible turbine H.P. 100
1-25-75 JM

(8) WATER LEVELS: Land-surface elevation above mean sea level ... ft.
Static level 8.5 ft. below top of well Date 6/22/71
Artesian pressure ... lbs. per square inch Date
Artesian water is controlled by ... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? STRASSER
Yield: 1000 gal./min. with 4 ft. drawdown after 1 1/2 hrs.
" 1425 " 5 " 6 "
" 1200 " 4 " 2 1/2 "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
IMMEDIATE RECOVERY					

Date of test JUNE 22, 1971
Bailer test ... gal./min. with ... ft. drawdown after ... hrs.
Artesian flow ... g.p.m. Date
Temperature of water 57 Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
GRAVEL AND BOULDERS	0	8
GRAVEL, SOME CLAY	8	18
CEMENTED GRAVEL	18	20
LOOSE GRAVEL	20	30
PACKED GRAVEL	30	36
GRAVEL AND GREY CLAY	36	39
LOOSE GRAVEL (WATER)	39	65
MEDIUM GRAVEL (WATER)	65	70
LARGE GRAVEL (WATER)	70	81
RED CLAY	81	84

RECEIVED
DEPARTMENT OF ECOLOGY
JUL 1 1971
AM 7,8,9,10,11,12,1,2,3,4,5 PM

Work started JUNE 7, 19 71. Completed JUNE 25, 19 71

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME R J STRASSER DRILLING CO (Person, firm, or corporation) (Type or print)

Address 8110 SE SUNSET LANE PORTLAND ORE

[Signed] Robert L Strasser (Well Driller)

License No. 223022806 Date JULY 12, 19 71

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7256—(Rev. 2-68)—Form No. 4516.

well #7

Report of Examination on Ground Water

Received date March 22, 1971 Date of exam. August 31, 1971 Appli. No. 11718

Name City of Camas Address 616 N.E. 4th Ave., Camas WA 98607

Type of works A well Dimensions 14" x 85'

Progress of works Well drilled and capped

Quantity applied for 1000 g.p.m. 530 acre-feet per year

of David C. Parker D.L.C. #48 within the City of Camas (lying within the SW¼)

Legal sub A portion/Sec. 12 Twp. 1 Rge. 3 E. County Clark

Use Municipal supply

Irrigation-acreage: Present Planned Feasible

Municipal: ~~Population~~ Area served 15,000 as of 1990

Industrial

Time pump will be operated Continuously

Other water rights appurtenant to this land See Surface Water Certificates Nos. 712 & 711; Ground Water Certificates Nos. 85, 4072, 6635 and 6636

Proximity to existing works, springs, wells, or streams City of Camas, west 400'; City of Camas, southeasterly 1000'; City of Camas, north; Washougal River, north 200'

Area Sub-area Zone

RECOMMENDATIONS

Approved for 1000 g.p.m. 530 acre-feet per year, subject to existing water rights. (1 acre-foot 325,850 gallons.)

The installation of an access port as described in attached Ground Water Bulletin No. 1 shall be required prior to issuance of final certificate of water right. The applicant may, for his own convenience, wish to install an airline and gage in addition to the access port.

Use of the waters to be appropriated under this application will be for a public water supply. State Board of Health rules require every owner of a public water supply to obtain written approval from the Assistant Secretary, Division of Health prior to any new construction or alterations of a public water supply. The applicant is advised to contact the Washington State Division of Health, Public Health Bldg. No. 7, Thurston Airdustrial Center, Olympia, with regard to the need for compliance.

The following water rights are appurtenant to this land:

Certificate No.	c.f.s./g.p.m.	ac-ft per yr.
SWC 711	1.0 c.f.s.	730
SWC 712	2.5 c.f.s.	1820
GWC 85-A	1200 g.p.m.	118
GWC 4072-A	1325 g.p.m.	1208
GWC 6635	1500 g.p.m.	2400
GWC 6636	600 g.p.m.	920

The total requirement based on an engineering study is 345 gallons per capita per day for all purposes for an estimated population of 15,000 by 1990 or approximately 5,750 acre-feet per year.

The quantity recommended under this application is 1000 gallons per minute not to exceed 530 acrefeet per year as requested in the application.

The permit when issued will carry the following provision: "The total amount of water to be withdrawn or diverted, which includes the amounts as approved in Surface Water Certificates Nos. 711 and 712 and Ground Water Certificates Nos. 85, 4072, 6635 and 6636 shall not exceed 5,750 acre-feet per year."

Additionally, the permit when issued shall carry the following provision: "Nothing in this permit shall be construed as excusing the permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations including those administered by local agencies under the Shoreline Management Act of 1971."

Signed at Olympia, Washington
this 28th day of September, 1971.

Jerry Louthain
JERRY LOUTHAIN, Engineer
Department of Ecology

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

CERTIFICATE OF WATER RIGHT

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
February 4, 1977	G 2-24400	G 2-24400 P	G 2-24400 C

NAME
CITY OF CAMAS

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
P.O. Box 1055	Camas	Washington	98607

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown.

PUBLIC WATER TO BE APPROPRIATED

SOURCE
well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	900	530

QUANTITY, TYPE OF USE, PERIOD OF USE		
530 acre-feet per year	municipal supply	continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
1375 feet East and 2145 feet North of Southwest corner of Section 12.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SW¼	12	1	3 E	28	Clark

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by the Camas Municipal water system.

"The total amount of water to be withdrawn or diverted, which includes the amounts as approved in Surface Water Certificate No. 711 and 712 and Ground Water Certificate Nos. 85A, 4072 A, 6635 A and G 2-00501 and this certificate shall not exceed 5750 acre-feet per year."

↑ 6636A ?

The access port as required on your permit shall be maintained at all times.

"All water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under Chapter 18.104 RCW (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and maintenance of Water Wells)."

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and the seal of this office at Olympia *Washington, this* 23rd *day of* May *19* 79

WILBUR G. HALLAUER, DIRECTOR
Department of Ecology

ENGINEERING DATA
OK RPS
OTES

by E.W. Asselstine
E.W. ASSELSTINE, Regional Manager

FOR COUNTY USE ONLY

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. G2-24400P
Permit No.

(1) OWNER: Name City of Camas Address Camas, Washington

(2) LOCATION OF WELL: County Clark NW SW Sec. 12 T. 1 N. R. 3E W.M.
Bearing and distance from section or subdivision corner 1375 E & 2145' N of SW Corner of Sec 12

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☒ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) 8
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 14 inches.
Drilled 87 ft. Depth of completed well 87 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 14" Diam. from 0 ft. to 87 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☒ " Diam. from ft. to ft.
(3' riser added for future fill)
Perforations: Yes ☒ No ☐
Type of perforator used Mills Knife
Size of perforations 3/8 in. by 3½ in.
8 rows perforations from 44 ft. to 79 ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 20 ft
Material used in seal Cement
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 33.2 ft. below top of well Date 5/10/77
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? driller
Yield: 1,040 gal./min. with 1.15 ft. drawdown after ½ hrs.
" 1,791 " 3.60 " 6 "
" 1,921 " 3.65 " 7 "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
0:00	36.85				
7:00	34.00				

minutes

Date of test 5/10/77
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water 50° Was a chemical analysis made? Yes ☒ No ☐

OK PRS

(10) WELL LOG:
Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Topsoil	0	6"
Gravel, small boulders	6"	4'
Gravel, boulders	4'	21'
Gravel, small boulders, brown clay seams	21'	37'
Gravel, loose, some brown clay	37'	39'
Gravel, sand, gray	39'	42'
Gravel, sand, gray, water bearing	42'	49'
Gravel, medium size, sand, gray, loose, water bearing	49'	55'
Gravel, small to large, loose, water bearing	55'	75'
Gravel, medium to large, loose	75'	79'
Gravel, large, red clay	79'	82'
Clay, red	82'	87'

RECEIVED
JUL 6 1977
DEPARTMENT OF ECOLOGY
SOUTHWEST REGIONAL OFFICE

Work started 4/14 19 77 Completed 5/14 19 77

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME NORRIS DRILLING & PUMP CO., INC. (Person, firm, or corporation) (Type or print)
Address 11026 N.E. St. Johns Blvd. Vancouver, Washington 98665

[Signed] O. J. Norris (Well Driller)

License No. 0366 Date June 6 19 77

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PERMIT

TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
February 4, 1977	G 2-24400	G 2-24400 P	

NAME
CITY OF CAMAS

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
616 ~~NE 4th Ave.~~ PO Box 1655	Camas	Washington	98607

The applicant is, pursuant to the Report of Examination which has been accepted by the applicant, hereby granted a permit to appropriate the following described public waters of the State of Washington, subject to existing rights and to the limitations and provisions set out herein.

PUBLIC WATER TO BE APPROPRIATED

SOURCE
well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	900	530

QUANTITY, TYPE OF USE, PERIOD OF USE
530 acre-feet per year — municipal supply — continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
1375 feet East and 2145 feet North of Southwest corner of Section 12.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SW¼	12	1	3 E	28	Clark

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by the Camas Municipal water system.

DESCRIPTION OF PROPOSED WORKS

Well 14" x 85', 100 HP pump to municipal water system.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	July 1, 1979	July 1, 1980

PROVISIONS

"The total amount of water to be withdrawn or diverted, which includes the amounts as approved in surface water certificate No. 711 and 712 and Ground Water Certificate Nos. 85A, 4072 A, 5635 A and G2-00501 and this permit shall not exceed 5750 acre-feet per year.

The installation of an access port as described in Ground Water Bulletin No. 1 shall be required prior to issuance of final certificate of water right. The permittee, may for his own convenience, wish to install an airline and gage in addition to the access port.

"All water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under Chapter 18.104 RCW (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and maintenance of Water Wells)."

Nothing in this permit shall be construed as excusing the permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations including those administered by local agencies under the Shoreline Management Act of 1971.

This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or fail to give notice to the Department of Ecology on forms provided by that Department documenting such compliance.

Given under my hand and the seal of this office at Olympia *Washington, this* 15th *day of* March, *19* 78

WILBUR HALLAUER, DIRECTOR
Department of Ecology

ENGINEERING DATA
OK RPB

by E.W. Asselstine

E.W. Asselstine, Regional Manager

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
February 4, 1977	G 2-24400		

NAME
CITY OF CAMAS

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
616 NE 4 th Ave	Camas	Washington	98607

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	900	530

QUANTITY, TYPE OF USE, PERIOD OF USE		
530 acre-feet per year	municipal supply	continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
1375 feet East and 2145 feet North of Southwest corner of Section 12.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SW¼	12	1	3 E	28	Clark

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by the Camas Municipal water system.

DESCRIPTION OF PROPOSED WORKS

1 14" x 85', 100 HP pump to municipal water system.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	July 1, 1979	July 1, 1980

PROVISIONS

Recommend this application be approved for 900 gallon per minute and 530 acre-feet per year for a municipal supply for the City of Camas.

The following water rights are appurtenant to this land.

Certificate No.	CFS/GPM	Acre-feet per year
SWC 711	1.0 CFS	730
SWC 712	2.5 CFS	1820
GWC 85-A	1200 GPM	118
GWC 4072 A	1325 GPM	1208
GWC 6635	1500 GPM	2400
GWC 6636	600 GPM	920
G2 - 00501 C	1000 GPM	530

total requirement based on an engineering study is 345 gallons per capita per day for all poses for an estimated population of 15,000 by 1990 or approximately 5,750 acre-feet per year. The permit when issued will carry the following provision: "The total amount of water to be withdrawn or diverted, which includes the amounts as approved in surface water certificate Nos. 711 and 712 and Ground Water Certificate Nos. 85A, 4072A, 6635 A 6636 A and G2-00501 and this application shall not exceed 5750 acre-feet per year.

The installation of an access port as described in attached Ground Water Bulletin No. 1 shall be required prior to issuance of final certificate of water right. The applicant may for his own convenience, wish to install an airline and gage in addition to the access port.

Use of the waters to be appropriated under this application will be for a public water supply. State Board of Health rules require every owner of a public water supply to obtain written approval from the Water Supply and Waste Section, Department of Social and Health Services, Mail Stop 4-1, Building 4, Olympia, Washington, 98504, prior to any new construction or alterations of a public water supply.

"All water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under Chapter 18.104 RCW (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells)."

Nothing in this application shall be construed as excusing the applicant from compliance with any applicable federal, state, or local statutes, ordinances, or regulations including those administered by local agencies under the Shoreline Management Act of 1971.

ned at Olympia, Washington,
...is 4 day of August, 1977.

Robert P. Burrell
Department of Ecology

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PERMIT

TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regul the Department of Ecology.)

☒ Ground Water (issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regul the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
August 13, 1986	G2-27384	G2-27384 P	

NAME
City of Camas

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
616 NE 4th Avenue	Camas	Washington	98607

The applicant is, pursuant to the Report of Examination which has been accepted by the applicant, hereby granted a permit to appr the following described public waters of the State of Washington, subject to existing rights and to the limitations and provisions s herein.

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Well No. 9

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	650	210 Supplemental

QUANTITY, TYPE OF USE, PERIOD OF USE		
210 acre-feet per year Supplemental to existing rights	Municipal Supply	Year-round, as needed

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION–WITHDRAWAL
600 feet south and 700 feet west of the north quarter corner of Section 4.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE¼NW¼	4	1	3E	28	Clark

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by the City of Camas.

This permit is subject to the implementation of the minimum requirements established in the Interim Guidel for Public Water Systems Regarding Water Use Reporting, Demand Forecasting Methodology and Conserva Programs, July 1990.

Under RCW 90.03.005 and 90.54.020(6), conservation and improved water use efficiency must be emphas in the management of the states water resources, and must be considered as a potential new source of w Accordingly, as part of the terms of this permit, the applicant shall prepare and implement a water conserva plan approved by Department of Health. The standards for such a plan may be obtained from either Department of Health or the Department of Ecology.

The Water Resources Act of 1971 specifies certain criteria regarding utilization and management of the wa of the state in the best public interest. Use of water may be subject to regulation at certain times, based on necessity to maintain water quantities sufficient for preservation of the natural environment.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

REPORT OF EXAMINATION

TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regu the Department of Ecology.)

☒ Ground Water (issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regu the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
August 13, 1986	G2-27384		

NAME
City of Camas

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
616 NE 4th Avenue	Camas	Washington	98607

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Well No. 9

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	650	210 Supplemental

QUANTITY, TYPE OF USE, PERIOD OF USE		
210 acre-feet per year Supplemental to existing rights	Municipal Supply	Year-round, as needed

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION–WITHDRAWAL
600 feet south and 700 feet west of the north quarter corner of Section 4.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE¼NW¼	4	1	3E	28	Clark

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by the City of Camas.

Existing City of Camas rights. The City of Camas has several surface and ground water rights and clair shown below:

Little Washougal River (reach now known as Boulder Creek), Certificate No. S 711 C, is for 1.0 cfs an acre-feet per year (AF/Y). This source is subject to low flow conditions in the summer.

Jones Creek, Certificate No. S 712 C, is for 2.5 cfs and 1820 AF/Y. This source goes low in the summe

Well No. 1, Claim No. 121022 for vested rights, is for 900 gpm and 320 AF/Y. The well is no longer us a regular basis.

Well No. 2, Claim No. 121023 for vested rights, is for 900 gpm and 230 AF/Y. The well is no longer us a regular basis.

Well No. 3, Certificate No. G 85-A C, is for 1200 gpm and 118 AF/Y.

Well No. 4, Certificate No. G 4072 C, is for 1325 gpm and 1208 AF/Y.

Well No. 5, Certificate No. G 6636 C, is for 600 gpm and 920 AF/Y.

Well No. 6, Certificate No. G 6635 C, is for 1500 gpm and 2400 AF/Y.

Well No. 7, Certificate No. G2-00501, is for 1000 gpm and 530 AF/Y.

Well No. 8, Certificate No. G2-24400, is for 900 gpm and 530 AF/Y.

Under the provisions of Certificates No. G2-00501C and G2-24400, the total annual quantity allowed u existing rights is 5,750 AF/Y.

Clark County Reservation. Under the provisions of Chapter 173-592 WAC, Reservation of Future Public W Supply for Clark County, ground water was reserved for future beneficial use for public water supply in C County. Since the enactment of this reservation, water rights issued pursuant to WAC 173-592 have rece a priority date of August 13, 1986, the effective date of said regulation. The total reservation quantity is 97 gpm and 65,300 AF/Y prorated by aquifer as follows:

1) Columbia River Alluvium (1A) and Sandy River Mudstone (1C) 77,000 gpm, 51,800 AF/Y;

2) Upper Troutdale (1B-2B) 20,000 gpm, 13,500 AF/Y.

The subject well is completed within the Upper Troutdale sediments. This appropriation, therefore, falls u WAC 173-592 and will, when permitted, be debited against the reserved quantity for the Upper Trout aquifers. In addition, the permit will carry the August 13, 1986, priority date of the reservation.

Annual quantity supplemental to existing rights. The total annual allocation under the City's existing rig 5,750 AF/Y, was based on a projected population of 15,000. The City of Camas' actual water use for the 1989 amounted to 1,930 acre-feet for a population of 6,600 (Clark County Coordinated Water system P Update, April 1991; Intergovernmental Resource Center population summary, March 1990).

The City's annual water use should remain within existing rights (5,750 AF/Y) for the foreseeable fut Therefore the annual quantity recommended for this permit will be supplemental to existing rights, augmen system supply within the 5,750 AF/Y already authorized.

Quantities from this well. Due to the apparent limitations of the aquifer, this well is probably not suitable use as a major production well, but it could serve to boost system capacity during peak periods. Mr. Levi requested that the permit authorize a maximum withdrawal of 650 gpm up to 20% of the time on average allow the City to determine the optimum rate and pumping schedule. Accordingly, the permit will autho 650 gpm and 210 AF/Y from Well 9, subject to the provisions below.

Water right certificate. Pursuant to RCW 90.03.330 and 90.44.080, a final certificate will be issued upo showing satisfactory to the Department that the appropriation has been perfected in compliance with the te of the subject permit. The certificated withdrawal rate and annual quantity will reflect a sustainable yield protection of senior rights, within the amounts specified on the permit. Monitoring and data submittal will required under the certificate as well as the permit.

Report Continued

The Water Resources Act of 1971 specifies certain criteria regarding utilization and management of the w
of the state in the best public interest. Favorable consideration of this application has been based on suf
waters available, at least during portions of the year. However, it is pointed out to the applicant that th
of water may be subject to regulation at certain times, based on the necessity to maintain water qua
sufficient for preservation of the natural environment.

REPORTED BY: Vinnie Wright DATE: October 12, 1992

The statutory permit fee for this application is $20.00.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
REPORT OF EXAMINATION

Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

[X] Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
August 21, 2003	G2-30144		

NAME
City of Camas

ADDRESS (STREET)	CITY	STATE	ZIP CODE
616 NE Fourth Avenue	Camas	WA	98607

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
8 Wells (Lower Washougal Wellfield)

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	500	2,150

QUANTITY, TYPE OF USE, PERIOD OF USE

2,150 acre-feet per year	Municipal	Year-round, as needed

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL

Well 5: 2600ft E & 790ft N of SW corner of Section 12, T1NR3E; Parcel=87268000; Lat=45.58059763; Long=122.38336343
Well 6: 2410ft E & 1795ft N of SW corner of Section 12, T1NR3E; Parcel=89927000; Lat=45.58340428; Long=122.38412204
Well 7: 1280ft E & 2110ft N of SW corner of Section 12, T1NR3E; Parcel=89891000; Lat=45.58431461; Long=122.38852327
Well 8: 1410ft E & 2080ft N of SW corner of Section 12, T1NR3E; Parcel=89888000; Lat=45.58426809; Long=122.38802699
Well 10: 790ft E & 2170ft N of SW corner of Section 12, T1NR3E; Parcel=89866000; Lat=45.58447735; Long=122.39044258
Well 11: 1060ft E & 2145ft N of SW corner of Section 12, T1NR3E; Parcel=89892000; Lat=45.58439709; Long=122.38937969
Well 12: 1030ft E & 2145ft N of SW corner of Section 12, T1NR3E; Parcel=89892000; Lat=45.58439492; Long=122.38950256
Well 13: 15ft E & 3410ft N of SW corner of Section 12, T1NR3E; Parcel=90928000; Lat=45.58783343; Long=122.39350782

SMALLEST SUBDIVISION	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
	12	1 N	3 E.W.M.	28	Clark

POINT OF WITHDRAWAL NAME	PARCEL NUMBER	LATITUDE	LONGITUDE	DATUM
Washougal River Wellfield	See above	See above	See above	NAD 83 (orthophoto)

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED
[Attachment 1 shows location of the authorized place of use and point(s) of diversion or withdrawal]

Area served by the City of Camas. The place of use of this water right is the service area described in the currently approved Water System Plan as approved by the Washington State Department of Health. RCW 90.03.386 may have the effect of revising the place of use of this water right if the criteria in section RCW 90.03.386(2) are met.

DESCRIPTION OF PROPOSED WORKS
8 Existing Wells in the Lower Washougal Wellfield

DEVELOPMENT SCHEDULE		
BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
August 1, 2008	August 1, 2015	August 1, 2025

PROVISIONS

Monitoring

The City of Camas shall develop a monitoring plan that includes the following:

a.) Monitor water levels in existing wells (TW-C and Well 4) and three new monitoring wells. The new monitoring wells must be installed as a cluster in the lower Washougal River in general proximity to the Georgia Pacific wellfield (where the largest drawdown occurs in the area). Two wells must be completed in the lower permeability streambed unit that lies beneath the river, and the third well must be completed in the more permeable PAA aquifer. All water levels must be measured to the nearest tenth of a foot, on an hourly basis during baseflow periods. New monitoring wells must be accurately located within 10 feet horizontally and 0.1 foot vertically. All monitoring wells must be constructed according to WAC 173-160-400.

b.) The City shall install a continuous river stage monitoring station in vicinity of the new monitoring wells. The monitoring station must include a staff gage which is accurately located within 10 feet horizontally and 0.1 foot vertically. Stage readings shall also be recorded on an hourly basis.

c.) Aquifer tests on the new Camas production wells must coincide with summer/fall low-flow periods and include seepage surveys during testing events. New supply wells must be accurately located within 10 feet horizontally and 0.1 foot vertically.

d.) The City shall submit water level data from their monitoring network for the previous year by January 31 to the Department of Ecology. Data shall be provided in a digital format along with a two page summary attached. A more thorough monitoring report must be provided after 5 years from the date of issuance of this water right or when this permit is perfected (whichever comes first), to further evaluate the effects of pumping on the Washougal River.

Operations of Surface Water System

1. Prior to groundwater being withdrawn under this water right, the City of Camas must cease their surface water diversions from Jones and Boulder Creeks between May 15 and October 31 of each year. At the State's discretion, the water rights associated with these diversions will be placed into the State's Trust Water Program as permanent, seasonal donations.

Metering and Reporting Diversions

1. An approved measuring device shall be installed and maintained for each of the wells authorized by this water right, in accordance with the rule "Requirements for Measuring and Reporting Water Use", WAC 173-173.

2. Reported water use data shall be submitted via the Internet. To set up an Internet reporting account, access https://fortress.wa.gov/ecy/wrx/wrx/Meteringx/. If you do not have Internet access, contact the Southwest Regional Office for forms to submit your data.

3. Chapter 173-173 WAC describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition Ecology for modifications to some of the requirements. Installation, operation, and maintenance requirements are enclosed as a document entitled "Water Measurement Device Installation and Operation Requirements."

4. Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the records of water use that are kept to meet the above conditions and may inspect, at reasonable times, any measuring device used to meet the above conditions.

Development Schedule

1. The development schedule shall be as follows:

   - Construction shall begin by August 1, 2008

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
REPORT OF EXAMINATION

Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

[X] Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
August 21, 2003	G2-30145		

NAME
City of Camas

ADDRESS (STREET)	CITY	STATE	ZIP CODE
616 NE Fourth Avenue	Camas	WA	98607

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Proposed Well (Anderson Site)

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	1000	880

QUANTITY, TYPE OF USE, PERIOD OF USE

880 acre-feet per year	Municipal	Year-round, as needed

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL

1900 feet north and 2050 feet west of SE corner of Section 12

SMALLEST SUBDIVISION	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NW 1/4 SE 1/4	12	1 N	3 E.W.M.	28	Clark

POINT OF WITHDRAWAL NAME	PARCEL NUMBER	LATITUDE	LONGITUDE	DATUM
Anderson proposed well	91045003	45.58349161	122.38087177	NAD 83 (orthophoto)

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED
[Attachment 1 shows location of the authorized place of use and point(s) of diversion or withdrawal]

Area served by the City of Camas. The place of use of this water right is the service area described in the currently approved Water System Plan as approved by the Washington State Department of Health. RCW 90.03.386 may have the effect of revising the place of use of this water right if the criteria in section RCW 90.03.386(2) are met.

DESCRIPTION OF PROPOSED WORKS
A proposed well

DEVELOPMENT SCHEDULE		
BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
August 1, 2008	August 1, 2015	August 1, 2025

PROVISIONS

Monitoring

The City of Camas shall develop a monitoring plan that includes the following:

a.) Monitor water levels in existing wells (TW-C and Well 4) and three new monitoring wells. The new monitoring wells must be installed as a cluster in the lower Washougal River in general proximity to the Georgia Pacific wellfield (where the largest drawdown occurs in the area). Two wells must be completed in the lower permeability streambed unit that lies beneath the river, and the third well must be completed in the more permeable PAA aquifer. All water levels must be measured to the nearest tenth of a foot, on an hourly basis during baseflow periods. New monitoring wells must be accurately located within 10 feet horizontally and 0.1 foot vertically. All monitoring wells must be constructed according to WAC 173-160-400.

b.) The City shall install a continuous river stage monitoring station in vicinity of the new monitoring wells. The monitoring station must include a staff gage which is accurately located within 10 feet horizontally and 0.1 foot vertically. Stage readings shall also be recorded on an hourly basis.

c.) Aquifer tests on the new Camas production wells must coincide with summer/fall low-flow periods and include seepage surveys during testing events. New supply wells must be accurately located within 10 feet horizontally and 0.1 foot vertically.

d.) The City shall submit water level data from their monitoring network for the previous year by January 31 to the Department of Ecology. Data shall be provided in a digital format along with a two page summary attached. A more thorough monitoring report must be provided after 5 years from the date of issuance of this water right or when this permit is perfected (whichever comes first), to further evaluate the effects of pumping on the Washougal River.

Operations of Surface Water System

1. Prior to groundwater being withdrawn under this water right, the City of Camas must cease their surface water diversions from Jones and Boulder Creeks between May 15 and October 31 of each year. At the State's discretion, the water rights associated with these diversions will be placed into the State's Trust Water Program as permanent, seasonal donations.

Metering and Reporting Diversions

1. An approved measuring device shall be installed and maintained for each of the wells authorized by this water right, in accordance with the rule "Requirements for Measuring and Reporting Water Use", WAC 173-173.

2. Reported water use data shall be submitted via the Internet. To set up an Internet reporting account, access https://fortress.wa.gov/ecy/wrx/wrx/Meteringx/. If you do not have Internet access, contact the Southwest Regional Office for forms to submit your data.

3. Chapter 173-173 WAC describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition Ecology for modifications to some of the requirements. Installation, operation, and maintenance requirements are enclosed as a document entitled "Water Measurement Device Installation and Operation Requirements."

4. Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the records of water use that are kept to meet the above conditions and may inspect, at reasonable times, any measuring device used to meet the above conditions.

Development Schedule

1. The development schedule shall be as follows:

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
REPORT OF EXAMINATION

Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

[X] Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
August 21, 2003	G2-30146		

NAME
City of Camas

ADDRESS (STREET)	CITY	STATE	ZIP CODE
616 NE Fourth Avenue	Camas	WA	98607

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Proposed Well (Parkers Landing)

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	1000	880

QUANTITY, TYPE OF USE, PERIOD OF USE

880 acre-feet per year	Municipal	Year-round, as needed

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL

200 feet north and 2500 feet west of the SE corner of Section 12

SMALLEST SUBDIVISION	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SW 1/4 SE 1/4	12	1 N	3 E.W.M.	28	Clark

POINT OF WITHDRAWAL NAME	PARCEL NUMBER	LATITUDE	LONGITUDE	DATUM
Parkers Landing proposed well	73134162	45.57960601	122.38210695	NAD 83 (orthophoto)

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED
[Attachment 1 shows location of the authorized place of use and point(s) of diversion or withdrawal]

Area served by the City of Camas. The place of use of this water right is the service area described in the currently approved Water System Plan as approved by the Washington State Department of Health. RCW 90.03.386 may have the effect of revising the place of use of this water right if the criteria in section RCW 90.03.386(2) are met.

DESCRIPTION OF PROPOSED WORKS

A proposed well

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
August 1, 2008	August 1, 2015	August 1, 2025

PROVISIONS

Monitoring

The City of Camas shall develop a monitoring plan that includes the following:

a.) Monitor water levels in existing wells (TW-C and Well 4) and three new monitoring wells. The new monitoring wells must be installed as a cluster in the lower Washougal River in general proximity to the Georgia Pacific wellfield (where the largest drawdown occurs in the area). Two wells must be completed in the lower permeability streambed unit that lies beneath the river, and the third well must be completed in the more permeable PAA aquifer. All water levels must be measured to the nearest tenth of a foot, on an hourly basis during baseflow periods. New monitoring wells must be accurately located within 10 feet horizontally and 0.1 foot vertically. All monitoring wells must be constructed according to WAC 173-160-400.

b.) The City shall install a continuous river stage monitoring station in vicinity of the new monitoring wells. The monitoring station must include a staff gage which is accurately located within 10 feet horizontally and 0.1 foot vertically. Stage readings shall also be recorded on an hourly basis.

c.) Aquifer tests on the new Camas production wells must coincide with summer/fall low-flow periods and include seepage surveys during testing events. New supply wells must be accurately located within 10 feet horizontally and 0.1 foot vertically.

d.) The City shall submit water level data from their monitoring network for the previous year by January 31 to the Department of Ecology. Data shall be provided in a digital format along with a two page summary attached. A more thorough monitoring report must be provided after 5 years from the date of issuance of this water right or when this permit is perfected (whichever comes first), to further evaluate the effects of pumping on the Washougal River.

Operations of Surface Water System

1. Prior to groundwater being withdrawn under this water right, the City of Camas must cease their surface water diversions from Jones and Boulder Creeks between May 15 and October 31 of each year. At the State's discretion, the water rights associated with these diversions will be placed into the State's Trust Water Program as permanent, seasonal donations.

Metering and Reporting Diversions

1. An approved measuring device shall be installed and maintained for each of the wells authorized by this water right, in accordance with the rule "Requirements for Measuring and Reporting Water Use", WAC 173-173.

2. Reported water use data shall be submitted via the Internet. To set up an Internet reporting account, access https://fortress.wa.gov/ecy/wrx/wrx/Meteringx/. If you do not have Internet access, contact the Southwest Regional Office for forms to submit your data.

3. Chapter 173-173 WAC describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition Ecology for modifications to some of the requirements. Installation, operation, and maintenance requirements are enclosed as a document entitled "Water Measurement Device Installation and Operation Requirements."

4. Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the records of water use that are kept to meet the above conditions and may inspect, at reasonable times, any measuring device used to meet the above conditions.

Development Schedule

1. The development schedule shall be as follows:

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
REPORT OF EXAMINATION

Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

[X] Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
August 21, 2003	G2-30147		

NAME
City of Camas

ADDRESS (STREET)	CITY	STATE	ZIP CODE
616 NE Fourth Avenue	Camas	WA	98607

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Proposed Well (Treatment Plant Well)

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	1000	880

QUANTITY, TYPE OF USE, PERIOD OF USE

880 acre-feet per year	Municipal	Year-round, as needed

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL

200 feet north and 200 feet west of the SW corner of Section 12

SMALLEST SUBDIVISION	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SW 1/4 SW ¼	12	1 N	3 E.W.M.	28	Clark

POINT OF WITHDRAWAL NAME	PARCEL NUMBER	LATITUDE	LONGITUDE	DATUM
Treatment Plant proposed well	87360000	45.57902697	122.39273145	NAD 83 (orthophoto)

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED
[Attachment 1 shows location of the authorized place of use and point(s) of diversion or withdrawal]

Area served by the City of Camas. The place of use of this water right is the service area described in the currently approved Water System Plan as approved by the Washington State Department of Health. RCW 90.03.386 may have the effect of revising the place of use of this water right if the criteria in section RCW 90.03.386(2) are met.

DESCRIPTION OF PROPOSED WORKS
A proposed well

DEVELOPMENT SCHEDULE		
BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
August 1, 2008	August 1, 2015	August 1, 2025

PROVISIONS

Monitoring

The City of Camas shall develop a monitoring plan that includes the following:

a.) Monitor water levels in existing wells (TW-C and Well 4) and three new monitoring wells. The new monitoring wells must be installed as a cluster in the lower Washougal River in general proximity to the Georgia Pacific wellfield (where the largest drawdown occurs in the area). Two wells must be completed in the lower permeability streambed unit that lies beneath the river, and the third well must be completed in the more permeable PAA aquifer. All water levels must be measured to the nearest tenth of a foot, on an hourly basis during baseflow periods. New monitoring wells must be accurately located within 10 feet horizontally and 0.1 foot vertically. All monitoring wells must be constructed according to WAC 173-160-400.

b.) The City shall install a continuous river stage monitoring station in vicinity of the new monitoring wells. The monitoring station must include a staff gage which is accurately located within 10 feet horizontally and 0.1 foot vertically. Stage readings shall also be recorded on an hourly basis.

c.) Aquifer tests on the new Camas production wells must coincide with summer/fall low-flow periods and include seepage surveys during testing events. New supply wells must be accurately located within 10 feet horizontally and 0.1 foot vertically.

d.) The City shall submit water level data from their monitoring network for the previous year by January 31 to the Department of Ecology. Data shall be provided in a digital format along with a two page summary attached. A more thorough monitoring report must be provided after 5 years from the date of issuance of this water right or when this permit is perfected (whichever comes first), to further evaluate the effects of pumping on the Washougal River.

Operations of Surface Water System

1. Prior to groundwater being withdrawn under this water right, the City of Camas must cease their surface water diversions from Jones and Boulder Creeks between May 15 and October 31 of each year. At the State's discretion, the water rights associated with these diversions will be placed into the State's Trust Water Program as permanent, seasonal donations.

Metering and Reporting Diversions

1. An approved measuring device shall be installed and maintained for each of the wells authorized by this water right, in accordance with the rule "Requirements for Measuring and Reporting Water Use", WAC 173-173.

2. Reported water use data shall be submitted via the Internet. To set up an Internet reporting account, access https://fortress.wa.gov/ecy/wrx/wrx/Meteringx/. If you do not have Internet access, contact the Southwest Regional Office for forms to submit your data.

3. Chapter 173-173 WAC describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition Ecology for modifications to some of the requirements. Installation, operation, and maintenance requirements are enclosed as a document entitled "Water Measurement Device Installation and Operation Requirements."

4. Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the records of water use that are kept to meet the above conditions and may inspect, at reasonable times, any measuring device used to meet the above conditions.

Development Schedule

1. The development schedule shall be as follows:

RECEIVED
SEP 04 2001
Washington State

For Ecology Use
Fee Paid _____
Date _____

State of Washington
Application for a Water Right

Please follow the attached instructions to avoid unnecessary delays.

Section 1. APPLICANT - PERSON, ORGANIZATION, OR WATER SYSTEM

Name City of Camas Home Tel:( ) -
Mailing Address 616 NE 4th Ave. Work Tel:(360) 834 - 3451
City Camas State WA Zip+4 98607 + FAX:(360) 834 - 1535

Section 2. CONTACT - PERSON TO CALL ABOUT THE APPLICATION

☐ Same as above

Name Eric Levison Home Tel:( ) -
Mailing Address 616 NE 4th Ave. Work Tel:(360) 834 - 3451
City Camas State WA Zip+4 98607 + FAX:(360) 834 - 1535
Relationship to applicant Engineering Manager - City of Camas

Section 3. STATEMENT OF INTENT

Municipal

The applicant requests a permit to use not more than 1,000 (☒ gallons per minute or ☐ cubic feet per second) from a ☐ surface water source or ☒ ground water source (check only one) for the purpose(s) of Domestic/Public Supply. **ATTACH A "LEGAL" DESCRIPTION OF THE PLACE OF USE.** (See instructions.) *NOTE: A tax parcel number or a plat number is not sufficient.* Area served by City of Camas.
Estimate a maximum annual quantity to be used in acre-feet per year: 1200 AF/YR

☐ Check if the water use is proposed for a short-term project. Indicate the period of time that the water will be needed:
From ___/___/___ to ___/___/___

Section 4. WATER SOURCE

If SURFACE WATER	If GROUNDWATER
Name the water source and indicate if stream, spring, lake, etc. If unnamed, write "unnamed spring," "unnamed stream," etc.: Number of diversions: _____	A permit is desired for 2 well(s).
Source flows into (name of body of water):	Size & depth of well(s): 12-inch deep 150 feet deep

LOCATION

Enter the north-south and east-west distances in feet from the point of diversion or withdrawal to the nearest section corner: 1600 feet east and 1000 feet south of the NW 1/4 of Section 28, Township 2 North, Range 3 East

¼ of	¼ of	Section	Township	Range(E/W)	County	If location of source is platted, complete below:		
						Lot	Block	Subdivision
NE	NW	28	2N	3E	Clark			

For Ecology Use Date Received: 9-4-01 Priority Date: 9-4-01
SEPA: Exempt/Not Exempt FERC License # _____ Dept. Of Health # _____
Date Accepted As Complete 9-21-01 By SC Date Returned _____ By _____ WRIA: 28

ECY 040-1-14
Rev. 9/95 F

APPLICATION

Appl. No.: G2-30019

Section 5. GENERAL WATER SYSTEM INFORMATION

A. Name of system, if named: Camas Municipal Water-Sewer System

B. Briefly describe your proposed water system. (See instructions.)

Two 12-inch supply wells will be constructed to depths of 150 feet. The wells will be used to provide water supply to municipal and industrial water users that are served by the City of Camas in the Lacamas Basin area. See 1996 Water System Plan documents for other related water system information.

C. Do you already have any water rights or claims associated with this property or system? ☒ YES ☐ NO
PROVIDE DOCUMENTATION. See list of City Water Rights and claims that are attached.

Section 6. DOMESTIC / PUBLIC WATER SUPPLY SYSTEM INFORMATION
(Completed for all domestic/public supply uses.)

A. Number of "connections" requested: 4896 (current number of connections) Type of connection Municipal Industrial Hookup (Homes, Apartment, Recreational, etc.)

B. Are you within the area of an approved water system? ☒ YES ☐ NO
If yes, explain why you are unable to connect to the system. *Note: Regional water systems are identified by your County Health Department.* The applicant (City of Camas) is the regional water provider.

Complete C. and D. only if the proposed water system will have fifteen or more connections.

C. Do you have a current water system plan approved by the Washington State Department of Health? ☒ YES ☐ NO
If yes, when was it approved? 1996 Please attach the current approved version of your plan.
Note: City is currently updating water system plan. New plan should be approved in early 2002.

D. Do you have an approved conservation plan? ☒ YES ☐ NO
If yes, when was it approved? 1996 Please attach the current approved version of your plan.
Note: Water Conservation Plan incorporated into 1996 Water System Plan, which is currently being updated.

Section 7. IRRIGATION/AGRICULTURAL/FARM INFORMATION
(Complete for all irrigation and agriculture uses.) N/A

A. Total number of acres to be irrigated: _____

B. List total number of acres for other specified agricultural uses:

Use_____ Acres_____
Use_____ Acres_____
Use_____ Acres_____

C. Total number of acres to be covered by this application: _____

D. Family Farm Act (Initiative Measure Number 59, November 3, 1977)
Add up the acreage in which you have a controlling interest, including only:
‡ Acreage irrigated under water rights acquired after December 8, 1977;
‡ Acreage proposed to be irrigated under this application;
‡ Acreage proposed to be irrigated under other pending application(s).

1. Is the combined acreage greater than 2000 acres? ☐ YES ☐ NO
2. Do you have a controlling interest in a Family Farm Development Permit? ☐ YES ☐ NO
If yes, enter permit no:_____

E. Farm uses:
Stockwater - Total # of animals _____ Animal type _____ (If dairy cattle, see below)
Dairy - # Milking _____ # Non-milking _____

Section 8. WATER STORAGE

Will you be using a dam, dike, or other structure to retain or store water? ☐ YES ☒ NO

NOTE: If you will be storing 10 acre-feet or more of water and/or if the water depth will be 10 feet or more at the deepest point, and some portion of the storage will be above grade, you must also apply for a reservoir permit. You can get a reservoir permit application from the Department of Ecology.

Section 9. DRIVING DIRECTIONS

Provide detailed driving instructions to the project site. From Lacey, WA, go southbound on I-5. Take I-205 exit at Hazel Dell. Proceed southbound on I-205 to SR-14. Take SR-14 eastbound to Brady Road. Proceed north on Brady Road which turns into NW Parker Avenue. Continue northbound on NW Parker to SE 1st Street. Go westbound on NW 1st to 216th Ave. Take 216th Ave. northbound to Camas Meadows Golf Course. Take service road through golf course to well site.

Section 10. REQUIRED MAP

A. Attach a map of the project. (See instructions.)

Section 11. PROPERTY OWNERSHIP

A. Does the applicant own the land on which the water will be used? ☐ YES ☒ NO
If no, explain the applicant's interest in the place of use and provide the name(s) and address(es) of the owner(s):

The City will use the water for supply within their service area.

B. Does the applicant own the land on which the water source is located? ☐ YES ☒ NO
If no, submit a copy of agreement:
The City will purchase property as part of the supply well development.

I certify that the information above is true and accurate to the best of my knowledge. I understand that in order to process my application, I grant staff from the Department of Ecology access to the site for inspection and monitoring purposes. Even though I may have been assisted in the preparation of the above application by the employees of the Department of Ecology, all responsibility for the accuracy of the information rests with me.

CITY OF CAMAS E. Levison ERIC LEVISON — 8/29/01

Applicant (or authorized representative) — Date

Landowner for place of use (if same as applicant, write "same") — Date

Use this page to continue your answers to any questions on the application. Please indicate section number before answer.

We are returning your application for the following reason(s):	
_____ Examination fee was not enclosed	APPLICANT PLEASE RETURN TO CASHIER, PO BOX 5128, LACEY, WA 98509-5128
_____ Section number(s) _____ is/are incomplete	APPLICANT PLEASE RETURN TO THE APPROPRIATE REGIONAL OFFICE
Explanation:	
Please provide the additional information requested above and return your application by _____ _____ *(date).*	

Ecology staff_____ Date_____

To receive this document in alternative format, contact Lisa Newman at (360) 407-6604 (Voice) or (360) 407-6006 (TDD).

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

October 1, 2001

City of Camas
Attn Eric Levison
616 NE 4th Avenue
Camas WA 98607

Re: Water Right Application No. G2-30018

This letter is to acknowledge that the Washington State Department of Ecology received your water right application. We have assigned your application the number indicated above. Please include this number in future correspondence regarding your application with the Department of Ecology.

When we begin actively evaluating applications in your area, we will prepare a public notice and send it to you with publication instructions. It will be sometime before we are able to begin working in your area. In the meantime, please notify Ecology of changes such as address, property ownership, or variations in your proposed water use plans.

The availability of water in Washington state is a serious problem. Much of the water in our state has already been appropriated. The competition for water has escalated with our state's increasing population, conflicting water policy issues, and grave declines in salmon and other fish populations. A new watershed management law brings us a step closer to addressing some of these issues. It sets into motion a locally based process to address water quantity, quality, and habitat issues. Watershed management will help meet challenges for getting water to people, industries, farms, and fish.

In some areas of the state, we are continuing to evaluate applications within watersheds where we have previously gathered information and completed watershed assessments. We are also continuing to process water right permit or change applications that are intended to address public health and safety emergencies, the natural environment, or are for nonconsumptive withdrawals. All other applications are grouped by watershed and processed according to the date of submittal, and when we have enough information and staff resources to make decisions.

If you would like further information on your application, please contact the Southwest Regional Office at (360) 407-0240.

Sincerely,

J. Mike Harris

J. Mike Harris
Water Resources Supervisor
Southwest Regional Office

JMH:th (applet.doc)

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

October 1, 2001

City of Camas
Attn Eric Levison
616 NE 4th Avenue
Camas WA 98607

Re: Water Right Application No. G2-30019

This letter is to acknowledge that the Washington State Department of Ecology received your water right application. We have assigned your application the number indicated above. Please include this number in future correspondence regarding your application with the Department of Ecology.

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J. Mike Harris

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Southwest Regional Office

JMH:th (applet.doc)

CITY OF CAMAS
616 Northeast Fourth Avenue
P.O. Box 1055
Camas, Washington 98607
http://www.ci.camas.wa.us

RECEIVED
DEPT. OF ECOLOGY/SWRO

'01 SEP -4 A10:37

August 29, 2001

DEPARTMENT OF PUBLIC WORKS

Mr. Mike Harris
Department of Ecology
300 Desmond Drive
P.O. Box 47600
Olympia, WA 98504-7600

Subject: ***Water Right Application Submittals***
City of Camas

Dear Mr. Harris:

Enclosed you will find two water right applications along with the statutory examination fee of $10.00 for each water right application (total of $20.00). The enclosed applications are for new water supply sources in the Lacamas Basin.

The City of Camas would like to develop three new supply wells under these applications to meet the rapid growth, which is occurring in the western portion of our service area. We recently completed an extensive test well drilling program in this area. The results of the exploratory drilling and aquifer testing are summarized in the attached report titled *City of Camas, Westside Test Well Drilling Program (PGG, 2001).*

At your convenience, we would like to schedule a meeting with you and your staff to discuss the results of our test well program and strategies for obtaining water right permits for new production wells.

We appreciate your assistance on this matter.

Sincerely,

Eric Levison
Engineering Manager

Enclosures: Water Right Applications

rls:g:\pworks\eric\harris 082901.doc

Printed By: Dawn Merryman
On: 09/07/2001 At: 10:10 am

RECEIPT

Department of Ecology (4610)
PO Box 5128
Lacey, WA 98509-5128
(360) 407-7095

Receipt Number **02-005123**

Current Document Number **461G0355CJ** Date **09/10/2001** FM **03**

Remitter Name **CAMAS CITY** Receipt Name

Check/Draw Number **4149**
Document Amount **$20.00**
Method of Payment **Check**
Comment Description **WATER RIGHTS**

Ref Doc Nr	Ref Doc Sfx	Inv Nr	Id Nr	Prgm Cd	T C	R	Fund	Maj Grp	Maj Src	Sub Src	Cnty	Work Cls	PIC	AI	Org	Prj	Sub Prj	Prj Phs	Sub Obj	Sub Sub Obj	Var GL	Sub Sid Dr	Sub Sid Cr	Alloc Amt
				H00	001		001	02	85	000010														$20.00

TABLE 1-3

City of Camas Water Right Summary

Source	Location of Diversion	Identification Number	Priority Date	Instantaneous Quantity Q_i (gpm)	Annual Quantity Q_a (ac-ft/yr.)
Claims					
Well No. 1	2159 ft. N, 667 ft. E, from the SW corner, S12, T1N, R3E	121022	6/11/74	900	320(1)
Well No. 2	2152 ft. N, 731 ft. E, from the SW corner, S12, T1N, R3E	121023	6/11/74	900	230(1)
Certificates					
Boulder Creek	(need this info)	S 712 C	8/22/23	1120 [2.5 cfs]	1820(2) (P)
Jones Creek	SE1/4, SW1/4, S3, T2N,R4E	S 711 C	9/5/30	450 [1.0 cfs]	730(3) (P)
Well No. 3	NW1/4, SW1/4, S12,T1N, R3E	G 85-A C	7/21/45	1200	118 (P)
Well No. 4	W1/2, NW1/4, S12, T1N, R3E	G 4072-A C	2/12/59	1325	1208 (S)
Well No. 5	Lot 9 of Orchard Homes, 2760 ft. E, 840 ft. N from SW corner, S12, T1N, R3E	G 6636-A C	3/22/68	600	920(4) (P)
Well No. 6	2300 ft. E, 1800 ft. N from SW corner, S12, T1N, R3E	G 6635-A C	3/22/68	1500	2400(4) (P)
Well No. 7	1245 ft. E, 2145 ft. N from SW corner, S12, T1N, R3E	G2-00501 C	3/22/71	1000	530(5) (P)
Well No. 8	1375 ft. E, 2145 ft. N from SW corner, S12, T1N, R 3E	G2-24400 C	2/4/77	900	530(5) (P)
Permits					
~~Well No. 9~~	~~600 ft. S, 700 ft. W from N1/4 corner, S4, T1N, R3E~~	~~G4-27384 P~~	~~8/13/86~~	~~650~~	~~210(5) (S)~~
Total	Sum of all existing water right certificates and permits. **These values do not include claims.**			**SW = 1570 gpm** **GW = 7175 gpm** **Total = 8745 gpm**	**SW = 2550 ac-ft.** **GW = 3200 ac-ft.** **Total = 5750 ac-ft.**

(1) Claims must go through an adjudication procedure in state court to determine validity.
(2) This source was formerly known as the Little Washougal River. The certificate refers to an instantaneous quantity (Q_i) and does not specify an annual withdrawal. A DOE Report of Examination for Well No. 7 (G2-00501 C) summarizes existing water rights including 1820 ac-ft/yr. for Boulder Creek (S 712 C) based on continuous withdrawal at the instantaneous right specified.
(3) The certificate refers to an instantaneous quantity (Q_i) and does not specify an annual withdrawal. A DOE Report of Examination for Well No. 7 (G2-00501 C) summarizes existing water rights including 730 ac-ft/yr. for Jones Creek (S 711 C) based on continuous withdrawal at the instantaneous right specified.
(4) The Permit and Report of Examination preceding this certificate limited water rights to "the total quantity withdrawn or diverted from all sources is not to exceed 3300 ac-ft/yr."
(5) The Permit and Report of Examination preceding this certificate provided for "the total amount of water to be withdrawn or diverted, which includes the amounts as approved in Surface Water Certificates No. 711 and 712 and Ground Water Certificates No. 85,4072, 6635, 6636, shall not exceed 5750 ac-ft/yr."
(P) Primary water right, additive to other rights.
(S) Supplemental water right, not additive or considered when summing a cumulative total of all rights.

Legend

- Proposed Supply Well Site
- Roads
- Parcels
- Rivers, Streams
- Water bodies

0 4000 Feet

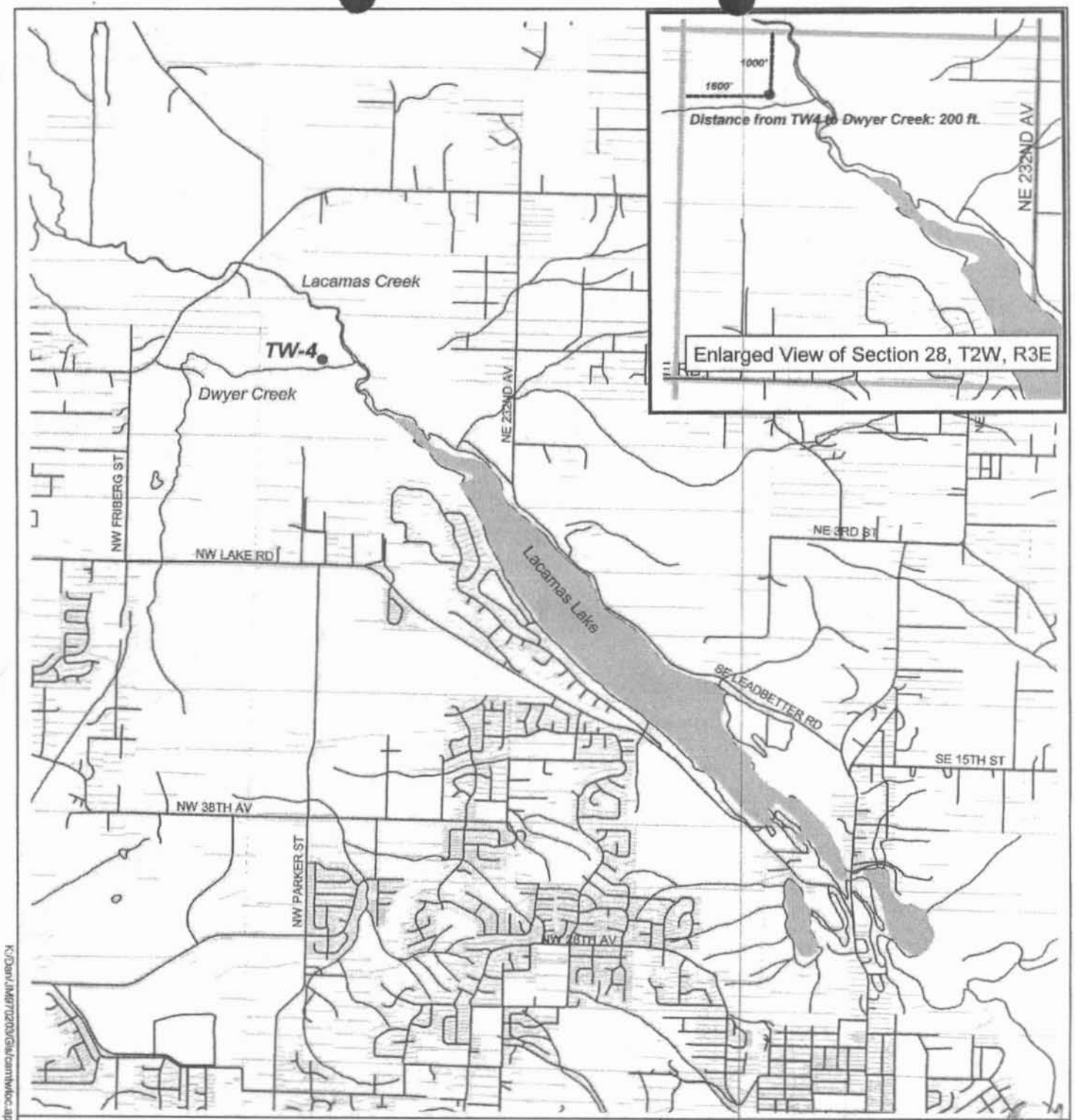
Figure 1
Proposed Well Location Map

City of Camas
Westside Test Well
Drilling Program

JM9702.03

Pacific Groundwater Group

K:\Data\JM9702\03\Site\camwloc.apr (Test Well Location Map), 2/22/01



Legend

- Proposed Supply Well Site
- Roads
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- Rivers, Streams
- Water bodies

0 4000 Feet

Figure 1
Proposed Well Location Map

City of Camas
Westside Test Well
Drilling Program

JM9702.03

Pacific Groundwater Group

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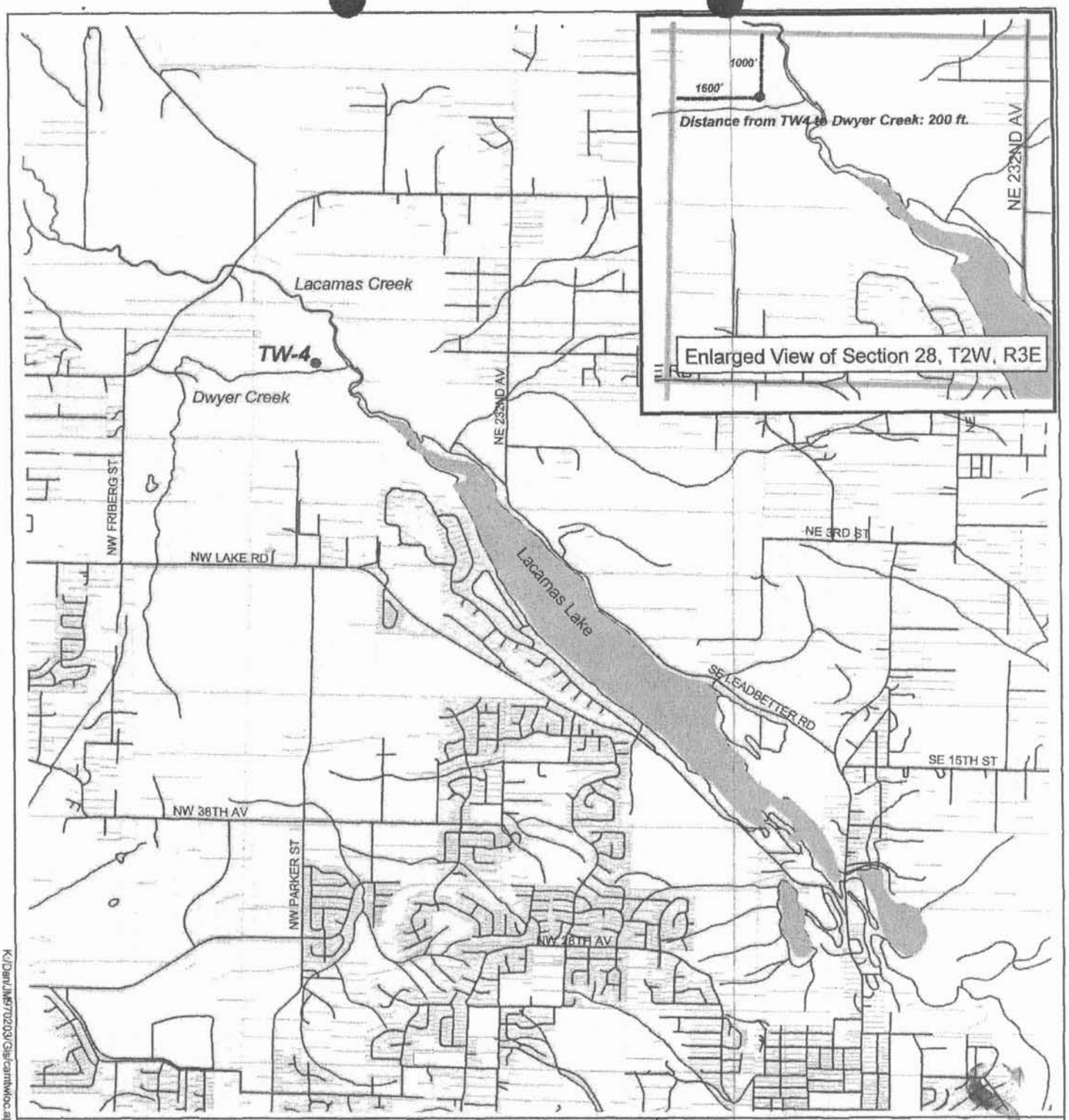

Legend

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0 4000 Feet

Figure 1
Proposed Well Location Map

City of Camas
Westside Test Well
Drilling Program

JM9702.03

Pacific Groundwater Group

K:\Dan\JM9702\03\Gis\camtwloc.apr (Test Well Location Map), 2/22/01

Account Transfers Recurring Transfers **Third-Party Transfers** External Transfers
IRA/ESA Certificate Add-On

Third Party Transfer Confirmation

Transfer of funds successfully completed. See the new account balances below.

From Account:	Share Savings 1274297009 KENNETH C ALEXANDER
From Account Balance:	$14.25
To Account:	EveryDay Checking 1274297710 ERNESTINE P ALEXANDER
Payment Amount:	$3,325.00
Effective Date:	03/09/2009
Confirmation Number:	304756

Print Receipt

ROTORK CONTROLS, INC.
SCOPE OF WORK
START UP/COMMISSIONING OF ROTORK ACTUATORS

JOB SITE LOCATION: WARDEN, WASHINGTON

Rotork Field Engineer will:

1. Inspect all installed Rotork actuators for proper orientation.
2. Inspect all installed Rotork actuators for proper wiring terminations.
3. Electrically power up Rotork actuators and perform initial programming.
4. Set both the Open and Closed limits on the Rotork actuators.
5. Electrically stroke all valves with Rotork actuators to ensure proper operation.
6. Provide customer with the Field Service Report for their records.
7. Correct any discrepancies found during this course of work.

rotork
factory service

2180 South Mc Dowell Blvd. Suite B
Petaluma, CA 94954
Phone: (707) 769-4880
Fax: (707) 769-4888

Service Report

Job No.:
Engineer:
Date:
Site:

Site Contact:
Phone Number:
Date Service Performed:
PO Number:
Type of Service:

Serial Number:	**Type:**	**WD:**	**RPM:**	**Volts:**
Gearbox Type:	**Valve Type:**		**Service Type:**	**Valve Tag No:**

Reported Problem:

Work Completed:

If there is additional work needed, please explain:

Rotork Site Training Syllabus (for IQT)

I. Introduction to Rotork

A. Tech introduction
B. Rotork Controls, Inc.
C. Types and models of actuators. Sizing, classifications. Nameplates.
D. Documentation, Rotork.com
  1) IQT- E110, E120, E175, E185, Wiring diagrams

II. IQT

A. Nomenclature and parts ID.
  1) Gearcase, center column, drive bushings, battery, seals and o-rings.
  2) Motor & wormwheel, resolver.
  3) Handwheel, hand/auto lever, H/A cover.
  4) Electronics- Cover (UV Window/ local controls), main pcb, power module, motor control pcb
  5) Options, if applicable

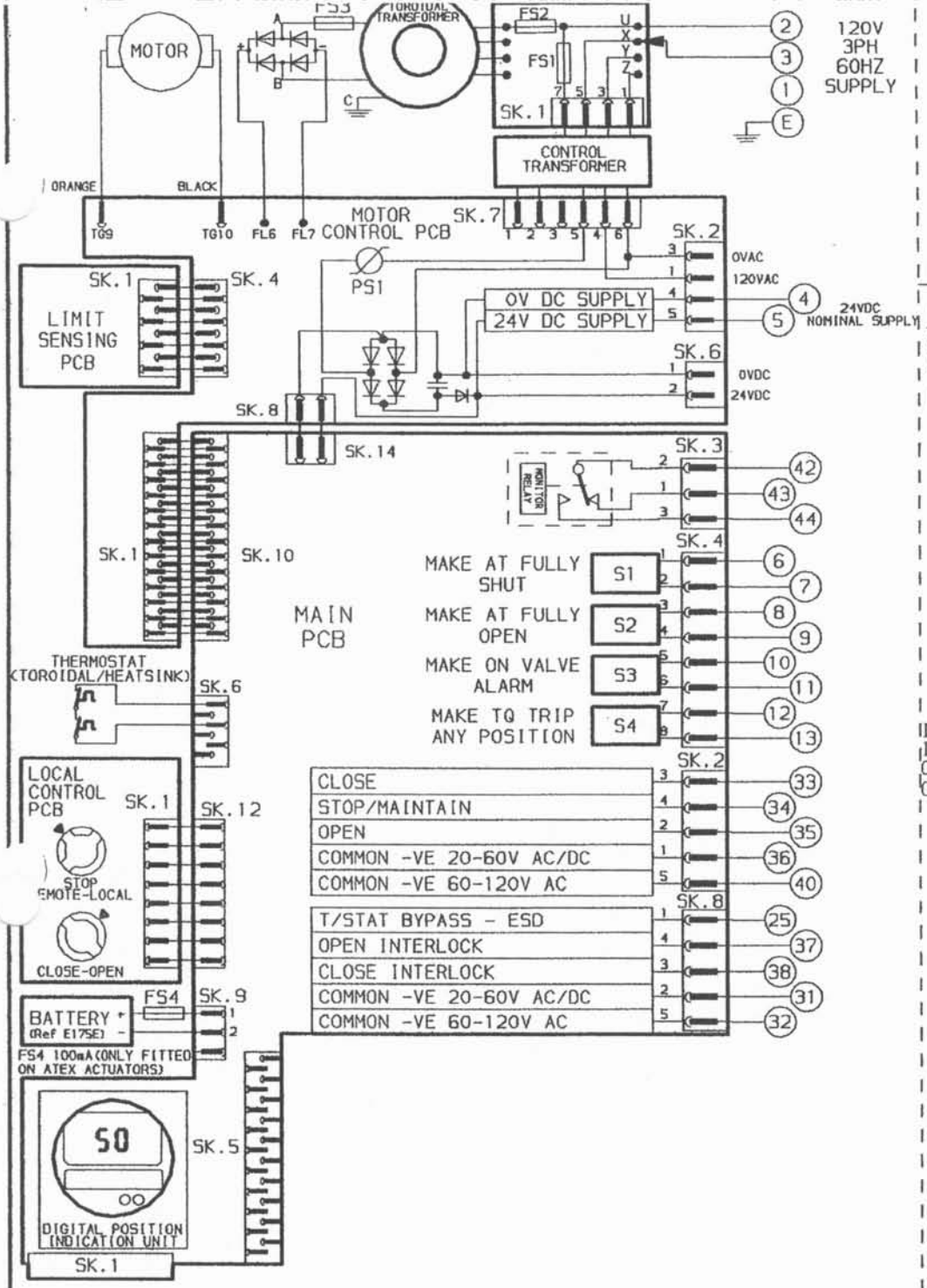
III. Operation, set-up and calibration (using live demo actuator)

A. Manual operation B. Setting tool and display
C. Menu structure and functions
  1) Torque display, password screen
  2) Primary functions- open/close action, torque setting, limit setting.
  3) Secondary functions-Indication, ESD(emerg shut down), options, IQT type and speed.
D. Local operation
E. Remote operation
  1) Remote voltage supplies 2) Remote control configurations 3) Network options
F. Installation and adaption
G.Troubleshooting
  1) Alarms 2) Help screens 3) Common faults and checks
H. Maintenance - 1) Lubrication 2) inspection 3) spares

IV. Advanced Functions and Utilities (using laptop and PDA)

A. Insight
B. Configuration Files
C. Datalogger files
  1) Torque profiles (for baseline files/trending, torque issues)
  2) Event logging and review

V. Conclusion- Review and Follow-up



RWS300

TRANSFORMER TAPPING

TYPE 1

TAP	NOM	RANGE
Z	120	96-144
FS1-250mA A/S FS2-5A A/S		

FUSE FS3 - 20A ATO FAST ACTING

PS1 SELF RESETTING FUSE

NOTE

REFER TO PUBLICATION E175E FOR APPROVED FUSES FS1, FS2 AND FS3.

MAX EXTERNAL LOAD ON TERMINALS 4 & 5 TO BE 5W.

CONTROL SIGNAL THRESHOLD VOLTAGES TO BE MINIMUM 'ON' 20V AC/DC
MAXIMUM 'OFF'= 3V
MINIMUM CONTROL SIGNAL DURATION TO BE 300mS.

CURRENT DRAWN FROM EACH REMOTE CONTROL SIGNAL IS 5mA ON 24V DC OR 12mA ON 120V AC

WIRES ARE IDENTIFIED AT EACH END BY TERMINAL No. OR TAG No.

INDICATION CONTACTS S1-S4 ARE SHOWN IN THEIR DEFAULT CONFIGURATION. CONTACTS MAY BE CONFIGURED FOR ANY OF THE FUNCTIONS DESCRIBED IN E175E

IQT

No	DATE	REVISION DETAILS
01	061008	FIRST ISSUE

www.rotork.com

CONFIG BY TPW
DATE 061008

6000-000 B1,C1,41,M1
CUSTOMER SPECIFIC

Rotork Site Training Syllabus (for IQMKII)

I. Introduction to Rotork

A. Tech introduction
B. Rotork Controls, Inc.
C. Types and models of actuators. Sizing, classifications. Nameplates.
D. Documentation, Rotork.com
  1) IQMKII- E110, E120, E170E2, E170E3, E180, Wiring diagrams

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A. Nomenclature and parts ID.
  1) Gearcase, center column, resolver drive, battery, terminal block/cover, seals and o-rings.
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B. Configuration Files
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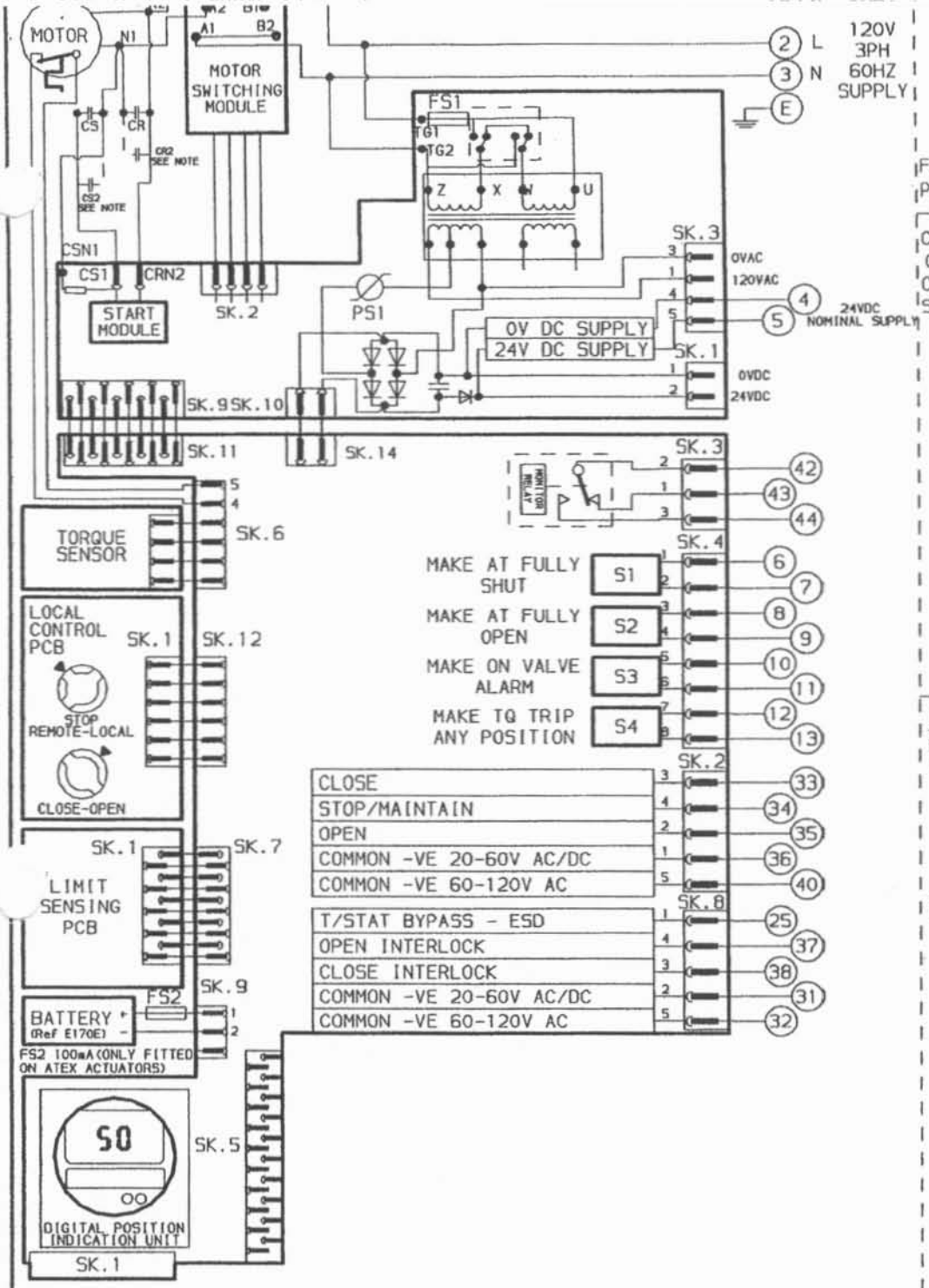

RWS300

TRANSFORMER TAPPING

VOLTAGE	60HZ
LOW	92-135

FUSE FS1 - 500mA ANTI-SURGE
PS1 SELF RESETTING FUSE.

CAPACITOR START/RUN (CS/CS2 and CR/CR2) COMBINATIONS & VALUES VARY WITH SUPPLY VOLTAGE & ACTUATOR SIZE.

NOTE

REFER TO PUBLICATION E170E FOR APPROVED FUSES FS1 AND FS2.

MAX EXTERNAL LOAD ON TERMINALS 4 & 5 TO BE 5W.

CONTROL SIGNAL THRESHOLD VOLTAGES TO BE MINIMUM 'ON' 20V AC/DC
MAXIMUM 'OFF'= 3V
MINIMUM CONTROL SIGNAL DURATION TO BE 300mS.

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1Q

No	DATE	REVISION DETAILS
01	061008	FIRST ISSUE

www.rotork.com

CONFIG BY TPW
DATE 061008

3001-000 B1,C1,41,M1
CUSTOMER SPECIFIC

CITY OF CAMAS
616 Northeast Fourth Avenue
P.O. Box 1055
Camas, Washington 98607
http://www.ci.camas.wa.us

RECEIVED
DEPT. OF ECOLOGY/SWRO

'01 SEP -4 A10:37

August 29, 2001

DEPARTMENT OF PUBLIC WORKS

Mr. Mike Harris
Department of Ecology
300 Desmond Drive
P.O. Box 47600
Olympia, WA 98504-7600

Subject: ***Water Right Application Submittals***
City of Camas

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We appreciate your assistance on this matter.

Sincerely,

Eric Levison
Engineering Manager

Enclosures: Water Right Applications

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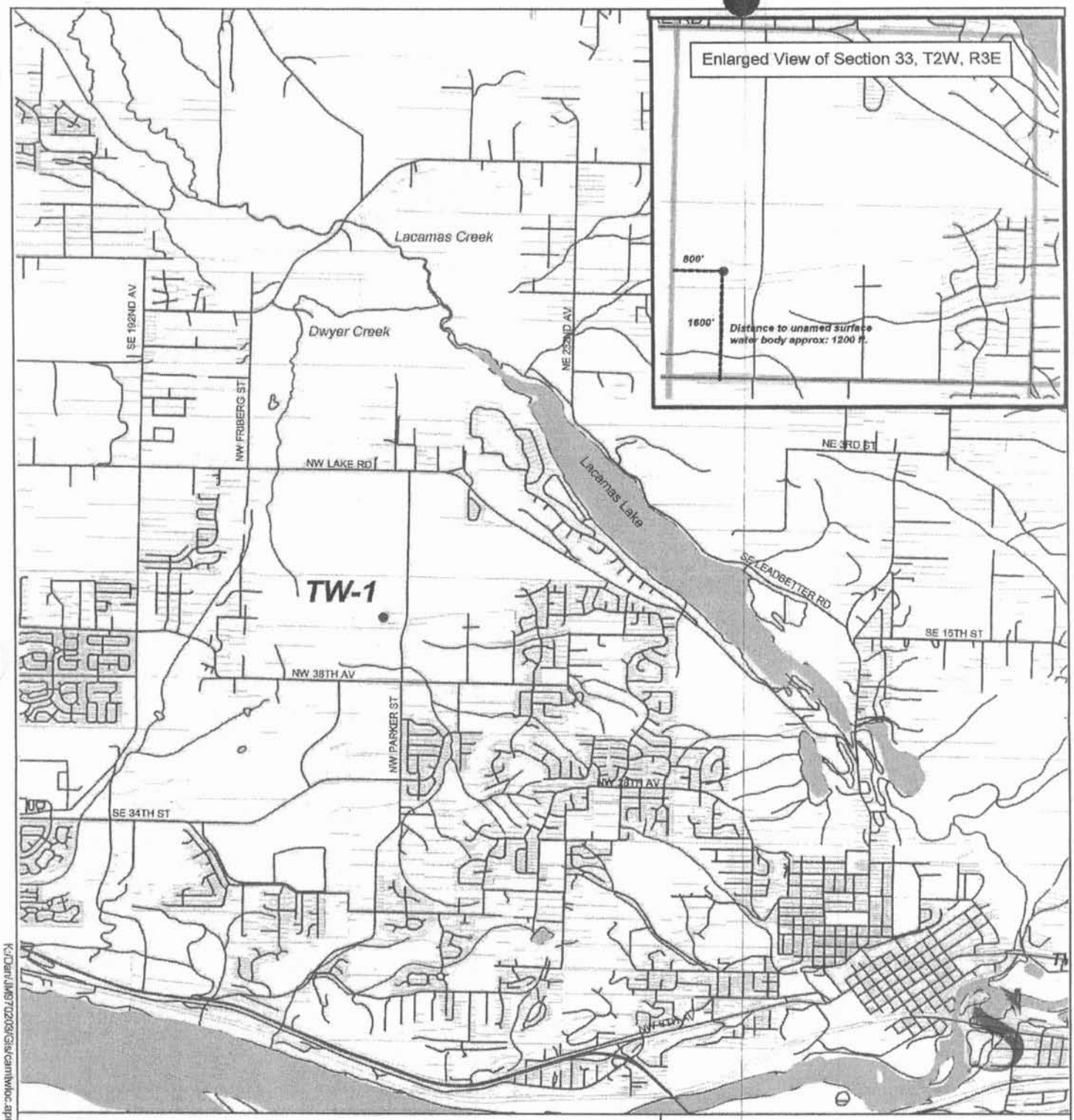


Legend

- Proposed Supply Well Site
- Roads
- Parcels
- Rivers, Streams
- Water bodies

N

0 4000 Feet

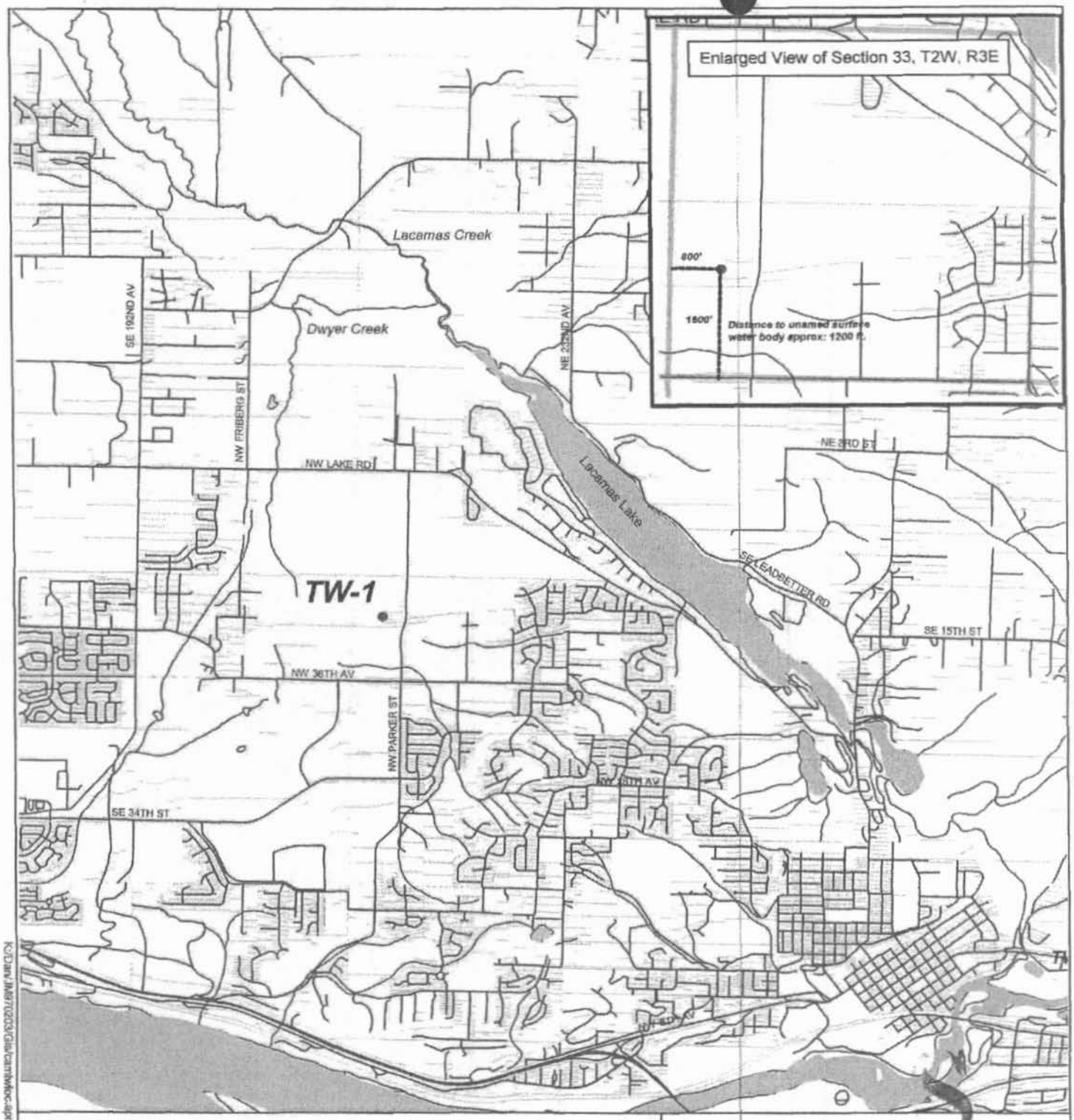
Figure 1
Proposed Well Location Map

City of Camas
Westside Test Well
Drilling Program

JM9702.03

Pacific Groundwater Group

K:/Dan/JM9702.03/Gis/camtwloc.apr (Test Well Location Map) 7/22/01



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0 4000 Feet

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Westside Test Well
Drilling Program

JM9702.03

Pacific Groundwater Group

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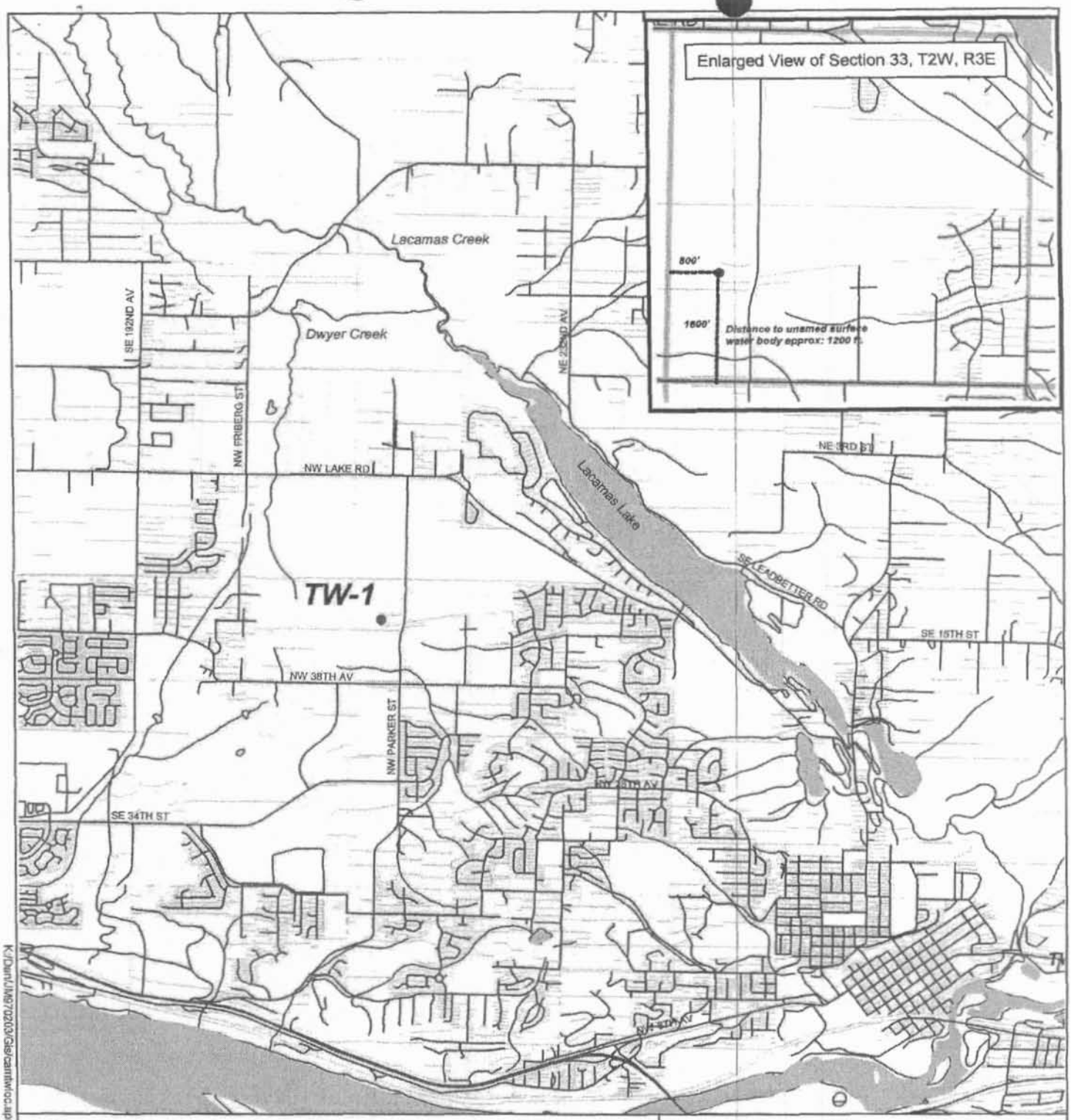

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0 4000 Feet

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Drilling Program

JM9702.03

Pacific Groundwater Group

K:\Dwn\JM9702\03\Gis\camtwloc.apr (Test Well Location Map), 2/22/01

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Well No. 8	1375 ft. E, 2145 ft. N from SW corner, S12, T1N, R 3E	G2-24400 C	2/4/77	900	530(5) (P)
Permits					
Well No. 9	600 ft. S, 700 ft. W from N1/4 corner, S4, T1N, R3E	G4-27384 P	8/13/86	650	210(5) (S)
Total	Sum of all existing water right certificates and permits. These values do not include claims.			**SW = 1570 gpm** **GW = 7175 gpm** **Total = 8745 gpm**	**SW = 2550 ac-ft.** **GW = 3200 ac-ft.** **Total = 5750 ac-ft.**

(1) Claims must go through an adjudication procedure in state court to determine validity.
(2) This source was formerly know as the Little Washougal River. The certificate refers to an instantaneous quantity (Q_i) and does not specify an annual withdrawal. A DOE Report of Examination for Well No. 7 (G2-00501 C) summarizes existing water rights including 1820 ac-ft/yr. for Boulder Creek (S 712 C) based on continuous withdrawal at the instantaneous right specified.
(3) The certificate refers to an instantaneous quantity (Q_i) and does not specify an annual withdrawal. A DOE Report of Examination for Well No. 7 (G2-00501 C) summarizes existing water rights including 730 ac-ft/yr. for Jones Creek (S 711 C) based on continuous withdrawal at the instantaneous right specified.
(4) The Permit and Report of Examination preceding this certificate limited water rights to "the total quantity withdrawn or diverted from all sources is not to exceed 3300 ac-ft/yr."
(5) The Permit and Report of Examination preceding this certificate provided for "the total amount of water to be withdrawn or diverted, which includes the amounts as approved in Surface Water Certificates No. 711 and 712 and Ground Water Certificates No. 85,4072, 6635, 6636, shall not exceed 5750 ac-ft/yr."
(P) Primary water right, additive to other rights.
(S) Supplemental water right, not additive or considered when summing a cumulative total of all rights.

Printed By: Dawn Merryman
On: 09/07/2001 At: 10:10 am

RECEIPT

Receipt Number **02-005123**

Department of Ecology **(4610)**
PO Box 5128
Lacey, WA 98509-5128
(360) 407-7095

Current Document Number **461G0355CJ** Date **09/10/2001** FM **03**

Remitter Name **CAMAS CITY** Receipt Name

Check/Draw Number **4149**
Document Amount **$20.00**
Method of Payment **Check**
Comment Description **WATER RIGHTS**

Ref Doc Nr	Ref Doc Sfx	Inv Nr	Id Nr	Prgm Cd	T C	R	Fund	Maj Grp	Maj Src	Sub Src	Cnty	Work Cls	PIC	AI	Org	Prj	Sub Prj	Prj Phs	Sub Obj	Sub Sub Obj	Var GL	Sub Sid Dr	Sub Sid Cr	Alloc Amt
				H00	001		001	02	85	000010														$20.00

RECEIVED
DEPT. OF ECOLOGY/SWRO
'01 NOV -5 A11:26

State of Washington
DEPARTMENT OF FISH AND WILDLIFE
Mailing Address: 600 Capitol Way N • Olympia, WA 98501-1091 • (360) 902-2200, TDD (360) 902-2207
Main Office Location: Natural Resources Building • 1111 Washington Street SE • Olympia, WA

October 31, 2001

Department of Ecology
Southwest Regional Office
7272 Cleanwater Lane
Olympia, Washington 98504-6811

WATER RIGHT APPLICATION REVIEW

Application Number: G230018

Applicant: City of Camas
616 NE 4th Avenue
Camas, Washington 98607

WRIA: 28
Water: Well near Lacamas Lake and the Columbia River.
This water and/or affected reaches downstream are inhabited by:

Based on: ☐ Site-specific observations ☐ WDFW database or GIS
☐ Literature ☐ Knowledge of this type of stream

Amount: cfs 359.00 gpm 300.00 acre-ft
Point of diversion: NW1/4 SW1/4 of S33 T2N R3E.
Point of use:

WDFW recommended conditions:

☐ Instream flows in WAC 173-5

☐ This water right should be subject to any established lake levels, if any.

Instream flows based on: ☐ IFIM study ☐ USGS toe-width ☐ Tennant
☐ Other:

WDFW requests that water right be subject to the following instream flows or natural flow, whichever is less:

Jan
Feb
Mar
Apr
May
Jun

S

Jul
Aug
Sep
Oct
Nov
Dec

Instream flows to be measured at:

Other conditions requested by WDFW indicated by ☐:

☐ HPA

☐ Screen intake if accessible to fish (to be determined during application for HPA) according to WDFW standards.

☐ Based upon review of fish resources present, type and amount of water use, condition of habitat, and amount of water available, WDFW REQUESTS DENIAL of this application, in accordance with RCW 75.20.050, IF THIS SPACE IS CHECKED.

☐ WDFW recommends modification of this proposal to minimize impacts to fish.

☐ WDFW is a landowner and water user that will be affected by this proposed use.

☐ Please HOLD this application pending field review. WDFW staff will provide detailed response by

☐ Granting this water right application would adversely affect WDFW's existing water rights for a facility. We request the following conditions for this water right if it is granted.

Rationale for WDFW recommendations if not based on existing rules or statutes: WDFW has no objections to this application.

Additional Comments:

Karen Kloempken

Karen Kloempken
Water Rights Biologist
360-902-2615
Fax: 360-902-2946
E-mail: kloemkak@dfw.wa.gov

S

For Ecology Use

Fee Paid _____

Date _____

State of Washington
Application for a Water Right

Please follow the attached instructions to avoid unnecessary delays.

Section 1. APPLICANT - PERSON, ORGANIZATION, OR WATER SYSTEM

Name City of Camas Home Tel:( ) -

Mailing Address 616 NE 4th Ave. Work Tel:(360) 834 - 3451

City Camas State WA Zip+4 98607 + FAX:(360) 834 - 1535

Section 2. CONTACT - PERSON TO CALL ABOUT THE APPLICATION

☐ Same as above

Name Eric Levison Home Tel:( ) -

Mailing Address 616 NE 4th Ave. Work Tel:(360) 834 - 3451

City Camas State WA Zip+4 98607 + FAX:(360) 834 - 1535

Relationship to applicant Engineering Manager - City of Camas

Section 3. STATEMENT OF INTENT

Municipal

The applicant requests a permit to use not more than 350 (☒ gallons per minute or ☐ cubic feet per second) from a ☐ surface water source or ☒ ground water source (check only one) for the purpose(s) of Domestic/Public Supply. **ATTACH A "LEGAL" DESCRIPTION OF THE PLACE OF USE. (See instructions.)** *NOTE: A tax parcel number or a plat number is not sufficient.* Area served by City of Camas

Estimate a maximum annual quantity to be used in acre-feet per year: 300 AF/YR

☐ Check if the water use is proposed for a short-term project. Indicate the period of time that the water will be needed:

From ___/___/___ to ___/___/___

Section 4. WATER SOURCE

If SURFACE WATER	If GROUNDWATER
Name the water source and indicate if stream, spring, lake, etc. If unnamed, write "unnamed spring," "unnamed stream," etc.: Number of diversions: _____	A permit is desired for 1 well(s).
Source flows into (name of body of water):	Size & depth of well(s): 12-inch well 400 feet deep

LOCATION

Enter the north-south and east-west distances in feet from the point of diversion or withdrawal to the nearest section corner: 1600 feet north and 800 feet east of the SW 1/4 of Section 33, Township 2 North, Range 3 East

¼ of	¼ of	Section	Township	Range(E/W)	County	If location of source is platted, complete below:		
						Lot	Block	Subdivision
NW	SW	33	2N	3E	Clark			

For Ecology Use Date Received: 9-4-01 Priority Date: 9-4-01

SEPA: Exempt/Not Exempt FERC License # _____ Dept. Of Health # _____

Date Accepted As Complete 9-21-01 By SC Date Returned _____ By _____ WRIA 28

ECY 040-1-14
Rev. 9/95 F

APPLICATION

Appl. No.: G2-30018

e9-30018

Section 5. GENERAL WATER SYSTEM INFORMATION

A. Name of system, if named: Camas Municipal Water-Sewer System

B. Briefly describe your proposed water system. (See instructions.)

One 12-inch supply well will be constructed to a depth of 400 feet. The well will be used to provide water supply to municipal and industrial water users that are served by the City of Camas in the Lacamas Basin Area. See City's 1996 Water System Plan documents for other related water system information.

C. Do you already have any water rights or claims associated with this property or system? ☒ YES ☐ NO
PROVIDE DOCUMENTATION. See list of city water right permits and claims that are attached.

Section 6. DOMESTIC / PUBLIC WATER SUPPLY SYSTEM INFORMATION
(Completed for all domestic/public supply uses.)

A. Number of "connections" requested: 4896 Type of connection Municipal Industrial Hookup (Homes, Apartment, Recreational, etc.)

B. Are you within the area of an approved water system? ☒ YES ☐ NO
If yes, explain why you are unable to connect to the system. *Note: Regional water systems are identified by your County Health Department.* The applicant (City of Camas) is the regional water provider.

Complete C. and D. only if the proposed water system will have fifteen or more connections.

C. Do you have a current water system plan approved by the Washington State Department of Health? ☒ YES ☐ NO
If yes, when was it approved? 1996 Please attach the current approved version of your plan.
Note: City is currently updating their Waster System Plan. The new plan should be approved in early 2002.

D. Do you have an approved conservation plan? ☒ YES ☐ NO
If yes, when was it approved? 1996 Please attach the current approved version of your plan.
Note: Water Conservation Plan incorporated into 1996 Water System Plan which is currently being updated.

Section 7. IRRIGATION/AGRICULTURAL/FARM INFORMATION
(Complete for all irrigation and agriculture uses.) N/A

A. Total number of acres to be irrigated: _____

B. List total number of acres for other specified agricultural uses:

Use _____ Acres _____
Use _____ Acres _____
Use _____ Acres _____

C. Total number of acres to be covered by this application: _____

D. Family Farm Act (Initiative Measure Number 59, November 3, 1977)
Add up the acreage in which you have a controlling interest, including only:
‡ Acreage irrigated under water rights acquired after December 8, 1977;
‡ Acreage proposed to be irrigated under this application;
‡ Acreage proposed to be irrigated under other pending application(s).

1. Is the combined acreage greater than 2000 acres? ☐ YES ☐ NO
2. Do you have a controlling interest in a Family Farm Development Permit? ☐ YES ☐ NO
If yes, enter permit no: _____

E. Farm uses:
Stockwater - Total # of animals _____ Animal type _____ (If dairy cattle, see below)
Dairy - # Milking _____ # Non-milking _____

Section 8. WATER STORAGE

Will you be using a dam, dike, or other structure to retain or store water? ☐ YES ☒ NO

NOTE: If you will be storing 10 acre-feet or more of water and/or if the water depth will be 10 feet or more at the deepest point, and some portion of the storage will be above grade, you must also apply for a reservoir permit. You can get a reservoir permit application from the Department of Ecology.

Section 9. DRIVING DIRECTIONS

Provide detailed driving instructions to the project site. From Lacey, WA, go southbound on I-5. Take I-205 exit at Hazel Dell. Proceed southbound on I-205 to SR-14. Take SR-14 eastbound to Brady Road. Proceed northbound on Brady Road, which turns into NW Parker Avenue, continue northbound on NW Parker Avenue past 20th Street NW. Turn into Fire Station Property, which is located on west side of NW Parker Avenue.

Section 10. REQUIRED MAP

A. Attach a map of the project. (See instructions.)

Section 11. PROPERTY OWNERSHIP

A. Does the applicant own the land on which the water will be used? ☐ YES ☒ NO
If no, explain the applicant's interest in the place of use and provide the name(s) and address(es) of the owner(s):

The City will use the water for supply within their service area.

B. Does the applicant own the land on which the water source is located? ☐ YES ☐ NO
If no, submit a copy of agreement:

The City will purchase the property as part of the supply well development.

I certify that the information above is true and accurate to the best of my knowledge. I understand that in order to process my application, I grant staff from the Department of Ecology access to the site for inspection and monitoring purposes. Even though I may have been assisted in the preparation of the above application by the employees of the Department of Ecology, all responsibility for the accuracy of the information rests with me.

City of Camas E. Levison — Eric Levison — 8/20/01

Applicant (or authorized representative) — Date

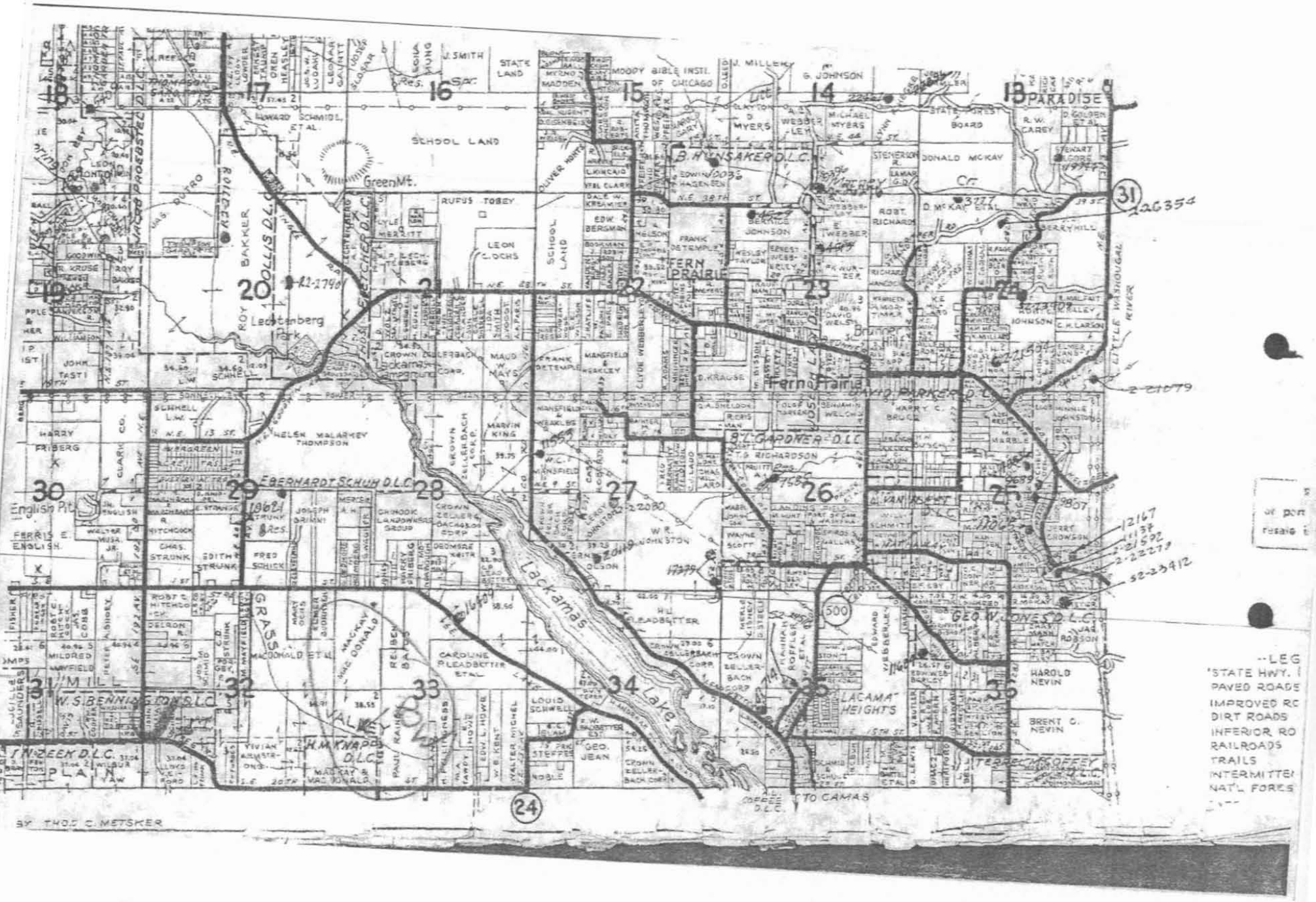
Landowner for place of use (if same as applicant, write "same") — Date

Use this page to continue your answers to any questions on the application. Please indicate section number before answer.

We are returning your application for the following reason(s):	
_____ Examination fee was not enclosed	APPLICANT PLEASE RETURN TO CASHIER, PO BOX 5128, LACEY, WA 98509-5128
_____ Section number(s) _____ is/are incomplete	APPLICANT PLEASE RETURN TO THE APPROPRIATE REGIONAL OFFICE
Explanation:	
Please provide the additional information requested above and return your application by _____ _____ *(date).*	

Ecology staff_____ Date_____

To receive this document in alternative format, contact Lisa Newman at (360) 407-6604 (Voice) or (360) 407-6006 (TDD).


SCHOOL LAND
GreenMt.
Leontenberg Park
FERN PRAIRIE
Fern Prairie
Lackamas Lake
LACAMA HEIGHTS
PARADISE
English Pit
TO CAMAS
BY THOS. C. METSKER
STATE HWY.
PAVED ROADS
IMPROVED RO
DIRT ROADS
INFERIOR RO
RAILROADS
TRAILS
INTERMITTE
NAT'L FORES

616 NE 4 Avenue
PO Box 1055
Camas WA 98607

WASHINGTON STATE DEPARTMENT OF ECOLOGY

STATE OF WASHINGTON
CERTIFICATE OF CHANGE ON A CLAIM

Document Title: Certificate of Water Right

Agency: Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

Applicant: **City of Camas**
616 NE 4th Ave
PO Box 1055
Camas, WA 98607

Reference Number:

PRIORITY DATE	CLAIM NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
3/09/2001	G2-121022		G2-CV1-2P159

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATERS TO BE APPROPRIATED

SOURCE	TRIBUTARY OF (IF SURFACE WATERS)
Well 12	

MAX. CUBIC FEET PER SECOND	MAX GALLONS PER MINUTE	MAX. ACRE-FEET PER YEAR
	900 GPM	320 AF/Y

QUANTITY/TYPE OF USE/PERIOD OF USE

320 Acre-feet per year Municipal Supply Year-round, as needed

LEGAL DESCRIPTION OF LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF WITHDRAWAL

2240 feet North and 1000 feet East of the Southwest corner of Section 12.

¼ ¼	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
NW ¼ SW ¼	12	1	3E	28	Clark

PARCEL # 89892000

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

1/4 1/4	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R I.A.	COUNTY
N/A	N/A	N/A	N/A	28	Clark

PARCEL #

Area served by City of Camas for municipal supply.

N/A

CONTINUED LEGAL DESCRIPTION FOR PROPERTY ON WHICH WATER IS TO BE USED

N/A

PROVISIONS

All conditions and requirements contained in reports of examination or permits previously issued apply to this certificate unless specifically noted below.

The water appropriated under this application will be used for public water supply. The State Board of Health rules require public water supply owners to obtain written approval from the Office of Water Supply, Department of Health, 1112 SE Quince Street, PO Box 47890, Olympia, Washington 98504-7890, prior to any new construction or alterations of a public water supply system.

An approved measuring device shall be installed and maintained for each of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use", Chapter 173-173 WAC.

Water use data shall be recorded monthly. The maximum rate of diversion/withdrawal and the annual total volume shall be submitted to Ecology by January 31st of each calendar year.

The following information shall be included with each submittal of water use data: owner, contact name if different, mailing address, daytime phone number, WRIA, Permit/Certificate/Claim No., source name, annual quantity used including units, maximum rate of diversion including units, monthly meter readings including units, peak monthly flow including units, Department of Health WFI water system number and source number(s), well tag number, and period of use. In the future, Ecology may require additional parameters to be reported or more frequent reporting. Ecology prefers web based data entry, but does accept hard copies. Ecology will provide forms and electronic data entry information. Submit data to: Department of Ecology, SWRO/WR PO Box 47775, Olympia, WA 98504-7775.

Chapter 173-173 WAC describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition Ecology for modifications to some of the requirements. Installation, operation and maintenance requirements are enclosed as a document entitled "Water Measurement Device Installation and Operation Requirements".

Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable

(continued on page 3)

The right to use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.100.

This certificate of water right is specifically subject to relinquishment for non-use of water as provided in Chapter 90.14 RCW.

Given under my hand and the seal of this office at Olympia, Washington, this 5th *day of* February, *2008.*

DEPARTMENT OF ECOLOGY STATE OF WASHINGTON

Jay Manning, Director
Department of Ecology

By Thomas Loranger
Thomas Loranger Section Manager

OK

Provisions Continued

times, to the records of water use that are kept to meet the above conditions, and to inspect at reasonable times any measuring device used to meet the above conditions.

All wells constructed in the State shall meet the construction requirements of Chapter 173-160 WAC entitled "Minimum Standards for the Construction and Maintenance of Wells" and Chapter 18-104 RCW entitled "Water Well Construction, Act (1971)."

In accordance with Chapter 173-160 WAC, wells shall not be located within certain minimum distances of potential sources of contamination. These minimum distances shall comply with local health regulations, as appropriate. In general, wells shall be located at least 100 feet from sources of contamination. Wells shall not be located within 1,000 feet of a solid waste landfill.

Nothing in this approval shall be construed as lessening or enlarging any water rights represented by Water Right Claim No's 121022 & 121023. The water use authorized under this filing (fill in with water right no.) shall be considered supplemental to any water rights confirmed for said claim as a result of a general adjudication through Superior Court, should adjudication be undertaken.

616 NE 4th Avenue
PO Box 1055
Camas WA 98607

WASHINGTON STATE DEPARTMENT OF ECOLOGY

STATE OF WASHINGTON
CERTIFICATE OF CHANGE ON A CLAIM

Document Title: Certificate of Water Right

Agency: Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

Applicant: **City of Camas**
616 NE 4th Ave
PO Box 1055
Camas, WA 98607

Reference Number:

PRIORITY DATE	CLAIM NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
4/06/2001	G2-121023		G2-CV1-2P160

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATERS TO BE APPROPRIATED

SOURCE	TRIBUTARY OF (IF SURFACE WATERS)
Well 10	

MAX. CUBIC FEET PER SECOND	MAX. GALLONS PER MINUTE	MAX. ACRE-FEET PER YEAR
	900	230

QUANTITY/TYPE OF USE/PERIOD OF USE

230 Acre-feet per year Municipal Supply Seasonal Use, May 1 – August 31

LEGAL DESCRIPTION OF LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF WITHDRAWAL

2220 feet North and 710 feet East of the Southwest corner of Section 12.

¼ ¼	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R I.A.	COUNTY
NW ¼ SW ¼	12	1	3E	28	Clark

PARCEL # 89866000

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

1/4 1/4	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R I.A.	COUNTY
N/A	N/A	N/A	N/A	28	Clark

PARCEL #

Area served by City of Camas for municipal supply.

N/A

CONTINUED LEGAL DESCRIPTION FOR PROPERTY ON WHICH WATER IS TO BE USED

N/A

PROVISIONS

All conditions and requirements contained in reports of examination or permits previously issued apply to this certificate unless specifically noted below.

The water appropriated under this application will be used for public water supply. The State Board of Health rules require public water supply owners to obtain written approval from the Office of Water Supply, Department of Health, 1112 SE Quince Street, PO Box 47890, Olympia, Washington 98504-7890, *prior to any new construction or alterations of a public water supply system.*

An approved measuring device shall be installed and maintained for each of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use", Chapter 173-173 WAC.

Water use data shall be recorded monthly. The maximum rate of diversion/withdrawal and the annual total volume shall be submitted to Ecology by January 31st of each calendar year.

The following information shall be included with each submittal of water use data: owner, contact name if different, mailing address, daytime phone number, WRIA, Permit/Certificate/Claim No., source name, annual quantity used including units, maximum rate of diversion including units, monthly meter readings including units, peak monthly flow including units, Department of Health WFI water system number and source number(s), well tag number, and period of use. In the future, Ecology may require additional parameters to be reported or more frequent reporting. Ecology prefers web based data entry, but does accept hard copies. Ecology will provide forms and electronic data entry information. Submit data to: Department of Ecology, SWRO/WR PO Box 47775, Olympia, WA 98504-7775.

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Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable

(continued on page 3)

The right to use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.100.

This certificate of water right is specifically subject to relinquishment for non-use of water as provided in Chapter 90.14 RCW.

Given under my hand and the seal of this office at Olympia, Washington, this 5th *day of* February, *2008.*

Jay Manning, Director
Department of Ecology

By Thomas Loranger
Thomas Loranger, Section Manager

OK

Provisions Continued

times, to the records of water use that are kept to meet the above conditions, and to inspect at reasonable times any measuring device used to meet the above conditions.

All wells constructed in the State shall meet the construction requirements of Chapter 173-160 WAC entitled "Minimum Standards for the Construction and Maintenance of Wells" and Chapter 18-104 RCW entitled "Water Well Construction, Act (1971)."

In accordance with Chapter 173-160 WAC, wells shall not be located within certain minimum distances of potential sources of contamination. These minimum distances shall comply with local health regulations, as appropriate. In general, wells shall be located at least 100 feet from sources of contamination. Wells shall not be located within 1,000 feet of a solid waste landfill.

Nothing in this approval shall be construed as lessening or enlarging any water rights represented by Water Right Claim No's 121022 & 121023. The water use authorized under this filing (fill in with water right no.) shall be considered supplemental to any water rights confirmed for said claim as a result of a general adjudication through Superior Court, should adjudication be undertaken.

Hall, Tammy (ECY)

From: Hall, Tammy (ECY)
Sent: Monday, October 08, 2018 11:09 AM
To: Bennett, Rose (ECY)
Cc: 'Jill Van Hulle'; 'sadams@cityofcamas.us'
Subject: New Streamlined CRA-City of Camas G2-30019

Good morning Rose

This application requests 1,000 gpm for municipal supply.

Would you please put me down for 25 hours of review time.

	Project Manager/ Primary Point of Contact	**Billing Contact**
Name	Sam Adams, Utilities Manager	Same
Address	1620 SE 8th Ave Camas, WA 98607	
Telephone	360-817-7003	
Fax		
Email	sadams@cityofcamas.us	

TAMMY HALL, L.HG.--HYDROGEOLOGIST
WA DEPT OF ECOLOGY--WATER RESOURCES PROGRAM--SOUTHWEST REGIONAL OFFICE
PO BOX 47775 | OLYMPIA, WA 98504-7775
v 360-407-6099 | f 407-6305 | tammy.hall@ecy.wa.gov

City of Camas
WASHINGTON

Public Works Department

RECEIVED
SEP 24 2018
WA State Department
of Ecology (SWRO)

September 19, 2018

Tammy Hall
Department of Ecology
Southwest Regional Office
PO Box 47775
Olympia, WA 98504-7775

RE: Streamlined CRA Request for City of Camas Well 17 (G2-30019)

Dear Ms. Hall:

The City of Camas would like to move forward with the processing of our *Application for Water Right G2-30019.* This request is associated with our Well 17 which is currently being drilled under the Preliminary Permit you issued. As you are already aware the issuance of new water rights in the Lacamas Creek watershed is regulated protect flows. Our current water right permitting approach is to provide Ecology with an appropriate mitigation offset for the water we will be withdrawing from Well 17.

We wish to use the Streamlined Cost Reimbursement Process, and enter into a contract with Ecology to oversee the processing of our new application.

Our consultant Pacific Groundwater Group's (PGG) preliminary evaluation of Well 17 indicates that a relatively small portion (less than 10%) of our projected surface water capture from the well will affect stream flows in the Lacamas Creek drainage above the confluence with the Lacamas Lake impoundment and the balance of the capture is to the impoundment itself. We understand that mitigation for this site, as for all new applications in WRIA 28, needs to be provided in a manner consistent with the recommendation of the WRIA 27/28 Planning Group, and embodied in the provisions of WAC 173-528.

Under the Streamlined CRA approach PGG will prepare a Report of Examination (ROE) for your review. The ROE will address impairment, mitigations and consistency with WAC 173-528.

For contracting purposes please use the following information:

	Project Manager/ Primary Point of Contact	**Billing Contact**
Name	Sam Adams, Utilities Manager	Sam Adams
Address	1620 SE 8th Avenue, Camas, WA 98607	Same
Telephone	(360) 817-7003	
Email	sadams@cityofcamas.us	

Feel free to contact me at (360) 817-7003, or you may speak directly with Jill Van Hulle at (360) 413-1510.

Sincerely,

Sam Adams
Utilities Manager
City of Camas

UNITED STATES
POSTAL SERVIC

Date: April 6, 2018

Teresa Hanson:

The following is in response to your April 6, 2018 request for delivery information on your Certified Mail™ item number 9171999991703776661108. The delivery record shows that this item was delivered on April 2, 2018 at 11:22 am in CAMAS, WA 98607. The scanned image of the recipient information is provided below.

Signature of Recipient :

Address of Recipient : 616 NE 4th

Thank you for selecting the Postal Service for your mailing needs.

If you require additional assistance, please contact your local Post Office or postal representative.

Sincerely,
United States Postal Service

Ref. 62-30019

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

March 29, 2018

City of Camas
Attn: Eric Levison
616 NE 4th Ave
Camas WA 98607

Re: Preliminary Permit to Drill and Test a Well for Water Right Application G2-30019

Dear Mr. Levison:

Water Right Application G2-30019 requests 1,000 gallons per minute (gpm) and 1,200 acre-feet (ac-ft) per year for municipal supply. The proposed point of withdrawal is a well to be drilled in the SW ¼ NW ¼ of Section 34, T. 2 N., R. 3 E.W.M. of Clark County.

Under the authority of RCW 90.03.290, Ecology can issue a Preliminary Permit for a water right applicant to conduct studies, surveys, and investigations to gather information to assess a water right application. This Preliminary Permit allows temporary groundwater withdrawals for testing purposes only.

Ecology needs information that evaluates your proposed withdrawal before your application can be processed. Impacts to area users and surface water impacts need to be evaluated. Ecology reserves the right to ask for more information before making a final decision on the application, if necessary.

The requirements of this Preliminary Permit must be met within the deadline or Water Right Application G2-30019 will automatically be cancelled. This Preliminary Permit does not commit Ecology to approve the water right for your project. Other uses needing a water right permit are not allowed unless approved.

Ecology has determined the activities authorized under this Preliminary Permit are categorically exempt from SEPA review under WAC 197-11-800(17).

Please make sure that your consultant receives a copy of this Preliminary Permit to ensure compliance with all requirements. If adverse impacts to senior water right holders occur during any portion of the test, the test must be stopped immediately. Once testing is complete, the well must be capped so it does not pose a safety hazard.

This Preliminary Permit will remain in effect until April 1, 2020, unless revoked sooner by Ecology. The City of Camas will assume all expenses, risks, and liabilities incurred in response to this Preliminary Permit.

This Preliminary Permit is subject to existing rights and the following requirements:

Requirements for drilling new wells:

- ✓ All water wells constructed must meet the minimum standards for construction and maintenance. Chapter 18.104 RCW (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells) discuss well construction requirements.

Check with the County Health Department to see if well site approval is required before well construction.

- ✓ Wells must be at least 100 feet away from potential sources of contamination, such as a sewer, septic tank, privy as specified in WAC 173-160-171. Wells must also be at least 1,000 feet away from solid waste landfills. These minimum distances must also comply with state and local health laws.

- ✓ The well must have a well-maintained access port. A backflow check-valve must also be installed. This valve will prevent water from flowing back into the well when pumping stops so data collected during recovery is accurate.

- ✓ The well driller must submit a well report for the new wells to Ecology within 30 days after drilling.

Requirements for test observation wells:

- ✓ At least one observation well must be monitored for drawdown, recovery and water quality during the aquifer test.

- ✓ Observation wells must be completed in the same aquifer as the pumping well and not be actively pumping during the test.

- ✓ Wells should be selected where they will best determine potential for impacts to surface water in the area, effects on nearby wells, and potential to cause seawater intrusion.

Requirements for pumping test:

> *The Washington State Department of Health (DOH) Water System Design Manual (DOH #331-123, June 99), Appendix E provides guidelines for designing and conducting aquifer tests (available at www.doh.wa.gov/ehp/dw). DOH guidelines are minimum requirements. Failure to follow correct methods may require the tests to be repeated.*

- ✓ A Washington Licensed Hydrogeologist or Registered Engineer, specializing in groundwater evaluation, must supervise the test and perform data analysis.

- ✓ The well must be tested at a constant rate not less than the maximum design rate of the well.

- ✓ The test **must be designed to provide the following information:**
  - Distance and time drawdown response in the producing aquifer.
  - Aquifer transmissivity.
  - Aquifer storage coefficient and specific yield.
  - Effects on regulated surface water.
  - Effects to area users

> *Select accurate water level devices, such as transducers, or electric tape, to measure water levels. All watches and clocks used for timing should be synchronized so that each measurement can be referenced to the exact time since pumping began.*

- ✓ The pumping portion of the test must be at least 24 hours long OR until the water level in the pumping well has been stable for at least four (4) hours, whichever occurs last.

> *Water levels are stable if they drop less than 0.1 foot in an hour while the well is pumping. Measuring points for water levels must be accurately located within 10 feet horizontally and 1 foot vertically.*

- ✓ Water pumped during the test should be discharged so it will not recharge the drawdown cone or influence monitoring during the test.

- ✓ Recovery data must be collected from all wells until the water level in the pumped well nears pre-pumping conditions and the water-level recovery rate is less than 0.1 foot per hour.

- ✓ Data collected must be corrected for influences of barometric pressure, if applicable.

> *Ecology recommends measuring water levels in the test and observation well every hour at least 48 hours before the start of the aquifer test. This will help evaluate aquifer response to external stresses such as precipitation and well interference. Barometric pressure should also be monitored on similar schedule, particularly for confined aquifers, so corrections for barometric influences can be made.*

For water quality sampling, water samples must be collected from the pumping well and observation wells and tested for chlorides and conductivity at a laboratory accredited by the Department of Ecology. Water samples must be collected as follows:

- ✓ From the pumping well:
  - During the first 30 minutes of pumping.
  - About mid-way through pumping.
  - During the last 15 minutes of pumping.

- ✓ From the observation wells:
  - Before the pump test starts.
  - Immediately after all recovery data is collected and the well has recovered to its static water level.

Please be aware that the state or county health department may require additional testing prior to the approval of your project. If your project involves a public water system, please check with the appropriate health agency to determine what additional testing is required before you conduct the test.

Requirements for reporting:

City of Camas must file a report with Ecology when aquifer testing is complete. This information must provide Ecology with the information needed to evaluate results of the study. Ecology may request any of this information in an electronic format.

The report should contain the following information:

- ✓ Maps showing locations of wells used in pump test (pumping and observation wells) and surface water bodies.

- ✓ Pumping well information.
  - Construction diagrams.
  - Well report
  - Lithology description of units.
  - Pump intake depth.
  - Wellhead elevation and way measured.
  - Identification of measuring point.

- ✓ Monitoring well information.
  - Well reports (if available).
  - Well information and way it was determined (if no well report).
  - Wellhead elevations and way measured.
  - Total well depth and way determined.
  - Screened interval and way determined.
  - Identification of measuring point.

All water level and water quality data must be presented in both tabular form and on data plots.

- ✓ Distances between pumping well and observation well(s).

- ✓ Testing information.
  - Pumping rates.
  - Duration of pumping and recovery.
  - Water level information.
  - Raw data and corrected measurements.
  - Corrections made for tidal influences (if any).
  - Discussion of the methods and calculations used to determine aquifer characteristics.
  - Copies of the all field data sheets related to the testing.

- ✓ Hydrogeology information.
  - Hydrogeologic cross-sections.
  - Description of the hydrogeologic system.
  - Copies of all laboratory data sheets.

YOUR RIGHT TO APPEAL

You have a right to appeal this Preliminary Permit to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this Preliminary Permit. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do all of the following within 30 days of the date of receipt of this Preliminary Permit:

- File your appeal and a copy of this with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this Preliminary Permit on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503	**Department of Ecology** Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608
Pollution Control Hearings Board 1111 Israel RD SW STE 301 Tumwater, WA 98501	**Pollution Control Hearings Board** PO Box 40903 Olympia, WA 98504-0903

Michael Gallagher, Section Manger
Department of Ecology, SWRO
PO Box 47775
Lacey, WA 98504-7775

If you have any questions regarding this Preliminary Permit please contact Tammy Hall at (360) 407-6099.

Sincerely,

Joseph J. Witczak

for Michael J. Gallagher, Section Manager
SWRO Water Resources Program

cc: Jill Van Hulle, Pacific Groundwater Group

By Certified Mail: 91 7199 9991 7037 7666 1108

Hall, Tammy (ECY)

From: Jill Van Hulle <jill@PGWG.COM>
Sent: Wednesday, March 21, 2018 2:57 PM
To: Hall, Tammy (ECY)
Cc: Dan Matlock; Sam Adams (SAdams@cityofcamas.us); Carroll, Sheri (ECY)
Subject: City of Camas - Request for Preliminary Permit and to Amend Application G2-30019
Attachments: Amend Camas Application.pdf; G2-30019_Camas application.pdf; Fig1_Site_Plan_V2.pdf

Hi Tammy, it's been a couple of months since we met with your regarding the City of Camas'plans to construct a new well (Well 17) near Lacamas Lake. As we discussed the City has a new well site in mind - just over a mile south and east from the originally designated site. We would like to modify the application that was filed in 2001 (G2-30019) with the new site AND request a **Preliminary Permit to Drill and Test** as soon as possible.

It does not appear that the original application was ever published so I will let the City know to be expecting that – and if you guys could loop me on that notice, I'd appreciate it.

A hard copy of this will be in the mail as well.

Thanks, and let me know if you need anything!

Jill

Jill Van Hulle | Water Resource Specialist
Pacific Groundwater Group | **Water Resource & Environmental Consulting**
(360) 413-1510 | jill@pgwg.com | www.pgwg.com

PACIFIC groundwater GROUP

RECEIVED
MAR 28 2018
WA State Department
of Ecology (SWRO)

March 21, 2018

Tammy Hall
Dept. of Ecology SWRO
PO Box 47775
Olympia, WA 98504

Re: Amendment of Application G2-30019

Dear Tammy

The intent of this letter is to request a modification in the *Point of Withdrawal* for pending application G2-30019 AND to request the issuance of a **Preliminary Permit** to drill and test at the new site.

Application G2-30019 was filed on September 4, 2001 in the amount of 1,000 gpm and projected annual quantity of 1,200 acre-feet per year. The intent was to construct up to two 12-inch production wells at a site immediately north of Lacamas Lake in the NE ¼ NW ¼ of Section 28, T. 2N. R. 3 E.W.M.

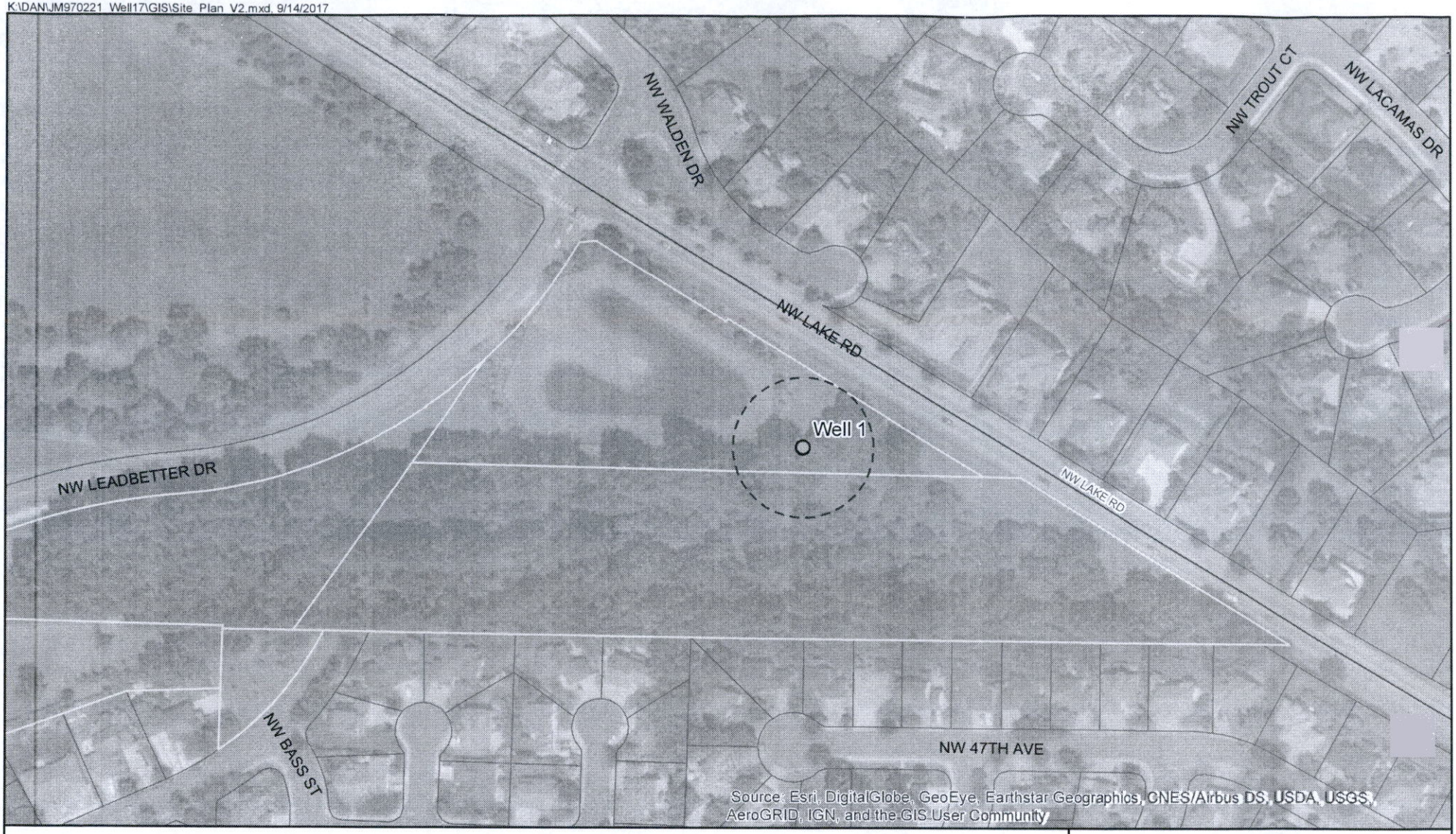
Since the time the application was filed we have reassessed our infrastructure needs and selected a new site for this well (Well 17) approximately a mile to the southeast of the original site within the SW ¼ NW ¼ of Section 34, T. 2 N., R. 3 E.W.M.

We would like to publish and secure the Preliminary Permit as soon as possible.

Sincerely,
Pacific Groundwater Group

Jill Van Hulle
Water Resources Specialist

K:\DAN\JM970221_Well17\GIS\Site_Plan_V2.mxd, 9/14/2017



Proposed Well 17 Location

100-ft Sanitary Control Area

City Properties

N

0 Feet 200

Figure 1
Camas
Well 17 Site

PgG

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

October 1, 2001

City of Camas
Attn Eric Levison
616 NE 4th Avenue
Camas WA 98607

Re: Water Right Application No. G2-30019

This letter is to acknowledge that the Washington State Department of Ecology received your water right application. We have assigned your application the number indicated above. Please include this number in future correspondence regarding your application with the Department of Ecology.

When we begin actively evaluating applications in your area, we will prepare a public notice and send it to you with publication instructions. It will be sometime before we are able to begin working in your area. In the meantime, please notify Ecology of changes such as address, property ownership, or variations in your proposed water use plans.

The availability of water in Washington state is a serious problem. Much of the water in our state has already been appropriated. The competition for water has escalated with our state's increasing population, conflicting water policy issues, and grave declines in salmon and other fish populations. A new watershed management law brings us a step closer to addressing some of these issues. It sets into motion a locally based process to address water quantity, quality, and habitat issues. Watershed management will help meet challenges for getting water to people, industries, farms, and fish.

In some areas of the state, we are continuing to evaluate applications within watersheds where we have previously gathered information and completed watershed assessments. We are also continuing to process water right permit or change applications that are intended to address public health and safety emergencies, the natural environment, or are for nonconsumptive withdrawals. All other applications are grouped by watershed and processed according to the date of submittal, and when we have enough information and staff resources to make decisions.

If you would like further information on your application, please contact the Southwest Regional Office at (360) 407-0240.

Sincerely,

J. Mike Harris

J. Mike Harris
Water Resources Supervisor
Southwest Regional Office

JMH:th (applet.doc)

File NR G2-30756
WR DOC ID #6802639

STATE OF WASHINGTON
FINAL
REPORT OF EXAMINATION
FOR WATER RIGHT APPLICATION

PRIORITY DATE	WATER RIGHT APPLICATION NUMBER
January 8, 2020	G2-30756

NAME AND MAILING ADDRESS	SITE ADDRESS (IF DIFFERENT)
CITY OF CAMAS 1620 SE 8TH AVE CAMAS, WA 98607	

Total Rate and Quantity Authorized for Withdrawal

WITHDRAWAL RATE (gpm)	ANNUAL QUANTITY (ac-ft/yr)
6,700	11,090

gpm = Gallons per Minute; ac-ft/yr = Acre-feet per Year

Attention: The annual quantity and instantaneous rate of withdrawal from the Lower Washougal Wellfield authorized under G2-30756 are non-additive to the associated rights listed below.

Purpose

PURPOSE	WITHDRAWAL RATE			ANNUAL QUANTITY (AF/YR)		PERIOD OF USE (mm/dd)
	ADDITIVE	NON-ADDITIVE	UNITS	ADDITIVE	NON-ADDITIVE	
Municipal		6,700	GPM		11,090	01/01-12/31

PUBLIC WATER SYSTEM INFORMATION	
WATER SYSTEM NAME and ID	CONNECTIONS
Camas Municipal Water Sewer System 108002	Unspecified

SPECIAL REMARKS:
Exercise of the non-additive quantities authorized by G2-30756 attributable to the primary authorizations under G2-30144, G2-30145, G2-30146, and G2-30147.

Associated Water Rights

DOCUMENT NUMBER	INSTANTANEOUS RATE (gpm)	ANNUAL QUANTITY (ac-ft/yr)	REMARKS
G2-CV1-2P159	900	320	Annual appropriations for these water rights and the City of Camas' surface water certificates 711 and 712 were capped at 6,300 ac-ft/yr under water right decisions G2-00501 and G2-24400.
G2-CV1-2P160	900	230	
C-85-A	1,200	118	
C-6635-A	1,500	2,400	
C-6636-A	600	920	
G2-00501C	1,000	530	
G2-24400C	900	530	
G2-30144	500	2,150	Withdrawals authorized under these four water rights are mitigated by reduced diversions from the City's Boulder Creek and Jones Creek surface water sources.
G2-30145	1,000	880	
G2-30146	1,000	880	
G2-30147	1,000	880	
Total Associated Rights	10,500	11,090	Total annual quantity accounts for 6,300 af/yr cap noted above.

Source Location

COUNTY	WATERBODY	TRIBUTARY TO	WATER RESOURCE INVENTORY AREA
Clark	Groundwater		WRIA 28

SOURCE NAME	PARCEL	WELL TAG	TOWNSHIP	RANGE	SECTION	QQ Q	LATITUDE (N)	LONGITUDE (W)
Well 5	87266000	AFP623	1N	3E	12	SW SE	45.5806	122.3834
Well 6	89927000	AFP624	1N	3E	12	NE SW	45.5834	122.3841
Well 7	89891000	AFP628	1N	3E	12	NW SW	45.5843	122.3885
Well 8	89888000	AFP629	1N	3E	12	NE SW	45.5843	122.3880
Well 10	89866000	AGP495	1N	3E	12	NW SW	45.5845	122.3904
Well 11	89892000	AHM259	1N	3E	12	NW SW	45.5840	122.3894
Well 12	89892000	AHM266	1N	3E	12	NW SW	45.5844	122.3895
Well 14	91045003	BAM409	1N	3E	12	NW SE	45.5837	122.3817

QQ Q = ¼ Quarter Quarter

Datum: NAD83/WGS84

Place of Use

Area served by Camas Municipal Sewer and Water System. The place of use of this water right is the service area described in the most recent Water System Plan approved by the Washington State Department of Health. RCW 90.03.386 may have the effect of revising the place of use of this water right if the criteria in section RCW 90.03.386(2) are met.

Proposed Works
Eight existing wells and one proposed well in the Lower Washougal Wellfield: Well 5: 8-inch diameter well to 71 feet below ground surface (bgs) Well 6: 16-inch diameter well to 85 feet bgs Well 7: 14-inch diameter well to 84 feet bgs Well 8: 14-inch diameter well to 87 feet bgs Well 10: 16-inch diameter well to 88 feet bgs Well 11: 16-inch diameter well to 105 feet bgs Well 12: 16-inch diameter well to 101 feet bgs Well 14: 20-inch diameter well to 85 feet bgs Proposed Well 18: Assumed 20-inch casing to about 100 feet bgs

Development Schedule

BEGIN PROJECT BY THIS DATE	COMPLETE PROJECT BY THIS DATE	PUT WATER TO FULL USE BY THIS DATE
Started	December 31, 2026	December 31, 2031

Attention: These dates represent deadlines that must be met or risk cancellation of this authorization. Submittal of formal documentation for each stage is required. Extensions may be requested.

Measurement of Water Use

HOW OFTEN MUST WATER USE BE MEASURED AND RECORDED?	Weekly
HOW OFTEN MUST WATER USE DATA BE REPORTED TO ECOLOGY?	Annually by January 31
WHAT QUANTITY SHOULD BE REPORTED?	Total annual quantity in acre-feet
WHAT RATE SHOULD BE REPORTED?	Annual peak rate of withdrawal in gpm

Provisions

Measurements, Monitoring, Metering, and Reporting
An approved measuring device must be installed and maintained for each of the sources identified by this water right in accordance with the rule “Requirements for Measuring and Reporting Water Use”, chapter 173-173 WAC, which describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition the Department of Ecology (Ecology) for modifications to some of the requirements.

Recorded water use data shall be submitted electronically by January 31 each year. To set up an Internet reporting account, contact the Regional Office. If you do not have Internet access, you can still submit hard copies by contacting the Regional Office for forms to submit your water use data.

Department of Health Requirements
Prior to any new construction or alterations of a public water supply system, the State Board of Health rules require public water supply owners to obtain written approval from the Office of Drinking Water of the Washington State Department of Health. Please contact the Office of Drinking Water at Southwest Drinking Water Operations: 243 Israel Road S.E., PO Box 47823, Tumwater, WA 98504-7823, (360) 236-3030.

Water Use Efficiency
Use of water under this authorization will be contingent upon the water right holder's maintenance of efficient water delivery systems and use of up-to-date water conservation practices consistent with established regulation requirements and facility capabilities.

Relationship with Other Water Rights and Mitigation
Exercise of the non-additive quantities authorized by G2-30756 is attributable to the primary authorizations under G2-30144, G2-30145, G2-30146, and G2-30147.

Proof of Appropriation
Consistent with the development schedule given in this report (unless extended by Ecology), the water right holder must file a Notice of Proof of Appropriation (PA) of Water with Ecology. The PA documents the project is complete and all the water needed has been put to full beneficial use (perfected). In order to verify the extent of water use under this permit, an inspection of water use is typically required, known as a "proof exam". After filing the PA, the water right holder's next step is to hire a Certified Water Rights Examiner (CWRE) to conduct this proof exam. A list of CWREs is provided to the water right holder upon filing the PA with Ecology. The final water right document, a water right certificate, then may issue based upon the findings of the CWRE. Statutory county and state filing fees may apply prior to certificate issuance.

Schedule and Inspections
Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the project location, and to inspect at reasonable times, records of water use, wells, diversions, measuring devices and associated distribution systems for compliance with water law.

Findings of Fact and Order

Upon reviewing the investigator's report, I find all facts, relevant and material to the subject application, have been thoroughly investigated.

Therefore, I ORDER **APPROVAL** of Application No. G2-30756, subject to existing rights and the provisions specified above.

Your Right To Appeal

You have a right to appeal this Order to the Pollution Control Hearings Board (PCHB) within 30 days of the date of receipt of this Order. The appeal process is governed by chapter 43.21B RCW and chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal, you must do the following within 30 days of the date of receipt of the Order:

- File your appeal and a copy of this Order with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this Order to Ecology in paper form - by mail or in person (see addresses below). E-mail is not accepted.

You must also comply with other applicable requirements in chapter 43.21B RCW and chapter 371-08 WAC.

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503	**Department of Ecology** Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608
Pollution Control Hearings Board 1111 Israel RD SW, Ste 301 Tumwater, WA 98501	**Pollution Control Hearings Board** PO Box 40903 Olympia, WA 98504-0903

For additional information, visit the Environmental Hearings Office Website: http://www.eho.wa.gov. To find laws and agency rules, visit the Washington State Legislature Website: http://www1.leg.wa.gov/CodeReviser.

Authorizing Signature

Signed at Lacey, Washington, this 2nd day of June, 2022.

Michael J. Gallagher

Michael J Gallagher, Section Manager
Water Resources Program/Southwest Regional Office
Department of Ecology

INVESTIGATOR'S REPORT

Water Right Application No.: G2-30756 (City of Camas)
Investigators: Joseph Morrice, LHG; Burt G. Clothier, LHG, RG
Reviewed by: Tammy Hall, L.HG.

BACKGROUND

This report serves as the written findings of fact concerning Water Right Application Number G2-30756.

On January 8, 2020 the City of Camas (City) filed an application for a new water right permit with the Washington State Department of Ecology (Ecology). The application requested authority to withdraw 6,700 gallons per minute (gpm) and an unspecified annual quantity from the City's Lower Washougal Wellfield (LWWF), non-additive to existing rights. The City also requested authorization for an additional point of withdrawal (well) in the LWWF; however, the requested new well (Well 18) will be authorized adding a point of withdrawal to one or more existing water rights (e.g., G2-0004C and G2-CV1-2P160) through a showing of compliance with RCW 90.44.100(3).

The LWWF consists of 8 existing wells near the confluence of the Washougal River and the Columbia River in the S½ of Section 12, Township 1N, Range 2E W.M. The City holds eleven water rights for the wellfield. Ten of the water rights each authorize withdrawals from a single well in the LWWF. The eleventh water right authorizes additional instantaneous withdrawals from one well (Well 8) and additional annual withdrawals from all existing wells in the wellfield except for Well 14. Combined, these rights authorize withdrawal of 10,500 gpm and 11,090 acre-feet per year (ac-ft/yr).

The purpose of the requested water right is to provide the City more flexibility in managing pumping from the wellfield, which is constrained by the instantaneous and annual limits associated with each water right and well. Additionally, the City's 2019 Water System Plan identified the need for additional supply to meet projected growth through 2035.

On February 17, 2022 the City requested via email that the application be amended to request a water right of 6,700 gpm, non-additive to existing rights for the LWWF. Over the near future this would help alleviate the City's constraints on managing the wellfield by allowing production to be shifted between wells, maximizing available withdrawals under the City's water rights. Projected long-term deficits in the annual quantity will likely require additional permitting of a new appropriation.

Table 1. Summary of Requested Water Right, as Amended

Applicant Name	City of Camas
Priority Date	1/8/2020
County	Clark
WRIA	27 – Salmon/Washougal
Water Source	Groundwater
Place of Use	The City of Camas service area as defined in the most recent Water System Plan.

Purpose	Instantaneous Rate (gpm)	Annual Quantity (ac-ft/yr)	Begin Season	End Season
Municipal	6,700	11,090	1/1	12/31

Source Name	Parcel	Well Tag	Township	Range	Section	QQ Q	Latitude (N)	Longitude (W)
Well 5	87266000	AFP623	1N	3E	12	SW SE	45.5806	122.3834
Well 6	89927000	AFP624	1N	3E	12	NE SW	45.5834	122.3841
Well 7	89891000	AFP628	1N	3E	12	NW SW	45.5843	122.3885
Well 8	89888000	AFP629	1N	3E	12	NE SW	45.5843	122.3880
Well 10	89866000	AGP495	1N	3E	12	NW SW	45.5845	122.3904
Well 11	89892000	AHM259	1N	3E	12	NW SW	45.5840	122.3894
Well 12	89892000	AHM266	1N	3E	12	NW SW	45.5844	122.3895
Well 14	91045003	BAM409	1N	3E	12	NW SE	45.5837	122.3817

WRIA = Water Resource Inventory Area; gpm = Gallons per Minute; ac-ft/yr = Acre-feet per Year; QQ Q = ¼ Quarter Quarter Datum: NAD83/WGS84

Cost Reimbursement

Under RCW 90.03.265 (1)(a) "any applicant for a new withdrawal or a change, transfer, or amendment of a water right pending before the department may initiate a cost-reimbursement agreement with the department to provide expedited review of the application. A cost-reimbursement agreement may be initiated under this section if the applicant agrees to pay for, or as part of a cooperative effort agrees to pay for, the cost of processing his or her application and all other applications from the same source of supply which must be acted upon before the applicant's request because they were filed prior to the date of when the applicant filed."

This application is being processed under a cost reimbursement agreement between the applicant and the Department of Ecology. This report has been prepared by Pacific Groundwater Group (PGG), a subsidiary of Mott MacDonald, and reviewed by Tammy Hall with the Department of Ecology's Water Resources Program.

Senior and Competing Applications

Under RCW 90.03.265 (1)(b) "the requirement to pay for the cost of other applications under (a) of this subsection does not apply to an application for a new appropriation that would not diminish the water available to earlier pending applicants for new appropriations from the same source of supply."

This new appropriation request is only for instantaneous and annual quantities non-additive to existing certificates and permits within the LWWF, no additional instantaneous or annual quantities will be approved. As such, this application can be processed without the risk of impacting the outcome of other applications.

INVESTIGATION

Investigation of this application included, but was not limited to, research and review of the following:

Carollo, 2019. City of Camas, Water System Plan Update, October 2019.
Ecology files of the water rights and well logs referenced in this report

Ecology, 2008. Hydrogeologic Investigation for the City of Camas Water Right Applications: G2-30144, G2-30145, G2-30146, and G2-30147. Memo from John Pearch, LHG to Tom Loranger.
Hartford and McFarland, 1989. Lithology, Thickness, and Extent of Hydrogeologic Units Underlying the East Portland Area, Oregon. USGS Water Resources Investigations Report 88-4110.
Hogenson and Foxworthy, 1965. Ground Water in the East Portland Area. USGS Water Supply Paper 1793.
McFarland and Morgan, 1997. Description of the Ground-Water Flow System in the Portland Basin, Oregon and Washington. USGS Water Supply Paper 2470-A.
Mundorff, 1964. Geology and Ground-Water Conditions of Clark County, Washington, with a Description of a Major Alluvial Aquifer along the Columbia River. USGS Water Supply Paper 1600.
PGG, 2003. Hydrogeologic Evaluation for City of Camas Replacement Wells 10, 11, and 12, Prepared for the City of Camas.
PGG, 2004. City of Camas Water Supply Alternatives Investigation, Prepared for City of Camas, Prepared by Pacific Groundwater Group.
PGG, 2006. Hydrogeologic Evaluation for City of Camas Replacement Well 13, Prepared for the City of Camas.
Swanson, McFarland, Gonthier, and Wilkinson, 1993. A Description of the Hydrogeologic Units in the Portland Basin, Oregon and Washington. USGS Water Resources Investigations Report 90-4196.

Proposed Use and Basis of Water Demand

Site Description

The LWWF is on a strip of land between the confluence of the Columbia and the Washougal Rivers. The distance between the two rivers is roughly one-half mile near LWWF with ground surface elevations about 20 to 40 feet above the elevation of the rivers. The City relies on the LWWF, two other water wells (Well 9 and Well 13), and two surface water diversions on Jones Creek and Boulder Creek to provide municipal supply to a residential population of about 26,000 people within the City's service area.

The City's water sources are within the Washougal River basin. The basin is in parts of Skamania and Clark counties. The headwaters are in the foothills of the Cascade Range at elevations up to 4,000 feet. Major tributaries include Lacamas Creek and the Little Washougal River. Lacamas Creek enters the river immediately downstream of the LWWF and the Little Washougal River enters the river about 5 miles upstream. Jones Creek and Boulder Creek, the City's surface water sources, both discharge to the Little Washougal River. The Washougal River discharges into the Columbia River, near the City of Camas at an average elevation of about 10 feet above mean sea level (msl).

Population is generally concentrated in the lower Washougal floodplain (e.g., the Cities of Camas and Washougal) and the lower reaches of the Little Washougal River and Lacamas Creek. The climate is characterized by mild, cool, wet winters and moderately dry warm summers. The Columbia River and the Pacific Ocean affect the weather patterns and help moderate temperatures year-round.

Topographic relief influences the distribution of precipitation, with average values of 35 inches per year west of Camas at the Portland Airport increasing to 110 inches per year in the upper elevations of the Washougal watershed.

Water System Description
The City of Camas water system serves about 26,000 people within their service area. The City's surface water and groundwater sources and service area are shown on Figure 1. The City currently operates 10 wells and two surface water diversions. Eight wells are in the LWWF (Well 5, Well 6, Well 7, Well 8, Well 10, Well 11, Well 12, and Well 14). Well 13 is located across the Washougal River from the LWWF, near the confluence of the river and Lacamas Creek and Well 9 is located about 3 miles northwest of the LWWF.

The eight LWWF wells range in depth from 70 to 110 feet below ground surface (bgs) and range in capacity from 500 to 1,350 gpm. The combined LWWF capacity is about 7,800 gpm or 11.23 million gallons per day (mgd), slightly less than the combined authorized withdrawal of 8,500 gpm. The City plans on system upgrades to increase the capacities of Well 11 and Well 12 and installing a new adjacent well (Well 18) under a Showing of Compliance with RCW 90.03(100) to allow full exercise of the water rights.

The City maintains emergency interties with the neighboring Cities of Washougal and Vancouver. However, due to system pressure relationships, the interties can only deliver water from Camas to the neighboring City except in very extreme circumstances and these connections do not represent practical sources of water for Camas.

History of Water Use
The City's has diverted water from Jones Creek since 1913 and from Boulder Creek since 1931 for municipal supply. The City drilled Wells 1 and 2 in 1936 and added Well 3 in 1945. These wells are all located in the LWWF. The system continued to expand with the addition of Wells 5 through 8 and 14 in the LWWF plus Wells 4 and 9 outside the wellfield. Wells 1, 2, 3 and 4 were subsequently replaced with Wells 10, 11, 12 and 13.

The City hasn't diverted any water from the two surface water sources since 2011 and intends to only use these sources during winter months. City staff provided monthly pumping and surface water diversion data obtained from their SCADA system. Table 2 presents average monthly and annual groundwater pumping rates and surface water diversion rates.

Table 2 – Annual Surface Water and Groundwater Production

YEAR	SURFACE WATER (ac-ft/yr)	GROUNDWATER (ac-ft/yr)	TOTAL (ac-ft/yr)
1997	1,597	1,418	3,015
1998	1,544	2,149	3,693
1999	1,541	2,136	3,677
2000	Data Unavailable		
2001	Data Unavailable		
2002	1,363	2,610	3,973
2003	1,183	3,474	4,657
2004	1,251	3,272	4,523
2005	864	3,390	4,254

2006	837	3,758	4,595
2007	855	3,260	4,115
2008	679	3,485	4,164
2009	306	3,800	4,106
2010	311	3,511	3,822
2011	51	3,935	3,986
2012	0	4,084	4,084
2013	0	4,156	4,156
2014	0	4,432	4,432
2015	0	4,765	4,765
2016	0	4,605	4,605
2017	0	4,578	4,578
2018	0	4,623	4,623
2019	0	4,437	4,437
2020	0	4,721	4,721

Proposed Use

The City's WSP identified the need for additional supply to meet future demands (Carollo, 2019). The WSP estimated population and water demand growth under low, medium and high growth projections to assess future instantaneous and annual supply needs. The WSP evaluated the instantaneous capacity requirements for the LWWF by subtracting Qi's allocated to non-LWWF sources from projected maximum daily demand (MDD) over a planning horizon (through 2035). Table 3 summarizes the annual demand data (under medium growth projections) and shows that the allocated LWWF Qi will be exceeded in 2030. The shortfall in instantaneous capacity could reach about 1,700 gpm in 2035.

Table 3 – Projected Maximum Day Demands and Water Right Authority, Medium Growth Scenario

YEAR	INSTANTANEOUS DEMAND (gpm)	AUTHORIZED Qi[1] (gpm)	SURPLUS / (DEFICIT) (gpm)
2021	8,188	10,475	2,287
2022	8,458	10,475	2,017
2023	8,729	10,475	1,746
2024	9,000	10,475	1,475
2025	9,271	10,475	1,204
2026	9,563	10,475	912
2027	9,854	10,475	621
2028	10,146	10,475	329
2029	10,438	10,475	37

[1] Includes rights associated with the LWWF and wells PW9 and PW13 but does not include undeveloped rights G2-30146 and G2-30147, which authorize an additional 1,000 gpm each. Water rights for the surface water diversions are not included, because diversions are not permitted during periods of maximum system demand (i.e., summer).

2030	10,729	10,475	(254)
2031	11,021	10,475	(546)
2032	11,313	10,475	(838)
2033	11,604	10,475	(1,129)
2034	11,896	10,475	(1,421)
2035	12,188	10,475	(1,713)

Other Rights Associated with Project or Place of Use

The City currently maintains a water rights portfolio of 11 certificates and four permits. Accounted together based on their stated amounts, these would allow for instantaneous withdrawal of 14,045 gpm and total annual withdrawal of 13,596 ac-ft/yr. Several factors alter the total annual allocation. In 1980 Ecology established an annual withdrawal limit of 5,750 ac-ft/yr for all (surface-water and groundwater) rights issued prior to 1979. This was increased to a maximum allocation of 6,300 ac-ft/yr with the recognition of groundwater claims for Wells 1 and 2. At that time, combined instantaneous and annual withdrawals authorized for the LWWF were 7,000 gpm and 5,048 ac-ft/yr.

This maximum allocation from the LWWF was increased again in 2008, when Ecology issued Permits G2-30144 and G2-30145 that added an allocation of 1,500 gpm and 3,030 ac-ft/yr to LWWF sources along with authorizing expansion of the wellfield with new Well 14. Addition of these two permits allowed the City to pump the LWWF at combined instantaneous and annual rates of up to 8,500 gpm and 8,078 ac-ft/yr.

Also, in 2008 Ecology issued additional permits to further expand the LWWF to new wells at Parker's Landing (G2-30146) and the Wastewater Treatment Plant (G2-30147). Neither of these permits have yet been developed due to current engineering and property constraints. Combining these permits with the others issued for the LWWF increases the total LWWF Qi to 10,500 gpm and the Qa to 9,838 ac-ft/yr.

The extended wellfield, as defined by the City's water right approvals, includes Wells 5 through 8, 10, 11, 12, 14, and the WWTP and Parkers Landing well sites.

Table 4 - City of Camas Water Rights

DOCUMENT NUMBER	PRIORITY DATE	INSTANTANEOUS RATE (gpm)	ANNUAL QUANTITY (ac-ft/yr)	COMMENTS
CS2-SWC712	8/22/1923	1,120	1,820	Boulder Creek
CS2-SWC711	9/5/1930	450	730	Jones Creek
G2-CV1-2P159	6/11/1974	900	320	Well 10 (replaced PW1)
G2-CV1-2P160	6/11/1974	900	230	Well 11 (replaced PW3)
C-85-A	7/21/1945	1,200	118	Well 12 (replaced PW2)
C-4072-A	2/12/1959	1,325	1,208	Well 13 (replaced PW4)
C-6635-A	3/22/1968	1,500	2,400	Well 6
C-6636-A	3/22/1968	600	920	Well 5
G2-00501C	3/22/1971	1,000	530	Well 7
G2-24400C	8/13/1986	900	530	Well 8
G2-30144	8/21/2003	500 (Well 8 only)	2,150	Wells 5 – 8, 10, 11, and 13

G2-27384	8/13/1986	650	210 N	Well 9
G2-30145	8/13/1986	1,000	880	Well 14
G2-30146	8/13/1986	1,000	880	Parkers Landing
G2-30147	8/13/1986	1,000	880	WWTP

gpm = Gallons per Minute; ac-ft/yr = Acre-feet per Year; N = non-additive

Hydrogeologic Evaluation

The geology of the project area has been studied and investigated by the United States Geological Survey (USGS; Mundorff, 1964; Hogenson and Foxworthy, 1965; Hartford and McFarland, 1989; Swanson and others, 1993; McFarland and Morgan, 1997) and various consultant reports for local governments (PGG, 2003, 2004, and 2006).

The City is located near the eastern edge of the Portland Basin near the Cascade foothills. The bottom of the basin is formed of volcanic rocks that rise to the east to form the Cascade Range. Sediments that fill the basin range are over 1,700 feet thick in the middle of the basin around the City of Vancouver, but dip up and thin toward the Camas area and are absent in the northern portion of the study area where bedrock is exposed. These sediments include river alluvium (deposited during both recent and Pleistocene times) underlain by deposits of the Troutdale formation. In the LWWF vicinity, the Troutdale formation is absent and alluvial deposits are underlain directly by relatively shallow bedrock.

Pleistocene Alluvial Deposits occur at or near the land surface throughout much of the City in the area that lies between the Washougal and Columbia Rivers and are largely overlain by river alluvium in the LWWF vicinity. During the late Pleistocene, the ancestral Columbia River deposited a great deltaic fan emanating to the west from the mouth of the Gorge during a series catastrophic events known as the "Missoula floods." The resulting deposits are approximately 100 feet thick in the vicinity of the LWWF increasing to about 200 feet under the Columbia River channel. Sediment textures are typically described by drillers as boulders, cobbles, sand and gravel with some limited cemented zones. In places, the Pleistocene Alluvial Deposits are overlain by finer-grained recent alluvial deposits.

Saturated portions of the Pleistocene Alluvial Deposits form the Pleistocene Alluvial Aquifer (PAA). The PAA is highly productive, with local supply wells typically producing between 500 and 1,500 gpm. Testing at the City's LWWF indicates an aquifer transmissivity of approximately 1,000,000 gallons per day per foot (gpd/ft) and a storage coefficient of about 0.05 (PGG, 2004). All of the City's wells located within the floodplain are completed in the PAA. Relatively shallow bedrock limits the saturated thickness of the PAA, thus limiting available drawdowns and maximum yields of PAA wells.

Groundwater levels in the PAA show significant seasonal variation due to river stage variation and pumping withdrawals (by Camas, Washougal and Georgia Pacific). Seasonal water level variations are locally observed to range from 15 to over 35 feet. Water levels in the LWWF tend to rise to the Washougal River elevation during high-flow events in late spring when the Columbia River and lower Washougal River are at their highest. This suggests that the aquifer is replenished up to the river elevation during these events and that groundwater and surface water are hydraulically connected. In contrast, seasonal declines in groundwater levels near the river during the summer and fall months indicate that unsaturated conditions develop in the lower reaches of the system. These unsaturated conditions locally sever the direct hydraulic connection between the river and the PAA water table during portions of the summer and the fall (PGG, 2004 and 2013).

Despite the proximity of LWWF wells to the Washougal River, testing showed that only Well 4 exhibited groundwater under the influence of surface water from the Washougal River (PGG, 2004). The City has subsequently taken Well 4 out of service.

ANALYSIS

Under Washington State law (RCW 90.03.290), each of the following four criteria must be met for an application for a new water right permit to be approved:

- Water must be available for appropriation.
- Water withdrawal and use must not cause impairment of existing water rights.
- The proposed water use must be beneficial.
- Water use must not be detrimental to the public interest (public welfare).

Water Availability

For any new appropriation, water must be both physically and legally available.

Physical Availability

For water to be physically available for appropriation, water must be present in quantities and quality and on a sufficiently frequent basis to provide a reasonably reliable source for the requested beneficial use or uses. An analysis of physical availability is required for both surface water and groundwater applications.

The PAA tapped by the LWWF wells is highly transmissive and supports numerous high-production supply wells operated by the City, the City of Washougal, and Georgia-Pacific. The City has been withdrawing groundwater from the LWWF since the late 1930s without any reported loss of aquifer yield or need to curtail use due to physical unavailability of water. Given the requested water right is non-additive to existing water rights for the LWWF there will be no increase in instantaneous or annual production and water is physically available for the requested use.

Legal Availability

To meet the legal availability test, the proposed appropriation may not withdraw and use water that is already “spoken for”, such as water from sources that are protected by administrative rule or court order.

Under Chapter 173-528 WAC, the Washougal River is closed to new consumptive appropriations year-round, including appropriation of groundwater in hydraulic continuity with surface water. The LWWF wells are in hydraulic continuity with the Washougal River. The existing water rights for the LWWF either pre-date adoption of Chapter 173-528 WAC (G2-CV1-2P159, G2-CV1-2P160, C-85-A, C-6635-A, C-6636-A , G2-00501C, and G2-24400C) or were issued as mitigated water rights, mitigated by the City’s reduced seasonal diversions from Jones Creek and Boulder Creek. Given the requested water right is non-additive to these primary water rights there will be no increase in pumping from the LWWF and pumping effects on the Washougal River remain within those estimated to support the authorization of previous water rights. As such, water is legally available.

Impairment

In analyzing impairment, Ecology must make a determination as to whether existing water rights, including adopted instream flows, may be impaired by the withdrawal and proposed use.

The requested water right is non-additive to the City's existing rights for the LWWF and would not increase the instantaneous or annual withdrawals. The existing primary water rights all either pre-date the adoption of Chapter 173-528 WAC or are mitigated by the City's reduction in diversions from Jones Creek and Boulder Creek. Approval of the requested non-additive water right would allow the City to shift production between wells within the expanded LWWF, but not increase the total authorized instantaneous or annual quantities from the LWWF. Based on this, impairment of other water rights or instream flows is unlikely.

Beneficial Use

The proposed appropriation must be for a beneficial use of water.

Municipal supply is considered a beneficial use of water under RCW 90.54.020(1).

Public Interest

The withdrawal and associated use must not be detrimental to the public interest. At a minimum, the following are considered when making this assessment.

Notification to the Washington Department of Fish and Wildlife
Per RCW 90.03.280 and 77.57.020, Ecology must give notice to the Washington Department of Fish and Wildlife (WDFW) of applications to divert, withdraw, use, or store water.

WDFW was provided notice of this water right application on November 4, 2021. Steve Boessow responded in a letter dated March 15, 2022 stating that WDFW did not oppose the approval of this application.

State Environmental Policy Act (SEPA)
Under chapter 197-11 WAC, a water right application is subject to a SEPA threshold determination (i.e., an evaluation of whether there will be significant adverse environmental impacts) if any of the following conditions are met:

- It is a surface water right application for more than 1 cfs, unless that project is for agricultural irrigation, in which case the threshold is increased to 50 cfs, so long as that irrigation project will not receive public subsidies;
- It is a groundwater right application for more than 2,250 gpm;
- It is an application that, in combination with other water right applications for the same project, collectively exceed the amounts above;
- It is a part of a larger proposal that is subject to SEPA for other reasons (e.g., the need to obtain other permits that are not exempt from SEPA);
- It is part of a series of exempt actions that, together, trigger the need to do a threshold determination, as defined under WAC 197-11-305.

The subject application's requested groundwater withdrawal exceeds 2,250 gpm. Therefore, a SEPA threshold determination was completed. Acting as the lead agency, the City of Camas prepared a SEPA checklist for the water right change. The City of Camas issued a Determination of Non-Significance (DNS) on January 20, 2022.

Public Notice

RCW 90.03.280 requires that notice of a water right application be published once a week, for two consecutive weeks, in a newspaper of general circulation in the county or counties where the water is to be stored, diverted, and used. Notice of this application was published in the Camas-Washougal Post-Record, a weekly newspaper, on 2/13/20 and 2/20/20.

No protests to this water right application were received.

Other Public Interest Concerns

The Watershed Management Plan adopted for WRIA 27/28 in 2006 addresses a range of issues related to water resources in the Salmon/Washougal drainage, including water supply, stream flow management, water quality, and aquatic habitat. The Watershed Management Plan recommended development of rules to protect instream flows and guide water resources permitting decisions. Chapter 173-528 WAC – Water Resources Program for the Salmon-Washougal Basin, WRIA 28 – was adopted into rule in January 2009 and implements the instream flow closures recommended in the Watershed Management Plan. The proposed new groundwater right, non-additive to existing rights, is consistent with the requirements and intent of Chapter 173-528 WAC and is not detrimental to the public interest.

Conclusions

I find that:

- Water is physically and legally available.
- The appropriation will not impair existing rights.
- The proposed municipal use is a beneficial use.
- Approval of this application will not be detrimental to the public interest.

RECOMMENDATIONS

Based on the above investigation and conclusions, I recommend this request for a water right be **APPROVED** in the amounts and within the limitations listed below and subject to the provisions listed above.

Recommended Quantities, Purpose of Use, and Project Location

The rate and quantity of water recommended are maximum limits. The permit holder may only withdraw water at a rate and quantity within the specified limits that are reasonable and beneficial:

Table 5. Recommended Limits and Location

Maximum Instantaneous Rate (gpm)	6,700 (non-additive)
Maximum Annual Quantity (ac-ft/yr)	10,050 (non-additive)
Purpose of Use	Municipal
Points of Withdrawal	Well 5: SW¼, SE¼, S12, T1N, R3E W.M. Well 6: NE¼, SW¼, S12, T1N, R3E W.M. Well 7: NW¼, SW¼, S12, T1N, R3E W.M. Well 8: NE¼, SW¼, S12, T1N, R3E W.M. Well 10: NW¼, SW¼, S12, T1N, R3E W.M. Well 11: NW¼, SW¼, S12, T1N, R3E W.M. Well 12: NW¼, SE¼, S12, T1N, R3E W.M. Well 14: NW¼, SE¼, S12, T1N, R3E W.M.
Place of Use	As described in the City's most recent Water System Plan, dated May 1, 2019.

Burt G. Clothier, LHG, RG — June 2, 2022 *Date*

Tammy Hall, LHG — June 2, 2022 *Date*

To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program at 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Southwest Region Office
PO Box 47775, Olympia, WA 98504-7775 • 360-407-6300

May 12, 2026

City of Camas
Attn: Rob Charles, PE
1620 SE 8th Ave
Camas, WA 98607

Email: rcharles@cityofcamas.us

Re: Proof of Appropriation Extension for Water Right No. G2-30144 & G2-30145

Dear City of Camas:

The Washington State Department of Ecology (Ecology) received your request to extend the date your project will be fully developed from August 1, 2025 to December 31, 2031. This is your first extension request to fully develop your project and therefore put (up to) the quantities of water on your permit to full beneficial use.

Per RCW 90.03.320, we approve permit extensions for "good cause shown" and "as may be reasonably necessary, having due regard to the good faith of the applicant and the public interests affected." For the reason(s) below, your permit extension request is approved:

- Changes in the project, while the project scope remains consistent with the original intent of the water right application – While the test wells have drilled, they are not productive or sufficient. Production has been shifted to the Lower Washougal Well Field under the non-additive quantities of water right permit G2-30756.

- Unforeseen financial and engineering problems – With the detection of PFAS is Well 13, funding and planning delays have resulted in significate redirection of Camas's resources. This has caused delays in development.

- Demonstrated effort to attain additional environmental studies – Camas has completed extensive testing and analysis within the Lower Washougal Wellfield to have a better understanding of the relationship between wells (i.e. existing and future), wellfield yield, hydrogeologic conditions, and hydraulic continuity between surface water and groundwater. This includes updating the regional groundwater model to better understand these conditions.

- Development of an updated water system plan – Camas is completing a Water System Plan Update (WSP) to be submitted to the Department of Health. The WSP will include changes to existing project and future plans.

The new deadline to fully develop your project is December 31, 2031. This is also the deadline to submit the enclosed Proof of Appropriation of Water form.

Please note that we expect you to follow all provisions on your permit and any underlying documentation until your use is certificated. Non-compliance may result in enforcement orders and/or penalties and may delay the certification of your water right permit.

Contact information

Please direct all questions about this letter and the enclosed Proof of Appropriation of Water form to:

Matthew Kogle
Staff Hydrogeologist – Permit Writer
Water Resources Program
Southwest Region Office

Phone: (360) 280-2983
Email: matthew.kogle@ecy.wa.gov

When you have fully developed your project, send the completed Proof of Appropriation of Water form to:

Department of Ecology – Southwest Region Office
Attn: Water Resources Program
P.O. Box 47775
Olympia, WA 98504-7775

Your right to appeal

You have a right to appeal this decision to the Pollution Control Hearings Board (PCHB) within 30 days of the date of receipt. The appeal process is governed by chapter 43.21B RCW and chapter 371-08 WAC. “Date of receipt” is defined in RCW 43.21B.001(2).

To appeal, you must do all of the following within 30 days of the date of receipt of this decision:

- File your notice of appeal and a copy of this decision with the PCHB (see filing information below). “Filing” means actual receipt by the PCHB during regular business hours as defined in WAC 371-08-305 and -335. “Notice of appeal” is defined in WAC 371-08-340.

- Serve a copy of your notice of appeal and this decision on the Department of Ecology by mail, in person, or by email (see addresses below).

You must also comply with other applicable requirements in chapter 43.21B RCW and chapter 371-08 WAC.

Filing an appeal

Filing with the PCHB
For the most current information regarding filing with the PCHB, visit: https://eluho.wa.gov/ or call: 360-664-9160.

Service on Ecology

Street Address:

Department of Ecology
Attn: Appeals Processing Desk
300 Desmond Drive SE
Lacey, WA 98503

Mailing Address:

Department of Ecology
Attn: Appeals Processing Desk
PO Box 47608
Olympia, WA 98504-7608

E-Mail Address:

ecologyappeals@ecy.wa.gov

More information

- **Pollution Control Hearings Board Website**
  https://eluho.wa.gov/
- **Chapter 43.21B RCW – Environmental Hearings Office – Pollution Control Hearings Board**
  http://apps.leg.wa.gov/RCW/default.aspx?cite=43.21B
- **Chapter 371-08 WAC – Practice And Procedure**
  http://apps.leg.wa.gov/WAC/default.aspx?cite=371-08
- **Chapter 34.05 RCW – Administrative Procedure Act**
  http://apps.leg.wa.gov/RCW/default.aspx?cite=34.05
- **Ecology's Laws, Rules & Rulemaking**
  https://www.ecology.wa.gov/About-us/How-we-operate/Laws-rules-rulemaking#ws

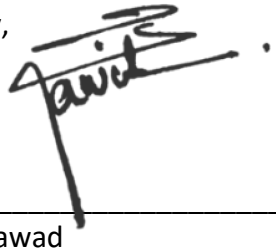
Americans with Disabilities Act information

Accommodation Requests

To request ADA accommodation including materials in a format for the visually impaired, call Ecology at 360-407-7668 or visit https://ecology.wa.gov/accessibility. People with impaired hearing may call Washington Relay Service at 711. People with speech disability may call TTY at 877-833-6341.

Signature

Sincerely,



Saboor Jawad
Section Manager
Water Resources Program
Southwest Region Office

Enclosures: **Proof of Appropriation of Water**
https://apps.ecology.wa.gov/publications/documents/ecy040126.pdf

cc: Burt Clothier, Strate Geoscience - burt@stratageosciences.com (email only)
City of Camas, Operations Center – publicworks@cityofcamas.us (email only)

Sent by Certified Mail: 9489 0090 0027 6340 7369 64

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Southwest Region Office
PO Box 47775, Olympia, WA 98504-7775 • 360-407-6300

May 12, 2026

City of Camas
Attn: Rob Charles, PE
1620 SE 8th Ave
Camas, WA 98607

Email: rcharles@cityofcamas.us

Re: Complete Construction Extension for Water Right No. G2-30146 & G2-30147

Dear City of Camas:

The Washington State Department of Ecology (Ecology) received your extension request to complete construction on your project. While Ecology's records indicate that construction has not started for these water right permits, further conversation with Camas indicated that test wells have been drilled under these water right permits. Furthermore, these water right permits are being exercised under non-additive quantities of water right permit G2-30756 within the Lower Washougal Well Field. Therefore, Ecology has determined that construction has begun for water right permits G2-30146 and G2-30147. This is your first request to extend the complete construction deadline.

Per RCW 90.03.320, we approve permit extensions for "good cause shown" and "as may be reasonably necessary, having due regard to the good faith of the applicant and the public interests affected." For the reason(s) below, your permit extension request is approved:

- Changes in the project, while the project scope remains consistent with the original intent of the water right application – While the test wells have drilled, they are not productive or sufficient. Production has been shifted to the Lower Washougal Well Field under the non-additive quantities of water right permit G2-30756.

- Unforeseen financial and engineering problems – With the detection of PFAS is Well 13, funding and planning delays have resulted in significate redirection of Camas's resources. This has caused delays in development.

- Demonstrated effort to attain additional environmental studies – Camas has completed extensive testing and analysis within the Lower Washougal Wellfield to have a better understanding of the relationship between wells (i.e. existing and future), wellfield yield,

hydrogeologic conditions and hydraulic continuity between surface water and groundwater. This includes updating the regional groundwater model to better understand these conditions.

- Development of an updated water system plan – Camas is completing a Water System Plan Update (WSP) to be submitted to the Department of Health. The WSP will include changes to existing project and future plans.

The new deadline to complete construction on your project is December 31, 2031. This is also the deadline to submit the enclosed Complete Construction Notice and Form 1 – Measuring Device Information.

As you develop your project, we expect you to follow all provisions on your permit and any underlying documentation. Non-compliance may result in enforcement orders and/or penalties and may delay the certification of your water right permit.

Contact information

Please direct all questions about this letter and the enclosed Complete Construction Notice and Form 1 – Measuring Device Information to:

Matthew Kogle
Staff Hydrogeologist – Permit Writer
Water Resources Program
Southwest Region Office

Phone: (360) 280-2983
Email: matthew.kogle@ecy.wa.gov

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You have a right to appeal this decision to the Pollution Control Hearings Board (PCHB) within 30 days of the date of receipt. The appeal process is governed by chapter 43.21B RCW and chapter 371-08 WAC. “Date of receipt” is defined in RCW 43.21B.001(2).

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- Serve a copy of your notice of appeal and this decision on the Department of Ecology by mail, in person, or by email (see addresses below).

You must also comply with other applicable requirements in chapter 43.21B RCW and chapter 371-08 WAC.

Filing an appeal

Filing with the PCHB

For the most current information regarding filing with the PCHB, visit: https://eluho.wa.gov/ or call: 360-664-9160.

Service on EcologyStreet Address:

Department of Ecology
Attn: Appeals Processing Desk
300 Desmond Drive SE
Lacey, WA 98503

Mailing Address:

Department of Ecology
Attn: Appeals Processing Desk
PO Box 47608
Olympia, WA 98504-7608

E-Mail Address:

ecologyappeals@ecy.wa.gov

More information

- **Pollution Control Hearings Board Website**
  https://eluho.wa.gov/
- **Chapter 43.21B RCW – Environmental Hearings Office – Pollution Control Hearings Board**
  http://apps.leg.wa.gov/RCW/default.aspx?cite=43.21B
- **Chapter 371-08 WAC – Practice And Procedure**
  http://apps.leg.wa.gov/WAC/default.aspx?cite=371-08
- **Chapter 34.05 RCW – Administrative Procedure Act**
  http://apps.leg.wa.gov/RCW/default.aspx?cite=34.05
- **Ecology's Laws, Rules & Rulemaking**
  https://www.ecology.wa.gov/About-us/How-we-operate/Laws-rules-rulemaking#ws

Americans with Disabilities Act information

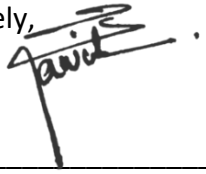
Accommodation Requests

To request ADA accommodation including materials in a format for the visually impaired, call Ecology at 360-407-7668 or visit https://ecology.wa.gov/accessibility. People with impaired

hearing may call Washington Relay Service at 711. People with speech disability may call TTY at 877-833-6341.

Signature

Sincerely,



Saboor Jawad
Section Manager
Water Resources Program
Southwest Region Office

Enclosures: **Complete Construction Notice**
https://apps.ecology.wa.gov/publications/documents/ecy04030b.pdf

Measuring Device Information form
https://apps.ecology.wa.gov/publications/documents/ecy070170.pdf

cc: Burt Clothier, Strate Geoscience - burt@stratageosciences.com (email only)
City of Camas, Operations Center – publicworks@cityofcamas.us (email only)

Sent by Certified Mail: 9489 0090 0027 6340 7369 40

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Southwest Region Office
PO Box 47775, Olympia, WA 98504-7775 • 360-407-6300

May 12, 2026

City of Camas
Attn: Rob Charles, PE
1620 SE 8th Ave
Camas, WA 98607

Email: rcharles@cityofcamas.us

Re: Complete Construction Extension for Water Right No. G2-30756

Dear City of Camas:

The Washington State Department of Ecology (Ecology) received your extension request to complete construction on your project from December 31, 2026 to December 31, 2031. This is your first request to extend the complete construction deadline.

Per RCW 90.03.320, we approve permit extensions for "good cause shown" and "as may be reasonably necessary, having due regard to the good faith of the applicant and the public interests affected." For the reason(s) below, your permit extension request is approved:

- Unforeseen financial and engineering problems – With the detection of PFAS is Well 13, funding and planning delays have resulted in significate redirection of Camas's resources. This has caused delays in development.

- Demonstrated effort to attain additional environmental studies – Camas has completed extensive testing and analysis within the Lower Washougal Wellfield to have a better understanding of the relationship between wells (i.e. existing and future), wellfield yield, hydrogeologic conditions, and hydraulic continuity between surface water and groundwater. This includes updating the regional groundwater model to better understand these conditions.

- Development of an updated water system plan – Camas is completing a Water System Plan Update (WSP) to be submitted to the Department of Health. The WSP will include changes to existing project and future plans.

The new deadline to complete construction on your project is December 31, 2031. This is also the deadline to submit the enclosed Complete Construction Notice and Form 1 – Measuring Device Information.

As you develop your project, we expect you to follow all provisions on your permit and any underlying documentation. Non-compliance may result in enforcement orders and/or penalties and may delay the certification of your water right permit.

Contact information

Please direct all questions about this letter and the enclosed Complete Construction Notice and Form 1 – Measuring Device Information to:

Matthew Kogle
Staff Hydrogeologist – Permit Writer
Water Resources Program
Southwest Region Office

Phone: (360) 280-2983
Email: matthew.kogle@ecy.wa.gov

Your right to appeal

You have a right to appeal this decision to the Pollution Control Hearings Board (PCHB) within 30 days of the date of receipt. The appeal process is governed by chapter 43.21B RCW and chapter 371-08 WAC. “Date of receipt” is defined in RCW 43.21B.001(2).

To appeal, you must do all of the following within 30 days of the date of receipt of this decision:

- File your notice of appeal and a copy of this decision with the PCHB (see filing information below). “Filing” means actual receipt by the PCHB during regular business hours as defined in WAC 371-08-305 and -335. “Notice of appeal” is defined in WAC 371-08-340.
- Serve a copy of your notice of appeal and this decision on the Department of Ecology by mail, in person, or by email (see addresses below).

You must also comply with other applicable requirements in chapter 43.21B RCW and chapter 371-08 WAC.

Filing an appeal

Filing with the PCHB
For the most current information regarding filing with the PCHB, visit: https://eluho.wa.gov/ or call: 360-664-9160.

Service on EcologyStreet Address:

Department of Ecology
Attn: Appeals Processing Desk
300 Desmond Drive SE
Lacey, WA 98503

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ecologyappeals@ecy.wa.gov

More information

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- **Chapter 371-08 WAC – Practice And Procedure**
  http://apps.leg.wa.gov/WAC/default.aspx?cite=371-08
- **Chapter 34.05 RCW – Administrative Procedure Act**
  http://apps.leg.wa.gov/RCW/default.aspx?cite=34.05
- **Ecology's Laws, Rules & Rulemaking**
  https://www.ecology.wa.gov/About-us/How-we-operate/Laws-rules-rulemaking#ws

Americans with Disabilities Act information

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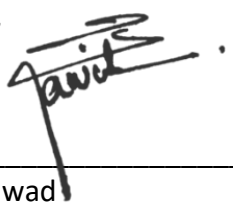
Signature

Sincerely,



Saboor Jawad
Section Manager
Water Resources Program
Southwest Region Office

Enclosures: **Complete Construction Notice**
https://apps.ecology.wa.gov/publications/documents/ecy04030b.pdf

Measuring Device Information form
https://apps.ecology.wa.gov/publications/documents/ecy070170.pdf

cc: Burt Clothier, Strate Geoscience - burt@stratageosciences.com (email only)
City of Camas, Operations Center – publicworks@cityofcamas.us (email only)

Sent by Certified Mail: 9489 0090 0027 6340 7369 57

APPENDIX T

WATER RIGHTS SELF-ASSESSMENT

Water Right Self-Assessment Form for Water System Plans

331-372 • 3/19/2026

All water right permits, claims, and certificates must be evaluated in a water right self-assessment for all sources used to supply the water system. The self-assessment is used to compare the parameters and other limitations of existing water rights against current and forecasted water production, as described in your water system plan, to determine whether the rights are adequate to serve your system's current and future water needs. This evaluation is for planning purposes and **does not constitute an official tentative determination of extent and validity** of water right permits, certificates, and claims. Tentative determinations of extent and validity occur when Ecology makes certain water right decisions, such as on water right change applications.

You must account for **all** sources of supply and total quantities of water withdrawn from the source. If you purchase water from another purveyor through a non-emergency intertie, you must complete the INTERTIES section of the self-assessment. All parts of the form must be filled out for each source. If information is missing it could result in delays of the water system plan approval process.

A Note on Permit-Exempt Wells

If you're seeking DOH approval of a new Group A or Group B water system using a permit-exempt well, you must complete the self-assessment, although certain fields will not apply. Talk to your DOH regional planner about using the Water Right Self-Assessment form for a Small Water System Management Program instead of this version.

Local governments must ensure that an adequate potable water supply is available from the permit-exempt well before issuing a building permit. Before developing a permit-exempt well, check with your local authorities on their criteria for establishing an adequate potable water supply for your planned public water system.

Water Right Parameters

Below is a brief description of the parameters associated with a typical water right. For the self-assessment, you only need to describe the last two bulleted items if they apply to your water rights.

- **Source Type**—refers to whether the source is surface water or groundwater.
- **Source Location**—this refers to the location of points of groundwater withdrawal or surface water diversion for each right.
- **Purpose of Use**—refers to the type of use, such as municipal water supply, community domestic, industrial or agricultural purposes.
- **Place of Use**—describes where water can be put to beneficial use under the right. Under the 2003 Municipal Water Law, RCW 90.03.386, the place of use for a water right held for municipal water supply purposes may be the system's service area as identified in an **approved** water system plan or small water system management program. Attach written

description and/or a map for water rights original place of use if service area is located in Mason, Thurston, Pierce, and Kitsap counties. To see the original place of use of a water right, use Ecology's Water Right Tracking System to look up the water right document using Ecology's Water Right Tracking System website.

  - See Ecology Policy 2030 for information on how Ecology administers the Municipal Water Law.

- **Period of Use**—refers to time-of-year limitations in which the water right may be put to use. If any water right has a time-of-year limitation, please include this information in the INTERRUPTIBLE WATER RIGHTS section.
- **Provisions or Limiting Conditions**—refers to any provisions or conditions placed on the water right. If a water right has a limiting condition or other provision, such as a collection and reporting requirement, other than a time-of year limitation, include this information in the ADDITIONAL COMMENTS section at the bottom of the self-assessment and in the water system plan narrative.

See Ecology Policy 20-11-065 for more information on water right terminology. If you have questions about your water rights, please contact the Ecology regional office in your area.

Completing the Water Right Self-Assessment Form

The self-assessment is a Word document to allow users to make changes or to expand the document. You may use another format, if preferred, as long as all required information is included. Below is a description of all fields and how to complete them. This form is divided into four different sections. Each section is described in the headings below.

See the column identifiers (A, B, C, etc) at the bottom of each column for guidance in completing the necessary calculations.

Water Right Permit, Certificate, or Claim Number: This number is assigned by Ecology when a permit application is filed. It's listed at the top of the permit or certificate. For water right claims, this is the registration number stamped in the lower left hand corner of the claim form.

WFI Source #: Identify the individual sources (e.g. well #1, well #2) as defined on the DOH Water Facilities Inventory form. If a **water right** is associated with multiple sources, list all sources in the same row in this column. If a **source** is associated with multiple water rights, identify each water right on a separate row.

Point of Withdrawal or Diversion Location: For wells, identify the well tag #. For wells and diversions please list the quarter-quarter section; township, range, or other more specific location identification information. If there are multiple points of withdrawal or diversion for single water right, list them all on the same line for that water right (do not list the water right on multiple lines with each unique point of withdrawal or diversion).

If you have any source(s) that is not currently being used (categorized as standby, back-up, or emergency), and the source has an associated water right that is not listed in column #1, please include the source and water right information in the ADDITIONAL COMMENTS section. This will identify that the source is still intended for a beneficial use under RCW 90.03.015(4). See Ecology Policy 20-11-065.

EXISTING WATER RIGHTS SECTION *(olive green color, top section)*

This section refers to existing water rights. It does not include any water right applications that have been submitted to Ecology.

Primary Qi (Instantaneous Quantity): This is also known as instantaneous flow rate. It's the amount of water allowed to be taken under the right from the source during a period of peak operation. For surface water, this is generally expressed in terms of cubic feet per second (cfs). For groundwater, this is generally expressed in terms of gallons per minute (gpm). One cfs equals 448.8 gpm. Please indicate the units of measurement you are using for each source. If there are situations where the flow rate will be limited (e.g. limitations established on the source when other sources are utilized), please note them in the ADDITIONAL COMMENTS section in the form and in the WSP narrative.

Non-Additive Qi: This term was formally known as "supplemental." Your water rights may use the old terminology. See Ecology Policy 20-11-065 for more information. Not all water rights have non-additive quantities. If a water right has non-additive Qi quantities, include the non-additive quantity in this field. This is generally listed in the "quantity, type of use, period of use" section on both permits and certificates. *Non-additive quantities should not be included in the primary Qi totals.*

Primary Qa (Annual Quantity): This is the amount of water that can be taken from the source under the right on an annual basis. This is different than the consumptive use limitation listed on the water right, if applicable (see WAC 173-500-050 and Ecology POL-1020 for further definition of consumptive use). It's usually expressed in terms of acre-feet. An acre-foot is the amount of water necessary to submerge an acre of land to a depth of one foot. One acre-foot equals 43,560 cubic feet or 325,851 gallons of water. If a Qa is not listed on the water right please write "N/A".

Non-Additive Qa: This term was formerly known as "supplemental." Your water rights may use the old terminology. See Ecology Policy 20-11-065 for more information. Not all water rights have non-additive quantities. If a water right has non-additive Qa quantities, include the non-additive quantity in this field. This is generally listed in the "quantity, type of use, period of use" section on both permits and certificates. *Non-additive quantities should not be included in the primary Qa totals.*

CURRENT SOURCE PRODUCTION SECTION *(light green color, top section)*

This section refers to how much water is withdrawn from the source under each water right for the most recent full calendar year. You will need to determine any excess or deficiency for each water right after calculating how much water was withdrawn compared to how much water is allowed under each water right. If demand has decreased over past years, you may wish to include historic maximum production information in the ADDITIONAL COMMENTS section. This will provide a more complete picture of the use of your water rights.

Use the water use data and demand projections from your water system plan to define current and projected water needs. You can determine if you'll need additional water rights based on the comparison of existing water rights, current water production, and projected 10- and 20-year needs.

Total Qi (Instantaneous Quantity): This refers to the total maximum instantaneous flow rate withdrawn from the source under each water right during the most recent calendar year. For surface water, this is expressed in terms of cubic feet per second (cfs). For groundwater, this is expressed in terms of gallons per minute (gpm). One cfs equals 448.8 gpm.

Current Excess or Deficiency (Qi): Please calculate the excess or deficiency for each water right after comparing the total amount withdrawn against each water right. Please use parentheses for deficient amounts.

Total Qa (Annual Quantity): This refers to the total volume of water withdrawn from each source under each water right during the most recent calendar year. It's usually expressed in acre-feet.

Current Excess or Deficiency (Qa): Please calculate the excess or deficiency for each water right after comparing the total amount withdrawn against each water right. Please use parentheses for deficient amounts.

10-YEAR FORECASTED SOURCE PRODUCTION SECTION *(light blue color, top section)*

This section refers to how much water you project to withdraw from each source in ten years as determined in your water system plan. Please complete this section in the same manner (using the same units of measurement) as the current source production section using your 10-year forecasted amounts.

20-YEAR FORECASTED SOURCE PRODUCTION SECTION *(darker blue color, top section)*

This section refers to how much water you project to withdraw from each source in twenty years as determined in your water system plan. Please complete this section in the same manner (using the same units of measurement) as the current source production section using your 20-year forecasted amounts. If you are unable to provide 20-year forecasts for each source, you may choose to include the combined 20-year total at the bottom.

PENDING WATER RIGHTS SECTION *(second section of form)*

Please complete this section for any water right applications that have been submitted to Ecology. Please include the application number, whether it's a new or a change application, the date submitted, and the total quantities requested.

INTERTIES SECTION *(third section of form)*

This section must be completed by purveyors who purchase any amount of wholesale water. If your system sells water to another public water system, include the quantity sold in the CURRENT SOURCE PRODUCTION section.

Purchasers of wholesale water must account for all water obtained through the intertie for non-emergency supply purposes. This is to ensure that all sources of supply are considered when evaluating whether new water rights are needed within 20 years.

Please identify the maximum quantity of water, expressed in the same manner as the above sections, allowed under each intertie contract. If there are limiting conditions or temporary agreements that effect the long-term use of the intertie, you must account for such limiting conditions when evaluating the current and forecasted water supply needs in your water system plan.

Finally, purchasers of wholesale water are responsible for ensuring that the underlying water right (held by the purveyor selling water) are adequate for such use. You should confirm that the selling system has accounted for the wholesale area in their water system plan to ensure that the water right authorizes the distribution of water through the intertie.

INTERRUPTIBLE WATER RIGHTS SECTION *(bottom section of form)*

This section refers to water rights that have an annual time-of-year interruption. Please complete this section for any water right listed in the above fields that has a time-of-year interruption. Please include the water right number, describe the limitation, and the time period of interruption. Purveyors with interruptible rights should develop a water shortage response plan as part of their water system plan to describe how demand will be met during periods of interruption through aggressive demand-side conservation, fixing leaks or other means.

ADDITIONAL COMMENTS SECTION *(bottom section of form)*

If the system has any source that is not currently being used on a regular basis (such a source may be categorized as stand-by, back-up, emergency), you should identify the source in this section if the source has an associated water right that is not listed in the above sections. The purpose is to identify that such water rights are still intended for a future beneficial use as required under RCW 90.03.015(4). See Page 2, Item 9 (b) in Ecology Policy 2030. For these water rights, please briefly describe the future intended use of the source and when you expect to utilize the water right. This does not refer to sources categorized as seasonal sources.

You should also include any other comments in this section that will explain aspects of your water right portfolio that are not identified above.

Washington State Department of HEALTH

To request this document in another format, call 1-800-525-0127. Deaf or hard of hearing customers, please call 711 (Washington Relay) or email doh.information@doh.wa.gov. If in need of translation services, call 1-800-525-0127.

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	Point of Withdrawal or Diversion Location Well tag #; quarter-quarter section; and township, range, section	Existing Water Rights Qi= Instantaneous Flow Rate Allowed (GPM or CFS) 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
C-712 CS2-SWC 712	S01: Boulder Creek		1,120 (2.5 cfs)[1]		977													
C-711 CS2-SWC 711	S02: Jones Creek		450 (1 cfs)[1]		393													
G 6636-A G2-*09325C	SO6: Well 5		600		920[5]		675	-75	305	615								
G 6635-A G2-*09325C	S07: Well 6		1,500		2,400[5]		1,200	300	421	1,979								
G2-00501	S08: Well 7		1,000		530[6]		950	50	606	-76								
G2-24400	S09: Well 8		900		530[6]		1,250	-350	511	19								
G2-27384	SO6: Well 9		650			210	575	75	196									
G2-CV1-2P159	S15: Well 10		900		320		900	0	450	-120								
G2-CV1-2P160	S14: Well 12		1,200		230[6]		1,000	200	811	-581								
C-85-A G2-*0004C	S13: Well 11		900		118		1,000	-100	498	-380								
G2-GWC4079 G2-*05130C	S16: Well 13		1,325		1,208[6]		1,350	-25	855	353								
G2-30144	Lower Washougal Wellfield		500 (At Well 8)		2,150 (All 8 wells)													
G2-30145	S17: Well 14		1,000		880		850	150	556	334								
G2-30146	Parkers Landing		1,000		880													
G2-30147	Treatment Plant Well		1,000		880													
G2-30756	Umbrella Wellfield		6,700		11,090 (All 8 wells)													
	TOTALS =		14,045[2] 12,475[3]		11,090[2]		9,750	2,725	5,210	5,880	10,490	1,985	8,070	3,020	14,080	-1,605	10,910	180
Column Identifiers for Calculations:			A		B		C	=A-C	D	=B-D	E	=A-E	F	=B-F	G	=A-G	H	=B-H

PENDING WATER RIGHT APPLICATIONS: Identify any water right applications that have been submitted to Ecology.

Application Number	New or Change Application?	Date Submitted	Quantities Requested			
			Primary Qi	Non-Additive Qi	Primary Qa	Non-Additive Qa
G2-30528	New		17,213 gpm		13,555 AFY	

INTERTIES: Systems receiving wholesale water complete this section. Wholesaling systems must include water sold through intertie in the current and forecasted source production columns above.

Name of Wholesaling System Providing Water	Quantities Allowed In Contract		Expiration Date of Contract	Currently Purchased Current quantity purchased through intertie				10-Year Forecasted Purchase Forecasted quantity purchased through intertie				20-Year Forecasted Purchase Forecasted quantity purchased through intertie			
	Maximum Qi Instantaneous Flow Rate	Maximum Qa Annual Volume		Maximum Qi Instantaneous Flow Rate	Current Excess or (Deficiency) Qi	Maximum Qa Annual Volume	Current Excess or (Deficiency) Qa	Maximum Qi 10-Year Forecast	Future Excess or (Deficiency) Qi	Maximum Qa 10-Year Forecast	Future Excess or (Deficiency) Qa	Maximum Qi 20-Year Forecast	Future Excess or (Deficiency) Qi	Maximum Qa 20-Year Forecast	Future Excess or (Deficiency) Qa
1															
2															
3															
TOTALS =															
Column Identifiers for Calculations:	A	B		C	=A-C	D	=B-D	E	=A-E	F	=B-F	G	=A-G	H	=B-H

INTERRUPTIBLE WATER RIGHTS: Identify limitations on any water rights listed above that are interruptible.

Water Right #	Conditions of Interruption	Time Period of Interruption
C-712 CS2-SWC 712	Surface water diversion unavailable during this period to maintain instream flow.	May 15th – October 31st
C-711 CS2-SWC 711	Surface water diversion unavailable during this period to maintain instream flow.	May 15th – October 31st
3		

ADDITIONAL COMMENTS:

[1] S01 Boulder Creek and S02 Jones Creek surface water diversions cease between May 15th and October 31st of each year as required by G2-30144.

[2] Due to permit and certificate restrictions, the total Qi and Qa do not equal the sum of quantities for each column.

[3] Total Qi available between May 15th and October 31st comes from ground water supplies only and is equal to total Qi of 14,045 gpm minus 1,570 gpm of surface water rights from Boulder Creek and Jones Creek.

[4] Installation of one future well in the LWWF is included under this permit.

[5] The Permit and Report of Examination preceding this certificate limited water rights to "the total quantity withdrawn or diverted from all sources is not to exceed 3,300 AFY.

[6] The Permit and Report of Examination preceding this certificate limited water rights to "the total quantity withdrawn or diverted from all sources is not to exceed 5,750 AFY.

APPENDIX U

WELLHEAD PROTECTION PLAN

City of Camas
Wellhead Protection Plan Update

DRAFT

July 2026

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DRAFT

CITY OF CAMAS
WELLHEAD PROTECTION PLAN UPDATE

DRAFT

Prepared for:

City of Camas
616 NE Fourth Ave
Camas, Washington 98607
360-817-1563
www.cityofcamas.us

Prepared by:

Strata Geosciences, LLC
851 Poplar Place S
Seattle, Washington 98144
206.329.0138
www.stratageosciences.com

July 2026
25-004
Camas WHP plan (July2026) draft.docx

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DRAFT

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SIGNATURE

This report, and Strata Geosciences' work contributing to this report, were reviewed by the undersigned and approved for release.

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1.0 INTRODUCTION

Strata Geosciences, LLC (Strata) has prepared this Wellhead Protection Plan (WHPP) update for the City of Camas (City) to summarize the hydrogeology, wellhead protection area (WHPA) delineations, and contaminant risks to groundwater supplies. Information presented in this report supports an update of the City's Water System Plan (WSP) currently being prepared for the City by Carollo Engineers. The purpose of this report is to help the City better manage its groundwater supply and to better understand the contaminant risks posed to these sources. Elements of the report were developed following the Washington State Department of Health (DOH) guidelines for Wellhead Protection Programs (DOH, 2017).

The study area for this investigation focuses on the WHPAs for the City's nine shallow supply wells that lie in close proximity to the lower Washougal River (Figure 1-1). This includes the Lower Washougal Wellfield (LWWF), comprised of eight wells to the south of the railroad track, and Well 13 on the north bank of the Washougal River. The City also operates one deeper supply well (Well 9) in the Lacamas Lake area to the northwest of downtown Camas that is not included in the study area. This well is used primarily for supply during peak demand. Well construction and land use conditions limit the susceptibility and vulnerability of this source; therefore, it was not reviewed as part of this investigation.

1.1 REPORT ORGANIZATION

This report is organized into seven sections:

Section 1: Introduction. This section contains background information on the report.

Section 2: Hydrogeologic Framework. This section presents the regional and local hydrogeologic features that are pertinent to the City's groundwater supplies. It describes the deposits that form aquifers and aquitards and describes the movement of groundwater through these deposits.

Section 3: Wellhead Protection Area Delineations. This section discusses the methods used to delineate the WHPAs and presents the results of the analysis. Time-related capture zones are presented for the Lower Washougal Wellfield area.

Section 4: Contaminant Source Inventory. This section presents an inventory of confirmed and potential sources of contamination, particularly those that lie within the wellhead capture zones. An evaluation of risks associated with these sources is also presented.

Section 5: Wellhead Management Strategies and Implementation. This section presents options for management strategies to provide safeguards against contamination of groundwater sources.

Section 6: Spill and Incident Response Planning. This section presents the local and regional agencies responsible for emergency incident/spill responses.

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2.0 HYDROGEOLOGIC FRAMEWORK

The hydrogeologic setting of the Camas area has been extensively studied by Strata staff under our predecessor companies Pacific Groundwater Group (PGG) and Mott MacDonald. Previous findings are summarized below.

2.1 GEOLOGY AND HYDROGEOLOGY

The Cities of Camas and Washougal are located near the eastern edge of the Portland Basin near the Cascade foothills. The bottom of the basin is formed of volcanic rocks that rise to the east to form the Cascade Range. Sediments that fill the Portland Basin are over 1,700 feet thick in the middle of the basin, around the City of Vancouver, but dip upwards and thin toward the Camas/Washougal area and are absent in the northern portion of the study area where bedrock is exposed. These sediments include Recent Alluvium and Pleistocene Alluvial Deposits at the surface, which are underlain by deposits of the Troutdale formation.

2.1.1 Recent and Pleistocene Alluvial Deposits

Alluvial deposits are sediments laid down by flowing streams (including channel deposits, overbank deposits, terraces, and deltas). Alluvial deposits exposed on the land surface within the study area include recent alluvium and Pleistocene (ice-age) cataclysmic flood deposits. Recent Alluvium was laid down by the Columbia and Washougal Rivers, with sedimentary textures ranging from silt to sand to gravel (including mixtures of multiple textures). Where exposed on the land surface, recent alluvium overlies the (older) Pleistocene Alluvial Deposits, and the two are mapped as a combined unit on Figure 1-1.

During the late Pleistocene, the ancestral Columbia River deposited a great deltaic fan emanating to the west from the mouth of the Gorge (near the eastern Clark County boundary) during a series of catastrophic events known as the Missoula floods. The resulting Pleistocene Alluvial Deposits crop out throughout much of the area that lies between the Washougal and Columbia Rivers (Figure 1-1). These deposits are approximately 100 feet thick in the vicinity of the City's LWWF. The sediments can reach thicknesses of up to 200 feet under the Columbia River channel. Sediment textures are typically described by drillers as boulders, cobbles, sand and gravel with some limited cemented zones and silty zones (potentially associated with paleosols).

2.1.2 Troutdale Formation

The Troutdale formation underlies the Pleistocene Alluvial Deposits in much of Clark County. The formation is exposed on the land surface in most of the northeastern and northwestern portions of the City (Figure 1-1) and underlies alluvial deposits in the southern portions. This formation is absent where older rocks are exposed at the surface and is inferred to be absent in the western portions of the study area where bedrock occurs at shallow depths. It is comprised of unconsolidated and semi-consolidated clay, silt, sand, and gravel. Throughout most of Clark County, the Troutdale formation contains three coarse-grained units that are separated by finer-grained confining units. The coarse units are:

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- The Upper Troutdale unit – variably cemented gravel in a matrix of sand and silt;
- The Lower Troutdale unit – relatively discontinuous occurrence of fine sand; and,
- The Sand and Gravel Aquifer (SGA) – a deeper sand and gravel unit.

Troutdale deposits underlying the combined floodplains of the Washougal and Columbia Rivers are difficult to differentiate. In this location, the Troutdale deposits are comprised of variably cemented, variably silty sands and gravels. Because this area is so close to the course of the ancestral Columbia River and the mouth of the Gorge, all of the Troutdale sediments deposited by the river are expected to be relatively coarse textured. This makes the upper and lower units difficult to distinguish in this area. Therefore, no attempt is made to distinguish between the various units of the Troutdale formation.

2.1.3 Older Rocks (Bedrock)

Older bedrock crops out in the north-central portion of the study area and in localized areas along the western portion of the study area (Figure 1-1). The older rocks range from Miocene to Eocene age. They are primarily igneous in origin and include andesite, basalt, granodiorite, pyroclastics (breccias, tuff, and agglomerate), conglomerate, and shale. The rocks are generally hard and compact because of Miocene deformation. The older rocks have relatively low permeability and are not considered an import source of supply for municipal purposes.

2.2 REGIONAL AQUIFERS

Two principal aquifers occur in the vicinity of the City: the Pleistocene Alluvial Aquifer (PAA) and the SGA. The Upper Troutdale Aquifer (UTA) and Lower Troutdale Aquifer (LTA) are also present in the Camas area but are not currently utilized by City wells. The four aquifers are discussed in order of occurrence below.

2.2.1 Pleistocene Alluvial Aquifer

The PAA is a shallow water-table aquifer that occurs within the Pleistocene Alluvial Deposits. The aquifer is very permeable and serves as a source of supply to most of the production wells in the lowland (i.e. LWWF vicinity) including industrial wells owned by Georgia Pacific and municipal wells owned by the Cities of Camas and Washougal. Groundwater in the PAA in the vicinity of the LWWF area occurs under unconfined conditions. The aquifer is recharged by local infiltration of precipitation, and induced recharge from the incised Columbia and Washougal rivers. Due to its limited geographic extent, limited saturated thickness, and susceptibility to contamination introduced at ground surface, the PAA is not considered an important water source for the purposes of municipal water supply in the upland portion of the Camas area (i.e. north of Prune Hill and west of Lacamas Lake).

The capacity of lowland wells completed in the PAA has been historically limited by its saturated thickness and the amount of available drawdown; however, recently this limitation is reducing due to water level rise associated with reduced Georgia Pacific pumping. Well capacities typically exceed 1,000 gallons per minute (gpm) and specific capacities (the ratio of pumping rate to pumping

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drawdown) typically range between 250 and 500 gallons per minute per foot of drawdown (gpm/ft). Testing at the City's wellfield indicates a transmissivity of approximately 1,000,000 gallons per day per foot of drawdown (gpd/ft) and a storage coefficient of about 0.05 (dimensionless). Previous PGG studies indicate that aquifer productivity may decline in an easterly direction. Specific capacity at the City of Washougal's Hathaway Wellfield (located approximately 2.5 miles to the east) ranges between about 50 to 65 gpm/ft, or about 10 to 20 percent of the values observed near the City's LWWF.

2.2.2 Upper Troutdale Aquifer

The UTA is the uppermost, regionally occurring aquifer in the Camas upland vicinity. The UTA is typically composed of a heterogeneous distribution of variably cemented sand and gravel. Much of the water-bearing material encountered in test wells drilled on the west side of Lacamas Lake is composed of fine to medium sand. Where the PAA is largely absent, the UTA is more vulnerable to contamination at the land surface and is likely in hydraulic continuity with Lacamas Lake. The UTA is unconfined where it occurs close to the land surface; however, due to cementation within the aquifer, it is often considered to be semi-confined.

On the regional scale, productive wells completed in the UTA often indicate moderate transmissivity in the early-time portions of pumping tests (e.g., during the first four hours) suggestive of sustainable pumping rates on the order of 400 to 500 gpm. However, in pumping tests that are conducted for longer periods, later time data indicate steeper rates of drawdown consistent with significantly lower transmissivity. This has been observed in test data for Camas Well 9 and in other wells in the Lacamas basin. This consistent pattern suggests that the UTA consists of moderate transmissivity lenses, hosted within a lower transmissivity matrix. The lower transmissivity of the bulk aquifer matrix, combined with limited saturated thickness in the Well 17 vicinity, limits expected well yields.

The UTA is not identified in the lowland in sediments underlying the PAA. Instead, underlying sediments are interpreted to represent the SGA (described below).

2.2.3 Lower Troutdale Aquifer

Within the Portland Basin, the LTA is typically a relatively homogeneous sandstone. However, in the Camas area, the LTA is a more heterogeneous mix of sand and gravel, similar to the UTA. This coarser facies is associated with the higher-energy depositional environment of the Columbia River that occurs in proximity to the Columbia River Gorge. In the uplands west of Lacamas Lake, the LTA includes both a coarse facies and sandstone. Materials encountered in the lower portions of the City's Well 17, located west of Lacamas Lake, were interpreted to represent the LTA. The LTA is not identified in the lowland in sediments underlying the PAA. Instead, underlying sediments are interpreted as representing the SGA (described below).

Hydraulic properties of the LTA are expected to be similar to the UTA, however with more available drawdown. Some production wells completed in the sandstone unit within the LTA (e.g. the Vanport Manufacturing Well) are able to produce over 400 gpm, presumably due to transmissivity associated with heavy fracturing of the sandstone.

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2.2.4 Sand and Gravel Aquifer

The SGA occurs within the Troutdale formation and is the next significant aquifer underlying the PAA in the Camas lowland area. The SGA functions as a confined aquifer due to the cemented and silty zones within the Troutdale formation. The aquifer has not been extensively developed for supply in the vicinity of the City but is an important source of supply within other portions of the county. Although specific capacities for SGA wells are considerably lower than the specific capacities of the PAA wells, SGA supply wells can have substantially larger amounts of available drawdown such that even wells with moderately low specific capacities (e.g., 5 gpm/ft) can achieve production capacities in excess of 500 gpm.

2.3 AQUIFER SUSCEPTIBILITY AND VULNERABILITY

The sensitivity of the City's groundwater sources to potential contamination was evaluated by assessing the relative susceptibility and vulnerability of the LWWF. Aquifer susceptibility refers to the estimated ease of contaminant transport from the land surface to the aquifer. Vulnerability accounts for the potential of contaminant releases at the land surface.

Some of the primary factors influencing aquifer susceptibility are the thickness and permeability of the sediments overlying the aquifer. Shallow aquifers are typically more susceptible to surficial contaminants than deeper aquifers. Evaluation of recent water level data from the LWWF supply wells shows typical depths to groundwater in the aquifer as shallow as 20 feet below land surface (Mott MacDonald, 2024). Aquifers overlain by highly permeable sediments such as sand and gravel are also at higher risk than aquifers overlain by lower permeability sediments such as silt or clay. In the vicinity of the LWWF, coarse grained soils typically extend from ground surface to the water table. While some fine-grained or low-permeability zones are noted above the shallow water table in drilling logs, in many cases they are absent in the logs of neighboring wells. Therefore, no laterally extensive low permeability layers appear to exist between land surface and the underlying PAA. The combination of a shallow depth to water and the relatively high permeability of the overlying sediments indicate the PAA has relatively high susceptibility to contamination.

Several natural mechanisms exist for attenuation of pollutant loading to the alluvial aquifer. While these mechanisms are probably benefiting groundwater quality under current conditions, they do not reduce the aquifer's susceptibility rating. Percolation of recharge through the unsaturated zone (from the land surface to the water table) supports some reduction of selected contaminants via: (1) adsorption to particulates, oxides, and organic carbon in surficial soils; (2) precipitation in aerated zones; and (3) biodegradation. However, the course texture of the sediments and general lack of organic matter suggests that the unsaturated zone offers minor contaminant attenuation relative to more silty, organic soils. Dilution via mixing with uncontaminated recharge in the unsaturated zone and the alluvial aquifer also serves to reduce contaminant concentrations. Because it is nearly certain that some contaminant loading occurs at the land surface (e.g., from known contaminated sites, urban runoff and septic systems), the fact that historic drinking water quality monitoring has detected minimal contamination at or above National Primary Drinking Water Regulations (NPDWR) criteria (Section 4.6) supports the value of these two processes. However, lack of contaminant detection in the City's wells does not mean that contamination is not reaching the water table in adjacent areas, as evidenced by the detections of per- and polyfluoroalkyl substances (PFAS) in Camas and

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Washougal source wells. It is important to understand that these natural attenuation processes are not likely to offer sufficient protection against a significant contaminant spill or release at the land surface, particularly for contaminants with maximum contaminant levels (MCLs) at the part-per-trillion (ppt; nanograms per liter [ng/L]) level and minimal natural attenuation (e.g., PFAS).

Aquifer vulnerability is typically expressed as a risk factor, calculated by combining the aquifer susceptibility discussed above, with an evaluation of the availability of contaminants at land surface and the likelihood of a contaminant release. In general, aquifer susceptibility is a function of stratigraphy and hydrogeology and cannot be substantially modified. The potential for contaminant release on the other hand is controllable and can be reduced in areas where susceptible aquifers are utilized as a major source of potable water. One of the primary purposes of a water system's WHPP is to evaluate the susceptibility of the systems aquifer(s), and the potential sources of contamination within the systems capture zones. Additional attention to potential contamination sources is recommended within the capture zones of high susceptibility aquifers, to reduce the likelihood of a contaminant release. This is especially true for potential contaminant sources within the shorter duration capture zones, such as the 1-year capture zone shown in Figure 2-1. In the case of Camas, the PAA should be considered highly vulnerable to potential contamination. While active, confirmed sources of groundwater contamination are limited, potential sources of contamination are discussed in Sections 4.4 and 4.5.

3.0 WELLHEAD PROTECTION AREA DELINEATIONS

The following sections describe the model used to delineate the City's WHPAs and capture zone analysis.

3.1 WHPA MODEL

The capture zone for the LWWF was estimated using the groundwater flow model MODFLOW, a finite difference numerical model originally developed by the U.S. Geologic Survey (McDonald and Harbaugh, 1988). A capture zone is the area that supplies groundwater recharge to a pumping well or wellfield. In natural systems, capture zones are not circular but elongated, with most of the capture occurring from areas that lie hydraulically up-gradient of the well. Each capture zone has a stagnation point, the furthermost point of capture down-gradient of the well. A time-related capture zone is the area in the aquifer that supplies groundwater recharge to a pumping well within a specified time period. Time-related capture zones provide a basis for developing monitoring plans, land-use inventories, and data collection plans. They are used in conjunction with the results of the aquifer vulnerability assessment.

The groundwater flow model developed for the Lower Washougal and Columbia River lowlands depicts the two major aquifers in the study area (PAA and SGA), the occurrence of bedrock, the Columbia and Washougal rivers, recharge from precipitation, and groundwater inflow from areas outside the model domain (PGG, 2004; 2007; 2011). The model simulates three-dimensional flow in its two layers (one for each aquifer). The model was calibrated to observe summer drawdowns in the City's Washougal Wellfield vicinity, summer seepage losses from the Washougal River, and groundwater level responses to tidal fluctuations and runoff events in the Columbia River.

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The calibrated model was used to perform predictive simulations which included evaluation of capture zones for the LWWF. The simulations assumed that the City would exercise all of their water rights and operation of the two proposed future wells (Treatment Plant and Parkers Landing)[1]. In addition, a high-end pumping was assumed for the Georgia Pacific wellfield (37.5 million gallons per day [mgd] based on 2016 information). This assumption provides for a fairly conservative assessment of the capture zone extent. Revision of these model assumptions is currently underway as part the Well 13 project with Carollo and may provide for an updated WHPA delineation later in 2026.

3.2 CAPTURE ZONE ANALYSIS

Estimated capture zones for 6-month, 1-year, and 5-year times of travel for the LWWF area, and the estimated capture zone for a 6-month time of travel for Well 13, are shown on Figure 1-1. The Camas Shoreline Master Program (City of Camas, 2015) states that the WHPA bounded by the 10-year time-of-travel will be considered a critical aquifer recharge area (CARA). All groundwater in the recharge area is younger than 10 years, therefore there is no need for a 10-year time-of-travel delineation (PGG, 2016). To account for the uncertainties associated with temporal variations in capture zones, a buffer area surrounding the WHPAs is defined as the CARA and shown on the attached figures. This includes areas that were not included in the simulated steady state capture zone analysis, but likely will contribute recharge during certain times of the year given variations in pumping, river elevation, and natural recharge. The Lower Washougal Wellfield WHPA is defined as the CARA and includes the 6-month, 1-year, 5-year capture zones and the supplemental CARA area. The LWWF groundwater flow model was also used to estimate WHPA capture zones for the City of Washougal (Murray Smith & Associates, Inc, 2012). Model predictions show the Washougal capture zones are set within the Camas capture zones, and that 5-year capture zones for both wellfields extend all the way to the eastern end of the CARA (Figure 1-1). Uncertainties inherent in the existing groundwater model dictate that estimated boundaries between the two capture zones are approximate, and that capture zones estimated for the two cities are closely geographically related.

The WHPA capture zones used in this report were originally presented in the City's 2016 Wellhead Protection Assessment Report (PGG, 2016). The shape and extent of these capture zones are influenced by pumping at the Georgia Pacific wellfield, and aquifer boundaries including the Washougal and Columbia Rivers and older bedrock exposures to the north. Capture for Well 13 is primarily to the northeast, extending to the approximate boundary where the PAA is pinched out by older bedrock. Capture zones for the remaining Lower Washougal wells extends to the east, between the Columbia and Washougal rivers. Evaluation of mass-balance calculations for the groundwater flow model indicate that the majority of water captured by the LWWF originates as flow within the PAA, that otherwise would have discharged to the Columbia and Washougal rivers.

The estimated capture zones were generated using a steady-state groundwater flow model, meaning that only the long-term average rates of withdrawal were simulated. Variations in pumping, recharge and boundary conditions such as river stage are not simulated in a steady state model. As a result, Figure 1-1 shows the average positions of the capture zones, not the temporal variations in the

[1] Based on test well drilling results these future wells will likely be constructed within the wellfield rather than at the originally proposed locations.

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capture areas. Increased pumping during peak use months will result in variations of the predicted capture zones beyond the long-term average estimates shown in Figure 1-1.

4.0 CONTAMINANT SOURCE INVENTORY

4.1 INTRODUCTION

Contaminant source inventories are included as part of WHPPs to identify potential sources of groundwater contamination to WHPAs associated with public sources of water supply. Although rarely achieved in practice, contaminant source inventories should be updated every two years[2]. In addition, DOH recommends updating the modeling or delineation of the WHPAs every 5 years, or as part of the 10-year Water System Plan cycle. The City's most recent contaminant source inventory was prepared in 2023 and was included in the LWWF Additional Yield Assessment (Mott MacDonald, 2024).

This section presents an inventory of confirmed and potential sources of contamination primarily within the City's WHPA, as well as consideration of land uses that may pose potential risk to groundwater quality. The facilities presented in the following sections were field evaluated by Carollo Engineers in April 2026 and the edits have been incorporated in the associated tables (Strata, 2026). This information can be factored into site selection for possible new production wells along with interpretation of water quality observed in existing wells. This section also includes a summary of water quality encountered in production wells operated by the cities of Camas and Washougal and provides suggestions for groundwater quality monitoring opportunities.

4.2 SEARCH AREA

The search area for this contaminant source inventory includes the City's 2016 WHPA, a "Western Search Area," and the consideration of several sites immediately east of the WHPA. These areas are shown in Figure 4-1.

Patterns of groundwater flow to the west of the Washougal River are not well understood, and the City's Well 13 may capture groundwater flowing towards the river from the west. In addition, reduced Georgia Pacific groundwater withdrawals and possible future redistribution of LWWF pumping (under the City's "umbrella water right") could alter the 2016 WHPA delineations. In order not to rule out possible contaminant sources to the west of the CARA, a Western Search Area was added from the west side of the Washougal River as far west as the Crown Zellerback Power Ditch (Figure 1-1). Ultimately, improved hydrogeologic characterization of this area may be warranted to better understand whether contaminated sites may pose a risk to City water supply.

[2] WAC 246-290-135 states that "an inventory, including identification of site locations and owners/operators, of all known and potential groundwater contamination sources located within the defined WHPA(s) having the potential to contaminate the source water of the well(s) or spring(s) shall be updated every two years".

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4.3 DATA SOURCES

Potential contaminant risks in the vicinity of the LWWF were investigated and mapped using data from the following sources:

- Clark County's (2025) *parcel database*, which contains information on land use and zoning.
- Data on file with Clark County, the City of Camas, and the City of Washougal regarding the locations of septic systems and infiltration facilities (dry wells and infiltration galleries) (Clark County, 2024; City of Camas, n.d.; City of Washougal, 2024).
- Washington State Department of Ecology (Ecology) *Facility/Site database*, which includes State Cleanup Sites, federal Superfund sites, hazardous waste generators, solid waste facilities and underground storage tanks (USTs).
- Ecology's *cleanup and tank search*, which includes confirmed and suspected contaminated sites, leaking and regulated USTs, brownfield sites, and Voluntary Cleanup Program (VCP) wait lists.
- Ecology's *Environmental Information Management (EIM) database*, which includes environmental monitoring physical, chemical, and biological data reported from sources such as Ecology-funded monitoring, cleanup sites, and municipal stormwater.
- A custom data report from DOH's *Sentry database*, which provides drinking water source and distribution sampling results reported by the Cities of Camas and Washougal (along with new PFAS sampling results recently provided by the City of Washougal).
- The U.S. Environmental Protection Agency (EPA) PFAS Industry Sectors Analytical tool, which presents Enforcement and Compliance History Online (ECHO) data filtered to industries identified by EPA as users or manufacturers of PFAS (EPA, 2025a).
- A custom records request from Lightbox Environmental Data Resources (EDR) using a 1-mile radius of Public Supply Well 13 in Camas, WA. A review of the EDR databases was originally presented in the Camas Well 13 PFAS Historic Contaminant Sources Inventory Review (Mott MacDonald, 2025).

The information from these data sources was classified and mapped to assess whether existing and potential contaminant sources were located within the Search Area[3].

4.4 SITES POSING POTENTIAL RISK

Information from Ecology's Facility/Site database were reviewed to identify facilities and sites within the Search Area that could be classified as a posing potential threat to groundwater contamination. The EDR databases and EPA PFAS Analytical Tool were used to augment the data retrieved from Ecology's databases for facilities with PFAS-specific risks to groundwater quality. The EIM database were reviewed to confirm sites with known contamination and the DOH's database of

[3] Some locations from Ecology's Facility/Site database were adjusted in Figure 4-1 based on facility address, parcel information, and imagery.

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drinking water results were reviewed to confirm local PFAS sampling occurrence and detections. Potential threats are associated with the use or storage of hazardous materials including the presence of USTs. A higher level of concern is associated with sites with known contaminant releases. While only a subset of sites with known releases are confirmed to have contaminated groundwater, other sites (e.g., associated with soil contamination) have the potential to contaminate groundwater through downward percolation of infiltrated recharge to the underlying PAA.

Table 4-1a summarizes known sites of potential environmental concern within the Search Area. Sites of potential environmental concern include both sites with and without confirmed or suspected releases of contamination to groundwater or soils. All sites with a cleanup status have a known or interpreted release, and Table 4-1b provides additional information about associated contaminant releases and current cleanup status (e.g., "awaiting cleanup", "cleanup underway", and "no further action" required). Figure 4-1 displays the location of each of these sites and indicates through the location symbols which types of activities or risk are associated with each site. Each site marker has three pie slices which indicate the type of activities associated with the site as follows:

- Cleanup Site (State Cleanup or Voluntary Cleanup)
- Underground Storage Tanks (UST) / Leaking Underground Storage Tanks (LUST)
- Hazardous Material Generator or Handler
- Release to Groundwater, Surface Water, or Soils

A red halo around any site indicates a documented contaminant release to soils, groundwater or surface water that has yet to be remediated. A yellow halo indicates that a prior release has been remediated and the site has been issued a No Further Action status by the Ecology. Any combination of the indicators is possible. Site markers without any halos or filled-in pie slices indicate the facility is tracked in the Ecology Facility/Site database, and the facility type is considered to have risk to soils or receiving water bodies, but the facility is not a cleanup site, a hazardous materials handler, nor does it have registered USTs.

Table 4-2 indicates four sites with contaminant exceedances in groundwater in or near the Search Area where contaminant concentrations are reported in Ecology's EIM database. Table 4-2 additionally shows reported contaminant exceedances in soil and sediment reported at the four sites. There are some differences in the groundwater exceedances identified in the data uploaded to EIM for the two sites within the WHPA, Hambleton Bros Log Yard (6-month capture zone) and Chevron Bulk Plant Camas (6-month capture zone), compared to the Ecology Facility/Site database (Table 4-1b). Likewise, there is no EIM data available for the two sites with confirmed groundwater concentrations in the Ecology Facility/Site database (Table 4-1b): Columbia Rock Concrete Products Inc (6-month capture zone) and Hi Way Fuel (5-year capture zone). The available EIM soil and sediment data for four sites and identified exceedances are summarized in Table 4-2. All four sites have a No Further Action cleanup status. Figure 4-1 identifies the locations of monitoring wells that showed contaminant exceedances at the four sites with the following symbol:

- Monitoring Well with Contaminant Detection in EIM Database (No Further Action)

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Sites posing potential and known contaminant risks are discussed by subarea below. A brief discussion of each known release site and groundwater exceedance site, along with their current status, is provided in Appendix A.

Forty-five sites of potential environmental concern to the water supply were identified within the WHPA, and an additional 21 sites of potential concern were identified in the Western Search Area (Table 4-1a). These sites are discussed in the sections below that are relevant to the onsite activities posing potential contamination risks.

4.4.1 Underground Storage Tanks

Contamination in soil and groundwater can be caused by leaking USTs (LUSTs). The most common causes of leaks are corrosion, fitting failures, improper installation or poor maintenance, impact damage, and overfilling (IIG, 2026; Karalekas, 2026). Although USTs usually contain flammable motor fuels or heating oils, they may contain other compounds used by industry, government, or business. Leakage from USTs and associated piping can often occur without detection. Even relatively small amounts of hazardous compounds can adversely impact groundwater quality. Once released from an UST, some contaminants can rapidly migrate to groundwater, a problem that is especially serious in areas with permeable soils, such as the sand and gravel comprising the PAA.

Of the many materials stored in USTs, solvents are considered the most toxic. However, petroleum products may pose a greater total risk because of the prevalence of tanks containing petroleum products. In addition, petroleum products contain many potential contaminants, including three EPA priority pollutants: benzene, toluene, and ethylbenzene. Benzene is a known human carcinogen.

Figure 4-1 shows the locations of USTs in the Search Area. Most of them lie within areas zoned industrial and commercial. These sites were identified from the Ecology's UST site data. This discussion does not imply UST leakage; LUSTs are discussed in the following paragraph. Table 4-1a shows that 9 of the 14 UST sites within the WHPA and 8 of the 13 UST sites within the Western Search Area have reported tank status that is either closed-in-place or removed, indicating the USTs are no longer present or actively used. Of the 10 active UST sites, there are only three large facilities (>15,000 gallons total volume) in operation within the WHPA and three within the Western Search Area (Table 4-1a). These include:

- Camas Washougal Port (6-month capture zone);
- Jimbo's Deli Mart 2 (6-month capture zone);
- Hi Way Fuel (5-year capture zone);
- Camas Foodmart (Western Search Area);
- Safeway Fuel 1000 (Western Search Area); and
- Quick Stop Mart (Western Search Area).

There are four LUSTs identified in Ecology's database located within the WHPA and seven within the Western Search Area (Table 4-1a). Nine of the 11 LUST sites have received No Further Action

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notices from Ecology. Two sites: Philpot and Hi Way Fuel, both located within the WHPA, have initiated their cleanup efforts. Further details about these sites are provided in Appendix A.

4.4.2 Hazardous Materials

The commercial use of chemicals poses a potential threat to groundwater quality since the chemicals can be accidentally spilled or disposed of improperly. The likelihood of such releases from spills can be reduced by proper methods of handling, spill prevention measures, and emergency response strategies. Improper disposal is likely the most common pathway for chemicals to be released into the environment. The following Ecology facility activity classifications were included as hazardous materials sites in this assessment:

Table 4-3: Hazardous Site Activity Code Definitions

Activity Code	Definition
HWG	Facilities that generate dangerous waste. They may be classified as very small, small, medium or large quantity generators (VSQG, SQG, MQG, or LQG) depending on the quantity of hazardous waste generated.
HWOTHER	Facilities that are required to have an EPA/State ID number but who do not generate and/or manage hazardous waste (XQG generator status). This includes transporters, used oil recyclers, and dangerous waste fuel marketers and burners.
HWP	Under Chapter 173-307 Washington Administrative Code (WAC), facilities that report under Section 313 of the Emergency Planning/Community Right-To-Know Act (EPCRA), or that generate more than 2,640 pounds of hazardous waste per year, must prepare Pollution Prevention Plans.
HWTSDF	Facilities that treat, store, or dispose of hazardous waste.
TIER2	Businesses that store 10,000 pounds or more of a hazardous chemical or 500 pounds or less, depending on the chemical, of an extremely hazardous chemical on site at any one time must report annually. Reports are sent to the State Emergency Response Commission [represented by Ecology], Local Emergency Planning Committees, and local fire departments for emergency planning. [product, not waste]
TRI	Facilities in specific industries that manufacture, process or use more than the threshold amount of one or more of 600 listed toxic chemicals. Most threshold amounts are 10,000 or 25,000 pounds per year. Some chemicals have much lower thresholds.

The Ecology Facility/Site database indicates that there are 25 sites within the WHPA and 9 additional sites within the Western Search Area that fall into one of the above hazardous waste classifications. Of these only 13, three of which are in the Western Search Area, have an active status (see below) and, the rest are inactive. Inactive status indicates that the sites do not have current permitting, and therefore, are not actively overseen by Ecology.

Table 4-4: Active Hazardous Materials Sites

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FSID	Facility Name	WHPZ	Activity Code
93671	City Of Camas Well 13	6-Month	TIER2
11338232	Columbia Storage Inc 2nd St	6-Month	TIER2
37125488	Columbia Warehouse	6-Month	TIER2
3264254	TARR Inc Washougal	6-Month	TIER2
88277363	Tidland Corp	6-Month	HWG (Other)
994431	Camas City Well 11 & 12	6-Month	TIER2
42373	City Of Camas Well 14	6-Month	TIER2
43057	City Of Washougal Lower Well Field	6-Month	TIER2
99999862	Walgreens 1085	1-Year	HWG (VSQG)
74959167	Camas STP	CARA	TIER 2
66765272	Georgia Pacific Consumer Products	Western Search Area	TIER2, HWP, TRI, HWG (SQG)
89994319	Verizon Northwest Inc Camas Co	Western Search Area	TIER2
8343024	Safeway Fuel 1000	Western Search Area	HWG (VSQG)

The Facility/Site database does not indicate whether sites listed are large or small hazardous waste generators. The hazardous waste generator (HWG) status presented in Table 4-4 were retrieved from EPA's ECHO facility search (https://echo.epa.gov/).

4.4.3 Cleanup Sites

The following subsections describe state cleanup sites that are located within the WHPA, Western Search Area, and east of the CARA, based on available information from Ecology.

4.4.3.1 Lower Washougal Wellfield WHPA

Ten of the 47 sites of potential environmental concern in the WHPA have known contaminant releases and are listed as State Cleanup Sites (Table 4-1b), as follows:

- Four sites (5, 13, 21, 25) have confirmed results below cleanup levels for all sampled media and have been issued a No Further Action status by Ecology.
- Six sites (4, 6, 11, 29, 35, 36) have confirmed or suspected contamination of groundwater and/or soil. Of these:
  - Two sites (11 and 29) have been issued a No Further Action status by Ecology.
  - Three sites (4, 29, 36) are associated with LUSTs.
  - Two sites are listed by Ecology as Awaiting Cleanup:

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- Site 6 (Facility ID 5016308, Columbia Rock Concrete Products, Inc.) has confirmed EPA Priority metals contamination in groundwater and is within the 6-month capture zone. Impacts to soil and groundwater were first detected in 2001 and the site was placed on the national priorities list in 2007. As of 2016, Ecology reported that it had had no plans for taking action on the site in the immediate future (Appendix A).
- Site 35 (Facility ID 94778244, Asher Engine Service Facility) has suspected soil and groundwater contamination and is located within the 5-year capture zone.

The use and storage of solvents poses a threat to groundwater quality. Solvents are persistent, both soluble and insoluble in water, and highly mobile. A small release of solvents to groundwater can cause a large groundwater plume. There are two cleanup sites (21 and 35) with solvents suspected or confirmed in soil or groundwater in Ecology's database located within the WHPA (Table 4-1b).

4.4.3.2 Western Search Area

Of the 22 sites of potential environmental concern that were identified in the Western Search Area, 12 have known contaminant releases and are listed as State Cleanup Sites (Table 4-1b). Seven of the 12 release sites (47, 48, 49, 52, 53, 58, 59) are associated with LUSTs, all of which have confirmed petroleum product detections in soil, including three with Petroleum product concentrations confirmed above cleanup levels by Ecology. Of the 12 sites, nine are listed as No Further Action, two (Sites 46 and 56) have cleanup underway, and one (Site 54) is awaiting cleanup, as summarized on Table 4-1b. Sites requiring cleanup include:

- Site 46 (Facility ID 66765272, Georgia Pacific Consumer Products) has suspected soil contamination, including for solvents, petroleum products, and reactive wastes.
- Site 54 (Facility ID 9620, Residence Heating Oil Tank) has non-halogenated solvent and petroleum product contamination confirmed in soil and suspected in groundwater.
- Site 56 (Facility ID 5458, Greseth Property) has confirmed petroleum product contamination of soil.

No contaminant exceedances in groundwater are reported in Ecology's EIM database within the Western Search Area.

4.4.3.3 East of the Critical Aquifer Recharge Area

Table 4-2 indicates two sites with contaminant exceedances in groundwater near the eastern boundary of the WHPA that have been reported to Ecology's EIM database. Both locations, ARCO 6008 and George Schmid & Sons, Inc, are listed as State Cleanup Sites that have been issued a No Further Action status by the Ecology and are associated with LUSTs. Reported groundwater exceedances include petroleum products, metals, and PAHs. The two LUST sites are included in this report due to their proximity to the 5-year capture zone (Figure 4-1) and the confirmed impact to groundwater.

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4.5 CURRENT ZONING AND LAND USE

Current zoning and land use information from Clark County's database were reviewed to evaluate zoning areas and specific parcels in the LWWF vicinity that could pose a risk to groundwater now or in the future. The following zoning categories were mapped (Figure 4-2):

- Industrial
- Commercial
- Residential
- Parks

The most common allowed land use within the WHPA is residential followed by commercial and industrial. Areas zoned as commercial and industrial are most likely to comprise threats to groundwater quality. Most of the allowed commercial and industrial use is concentrated along SR-14, the southern terminus of SR-500, the railroad corridors, SE 3rd and 6th Avenues, and E. Street. The Western Search Area is nearly evenly divided between industrial (in the south), commercial, and residential (in the north).

A GIS analysis was used to identify land uses descriptions within each parcel where associated activities could pose a risk to groundwater within the Search Area. Parcels where such land uses were identified were designated "parcels of concern" and are interpreted to represent potential sources of contamination. [Note: whereas "parcels of concern" are based on land use, "sites of concern" (discussed above) are based on registered handling of hazardous waste and suspected or known contaminant releases.] Table 4-5 provides a list of land uses and categories that are considered potential concerns and counts of these parcels within WHPA and Western Search Area. The land uses are divided into 7 generalized use groupings based on similar activities, including: A) uses related to automobiles, boats and fuel; B) potential biohazards; C) manufacturing; D) dry cleaners; E) electrical infrastructure; M) medical; and O) "other" uses[4]. Appendix B provides a detailed list of ownership and land-use description associated with these parcels. Parcels of concern are also mapped on Figure 4-2.

The WHPA contains 81 parcels of concern, and the Western Search Area contains 75 parcels of concern. Evaluation by sub-area shows:

- The WHPA 6-month capture zone contains 38 parcels of concern distributed among all categories besides biohazards and dry cleaners, with larger proportions of automobile-related, manufacturing, and "other" uses.
- The WHPA 1-year capture zone contains 14 parcels of concern, comprised mostly of automobile-related and "other" uses.

[4] "Biohazards" include: cemeteries, crematories, feedlots, biofiltration, and sewage infrastructure. "Electrical infrastructure" includes: boosters, transformers and stations. "Medical" also includes dental and veterinary. "Manufacturing" includes chemical, wood, machinery, paper, plastic. "Other" includes storage, parking, quarries, sand/gravel pits and crushing operations.

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- The WHPA 5-year capture zone contains 20 parcels of concern, comprised mostly of automobile-related uses.
- The WHPA supplemental CARA zone contains 9 parcels of concern, distributed between biohazards and "other" uses.
- The Western Search Area contains 75 parcels of concern, distributed between all categories with a larger proportion of automobile-related uses and just one dry cleaner and one electrical facility.

In addition to the zoning categories and parcels of concern discussed above, the following land uses and activities should be considered as potential sources of contamination:

- On-site septic systems
- Stormwater
- Unused and improperly constructed wells
- Agriculture, golf courses, and parks
- Burlington Northern Santa Fe Railway
- Users and Potential Sources of PFAS

4.5.1 On-Site Septic Systems

On-site septic systems pose a risk to groundwater where they are relatively high in density and/or where hazardous waste is discharged to them. Potential contaminants from septic systems include pathogenic organisms (bacteria and parasites), toxic substances including PFAS, and nitrogen compounds (EPA, 2026a; Palmerton, 2023).

The extent to which pathogens are transported in the subsurface away from a septic drain field depends on the type of pathogen and the chemical and physical conditions in the subsurface. In general, if a septic system is properly sited, constructed, and maintained, the impact to water quality will be limited (EPA, 2026b). Household hazardous chemicals such as cleaners, polishes, waxes, and paints can be transported to groundwater via a septic system. Some products contain toxic and persistent chemicals that can cause low-level contamination when coupled with a high density of septic systems. Homeowners can improperly apply or dispose of chemicals because they do not understand the threat they pose to groundwater quality. A variety of in-home materials (such as food packaging, cookware, cosmetics and dust generated from upholstery) can supply PFAS to domestic septic systems (Kaboggoza, 2026). Other organic compounds (such as pharmaceuticals, personal care products and organophosphate flame retardants) can also be associated with domestic wastewater (EPA, 2026b; EPA, 2026c). In some areas, business and commercial facilities still use on-site septic systems for sewage disposal. Business, commercial, and industrial operations that utilize on-site systems need to take special precautions to avoid contamination of their wastewater.

Ammonia and nitrate are highly soluble in water and can be expected in detectable quantities wherever portions of an aquifer are affected by septic system discharges. Septic systems are a source of nitrates in groundwater throughout Clark County. Nitrate is regulated, since ingestion can result in

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methemoglobinemia, or "blue baby" syndrome (Knobeloch, 2000). Other sources of nitrate include fertilizers, feedlots, and natural mineral deposits. Background concentrations of nitrates in groundwater are typically less than 1 milligram of nitrogen per liter (mg-N/L) (EPA, 2026d). The MCL for nitrate is 10 mg-N/L.

Although significant portions of the urban areas are served by sewer systems, many residents still rely on septic systems. Clark County maintains GIS coverage of on-site septic system locations, locations that are based on information provided by the Clark County Public Health Department. The locations of the septic systems are plotted on Figure 4-1. This figure indicates that the LWWF WHPA has only one identified septic system within the 6-month capture zone, four systems within the 1-year capture zone, 26 systems within the 5-year capture zone, and none in the supplemental CARA. Overall, 29 septic systems fall within the WHPA. There is one additional septic system identified in the Western Search Area, within the Georgia Pacific facility.

4.5.2 Stormwater

Stormwater (i.e., urban runoff) is produced when rainfall or other precipitation accumulates faster than it can evaporate, be used by plants, or infiltrate to the subsurface. Urban areas, particularly industrial, commercial, and high-density residential development areas, produce more runoff than rural areas because they have more impermeable surfaces, such as rooftops, driveways, streets, and highways (Ecology, n.d.). These surfaces not only promote runoff, but they also reduce the infiltration that recharges groundwater supplies. Even grass lawns can produce more runoff than forests and pasture. Most of the stormwater infiltration and bioswale areas are concentrated along SR-14 and E. Street (Figure 4-3).

Concern over potential groundwater contamination from stormwater has been recognized by several governmental agencies in western Washington. Stormwater typically contains pollutants, such as sediment, nutrients, bacteria, oils and grease, metals, and other toxicants. Many of these contaminants come from air pollution, motor vehicles, application of pesticides and fertilizers, soil erosion, and pet feces. Stormwater runoff from highways and roads can introduce contaminants such as heavy metals, organic priority pollutants, pesticides, coliform bacteria, and 6PPD-quinone into the groundwater system (Ecology, n.d.). Roofing materials have also been identified as a diffuse source of metals in runoff, particularly zinc (Good, 1993). Concentrated sources of stormwater contamination may also occur if undiluted pollutants (e.g., fertilizer, gasoline) are accidentally spilled or intentionally released and enter storm drains.

Stormwater contamination has primarily been a concern for surface water pollution because urban runoff is typically directed to streams, lakes, and other water bodies with fish and other aquatic life that are highly sensitive to common stormwater contaminants. However, in areas where coarse-grained Pleistocene Alluvial Deposits occur at the land surface (i.e. portions of Vancouver, Camas and Washougal), dry wells are commonly used to infiltrate stormwater into the subsurface, which creates the potential for groundwater contamination. Specific sites with potential/known stormwater contamination risks and general assessment of stormwater impacts to groundwater via dry wells and infiltration facilities are discussed below.

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Information from Ecology, Clark County's GIS coverage of dry wells, and prior communications with City Staff were reviewed to evaluate stormwater-related site features and land uses in the LWWF vicinity that could pose a risk to groundwater now or in the future.

4.5.2.1 Stormwater Risks at Ecology Sites of Potential Environmental Concern

Ecology considers sites to be a risk to stormwater if they have any of the following site interaction types noted in Ecology's Facility/Site database: Underground Injection Control, Fruit Packer General Permit (GP), Municipal SW GP (any phase), WSDOT Municipal SW GP, Construction SW GP, or Industrial SW GP. As shown on Table 4-1a, there are eight sites located within the WHPA and one within the Western Search Area that have been identified as posing a potential stormwater risk to groundwater. These sites include:

- Triangle Resources (6-month capture zone);
- Columbia Storage Inc 2nd St (6-month capture zone);
- Hambleton Bros Log Yard (6-month capture zone);
- Goodwill – Washougal (6-month capture zone);
- Washougal City Westside Wellfield Well 12 (6-month capture zone);
- Rockwood Terrace (1-year capture zone);
- Washougal School District Bus Garage (5-year capture zone);
- SE 8th & SE Tampa Development (CARA);
- Camas City Municipal SW (Western Search Area).

Sites with only Construction SW GP interactions have not been included in Table 4-1a due to their temporary nature.

4.5.2.2 Consideration of Dry Wells and Infiltration Facilities

Impervious surfaces in the commercial and industrial areas along SR-14, the southern terminus of SR-500, the railroad, and 3rd Avenue contribute substantial amounts of runoff in the Camas study area. In 2012, the Washington State Department of Transportation (WSDOT) installed a large stormwater infiltration facility between SE 11th Avenue and SR-14, near the City's wastewater treatment plant (Figure 4-3) in order to infiltrate road runoff. The City (along with PGG) communicated with WSDOT during the construction phase the need to protect water quality in the underlying PAA. The infiltration facility is located within the CARA boundary. The operation and performance of this facility should be evaluated if the City pursues new groundwater sources in this area in the future.

Sam Adams, former Utilities Manager at Camas Public Works provided the following information about the City's stormwater facilities (reproduced from PGG, 2016). This information should be confirmed by follow-up conversations but indicates that all of the stormwater runoff in Camas flows to catchment basins, drainage ditches, biofiltration swales, exfiltration ponds or sedimentation ponds. Catchment basins and other surface stormwater facilities filter out some pollutants before the

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water enters the subsurface or surface water environment. Near the LWWF area, most stormwater is captured via catchment basins and then routed to the Washougal River via outfall pipes. The City's stormwater discharges are regulated under the Federal National Pollutant Discharge Elimination System (NPDES) Phase II permitting process (Permit Number WAR045004). The permitting process requires that the City provide annual reports and updates to their stormwater management plan (SWMP). A Reporting Violation was issued for Permit WAR045004 on March 31, 2025 for a late/missing submittal. According to the City, there are no current dry wells associated with the City of Camas stormwater system. Dry wells previously used in the area of Oak Park and Goot Park in southeast Camas were abandoned and replaced with new stormwater collections systems in the mid 1990's (PGG, 2016).

Dry wells currently included in the Clark County GIS are shown on Figure 4-3. The GIS coverage shows 19 dry wells within the 6-month capture zone, 12 dry wells within the 1-year capture zone, 69 wells within the 5-year capture zone, and no dry wells within the supplemental CARA. Overall, 100 dry wells fall within the WHPA. There are five additional dry wells identified in the Western Search Area along the Crown Zellerback Power Ditch near NE Dallas Street. Several dry wells within the 6-month capture zone are close to the City's Well 5, but all other City production wells do not have immediately adjacent dry wells. A large portion of dry wells within the 5-year capture zone are located along E Street. These features are likely the City's abandoned and replaced dry wells and are incorrectly attributed in the County's database. The City should review this dataset with the County and make appropriate modifications to reflect current conditions.

4.5.3 Unused and Improperly Constructed Wells

Well casings can provide a conduit between the ground surface and underlying aquifers. Improperly constructed or abandoned wells pose several potential problems. In wells with no surface seal, contaminants introduced near the wellhead can move downward outside the casing to underlying aquifers (Scherer, 2021). Many older wells that were constructed before the implementation of the State's minimum well standards in WAC 173-160 (pre-1971) have no surface seal. Unused wells that have not been properly abandoned are left uncapped in many cases, posing a special risk because contaminants can be introduced directly into the aquifer. Unused wells also pose a risk when they are damaged during site redevelopment. Any of these situations can provide a conduit for contaminant movement.

Among the private wells in the Camas vicinity, a portion were constructed prior to adoption of Ecology's drilling standards in 1971 and therefore have a higher likelihood of improper construction. There is no inventory on the number or location of these wells; however, many of them may have been abandoned properly following the State's standards. Furthermore, public water supplies have served most of the LWWF area since the 1930's and therefore few private wells are likely to occur in this area.

4.5.4 Agriculture, Golf Courses, and Parks

Fertilizers, pesticides, and herbicides are applied to residential lawns, commercial landscaping, agricultural lands, and landscaped areas adjacent to roads. If optimally applied, these chemicals pose little threat to groundwater, however, applications are commonly not made correctly and groundwater contamination can result if fertilizers are applied in exceedance of the agronomic uptake rate (Pitz,

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2014). Excess nitrate from fertilizer will be recharged to the underlying groundwater system. Frimpter and others (1990) estimated that an average of 9 pounds of nitrate-N leached annually to groundwater from each 5,000-squarefoot lawn. Landscaping activities can also be the source of pesticides and herbicides such as ethylene dibromide (EDB), 1,2-dibromo-3-chloropropane (DBCP), and dicamba.

There are no agricultural parcels within the WHPA and park turf is not a significant concern (Figure 4-2). Most of the parks within the 6-month capture zone are natural areas with the exception of Goot Park, which has managed turf. The City should coordinate with the parks department to confirm these designations and discuss the use of chemicals at Goot Park given its proximity to the City's Well 14 (although groundwater beneath Goot Park is more likely to be captured by the City of Washougal's "Lower Wellfield," comprised of five production wells located immediately east of Camas Well 14).

Residential lawns and other landscaping occur throughout the WHPA. These are potential sources of nitrogen, pesticides, and herbicides to the groundwater. The risk of groundwater contamination by these contaminants is high in the PAA because the aquifer is unconfined and groundwater is relatively shallow.

4.5.5 Burlington Northern Santa Fe Railway

In 2001, about 32 to 45 Burlington Northern Santa Fe (BNSF) freight trains were reported to pass through the Washougal area on a daily basis (pers. comm. Read Fay, BNSF), with roughly 25% of the containers potentially containing hazardous materials (including petrochemicals). Movement of crude oil by rail in Washington State began in 2012 and has continued to increase since that time (Ecology, 2025a)

During the 1-year period between July 1, 2024 and June 30, 2025, rail was responsible for 18 percent of reported crude oil movement through Washington, equal to over 38 million barrels (Ecology, 2025a). In the same period, receiving facilities reported that 49,879 rail cars transported crude oil through route segment 2, which follows the Columbia River corridor from the Tri-Cities to Vancouver, Washington. This averages to approximately 959.2 oil tank cars travelling on the rail segment per week with an average tank car volume of 681 barrels. The 2025 Quarter 2 total volume transported by rail through segment 2 was 11,684 tank cars carrying an estimated 7.95 million barrels (Ecology, 2025a), a 42 percent reduction in volume from the 20,037 tank cars carrying 13.7 million barrels reported to have passed through the same segment in 2017 Quarter 2 (Ecology, 2017).

Derailment of rail cars with hazardous materials is a serious potential contaminant source for the WHPA since the BNSF tracks run directly over the source aquifer. Road crossings at rail tracks are of highest concern since there is increased risk of accidents at these locations. There are three railroad crossings within the WHPA and one within the Western Search Area (Figure 4-1). Two of the crossings are public with warning lights and rail guard (6th Street and 3rd Street) and one is private with only a stop sign. The private crossing leads to the main entrance for the Columbia Rock Concrete site at 1615 SE 6th Avenue and is within the WHPA 6-month capture zone. Rail collision with large trucks entering or leaving the concrete facility increases the possibility of derailment at this location and is considered a potential risk for the wellfield.

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As noted in the 2016 WHPP report (PGG, 2016), the maximum speed of BNSF freight trains was reported to not exceed 45 to 50 miles per hour (pers. comm. Read Fay, BNSF). These low speeds and the durability of the tank cars minimize the possibility of a spill in the unlikely event of a derailment. The most recent crude oil spill from a train occurred in Whatcom County in December 2020 and 28,962 gallons were released to the environment (Ecology, 2021) BNSF maintains a spill response plan working with local fire departments, emergency response, and Ecology.

4.5.6 PFAS Regulation and Potential Sources

PFAS is a group of thousands of compounds that have been designated as contaminants of emerging concern. On April 10, 2024, EPA announced the final NPDWRs and MCL goals (MCLGs) for six PFAS compounds (Table 4-6). Public water systems were given three years (by 2027) to complete initial monitoring, followed by ongoing compliance monitoring, and five years (by 2029) to implement solutions that reduce these PFAS if monitoring shows that drinking water levels exceed these MCLs. Beginning in 2029, public water systems that have PFAS in drinking water which violates one or more of these MCLs must take action to reduce levels of these PFAS in their drinking water and must provide notification to the public of the violation (EPA, 2025b). Compliance with MCLs is determined by running annual averages at the sampling point. On May 8, 2024, EPA designated PFOA and PFOS, including their salts and structural isomers, as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (EPA, 2024). Ecology has concluded that PFAS fall under the Model Toxics Control Act (MTCA) and is applying the federal MCLs as well as calculated cleanup levels for other media (Ecology, 2025b).

Table 4-6: Final EPA MCLs and MCLGs

Compound	Final MCLG	Final MCL (enforceable levels)
PFOA	Zero	4.0 ng/L (ppt)
PFOS	Zero	4.0 ng/L (ppt)
PFHxS	10 ng/L (ppt)	10 ng/L (ppt)
PFNA	10 ng/L (ppt)	10 ng/L (ppt)
HFPO-DA (GenX)	10 ng/L (ppt)	10 ng/L (ppt)
Mixtures containing 2 or more of PFHxS, PFNA, HFPO-DA, and PFBS	1 (unitless) Hazard Index	1 (unitless) Hazard Index

On May 14, 2025 EPA announced its intent to extend the compliance deadlines for PFOA and PFOS to 2031 and rescind the regulations and reconsider the regulatory determinations for PFHxS, PFNA, HFPO-DA (GenX), and the Hazard Index for mixtures of these three plus PFBS (EPA, 2025c).

In 2021, the Washington State Board of Health adopted State Action Levels (SALs) for five PFAS (Table 4-7). SALs are set to protect human health and are based on the best available science at the time.

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WAC 246- 290-315(8) states that upon federal adoption of a MCL, the MCL will supersede a less stringent SALs and associated requirements, including monitoring and public notice. The Washington State Board of Health adopted emergency rule CR-103E on June 12, 2024 to amend WAC 246-290-315 such that the criteria would apply on the effective date of the MCL as set in the federal standard, not the adoption date. This ruling extends the SALs and the associated requirements for Group A Public Water Supplies until 2029, or 2031, when the EPA MCL compliance becomes effective. The fourth emergency rule has been extended to October 16, 2025. The Board will consider additional emergency rule filings as needed, until a permanent rule is in place.

Table 4-7: Washington State Action Levels (SALs)

Compound	**2021 WA SALs**	**2025 WA SALs**
PFOA	10 ng/L (ppt)	4.0 ng/L (running annual average)
PFOS	15 ng/L (ppt)	4.0 ng/L (running annual average)
PFHxS	65 ng/L (ppt)	10 ng/L (running annual average)
PFNA	9 ng/L (ppt)	10 ng/L (running annual average)
PFBS	345 ng/L (ppt)	-
HFPO-DA (GenX)	-	10 ng/L (running annual average)
Hazard Index PFAS (HFPO-DA, PFBS, PFHxS, and PFNA)[5]	-	1 (unitless) Hazard Index

Detection of PFAS in the City's LWWF production wells suggests that there are sources of PFAS within the capture zones of the City's wells. The mobility of PFAS in groundwater varies by the specific compound, with branched, shorter-chain, and octanoic acid species being more mobile than their longer-chain and linear counterparts

Ecology indicates that the storage and use of aqueous film-forming foam (AFFF), a common type of firefighting foam, is a key suspected source of PFAS-contaminated drinking water in Washington with specific source areas that include military facilities, airports, and firefighting training facilities (Ecology, 2026). Other sources of PFAS to the environment include wastewater treatment plants, paper mills, refineries, landfills, biosolids facilities, manufacturing and semiconductor industries, auto garages, dry cleaners, concrete production sites, chemical and metal plating facilities, and residential septic systems. There are no confirmed PFAS releases in or around the WHPA; however, this does not preclude unidentified releases to groundwater.

In April 2025, Mott MacDonald completed a review of historical site data to identify potential sources of PFAS contamination (Mott MacDonald, 2025). The historical site list was reviewed in

[5] The PFAS Mixture Hazard Index (HI) is the sum of component hazard quotients (HQs), which are calculated by dividing the measured component PFAS concentration in water by the relevant health-based water concentration (HBWC) when expressed in the same units (shown in ng/L for simplification). The HBWC for PFHxS is 10 ng/L; the HBWC for HFPO-DA is 10 ng/L; the HBWC for PFNA is 10 ng/L; and the HBWC for PFBS is 2000 ng/L. Hazard Index = ([HFPO-DA$_{water}$ ng/L]/[10 ng/L]) + ([PFBS$_{water}$ ng/L]/[2000 ng/L]) + ([PFNA$_{water}$ ng/L]/[10 ng/L]) + ([PFHxS$_{water}$ ng/L]/[10 ng/L])

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tandem with Ecology's facility site database (Table 4-1a and 4-1b) and EPA's PFAS Industry Sectors Analytical tool (EPA, 2025a) to develop a PFAS industry site risk ranking (Table 4-8). The 80 sites included in Table 4-8 are from Camas and Washougal and within 4 miles of Camas supply well 13; 13 sites are within the 6-month capture zone, 12 sites are within the 1-year capture zone, six sites within the 5-year capture zone, and four in the supplemental CARA (Figure 4-4). Overall, 35 PFAS industry sites are within the WHPA, ten of which have a recorded or likely release to the environment. There are 17 additional PFAS industry sites in the Western Search Area. Of the 52 PFAS industry sites within the WHPA and Western Search Area, 41 are included in Tables 4-1a and 4-1b. The 11 PFAS industry sites within the WHPA and Western Search Area and not included in Tables 4-1a and 4-1b are predominantly historical auto service stations and dry cleaners. There are 28 PFAS industry sites included in Table 4-8 that are outside of the WHPA and Western Search Area. Eleven of these 28 sites are within the industrial park northeast of Captain William Clark Park, south of Highway 14 in Washougal, and west of Steigerwald Lake National Wildlife Refuge (labeled "Columbia Industrial Park" in Table 4-8). The industries represented by these facilities includes textiles and leather, metal plating and machining, semiconductors and related devices, chemical manufacturing including surface active agents, waste management, and plastics and resins. Three sites (Camas-Washougal Fire Department [CWFD], Pendleton Woolen Mills, and ARCO #6008) are near the eastern boundary of the WHPA.

4.6 PUBLIC WATER SYSTEM MONITORING

Public water system sources are routinely sampled for water quality analysis and screening for drinking water contaminants. Strata obtained query results from DOH's Sentry database regarding exceedances of regulated drinking water parameters along with PFAS analyses from groundwater sources operated by the Cities of Camas and Washougal. Reported monitoring results were compared to NPDWRs and National Secondary Drinking Water Regulations (NSDWR). NPDWRs are legally enforceable primary standards and treatment techniques that apply to public water systems, and NSDWRs are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects in drinking water. Washington State groundwater quality criteria for use as drinking water are available in WAC 173-200-040 Table 1. State criteria for detected analytes generally agrees with NPDWR or NSDWR and is only referenced below if it is the stricter of the standards. In general, groundwater quality meets NPDWR and NSDWR, with the most recent exceedance occurring in 2005 for the City of Camas and in 2023 for the City of Washougal. However, recent detections of PFAS in both city's supply wells necessitate an investment in treatment infrastructure, scoping alternative sources, or both. The results of our review are reported below.

4.6.1 City of Camas Water Supply Wells

Water system monitoring results from the City of Camas water supply wells are available from October 1988 through August 2025. From the reported samplings, four exceedances of National Primary or Secondary Drinking Water Regulations have been identified in the Post-Treatment/Finished water:

- Iron (NSDWR: 0.3 mg/L): exceeded once in 2004 at a concentration of 0.4 mg/L.

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- Radium 228 (NPDWR MCL for Radium 226+228: 5 picocuries per liter [pCi/L]): exceeded once in 2005 at a concentration of 2.5 pCi/L.

EPA finalized the MCLs for PFAS (Section 4.5.6) in April 2024. PFAS sampling performed to date has detected 33 exceedances of the final MCLs for individual PFAS compounds in sampled Post-Treatment/Finished water. Specifically:

- PFOA (MCL: 4.0 ng/L): exceeded five times between August 2022 and July 2024 with a maximum concentration of 5.4 ng/L at City Well 5.
- PFOS (MCL: 4.0 ng/L): exceeded 28 times between March 2022 and July 2024 with a maximum concentration of 25 ng/L in August 2022 at City Well 13.
  - Three detections of PFOS at City Well 13 exceed the 2021 Washington SALs.

Seven detections of PFOS exceed the MCL within the past year (October 2024-October 2025) with a maximum concentration of 7.2 ng/L at City Well 9.

Table 4-9a summarizes the results of all known PFAS sampling efforts through September 2024 within the Camas supply and distribution network. Detections of PFBS, PFOA, and PFOS are the most frequent of the tested PFAS compounds.

4.6.2 City of Washougal Water Supply Wells

Water system monitoring results from the City of Washougal water supply wells are available from December 1993 through February 2025. From the reported samplings, one exceedance of National Primary or Secondary Drinking Water Regulations has been identified in the Post-Treatment/Finished water. Lead (0.028 mg/L) exceeded the NPDWR action level (0.01 mg/L) in July 2023 in a sample collected from 3600 Ast #24. The Lower Wellfield comprises the five production wells located immediately east of Camas Well 14 (Figure 1-1). The PFAS results from the City of Washougal's "Lower Wellfield", summarized in Table 4-9b, show detections of PFBS, PFHxA, PFHxS, and PFOA below the MCL, and PFOS detections above the MCL. None of the detections exceed the 2021 Washington SALs.

5.0 WELLHEAD MANAGEMENT STRATEGIES AND IMPLEMENTATION

The completion of wellhead protection planning provides no safeguards unless effective management strategies are implemented to prevent potential contamination of groundwater sources. The City does not have land-use regulatory control within all of its WHPAs. Therefore, the City should endeavor to keep and maintain close, cooperative ties with Clark County and the Cities of Washougal and Vancouver.

The City continues to interact with its neighbors, especially the City of Washougal which has overlapping WHPAs with the City of Camas, and regulating agencies to exchange information on

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groundwater protection activities. The City also monitors land use activities and groundwater conditions within the WHPA for its supply sources.

Implementation of some of the proposed management strategies presented below will be dependent on the availability of City resources. For this review, we have included strategies that are both completed, ongoing, or have yet to be implemented. The strategies shown in Table 5-1 below are organized by recommended priority.

Table 5-1: WHPP Management Strategies

Priority	Strategy
1	Maintain a Central Point of Contact
2	Track State Cleanup (MTCA) Sites
3	Obtain Notifications of Hazardous Materials Spills
4	Monitor Groundwater
5	Map Petroleum Pipelines and Develop Emergency Response Measures
6	Provide Current WHPA Maps to Controlling Jurisdictions
7	Send Notification Letters to Owners/Operators of Identified Contaminant Sources
8	Promote Protective Stormwater Management
9	Track Pesticide Use
10	Inventory of Historical Sites
11	Inventory Underground Storage Tanks
12	Track the State's Inventory of Dry Wells
13	Inventory Abandoned Wells
14	Encourage BMPs in Land Management Activities
15	Review Pending Land Use Permits
16	Develop Notification Process for Pending Land Use Permits in WHPA
17	Target Public Education Programs in the WHPA
18	Participate in Future Updates to CARA Regulations

5.1 MAINTAIN A CENTRAL POINT OF CONTACT

The City should maintain a central point of contact for issues related to their Wellhead Protection Program. For purposes of this WHPP, this central point of contact is referred to as the "Wellhead Protection Coordinator." The Wellhead Protection Coordinator will foster and promote ongoing interaction with jurisdictions inside the WHPA but outside the City limits and will provide a central resource for departments within the City.

5.2 TRACK STATE CLEANUP (MTCA) SITES

The City should continue to track the status of all contaminated sites within their WHPA. This includes checking the Ecology databases at least every six months to determine if any new sites have

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been added to the contaminated sites lists. For sites that have cleanup work in progress (see Section 4.4.3), notify the Ecology Site Manager that the site is in a WHPA, and request that Ecology notify the City when the site status is updated or changed. Review all available information regarding activities being conducted on the site until the cleanup action and confirm that all monitoring is being completed as directed. Maintain periodic communications with the Ecology site manager to efficiently track status and maintain awareness of the site's location within the WHPA.

5.3 OBTAIN NOTIFICATIONS OF HAZARDOUS MATERIALS SPILLS

Concurrent with tracking MTCA sites (Section 5.2), the City should request notification from Ecology for any spills that occur within the WHPA. This should also include similar coordination with the first-response emergency units (e.g., Camas Dire Department, National Response Center, State Emergency Management Division). The City should then follow up with Ecology on any cleanup action implemented following the spill.

5.4 MONITOR GROUNDWATER

The City should actively participate in the collection and analysis of groundwater quality and water level information. A Monitoring Program provides a means of identifying trends and detecting problems before they reach the wellhead. Monitoring data can support protective regulatory actions and allow proactive measures to be enacted before the City's water supply sources are impacted. In addition, the data collection and monitoring can assist with regional groundwater management since data provide the basis for making appropriate decisions for long-term protection of groundwater quality and quantity. The monitoring data should be reviewed and summarized annually to identify any potential problems and evaluate the effectiveness of the network.

5.5 MAP PETROLEUM PIPELINES AND DEVELOP EMERGENCY RESPONSE MEASURES

The Northwest Pipeline passes through Washougal before crossing the Columbia River into Troutdale, Oregon. The City should map the Northwest Pipeline and any other petroleum distribution lines within or near the City's WHPAs. The City should coordinate with state and local spill response organizations to develop emergency plans to be implemented in the advent of pipeline leaks or spills.

5.6 PROVIDE CURRENT WHPA MAPS TO CONTROLLING JURISDICTIONS

The City should provide the current electronic (GIS) and printed maps of their WHPAs to all land use authorities within the City's WHPAs on a periodic basis. These maps should also be provided to DOH, Clark County Public Health Department, and local fire departments or Districts.

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Fire departments are recommended since, as first responders, they should be aware of the proximity to water sources when responding to fires or spills or other incidents where contaminants are involved. The nature of the response may need to be changed depending on the need to contain or prevent disbursement of a contaminant in order to prevent compromising the water source.

5.7 SEND NOTIFICATION LETTERS TO OWNERS/OPERATORS OF IDENTIFIED CONTAMINANT SOURCES

In an effort to protect and coordinate spill response planning within the City's WHPA, the City should send notification letters to the owners and operators of sites with identified sources of contamination as described in Section 4.4. The notification letters should present a map of the WHPAs, a table of the site of concern, the system's susceptibility rating and population served, and briefly describe appropriate procedures in the event of a spill. The City should maintain documentation of the notifications in accordance with the Wellhead Protection Program Guidance Document (DOH, 2017).

5.8 PROMOTE PROTECTIVE STORMWATER MANAGEMENT

The City should continue to promote and enforce stormwater requirements that provide water quality protection in the WHPA, consistent with the 2024 Ecology Stormwater Management Manuals. Specifically, support development of the most protective criteria; such as 5 feet of separation between infiltration facilities and the water table, sufficient rigor in testing of potential infiltration pond locations, and mandatory treatment requirements within 1-year time-of-travel zones.

5.9 TRACK PESTICIDE USE

The City can monitor some of the state and county pesticide use within the WHPA by requesting annual reports from WSDOT and Washington State Department of Agriculture (WSDA) Pesticide Management Division. Roadside pesticide/herbicide use by WSDOT and WSDA are maintained in digital database formats that provide up-to-date information on the recently sprayed locations, and quantities and types of pesticides used. WSDOT's database is available on the web. This inventory may be used to guide future groundwater monitoring and WHP-related education programs. In addition, the City should encourage private land managers to use vegetation management practices which protect groundwater quality (Strategy 5.14).

5.10 INVENTORY OF HISTORICAL SITES

The City should locate and inventory sites that are historical sources of potential contamination. This includes maintaining a record of MTCA cleanup sites after receiving an NFA status from Ecology. Retain all available information regarding activities conducted on the site up to and including the cleanup action. Conduct additional reviews as research progress on contaminants of emerging concern and contaminant sources, including when new industries are linked to groundwater contaminants.

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5.11 INVENTORY UNDERGROUND STORAGE TANKS

The City should locate and inventory USTs. USTs registered with the Ecology have been included in the contaminant source inventory (Section 4.0). This includes checking the Ecology databases at least every six months to determine if new USTs have been registered.

5.12 TRACK THE STATE'S INVENTORY OF DRY WELLS

The City should locate and inventory dry wells. Owners of these dry wells should be notified of the potential liability such wells cause and be educated on the stormwater requirements that provide water quality protection in the WHPA. Dry wells that are currently included in the Clark County GIS should be reviewed for accuracy.

5.13 INVENTORY ABANDONED WELLS

The City should locate and inventory abandoned (unused) wells. Owners of these wells should be notified of the potential liability such wells cause and be educated on the state's requirements for well decommissioning once a well is longer in use. This effort could be time consuming since the available information for many of the wells is limited to a driller's log, which, particularly for older wells, can be of variable quality. Wells located within the 1-year WHPA should be prioritized as time allows, and notification sent to owners regarding the well decommissioning requirements and the availability of technical assistance from Ecology or Clark County Public Health Department.

5.14 ENCOURAGE BMPS IN LAND MANAGEMENT ACTIVITIES

The City should engage with County and City planning departments to encourage that planners require developers use best management practices (BMPs) that reduce the potential for contaminants to enter the groundwater system.

5.15 REVIEW PENDING LAND USE PERMITS

Concurrent with encouraging BMPs in land management activities (Section 5.14), the City should track and review all pending land development projects within its WHPA. Review should include communication with the permit project manager and submission of comments to the permitting agency as necessary on mitigation and BMPs appropriate to protection of water quantity and quality.

5.16 DEVELOP NOTIFICATION PROCESS FOR PENDING LAND USE PERMITS IN WHPA

The City should maintain a point of contact within the City of Washougal and Clark County to ensure an opportunity to comment on pending land use activities within those jurisdictions and develop a process that ensures the City will be notified of all pending land use permitting actions.

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5.17 TARGET PUBLIC EDUCATION PROGRAMS IN THE WHPA

The City should continue to educate residents, particularly on groundwater quality issues. Customers within the WHPA should be targeted for distribution of literature regarding:

- Septic tank maintenance: Comply with the existing state regulations on septic tank use (WAC 246-272A), which requires the owner to inspect and maintain the system, and notify the Clark County Public Health Department of any repairs, alterations, or expansions
- Home heating oil tank maintenance and proper decommissioning
- Residential use of herbicides and pesticides: Encourage "waterwise" native vegetations planting and integrated pest management, rather than chemical applications
- Hazardous material use, disposal, and storage

In addition to City-run programs, the City should strive to participate in and support small-quantity waste disposal programs and support Clark County and other local municipal governments in developing and creating public education programs concerning groundwater.

5.18 PARTICIPATE IN FUTURE UPDATES TO CARA REGULATIONS

With adoption of Clark County Code 40.410, Clark County specified activities that are prohibited or require permits depending on the activity location within CARAs. Other municipalities with jurisdiction over land use within the City of Camas WHPAs should be reminded to consult the CARA ordinance, and the City should track and comment on any future proposed changes to the CARA ordinance.

6.0 SPILL AND INCIDENT RESPONSE AND PLANNING

As part of the wellhead protection program, the City must develop a spill and incident response plan. The City should summarize its spill response procedures, continue to coordinate it spill response planning with local emergency responders, the Department of Ecology's Spill Operations Section, the Emergency Management Division of the Washington Military Department, the local health department, Clark County, and any local emergency planning committee (at minimum) and contact first responders and regulators to provide input into the completed plan.

This section outlines spill response procedures and capability for jurisdictions within the WHPA. Spill events can be large or small and can consist of materials that can range from inert to highly toxic. Spills can occur under conditions and locations which are easily contained, or not, so that surface water or groundwater are under immediate threat. This range of possibilities has prompted a spill response (and emergency response) system which is nationwide in scope (National Response System), yet one which is designed to handle the more common, small scale (yet potentially dangerous) spills. This plan takes into account this range of systems.

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The ability of the City to affect the protocols and procedures of the national and state response systems is limited. Also, the majority of spills are small and require local response. Therefore, for the purposes of this WHPP, focus is given to local response capabilities and needs associated with these local response systems.

6.1 NATIONAL, STATE, AND LOCAL SPILL RESPONSE PLANS

Spill response planning has been ongoing throughout Clark County and within Washington State for many years. As a result, there are many plans in existence, each focusing on a specific geographical area or type of substance. In addition, parties involved in the storage and transportation of hazardous materials have been required to develop contingency plans. Each of these contingency plans should be consistent with each other and fit within the context of the response plans listed and described below. The following spill response plans are in effect in Washington State and cover inland, or non-marine areas, such as wellhead protection areas and aquifer recharge areas:

- National Oil and Hazardous Substances Pollution and Contingency Plan (National Contingency Plan; NCP), prepared by the EPA
- Oil and Hazardous Substance Pollution Contingency Plan for Federal Region 10 (RCP), prepared by Region 10 of the EPA
- Washington Statewide Master Oil and Hazardous Substance Spill Prevention and Contingency Plan, prepared by Ecology
- Local Emergency Response Plans prepared by city and county governments

6.2 SPILL RESPONSE ORGANIZATIONS

Depending on the magnitude of the spill event, numerous organizations at all levels of government, some voluntary organizations, and the private sector may have a role in spill response and cleanup. Each of the plans mentioned above describes the relationship and roles of these organizations in terms of the specific area of concern. Some of the organizations listed below might be, depending on the size and nature of the release, involved in a spill response in the City's WHPA. Spill response plans stress that spill response procedures be effectively executed. For that to be accomplished, each party must be fully aware of their specific roles and responsibilities. Moreover, there must be an understanding of the roles of other parties potentially involved in response activities, as well as effective coordination, cooperation, and communication among responding agencies, organizations, and individuals. The discussion below briefly summarizes the organizations that may be involved in spill response within the WHPA and describes their roles and responsibilities. The discussion below is organized in order from federal to local jurisdictions.

6.2.1 Federal Spill Response

The EPA has primary responsibility for all spills that occur on land. As directed by the NCP, the EPA is pre-designated as on-scene commander (OSC) for spills occurring under its jurisdiction. The OSC determines the status of the local spill response and determines whether, or how much, federal

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involvement is needed. The EPA may call on the following response teams to assist them in responding to a spill.

- National Response Team (NRT): The NRT consists of representatives from the various federal agencies (such as EPA, the US Coast Guard, Fish and Wildlife Service, etc.). It serves as the national body for planning and preparedness actions prior to a spill and as an emergency advisory center when a spill occurs.
- Regional Response Team (RRT): The RRT, consisting of representatives from selected federal and state agencies, performs functions similar to those performed nationally by the NRT. Essentially, the RRT is the regional body responsible for planning and preparedness before an oil spill occurs and provides advice to the OSC following such incidents.
- Technical Assistance Team (TAT): The TAT is a contractor used by the EPA Region 10 Office to provide technical oversight for spill response. Requests for the TAT are made via the EPA. Once on site, the TAT will report the situation to the EPA duty officer who then decides whether an EPA OSC needs to be on scene.
- Environmental Response Team (ERT): The ERT, based in Edison, New Jersey, is established to advise the OSC and RRT on environmental issues surrounding spill containment, cleanup, and damage assessment, with personnel expertise in areas such as treatment technology, biology, chemistry, hydrology, geology, and engineering.

6.2.2 State Spill Response

- Military Department Emergency Management Division (EMD): The state EMD is tasked with receiving and record verbal emergency toxic chemical release reports through its 24-hour duty officer system and making appropriate notifications. The EMD also assists and provides guidance to local emergency planning commissions for preparation of their emergency response plans.
- Department of Ecology: Ecology is the lead state agency for environmental pollution response within the State of Washington. As such, it serves as an advisor to the OSC and the Incident Commander (IC) for many spills occurring in state jurisdiction. Ecology is the state designated OSC for all oil spills in water. In the event of a spill occurring on a state highway, Ecology coordinates with the Washington State Patrol (State Patrol), which assumes responsibility as IC. In addition, Ecology acts as the lead agency responsible for cleanup activities.
- Ecology Spill Response Team: The Ecology Spill Response Team consists of Ecology regional office personnel. This team is responsible for determining the source, cause, and responsible party, as well as initiating enforcement action as appropriate. Additional responsibilities include ensuring containment, cleanup, and disposal are carried out adequately. The team coordinates its actions with other state, federal, and local agencies.
- State Patrol: The State Patrol acts as the designated IC Agency for incidents on interstate and state highways, and other roads and jurisdictions as delegated. When a spill occurs

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on a state highway, Ecology joins the Unified Command and acts as the lead agency for cleanup response.

- Washington Department of Fish and Wildlife (WDFW): The WDFW is a state agency with trustee responsibilities for fish and wildlife, and associated habitats. The WDFW Oil Spill Team (OST) provides round-the-clock oil spill response capability to address the needs of fish and wildlife resources. The OST also provides extensive technical support to the State's oil spill planning and preparedness efforts.
- Department of Transportation (DOT): The Washington State DOT may provide traffic control, equipment, and personnel for non-hazardous cleanup activities on and interstate highways. The DOT may provide and mobilize the necessary equipment in a major spills incident.

6.2.3 Local Response

Local governments have a duty to be prepared for all disaster emergencies. The Clark Regional Emergency Services Agency (CRESA) is charged with establishing Local Emergency Planning Committees (LEPC) to facilitate the local planning efforts.

LEPCs have the responsibility to create local emergency response plans. General requirements for local response plans are contained in Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986. Generally, local agencies, particularly fire services and law enforcement agencies, can be activated to provide emergency response services when there is a threat to life and property. Emergency response services may include: fire and explosion controls investigation and documentation, perimeter control, evacuation, traffic controls, and initial containment or even removal depending on the nature of the incident.

The "first responders" for the majority of spills are these local entities. They provide for immediate protection of health, property, and the environment. It is this group of responders who determine the need for additional assistance and mobilization of the additional resources provided by the state and federal government.

Local spill response within the WHPAs is within the jurisdiction of the Camas Fire Department (CFD) for incident response. Within the City, the CFD has been appointed IC for hazardous material incidents, except upon State and Interstate roadways, where the State Patrol will assume the role of IC upon arrival at the scene.

The Clark County Hazardous Materials Emergency Response Plan (HMERP) is the guide for coordinating all resources, both public and private toward preparedness, response, recovery and mitigation efforts for hazardous material emergencies.

6.2.4 The Responsible Party

The primary responsibility for assessing, responding to, and containing an oil spill or discharge falls upon the individual, agency, and/or company responsible for the spill incident. The responsible party (RP), whether there is an approved contingency plan or not, is responsible for containment and cleanup of the spill, disposal of contaminated debris, restoration of the environment, and

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payment of damages. State law (Chapter 70.105D RCW) and federal law (40 CFR 300, the NCP) specifically require that the removal of a discharge of oil or hazardous substance should be immediate.

6.3 SPILL RESPONSE CONTACT INFORMATION

A spill of any magnitude within the WHPA, must be reported to Ecology's Southwest Regional Office:

- Ecology (24 hour) **1-800-OILS-911 (645-7911)**
  or 206-594-0000 (during business hours)

https://ecology.wa.gov/footer-pages/report-an-environmental-issue/report-a-spill

If necessary, contact local first responders and other government agencies and request their assistance:

- Police 911
- Fire/Ambulance 911
- Clark County Public Health (564) 397-8000

If a spill cannot be contained, Safety Kleen, a cleanup contractor in Clackamas, Oregon should be contacted:

- Safety Kleen (503) 655-5798

If a spill can be contained, it should be pumped into a containment tank. If there are no containment tanks on site, United Rentals can be contacted to provide one:

- United Rentals (360) 574-5455

In the case of a railway spill, BNSF railways General Director of Hazardous Material Safety should be notified (in addition to first responders and agencies above):

- Patrick Brady office: (817) 352-3652
  mobile: (817) 821-1325

6.4 WHPA NOTIFICATION LETTERS

To help protect and coordinate spill response planning within the community surrounding the City's WHPAs, the City should send notification letters (example letters included in Appendix C) to contaminant source site owners, emergency responders, and governmental and regulatory agencies. The notification letters should present a map of the WHPAs (similar to Figure 4-1), a table of the site of concern (similar to Table 4-1a) and briefly describe appropriate procedures in the event of a spill. Notification letters for business/site owners should be sent all 69 sites ranked in Table 4-1a.

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Notification letters for emergency responders should be sent to the following entities:

- Parcels of Concern within WHPA (Appendix B)
- Owners of Environmental Sites of Potential Concern within WHPA (Table 4-1a)
- Local Fire and Police Departments
- Ecology Southwest Regional Office
- Washington State Department of Health Southwest Regional Office
- Clark County Public Health
- BNSF railways

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7.0 LIMITATIONS

Work for this project was performed for the exclusive use of the City of Camas (Client), and this report was prepared consistent with generally accepted environmental and hydrogeologic practices of professionals in the same locality and involving similar conditions, at the time the work was performed. No other warranty, express or implied, is made by Strata Geosciences' (Strata). All deliverables prepared by Strata for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Strata. Strata's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others. Strata accepts no responsibility for any error or omission which is due to an error or omission in data supplied to us by other parties.

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TABLES

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Table 4-1a: Sites of Potential Environmental Concern within Wellhead Protection Capture Zones

Map ID	Facility Name	Facility ID	WHPZ	Ecology Active Status	Release	Storm Water Risk	UST	LUST	Total "Current" Operational Tank Volume (gallons)	Solid Waste	Hazardous Materials	Cleanup Site	Cleanup Status[1]
1	Camas Police Department	22289	6-Month Well 13	Active						Y			
2	Camas City Well 4	81347684	6-Month Well 13	Inactive							Y		
3	City of Camas Well 13	93671	6-Month Well 13	Active							Y		
4	Philpot	12088	6-Month	Active	Y		Y	Y	500 - Closing 500 - Exempt			Y	Cleanup Started
5	Camas Washougal Port (The Port Sider Store on the Marina	92847997	6-Month	Active	Y		Y	Y	1,040 - Unregistered 16,000 - Operational			Y	NFA
6	Columbia Rock Concrete Products Inc	5016308	6-Month	Active	Y							Y	Awaiting Cleanup
7	Concrete Products Of Oregon LLC	70983458	6-Month	Active			Y		Removed 1996		Y		
8	Triangle Resources	3153967	6-Month	Active		Y				Y			
9	Columbia Storage Inc 2nd St	11338232	6-Month	Active		Y					Y		
10	Columbia Warehouse	37125488	6-Month	Active			Y		Removed or Closed in Place 1996		Y		
11	Hambleton Bros Log Yard	4399598 87338713	6-Month	Active	Y	Y	Y		Removed 1996			Y	NFA
13	Northwest Pipeline Gp Washougal M/S	14447751	6-Month	Active	Y						Y	Y	NFA
14	Jimbos Deli Mart 2	86429735	6-Month	Active			Y		35000				
15	Tarr Inc Washougal	3264254	6-Month	Active							Y		
12	Tidland Corp	88277363 7282918	6-Month	Active			Y		Removed 1996		Y		
16	Goodwill - Washougal	100001039	6-Month	Active		Y							
17	Camas City Well 11 & 12	994431	6-Month	Active							Y		
18	City of Camas Well 14	42373	6-Month	Active							Y		
19	City of Washougal Lower Well Field	43057	6-Month	Active							Y		
20	Washougal City Westside Wellfield Well 12	6975	6-Month	Active		Y							
21	Chevron Bulk Plant Camas	1043	6-Month	Active	Y							Y	NFA
22	Camas City Well 3	9810684	6-Month	Inactive							Y		
23	Us Doe Bpa Camas Substation	3811629	6-Month	Inactive							Y		
24	Clark Public Utility Dist C St	5352681	6-Month	Inactive			Y		Removed 1996				
25	Clark PUD Transformer Release J Street	100003734	1-Year	Active	Y							Y	NFA
26	Lacamas Dry Cleaners	49143	1-Year	Active									
27	Walgreens 1085	99999862	1-Year	Active							Y		
28	Rockwood Terrace	73627	1-Year	Active		Y							
29	Goodyear Tire Camas	85837922	1-Year	Inactive	Y		Y	Y	Removed 1999 & 2001			Y	NFA
30	Washougal Electric & Sheet Metal Inc	16327542	1-Year	Inactive			Y		Removed 1996				
31	Schucks Auto Supply Camus	52218486	1-Year	Inactive							Y		
32	All Seasons Auto Centers Inc Camas	18768638	1-Year	Inactive							Y		
33	Brass Lamp Motor Inn	64124152	1-Year	Inactive							Y		
34	Helland Brothers SS	69936158	1-Year	Inactive							Y		
35	Asher Engine Service (East County Auto)	94778244	5-Year	Active	Y						Y	Y	Awaiting Cleanup
36	Hi Way Fuel	22538744	5-Year	Active	Y		Y	Y	Removed 1996 56,000 - Operational			Y	Cleanup Started
37	Washougal Shell	57872946	5-Year	Inactive			Y		Removed 1996		Y		
38	Washougal School Dist Bus Garage	48371594	5-Year	Inactive		Y	Y		Removed 1996 Unknown - Exempt				
39	Overton Mfg Inc	49392144	5-Year	Inactive							Y		
40	Napa Washougal	79581825	5-Year	Inactive							Y		
41	Clark County Pub Wks Washougal Site	95756539	5-Year	Inactive			Y		Removed 1996				
42	Camas STP	74959167	CARA	Active						Y	Y		
43	Gk Construction & Equipment Rentals	4168647	CARA	Active							Y		
44	SE 8th & SE Tampa Development	99999682	CARA	Active		Y							
45	Camas City Operations Center	38772238	CARA	Inactive							Y		
46	Georgia Pacific Consumer Products	66765272	Western Search Area	Active	Y						Y	Y	Cleanup Started
47	Camas Foodmart (Browns Chevron)	18732618	Western Search Area	Active	Y		Y	Y	Removed 1996 111-1,100 - Exempt 32,000 - Operational		Y	Y	NFA
48	Camas City Shops	8698751 45416761	Western Search Area	Active	Y		Y	Y	Removed 1996		Y	Y	NFA
49	Verizon Northwest Inc Camas Co (GTE Northwest Inc)	89994319	Western Search Area	Active	Y		Y	Y	Removed 1996 500 - Operational		Y	Y	NFA
50	Safeway Fuel 1000	8343024	Western Search Area	Active			Y		40000		Y		
51	Westlie Ford Mercury Inc	61664371	Western Search Area	Active			Y		500 - Unregister 30 Day Notice 2014		Y		

Table 4-1a: Sites of Potential Environmental Concern within Wellhead Protection Capture Zones

Map ID	Facility Name	Facility ID	WHPZ	Ecology Active Status	Release	Storm Water Risk	UST	LUST	Total "Current" Operational Tank Volume (gallons)	Solid Waste	Hazardous Materials	Cleanup Site	Cleanup Status[1]
52	Camas Gas Services Inc (Browns Arco)	97188815	Western Search Area	Active	Y		Y	Y	Removed 1996			Y	NFA
53	Quick Stop Mart (Camas Mart)	33881994	Western Search Area	Active	Y		Y	Y	Removed 1996 and 1999 15,000 - Operational			Y	NFA
54	Residence Heating Oil Tank	9620	Western Search Area	Active	Y							Y	Awaiting Cleanup
55	Haag & Shaw Excavating	82973453	Western Search Area	Active	Y		Y		Removed 1996			Y	NFA
56	Greseth Property	5458	Western Search Area	Active	Y							Y	Cleanup Started
57	Camas Cemetary Association	39618925	Western Search Area	Active			Y		Removed or Closed in Place 1996				
58	P & L Investments	41313725	Western Search Area	Inactive	Y		Y	Y	Removed 2000			Y	NFA
59	Helen Brothers Service	65648254	Western Search Area	Inactive	Y		Y	Y	Removed 2000			Y	NFA
60	Camas City Minicipal SW	930	Western Search Area	Active		Y							
61	Camas City Old Sewage Treatment Plant	53821114	Western Search Area	Inactive							Y		
62	Camas Public Library	53186612	Western Search Area	Inactive			Y		Removed 1996				
63	Town & Country Stores Inc	44713844	Western Search Area	Inactive			Y		Removed 1996				
64	QWEST Camas N Rptr Bldg	43889368	Western Search Area	Inactive							Y		
65	Imperial Cleaners	78239817	Western Search Area	Inactive							Y		
66	First Christian Church HOT	100003126	Western Search Area	Inactive	Y							Y	NFA

Notes:
CARA = extended CARA
NFA = No Further Action
Y = Yes, site contains Ecology interaction type

Table 4-1b: Cleanup Sites and Associated Contaminants

Map ID	Facility Name	Facility ID	WHPZ	Cleanup Status[1]	Nature of Contaminants at Cleanup Sites[2]																	
					Arsenic	Asbestos	Benzene	Dioxins/Furans	Halogenated Solvents	Non-Halogenated Solvents	Halogenated Organic Compounds	Other Non-Halogenated Organics	Lead	Metals - EPA Priority Pollutant	Metals - Other	PAH	PCB	Petroleum- Diesel	Petroleum - Gasoline	Petroleum Products - Unspecified	Phenolic Compounds	Reactive Wastes
4	Philpot	12088	6-Month	Cleanup Started														S(gw) C (s)	S (gw) S(s)			
5	Camas Washougal Port (The Port Sider Store on the Marina)	92847997	6-Month	NFA			B (s)					B (s)							RB (s)			
6	Columbia Rock Concrete Products Inc	5016308	6-Month	Awaiting Cleanup										C (gw) S (s)						S (gw) C (s)		
11	Hambleton Bros Log Yard	4399598 87338713	6-Month	NFA										B (gw) RB (sw) RA (s)		RB (sw) RA (s)	RA (s)	RA (gw) RA (s)		RB (sw) RA (s)	RB (sw)	
13	Northwest Pipeline Gp Washougal M/S	14447751	6-Month	NFA	B (s)									RB (s)								
21	Chevron Bulk Plant Camas	1043	6-Month	NFA						RB (gw) RB (s)	RB (gw)			RB (s)						RB (gw) RB (s)		
25	Clark PUD Transformer Release J Street	100003734	1-Year	NFA													B (s)	B (s)		B (s)		
29	Goodyear Tire Camas	85837922	1-Year	NFA							R (s)									C (s)		
35	Asher Engine Service (East County Auto)	94778244	5-Year	Awaiting Cleanup			S (gw) S (s)		S (gw) S (s)	S (gw) S (s)		S (gw) S (s)	S (gw) S (s)		S (gw) S (s)	S (gw) S (s)	S (gw) S (s)	S (gw) S (s)	S (gw) S (s)	S (gw) S (s)		
36	Hi Way Fuel	22538744	5-Year	Cleanup Started																C (gw) C (s)		
46	Georgia Pacific Consumer Products	66765272	Western Search Area	Cleanup Started		S (s)	S (s)	S (s)		S (s)			S (s)		S (s)	S (s)	S (s)			S (s)		S (s)
47	Camas Foodmart (Browns Chevron)	18732618	Western Search Area	NFA															C (s)	C (s)		
48	Camas City Shops	8698751 45416761	Western Search Area	NFA			B (s)					B (s)	B (s)					B (s)	RB (s)			
49	Verizon Northwest Inc Camas Co (GTE Northwest Inc)	89994319	Western Search Area	NFA														B (s)		B (s)		
52	Camas Gas Services Inc (Browns Arco)	97188815	Western Search Area	NFA			B (s)					B (s)	B (s)						C (s)			
53	Quick Stop Mart (Camas Mart)	33881994	Western Search Area	NFA			B (s)					B (s)	B (s)						B (s)	B (s)		
54	Residence Heating Oil Tank	9620	Western Search Area	Awaiting Cleanup						S (gw) C (s)										S (gw) C (s)		
55	Haag & Shaw Excavating	82973453	Western Search Area	NFA														RB (s)				
56	Greseth Property	5458	Western Search Area	Cleanup Started																C (s)		
58	P & L Investments	41313725	Western Search Area	NFA															C (s)			
59	Helen Brothers Service	65648254	Western Search Area	NFA			B (s)					B (s)						B (s)	B (s)	B (s)		
66	First Christian Church HOT	100003126	Western Search Area	NFA														RB (s)				

Notes:
Nature of Contaminants and Impacted Media at Cleanup Sites (as provided on Ecology's online Site Summary Report).
NFA = No Further Action

B Below Cleanup Level	R Remediated	(gw) Groundwater
C Confirmed Above Cleanup Level	RA Remediated-Above Cleanup Level	(sw) Surface Water
S Suspected	RB Remediated-Below Cleanup Level	(s) Soil

Table 4-2: Sites with EIM Contaminant Detections in Monitoring Wells and Nature of Site Exceedances

Map ID (See Fig. 4-1)	EIM Study ID	EIM Study Name	Facility ID	WHPZ	Cleanup Status[1]	Location ID	Most Recent Exceedance	Most Recent Sample Date	Clean Confirmation Sample	Nature of Contaminants in EIM Reported Detections											
										Benzene	Halogenated Solvents	Non Halogenated Solvents	Non-Halogenated Organics - Phenolic Compounds	Metals - EPA Priority Pollutant	Metals - Other	PAH	PCB	Petroleum- Diesel	Petroleum - Gasoline	Petroleum - Other	Petroleum - Other, Volatile
11	G1400032	Former Hambleton Brothers Log Yard	4399598	6-Month	NFA	G1400032-MW-07	4/17/2015	4/17/2015	N					GW				GW		GW	
						Freshwater Sediment	9/7/2011	9/7/2011	N				Sed	Sed		Sed					
						Soil	10/28/2011	8/26/2014	Y			S		S		S	S			S	
21	AO02TCPSR-3991	Former Chevron Bulk Terminal No. 207407	1043	6-Month	NFA	AO3991_MW5	6/30/2011	12/7/2015	Y									GW		GW	
						AO3991_MW6	6/3/2013	12/7/2015	Y									GW		GW	
						AO3991_MW9	6/30/2011	6/1/2015	Y											GW	
						AO3991_MW10	3/25/2011	6/2/2015	Y											GW	
						AO3991_MW12	3/25/2011	12/7/2015	Y									GW		GW	
						AO3991_MW13	3/15/2007	6/24/2008	Y									GW		GW	
						Soil	9/21/2014	9/21/2014	N							S		S	S	S	S
n/a	VCSW1182	ARCO 6008 (KT KANSO AM/PM), Washougal, WA	46212644	Eastern	NFA	SW1182MW_3	4/17/2013	4/17/2013	N					GW							
						VCSW1182SB_3	1/28/2011	1/28/2011	N					GW						GW	
						Soil	4/8/2013	3/4/2014	Y	S		S									
n/a	VCSW1430	George Schmid & Sons, Inc. 32nd Street Property, Washougal, WA	53281319	Eastern	NFA	VCSW1430-GP09	4/20/2012	4/20/2012	N									GW		GW	
						VCSW1430-GP10	4/20/2012	4/20/2012	N					GW							
						VCSW1430-GP13	4/20/2012	4/20/2012	N					GW	GW						
						VCSW1430-GP18	10/14/2013	10/14/2013	N									GW			
						VCSW1430-GP21	10/14/2013	10/14/2013	N							GW		GW			
						VCSW1430-MW01	1/12/2015	1/12/2015	N						GW			GW			
						VCSW1430-MW03	3/18/2014	9/16/2015	Y											GW	
						VCSW1430-MW04	10/6/2014	1/12/2015	Y					GW							
						Soil	2/19/2015	2/20/2015	N			S		S		S	S	S	S		

Abbreviations:
NFA = No Further Action
GW = Groundwater
Sed = Freshwater Sediment
S = Soil

Table 4-5: Parcel-of-Concerns, Categories, and Occurrence

Parcel Land-Use Description	Zoning Category	Land-Use Concern	Generalized Use Grouping for Land-Uses of Concern	Number of Parcels				
				6-Month Capture Zone	1-Year Capture Zone	5-Year Capture Zone	CARA	Western Search Area
Agricultural Buildings	Residential			1	1	1	0	0
Auto Body Shop	Commercial	High Concern	Auto-Boats-Fuel	0	0	0	0	1
Banks & Credit Unions	Commercial			1	2	2	0	4
Boats And Marine Accessories.	Commercial	Concern	Auto-Boats-Fuel	1	0	0	0	0
Cemeteries	Commercial	High Concern	Biohazards (cemeteries, crematories, feedlots, biofiltration, sewage infrastructure)	0	0	0	0	2
Churches, Synagogues, Temples, Sunday School Bldgs	Commercial			4	1	13	0	22
Communication Bldgs & Related Structures	Commercial			1	0	0	0	1
Community Center	Commercial			0	0	0	1	0
Community Shop Cntr W/ 1 Or More Anchors	Commercial			0	6	0	0	0
Convalescent Or Nursing Home	Commercial			0	0	0	0	1
Convenience Store - W/ Pumps & Tanks	Commercial	High Concern	Auto-Boats-Fuel	2	0	1	0	3
Convenience Store - W/O Pumps & Tanks	Commercial			0	0	1	0	0
Drive Through Car Wash	Commercial	Concern	Auto-Boats-Fuel	0	2	2	0	0
Dry Cleaners, Laundries (1 Tenant - Free Standg Bl	Commercial	High Concern	Dry Cleaners	0	0	0	0	1
Electric Power Boosters, Transformers, Stations, R	Commercial	Concern	Electrical Infrastructure	1	0	0	0	1
Electric Power Operating, Maint., And Repair Build	Commercial	Concern	Electrical Infrastructure	2	0	0	0	0
Espresso Stand	Commercial			0	0	0	0	1
Fast Food Rest & Other Drive Through Food Service	Commercial			4	6	0	0	3
Fleet Operation Centers & Storage	Commercial	Concern	Auto-Boats-Fuel	0	0	4	0	0
Flex Space	Commercial			1	10	0	1	0
Funeral Services And Crematories.	Commercial	High Concern	Biohazards (cemeteries, crematories, feedlots, biofiltration, sewage infrastructure)	0	0	0	0	4
Gas Storage Tanks, Pumping, Distribution, Pipeline	Industrial	Concern	Auto-Boats-Fuel	1	0	0	0	0
General Repair & Service Garages	Commercial	Concern	Auto-Boats-Fuel	0	1	4	1	2
Government Buildings	Commercial			0	0	1	0	0
Government Offices And Courts	Commercial			1	0	0	1	8
Granges, Lodges, & Meeting Halls	Commercial			1	0	0	0	0
Health Clinics: Medical / Dental / Other	Commercial	Concern	Medical	2	0	0	0	16
Highway Construction And Repair Contractors.	Commercial	Concern	Other	1	0	0	0	0
Large Grocery Store	Commercial			0	0	0	0	2
Law Enforcement (Except Jails[085 And 086]).	Commercial			1	0	0	0	0
Libraries.	Commercial			0	0	0	0	1
Lodging - Economy	Commercial			0	2	0	0	1
Lodging - Limited Service	Commercial			2	0	0	0	0
Manufactured Or Mobile Home Assessed With Land	Residential			0	2	7	0	1
Manufactured Or Mobile Home Not Assessed With Land	Residential			0	0	45	0	0
Marinas.	Commercial	Concern	Auto-Boats-Fuel	9	0	0	0	0
Medical & Dental Laboratories	Commercial	Concern	Medical	1	0	0	0	0
Medium Retail Building (Btwn 10,000 S.F. & 40,000	Commercial			2	0	0	0	0
Mfg - Lumber & Wood Products	Industrial	High Concern	Manufacturing	2	0	0	0	1
Mfg - Machinery	Industrial	Concern	Manufacturing	4	0	0	0	0
Mfg - Miscellaneous	Industrial	Concern	Manufacturing	2	0	0	0	0
Mfg - Paper Products	Industrial	High Concern	Manufacturing	0	0	0	0	5
Mhp / Court (Use For The Land Pid'S Of The Mh Cour	Commercial			0	0	2	0	0
Minimal Strg Bldgs, Equip, Sheds, Open Pole Bldgs	Residential	High Concern	Other	0	0	1	0	1
Misc. Bldg. With Office Functionality	Commercial			1	0	0	0	2
Miscellaneous Improvement On Its Own Pid	Residential			0	1	0	0	2
Motor Vehicle Dealers, New Cars And Small Trucks,	Commercial	Concern	Auto-Boats-Fuel	4	0	0	0	0
Motor Vehicle Dealers, Used Cars And Small Trucks.	Commercial	Concern	Auto-Boats-Fuel	0	0	1	0	0
Movie Theaters.	Commercial			0	0	0	0	2
Multi- Family 10 To 14 Units	Residential			1	0	4	0	4
Multi-Family 100 Or More Units	Residential			2	1	0	0	0
Multi-Family 15 To 19 Units	Residential			0	1	0	0	3

Table 4-5: Parcel-of-Concerns, Categories, and Occurrence

Parcel Land-Use Description	Zoning Category	Land-Use Concern	Generalized Use Grouping for Land-Uses of Concern	Number of Parcels				
				6-Month Capture Zone	1-Year Capture Zone	5-Year Capture Zone	CARA	Western Search Area
Multi-Family 20 To 29 Units	Residential			2	1	2	1	0
Multi-Family 30 To 49 Units	Residential			0	0	0	0	4
Multi-Family 5 To 9 Units	Residential			6	0	8	1	2
Multi-Family 50 To 99 Units	Residential			0	1	0	0	0
Neighborhood Strip Center With No Anchor	Commercial			3	3	0	1	0
Nurseries And/Or Commercial Greenhouses	Commercial			1	0	0	0	0
Office Bldg: Leasing Class B & C	Commercial			2	0	0	0	15
Parking Lot: Gravel, For Adjoining Building	Industrial	High Concern	Auto-Boats-Fuel	0	0	0	0	16
Parking Lot: Paved, For Adjoining Building	Industrial	Concern	Auto-Boats-Fuel	0	0	0	0	8
Parking Lots & Parking Structures	Commercial	Concern	Auto-Boats-Fuel	0	0	0	0	2
Parks With Playgrounds, Ball Fields, And Picnic Ar	Residential			18	0	1	1	4
Post Office, Mail Handling Facilities	Commercial			1	0	0	0	1
Prime Commercial Pad Site - Vacant	Commercial			0	0	0	0	1
Prime Developable Ground	Commercial			14	1	8	0	1
Private - Daycare Center & Preschool	Commercial			0	1	0	1	0
Pumping Station / City Well	Commercial			2	0	0	0	0
Railroad Right-Of-Way	Industrial			0	0	0	0	3
Restaurants, Cafes	Commercial			5	1	1	0	7
Retail Services	Residential			0	0	0	0	1
Retirement Residences & Alf'S (Asst Living Facilit	Residential			0	0	1	0	0
Rock Quarry, Crushing, Sand And Gravel Pits.	Commercial	Concern	Other	2	0	0	0	0
Self Service Car Wash (Wand Type)	Commercial	Concern	Auto-Boats-Fuel	0	3	0	0	0
Self Storage / Mini Warehouse	Commercial			14	9	2	1	0
Serv Station W/ Tanks & Pumps Or Card Lock Station	Commercial	Concern	Auto-Boats-Fuel	0	0	1	0	0
Service Repair Shop	Commercial	Concern	Auto-Boats-Fuel	0	1	5	0	6
Sewage Related Bldg Or Structure	Commercial	Concern	Biohazards (cemeteries, crematories, feedlots, biofiltration, sewage infrastructure)	0	0	0	5	0
Sfr Converted To Duplex	Residential			1	1	1	0	0
Sfr Converted To Office Functionality	Commercial			1	1	0	0	8
Sfr Convtd To 3-4 Units, With Kit, Bath & Ext Entr	Residential			0	0	0	0	5
Sfr On Comm Land Chgd To Comm Use Othr Than Office	Commercial			0	7	3	0	5
Sfr Unit Not Sharing Structure With Other Uses	Residential			252	137	871	89	304
Sfr Unit Sharing A Common Wall, W/Lot Ownership	Residential			15	0	20	0	4
Sfr Unit Sharing Premises With Other Major Use	Residential			0	0	0	0	1
Sfr With A Shared Major Use On Commercial Land.	Commercial			0	0	1	0	0
Sfr With Auxiliary Unit	Residential			1	0	0	0	0
Single Family Condominium Unit	Residential			0	0	44	14	9
Single Family Residence On Commercial Land	Residential			4	1	9	0	8
Small Retail Building (<10,000 S.F.)	Commercial			2	3	6	0	32
Social, Charitable Or Community Use Bldgs	Commercial			1	0	2	0	3
Storage Warehouse	Commercial	High Concern	Other	3	5	0	3	6
Taverns And Bars, Drink, And Dance Establishments.	Commercial			0	1	1	0	3
Tidelands	Commercial			0	0	0	23	2
Tire, Batteries, Parts And Accessories Dealers	Commercial	Concern	Auto-Boats-Fuel	1	1	1	0	0
Traditional Duplex	Residential			12	10	40	21	13
Triplex Or Fourplex	Residential			3	2	19	4	3
Unattached Parking For Profit	Commercial			0	0	0	0	1
Unused Buildings Other Than Residential.	Commercial			0	0	1	2	0
Unused Land Because Of Terrain.	Industrial			1	0	0	0	0
Unused Land Timbered.	Residential			1	0	2	0	3
Unused Or Vacant Land - No Improvements	Commercial			44	6	42	8	39
Unused Platted Land.	Commercial			14	4	2	6	6

Table 4-5: Parcel-of-Concerns, Categories, and Occurrence

Parcel Land-Use Description	Zoning Category	Land-Use Concern	Generalized Use Grouping for Land-Uses of Concern	Number of Parcels				
				6-Month Capture Zone	1-Year Capture Zone	5-Year Capture Zone	CARA	Western Search Area
Vacant	Residential			0	0	0	1	1
Veterinarians / Small Animal Hospitals.	Commercial	Concern	Medical	0	1	0	0	0
Warehouse Buildings 201-209	Commercial			0	0	1	0	0
Water Towers & Reservoirs	Industrial			9	0	0	0	0
Wedding Chapels, Dance Halls, Ballrooms	Commercial			1	0	0	0	0
Zero Value Property For Various Reasons	Residential			6	3	20	6	1

Notes:
See Appendix C for detailed descriptions of parcels of concern
“Biohazards” include: cemeteries, crematories, feedlots, biofiltration and sewage infrastructure. “Electrical infrastructure” includes: boosters, transformers and stations. “Medical” also includes dental and veterinary. “Manufacturing” includes chemical, wood, machinery, paper, plastic. “Other” includes storage, parking, quarries, sand/gravel pits and crushing operations
CARA = extended CARA

Table 4-8: PFAS Industry Sites

PFAS Site Ranking	Map ID	Facility Name	Facility ID	WHPZ	Risk Active Status	Distance from Well 13 (Miles)	Historic Site Review Assigned Color	PFAS Industrial Sites - Historical Activities Related to PFAS Contamination																Spills and Reported Releases
								Paper Mills and Products	Lumber Processing	Textiles and Leather	Metal Plating, Finishing, Machining	Electronics Industry	Chemical Manufacturing	Chemical Storage	General Warehouse and Storage	Auto Stations/Garages	Car Wash	Dry Cleaning Facilities	Concrete Production	Waste Management; Water Treatment	Airports	Fire Stations; Fire Protection	Plastics and Resins	
1	6	Columbia Rock Concrete Products Inc	5016308	6-Month	Active	0.3	5-Amber												Y					Y
2	46	Georgia Pacific Consumer Products	66765272	Western Search Area	Active	0.6	1-Red	Y					Y							Y				Y
3	1	Camas Police Department	22289	6-Month Well 13	Active	0.4	6-Amber													Y				Y
4	45	Camas City Operations Center	38772238	CARA	Active	0.5								M		Y								Y
5	43	Gk Construction & Equipment Rentals	4168647	CARA	Active	0.5								M		Y								Y
6	7	Concrete Products Of Oregon LLC (Jensen Precast Camas)	70983458	6-Month	Active	0.3	5-Amber												Y					
7	8	Triangle Resources	3153967	6-Month	Active	0.5			Y											Y				
8	55	Haag & Shaw Excavating	82973453	Western Search Area	Active	0.4										Y								
9	42	Camas STP	74959167	CARA	Active	0.6														Y				Y
10	12	Tidland Corporation	7282918 88277363	6-Month	Active	0.7	24-Amber				Y			Y										
11	48	Camas City Shops	8698751 45416761	Western Search Area	Active	0.6	14-Amber								Y	M								
12	47	Camas Foodmart (Browns Chevron)	18732618	Western Search Area	Active	0.5	7-Amber									Y								
13	11	Hambleton Bros Lumber Co Inc	87338713 4399598	6-Month	Inactive	0.7	32-Amber		Y					Y										
14	51	Westlie Ford Mercury Inc	61664371	Western Search Area	Inactive	0.6	13-Amber							M										Y
15		Imperial Dry Cleaners & Laundry		Western Search Area	Active	0.6	15-Amber											Y						
16		2500 NE 3rd Ave		CARA	Inactive	0.6	16-Amber															M		Y
17	53	Quick Stop Mart (Camas Mart)	33881994	Western Search Area	Active	0.6	17-Amber									Y								
18	30	Washougal Electric & Sheet Metal Inc	16327542	1-Year	Inactive	1.3	37-Amber				Y	Y		Y										
19	52	Camas Gas Services Inc (Browns Arco)	97188815	Western Search Area	Inactive	0.5	8-Amber									Y								
20	65	Imperial Cleaners	78239817	Western Search Area	Inactive	0.5	10-Amber											Y						
21	23	Us Doe Bpa Camas Substation	3811629	6-Month	Active	0.7						Y												
22		Straubs Swank Memorial Chapel		Western Search Area	Inactive	0.5	11-Amber									Y								
23		Camas Shell		Western Search Area	Inactive	0.5	9-Amber									Y								
24	49	Verizon Northwest Inc Camas Co (GTE Northwest Inc)	89994319	Western Search Area	Active	0.6								M										
25		M&M Car Wash		1-Year	Active	1.1	36-Amber										Y							M
26	61	Camas City Old Sewage Treatment Plant	53821114	Western Search Area	Inactive	0.6														Y				
27		Ulbrich Stan & Sue		Western Search Area	Inactive	0.6	18-Amber											Y						
28	39	Overton Mfg Inc	49392144	5-Year	Inactive	1.8					Y			Y		Y								
29		Camas Chevron Service		Western Search Area	Inactive	0.6	21-Amber									Y								
30	10	Columbia Warehouse (Iron Gate Storage)	37125488	6-Month	Active	1.0	30-Amber								Y									

Table 4-8: PFAS Industry Sites

PFAS Site Ranking	Map ID	Facility Name	Facility ID	WHPZ	Risk Active Status	Distance from Well 13 (Miles)	Historic Site Review Assigned Color	PFAS Industrial Sites - Historical Activities Related to PFAS Contamination																
								Paper Mills and Products	Lumber Processing	Textiles and Leather	Metal Plating, Finishing, Machining	Electronics Industry	Chemical Manufacturing	Chemical Storage	General Warehouse and Storage	Auto Stations/Garages	Car Wash	Dry Cleaning Facilities	Concrete Production	Waste Management; Water Treatment	Airports	Fire Stations; Fire Protection	Plastics and Resins	Spills and Reported Releases
31	15	Tarr Inc Washougal (Iron Gate Storage)	3264254	6-Month	Active	1.0	30-Amber								Y									
32	59	Helen Brothers Service (CEASARS UNION 76)	65648254	Western Search Area	Inactive	0.7	23-Amber									Y								
33	36	Hi Way Fuel	22538744	5-Year	Active	1.8										Y	Y							
34	13	Northwest Pipeline Gp Washougal M/S	14447751	6-Month	Active	0.7	25-Amber							M										
35	26	Lacamas Dry Cleaners	49143	1-Year	Active	1.1	34-Amber											Y						
36	35	Asher Engine Service (East County Auto)	94778244	5-Year	Active	1.8	47-Amber									Y								Y
37	27	Walgreens 1085	99999862	1-Year	Active	1.1	35-Amber						Y											
38	9	Columbia Storage Inc 2nd St	11338232	6-Month	Inactive	0.8									Y									
39		Camas Transmission (Racers Division)		1-Year	Active	1.2	40-Amber									Y								
40	32	All Seasons Auto Centers Inc Camas	18768638	1-Year	Active	1.2	39-Amber									Y								
41	29	Goodyear Tire Camas	85837922	1-Year	Active	1.2	39-Amber									Y								
42	31	Schucks Auto Supply Camus	52218486	1-Year	Active	1.2	39-Amber									Y								
43		Stanford Cleaners		6-Month	Inactive	1.0	27-Amber											Y						
44		Cavalier Cleaning Corp of Washington		W Camas	Inactive	1.0	29-Amber											Y						
45	21	Chevron Bulk Plant Camas	1043	6-Month	Inactive	0.5	12-Amber							M										
46		Orbit Industries, LLC	1052	Columbia Industrial Park	Unknown	2.7					Y			Y							M			
47		Intech Enterprises	17695 92774682	Columbia Industrial Park	Active	2.7					Y									Y				
48	38	Washougal School Dist Bus Garage	48371594	5-Year	Active	1.7										Y								
49	64	QWEST Camas N Rptr Bldg	43889368	Western Search Area	Inactive	0.6								M										
50		Burlington Environmental LLC (Clean Earth; Stericycle)	1018	Columbia Industrial Park	Active	2.9								Y						Y				
51		Noble William E & J W		W Camas	Inactive	1.2	38-Amber									Y								
52	25	Clark PUD Transformer Release J Street	100003734	1-Year	Inactive	1.2						Y												
53		Hansens One Stop Service		1-Year	Inactive	1.2	41-Amber									Y								
54		Dolinsky Joseph		1-Year	Inactive	1.3	42-Amber									Y								
55		CWFD - A St Station		Beyond CARA	Active	1.9																Y		
56	33	Brass Lamp Motor Inn	64124152	1-Year	Inactive	1.3									Y									
57		Freeman Rick		W Camas	Inactive	1.4	43-Amber									Y								
58	37	Washougal Shell	57872946	5-Year	Inactive	1.4	45-Amber									Y								
59		Miller Manufacturing	23944	Columbia Industrial Park	Inactive	2.8				Y													Y	
60		Lake Store James E Pidgeon	86115375	N Camas	Inactive	1.4	44-Amber									Y								
61		Pendleton Woolen Mills	1020 15438643	Beyond CARA	Active	2.2	49-Amber			Y														
62		East County Fire and Rescue Station 91		N Camas	Active	2.7																Y		
63	40	Napa Washougal	79581825	5-Year	Inactive	1.9										Y								
64		Grove Field Port of Camas		N Camas	Active	2.8															Y			

Table 4-8: PFAS Industry Sites

PFAS Site Ranking	Map ID	Facility Name	Facility ID	WHPZ	Risk Active Status	Distance from Well 13 (Miles)	Historic Site Review Assigned Color	PFAS Industrial Sites - Historical Activities Related to PFAS Contamination																
								Paper Mills and Products	Lumber Processing	Textiles and Leather	Metal Plating, Finishing, Machining	Electronics Industry	Chemical Manufacturing	Chemical Storage	General Warehouse and Storage	Auto Stations/Garages	Car Wash	Dry Cleaning Facilities	Concrete Production	Waste Management; Water Treatment	Airports	Fire Stations; Fire Protection	Plastics and Resins	Spills and Reported Releases
65		ARCO #6008 (KT KANSO AM/PM)	46212644	Beyond CARA	Active	1.9	48-Amber							M		Gas Only								
66		Linear Technology Corp (Analog Devices, Inc.)	29115524	NW Camas	Active	3.0						Y												
67		Northwest Paper Box Manufacturers	99998131	NW Camas	Active	3.0		Y																
68		East County Fire and Rescue Station 93		N Washougal	Active	3.2																Y		
69		CWFD Station 42		NW Camas	Active	3.2																Y		
70		nLight Inc Camas	98835	W Camas	Active	3.2						Y												
71		Kemira Chemicals Inc Washougal Plan	68766465	Columbia Industrial Park	Active	3.3							Y											
72		Fiber Web Washougal Inc (Fitesa Washougal)		Columbia Industrial Park	Active	3.5				Y														
73		City of Washougal Wastewater Treatment Plant	100002147 20657 5618	Columbia Industrial Park	Active	3.5														Y				
74		Norwesco	19457 74135527	Columbia Industrial Park	Active	3.6																	Y	
75		Piller Aimmco Grant St	3811	Columbia Industrial Park	Active	3.6																	Y	
76		Wafer Tech LLC (TSMC Washington)	12734887	NW Camas	Active	3.7						Y												
77		Landa Inc	9810176	NW Camas	Inactive	3.0					Y													
78		Betz Dearborn Washougal		Columbia Industrial Park	Inactive	3.0							Y											
79		Saint Gobain Crystals and Detectors	74582235	Columbia Industrial Park	Inactive	3.1						Y												
80		Sigma Design	83917959	NW Camas	Inactive	3.2						Y												

Notes:

Beyond CARA = east of the defined CARA

Columbia Industrial Park = The industrial park northeast of Captain William Clark Park, south of Highway 14 in Washougal, and west of Steigerwald Lake National Wildlife Refuge

M = the site may or may have performed the listed activity

N = North

NW = Northwest

PFAS = Per- and polyfluoroalkyl substances

WHPZ = Wellhead Protection Zone

Y = Yes, site is or was known to perform the listed activity

Table 4-9a: Summary of Available PFAS Results Through CY 2025, City of Camas

Sampling Location	DOH Source No.	Testing Date	Result Summary
SOURCE			
City Well No. 5	06	3/22/2022	PFBS, PFOA, *PFOS*
		8/5/2022	(PFBA), PFBS, *PFOA*, *PFOS*
		11/9/2022	(PFBA), PFBS, (PFHxA), *PFOA*, *PFOS*, (PFPeA)
		4/4/2023	PFBS, *PFOS*
		7/3/2024	PFBS, *PFOA*, *PFOS*, (PFHxA)
City Well No. 6	07	4/4/2023	Not Detected
		9/27/2023	PFBS, (PFHpA), (PFHxA), PFOA, *PFOS*, (PFPeA)
City Well No. 7	08	4/4/2023	Not Detected
		9/27/2023	Not Detected
City Well No. 8	09	9/27/2023	Not Detected
City Well No. 9	11	3/22/2023	Not Detected
		9/27/2023	Not Detected
		8/6/2025	Not Detected
City Well No. 10	15	9/27/2023	Not Detected
City Well No. 11	13	4/4/2023	Not Detected
		9/27/2023	PFOA, PFOS
City Well No. 12	14	9/27/2023	Not Detected
City Well No. 13	16	8/5/2022	PFBS, PFOA, **PFOS**
		12/5/2022	PFOA, **PFOS**
		3/23/2023	PFOS
		5/4/2023	PFOS
		6/8/2023	*PFOS*
		6/13/2023	PFOA, *PFOS*
		6/22/2023	PFOA, *PFOS*
		7/13/2023	PFBS, *PFOA*, **PFOS**
		10/25/2023	PFBS, *PFOA*, *PFOS*
		12/5/2023	PFBS, PFOA, *PFOS*
		3/28/2024	Not Detected
		7/3/2024	*PFOS*
City Well No. 14	17	7/13/2023	PFBS, PFOA, *PFOS*
		9/27/2023	Not Detected
		7/11/2024	Not Detected
DISTRIBUTION SYSTEM			
Jones Creek	01	9/27/2023	Not Detected
Well Field East (City Wells No. 6 or 14)	18	3/22/2022	PFOS
		11/9/2022	PFBS, PFOA, *PFOS*
		7/13/2023	PFBS, PFOA, *PFOS* [detections from Well No. 14]
		9/27/2023	PFBS, (PFHpA), (PFHxA), PFOA, *PFOS*, (PFPeA) [detections only in Well No. 6]
Oak Park Well Field (City Wells No. 7, 8, 10, 11, or 12)	19	3/22/2022	PFOS
		11/9/2022	PFOA, *PFOS*
		4/4/2023	*PFOS*
		7/13/2023	PFBS, PFOA, PFOS
		9/27/2023	PFOA, PFOS [detections only in Well No. 11]
		9/10/2024	PFOS
5711 SE Strong Road		8/23/2023	PFOS
27200 Robinson Road		9/11/2023	PFOS
Deer Haven		9/11/2023	PFOA, *PFOS*
Crown Park		9/11/2023	PFOA, *PFOS*
NE Sitka Dr		9/11/2023	PFOS
NW Woodburn Drive		10/5/2023	PFOA, *PFOS*
1620 SE 8th Ave		10/5/2023	PFOA, *PFOS*
2822 NW 18th Ave		10/5/2023	PFOA, *PFOS*
North Chestnut Street		10/5/2023	*PFOS*
4542 NW Rae Ct		10/5/2023	PFOA, *PFOS*
Stone Leaf		10/5/2023	Not Detected
Columbia River Bank Pearl		11/1/2023	Not Detected
Washougal River (Goot Park)		11/1/2023	Not Detected

Formatting Notes:
PFAS - below EPA MCL
PFAS - above EPA MCL, below Washington SAL
PFAS - above Washington SAL
(PFAS) - detected but no standard established

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Table 4-9b: Summary of Available PFAS Results Through CY 2025, City of Washougal

Sampling Location	DOH Source No.	Testing Date	Result Summary
PRE-TREATMENT			
City Well No. 6	Unknown	late 2023	PFOA, *PFOS*
City Well No. 7	Unknown	late 2023	PFOA, *PFOS*
Unknown	04	4/16/2024	PFBS, PFOA, *PFOS*
		7/16/2024	PFOA, PFOS
		2/18/2025	Not Detected
Unknown	05	4/18/2024	PFOA, *PFOS*
		7/16/2024	PFBS, (PFHxA), PFOA, PFOS
Unknown	06	2/1/2024	PFOA, *PFOS*
		7/16/2024	PFHxS, (PFHxA), PFOA, *PFOS*
Unknown	07	2/1/2024	*PFOS*
		7/16/2024	Not Detected
Unknown	11	4/16/2024	PFBS, PFOA, *PFOS*
		7/16/2024	Not Detected
Unknown	13	4/16/2024	PFBS, (PFHxA), *PFOA* , *PFOS*
		7/16/2024	Not Detected
POST-TREATMENT			
Unknown	04	10/8/2024	Not Detected
Unknown	05	4/18/2024	PFOS
		7/16/2024	Not Detected
		10/8/2024	PFOS
		2/18/2025	PFBS, PFOA, *PFOS*
Unknown	06	2/1/2024	PFOA, *PFOS*
		7/16/2024	Not Detected
		10/8/2024	PFOS
		2/18/2025	PFBS, PFOA, *PFOS*
Unknown	07	2/1/2024	*PFOS*
		7/16/2024	Not Detected
		10/8/2024	PFOS
		2/18/2025	PFBS, PFOA, *PFOS*
Unknown	11	4/16/2024	PFBS, (PFHxA), PFOA, *PFOS*
		7/16/2024	PFBS, PFHxS, PFOA, *PFOS*
		10/8/2024	PFBS, PFOA, *PFOS*
		2/18/2025	PFBS, (PFHxA), PFOA, *PFOS*
Unknown	13	4/16/2024	PFBS, (PFHxA), PFOA, *PFOS*
		7/16/2024	PFBS, PFHxS, PFOA, *PFOS*
		10/8/2024	PFBS, (PFHxA), PFOA, *PFOS*
		2/18/2025	PFBS, PFOA, *PFOS*

Formatting Notes:
PFAS - below EPA MCL
PFAS - above EPA MCL, below Washington SAL
PFAS - above Washington SAL
(PFAS) - detected but no standard established

FIGURES

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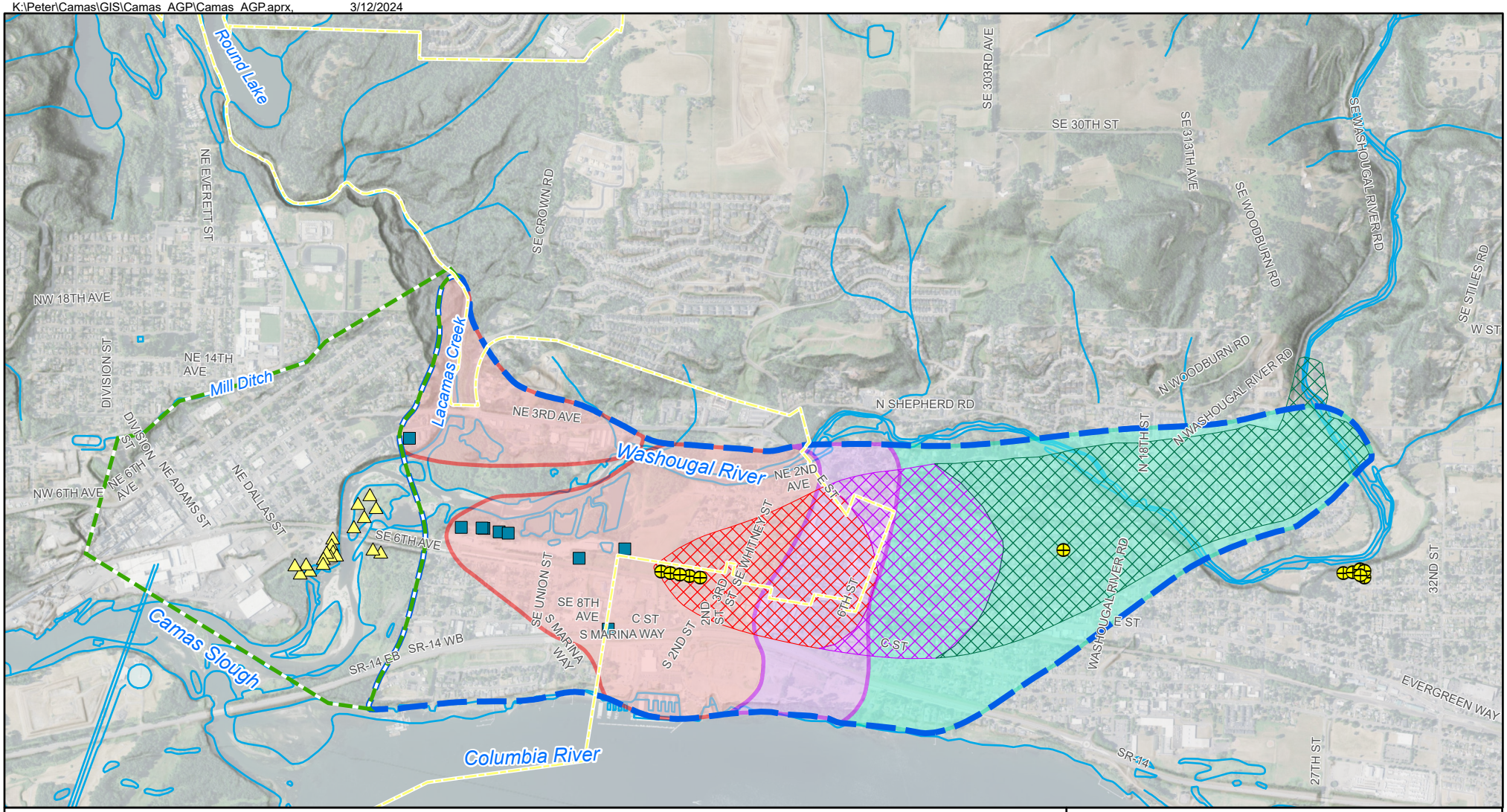


Camas Wellhead Protection Capture Zones

- 6 Month Capture Zone
- 1 Year Capture Zone
- 5 Year Capture Zone
- Critical Aquifer Recharge Area (CARA)

Washougal Wellhead Protection Capture Zones

- 6-Months
- 1-Year
- 5-Year

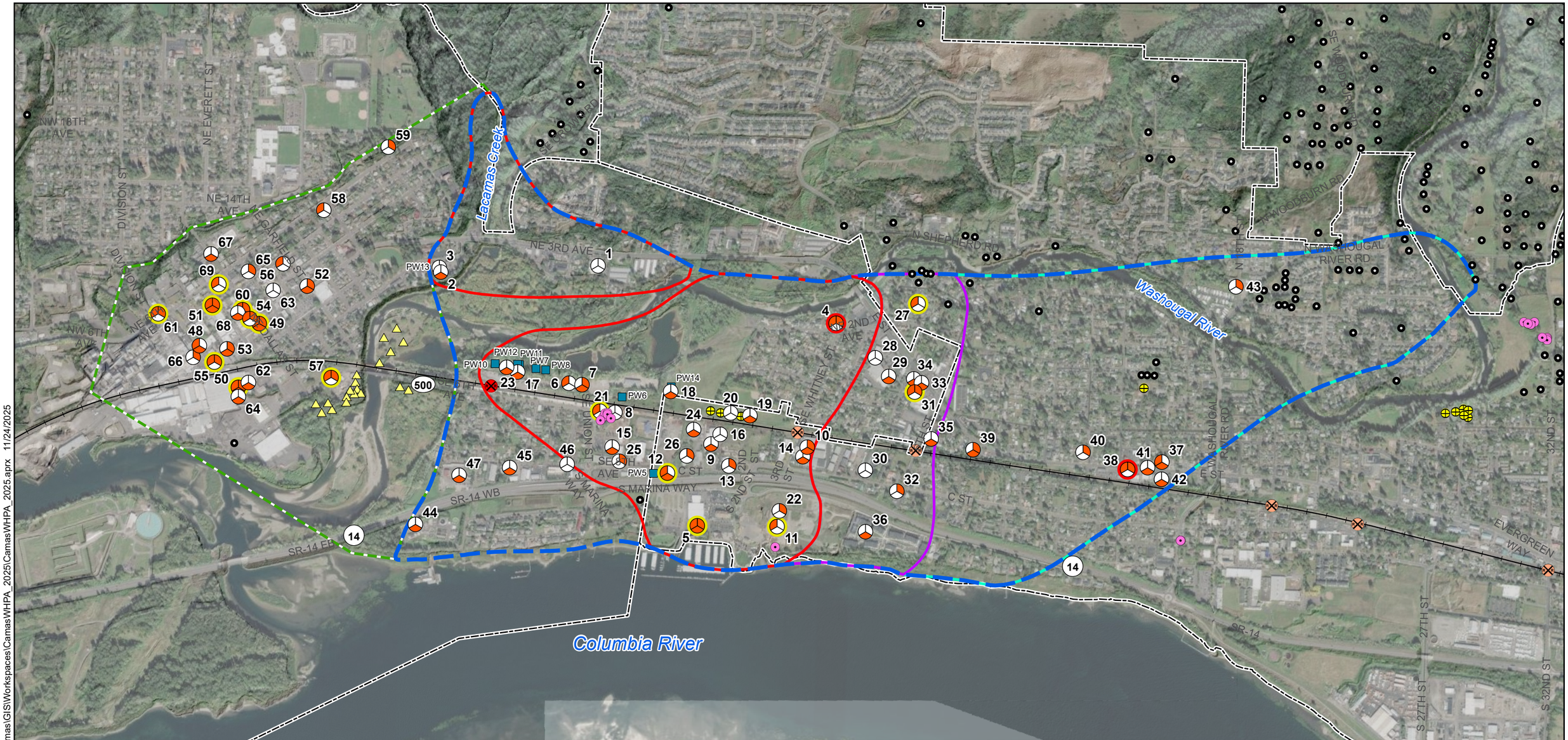
- Camas Supply Wells
- Washougal Supply Wells
- Georgia Pacific Supply Wells
- Western Search Area
- City Boundary

0 Feet 2,000

Figure 1-1
Contaminant Source Inventory - Search Areas

WHPA 2025

Strata Geosciences



- Camas Supply Wells
- Washougal Supply Wells
- Georgia Pacific Supply Wells
- 6 Month Capture Zone
- 1 Year Capture Zone
- 5 Year Capture Zone
- Critical Aquifer Recharge Area (CARA)
- Western Search Area
- City Limits
- Railroad Crossing (Public)
- Railroad Crossing (Private)
- BNSF Railroad
- Septics (from County 2025)
- Prior Contaminant Detections in Groundwater

DOE Sites of Concern

- Known Release
- NFA
- Table ID → 11
- Cleanup Site → 11
- UST/LUST
- Hazardous Materials

Refer to Section 7.4, Tables 7-1a and 7-1b, and Appendix C for description.

0 Feet 1,000

N

Figure 4-1
Potential Contaminant Sources of Concern

WHPA 2025

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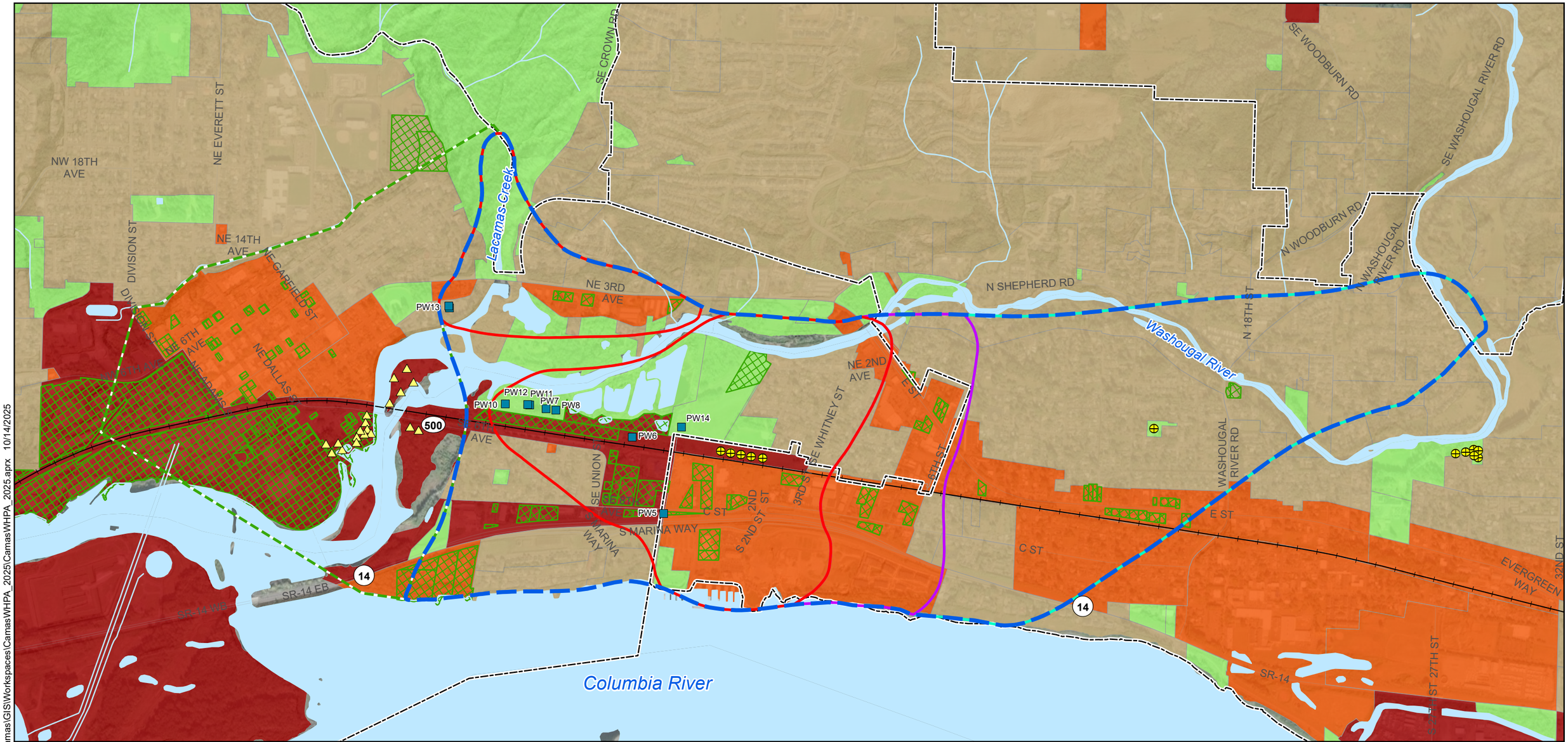

- Camas Supply Wells
- Washougal Supply Wells
- Georgia Pacific Supply Wells
- 6 Month Capture Zone
- 1 Year Capture Zone
- 5 Year Capture Zone
- Critical Aquifer Recharge Area (CARA)
- Western Search Area
- BNSF Railroad
- City Limits
- Land Uses of Concern

Zoning Categories

- Industrial
- Commercial
- Residential
- Parks

0 Feet 1,000

N

Figure 4-2

Zoning Categories and Parcels of Concern

WHPA 2025

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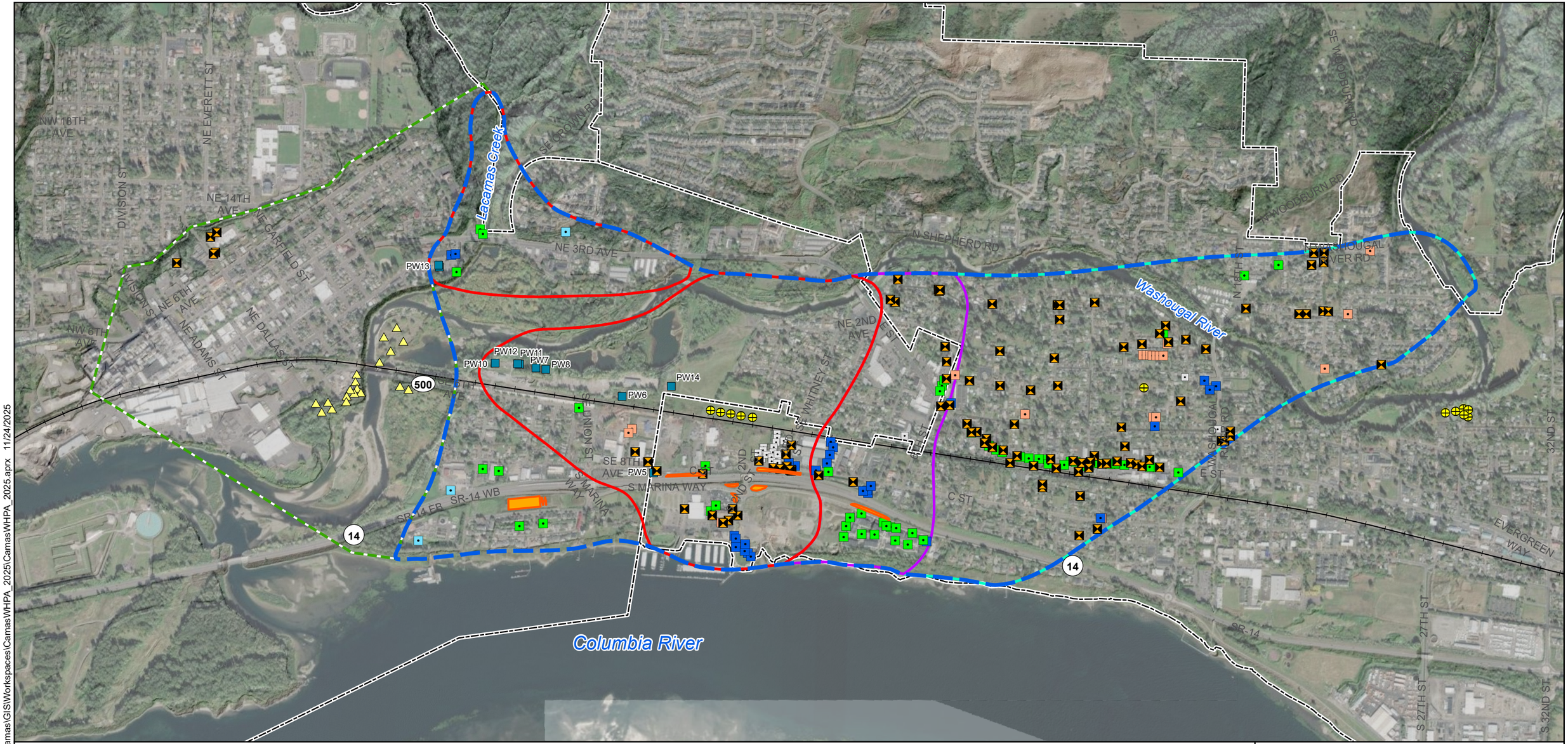

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- Camas Supply Wells
- Washougal Supply Wells
- Georgia Pacific Supply Wells
- 6 Month Capture Zone
- 1 Year Capture Zone
- 5 Year Capture Zone
- Critical Aquifer Recharge Area (CARA)
- Western Search Area
- City Limits
- BNSF Railroad
- WSDOT Infiltration Areas
- Drywell
- Bioretention Facility/Swale
- Detention Pond
- Permeable Pavement
- Rain Garden
- Other Infiltration Facility

0 Feet 1,000

N

Figure 4-3
Stormwater Infiltration and Management Areas

WHPA 2025

Strata Geosciences

Supply Wells

Owner

- Camas Supply Wells
- Washougal Supply Wells
- Georgia Pacific Supply Wells
- Critical Aquifer Recharge Area
- 6 Month Capture Zone
- 1 Year Capture Zone
- 5 Year Capture Zone
- Western Search Area
- City Limits
- BNSF Railroad
- Arterials - base, surfgeo
- Pfas_Facilities

Figure 4-4

PFAS Facilities

WHPA 2025

Strata Geosciences

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APPENDIX A
ENVIRONMENTAL SITES INFORMATION

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1.0 ENVIRONMENTAL SITES INFORMATION

The following 22 sites are indicated as confirmed release sites in Table 4-1a and Table 4-1b. Mapped environmental sites within the Lower Washougal Wellfield Wellhead Protection Area (WHPA) (sites detailed in 1.1) are of primary concern to the City of Camas supply wells. The remaining sites (detailed in 1.2) are within the Western Search Area and should be considered a secondary concern to existing City of Camas supply wells.

Two additional sites with EIM-reported groundwater exceedances near the Eastern border of the CARA are included in 1.3.

Copies of Cleanup Site reports and documents reviewed for this report can be obtained from the Seattle office of Strata Geosciences by contacting Burt Clothier.

1.1 ENVIRONMENTAL SITES WITHIN THE LWWF WELLHEAD PROTECTION AREA

1.1.1 Philpot (FSID 12088, CSID 14631, Map ID=4)

The Philpot residential site is located at 301 NE 2nd Avenue. A 675-gallon UST containing fuel and a 350-gallon Heating Oil Tank (HOT) were decommissioned via removal in 2016. At the time of removal, the soil surrounding the UST and HOT were tested for gasoline and diesel respectively. Results indicated a petroleum release had occurred at the site and the Washington DOE was notified. Excavation of the area was performed following tank removal and follow-up NWTPH-Dx analysis indicated that petroleum impacts remained in the eastern wall and base of the excavation in levels as high as 9,520 mg/Kg. The MTCA Method A cleanup level for diesel in soil is 2,000 mg/Kg. In addition to the confirmed diesel contamination in the soil, it is suspected that there is remaining gasoline products in soil and both petroleum products are also suspected in groundwater. An Early Notice Letter for the site was delivered to the site owner in August 2018, and the site is listed as Cleanup Started. Currently at the site, one 500 gallon unleaded gasoline UST is listed as closure in progress and one 500 gallon tank of hazardous substance is listed as Exempt-Operational.

1.1.2 Camas Washougal Port (FSID 92847997, CSID 11089, Map ID=5)

The Camas Washougal Port (Port Sider Store on the Marina) site is located at 24 South A Street in Washougal and conducted cleanup for a leaking underground storage tank. Initial site characterization and cleanup work for benzene, non-halogenated organics, and gasoline began in 1990 with additional investigative work performed in 2011. Soil concentrations have been confirmed below cleanup levels, and the site was issued a No Further Action by Ecology in 2012. The site remains a Class 4 Facility under WAC 173-180.

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1.1.3 Columbia Rock Concrete Products (FSID 5016308, CSID 1548, Map ID=6)

The Columbia Rock Concrete Products site is located at 1615 SE 6th Avenue, and has documented soil and groundwater contamination based on a 2001 investigation. The site is located immediately adjacent to several of the City's water supply wells. Operations at the site includes production of concrete moldings (primarily Jersey barriers and sound wall barriers). A site hazard assessment was completed by Clark County Public Health in 2007, with the site receiving a ranking of "2" indicating that it poses a serious threat to human health and the environment. Results of a Phase II Environmental Assessment completed in 2001 found impacts to soil and groundwater. Contaminants of concern (above MTCA Cleanup Levels) identified during the Phase II assessment are petroleum products (diesel, gasoline, and heavy range oils) in soils and metals (arsenic, chromium, lead and barium) in groundwater. The concentration of metals in groundwater were reported as:

- Arsenic = 73.1 µg/L (MTCA Level A = 5 µg/L)
- Chromium = 641 µg/L (MTCA Level A = 50 µg/L)
- Lead = 498 µg/L (MTCA Level A = 15 µg/L)
- Barium = 5880 µg/L (MTCA Level B = 3200 µg/L)

The site was placed on the national priorities list in 2007 and is awaiting a remedial assessment (RA). No other information or action has taken place at the site since these activities and Ecology has no plans for taking action in the immediate future (personal communication with Kirsten Alvarez at Ecology 10/31/16).

1.1.4 Hambleton Bros Log Yard (FSID 4399598, CSID 2482, Map ID=11)

The Hambleton Bros. Log Yard is a historic lumber mill along the Columbia River located at 335 South A Street, now managed by the Port of Camas-Washougal. The mill, including chemical storage and aggregate recycling, operated on the property from approximately 1948 to 2010. Wood-treating activities were reported to not be conducted on the Hambleton Site. The site was purchased by the Port of Camas-Washougal in 2012. Site investigations and interim actions have taken place at the site since 2002 and a Focused Site Assessment was conducted in 2011 to evaluate the nature and extent of contamination at the site. Site investigations indicate contaminants above MTCA Method A cleanup levels (CULs) in groundwater, soil, log pond surface water, and log pond sediments. Contaminants found above CULs included:

- Groundwater: Petroleum hydrocarbons and arsenic.
- Soils (near log pond, mill area, and recycling center): Petroleum hydrocarbons, metals (arsenic, lead, and mercury), cPAHs, and PCBs.
- Log Pond Surface Water: metals, petroleum hydrocarbons, VOCs and PAHs
- Log Pond Sediments: VOCs and petroleum hydrocarbons

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- Four sediment samples were also collected from the Columbia River were found to all be below Ecology's Freshwater criteria.

A cleanup action plan (CAP) was developed for the site in 2013 and implemented in 2014. Components of the CAP included dewatering the log pond, consolidating impacted soils into the empty pond, site grading, and capping of the log pond, former mill area and recycling area. Institutional controls to restrict future site use were also included. A No Further Action status was granted to the Port in 2015; however, the Port is required to continue groundwater compliance monitoring at MW-7 for petroleum hydrocarbons on an 18-month schedule until groundwater CULs are achieved. The most recent groundwater sampling results from MW-7 that are accessible on Ecology's Cleanup Page for the site were collected in April 2024, at which time both Diesel Range Organics and Lube Oil range organics were not detected.

The Port completed over-excavation of unsuitable soils and replacement with structural fill for the construction of the Hyas Point Phase 1a and 1b developments that impacted the protective gravel and geotextile cap that was part of the cleanup action. The excavation began on August 7, 2024 and was completed on November 21, 2024. On September 11, 2024, one UST was discovered while excavating the organic-rich soil north of the cap area in an area previously noted as not being environmentally contaminated. The UST was inadvertently damaged by the excavator upon discovery. The UST was not active at the time of discovery and was void of any liquid product, however, approximately five gallons of water was observed draining from the damaged UST upon discovery. PID readings of up to 65 parts per million were observed within the UST. On September 25, 2024, visually stained soils and a degraded hydrocarbon odor were observed to a depth of approximately 10 feet below ground surface (bgs). One confirmation sample taken from within the excavation exceeded 2013 Washington DOE Cleanup Action Levels for diesel range organics, residual range organics, 1,2-dibromomethane, and methylene chloride.

1.1.5 Northwest Pipeline Gp Washougal M/S (FSID 14447751, CSID 420, Map ID=13)

The Northwest Pipeline GP Washougal Meter Station (M/S) site is located at 30 C Street, Washougal. This site was participating in the VCP program for soil and mercury contaminants in soils. Early remedial action performed in 1991 consisted of removal of three drums of soil in a 14-square foot area. Further site assessment work was performed in 2006 and 2007 with collection of 75 surface and subsurface soils samples. Additional soils were excavated in 2007 and confirmation samples were below cleanup levels. The site was issued a No Further Action status by Ecology in 2012.

1.1.6 Chevron Bulk Plant / Former Chevron Bulk Terminal No. 207407 (FSID 1043, CSID 3783, Map ID=21)

The Chevron Bulk Plant site is a decommissioned bulk fuel facility with historic releases of contaminants to soil and groundwater located at SE 6th Avenue and SE Union Avenue. Chevron sold the property in November 1994 to Triangle Resources (FSID 3153967) who uses the property for wood recycling. The site is located in close proximity to City Well 6. A Site Hazardous Assessment (SHA) was originally completed for the site in 1995, and at that time Ecology assigned a ranking of "2" to

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this site, indicating the site posed a serious threat to human health and the environment. Early investigative work conducted during the 1990's included soil borings and sampling, installation of groundwater monitoring wells, and remedial excavation of a sump containing an oil/water mixture and 830 cubic yards of impacted soils. Contaminants of concern at the site include petroleum products in soil and groundwater and priority pollutant metal (lead) in soil. In 2003, Chevron entered an agreed order with Ecology to conduct a formal Remedial Investigation, Risk Assessment, and Feasibility Study (RI/RA/FS) under MTCA and to implement any corrective actions identified in the RI/RA/FS.

Additional soil borings and monitoring wells were installed between 2004 and 2014. Of the soil samples collected in September 2014:

- SB-4-15 exceeded for Gasoline Range Organics and Extractable Petroleum Hydrocarbons (>C10-C12, >C12-C16, >C16-C21)
- SB-5-16 exceeded for 2-methylnaphthalene (PAH), Gasoline Range Organics, Extractable Petroleum Hydrocarbons (>C10-C12, >C12-C16, >C16-C21, >C21-34), and Volatile Petroleum Hydrocarbons (>C8-C10)
- SB-6-19 exceeded for Gasoline Range Organics, Extractable Petroleum Hydrocarbons (>C10-C12, >C12-C16, >C16-C21, >C21-34), and Volatile Petroleum Hydrocarbons (>C8-C10)

Groundwater samples collected at the site between 2006 and June 2013 regularly exceeded for Diesel Range Organics and Heavy Fuel Oil. Follow-up sampling occurred through December 2015. The highest detection of Diesel Range Organics after June 2013 was 120 µg/L in June 2015. There were no detections of Heavy Fuel Oil during the follow-up sampling.

The RI was completed in 2015 following more than eight quarters of groundwater sampling showing Total Petroleum Hydrocarbon (TPH) contamination below MTCA Method A groundwater cleanup levels (CULs). Ecology held a public comment period between December 23, 2018 and January 23, 2019 during which no comments were received. The site status was changed to No Further Action by Ecology in 2019, and Ecology will finalize the Remedial Investigation and Cleanup Action Plan reports and remove the site from the Hazardous Sites List.

1.1.7 Clark PUD Transformer Release J Street (FSID 100003734, CSID 17230, Map ID=25)

The Clark PUD Transformer Release J Street is located at 455 J Street, Washougal. Clark County Public Utilities Department (PUD) reported a release of 5-10 gallons of non-PCB mineral oil from a transformer to soil in June 2021. The impacted soil was removed in two mobilizations between June and August of 2021. Soil confirmation samples were collected from the excavation in August 2021 that were below the MTCA Method A cleanup level (4,000 mg/Kg), and remaining detections of diesel were deemed likely to be present to either pre-existing impact or roadway runoff. The site was classified as No Further Action by Ecology in 2022.

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1.1.8 Goodyear Tire Camas (FSID 85837922, CSID 6772, Map ID=29)

The Goodyear Tire (Schuck's Auto Supply) site is located at 3440 3rd Avenue and participated in a voluntary cleanup for a leaking underground storage tank. The site was cleaned up in 1999 and five USTs totaling 6,275 gallons and storing diesel, unleaded gasoline, and waste oil were removed in 1999 and 2001. The site was subsequently classified as No Further Action by Ecology in 2001. The location is currently an O'Reilly Auto Parts that offers some automotive services, including battery, motor oil, transmission fluid, and gear oil recycling and brake drum and rotor resurfacing.

1.1.9 Asher Engine Service / East County Auto (FSID 94778244, CSID 15034, Map ID=35)

The Asher Engine Service / East County Auto site is an automotive repair and maintenance facility located at 1405 E St, Washougal that is suspected to have soil and groundwater contamination. The site is located near the boundary of the 5-Year capture zone. An initial investigation was conducted in 2019 following a previous remediation and recommendation for No Further Action, following a complaint received from an adjacent property. A pipe appearing to lead from the automotive shop and discharging petroleum hydrocarbon-sheening fluid into a low-lying area between parcels was observed. An accumulation of water with significant petroleum hydrocarbon sheen on its surface was also observed. An Early Notice Letter for the site was delivered to the site owner in September 2019, and the site is listed as Awaiting Cleanup.

1.1.10 Hi-Way Fuel (FSID 22538744, CSID 8323, Map ID=36)

The Hi-Way Fuel site is a gas station with repair shop located at 1250 E Street in Washougal. Initial site characterization work began in 1996 for a leaking underground storage tank. During this time, five older tanks were removed and impacted soils excavated to the extent possible. Four new tanks were installed, increasing the capacity by 21,000 gallons, and pipes were upgraded to newer standards at that time. Some contaminated soils were left in place, but there is no information in current Ecology files indicating confirmed groundwater contamination (personal communication with Aaren Fiedler at Ecology 10/31/16). However, Ecology's online Cleanup Site report indicates confirmed petroleum contamination above cleanup levels in soil and groundwater at this site. Ecology sent a status update request letter to the owner in 2011, but there was no response. No other action has taken place at the site since these activities and Ecology has no plans for taking action in the immediate future (personal communication with Aaren Fiedler at Ecology 10/31/16).

1.2 ENVIRONMENTAL SITES WITHIN THE WESTERN SEARCH AREA

1.2.1 Georgia-Pacific Consumer Products (FSID 66765272, CSID 15156, Map ID=46) and Georgia-Pacific Camas Business Center (FSID 78452582, CSID 2961)

The Georgia-Pacific Consumer Products site includes two locations under Agreed Order 18201.

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The pulp and paper mill is located at 401 NE Adams Street. The mill began operations in the late 1880 and, while pulping operations have ceased, it still makes paper products from purchased pulp. Due to historic land use and industrial practices, soil is contaminated with total petroleum hydrocarbons (TPH) from diesel, gasoline, and oil. Other likely contaminants in soil, groundwater, and/or sediments include:

- Polycyclic aromatic hydrocarbons (PAHs) and carcinogenic PAHs
- Benzene, toluene, ethylbenzene, and xylenes (BTEX)
- Polychlorinated biphenyls (PCBs)
- Metals (lead and chromium)
- Corrosive wastes
- Asbestos
- Dioxins and furans

This facility has an industrial operating permit for industrial fugitive air emissions under WAC 173-401. The listed Program ID on the Ecology Facility is S0110005 and the submitted monitoring data could not be verified.

This facility is additionally tracked under the following EPA Regulatory Programs and Reports: Air Emissions Inventory (EIS) [ID 4986811], Toxics Release Inventory (TRI) [ID 98607JMSRVNE4TH], Clean Air Act (CAA) [ID WASWC000530112514], Clean Water Act (CWA) [ID WA0000256], Resource Conservation and Recovery Act (RCRA) [ID WAD009042896], and Greenhouse Gas Reporting Program (GHGRP) [ID 1005998]. The Facility Register Service (FRS) ID for Georgia Pacific Consumer Products related to these EPA programs is 110000564586. The most recent CAA compliance violation was disclosed by the facility in October 2018. The most recent RCRA violations were issued in May 2024. The facility has had an identified a CWA violation in all 12 of the prior 12 quarters (July 2022-September 2025). TRI tracked releases and transfers dropped off substantially after 2018; after 2020, only releases of 1,3-Dichloro-2-propanol were reported, totaling 19 pounds in 2023 and 20 pounds in 2024. Between January 1 and June 21, 2025, 546 kilograms of hazardous waste were shipped by the facility.

The Camas Business Center (CBC) is located north of the main mill site, at 906 NW Drake Street. This site was used for the manufacturing of chemicals for the paper making process and operated from the 1950s until 1997. Research involved pesticides including dimethyl sulfoxide, energy production, crop yields, and synthetic pulp production. There was also an electrical substation on the western side of the CBC until 2004. During a 2016 Environmental Site Assessment, one surface sample exceeded MTCA cleanup levels for lead (345 mg/kg), two boring samples exceeded MTCA cleanup levels for tetrachloroethylene (PCE) (2.95 mg/Kg and 0.25 mg/Kg), and one boring sample exceeded MTCA cleanup levels for methylene chloride (0.75 mg/Kg). Other soil samples collected in the vicinity were below MTCA cleanup levels for PCE and methylene chloride. Five monitoring wells exist at the CBC, though data is not available through Ecology's EIM database. In the March 2021 sampling event, results were below MTCA cleanup levels except for trichloroethylene (TCE),

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which exceeded the MTCA cleanup level [5 µg/L] at MW-3 (8.2 µg/L). Methylene chloride was not detected in groundwater.

Current Ecology files indicate that cleanup has started at the site. Georgia-Pacific submitted a revised draft Remedial Investigation Work Plan in August 2025 as required under Agreed Order 18201. It defines the investigation of environmental contamination at this site, including:

- A historical site review
- Identification of gaps in data that need to be addressed
- A sampling and analysis plan, that includes a quality assurance project plan

1.2.2 Camas Foodmart (Browns Chevron) (FSID 18732618, CSID 8218, Map ID=47)

The Browns Chevron 60092647 site is a gas station located at 501 NE 3rd Avenue. Notification and reports of a LUST were conducted in 1990 and 1991. Ecology's online Cleanup Site report indicates soil contamination above cleanup levels for gasoline and other petroleum products. Current Ecology files indicate independent action was taken to upgrade three tanks in 1991 and the site status was changed to No Further Action by Ecology in 1995. Five tanks were listed as having been removed from the site in 1996. One exempt, single wall steel tank storing an unknown substance is listed as associated with the property.

1.2.3 Camas City Shops (FSID 8698751, CSID 7811, Map ID=48)

The Camas City Shops is an auto repair property located at 234 E 1st Avenue, within the Georgia Pacific Camas Mill and across the Washougal River from the Lower Camas Washougal wellfield. The discovery of a LUST occurred in 1992 and site characterization began in 2011. Ecology's online Cleanup Site report indicates soil contamination below cleanup levels for diesel, benzene, and lead and remediated-below cleanup levels gasoline contamination. Current Ecology files indicate independent action was taken to remove four USTs and the site status was changed to No Further Action by Ecology in 2012 following a Site Hazard Assessment.

1.2.4 Verizon Northwest Inc Camas Co (GTE Northwest Inc) (FSID 89994319, CSID 11002, Map ID=49)

The GTE Northwest Inc site is a telephone communications and storage property located at 330 NE 5th Avenue. Notification of a LUST was submitted in 1989. Current Ecology files indicate independent action was taken to remove two tanks in 1996 and upgrade one 500-gallon emergency power generation tank in 1998. Initial site characterization work was performed in 2011. Ecology's online Cleanup Site report indicates soil contamination below cleanup levels for diesel and other petroleum products. The site status was changed to No Further Action by Ecology in 2012 following a Site Hazard Assessment. The site has additionally been categorized as a Tier 2 Hazardous Materials Site since 1987 (Program ID WAD988467478) and was listed as a hazardous waste generator in 1989. The Facility Register Service (FRS) ID for Verizon Northwest Inc Camas Co is 110005349710, which reflects that the RCRA identifier is inactive.

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1.2.5 Camas Gas Services Inc (Browns Arco) (FSID 97188815, CSID 11271, Map ID=52)

The Browns Arco site is a gas station located at 435 NE 3rd Avenue. Notification of a LUST was submitted in 1995. Initial site characterization work was performed in 2011. Ecology's online Cleanup Site report indicates soil contamination below cleanup levels for benzene, and other non-halogenated organics and soil contamination above cleanup levels for gasoline. Current Ecology files indicate independent action was taken to remove three USTs and the site status was changed to No Further Action by Ecology in 2012 following a Site Hazard Assessment.

1.2.6 Quick Stop Mart (Camas Mart) (FSID 33881994, CSID 8776, Map ID=53)

The Camas Mart site is gas station located at 207 NE 3rd Avenue, north of the Georgia Pacific Camas Mill. Notification of a LUST was submitted in 1996. Current Ecology files indicate independent action was taken to remove four leaded and unleaded gasoline tanks in 1996, upgrade two unleaded gasoline tanks totaling 15,000 gallons in 1998, and remove an additional waste oil tank in 1999. Initial site characterization work was performed in 2011. Ecology's online Cleanup Site report indicates soil contamination below cleanup levels for benzene, lead, gasoline and other petroleum products, and other non-halogenated organics. The site status was changed to No Further Action by Ecology in 2012 following a Site Hazard Assessment.

1.2.7 726 NE 5th Ave Camas (FSID 9620, CSID 11792, Map ID=54)

The site is a residence located at 726 NE 5th Avenue with a heating oil tank (HOT) of unknown volume. An initial investigation was completed in 2011. Ecology's online Cleanup Site report indicates soil contamination above cleanup levels for non-halogenated solvents and other non-halogenated petroleum products, both of which are also suspected in groundwater. An Early Notice Letter for the site was delivered to the site owner in February 2012, and the site is listed as Awaiting Cleanup.

1.2.8 Haag & Shaw Excavating (FSID 82973453, CSID 12835, Map ID=55)

The Haag & Shaw Excavating site is a general contracting business specializing in demo, underground, site work, excavation, paving utilities, concrete, and asphalt recycling located at 636 SE 3rd Avenue. Above-ground storage tanks and heavy machinery are visible on permeable to semi-permeable surfaces from the street. One 2,000 gallon gasoline UST and one 2,000 gallon diesel UST were decommissioned and removed from the site in 1991. A site discovery report was submitted in 2014 following a geophysical study of the property during which diesel was detected in soil samples collected from borings at 2-feet below ground surface (bgs). The impacted areas were over excavated and confirmation samples were below the MTCA Method A cleanup level for diesel in soil. Groundwater was not encountered during the excavations or boring advancements to 10-feet bgs. The site status was changed to No Further Action by Ecology in 2015.

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1.2.9 Greseth Property (FSID 5458, CSID 12121, Map ID=56)

The Greseth Property site is a residential property located at 1034 NE 6th Avenue. A LUST notification and decommissioning report was submitted to Ecology in 2013. The tank was pumped, cleaned, and backfilled with inert material. Assessment samples taken at the time of decommissioning indicate that soils at the south end of the tank had been impacted with diesel-range organics at up to 28,600 mg/kg and chrysene. Impacted soils were conservatively estimated at 11 cubic yards. Ecology's MTCATPH11.1 spreadsheet model for protection of the ground water resource was completed to conclude that the impacted soil plume was unlikely to present an unacceptable health risk by leaching to ground water with subsequent ingestion pathway.

A Remedial Investigation Report response to comments requesting site closure was submitted to Ecology in 2014. Ecology terminated the VCP Agreement in 2014 following the property owner's decision to conduct the heating oil storage tank cleanup under the direction of the Pollution Liability Insurance Agency. Ecology's online Cleanup Site report indicates soil contamination above the cleanup level for other non-halogenated organics and that cleanup has started at the site.

1.2.10 P & L Investments (FSID 41313725, CSID 6034, Map ID=58)

The P & L Investments site is storefront located at 440 NE 4th Avenue. Notification of a LUST was submitted in 1995. Initial site characterization work was performed in 2011. Ecology's online Cleanup Site report indicates soil contamination above the cleanup level for gasoline. Current Ecology files indicate standard voluntary cleanup action was taken to remove one UST in 2000 that had contained leaded gasoline and the site status was changed to No Further Action by Ecology in 2003.

1.2.11 Helen Brothers Service (FSID 65648254, CSID 10060, Map ID=59)

The Helen Brothers Service site was located at 135 NE 6th Avenue, north of the Georgia Pacific Camas Mill. Notification of a LUST was submitted in 1995. Ecology's online Cleanup Site report indicates soil contamination above cleanup levels for gasoline. Current Ecology files indicate independent action was taken to remove five tanks in 2000 that had contained diesel, leaded and unleaded gasoline, and waste oil. The site status was changed to No Further Action by Ecology in 2012.

1.2.12 First Christian Church HOT (FSID 100003126, CSID 17135, Map ID = 66)

The First Christian Church HOT site is the location of the former Camas First Christian Church located at 4004 NE 6th Avenue. A historical decommissioning permit notes the removal of an underground HOT from the property in 1995 without the collection of confirmation samples. A geophysical survey was completed in September 2023, which located a soil disturbance consistent with a former tank excavation along the eastern side of the church structure. Soil samples were collected and petroleum contamination was encountered at a depth of 8 feet bgs with a maximum diesel-range petroleum concentration of 28,900 mg/Kg. An excavation was performed in March 2024 and diesel-range petroleum was not detected above laboratory reporting limits in any of the confirmation

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samples collected. Groundwater was not encountered during excavation. The site was classified as No Further Action by Ecology in 2024.

1.3 ENVIRONMENTAL SITES WITH GROUNDWATER EXCEEDANCES EAST OF THE CARA

1.3.1 ARCO 6008 / KT KANSO AM/PM (FSID 46212644, CSID 9311)

The ARCO 6008 site is a service station located at 212 15th Street in Washougal. The site is located just beyond the eastern boundary of the 5-Year capture zone. Four 10,000 gallons double-walled fiberglass unleaded gasoline USTs are located on the north side of the site, one of which has been temporarily closed since January 2024. The endorsements for all four USTs expire on June 30, 2026. The site was entered into the Ecology LUST database in January 1990 when petroleum impacted soil was encountered during UST decommissioning and replacement activities. The site was cleaned up under the Voluntary Cleanup Program, and Ecology's online Cleanup Site report indicates soil contamination below cleanup levels for benzene, lead, diesel, gasoline, and other non-halogenated organics. The site was cleaned up under the Voluntary Cleanup Program, and the site status was changed to No Further Action by Ecology in 2014.

In 2011, a groundwater sample from SB-3 exceeded the MCL for lead (15 µg/L) and MTCA Method A for Heavy Fuel Oil (500 µg/L). The most recent groundwater sampling results available on Ecology's EIM database were collected during a site investigation in April 2013, at which time MW-3 exceeded the MCL for lead [15 µg/L] with a result of 22.5 µg/L and lead was detected below the MCL at MW-2 (12.7 µg/L). The most recent soil samples were taken in March 2014. Lead was detected in two samples collected at 3.5 feet bgs (1.49-3.99 mg/Kg), below all available MTCA criteria.

The site was additionally categorized as a Tier 2 Hazardous Materials Site in 1988 (Program ID WAD988517272) and was listed as a hazardous waste generator from 1993 to 2006. The Facility Register Service (FRS) ID for Arco 6008 is 110005383717, which reflects that the RCRA identifier is inactive.

1.3.2 George Schmid & Sons, Inc. (FSID 53281319, CSID 12445)

The George Schmid & Sons, Inc. site is located at 1411 32nd Street in Washougal. The site is located just beyond the northeastern boundary of the 5-Year capture zone. The site consists of a total of 17 acres, which include the former operational area of the property (approximately 5 acres) and the lower pasture area (approximately 12 acres), which is bordered by the Washougal River. Light industrial use of the property started in the 1950s. On-site operations included heavy equipment maintenance and repair, power washing, sandblasting, equipment storage, and administrative business operations. All structures, including aboveground storage tanks (ASTs) and USTs, were removed from the Property by 2010. The site was cleaned up under the Voluntary Cleanup Program, and Ecology's online Cleanup Site report indicates remediated soil contamination below cleanup levels for PAHs, diesel, gasoline, and petroleum products, and remediated groundwater contamination above cleanup

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levels for arsenic, lead, diesel, and other petroleum products. The site status was changed to No Further Action by Ecology in 2016. The site is not Schmid Family Park.

Groundwater samples collected at the site between 2012 and June 2015 exceeded cleanup levels for Arsenic, Barium, Chromium, Iron, Lead, Manganese, PAHs, Diesel Range Organics, and Lube Oil. Follow-up sampling for Diesel Range Organics and Lube Oil occurred in April and September 2015. There were no exceedances during the follow-up sampling.

The site was additionally categorized as a Tier 2 Hazardous Materials Site from 2003 to 2010 (Program ID CRK000054050). The Facility Register Service (FRS) ID for George Schmid & Sons, Inc. is 110015458128 and does not contain information.

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APPENDIX B
PARCELS OF CONCERN

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Parcel Serial Number	Owner Name	Owner Address	Site Address	Legal Description	Land-Use Description	Zoning	WHPZ
71355005	SNOWDEN VETERINARY HOLDINGS LLC	833 K ST, WASHOUGAL, WA, 98671	401 6TH ST, WASHOUGAL, 98671	LOT 2 SP2-554 1.04A	VETERINARIANS / SMALL ANIMAL HOSPITALS.	CH	1-Year
71734000	KIRKLAND PREMIER CAR WASH LLC	2370 E THIRD LOOP #100, VANCOUVER, WA, 98661	510 C ST, WASHOUGAL, 98671	#577 OF RICHARD OUGH DLC .25A	DRIVE THROUGH CAR WASH	CH	1-Year
73134114	SAUER DEVELOPMENT GROUP LLC	26300 NE 16TH ST, CAMAS, WA, 98607	455 C ST, WASHOUGAL, 98671	#114 DAVID C PARKER DLC .48A	STORAGE WAREHOUSE	CH	1-Year
73134116	SAUER DEVELOPMENT GROUP LLC	26300 NE 16TH ST, CAMAS, WA, 98607	453 C ST, WASHOUGAL, 98671	#116 DAVID C PARKER DLC 1.11A	STORAGE WAREHOUSE	CH	1-Year
73134155	DASSA MANAGEMENT LLC	1001 NE 152ND AVE, VANCOUVER, WA, 98684	450 C ST, WASHOUGAL, 98671	#155 DAVID C PARKER DLC .38A	SERVICE REPAIR SHOP	CH	1-Year
75357048	TIMBER RIDGE CAR WASH LLC	24324 NE 14TH ST, CAMAS, WA, 98607	469 E ST, WASHOUGAL, 98671	R B JOHNSTON TTS LOT 12 BLK 2	DRIVE THROUGH CAR WASH	CV	1-Year
75357049	TIMBER RIDGE CAR WASH LLC	24324 NE 14TH ST, CAMAS, WA, 98607		R B JOHNSTON TT LOT 12 BLK 2 (SEE 075357-048-050 LAND AV)	SELF SERVICE CAR WASH (WAND TYPE)	CV	1-Year
75357050	TIMBER RIDGE CAR WASH LLC	24324 NE 14TH ST, CAMAS, WA, 98607	469 E ST, WASHOUGAL, 98671	R B JOHNSTON TRACTS LOT 13 BLK 2	SELF SERVICE CAR WASH (WAND TYPE)	CV	1-Year
75357051	TIMBER RIDGE CAR WASH LLC	24324 NE 14TH ST, CAMAS, WA, 98607		R B JOHNSTON TRACTS LOT 14 BLK 2	SELF SERVICE CAR WASH (WAND TYPE)	CV	1-Year
91045552	FRENCH GORDON B II & FRENCH PATRICIA J TRUSTEES	1639 BROOKHOLLOW DR, HIDEAWAY, TX, 75771		GOOTS ADDN WEIR PARK LOT 4	STORAGE WAREHOUSE	RC	1-Year
91045554	FRENCH GORDON B II & FRENCH PATRICIA J TRUSTEES	1639 BROOKHOLLOW DR, HIDEAWAY, TX, 75771	3439 NE 3RD AVE, CAMAS, 98607	GOOTS ADDN WEIR PARK LOT 5	STORAGE WAREHOUSE	RC	1-Year
91045556	FRENCH GORDON B II & FRENCH PATRICIA J TRUSTEES	1639 BROOKHOLLOW DR, HIDEAWAY, TX, 75771	3501 NE 3RD AVE, CAMAS, 98607	GOOTS ADDN WEIR PARK LOT 6	STORAGE WAREHOUSE	RC	1-Year
91045652	O-R CAMAS LLC	PO BOX 9167, SPRINGFIELD, MO, 65801	3440 NE 3RD AVE, CAMAS, 98607	WEIR PARK LOTS 3 & 4 BLK 5	TIRE, BATTERIES, PARTS AND ACCESSORIES DEALERS	RC	1-Year
91045666	FOUNTAIN ROBERT & FOUNTAIN NANCY	PO BOX 737, WASHOUGAL, WA, 98671	114 NE WEIR ST, CAMAS, 98607	WEIR PARK LOT 16 BLK 5	GENERAL REPAIR & SERVICE GARAGES	RC	1-Year
71360000	HIGGINSON BLAINE & HIGGINSON BRIAN	984 WASHOUGAL RIVER RD, WASHOUGAL, WA, 98671	984 WASHOUGAL RIVER RD, WASHOUGAL, 98671	#19C OF RICHARD OUGH DLC .50A	SERVICE REPAIR SHOP	R1-10	5-Year
71364000	HIGGINSON BLAINE & HIGGINSON BRIAN	984 WASHOUGAL RIVER RD, WASHOUGAL, WA, 98671		#32 OF RICHARD OUGH DLC .18A	MINIMAL STRG BLDGS, EQUIP, SHEDS, OPEN POLE BLDGS	R1-10	5-Year
71528000	SNK PROPERTIES LLC	1700 MAIN ST #136, WASHOUGAL, WA, 98671	1434 E ST, WASHOUGAL, 98671	#275, 276, 803 RICHARD OUGH DLC	GENERAL REPAIR & SERVICE GARAGES	CC	5-Year
71543000	BROTHERS NORTHWEST INVESTMENTS LLC	20615 NE 212TH AVE, BATTLE GROUND, WA, 98604	1423 E ST, WASHOUGAL, 98671	#293 OF RICHARD OUGH DLC	SERVICE REPAIR SHOP	CC	5-Year
71559000	MALFAIT RONALD SCOTT	31914 SE 17TH ST, WASHOUGAL, WA, 98671		#315 OF RICHARD OUGH DLC	DRIVE THROUGH CAR WASH	CC	5-Year

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71592000	MALFAIT RONALD SCOTT	31914 SE 17TH ST, WASHOUGAL, WA, 98671		#367 OF RICHARD OUGH DLC	DRIVE THROUGH CAR WASH	CC	5-Year
71622000	WASHOUGAL SCHOOL DIST #112	4855 EVERGREEN WAY, WASHOUGAL, WA, 98671		#420 OF RICHARD OUGH DLC	FLEET OPERATION CENTERS & STORAGE	CC	5-Year
71666000	MALFAIT RONALD SCOTT	31914 SE 17TH ST, WASHOUGAL, WA, 98671	1138 E ST, WASHOUGAL, 98671	#473 OF RICHARD OUGH DLC	GENERAL REPAIR & SERVICE GARAGES	CC	5-Year
71678002	BROTHERS NORTHWEST INVESTMENTS LLC	20615 NE 212TH AVE, BATTLE GROUND, WA, 98604	1351 E ST, WASHOUGAL, 98671	#487 OF RICHARD OUGH DLC .23A	MOTOR VEHICLE DEALERS, USED CARS AND SMALL TRUCKS.	CC	5-Year
71680000	MALFAIT RONALD SCOTT	31914 SE 17TH ST, WASHOUGAL, WA, 98671	1250 E ST, WASHOUGAL, 98671	#489 OF RICHARD OUGH DLC .22A	CONVENIENCE STORE - W/ PUMPS & TANKS	CC	5-Year
71683000	COLUMBIA ELECTRIC INC	PO BOX 900, WASHOUGAL, WA, 98671	1338 E ST, WASHOUGAL, 98671	#496 OF RICHARD OUGH DLC .21A	SERVICE REPAIR SHOP	CC	5-Year
71706000	MALFAIT RONALD SCOTT	31914 SE 17TH ST, WASHOUGAL, WA, 98671	1204 E ST, WASHOUGAL, 98671	#530 OF RICHARD OUGH DLC .25A	TIRE, BATTERIES, PARTS AND ACCESSORIES DEALERS	CC	5-Year
71717002	KITCHEN PAUL & KITCHEN SARA	1315 E ST, WASHOUGAL, WA, 98671	1315 E ST, WASHOUGAL, 98671	#553 OF RICHARD OUGH DLC .12A	SERVICE REPAIR SHOP	CC	5-Year
71792000	HATTEN RANDALL & HATTEN BRENDA	3567 CEDAR CT, WASHOUGAL, WA, 98671	1320 E ST, WASHOUGAL, 98671	#662 OF RICHARD OUGH DLC .31A	SERVICE REPAIR SHOP	CC	5-Year
71832000	BROTHERS NORTHWEST INVESTMENTS LLC	20615 NE 212TH AVE, BATTLE GROUND, WA, 98604	1405 E ST, WASHOUGAL, 98671	#714 RICHARD OUGH DLC .23A	GENERAL REPAIR & SERVICE GARAGES	CC	5-Year
71909000	MALFAIT RONALD SCOTT	31914 SE 17TH ST, WASHOUGAL, WA, 98671		#802 RICHARD OUGH DLC .12A	SERV STATION W/ TANKS & PUMPS OR CARD LOCK STATION	CC	5-Year
75358010	WASHOUGAL SCHOOL DIST #112	4855 EVERGREEN WAY, WASHOUGAL, WA, 98671	971 E ST, WASHOUGAL, 98671	ELLS SUB-DIV LOT 1	FLEET OPERATION CENTERS & STORAGE	CC	5-Year
75359586	SRBC PARTNERS LLC	13900 NW 53RD AVE, VANCOUVER, WA, 98685	730 E ST, WASHOUGAL, 98671	MIDLAND ACRE REPLT BLKS 1-5 & TTA #2 LTS 24 - 26 BLK 1	GENERAL REPAIR & SERVICE GARAGES	CC	5-Year
75359644	WASHOUGAL SCHOOL DIST #112	4855 EVERGREEN WAY, WASHOUGAL, WA, 98671	995 E ST, WASHOUGAL, 98671	MIDLAND ACRES REPLAT BLKS 1-5 & TT A #1 LOT 2 BLK A	FLEET OPERATION CENTERS & STORAGE	CC	5-Year
75359646	WASHOUGAL SCHOOL DIST #112	4855 EVERGREEN WAY, WASHOUGAL, WA, 98671		MIDLAND ACRE REPLAT BLKS 1-5 & TT A #2 LOT 2 BLK A	FLEET OPERATION CENTERS & STORAGE	CC	5-Year
73134007	NORTHWEST PIPELINE	PO BOX 2400 MD 46-4, TULSA, OK, 74102	30 C ST, WASHOUGAL, 98671	#7 DAVID PARKER DLC 0.45A (TCO 6-164)	GAS STORAGE TANKS, PUMPING, DISTRIBUTION, PIPELINE	CH	6-Month
73134022	S&A OIL INC	1523 NW 33RD WAY, CAMAS, WA, 98607	165 C ST, WASHOUGAL, 98671	#22 DAVID C PARKER DLC .55A M/L	CONVENIENCE STORE - W/ PUMPS & TANKS	CH	6-Month
73134025	BRG LLC	2375 SE 8TH AVE, CAMAS, WA, 98607		#2 LOT 1 SP3-341 1.87A	HIGHWAY CONSTRUCTION AND REPAIR CONTRACTORS.	CH	6-Month
73134047	S&A OIL INC	1523 NW 33RD WAY, CAMAS, WA, 98607	133 C ST, WASHOUGAL, 98671	#47 DAVID C PARKER DLC .23A	CONVENIENCE STORE - W/ PUMPS & TANKS	CH	6-Month
73134157	PORT OF CAMAS WASHOUGAL	24 S A ST, WASHOUGAL, WA, 98671		#157 DAVID PARKER DLC .92A	MARINAS.	CH	6-Month

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73134161	PORT OF CAMAS WASHOUGAL	24 S A ST, WASHOUGAL, WA, 98671	40 S MARINA WAY, WASHOUGAL, 98671	#161 DAVID C PARKER DLC 1.79A	MOTOR VEHICLE DEALERS, NEW CARS AND SMALL TRUCKS,	CH	6-Month
73134170	PORT OF CAMAS WASHOUGAL	24 S A ST, WASHOUGAL, WA, 98671		#170 DAVID C PARKER DLC	ELECTRIC POWER OPERATING, MAINT., AND REPAIR BUILD	CH	6-Month
73134182	LNI INVESTMENTS LLC	281 C STREET STE 112, WASHOUGAL, WA, 98671	281 C ST, WASHOUGAL, 98671	#184A & #189 DAVID PARKER DLC 1.01A	HEALTH CLINICS: MEDICAL / DENTAL / OTHER	CH	6-Month
73139075	PORT OF CAMAS WASHOUGAL	24 S A ST, WASHOUGAL, WA, 98671	24 S A ST, WASHOUGAL, 98671	PARKERSVILLE LOTS 4 & 5 BLK 9	MARINAS.	CH	6-Month
73139077	PORT OF CAMAS WASHOUGAL	24 S A ST, WASHOUGAL, WA, 98671		PARKERSVILLE LOTS 6 & 7 BLK 9	MARINAS.	CH	6-Month
73139079	PORT OF CAMAS WASHOUGAL	24 S A ST, WASHOUGAL, WA, 98671		PARKERSVILLE LOTS 8 9 10 BLOCK 9	MARINAS.	CH	6-Month
73139080	PORT OF CAMAS WASHOUGAL	24 S A ST, WASHOUGAL, WA, 98671	115 S 1ST ST, WASHOUGAL, 98671	PARKERSVILLE LOTS 1, 2, 3, 4, 5 BLK 10	BOATS AND MARINE ACCESSORIES.	CH	6-Month
73139085	PORT OF CAMAS WASHOUGAL	24 S A ST, WASHOUGAL, WA, 98671		PARKERSVILLE LOTS 6 & 7 BLK 10	MARINAS.	CH	6-Month
73139087	PORT OF CAMAS WASHOUGAL	24 S A ST, WASHOUGAL, WA, 98671		PARKERSVILLE LOTS 8 & 9 BLK 10	MARINAS.	CH	6-Month
73139089	PORT OF CAMAS WASHOUGAL	24 S A ST, WASHOUGAL, WA, 98671		PARKERSVILLE LOT 10 BLK 10	MARINAS.	CH	6-Month
73139090	PORT OF CAMAS WASHOUGAL	24 S A ST, WASHOUGAL, WA, 98671		#223 PARKERSVILLE BLK 13 .84	MARINAS.	CH	6-Month
87021000	BRG LLC	2375 SE 8TH AVE, CAMAS, WA, 98607	2375 SE 8TH AVE, CAMAS, 98607	#1 LOT 1 SP3-341 3.12A	TIRE, BATTERIES, PARTS AND ACCESSORIES DEALERS	HI	6-Month
87053000	SAUER DEVELOPMENT GROUP LLC	26300 NE 16TH ST, CAMAS, WA, 98607		ORCHARD HOME WASHOUGAL #4 LOT 2 1.91A	MFG - MACHINERY	HI	6-Month
87054000	SAUER DEVELOPMENT GROUP LLC	26300 NE 16TH ST, CAMAS, WA, 98607		ORCHARD HOME WASHOUGAL #5 LOT 2 .23A	MFG - MACHINERY	HI	6-Month
87055000	SAUER DEVELOPMENT GROUP LLC	26300 NE 16TH ST, CAMAS, WA, 98607	2305 SE 8TH AVE, CAMAS, 98607	ORCHARD HOME WASHOUGAL #6 LOT 2 1.69A	STORAGE WAREHOUSE	HI	6-Month
87216000	C B I LLC	829 NW VIEW RIDGE CT, CAMAS, WA, 98607		ORCHARD HOME ADDN #3 LOT 8 #8 LOT 9 .26A	MFG - MISCELLANEOUS	LI	6-Month
87260000	C B I LLC	829 NW VIEW RIDGE CT, CAMAS, WA, 98607	2380 SE 8TH AVE, CAMAS, 98607	ORCHARD HOME WASHOUGAL #2 LOT 9 .17A	MFG - MISCELLANEOUS	LI	6-Month
88610000	SAUER DEVELOPMENT GROUP LLC	26300 NE 16TH ST, CAMAS, WA, 98607		OAK PARK ADDN WASHOUGAL LOTS 3 & 4 BLK 8	STORAGE WAREHOUSE	HI	6-Month
88630000	SAUER DEVELOPMENT GROUP LLC	26300 NE 16TH ST, CAMAS, WA, 98607	754 SE UNION ST, CAMAS, 98607	OAK PARK ADDN WASHOUGAL LOT 6 BLK 8	MFG - MACHINERY	HI	6-Month
88640000	SAUER DEVELOPMENT GROUP LLC	26300 NE 16TH ST, CAMAS, WA, 98607	2205 SE 8TH AVE, CAMAS, 98607	OAK PARK ADDN WASHOUGAL LOTS 7 & 8 BLK 8	MFG - MACHINERY	HI	6-Month

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88650000	ZIEGLER JOHN K ETAL	1235 NORTH LOOP WEST, SUITE 205, HOUSTON, TX, 77008		OAK PARK ADDN WASHOUGAL LOT 1 BLK 9	MFG - LUMBER & WOOD PRODUCTS	HI	6-Month
88660000	ZIEGLER JOHN K ETAL	1235 NORTH LOOP WEST, SUITE 205, HOUSTON, TX, 77008		OAK PARK ADDN WASHOUGAL LOTS 2 & 3 BLK 9	MFG - LUMBER & WOOD PRODUCTS	HI	6-Month
89861000	DLJ PROPERTIES CAMAS LLC	9895 DOUBLE R BLVD, RENO, NV, 89521	1635 SE 6TH AVE, CAMAS, 98607	#32 OF DAVID C PARKER DLC 4.98A	ROCK QUARRY, CRUSHING, SAND AND GRAVEL PITS.	HI	6-Month
89934000	INTERFAITH TREASURE HOUSE	89 C ST, WASHOUGAL, WA, 98671	91 C ST, WASHOUGAL, 98671	#194 DAVID C PARKER DLC 1.22A	STORAGE WAREHOUSE	CH	6-Month
91045163	CITY OF CAMAS	613 NE 4TH AVE, CAMAS, WA, 98607	175 SE YALE ST, CAMAS, 98607	#163 DAVID C PARKER DLC 4.39A	ELECTRIC POWER BOOSTERS, TRANSFORMERS, STATIONS, R	SU	6-Month
127950000	CLARK PUBLIC UTILITIES	PO BOX 8900, VANCOUVER, WA, 98668	345 1ST ST, WASHOUGAL, 98671	#115 DAVID C PARKER DLC 1.32A	ELECTRIC POWER OPERATING, MAINT., AND REPAIR BUILD	CH	6-Month
700120000	ENCON NORTHWEST LLC	9895 DOUBLE R BLVD, RENO, NV, 89521	1635 SE 6TH AVE, CAMAS, 98607	BNSF LEASE BF31374	ROCK QUARRY, CRUSHING, SAND AND GRAVEL PITS.	HI	6-Month
986035425	PORT OF CAMAS WASHOUGAL	24 S A ST, WASHOUGAL, WA, 98671		#224 PARKERSVILLE BLK 13 0.53A	MARINAS.	CH	6-Month
87451000	OREGON MOTOR SERVICES LLC	8503 SE 132ND AVE, HAPPY VALLEY, OR, 97086	1846 NE 3RD AVE, CAMAS, 98607	RIVER VIEW ADDN TO CAMAS #3 LOT 8	MOTOR VEHICLE DEALERS, NEW CARS AND SMALL TRUCKS,	RC	6-Month Well 13
87452000	OREGON MOTOR SERVICES LLC	8503 SE 132ND AVE, HAPPY VALLEY, OR, 97086		RIVER VIEW ADDN TO CAMAS #4 LOT 8 & #3 LOT 9	MOTOR VEHICLE DEALERS, NEW CARS AND SMALL TRUCKS,	RC	6-Month Well 13
87460000	OREGON MOTOR SERVICES LLC	8503 SE 132ND AVE, HAPPY VALLEY, OR, 97086	1904 NE 3RD AVE, CAMAS, 98607	RIVER VIEW ADDN TO CAMAS #1 LOT 9	MOTOR VEHICLE DEALERS, NEW CARS AND SMALL TRUCKS,	RC	6-Month Well 13
87500000	2016 NE 3RD LLC	2016 NE 3RD AVE, CAMAS, WA, 98607	2016 NE 3RD AVE, CAMAS, 98607	RIVER VIEW ADD TO CAMAS #1 #4 LOT 10 #2 LOT 11	HEALTH CLINICS: MEDICAL / DENTAL / OTHER	RC	6-Month Well 13
89882000	BRAMBLE ACRES LLC	4206 NE 261ST AVE, CAMAS, WA, 98607	2459 NE 3RD LOOP, CAMAS, 98607	#64 DAVID C PARKER DLC .50A	MEDICAL & DENTAL LABORATORIES	RC	6-Month Well 13
87120000	KINSCO LLC	10500 NE 51ST CIR, VANCOUVER, WA, 98682	1718 SE 8TH AVE, CAMAS, 98607	ORCHARD HOME WASHOUGAL B OF LOT 4 .14A	STORAGE WAREHOUSE	LI	CARA
87124000	CITY OF CAMAS	616 NE 4TH AVE, CAMAS, WA, 98607		ORCHARD HOME WASHOUGAL G,H,& I LOT 4 .17A	SEWAGE RELATED BLDG OR STRUCTURE	LI	CARA
87180000	HIT DEVELOPMENT LLC	2470 NE 2ND ST, BEND, OR, 97701	1840 SE 8TH AVE, CAMAS, 98607	ORCHARD HOME WASHOUGAL #2 LOT 5 .82A	GENERAL REPAIR & SERVICE GARAGES	LI	CARA
87181000	P&E INVESTMENTS LLC	1900 SE 8TH AVE, CAMAS, WA, 98607	1900 SE 8TH AVE, CAMAS, 98607	ORCHARD HOME WASHOUGAL #3 LOT 5 .44A	STORAGE WAREHOUSE	LI	CARA
87200000	MCELROY PROPERTY MANAGEMENT LLC	PO BOX 908, CAMAS, WA, 98607	1910 SE 8TH AVE, CAMAS, 98607	ORCHARD HOME WASHOUGAL #1 LOT 6 .95A	STORAGE WAREHOUSE	LI	CARA
87360000	CITY OF CAMAS	616 NE 4TH AVE, CAMAS, WA, 98607	1129 SE POLK ST, CAMAS, 98607	ORCHARD HOME WASHOUGAL #1 LOT 16 3.02A	SEWAGE RELATED BLDG OR STRUCTURE	RC	CARA
87365000	CITY OF CAMAS	616 NE 4TH AVE, CAMAS, WA, 98607		ORCHARD HOME WASHOUGAL #2 LOT 16	SEWAGE RELATED BLDG OR STRUCTURE	RC	CARA

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89869000	CITY OF CAMAS	1303 SE 12TH, CAMAS, WA, 98607		#40 OF DAVID C PARKER DLC 3.3A	SEWAGE RELATED BLDG OR STRUCTURE	RC	CARA
89924000	CITY OF CAMAS	616 NE 4TH AVE, CAMAS, WA, 98607		#183A DAVID C PARKER DLC 1 A M/L	SEWAGE RELATED BLDG OR STRUCTURE	RC	CARA
76695000	RODRIGUEZ TYRONE	339 SE EVERETT RD, CAMAS, WA, 98607	410 NE 2ND AVE, CAMAS, 98607	CAMAS LOT 8 BLK 4	GENERAL REPAIR & SERVICE GARAGES	HI	Western Search Area
76880000	MELTON ROBERT S & MELTON JANET L	5120 NW COLUMBIA ST, VANCOUVER, WA, 98663	732 NE 2ND AVE, CAMAS, 98607	CAMAS LOT 5 BLK 7	HEALTH CLINICS: MEDICAL / DENTAL / OTHER	MX	Western Search Area
77355000	SAFEWAY INC	250 PARKCENTER BLVD, BOISE, ID, 83726		SAFEWAY SP LOT 3 4-341	CONVENIENCE STORE - W/ PUMPS & TANKS	DC	Western Search Area
77760000	DIERICKX PROPERTIES LLC	2947 NW IVY LN, CAMAS, WA, 98607		CAMAS LOTS 5 & 6 BLK 18	FUNERAL SERVICES AND CREMATORIES.	DC	Western Search Area
77770000	FMG BODY SHOP LLC	314 NE BIRCH ST, CAMAS, WA, 98607	318 NE 3RD AVE, CAMAS, 98607	CAMAS LOTS 1,2,7 & 8 BLK 18	AUTO BODY SHOP	DC	Western Search Area
77785000	DICKERSON RANDY S	1900 SE 97TH AVE, VANCOUVER, WA, 98664		CAMAS #3 LOT 2 #2 LOTS 3 & 4 BLK 19	SERVICE REPAIR SHOP	HI	Western Search Area
77830000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348	339 NE ADAMS ST, CAMAS, 98607	CAMAS #1 BLOCK 20	MFG - PAPER PRODUCTS	HI	Western Search Area
77860000	ESHGHI MAHSA	207 NE 3RD AVENUE, CAMAS, WA, 98607	207 NE 3RD AVE, CAMAS, 98607	CAMAS #1 LOT 1 & 2 BLK 22	CONVENIENCE STORE - W/ PUMPS & TANKS	DC	Western Search Area
78000000	DIERICKX PROPERTIES LLC	2947 NW IVY LN, CAMAS, WA, 98607	325 NE 3RD AVE, CAMAS, 98607	CAMAS #1 LOTS 3 & 4 BLK 23	FUNERAL SERVICES AND CREMATORIES.	DC	Western Search Area
78090000	COLUMBIA RIVER LAND LLC	1104 NE 152ND AVE, VANCOUVER, WA, 98684	501 NE 3RD AVE, CAMAS, 98607	CAMAS LOTS 1 & 2 BLK 25	CONVENIENCE STORE - W/ PUMPS & TANKS	DC	Western Search Area
78105000	CITY OF CAMAS	616 NE 4TH AVE, CAMAS, WA, 98607	533 NE 3RD AVE, CAMAS, 98607	CAMAS LOT 4 BLK 25	PARKING LOTS & PARKING STRUCTURES	DC	Western Search Area
78150000	CITY OF CAMAS	616 NE 4TH AVE, CAMAS, WA, 98607	605 NE 3RD AVE, CAMAS, 98607	CAMAS LOT 2 BLK 26	SERVICE REPAIR SHOP	DC	Western Search Area
78560000	BROWN CATH-A-LEENE ANN	410 NE GARFIELD ST, CAMAS, WA, 98607	410 NE GARFIELD ST, CAMAS, 98607	CAMAS LOT 1 & 2 BLK 33	FUNERAL SERVICES AND CREMATORIES.	DC	Western Search Area
78600000	BROWN CATH-A-LEENE ANN	410 NE GARFIELD ST, CAMAS, WA, 98607	436 NE GARFIELD ST, CAMAS, 98607	CAMAS #1 LOT 7 & 8 BLK 33	FUNERAL SERVICES AND CREMATORIES.	DC	Western Search Area
78630000	CHRISTENSEN JEREMY D & CHRISTENSEN INGRID L	1911 NW 22ND AVE, CAMAS, WA, 98607	713 NE 4TH AVE, CAMAS, 98607	CAMAS LOT 2 BLK 34	HEALTH CLINICS: MEDICAL / DENTAL / OTHER	DC	Western Search Area
78956000	CORNERSTORE CAMAS LLC	515 NW SALTZMAN RD #70, PORTLAND, OR, 97229	450 NE BIRCH ST, CAMAS, 98607	CAMAS LOT 8 BLK 38	DRY CLEANERS, LAUNDRIES (1 TENANT - FREE STANDG BL	DC	Western Search Area
79040000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348		CAMAS BLOCK 42	PARKING LOT: PAVED, FOR ADJOINING BUILDING	DC	Western Search Area
79050000	ALP 3 LLC	16420 SE MCGILLIVRAY, SUITE 103, VANCOUVER, WA, 98683	518 NE BIRCH ST, CAMAS, 98607	CAMAS #1 LOT 1 BLK 43	HEALTH CLINICS: MEDICAL / DENTAL / OTHER	DC	Western Search Area

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79051000	ALP 3 LLC	16420 SE MCGILLIVRAY, SUITE 103, VANCOUVER, WA, 98683		CAMAS #2 LOT 1 BLK 43	HEALTH CLINICS: MEDICAL / DENTAL / OTHER	DC	Western Search Area
79070000	ALP 3 LLC	16420 SE MCGILLIVRAY, SUITE 103, VANCOUVER, WA, 98683		CAMAS LOT 2 BLK 43	HEALTH CLINICS: MEDICAL / DENTAL / OTHER	DC	Western Search Area
79080000	ALP 3 LLC	16420 SE MCGILLIVRAY, SUITE 103, VANCOUVER, WA, 98683	327 NE 5TH AVE UNIT A, CAMAS, 98607	CAMAS LOT 3 BLK 43	HEALTH CLINICS: MEDICAL / DENTAL / OTHER	DC	Western Search Area
79115000	ALP 3 LLC	16420 SE MCGILLIVRAY, SUITE 103, VANCOUVER, WA, 98683	518 NE BIRCH ST, CAMAS, 98607	CAMAS #2 LOT 7 & 8 BLK 43	HEALTH CLINICS: MEDICAL / DENTAL / OTHER	DC	Western Search Area
79140000	CASCADIA DEVELOPMENT PARTNERS LLC	610 ESTHER ST STE 202, VANCOUVER, WA, 98660	435 NE 5TH AVE, CAMAS, 98607	CAMAS LOTS 3 & 4 BLK 44	GENERAL REPAIR & SERVICE GARAGES	DC	Western Search Area
79194000	NWOH HOLDINGS LLC	531 NE EVERETT ST, CAMAS, WA, 98607	531 NE EVERETT ST, CAMAS, 98607	CAMAS LOT 5 & #1 LOT 6 BLK 45	HEALTH CLINICS: MEDICAL / DENTAL / OTHER	DC	Western Search Area
79197000	NWOH HOLDINGS LLC	531 NE EVERETT ST, CAMAS, WA, 98607	522 NE 6TH AVE, CAMAS, 98607	CAMAS #2 LOT 6 BLK 45	HEALTH CLINICS: MEDICAL / DENTAL / OTHER	DC	Western Search Area
79230000	GESSFORD PROPERTY LLC	906 N SHEPHERD RD, WASHOUGAL, WA, 98671	518 NE EVERETT ST, CAMAS, 98607	CAMAS LOTS 1 & 2 BLK 46	HEALTH CLINICS: MEDICAL / DENTAL / OTHER	DC	Western Search Area
79340000	ALLEN TREVOR W & ALLEN LISA R TRUSTEES	4475 NW EMILY WAY, CAMAS, WA, 98607	736 NE 6TH AVE, CAMAS, 98607	CAMAS LOT 5 BLK 47	HEALTH CLINICS: MEDICAL / DENTAL / OTHER	DC	Western Search Area
79805002	BRESTER PROPERTIES LLC	403 NE 6TH AVE, CAMAS, WA, 98607	411 NE 6TH AVE, CAMAS, 98607	BENZ NEVIN PAYNE CONDOMINIUMS UNIT 1	HEALTH CLINICS: MEDICAL / DENTAL / OTHER	DC	Western Search Area
79805004	BRESTER PROPERTIES LLC	411 NE 6TH AVE, CAMAS, WA, 98607	403 NE 6TH AVE, CAMAS, 98607	BENZ NEVIN PAYNE CONDOMINIUMS UNIT 2	HEALTH CLINICS: MEDICAL / DENTAL / OTHER	DC	Western Search Area
79805006	BRESTER PROPERTIES LLC	411 NE 6TH AVE, CAMAS, WA, 98607	405 NE 6TH AVE, CAMAS, 98607	BENZ NEVIN PAYNE CONDOMINIUMS UNIT 3	HEALTH CLINICS: MEDICAL / DENTAL / OTHER	DC	Western Search Area
79880000	IMP GROUP LLC	4525 NE 126TH CIR, VANCOUVER, WA, 98686	329 NE 6TH AVE, CAMAS, 98607	CAMAS LOT 3 BLK 58	HEALTH CLINICS: MEDICAL / DENTAL / OTHER	DC	Western Search Area
79885000	IMP GROUP LLC	4525 NE 126TH CIR, VANCOUVER, WA, 98686		CAMAS LOT 4 BLK 58	HEALTH CLINICS: MEDICAL / DENTAL / OTHER	DC	Western Search Area
79980000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348	133 NE 6TH AVE, CAMAS, 98607	CAMAS LOTS 1-8 BLK 60	STORAGE WAREHOUSE	DC	Western Search Area
81760000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348		PROSPECT PLACE ADDN CAMAS LOT 8	PARKING LOT: PAVED, FOR ADJOINING BUILDING	DC	Western Search Area
81770000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348		PROSPECT PLACE ADDN CAMAS LOTS 9 & 10	PARKING LOTS & PARKING STRUCTURES	DC	Western Search Area
82531000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348		#2 OF T M COFFEY BNTY CL 3.41A	PARKING LOT: PAVED, FOR ADJOINING BUILDING	DC	Western Search Area
82532000	CLARK PUBLIC UTILITIES	PO BOX 8900, VANCOUVER, WA, 98668	750 DIVISION ST, CAMAS, 98607	#3 OF TM COFFEY BNTY CL .43A	ELECTRIC POWER BOOSTERS, TRANSFORMERS, STATIONS, R	DC	Western Search Area

Parcel Serial Number	Owner Name	Owner Address	Site Address	Legal Description	Land-Use Description	Zoning	WHPZ
88980000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348		OVERLOOK ADDN CAMAS #1 LOTS 5 THRU 10 BLK 4	PARKING LOT: PAVED, FOR ADJOINING BUILDING	HI	Western Search Area
88990000	JAMES RIVER II INC	PO BOX 105681, ATLANTA, GA, 30348		OVERLOOK ADDN CAMAS #2 LOTS 5 THRU 8 BLK 4	MFG - PAPER PRODUCTS	HI	Western Search Area
89020000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348	112 E 1ST AVE, CAMAS, 98607	OVERLOOK ADDN CAMAS LOTS 1 & 2 BLK 5	MINIMAL STRG BLDGS, EQUIP, SHEDS, OPEN POLE BLDGS	HI	Western Search Area
89030000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348		OVERLOOK ADDN CAMAS LOT 3 BLK 5	SERVICE REPAIR SHOP	HI	Western Search Area
89040000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348	234 E 1ST AVE, CAMAS, 98607	OVERLOOK ADDN CAMAS LOT 4 BLK 5	SERVICE REPAIR SHOP	HI	Western Search Area
89060000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348		OVERLOOK ADDN CAMAS LOTS 7 & 8 BLK 5 & #224 MAXON DLC	MFG - PAPER PRODUCTS	HI	Western Search Area
89070000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348	234 E 1ST AVE, CAMAS, 98607	OVERLOOK ADDN CAMAS LOT 1 BLK 6	SERVICE REPAIR SHOP	HI	Western Search Area
89080000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348		OVERLOOK ADDN CAMAS LOT 2 BLK 6	PARKING LOT: GRAVEL, FOR ADJOINING BUILDING	HI	Western Search Area
89090000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348		OVERLOOK ADDN CAMAS LOT 3 BLK 6	PARKING LOT: GRAVEL, FOR ADJOINING BUILDING	HI	Western Search Area
89100000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348	117 SE CEDAR ST, CAMAS, 98607	OVERLOOK ADDN CAMAS #1 LOT 4 BLK 6	PARKING LOT: PAVED, FOR ADJOINING BUILDING	HI	Western Search Area
89105000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348	336 E 1ST AVE, CAMAS, 98607	OVERLOOK ADDN CAMAS #2 LOT 4 BLK 6	PARKING LOT: GRAVEL, FOR ADJOINING BUILDING	HI	Western Search Area
89110000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348		OVERLOOK ADDN CAMAS LOT 5 BLK 6	PARKING LOT: PAVED, FOR ADJOINING BUILDING	HI	Western Search Area
89115000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348		OVERLOOK ADDN CAMAS LOTS 6 & 7 BLK 6	STORAGE WAREHOUSE	HI	Western Search Area
89120000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348	129 SE CEDAR ST, CAMAS, 98607	OVERLOOK ADDN CAMAS LOT 8 BLK 6	PARKING LOT: GRAVEL, FOR ADJOINING BUILDING	HI	Western Search Area
89140000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348	416 E 1ST AVE, CAMAS, 98607	OVERLOOK ADDN CAMAS LOTS 1 & 2 BLK 7	PARKING LOT: GRAVEL, FOR ADJOINING BUILDING	HI	Western Search Area
89150000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348		OVERLOOK ADDN CAMAS LOTS 3 & 4 BLK 7	PARKING LOT: GRAVEL, FOR ADJOINING BUILDING	HI	Western Search Area
89170000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348	124 SE CEDAR ST, CAMAS, 98607	OVERLOOK ADDN CAMAS LOT 6 BLK 7	PARKING LOT: GRAVEL, FOR ADJOINING BUILDING	HI	Western Search Area
89171000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348		OVERLOOK ADDN CAMAS LOT 5 BLK 7	PARKING LOT: GRAVEL, FOR ADJOINING BUILDING	HI	Western Search Area
89550000	RIVERVIEW SAVINGS BANK	PO BOX 872290, VANCOUVER, WA, 98687	202 SE DALLAS ST, CAMAS, 98607	OVERLOOK ADDN CAMAS LOT 1 BLK 17	STORAGE WAREHOUSE	HI	Western Search Area
89610000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348		OVERLOOK ADDN CAMAS LOT 1 BLK 18	PARKING LOT: GRAVEL, FOR ADJOINING BUILDING	HI	Western Search Area
89615000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348	203 SE DALLAS ST, CAMAS, 98607	OVERLOOK ADDN CAMAS #1 LOT 2 BLK 18	PARKING LOT: PAVED, FOR ADJOINING BUILDING	HI	Western Search Area

Parcel Serial Number	Owner Name	Owner Address	Site Address	Legal Description	Land-Use Description	Zoning	WHPZ
89616000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348	428 SE 2ND AVE, CAMAS, 98607	OVERLOOK ADDN CAMAS #2 LOT 2 BLK 18	PARKING LOT: PAVED, FOR ADJOINING BUILDING	HI	Western Search Area
89620000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348		OVERLOOK ADDN CAMAS LOT 3 BLK 18	PARKING LOT: GRAVEL, FOR ADJOINING BUILDING	HI	Western Search Area
89630000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348		OVERLOOK ADDN CAMAS LOTS 4 & 5 BLK 18	PARKING LOT: GRAVEL, FOR ADJOINING BUILDING	HI	Western Search Area
89640000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348		OVERLOOK ADDN CAMAS LOTS 6,7 & 8 BLK 18	PARKING LOT: GRAVEL, FOR ADJOINING BUILDING	HI	Western Search Area
89730000	JHTM PROPERTIES LLC	636 SE 3RD AVE, CAMAS, WA, 98607		OVERLOOK ADDN CAMAS #1 LOTS 2 & 3 BLK 20	PARKING LOT: GRAVEL, FOR ADJOINING BUILDING	HI	Western Search Area
89740000	JHTM PROPERTIES LLC	636 SE 3RD AVE, CAMAS, WA, 98607	636 SE 3RD AVE, CAMAS, 98607	OVERLOOK ADDN CAMAS #2 LOTS 2 & 3 BLK 20	SERVICE REPAIR SHOP	HI	Western Search Area
89750000	JHTM PROPERTIES LLC	636 SE 3RD AVE, CAMAS, WA, 98607		OVERLOOK ADDN CAMAS LOT 4 BLK 20	PARKING LOT: GRAVEL, FOR ADJOINING BUILDING	HI	Western Search Area
89760000	JHTM PROPERTIES LLC	636 SE 3RD AVE, CAMAS, WA, 98607		OVERLOOK ADDN CAMAS LOT 5 BLK 20	PARKING LOT: GRAVEL, FOR ADJOINING BUILDING	HI	Western Search Area
89770000	H & R PROPERTIES LLC	81 ROCKWOOD DR, STEVENSON, WA, 98648	325 SE FRANKLIN ST, CAMAS, 98607	OVERLOOK ADDN CAMAS LOT 6 BLK 20	STORAGE WAREHOUSE	HI	Western Search Area
89790000	JHTM PROPERTIES LLC	636 SE 3RD AVE, CAMAS, WA, 98607		OVERLOOK ADDN CAMAS LOT 8 BLK 20	PARKING LOT: GRAVEL, FOR ADJOINING BUILDING	HI	Western Search Area
90939000	CITY OF CAMAS	616 NE 4TH AVE, CAMAS, WA, 98607		#65, 73 & 79 OF HJG MAXON DLC 2.30A	CEMETERIES	R-7.5	Western Search Area
90967000	JHTM PROPERTIES LLC	636 SE 3RD AVE, CAMAS, WA, 98607	606 SE 3RD AVE, CAMAS, 98607	#153 HJG MAXON DLC .17A	STORAGE WAREHOUSE	HI	Western Search Area
91044013	GEORGIA-PACIFIC CORPORATION	PO BOX 105681, ATLANTA, GA, 30348		#275 MAXON COFFEY DLCS SEC 10-1-2 OVERLOOK & CAMAS (BLDG)	MFG - LUMBER & WOOD PRODUCTS	HI	Western Search Area
91044015	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348	273 NE ADAMS ST, CAMAS, 98607	#275 MAXON COFFEY DLCS SEC 10-1-2 OVERLOOK & CAMAS 189.27A (SEE 91044027	MFG - PAPER PRODUCTS	HI	Western Search Area
91044019	CITY OF CAMAS	616 NE 4TH AVE, CAMAS, WA, 98607	630 NE OAK ST, CAMAS, 98607	#281A HJG MAXON DLC 6.53 A	CEMETERIES	R-7.5	Western Search Area
91044034	JHTM PROPERTIES LLC	636 SE 3RD AVE, CAMAS, WA, 98607		#295 HJG MAXON DLC .03A	STORAGE WAREHOUSE	HI	Western Search Area
700525000	FORT JAMES CAMAS LLC	PO BOX 105681, ATLANTA, GA, 30348		BN RR LEASE #500,086	MFG - PAPER PRODUCTS	HI	Western Search Area

APPENDIX C
EXAMPLE NOTIFICATION LETTERS

DRAFT

DATE

Recipient [Fire/Police Departments] name
Recipient company
Recipient address 1
Recipient address 2

Re: City of Camas Wellhead Protection Plan

Dear Emergency Responder:

The City of Camas has developed an updated Wellhead Protection Plan to help maintain drinking water quality for our City residents. The Plan is based on Washington Department of Health WAC 246-290-135(3) regulations. As part of the Plan, maps were prepared that show the areas around each city drinking water well where a chemical spill on the ground may cause contamination of the well/aquifer. These areas are Wellhead Protection Areas (WHPAs).

As part of this Plan, the City must provide wellhead protection information to agencies responsible for incident/spill response procedures. It is important that you are aware of where potential contaminant releases could adversely impact the quality of our community's drinking water supply.

A map of the WHPAs and adjacent transportation routes is enclosed for your review. Also enclosed is a table providing the facility ID, name, and location for each potential contaminant source. An acknowledgement of receipt of this information or a response from your office as part of our wellhead protection plan documentation would be appreciated. Please note that the City has sent notices to each of these properties informing them of their location within the WHPA boundary.

In the event of a spill or contaminant release, we would ask that you immediately notify us and the Department of Ecology, so that we can take appropriate measures to deal with the problem.

Thank you for assisting us in protecting our water supply and groundwater resources. If you have any questions, please contact me at (###) ###-####.

Sincerely,

Name
Title
City of Camas

DRAFT

DATE

Department of Ecology
Recipient company
Recipient address 1
Recipient address 2

Re: City of Camas Wellhead Protection Plan

Dear Department of Ecology:

The City of Camas has developed an updated Wellhead Protection Plan to help maintain drinking water quality for our City residents. The Plan is based on Washington Department of Health WAC 246-290-135(3) regulations. As part of the Plan, maps were prepared that show the areas around each city drinking water well where a chemical spill on the ground may cause contamination of the well/aquifer. These areas are Wellhead Protection Areas (WHPAs).

The enclosed map depicts the WHPA boundary, source wells, and identified potential contaminant sources. Also enclosed is a table providing the facility ID, name, and location for each potential contaminant source. Please review the map and use it as a reference when inspecting and permitting the storage, use, and disposal of hazardous material within our WHPAs.

Please note that the City has sent notices to each of these properties informing them of their location within the WHPA boundary. The City has also sent similar letters to businesses with land uses that could potentially contaminate groundwater quality.

Thank you for assisting us in protecting our water supply and groundwater resources. If you have any questions, please contact me at (###) ###-####.

Sincerely,

Name
Title
City of Camas

DRAFT

DATE

Recipient [local business or cleanup site] name
Recipient company
Recipient address 1
Recipient address 2

Re: City of Camas Wellhead Protection Plan

To Whom It May Concern:

The City of Camas has developed an updated Wellhead Protection Plan to help maintain drinking water quality for our county residents. The Plan is based on Washington Department of Health WAC 246-290-135(3) regulations. As part of the Plan, maps were prepared that show the areas around each PUD drinking water well where a chemical spill on the ground may cause contamination of the well/aquifer. These areas are Wellhead Protection Areas (WHPAs). The Plan also requires an inventory of potential sources of groundwater contamination within these WHPAs.

The primary purpose of this letter is to notify you that your facility is located within one of our WHPAs. Since your business or the activities conducted at your facility may involve the use or storage of chemicals (e.g., gasoline, underground storage tanks, hazardous waste, etc.) that could adversely impact the drinking water supply in the event of a spill. If a chemical spill occurs, immediately notify the Department of Ecology and relevant first responders (for specific guidance see https://ecology.wa.gov/footer-pages/report-an-envi-ronmental-issue/report-a-spill), followed by the City of Camas.

Thank you for assisting us in protecting our water supply and groundwater resources. If you have any questions, please contact me at (###) ###-####.

Sincerely,

Name
Title
City of Camas

DRAFT

APPENDIX V

TM 1 - HYDRAULIC MODEL DEVELOPMENT AND CALIBRATION

2026 Water System Plan Update

TECHNICAL MEMORANDUM 1

Hydraulic Model Development and Calibration

DRAFT / September 2025

2026 Water System Plan Update

TECHNICAL MEMORANDUM 1

Hydraulic Model Development and Calibration

DRAFT / September 2025

This document is released for the purpose of information exchange review and planning only under the authority of Matthew Huang, September 29, 2025, State of Washington PW No. 54002.

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Abbreviations

ADD	average day demand
AWWA	American Water Works Association
BPS	booster pump station
Carollo	Carollo Engineers
City	City of Camas
DEM	digital elevation model
DS	downstream
DSL	distribution system leakage
EPS	extended period stimulation
FCV	flow control valve
GIS	geographic information system
GME	Green Mountain Estates
gpm	gallons per minute
HGL	hydraulic grade line
HP	horsepower
LPH	Lower Prune Hill
MDD	maximum day demand
MG	million gallons
mgd	million gallons per day
MSL	mean sea level
PM	project memorandum
PRV	pressure reducing valve
psi	pounds per square inch
PSV	pressure sustaining valve
SCADA	supervisory control and data acquisition
TM	technical memorandum
UPH	Upper Prune Hill
USGS	United States Geological Survey
WSPU	Water System Plan Update

TM 1 HYDRAULIC MODEL DEVELOPMENT AND CALIBRATION

1.1 Hydraulic Model Development

This section of the technical memorandum (TM) summarizes the process used to update and calibrate the hydraulic computer model of the City of Camas' (City) water distribution system as part of the City's 2026 Water System Plan Update (WSPU). Included in this TM are summaries of model development, demand allocation, and calibration results.

1.2 Previous Hydraulic Model

Prior to this project, the City maintained a hydraulic model of their distribution system in InfoWater by Innovyze. Recently, Innovyze was acquired by AutoDesk, and its services were updated. The City's hydraulic model has since been converted and utilizes the most current InfoWater Pro software. The most recent recalibration of the City's hydraulic model was completed in 2013 and as part of the last water system plan update, calibration was verified by utilizing data collected from hydrant flow tests.

1.3 Elements of the Hydraulic Model

A hydraulic model is comprised of elements that represent water system assets and include junctions, pipes, tanks and reservoirs, pumps, and control valves. The following provides a brief overview of the various elements of the hydraulic model and the required input parameters associated with each:

- **Elevation.** Each modeled element is assigned an elevation which is used as a reference point when calculating system pressure and hydraulic grade line. Carollo Engineers (Carollo) decided to utilize United States Geological Survey (USGS) Data, available as a standard one-meter resolution digital elevation model (DEM) as the model elevation source. The one-meter DEM (converted to feet for use in the hydraulic model) was developed exclusively from high resolution light detection and ranging datasets collected between March 2016 and May 2017 as part of the USGS 3D elevation program. The DEM elevation values reference the North American Vertical Datum of 1988.
- **Junctions.** Locations where pipe sizes change, where pipelines intersect, change in material, open valves, or where water demands are applied are represented by junctions in the hydraulic model. Required inputs for junctions include service elevation and water demands. Demand nodes were delineated within InfoWater Pro as junctions that were in the respective pressure zone and not linked to a transmission main or facility. Note that hydrants and standpipes are modeled as junctions with a one-to-one relationship.
- **Pipes.** Water mains are represented as pipes in the hydraulic model. Input parameters for pipes include length, roughness (Hazen-Williams C factor), diameter, and whether or not the pipe is a check valve (i.e., does not allow reverse flow). Existing pipes in the hydraulic model were compared to the most recent water main GIS layer provided by the City. Any missing pipes were hand drawn into the hydraulic model. For modeling purposes, any small diameter dead-end pipe (4-inches in diameter and

less) with no hydrant connections were not added to the City's model. Additionally, pipes for facilities (i.e., reservoirs, pump stations), were noted in InfoWater Pro as facility pipes to differentiate between distribution system piping and facility yard piping. This notation will allow for future updates to the model to focus on GIS updates and not facilities.

- **Tanks.** Water tanks are included in the hydraulic model as either cylindrical tanks or variable area tanks, depending on the complexity of the tank geometry. Required input parameters for cylindrical tanks include bottom elevation, maximum level, initial level, and diameter. For modeling purposes, any rectangular tanks were recalculated to be circular tanks. The volume was divided by the depth to obtain the area of the tank and then an equivalent circular diameter tank was calculated.
- **Reservoirs.** For water distribution system modeling, fixed head reservoirs are used to represent a water source with a constant hydraulic grade line (HGL). Typically, fixed head reservoirs are used to represent water sources, such as groundwater wells or water treatment facilities.
- **Pumps**. Pumps are included in the hydraulic model as links. Input parameters for pumps include pump curves, operational controls, and elevation.
- **Control Valves.** Several different valves, such as gate valves, check valves, butterfly valves, pressure sustaining valves (PSV), flow control valves (FCV), and pressure reducing valves (PRV) are represented as links in the hydraulic model. Input parameters for control valves include diameter, operational controls, and other settings.

1.4 Demand Allocation

Allocation of water demands to appropriate nodes in the hydraulic model was completed by Carollo. Demands were allocated based on 2024 water billing dataset provided by the City, which contained billed consumption by month in million gallons (MG) for each parcel connected to the City's distribution system. Annual average demands from the dataset were then allocated into the hydraulic model by assigning each billed parcel to the nearest model "demand" junction in geographic information system (GIS). Excel was utilized to then return consumption volumes for each model junction, and those values were pasted into the model demand set.

The billed consumption for 2024 amounted to approximately 4.03 million gallons per day (mgd). Distribution system leakage (DSL) amounted to 0.64 mgd in 2024 or 14 percent of total water production. DSL is the water lost from the distribution system that includes apparent (theft, meter inaccuracy, data collection errors) and real losses (water main breaks, reservoir overflows, leaky valves, etc.). Annual average production in 2024 from all the City's supply sources was 4.67 mgd. DSL was uniformly distributed across the City's system to match consumption and production values.

After allocating demands, the hydraulic model was calibrated to mimic actual operations. A description of the calibration process and details for the City's distribution system is discussed later in this TM.

1.5 Distribution System Components

The City owns and operates a multi-source municipal water system (Washington State Department of Health System Number 108002), which includes supply, treatment, storage, and distribution of potable water to residential and commercial customers. Carollo updated the City's hydraulic model utilizing GIS geodatabases, pump curves, record drawings, and other facility data provided by the City.

The following sections describe the methodology used to update the hydraulic model.

1.5.1 Water Supply

Water is supplied to the Camas water system from one slow sand filtration plant treating raw water from the City's two surface water diversions and 10 groundwater wells. All supply sources were modeled as a fixed head reservoir and a flow control valve which opens/closes at a set flow rate based on tank levels. Table 1.1 summarizes the City's water supply sources.

Table 1.1 Water Supply Summary(1)

Model ID	Name	Status	Modeled Capacity (gpm)
SLOW_SAND_PLANT	Slow Sand Filtration Plant	Inactive(1)	1,570
BOULDER	Boulder Creek Intake	Inactive(1)	1,120
JONES	Jones Creek Intake	Inactive(1)	450
WELL-5	Well 5	Active	675
WELL-6	Well 6	Active	1,200
WELL-7	Well 7	Active	950
WELL-8	Well 8	Active	1,250
WELL-9	Well 9	Active	575
WELL-10	Well 10	Active	900
WELL-11	Well 11	Active	1,000
WELL-12	Well 12	Active	1,000
WELL-13	Well 13	Active	1,350
WELL-14	Well 14	Active	850

Notes:
(1) During the period of extended period stimulation (EPS) and fire flow calibration, the plant was offline and for purposes of hydraulic analysis it is assumed that under maximum day demand conditions (typically occur during summer months), the plant is unable to divert water from its surface water supplies.
gpm - gallons per minute.

1.5.2 Pressure Zones

The City's water system is divided into 26 distinct pressure zones. Table 1.2 lists the HGL of each pressure zone, which range from 285 feet to 852 feet above mean sea level (MSL). Carollo updated pressure zones using closed valves, pipes and PRV settings provided in the City's PRV Study (Grey & Osborne, 2024). A shapefile containing these updated pressure zone boundaries will be provided for City review and to assist with model review. The ground elevations within the service area range from 21 feet to 757 feet above MSL.

Table 1.2 Pressure Zones

Zone ID[1] (feet)	Supplying Pressure Zone	Open or Closed?	Minimum Elevation[2][3] (feet)	Maximum Elevation[2][3] (feet)
285 – Downtown	343 – Butler (Transmission)	Open	21	159
343 – Butler (Transmission)	N/A	Open	51	234
455 – LPH	N/A	Open	96	409
542 – Gregg	N/A	Open	225	440
544 – Lacamas	N/A	Open	190	456
440 - Lacamas Shores	544 – Lacamas	Open	212	358
852 – UPH	N/A	Open	428	757
542 – Spyglass	852 - UPH	Open	353	485
547	852 – UPH	Open	285	426
550	455 - LPH	Closed	361	409
581	852 – UPH	Open	334	460
612	852 – UPH	Open	404	488
625	852 – UPH	Open	399	549
674	852 – UPH	Open	382	530
675	852 – UPH	Open	460	523
687	852 – UPH	Open	428	524
694	852 – UPH	Open	510	544
695 - Green Mountain Estates	542 – Gregg / 544 - Lacamas	Closed	456	534
697	852 – UPH	Open	421	636
697 – East	852 – UPH	Open	526	557
710	852 – UPH	Open	471	575
711	852 – UPH	Open	502	574
734	852 – UPH	Open	480	634
745	852 – UPH	Open	529	603
782	852 – UPH	Open	610	662
800	852 – UPH	Open	506	633

Notes
(1) Zone ID is based on hydraulic grade line (HGL).
(2) Elevation data based on interpolation of 2-ft contours.
(3) Location of service connections based on model node location.
LPH - Lower Prune Hill; UPH - Upper Prune Hill.

1.5.3 Pipe Network

The modeled water distribution system consists of over 159 miles of pipelines ranging from 6-inch to 24-inches in diameter. Table 1.31.3 provides a breakdown by diameter of the modeled distribution system. As shown in Table 1.3, nearly 64 percent of the City's modeled water distribution system consists of 8-inch through 12-inch diameter water mains. Almost 21 percent of the modeled system is 6-inches in diameter. The remaining 15 percent of the system is 14-inches in diameter and larger.

Table 1.3 Modeled Pipeline Summary(1)

Diameter (inches)	Length		Percent of Modeled System
	(feet)	(miles)	
6	180,065	34.1	21%
8	365,424	69.2	43%
10	20,264	3.8	2%
12	162,810	30.8	19%
14	32,881	6.2	4%
16	13,278	2.5	2%
18	50,251	9.5	6%
20	57	0.01	<1%
24	16,272	3.1	2%
Total	**841,303**	**159.2**	**100%**

Notes:
(1) Source: Hydraulic Model.

1.5.4 Storage Reservoirs

Water distribution systems rely on stored water to help equalize daily fluctuations between supply and demand, to supply sufficient water for firefighting, and to meet demands during an emergency or an unplanned outage of a major source of supply. The hydraulic model includes 7 storage reservoirs with volumes ranging from 0.1 to 2.4 MG. Detailed information for each of the City's storage reservoirs is summarized in Table 1.4.

Table 1.4 Modeled Reservoir Summary

Tank ID	Name	Capacity (MG)	Diameter (feet)	Height (feet)	Base Elevation (feet)	Maximum Level (feet)
BUTLER	Butler Reservoir	1.15	113.0	15.0	328.0	343.0
LOWER_PRUNE_RES2	Lower Prune Hill Reservoir #2	1.5	105.0	23.0	432.0	455.0
GREGG	Gregg Reservoir	0.1	15.5	72	470.0	542.0
LACAMAS	Lacamas Reservoir	2.0	84.2	48.0	496.0	544.0
18TH_AVE	18th Avenue (Anderson) Reservoir	2.0	95.0	44.0	500.0	544.0
UPPER_PRUNE_RES	Upper Prune Hill Reservoir	2.4	77.5	68.0	748.0	816.0
UPPER_PRUNE_STD	Upper Prune Hill Standpipe	0.75	36.0	100.0	752.0	852.0

Notes:
(1) Source: City of Camas 2019 Water System Plan Update.

1.5.5 Booster Pump Stations

The hydraulic model includes 10 booster pump stations with 28 individual pumps. Pump stations were modeled as multiple point curves based on the pump curves or design points based on pump design flow and total dynamic head that the City provided. The hydraulic characteristics for each pump are summarized in Table 1.5.

Table 1.5 Modeled Booster Pump Summary

Name	From Zone	To Zone	Pump Information			
			Pump ID	Status	Power (HP)	Design Capacity (gpm)
Angelo BPS	343 – Butler (Transmission)	455 – LPH	ANGELO-1	Active	75	1,000
			ANGELO-2	Active	75	1,000
			ANGELO-3	Active	75	1,000
			ANGELO-4	Active	75	1,000
Butler BPS	343 – Butler (Transmission)	455 – LPH	BUTLER-1	Active	50	800
			BUTLER-2	Active	60	600
Crown Road BPS	343 – Butler (Transmission)	542 – Gregg	CROWN_RD-1	Active	75	800
			CROWN_RD-2	Active	75	800
Forest Home BPS	285 - Downtown	455 – LPH	FOREST_HOME-PMP	Active	50	1,000
Green Mountain Estates BPS	544 – Lacamas	695 – GME	GME_1	Active	15	180
			GME_2	Active	15	180
			GME_3	Active	15	180
			GME_4	Active	60	650
			GME_5	Active	60	650
Gregg BPS	455 – LPH	542 – Gregg	GREGG-1	Active	100	1,500
			GREGG-2	Active	100	1,500
			GREGG-3	Active	15	500
Lacamas BPS	455 – LPH	544 – Lacamas	LACAMAS-1	Active	25	500
			LACAMAS-2	Active	25	500
			LACAMAS-3	Active	100	1,500
Lower Prune Hill BPS	455 – LPH	852 – UPH	LPH-1	Active	150	1,000
			LPH-2	Active	150	1,000
			LPH-3	Active	100	750
Upper Prune Hill BPS	852 – UPH	852 – UPH	UPH-1	Active	20	750
			UPH-2	Active	20	750
			UPH-3	Active	40	1,400
			UPH-4	Active	40	1,400
Francis Road BPS	455 – LPH	550	FRANCIS_RD-1	Active	7.5	80

Notes:
(1) Source: City of Camas 2019 Water System Plan Update.
BPS - booster pump station; GME - Green Mountain Estates; HP - horsepower.

1.5.6 Control Valves

The City's distribution system includes 39 PRV stations with 71 individual valves, which convey and regulate water between zones and/or storage tanks. PRVs are hydraulically operated valves that modulate open and closed to maintain the downstream pressure setpoint, allowing distribution systems to transfer water from upper pressure zones to lower pressure zones without exceeding design pressures in the lower zones or dropping the pressures of the higher zone. Typically, PRV stations are configured with several valves in parallel, each with a different downstream pressure setpoint for redundancy. All PRVs listed in the table below were modeled, but for modeling purposes if a PRV station had more than one valve, only the largest diameter PRV was simulated (smaller diameter PRV was closed). Pressure reducing valves were adjusted to match field recorded data or reported setpoints and hydraulic grade lines from City provided documents flow control valves are another control valve that limit flow to a specified flowrate. Valves for all supply sources are modeled as FCVs. PSV are also another type of control valve that maintains a set pressure on the suction or discharge of the valve depending on the control configuration. Several of the City's booster pump stations have pump control valves that modulate open and closed for the pump to operate on its curve. In these instances, a pressure sustaining valve was modeled at a specified setpoint to match station flow to values typically seen in historical supervisory control and data acquisition (SCADA) data.

A system valve station typically consists of several valves that are standby, or backup. In addition to independent PRV stations, many pump stations have a bypass PRV that enables water to flow to a lower zone during an emergency. Pump station bypass PRV's were not modeled as part of this project.

The details for each of the City's PRV's are summarized in Table 1.6 and PSV's summarized in Table 1.7

Table 1.6 Pressure Reducing Valves

PRV Station	PRV Model ID	Size (inches)	Downstream Zone	Downstream Setting (psi)	Upstream Pressure (psi)
NW McIntosh	PRV-1	6	697	27	120
	PRV-2	2	697	32	120
NW Payne Rd. and SE 201st Ave.	PRV-3	8	544	Closed	Closed
	PRV-4	4	544	Closed	Closed
NW 16th Ave. and Klickitat	PRV-5	10	697	12	105
	PRV-6	4	697	22	105
NW Ivy and Fargo	PRV-7	4	734	45	90
NW 22nd and Fargo	PRV-8	4	697E	65	130
NW 19th Ave. and Fargo	PRV-9	6	687	70	157
NE 21st and Everett	PRV-10	8	343	45	110
NE 19th and Everett	PRV-11	6	343	40	110
2349 NW 32nd Circle	PRV-12	8	680	25	120
	PRV-13	2	680	30	120
NW Brady Rd. and Deer Creek	PRV-14	8	547	25	105
	PRV-15	3	547	30	105

PRV Station	PRV Model ID	Size (inches)	Downstream Zone	Downstream Setting (psi)	Upstream Pressure (psi)
NW Parker St. and Linear	PRV-16	8	544	Closed	Closed
NW Astor and 36th (Applewood)	PRV-17	8	612	55	90
	PRV-18	2	612	65	90
NW 43rd and Sierra	PRV-19	8	544	30	190
NW 23rd Ave. and Fargo	PRV-20	4	734	45	130
2666 NW Logan St. off NW 28th	PRV-21	6	782	50	90
	PRV-22	2	782	55	90
2929 NW 31st and NW Dahlia Dr.	PRV-23	6	544	Closed	Closed
	PRV-24	2	544	Closed	Closed
NW 29th Ave. and NW Astor St.	PRV-25	2	800	58	90
	PRV-26	6	800	53	90
NW Sierra Dr. and NW 38th Ave.	PRV-27	6	711	35	115
	PRV-28	2	711	40	115
Currawong Ct. and NW 40th Ave.	PRV-29	6	711	75	145
	PRV-30	2	711	80	145
NW 23rd Ave. and Iris	PRV-31	8	656	58	130
	PRV-32	2	656	63	130
NW Julia St.	PRV-33	8	544	Closed	Closed
	PRV-34	2	544	Closed	Closed
NW Fern Ridge Dr.	PRV-35	2	547	40	110
	PRV-36	8	547	35	110
NE 6th and NE Hayes St	PRV-37	4	343	68	94
	PRV-38	12	343	58	94
East End Walden	PRV-41	2	442	37	84
	PRV-42	6	442	32	84
West End Walden	PRV-43	1.5	442	72	118
	PRV-44	6	442	67	118
NE 6th and Joy	PRV-45	6	343	55	92
Goot Park	PRV-46	3	343	115	138
	PRV-47	10	343	110	138
Lake Ridge Lower	PRV-48	2	581	55	98
	PRV-49	6	581	50	98
Lake Ridge Middle	PRV-50	2	675	63	91
	PRV-51	6	675	58	91
Lake Ridge Upper	PRV-52	2	745	68	123
	PRV-53	6	745	63	123

PRV Station	PRV Model ID	Size (inches)	Downstream Zone	Downstream Setting (psi)	Upstream Pressure (psi)
702 NW View Ridge St. (Dovehill) Upper	PRV-54	2	542S	30	100
	PRV-55	6	542S	25	100
NW 7th and Valley (Dovehill) View Ridge Lower	PRV-56	2	542S	40	110
	PRV-57	6	542S	35	110
NW Fargo and 27th (Drewf's Farm Upper)	PRV-58	2	734	Open	63
	PRV-59	6	734	Open	63
905 NW 30th Ave. and NW Ivy Ln. (Drewf's Farm Lower)	PRV-60	2	710	60	130
	PRV-61	6	710	55	130
NW Ivy and Ostenson Canyon	PRV-62	2	694	65	140
	PRV-63	6	694	60	140
NW 24th Ave and NW Brady Rd	PRV-64	6	625	70	124
	PRV-65	2	625	75	124
2011 NW Larkspur St	PRV-66	6	625	45	132
	PRV-67	2	625	50	132
Wellfield East	PRV-69	12	343	100	125
	PRV-70	4	343	Closed	Closed
NE 277th and NE 14th St.	PRV_SSP	6	542	78	140
	V9093	3	542	88	140

Notes:
psi - pounds per square inch.

Table 1.7 Pressure Sustaining Valves

PSV Station	PSV Model ID	Size (inches)	Pressure Setpoint (psi)
Angelo BPS	PSV-ANGELO	8	140
Crown Rd. BPS	PSV-CROWNRD	8	180
Gregg BPS	PSV-GREGG	12	140
Lower Prune Hill BPS	PSV-LPH	6	250

1.5.7 Facility Controls

Facility controls are set for pumps and control valves for supply sources to match actual distribution system conditions. Input from City operations staff and review of SCADA data were used to determine setpoints. Typically, pumps are set with controls to turn on and off at specified tank levels, and PRVs and FCVs may be similarly set to open and close to maintain specified tank levels. For modeling purposes, pumps supplying "closed" zones were modeled having a variable speed control set to maintain a downstream junction pressure setpoint. The specific controls developed are summarized in the tables below. Booster pump station controls are summarized in Table 1.8 noting on/off settings and controlling facility. Supply source controls are summarized in Table 1.9 defining on/off settings, controlling facility and flow setpoint. Controls for miscellaneous facilities like pipes and tank altitude valves are provided in Table 1.10, respectively.

Table 1.8 Pump Station Controls

Pump	On Setting	Off Setting	Control Location
ANGELO-1	Level < 22 feet	Level > 22.5 feet	LPH Reservoir
ANGELO-2	Level < 21 feet	Level > 22 feet	LPH Reservoir
ANGELO-3	Level < 21 feet	Level > 21.5 feet	LPH Reservoir
ANGELO-4	Level < 20.5 feet	Level > 21 feet	LPH Reservoir
BUTLER-1	None	None	None
BUTLER-2	None	None	None
CROWN_RD-1	Level < 57 feet	Level > 66 feet	Gregg Reservoir
CROWN_RD-2	Level < 54 feet	Level > 61 feet	Gregg Reservoir
FOREST_HOME_PMP	00:00	10:00	Time
FRANCIS_RD_PMP	80 psi	None	DS Junction
GREGG-1	None	None	None
GREGG-2	None	None	None
GREGG-3	Level < 59 feet (Pump Setting = 0.82)	Level > 66 feet	Gregg Reservoir
GME_1	140 psi	None	DS Junction
GME_2	None	None	None
GME_3	None	None	None
GME_4	None	None	None
GME_5	None	None	None
LACAMAS-1	Level < 30 feet	Level > 32 feet	Lacamas Reservoir
LACAMAS-2	Level < 32 feet	Level > 34 feet	Lacamas Reservoir
LACAMAS-3	Level < 40 feet	Level > 44 feet	Lacamas Reservoir
LPH-1	Level < 60 feet	Level > 92 feet	On = UPH 2.4 MG Reservoir Off = UPH Standpipe
LPH-2	Level < 52 feet	Level > 86 feet	On = UPH 2.4 MG Reservoir Off = UPH Standpipe
LPH-3	Level < 58 feet	Level > 89 feet	On = UPH 2.4 MG Reservoir Off = UPH Standpipe
UPH-1	Level < 88 feet	Level > 92 feet	UPH Standpipe
UPH-2	Level < 86 feet	Level > 90 feet	UPH Standpipe
UPH-3	Level < 84 feet	Level > 88 feet	UPH Standpipe
UPH-4	Level < 80 feet	Level > 86 feet	UPH Standpipe

Notes:
(1) Source: Hydraulic Model.
DS – downstream.

Table 1.9 Supply Source Controls

Supply Source	On Setting	Off Setting	Control Location	Flow Setting (gpm)
Well_5	00:00	10:00	Time	650
Well_6	None	None	None	0
Well_7	None	None	None	0
Well_8	Level < 13 feet	Level > 13.25 feet	Butler Reservoir	1,250
Well_9	Level < 41 feet	Level > 43 feet	Lacamas Reservoir	575
Well_10	Level < 13 feet	Level > 13.1 feet	Butler Reservoir	900
Well_11	None	None	None	0
Well_12	Level < 13.9 feet	Level > 14 feet	Butler Reservoir	1,000
Well_13	Level < 13.7 feet	Level > 14 feet	Butler Reservoir	1,350
Well_14	Level < 13.2 feet	Level > 13.4 feet	Butler Reservoir	850

Table 1.10 Miscellaneous Controls

Facility Name	On Setting	Off Setting	Control Location	Flow Setting (gpm)
UPH Res Altitude Valve	Level < 58 feet	Level > 62.1 feet	UPH 2.4 MG Reservoir	1,800
P419 (18th Ave Res Inlet/Outlet Pipe)	Lacamas Pump 3 = OFF Lacamas Level > 44 feet	Lacamas Pump 3 = ON Lacamas Level < 40 feet	None	N/A

1.6 Hydraulic Model Calibration Process

This section of the report builds upon the previous project memorandum (PM) developed for this project and is described below:

- **PM - Summary of Hydrant Field Testing** – This document was developed to capture hydrant testing activities and data gathered to support the steady state calibration of the City's distribution system.

This section summarizes the overall methodology employed to calibrate the City's water system hydraulic models and the calibration results, including a detailed description of each of the major components of the model calibration process. The hydraulic model was calibrated in accordance with American Water Works Association (AWWA) Manual on Distribution Network Analysis of Water Utilities (AWWA M-32). Both an extended period simulation calibration and a steady state fire flow calibration were performed for the water system.

1.6.1 Model Scenarios

The scenarios created in the model for calibration and hydraulic analysis purposes are described below and include the following:

- **Extended Period Simulation (EPS) Calibration** - This scenario is for a 24-hour period, simulating system operation and demand conditions for the selected day of calibration. Controls for the facilities were developed and/or updated as part of the EPS model calibration to mimic typical system operations. Demands for the day of EPS calibration are summarized below in Table 1.11.

- **Steady State Fire Flow Scenarios** -– There were 10 hydrant flow tests performed across the City's system that the hydraulic model was calibrated to. Each hydrant test has two separate model scenarios, a static demand and fire flow demand. Each scenario has its own scenario with different demand sets and control sets based on the demand and operations on the day the test was performed. Demands for the days of fire flow calibration are summarized below in Table 1.11.
- **Average Day Demand (ADD)** - A total of five individual ADD scenarios were created. . Each individual scenario utilizes an ADD demand set developed using medium scenario projections for existing (2025), 2031, 2036, 2046, and buildout planning years. Demand sets for the 2031, 2036, and 2046 planning years will be used for hydraulic analysis. Modeled ADD for each planning year is summarized below in Table 1.12.
- **Maximum Day Demand (MDD)** - A total of five individual MDD scenarios were created. Each individual scenario utilizes an MDD demand set developed using medium scenario projections for existing (2025), 2031, 2036, 2046, and buildout planning years. Demand sets for the 2031, 2036, and 2046 planning years will be used for hydraulic analysis. Modeled MDD for each planning year is summarized below in Table 1.12.

The EPS Calibration and the Steady State Fire Flow scenarios are included in the model as a reference to the calibration of the model which is described in Section 6.5.5 of this report and should not be used to perform analysis on the system. Rather, the ADD and MDD scenarios should be used for analysis.

Table 1.11 Calibration Scenario Demand Summary

EPS Calibration Demands (gpm)	Demand Basis	Fire Flow Calibration Demand Set 1 (gpm)	Demand Basis	Fire Flow Calibration Demand Set 2 (gpm)	Demand Basis
3,079	10/11/2024	3,218	05/15/2025	2,978	05/16/2025

Table 1.12 ADD and MDD Demand Summary

Planning Year	ADD (gpm)	MDD (gpm)
Existing (2025)	3,243	6,373
2031	3,972	7,994
2036	4,576	9,208
2046	5,805	11,686
Buildout	10,986	22,727

1.6.2 Operational Considerations

During calibration, it is necessary to adjust the operation of facilities to meet the demand, pressures, and/or reservoir levels of the water system. Pump stations were turned on or off based on downstream pressures or reservoir levels. Supply sources were adjusted to meet scenario demands and cycle the storage reservoirs. The City has the flexibility to alternate supply source operations to evenly distribute wear on the pumps and turn pumps on/off to meet demand conditions for each day as needed. Therefore, the facility controls for supply sources summarized in section 6.3.7 capture the operational statuses for wells on the selected day of EPS calibration. Furthermore, for future planning scenarios where demands increase significantly, additional supply sources and pump station capacities will be required. Control settings and flows for future capacities are not summarized in this report, rather the supply and pump station capacity improvements will be captured in Chapter 9 of the 2026 WSPU.

1.6.3 Diurnal Pattern Development

As part of the EPS calibration process, diurnal patterns were developed for individual pressure zones (where applicable) for the water system. In one case, several of the City's larger pressure zones could not be isolated to create individual diurnal patterns and were combined to develop a grouped zone diurnal pattern. These individual and grouped diurnal patterns were developed based on the selected calibration date. They were applied to each of the respective hydraulic models for use in EPS model simulations. For individual diurnal patterns, see Appendix 1A. Due to limitations in compiling SCADA data for various facilities, the diurnal patterns developed are only representative of a single day. The City maintains a system integrator to generate queries which helps automate compiling SCADA into an excel spreadsheet format. However, for facilities that did not yet have a query created, hourly instantaneous data points were manually recorded using pencil and paper. If more comprehensive SCADA data is available in the future, the diurnal patterns can be refined to be more representative of typical conditions, and the group zone diurnal pattern can be further isolated to create individual diurnal patterns.

1.6.4 Model Calibration Data Collection

Carollo coordinated with City staff regarding SCADA and field data needs that were required to calibrate the hydraulic model. The required calibration data included site maps for specific fire flow test locations, pressure logger locations, and included a list of the SCADA data needs, durations, time intervals, and units. This section summarizes the data collection process that was conducted and how the data will be used to support calibration efforts.

- **SCADA Data Gathering for EPS Model Calibration**: For the EPS data gathering period, Carollo coordinated with City staff to obtain 1 minute data for SCADA points within the distribution system, including flow, and pressure data and reservoir levels. These data, spanning the period from July 2024 to October 2024, were primarily used to generate the diurnal pattern and for EPS model calibration. As discussed in Section 6.5.3, there were difficulties in obtaining SCADA data for certain facilities without a SCADA query. For the locations with no queries, the trends and cleanliness of data were observed during the period of temporary pressure logger deployment. Upon identifying October 11, 2024, as the date with most representative system condition trends, instantaneous data recordings for these facilities were manually recorded using pencil and paper.
- **Temporary Pressure Logger Installation for EPS Calibration:** In addition to the data obtained from the SCADA system from the major system facilities, Carollo also provided temporary pressure loggers that were connected to hydrants to capture pressure fluctuations at key points within the distribution system. The data obtained from the temporary loggers consisted of 1-minute pressure data. The pressure loggers were installed by City staff in the distribution system for a one-week period during October of 2024.
- **Hydrant Flow Testing for Fire Flow (Steady State) Calibration:** Field testing for fire flow calibration took place on May 15 and 16 of 2025. Carollo coordinated with City staff to conduct 10 hydrant flow tests across the distribution system. Specific details related to hydrant flow testing activities are detailed in Table 1.13.
- **SCADA Data Gathering for Fire Flow (Steady State) Calibration:** For the fire flow calibration data gathering period, Carollo coordinated with City staff to obtain 1 minute SCADA data for all pump statuses and reservoir levels within the distribution system during the hydrant flow testing period (May 15 and May 16 of 2025). This data was used to identify boundary conditions in the distribution

system (pump on/off status, reservoir level, etc.) at the time of each hydrant flow test. These boundary conditions were then matched in the model to calibrate each fire flow location. City operations staff provided pump statuses for all booster pump stations without SCADA queries.

1.6.5 Model Calibration Methodology and Results

The purpose of a water system hydraulic model is to estimate, or predict, how the water distribution system will respond under a given set of conditions. One way to assess the accuracy of the hydraulic model is to create a set of known conditions in the water system and then compare the results observed in the field against the results of the hydraulic model simulation using the same conditions. Flow tests conducted in the field on the water system can yield a profound tool in verifying data used in the hydraulic model and a greater understanding of how the water system operates.

Field testing can indicate errors in the data used to develop the hydraulic model or show that a condition might exist in the field not otherwise known. Valves, which are reported as being open, may be closed (or vice versa), an obstruction could exist in a pipeline, or pressure settings for a PRV may be slightly different than noted. Field testing can also correct erroneous model data such as incorrect pipe diameters or incorrect connectivity.

Data obtained from the field tests can be used to determine appropriate roughness coefficients for certain groups of pipe or areas in the City's distribution system, as roughness coefficients can vary with age and pipe material. Other parameters can also be adjusted to generate a calibrated model.

The calibration process for the City's water distribution system hydraulic model consisted of two parts, a macro (EPS) calibration and a fire flow test (Steady State) calibration. The EPS and fire flow calibrations are summarized for each system individually in the following sections.

1.6.5.1 Extended Period Simulation Calibration

The purpose of extended period simulation calibration is to demonstrate the hydraulic model's ability to accurately mimic the real-world operations of the distribution system facilities, including pressure fluctuations, tank fill/drain cycles, PRV station operation, and pump station operations. The primary varied parameters for this calibration were operational controls, with other parameters also being adjusted as calibration results were generated.

The first step in the EPS calibration process is the selection of a calibration day. The selected date of calibration was October 11, 2024. The calibration date was chosen based on SCADA data cleanliness, as well as being a day which field installed pressure loggers were deployed in the distribution system.

The billing data that was allocated in the hydraulic model was scaled to match the demands for the calibration day as noted in the following sections.

The EPS calibration compared model simulated supply source and pump station flows, pump station discharge and suction pressures, and tank levels to the field measured data. In addition, model simulated pressures at the pressure logger locations were compared to the actual field pressures and flows recorded during the calibration day. Model results and SCADA are compared for the City's distribution system for all the monitored facilities and are presented in Appendix 1B.

To assess calibration accuracy, different comparisons can be made. As it is not possible to calibrate while optimizing for all hydraulic variables, considering multiple calibration points together is instructive. One variable may visibly align (match) between SCADA observed and model simulated, while another variable may not match. For example, the value or magnitude may match, but the timing may not. For example, booster pump or well supply setpoints in the model may accurately simulate the normal low water level and normal high-water level of a storage tank, but the model simulated timing (occurrence) of the low and high-water levels may not match SCADA data. Thus, observing a trend over time – as evaluating an average value or a trend – can provide clarity into model calibration accuracy.

In several instances, model simulated results do not match SCADA data due to known circumstances. One reason for known discrepancies is incomplete or unavailable SCADA data for certain facilities, which prevents the ability to fully match system conditions. Having incomplete SCADA data for certain facilities, also prevented the development of diurnals for certain pressure zones as discussed previously. Another reason is that some of the available SCADA data is comprised of instantaneous readings in 1-hour increments, which prevents the ability to determine when pumps turn on and off. These circumstances contribute to model simulated results not matching SCADA data for various facilities and areas of the systems.

Graphs summarizing the EPS model calibration results are presented in the following figures. The calibration graphs include a dashed interior line that represents equivalent average SCADA and average simulated model values with confidence bands. The confidence bands represent a targeted deviation between SCADA and model values. For tanks, this confidence band is +/- 2 feet (ft), for pumps, +/- 10 percent gpm and for pressure +/- 5 pounds per square inch (psi). Select calibration points located outside of the confidence band are labelled for reference.

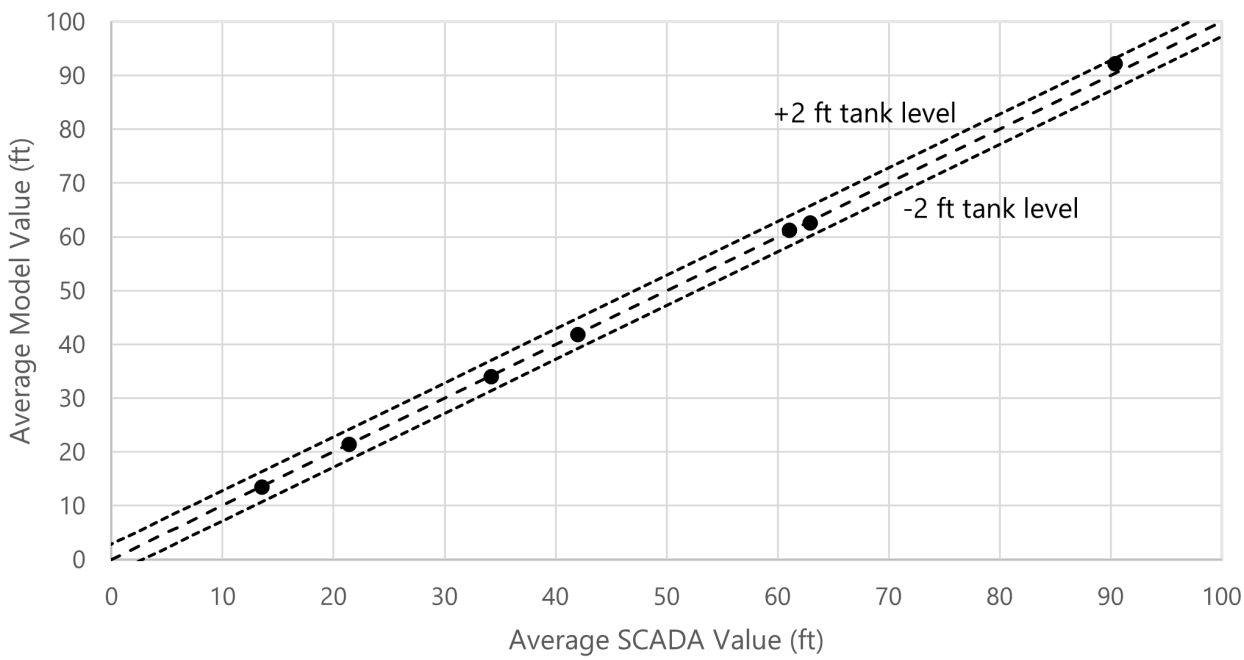


Figure 1.1 EPS Tank Calibration Accuracy Graph

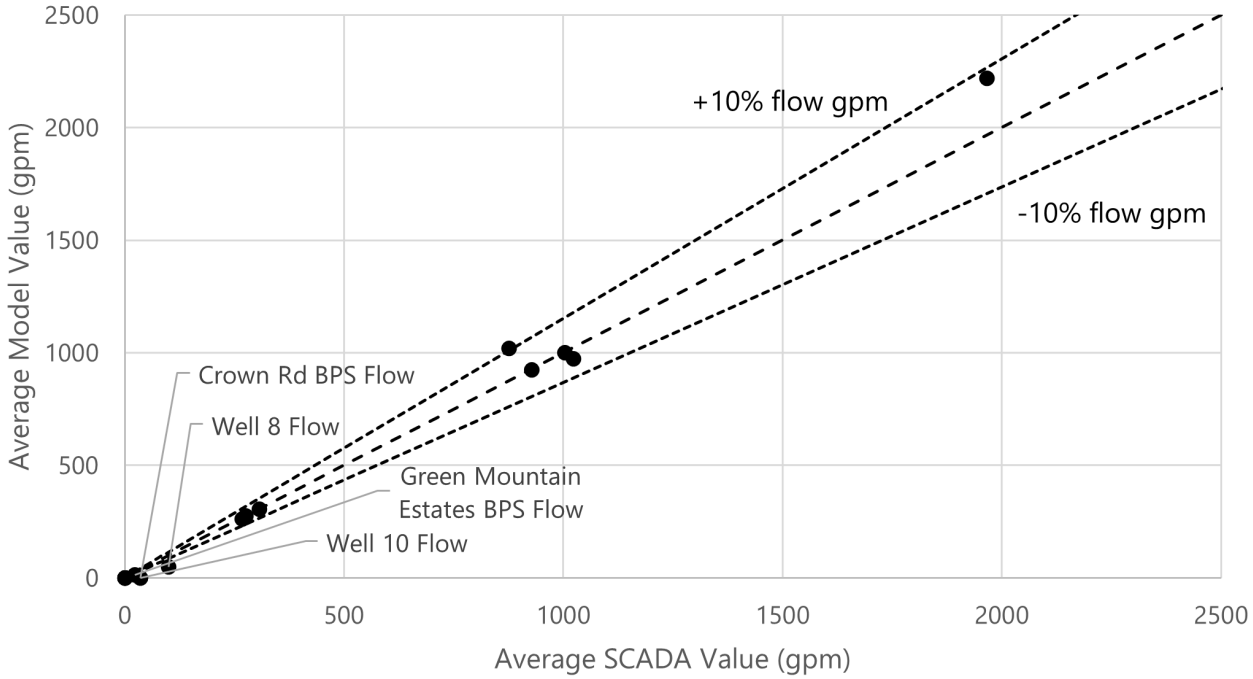


Figure 1.2 EPS Pump Calibration Accuracy Graph

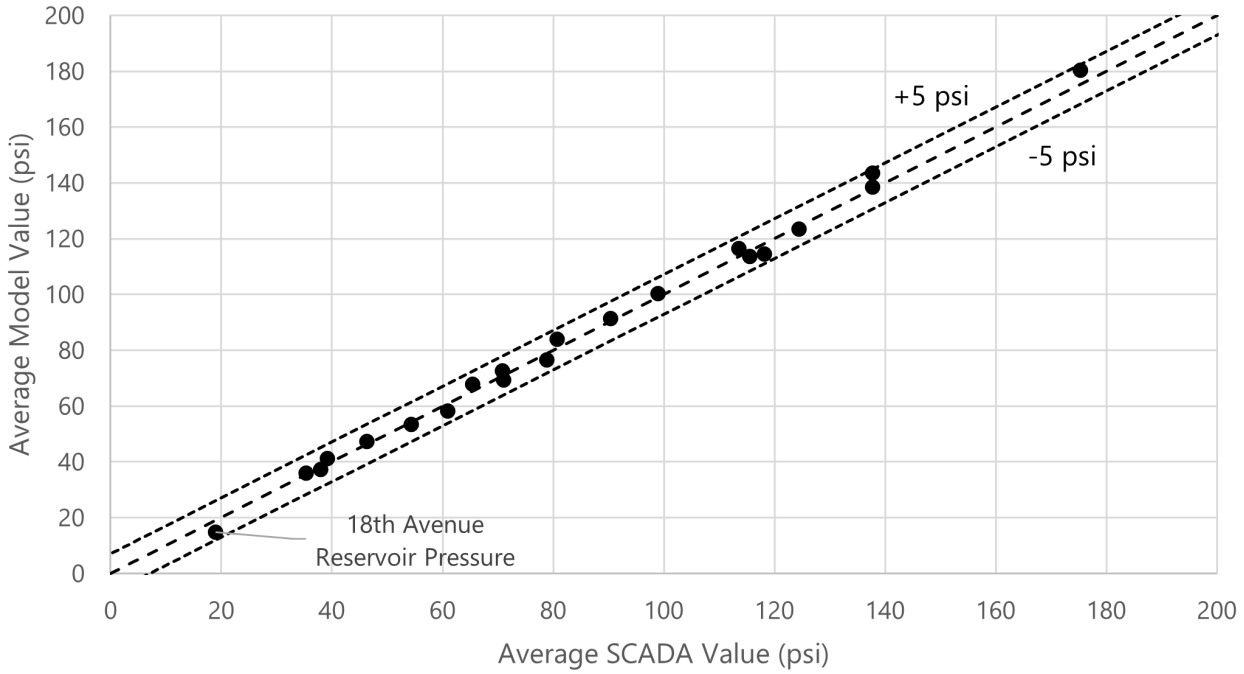


Figure 1.3 EPS Pressure Calibration Accuracy Graph

The graphs above indicate that tank levels and system pressures have an optimal calibration. Percent variance between modeled and SCADA values for tank levels are less than 2 percent and for pressures all but one of the calibration locations are within a 5 percent tolerance between modeled and SCADA values. The one exception is the 18th Avenue Reservoir pressure point; it was determined that this SCADA point is monitoring pressure based on tank level at the reservoir site. Since the tank level calibrated well at the 18th Avenue site, the pressure was determined to be negligible. Pumps generally calibrated well, with most calibration points falling within an acceptable tolerance between modeled and SCADA. The points with greater than 10% variance between modeled and SCADA are noted in Figure 1.3 with a callout. Well 8 and 10 were both supply sources that showed a high variance between modeled and SCADA data. This can likely be attributed to the total runtime of these respective wells during each hour of the calibration day. SCADA data for Well 8 showed the well was operational twice during the day but only ran for approximately 45 minutes each time. Likewise for Well 10, SCADA data showed the well operated for only 30 minutes on the day of calibration. Since model results were only reported in hourly timesteps, it is likely that these wells turned on/off in the model between the hour. The two booster pump stations that showed a higher were Crown Road and GME. In a discussion with City operations staff, it was discovered that Crown Road has a complex control strategy with another booster pump station (New Gregg BPS) that serves the 542 – Gregg Zone. To prevent model convergence issues, New Gregg BPS was modeled as the lead source of supply to this zone, with Crown Road BPS serving as the backup. Since New Gregg BPS was able to keep up with demand, Crown Road did not run in the EPS calibration scenario even though SCADA data showed it was operational. GME BPS showed high variance due to the way in which it was modeled. In reality, GME is equipped with a surge tank that maintains discharge pressure to prevent over cycling of pumps. The GME pumps kick on when pressure in the surge tanks drops (surge tank is emptying). However, the surge tank was not modeled and instead GME pumps were modeled as variable speed pumps with downstream pressure controls. The difference between the modeled field controls were the cause for significant difference in magnitude for maximum flows.

The results of each individual calibration location are presented in Appendix 1B. The minimum/maximum and general trends of modeled values are comparable and within acceptable tolerances to those seen in SCADA data with exceptions to the calibration locations noted above. Although, the timing of facilities turning on/off and peaks observed in system pressures are slightly variable at some calibration points. An example of this can be a well turning off in the model one hour later than what is observed in SCADA. As previously noted, finetuning diurnal patterns could improve timing of modeled simulated results.

1.6.5.2 Fire Flow Calibration

The purpose of fire flow calibration is demonstrating the model's ability to accurately replicate the performance of the distribution system during extreme demand conditions, such as when fire hydrants are being operated. The primary varied parameter for this calibration is pipeline roughness coefficient, although other parameters were also adjusted as calibration results are generated.

Hazen-Williams roughness coefficients, or C-factors, have industry accepted value ranges based on pipeline material, diameter, and age. Characteristics specific to City's water distribution system such as water quality, temperature, construction methodologies, material suppliers, and other factors may result in roughness coefficients that differ from the average of the industry accepted ranges. Fire flow calibration refines the initial estimation of the value of roughness coefficients that best indicate the conditions of the City's distribution system.

During average day flows, roughness coefficients have a relatively small effect on the operation of the distribution system. However, as the flows increase in the system on higher demand days, velocity within pipelines increases and roughness coefficients contribute more to overall system headloss. Fire flow tests artificially create high demand events to generate more headloss, allowing a better estimation of the pipeline roughness coefficients.

Fire flow tests stress the distribution system by creating a differential between the HGL at the point of hydrant flow and the system HGL at neighboring hydrants. This HGL differential increases the effect of the roughness coefficients on system losses and allows adjustments to the model to match model pressures to field pressures within an acceptable tolerance. As the model is adjusted to match system pressures, roughness coefficients should be adjusted only within a tolerance of industry accepted roughness coefficient ranges. If a model is unable to match the calibration results within the acceptable range of roughness coefficient values for a given pipeline material and age, there may be cause for further investigation. Often, a previously unknown field condition may be discovered. Examples of such conditions, which typically arise during hydraulic model calibration, include closed valves, partially closed or malfunctioning valves, extreme corrosion within pipelines, connectivity, and diameter errors in GIS layers or record drawings, and diurnal patterns of large water users.

A separate hydraulic model scenario was created for each flow test for both the static and the dynamic, or flowing, condition for each of the 10 fire flow calibration scenarios. The flow observed at each fire flow hydrant was assigned as a demand to the model node at the location of the hydrant. Residual pressures were then read at each hydrant location while the hydrant was flowing. To assess model result accuracies, the modeled static and residual pressures were compared to the field measured static and residual pressure, and then a percent different between the two values were calculated. Model results were considered acceptable if the pressure drops fell within a 10 percent tolerance or a 10 psi value. Specific details pertaining to each hydrant test are provided in Table 1.13. Furthermore, a summary of the fire flow calibration results is presented in Table 1.14.

Table 1.13 Hydrant Test Locations

Test Site	Pressure Zone	Flow Hydrant ID	Pressure Hydrant 1 ID	Pressure Hydrant 2 ID	Location
1	343 – Downtown	WH200146	WH200144	WH200143	SE 12th Ave
2	343 - Downtown	WH200779	WH200776	WH200777	E 1st Ave / NE Joy St
3	343 – Transmission	WH200802	WH200801	WH200914	NE Garfield St
4	455 – LPH	WH200708	WH200709	WH200992	NW 7th Ave / NW Greeley St
5	852 – UPH	WH200237	WH200236	WH200246	NW 31st Ave / NW Sierra Dr
6	544 – Lacamas	WH200299	WH200298	WH200300	NW 46th Ave / NW Howard St
7	544 – Lacamas	WH200504	WH200503	WH200500	N Alder St / N 96th Ave
8	542 – Gregg	WH200424	WH200423	WH200425	NE Quince Way
9	695 - GME	WH200964	WH200965	WH200963	N 91st Ave
10	697 Zone	WH200860	WH200098	WH200097	NW Deerfern St / NW 14th Ave

Table 1.14 Steady State Fire Flow Calibration Summary

Test Site	Pressure Zone	Field Measured Data(1)			Model Simulated Data		Percent Difference	
		Hydrant Flow (gpm)	Hydrant Pressure (psi)		Hydrant Pressure (psi)			
			Static	Residual	Static	Residual	Static	Residual
1	343 - Downtown	1,100	116	70	116	69	<1%	2%
			115	70	115	69	<-1%	<1%
2	343 -Downtown	1,350	100	80	101	81	<-1%	-1%
			100	83	99	85	1%	2%
3	343 – Transmission	850	54	40	56	39	-3%	3%
			50	35	50	35	<-1%	<1%
4	455 – LPH	1,300	118	99	115	97	3%	2%
			134	120	134	123	<-1%	-2%
5	852 – UPH	1,190	71	64	69	62	4%	3%
			75	72	76	70	-2%	3%
6	544 – Lacamas	1,350	100	82	97	80	3%	3%
			87	66	85	68	2%	-3%
7	544 – Lacamas	1,300	104	84	104	85	<1%	<-1%
			118	101	118	100	<1%	1%
8	542 – Gregg	600	38	28	30	27	22%	4%
			35	24	34	31	3%	-31%
9	695 – GME	950	74	50	75	50	-2%	-1%
			86	62	86	61	<1%	2%
10	697 Zone	1,250	70	67	73	65	-5%	3%
			80	72	80	70	<1%	3%

As shown in Table 1.14, the comparison of model results to observed field data is within a 5 percent tolerance for nine of the fire flow calibration locations, which indicates an excellent calibration at these locations. The remaining fire flow calibration location exceeded the acceptable 10 percent tolerance. This is likely due to elevations being inaccurate in the DEM file. The area this test was conducted in was a recently developed area and it was assumed that significant grading likely lowered the ground elevation, though there was available data that could confirm this assumption. Additionally, there may have been a pipe in that was modeled as a larger diameter reducing headloss at the test location. Pipe diameters will be verified with the City, and any discrepancies will be addressed before recalibrating the model at this location. Detailed comparisons of model results to observed field data are included in Appendix 1C.

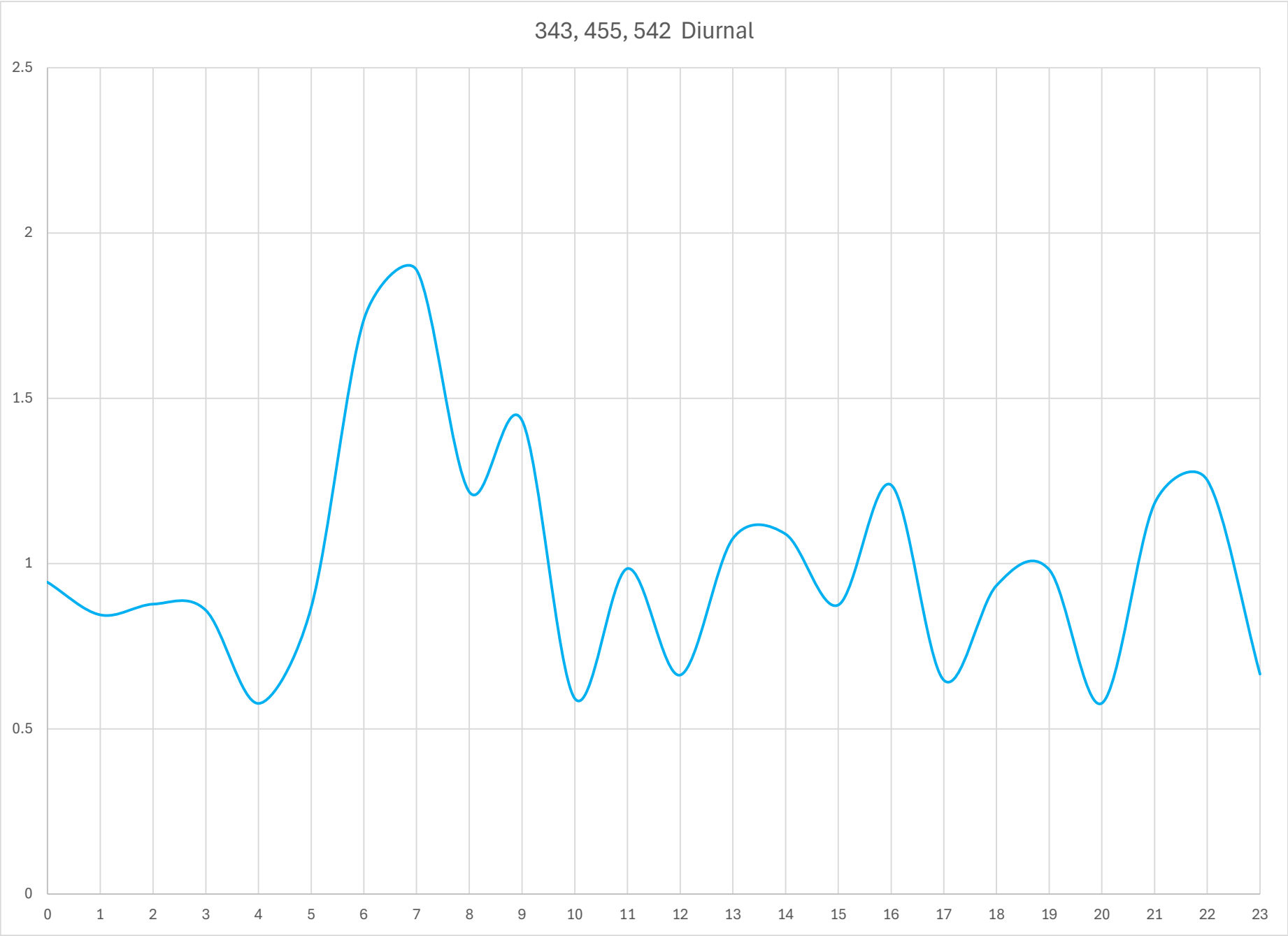
1.7 Calibration Summary

The calibration results indicate that the City's hydraulic model generally predicts conditions similar to those observed in the field.

Based on the results presented in this report, it can be concluded that the model is calibrated to extended period conditions and fire flow conditions. The models provide a reliable representation of the City's distribution system and system operations to a level suitable for hydraulic system analysis.

APPENDIX 1A

DIURNAL PATTERNS


343, 455, 542 Diurnal
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0
0
1
2
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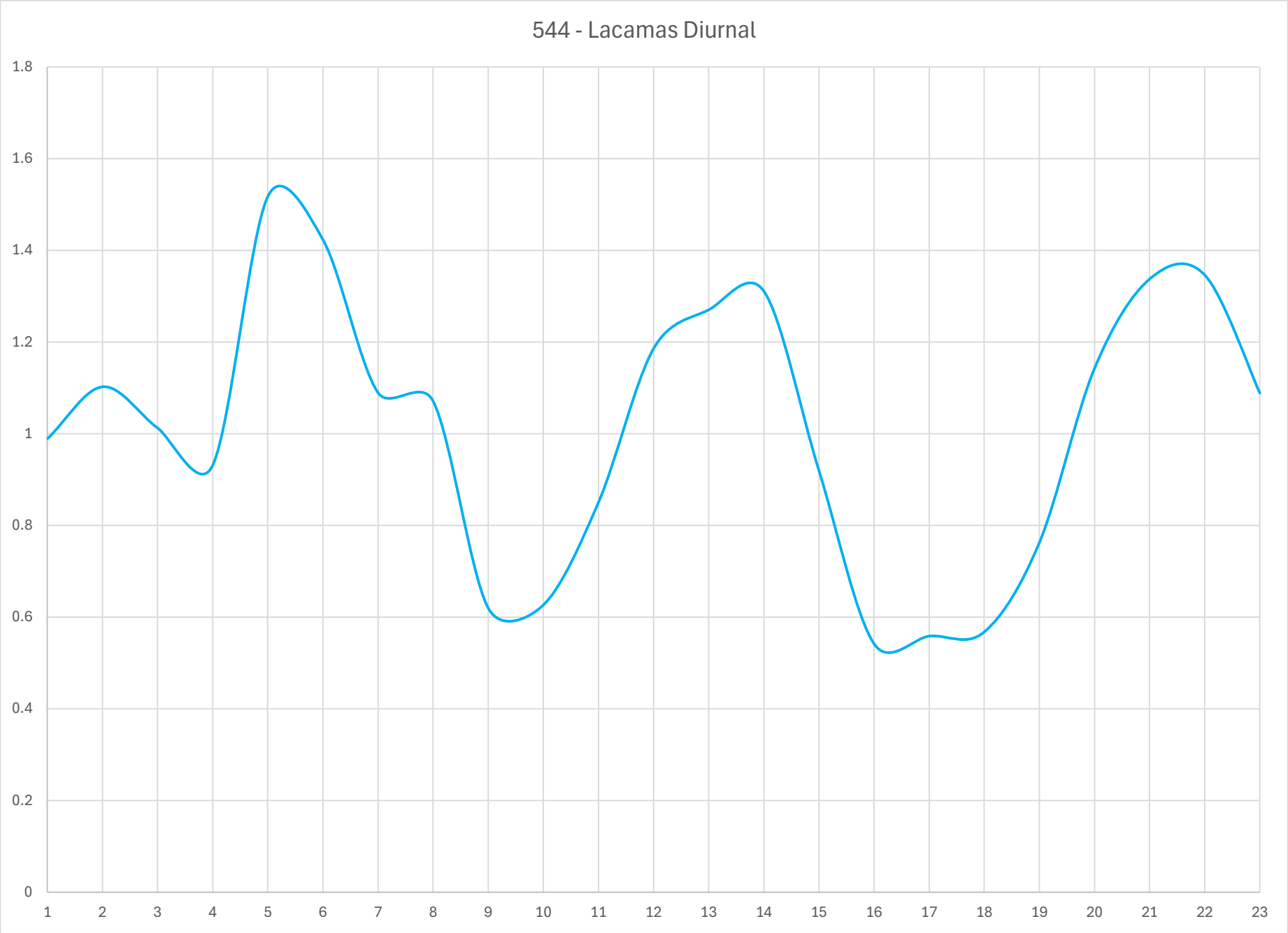
544 - Lacamas Diurnal
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1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1
2
3
4
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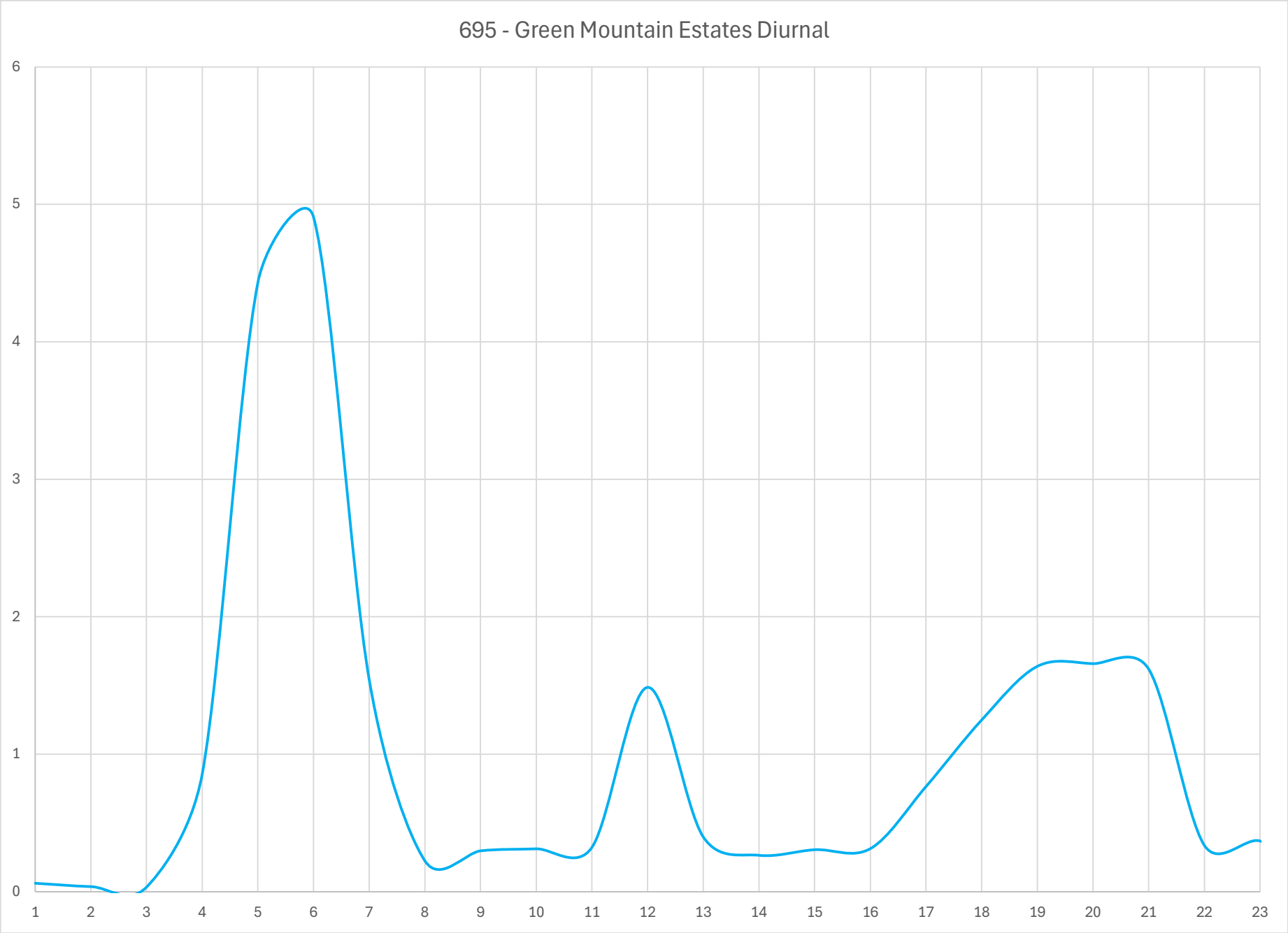
695 - Green Mountain Estates Diurnal
6
5
4
3
2
1
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
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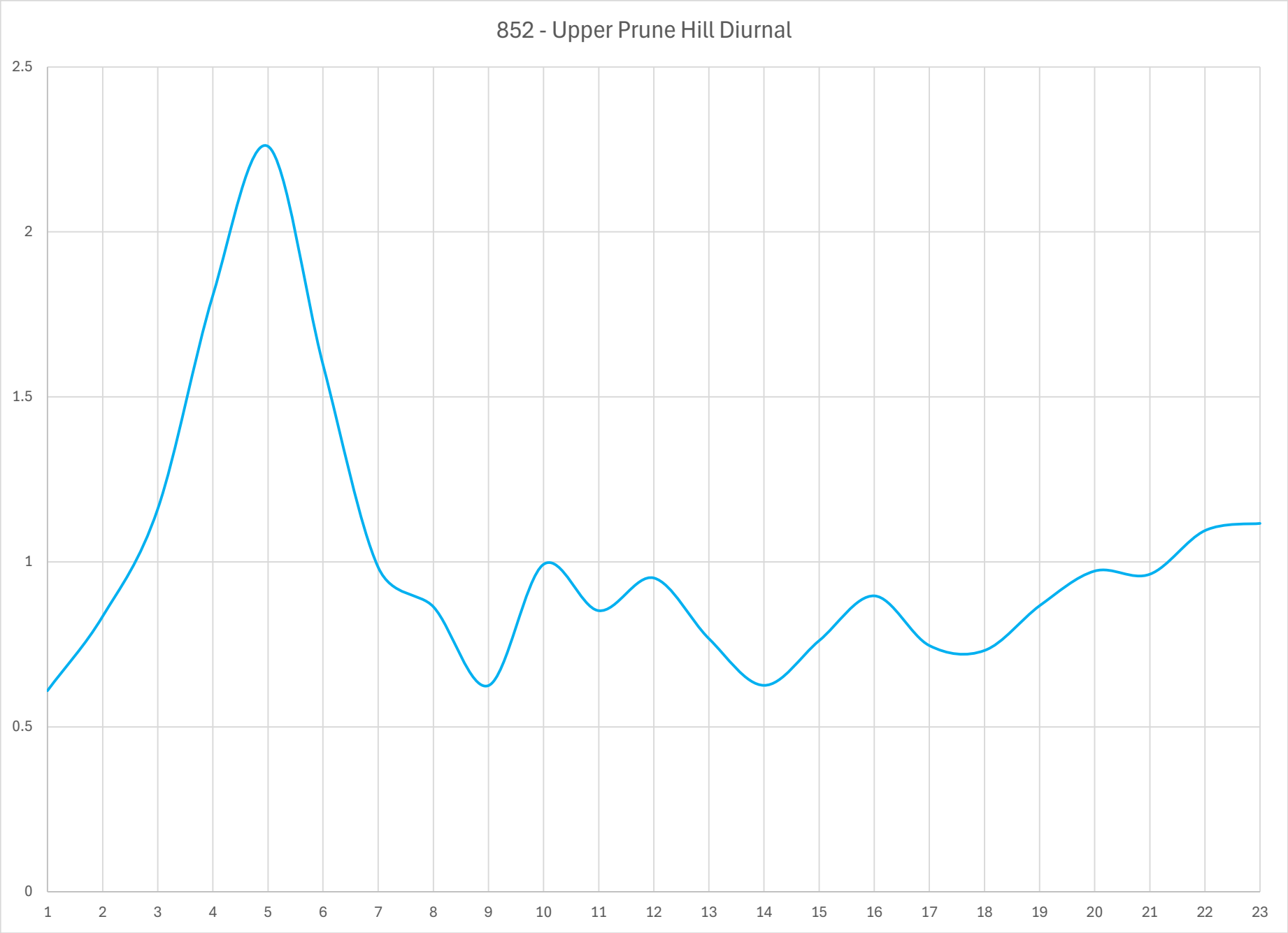
19
20
21
22
23


852 - Upper Prune Hill Diurnal
2.5
2
1.5
1
0.5
0
1
2
3
4
5
6
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10
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12
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APPENDIX 1B

EPS CALIBRATION

2026 Water System Plan Update
City of Camas

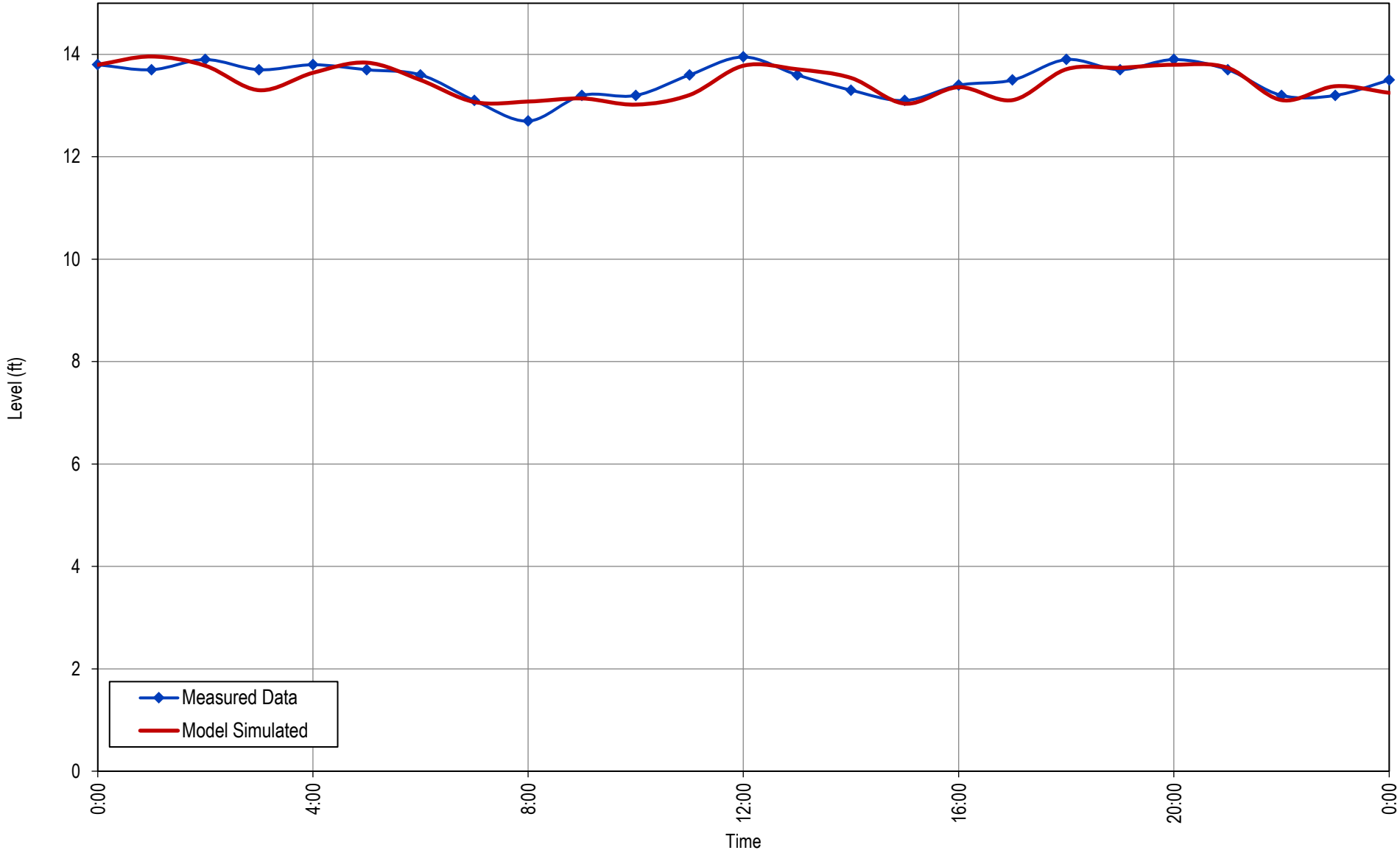
Project Type	Water Distribution System Model Calibration
Project Status	DRAFT
Date	SEPTEMBER 2025
SCADA Data Start Date	**10/11/2024**
Selected Calibration Day =	**10/11/2024**

#	Model Node ID	Cal Point	Units
1	BUTLER	Butler Level	ft
2	LOWER_PRUNE_RES2	Lower Prune Hill Level	ft
3	GREGG	Gregg Level	ft
4	LACAMAS	Lacamas Level	ft
5	18TH_AVE	Anderson Level (18th Ave Reservoir)	ft
6	UPPER_PRUNE_RES	Upper Prune Hill 2.4 MG Level	ft
7	UPPER_PRUNE_STD	Upper Prune Hill Standpipe Level	ft
8	P895	Lower Prune Hill BPS Flow	gpm
9	P2-865	Angelo BPS Flow	gpm
10	P1-910	Butler PRV Flow	gpm
11	P2-656	Lacamas BPS Flow	gpm
12	PS-114	Slow Sand Plant Flow	gpm
13	FCV-52	Well 5 Flow	gpm
14	FCV-62	Well 6 Flow	gpm
15	FCV-72	Well 7 Flow	gpm
16	FCV-82	Well 8 Flow	gpm
17	FCV-92	Well 9 Flow	gpm
18	V-90212	Well 10 Flow	gpm
19	V-90222	Well 11 Flow	gpm
20	V-90232	Well 12 Flow	gpm
21	FCV-42	Well 13 Flow	gpm
22	FCV-142	Well 14 Flow	gpm
23	P665	Green Mountain Estates BPS Flow	gpm
24	P893	Crown Rd BPS Flow	gpm
25	J4-805	Upper Prune Hill Discharge Pressure	psi
26	J1193	Lower Prune Hill Discharge Pressure	psi
27	J1-856	Angelo Discharge Pressure	psi
28	J1-802	Angelo Suction Pressure	psi
29	J2-216	Forest Home Discharge Pressure	psi
30	J1-144	Forest Home Suction Pressure	psi
31	J201	18th Avenue Reservoir Pressure	psi
32	J75	Butler 542 Zone Pressure	psi
33	J4-624	Lacamas Discharge Pressure	psi
34	J2-655	Lacamas Suction Pressure	psi
35	J1191	Crown Road Discharge Pressure	psi
36	J1-402	Crown Road Suction Pressure	psi
37	J355	Green Mountain Estates Suction Pressure	psi
38	J377	Green Mountain Estates Discharge Pressure	psi
39	JS-110	PIT 701 Upstream Pressure	psi
40	JS-111	PIT 702 Downstream Pressure	psi
41	J79	18th Avenue Reservoir (Logger 35)	psi
42	J1-100	Downtown (Logger 37)	psi

43	J1-58	Oak Park, across Ops Center (Logger 49)	psi
44	J1-151	Helen Baller Elementary (Logger 50)	psi
45	J3-388	Dorothy Fox Elementary (Logger 58)	psi
46	J-5062	Union HS (Logger 68)	psi
47	J4-105	Green Mountain Estates (Logger 69)	psi

2026 Water System Plan Update

EPS CALIBRATION - BUTLER LEVEL



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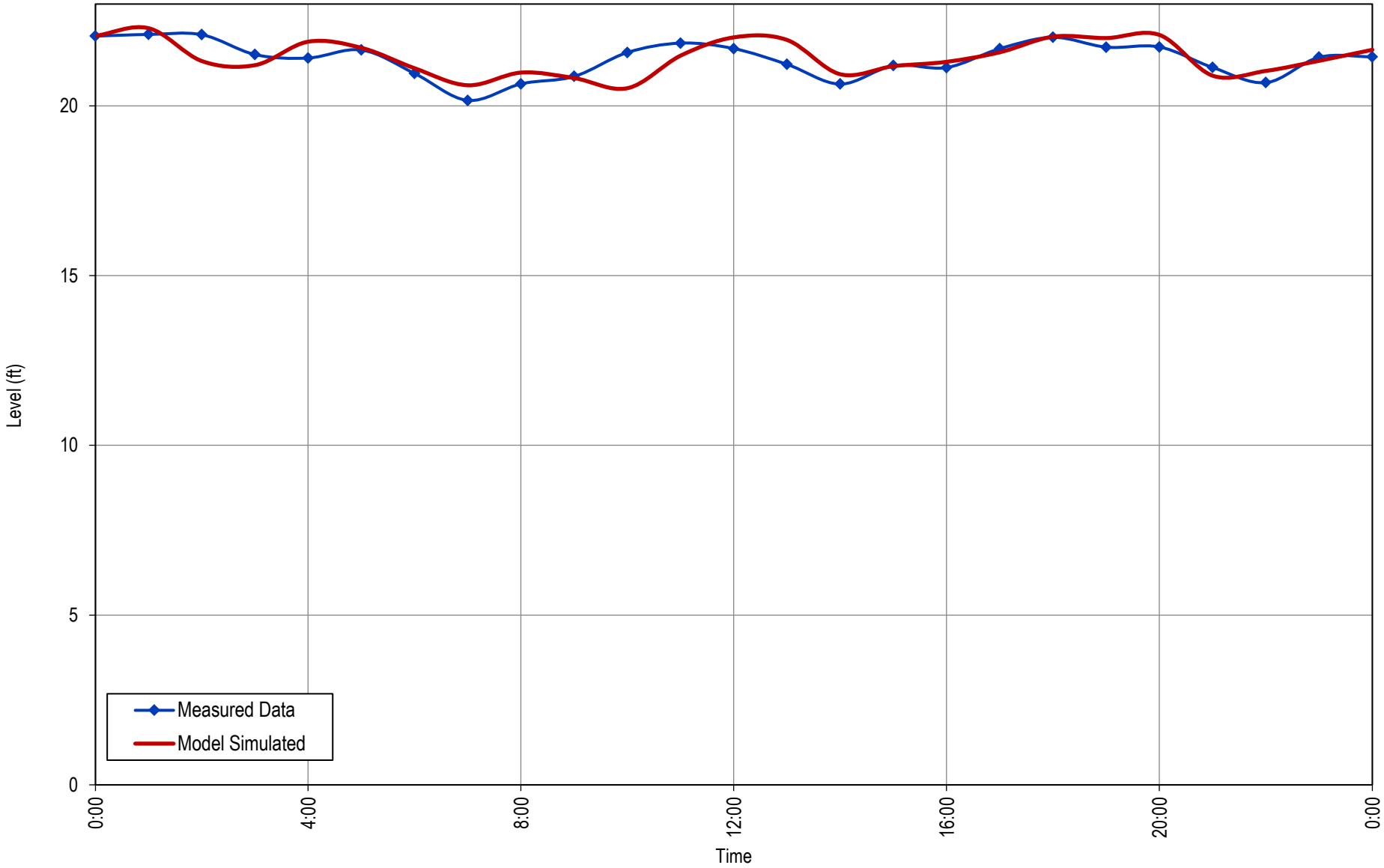

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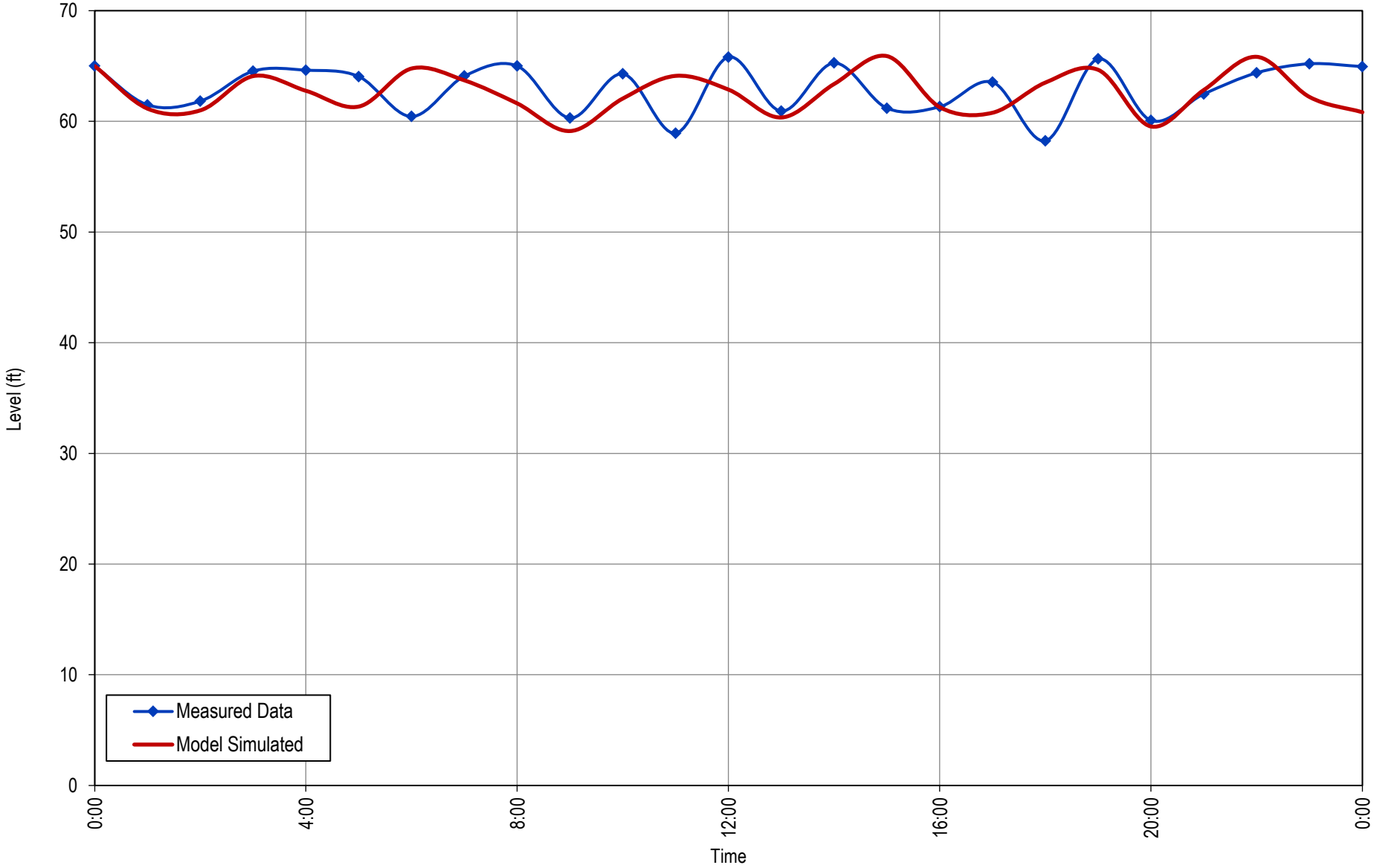
EPS CALIBRATION - GREGG LEVEL



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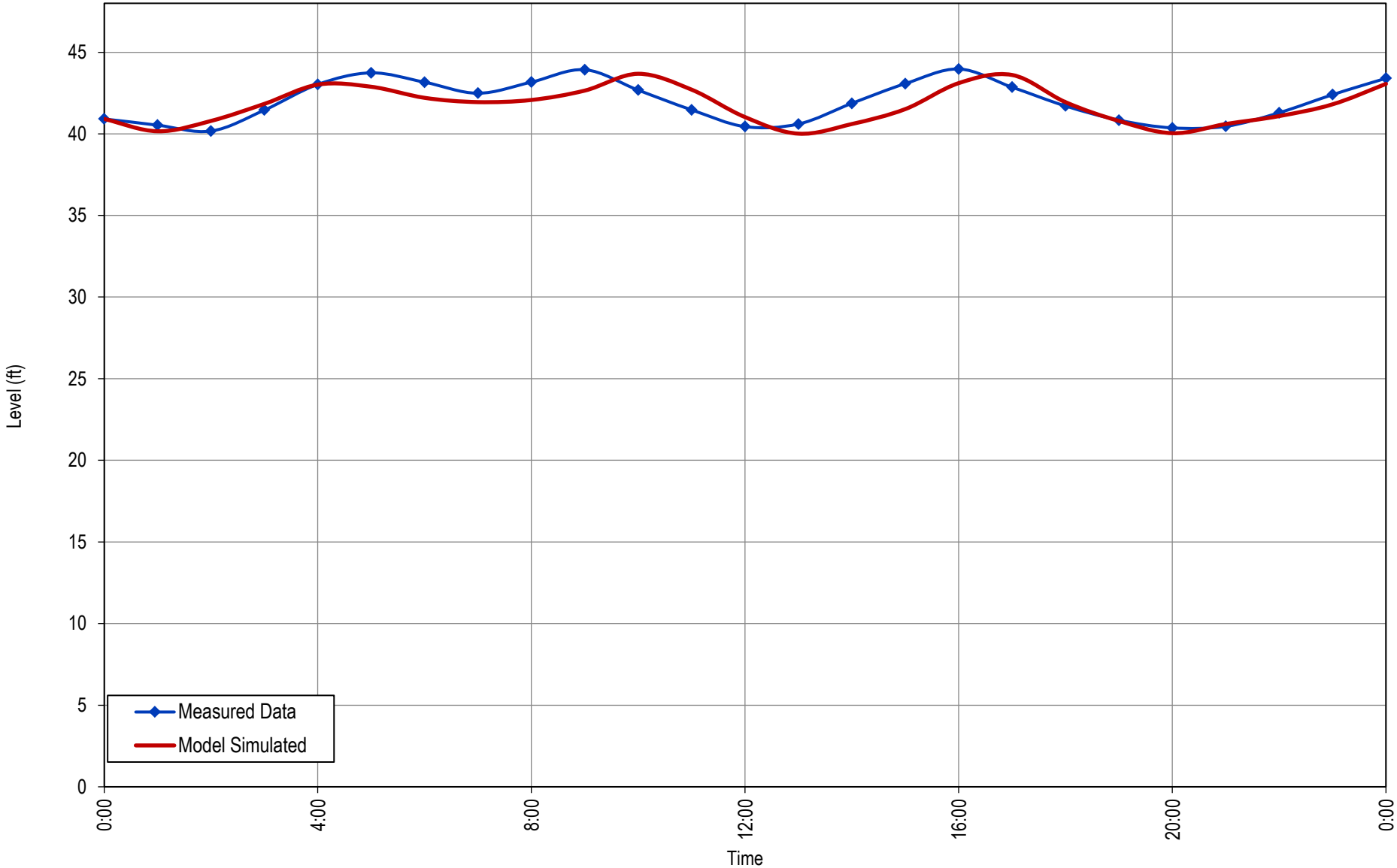
EPS CALIBRATION - LACAMAS LEVEL



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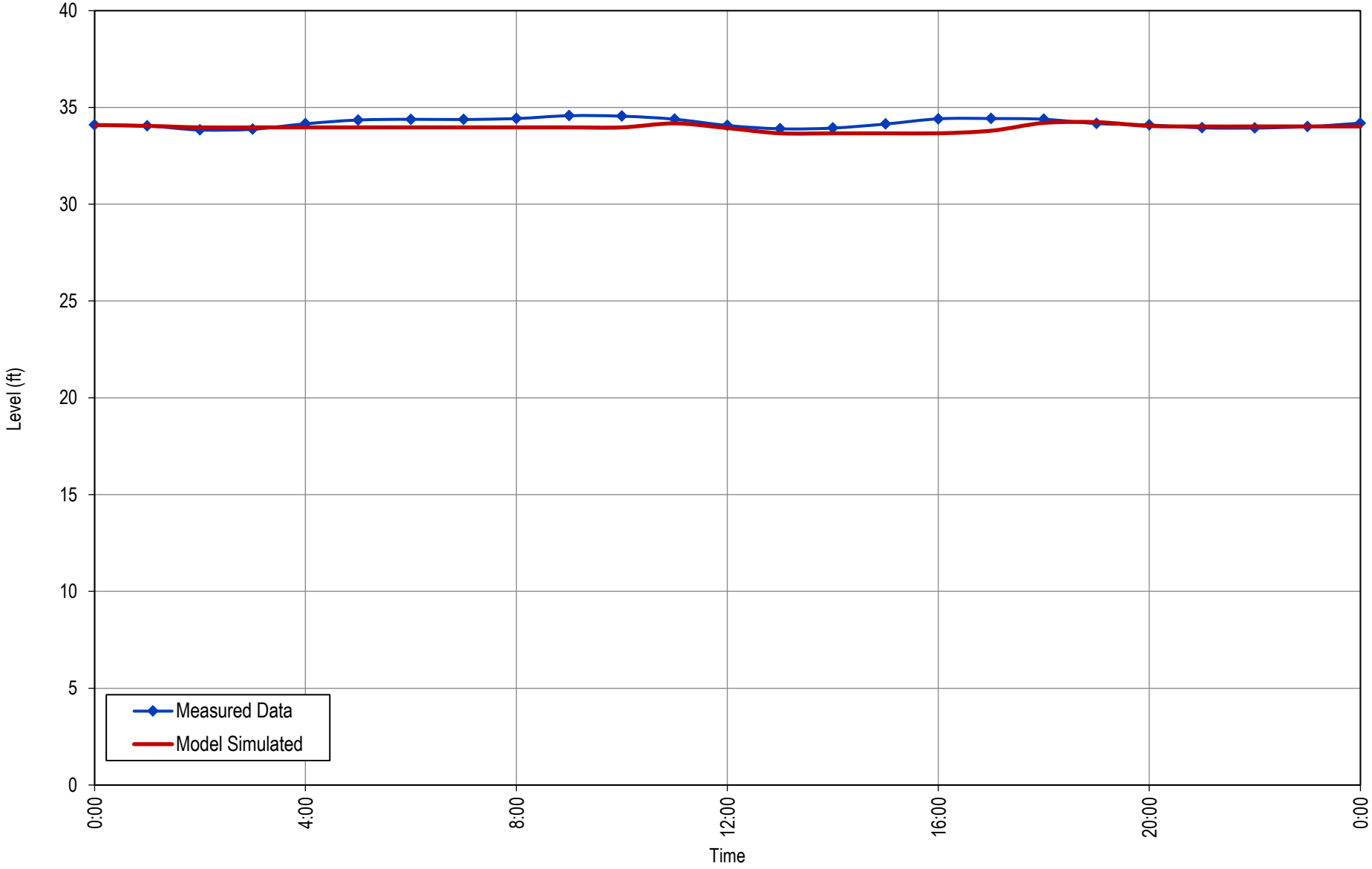

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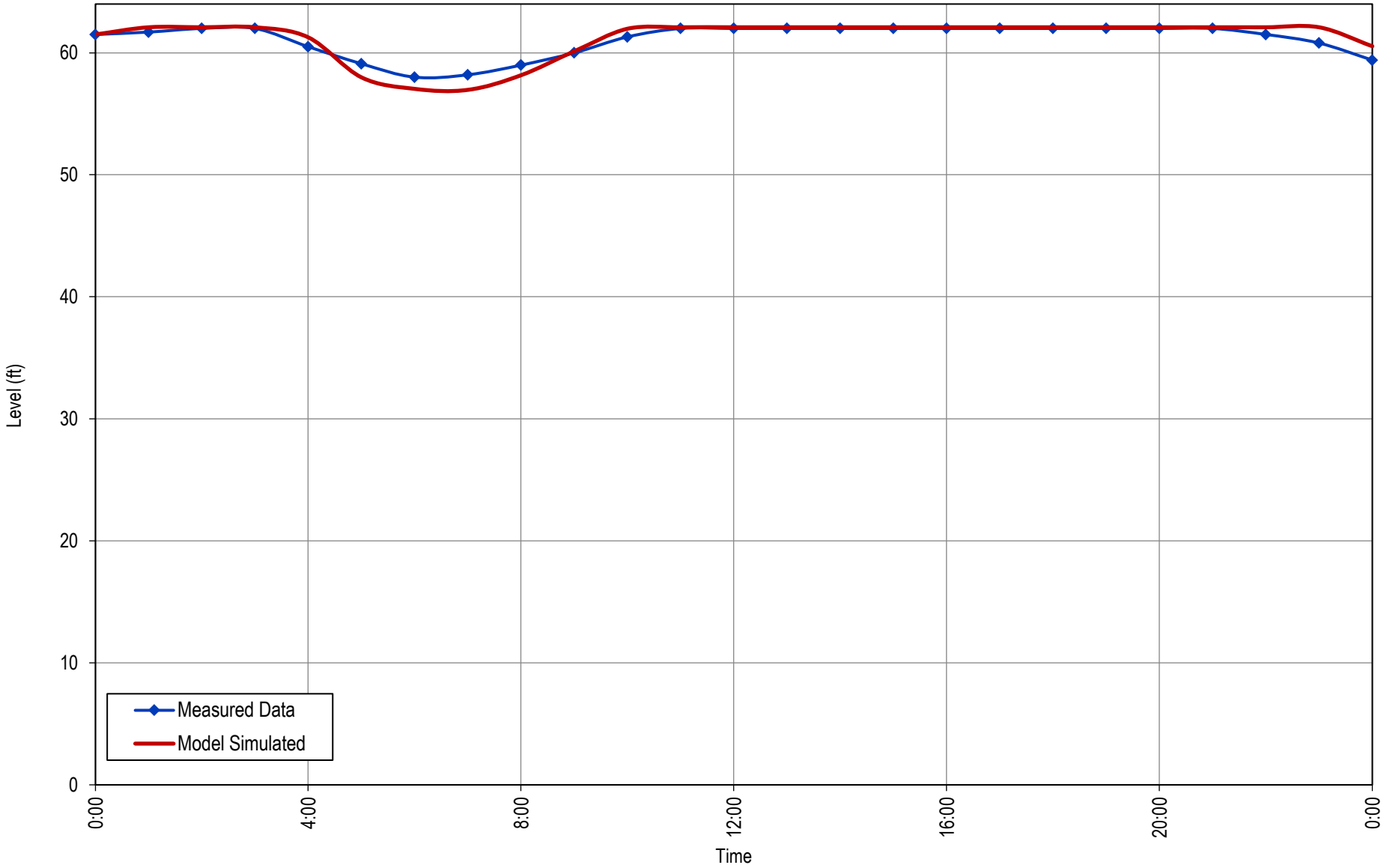
EPS CALIBRATION - UPPER PRUNE HILL 2.4 MG LEVEL



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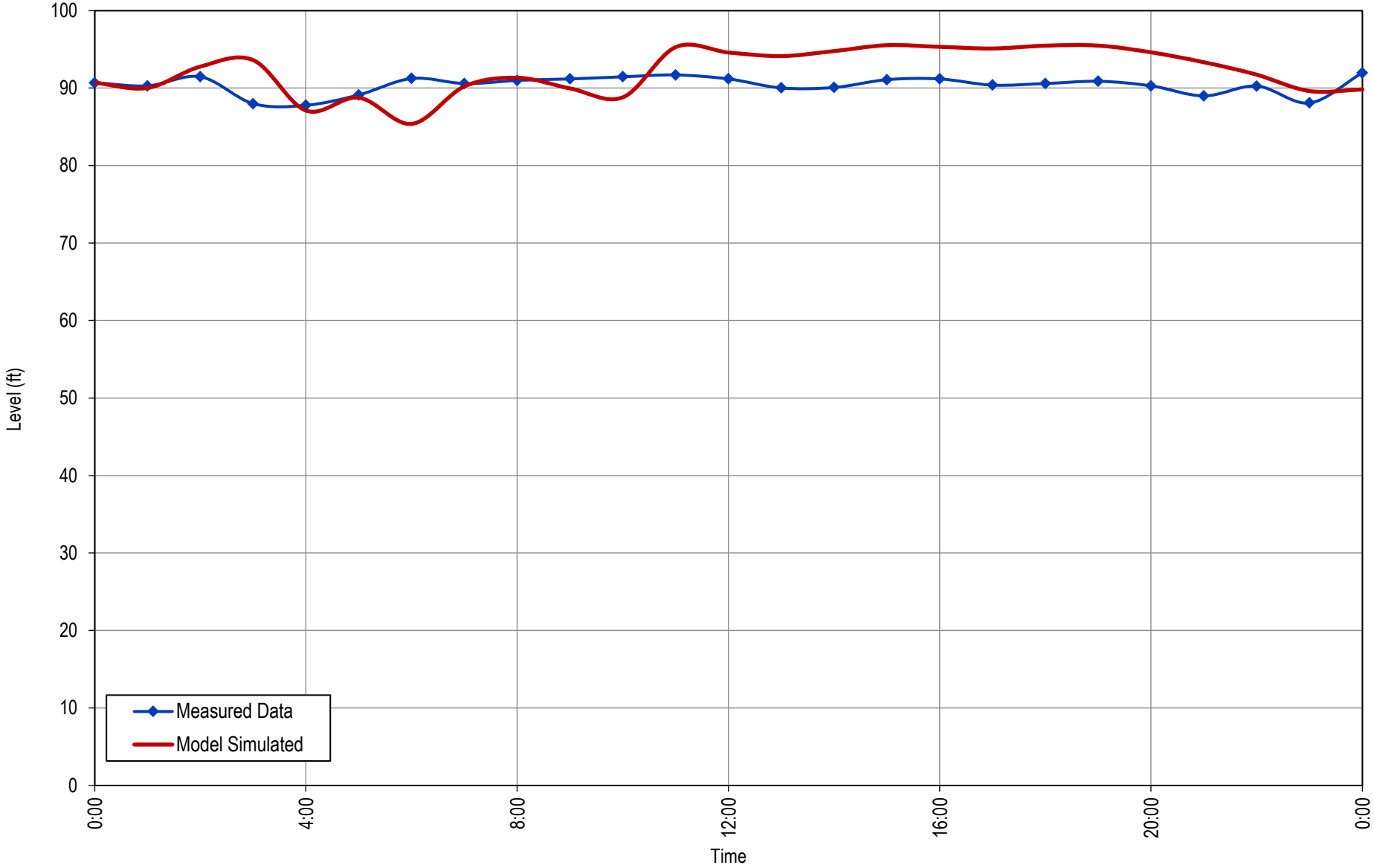
EPS CALIBRATION - UPPER PRUNE HILL STANDPIPE LEVEL



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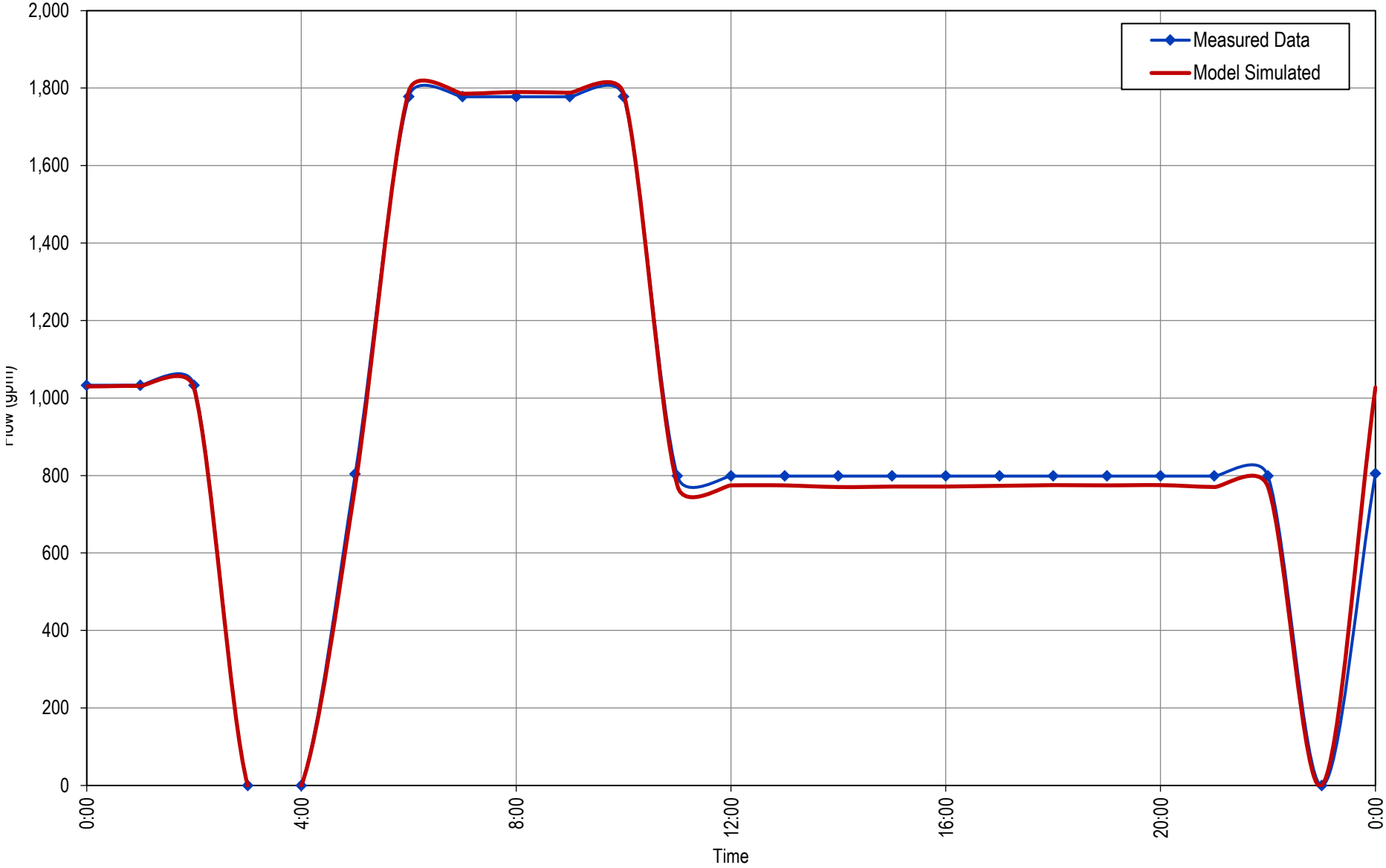

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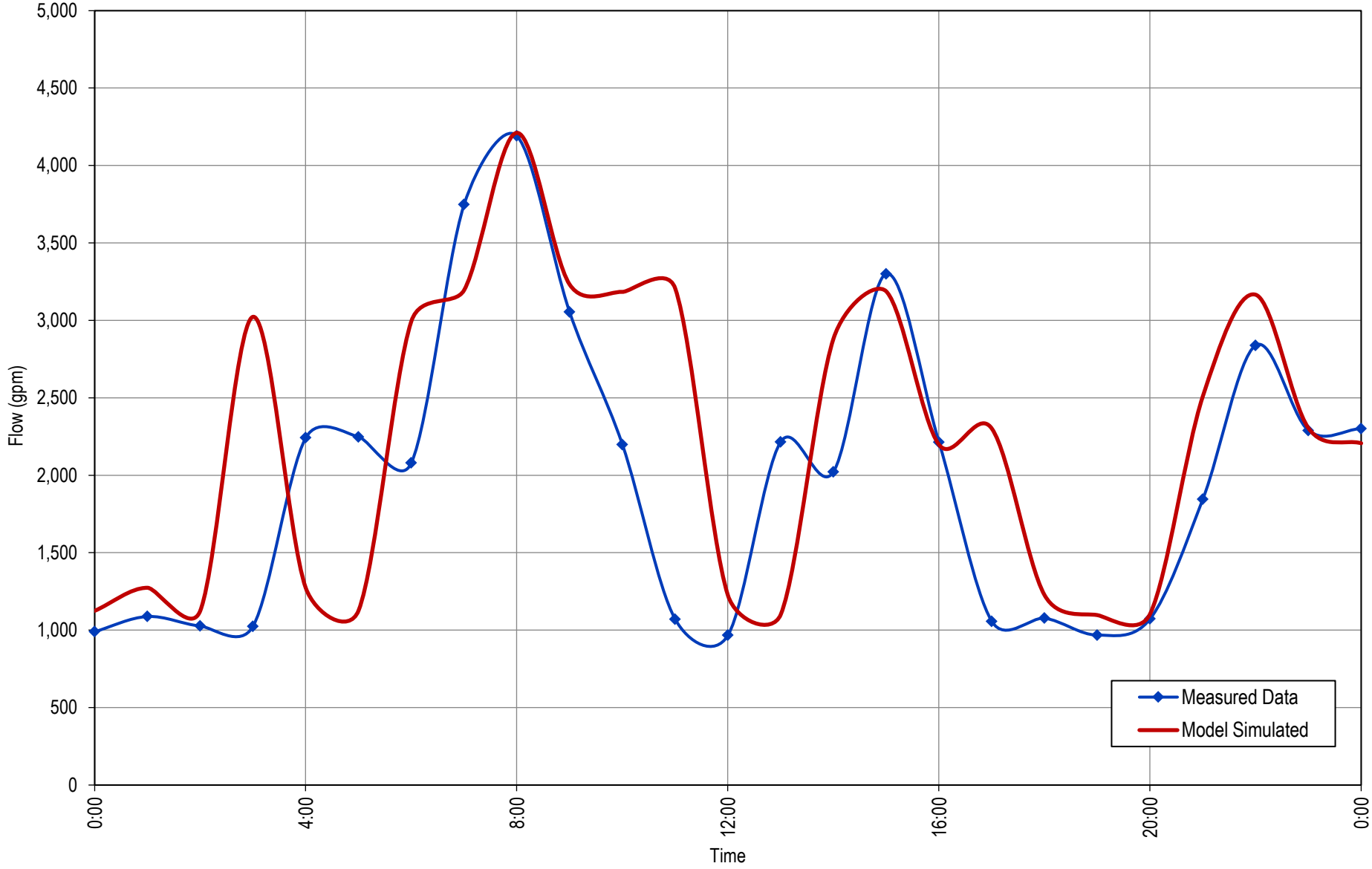
EPS CALIBRATION - ANGELO BPS FLOW



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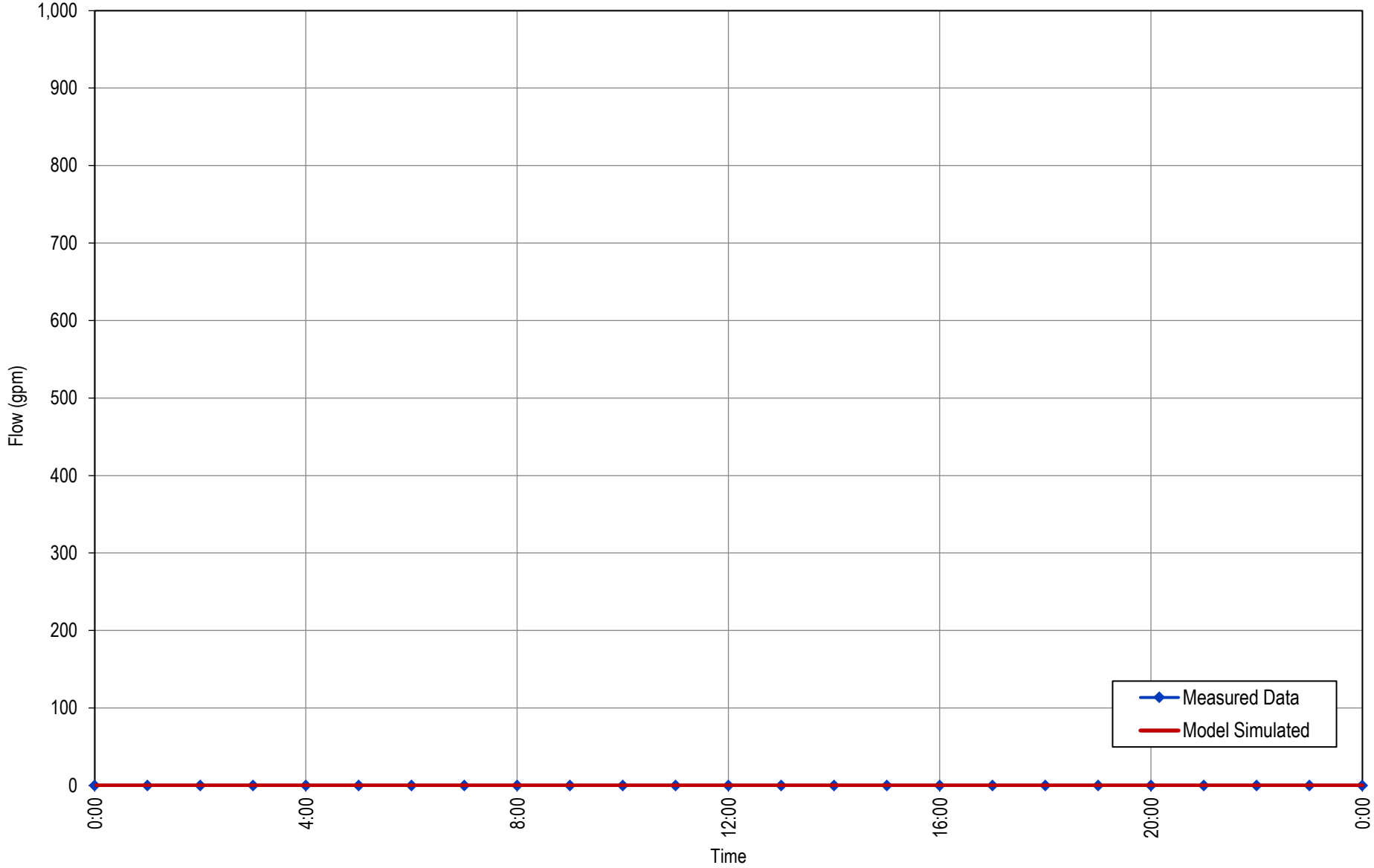
EPS CALIBRATION - BUTLER PRV FLOW



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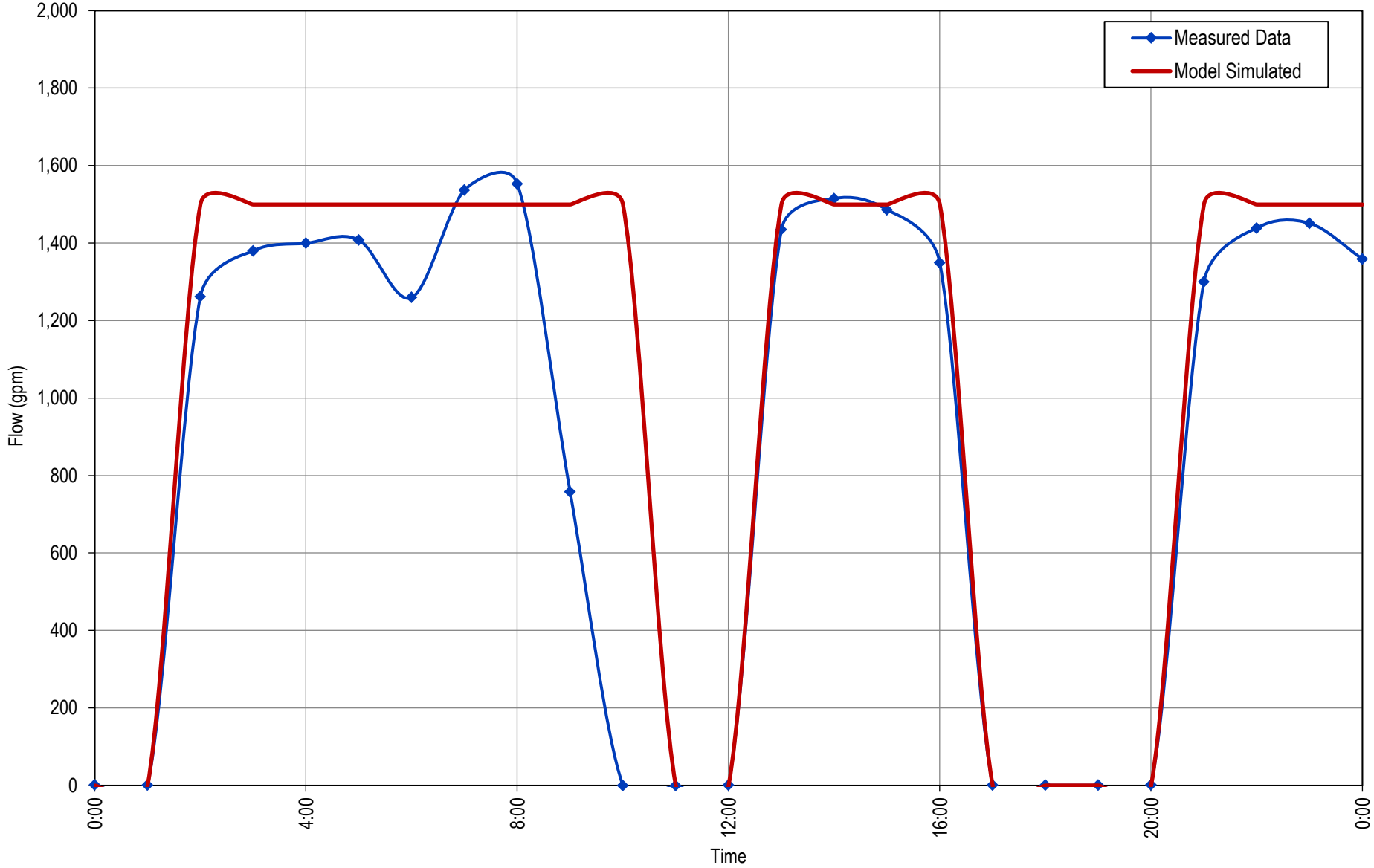
EPS CALIBRATION - LACAMAS BPS FLOW



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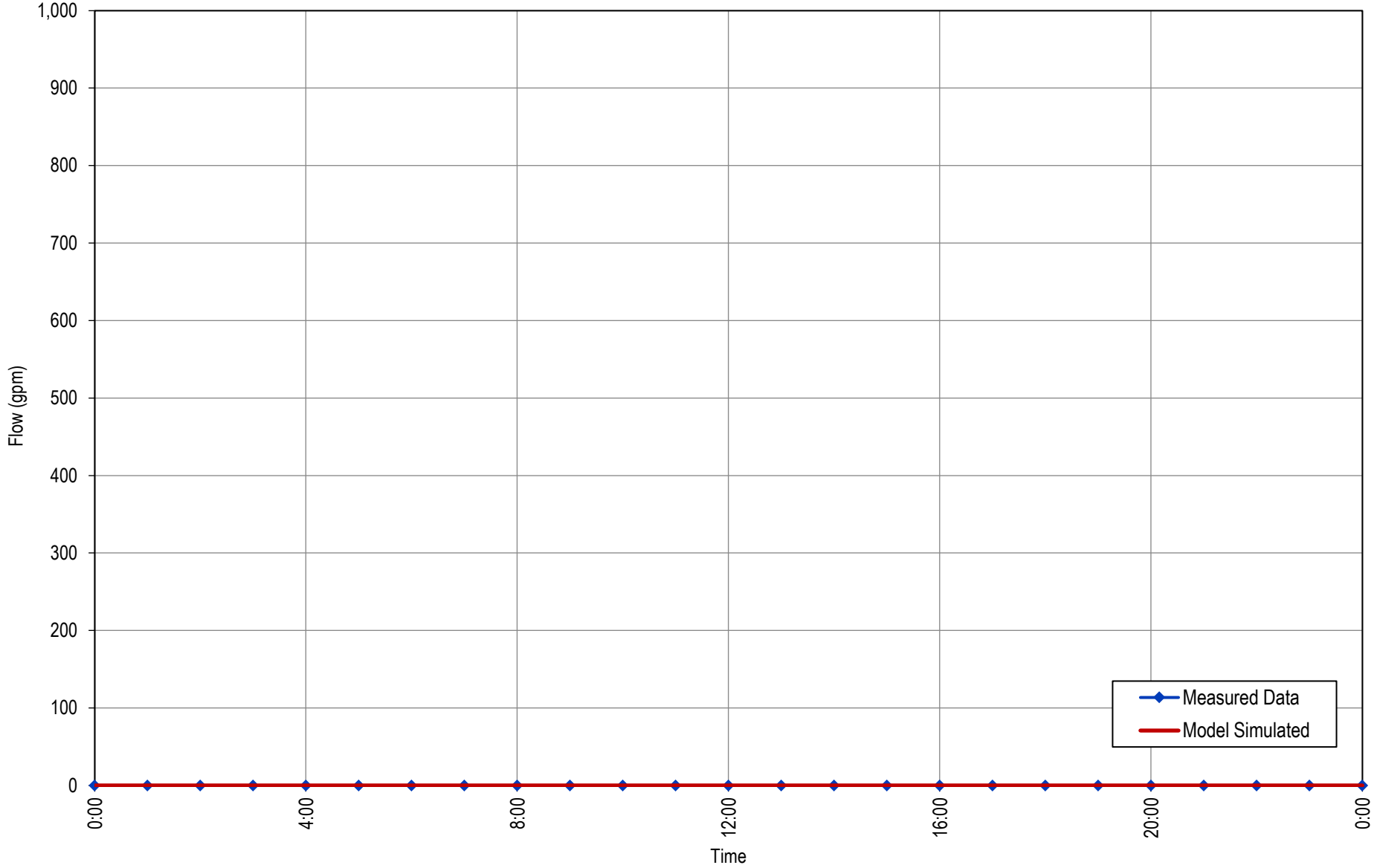

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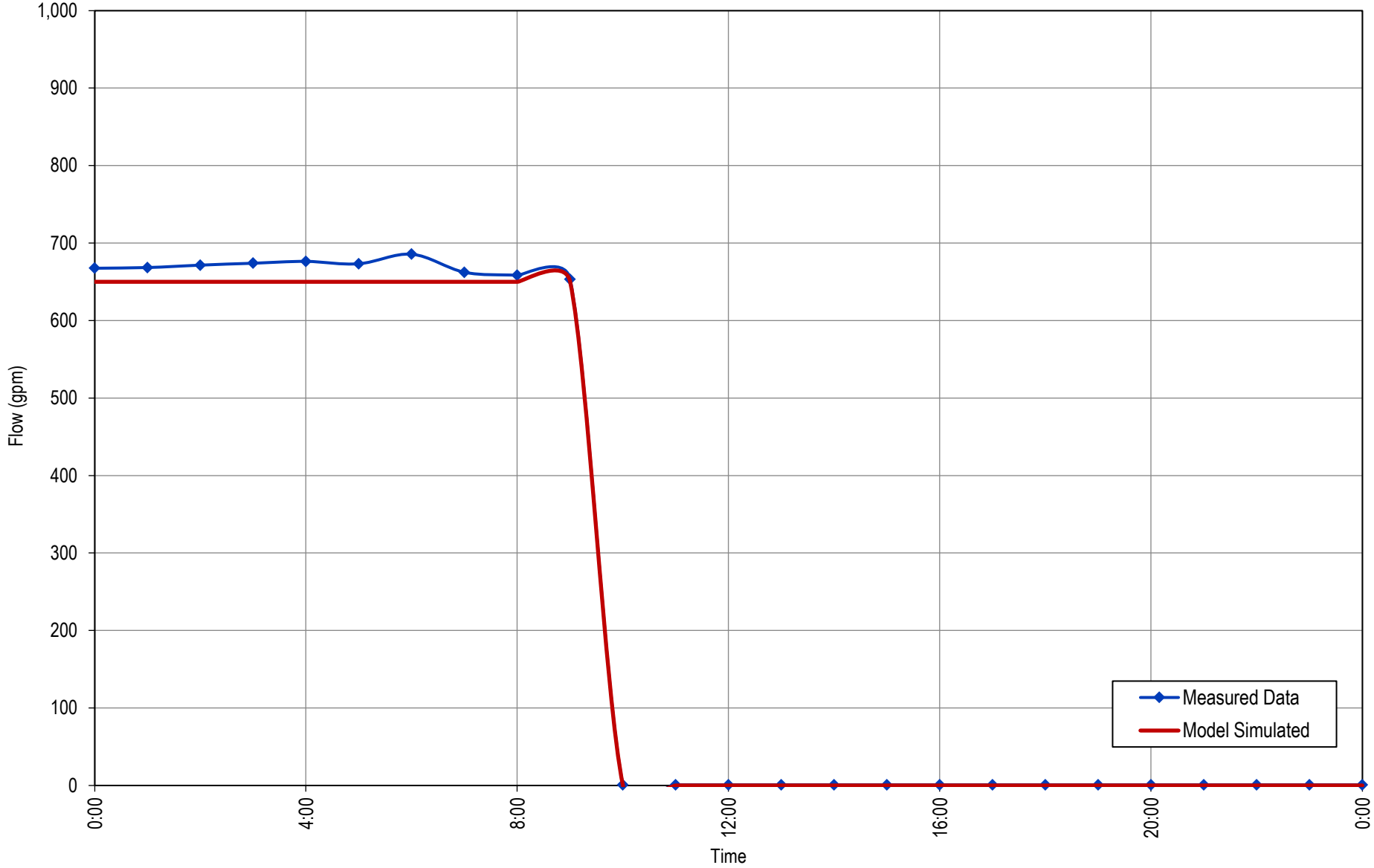
EPS CALIBRATION - WELL 5 FLOW



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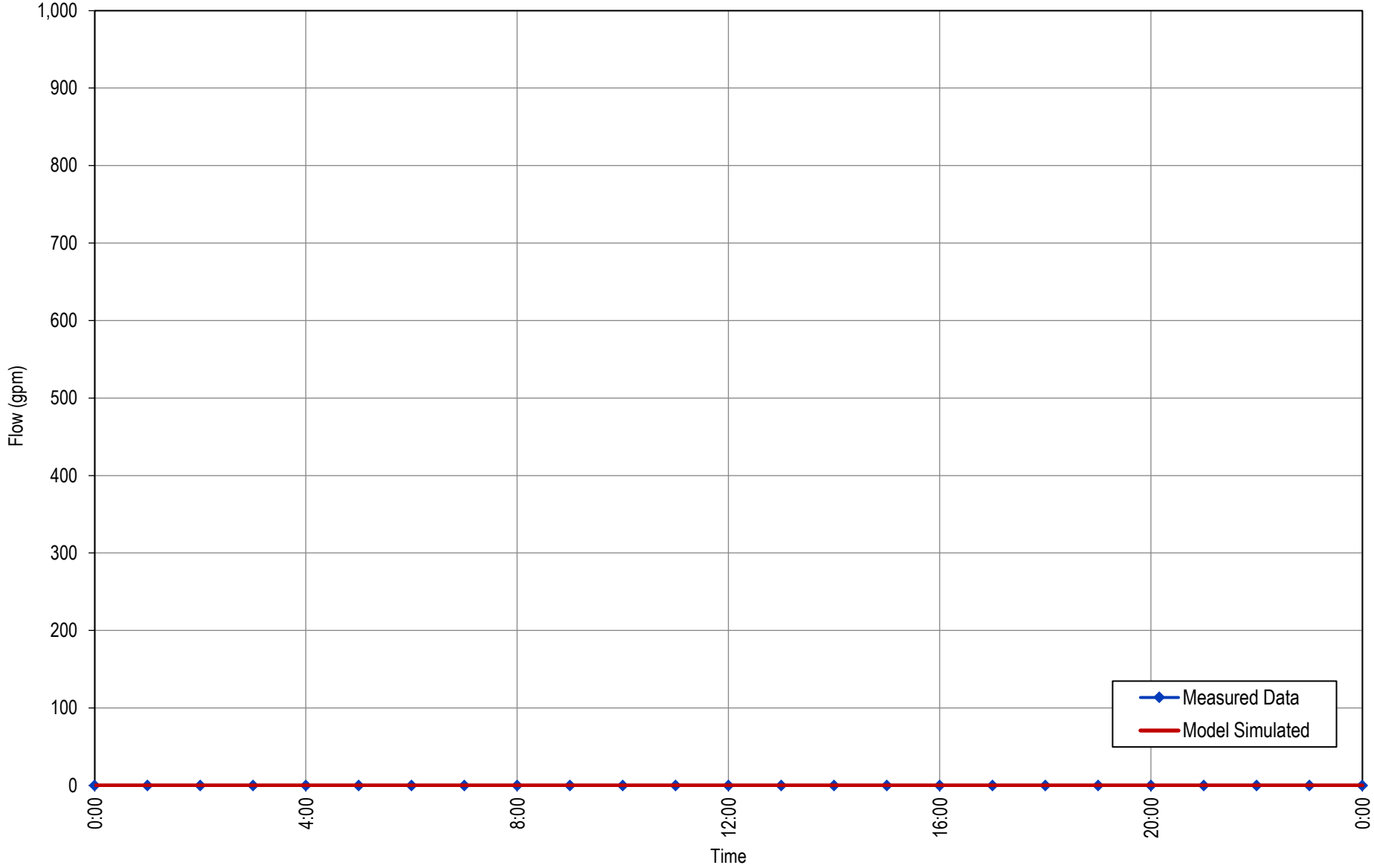

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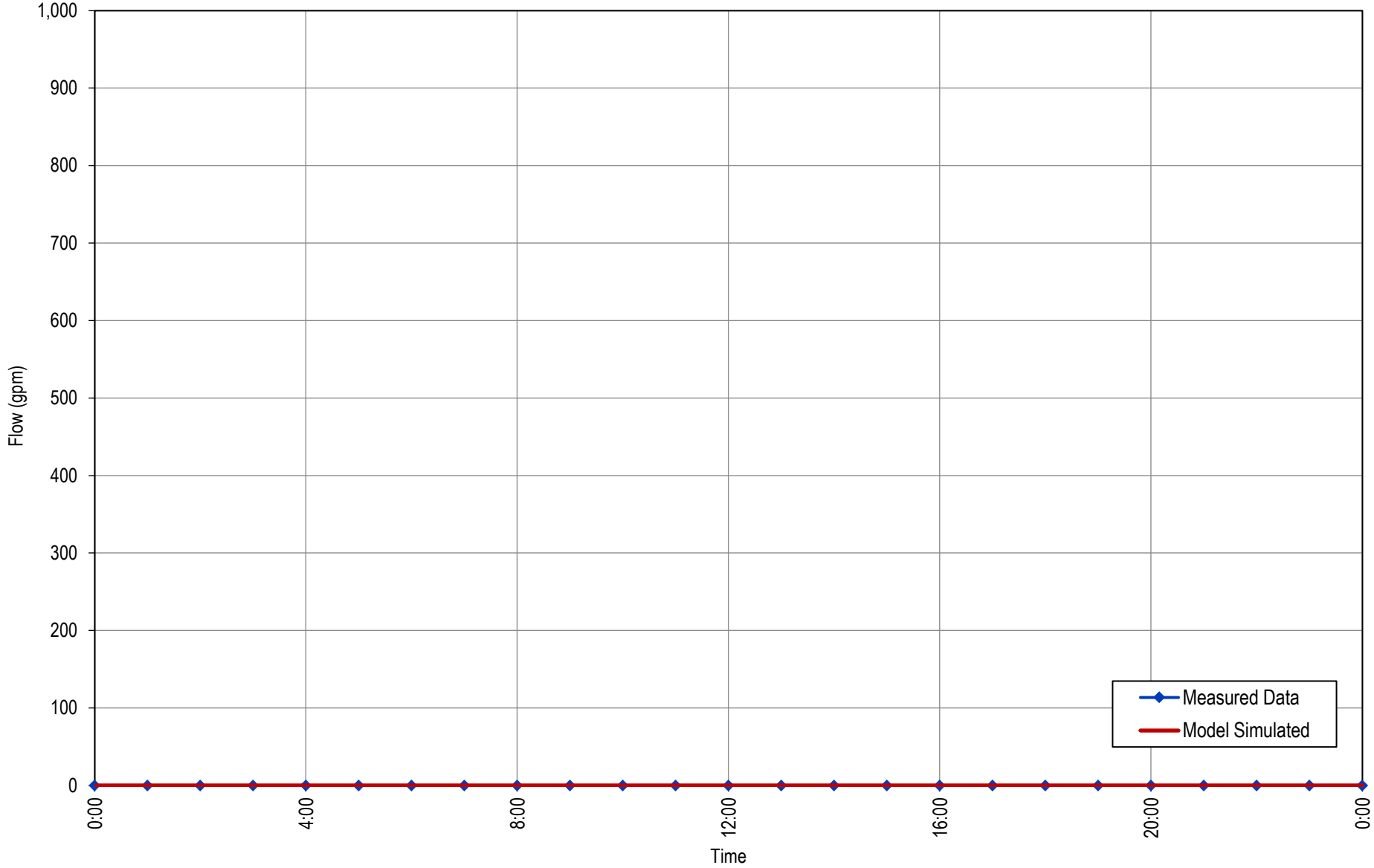

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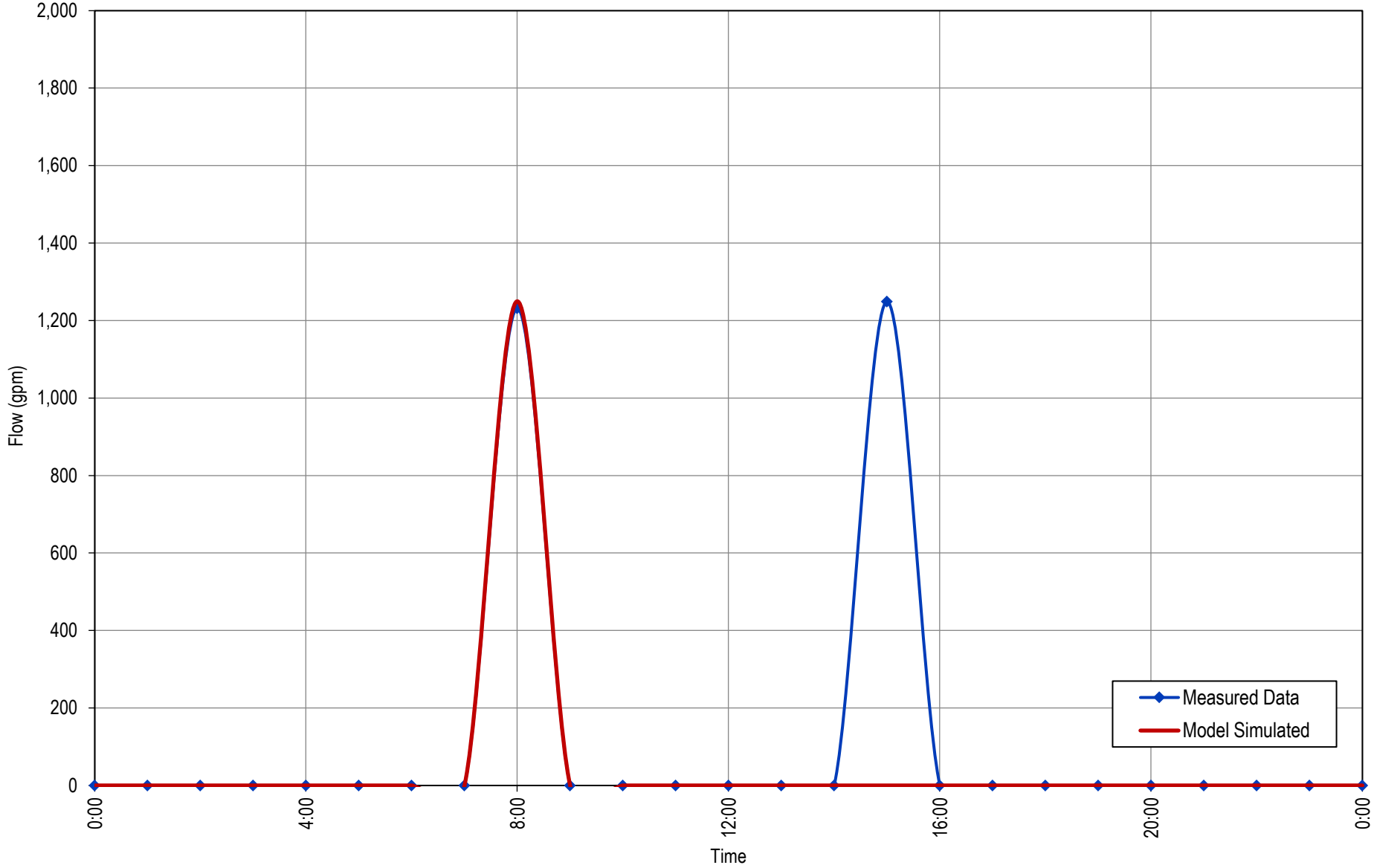

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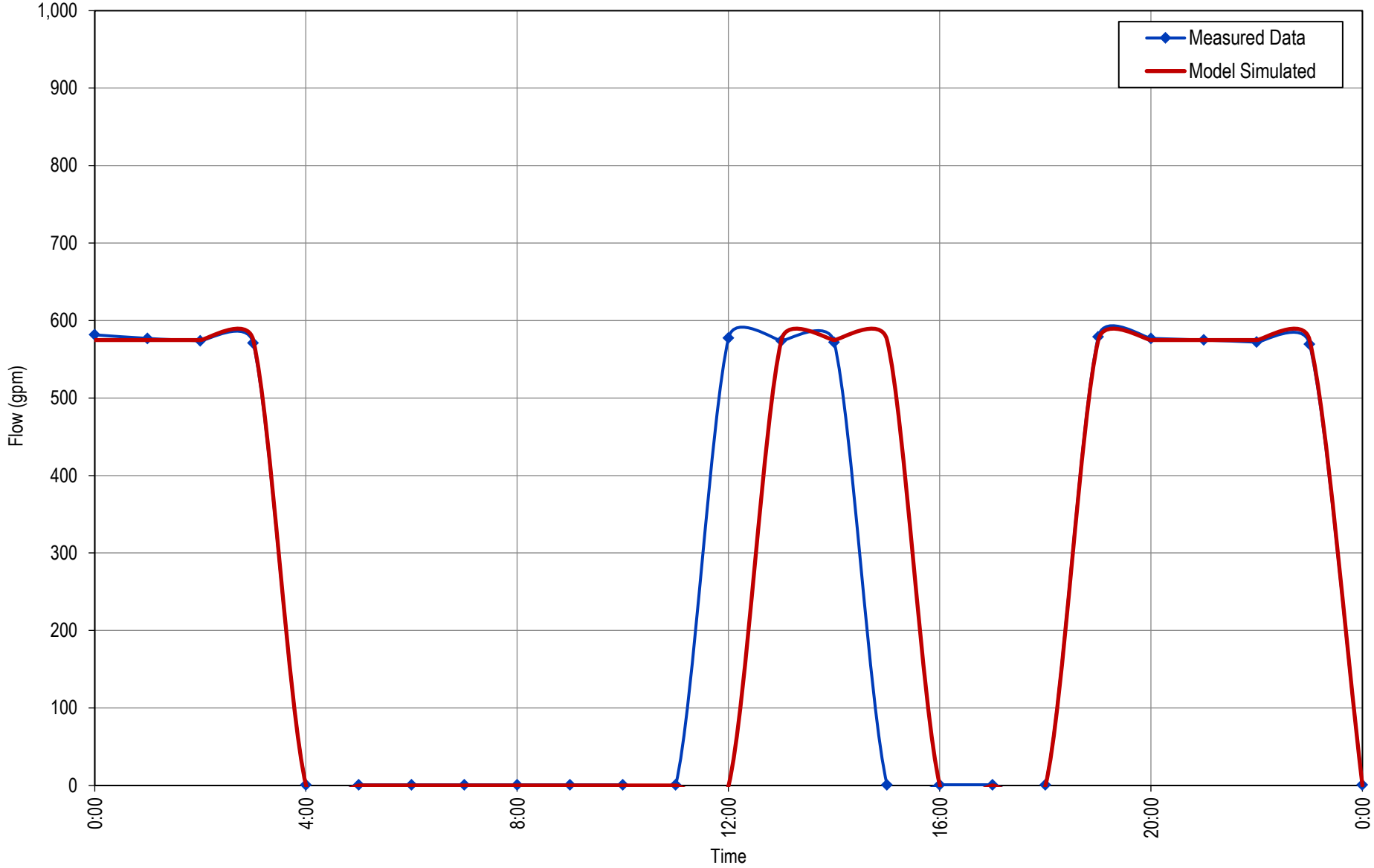

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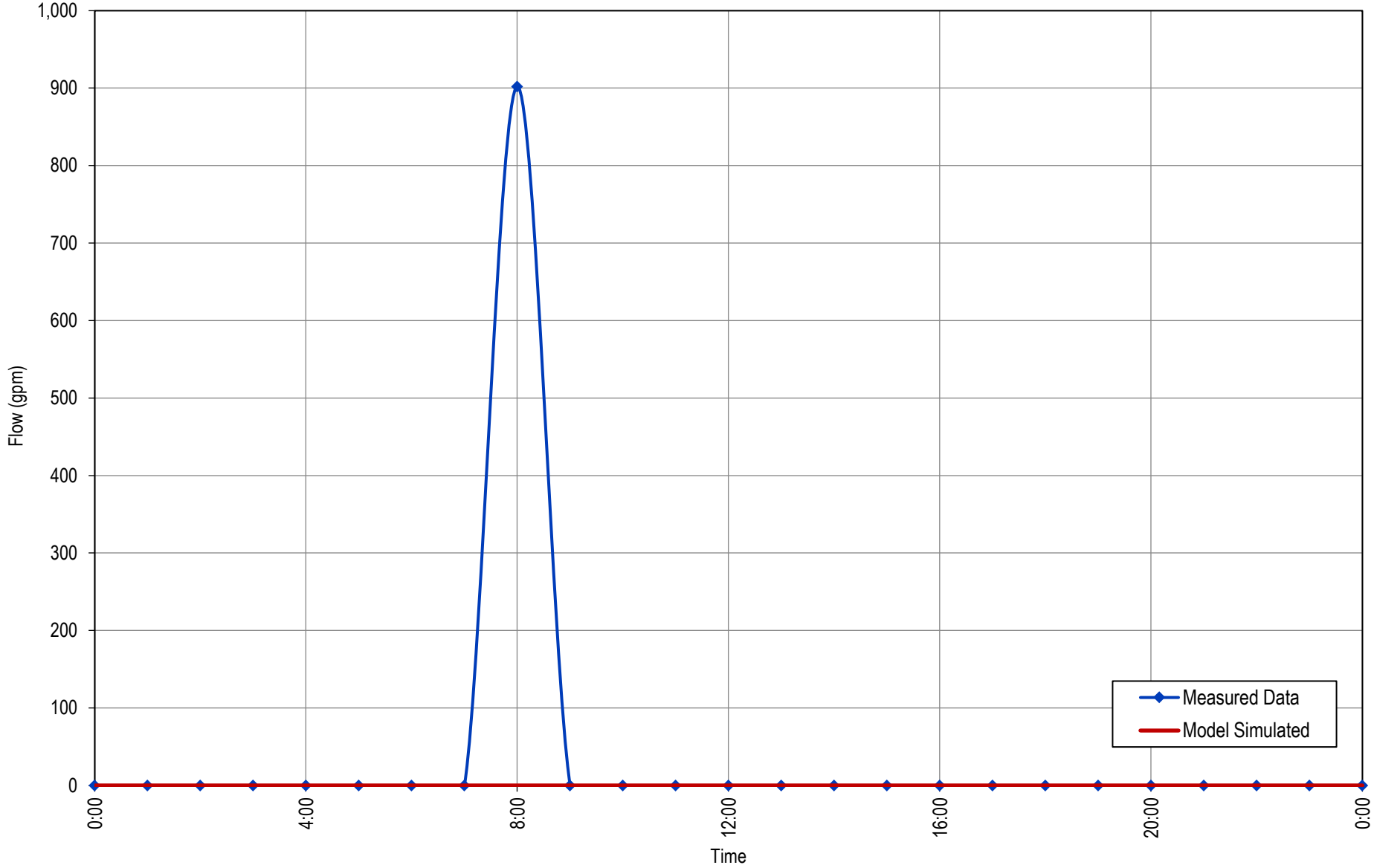

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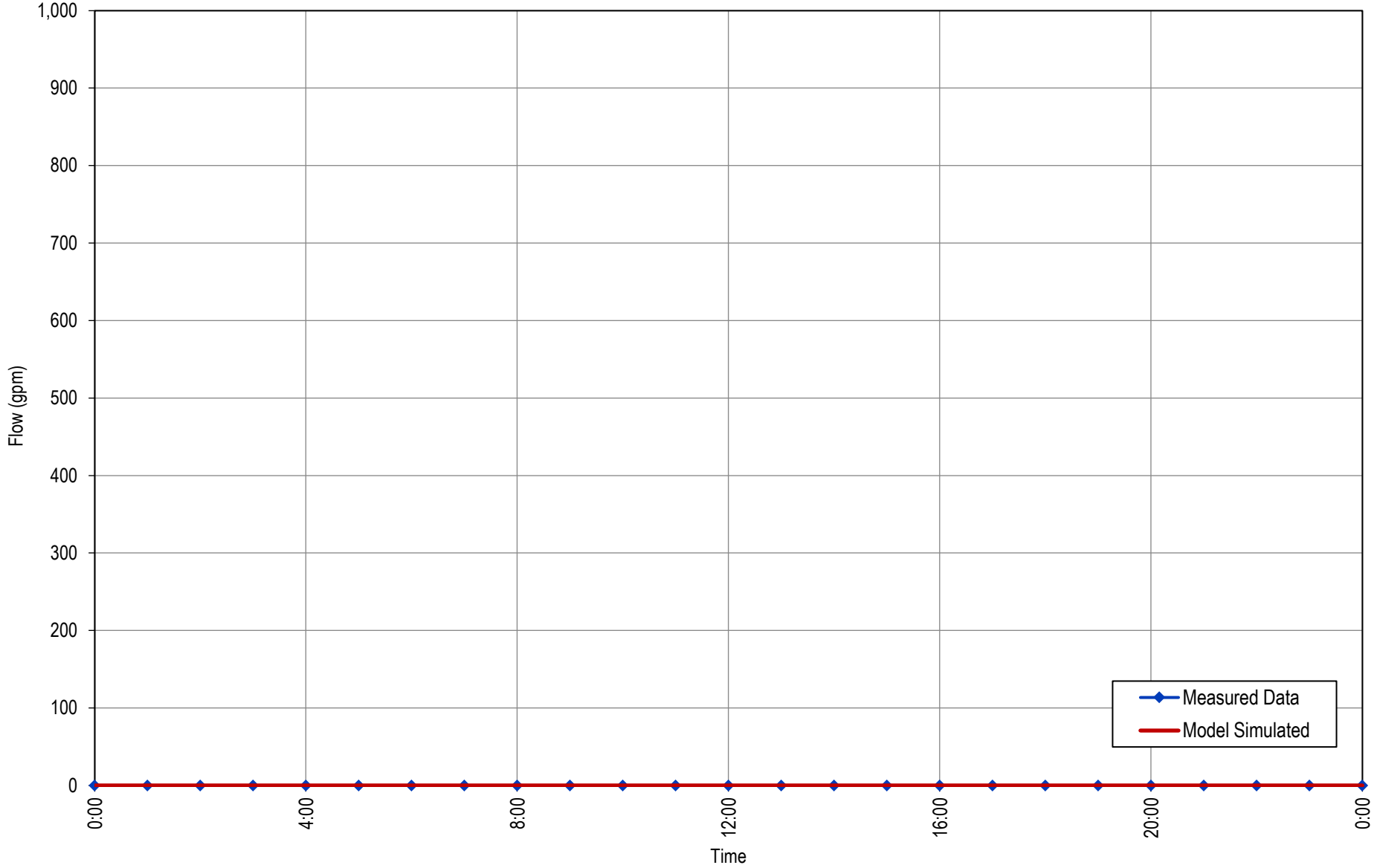
EPS CALIBRATION - WELL 11 FLOW



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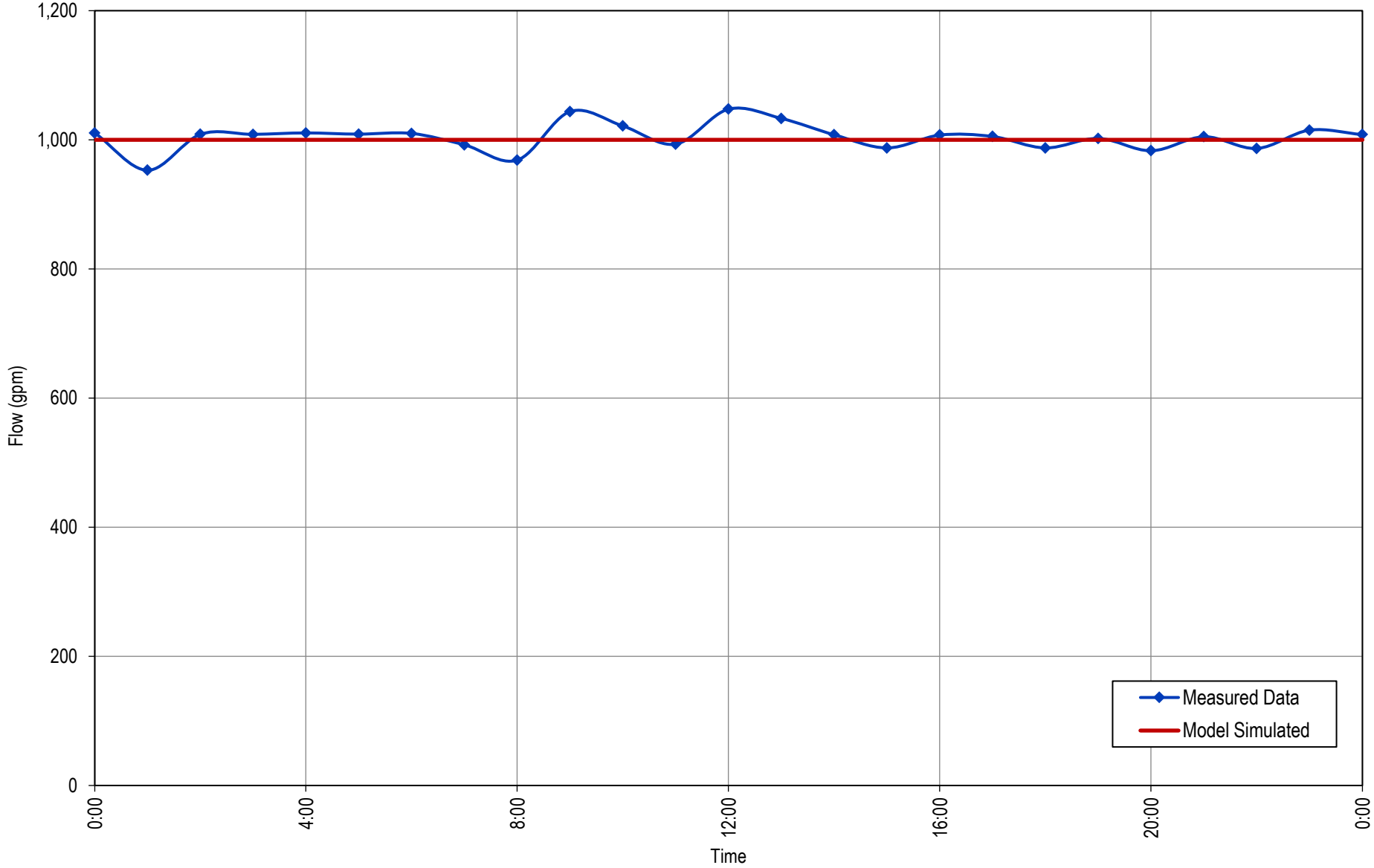

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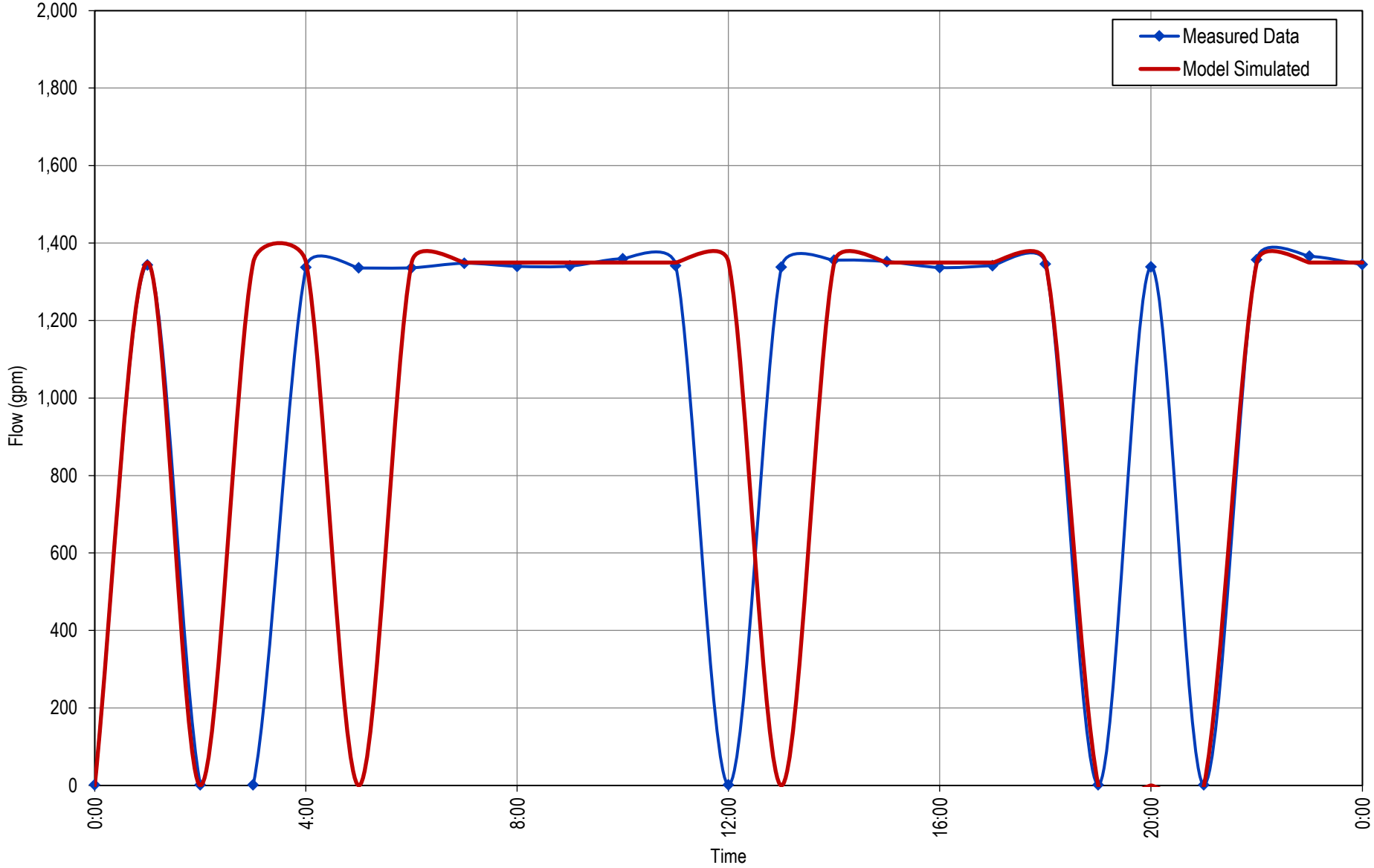

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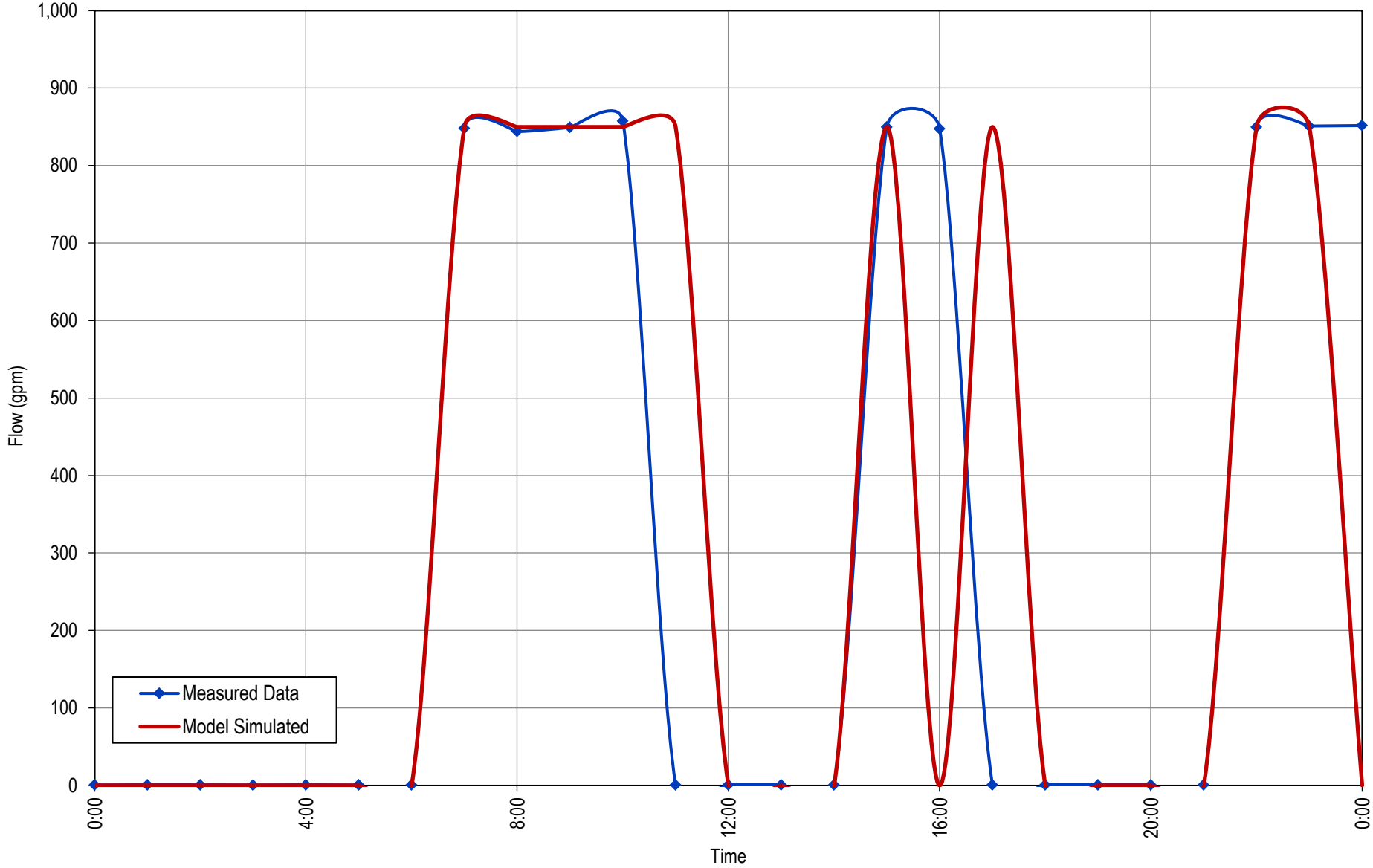

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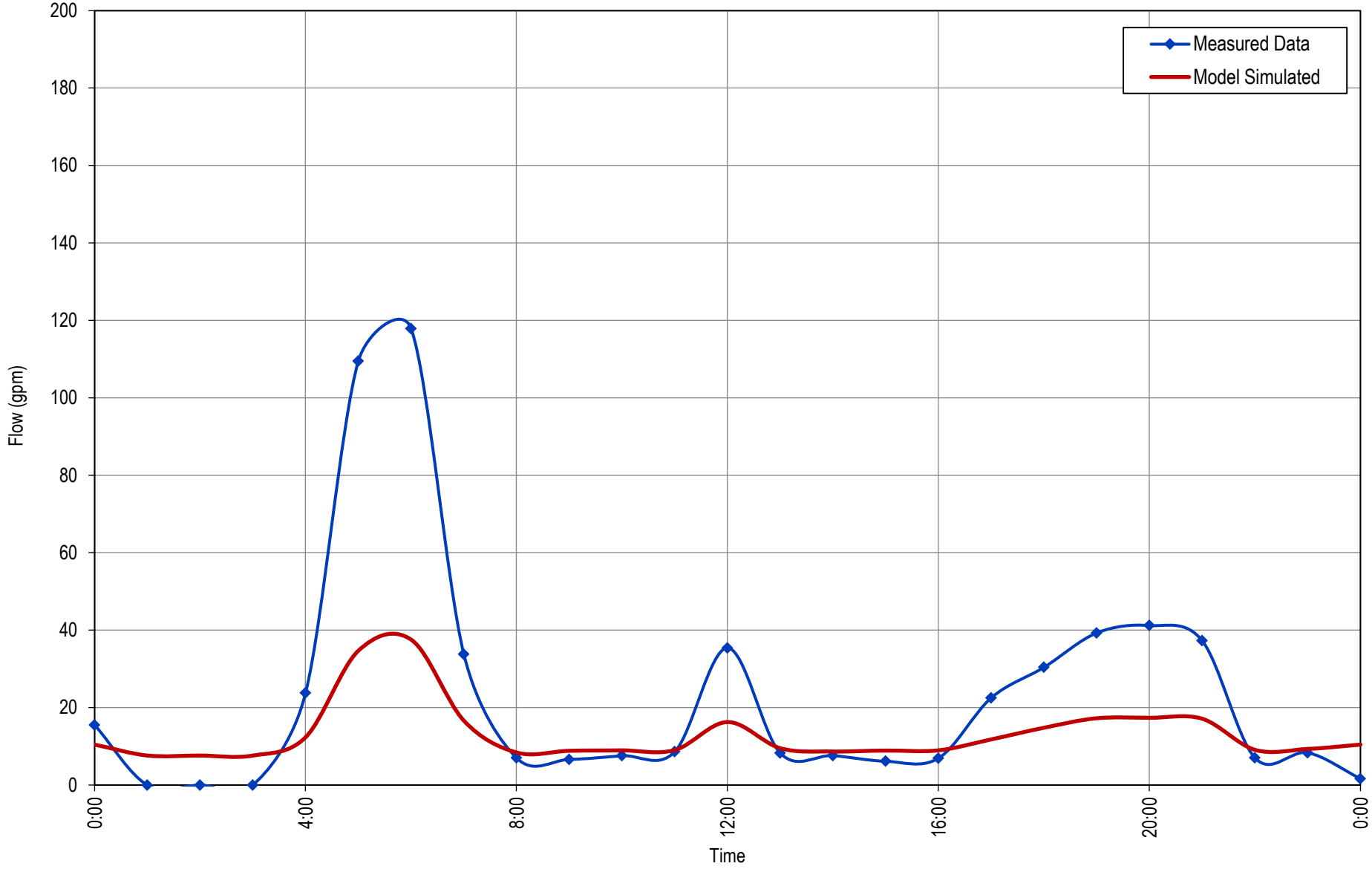
EPS CALIBRATION - GREEN MOUNTAIN ESTATES BPS FLOW



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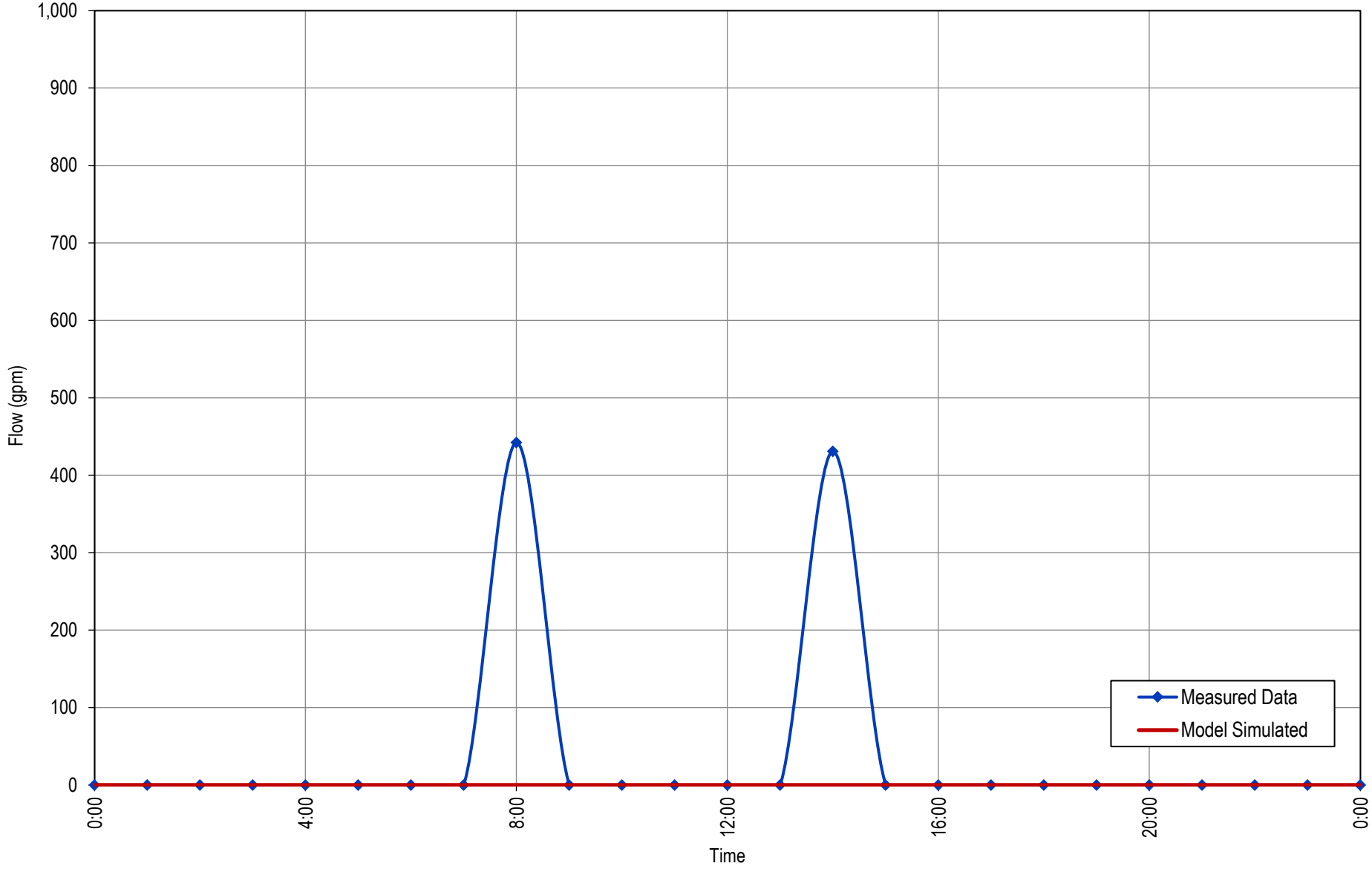
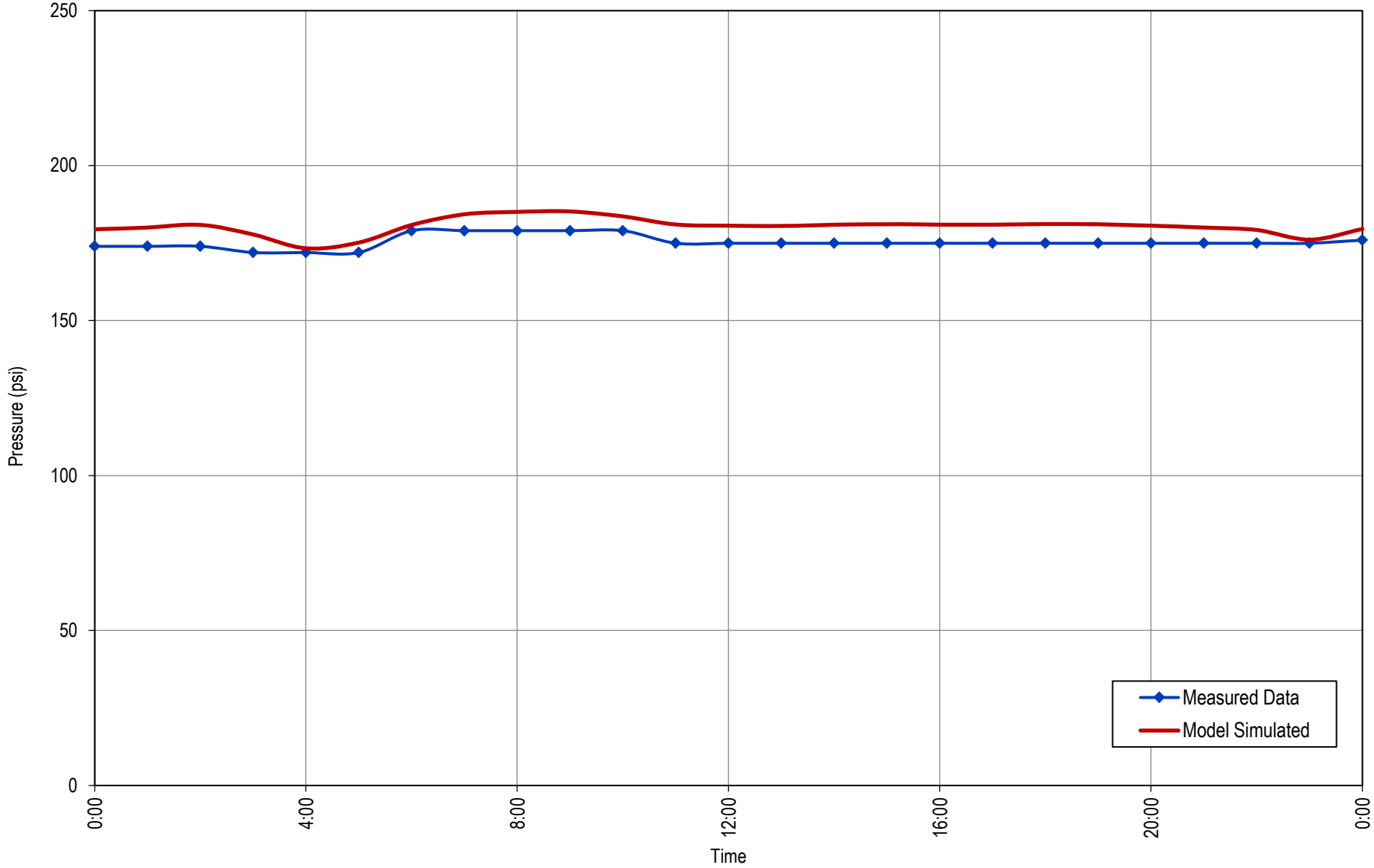


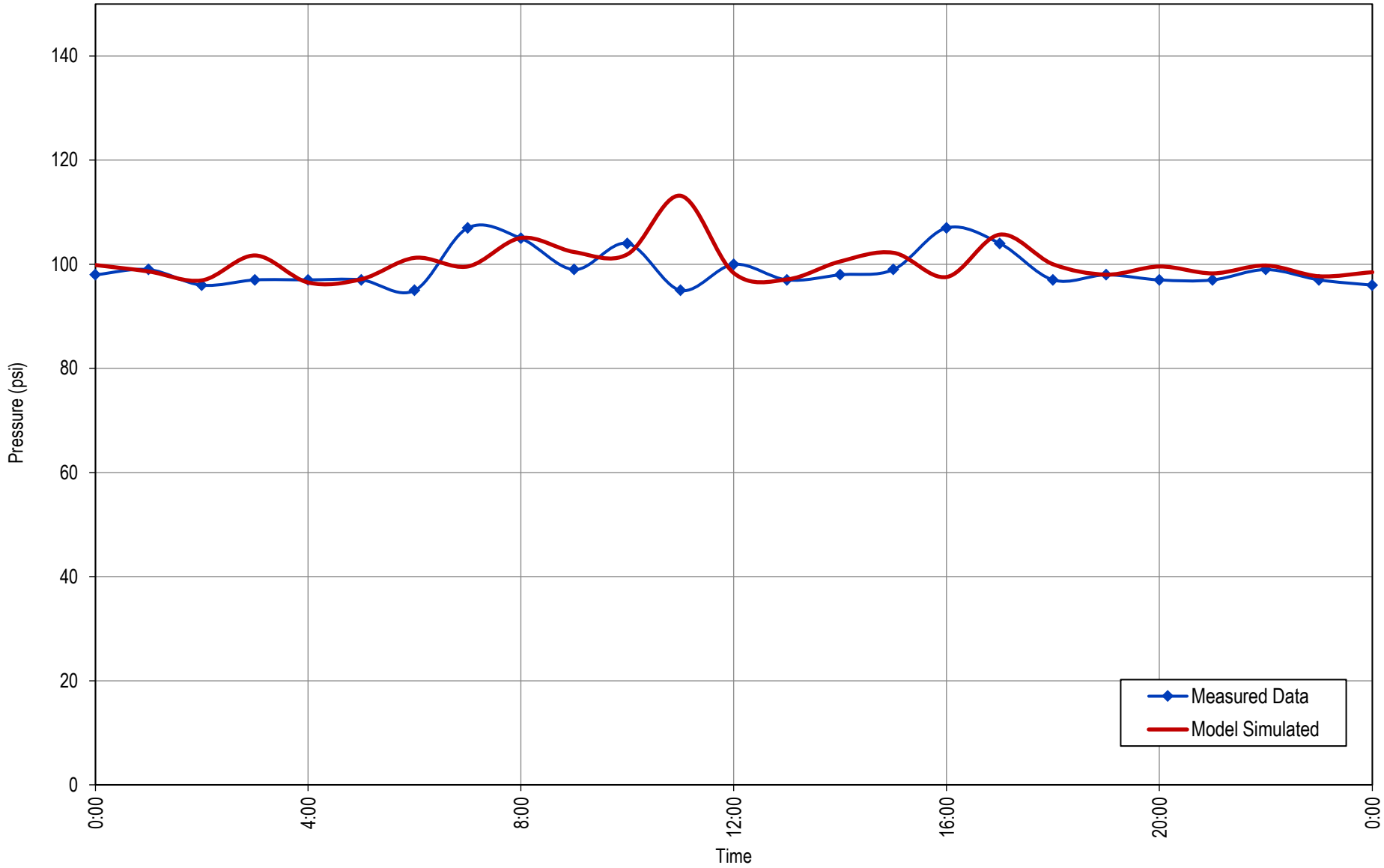
2026 Water System Plan Update

EPS CALIBRATION - LOWER PRUNE HILL DISCHARGE PRESSURE



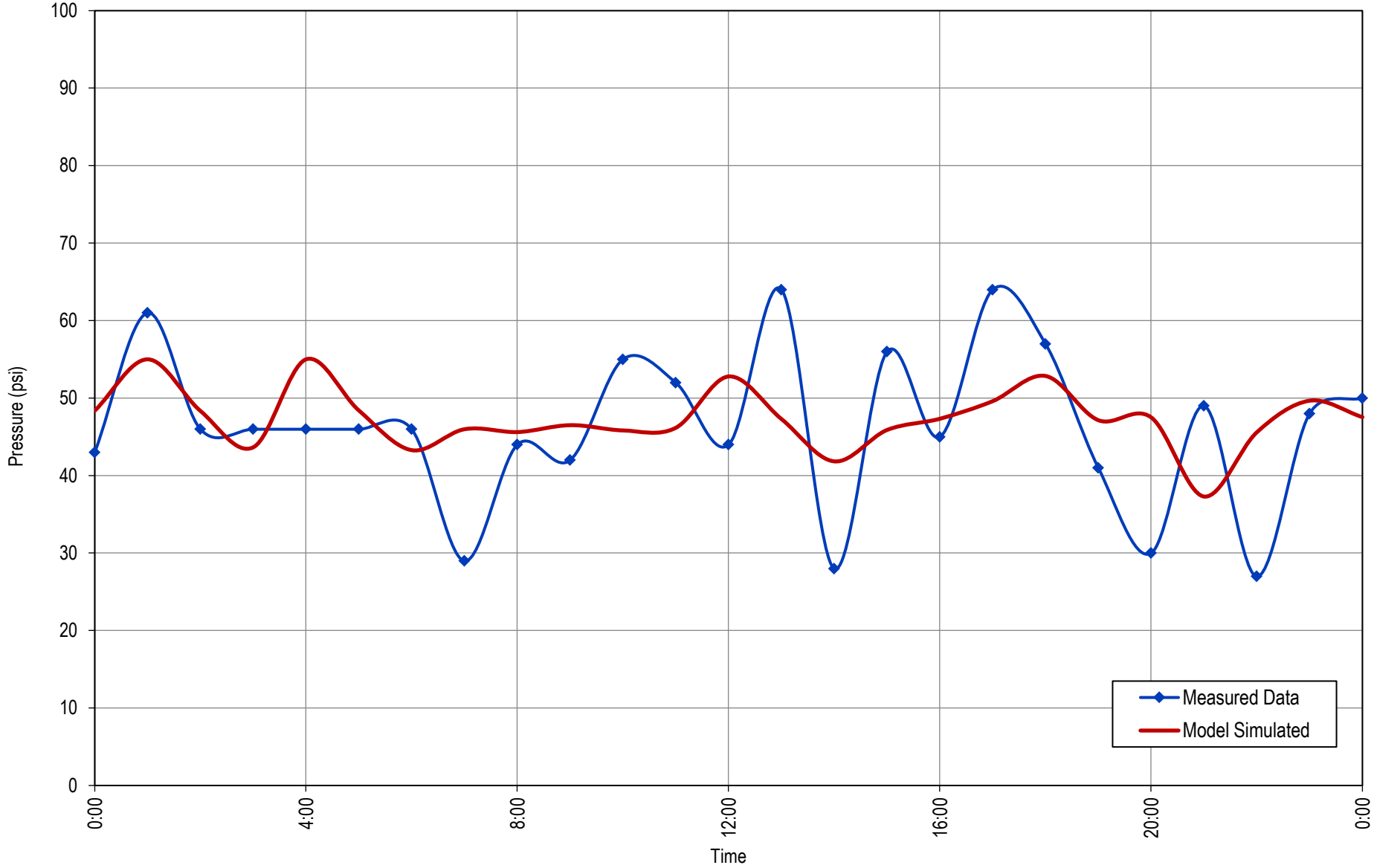
2026 Water System Plan Update

EPS CALIBRATION - ANGELO DISCHARGE PRESSURE



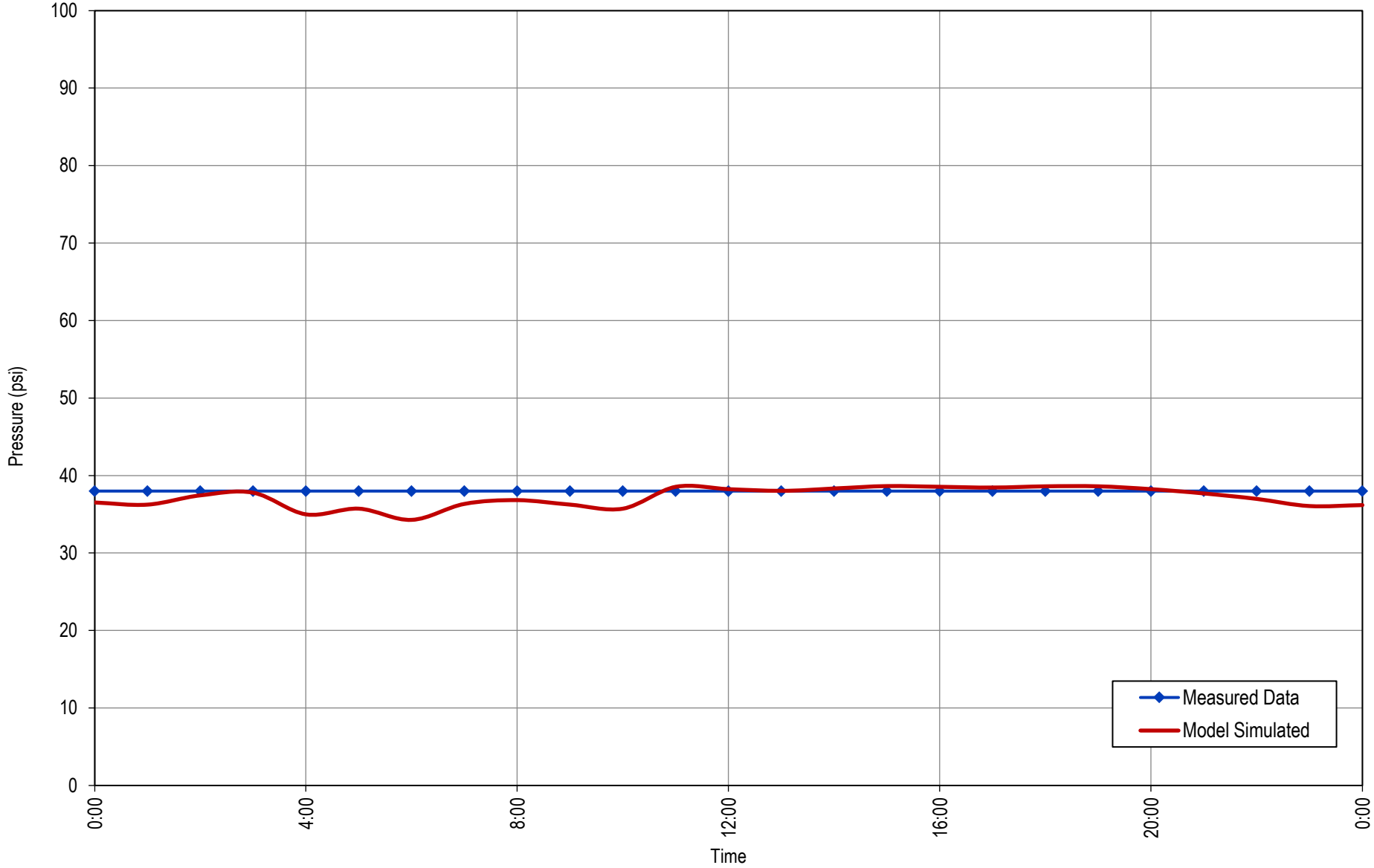
2026 Water System Plan Update

EPS CALIBRATION - ANGELO SUCTION PRESSURE



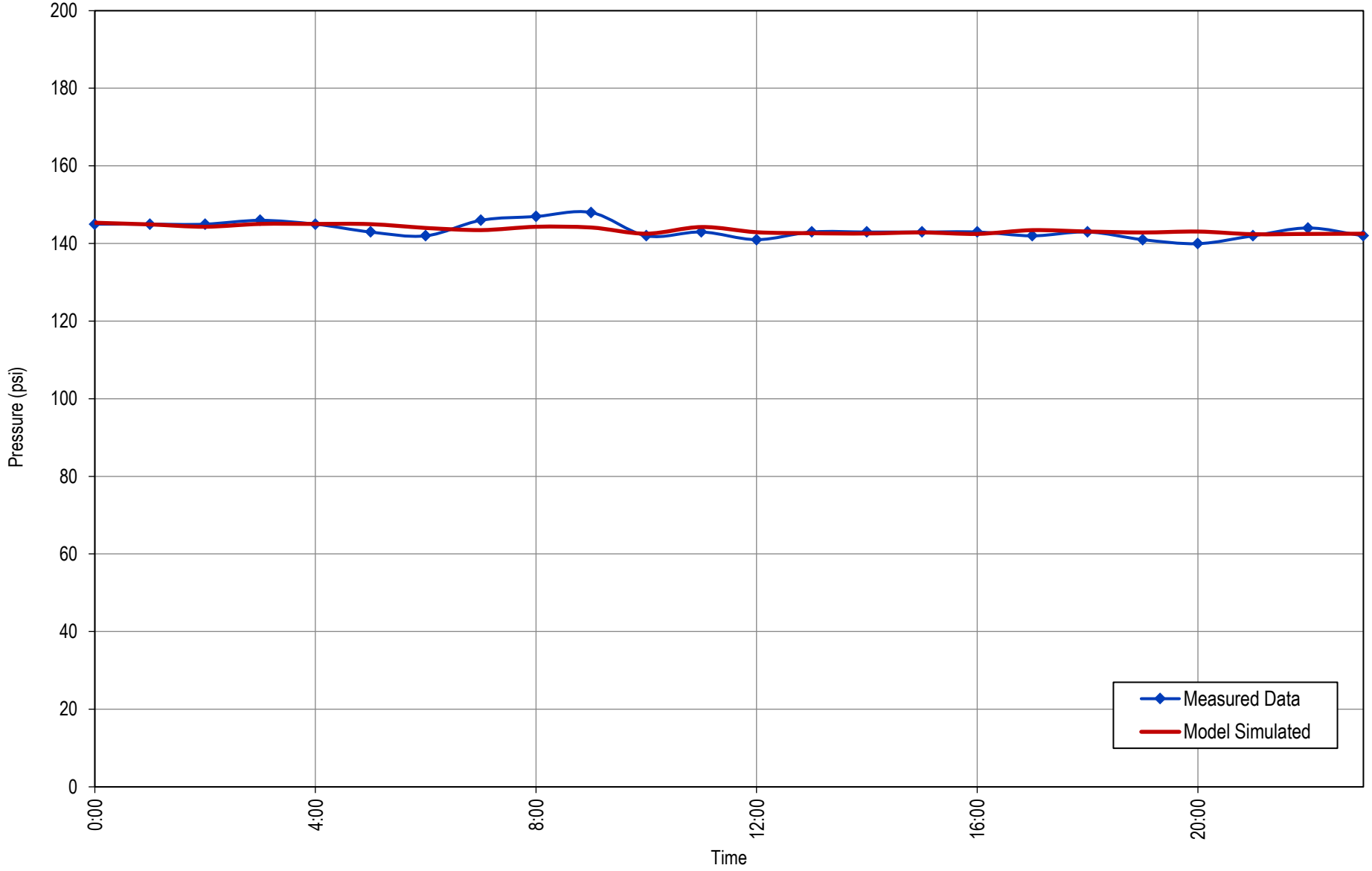
2026 Water System Plan Update

EPS CALIBRATION - UPPER PRUNE HILL DISCHARGE PRESSURE



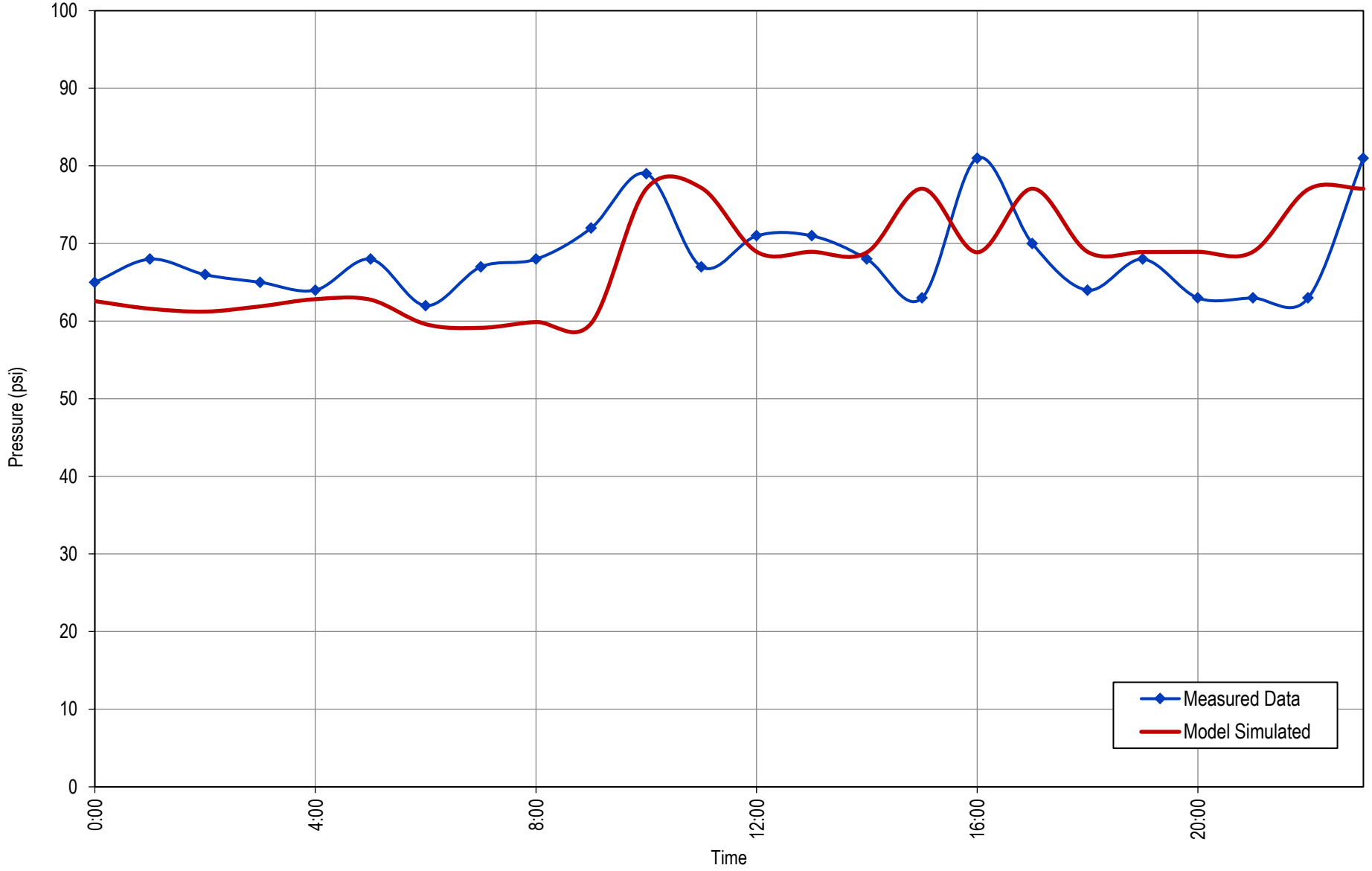
2026 Water System Plan Update

EPS CALIBRATION - FOREST HOME DISCHARGE PRESSURE



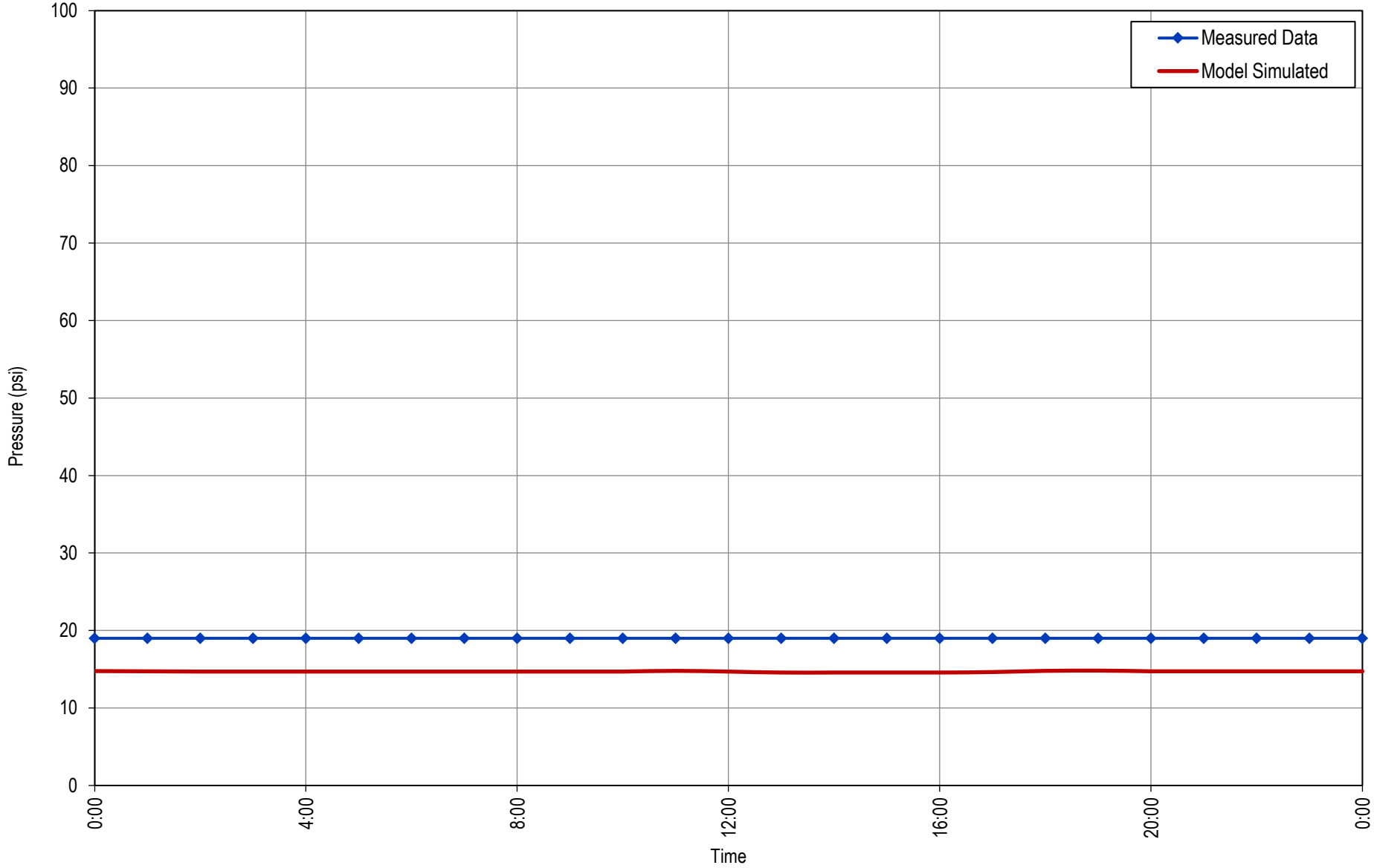
2026 Water System Plan Update

EPS CALIBRATION - FOREST HOME SUCTION PRESSURE



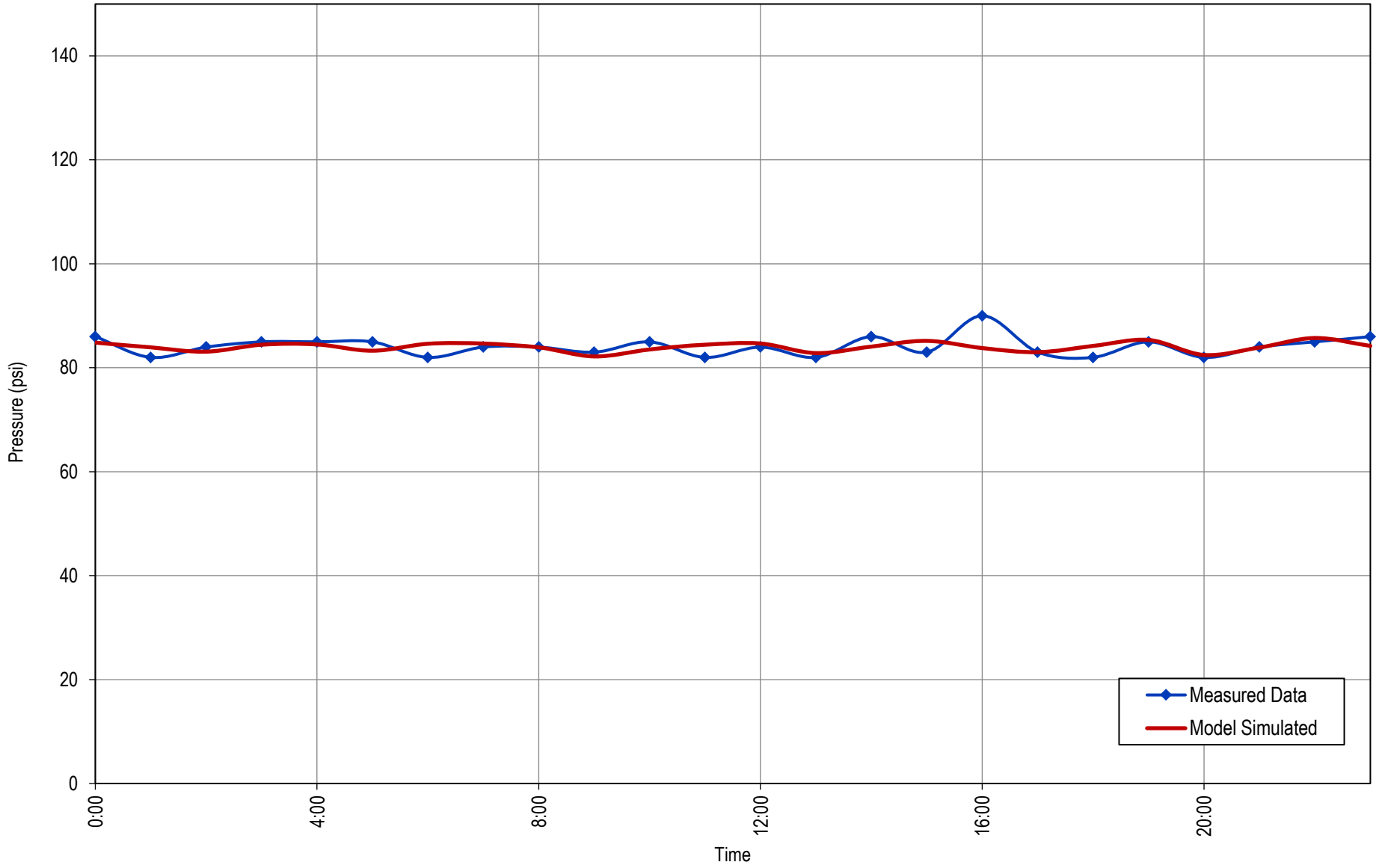
2026 Water System Plan Update

EPS CALIBRATION - 18TH AVENUE RESERVOIR PRESSURE



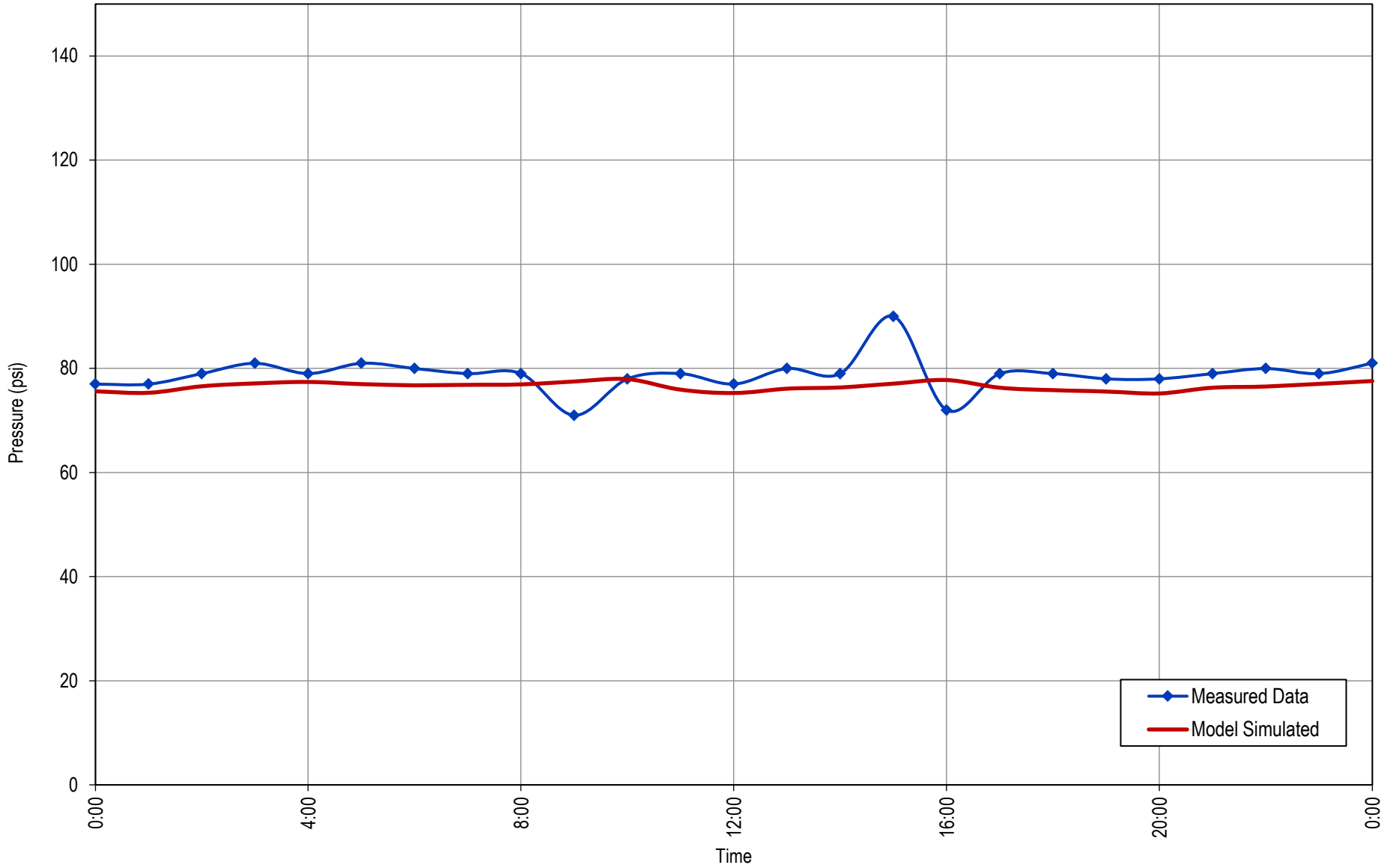
2026 Water System Plan Update

EPS CALIBRATION - BUTLER 542 ZONE PRESSURE



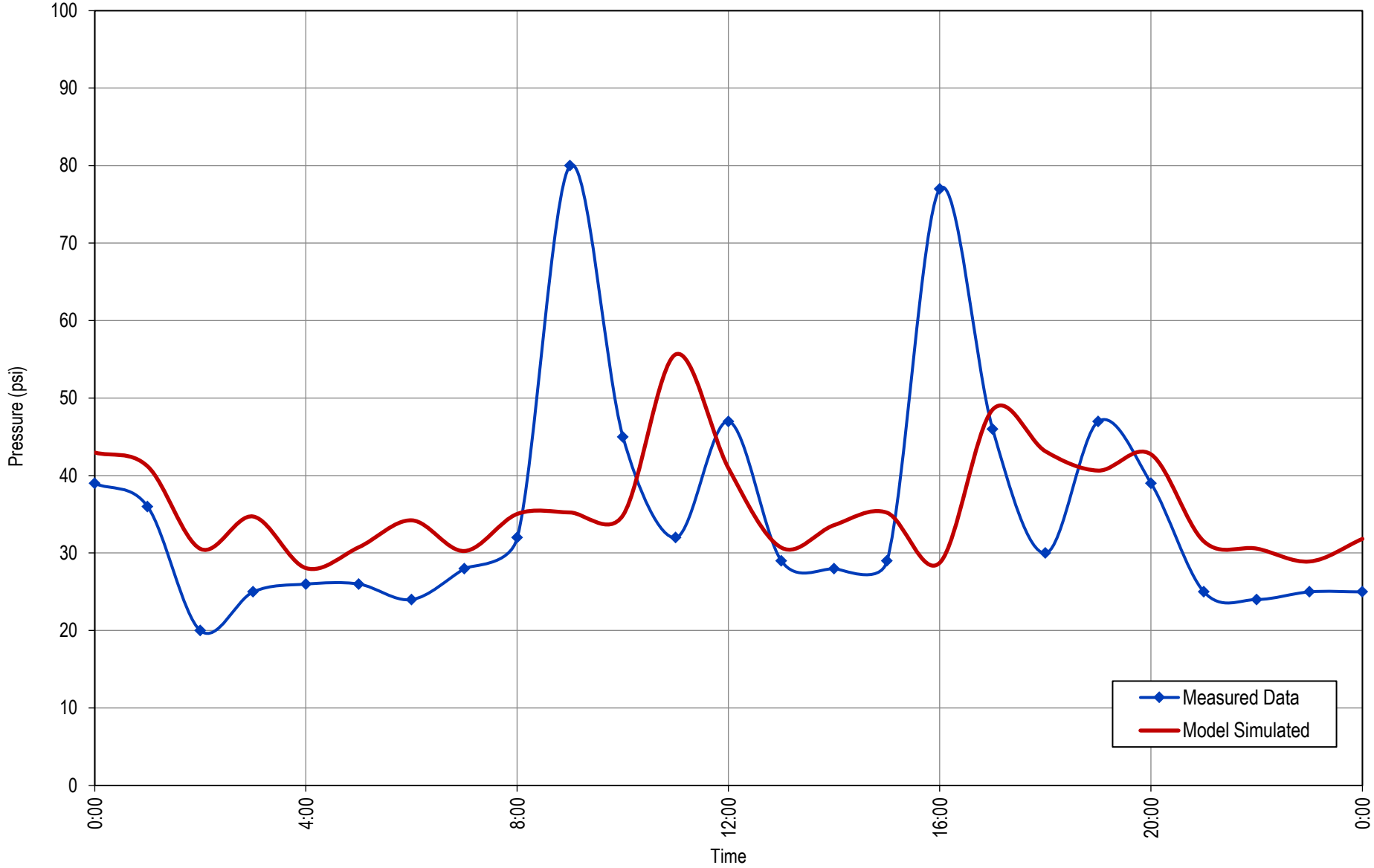
2026 Water System Plan Update

EPS CALIBRATION - LACAMAS DISCHARGE PRESSURE



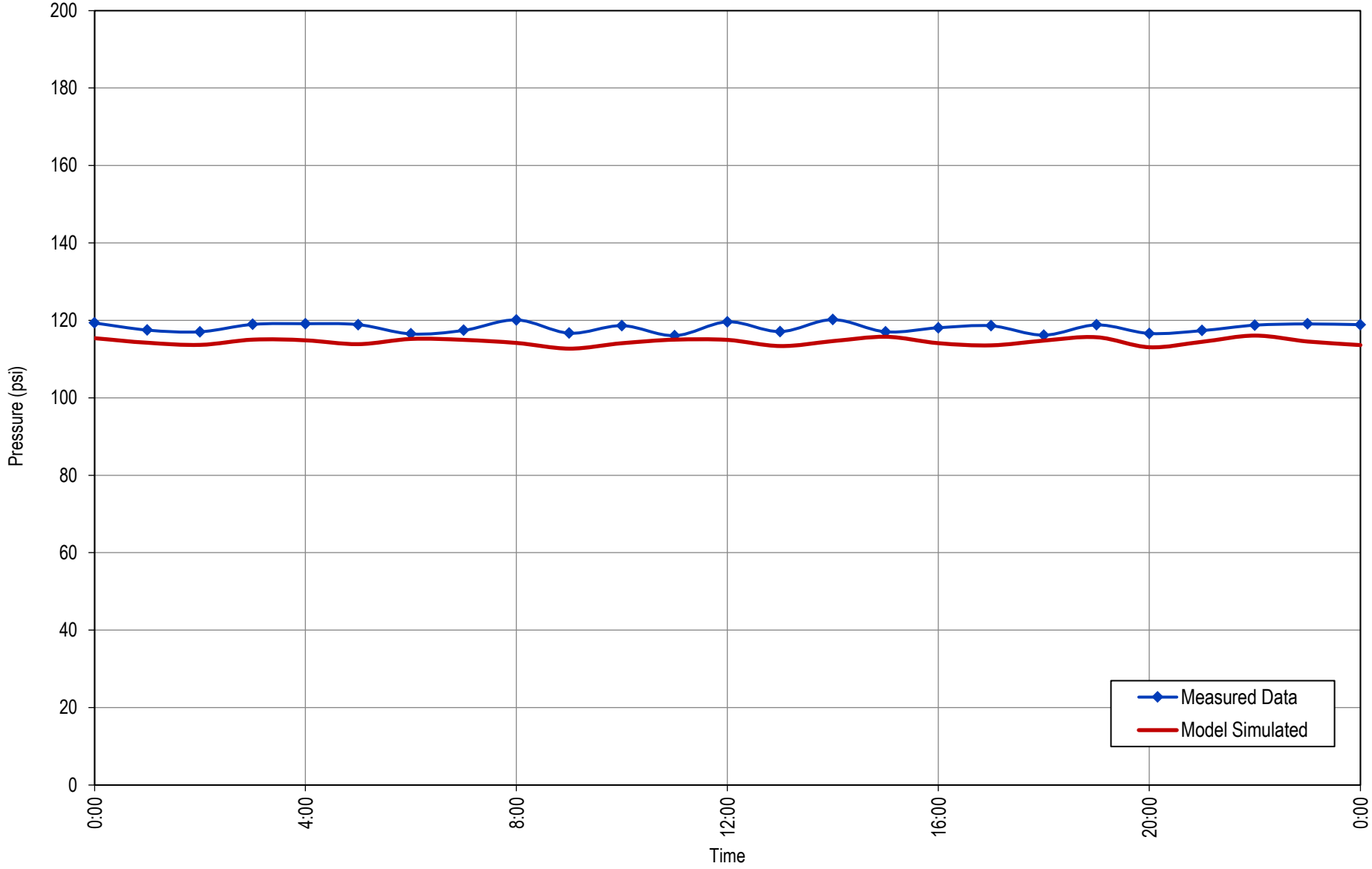
2026 Water System Plan Update

EPS CALIBRATION - LACAMAS SUCTION PRESSURE



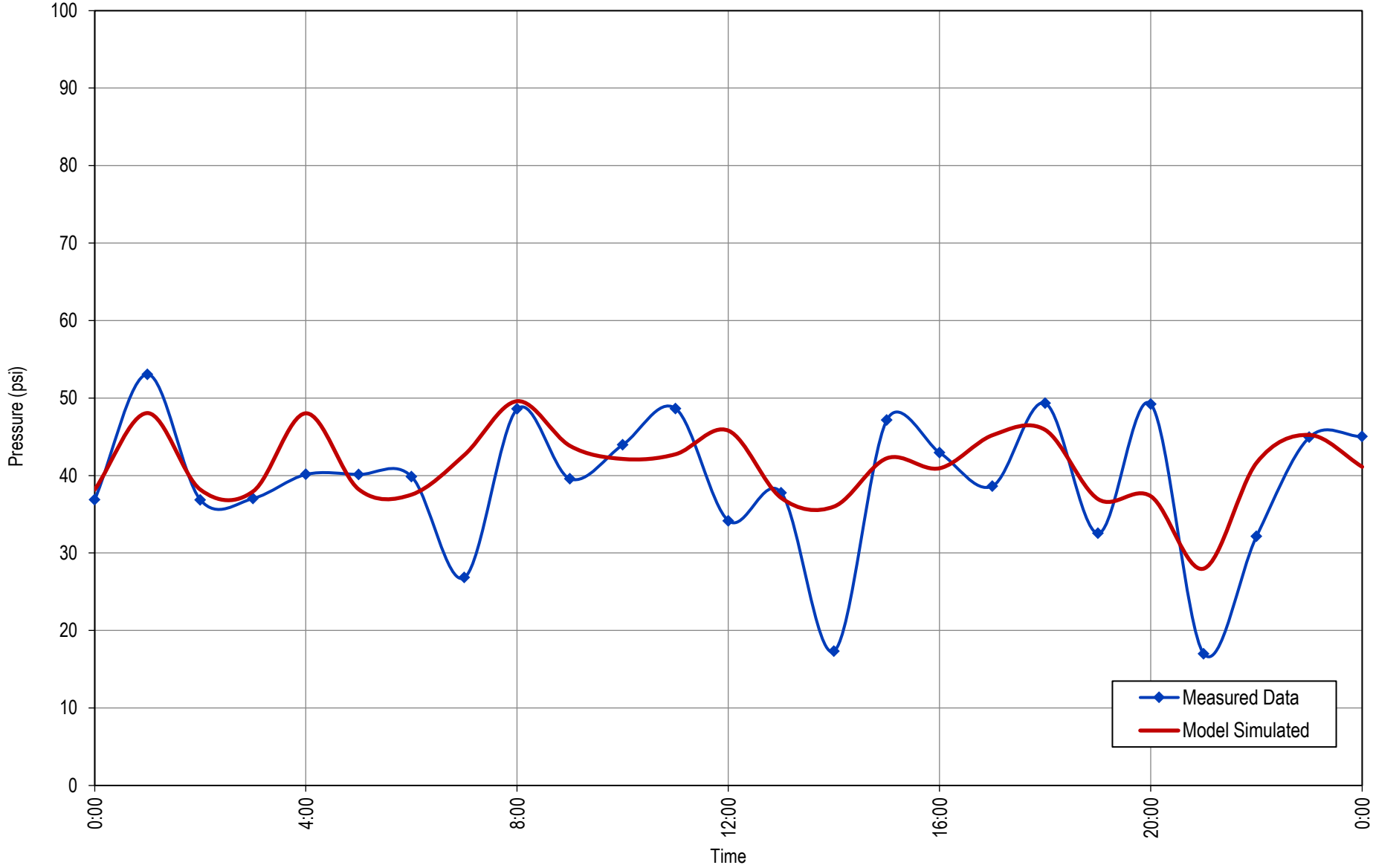
2026 Water System Plan Update

EPS CALIBRATION - CROWN ROAD DISCHARGE PRESSURE



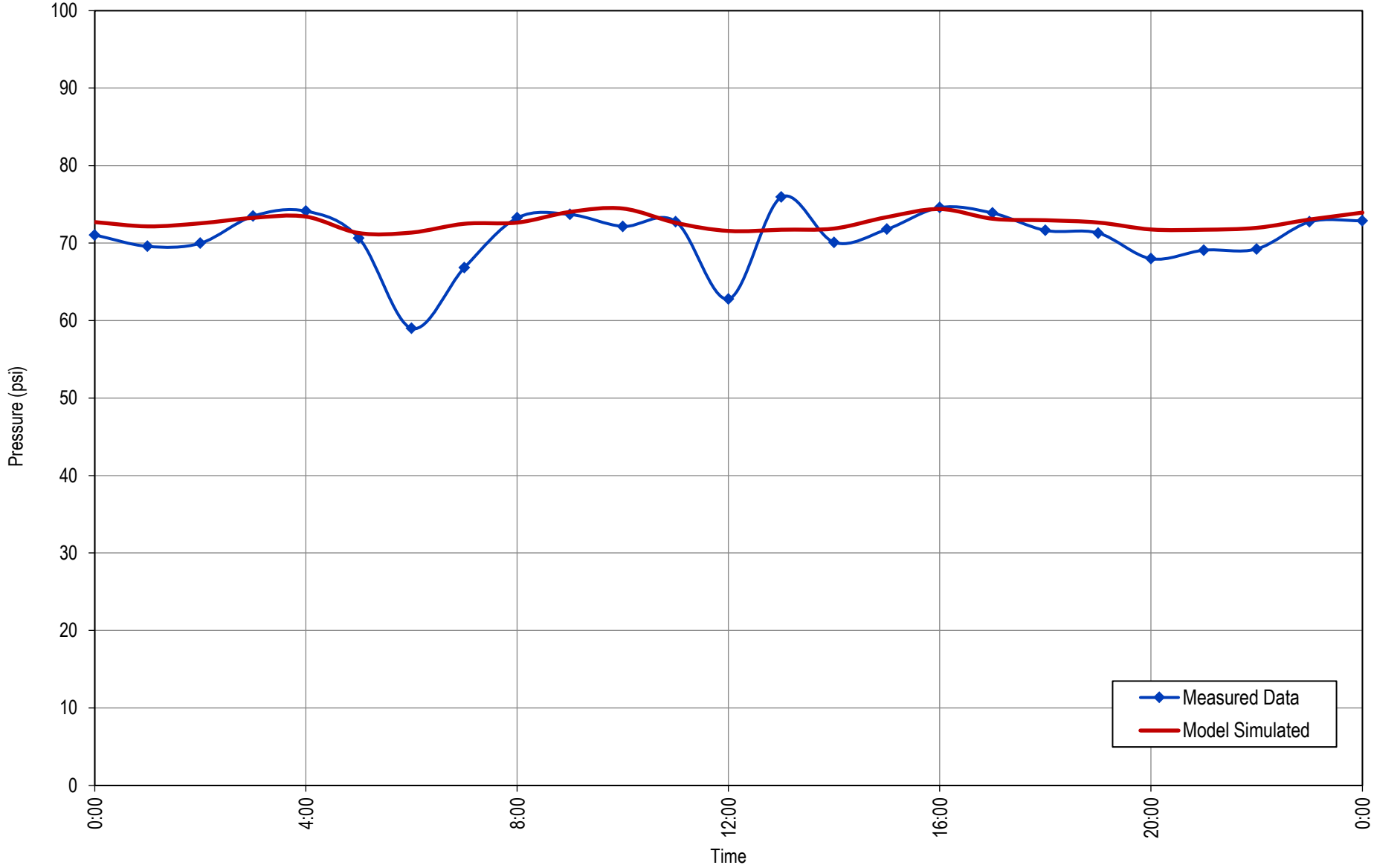
2026 Water System Plan Update

EPS CALIBRATION - CROWN ROAD SUCTION PRESSURE



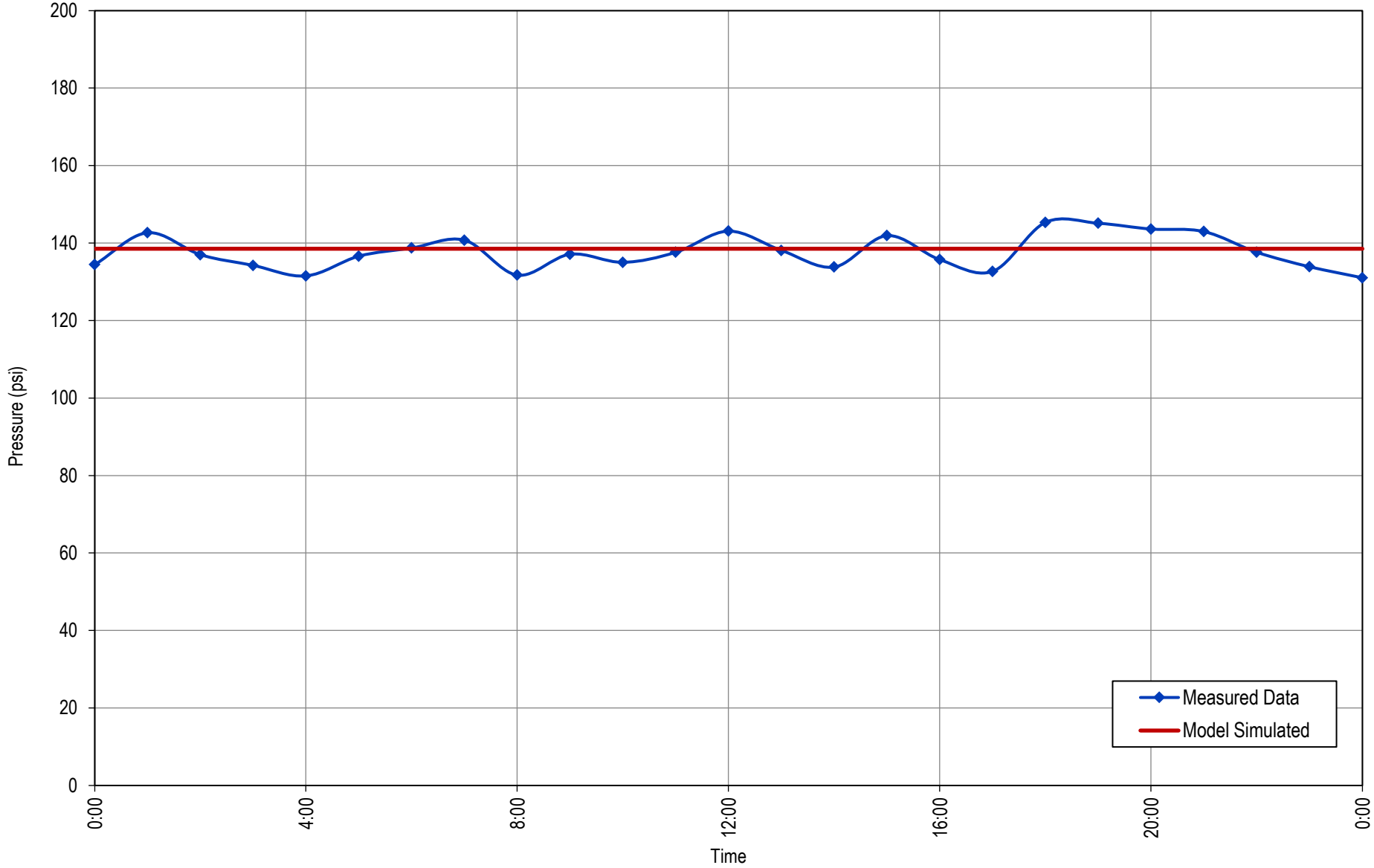
2026 Water System Plan Update

EPS CALIBRATION - GREEN MOUNTAIN ESTATES SUCTION PRESSURE



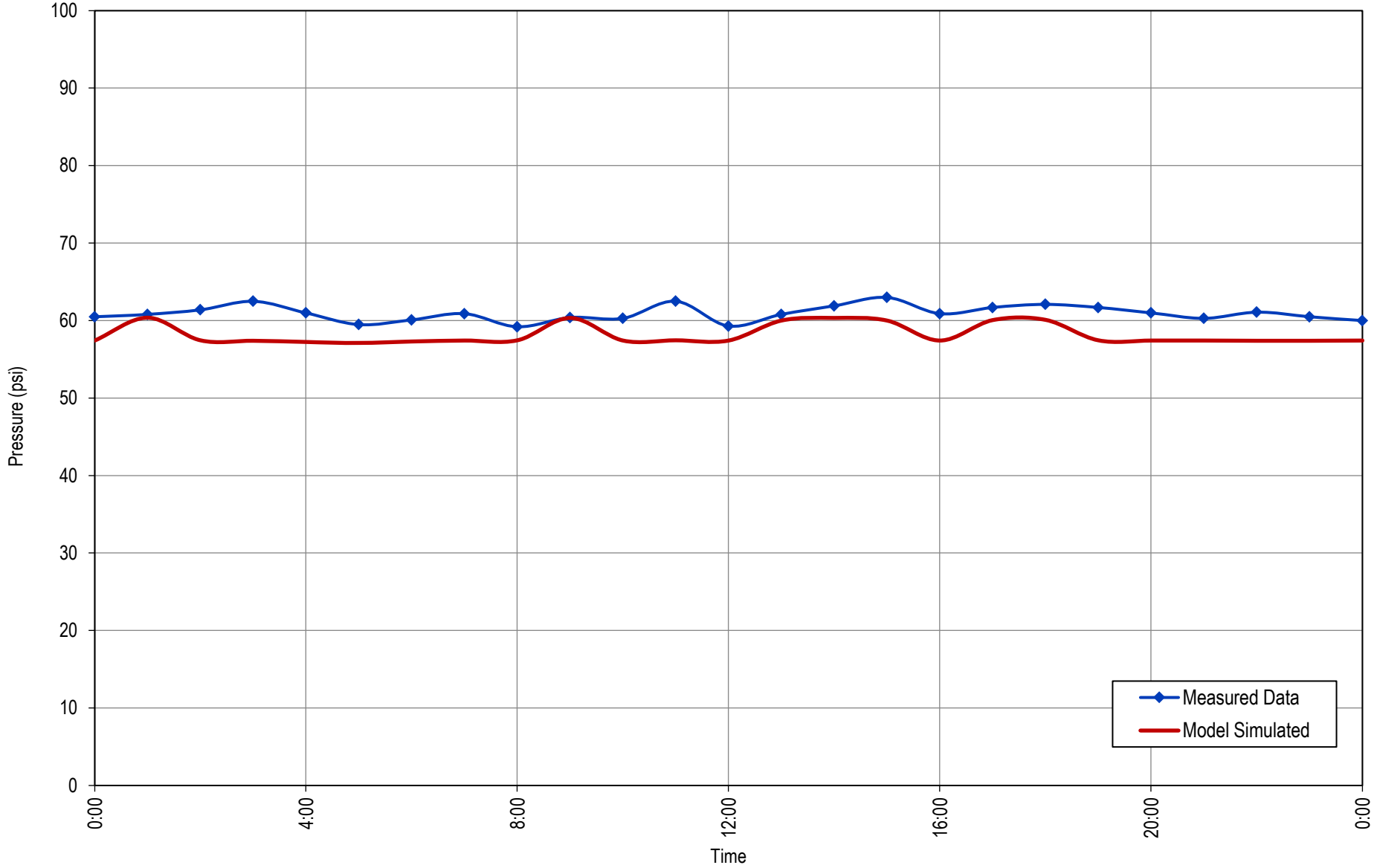
2026 Water System Plan Update

EPS CALIBRATION - GREEN MOUNTAIN ESTATES DISCHARGE PRESSURE



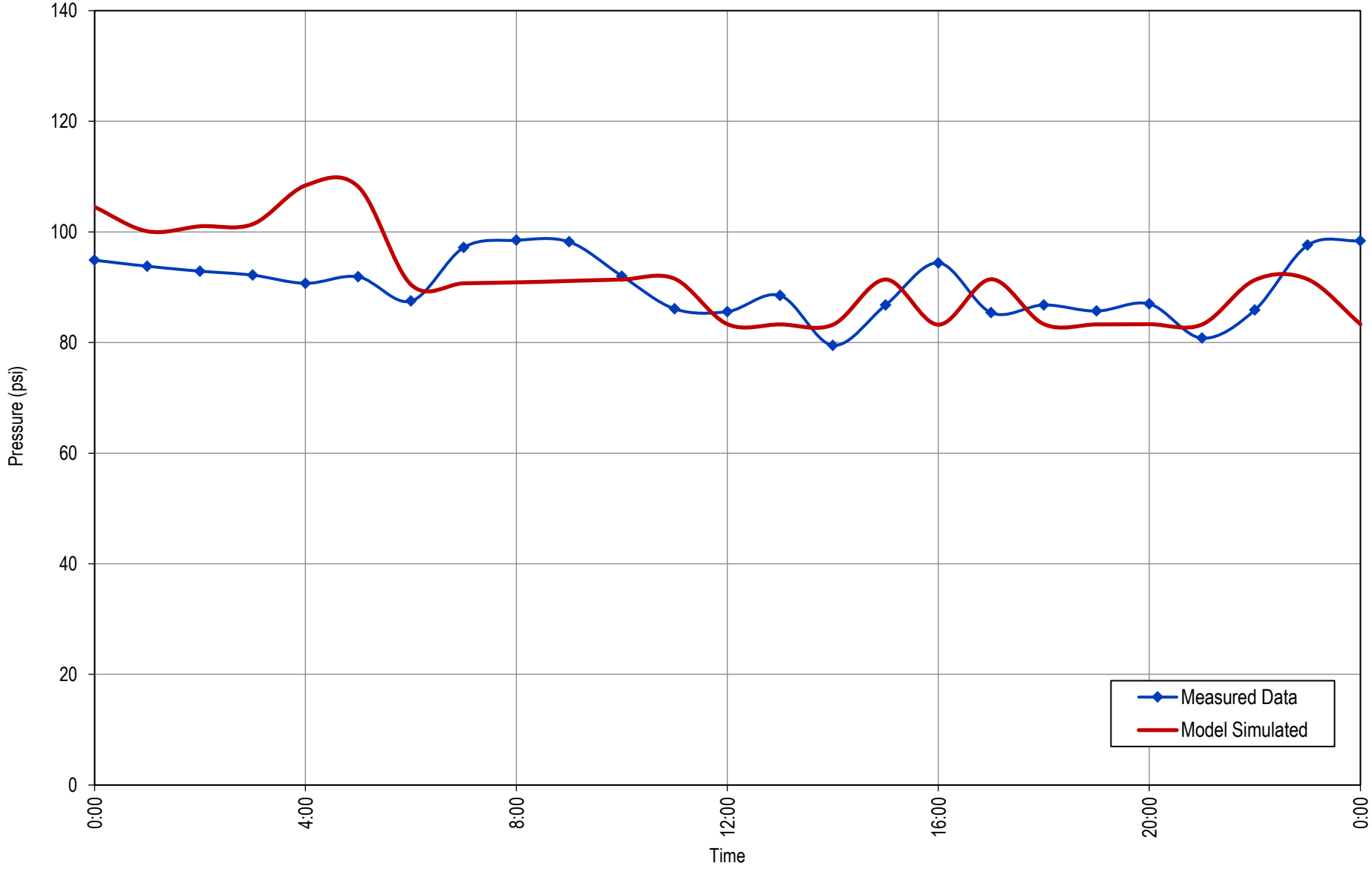
2026 Water System Plan Update

EPS CALIBRATION - 18TH AVENUE RESERVOIR (LOGGER 35)



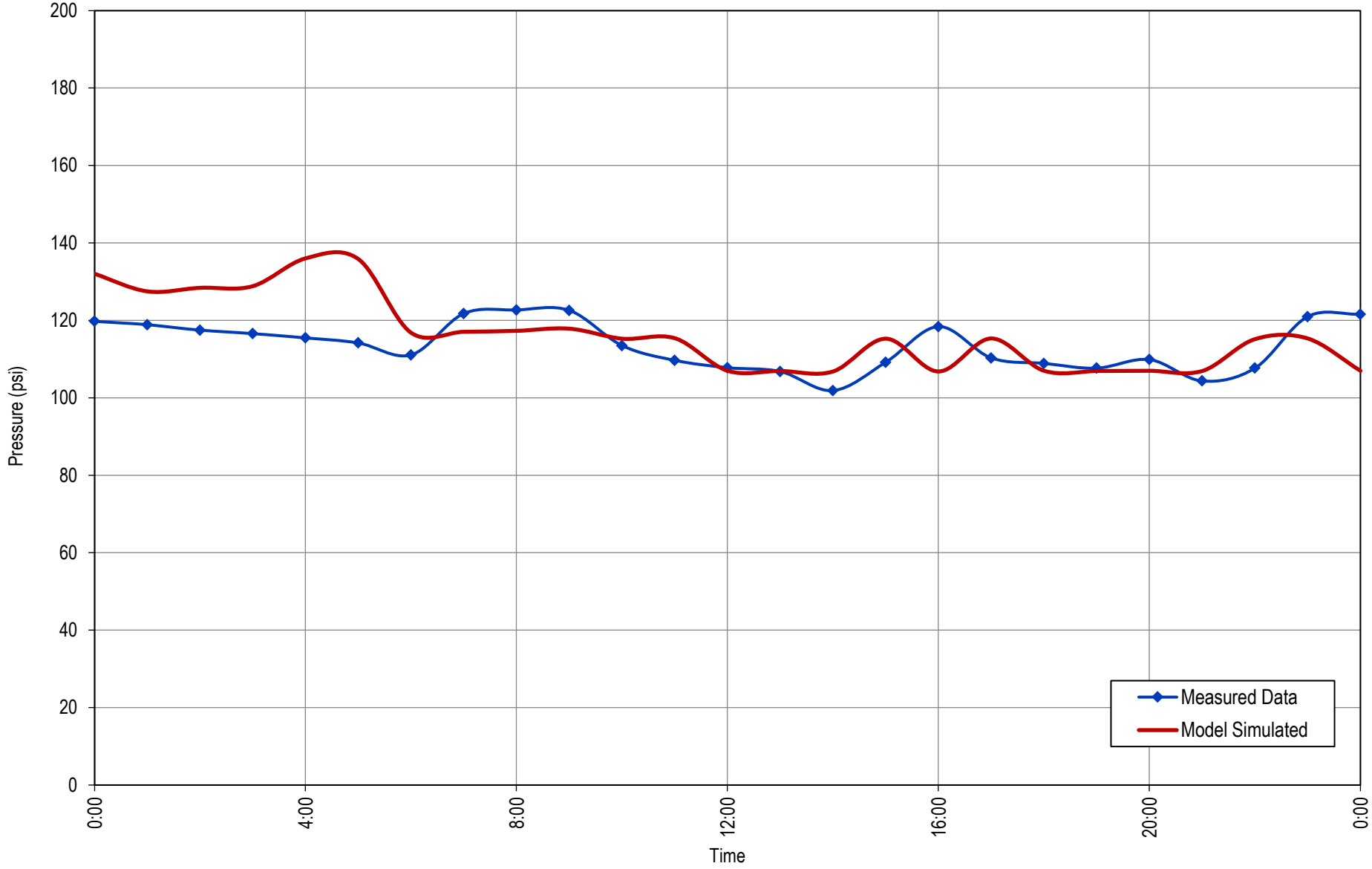
2026 Water System Plan Update

EPS CALIBRATION - DOWNTOWN (LOGGER 37)



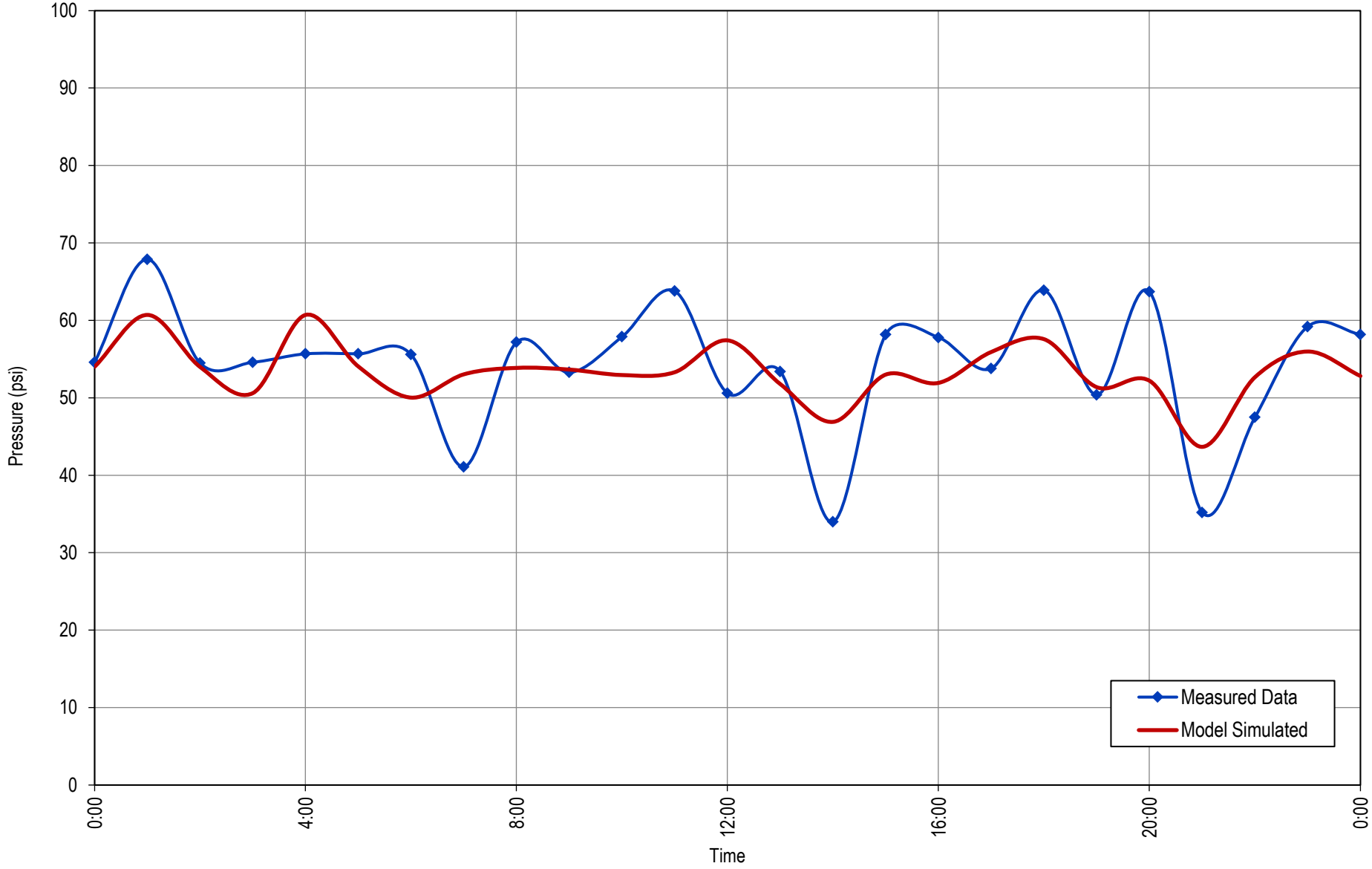
2026 Water System Plan Update

EPS CALIBRATION - OAK PARK, ACROSS OPS CENTER (LOGGER 49)



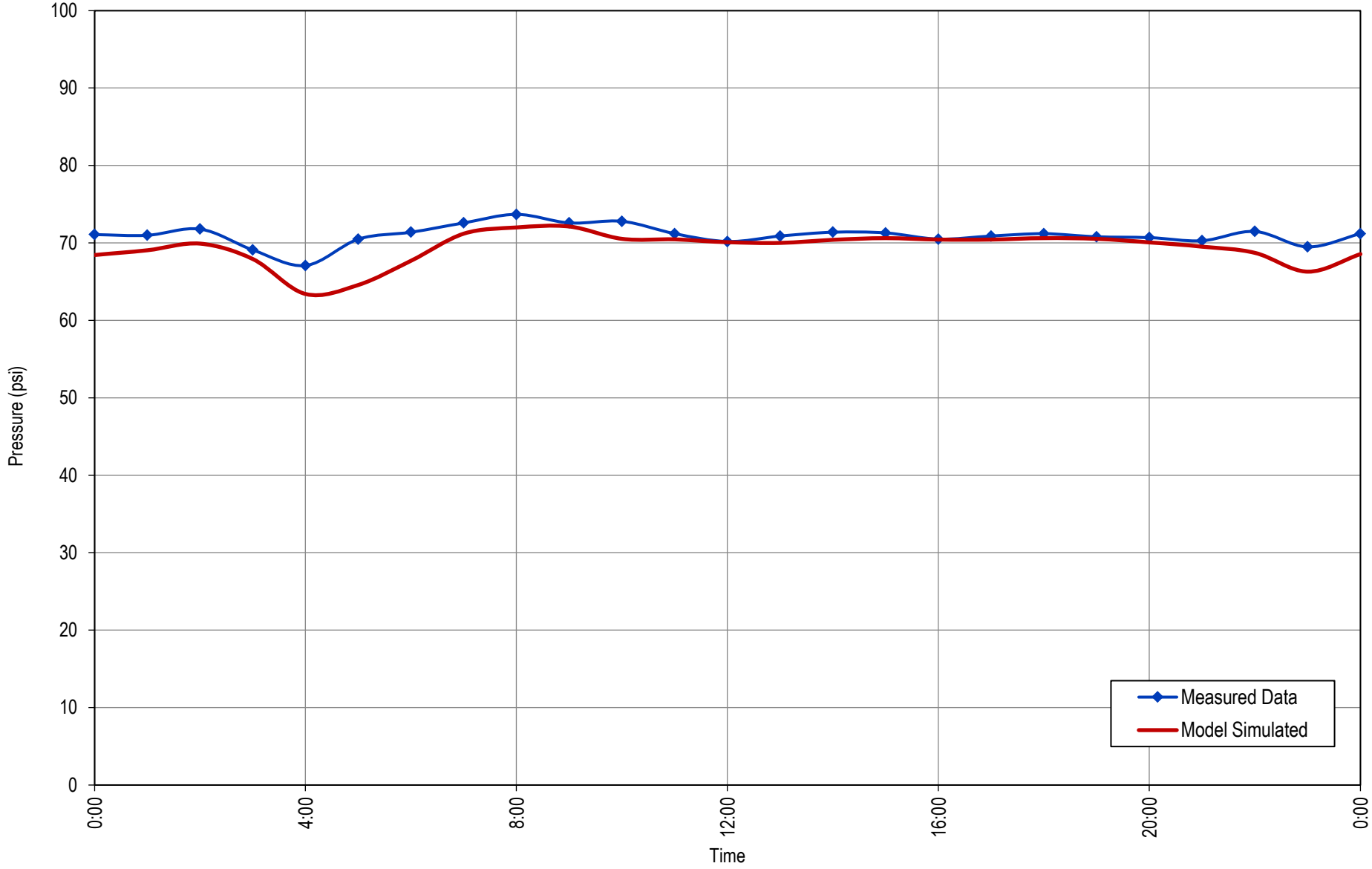
2026 Water System Plan Update

EPS CALIBRATION - HELEN BALLER ELEMENTARY (LOGGER 50)



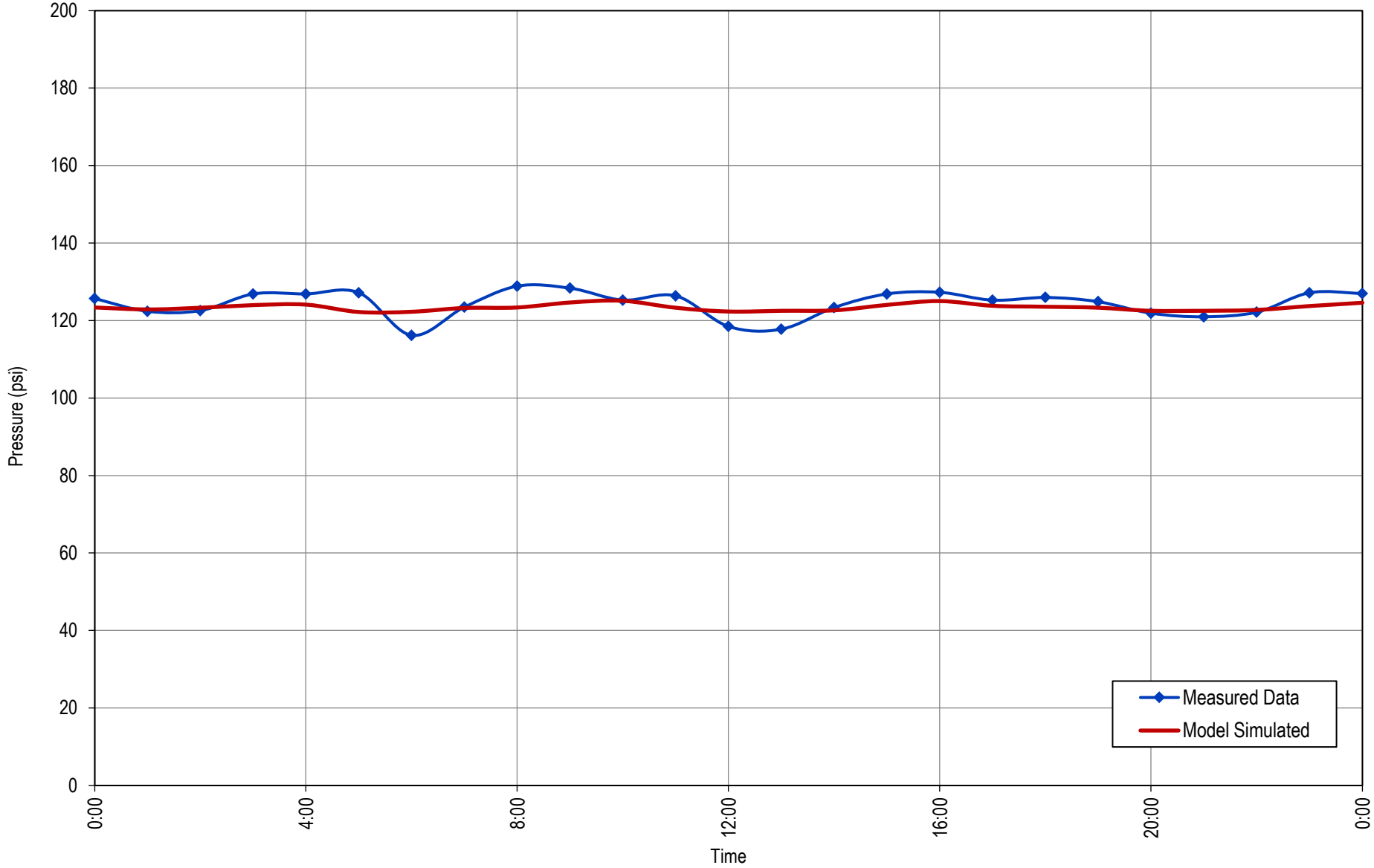
2026 Water System Plan Update

EPS CALIBRATION - DOROTHY FOX ELEMENTARY (LOGGER 58)



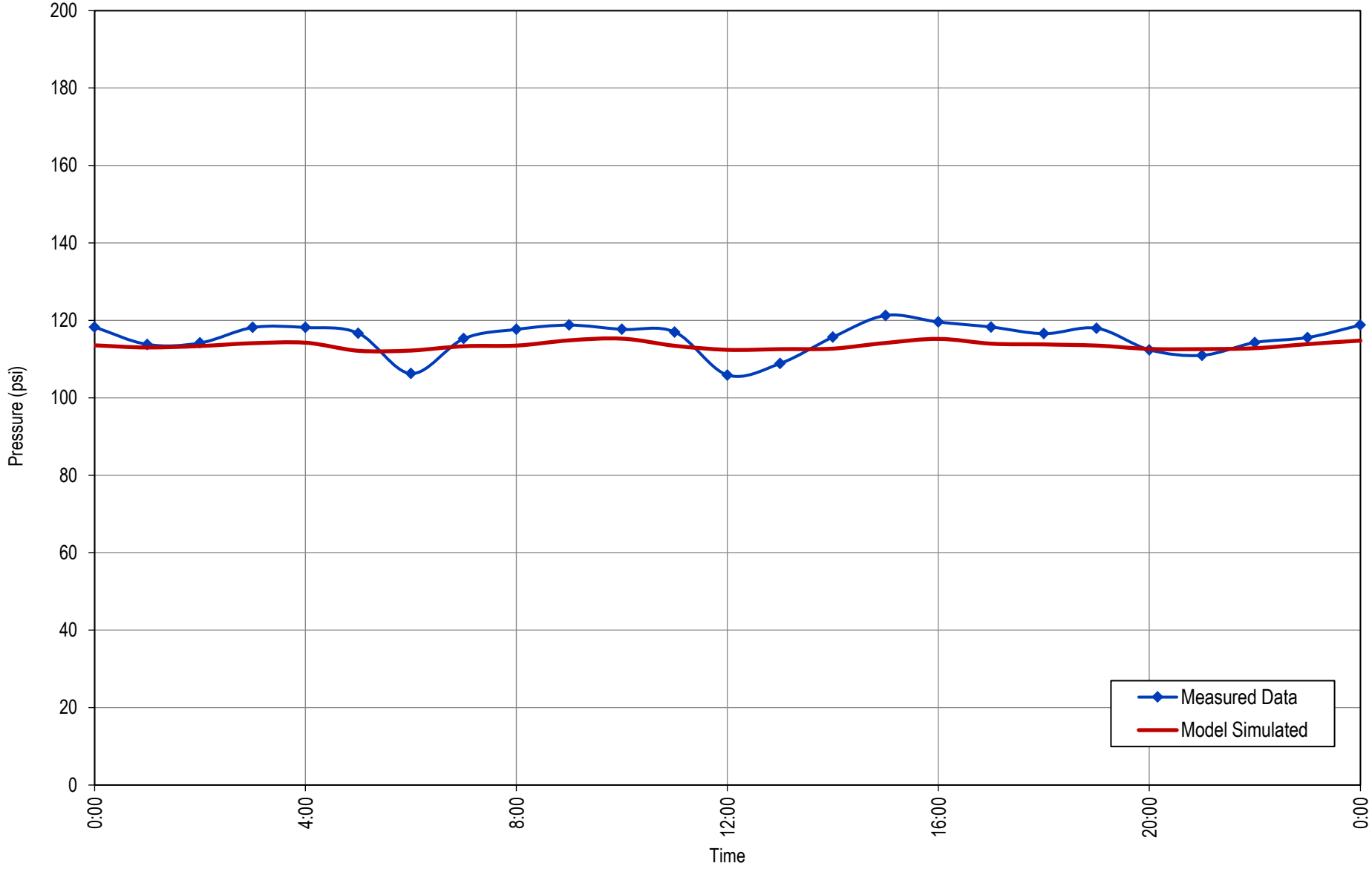
2026 Water System Plan Update

EPS CALIBRATION - UNION HS (LOGGER 68)



2026 Water System Plan Update

EPS CALIBRATION - GREEN MOUNTAIN ESTATES (LOGGER 69)



APPENDIX 1C

FF CALIBRATION RESULTS

Project Details

Client City of Camas
Project Name 2026 Water System Plan Update
Status Draft
Date September 2025

Hydrant Test Field Data/Model Junctions										Field Results						Model Results				Comparison						
Test No.	Pressure Zone	Date	Time	Duration (mins)	Location	Hydrant	Hydrant Number	Model Junction ID	Junction Elevation (ft)	Flow (gpm)	Post-Static Pressure (psi)	Static Pressure (psi)	Static HGL (FT)	Residual Pressure (psi)	Residual HGL (ft)	Static Pressure (psi)	Static HGL (FT)	Residual Pressure (psi)	Residual HGL (ft)	Static Pressure Diff (psi)	Res. Pressure Diff (psi)	Static Pressure Error (%)	Residual Pressure Error (%)	Pressure Drop (psi)		
																								Measured	Modeled	Diff
1	343 Downtown	May 15, 2025	14:40	1	SE 12th Ave	F1	WH200146	J1-1012	33.81	1100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
						P1	WH200144	J1-1013	33.8	--	116	116	302	70	196	116	301	69	192	0.4	1.5	0.3%	2.1%	46	47	-1
						P2	WH200143	J1393	34.77	--	116	115	300	70	196	115	301	69	195	-0.2	0.6	-0.2%	0.9%	45	46	-1
2	343 Downtown	May 15, 2025	9:00	2	E 1st Ave / NE Joy St	F1	WH200779	J1-93	66.68	1350	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
						P1	WH200776	J1207	68.3	--	100	100	299	80	253	101	301	81	256	-0.9	-1.1	-0.9%	-1.4%	20	20	0
						P2	WH200777	J1-91	73.59	--	100	100	305	83	265	99	301	85	269	1.4	-1.7	1.4%	-2.0%	17	14	3
3	343 Cemetery	May 15, 2025	9:39	1	NE Garfield St	F1	WH200802	J1-794	216.99	850	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
						P1	WH200801	J1-152	210.9	--	56	54	336	40	303	56	339	39	300	-1.6	1.2	-3.0%	3.1%	14	17	-3
						P2	WH200914	J1-158	223.3	--	50	50	339	35	304	50	339	35	304	-0.1	0.3	-0.2%	0.7%	15	15	0
4	455 LPH	May 15, 2025	10:37	2	NW 7th Ave / NW Greeley St	F1	WH200708	J2-220	176.97	1300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
						P1	WH200709	J2-225	188.19	--	120	118	461	99	417	115	453	97	412	3.2	2.1	2.7%	2.1%	19	18	1
						P2	WH200992	J2-213	143.04	--	134	134	453	120	420	134	454	123	427	-0.5	-2.8	-0.4%	-2.3%	14	12	2
5	852 UPH	May 15, 2025	11:03	2	NW 31st Ave / NW Sierra Dr	F1	WH200237	J3-322	678.51	1190	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
						P1	WH200236	J3-338	676.63	--	70	71	841	64	824	69	835	62	820	2.5	1.9	3.5%	2.9%	7	6	1
						P2	WH200246	J3-318	659.15	--	75	75	832	72	825	76	835	70	820	-1.1	2.2	-1.5%	3.1%	3	6	-3
6	544 Lacamas	May 15, 2025	12:45	2	NW 46th Ave / NW Howard St	F1	WH200299	J4-2008	315.05	1350	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
						P1	WH200298	J1195	306.82	--	100	100	538	82	496	97	531	80	491	3.1	2.1	3.1%	2.6%	18	17	1
						P2	WH200300	J4-2003	334.14	--	87	87	535	66	487	85	531	68	491	1.9	-1.9	2.2%	-2.9%	21	17	4
7	544 Lacamas	May 15, 2025	13:15	1	N Alder St / N 96th Ave	F1	WH200504	J285	286.35	1300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
						P1	WH200503	J281	290.66	--	104	104	531	84	485	104	530	85	486	0.2	-0.7	0.2%	-0.9%	20	19	1
						P2	WH200500	J295	258.24	--	114	118	531	101	492	118	530	100	489	0.2	1.3	0.2%	1.3%	17	18	-1
8	542 Gregg	May 15, 2025	14:10	1	NE Quince Way	F1	WH200424	J779	443.31	600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
						P1	WH200423	J791	462.25	--	40	38	550	28	527	30	530	27	525	**8.5**	1.0	**22.3%**	3.5%	10	2	**8**
						P2	WH200425	J751	452.22	--	35	35	533	24	508	34	530	31	525	1.1	**-7.4**	3.3%	**-31.0%**	11	2	**9**
9	GME	May 15, 2025	1:45	1	N 91st Ave	F1	WH200964	J1203	505.64	950	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
						P1	WH200965	J1199	518.06	--	110	74	689	50	634	75	692	50	634	-1.2	-0.3	-1.7%	-0.6%	24	25	-1
						P2	WH200963	J1201	494.15	--	109	86	693	62	637	86	692	61	634	0.4	1.3	0.5%	2.0%	24	25	-1
10	697	May 16, 2025	8:10	2	NW Deefern St. / NW 14th Ave.	F1	WH200860	J3-602	501.47	1250	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
						P1	WH200098	J3-573	497.37	--	75	70	659	67	652	73	667	65	648	-3.3	1.8	-4.7%	2.7%	3	8	**-5**
						P2	WH200097	J1205	482.52	--	81	80	667	72	649	80	667	70	643	0.3	2.4	0.3%	3.3%	8	10	-2

APPENDIX W

CIP PROJECTS

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: D-01
Project Title: NW 7th Avenue Fire Flow Improvements
Priority: 0-10 years

Facility Type: Distribution System
Pressure Zone: 285 - Downtown
Project Status (Completed?): No

Go to CIP Summary Table

Project Description:

Project Description: To address fire flow deficiencies along NW 7th Avenue, replace approximately 1,300 linear feet of 6-inch diameter cast iron pipeline to 12-inch pipeline.

Reasoning Fire flow deficiency

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 50%	Total Cost
Pipeline: 12-inch	1,300	LF	$ -	$ -	$ -	$ -	$ -
Total Anticipated Project Cost							$ -

Notes on Cost Estimation:

Costs for this project have been incorporated into the pipe replacement program.

Go to Assumptions Tab

Cost Allocation:

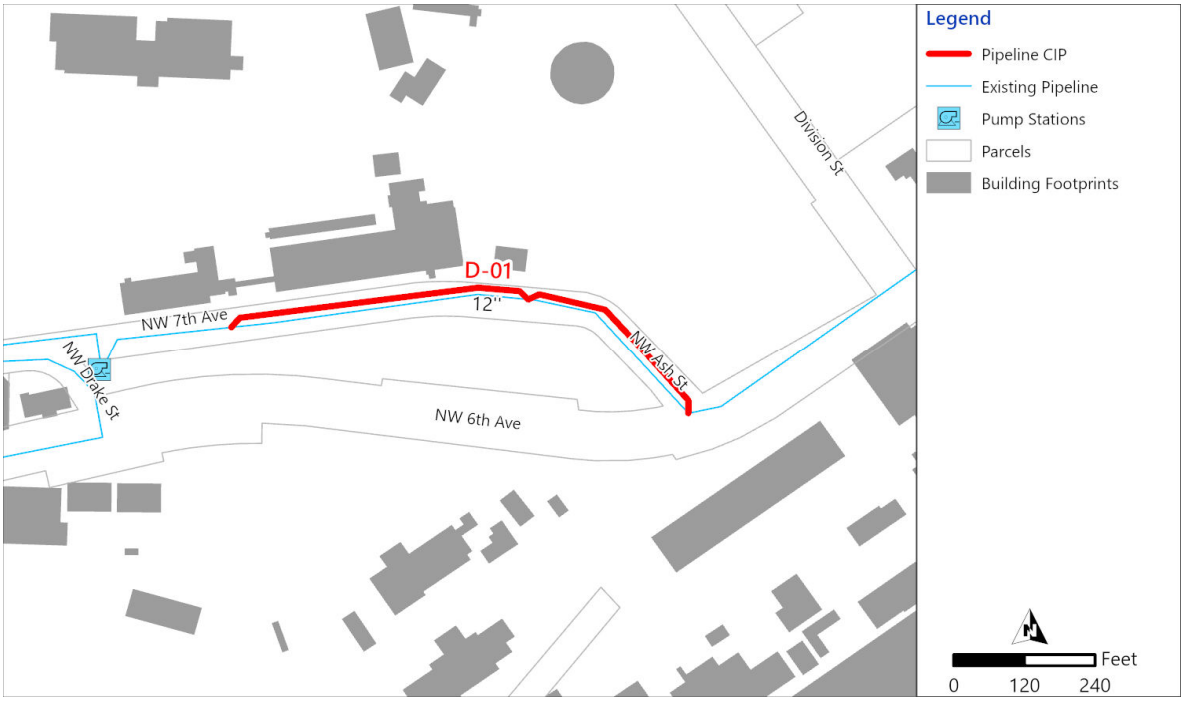
Project Type	Percent	Cost
Growth:	0%	$ -
Upgrade:	100%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ -

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	-	0-10 years	$ -
Total Anticipated Project Cost			$ -

Project Location Map:

Go to Maps Tab



City of Camas
Water System Plan
Capital Improvement Plan

Project ID: D-02
Project Title: NE Dallas Street Fire Flow Improvements
Priority: 0-10 years

Facility Type: Distribution System
Pressure Zone: 285 - Downtown
Project Status (Completed?): No

Go to CIP Summary Table

Project Description:

Project Description: To address fire flow deficiencies along NE Dallas Street the following improvements are recommended:
1) Construct approximately 500 LF of 8-inch diameter pipeline along NE Everett Street between NE 4th and NE 6th Avenue
2) Replace approximately 250 LF of 6-inch diameter cast iron pipeline along NE 6th Ave with 8-inch pipeline.
3) Replace approximately 400 LF of 6-inch diameter cast iron pipeline along NE Dallas Street between NE 6th Ave and View Crest Terrace with 8-inch pipeline.

Reasoning Fire flow deficiency

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 50%	Total Cost
Pipeline: 8-inch	1,150	LF	$ -	$ -	$ -	$ -	$ -
Total Anticipated Project Cost							$ -

Notes on Cost Estimation:
Costs for this project have been incorporated into the pipe replacement program.

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	0%	$ -
Upgrade:	100%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ -

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	-	0-10 years	$ -
Total Anticipated Project Cost			$ -

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: D-03
Project Title: 1st Avenue Fire Flow Improvements
Facility Type: Distribution System
Pressure Zone: 285 - Downtown

Go to CIP Summary Table

Priority: 0-10 years
Project Status (Completed?): No

Project Description:

Project Description: To address fire flow deficiencies, upsize approximately 1,150 LF of 6-inch cast iron pipeline along E 1st Ave between SE Garfield Street and SE King Street with 8-inch pipeline.

Reasoning Fire flow deficiency

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 50%	Total Cost
Pipeline: 8-inch	1,150	LF	$ -	$ -	$ -	$ -	$ -
Total Anticipated Project Cost							$ -

Notes on Cost Estimation:

Costs for this project have been incorporated into the pipe replacement program.

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	0%	$ -
Upgrade:	100%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ -

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	-	0-10 years	$ -
Total Anticipated Project Cost			$ -

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: D-04
Project Title: Operations Center/WWTF Fire Flow Improvements
Priority: 0-10 years
Facility Type: Distribution System
Pressure Zone: 285 - Downtown
Project Status (Completed?): No

Go to CIP Summary Table

Project Description:

Project Description: To address fire flow deficiencies near the City's operations center and WWTF the following improvements are recommended:
1) Replace approximately 450 LF of 6-inch cast iron pipeline along SE 8th Avenue with 8-inch pipeline.
2) Replace approximately 400 LF of 6-inch cast iron pipeline along SE Polk Street with 8-inch pipeline.

Reasoning Fire flow deficiency

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 50%	Total Cost
Pipeline: 8-inch	850	LF	$ -	$ -	$ -	$ -	$ -
Total Anticipated Project Cost							$ -

Notes on Cost Estimation:

Costs for this project have been incorporated into the pipe replacement program.

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	0%	$ -
Upgrade:	100%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ -

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	-	0-10 years	$ -
Total Anticipated Project Cost			$ -

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: D-05
Project Title: NW Fargo Street Fire Flow Improvements
Priority: 0-10 years

Facility Type: Distribution System
Pressure Zone: 697/734
Project Status (Completed?): No

Go to CIP Summary Table

Project Description:

Project Description: To address fire flow deficiencies in the NW Fargo Street area the following improvements are recommended:
1) Replace approximately 450 LF of 6-inch cast iron pipeline along NW Fargo Street between NW 23rd Street/Fargo PRV and NW 22nd Avenue with 8-inch pipeline.
2) Replace approximately 1,250 LF of 6-inch cast iron pipeline along NW Fargo Loop with 8-inch pipeline.

Reasoning Fire flow deficiency

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 50%	Total Cost
Pipeline: 8-inch	1,700	LF	$ -	$ -	$ -	$ -	$ -
Total Anticipated Project Cost							$ -

Notes on Cost Estimation:

Costs for this project have been incorporated into the pipe replacement program.

Go to Assumptions Tab

Cost Allocation:

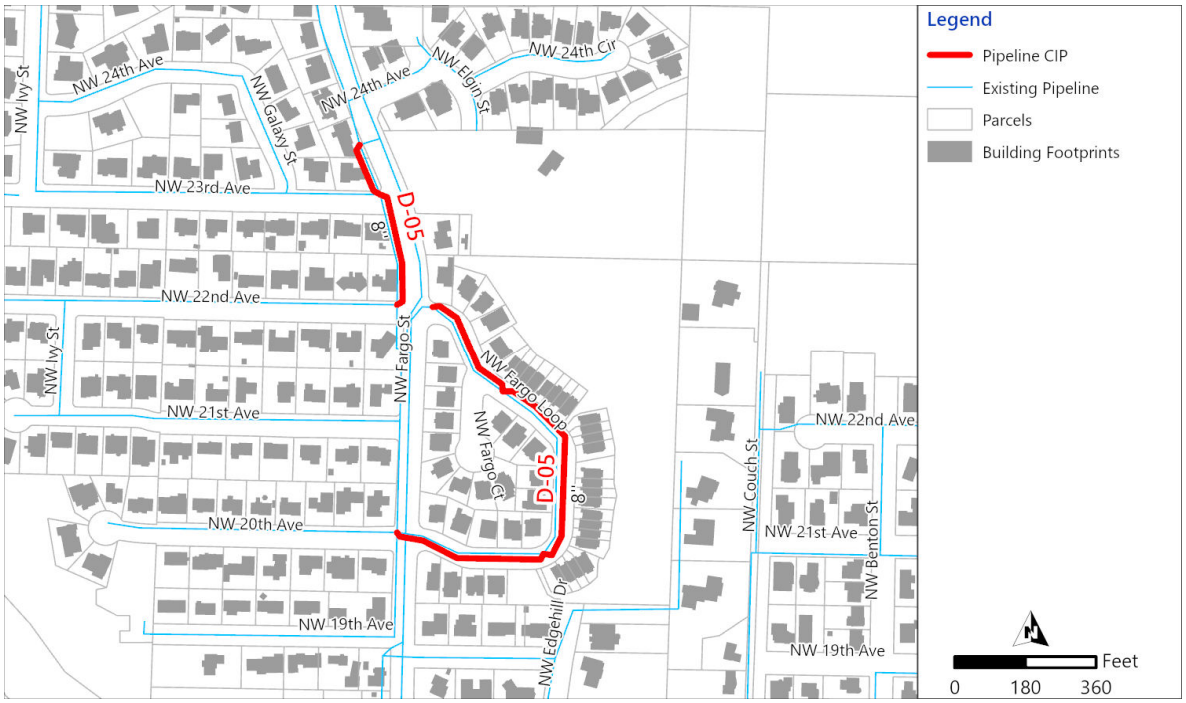
Project Type	Percent	Cost
Growth:	0%	$ -
Upgrade:	100%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ -

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	-	0-10 years	$ -
Total Anticipated Project Cost			$ -

Project Location Map:

Go to Maps Tab



City of Camas
Water System Plan
Capital Improvement Plan

Project ID: D-06
Project Title: Upper Prune Hill Fire Flow Improvements
Priority: 0-10 years

Facility Type: Distribution System
Pressure Zone: 852
Project Status (Completed?): No

Go to CIP Summary Table

Project Description:

Project Description: To improve fire flows near the Upper Prune Hill Reservoirs, the following improvements are recommended.
1) Upsize approximately 1,100 feet of existing 12-inch pipeline from along NW 18th Avenue from NW Cascade Street to Upper Prune Hill Reservoir with 16-inch pipeline.
2) Upsize approximately 450 feet of 8-inch pipeline along NW Cascade Street to 12-inch pipeline.
3) Construct approximately 250 feet of 8-inch pipeline along the walking path between NW 12th Circle and NW Astor Street.

Reasoning Fire flow deficiency

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 50%	Total Cost
Pipeline: 8-inch	250	LF	$ 236	$ 60,000	$ 20,000	$ 40,000	$ 120,000
Pipeline: 12-inch	450	LF	$ 300	$ 140,000	$ 40,000	$ 100,000	$ 280,000
Pipeline: 16-inch	1,100	LF	$ 404	$ 440,000	$ 130,000	$ 280,000	$ 850,000
Total Anticipated Project Cost							$ 1,250,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

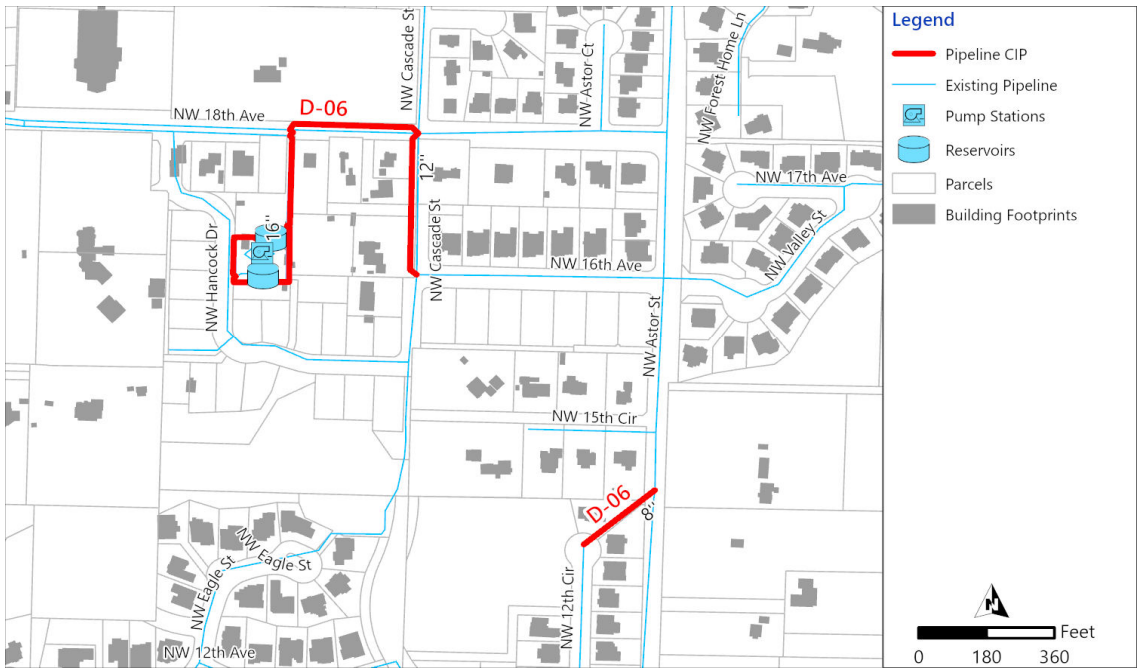
Project Type	Percent	Cost
Growth:	50%	$ 625,000
Upgrade:	50%	$ 625,000
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 1,250,000

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	2034	0-10 years	$ 1,250,000
Total Anticipated Project Cost			$ 1,250,000

Project Location Map:

Go to Maps Tab



City of Camas
Water System Plan
Capital Improvement Plan

Project ID: D-07
Project Title: Sierra Lane PRV Station
Facility Type: Distribution System
Pressure Zone: 455
Priority: 0-10 years
Project Status (Completed?): No

Go to CIP Summary Table

Project Description:

Project Description: To address fire flow deficiencies near the top of NW Sierra Lane, a PRV station is recommended to allow fire flow from the 542_S zone to the 455 zone.

Reasoning Fire flow deficiency

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 50%	Total Cost
PRV	1	No.	$ 400,000	$ 400,000	$ 120,000	$ 260,000	$ 780,000
Total Anticipated Project Cost							$ 780,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	0%	$ -
Upgrade:	100%	$ 780,000
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 780,000

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	2034	0-10 years	$ 780,000
Total Anticipated Project Cost			$ 780,000

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: D-08
Project Title: SE 5th Street and SE Everett Rd Fire Flow Improvements
Priority: 0-10 years
Facility Type: Distribution System
Pressure Zone: 542
Project Status (Completed?): No

Go to CIP Summary Table

Project Description:

Project Description: To improve fire flows along SE Everett Road and SE 5th Street the following improvements are recommended:
1) Upsize approximately 1,200 LF of 10-inch pipeline along SE Everett Street between SE 5th Street and the proposed North Shore roundabout with 12-inch pipeline.
2) Construct approximately 50 LF of 8-inch pipeline along SE 5th Street to connect to the 12-inch pipeline on SE Everett Street.

Reasoning Fire flow deficiency

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 50%	Total Cost
Pipeline: 8-inch	50	LF	$ 236	$ 10,000	$ -	$ -	$ 10,000
Pipeline: 12-inch	1,200	LF	$ 300	$ 360,000	$ 110,000	$ 230,000	$ 700,000
Total Anticipated Project Cost							$ 710,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

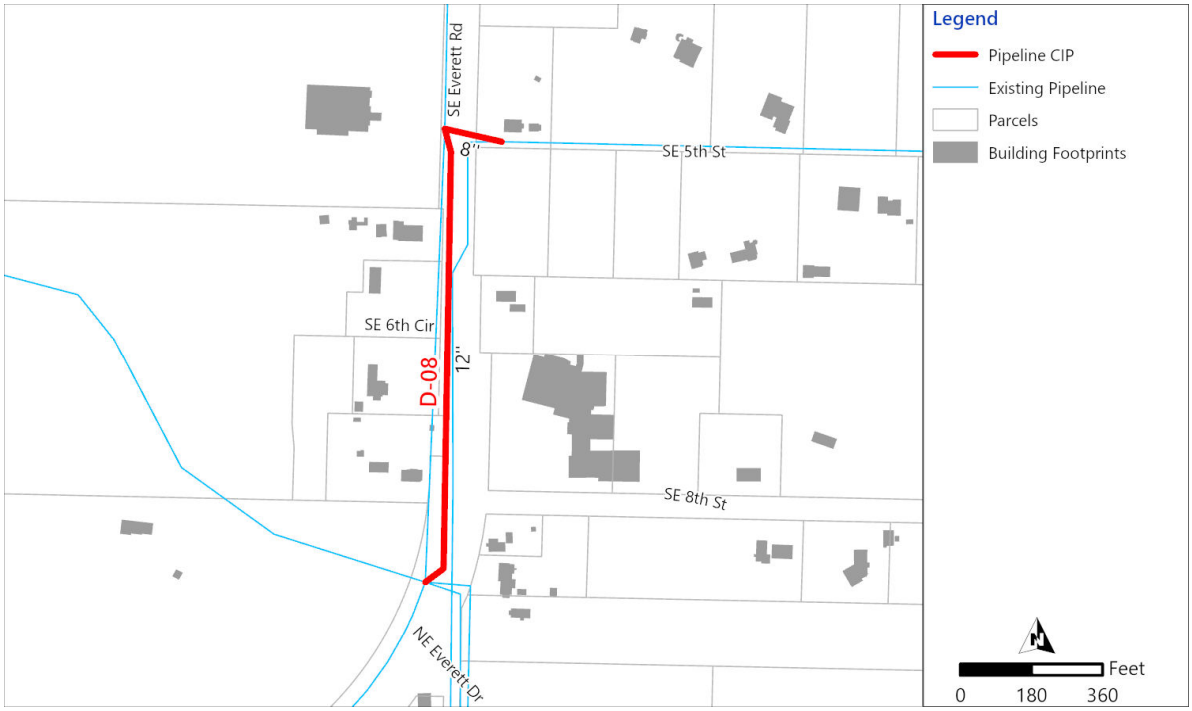
Project Type	Percent	Cost
Growth:	100%	$ 710,000
Upgrade:	0%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 710,000

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	2034	0-10 years	$ 710,000
Total Anticipated Project Cost			$ 710,000

Project Location Map:

Go to Maps Tab



City of Camas
Water System Plan
Capital Improvement Plan

Project ID: D-09
Project Title: SE 283rd Avenue Fire Flow Improvements
Priority: 0-10 years

Facility Type: Distribution System
Pressure Zone: 542
Project Status (Completed?): No

Go to CIP Summary Table

Project Description:

Project Description: To address fire flow deficiencies along SE 283rd Avenue, replace approximately 2,700 LF of 8-inch pipeline between SE 7th Street and SE Nourse Road with 12-inch pipeline.

Reasoning Fire flow deficiency

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 50%	Total Cost
Pipeline: 12-inch	2,700	LF	$ 300	$ 810,000	$ 240,000	$ 550,000	$ 1,600,000
Total Anticipated Project Cost							$ 1,600,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	100%	$ 1,600,000
Upgrade:	0%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 1,600,000

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	2034	0-10 years	$ 1,600,000
Total Anticipated Project Cost			$ 1,600,000

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: D-10
Project Title: NE 6th Avenue and NE Nevada Street Fire Flow Improvements
Priority: 0-10 years

Facility Type: Distribution System
Pressure Zone: 285-Downtown/343
Project Status (Completed?): No

Go to CIP Summary Table

Project Description:

Project Description: To address fire flow deficiencies in the NW Fargo Street area the following improvements are recommended:
1) Replace approximately 1,700 LF of 6-inch cast iron pipeline along NE 6th Avenue with 8-inch pipeline.
2) Replace approximately 1,900 LF of 6-inch cast iron pipeline along NE Nevada Street with 8-inch pipeline.

Reasoning Fire flow deficiency

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 50%	Total Cost
Pipeline: 8-inch	3,600	LF	$ -	$ -	$ -	$ -	$ -
Total Anticipated Project Cost							$ -

Notes on Cost Estimation:

Costs for this project have been incorporated into the pipe replacement program.

Go to Assumptions Tab

Cost Allocation:

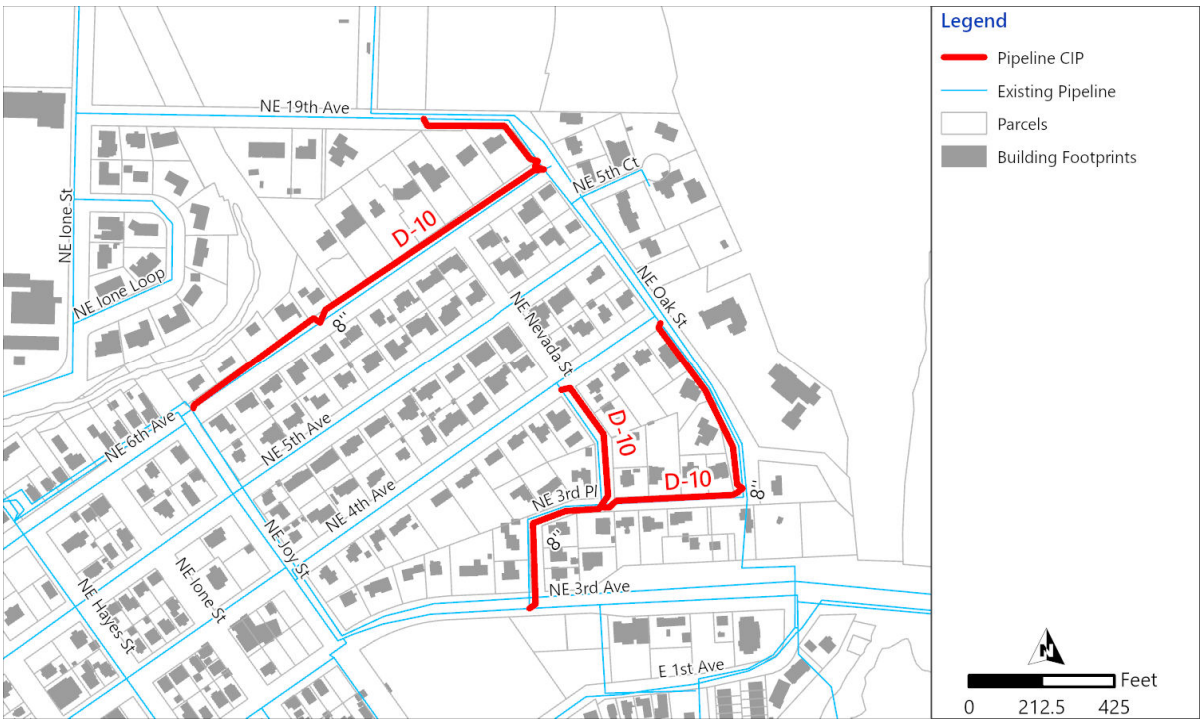
Project Type	Percent	Cost
Growth:	0%	$ -
Upgrade:	100%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ -

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	-	0-10 years	$ -
Total Anticipated Project Cost			$ -

Project Location Map:

Go to Maps Tab



City of Camas
Water System Plan
Capital Improvement Plan

Project ID: T-01
Project Title: North Shore Transmission Pipeline
Facility Type: Transmission Pipeline
Pressure Zone: 542

Go to CIP Summary Table

Priority: 0-10 years
Project Status (Completed?): No

Project Description:

Project Description: To serve future development and demands expected in the North Shore area, it is recommended to construct a transmission pipeline network. The transmission pipeline network shall consist of the following segments:
Segment 1 - 1,600 LF of 12-inch pipeline along NE 3rd Avenue between NE Everett Street and N Benton Drive
Segment 2 - 13,200 LF of 24-inch pipeline along the proposed North Shore Boulevard between the proposed roundabout at NE Everett Street and N Benton Drive.
Segment 3 - 4,200 LF of 24-inch pipeline along SE 15th Street between the recommended Gregg Reservoir and the proposed roundabout at NE Everett Street.

Reasoning Demand growth

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 50%	Total Cost
Segment 1: Pipeline: 12-inch	1,600	LF	$ 300	$ 480,000	$ 140,000	$ 310,000	$ 930,000
Segment 2: Pipeline: 24-inch	13,200	LF	$ 575	$ 7,600,000	$ 2,300,000	$ 5,000,000	$ 14,900,000
Segment 3: Pipeline: 24-inch	4,200	LF	$ 575	$ 2,400,000	$ 720,000	$ 1,580,000	$ 4,700,000
Total Anticipated Project Cost							$ 20,530,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

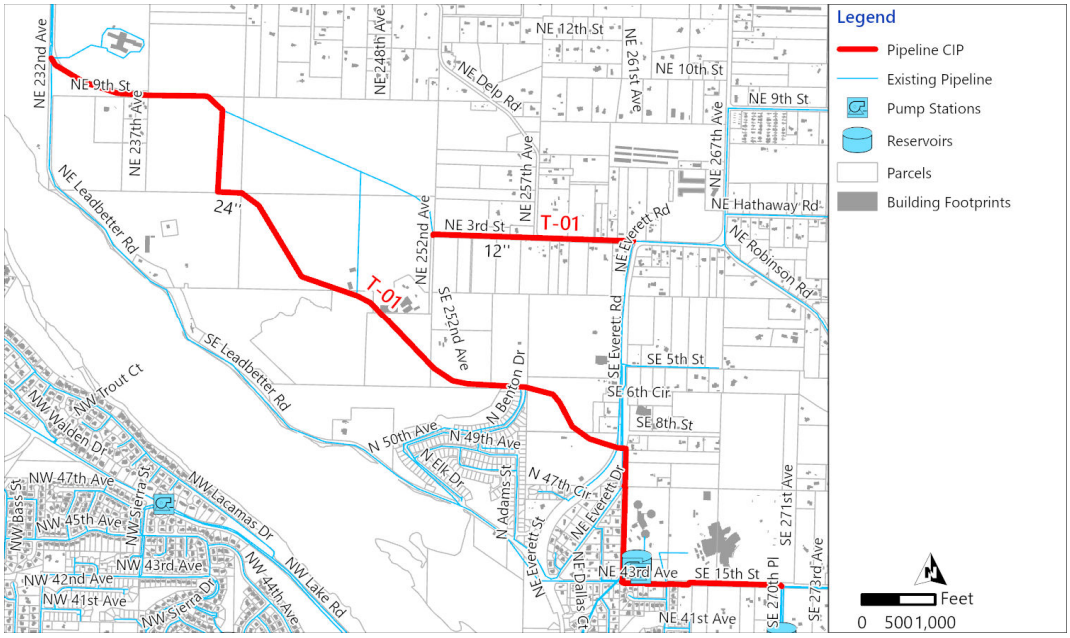
Project Type	Percent	Cost
Growth:	100%	$ 20,530,000
Upgrade:	0%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 20,530,000

Project Timing:

Project Element	Timing	Priority	Cost
Segment 1	2032	0-10 years	$ 930,000
Segment 2	2032	0-10 years	$ 14,900,000
Segment 3	2032	0-10 years	$ 4,700,000
Total Anticipated Project Cost			$ 20,530,000

Project Location Map:

Go to Maps Tab



City of Camas
Water System Plan
Capital Improvement Plan

Project ID: T-02
Project Title: Angelo Discharge Pipeline

Facility Type: Transmission Pipeline
Pressure Zone: 455

Go to CIP Summary Table

Priority: 10-20 years

Project Status (Completed?): No

Project Description:

Project Description: The discharge piping for Angelo Pump Station in the distribution network is undersized for future demands, resulting in high head loss and discharge pressures. Approximately 3,350 linear feet of 16-inch pipeline is recommended between Angelo PS and the Lower Prune Hill Reservoirs.

Reasoning Demand growth

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 50%	Total Cost
Pipeline: 16-inch	3,350	LF	$ 404	$ 1,400,000	$ 420,000	$ 880,000	$ 2,700,000
Total Anticipated Project Cost							$ 2,700,000

Notes on Cost Estimation:

To distribute project costs across multiple fiscal years, it is expected design of this pipeline will occur in 2037 with construction to occur in 2038. Design is assumed to be 10% of the total project cost.

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Cost Allocation:

Project Type	Percent	Cost
Growth:	100%	$ 2,700,000
Upgrade:	0%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 2,700,000

Project Timing:

Project Element	Timing	Priority	Cost
Design	2037	10-20 years	$ 270,000
Construction	2038	10-20 years	$ 2,430,000
Total Anticipated Project Cost			$ 2,700,000

Project Location Map:

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City of Camas
Water System Plan
Capital Improvement Plan

Project ID: R-01
Project Title: Pipeline R&R Program
Facility Type: Annual Programs
Pressure Zone: System-wide

Go to CIP Summary Table

Priority: Annual
Project Status (Completed?): No

Project Description:

Project Description: During the duration of this WSP planning period, the City should consider implementing a pipeline replacement program to address localized issues or to participate in joint projects that cost-effectively replace aging pipeline. The City currently has approximately 32 miles of cast iron or steel pipeline in its distribution system, mostly centralized in the downtown area that have or are approaching the end of their useful life. Small diameter mains (less than 6-inch) should also be upsized to 8-inch to meet current City standards. This pipelineline replacement program recommends replacing 1% (~1.5 miles) of pipeline per year.

Reasoning Replace aging infrastructure

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 50%	Total Cost
Pipeline: 8-inch	119,700	LF	$ 236	$ 28,200,000	$ 8,500,000	$ 18,300,000	$ 55,000,000
Pipeline: 12-inch	33,500	LF	$ 300	$ 10,100,000	$ 3,000,000	$ 6,600,000	$ 19,700,000
Pipeline: 16-inch	11,900	LF	$ 404	$ 4,800,000	$ 1,400,000	$ 3,100,000	$ 9,300,000

Total Anticipated Project Cost	$ 84,000,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

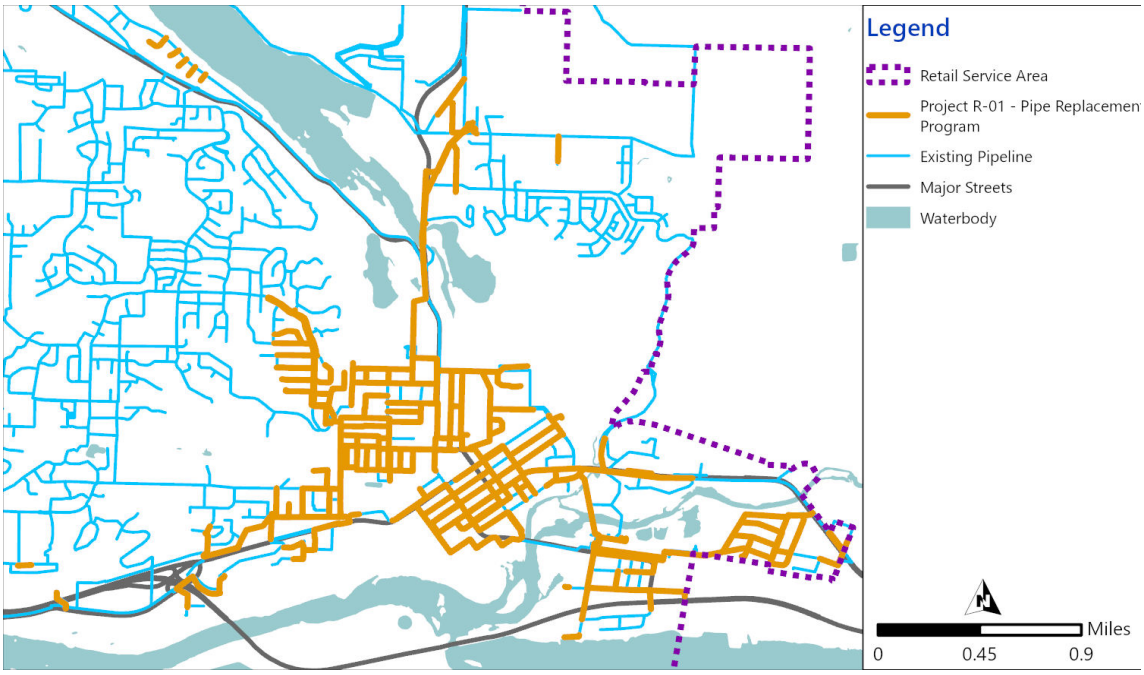
Project Type	Percent	Cost
Growth:	0%	$ -
Upgrade:	0%	$ -
Repair & Replacement:	100%	$ 84,000,000
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 84,000,000

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	-	Annual	$ 84,000,000
Total Anticipated Project Cost			$ 84,000,000

Project Location Map:

Go to Maps Tab



City of Camas
Water System Plan
Capital Improvement Plan

Project ID: R-02
Project Title: Miscellaneous Facility Projects
Facility Type: Annual Programs
Pressure Zone: System-wide

Go to CIP Summary Table

Priority: Annual
Project Status (Completed?): No

Project Description:

Project Description: Miscellaneous Facility Projects

Reasoning Repair and Replacement

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 50%	Total Cost
Miscellaneous	40	No.	$ 75,000	$ 3,000,000	$ -	$ -	$ 3,000,000
Total Anticipated Project Cost							$ 3,000,000

Notes on Cost Estimation:

Total cost for the entire 20 year period is $3M. The City typically completes two projects per year totaling $150K.

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Cost Allocation:

Project Type	Percent	Cost
Growth:	0%	$ -
Upgrade:	0%	$ -
Repair & Replacement:	100%	$ 3,000,000
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 3,000,000

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	-	Annual	$ 3,000,000
Total Anticipated Project Cost			$ 3,000,000

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: PS-01
Project Title: 544 Zone Pumping Improvements
Facility Type: Pump Station
Pressure Zone: 544

Go to CIP Summary Table

Priority: 0-10 years
Project Status (Completed?): In Design

Project Description:

Project Description: Lake Road PS and 343 zone transmission pipeline are recommended to increase pumping capacity into the 544 zone. The new PS will pump directly from the 343 zone into the 544 zone alleviating reliance on Angelo PS. To best align the construction of the transmission pipeline with future water system needs and ongoing projects within the City, it is recommended the transmission pipeline be divided into the following segments:

Segment 1 - 6,000 LF of 36-inch diameter pipeline from the intersection of E 1st Avenue/NE 3rd Avenue to the intersection of NE Everett Street/NE 22nd Avenue.

Segment 2 - 3,600 LF of 30-inch pipeline from the intersection of NE Everett Street/NE 22nd Avenue to Lacamas Lodge.

Segment 3 - 6,250 LF of 30-inch pipeline along NW Lake Road between Lacamas Lodge and NW Sierra Street.

Segment 4 - 1,350 LF of 24-inch pipeline along NW Sierra Street between NW Lake Road and NW 43rd Avenue.

Reasoning Demand growth

Anticipated Project Cost:

Project Element	Total Cost
Pump Station	$ 7,300,000
Segment 1: Pipeline: 36-inch	$ 13,200,000
Segment 2: Pipeline: 30-inch	$ 5,800,000
Segment 3: Pipeline: 30-inch	$ 10,200,000
Segment 4: Pipeline: 24-inch	$ 1,400,000
Total Anticipated Project Cost	$ 37,900,000

Notes on Cost Estimation:

Pump station cost provided from Lake Road PS Class 4 estimate prepared by Carollo. Pipe cost developed using unit costs and assumes 10% ELA for construction management services (project is currently in design).

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	100%	$ 37,900,000
Upgrade:	0%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 37,900,000

Project Timing:

Project Element	Timing	Priority	Cost
Segment 1 Construction	2027-2028	0-10 years	$ 13,200,000
Segment 2-4 Design	2031	0-10 years	$ 1,740,000
Segment 2-4 Construction	2032-2033	0-10 years	$ 15,660,000
PS Design	2032	0-10 years	$ 730,000
PS Construction	2033-2034	0-10 years	$ 6,570,000
Total Anticipated Project Cost			$ 37,900,000

Project Location Map:

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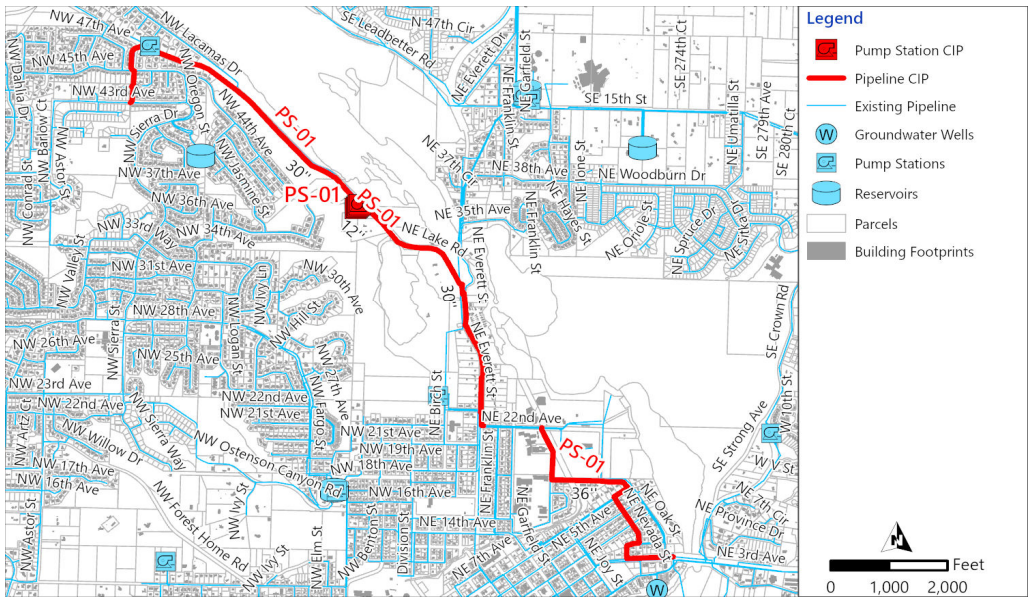

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: PS-02
Project Title: 542 Zone Pumping Improvements
Facility Type: Pump Station
Pressure Zone: 542

Go to CIP Summary Table

Priority: 10-20 years
Project Status (Completed?): No

Project Description:

Project Description: To reduce reliance on New Gregg PS and address pumping capacity deficiencies it is recommended to add a 800 gpm pump in the remaining empty can at Crown Road PS.

Reasoning Demand growth

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 55%	Total Cost
Pump Station	1	No.	$ 350,000	$ 350,000	$ 110,000	$ 260,000	$ 720,000

Total Anticipated Project Cost	$ 720,000

Notes on Cost Estimation:

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Cost Allocation:

Project Type	Percent	Cost
Growth:	100%	$ 720,000
Upgrade:	0%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 720,000

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	2045	10-20 years	$ 720,000
Total Anticipated Project Cost			$ 720,000

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: PS-03
Project Title: Francis Road Pump Station Improvements
Priority: 0-10 years

Facility Type: Pump Station
Pressure Zone: Francis Road
Project Status (Completed?): No

Go to CIP Summary Table

Project Description:

Project Description: To address fire flow deficiencies and low pressures in the neighboring areas, it is recommended to replace Francis Road PS and expand the service area to increase pressures to high elevation customers. Additionally, to supply sufficient fire flow a 1,000 gpm fire pump is recommended at the site. To meet the City's reliability criteria an on-site generator is included as part of this project.

Reasoning Fire flow and low pressures

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 55%	Total Cost
Pump Station	1	No.	$ 1,230,000	$ 1,200,000	$ 360,000	$ 840,000	$ 2,400,000
Generators	1	No.	$ 500,000	$ 500,000	$ 150,000	$ 350,000	$ 1,000,000

Total Anticipated Project Cost	$ 3,400,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	0%	$ -
Upgrade:	100%	$ 3,400,000
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 3,400,000

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	2035	0-10 years	$ 3,400,000
Total Anticipated Project Cost			$ 3,400,000

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: ST-01
Project Title: 343 Zone Storage
Facility Type: Storage
Pressure Zone: 343

Go to CIP Summary Table

Priority: 0-10 years
Project Status (Completed?): In Design

Project Description:

Project Description: Minimum of 1.84 MG of usable storage in the elevated reservoir at the Cemetery site to address a storage deficit and replace the aging Butler Reservoir. Once complete this reservoir will provide sufficient storage for the entirety of the planning period while Butler Reservoir is decommissioned. The elevated reservoir was the selected alternative and memorialized in Gray & Osborne's New 343 Reservoir Alternatives Analysis report in September 2025.

Reasoning Storage needs

Anticipated Project Cost:

Project Element	Total Cost
New Storage Reservoir	$ 25,700,000

Total Anticipated Project Cost	$ 25,700,000

Notes on Cost Estimation:

Total estimated cost is from Gray and Osborne (G&O) 343 New Reservoir Alternatives Analysis, Sept 2025

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	36%	$ 9,252,000
Upgrade:	64%	$ 16,448,000
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 25,700,000

Project Timing:

Project Element	Timing	Priority	Cost
Construction	2030-2031	0-10 years	$ 25,700,000
Total Anticipated Project Cost			$ 25,700,000

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: ST-02
Project Title: 542 Zone Storage

Facility Type: Storage
Pressure Zone: 542

Go to CIP Summary Table

Priority: 0-10 years

Project Status (Completed?): No

Project Description:

Project Description: 1.5 MG reservoir at the Gregg Standpipeline site is recommended to address the storage deficit in the 542 zone. Approximately 3,800 feet of 24-inch transmission pipeline will be needed from Crown Road pump station to the new reservoir. The transmission pipeline will alleviate hydraulic bottlenecks, allowing more pumps at Crown Road pump station to operate simultaneously and fill the new reservoir.

Reasoning Storage needs

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 50%	Total Cost
Reservoir	1.5	MG	$ 10	$ 15,000,000	$ 4,500,000	$ 9,800,000	$ 29,300,000
Pipeline: 24-inch	3,800	LF	$ 575	$ 2,200,000	$ 660,000	$ 1,440,000	$ 4,300,000

Total Anticipated Project Cost	$ 33,600,000

Notes on Cost Estimation:

To reduce annual CIP cost, the pipe portion of this project can be completed a year prior to the reservoir (estimated completion in 2032).

Go to Assumptions Tab

Cost Allocation:

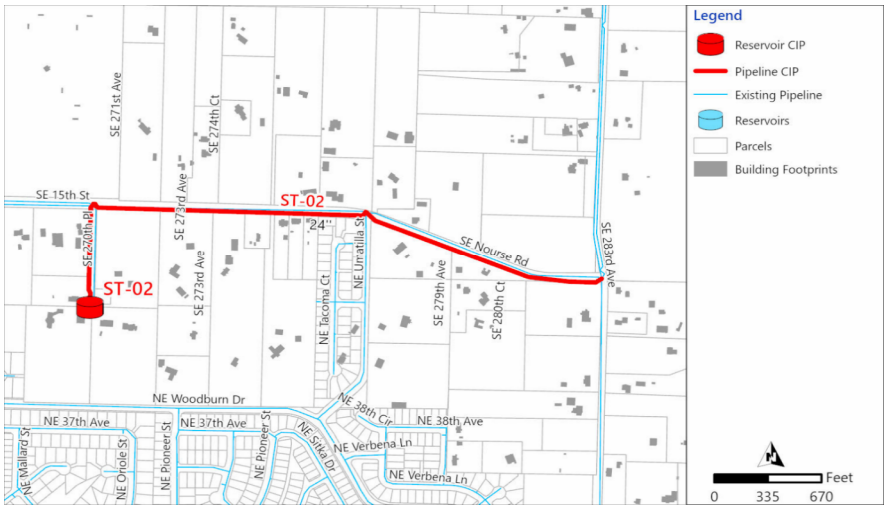
Project Type	Percent	Cost
Growth:	22%	$ 7,224,000
Upgrade:	79%	$ 26,376,000
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 33,600,000

Project Timing:

Project Element	Timing	Priority	Cost
Pipeline Design	2029	0-10 years	$ 430,000
Pipeline Construction	2030	0-10 years	$ 3,870,000
Reservoir Design	2034	0-10 years	$ 2,930,000
Reservoir Construction	2035-2036	0-10 years	$ 26,370,000
Total Anticipated Project Cost			$ 33,600,000

Project Location Map:

Go to Maps Tab



City of Camas
Water System Plan
Capital Improvement Plan

Project ID: ST-03
Project Title: 544 Zone Storage

Facility Type: Storage
Pressure Zone: 544

Go to CIP Summary Table

Priority: 10-20 years

Project Status (Completed?): No

Project Description:

Project Description: 0.75 MG reservoir at the 18th Avenue site is recommended to address the storage deficit in the 544 zone.

Reasoning Storage needs

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 50%	Total Cost
Reservoir	0.75	MG	$ 3	$ 2,300,000	$ 690,000	$ 1,510,000	$ 4,500,000

Total Anticipated Project Cost	$ 4,500,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	100%	$ 4,500,000
Upgrade:	0%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 4,500,000

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	2045	10-20 years	$ 4,500,000
Total Anticipated Project Cost			$ 4,500,000

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: S-01
Project Title: Well 8, 11, 12 Expansion + PFAS Treatment
Priority: 0-10 years

Facility Type: Supply and Treatment
Pressure Zone: N/A
Project Status (Completed?): No

Go to CIP Summary Table

Project Description:

Project Description: The City will need to increase supply capacity to serve projected future demands. The City's water supply strategy identified capacity upgrades in the Lower Washougal Wellfield can be acheived by upsizing the well screen and pump at Well 8 and upsizing pumps at Well 11 and 12. Additionally, treatment will be needed for wells with PFAS detections exceeding regulatory limits. This project will consist of well upgrades, initial PFAS treatment capacity of 2,725 gpm, an intermediate reservoir/PS, chemical facility upgrades, and standby power. Details regarding this project are further discussed in the LWWF PFAS Treatment Alternatives Analysis (Carollo 2026).

Reasoning Supply capacity needs

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 55%	Total Cost
Well Upgrades	1	LS	$ 3,819,400	$ 3,800,000	$ 1,100,000	$ 2,600,000	$ 7,500,000
PFAS Treatment	1	LS	$ 6,112,600	$ 6,100,000	$ 1,800,000	$ 4,400,000	$ 12,300,000
Reservoir/PS	1	LS	$ 6,668,000	$ 6,700,000	$ 2,000,000	$ 4,800,000	$ 13,500,000
Chemical Facilities	1	LS	$ 2,692,308	$ 2,700,000	$ 810,000	$ 1,890,000	$ 5,400,000
Standby Power	1	LS	$ 769,231	$ 770,000	$ 230,000	$ 600,000	$ 1,600,000

Total Anticipated Project Cost	$ 40,300,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	13%	$ 5,239,000
Upgrade:	87%	$ 35,061,000
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 40,300,000

Project Timing:

Project Element	Timing	Priority	Cost
Design	2027	0-10 years	$ 4,030,000
Construction	2028-2030	0-10 years	$ 36,270,000
Total Anticipated Project Cost			$ 40,300,000

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: S-02
Project Title: Well 18 Development
Facility Type: Supply and Treatment
Pressure Zone: N/A

Go to CIP Summary Table

Priority: 10-20 years
Project Status (Completed?): No

Project Description:

Project Description: Increase production capacity in the Lower Washougal Wellfield by approximately 2,000 gpm to meet future demands by developing Well 18. Development of Well 18 would include the drilling, equipping (building and mechanical equipment), and installation of an on-site generator for reliability. As water quality for the new well is unknown, it is assumed for planning purposes that PFAS treatment will be needed.

Reasoning Supply capacity needs

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 55%	Total Cost
Well 18 Drilling	1	LS	$ 150,000	$ 150,000	$ 50,000	$ 110,000	$ 310,000
Well 18 Equipping	1	LS	$ 1,750,000	$ 1,800,000	$ 540,000	$ 1,260,000	$ 3,600,000
PFAS Treatment	1	LS	$ 2,310,000	$ 2,300,000	$ 690,000	$ 1,610,000	$ 4,600,000
Generators	1	No.	$ 500,000	$ 500,000	$ 150,000	$ 350,000	$ 1,000,000

Total Anticipated Project Cost	$ 9,510,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	100%	$ 9,510,000
Upgrade:	0%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 9,510,000

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	2037	10-20 years	$ 9,510,000
Total Anticipated Project Cost			$ 9,510,000

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: S-03
Project Title: Well 13B Development
Facility Type: Supply and Treatment
Pressure Zone: N/A

Go to CIP Summary Table

Priority: 10-20 years
Project Status (Completed?): No

Project Description:

Project Description: Increase production capacity in the Lower Washougal Wellfield by approximately 1,000 gpm to meet future demands by Well 13B. The location of this well is assumed to be at the Well 13 site or nearby at Louis Bloch Park. Development of this well would include the drilling, equipping (building and mechanical equipment), and installation of an on-site generator for reliability. As water quality for the new well is unknown, it is assumed for planning purposes that PFAS treatment will be needed.

Reasoning Supply capacity needs

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 55%	Total Cost
Well 13B Drilling	1	LS	$ 150,000	$ 150,000	$ 50,000	$ 110,000	$ 310,000
Well 13B Equipping	1	LS	$ 1,375,000	$ 1,400,000	$ 420,000	$ 980,000	$ 2,800,000
PFAS Treatment	1	LS	$ 2,310,000	$ 2,300,000	$ 690,000	$ 1,610,000	$ 4,600,000
Generators	1	No.	$ 500,000	$ 500,000	$ 150,000	$ 350,000	$ 1,000,000

Total Anticipated Project Cost	$ 8,710,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	100%	$ 8,710,000
Upgrade:	0%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 8,710,000

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	2044	10-20 years	$ 8,710,000
Total Anticipated Project Cost			$ 8,710,000

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: S-04
Project Title: Well 19 Development
Facility Type: Supply and Treatment
Pressure Zone: N/A
Priority: 10-20 years
Project Status (Completed?): No

Go to CIP Summary Table

Project Description:

Project Description: Increase production capacity in the Lower Washougal Wellfield by approximately 1,000 gpm to meet future demands by developing Well 19. Development of this well would include the drilling, equipping (building and mechanical equipment), and installation of an on-site generator for reliability. As water quality for the new well is unknown, it is assumed for planning purposes that PFAS treatment will be needed.

Reasoning Supply capacity needs

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 55%	Total Cost
Well Drilling	1	LS	$ 150,000	$ 150,000	$ 50,000	$ 110,000	$ 310,000
Well Equipping	1	LS	$ 1,375,000	$ 1,400,000	$ 420,000	$ 980,000	$ 2,800,000
PFAS Treatment	1	LS	$ 2,310,000	$ 2,300,000	$ 690,000	$ 1,610,000	$ 4,600,000
Generators	1	No.	$ 500,000	$ 500,000	$ 150,000	$ 350,000	$ 1,000,000

Total Anticipated Project Cost	$ 8,710,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	100%	$ 8,710,000
Upgrade:	0%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 8,710,000

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	2046	10-20 years	$ 8,710,000
Total Anticipated Project Cost			$ 8,710,000

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: S-05
Project Title: LWWF PFAS Treatment Facility Expansion Phase 1
Priority: 0-10 years
Facility Type: Supply and Treatment
Pressure Zone: N/A
Project Status (Completed?): No

Go to CIP Summary Table

Project Description:

Project Description: Expand the capacity at the LWWF PFAS Treatment Facility (~2,400 gpm) to treat additional wells that may become impacted by PFAS in the future. The Phase 1 expansion will increase the initial capacity of the treatment facility to approximately 5,125 gpm

Reasoning Future PFAS regulatory compliance

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 55%	Total Cost
PFAS Treatment	1	LS	$ 4,620,000	$ 4,600,000	$ 1,400,000	$ 3,300,000	$ 9,300,000

Total Anticipated Project Cost	$ 9,300,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	100%	$ 9,300,000
Upgrade:	0%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 9,300,000

Project Timing:

Project Element	Timing	Priority	Cost
Design	2032	0-10 years	$ 930,000
Construction	2033-2034	0-10 years	$ 8,370,000
Total Anticipated Project Cost			$ 9,300,000

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: S-06
Project Title: LWWF PFAS Treatment Facility Expansion Phase 2
Priority: 10-20 years
Facility Type: Supply and Treatment
Pressure Zone: N/A
Project Status (Completed?): No

Go to CIP Summary Table

Project Description:

Project Description: Expand the capacity at the LWWF PFAS Treatment Facility (~2,400 gpm) to treat additional wells that may become impacted by PFAS in the future. The Phase 2 expansion will increase the initial capacity of the treatment facility to approximately 7,525 gpm

Reasoning Future PFAS regulatory compliance

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 55%	Total Cost
PFAS Treatment	1	LS	$ 4,620,000	$ 4,600,000	$ 1,400,000	$ 3,300,000	$ 9,300,000

Total Anticipated Project Cost	$ 9,300,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	100%	$ 9,300,000
Upgrade:	0%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 9,300,000

Project Timing:

Project Element	Timing	Priority	Cost
Design	2036	0-10 years	$ 930,000
Construction	2037-2038	10-20 years	$ 8,370,000
Total Anticipated Project Cost			$ 9,300,000

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: S-07
Project Title: LWWF PFAS Treatment Facility Expansion Phase 3
Priority: 10-20 years
Facility Type: Supply and Treatment
Pressure Zone: N/A
Project Status (Completed?): No

Go to CIP Summary Table

Project Description:

Project Description: Expand the capacity at the LWWF PFAS Treatment Facility (~2,400 gpm) to treat additional wells that may become impacted by PFAS in the future. The Phase 3 expansion will increase the capacity of the treatment facility to the initial buildout capacity of 9,925 gpm. Future expansions from initial buildout to ultimate buildout will occur as future wells in the LWWF are drilled and developed.

Reasoning Future PFAS regulatory compliance

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction 30%	General 55%	Total Cost
PFAS Treatment	1	LS	$ 4,620,000	$ 4,600,000	$ 1,400,000	$ 3,300,000	$ 9,300,000

Total Anticipated Project Cost	$ 9,300,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	100%	$ 9,300,000
Upgrade:	0%	$ -
Repair & Replacement:	0%	$ -
General:	0%	$ -
Total Anticipated Project Cost	100%	$ 9,300,000

Project Timing:

Project Element	Timing	Priority	Cost
Design	2040	0-10 years	$ 930,000
Construction	2041-2042	10-20 years	$ 8,370,000
Total Anticipated Project Cost			$ 9,300,000

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: G-01
Project Title: 2036 Water System Plan Update
Facility Type: General
Pressure Zone: System-wide

Go to CIP Summary Table

Priority: 0-10 years
Project Status (Completed?): No

Project Description:

Project Description: Update Water System Plan every 10-years.

Reasoning Regulatory requirements

Anticipated Project Cost:

Project Element	Total Cost
Water System Plan	$ 525,000
Total Anticipated Project Cost	$ 525,000

Notes on Cost Estimation:

Total cost includes 5% factor applied to direct costs for the City to administer the project.

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	0%	$ -
Upgrade:	0%	$ -
Repair & Replacement:	0%	$ -
General:	100%	$ 525,000
Total Anticipated Project Cost	100%	$ 525,000

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	2035-2036	0-10 years	$ 525,000
Total Anticipated Project Cost			$ 525,000

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: G-02
Project Title: 2046 Water System Plan Update
Facility Type: General
Pressure Zone: System-wide

Go to CIP Summary Table

Priority: 10-20 years
Project Status (Completed?): No

Project Description:

Project Description: Update Water System Plan every 10-years.

Reasoning Regulatory requirements

Anticipated Project Cost:

Project Element	Total Cost
Water System Plan	$ 525,000
Total Anticipated Project Cost	$ 525,000

Notes on Cost Estimation:

Total cost includes 5% factor applied to direct costs for the City to administer the project.

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	0%	$ -
Upgrade:	0%	$ -
Repair & Replacement:	0%	$ -
General:	100%	$ 525,000
Total Anticipated Project Cost	100%	$ 525,000

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	2045-2046	10-20 years	$ 525,000
Total Anticipated Project Cost			$ 525,000

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: G-03
Project Title: Water Rights Investigation
Facility Type: General
Pressure Zone: System-wide

Go to CIP Summary Table

Priority: 0-10 years
Project Status (Completed?): No

Project Description:

Project Description: Conduct a study to evaluate the transfer or acquisition of additional groundwater rights in the Lower Washougal Wellfield.

Reasoning General Study

Anticipated Project Cost:

Project Element	Total Cost
General Fund for Studies	$ 290,000
Total Anticipated Project Cost	$ 290,000

Notes on Cost Estimation:

Total cost includes 5% factor applied to direct costs for the City to administer the project.

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	0%	$ -
Upgrade:	0%	$ -
Repair & Replacement:	0%	$ -
General:	100%	$ 290,000
Total Anticipated Project Cost	100%	$ 290,000

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	2027-2028	0-10 years	$ 290,000
Total Anticipated Project Cost			$ 290,000

Project Location Map:

Go to Maps Tab

City of Camas
Water System Plan
Capital Improvement Plan

Project ID: G-04
Project Title: Pipeline Replacement Prioritization Study
Priority: 0-10 years
Facility Type: General
Pressure Zone: System-wide
Project Status (Completed?): No

Go to CIP Summary Table

Project Description:

Project Description: Conduct a study to develop a prioritization schedule for cast iron and steel pipelines identified in the pipeline replacement program.

Reasoning General Study

Anticipated Project Cost:

Project Element	Total Cost
General Fund for Studies	$ 160,000
Total Anticipated Project Cost	$ 160,000

Notes on Cost Estimation:

Total cost includes 5% factor applied to direct costs for the City to administer the project.

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Growth:	0%	$ -
Upgrade:	0%	$ -
Repair & Replacement:	0%	$ -
General:	100%	$ 160,000
Total Anticipated Project Cost	100%	$ 160,000

Project Timing:

Project Element	Timing	Priority	Cost
Entire Project	2034	0-10 years	$ 160,000
Total Anticipated Project Cost			$ 160,000

Project Location Map:

Go to Maps Tab

APPENDIX X

ENGINEERING DESIGN AND CONSTRUCTION STANDARDS

Section IV

Engineering Design Standards and Submittal Requirements

Section Index

- **Submittal Requirements**
- **Design Standards**
- **Small Wireless Facilities**
- **As-Built Submittal Requirements**
- **Plan Review Checklists**
- **Donated Infrastructure Quantity Tracking (Pending)**

ENGINEERING DESIGN SUBMITTAL REQUIREMENTS

Drawing submittals

Drawings shall be submitted on standard 24” x 36” bond paper for engineering review and approval. Each sheet shall be numbered and titled. Each sheet shall have a minimum text height of 0.10 inches.

Cover Sheet

Minimum information required shall include a vicinity map, site map, project title, sheet index, owner/developer address and phone number, revision block, engineers stamp, city signature block (locate in lower right corner). General notes and legend may also be shown on this sheet.

Existing Conditions Sheet

All pertinent as-built and existing utility information on and adjacent to the project shall be noted on this sheet. Existing utilities shall include: all manhole rim and invert flow line elevations, existing street lighting, gas mains, valves and services, water mains, valves and services, sanitary mains and services, electrical, TV, phone lines, power pole locations, utility risers and transformers, curb lines, catch basins, driveways, sidewalks, curb ramps and sign locations. All existing wells, septic drain fields, irrigation systems, and any other private or public service lines or easements shall be shown on this sheet. All sensitive lands, archeological sites, wetlands, stream courses and buffers including existing contours shall be shown.

Grading and Erosion Sediment Control Sheet (see design stds for grading/ESC)

Information shown shall include a legend showing shaded or hatched cut and fill locations and erosion control BMP’s. Existing contours screened back and proposed contours shall be shown including any grading associated with the storm water facilities. Locations of stripping stockpiles, building envelopes, and areas to be protected from damage shall be shown. Grading and Erosion control notes shall also be shown on this sheet. A table listing the total cubic yards of cut, fill, and strippings shall also be shown.

Street and Storm Plan Sheet (see design stds for street and storm)

Information shown shall include the proposed storm system including manhole locations, catch basin locations and types. The rim, grate and pipe invert in and out elevations shall be listed to the hundredth of a foot. All pipe runs and catch basin lateral lines shall list pipe size, length, slope, and pipe material. The required street information shall include street centerline stationing and centerline curve information including radius, length, and central angle. Centerline tangent bearings shall be listed. All high and low points shall be identified. Curb return information shall include radius, length, and central angle. Sidewalk and curb ramp locations shall be shown. Street and Storm construction notes shall be included on this sheet.

Water and Sewer Plan Sheet (see design stds for water and sewers)

Information shown shall include the proposed water and sewer system and service line locations. Water and Sewer main line lengths, sizes, material types, and where appropriate, slopes shall be listed. Sewer manhole rim and pipe invert elevations in and out shall be listed to the hundredth of a foot. All water and sewer system appurtenances including AARV's, cleanouts, blowoffs, hydrants, valves and PRV's shall be called out on the plans. The water and sewer construction notes shall be included on this sheet.

Street and Storm Profile Sheet

Profile sheets shall include the street centerline proposed vertical alignment and vertical curve information including PVI station and elevation, high and low point station and elevation, vertical curve length, begin and end stationing, grades in and out of the vertical curve, algebraic differences, and "K" values shall be listed. Proposed finished grade and existing ground lines shall be shown. Where curb elevations left and right are not the same due to shed sections or cul-de-sacs, the left and right top of curb profiles shall also be shown on the profile sheet. Street intersections shall be identified. The proposed storm system shall be shown including manhole and catch basin stations and elevations of all pipe inverts, rims and grates. All pipe runs and laterals shall have line sizes, pipe diameters, slopes and materials labeled or noted. All proposed and existing utility crossings shall be shown.

Water and Sewer Profile Sheet

The proposed finished grade and existing ground lines shall be shown. Street intersections shall be identified. The proposed water system shall be shown including blowoff, hydrant, valve, PRV and AARV locations and minimum depth of cover requirements. The proposed sewer system shall be shown including stations and elevations of all manholes, pipe inverts, rims and cleanouts. All pipe runs and laterals shall have line sizes, pipe diameters, slopes and materials labeled or noted. All proposed and existing utility crossings shall be shown.

Detail Sheets

The detail sheets shall show specific city standard details for water, sewer, and storm system appurtenances as proposed on the engineering drawings. The typical street width sections and structural section requirements shall also be shown. Other detail sheets may include street intersection details, stormwater detention and treatment facility details, trail location, section and construction details, sanitary sewer pump station facility details, landscaping layout, irrigation and planting detail and or street signage and striping details.

Miscellaneous

Based on submittal review the engineering department may require additional information to provide a complete understanding of the project. These requirements are provided as a minimum for a timely review.

ENGINEERING DESIGN STANDARDS FOR GRADING/ESC PLAN

Drawing submittals

Each sheet shall be clearly labeled as “Grading” or “Grading/Erosion Control”.

Subdivisions & Short Plats (see engineering design submittal requirements)

The required minimum information to be shown on the grading plan shall include existing 2-foot contour intervals screened back with listed elevations. The proposed finished grade 2-foot contour intervals with listed elevations shall also be shown. Sod stripping stockpile locations, proposed street and lot layout configurations, a quantities table listing the total cut, fill and stripping amounts, hatching or shading of the cut and fill locations, any tree removal or preservation and the grading notes shall also be shown.

The required minimum information to be shown on the erosion control plan shall include inlet protection on all proposed catch basins on site and any adjacent existing catch basins off site, sediment trap locations, silt fence locations, gravel construction entrance locations. The details of the required erosion control measures shall be shown. All stream courses and buffer areas shall be identified and protected.

If an NPDES, HPA, FPA, or an Erosion Control Bond are required for the project there shall be a note to that requirement along with the erosion control and grading notes.

ENGINEERING DESIGN STANDARDS FOR STREETS

Drawing submittals

Each sheet shall be clearly labeled as “Street” or “Street/Storm”.

Subdivisions and Short Plats

- Design of the proposed streets shall incorporate the recommendations of the traffic study if one was required and shall meet the requirements of the current AASHTO A Policy on Geometric Design for Highways and Streets manual and the current MUTCD manual.

- Neighborhood Traffic Management (NTM) elements may be required on the existing or proposed streets based on projected traffic volumes.

- The pavement design and structural section shall be based on the soil type and the recommendations of the geotechnical report, but shall not be less than the current City standard minimum.

- Alleys, half-street improvements, and private streets shall meet the minimum City standard structural section.

Commercial, multifamily or Industrial

- The City engineer will give specific recommendations on pavement design, width, geometric requirements, safety, and pavement markings based on the submitted proposal.

TABLE 1 - GUIDELINES FOR GEOMETRY OF PRIVATE ROADWAY

ITEM	ALLEY PRIVATE	ACCESS TO FOUR OR LESS DWELLING UNITS (LESS THAN OR EQUAL TO 150' IN LENGTH) PRIVATE STREET 'A' [3]	ACCESS TO FIVE OR MORE DWELLING UNITS (LESS THAN OR EQUAL TO 100' IN LENGTH) PRIVATE STREET 'B'	ACCESS TO FIVE OR MORE DWELLING UNITS (GREATER THAN 100' AND NOT OVER 300' IN LENGTH) PRIVATE STREET 'C'	ACCESS TO FIVE OR MORE DWELLING UNITS (GREATER THAN 300' IN LENGTH) PRIVATE STREET 'D'
TRACT WIDTH (PRIVATE)	20 FEET	20 FEET (TRACT OR EASEMENT)	30 FEET	42 FEET	48 FEET
STREET WIDTH	18 FEET [2]	12 FEET	20 FEET	28 FEET	28 FEET
CUL-DE-SAC TURNAROUND RADIUS	N/A	35 FEET	35 FEET	35 FEET	35 FEET
SIDEWALK / PLANTER WIDTH	N/A	OPTIONAL 5-FEET / NO PLANTER STRIP	ONE SIDE 5-FEET WITH 4- FOOT PLANTER STRIP	ONE SIDE 5-FEET WITH 4.5 FOOT PLANTER STRIP	BOTH SIDES 5-FEET WITH 4.5-FOOT PLANTER STRIP
BIKE LANES	N/A	N/A	N/A	N/A	N/A
MIN. CENTERLINE RADIUS	70 FEET	100 FEET	100 FEET	200 FEET	200 FEET
PARKING	NO PARKING BOTH SIDES	NO PARKING BOTH SIDES	NO PARKING BOTH SIDES	PARKING ONE SIDE ONLY	PARKING ONE SIDE ONLY
CLEAR ZONE*	1.5 FEET MIN.	1.5 FEET	1.5 FEET MIN.	1.5 FEET MIN.	1.5 FEET MIN.
ACCESS CONTROL	N/A	N/A[1]	N/A[1]	N/A[1]	N/A[1]
LIGHTING REQUIRED	NO	YES	YES	YES	YES

* LAG MANUAL, WSDOT DESIGN MANUAL
[1] POSSIBLE BY COUNCIL MANDATE LIMITING CERTAIN LOTS DURING DEVELOPMENT REVIEW
[2] OR GREATER IF REQUIRED BY FMO
[3] ROADWAYS IN EXCESS OF 150' IN LENGTH WITH FOUR OR FEWER DWELLING UNITS ARE SUBJECT TO ADDITIONAL REQUIREMENTS FROM THE FIRE MARSHALL

NOTES:

1. ACCESS TO TWO OR LESS LOTS MAY BE DESIGNED AND ESTABLISHED AS AN EASEMENT RATHER THAN A TRACT. GARBAGE AND RECYCLING CONTAINERS SHALL BE PLACED AT THE PUBLIC RIGHT-OF-WAY.
2. OFF-STREET PARKING:
   a. STANDARD SIZE SPACES: MINIMUM 9-FEET WIDE; MINIMUM 18-FEET LONG
   b. SMALL CAR SPACES: MINIMUM 8-FEET WIDE; MINIMUM 15-FEET LONG; MARKED 'COMPACTS ONLY'
   c. AISLE DIMENSIONS: ONE-WAY AISLE MINIMUM 15-FEET WIDE; TWO-WAY AISLE MINIMUM 24-FEET WIDE
   d. INGRESS AISLES SETBACK FROM BACK OF SIDEWALK: COLLECTORS MINIMUM 40-FEET; ARTERIALS MIMINUM 50-FEET
3. DEAD-END ROADS IN EXCESS OF 150-FEET, AS MEASURED FROM THE CENTERLINE OF THE ADJACENT ROAD, REQUIRE A DEAD-END TURNAROUND.
4. A DEAD-END TURNAROUND MAY BE REQUIRED ON ROADS LESS THAN 150-FEET WHEN ADJACENT ROAD IS A COLLECTOR OR ARTERIAL.
5. CONFIGURATION OF DEAD-END TURNAROUNDS SHALL BE PER STREET DETAIL ST36A 'DEAD-END TURNAROUND ON PRIVATE STREETS; OR AS APPROVED BY ENGINEERING AND THE FIRE MARSHAL.

FILE: R:\ENG_PWORKS\DETAILS REVISED: 01/20/2023 Approved by:

TABLE 2 - GENERAL GUIDELINES FOR GEOMETRY OF ROADWAY

ITEM	COMMERCIAL/ INDUSTRIAL (PRIVATE)	2 LANE LOCAL SPRINKLERED[4]	2 LANE LOCAL - NEIGHBORHOOD	2 LANE[2] COLLECTOR / ARTERIAL	3 LANE COLLECTOR / ARTERIAL	5 LANE ARTERIAL
R.O.W. WIDTH	40 FEET (TRACT)	52 FEET	60 FEET	60 FEET	74 FEET	100 FEET
STREET WIDTH	24 FEET	28 FEET	36 FEET	36 FEET	46 FEET / INCLUDES 12 FOOT MEDIAN	74 FEET / INCLUDES 14 FOOT MEDIAN
CUL-DE-SAC RADIUS	N/A	35 FEET	35 FEET	N/A	N/A	N/A
SIDEWALK / PLANTER WIDTH	ONE SIDE 5-FEET WITH 4.5-FOOT PLANTER STRIP	BOTH SIDES 5-FEET WITH 4.5-FOOT & 7.5-FOOT PLANTER STRIPS	BOTH SIDES 5-FEET WITH 4.5-FOOT & 7.5-FOOT PLANTER STRIPS	BOTH SIDES 6-FEET WITH 4.5-FOOT & 5.5-FOOT PLANTER STRIPS	BOTH SIDES 6-FEET WITH 5.5-FOOT & 7.5 FOOT PLANTER STRIPS	BOTH SIDES 6-FEET WITH 4.5-FOOT & 6.5-FOOT PLANTER STRIPS
BIKE LANES	N/A	N/A	N/A	5-FEET	5-FEET	6-FEET
MIN. CENTERLINE RADIUS	42 FEET FIRE ACCESS	70 FEET	70 FEET	200 FEET	300 FEET[3]	300 FEET[3]
PARKING	NO PARKING BOTH SIDES	PARKING ONE SIDE ONLY	PARKING BOTH SIDES	NO PARKING BOTH SIDES	NO PARKING BOTH SIDES	NO PARKING BOTH SIDES
CLEAR ZONE*	1.5 FEET MIN.	1.5 FEET	1.5 FEET MIN.	1.5 FEET MIN.	1.5 FEET MIN.	AS DIRECTED
ACCESS CONTROL	YES	N/A[1]	N/A[1]	YES	YES	YES
LIGHTING REQUIRED	YES	YES	YES	YES	YES	YES
CURB RADII	30 FEET MIN.	25 FEET MIN.	25 FEET MIN.	35 FEET MIN. [5]	35 FEET MIN. [5]	35 FEET MIN. [5]
OFF-STREET PARKING SETBACKS	N/A	N/A	N/A	INGRESS AISLES 40' FROM BACK OF SIDEWALK	INGRESS AISLES 50' FROM BACK OF SIDEWALK	INGRESS AISLES 50' FROM BACK OF SIDEWALK

* LAG MANUAL, WSDOT DESIGN MANUAL
[1] POSSIBLE BY COUNCIL MANDATE LIMITING CERTAIN LOTS DURING DEVELOPMENT REVIEW
[2] LEFT TURN LANES REQUIRED AT INTERSECTIONS
[3] MUST MEET AASHTO GUIDELINES FOR SPEED AND SIGHT DISTANCE
[4] STREET SECTION REQUIRES APPROVAL FROM THE CITY ENGINEER.
[5] LARGER RADII MAY BE REQUIRED AT THE DIRECTION OF THE CITY ENGINEER

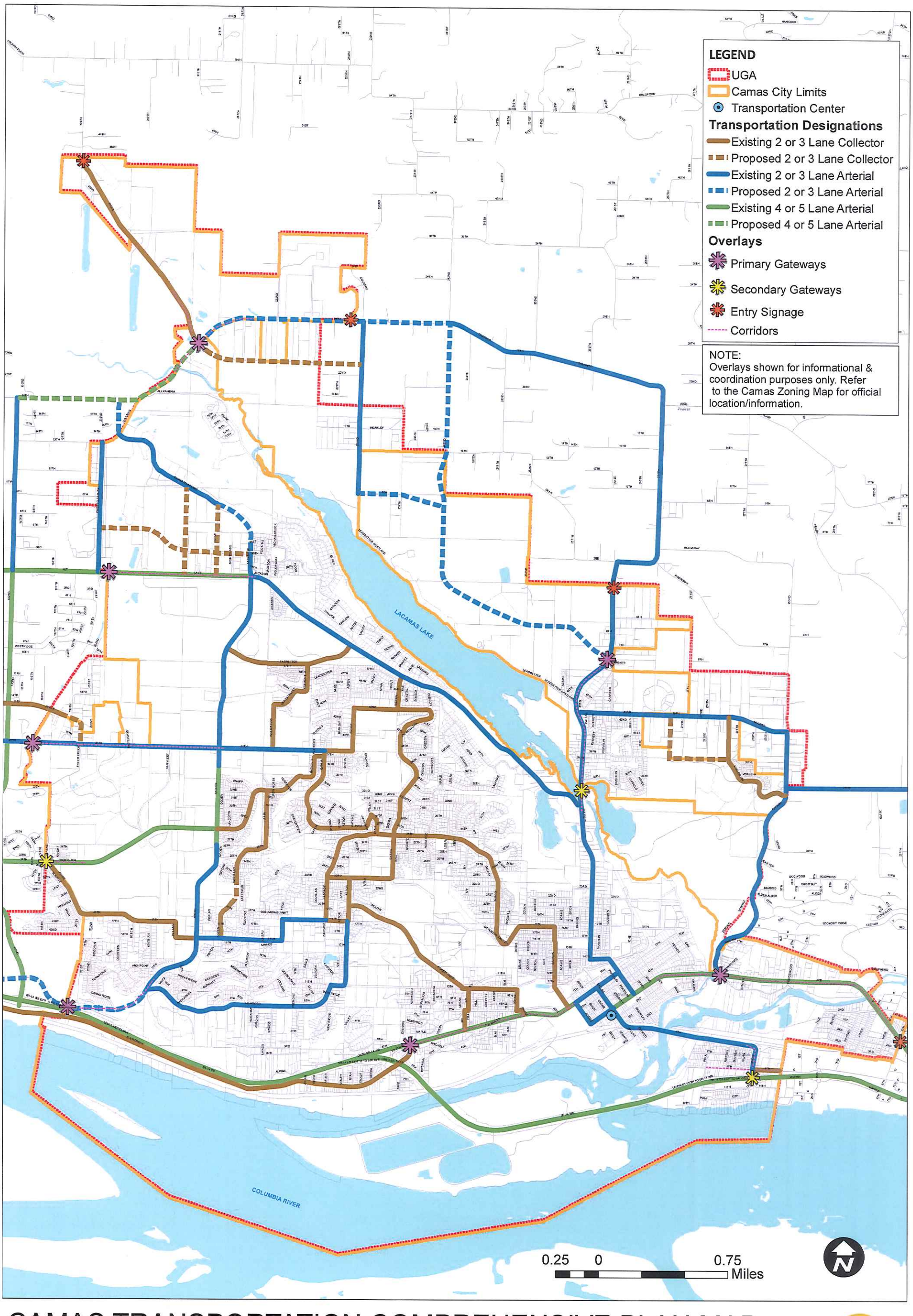
FOR INTERSECTION SPACING AND SETBACK, SEE ACCESS SPACING STANDARDS – TABLE 3 (NEXT PAGE)

TABLE 3 - ACCESS SPACING STANDARDS

RESOLUTION 17-005

ROADWAY CLASS	MINIMUM ACCESS SPACING***	MAXIMUM ACCESS SPACING	MINIMUM INTERSECTION & DRIVEWAY SETBACK	NEW RESIDENTIAL ACCESS PERMITTED
ARTERIAL	660-FEET	1,000-FEET****	300-FEET	NO**
COLLECTOR	330-FEET	600-FEET	110-FEET*	NO**
LOCAL	110-FEET	600-FEET	N/A	YES

* BASED ON TURN DESIGN SPEED OF 20 MPH
** TEMPORARY ACCESS MAY BE PERMITTED OR COMBINED FOR LANDLOCKED PARCELS
*** INCLUDES NON-RESIDENTIAL DRIVEWAYS
**** BLOCK LENGTHS IN EXCESS OF 600-FEET SHALL PROVIDE A MID-WAY PEDESTRIAN CONNECTION



CAMAS TRANSPORTATION COMPREHENSIVE PLAN MAP

CAMAS, WA I Ordinance 16-010 Adopted June 2016

2035 Camas
Your voice, Your vision, Your future

ENGINEERING DESIGN STANDARDS FOR ADA ACCESSIBILITY

Policy

It is City of Camas policy to provide appropriate pedestrian facilities along and across sections of City roadways. It is City of Camas, FHWA and WSDOT policy that pedestrian facilities be given full consideration in the planning and design of new construction and reconstruction projects.

Drawing submittals

Each sheet shall be clearly labeled as “Street” or “Street/Storm”.

The appropriate sidewalk and ADA Ramp details shall be included on a sheet labeled as “Details”, “Street Details” or “Accessibility Details.” Only City of Camas details from the most current Design Standard Manual (DSM) shall be used. In the case where the Camas DSM does not contain an appropriate detail, current WSDOT Standard Plan Details or site specific details may be used.

Accessibility Design

Design of proposed sidewalks shall meet the requirements of the USDOJ’s *ADA Standards for Accessible Design*; the USDOT’s current *ADA Standards for Transportation Facilities*; the FHWA’s current MUTCD; the current Americans with Disabilities Act requirements, the US Access Board’s current *Public Rights-of-Way Accessibility Guidelines* (PROWAG), and the current WSDOT Design Manual, Chapter 1510 and any referenced documents therein.

ADA Accessibility Triggers

All new construction, reconstruction, or alteration of existing transportation facilities shall be designed and constructed to be accessible and useable by those with disabilities. Existing facilities shall be retrofitted to be accessible when required per the WSDOT Design Manual, Chapter 1510.

The following are some examples that are considered alterations, which can potentially trigger the need to improve accessibility to meet ADA requirements:

- HMA overlay or inlay
- Traffic signal installation or retrofit
- Realignment of a roadway (vertical or horizontal)
- Sidewalk improvements
- Bridge replacement
- Concrete panel repair/replacement
- Raised channelization

The following are not considered alterations:

- Spot pavement repair
- Liquid asphalt sealing, chip seal, or crack sealing
- Lane restriping that does not alter the usability of the shoulder

Matching Facilities

In the case where a new development installation ends with a sidewalk and curb ramp at an intersection, a matching curb ramp installation shall be required at the other end of the crosswalk. A third ramp will not be required across from the second ramp.

Crosswalk Accessibility

Design consideration shall be made such that not only curb ramps meet ADA requirements, but street crossings shall also meet the above requirements. For retrofit situations where existing street crossings will be out of compliance with ADA requirements, an MEF submittal shall be required.

Design slopes

Designs shall not be based on design standard maximum limits. Allow for field adjustment based on actual conditions when specifying ramp lengths and slopes.

Maximum Extent Feasible (MEF)

Design deviation allowances will be considered on a case-by-case basis for retrofit situations, or when new construction meets existing facilities. The MEF memo shall be submitted to the City Engineer for approval when an element of a design will not meet the accessibility requirements. The MEF memo is required:

- Prior to Engineering plan approval.
- When unanticipated field issues arise during the construction phase.

Use of WSDOT's MEF Template or an abbreviated version with the following elements shall be used to formally request of deviation of the standards noted above:

- Project description;
- Existing pedestrian / road conditions;
- Applicable design standards that apply;
- Justification of design constraints;
- ***Cost is not a justification for not meeting accessibility criteria;***
- Proposal, including details;
- Stamped and signed by an Engineer.

ENGINEERING DESIGN STANDARDS FOR STORM SYSTEM

Drawing submittals

Each sheet shall be clearly labeled as “Street” or “Street/Storm”.

Subdivisions & Short Plats (see engineering design submittal requirements)

- For application construction standards, see *Section IV Engineering Details: Storm Detail SD1.*

- Design of the proposed stormwater treatment and detention system shall be in accordance with the latest edition of the Washington State Department of Ecology’s Stormwater Management Manual for Western Washington.

- All main line locations shall be located within the proposed or existing street right-of-way where ever possible, unless otherwise approved.

- All roof drainage shall be directed to the stormwater facility for detention, except as follows: Lots adjacent to streams, wetlands, and wetland/stream management zones are to be evaluated on the basis of aquifer recharge and fish and wildlife issues. When considered necessary roof drains, french drains, and foundation drains are to be directed, by approved means, back into the wetland or stream.

- If runoff from the proposed building envelope is not directed to the stormwater facility, an approved house connection plan for roof drains and foundation drains will be required. Method and location of discharge must have prior approval.

- When required along proposed roadways, based on site conditions, french drains shall be located behind sidewalks and shall be owned and maintained by the home owner or Homeowner’s Association.

- Spacing between catch basins shall be a maximum of 400-feet and shall be located at all intersections. Roadways in excess of 10% slope shall require a reduced spacing. Catch basins shall be tied into manholes at a minimum slope of 1%. Flow calculations may be required to analyze curb flow depths and widths.

- Spacing between manholes is to be a minimum of 400-feet; min. 48-inch dia.

- Stormwater main lines shall not be laid flatter that 0.4% slope. Slopes over 18% will require pipe anchors.

- Stormwater mains are to be 12-inch min. and laterals are to be 10-inch min.

- The stormwater design report shall include a project overview stating any assumptions made. Requests to deviate from the stormwater manual shall be fully stated and the reasons clearly outlined. The pervious and impervious acreage totals, site maps, soil maps, and full size basin maps showing the actual basin; even if beyond the project limits shall be included. Isopluvial charts for the 2, 10, and 100 year 24-hour storm events, runoff curve numbers, and downstream impact analysis shall be included.

ENGINEERING DESIGN STANDARDS FOR WATER SYSTEMS

Drawing submittals

Each sheet shall be clearly labeled as “Water” or “Water/Sewer”.

Subdivisions & Short Plats (see engineering design submittal requirements

- All main line locations shall be located within the proposed or existing street right of way where ever possible unless otherwise approved.
- Each lot shall have a water meter box location shown on the plan. Meter boxes shall be located in the right-of-way, near or at lot lines, in the planter strip or located behind the sidewalk in curb tight situations, and shall maintain 10-feet of horizontal separation from sewer services.
- Irrigation service meter box locations and backflow prevention devices shall be shown on the plan for all landscape islands, open space tracts or other areas as identified on the plan.
- Fire hydrant locations shall be shown on the plan and shall be located as nearly as possible at lot lines or as directed by the Fire Marshal.
- AARV’s, low point blowoffs, valve cluster locations and dead end blowoffs shall be called out on the plans and profile sheets.
- The system design may require sizing analysis for fire flow capacity, pressure zones and or pressure reducing valve vault locations upstream or downstream of the project site at the City’s discretion.
- Possible line upsizing may be required for future extensions at the City’s discretion. Upsizing will be based on the City’s latest *Water System Plan Update*.
- Any existing services not used or existing main lines that will be replaced or relocated may require abandonment and or removal at the City’s discretion.

Commercial, Multifamily, or Industrial

In addition to the above requirements, the following requirements may apply for these types of uses.

- Fire flow calculations/analysis for fire sprinkler systems.
- The locations of fire department connection (FDC) ports shall be shown.
- Separate domestic water main lines and fire system main lines may be required.
- Each unit of a duplex shall have its own water service.
- Multifamily units shall have one service for each building.
- Fire lines are to be shown for informational purposes only. NFPA 24 fire permit application is to be submitted to the Fire Marshal for review and approved, prior to construction.

ENGINEERING DESIGN STANDARDS FOR PRESSURE REDUCING VALVE STATIONS

When a water system PRV station is required as part of a residential development, the following minimum components shall be included with the PRV submittal.

1. An existing water system area plan shall be submitted by the developer's engineer. The area plan shall show the elevation and location of existing PRV's adjacent to the development site. High side and low side pressures shall be included. The plan shall also show the proposed development layout with elevation of all street intersections, lots, and other high and low points within the site.
2. The PRV station shall be a pre-assembled, pre-tested, and packaged system from G.C. Systems or approved equal.
3. The PRV station shall include a catch basin located adjacent to the station and tied to the stormwater system for the 3" pressure relief bypass flows.
4. There shall be a minimum 9" air gap from the bypass pipe to the catch basin. And acceptable bug screen shall be included on the end of the bypass pipe.
5. A vault drain or sump pump tied into the storm system will be required.
6. The valve vault access shall be a rated H-20, a spring assisted 36" x 72" double door, lockable, diamond plated hatch with safety grate, centered over the largest PRV.
7. The PRV station shall be located within the right-of-way in a widened planter strip or located outside of the right-of-way in an easement dedicated to the City.
8. The City of Camas reserves the right to determine the size of the PRV devices and the vault.
9. All interior piping shall be schedule 40, 306 stainless steel with flanges, and Victaulic coupling as required for disassembly.

ENGINEERING DESIGN STANDARDS FOR SANITARY SEWERS

Drawing submittals

Each sheet shall be clearly labeled as “Sewer” or “Water/Sewer”.

Subdivisions & Short Plats (see engineering design submittal requirements)

- For application construction standards, see *Section IV Engineering Details: Gravity Sewer Detail SG1; STEF Sewer Detail SF1; or STEP Sewer Detail SP1*.
- Detached units shall have their own sewer service and STEP or STEF or conventional gravity system as required.
- Duplex units may have up to two sewer services at the discretion of the engineering and public works departments.
- Multifamily units shall have one sewer lateral per building.
- All main line locations shall be located within the proposed or existing right of way where ever possible unless otherwise approved.
- Service lateral locations shall be located in the planter strip for STEP systems and 8-feet past the right of way line for gravity or STEF systems.
- Main line grades shall not be designed flatter than 0.5% slope. Slopes over 18% will require pipe anchors.
- AARV, cleanout, valve, odor control, and manholes shall be shown on the plan and profile sheets.
- The system design may require sizing analysis for line size and capacity. The system may also require a pump station based on the type of sewer system being proposed, the location of the project, or other factors. Future pump station upsizing may also be required.
- There may be downstream capacity analysis required for the project depending on project location and the type of sewer system proposed.
- Design shall take into account the capacity and grade to allow for desirable extension beyond the development.
- Additional odor control analysis and/or measures may be required.
- Septic tank sizing if required shall be based on the proposed use and in conformance with the CC&R’s. If pools are allowed then tank sizes may increase.

Commercial, Multifamily or Industrial

- Tank sizing submittal documentation and material submittals will be required.
- Material submittals, materials list and supplier information will be required prior to construction.
- Required as-built information shall include the depth of service, location of main lines, AARV’s, odor control, cleanouts, manholes, and valve locations.

ENGINEERING DESIGN STANDARDS FOR SANITARY SEWER PUMP STATIONS

For design of sanitary sewer pump stations, see ***'Sanitary Sewer Pump Station Design Manual'*** located under the Engineering Standards section of this document.

ENGINEERING DESIGN STANDARDS FOR COMMUNITY STEF TANKS

When a community STEF tank system is proposed for a residential development to retain sanitary sewer solids, the following minimum requirements shall apply.

1. The community tanks will only be allowed if lot sizes are 4,000 S.F. or less. For lots over 4,000 S.F. an individual 1,500 gallon minimum tank will be required on each individual lot.
2. The community tank(s) shall be a fiberglass reinforced single walled Xerxes tank or approved equal. The tank submittal shall include buoyancy calculations with minimum factor of safety of 1.5 for dead man sizing.
3. An approved odor control system is required for the tanks. If the development includes a pump station, a vent line from the tank(s) to the odor control system will be required. If no pump station is proposed, chemical injection, soil filter beds, or other odor control systems acceptable to the City shall be included in the design.
4. A minimum of one permanent ground water monitoring and dewatering well(s) acceptable to the City shall be included in the design and site construction.
5. An Orenco liquid level alarm, AMAHW or AMLAHW series, high level alarm and float system, or approved equal, will be required on each tank that contains bio tube filters. A 12” wide by 18” tall sign shall be included to read as follows:

   THIS BOX IS THE PROPERTY OF THE CITY OF CAMAS PUBLIC WORKS DEPARTMENT. IT IS TO BE OPENED BY AUTHORIZED PERSONNEL ONLY. ALARM – IF THE ALARM SOUNDS, PRESS THE RED LAMP COVER TO SILENCE, THEN CALL CAMAS OPERATIONS CENTER AT (360) 817-1563 (DAYS) OR (360) 737-0592 (NIGHTS, WEEKENDS OR HOLIDAYS).

   The sign and alarm panel shall be mounted at the tank location in accordance with the City requirements.
6. Tank sizing requirements shall be as determined by the City of Camas.
7. The tank(s) shall be located in such a fashion as to allow for the future excavation and replacement of the tank(s) if necessary. Building foundation, infrastructure main line utilities, and other facilities including streets and street intersections, stormwater facilities, retaining walls or other improvements shall not be located within the future excavation zone of the installed tank(s).
8. A water service with an approved backflow protection device is required at the tank location as directed by the City.
9. The tank location shall include an area light if no street light is within 50 feet.
10. The tank(s) shall be accessible for future solids pumping and maintenance.

ENGINEERING DESIGN STANDARDS FOR STREET LIGHTING

ALL INFORMATION IS INTENDED TO PRODUCE A LIGHTING DESIGN WITH LUMINANCE LEVELS AND LUMINANCE UNIFORMITY WHICH MEETS OR EXCEEDS THOSE IN THE I.E.S. "RECOMMENDED MAINTAINED LUMINANCE FOR ROADWAYS" FROM THE I.E.S. LIGHTING HANDBOOK. INSTALLATION OF ADDITIONAL LIGHTS MAY BE NECESSARY TO MEET THE INTENT OF THIS STANDARD.

1. WHERE THE AVERAGE RESIDENTIAL DENSITY IS GREATER THAN 12 DWELLING UNITS PER ACRE, USE COMMERCIAL OR INTERMEDIATE FOR LAND USE.
2. AVERAGE MAINTAINED LUMINANCE IS MEASURED IN FOOT CANDELAS PER SQUARE METER.
3. AT SIGNALIZED INTERSECTIONS, THE AVERAGE MAINTAINED LUMINANCE SHALL BE OF THE AVERAGE FOR THE TWO INTERSECTING STREETS.
4. LUMINANCE UNIFORMITY IS THE RATIO OF AVERAGE OR MAXIMUM MAINTAINED LUMINANCE TO MINIMUM LUMINANCE. LUMINANCE VALUES OUTSIDE THE ROADWAY SHALL NOT BE INCLUDED IN THE RATIO. ALL SIDEWALK AREAS AND THE AREA BETWEEN THE SIDEWALK AND THE STREET CURB SHALL BE INCLUDED WHEN DETERMINING THE MAINTAINED LUMINANCE.
5. ALL LIGHTING FIXTURES SHALL BE LIGHT EMITTING DIODE (LED). LIGHTING CIRCUITS SHALL BE 120 VOLTS.
6. THE MOUNTING HEIGHT OF THE FIXTURE IS MEASURED FROM THE ROADWAY SURFACE TO THE CENTER OF THE LIGHT SOURCE WITH THE FIXTURE LOCATED OVER THE BIKE LANE LINE OR SIX FEET FROM THE FACE OF CURB.
7. ALTERNATIVE LIGHTING LAYOUTS MAY BE SUBMITTED FOR REVIEW. WHERE LIGHTING IS REQUIRED ON BOTH SIDES, DESIGNS SHALL BE "OPPOSITE LIGHTING" ON MAJOR ROADWAYS 46 FEET OR GREATER IN WIDTH. THE USE OF STAGGERED LIGHTING SHALL ONLY BE USED WHERE "OPPOSITE LIGHTING" IS NOT PRACTICAL. LIGHTING LAYOUTS ON LOCAL RESIDENTIAL STREETS WITHIN A SUBDIVISION MAY VARY FROM SIDE TO SIDE.
8. COBRA STYLE LIGHT POLES ARE REQUIRED ON ALL COLLECTOR AND ARTERIAL ROADWAYS.
9. MAXIMUM POLE HEIGHT SHALL BE LIMITED TO 34 FEET.
10. LIGHTING LAYOUTS WILL REQUIRE APPROVAL AND POSSIBLE ADJUSTMENT TO MEET THE CITY OF CAMAS LIGHTING OBJECTIVES AND I.E.S. STANDARDS. THIS MAY INCLUDE ADJUSTMENT TO THE POLE SPACING AS LISTED AND MAY RESULT IN ADDITIONAL OR FEWER LIGHTS.
11. A LIGHTING DESIGN CONSISTENT WITH THESE REQUIREMENTS SHALL BE SUBMITTED FOR REVIEW AND APPROVAL BY THE CITY, PRIOR TO SUBMITTAL TO CLARK PUBLIC UTILITY DISTRICT (CPU) FOR APPROVAL.
12. STREET LIGHTS ON LOCAL AND NEIGHBORHOOD LEVEL STREETS SHALL BE LOCATED AT PROPERTY LINES.
13. THE STREET LIGHTS SHALL BE LOCATED IN THE PLANTER STRIP UNLESS OTHERWISE APPROVED BY THE CITY.

14. STREET LIGHT SPACING:

	ARTERIAL ROADWAY		COLLECTOR ROADWAY		NEIGHBORHOOD ROADWAY		LOCAL ROADWAY	
LAND USES	COMMERCIAL INDUSTRIAL	RESIDENTIAL	COMMERCIAL INDUSTRIAL	RESIDENTIAL	COMMERCIAL INDUSTRIAL	RESIDENTIAL	PUBLIC	PRIVATE
MAX. POLE SPACING (A)	170	160	130	160	150	170	N/A	N/A
MAX. POLE SPACING (B)	N/A	N/A	N/A	N/A	150	150	150	150

(A) STANDARD COBRA STYLE
(B) POLE TOP STYLE

15. PEDESTRIAN CROSSINGS AND VERTICAL SAG CURVES SHALL BE ILLUMINATED.

16. STREET LIGHTING IS REQUIRED ON ALL PRIVATE STREETS OVER 100 FEET IN LENGTH AND SERVING MORE THAN FIVE DWELLING UNITS.

17. PRIVATE STREETS WITH STREET LIGHTING SHALL HAVE A SEPARATE METER THAT THE HOME OWNERS ASSOCIATION WILL BE RESPONSIBLE FOR.

ENGINEERING AS-BUILT SUBMITTAL REQUIREMENTS

Drawing submittals

- Submitted on standard 24” x 36” bond paper for engineering review and approval.
- Each sheet shall be numbered and titled.
- Each sheet shall have a minimum text height of 0.10 inches.
- Each sheet shall be clearly labeled as “As-Built” or “Record Drawings” and dated.
- Shaded areas, satellite photography, or aerial photography is not acceptable due to reproducibility.
- Any hatched area shall be transparent or hatched at such a scale that it will not show as a black area after scanning.
- Upon engineering department review and approval, the “As-Builts” shall be submitted in a PDF digital format on a CD-ROM disc. CAD files shall be submitted as directed below.

Required Information

- As-Built elevations, if different than design, of all rims, pipe inverts in and out of manholes, catch basins, and outfalls shall be labeled next to the crossed out design elevation.
- Any change in the lot numbering or configurations from what was originally proposed or approved and shall conform to the final plat lot numbering.
- All as-built pipe lengths, depths and slopes shall be recorded next to the crossed out design information on the plan view sheet as well as on the appropriate profile and or detail sheet(s).
- Stormwater facility as-built verification note shall appear on the as-built sheet showing the facilities and indicate the following:
    - The engineer has performed an as-built inspection of the facilities
    - The constructed facilities meet the design criteria per the stormwater report for stormwater treatment and detention requirements for the site.
- Stormwater detention and treatment facilities shall show:
    - As-built elevations of all pipe inverts, control structures and orifices
    - Pond and swale lengths, depths, widths and slopes.
    - Overflow structures, pond berms and access roads as-built information for slopes, heights, widths, lengths and locations.
- Final as-built grading/topographical site plan shall be submitted with the as-built plans indicating the following:
    - Final finished grade contours and elevations over all lot areas.
    - Elevation of all lot corners shall be noted
    - Physical distance ties to the sanitary sewer service laterals that are marked with a 10 foot long 2x4 board. There shall be a minimum of two distances to each lateral from adjacent lot corners or arcs in the curb line.

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT

Project/Development Name: _____
City Project Number: _____
Reviewer's Initials and Date: _____

Please mark completed items in the space provided. Mark N/A if not applicable. Items left blank are incomplete.

COVER SHEET AND GENERAL REVIEW

___ Project Name (Title) (Past Project Names if applicable)
___ Owner's / Developers Name, Address, & Phone Number
___ Engineer's Name, Address and Phone Number
___ Architect's Name, Address and Phone Number
___ City of Camas Approval Block (Locate in lower right hand corner of cover sheet)
___ Vicinity Map
___ Legend
___ General Notes
  ___Reference to Standard Specifications
    ___City of Camas
    ___WSDOT/APWA
___ North Arrow and Scale
___ Preliminary State of Washington Engineer's Stamp (Signed at final review)
___ Memo Stating the Total Linear Feet of Improvements
  ___Street
  ___Water
  ___Storm
  ___Sanitary
___ Sheet Index
___ Benchmark, Datum Elevations
___ Complies with Request for Utility Services (R.U.S.)
___ Complies with Council's Decision (Staff to Review Notice of Final Decision)
___ Submitted Four Full-Sized & One Half-Size Set of Plans (1st review only)

Comments: _____

_____

_____

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT

Project/Development Name: _____
City Project Number: _____
Reviewer's Initials and Date: _____

Please mark completed items in the space provided. Mark N/A if not applicable. Items left blank are incomplete.

GRADING & EROSION CONTROL

___ Preliminary State of Washington Engineer's Stamp
___ North Arrow and Scale
___ Standard City of Camas Erosion Prevention & Sediment Control and Grading Detail Sheets
__ Construction Entrance __ Silt Fence __ Cut-off Ditches
__ Inlet Protection __ Slope Stability __ Temp. Sediment Ponds
__ Temp. Stockpile Area(s) Shown w/ Protection
___ Special Details Required
___ Easement(s) Required, Shown, Called Out
___ Property Lines / Adjoining Tax Lots Shown
___ Street Names (Names to be Assigned by Building Official)
___ Proposed Right of Way
___ Identify All Sensitive Areas (Wetlands and Buffers, Floodplains, Tree Resource Area, Streams, Creeks, Springs, etc.)
___ Existing and Finished Contours (**Finished Grade Slope No Greater than 2:1**)
___ Existing Area of Potential Slope Instability and Structures
___ Location of 100 Year Flood Plain & Shoreline Management Area Limits on the Site
___ Proposed Impervious Surfaces Other than Streets and Sidewalks
___ Drainage Flow Routes and Existing Discharge Points to and from Site
___ Edge of Pavement
___ Existing Trees, Trees to be Removed (w/ Diameter), Utility Poles, Wells, Septic Tanks, Drainage Structures, Fire Hydrants, Street Lights, Etc.)
___ Site Acreage
___ Area of Cut/Fill
___ Quantity of Cut/Fill
___ Wetland Area and Buffers – Cannot be Used for Treatment or Detention
___ Location of Buildable Lot Area
___ Testing Requirements / Frequency Matrix

Comments: _____
_____
_____

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT

Project/Development Name: _____
City Project Number: _____
Reviewer's Initials and Date: _____

Please mark completed items in the space provided. Mark N/A if not applicable. Items left blank are incomplete.

SANITARY SEWER

___ Preliminary State of Washington Engineer's Stamp
___ North Arrow and Scale
___ Sewer: ___ STEP; ___ STEF; ___Gravity; ___ Combo
___ Standard City of Camas Sewer Detail Sheets
___ Special Details Required
___ Easement(s) Required, Shown, Called Out
___ Property Lines / Adjoining Tax Lots Shown
___ Street Names and Widths
___ Pipe size, Lengths, & Material meet City standards and are shown
___ Stationing
___ Existing and Proposed Utilities Shown
___ Existing and Possible Conflicts Shown (Structures, Trees, etc.)
___ Lateral Table
___Lateral Size ___Length ___Depth ___Pipe Material
___ Dimensioning (Lateral ends 8' from curb and cleanout at property line)
___ Manhole Spacing (max. 400' for gravity system)
___ Cleanout Spacing (max. 200' or every 90° of Bend for STEF system)
___ All manholes with Coated Lining Called Out (STEP/STEF/Gravity)
___ Special Manhole Frame or Cover Required
___ Separation from Water Utility (10' horizontal, 18" vertical)
___ Invert Elevations
___ Rim Elevations
___ Check Slopes
___ Minimum Design Slopes (0.004 for gravity and STEF mains)
___ Minimum Depth and Cover (6' for gravity and STEF, 5' for STEP mains)
___ Concrete Pipe Anchors for Main Lines (Slopes greater than 20%)
___ Service to Each Lot
___ Shown on Profile

Comments: _____
_____
_____

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT

Project/Development Name: _____
City Project Number: _____
Reviewer's Initials and Date: _____

Please mark completed items in the space provided. Mark N/A if not applicable. Items left blank are incomplete.

STORMWATER

Plans

___ Preliminary State of Washington Engineer's Stamp
___ North Arrow and Scale
___ Standard City of Camas Stormwater Detail Sheets
___ Special Details Required
___ Property Lines / Adjoining Tax Lots Shown
___ Street Names and Widths
___ Pipe size, Lengths, & Material meet City standards and are shown. Mains 12" minimum and Laterals 10" minimum per CSDS*
___ Stationing
___ Existing and Proposed Utilities Shown
___ Existing and Possible Conflicts Shown (Structures, Trees, etc.)
___ Location and dimensions of proposed stormwater facilities, including typical cross sections of proposed facilities)
___ Stormwater Profile for all Systems in R.O.W.
___ Drainage Flow Routes and Existing Discharge Points to and from site
___ Check All Pipe Slopes and Invert Elevations. Mains 0.25% minimum and Laterals 0.3% minimum per CSDS*
___ All changes in pipe size, material, direction, or grade require a catch basin or manhole per CSDS*
___ Connections to Pipe Systems at Catch Basin or MH Only, min. slope 1%
___ If pipe cover is less than what is required in the on Details G2 & G3, provide minimum pipe cover for vehicular loads per manufacturer's specifications
___ Catch basins at low points, not to be located at base of ADA ramps
___ Catch basin spacing 400' max., located all intersections, reduced spacing on roads in excess of 10%
___ Manhole spacing 400' maximum
___ Concrete pipe anchors for main lines with slopes greater than 15%

*CSDS – Camas Stormwater Design Standards

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT

STORMWATER Continued

WQ Treatment Facility

___ Detail of any flow control structures

___ Provide overflow structure in fine grained soils or if low percolation

___ Check if Oil/water Separator is required

___ Show sufficient dimensions on all stormwater facility(s) for construction

___ Provide typ. Swale Cross section

- ___ 4:1 slopes preferred for mowing (Max. 3:1)
- ___ Min. width 2'
- ___ 1'Freeboard on Ponds & Swales
- ___ 0.5%-4% slope

___ Minimum 6" topsoil mix for the swale grass if in permeable soils

___ Permeable soils require impermeable liner or 1 ft. clay liner under 6" topsoil layer in swale to be less than 2.4 in/hr to be field verified by design engineer prior to sodding or seeding.

___ List swale seeding specifications

___ Finish elevations on all outfall inverts, top of level spreader, top of grates

___ Energy Dissipater at end of outfall piping

___ If rip rap used, detail length, width, depth, and size

___ Debris barrier/grate for all pipes entering a closed pipe system

___ Retaining Walls – specify top and bottom of wall elevations, dimensions, type of material, backfill material, installation, wall section, footing drainage, etc.

___ Maintenance access to swale or pond from street (min.15' wide, less than 18% slope, min. 15' easement, access 12% or greater required to be paved, & around pond as needed)

___ Barrier or fencing around the stormwater facility, if safety is a concern, (fence type, height (max. 6'), gate opening (10' min), top rail on fence

___ Stenciling / medallions at all catch basins

___ Label Stormwater facility as tract of land, where applicable

___ Stormwater facilities in subdivisions and short plats are shown in separate tract/s, with access.

___ Stormwater facilities on commercial / industrial sites are accessible and a note is on the plans that states 'Facility is owned and maintained by the property owner and right-of-entry shall be granted to the City for inspection purposes.'

___ Types & Number of plantings around pond perimeter to be reviewed by Planning

___ Operating and Maintenance Manual for Storm Facilities (Ref. TIR)

___ Wetlands & Buffers (Sensitive areas labeled and shown)

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT

STORMWATER Continued

___ Roof Downspout Connection:
- ___ To approved drainage structure; Include sizing on plans
- ___ To curb weep holes on crown streets or low side of shed streets

Infiltration Facility

___ Cross section of infiltration system
- ___ Drywells
- ___ Building roof drain
- ___ Perforated pipe trench
- ___ Infiltration pond

___ Check landscaping plan against stormwater facility (no trees in treatment area, etc.)

___ Design Infiltration Rate & Contractors design table for length of perf. pipe required per 1000 sq. feet of roof area

___ Pre-sedimentation manhole required for all drywells without water quality treatment

___ Verify that no wells or other facilities are adjacent to infiltration pond.

___ Provisions for roof drains for all lots.

Comments: _____

_____

_____

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT

Project/Development Name: _____
City Project Number: _____
Reviewer's Initials and Date: _____

Please mark completed items in the space provided. Mark N/A if not applicable. Items left blank are incomplete.

Transportation Plan

___ Plan is consistent with traffic study recommendations and decision
___ Signing and striping Plan
___ Sight Distance Triangles and Calculations
___ Sight Distance Triangle Easements on all corner lots (label and Dimension)
___ Road Modifications
___ Pavement Design
___ Preliminary State of Washington Engineer's Stamp
___ North Arrow and Scale
___ Legend
___ Easement(s) Required, Shown, Called Out
___ Property Lines / Adjoining Tax Lots Shown
___ Street Names
___ Existing and proposed Right of Way
___ Stationing
___ Tangent Bearings
___ Statement of ownership, maintenance, and repair of all utilities at private streets
___ Curve Data (per CMC 17.19.040.B.12.c): Centerline Radius 300' minimum on Primary Arterials, and 200' minimum on Secondary Arterials)
___ Curb
  ___ Radii (35' minimum on Arterials and Collectors, 25' minimum on others)
  ___ Elevation at Radius Returns (½'s' ¼'s)
  ___ Elevations at Lot Lines
___ Dimensions
  ___ Streets ___ Hammerheads, per Detail ST36
  ___ Driveways ___ Temporary Turnarounds, per Detail ST36
  ___ Cul-de-sacs & Dead Ends, per Detail ST36 (Over 300' require approval)
___ Grades (per CMC 17.19.040.B.12.b): Arterials 6% max.; Collectors 10% max.; Others 12% max.)
___ Driveway locations shown on all corner lots – Access control issue
___ Sidewalks
  ___ Pedestrian Ramps (check alignment)
  ___ Connectivity
___ Turning lanes
___ Traffic Signals
___ Vertical Curves per AASHTO (see "Policy on Geometric Design of Highway & Streets", Exhibit 3-76, page 274)

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT

Transportation Plan Continued

___ Intersection alignments and curb return minimums
___ K value Shown
___ Superelevation
___ Design Speed ____ mph; Posted speed ____ mph
___ Typical Street Section
  ___ Street Classification _____
___ ½ street improvement __ ½ street inlay __ resurfacing of ex.
  ___ Soil Classification _____
  ___ Crown Street 2% Min., 4% Max. Cross Slope
  ___ Shed Street 2% Min., Slopes in excess of 2% require prior approval, 6% Max. Cross Slope
  ___ Controlled Density Fill (CDF)
  ___ Center Line
  ___ Width of Right of Way
  ___ Width of Street
  ___ Public Utility Easement (P.U.E.)
  ___ Subgrade and pavement including depth and type
  ___ Curb Type
___ Sidewalk location, width, depth, compacted subgrade
___ Misc. Typical Sections
  ___ Standard Concrete Driveway
  ___ Concrete Vertical Curb
  ___ Concrete Curb and Gutter
  ___ ADA Curb Ramps
    ___ Ramp detectable warning detail
  ___ Barricade (Type III)
  ___ Sidewalk Cross Section
  ___ Mailbox Location
___ Letter for Road Modification from Engineer
___ Sign and Striping locations in accordance with MUTCD
___ Signs and Mailboxes located in planter strip (5' horizontal clearance; min. 7' vertical clearance).
___ Street configuration and lot numbering conforms to preliminary plat.
___ Bike lanes required
___ Traffic signal plan or loop & conduit installation for future.
___ Neighborhood Traffic Management Compliant

Comments: _____

_____

_____

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT

Project/Development Name: _____
City Project Number: _____
Reviewer's Initials and Date: _____

Please mark completed items in the space provided. Mark N/A if not applicable. Items left blank are incomplete.

Water Plan

___ Preliminary State of Washington Engineer's Stamp
___ North Arrow and Scale
___ Standard City of Camas Water Detail Sheets
___ Special Details Required
___ Easement(s) Required, Shown, Called Out
___ Property Lines / Adjoining Tax Lots Shown
___ Street Names & Widths
___ Pipe Size, Lengths, & Material per Standards
  ___ 8" Minimum
___ Stationing
___ Existing and Proposed Utilities Shown/Conflicts
___ Existing and Possible Conflicts Shown (Structures, Trees, etc.)
___ Dimensioning (6' from North/East Curb)
___ Fire Hydrant w/ Fire Marshal's Approval
  ___400' Between Hydrants
___ 600' from Property Lines
  ___No Fire Hydrant on Dead End 6"
___ Valves: 3 on a Tee, 4 on a Cross, and Valves Every 600' (minimums)
___ Fittings / Blocks, Shown & Called Out
___ Pipe Deflection Checked for Pipe Sections
___ Blow-off (Standard or Construction)
___ Separation from Sanitary (10' Horizontal, 18" Vertical)
  ___ Encased in Concrete
  ___ Ductile Iron Sleeve, 10' Each Side of Crossing.
___ Water Depths and Crossings Shown on Profile
___ Water Meter Locations and Size
___ Irrigation Meter Locations, Size, and Backflow Prevention Device
___ G.P.M. Available
___ Cross-Connection Control for irrigation and business services
___ Service to Each Lot

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT

Water Plan Continued

___ Verify Correct Locations, Size, & Type of Existing Water Facilities (Booster Stations, Reservoirs, etc.)
___ Engineered Vacuum Relief Locations for Large Water Mains
___ Air / Vacuum Relief Location Shown - High Point Typical
___ PRV Location / Settings

Comments:

_____
_____
_____
_____
_____

GENERAL PLAN REVIEW CHECKLIST
ENGINEERING DEPARTMENT

Project/Development Name: _____
City Project Number: _____
Reviewer's Initials and Date: _____

Please mark completed items in the space provided. Mark N/A if not applicable. Items left blank are incomplete.

Donated Infrastructure Quantity Tracking Submittal Sheets

Vacant

Water Details

City of Camas Water Details ~ INDEX

Detail No.	Detail Name	Rev.	Rev. Date
W1	Water Notes	7	3/2/2022
W2	1" Water Service - New	11	7/6/2026
W3	1" Water Service - Replacement	9	1/3/2024
W4	H20 Rated 1" Water Service	1	6/11/2019
W5	1" Water Service - Infill Lot	3	7/6/2026
W6	2" Water Service	10	5/20/2024
W6A	2" Water Service For Irrigation	4	5/20/2024
W6B	1" Water Service For Irrigation	1	7/6/2026
W7a & b	3"-8" Water Service	4	3/24/2022
W8	2" Standard Blowoff	5	1/3/2024
W9	6" Low Point Blowoff - Ditch	2	1/1/2011
W10	6" Low Point Blowoff - Street	2	1/1/2011
W11	Fire Hydrant	8	1/3/2024
W12	Valve Box and Riser	4	10/21/2014
W13	Water Main Line and Valve	2	1/1/2011
W14	Pipe Joint Restraint	3	1/1/2011
W15	Thrust Blocks	3	1/1/2011
W16	2" Air/Vacuum Release Valve	7	1/3/2024
W17	2" Air/Vacuum Release Valve in 48" MANHOLE	4	1/3/2024
W17A	2" Air/Vacuum Release Valve in 48" Outside of Curb	2	1/3/2024
W17B	1" Air/Vacuum Release Valve	1	7/6/2026
W18	2" Pressure Relief Valve Assembly	3	1/3/2024
W19	4" Vacuum Relief Valve	2	1/1/2011
W20A	6"x2" PRV Station with 3" Relief	2	1/1/2011
W20B	6"x2" PRV Station with 3" Relief	3	10/21/2014
W21	Above Ground PRV Relief Drain	4	5/16/2019
W22	Water Quality Sampling Station	5	1/3/2024
W23A	Standard Double Check Detector Valve Assembly	3	10/21/2014
W23B	Standard Double Check Detector Valve Assembly	3	10/21/2014
W24	Reduced Pressure Backflow Assembly, 1” and 2”	1	10/2/2017
W25	Reduced Pressure Backflow Assembly, 2.5” & Larger	1	10/2/2017
W26	Water Locate Station Plan	1	3/28/2022
W26A	Locate Station For Water	1	3/28/2022
W27	Water Meter Manifold Assembly	2	1/3/2024
W27A	Water Meter Manifold Assembly	1	2/12/2026

WATER CONSTRUCTION NOTES:

1. ALL TRENCH EXCAVATION AND PIPE INSTALLATION SHALL CONFORM TO THE MOST CURRENT A.W.W.A. STANDARDS, AND THE MOST RECENTLY ADOPTED EDITION OF THE W.S.D.O.T. STANDARD SPECIFICATIONS SECTION 7-08.3(1) AND SECTION 7-08.3(2). ALL EXCESS MATERIAL FROM THE TRENCH EXCAVATION SHALL BE LOADED DIRECTLY INTO A DUMP TRUCK AND DISPOSED OF AT AN APPROVED SITE.

2. PIPE BEDDING AND PRE-COVER (PIPE ZONE) MATERIAL SHALL BE 5/8 INCH MINUS CRUSHED ROCK.

3. TRENCH BACKFILL MATERIAL SHALL BE 1-1/4 INCH MINUS CRUSHED ROCK.

4. TRENCH COMPACTION SHALL CONFORM TO THE MOST RECENTLY ADOPTED EDITION OF THE W.S.D.O.T. STANDARD SPECIFICATIONS SECTION 7-08.3(3). CONTRACTOR TO DETERMINE THE TYPE OF EQUIPMENT AND METHOD USED TO ACHIEVE THE REQUIRED COMPACTION AND BE APPROVED BY THE CITY OF CAMAS. EACH LIFT SHALL BE COMPACTED TO A MINIMUM OF 95 PERCENT OF THE MAXIMUM DENSITY AS DETERMINED BY THE A.A.S.H.T.O. T-180 TEST METHOD.

5. SETTLEMENT OF THE FINISHED SURFACE WITHIN THE WARRANTY PERIOD SHALL BE CONSIDERED TO BE A RESULT OF IMPROPER COMPACTION AND SHALL BE PROMPTLY REPAIRED BY THE CONTRACTOR AT NO EXPENSE TO THE CITY.

6. ALL VALVES 10 INCHES OR LESS IN DIAMETER SHALL BE A.W.W.A. APPROVED RESILIENT WEDGE GATE VALVES, BUBBLE TIGHT AT 200PSI, HAVE NON RISING STEMS, AND OPEN BY TURNING TO THE LEFT. PROVIDE A 2 INCH SQUARE NUT TO CONFORM TO A.W.W.A. C-504. ALL VALVES 12 INCHES OR LARGER IN DIAMETER SHALL BE A.W.W.A. APPROVED BUTTERFLY VALVES.

7. ALL WATER PIPE 12 INCHES OR LESS IN DIAMETER SHALL BE DUCTILE IRON CLASS 52 PIPE. ALL WATER PIPE 14 INCHES IN DIAMETER AND LARGER SHALL BE DUCTILE IRON CLASS 51 PIPE. RUBBER GASKET TYPE SHALL BE U.S. PIPE, TYTON OR APPROVED EQUAL. ALL FITTINGS SHALL BE DUCTILE IRON AND SHALL CONFORM TO THE A.W.W.A. STANDARD C-110.

8. ALL TEES, FLANGES, CAPS, BENDS AND OFFSETS, AS WELL AS ALL OTHER APPURTENANCES WHICH ARE SUBJECT TO UNBALANCED THRUST, SHALL BE PROPERLY BRACED BY ONE OF THE FOLLOWING METHODS:

   A. PRIMARY METHOD IS MECHANICAL JOINT RESTRAINT, AS SHOWN IN DETAIL W14 – USE "EBBA IRON SERIES 1100 MEGA LUG" MECHANICAL JOINT THRUST RESTRAINT OR APPROVED EQUAL. CONTRACTOR TO RESTRAIN THE MINIMUM REQUIRED PIPE LENGTH WITH "FIELD-LOK" GASKETS OR APPROVED EQUAL.

   B. ALTERNATE METHOD IS CONCRETE THRUST BLOCKING, AS SHOWN IN DETAIL W15 – BLOCKING SHALL BE 3000 PSI CONCRETE POURED IN PLACE. THRUST BLOCKING SHALL ONLY BE USED WHEN OTHER MEANS OF RESTRAINT CANNOT BE USED, OR EXISTING PIPE BEING CONNECTED IS NOT RESTRAINED.

9. ALL WATER MAINS SHALL BE TESTED AT 200PSI IN ACCORDANCE WITH SECTION 7-09.3(23) OF THE STANDARD SPECIFICATIONS. THE CITY SHALL BE NOTIFIED 48 HOURS IN ADVANCE OF ACCEPTANCE TESTING. MAXIMUM LENGTH OF PIPE TO BE TESTED AT ONE TIME IS 1000 FT.

10. CHLORINATION SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 7-09.3(24) OF THE STANDARD SPECIFICATIONS. CITY INSPECTOR WILL TAKE SAMPLES AND DELIVER TO LABORATORY FOR BACTERIA TESTING, NEGATIVE SAMPLE RESULTS SHALL BE CONFIRMED, PRIOR TO PRESSURE TESTING. DECHLORINATION OR DISPOSAL TO SANITARY MAIN MAY BE REQUIRED.

11. APPROPRIATE DISPOSAL AND OR DECHLORINATION OF FLUSHED WATER DURING BLOWOFF IS THE RESPONSIBILITY OF THE CONTRACTOR. METHOD USED SHALL BE APPROVED BY CITY AND OTHER REGULATING AUTHORITIES.

12. WATER MAIN TO HAVE A MINIMUM COVER OF 30 INCHES. WATER SERVICES TO HAVE A MINIMUM 24" OF COVER.

13. ALL EXISTING VALVES TO BE OPERATED BY CITY OF CAMAS WATER/SEWER DEPARTMENT PERSONNEL ONLY.

14. NO CONNECTIONS TO EXISTING WATER MAINS SHALL BE MADE PRIOR TO SATISFACTORY PRESSURE TESTING, DISINFECTION, AND THE CONFIRMATION OF A NEGATIVE BACTERIA TEST.

15. WATER MAINS SHALL BE LOOPED WHEREVER POSSIBLE.

16. WATER MAINS SHALL BE 8" DIAMETER MINIMUM LINE SIZE. LARGER LINE SIZES MAY BE REQUIRED.

17. SEE IRRIGATION CONSTRUCTION NOTES, DETAIL IR1, FOR APPROVED BACKFLOW PREVENTION DEVICES.

City of Camas WASHINGTON

WATER DETAIL

WATER CONSTRUCTION NOTES

3-2-22

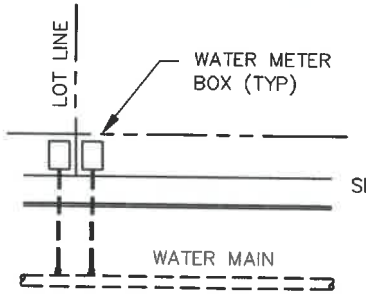
DETAIL APPROVED BY DATE

NOT TO SCALE

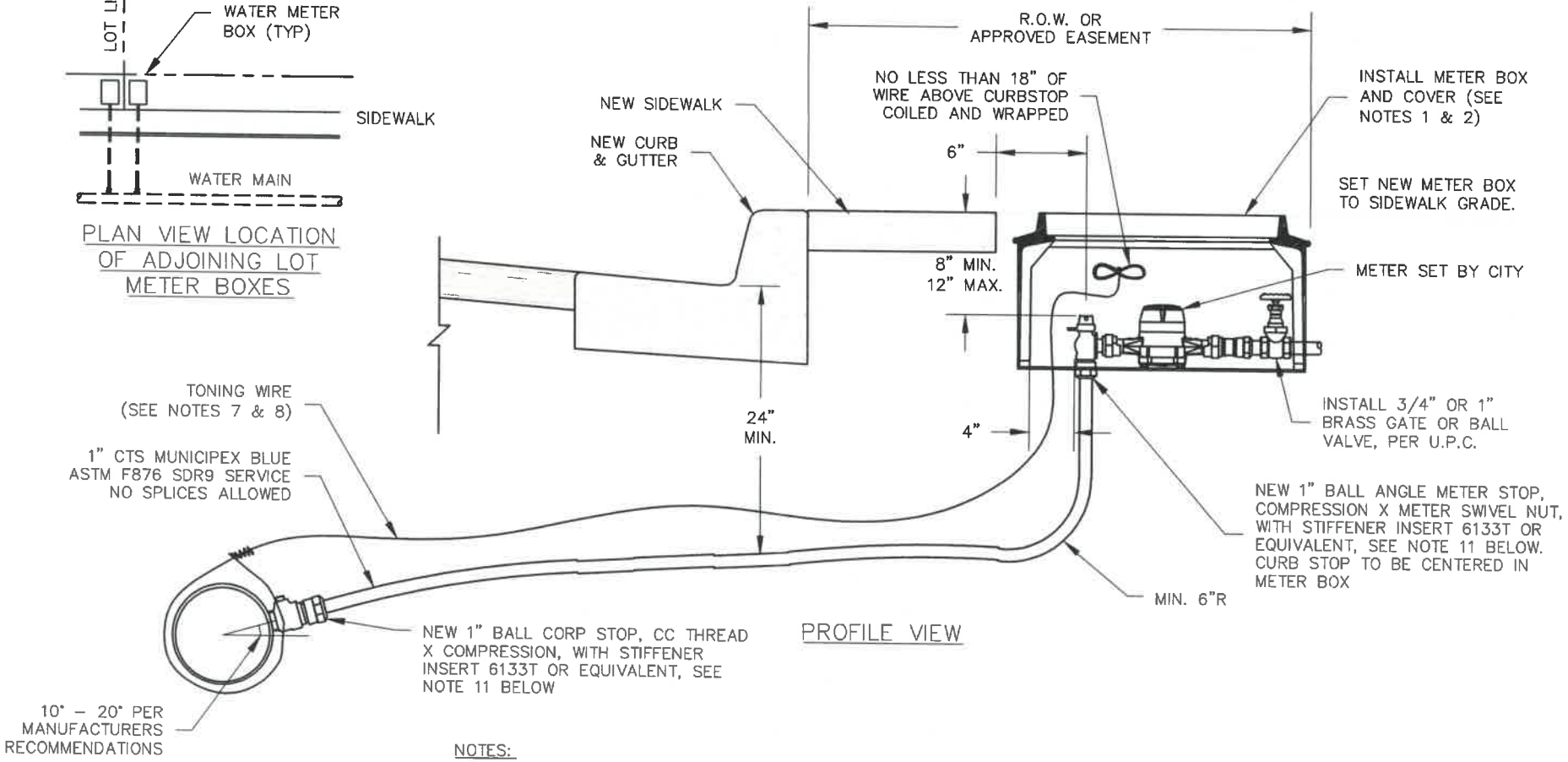
REVISION: 7 DATE: 03/02/2022

DETAIL NO. W1

WTR-NOTES.DWG



PLAN VIEW LOCATION OF ADJOINING LOT METER BOXES



PROFILE VIEW

DUCTILE IRON MAIN

6" OR LARGER REQUIRES DIRECT TAP.
4" MAIN – DOUBLE STRAP SADDLE REQUIRED FOR SERVICE CONNECTION

NOTES:

1. METER BOX SHALL BE EITHER OLDCASTLE FIBRELYTE FL12BOX WITH NO MOUSE HOLES OR ARMORCAST ROTOCAST P6000485.
2. COVER SHALL BE OLDCASTLE FIBRELYTE FL12D "WATER" OR ARMORCAST A6000484–H9 WITH OFFSET AMR RADIO READ ANTENNA HOLE FOR NEPTUNE METER
3. INSTALL METER BOX OUTSIDE OF SIDEWALK OR IN PLANTER STRIP, EXCEPT WHERE NOTED IN PLANS.
4. SEE TRENCH SECTION DETAILS G2 OR G3 FOR BACKFILL REQUIREMENTS.
5. METER BOXES FOR ADJOINING LOTS SHALL BE WITHIN 2' OF LOT LINE WHERE POSSIBLE (SEE ABOVE LEFT).
6. WATER METER SHALL BE INSTALLED BY THE CITY.
7. TONING WIRE SHALL BE COPPERHEAD SUPERFLEX 12 AWG 45MIL BLUE HDPE INSULATION, NO SPLICES ALLOWED.
8. SEAL TONING WIRE SPLICE CONNECTIONS WITH COPPERHEAD 12 AWG SNAKEBITE LOCKING CONNECTORS (TYPICAL).
9. NEW WATER MAINS REQUIRE TONING WIRE TO A LOCATE STATION
10. TONING WIRE FROM MAIN TO SERVICE REQUIRES A SNAKEBITE LOCKING CONNECTOR
11. PREFERRED BRASS FITTINGS TO BE USED, IN ORDER:
    1. FORD
    2. AY MCDONALD

City of Camas WASHINGTON

WATER DETAIL

1" WATER SERVICE – NEW

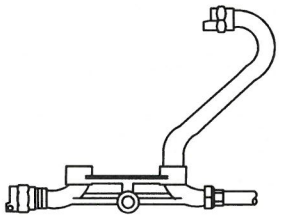
DETAIL APPROVED BY — DATE 7/6/2026

NOT TO SCALE

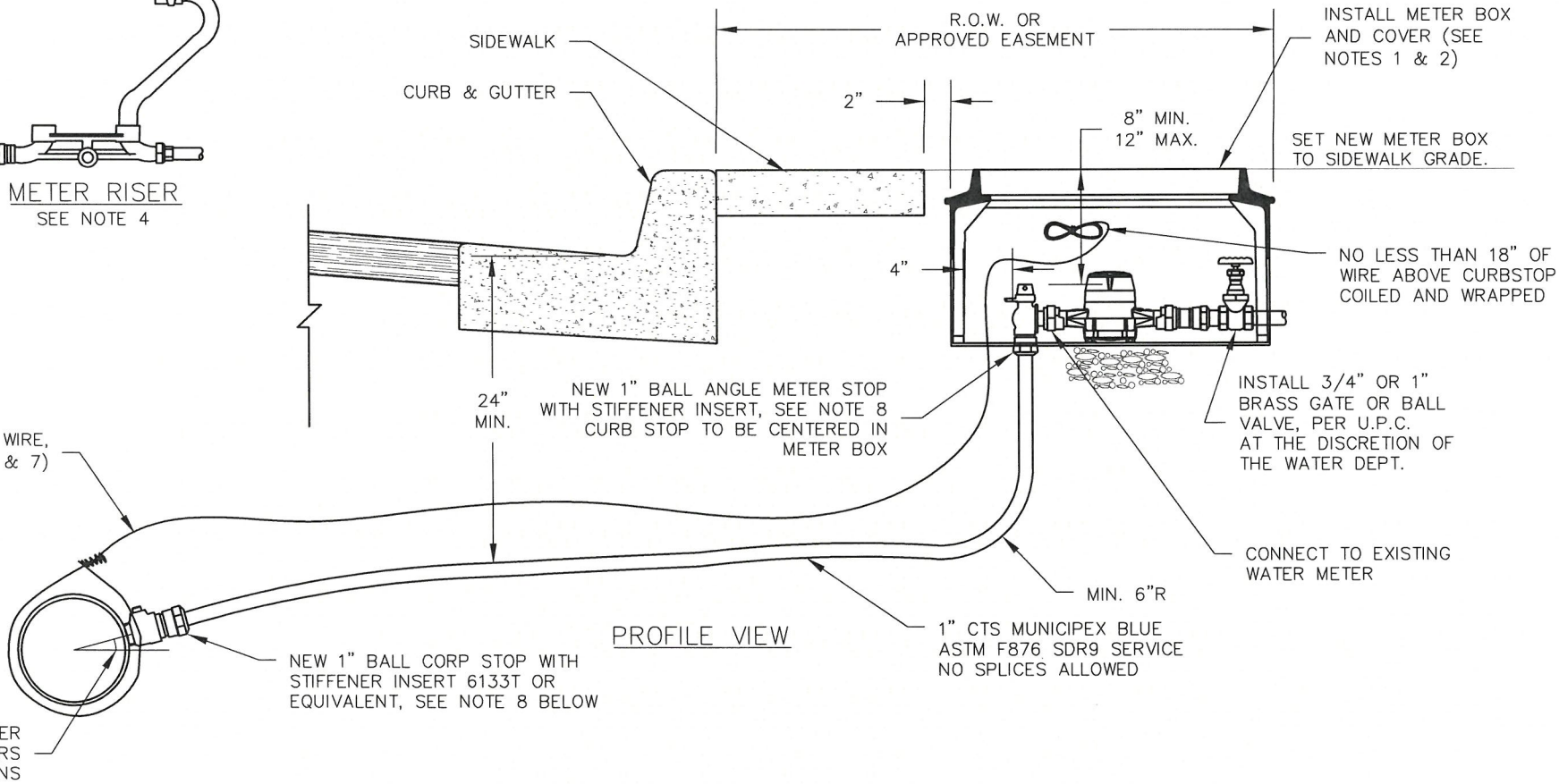
DETAIL NO. W2

REVISION: 11 DATE: 07/02/2026

WTR–WS1.DWG



METER RISER
SEE NOTE 4



PROFILE VIEW

DUCTILE IRON MAIN

6" OR LARGER REQUIRES DIRECT TAP.
4" MAIN – DOUBLE STRAP SADDLE
REQUIRED FOR SERVICE CONNECTION

NOTES:

1. METER BOX SHALL BE OLDCASTLE FIBRELYTE FL12BOX WITH NO MOUSE HOLES OR ARMORCAST ROTOCAST P6000485.
2. COVER SHALL BE OLDCASTLE FIBRELYTE FL12D "WATER" OR ARMORCAST A6000484–H9 WITH OFFSET AMR RADIO READ ANTENNA HOLE FOR NEPTUNE METER
3. REPLACE ALL SERVICES WHICH MEET ANY OF THE FOLLOWING CONDITIONS:
   - METER BOX IS RELOCATED
   - SUBSTANDARD EITHER BY MATERIALS OR LACK OF COVER
4. IF SERVICE LINE TO HOUSE IS DEEP, HALF OF A METER RISER MAY BE REQUIRED.
5. SEE TRENCH SECTION DETAILS G2 OR G3 FOR BACKFILL REQUIREMENTS. WATER METER SHALL BE INSTALLED BY THE CITY.
6. TONING WIRE SHALL BE COPPERHEAD SUPERFLEX 12 AWG 45MIL BLUE HDPE INSULATION, NO SPLICES ALLOWED.
7. SEAL TONING WIRE SPLICE CONNECTIONS WITH COPPERHEAD 12 AWG SNAKEBITE LOCKING CONNECTORS (TYPICAL).
8. PREFERRED BRASS FITTINGS TO BE USED, IN ORDER:
   1. FORD
   2. AY MCDONALD

City of Camas WASHINGTON

WATER DETAIL

1" WATER SERVICE – REPLACEMENT

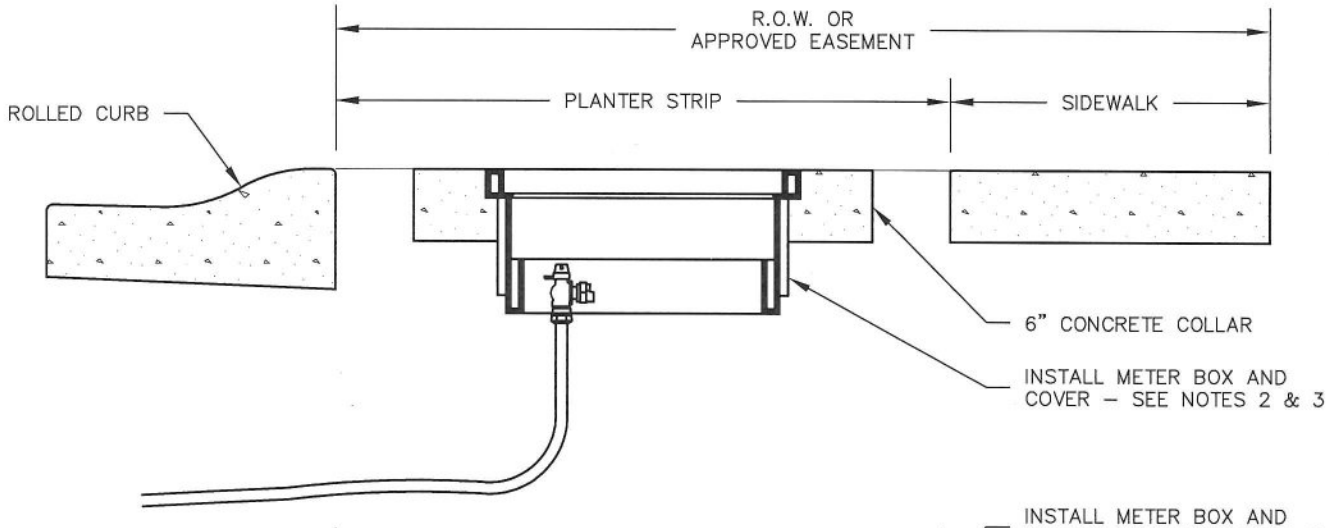
DETAIL APPROVED BY 1/3/24 DATE

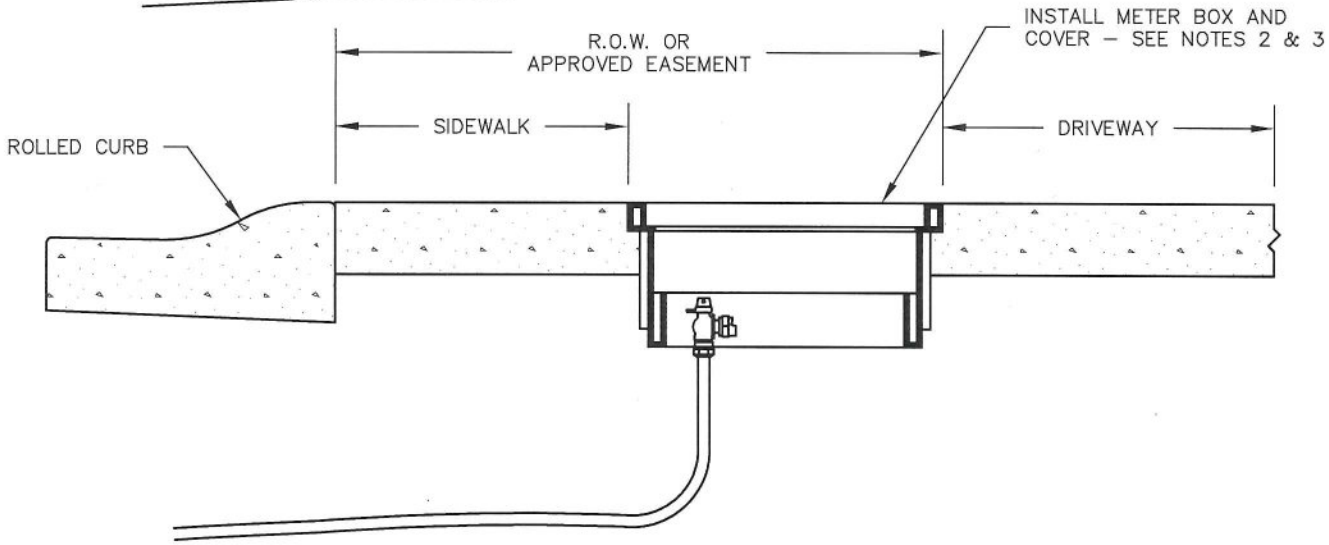
NOT TO SCALE

DETAIL NO. W3

REVISION: 9 DATE: 01/02/2024

WTR–WS1.DWG





NOTES:

1. FOR INSTALLATIONS BEHIND ROLLED CURBS OR IN DRIVEWAYS WHERE H20 TRAFFIC RATING IS REQUIRED.
2. THE METER BOX SHALL BE SIGMA RAVEN HDPE STRAIGHT WALL BOX, BLACK, WITH NO MOUSE HOLES, M/N RMB132412–SW–B.
3. COVER SHALL BE SIGMA RAVEN POLYETHYLENE LID WITH OFFSET AMR RADIO READ ANTENNA HOLE FOR NEPTUNE METER, M/N N1324BLKWAT–TS.
4. BACKFILL AROUND METER BOX SHALL BE 5/8" MINUS CRUSHED SURFACING TOP COURSE. PLACE 2X6 WOOD SUPPORT ACROSS THE SHORT SIDE IN THE BASE OF BOX, PRIOR TO COMPACTION AROUND THE BOX, TO PREVENT INWARD BOWING.
4. METER BOX SHALL BE SET AT FINISH GRADE PRIOR TO CONCRETE BEING PLACED AROUND THE BOX.
5. METER BOXES SET IN PLANTER STRIPS AND IN HOT–MIX ASPHALT SHALL HAVE A 6 INCH CONCRETE COLLAR POURED AROUND THE METER BOX PRIOR TO PAVING.

City of Camas WASHINGTON

WATER DETAIL

H20 RATED 1" WATER METER BOX

Jan E. Carter 6-17-19

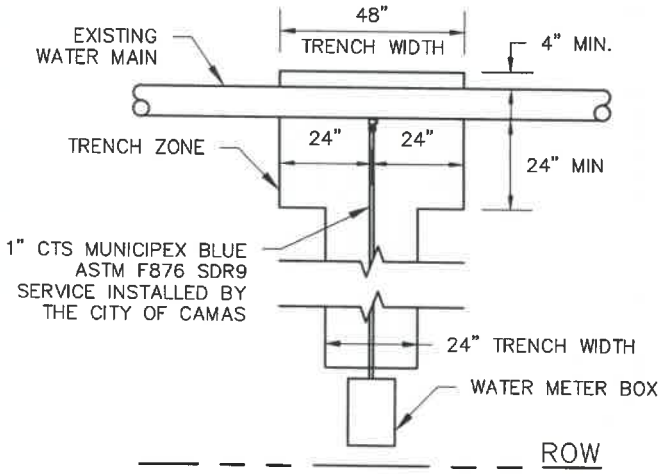
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO. W4

REVISION: 1 DATE: 6/11/2019

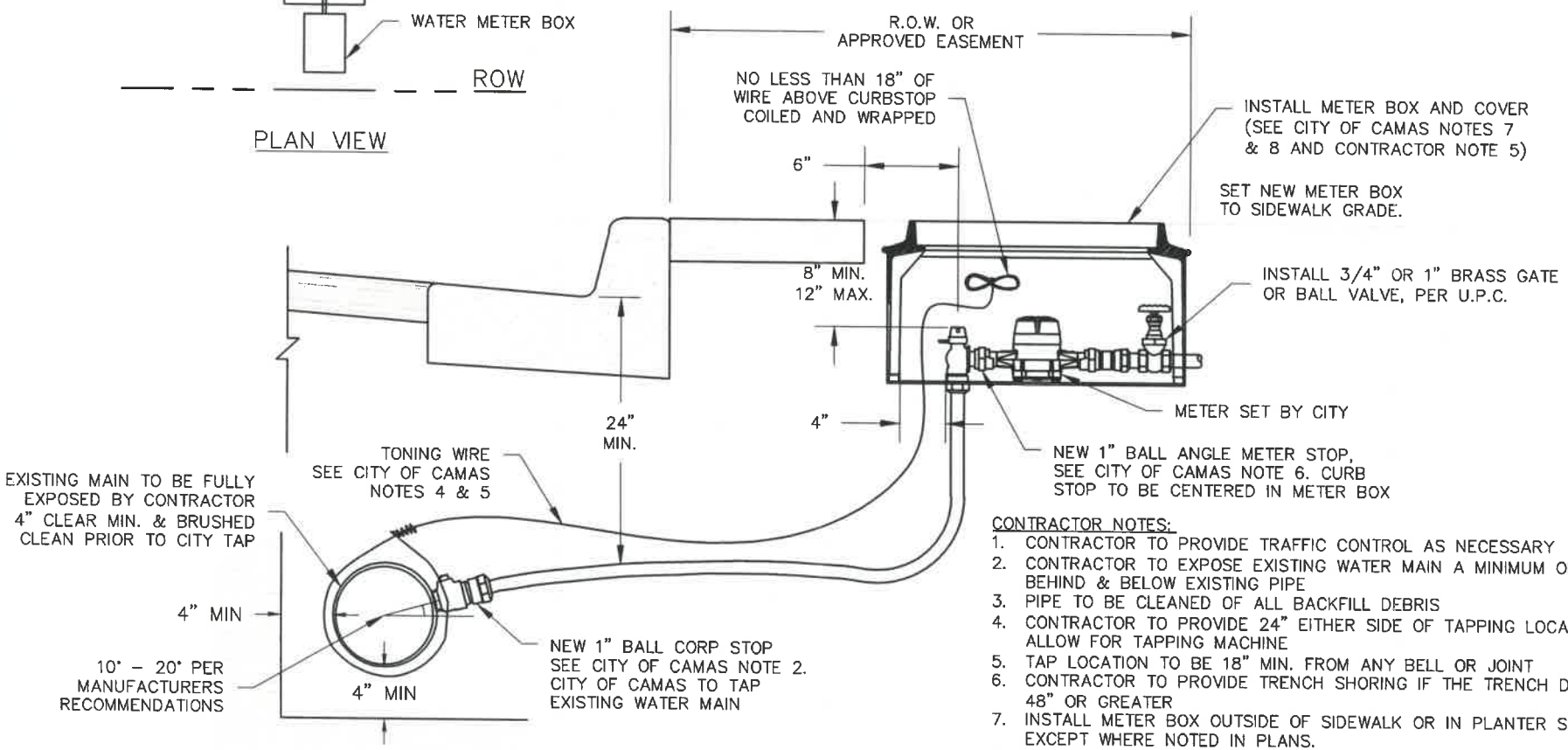
WTR–WS1 2019.DWG



PLAN VIEW

CITY OF CAMAS NOTES:

1. TAPPING OF THE EXISTING WATER MAIN IS TO BE PERFORMED BY THE CITY OF CAMAS.
2. CORP STOP SHALL BE 1" BALL CORP STOP, CC THREAD X COMPRESSION, WITH STIFFENER INSERT 6133T OR EQUIVALENT. PROVIDED AND INSTALLED BY THE CITY OF CAMAS
3. WATER SERVICE SHALL BE 1" CTS MUNICIPEX BLUE ASTM F876 SDR9, PROVIDED AND INSTALLED BY THE CITY OF CAMAS
4. TONING WIRE SHALL BE COPPERHEAD SUPERFLEX 12 AWG 45MIL BLUE HDPE INSULATION, NO SPLICES ALLOWED. PROVIDED AND INSTALLED BY THE CITY OF CAMAS.
5. SEAL TONING WIRE SPLICE CONNECTIONS WITH COPPERHEAD 12 AWG SNAKEBITE LOCKING CONNECTORS (TYP)
6. METER STOP SHALL BE 1" BALL ANGLE METER STOP, COMPRESSION X METER SWIVEL NUT, WITH STIFFENER INSERT 6133T OR EQUIVALENT. PROVIDED AND INSTALLED BY THE CITY OF CAMAS
7. METER BOX SHALL BE OLDCASTLE FIBRELYTE FL12BOX WITH NO MOUSE HOLES OR ARMORCAST ROTOCAST P6000485. CITY OF CAMAS TO PROVIDE METER BOX, CONTRACTOR TO INSTALL
8. COVER SHALL BE OLDCASTLE FIBRELYTE FL12D "WATER" OR ARMORCAST A6000484-H9 WITH OFFSET AMR RADIO READ ANTENNA HOLE FOR NEPTUNE METER. CITY OF CAMAS TO PROVIDE COVER, CONTRACTOR TO INSTALL.
9. WATER METER SHALL BE INSTALLED BY THE CITY OF CAMAS



PROFILE VIEW

CONTRACTOR NOTES:

1. CONTRACTOR TO PROVIDE TRAFFIC CONTROL AS NECESSARY
2. CONTRACTOR TO EXPOSE EXISTING WATER MAIN A MINIMUM OF 4" BEHIND & BELOW EXISTING PIPE
3. PIPE TO BE CLEANED OF ALL BACKFILL DEBRIS
4. CONTRACTOR TO PROVIDE 24" EITHER SIDE OF TAPPING LOCATION TO ALLOW FOR TAPPING MACHINE
5. TAP LOCATION TO BE 18" MIN. FROM ANY BELL OR JOINT
6. CONTRACTOR TO PROVIDE TRENCH SHORING IF THE TRENCH DEPTH IS 48" OR GREATER
7. INSTALL METER BOX OUTSIDE OF SIDEWALK OR IN PLANTER STRIP, EXCEPT WHERE NOTED IN PLANS.
8. SEE TRENCH SECTION DETAIL G2 FOR BACKFILL REQUIREMENTS.
9. SEE DETAIL G2A FOR LIMITS OF REQUIRED SURFACE RESTORATION

City of Camas WASHINGTON

WATER DETAIL

1" WATER SERVICE – INFILL LOT

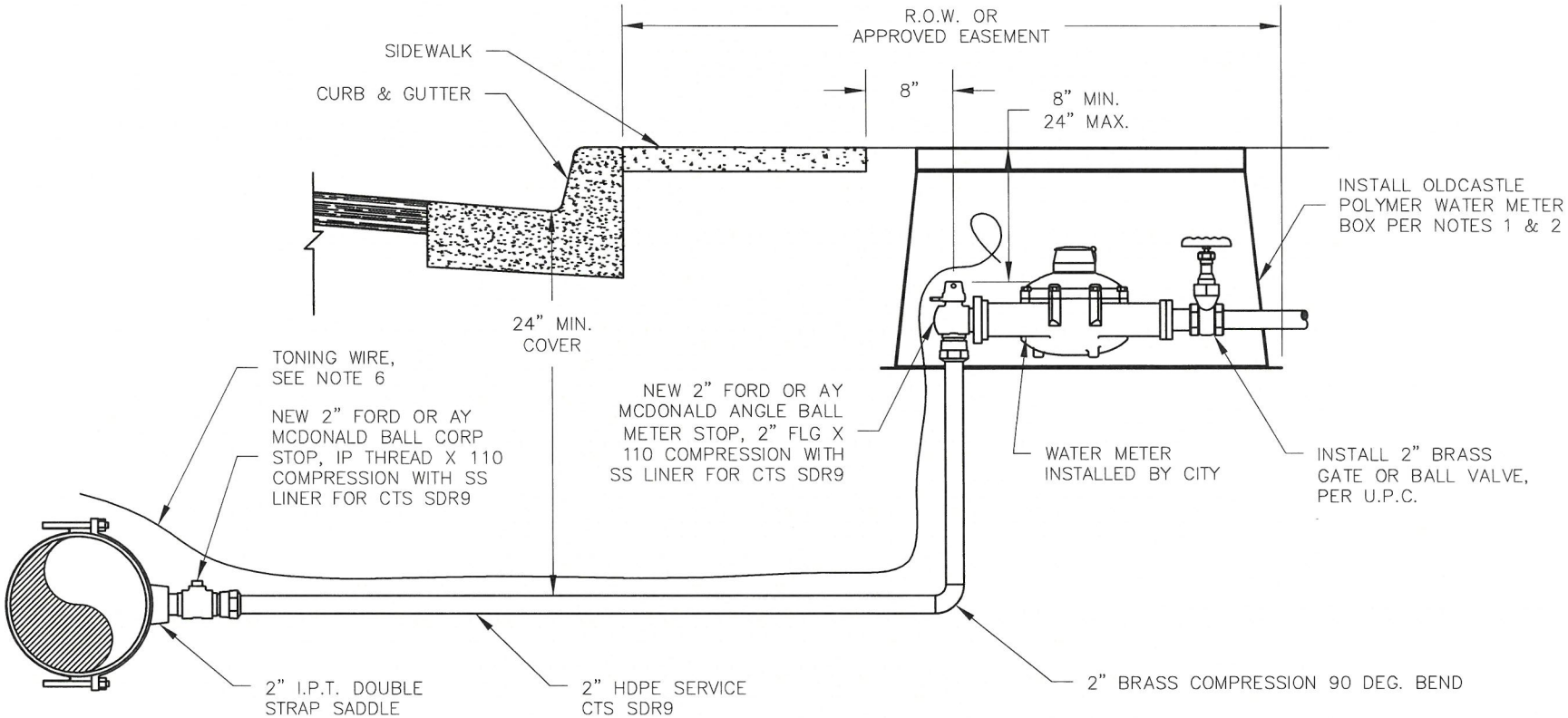
DETAIL APPROVED BY 7/6/2026 DATE

NOT TO SCALE

DETAIL NO. W5

REVISION: 3 DATE: 7/02/2026

WTR-WS1.DWG



NOTES:

1. METER BOX SHALL BE OLDCASTLE FIBRELYTE FL36BOX18. INSTALL FL36X6 OR FL36X8 BASE EXTENSIONS AS REQUIRED.
2. COVER SHALL BE OLDCASTLE FIBRELYTE FL36 P "WATER" WITH OFFSET AMR RADIO READ ANTENNA HOLE FOR NEPTUNE METER
3. REPLACE ALL SERVICES WHICH MEET ANY OF THE FOLLOWING CONDITIONS:
   - METER BOX IS RELOCATED
   - SUBSTANDARD EITHER BY MATERIALS OR LACK OF COVER
4. SEE TRENCH SECTION DETAILS G2 OR G3 FOR BACKFILL REQUIREMENTS.
5. AFTER FEES HAVE BEEN PAID WATER METER SHALL BE ORDERED AND INSTALLED BY THE CITY.
6. TONING WIRE IS REQUIRED AND SHALL BE COPPERHEAD SUPERFLEX 12 AWG 45MIL BLUE HDPE INSULATION, NO SPLICES ALLOWED.

City of Camas WASHINGTON

WATER DETAIL

2" WATER SERVICE

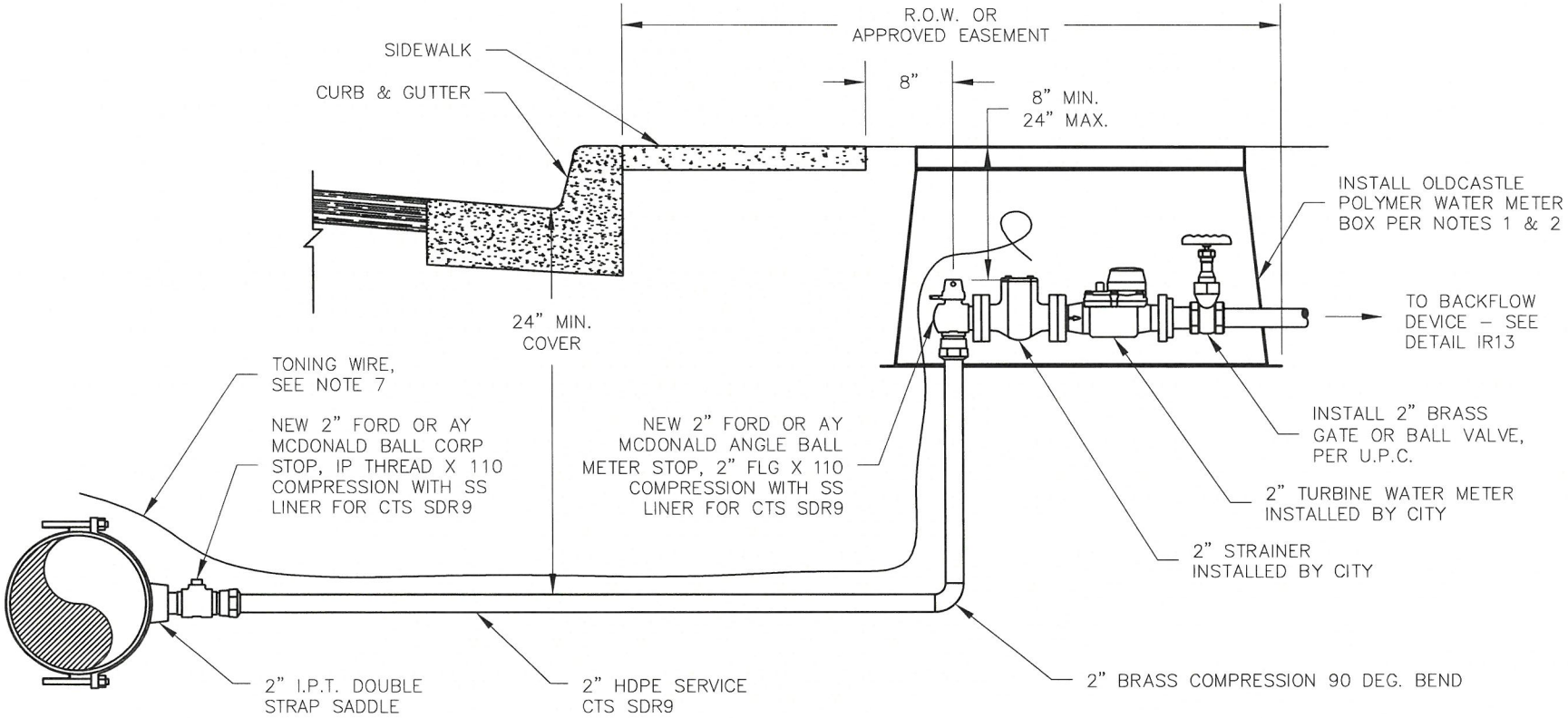
DETAIL APPROVED BY 5/20/24 DATE

NOT TO SCALE

DETAIL NO. W6

REVISION: 10 DATE: 05/20/2024

WTR-WS2.DWG



NOTES:

1. METER BOX SHALL BE OLDCASTLE FIBRELYTE FL36BOX18. INSTALL FL36X6 OR FL36X8 BASE EXTENSIONS AS REQUIRED.
2. COVER SHALL BE OLDCASTLE FIBRELYTE FL36 P "WATER" WITH OFFSET AMR RADIO READ ANTENNA HOLE FOR NEPTUNE METER
3. REPLACE ALL SERVICES WHICH MEET ANY OF THE FOLLOWING CONDITIONS:
   - METER BOX IS RELOCATED
   - SUBSTANDARD EITHER BY MATERIALS OR LACK OF COVER
4. SEE TRENCH SECTION DETAILS G2 OR G3 FOR BACKFILL REQUIREMENTS.
5. AFTER FEES HAVE BEEN PAID WATER METER SHALL BE ORDERED AND INSTALLED BY THE CITY.
6. 1-1/2" METER WILL REQUIRE A 2" X 1-1/2" REDUCER FITTING AND MAY REQUIRE ADDITIONAL METER BOX, OR SEPARATE VALVE BOX FOR GATE VALVE.
7. TONING WIRE IS REQUIRED AND SHALL BE COPPERHEAD SUPERFLEX 12 AWG 45MIL BLUE HDPE INSULATION, NO SPLICES ALLOWED.

City of Camas WASHINGTON

WATER DETAIL

2" WATER SERVICE FOR IRRIGATION

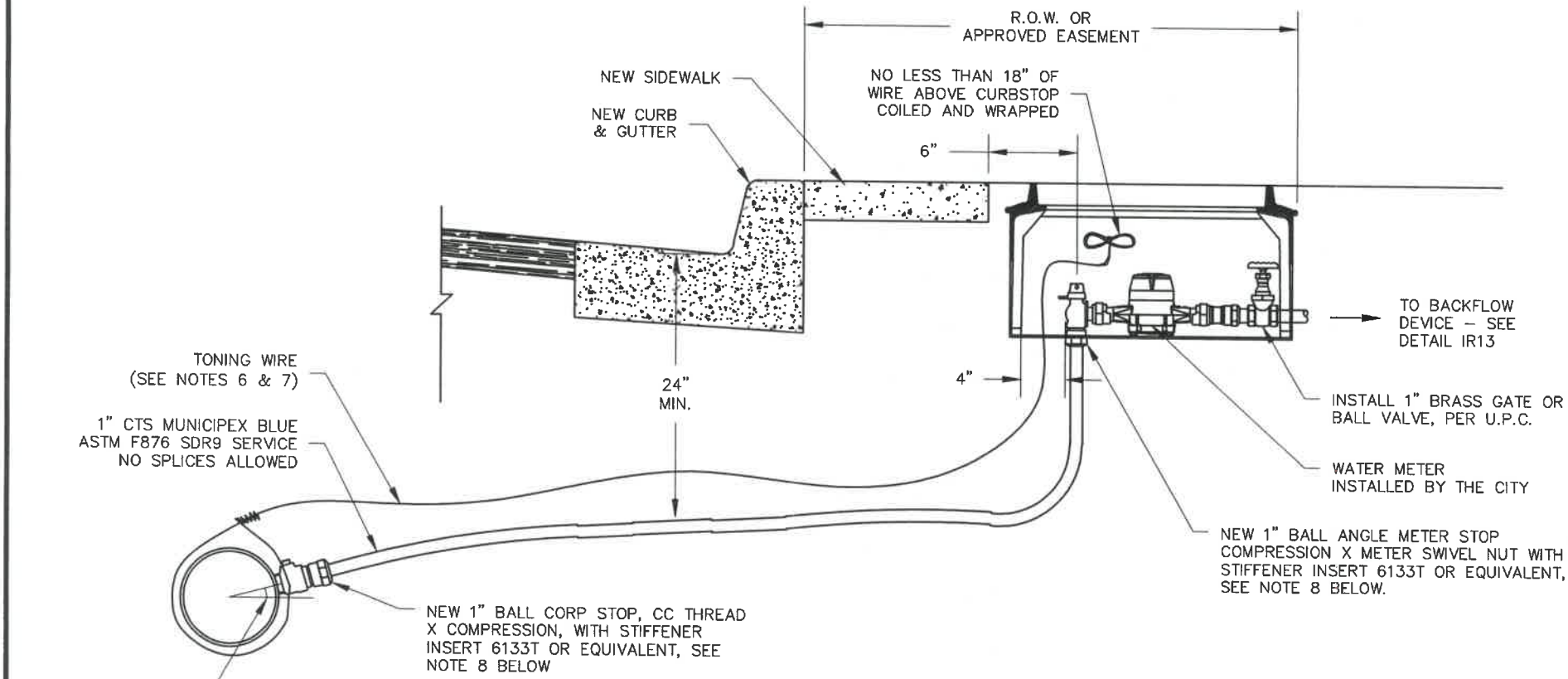
DETAIL APPROVED BY — DATE 5/20/24

NOT TO SCALE

DETAIL NO. W6A

REVISION: 4 DATE: 05/20/2024

WTR-WS2.DWG



NOTES:

1. METER BOX SHALL BE OLDCASTLE FIBRELYTE FL36BOX18. INSTALL FL36X6 OR FL36X8 BASE EXTENSIONS AS REQUIRED.
2. COVER SHALL BE OLDCASTLE FIBRELYTE FL36 P "WATER" WITH OFFSET AMR RADIO READ ANTENNA HOLE FOR NEPTUNE METER
3. REPLACE ALL SERVICES WHICH MEET ANY OF THE FOLLOWING CONDITIONS:
   - METER BOX IS RELOCATED
   - SUBSTANDARD EITHER BY MATERIALS OR LACK OF COVER
4. SEE TRENCH SECTION DETAILS G2 OR G3 FOR BACKFILL REQUIREMENTS.
5. AFTER FEES HAVE BEEN PAID WATER METER SHALL BE ORDERED AND INSTALLED BY THE CITY.
6. TONING WIRE IS REQUIRED AND SHALL BE COPPERHEAD SUPERFLEX 12 AWG 45MIL BLUE HDPE INSULATION, NO SPLICES ALLOWED.
7. SEAL TONING WIRE SPLICE CONNECTIONS WITH COPPERHEAD 12 AWG SNAKEBITE LOCKING CONNECTORS (TYPICAL).
8. PREFERRED BRASS FITTINGS TO BE USED, IN ORDER:
   1. FORD
   2. AY MCDONALD

City of Camas WASHINGTON

WATER DETAIL

1" WATER SERVICE FOR IRRIGATION

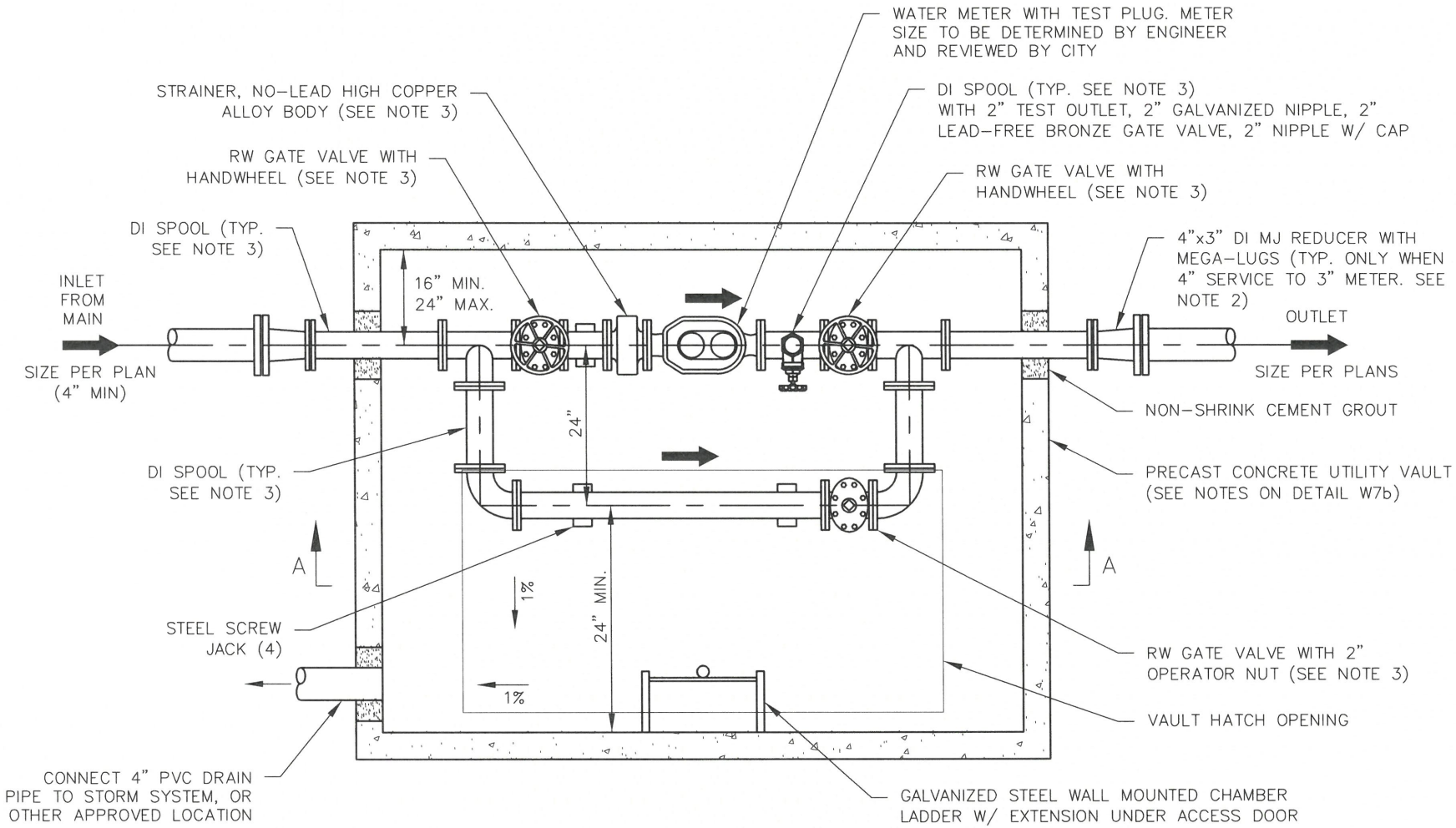
DETAIL APPROVED BY — DATE 7/6/2026

NOT TO SCALE

DETAIL NO. W6B

REVISION: 1 DATE: 7/02/2026

WTR-WS2.DWG



PLAN VIEW

WATER METER NOTES:

1. FOR NEW MAINS, INSTALL MAIN SIZE MJ x NEW SERVICE FL TEE (4" MIN). FOR EXISTING MAINS, LIVE TAP TO BE PERFORMED BY APPROVED TAPPING CONTRACTOR.
2. ALL COMPONENTS TO MATCH METER SIZE.
3. PROVIDE FLANGED CONNECTIONS FOR ALL JOINTS ON 3" DUCTILE IRON PIPE AND FITTINGS; FOR 4" AND BIGGER PROVIDE APPROVED JOINT RESTRAINT FOR ALL JOINTS.
4. CONSTRUCTION AND MAINTENANCE WITHIN VAULTS MAY BE SUBJECT TO CONFINED SPACE ENTRY PERMITTING REQUIREMENTS AND/OR SAFETY PRECAUTIONS.
5. WATER METER TO BE ORDERED, PAID, AND INSTALLED BY CONTRACTOR. BRAND AND TYPE TO BE APPROVED BY WATER DEPARTMENT.

City of Camas WASHINGTON

WATER DETAIL

3" – 8" WATER SERVICE

3-24-22

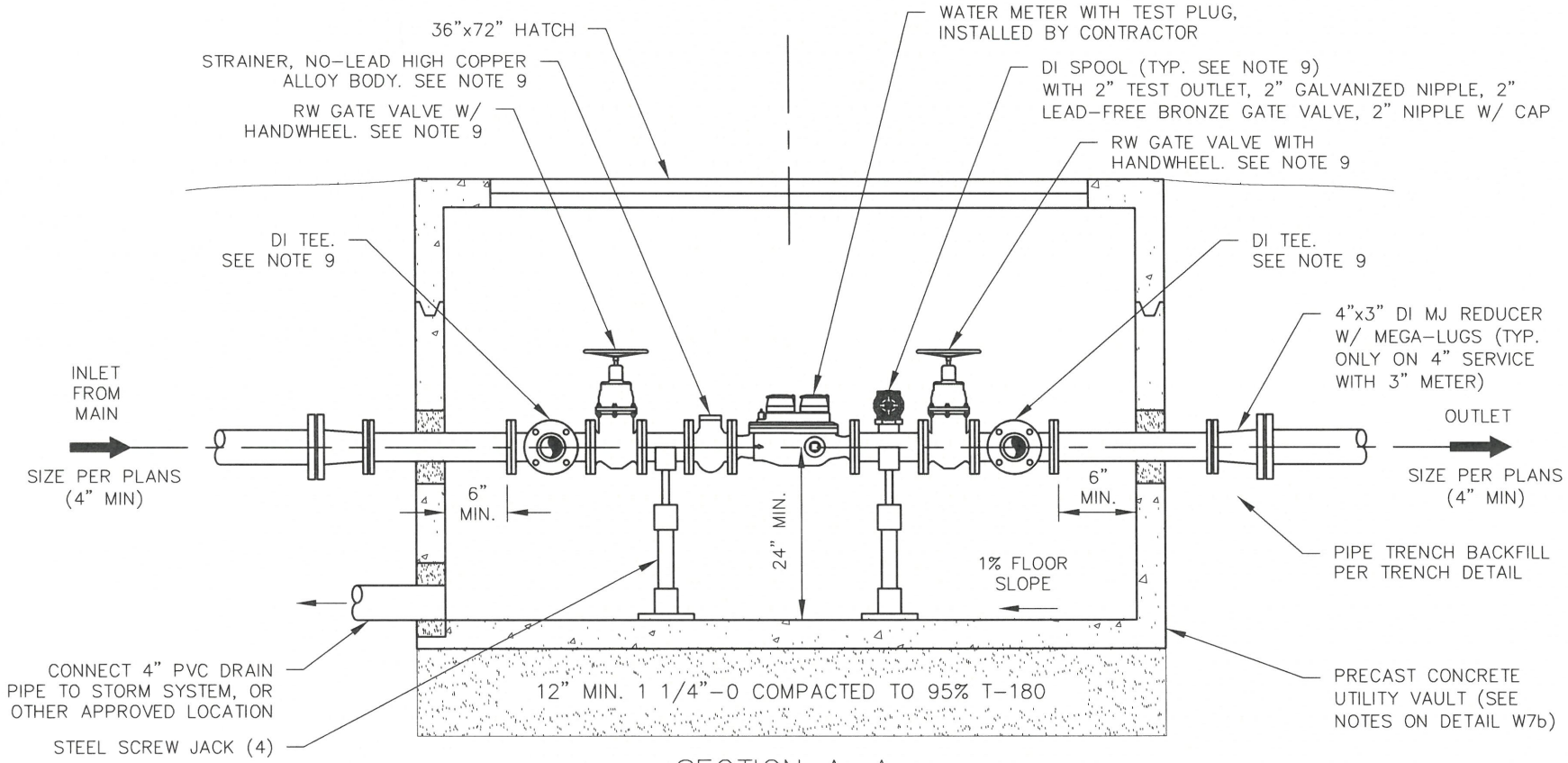
DETAIL APPROVED BY DATE

NOT TO SCALE

REVISION: 4 DATE: 03/22/2022

DETAIL NO. W7A

WTR-WS3.DWG



SECTION A-A

(BY-PASS LINE REMOVED FOR CLARITY)

VAULT CONSTRUCTION NOTES:

1. VAULT SHALL BE PRE-APPROVED PRIOR TO INSTALLATION.
2. VAULTS SHALL HAVE A MINIMUM OF 3' CLEARANCE FROM ALL STRUCTURES.
3. APPROVED VAULT SHALL BE RATED FOR H20 LOADING AND INCLUDE AN EXTENSION LADDER, MINIMUM INSIDE DIMENSIONS 8'Lx6'Wx5'H.
4. VAULT SHALL BE SET FOR 1% SLOPE TO DRAIN.
5. ALL BACKFILL SHALL BE APPROVED GRANULAR MATERIAL.
6. HATCH SHALL BE AN H20 RATED, 36"x72" SPRING ASSISTED, HOT DIPPED GALVANIZED DIAMOND PLATE DOUBLE DOOR. FOR TRAFFIC INSTALLATIONS A 30" MANHOLE LID SHALL BE USED INSTEAD OF A HATCH.
7. SUMP PUMP MAY BE REQUIRED ON INSTALLATIONS WHERE DRAIN PIPE CANNOT BE CONNECTED TO ADEQUATE STORM DRAIN SYSTEM. THE APPROVED SUMP PUMP SHALL BE A COMMERCIAL GRADE WATER POWERED VENTURI DESIGN WITH BACKFLOW PREVENTION, SIZED TO PROVIDE 10GPM AT 10 FEET OF HEAD AT THE AVAILABLE SYSTEM WATER PRESSURE. BACKFLOW DEVICE SHALL BE CERTIFIED BY WASHINGTON STATE CERTIFIED BACKFLOW TESTER AFTER INSTALLATION AND PRIOR TO ACCEPTANCE. TEST RESULTS SHALL BE SENT TO CITY OF CAMAS WATER DEPARTMENT.
8. CONSTRUCTION AND MAINTENANCE WITHIN VAULTS MAY BE SUBJECT TO CONFINED SPACE ENTRY PERMITTING REQUIREMENTS AND/OR SAFETY PRECAUTIONS.
9. PROVIDE FLANGED CONECTIONS FOR ALL JOINTS 3" DI PIPE AND FITTINGS; FOR 4" AND BIGGER PROVIDE APPROVED JOINT RESTRAINTS.

City of Camas WASHINGTON

WATER DETAIL

3" – 8" WATER SERVICE

Jim C. Carothers 3-24-22

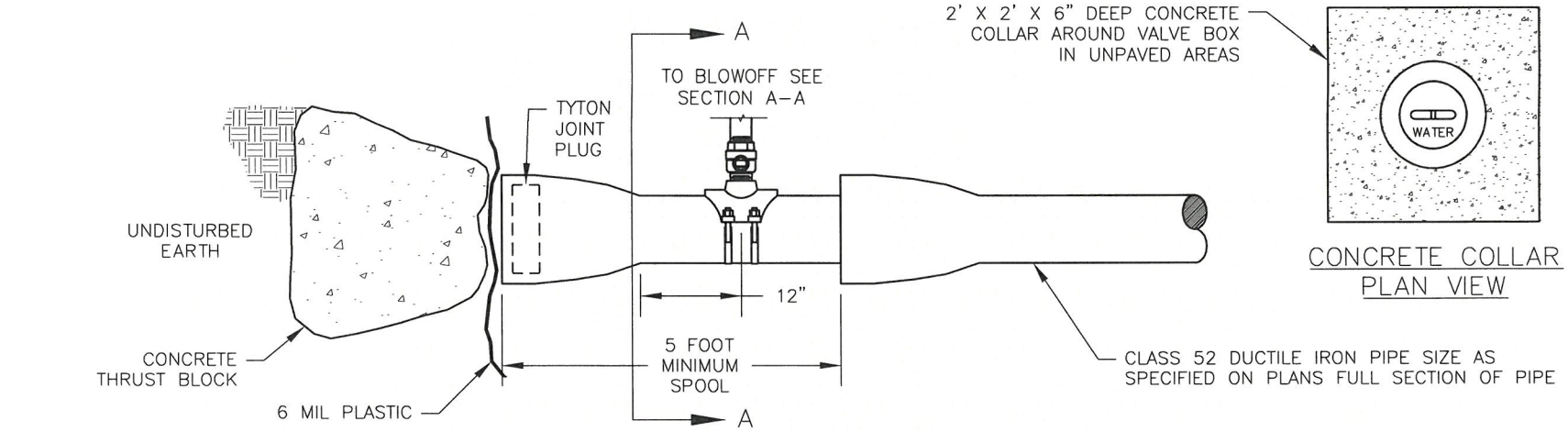
DETAIL APPROVED BY DATE

NOT TO SCALE

REVISION: 4 DATE: 03/22/2022

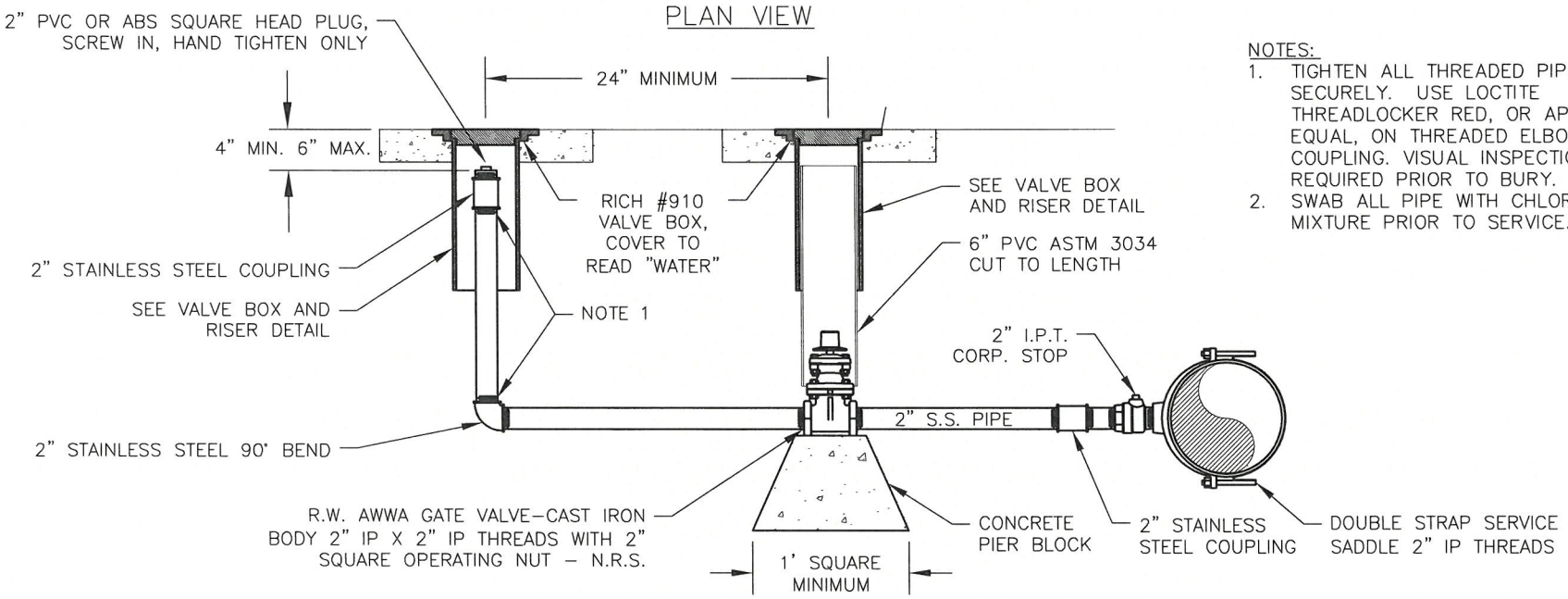
DETAIL NO. W7B

WTR-WS3.DWG



PLAN VIEW

CONCRETE COLLAR PLAN VIEW



SECTION A–A

NOTES:

1. TIGHTEN ALL THREADED PIPE JOINTS SECURELY. USE LOCTITE THREADLOCKER RED, OR APPROVED EQUAL, ON THREADED ELBOW AND COUPLING. VISUAL INSPECTION REQUIRED PRIOR TO BURY.
2. SWAB ALL PIPE WITH CHLORINE MIXTURE PRIOR TO SERVICE.

City of Camas WASHINGTON

WATER DETAIL

2" STANDARD BLOWOFF

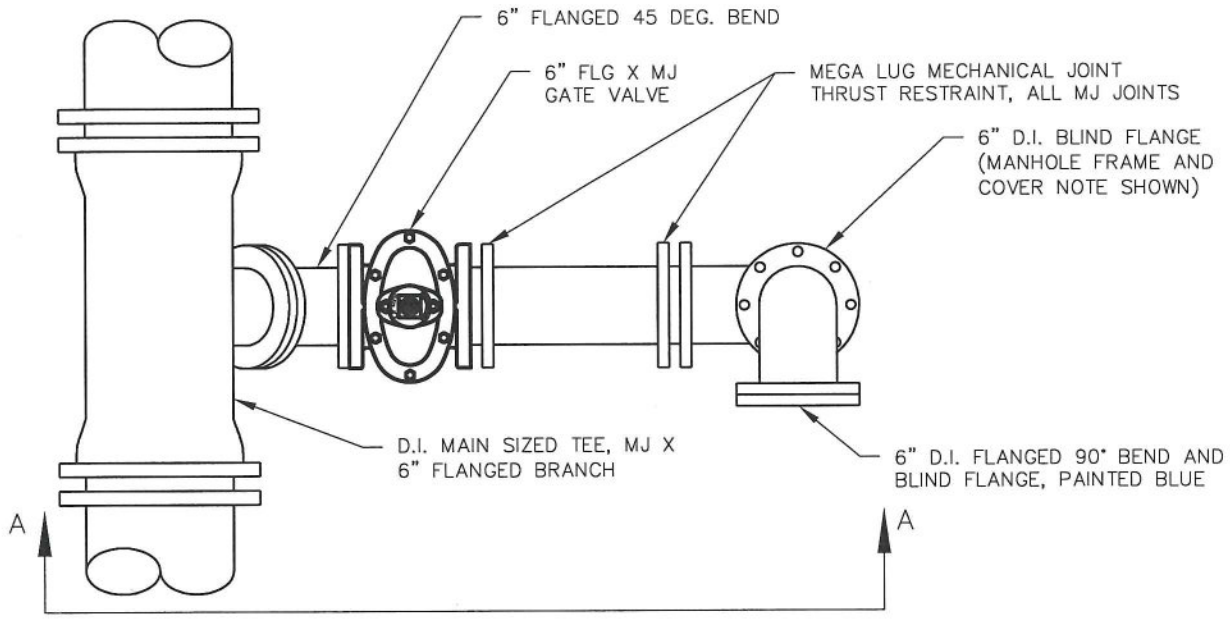
DETAIL APPROVED BY — DATE 1/3/24

NOT TO SCALE

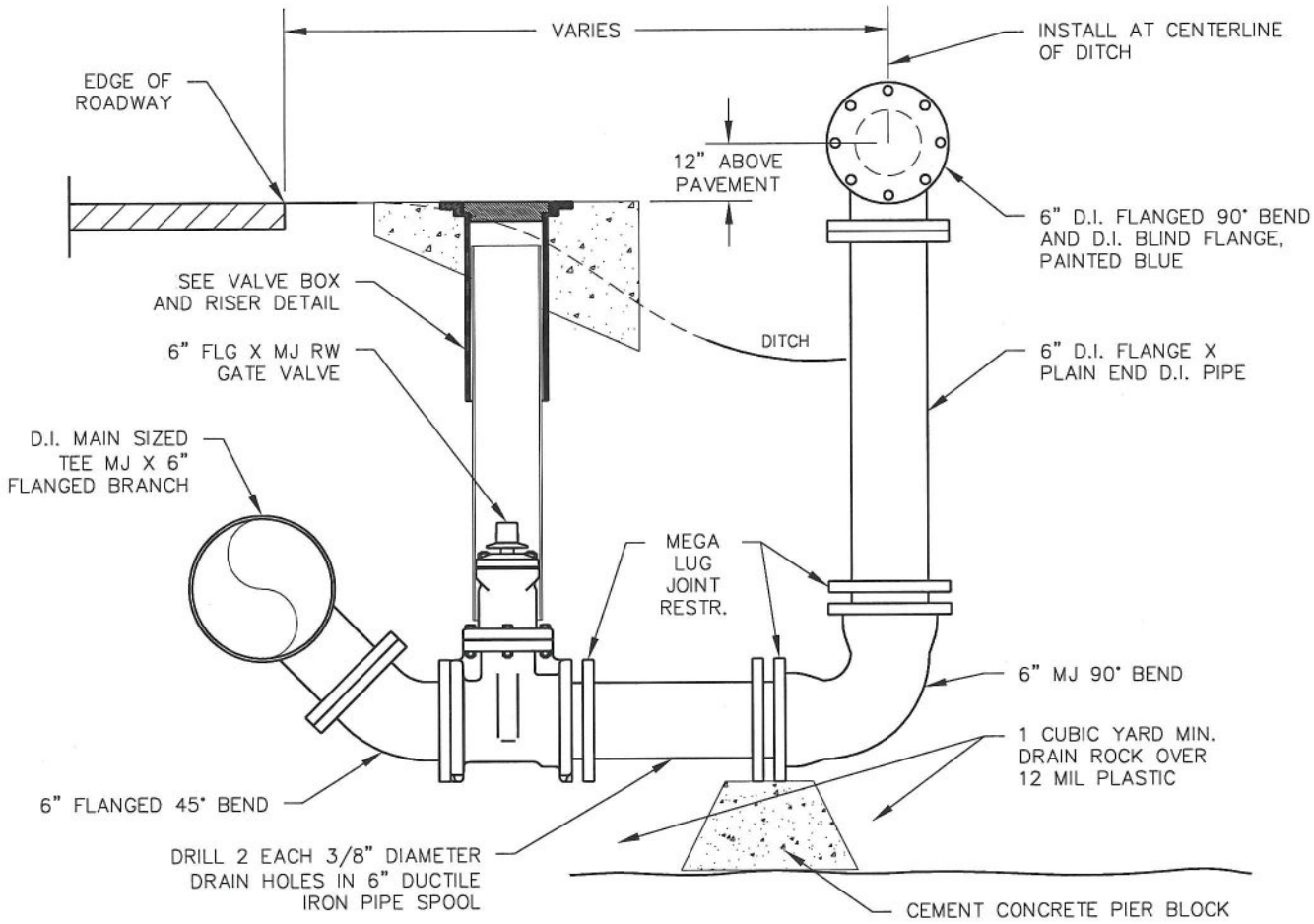
DETAIL NO. W8

REVISION: 7 DATE: 01/02/2024

WTR–BLOWOFF.DWG



PLAN VIEW



SECTION VIEW A–A

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC

CITY OF CAMAS ~ WATER DETAIL

6" LOW POINT BLOW OFF – DITCH

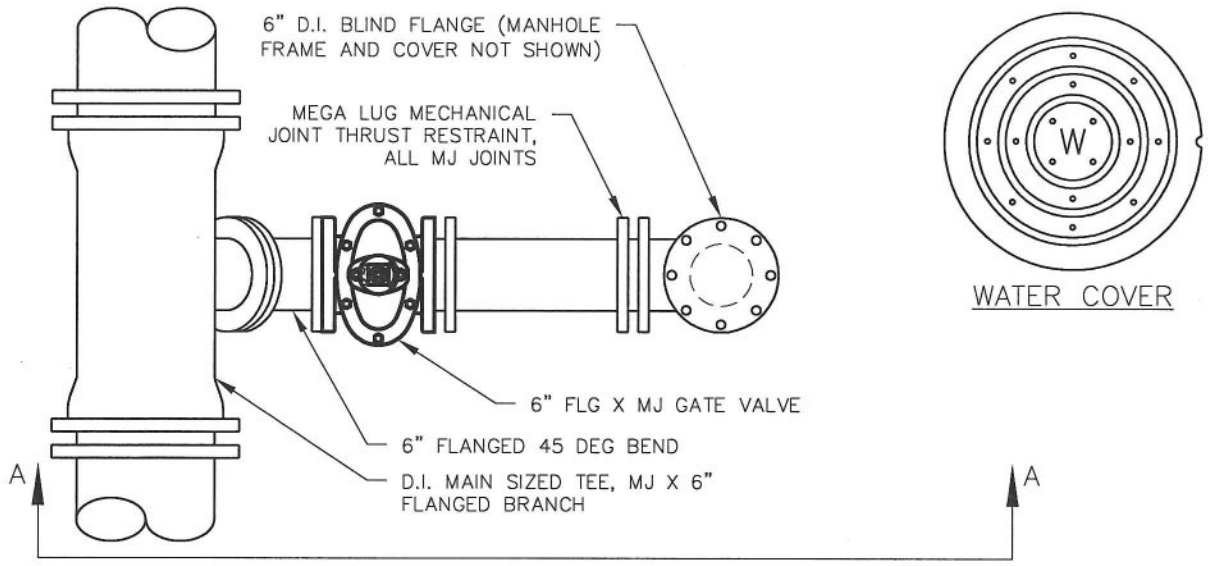
Jim E. Carothers 1-4-11

DETAIL APPROVED BY DATE

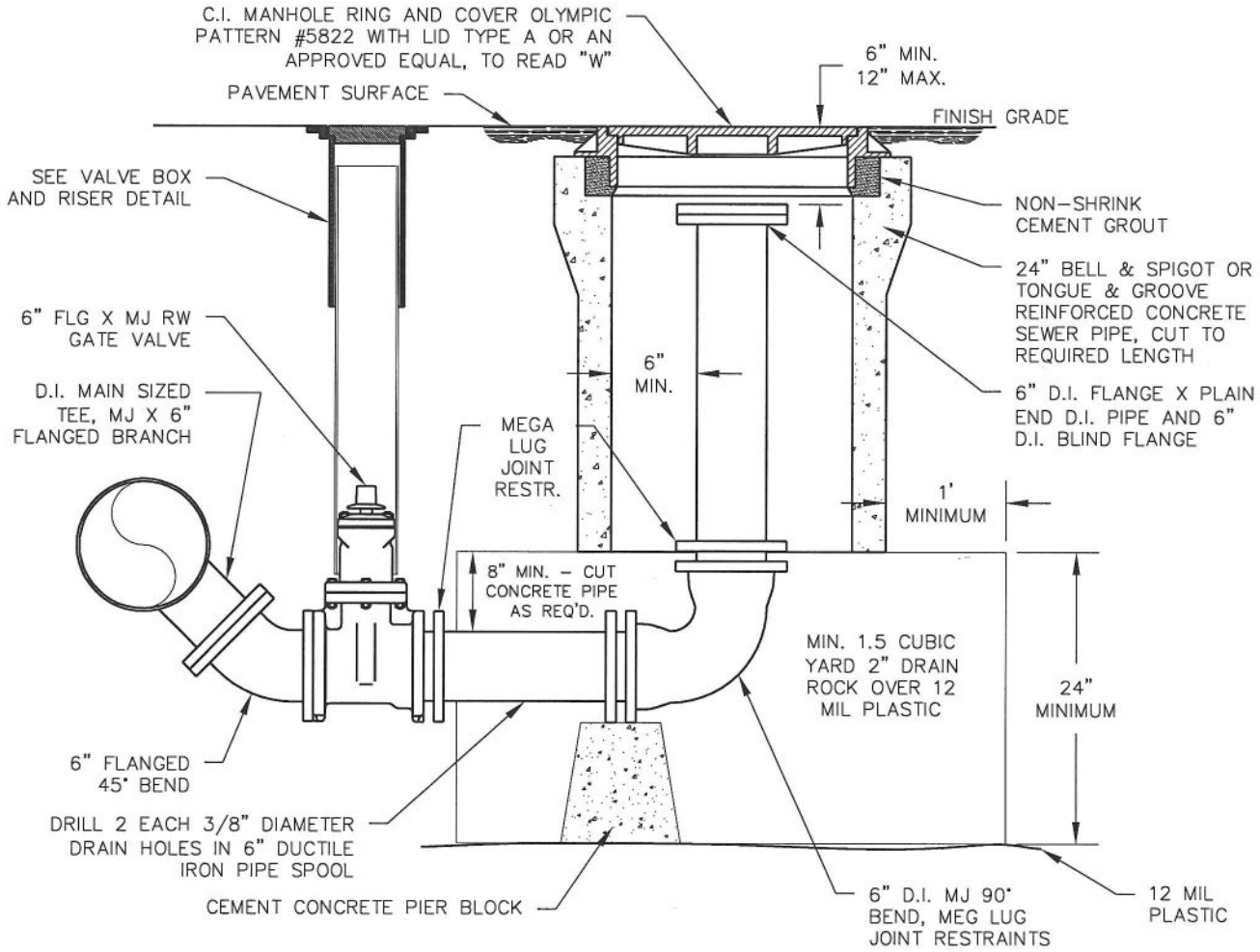
NOT TO SCALE

DETAIL NO. W9

WTR–6BLOWOFF.DWG



PLAN VIEW



SECTION VIEW A–A

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC

CITY OF CAMAS ~ WATER DETAIL

6" LOW POINT BLOW OFF – STREET

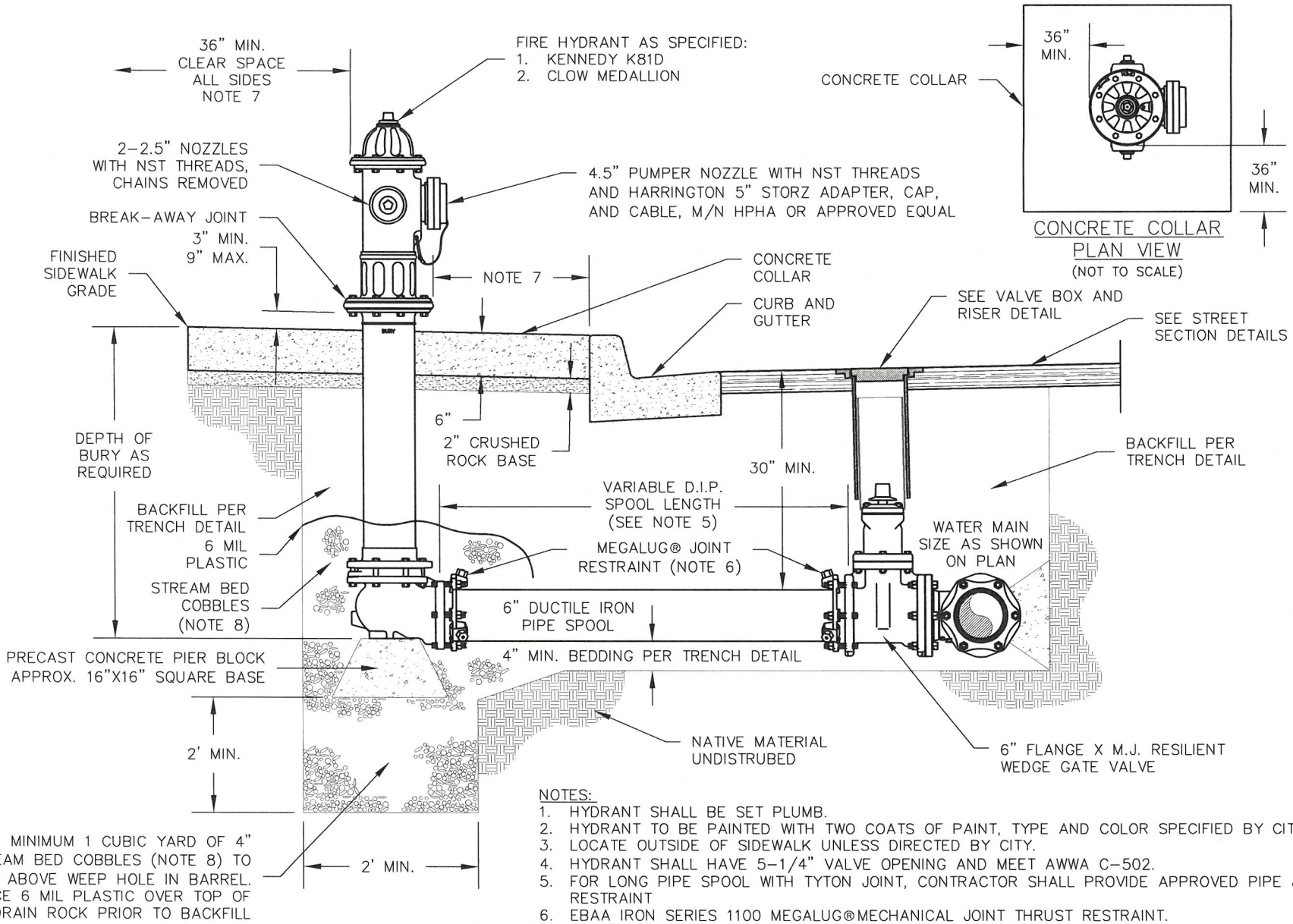
1-4-11

DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO. W10

WTR-6BLOWOFF.DWG



NOTES:

1. HYDRANT SHALL BE SET PLUMB.
2. HYDRANT TO BE PAINTED WITH TWO COATS OF PAINT, TYPE AND COLOR SPECIFIED BY CITY.
3. LOCATE OUTSIDE OF SIDEWALK UNLESS DIRECTED BY CITY.
4. HYDRANT SHALL HAVE 5-1/4" VALVE OPENING AND MEET AWWA C-502.
5. FOR LONG PIPE SPOOL WITH TYTON JOINT, CONTRACTOR SHALL PROVIDE APPROVED PIPE JOINT RESTRAINT
6. EBAA IRON SERIES 1100 MEGALUG®MECHANICAL JOINT THRUST RESTRAINT.
7. 36" MINIMUM CLEARANCE ON ALL SIDES (MAY INCLUDE SIDEWALK), 20" MINIMUM ONLY ON CURB SIDE
8. 4 INCH STREAM BED COBBLES PER WSDOT SPEC WSDOT 9-03.11(2)

City of Camas WASHINGTON

WATER DETAIL

FIRE HYDRANT

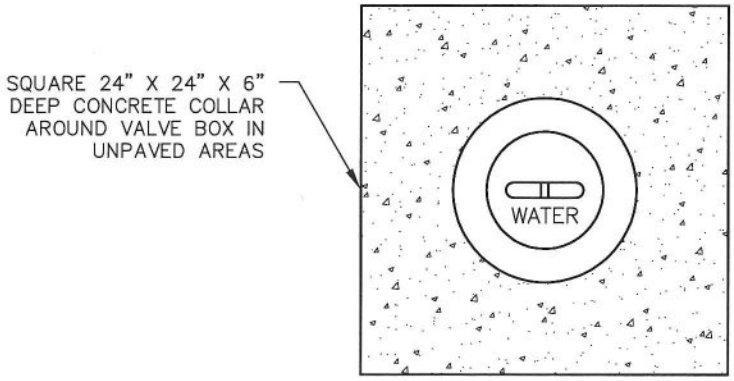
DETAIL APPROVED BY 1/3/24 DATE

NOT TO SCALE

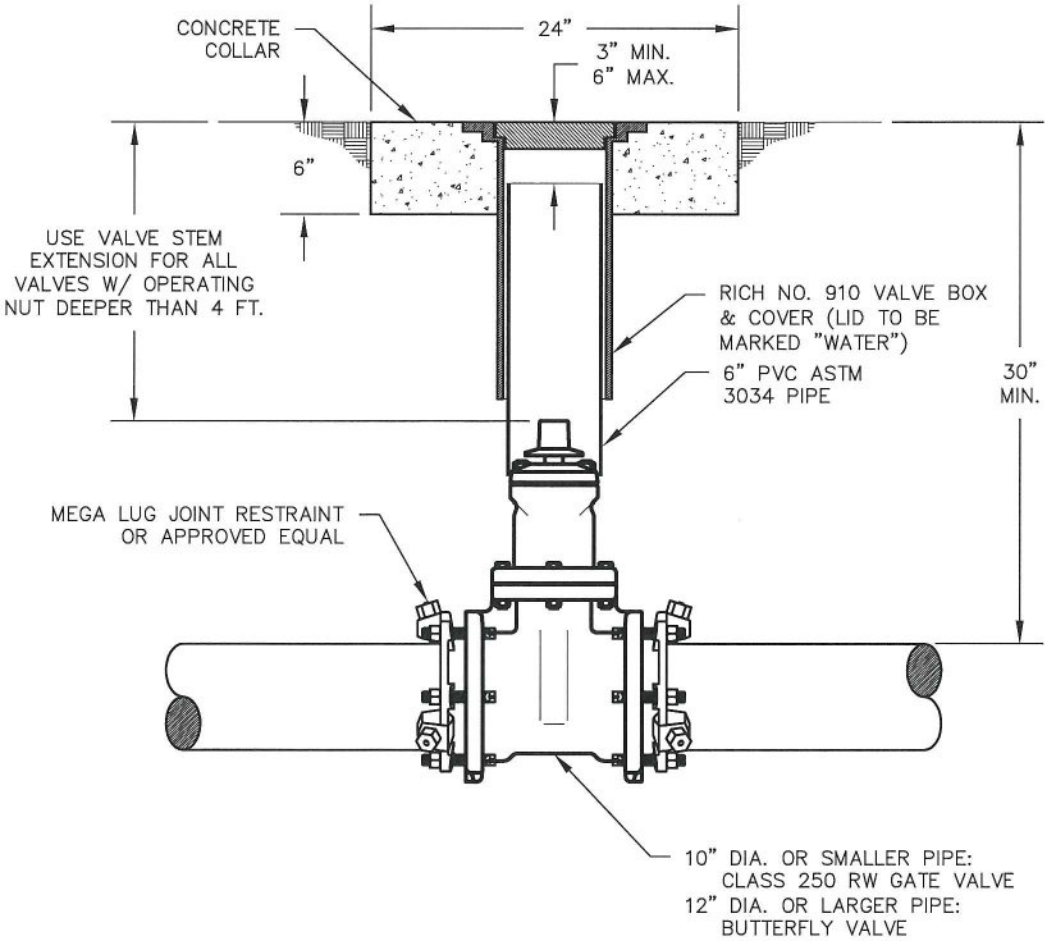
DETAIL NO. W11

REVISION: 8 DATE: 01/02/2024

WTR-FHYD.DWG



CONCRETE COLLAR PLAN VIEW



REV. NO.	DATE	BY	APPR.
1	7/17/06	SCD	RES1076
2	5/1/07	SCD	JC
3	1/1/11	SCD	JC
4	10/21/14	SCD	JC

CITY OF CAMAS ~ WATER DETAIL

VALVE BOX AND RISER

10-21-14

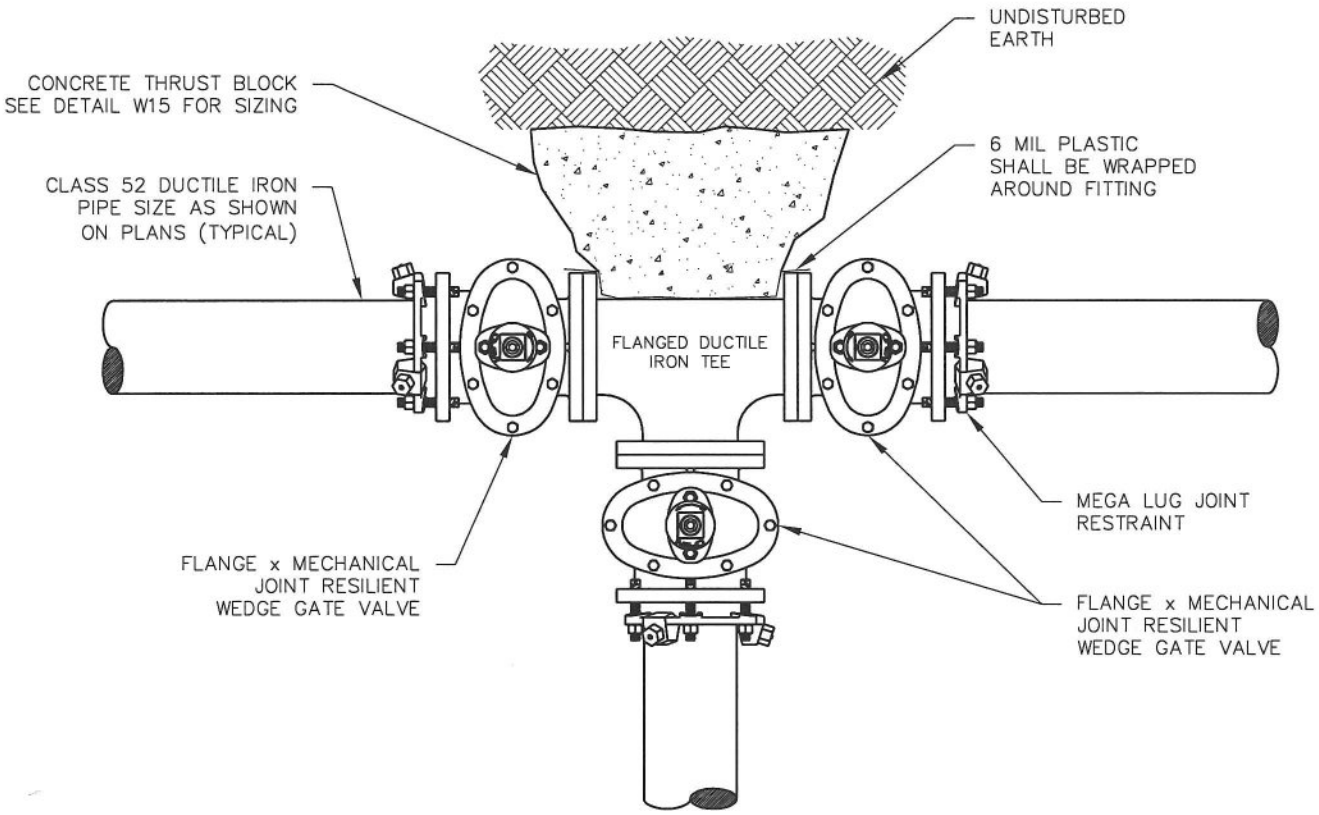
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

W12

WTR-RISER.DWG



NOTES:

1. VALVES TO BE INSTALLED AT ALL BRANCHES. FOR LONG MAIN LINE RUNS, INLINE VALVE SPACING NOT TO EXCEED 500'. LOOP WATER SYSTEM WHEREVER POSSIBLE. KEEP DEAD ENDS TO A MINIMUM.
2. MECHANICAL THRUST RESTRAINT MAY BE USED DUE TO UNSTABLE SOILS OR THE ENGINEER'S DISCRETION.
3. SEE DETAIL W15 FOR THRUST BLOCK REQUIREMENTS.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC

CITY OF CAMAS ~ WATER DETAIL

WATER MAIN LINE AND VALVE

Jim E. Carothers 1-4-11

DETAIL APPROVED BY DATE

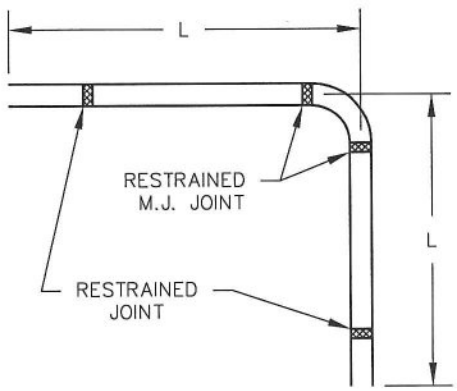
NOT TO SCALE

DETAIL NO.

W13

WTR-VALVE.DWG

FOR HORIZONTAL BENDS:



MINIMUM REQUIRED PIPE LENGTHS FOR RESTRAINED JOINTS

BEND IN DEGREES	PIPE DIAMETER 6"	8"	10"	12"
90°	25'	33'	39'	45'
45°	10'	13'	16'	19'
22 1/2°	5'	6'	8'	9'
11 1/2°	3'	3'	4'	4'

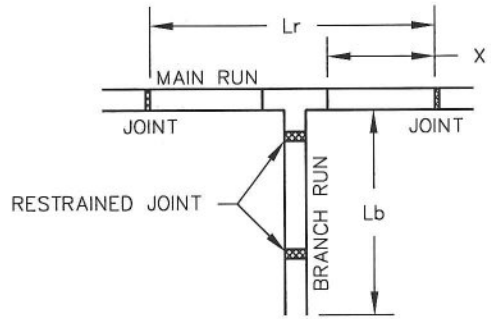
NOTE: CHART USES WORKING PRESSURE OF 200 PSI

FOR PRESSURES OTHER THAN 200 PSI USE:

$$\frac{(L) \times (PRESSURE)}{200}$$

NOTE:
FIELD–LOCK GASKETS ARE APPROVED FOR RESTRAINED JOINT INSTALLATION.

FOR TEES:



MINIMUM REQUIRED PIPE LENGTHS FOR RESTRAINED JOINTS

FOR 6" TEES USE FORMULA
Lb= 50 – 1.63 (Lr)

WHERE:
Lb= THE MINIMUM REQUIREDRESTRAINED PIPE (IN FEET)ON THE BRANCH LINE
Lr= THE TOTAL LENGTH (IN FEET) BETWEEN THE FIRST JOINTS ON EITHER SIDE OF THE TEE ON THE MAIN RUN.

NOTE:
CONDITIONS TO BE FIELD VERIFIED BY ENGINEER.

IF (X) IS LESS THAN 5 FEET THEN PIPE MUST BE RESTRAINED TWO FULL LENGTHS.

FOR 8" TEE USE FORMULA
Lb= 64 – 1.65(Lr)

FOR 12" TEE USE FORMULA
Lb= 90 –1.67(Lr)

REV. NO.	DATE	BY	APPR.
1	7/17/06	SCD	RES1071
2	5/1/07	SCD	JC
3	1/1/11	SCD	JC

CITY OF CAMAS ~ WATER DETAIL

PIPE JOINT RESTRAINT

1-4-11

DETAIL APPROVED BY DATE

NOT TO SCALE

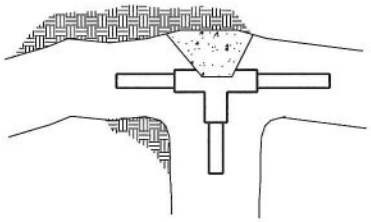
DETAIL NO.

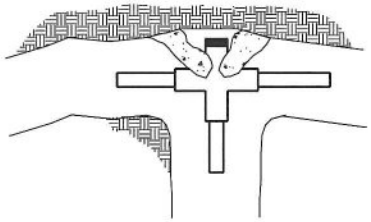
W14

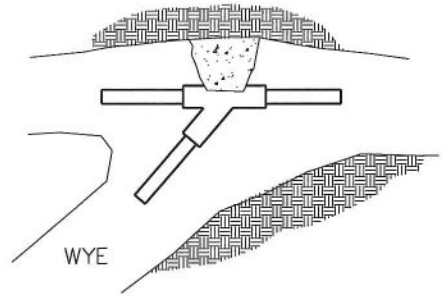
WTR–THRUST.DWG

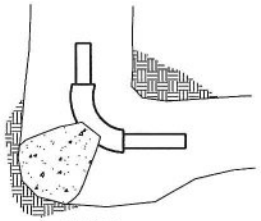
FITTING SIZE	TEE, WYE, PLUG OR CAP	90° BEND PLUGGED CROSS	TEE PLUGGED ON RUN		45° BEND	22 1/2° BEND	11 1/2° BEND
			A1	A2			
4	1.0	1.4	1.9	1.4	1.0	--	--
6	2.1	3.0	4.3	3.0	1.6	1.0	--
8	3.8	5.3	7.6	5.4	2.9	1.5	1.0
10	5.9	8.4	11.8	8.4	4.6	2.4	1.2
12	8.5	12.0	17.0	12.0	6.6	3.4	1.7
14	11.5	16.3	23.0	16.3	8.9	4.6	2.3
16	15.0	21.3	30.0	21.3	11.6	6.0	3.0
18	19.0	27.0	38.0	27.0	14.6	7.6	3.8
20	23.5	33.3	47.0	33.3	18.1	9.4	4.7
24	34.0	48.0	68.0	48.0	26.2	13.6	6.8

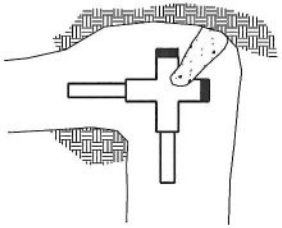
NOTES:
1. CONCRETE THRUST BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH
2. KEEP CONCRETE CLEAR OF JOINTS AND ACCESSORIES.
3. THE REQUIRED THRUST BEARING AREAS FOR SPECIAL CONNECTIONS ARE SHOWN ENCIRCLED ON THE PLANS. e.g. (15) INDICATES 15 SQUARE FEET BEARING AREA REQUIRED.
4. IF NOT SHOWN ON PLANS THE REQUIRED BEARING AREAS AT FITTINGS SHALL BE AS INDICATED IN TABLE, ADJUSTED IF NECESSARY, TO CONFORM TO THE TEST PRESSURE(S) AND ALLOWED SOIL BEARING STRESS(ES) STATED IN THE SPECIAL SPECIFICATIONS.
5. BEARING AREAS AND SPECIAL BLOCKING DETAILS SHOWN ON PLANS TAKE PRECEDENCE OVER BEARING AREAS AND BLOCKING DETAILS SHOWN ON THIS STANDARD DETAIL.
6. ALL FITTINGS SHALL BE WRAPPED IN 6 MIL PLASTIC PRIOR TO THRUST BLOCK PLACEMENT MAKING SURE THE BOLTS AND NUTS ARE PROTECTED.
7. THRUST BLOCKS SHALL BE GIVEN 72 HOURS TO SET UP PRIOR TO PRESSURIZING LINE OR AS DIRECTED BY CITY INSPECTOR.


TEE


PLUGGED CROSS


WYE


BEND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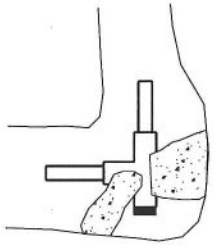
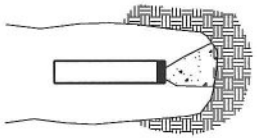

PLUGGED TEE


PLUG OR CAP

NOTES:
1. ABOVE BEARING AREAS BASED ON TEST PRESSURE OF 150 PSI AND AN ALLOWABLE SOIL BEARING STRESS OF 2,000 LBS. PER SQUARE FOOT.
2. TO COMPUTE BEARING AREAS FOR DIFFERENT TEST PRESSURES AND SOIL BEARING STRESSES USE THE FOLLOWING EQUATION:
   BEARING AREA=(TEST PRESSURE/150)x(2000/SOIL BEARING STRESS)x(TABLE VALUE)
3. EACH AREA IS 1/2 OF REQUIRED TOTAL AREA

REV. NO.	DATE	BY	APPR.
1	7/17/06	SCD	RES1071
2	5/1/07	SCD	JC
3	1/1/11	SCD	JC

CITY OF CAMAS ~ WATER DETAIL

THRUST BLOCKS

Jan E. Carothers 1-4-11

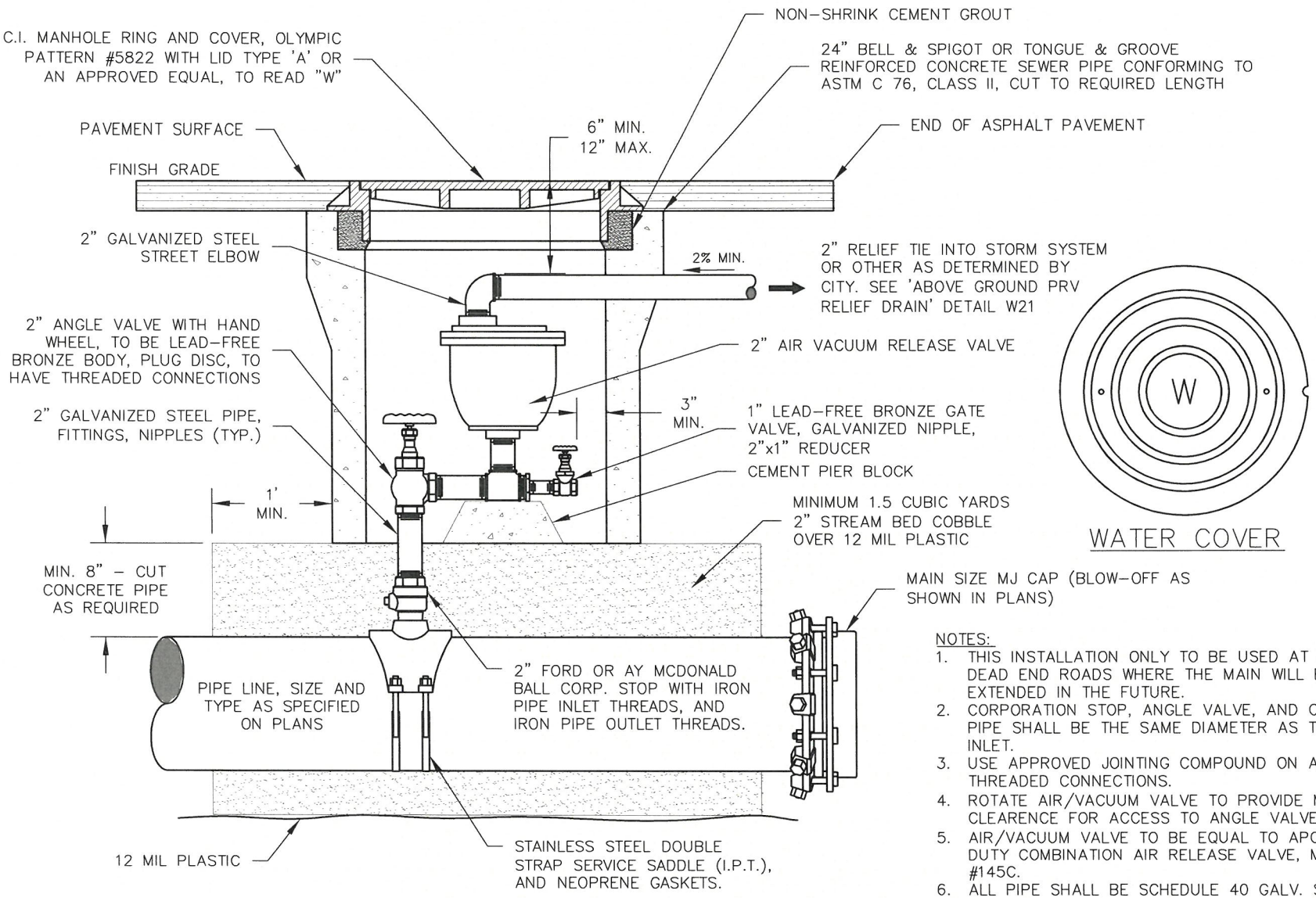
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

W15

WTR-THRUST.DWG



NOTES:

1. THIS INSTALLATION ONLY TO BE USED AT HIGH-POINT DEAD END ROADS WHERE THE MAIN WILL BE EXTENDED IN THE FUTURE.
2. CORPORATION STOP, ANGLE VALVE, AND CONNECTING PIPE SHALL BE THE SAME DIAMETER AS THE AIR INLET.
3. USE APPROVED JOINTING COMPOUND ON ALL THREADED CONNECTIONS.
4. ROTATE AIR/VACUUM VALVE TO PROVIDE MAXIMUM CLEARENCE FOR ACCESS TO ANGLE VALVE.
5. AIR/VACUUM VALVE TO BE EQUAL TO APCO HEAVY DUTY COMBINATION AIR RELEASE VALVE, MODEL #145C.
6. ALL PIPE SHALL BE SCHEDULE 40 GALV. STEEL PIPE CONFORMING TO ASTM A 120.
7. DETAILS SHOWN ON THE PLANS TAKE PRECEDENCE OVER THIS STANDARD DETAIL.
8. AIR/VAC ASSEMBLY MAY BE LOCATED ADJACENT TO MAIN LOCATION AT THE DISCRETION OF ENGINEER.

City of Camas WASHINGTON

WATER DETAIL

2" AIR/VACUUM RELEASE VALVE

1/3/24

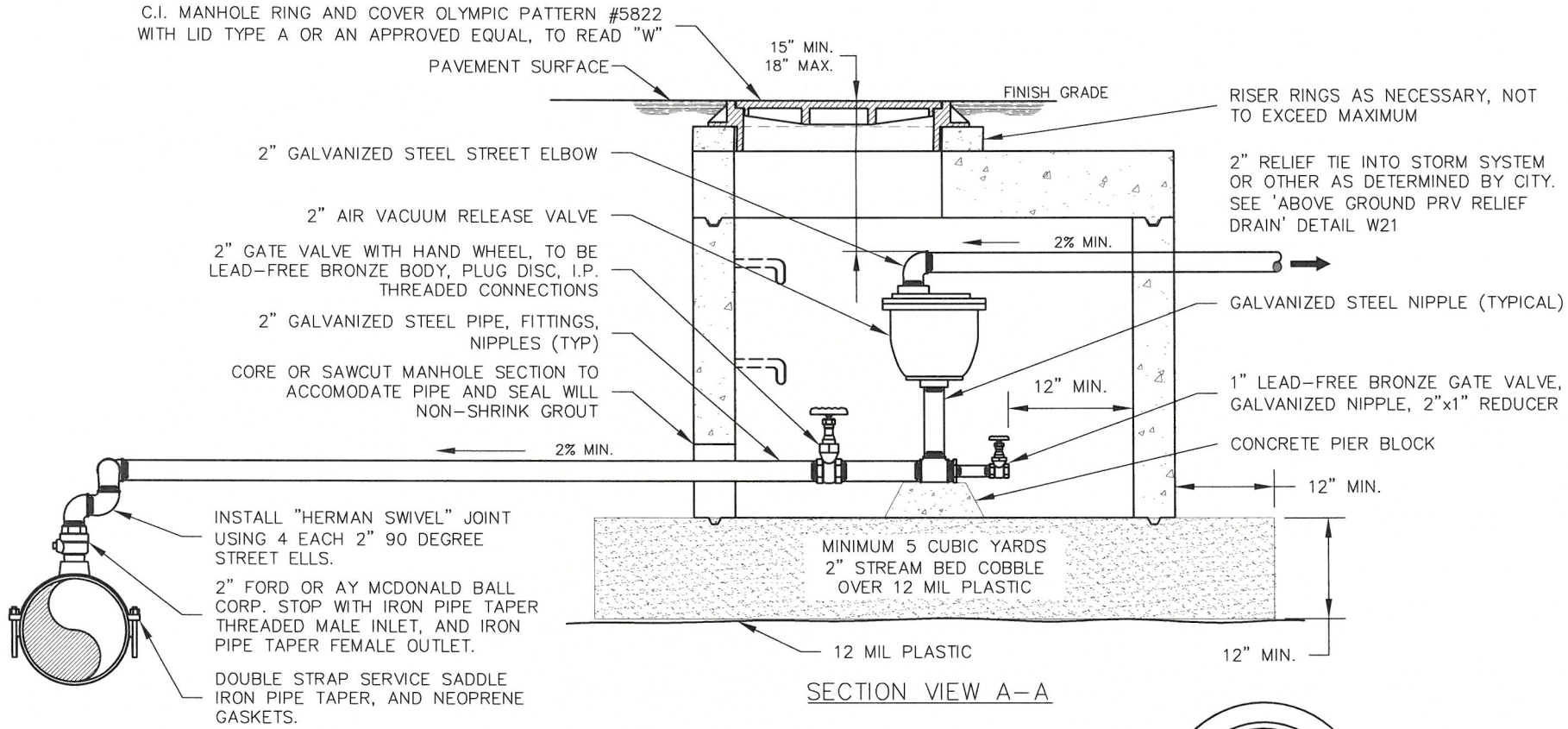
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO. W16

REVISION: 7 DATE: 01/02/2024

WTR-2VACVLV.DWG



WATER NOTES:

1. MANHOLE SECTION SHALL BE LOCATED WITHIN ONE TRAVEL LANE WITH MANHOLE FRAME CENTERED IN THE TRAVEL LANE.
2. CORPORATION STOP, GATE VALVE, AND CONNECTING PIPE SHALL BE THE SAME DIAMETER AS THE AIR INLET.
3. USE APPROVED JOINTING COMPOUND ON ALL THREADED CONNECTIONS.
4. LOCATE AIR/VACUUM VALVE TO PROVIDE MAXIMUM CLEARANCE FOR ACCESS TO GATE VALVE.
5. AIR/VACUUM VALVE TO BE EQUAL TO APCO HEAVY DUTY COMBINATION AIR RELEASE VALVE, MODEL #145C.
6. ALL PIPE SHALL BE SCHEDULE 40 GALVANIZED STEEL PIPE CONFORMING TO ASTM A 120.
7. DETAILS SHOWN ON THE PLANS TAKE PRECEDENCE OVER THIS STANDARD DETAIL.
8. AIR/VAC ASSEMBLY MAY BE LOCATED ADJACENT TO MAIN LOCATION AT THE DISCRETION OF ENGINEER.
9. MANHOLES SHALL CONFORM TO ASTM C-478.
10. NON-SHRINK GROUT SHALL BE USED BETWEEN FRAME, RISER RINGS, AND MANHOLE.
11. 3" TALL FRAME IS STANDARD, 7" TALL FRAME (NOT SHOWN) IS OPTIONAL.
12. ANY COMBINATION OF RISER RING THICKNESS, GROUT, AND FRAME SHALL BE USED TO ACHIEVE THE 12" MAXIMUM DEPTH FROM FINISH GRADE TO TOP OF CONE OR FLAT TOP.

City of Camas WASHINGTON

WATER DETAIL

2" AIR/VACUUM RELEASE VALVE IN 48" MANHOLE

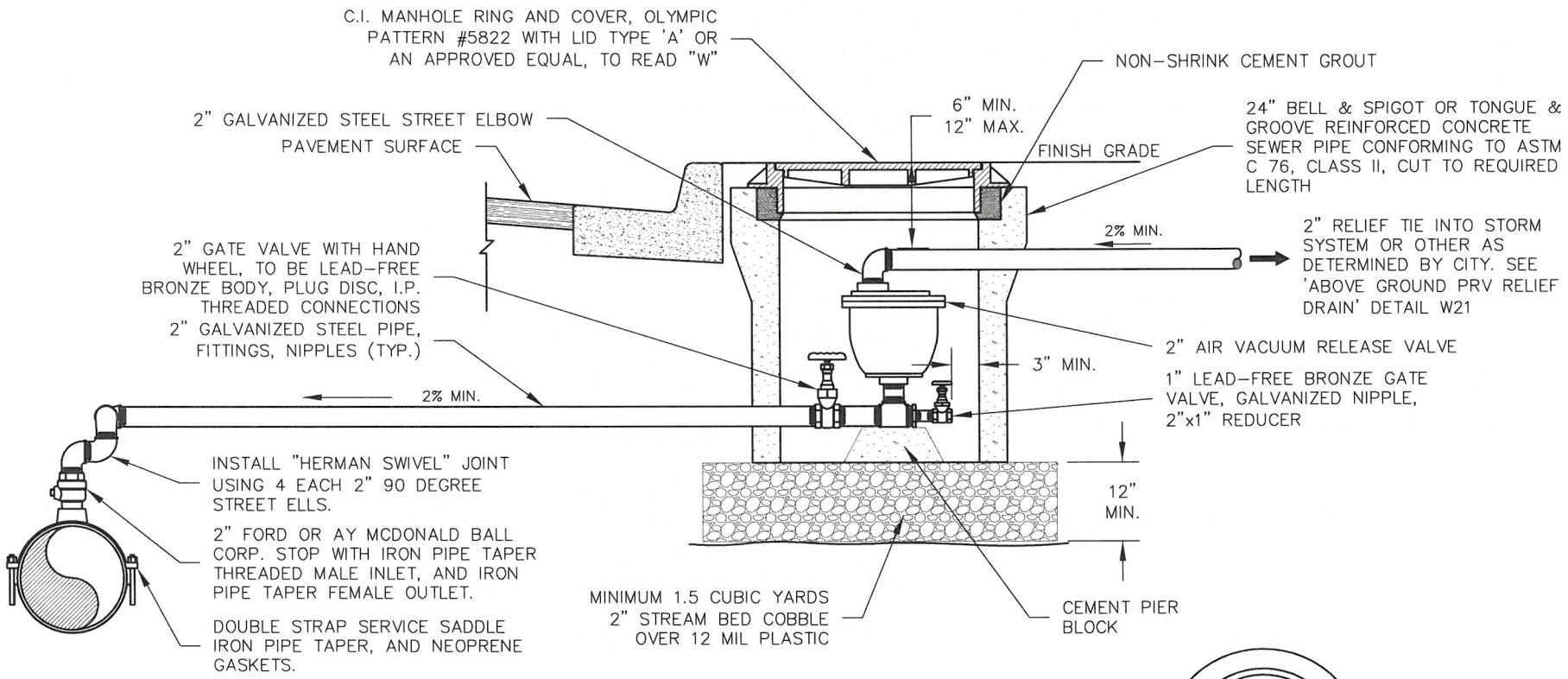
DETAIL APPROVED BY 1/3/24 DATE

NOT TO SCALE

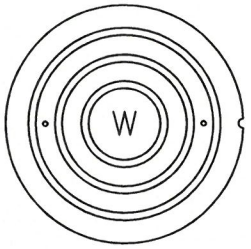
DETAIL NO. W17

REVISION: 4 DATE: 01/02/2024

WTR-2VACVLV.DWG



SECTION VIEW A–A



WATER COVER

WATER NOTES:

1. AIR/VACUUM VAULT SHALL BE LOCATED WITHIN THE PLANTER STRIP OR BEHIND THE SIDEWALK. PART OF THE MANHOLE COVER MAY BE IN THE SIDEWALK IF NEEDED.
2. CORPORATION STOP, GATE VALVE, AND CONNECTING PIPE SHALL BE THE SAME DIAMETER AS THE AIR INLET.
3. USE APPROVED JOINTING COMPOUND ON ALL THREADED CONNECTIONS.
4. LOCATE AIR/VACUUM VALVE TO PROVIDE MAXIMUM CLEARANCE FOR ACCESS TO GATE VALVE.
5. AIR/VACUUM VALVE TO BE EQUAL TO APCO HEAVY DUTY COMBINATION AIR RELEASE VALVE, MODEL #145C.
6. ALL PIPE SHALL BE SCHEDULE 40 GALVANIZED STEEL PIPE CONFORMING TO ASTM A 120.
7. DETAILS SHOWN ON THE PLANS TAKE PRECEDENCE OVER THIS STANDARD DETAIL.
8. AIR/VAC ASSEMBLY MAY BE LOCATED ADJACENT TO MAIN LOCATION AT THE DISCRETION OF ENGINEER.

City of Camas WASHINGTON

WATER DETAIL

2" AIR/VACUUM RELEASE VALVE OUTSIDE OF CURB

1/3/24

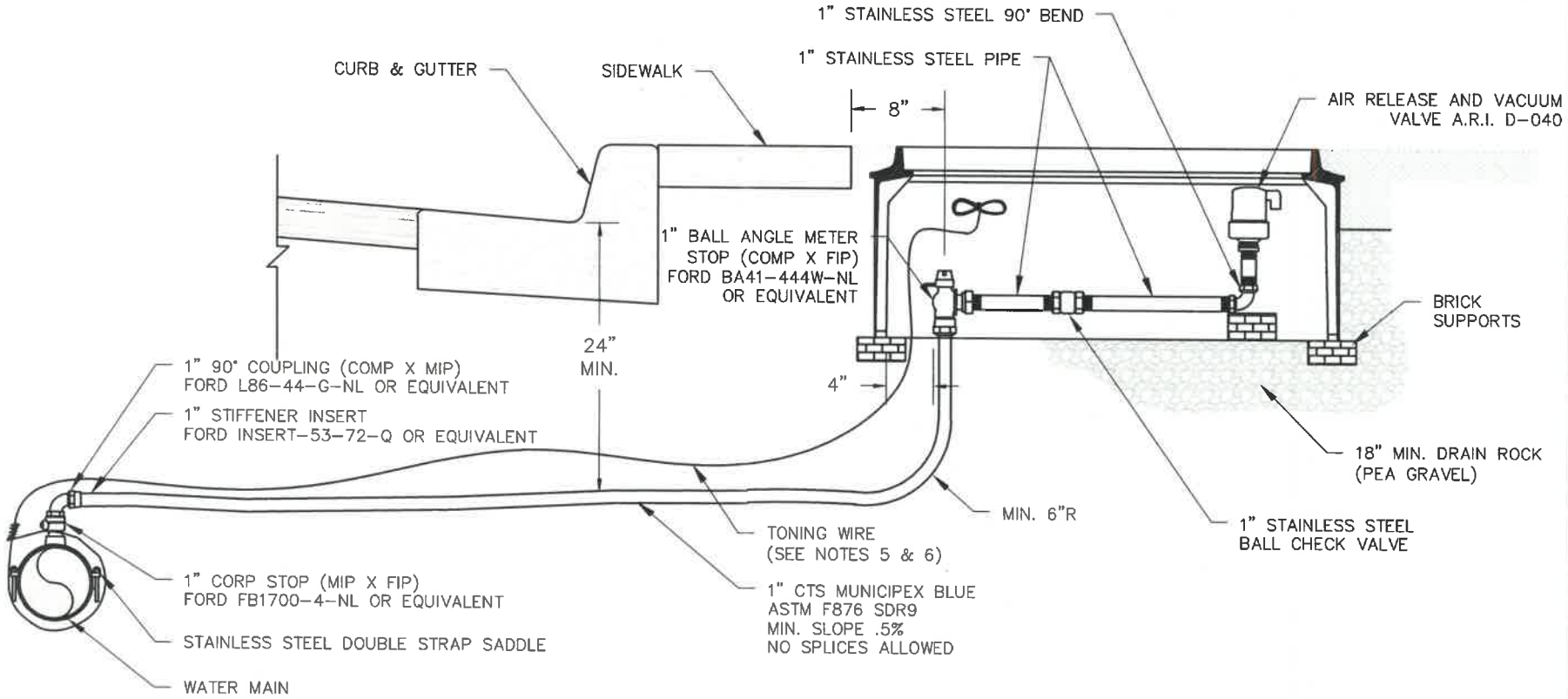
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO. W17A

REVISION: 4 DATE: 01/02/2024

WTR-2VACVLV.DWG



NOTES:

1. METER BOX SHALL BE OLDCASTLE FIBRELYTE FL36BOX WITH NO MOUSE HOLES.
2. COVER SHALL BE OLDCASTLE FIBRELYTE FL36 FLUSH SOLID "WATER"
3. INSTALL METER BOX OUTSIDE OF SIDEWALK OR IN PLANTER STRIP, EXCEPT WHERE NOTED IN PLANS.
4. SEE TRENCH SECTION DETAILS G2 OR G3 FOR BACKFILL REQUIREMENTS.
5. TONING WIRE SHALL BE COPPERHEAD SUPERFLEX 12 AWG 45MIL BLUE HDPE INSULATION, NO SPLICES ALLOWED.
6. SEAL TONING WIRE SPLICE CONNECTIONS WITH COPPERHEAD 12 AWG SNAKEBITE LOCKING CONNECTORS (TYPICAL).
7. NEW WATER MAINS REQUIRE TONING WIRE TO A LOCATE STATION
8. TONING WIRE FROM MAIN TO SERVICE REQUIRES A SNAKEBITE LOCKING CONNECTOR
9. PREFERRED BRASS FITTINGS TO BE USED, IN ORDER:
    1. FORD
    2. AY MCDONALD

City of Camas WASHINGTON

WATER DETAIL

1" AIR RELEASE AND VACUUM VALVE ASSEMBLY (FOR 6" AND 8" WATER MAINS)

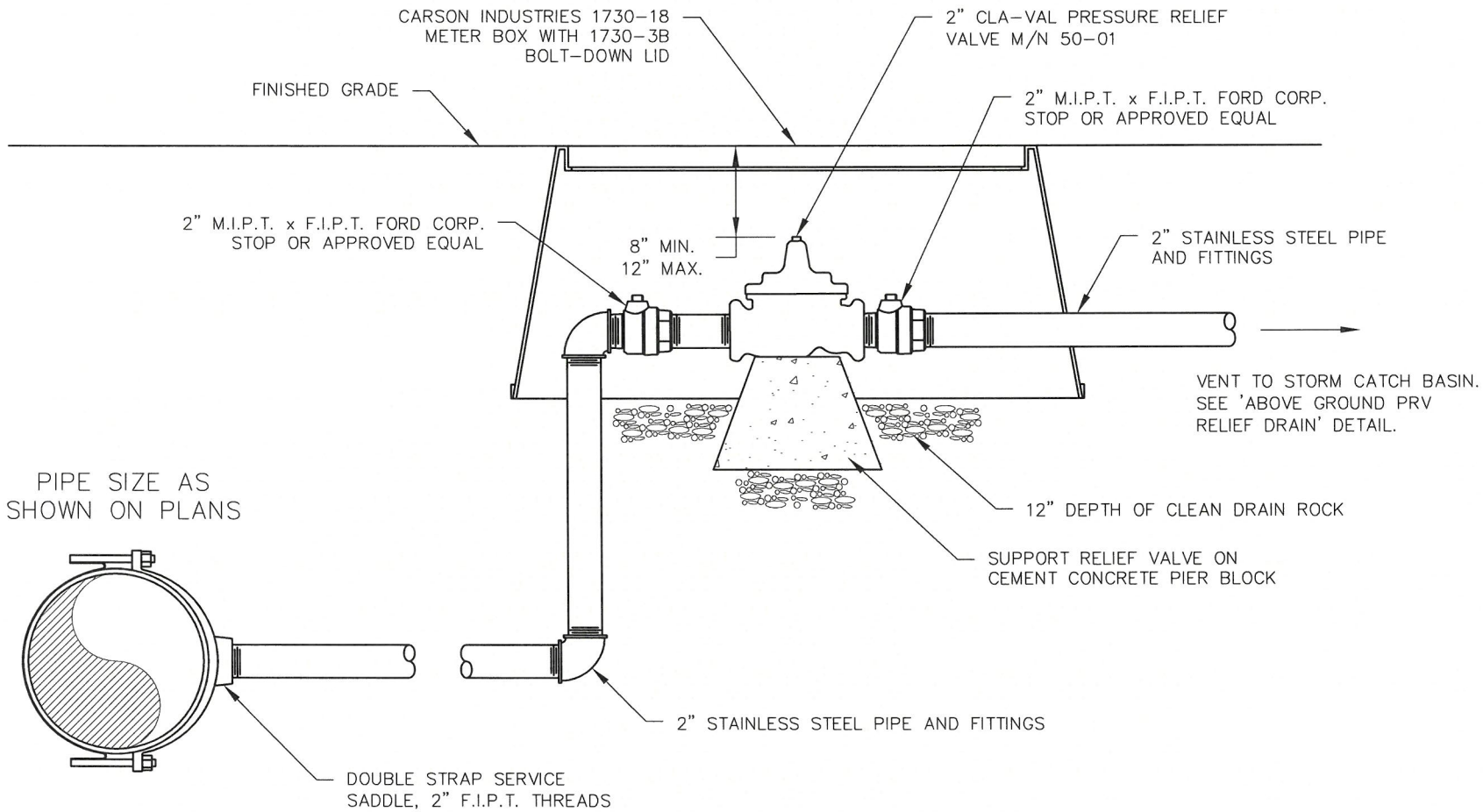
DETAIL APPROVED BY — DATE 7/6/2026

NOT TO SCALE

REVISION: 1 DATE: 7/02/2026

DETAIL NO. W17B

WTR-WS1.DWG



City of Camas WASHINGTON

WATER DETAIL

2" PRESSURE RELIEF VALVE ASSEMBLY

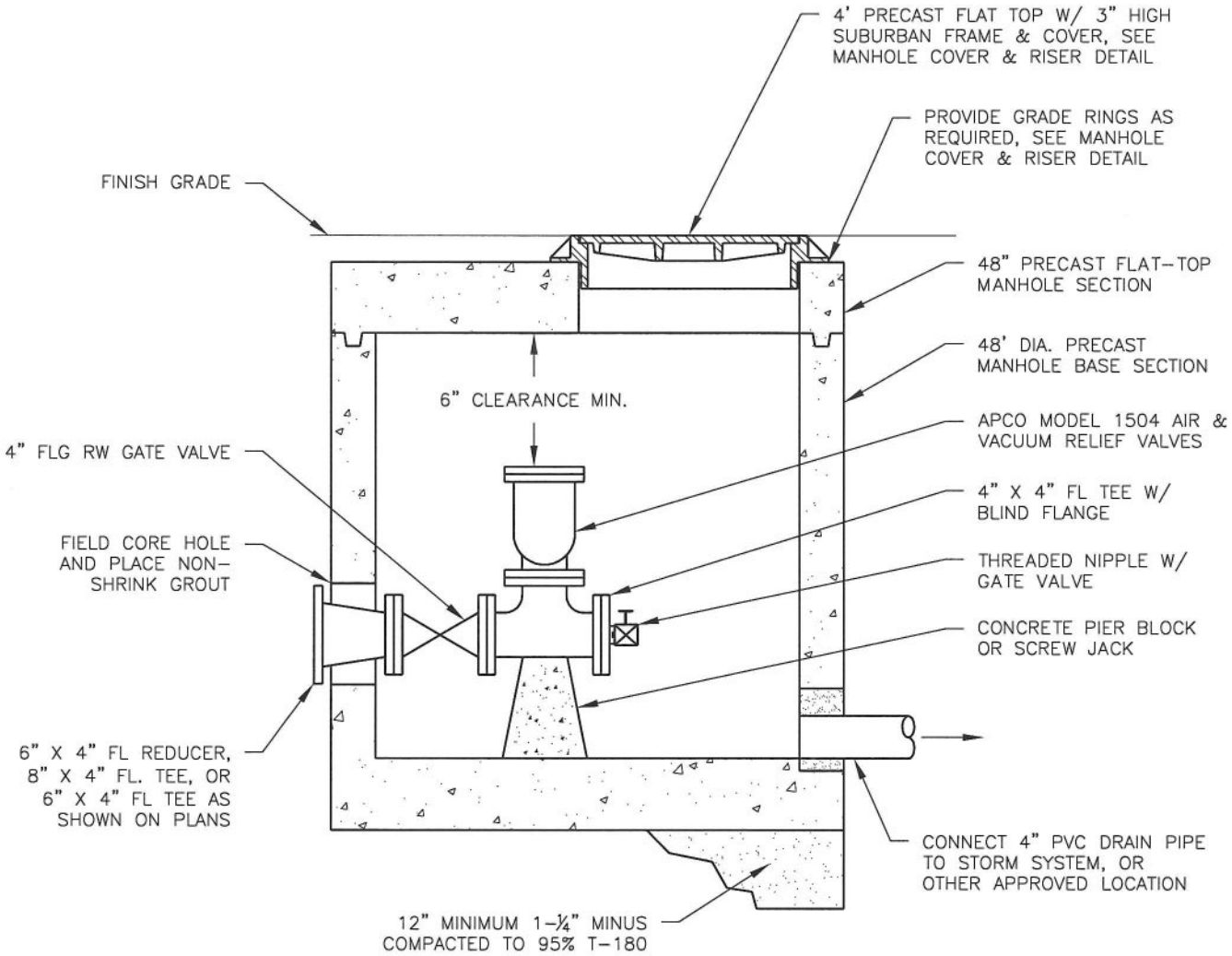
DETAIL APPROVED BY 1/3/24 DATE

NOT TO SCALE

REVISION: 4 DATE: 01/02/2024

DETAIL NO. W18

2PRV.DWG



NOTES:

1. MANHOLE SHALL CONFORM TO ASTM C-478.
2. MASTIC SEAL REQUIRED ON ALL KEYLOCK JOINTS.
3. VAULT SHALL BE SET FOR 1% SLOPE TO DRAIN.
4. ALL BACKFILL SHALL BE APPROVED GRANULAR MATERIAL.
5. SUMP PUMP MAY BE REQUIRED ON INSTALLATIONS WHERE DRAIN PIPE CANNOT BE CONNECTED TO ADEQUATE STORM DRAIN SYSTEM. THE APPROVED SUMP PUMP SHALL BE A COMMERCIAL GRADE WATER POWERED VENTURI DESIGN WITH BACKFLOW PREVENTION, SIZED TO PROVIDE 10GPM AT 10 FEET OF HEAD AT THE AVAILABLE SYSTEM WATER PRESSURE. BACKFLOW DEVICE SHALL BE CERTIFIED BY WASHINGTON STATE CERTIFIED BACKFLOW TESTER AFTER INSTALLATION AND PRIOR TO ACCEPTANCE. TEST RESULTS SHALL BE SENT TO CITY OF CAMAS WATER DEPARTMENT.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC

CITY OF CAMAS ~ WATER DETAIL

4" VACUUM RELIEF VALVE

Jim C. Carothers 1-4-11

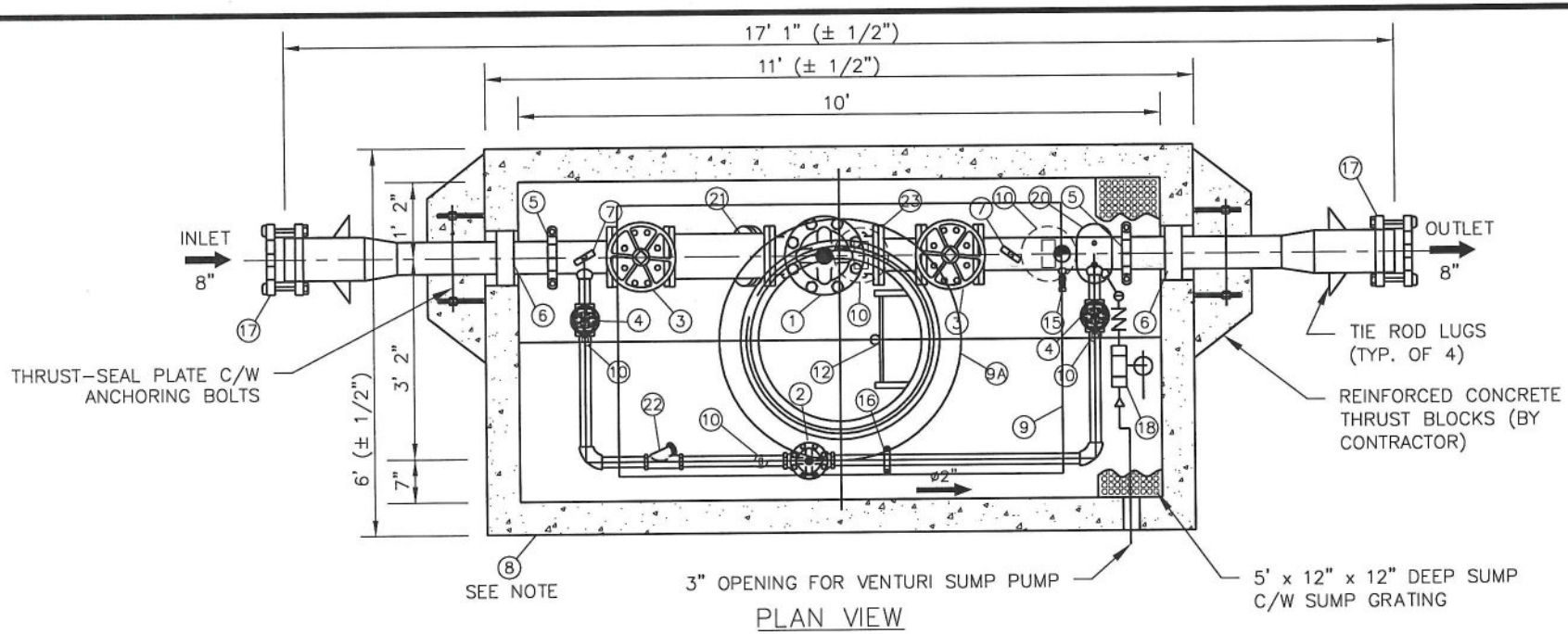
DETAIL APPROVED BY DATE

NOT TO SCALE

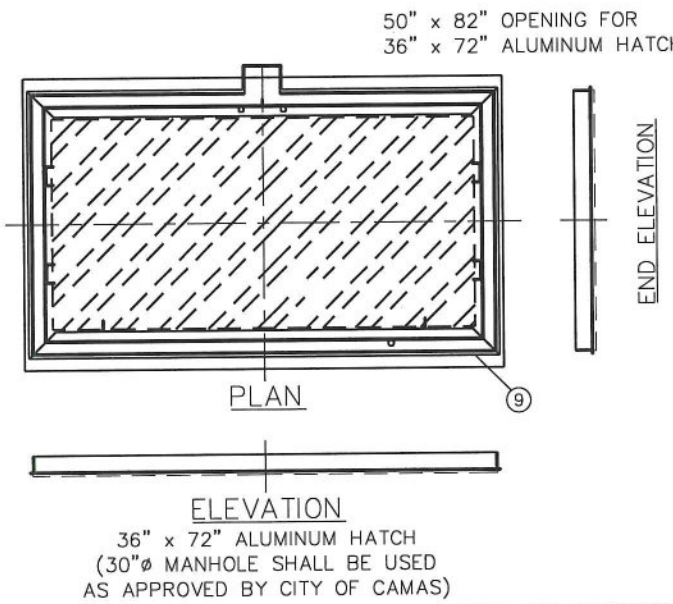
DETAIL NO.

W19

WTR-4ARV.DWG



PLAN VIEW



NOTES:

1. PRV STATION SHALL BE A PRE-ASSEMBLED, PRE-TESTED, PACKAGED UNIT BY GC SYSTEMS, INC., OR APPROVED EQUAL.
2. VAULT #10565 (H20 LOADING) INSIDE DIMENSIONS 10'LX5'WX6'6"H.

STANDARD FABRICATION & FINISHING SPECIFICATION:

ALL 2" AND SMALLER PIPE TO BE THREADED BRASS. ALL 3" AND LARGER PIPE, INSIDE WETTED SURFACES TO BE SANDBLASTED, EPOXY LINED AND COATED TO AWWA C-210 AND NSF-61 SPECIFICATION. FINISH COATING WILL BE BLUE ENAMEL.

FABRICATED STEEL PIPE & FITTINGS TO BE SCHEDULE NO. 40 STEEL PIPE FOR SIZES TO 10" AND 3/8" WALL FOR 12" AND LARGER.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC

CITY OF CAMAS ~ WATER DETAIL

6"X2" PRV STATION W/ 3" RELIEF

Jon E. Cauthen 1-4-11

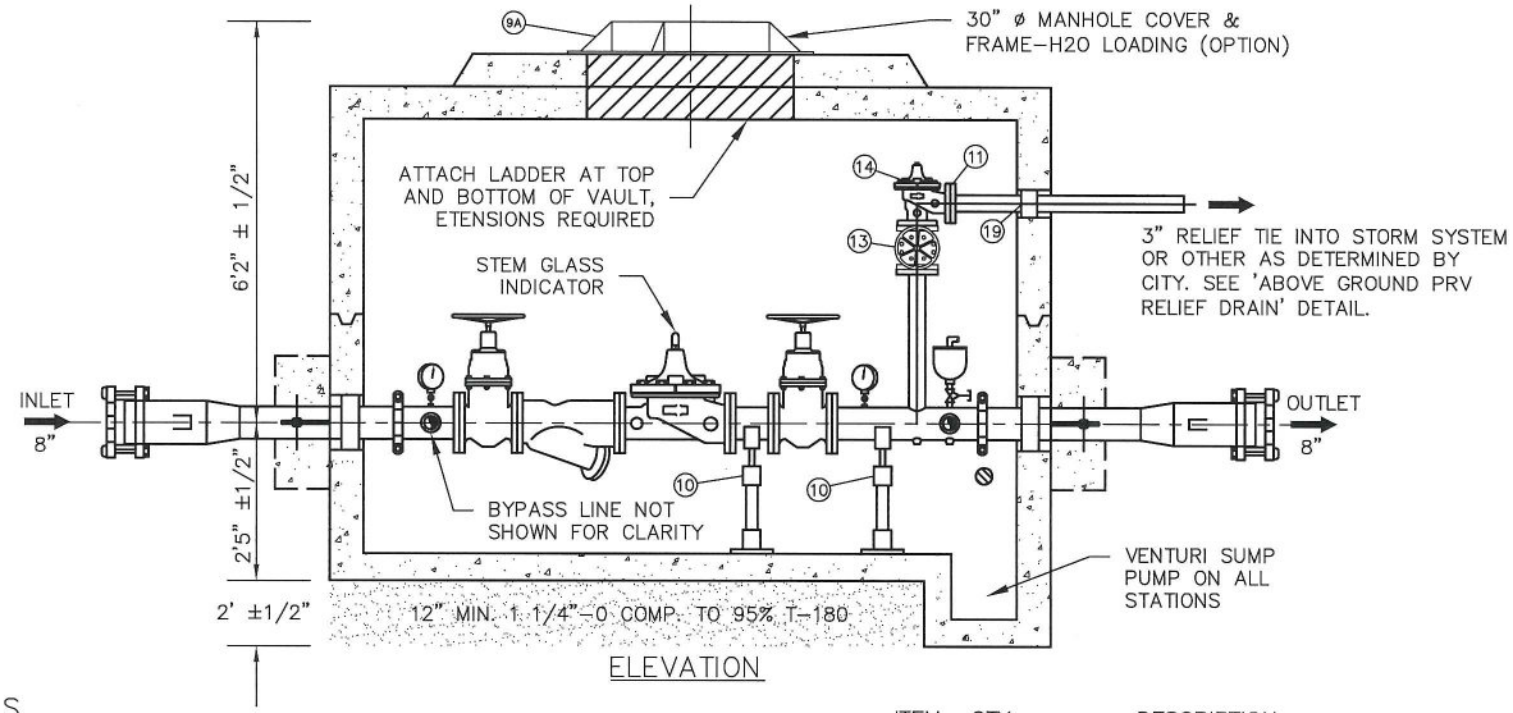
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

W20A

WTR-PRV3RELIEF.DWG



ELEVATION

MATERIALS

ITEM	QTY.	DESCRIPTION
1	1	6" CLA–VAL 90–01YBCS PRESSURE REDUCING VALVE
		C/W X 101 POSITION INDICATOR, DIBT–#150 FLG (15–75PSI)
2	1	2" CLA–VAL 90–01YBCS PRESSURE REDUCING VALVE
		C/W X 101 POSITION INDICATOR, DIBT–THREADED (15–75 PSI)
3	2	6" MUELLER A2360–6W41 NRS GATE VALVE C/W HANDWHEEL –#125 FLGD
4	2	2" MUELLER A2360–8 RW NRS GATE VALVE C/W HANDWHEEL–THREADED
5	2	6" VICTAULIC #07 COUPLING
6	2	6" PIPE SEAL ASSEMBLY
7	2	4" WIKA (0–200PSI) PRESSURE GAUGE C/W GAUGE COCK
8	1	#10565 PRECAST CONCRETE VAULT C/W WHITE INTERIOR, BLACK EXTERIOR
9	1	36"x72" ALUMINUM HATCH W/ SPRING ASSIST
10	5	ADJUSTABLE PIPE SUPPORTS
11	1	3" VICTAULIC #741 FLANGE ADAPTER ADAPTOR

ITEM	QTY.	DESCRIPTION
12	1	ALUMINUM LADDER WITH LADDER–UP ASSEMBLY
13	1	3" MUELLER A2360–6W41 NRS GATE VALVE C/W
		HANDWHEEL–#125 FLGD.
14	1	3" CLA–VAL 50A–01B PRESSURE RELIEF VALVE
		C/W DIBT–150# FLG (20–200 PSI)
15	1	3/4" HOSE BIB ASSEMBLY
16	1	2" VICTAULIC #07 COUPLING
17	1	8" SMITH BLAIR ST X DI TRANSITION COUPLING
18	1	VENTURI SUMP PUMP
19	1	3" PIPE SEAL ASSEMBLY
20	1	1" APCO 143C.1 COMB. A.R.V. C/W ISOLATION VALVE
21	1	6" MUELLER 758 Y–STRAINER – #125 FLGD
22	1	2" MUELLER 351M Y–STRAINER – THD
23	1	6" VICTAULIC #741 FLANGE ADAPTOR

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC

CITY OF CAMAS ~ WATER DETAIL

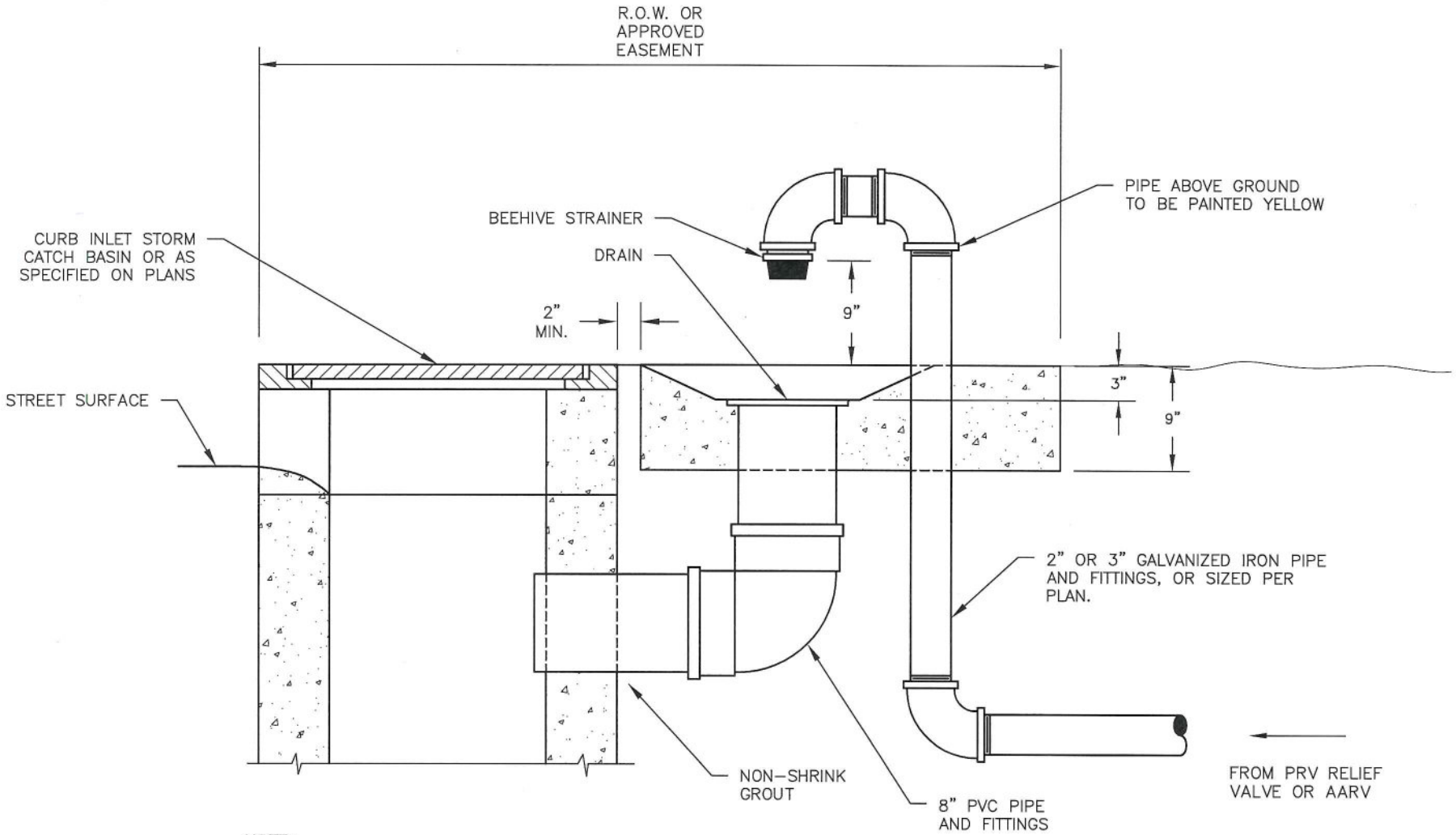
6"X2" PRV STATION W/ 3" RELIEF

DETAIL APPROVED BY — DATE 10-21-14

NOT TO SCALE

DETAIL NO. W20B

WTR–PRV3RELIEF.DWG



NOTE:
1. IF CATCH BASIN IS NOT AVAILABLE, A DEDICATED STORM LATERAL MAY BE REQUIRED.

City of Camas WASHINGTON

WATER DETAIL

ABOVE GROUND PRV RELIEF DRAIN

5-16-19

DETAIL APPROVED BY DATE

NOT TO SCALE

REVISION: 4 DATE: 5/16/2019

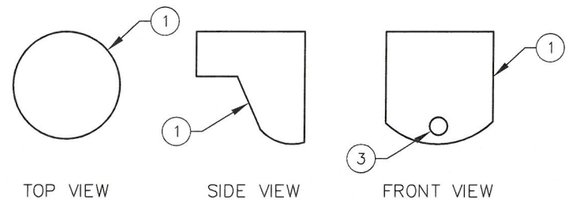
DETAIL NO.

W21

WTR-RELIEFDRN.DWG

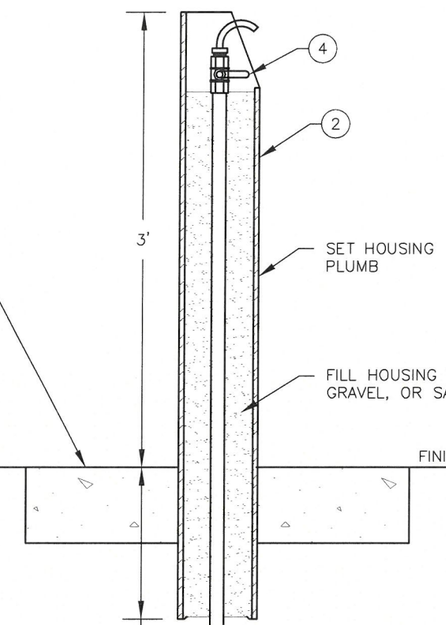
KORALEEN WATER QUALITY SAMPLING STATION:

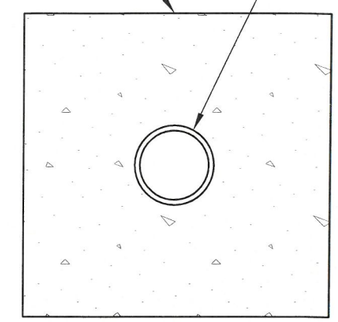
1.	ALUMINUM LID – 6" DIA. I.D.
2.	ALUMINUM HOUSING – 6" DIA. O.D.
3.	FLUSH MOUNTED LOCK
4.	½" X 1" BALL VALVE



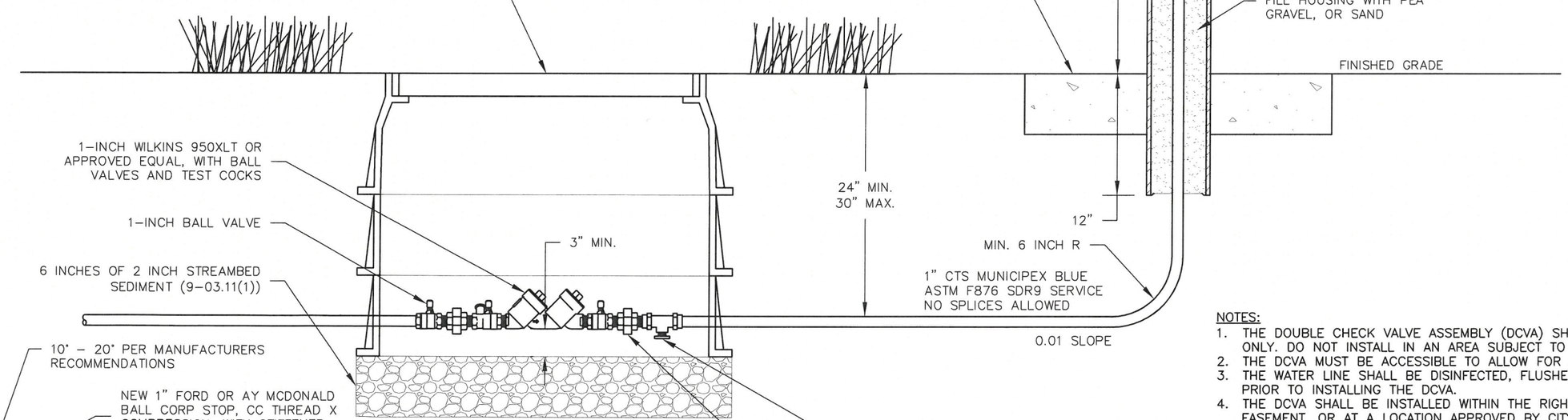
ALUMINUM LID

SAMPLING STATION

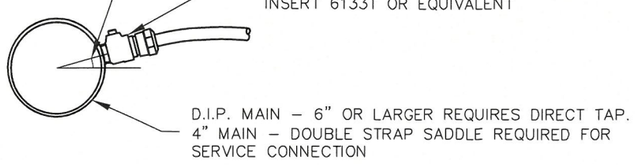




CONCRETE COLLAR DETAIL
PLAN VIEW
N.T.S.



DOUBLE CHECK
VALVE ASSEMBLY



TYPICAL MAIN CONNECTION

NOTES:

1. THE DOUBLE CHECK VALVE ASSEMBLY (DCVA) SHALL LAY HORIZONTAL ONLY. DO NOT INSTALL IN AN AREA SUBJECT TO FLOODING.
2. THE DCVA MUST BE ACCESSIBLE TO ALLOW FOR ANNUAL TESTING.
3. THE WATER LINE SHALL BE DISINFECTED, FLUSHED AND PRESSURE TESTED PRIOR TO INSTALLING THE DCVA.
4. THE DCVA SHALL BE INSTALLED WITHIN THE RIGHT-OF-WAY, WITHIN AN EASEMENT, OR AT A LOCATION APPROVED BY CITY OF CAMAS WATER DEPARTMENT.
5. THE DCVA SHALL BE TESTED AFTER INSTALLATION AND PRIOR TO ACCEPTANCE,
6. ALL NEWLY INSTALLED FITTINGS IN CONTACT WITH WATER SHALL BE IN COMPLIANCE WITH THE REVISED SECTION 1417 OF THE EPA SAFE WATER DRINKING ACT AND CERTIFIED LEAD FREE USING NSF 372 STANDARDS.

City of Camas WASHINGTON

WATER DETAIL

WATER SAMPLING STATION

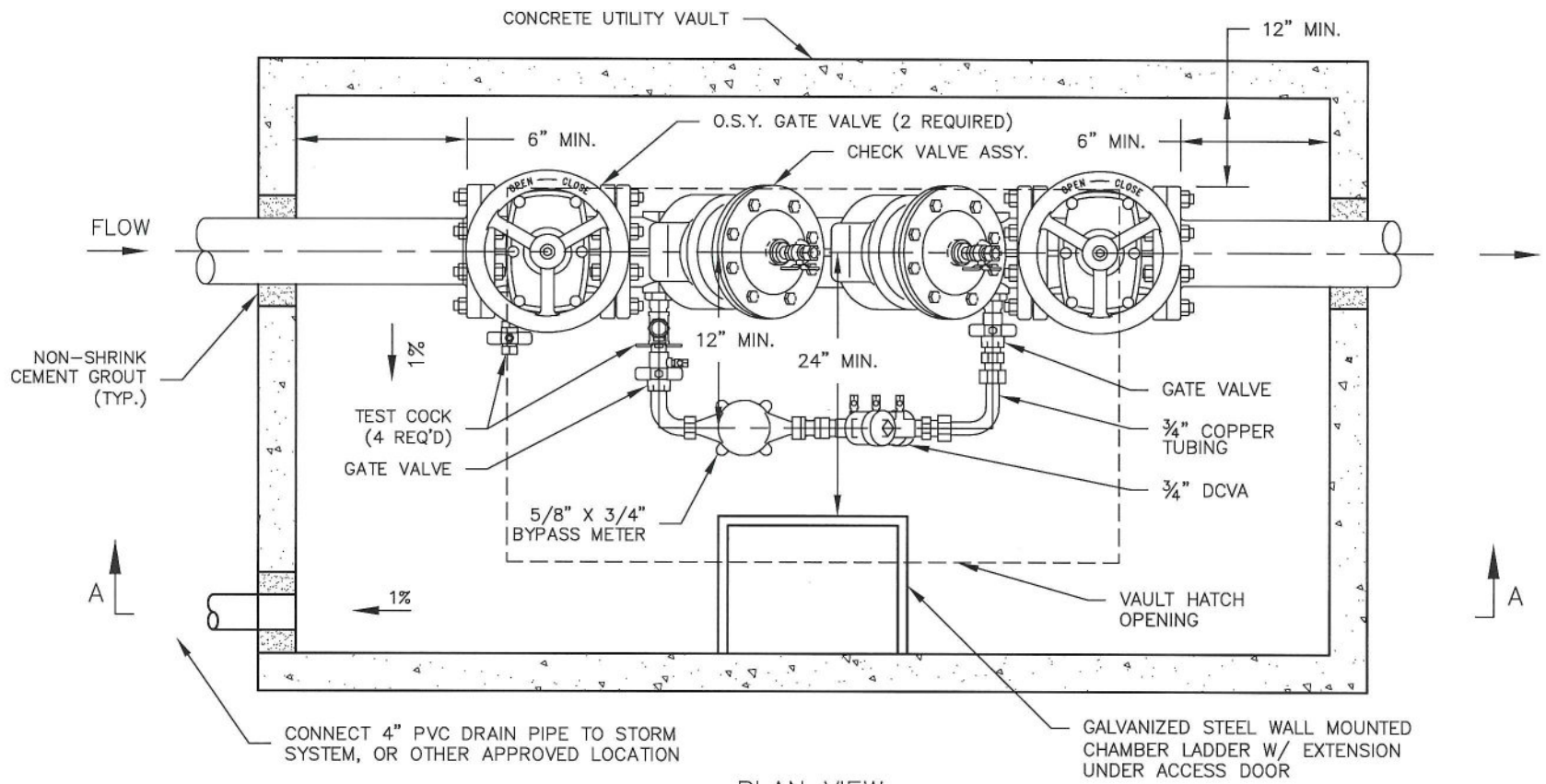
DETAIL APPROVED BY 1/3/24 DATE

NOT TO SCALE

DETAIL NO. W22

REVISION: 5 DATE: 01/02/2024

WTR-WQSMPL.DWG



PLAN VIEW

DOUBLE CHECK DETECTOR VALVE ASSY. NOTES:

1. APPROVED DOUBLE CHECK DETECTOR VALVE ASSEMBLY TO LAY HORIZONTAL WITH THE GROUND, SHALL BE INSTALLED ON FIRE PROTECTION SYSTEMS WHEN CONNECTED TO POTABLE WATER SUPPLY. THE ASSEMBLY SHALL BE A COMPLETE ASSEMBLY INCUDING UL LISTED RESILIENT SEATED OSY SHUTOFF VALVES AND TEST COCKS. THE UNIT SHALL BE UL/FM APPROVED WITH UL/FM APPROVED OSY SHUTOFF VALVES. THE AUXILIARY LINE SHALL CONSIST OF AN APPROVED BACKFLOW PREVENTER AND WATER METER. THE ASSEMBLY SHALL MEET THE BASIC REQUIREMENTS OF ASSE 1048; AWWA STD. C510 FOR DOUBLE CHECK VALVES, AND BE APPROVED BY THE FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH AT THE UNIVERSITY OF SOUTHERN CALIFORNIA. THE DOUBLE CHECK DETECTOR VALVE ASSEMBLY SHALL BE A ZURN WILKINS MODEL 950DA OR APPROVED EQUAL.
2. SYSTEM SHALL BE DESIGNED FOR BACK SIPHONAGE AND BACK PRESSURE.
5. THE WATER LINE SHALL BE DISINFECTED, FLUSHED, AND PRESSURE TESTED PRIOR TO INSTALLING THE BACKFLOW ASSEMBLY. THE BACKFLOW ASSEMBLY SHALL BE PROTECTED FROM FREEZING AND FLOODING.
4. ALL PIPE, VALVE, AND FITTING JOINTS FROM THE SUPPLY MAIN SHALL BE FLANGED AND RESTRAINED. MINIMUM COVER 30". GROUT PIPE ENTRANCE AND EXIT IN VAULT WITH WATER TIGHT GROUT.
5. THE BACKFLOW ASSEMBLY SHALL BE TESTED AFTER INSTALLATION AND PRIOR TO ACCEPTANCE AND ALSO YEARLY THEREAFTER BY A WASHINGTON STATE CERTIFIED BACKFLOW TESTER. TEST RESULTS SHALL BE SENT TO THE CITY OF CAMAS WATER DEPARTMENT.
6. ALL BACKFILL SHALL BE APPROVED GRANULAR MATERIAL.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC

CITY OF CAMAS ~ WATER DETAIL

STANDARD DOUBLE CHECK DETECTOR VALVE ASSY.

Jon P. Carothers 10-21-14

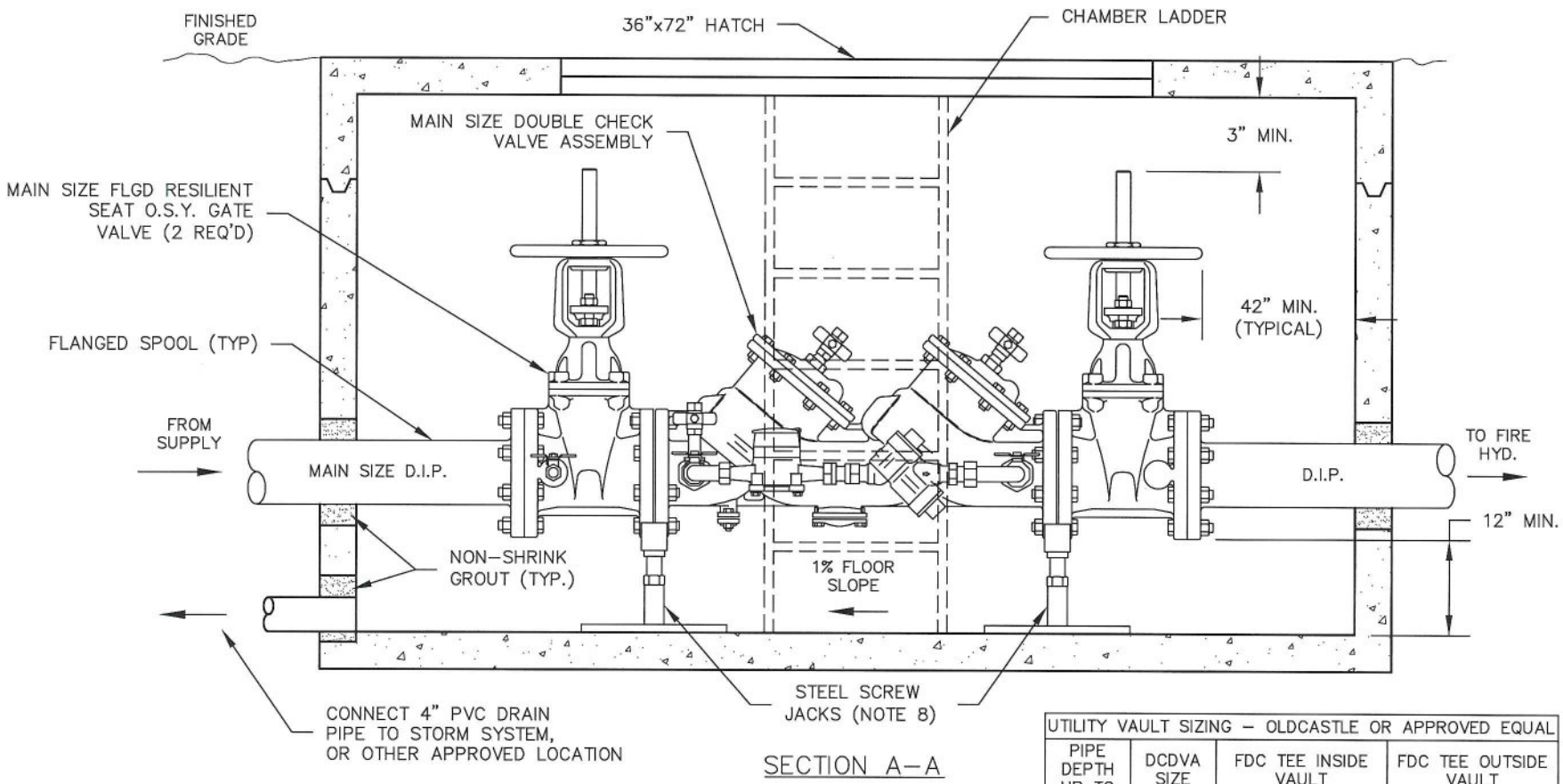
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO.

W23A

WTR-DCDVA.DWG



SECTION A–A

UTILITY VAULT SIZING – OLDCASTLE OR APPROVED EQUAL			
PIPE DEPTH UP TO	DCDVA SIZE	FDC TEE INSIDE VAULT	FDC TEE OUTSIDE VAULT
6'	4"	676–WA	577–WA
4'	6"	687–WA	675–WA
6'	6"	–	676–WA
6'	8"	5106–WA	687–WA
6'	10"	5106–WA	5106–WA

VAULT CONSTRUCTION NOTES:

1. VAULT SHALL BE PRE–APPROVED PRIOR TO INSTALLATION.
2. VAULT SHALL BE INSTALLED AT PROPERTY LINE OR EASEMENT LINE AND ON OWNERS PROPERTY.
3. VAULTS SHALL HAVE A MINIMUM OF 3' CLEARANCE FROM ALL STRUCTURES.
4. APPROVED VAULT SHALL BE RATED FOR H20 LOADING AND INCLUDE AN EXTENSION LADDER
5. VAULT SHALL BE SET FOR 1% SLOPE TO DRAIN.
6. ALL BACKFILL SHALL BE APPROVED GRANULAR MATERIAL.
7. HATCH SHALL BE AN H20 RATED, 36"x72" SPRING ASSISTED, HOT DIPPED GALVANIZED DIAMOND PLATE DOUBLE DOOR. FOR TRAFFIC INSTALLATIONS A 30" MANHOLE LID SHALL BE USED INSTEAD OF A HATCH.
8. SUMP PUMP MAY BE REQUIRED ON INSTALLATIONS WHERE DRAIN PIPE CANNOT BE CONNECTED TO ADEQUATE STORM DRAIN SYSTEM. THE APPROVED SUMP PUMP SHALL BE A COMMERCIAL GRADE WATER POWERED VENTURI DESIGN WITH BACKFLOW PREVENTION, SIZED TO PROVIDE 10GPM AT 10 FEET OF HEAD AT THE AVAILABLE SYSTEM WATER PRESSURE. BACKFLOW DEVICE SHALL BE CERTIFIED BY WASHINGTON STATE CERTIFIED BACKFLOW TESTER AFTER INSTALLATION AND PRIOR TO ACCEPTANCE. TEST RESULTS SHALL BE SENT TO CITY OF CAMAS WATER DEPARTMENT.
9. FOUR (4) STEEL SCREW JACKS REQUIRED FOR SUPPORT OF DOUBLE CHECK VALVE ASSEMBLY AND BYPASS ASSEMBLY.
10. FIRE DEPARTMENT CONNECTION (FDC) MAY BE LOCATED THROUGH THE VAULT LID (NOT SHOWN), OR MAY BE LOCATED OUTSIDE OF THE VAULT DEPENDING UPON SITE.

REV. NO.	DATE	BY	APPR.
1	5/1/07	SCD	JC
2	1/1/11	SCD	JC
3	10/21/14	SCD	JC

CITY OF CAMAS ~ WATER DETAIL

STANDARD DOUBLE CHECK DETECTOR VALVE ASSY.

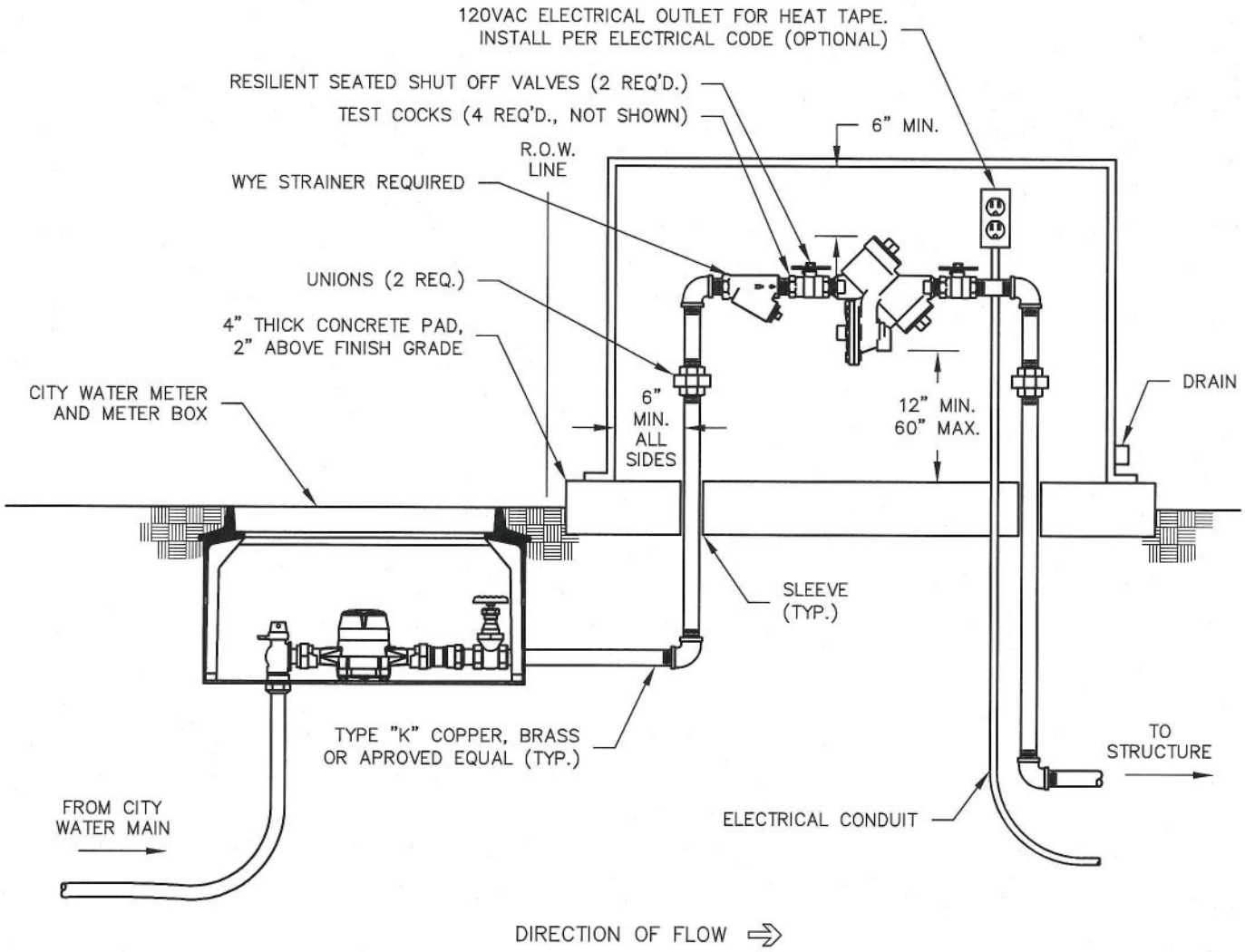
Jon E. Carothers 10-21-14

DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO. W23B

WTR–DCDVA.DWG



NOTES:

1. REDUCED PRESSURE BACKFLOW ASSEMBLY (RPBA) SHALL BE DESIGNED FOR BACK SIPHONAGE AND BACK PRESSURE, AND APPROVED BY THE STATE OF WASHINGTON DEPARTMENT OF HEALTH.
2. THE RPBA SHALL LAY HORIZONTAL ONLY (VERTICAL IF APPROVED BY DEPT. OF HEALTH). DO NOT INSTALL IN A PIT, TRENCH OR AN AREA SUBJECT TO FLOODING.
3. THE RPBA MUST BE ACCESSIBLE TO ALLOW FOR ANNUAL TESTING.
4. THE DRAIN SHALL BE SIZED PER THE AWWA CROSS CONTAMINATION CONTROL MANUAL.
5. PLUMBING PERMIT IS REQUIRED – CONTACT THE APPROPRIATE JURISDICTION FOR PERMIT.
6. THE WATER LINE SHALL BE DISINFECTED, FLUSHED AND PRESSURE TESTED PRIOR TO INSTALLING THE RPBA. THE RPBA SHALL BE PROTECTED FROM FREEZING AND FLOODING.
7. THE RPBA SHALL BE INSTALLED ON OWNER'S PROPERTY AT PROPERTY LINE OR EASEMENT LINE, OR AT A LOCATION APPROVED BY CITY OF CAMAS WATER DEPARTMENT.
8. ALL ENCLOSURES SHALL BE PRE–APPROVED BY THE CITY OF CAMAS WATER DEPARTMENT PRIOR TO INSTALLATION
9. THE RPBA SHALL BE TESTED AFTER INSTALLATION AND PRIOR TO ACCEPTANCE, ALSO YEARLY THEREAFTER BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER. TEST RESULTS SHALL BE SENT TO THE CITY OF CAMAS WATER DEPARTMENT.
10. HEAT AND/OR INSULATION SHALL BE PROVIDED TO PREVENT FREEZING.
11. RPBA SHALL BE RETESTED IF MOVED OR REPAIRED.
12. ALL NEWLY INSTALLED FITTINGS IN CONTACT WITH WATER SHALL BE IN COMPLIANCE WITH THE REVISED SECTION 1417 OF THE EPA SAFE WATER DRINKING ACT AND CERTIFIED LEAD FREE USING NSF 372 STANDARDS.

City of Camas WASHINGTON

WATER DETAIL

REDUCED PRESSURE BACKFLOW ASSEMBLY, 1" AND 2"

NOT TO SCALE

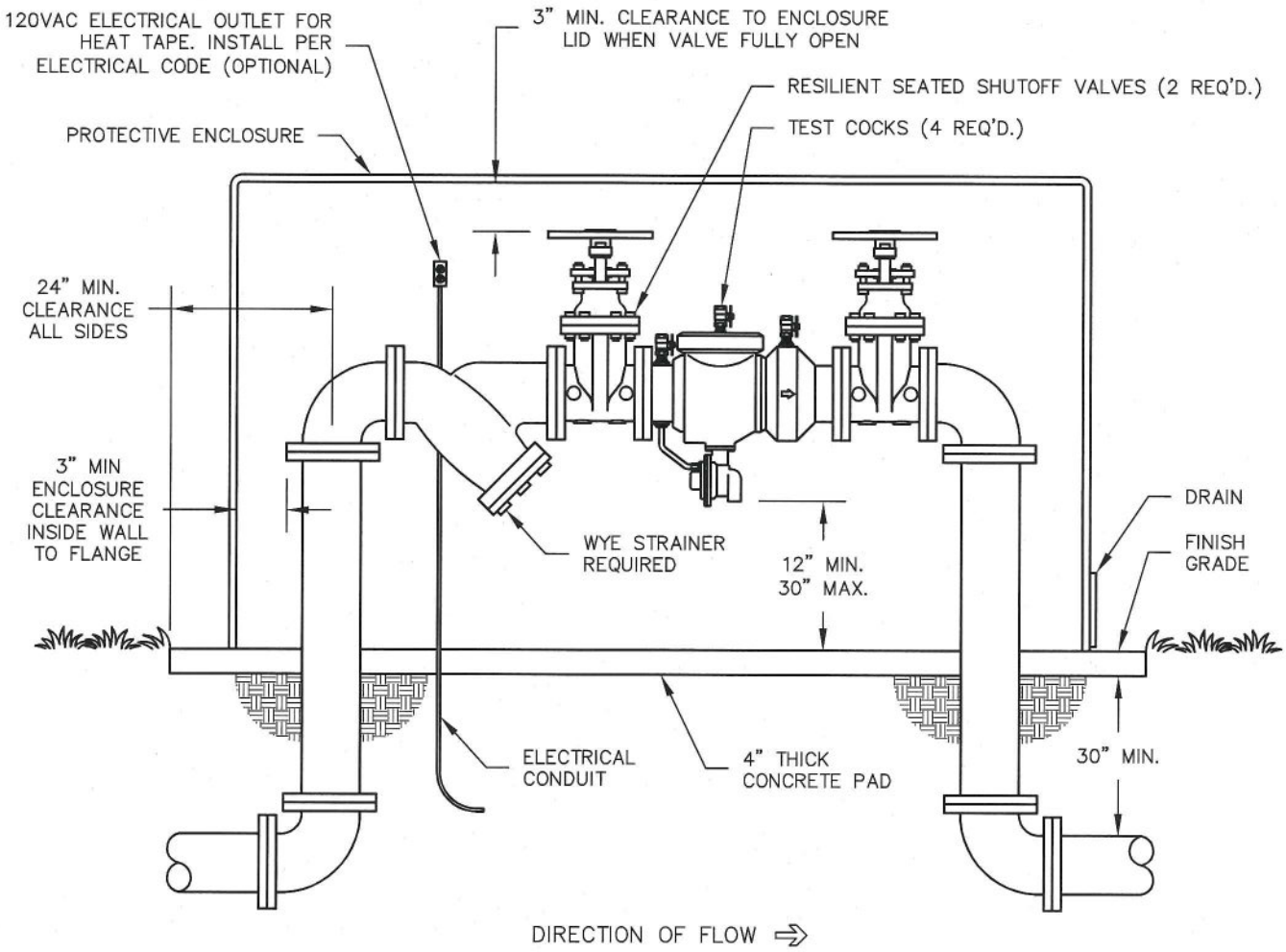
DETAIL NO. W24

9-28-17

DETAIL APPROVED BY DATE

REVISION: 1 DATE: 09/2017

WTR–RPBA.DWG



NOTES:

1. REDUCED PRESSURE BACKFLOW ASSEMBLY (RPBA) SHALL BE DESIGNED FOR BACK SIPHONAGE AND BACK PRESSURE, AND APPROVED BY THE STATE OF WASHINGTON DEPARTMENT OF HEALTH.
2. THE RPBA SHALL LAY HORIZONTAL ONLY (VERTICAL IF APPROVED BY DEPT. OF HEALTH). DO NOT INSTALL IN A PIT, TRENCH OR AN AREA SUBJECT TO FLOODING.
3. THE RPBA MUST BE ACCESSIBLE TO ALLOW FOR ANNUAL TESTING.
4. THE DRAIN SHALL BE SIZED PER THE AWWA CROSS CONTAMINATION CONTROL MANUAL.
5. PLUMBING PERMIT IS REQUIRED – CONTACT THE APPROPRIATE JURISDICTION FOR PERMIT.
6. THE WATER LINE SHALL BE DISINFECTED, FLUSHED AND PRESSURE TESTED PRIOR TO INSTALLING THE RPBA. THE RPBA SHALL BE PROTECTED FROM FREEZING AND FLOODING.
7. ALL UNDERGROUND PIPE, VALVES AND FITTING JOINTS SHALL BE RESTRAINED FROM THE SUPPLY MAIN. ALL ABOVE GROUND JOINTS SHALL BE FLANGED.
8. ALL ENCLOSURES SHALL BE PRE–APPROVED BY THE CITY OF CAMAS WATER DEPARTMENT PRIOR TO INSTALLATION.
9. THE RPBA SHALL BE INSTALLED ON OWNER'S PROPERTY AT PROPERTY LINE OR EASEMENT LINE, OR AT A LOCATION APPROVED BY CITY OF CAMAS WATER DEPARTMENT.
10. ADEQUATE GRAVITY DRAINAGE SYSTEM REQUIRED WITH APPROVED AIR GAP.
11. MINIMUM 24" CLEARANCE ON ALL SIDES AROUND RPBA.
12. THE RPBA SHALL BE TESTED AFTER INSTALLATION AND PRIOR TO ACCEPTANCE, ALSO YEARLY THEREAFTER BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER. TEST RESULTS SHALL BE SENT TO THE CITY OF CAMAS WATER DEPARTMENT.
13. HEAT AND/OR INSULATION SHALL BE PROVIDED TO PREVENT FREEZING.
14. RPBA SHALL BE RETESTED IF MOVED OR REPAIRED.
15. ALL NEWLY INSTALLED FITTINGS IN CONTACT WITH WATER SHALL BE IN COMPLIANCE WITH THE REVISED SECTION 1417 OF THE EPA SAFE WATER DRINKING ACT AND CERTIFIED LEAD FREE USING NSF 372 STANDARDS.

City of Camas WASHINGTON

WATER DETAIL

NOT TO SCALE

REDUCED PRESSURE BACKFLOW ASSEMBLY, 2.5" & LARGER

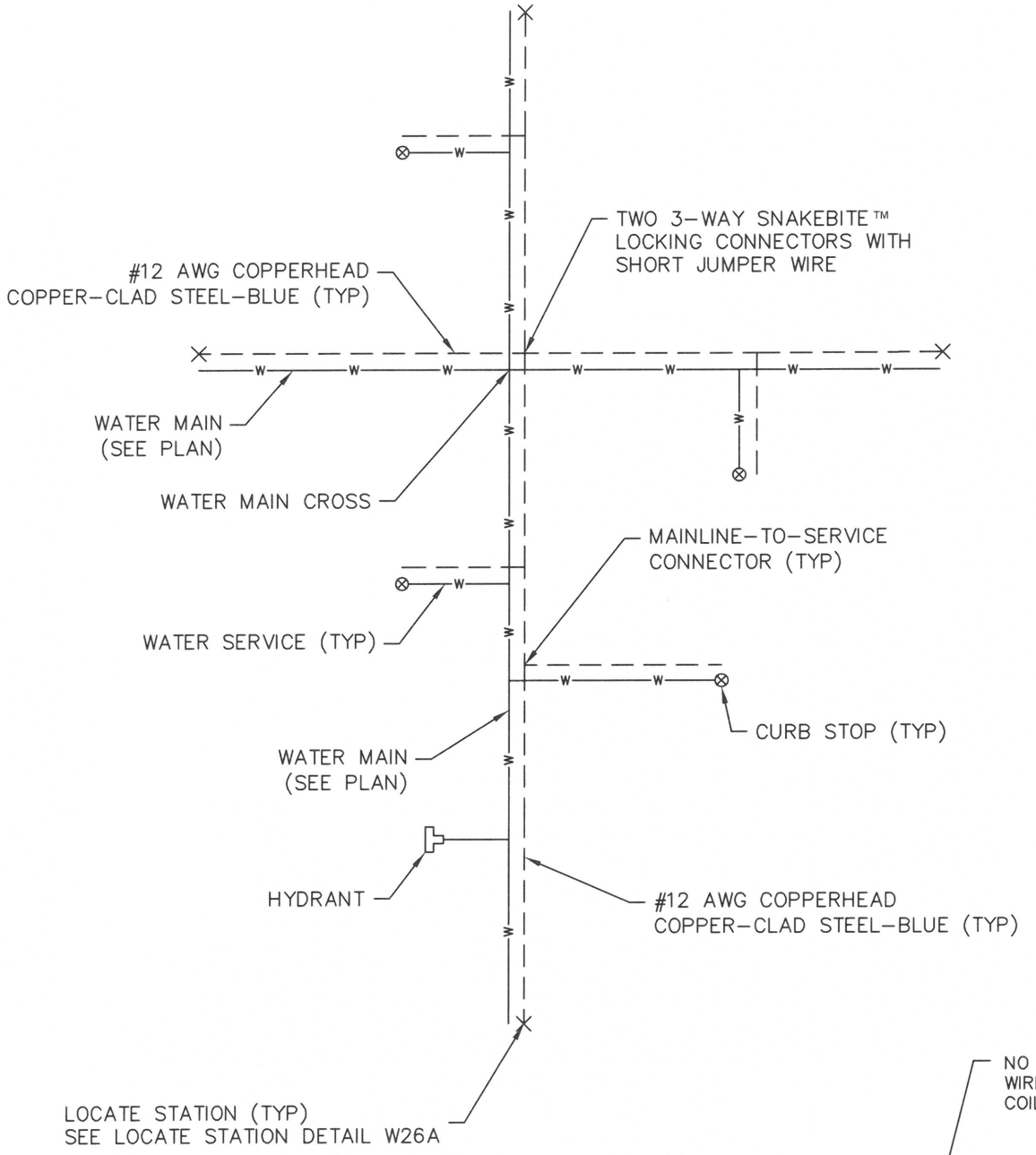
Sam Adams 9-28-17

DETAIL APPROVED BY DATE

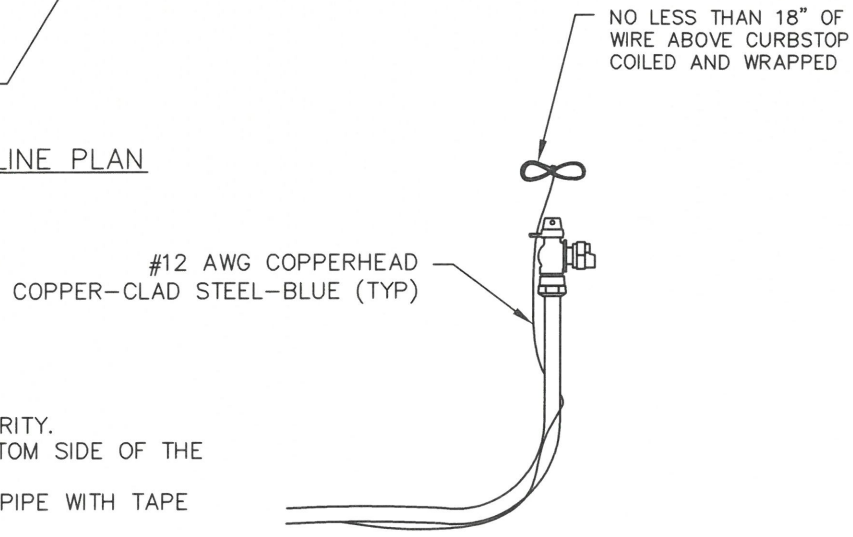
REVISION: 1 DATE: 09/2017

DETAIL NO. W25

WTR–RPBA.DWG



WATERLINE PLAN



WATER SERVICE

NOTES:
1. WIRE SHOWN AWAY FROM PIPE FOR CLARITY.
2. WIRE SHALL BE INSTALLED ON THE BOTTOM SIDE OF THE PIPE, BELOW THE SPRING LINE.
3. THE WIRE SHALL BE FASTENED TO THE PIPE WITH TAPE OR PLASTIC TIES AT 10' INTERVALS.
4. LOCATE STATIONS TO BE LOCATED AT 1000' INTERVALS OR AS DIRECTED BY THE CITY OF CAMAS

City of Camas WASHINGTON

SANITARY SEWER DETAIL

WATER LOCATE STATION PLAN

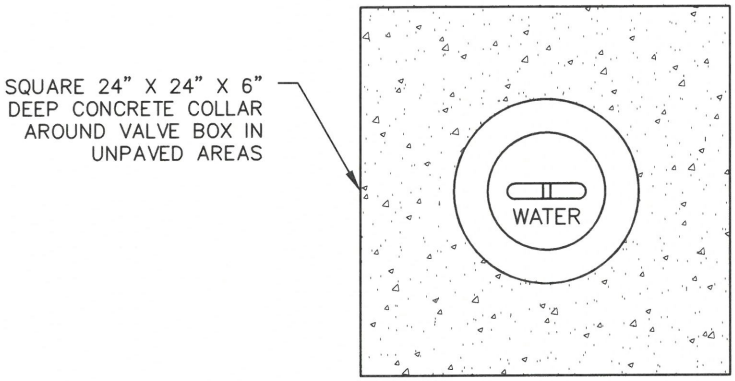
DETAIL APPROVED BY 3-28-22 DATE

NOT TO SCALE

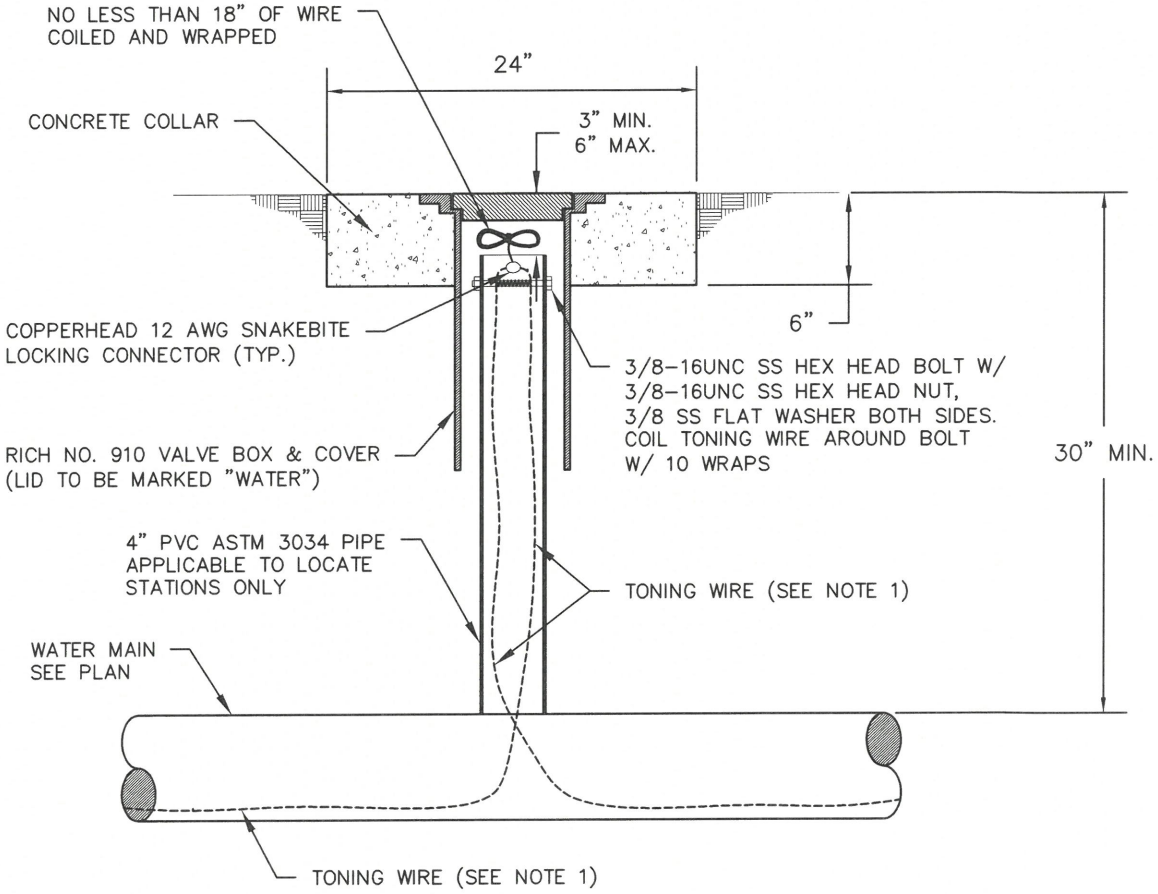
REVISION: 1 DATE: 03/28/2022

DETAIL NO. W26

WTR-RISER.DWG



CONCRETE COLLAR PLAN VIEW



NOTES:
1. TONING WIRE SHALL BE COPPERHEAD SUPERFLEX 12 AWG 45MIL BLUE HDPE INSULATION, NO SPLICES ALLOWED.
2. SEAL TONING WIRE SPLICE CONNECTIONS WITH COPPERHEAD 12 AWG SNAKEBITE LOCKING CONNECTORS (TYPICAL)
3. WIRE SHALL BE INSTALLED ON THE BOTTOM SIDE OF THE PIPE, BELOW THE SPRING LINE.
4. THE WIRE SHALL BE FASTENED TO THE PIPE WITH TAPE OR PLASTIC TIES AT 10' INTERVALS.
5. LOCATE STATIONS TO BE LOCATED AT 1000' INTERVALS OR AS DIRECTED BY THE CITY OF CAMAS

City of Camas WASHINGTON

SANITARY SEWER DETAIL

LOCATE STATION FOR WATER

3-28-22

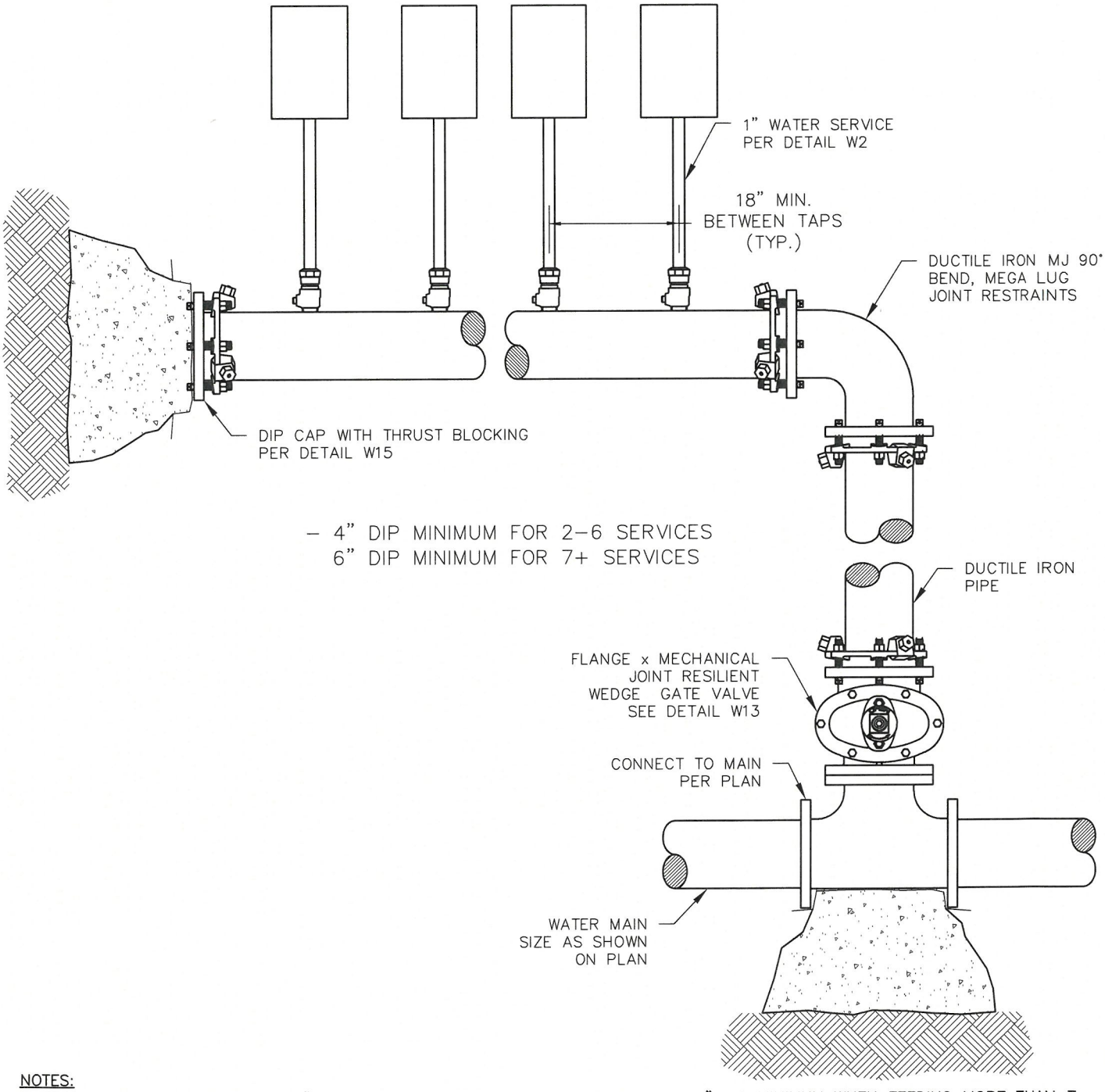
DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO. W26A

REVISION: 1 DATE: 03/28/2022

WTR-RISER.DWG



NOTES:

1. WATERLINE MANIFOLD TO BE 4" DIP MINIMUM WHEN FEEDING 2–6 SERVICES, 6" DIP MINIMUM WHEN FEEDING MORE THAN 7 SERVICES
2. MANIFOLD LEG TO BE LOCATED UNDER PLANTER STRIP OR BEHIND SIDEWALK, AVOID PLACING UNDER IMPERVIOUS SURFACE.
3. MANIFOLD LEG TO BE AT A DEPTH OF 24" MIN/48" MAX.
4. NEW WATERLINE MANIFOLDS REQUIRE TONING WIRE, PLACED ON THE BOTTOM SIDE OF THE PIPE, BELOW THE SPRING LINE.
5. TONING WIRE SHALL BE FASTENED TO THE PIPE WITH TAPE OR PLASTIC TIES AT 10' INTERVALS.
6. TONING WIRE SHALL BE COPPERHEAD SUPERFLEX 12 AWG 45MIL BLUE HDPE INSLATION, NO SPLICES ALLOWED.
7. SEAL TONING WIRE SPLICE CONNECTIONS WITH COPPERHEAD 12 AWG SNAKEBITE LOCKING CONNECTORS (TYPICAL)
8. WATER SERVICES TO BE SPACED 18" MINIMUM AND INSTALLED PER DETAIL W2
9. METER BOXES TO BE LOCATED OUTSIDE OF SIDEWALK OR IN PLANTER STRIP, EXCEPT WHERE NOTED IN PLANS
10. TONING WIRE FROM THE MANIFOLD TO SERVICE REQUIRES A SNAKEBITE LOCKING CONNECTOR
11. PREFERRED BRASS FITTINGS TO BE USED, IN ORDER: 1) FORD 2) AY MCDONALD

City of Camas WASHINGTON

WATER DETAIL

WATER METER MANIFOLD ASSEMBLY

1/3/24

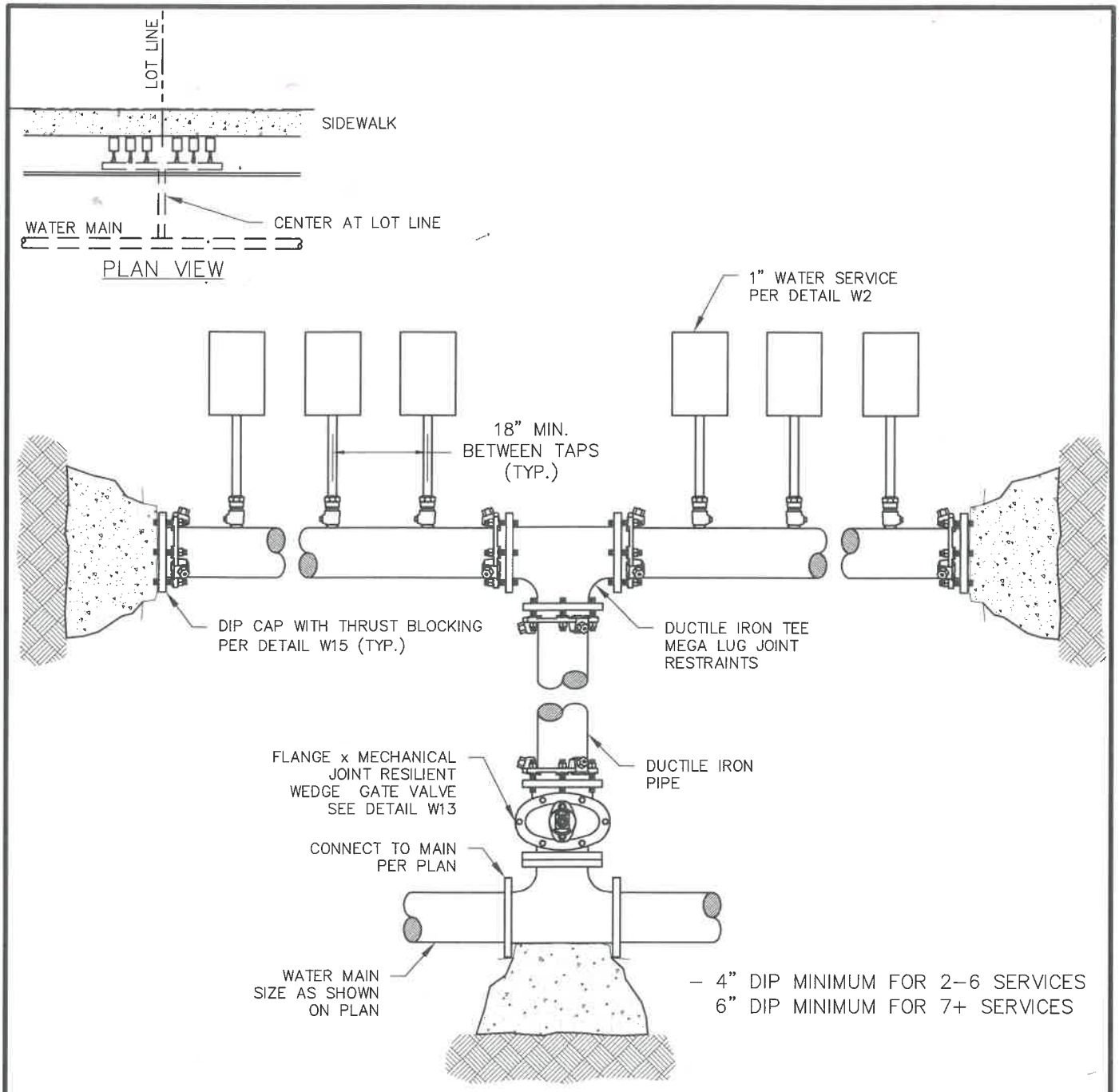
DETAIL APPROVED BY DATE

NOT TO SCALE

REVISION: 2 DATE: 01/02/2024

DETAIL NO. W27

WTR–MNFLD.DWG



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City of Camas WASHINGTON

WATER DETAIL

WATER METER MANIFOLD ASSEMBLY

DETAIL APPROVED BY 2/12/2026 DATE

NOT TO SCALE

DETAIL NO. W27a

REVISION: 1 DATE: 02/10/2026

WTR–MNFLD.DWG