

City of Washougal

Water System Plan Update

August 2021

Water System Plan Update

City of Washougal

August 2021



Murraysmith

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Acronyms & Abbreviations

A	
ADD	average day demand
AL	action level
AMI	advanced metering infrastructure
AWIA	America's Water Infrastructure Act
B	
BPS	booster pump station
C	
CCF	100 cubic feet of water
CCL	Contaminant Candidate List
CCR	Consumer Confidence Report
CCS	cross-connection control specialist
CIP	Capital Improvement Program
City	City of Washougal
CRGNSA	Columbia River Gorge National Scenic Area
CWSP	Clark County Coordinated Water System Plan Update
D	
DBP	Disinfection Byproducts
DBPR	Disinfectants/Disinfection Byproducts Rule
DOH	Department of Health
DSL	distribution system leakage
E	
ENR	Engineering News-Record
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
ERU	equivalent residential unit
ES	equalization storage
F	
FSS	fire suppression storage
ft/sec	feet per second
G	
GIS	geographic information system
gpm	gallons per minute
gpud	gallons per unit per day
H	
HAA5	Five Haloacetic Acids
HDPE	high-density polyethylene
HGL	hydraulic grade line

I	
IACC	Infrastructure Assistance Coordinating Council
IFC	International Fire Code
IOC	Inorganic Contaminant
L	
LCR	Lead and Copper Rule
LID	Local Improvement District
Lower (Wellfield)	Westside (Wellfield)
LRAA	locational running annual averages
M	
MCL	Maximum Contaminant Levels
MCLG	Maximum Conatminant Level Goal
MDD	maximum day demand
MG	million gallons
mg/L	milligrams per liter
mgd	million gallons per day
MRDL	maximum residual disinfectant level
MRDLG	maximum residual disinfectant level goal
msl	mean sea level
O	
O&M	operations and maintenance
OFM	State of Washington Office of Financial Management
OS	operational storage
P	
PAA	Pleistocene Alluvial Aquifer
pCi/L	picocurie per liter
PF	peaking factors
pH	potential hydrogen
PHD	peak hour demand
PRV	pressure reducing valve
psi	pounds per square inch
PVC	polyvinyl chloride
PWTF	Public Works Trust Fund
R	
RR	Radionuclides Rule
RTCR	Revised Total Coliform Rule
S	
SB	standby storage
SCADA	Supervisory Control and Data Acquisition
SDC	System Development Charge
SDWA	Safe Drinking Water Act
SMCL	secondary maximum contaminant level
SMF	Standardized Monitoring Framework

SOC	Synthetic Organic Contaminant
T	
TC	total coliform
TCR	Total Coliform Rule
TOC	total organic carbon
TOT	Time-of-Travel
TTHMs	total trihalomethanes
U	
UCMR	Unregulated Contaminant Monitoring Rule
µg/L	microgram per liter
Upper (Wellfield)	Hathaway Park (Wellfield)
UGA	Urban Growth Area
USGS	United States Geologic Survey
V	
VOC	Volatile Organic Contaminant
W	
W1R	Well 1R CIP Project
WAC	Washington Administrative Code
WDM	State of Washington Water Distribution Manager
WHPA	wellhead protection area
WHPP	Wellhead Protection Program
WHS	Washougal High School
WPAR	Wellhead Protection Assessment Report
WQMS	Water Quality Montoring Schedule
WRSA	Water Right Self-Assessment Form
WSA	water service area
WSDM	Water System Design Manual (DOH, 2019)
WSDOT	Washington State Department of Transportation
WSP	Water System Plan
WWTP	wastewater treatment plant
WUE	water use efficiency

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Executive Summary

Executive Summary

Introduction

The City of Washougal (City) owns and operates a public drinking water system that serves a population of approximately 16,500 people (2019). This update to the Water System Plan (WSP) as required by the Washington State Department of Health, Office of Drinking Water (DOH), documents key water system information and provides analysis and recommendations that inform infrastructure development and operational decisions by City staff.

How This Plan Should Be Used

This WSP serves as the guiding document for future water system improvements. The use of this plan by the City should include the following.

- Reviewed annually to prioritize and budget needed improvement projects.
- Update mapping regularly to reflect ongoing water system expansion.
- Specific project recommendations are conceptual. The location, size and timing of projects may change as additional site-specific details and potential alternatives are investigated and analyzed in the preliminary engineering phase of project design.
- Update and refine cost estimates with preliminary engineering and final project designs.

Scope of Work

The City selected Murraysmith, Inc. (Murraysmith) to update the WSP. The scope of work for this WSP Update includes the following major tasks.

- Describe the City's existing water system.
- Develop population and water demand projections.
- Develop performance criteria for use in identifying deficiencies and sizing improvements.
- Evaluate the water system hydraulic capacity to identify deficiencies for existing, 10-year, and 20-year planning horizons.
- Assess the condition of current facilities.

- Review and provide recommended updates to the City's Operations and Maintenance (O&M) and Water Use Efficiency (WUE) programs.
- Review water system compliance with water quality regulations.
- Develop project recommendations and cost estimates for the Capital Improvement Plan (CIP).
- Evaluate capital improvement projects and impact to rates.

Organization of the WSP

This WSP is organized into seven sections, as described in **Table ES-1**. Detailed technical information and support documents are included in the appendices.

Table ES-1 | WSP Organization

Section	Description
Executive Summary	Purpose and scope of the WSP and summary of key components of the document.
1 – Description of Water System	Description of the service area and overview of the existing system and facilities.
2 – Basic Planning Data and Water Demand Forecasting	Population projections and water demand estimates for existing and future service areas.
3 – System Analysis	Overview of system performance criteria. Discussion of supply, storage, and pumping capacity, and distribution system hydraulic analysis and deficiencies for existing and future planning horizons.
4 – Water Resource Analysis and Water Use Efficiency	Outlines the City's Water Use Efficiency program including conservation efforts and water use reduction goals.
5 – Source Water Protection	Provides a summary of the wellhead protection areas for the City's well sources and identifies potential contaminants located within the time-of-travel zones for each well. Summarizes current and anticipated future water quality regulations.
6 – Operations and Maintenance	Provides an update to the City's current Operations and Maintenance program, including management and personnel, routine operating procedures and preventive maintenance, the water quality monitoring program, and the cross-connection control program.
7 – Design and Construction Standards	Provides a summary of the City's current water design and construction standards.
8 – Capital Improvements Program	Improvement project recommendations including opinions of probable project cost and time frame for implementation.
9 – Financial Program	Presents a financial analysis including water rate and system development charge evaluation.

Description of Water System

The City is governed by an elected Mayor and seven-member council, and is the owner of all water production, pumping, storage, transmission, distribution, and other systems related to the provision of public water supply to users within the retail water service area. In addition, the City has an emergency intertie agreement with the City of Camas, covering ownership and maintenance of two manually operated intertie pressure reducing valve (PRV) facilities that flow from Camas to Washougal under emergency supply conditions.

The City's water is produced from six active groundwater wells at two wellfields that withdraw water from the Pleistocene Alluvial Aquifer (PAA). Wells 5, 6, 7, 11, and 12 comprise the Lower Wellfield, and Well 1 is the only active well at the Upper Wellfield. The production capacity of these wells is approximately 7.9 mgd. Other infrastructure includes seven storage reservoirs and three booster pump stations (BPS). The City distribution system includes 83 miles of pipelines ranging in diameter from 1.5- to 16-inches. Topography across the system ranges from nearly sea level to 600 feet and the system has 12 pressure zones isolated by 15 PRVs.

Basic Planning Data

The City's 2015 Comprehensive Plan projects population growth of approximately 1.9 percent, which provides the basis of future population projections and equivalent residential units (ERUs). The distribution of future ERUs between pressure zones were developed in coordination with Community Development staff based on planned and anticipated future developments.

This growth corresponds to estimated increases in average day demand (ADD) requirements from 1.62 to 2.62 million gallons per day (MGD) by 2039. Through continued implementation of water conservation and efficiency measures, it is estimated that projected ADD will decrease by one percent annually. Moving forward, the City will update the WSP every ten years, which provides the opportunity to update population and demand trends and collect data on its distribution system water loss.

The projected demands for the 20-year planning period are used to evaluate the hydraulic capacity of the system and identify improvements. The actual timing of any improvements should be based primarily on when the system reaches demand capacity thresholds versus specific predetermined timelines.

The service area and ERU projections are summarized in Table ES-2. The projected water demand requirements by pressure zone, inclusive of future proposed pressure zones are presented in Table ES-3.

Table ES-2 | Service Area Population and ERUs

Projected Population and ERUs	2019	2029	2039
WSA Population Projection	16,500	19,944	24,108
Equivalent Residential Units (ERUs)	9,029	11,480	14,615
Residential ERUs	4,870	6,263	7,977
Non-Residential ERUs	4,159	5,213	6,638

Table ES-3 | System Demand Projections

Zone	Demand (MGD)											
	2019				2029				2039			
	ERUs	ADD	MDD	PHD	ERUs	ADD	MDD	PHD	ERUs	ADD	MDD	PHD
1	5,421	0.86	1.58	2.63	7,068	1.12	2.07	3.43	8,915	1.42	2.61	4.33
2	1,216	0.24	0.68	1.27	1,341	0.27	0.75	1.40	1,541	0.31	0.87	1.60
3	1,521	0.34	0.65	1.20	1,971	0.44	0.84	1.56	1,841	0.41	0.79	1.45
4	871	0.18	0.65	1.26	1,021	0.21	0.76	1.47	1,410	0.29	1.06	2.04
5	-	-	-	-	78	0.02	0.03	0.06	116	0.03	0.05	0.09
6	-	-	-	-	-	-	-	-	392	0.09	0.17	0.31
7	-	-	-	-	-	-	-	-	400	0.08	0.30	0.58
Total	**9,029**	**1.62**	**3.57**	**6.36**	**11,480**	**2.06**	**4.46**	**7.92**	**14,615**	**2.62**	**5.83**	**10.40**
Total (GPM)		**1,127**	**2,480**			**1,430**	**3,098**			**1,820**	**9,050**	

Notes:

1. MGD = million gallons per day

System Analysis

The water system analysis includes a review of the supply, pumping, storage, and distribution capacity of the system for existing, 10-year and 20-year planning horizons compared to regulatory and industry criteria outlined in **Table ES-4**. A calibrated hydraulic model was developed to assess existing pressure zones, service pressures, and distribution main capacity.

Table ES-4 | Performance Criteria

Attribute	Evaluation Criterion
Water Supply	Firm Capacity[1]
Storage	Dead Storage
	Equalization Storage
	Fire Suppression Storage
	Operational Storage
	Standby Storage
Booster Pump Stations	Pump Redundancy
	Firm Capacity, Open and Closed Zones
	Total Capacity, Open and Closed Zones
	Emergency Power
Service Pressure	Minimum
	Standard Range
	Maximum
Distribution Piping	Maximum Velocity
	Minimum Future Diameter
Fire Suppression	Single Family, Multi-family, and Non-residential Requirements

Note:
1. Firm capacity: the total production capacity with the largest capacity pump out of service.

The City provides reliable water supply to its customers when evaluated against criteria for pressure, storage, and pumping capability for the 20-year horizon. With planned distribution system improvements, the City will also be able to meet criteria during fire suppression scenarios for the planning period. The following describes the high-level takeaways from each of the respective analysis components.

Supply Analysis Summary

The City has adequate yearly water rights and supply capacity to meet existing, 10-year, and 20-year max day demand (MDD) projections. The City completed drilling for the new Well 1R in 2016 that was intended to replace the aging Well 1 with increased capacity, however, testing indicated that the yield was less than anticipated. The project hydrogeologist recommended to operate Wells 1 and 1R together to achieve a combined short-term pumping rate of up to 1,325 gallons per minute (gpm) to realize the full water right and provide redundancy.

Booster Pump Station Analysis Summary

The City operates three booster pump stations. With Zone 1 supplied by the production wells, adequate existing pump station capacity is available to supply projected demands for Zones 2 and 3 for the 20-year planning period. There is a slight supply deficiency for Pump Station No. 4 under the 20-year MDD scenario. This deficiency is not viewed as warranting an improvement since the calculation conservatively includes future Zone 7 demand and there is a surplus of available storage in Zone 4. Zones 5 and 6 are future service areas not currently served by the City, and Zone 6 serves a portion of the current Zone 3 service area. New booster pump stations will be constructed to serve future Zones 5, 6, and 7 as growth occurs in those areas.

Storage Analysis Summary

The City has sufficient storage in Zones 1, 2, and 4 to meet the storage requirements for the 20-year planning period. The City is currently working with the Northside Development to construct the new Reservoir 3B that will provide supplemental storage for Zone 3 and the proposed Zone 5 in conjunction with the existing Reservoir 3 to meet 20-year planning period demand conditions. Future Reservoirs 6 and 7 are included as improvements that will be designed to provide storage for future development.

Distribution System Analysis Summary

The majority of the system provides water service pressures within the desired service pressure range of 40 – 90 pounds per square inch (psi). Under all conditions there are a handful of areas with operating pressures above 100 psi, specifically in the lower elevation service area of Zone 3. Under the MDD plus fire flow scenario there are areas in the system that do not adequately meet the minimum fire flow targets for existing infrastructure. The deficiencies are typically due to small diameter and/or dead-end pipe, and improvements are identified as outlined in Table ES-4. It is recommended the City continue to replace undersized (less than 6-inch diameter) pipe in the distribution system.

The only locations where distribution system flow velocity exceeds the criteria for the existing MDD and peak hour demand (PHD) scenarios are the short runs of pipe immediately downstream from the Zone 1 and Zone 2 reservoirs. Velocities in all other distribution and transmission mains are beneath the criteria threshold.

System pressures under the 10-year and 20-year scenarios were similar to existing conditions, which is to be expected due to the relatively modest growth that is projected in the system over the next 20 years. There are a handful of locations with high pressures, but the future addition of Zone 6 significantly reduced the high pressure service area at the lower elevations of the existing Zone 3. In accordance with Uniform Plumbing Code, individual service PRVs should continue to be installed where static pressure exceeds 80 psi; property owners are responsible for installing and maintaining their PRV devices. No additional fire flow deficiencies were identified under future conditions.

Overall, the City's distribution system mains are in good condition. It is recommended that the City continue to document pipe leaks/breaks as well as locations with undersized pipes (typically 6 inches or less) to help coordinate water infrastructure renewal-replacement needs with other utilities. The City should continue these efforts to reduce water loss and keep system piping in working order and with appropriate life cycle expectations.

Water Resource Analysis and Water Use Efficiency

The City has updated its WUE program goals and measures, aimed at maintaining low water loss and reducing consumption. The City will continue to implement the WUE measures identified and evaluate the effectiveness of the measures with continued tracking and review of demand and water loss data.

Overall the City has sufficient water rights and maintains wells with adequate capacity and will develop supplemental source production to meet the 20-year demand projections presented in Table ES-3. All water system customers and sources are metered and the 3-year average distribution system loss (DSL) is below the 10 percent threshold mandated by WUE requirements.

Source Water Protection

The City operates two groundwater wellfields (Upper and Lower) that draw water from the PAA. The City's 2012 *Wellhead Protection Assessment Report* delineates the capture zones for the wellfields and identifies potential contaminant sources located within the zones. A map of the wellfield capture zones and a list of potential contaminant sources has been updated and included in Appendix I along with a copy of the notification letters that were distributed to the owners and operators of the potential contaminant sources. The City maintains its Emergency Response Plan (ERP) to address potential threats or interruptions to service including potential water shortages or hazardous waste spills.

By State law (WAC 246-290), the City is required to maintain an ongoing water quality testing and monitoring program. This program is administered by the DOH and is comprised of monitoring the water supply for specified chemical and physical contaminants. The DOH requires that the source water supply be monitored for regulated primary and secondary contaminants. Primary contaminant levels are not to be exceeded for health reasons, while secondary contaminants should not be exceeded for aesthetic reasons. The City is required to monitor Inorganic Contaminants, Volatile Organic Contaminants, and radiological constituents. Distribution system water quality testing requirements include monitoring of many types of components including bacteriological, inorganic chemical, physical, DBPs and disinfection residual, radionuclides, organic chemicals and any other chemicals for which maximum contaminant levels are established.

Bacteriological samples are collected by City personnel monthly. Currently, a minimum of 20 bacteriological samples are tested each month. Monitoring of inorganic compounds is completed every nine years, while monitoring of organic compounds is completed every six years. Lead and copper monitoring is performed every 3 years at the customer tap based on a select sample group

within the distribution system. Disinfection Byproducts (DBP) monitoring is performed every year. The City water system is of high quality and complies with all water quality regulations.

Operations and Maintenance Program

The City has procedures and policies in place to operate and maintain its water system. It has an organizational structure that ensures each component of the system is managed and overseen by those with the appropriate certifications. Routine operation tasks include daily rounds to visually check system facilities, monitoring flow and reservoir level recordings, and responding to customer inquiries and complaints. Preventive maintenance consists of regularly servicing pumps and motors, cleaning and painting reservoirs, and flushing dead-end pipelines. It is recommended that the City develop a formal valve exercising program to ensure proper operation. The City has projects identified to maintain the system and address areas requiring improvements as identified through system operations.

The City has water quality monitoring procedures in place to monitor and check water quality parameters such as coliform, lead and copper, and DBP. It maintains a Cross-Connection Control Program through municipal code and reports on its status annually. There are emergency management and vulnerability assessments in place to address circumstances that could require increased levels of management under emergency conditions.

Design and Construction Standards

The City has developed and maintains Engineering Standards for Public Works Construction that serves as a supplement to the current Washington State Department of Transportation's *Standard Specifications for Road, Bridge, and Municipal Construction.*

Capital Improvement Plan

Recommended projects are developed for two planning periods, those within the next 10 years and those from 11 to 20 years. Projects are designed to address system deficiencies projected during these time periods but should be evaluated annually through City reviews of demand growth, available budget, and specifically where development is occurring. Projects include supply, storage and distribution improvements to address existing deficiencies and support system growth. An updated rate study and updates to the WSP are also scheduled in addition to completion of the America's Water Infrastructure Act (AWIA) Risk and Resilience Assessment and ERP preparation. The total project cost (2020 dollars) within the 10-year timeframe is approximately $13.9 million; in the 11 to 20-year timeframe it is approximately $39.3 million. Improvement projects scheduled for the next 10 years are summarized in Table ES-5, and projects scheduled for the following 11 to 20 years are presented in Table ES-6.

Table ES-5 | Years 1 to 10 Capital Improvement Projects

Category	Project ID	Description	Project Cost[1,2]									
			2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Storage Facilities	R1	Reservoirs 1A and 1B Seismic Upgrades				$164,000						
	R6	Reservoir 6 Site Grading		$330,000								
	R7	Reservoir 7 Site Alternatives Analysis and Property Acquisition						$34,800		$615,000		
		Storage Subtotal		**$330,000**		**$164,000**		**$34,800**		**$615,000**		
Source Facilities	W1R	Well 1R – 425 gpm well									$316,700	$1,957,200
		Source Subtotal									**$316,700**	**$1,957,200**
Northside Development[3]	R3	0.31 MG Reservoir 3B serving Zones 3 and 5										
	PS5	1,200 gpm BPS 5 serving Zone 5		$1,050,000	$1,050,000							
	P34	Northside Development Transmission										
		Northside Development Subtotal		**$1,050,000**	**$1,050,000**							
Distribution System	P7	J Street from 32nd Street to 34th Street, 1,190 feet (8-inch)					$394,000					
	P8	I Street from 32nd Street to 34th Street, 1,240 feet (8-inch)						$420,900				
	P9	G Street from 32nd Street to 34th Street, 1,190 feet (8-inch)							$413,200			
	P10	32nd Street from G Street to K Street, 20 Service Transfers from 4-inch to 14-inch				$164,000						
	P11	A Street from 7th Street to 10th Street, 2,670 feet (8-inch)							$938,600			
	P13	South 1st Street from Port Building West, 410 feet (8-inch)						$136,800				
	P14	3rd Avenue from 4th Street to Shepherd Road, 1,420 feet (12-inch)					$1,028,800					
	P16	S Street from 32nd Street, 220 feet (4-inch)		$50,000								
	P17	R Street, 825 feet (4-inch)		$75,000								
	P18	B Street from 11th Street to 14th Street, 20 Service Transfers from 6-inch to 14-inch									$190,100	
	P23	D Street from 11th Street to 12th Street, 270 feet (8-inch)				$73,300						
	P48	Woodburn Hill Transmission Main		$345,000								
		Major Repairs/Miscellaneous Pipe Improvements	$50,000	$50,000	$53,100	$54,700	$56,300	$58,000	$59,800	$61,500	$63,400	$65,300
		AMI Implementation	$296,000	$386,500	$410,000	$422,300	$450,300	$463,800	$477,700			
		Distribution System Subtotal	**$346,000**	**$906,500**	**$463,100**	**$714,300**	**$1,929,400**	**$1,079,500**	**$1,889,300**	**$61,500**	**$253,500**	**$65,300**
Planning		Rate and Connection Fee Study[4]				$71,000						
		AWIA Risk and Resilience Assessment and ERP		$105,000					$125,400			
		Water System Plan Update										$326,200
		System Capacity/CIP Update						$58,000				
		Planning Subtotal		**$105,000**	**$0**	**$71,000**	**$0**	**$58,000**	**$125,400**	**$0**	**$0**	**$326,200**
		Total:	**$346,000**	**$2,391,500**	**$1,513,100**	**$949,300**	**$1,929,400**	**$1,172,300**	**$2,014,700**	**$676,500**	**$570,200**	**$2,348,700**

Notes:

1. Costs shown were developed in 2020 dollars with a 3 percent annual escalation applied for inflation. Funding sources will vary including City water rates, loans, bonds, grants, and private developers.
2. Costs shown represent total project costs and include local sales tax at 8.4 percent.
3. Cost shown for Northside Development improvements reflects only portion of project cost that City is responsible for.
4. Current rate window through 2023..

Table ES-6 | Years 11 to 20 Capital Improvement Projects

Category	Project ID	Description	Cost[1,2]
Storage Facilities	R6	1.00 MG Reservoir 6 – storage for mid-level Zone 6	$4,070,000
	R7	0.51 MG Reservoir 7 – storage for proposed Zone 7 in northeast UGA	$3,120,000
		Storage Facilities Subtotal	**$7,190,000**
Pumping Facilities	PS3	650 gpm BPS 3 at Reservoir 6 site including electrical service and abandon existing BPS 3	$1,710,000
	PS6	815 gpm BPS 6 – fills proposed Reservoir 6 from Zone 1	$1,470,000
	PS7	800 gpm BPS 7 – fills proposed Reservoir 7 from Zone 4	$1,070,000
		Pumping Facilities Subtotal	**$4,250,000**
Distribution System Pipes and Valves		*Pipe Improvements for Fire Flow*	
	P12	6th Street from C Street to S A Place, 1,790 feet (12-inch)	$914,000
	P15	32nd Street from A Street to Lewis Lane, 4,190 feet (24-inch)	$2,594,000
	P20	33rd Street from Webster Lane to F Street, 410 feet (8-inch)	$120,000
	P21	F Place from F Street to 33rd Street, 360 feet (8-inch)	$104,000
	P22	F Street from 12th Street to 14th Street, 1220 feet (8-inch)	$359,000
	P23	D Street from 11th Street to 12th Street, 270 feet (8-inch)	$67,000
	P24	A Street to Addy Street Connection, 2,100 feet (12-inch)	$748,000
	P25	Addy Street from S 27th Street to 32nd Street, 1,580 feet (12-inch)	$580,000
	P26	8th Street from C Street to B Street from C Street to B Street, 270 feet (8-inch)	$79,000
	P27	A Street from SR 14 to 14th Street from SR 14 Hwy to 14th Street, 710 feet (8-inch)	$208,000
	P28	G Street from Evergreen Highway to 9th Street from Evergreen Hwy to 9th Street, 1,250 fee (8-inch)t	$367,000
	P29	23rd Street from G Street to E Street from G street to E Street, 560 feet (8-inch)	$163,000
		Zone 3 Expansion between City Limits and northern UGA boundary	
	P30	Woodburn Road Loop (Woodburn Road to SE 30th Street, branching to Reservoir 3 transmission), 5,370 feet (12-inch)	$1,906,000
	P31	Central Main East Loop (SE 28th Street to SE 303rd Avenue to SE 23rd Street to SE 293rd Avenue), 6,500 feet (12-inch)	$2,301,000
	P32	Central Main West Loop (SE 293rd Avenue to SE 23rd Ave branching west then south, west of Northside development), 3,840 feet (12-inch)	$1,360,000
	P33	N T Street to SE Woodburn Road, 1,120 feet (8-inch)	$319,000
		Zone 3-2 Expansion between City Limits and northern UGA boundary	
	P35	SE 23rd Street PRV to SE Crown Road to SE 282nd Court, 3,970 feet (8-inch)	$1,136,000
	P36	SE Crown Road to SE McKever Road, 1,490 feet (8-inch)	$426,000
		Zone 3-3 Expansion north of City Limits	
	P37	Proposed Crown Road PRV connection to existing distribution (SE McKever Road to W 10th Street), 400 feet (8-inch)	$113,000
		Zone 3-7 Piping	
	P38	SE 314th Avenue and SE Woodburn Road Double Loop, 2,390 feet (8-inch)	$683,000
		Zone 4-2 Expansion north of City Limits	
	P39	Eagle Woods Loop (SE 34th Street to SE 330th Court to SE Eagle Woods Drive to SE 328th Avenue to Y Street), 4,170 feet (8-inch)	$1,193,000
		Zone 5 Piping	
	P40	Central Main (SE 28th Street extension west of SE 303rd Avenue to Northside Zone 5 piping to SE 30th Circle), 4,260 feet (12-inch)	$1,380,000
	P41	West Loop (north of SE 30th Circle to W 7th and 8th Streets), 3,710 feet (8-inch)	$1,062,000
	P42	SE 30th Street extension east of SE 300th Avenue, 1,020 feet (8-inch)	$361,000
		Zone 6 Piping	
	P1	N V Street from N 7th Street to N 14th Street, 1,650 feet (12-inch)	$347,000
	P2	W U Street from east of W 7th Street to N LeBrun Drive, 740 feet (12-inch)	$262,000
	P3	W Lookout Ridge Drive to proposed Reservoir 6, PBS 3, and loop with existing mains at W W St, 1,210 feet (12-inch)	$345,000
	P4	W Lookout Ridge Drive Zone 3 water main extension, 310 feet (8-inch)	$87,000
	P5	N U Street from east end of N U Street to N 6th Street, 390 feet (12-inch)	$136,000
	P6	N Lebrun Boulevard to N 3rd Street and N 6th Street, 2,700 feet (12-inch)	$957,000
	V1	Miscellaneous Zone 6 PRV and isolation valve modifications	$120,000
		Zone 7 Piping	
	P43	Reservoir 7 Transmission, 2,240 feet (12-inch)	$793,000
	P44	Jennings Road and 357th Loop (SE 357th Avenue to SE 31st Way and SE 347th Avenue down SE Jennings Road to SE 31st Way to SE 362nd Avenue), 7,530 feet (12-inch)	$2,672,000
	P45	Saint Clair Road Loop (SE 362nd Avenue to SE Saint Clair Road to W Street), 3,710 feet (12-inch)	$1,317,000
	P46	57th Street north extension (P Street to W Street to Saint Clair Loop), 2,040 feet (12-inch)	$724,000
	P47	Zone 4-3 Connection (P Street and 57th Street Fire Flow Improvements), 720 feet (8-inch)	$205,000
		Pressure Reducing Valves	
	V2	Green View Estates Development North PRV	$150,000
	V3	SE 23rd Street PRV	$150,000
	V4	Crown Road PRV	$150,000
	V5	SE Woodburn Road PRV	$150,000
	V6	SE Woodburn Road and N T Street PRV	$150,000
	V7	SE 330th Court PRV	$150,000
	V8	Second 57th Street PRV	$150,000
		Distribution System Subtotal	**$27,558,000**
Planning		Water System Plan Update	$150,000
		AWIA Risk and Resilience Assessment and ERP (x2)	$200,000
		Planning Subtotal	**$500,000**
		Total:	**$39,348,000**

Notes:

1. Costs are in 2020 dollars. Funding sources will vary including City water rates, loans, bonds, grants, and private developers.
2. Costs shown represent total project costs and include local sales tax at 8.4%.

Financial Program

The results of the financial program analysis indicates that annual rate increases are recommended to address current obligations, fund and finance the CIP, and satisfy financial policies. Implementation of the financial program and related rate increases target ongoing financial viability, while maintaining affordable rates. It is recommended that the proposed rate increases be implemented and become effective January 1st of each year, with annual review to ensure no significant deviation of actual performance from projected in maintaining the rate plan.

Summary and Overall Recommendations

This WSP constituted a significant investment of time and resources for City staff and provides a valuable resource for how to continue providing quality water to system customers. This WSP utilized industry standard approaches by employing hydraulic modeling software to identify system deficiencies and refine recommended improvement projects. The capital projects that have been identified provide a plan, phased over the next 20 years, that will enable the City to continue meeting required standards and providing quality water to its customers.

As a result of this WSP, the following recommendations are made.

- Implement the 1 to 10-year improvements as identified in the CIP to address existing capacity and condition deficiencies.
- Continue improving the quality of available water system information, specifically through GIS data management and improved SCADA.
- Continue evaluating system pipe condition to maintain a prioritized list of pipe replacement projects that can be coordinated with other utility improvement projects if possible.
- Conduct regular updates to the WSP.
- Evaluate the water rate structure annually to fund system improvements and continue to review and update the financial plan regularly.



Section **1**

Chapter 1

Description of Water System

1.1 Introduction

The City of Washougal (City) is located in east Clark County adjacent to the Columbia River Gorge National Scenic Area (CRGNSA). This Chapter describes the City's water service area (WSA) characteristics and inventories water distribution system facilities owned and operated by the City to supply its customers. Also included is a discussion of water system management and background, related plans, and service area policies.

1.2 Ownership and Management

The City's water system (Water System ID: 93400) is owned and operated by the City. The City is governed under a Council / City Manager form of government. The elected seven-member City Council selects a mayor and mayor pro tem from the city council members. The Public Works Committee, comprised of three members of the City Council, is charged with discussing public works related issues within the City and forwarding agenda items to the larger City Council for consideration.

The City Manager, approved by a majority of the City Council, oversees the business operations of the City. The Public Works Director works under the City Manager and in collaboration with the Deputy Public Works Director / City Engineer to manage and plan for the future of the City's utility infrastructure, including the water supply and distribution system.

The Water Superintendent is a certified State of Washington Water Distribution Manager (WDM) who works under the Public Works Director. The Water Superintendent is responsible for requisitioning materials and equipment necessary for water system function, inspecting water system components for compliance with standards, providing oversight and training for water system operators, and working with the public to resolve complaints related to water system activities. The Water System Supervisor and Water System Lead, working under the Water Superintendent, focus on water quality, operational duties, overseeing system maintenance, and implementing a cross-connection control program. Water system staff are responsible for installing new water services, performing maintenance activities, and collecting water quality samples. Water system personnel certifications are discussed in Chapter 6, Operations and Maintenance.

1.3 System History and Background

The City was established in 1880 and incorporated in 1908 on the north shore of the Columbia River at the entrance to the Columbia River Gorge. Historically, population growth in the City was driven by the timber industry as well as paper and woolen mills. Although the City's population growth rate slowed during the Depression and World War II, industry continued to play a role in the community's growth particularly with the development of the Port of Camas/Washougal Industrial Park on the Columbia River beginning in 1967. Population growth in the City today is also influenced by the City's proximity to the Portland/Vancouver metropolitan area.

The City's water system is supplied entirely by groundwater wells that produce water from the shallow Pleistocene Alluvial Aquifer (PAA). The aquifer is very permeable and serves as a source of supply to most of the industrial wells owned by Georgia Pacific and many of the municipal wells owned by the City of Camas. Groundwater in this aquifer generally flows in the southwesterly direction.

Groundwater supply development began with Wells 1 through 4 at the Hathaway Park (Upper) Wellfield between 1931 and 1939. The Upper Wellfield is located near 28th Street and I Street. The depth to the water table at the Upper Wellfield ranges from 55 to 81 feet. Due to limited space at Hathaway Park, Wells 5, 6, and 7 were constructed at the new Westside (Lower) Wellfield between 1942 and 1954. The Lower Wellfield is located between the Burlington Northern Railroad and C Street on 1st Street near the Camas/Washougal border. Depth to the water table ranges from 38 to 46 feet at the Lower Wellfield.

Well 9 was constructed at what is now Hamllik Park in 1977 but is no longer in use due to water taste and odor concerns. Well 10 was constructed in 1984 at the Upper Wellfield as a partial replacement for Wells 2, 4, and 9 which are no longer in service. Well 10 is currently inactive with no pump installed in the well, available only as an emergency supply source. Well 11 was constructed in 1984 alongside existing Wells 5, 6, and 7 at the Lower Wellfield. In 2009, Well 12 was constructed at the Lower Wellfield to serve customers in new residential developments annexed by the City from within its Urban Growth Area (UGA).

In 2016, drilling was completed for the new Well 1R that was intended to replace the aging Well 1 with increased capacity, but subsequent testing indicated that the yield was less than anticipated. The current plan is to operate Wells 1 and 1R together to achieve the allowable water right production rate when Well 1R is completed in the future.

1.4 Inventory of Existing Facilities

This section provides an inventory of existing system facilities as shown in Figure 1-1. An extensive assessment of the system's capabilities and deficiencies are presented in Chapter 3. See Appendix A for a copy of the system's current Water Facilities Inventory Form.

1.4.1 Groundwater Sources

The City's water supply consists of six active groundwater wells within the city limits, located at the Upper and Lower Wellfields. The City utilizes a single water right permit for each wellfield that supplements existing Certificates and Claims for each of the wells. The maximum instantaneous flow rate allowed by both water right permits is 4,675 gallons per minute (gpm) for the Lower Wellfield and 1,325 gpm for the Upper Wellfield. The production capacity of all active wells is 5,475 gpm, or 7.9 million gallons per day (mgd). According to City staff, any one of Wells 5, 6, and 7 can generally supply the City's water demand during the winter months. During the winter, the City operates these wells on a rotating schedule. During the summer, primary water supply needs are supplemented by Wells 1, 11, or 12.

The installed pump capacity of each well is summarized in Table 1-1.

Table 1-1 | Existing Well Summary

Well No.	Wellfield	Approximate Capacity (gpm)
1	Upper	900
5	Lower	650
6	Lower	675
7	Lower	750
10	Upper	400 (Inactive)
11	Lower	1,000
12	Lower	1,500

1.4.2 Treatment

Treatment of the groundwater produced by the City's existing well sources includes disinfection and potential hydrogen (pH) adjustment to minimize the potential for lead and copper corrosion prior to entering the distribution system. The City utilizes bulk sodium hypochlorite feed systems for disinfection and bulk liquid sodium hydroxide for pH adjustment at the Upper and Lower Wellfields.

1.4.3 Treated Water Storage and Pump Stations

The City's water system operates three booster pump stations (BPS) and seven finished water storage reservoirs with a combined volume of 4.88 million gallons (MG) as summarized in the following Tables 1-2 and 1-3.

Table 1-2 | Existing Finished Water Storage Reservoirs

Reservoir Name	Effective Capacity (MG)	Floor Elevation (ft)	Overflow Elevation (ft)
1A	1.50	197	236
1B	1.00	202	236
2A	0.16	332	362
2B	0.45	338	361.5
3	0.42	630	645
4[1]	0.1	578	677
4B	1.25	654	677

Notes:

1. Reservoir 4 is a standpipe with a physical capacity of 0.531 MG, but only 0.1 MG of this capacity provides effective storage to Zone 4.

Table 1-3 | Existing Booster Pump Stations

Pump Station No.	Number of Pumps	Firm Capacity (gpm)	Full Capacity (gpm)
1	3	1,680	2,680
3	3	750	1,050
4	3	600	900

1.4.4 Distribution System

The City distribution system includes approximately 83 miles of pipe ranging in diameter from 1.5 inches to 16 inches. All new pipelines constructed in the water system are ductile iron, with the exception of polyvinyl chloride (PVC) pipe for sizes smaller than 6 inches. Other existing pipe materials include welded steel, high-density polyethylene (HDPE), galvanized and non-galvanized iron, cast iron, and asbestos cement. Topography across the service area varies from nearly sea level to approximately 600 feet. The system has four primary pressure zones served by the three BPSs and seven finished water storage reservoirs. The primary pressure zones are further divided into sub-zones supplied through 15 pressure reducing valve (PRV) stations. PRVs allow water stored at higher pressures to supplement the supply to lower pressure zones. **Figure 1-1** shows the City's main water facilities and distribution system pipe and **Figure 1-2** shows the City's existing hydraulic profile. **Table 1-4** summarizes the PRV characteristics and **Table 1-5** details the pressure zone characteristics following the summaries of each pressure zone.

Table 1-4 | Existing Distribution System PRVs

PRV Name	Large Valve Diameter (in)	Small Valve Diameter (in)	Elevation (ft)	Pressure Setting (psi)	From Zone	To Zone
WHS[1]	6	3	100	56	2	1
Evergreen	6	2	50	80	2-2	1
Lebrun[1]	6	1.5	160	32	3	1
Sunset Ridge	6	2	135	60	2	2-2
Coda Ridge	6	2	357	78	3	3-2
Lookout Ridge 1	8	2	290	85	3	3-3

PRV Name	Large Valve Diameter (in)	Small Valve Diameter (in)	Elevation (ft)	Pressure Setting (psi)	From Zone	To Zone
Lookout Ridge 2	6	2	390	34	3	3-3
N 10th Street	6	1.5	190	73	3	3-4
Columbia Ridge	6	2	250	40	3	3-4
Crown Pointe	6	1.5	180	50	3	3-5
Arborview	6	2	324	90	4	4-2
Columbia View	8	2	361	30	4	4-3
49th Street	6	3	338	30	4	4-3
57th Street	6	2	260	48	4-3	2
C-Dymond	6	2	415	52	4	4-4

Notes:
1. PRVs are normally closed.

1.4.4.2 Pressure Zone 1

Pressure Zone 1 is the largest zone in the City and contains both wellfields and the two emergency interties with the City of Camas. This zone serves most water customers south of Shepherd Road between the City of Camas to the west and the eastern city limits in areas with elevations below approximately 160 feet above mean sea level (msl).

Pressure Zone 1 is served by Reservoirs 1A and 1B, located on a single site near the intersection of Stiles Road and W Street, with capacities of 1.5 MG and 1.0 MG, respectively. The reservoirs are welded steel tanks supplied through distribution mains from the wellfields. The wells are sequenced and controlled by the water system Supervisory Control and Data Acquisition (SCADA) system to maintain the water level in the reservoirs. Both reservoirs have an overflow elevation of 236 feet.

The Washougal High School (WHS) PRV on 39th Street and J Street can provide water to Zone 1 from the higher elevation Zone 2. The WHS PRV is normally closed, that is, isolated from the system with a normally closed valve. The Evergreen PRV on Evergreen Way at Sunset View Road can also supply water to Zone 1 from Zone 2-2. The Lebrun PRV at Lebrun Drive near Shepherd Road can feed water back to Pressure Zone 1 from Pressure Zone 3, but it is also normally closed.

1.4.4.3 Pressure Zone 2

Pressure Zone 2 is served by the 0.16 MG Reservoir 2A and the 0.45 MG Reservoir 2B located on a single site near 37th Street and W Street, serving customers east of the Washougal River between approximate ground elevations of 140 and 300 feet. Reservoir 2A has an overflow elevation of 362 feet and Reservoir 2B has an overflow elevation of 361.5 feet. The Zone 2 reservoirs are supplied by Pump Station 1 which draws suction supply from Reservoirs 1A and 1B. Pump Station 1 is located adjacent to Reservoirs 1A and 1B. Pressure Zone 2 can also be supplied from Pressure Zone 4-3 by the 57th Street PRV at 57th and L Streets. Pressure Zone 2 serves Pressure Zone 2-2.

The Sunset Ridge PRV reduces water pressure as it flows from Pressure Zone 2 to lower elevations in the Sunset Ridge Phase 1 subdivision near Sunset Ridge Drive and F Street. Service connections in this area are considered part of Zone 2-2 with approximate ground elevations between 60 and 180 feet. This zone also serves a small number of customers outside the eastern city limits on Evergreen Way as far east as SE 356th Avenue. These customers, including the Jemtegaard Middle School, are within the CRGNSA.

1.4.4.4 Pressure Zone 3

Pressure Zone 3 is served by the 0.42 MG Reservoir 3 which is a glass fused bolted steel tank with an overflow elevation of 645 feet. The reservoir is supplied from Pump Station 3 on 10th Court north of Shepherd Road. Pump Station 3 draws suction supply from the Pressure Zone 1 distribution grid. Pressure Zone 3 and the four sub-zones supplied from Zone 3 serve water system customers west of the Washougal River between approximate ground elevations of 160 and 540 feet. Water mains at lower elevations in Pressure Zone 3, particularly in the Granite Highlands development centered at N Stonegate Drive and N 4th Street will provide excessive service pressures. Service pressures for customers in this area are regulated by individual PRVs at each service.

1.4.4.5 Pressure Zone 3-2

The Coda Ridge PRV at the intersection of X and Y Streets reduces Zone 3 water pressure to serve customers on Y Street between X and Z Streets as well as all existing customers on Z Street north to the dead end of 9th Street south of McKever Road. Service connections in this area are considered part of Zone 3-2 with approximate ground elevations between 340 and 450 feet.

1.4.4.6 Pressure Zone 3-3

The Lookout Ridge 1 PRV on Lookout Ridge Drive at LeBrun Boulevard and the Lookout Ridge 2 PRV that was relocated to X Street and 1st Street reduce water pressure from Zone 3 to Zone 3-3. Zone 3-3 serves customers at lower elevations of the Crown Terrace, Lookout Ridge and Riverview Terrace subdivisions along 10th, Bamboo and Alder Streets, Lookout Ridge Drive, and S, T, U, and X Streets. Service connections in Zone 3-3 have approximate ground elevations between 120 and 400 feet. Water mains at lower elevations in Pressure Zone 3-3, particularly in the River View Terrace development south of U Street provide excessive service pressures. Service pressures for customers in this area are regulated by individual PRVs at each service.

1.4.4.7 Pressure Zone 3-4

The 10th Street PRV near the intersection of 10th and S Streets reduces Zone 3 water pressure from the transmission main between Pump Station 3 and Reservoir 3 into the River View Place and Jordan Pointe subdivisions on S Street and Columbia Ridge Way. Service connections in this area are considered part of Zone 3-4 with approximate ground elevations between 140 and 280 feet. This zone is also fed from Zone 3 by the Columbia Ridge PRV on Columbia Ridge Way south of 40th Street.

1.4.4.8 Pressure Zone 3-5

The Crown Pointe PRV on 6th Street near Q Street reduces Zone 3 water pressure into the Crown Pointe Estates subdivision on P and R Streets between 6th and 9th Streets. Service connections in this area are considered part of Zone 3-5 with approximate ground elevations between 100 and 240 feet.

1.4.4.9 Pressure Zone 4

Pressure Zone 4 is served by the 0.53 MG Reservoir 4 and the 1.25 MG Reservoir 4B. Reservoir 4 is a welded steel standpipe with an effective storage capacity of approximately 0.1 MG. Reservoir 4B is a welded steel tank. Both reservoirs have an overflow elevation of approximately 677 feet. The reservoirs are supplied by Pump Station 4 which draws suction supply from Reservoirs 2A and 2B. Pressure Zone 4 serves water customers east of the Washougal River and north of W Street between approximate ground elevations of 380 and 600 feet. Water mains at lower elevations in Pressure Zone 4, particularly in the Columbia View development on 45th, 48th and Z Streets provide excessive service pressures. Service pressures for customers in this area are regulated by individual PRVs at each service.

1.4.4.10 Pressure Zone 4-2

The Arborview PRV, adjacent to the Zone 2 reservoirs and Pump Station 4, reduces Zone 4 water pressure to serve customers around Reservoirs 2A and 2B, north of the reservoirs between Stiles Road and 41st Street. Service connections in this area are considered part of Zone 4-2 with approximate ground elevations between 300 and 440 feet.

1.4.4.11 Pressure Zone 4-3

The Columbia View PRV located at the intersection of Y, Z, and 45th Streets reduces water pressure from Reservoir 4 to serve customers northwest of Campen Creek between Z and U Streets. The 49th Street PRV at 49th and W Streets reduces water pressure from Reservoir 4 to serve customers southeast of Campen Creek between U Drive and L Street. Customer connections served by these PRVs are considered part of Zone 4-3 with approximate ground elevations between 220 and 360 feet.

1.4.4.12 Pressure Zone 4-4

The C-Dymond PRV located at the intersection of 332nd Ave and 20th Street reduces water pressure from Reservoir 4 to serve a small number of residential customers outside the city limits and the UGA but within the City's WSA. This area has not been annexed by the City, and no immediate plans are in place to do so. Customer connections served by this PRV are considered part of Zone 4-4 with approximate ground elevations between 320 and 400 feet.

Table 1-5 | Existing Pressure Zone Summary

Pressure Zone	Approximate HGL (ft)	Supply	Planned Service Elevation Range (ft)[1]		Existing Service Elevation Range	
			90 psi	30 psi		
1	236	Reservoirs 1A & 1B All Wells WHS, Evergreen & Lebrun PRVs	30	165	20	160
2	362	Reservoirs 2A & 2B Pump Station 1 57th Street PRV	155	290	140	300
2-2	274	Sunset Ridge PRV	65	205	60	180
3	658	Reservoir 3 Pump Station 3	450	590	160[3]	540
3-2	537	Coda Ridge PRV	330	470	340	450
3-3	495[2]	Lookout Ridge 1 & Lookout Ridge 2 PRVs	290	430	120[3]	400
3-4	353[2]	N 10th Street & Columbia Ridge PRVs	145	285	140	280
3-5	296	Crown Pointe PRV	90	225	100	240
4	677	Reservoirs 4 & 4B Pump Station 4	470	605	380[3]	600
4-2	532	Arborview PRV	325	460	300	440
4-3	425[2]	Columbia View & 49th Street PRVs	220	355	220	360
4-4	418	C-Dymond PRV	323	462	320	400

Notes:
1. Planned service elevation range reflects desired lower and upper limits of normal operating pressure.
2. Where a PRV-controlled pressure zone is served by multiple PRVs, the HGL is assumed to be the average of the small valve settings for all PRVs supplying the zone.
3. Individual PRVs are assumed to be present on service connections in the lowest elevations of Zones 3, 3-3 and 4.

1.4.4.13 Number of Service Connections

In 2018, the City had approximately 5,350 active water service connections.

1.4.4.14 Existing Interties

The City has an emergency intertie agreement with the City of Camas water system. The City has two one-way PRV interties with the City of Camas: the South Intertie at 3rd Street and James Street in Camas and the North Intertie on the west end of Shepherd Road at the Washougal/Camas city limits. Both interties are normally closed with manually operated isolation valves and include 8-inch diameter PRVs. The City's distribution system is on the low-pressure side of the interties with the downstream pressure ranging from 75 to 82 psi. The existing interties are shown on **Figure 1-1**. Copies of the intertie agreements are included in **Appendix B.**

1.5 Related Plans

The following plans are related to the City's Water System Plan (WSP).

1.5.1 Clark County Coordinated Water System Plan

The Clark County Coordinated Water System Plan (CWSP) was originally developed in 1983 and has been updated in 1991, 1999, and most recently in 2011. The plan includes the communities of Vancouver, Camas, Washougal, Battle Ground, Ridgefield, La Center, and Yacolt. The CWSP establishes minimum countywide water utility design standards.

1.5.2 City of Washougal 2015-2035 Comprehensive Plan

The City's 2015-2035 Comprehensive Plan was adopted in 2015. This plan is the definitive planning document for the City and reflects the City's guiding principles and commitment to the ongoing growth of the City. The plan discusses population growth in the UGA expected between 2015-2035.

1.5.3 City of Washougal Subarea Plan Summary

In 2015, the city began a subarea planning process to assess the appropriate mix of employment and residential lands in the City's Northwest and Northeast UGAs. The City adopted the plan in February 2017. The subarea plan set forth a community vision for residential and employment use and growth in the City's Northwest and Northeast UGA, and ultimately resulted in amendments to the City's zoning map and adoption of residential code standards that set the stage for future development in these areas of the UGA.

1.5.4 City of Camas 2019 Water System Plan

The City of Camas WSP was updated in 2019. The plan presents a long-term planning strategy for the City Retail WSA, which shares a boundary with the west end of the City's WSA. The City has an emergency intertie agreement with Camas, and two existing one-way PRV interties that are configured to allow Camas to supply water to the City under emergency low pressure conditions as previously discussed.

1.6 Water Service Areas

The State of Washington Municipal Water Law allows municipal water providers such as the City to expand the place-of-use for an existing water right to the WSA defined in the City's approved WSP. The City is required to define their Retail and Future WSAs within the WSP as described below and illustrated in Figure 1-3.

1.6.1 Retail Water Service Area

The City's Retail WSA is defined as the area where the City currently provides water to customers and areas where the City has a duty to provide service to new customers under the conditions set forth in the 2003 Washington Municipal Water Law. The majority of the City's Retail WSA is comprised of low-density residential and retail commercial land as well as the Port of Camas-Washougal industrial park southeast of the City as outlined in **Figure 1-3**.

Future development within the Retail WSA is expected to consist of single-family housing, infill of vacant properties, redevelopment to higher-density multifamily housing, conversion of marginal residential properties to commercial zoning, and continued development of industrial-zoned land.

1.6.2 Future Water Service Area

The City's WSA has experienced consistent growth over the last two decades due in part to the City's proximity to the Portland-Vancouver Metropolitan area as well as industrial development by the Port of Camas-Washougal and annexations of approximately 1,700 acres of surrounding urbanized lands into the City. The CWSP Update identifies future WSAs for the provision of public water supply throughout the County. Central to the identification process is the selection of a qualified water provider who could most logically serve the area. The City's Future WSA boundary, as defined in the CWSP, is generally described as west to the Camas WSA, north to the Little Washougal and Washougal Rivers, east to the Skamania County line and south to the Columbia River. This area contains approximately 15,200 acres. Any future boundary adjustments must be negotiated with adjoining providers and adopted through inter-local agreements or as part of a CWSP update.

The CRGNSA overlays approximately 5,200 acres of the City's Future WSA. Within the CRGNSA boundary, approximately 730 acres have low density residential zoning designations with the remaining 4,470 acres set aside for agriculture, open space, or forest land. Significant future development in the CRGNSA is not anticipated. Existing water customers within the CRGNSA boundary will continue to be served by the City's water system. The City's UGA, the CRGNSA overlay, and city zoning designations within the WSA are illustrated in **Figure 1-4.**

1.6.3 Service Area

The City's Service Area includes the Future WSA as well as areas where the City provides wholesale water. Since the City currently does not provide wholesale water, the Service Area boundary corresponds with the City's Future WSA boundary.

1.7 Service Area Agreements

The City currently has an inter-local agreement with the City of Camas for supply from Camas to the City through two interties under emergency low pressure conditions. Existing service area

inter-local agreements include adoption of the CWSP and Camas emergency intertie as included in Appendix B.

1.8 Service Area Policies

Title 13 of the City Municipal Code sets forth rules and regulations pertaining to the City's water utility. Title 3 governs development charges and water rates. The City's policies and plan for service outlined in this WSP update have been confirmed by the Community Development Department, as documented in the Local Government Consistency Form included in Appendix C. Relevant sections of Titles 3 and 13 of the Municipal Code have been included in Appendix D. In addition, the City's Design and Construction Standards, contained in Appendix F, serve as a further extension of the City's service policies.

1.8.1 Service Area Requirements and Conditions of Service

The following summary highlights the substantive requirements and policies that govern the conditions under which the City provides water service.

- Areas of Service: The City supplies water to customers within the city limits. Potential water customers residing or developing property outside the city limits must agree to enter into a contractual agreement binding them to annexation of the unincorporated property in order to become water system customers.

- Main Extension: To accommodate new customers, distribution water mains may be extended. The cost of these extensions is the responsibility of the developer or property owner requesting City services. Late-comers or property owners requesting connection to an extended line after its completion are assessed a cost for connection to the extended water main which is then paid to the original developer until the full shared cost of the main extension has been repaid or until 10 years have elapsed following the water main's completion, whichever occurs first. Any additional connection fees after this time accrue to the City. Extension of existing water mains and new water mains installed in new development areas must meet the City's Design and Construction Standards in Appendix F. The City will provide financial assistance for oversizing of water mains when the projected future needs of the system exceed the existing requirements. The City also offers assistance in the formation of a Local Improvement District (LID) outside the city limits provided that the LID is within the City's future WSA.

- Wholesaling Water: The City does not currently offer water for wholesale purchase nor does the City maintain connections to satellite water systems. All City water customers are directly connected to the distribution system.

- Service Location Change: The City is responsible for all costs involved with changing the location of an existing domestic water meter or water service location if it is moved for the convenience of the city because of the installation of a new water main or for any other

reason. The property owner is responsible for the costs involved with reinstalling their domestic water service pipes to connect the relocated meter.

- Service Leaks: Property owners are responsible for all leaks or damage to service lines.

- Meters: All water meters are the property and responsibility of the City. Meters may be removed, replaced, or changed whenever the water department deems it necessary.

- Conservation: The Public Works Director has the authority to declare various stages for water emergencies and to implement water conservation measures for the protection of public health, safety, and welfare. The director can determine if the water conservation measures apply to the entire utility service area or just affected portions.

- Interruptions in Supply: The City will exercise diligence and care to deliver a continuous and sufficient supply of pure water and to avoid any shortages or interruptions of delivery. However, the city is not liable for high or low-pressure conditions, chemical or bacteriological conditions, interruptions, shortages, or insufficient supply. Once the water reaches the customer it is the risk of the customer.

- Complaints: Water system customer complaints may be filed through the Citizen Referral form process at Washougal City Hall. Complaints regarding the water system are forwarded to water department staff members who then begin a work order to investigate and address the customer's concern. The City also accepts citizen comments and complaints through their website.

- Cross Connection Control: All users of the water supply must comply with the Uniform Plumbing Code Chapter 10, State of Washington Cross Connection Regulations and the current of the Cross Connections Control Manual-Accepted Procedure and Practice published by the Pacific Northwest Section of American Water Works Association.

1.8.2 Process for Requests for New Services

To request a new water service the new customer must fill out a water-sewer connection application and submit it to the City Public Works department. All applications must be made by the owner of the property or an authorized agent. The water-sewer application is considered a contract agreeing to abide by all rates, rules, and regulations that are in effect at the time the application is signed. Water meters must be installed on all connections and the pipes should be 18 inches below the ground surface.

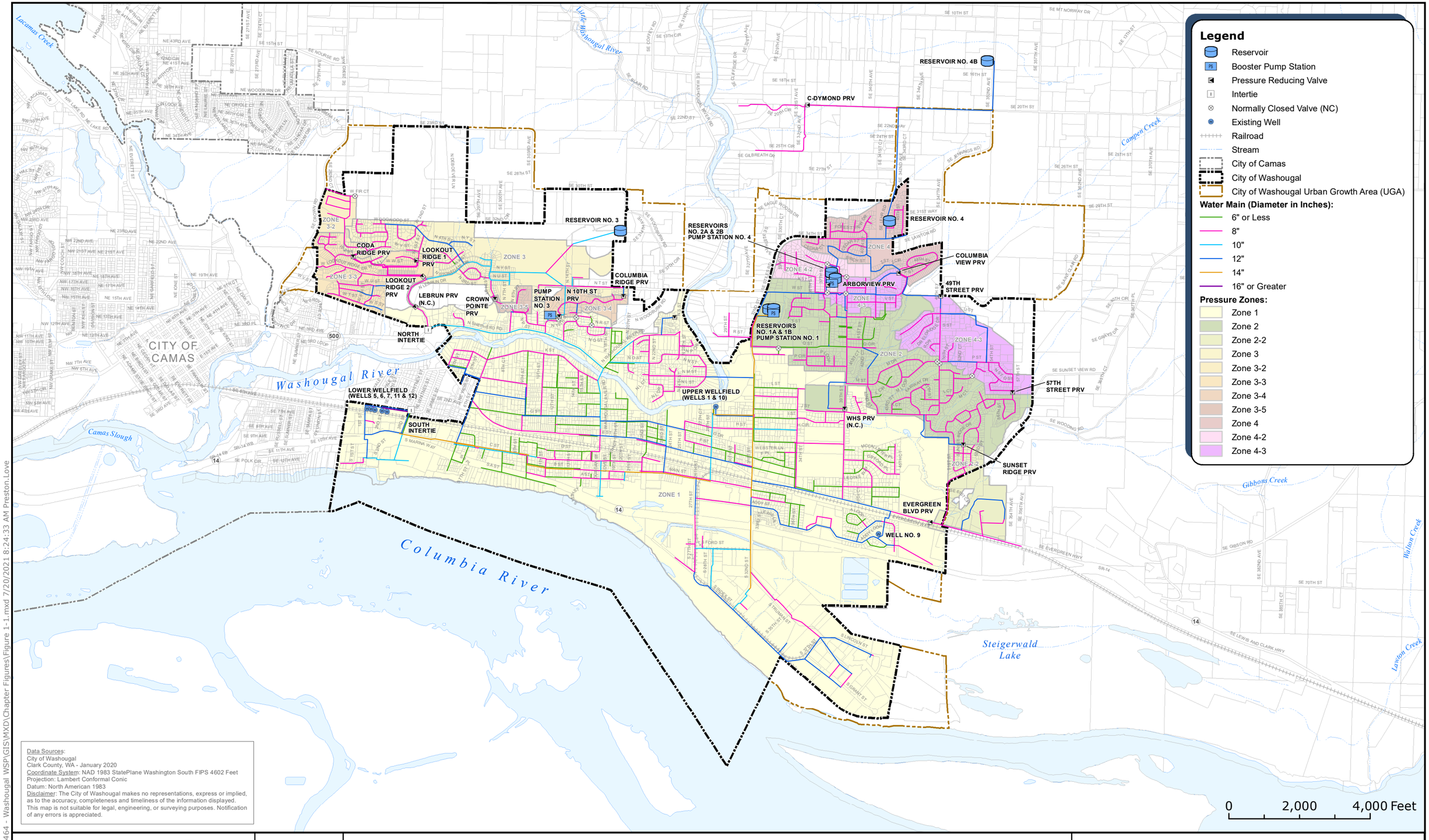
In order to accommodate new customers, distribution water mains may be extended. The cost of these extensions is the responsibility of the developer or property owner requesting City services. Late-comers or property owners requesting connection to an extended line after its completion, are assessed a cost for connection to the extended water main which is then paid to the original developer until the full shared cost of the main extension has been repaid or until 10 years have

elapsed following the water main's completion, whichever occurs first. Any additional connection fees after this time accrue to the City.

1.9 Summary

The City is governed by an elected Mayor and seven-member council, and is the owner of all water production, pumping, storage, transmission, distribution, and other systems related to the provision of public water supply to users within the retail WSA. In addition, the City has an emergency intertie agreement with the City of Camas, covering ownership and maintenance of two intertie PRV facilities that flow from Camas to the City that can be manually operated under emergency low pressure conditions.

The City's water is produced from six active groundwater wells at two different wellfields that withdraw water from the PAA. Wells 5, 6, 7, 11, and 12 comprise the Lower Wellfield, and Well 1 is the only active well at the Upper Wellfield. The production capacity of these wells is approximately 7.9 mgd. Other infrastructure includes seven storage reservoirs and three BPSs. The City distribution system includes 79 miles of pipelines ranging in diameter from 1.5 inches to 24 inches. Topography across the system ranges from nearly sea level to 600 feet and the system has 11 pressure zones isolated by 15 PRVs.



Data Sources:
City of Washougal
Clark County, WA - January 2020
Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Disclaimer: The City of Washougal makes no representations, express or implied, as to the accuracy, completeness and timeliness of the information displayed. This map is not suitable for legal, engineering, or surveying purposes. Notification of any errors is appreciated.

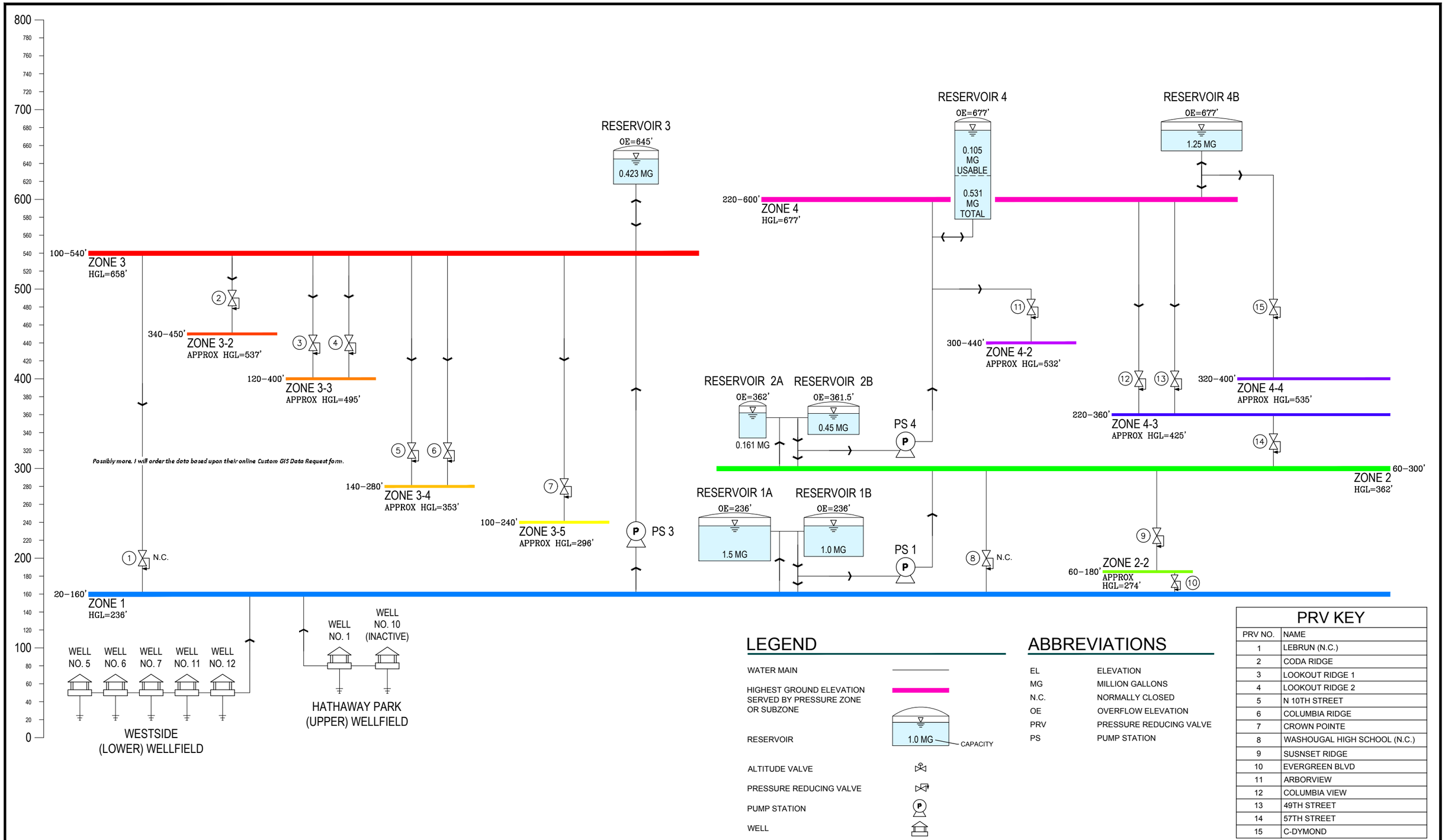
City of Washougal
Water System Plan Update

Figure 1-1
Existing Water System Facilities

July 2021

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LEGEND

- WATER MAIN
- HIGHEST GROUND ELEVATION SERVED BY PRESSURE ZONE OR SUBZONE
- RESERVOIR (1.0 MG — CAPACITY)
- ALTITUDE VALVE
- PRESSURE REDUCING VALVE
- PUMP STATION
- WELL

ABBREVIATIONS

EL	ELEVATION
MG	MILLION GALLONS
N.C.	NORMALLY CLOSED
OE	OVERFLOW ELEVATION
PRV	PRESSURE REDUCING VALVE
PS	PUMP STATION

PRV KEY

PRV NO.	NAME
1	LEBRUN (N.C.)
2	CODA RIDGE
3	LOOKOUT RIDGE 1
4	LOOKOUT RIDGE 2
5	N 10TH STREET
6	COLUMBIA RIDGE
7	CROWN POINTE
8	WASHOUGAL HIGH SCHOOL (N.C.)
9	SUSNSET RIDGE
10	EVERGREEN BLVD
11	ARBORVIEW
12	COLUMBIA VIEW
13	49TH STREET
14	57TH STREET
15	C-DYMOND

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City of Washougal

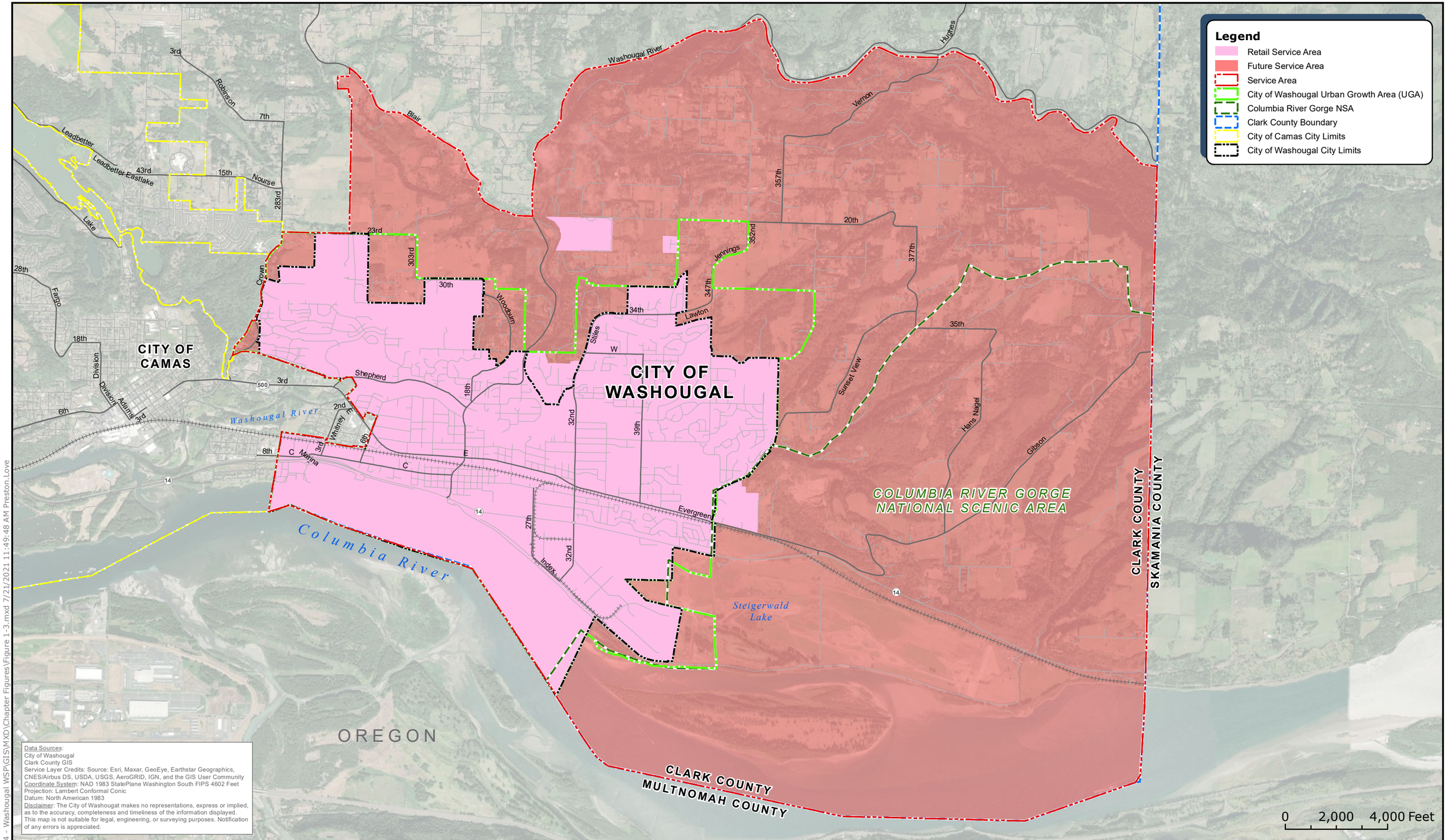
City of Washougal
Water System Plan Update

Figure 1-2
Existing Water System
Hydraulic Profile

November 2020

20-2776

G:\PDX_Projects\19\2464 - Washougal WSP\CAD\Figures\19-2464-WA-FIGURE 1-2.dwg FIG 1-2 11/11/2020 12:30 PM KENT.HARJALA 23.0s (LMS Tech)



Data Sources:
City of Washougal
Clark County GIS
Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Disclaimer: The City of Washougat makes no representations, express or implied, as to the accuracy, completeness and timeliness of the information displayed. This map is not suitable for legal, engineering, or surveying purposes. Notification of any errors is appreciated.

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City of Washougal

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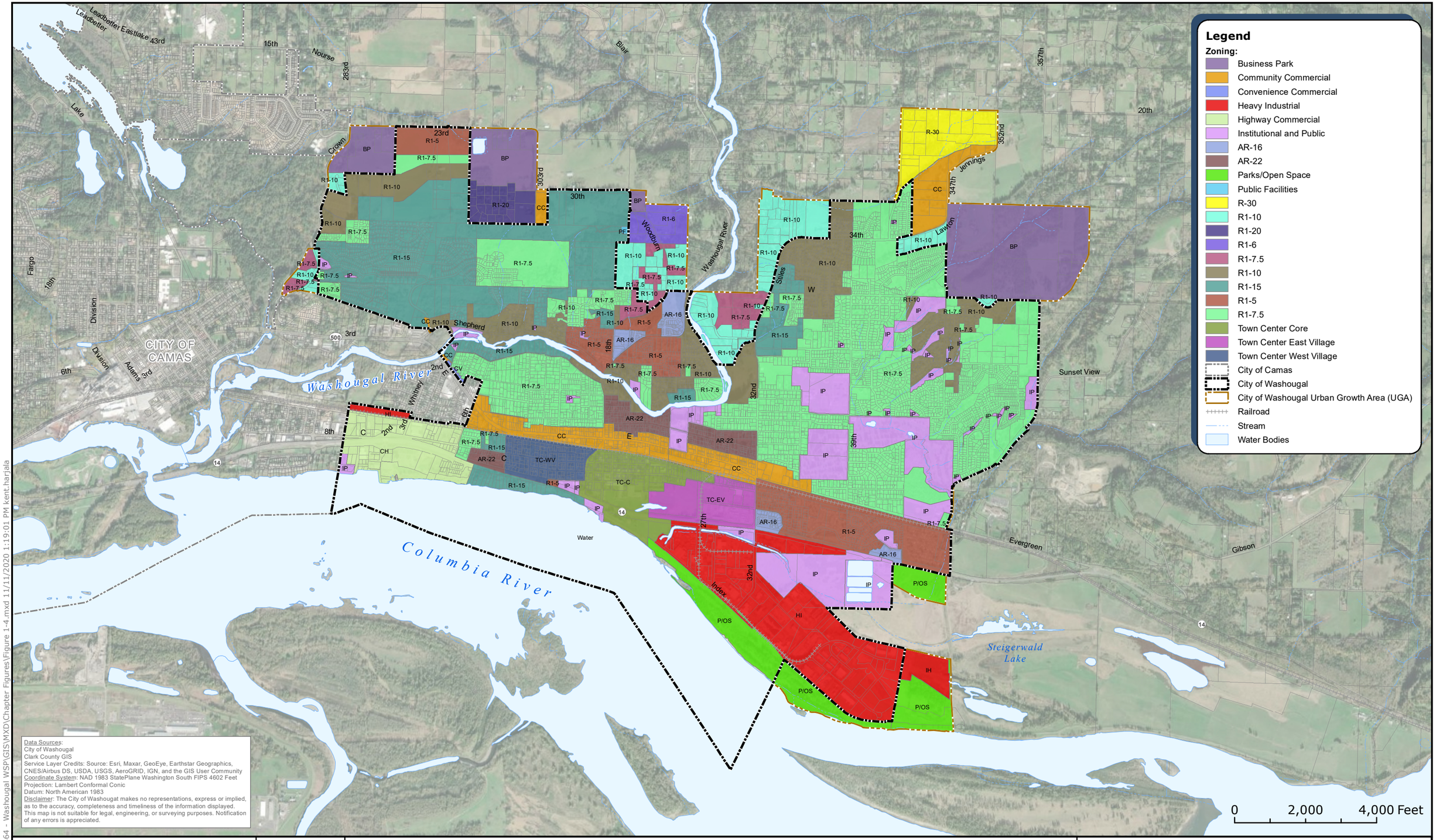
City of Washougal
Water System Plan Update

Figure 1-3
Water Service Areas

July 2021

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City of Washougal
Water System Plan Update

Figure 1-4
UGA Zoning Map

November 2020

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Section **2**

Chapter 2

Basic Planning Data and Water Demand Forecasting

2.1 Introduction

The basis of planning for this WSP is the City's 2015 Comprehensive Plan and the previous City WSP (2012), along with system data collected for 2016 through 2018 (unless otherwise noted). The planning period for this WSP is 20 years, through the year 2039. This chapter presents existing estimates and future projections of population and water demand for the City's retail and future WSAs. In subsequent sections, water demand projections will provide the basis of evaluating the capacity of the existing water system facilities and identify system improvements needed to satisfy future water demand conditions.

2.2 Historical Data

A summary of the historical and current system conditions is provided, including connections and water use, retail WSA population, equivalent residential unit (ERU) consumption, distribution system leakage (DSL), and source water production.

2.2.1 Service Connections and Water Use

Information on the water service connections by customer class is presented in **Table 2-1**. The City customer base is primarily residential. Customers are identified under five billing classifications: single family residential, multi-family residential, residential outside of city, commercial/industrial, and commercial outside of city.

Table 2-1 | Service Connections by Customer Class

Customer Class	2016	2017	2018
Single Family Residential	4,787	4,872	4,828
Multi-Family Residential	187	187	186
Residential Outside City	37	42	45
Commercial/Industrial	260	272	286
Commercial Outside City	1	1	1
Total	**5,272**	**5,374**	**5,346**

Table 2-2 summarizes the total consumption volume billed to each customer class in MG from 2016 to 2018. The City implemented a new billing software system in 2016 which provides more accurate billing classification data so previous years are not included. Table 2-3 presents 2018 seasonal water use by customer class. Table 2-4 summarizes 2018 monthly consumption by customer class.

Table 2-2 | Water Use by Customer Class

Customer Class	Annual Demand (MG)		
	2016	2017	2018
Single Family Residential	314.2	334.8	321.0
Multi-Family Residential	63.6	58.9	62.4
Residential Outside City	4.8	3.7	8.2
Commercial/Industrial	111.6	113.3	119.7
Commercial Outside City	<0.0	<0.0	<0.0
Total	**494.1**	**510.8**	**511.3**

Table 2-3 | 2018 Seasonal Water Use by Customer Class

Customer Class	Seasonal Demand (MG)	
	Peak Season(May-Oct)	Low Season(Nov-Apr)
Single Family Residential	205.5	115.5
Multi-Family Residential	33.5	28.8
Residential Outside City	6.2	2.0
Commercial/Industrial	82.1	37.5
Commercial Outside City	0.0	0.0
Total	**327.3**	**183.9**

Table 2-4 | 2018 Monthly Water Use by Customer Class

Customer Class	Monthly Demand (MG)											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Single Family Residential	4.7	7.8	4.8	8.7	4.9	13.1	9.8	15.7	14.1	24.7	5.2	6.3
Multi-Family Residential	<0.0	0.0	0.0	0.0	<0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Residential Outside City	5.3	5.3	4.4	4.4	4.9	5.0	5.9	6.2	6.0	5.5	4.7	4.7
Commercial/ Industrial	21.7	17.7	18.6	16.2	22.6	25.1	38.5	41.2	48.0	30.1	23.8	17.5
Commercial Outside City	0.4	<0.0	0.6	0.0	0.8	<0.0	2.0	0.1	3.3	<0.0	0.9	<0.0
Total	**32.1**	**30.8**	**28.5**	**29.3**	**33.1**	**43.2**	**56.2**	**63.2**	**71.3**	**60.3**	**34.7**	**28.5**

The City has two interties with the City of Camas water system. The interties are only used in case of emergency and are normally closed. There has been no recorded flow through the interties between 2016 and 2018.

2.2.2 Service Area Population

The current population served by the water system includes customers primarily within the city limits, with the exception of a small number of customers on R Street west of 32nd Street, and Evergreen Highway in the CRGNSA just east of the city limits. The boundaries of the Retail WSA are presented in **Figure 1-3**.

Table 2-5 summarizes the water service area population which was estimated at 16,143 in 2018. The City's existing and historic population are in accordance with the State of Washington Office of Financial Management (OFM). The population of customers outside of the City are estimated by multiplying the number of water service connections by the estimated number of people per service connection (2.73), obtained from the most recent census estimate. Population for the emergency intertie service area (City of Camas) is not included.

Table 2-5 | 2016-2018 Water Service Area Population

	2016	2017	2018
Washougal City Limits	15,560	15,760	16,020
Outside City Limits	102	115	123
Total	**15,662**	**15,875**	**16,143**
	Annual Increase	**1.36%**	**1.69%**

2.2.3 Equivalent Residential Units

An ERU is defined as the average amount of water historically used by a single-family residence. The ERU calculation is determined by dividing the amount of water billed to single family residential connections by the number of single-family residential connections. **Table 2-6** summarizes ERU average day demand (ADD) calculations for 2016 to 2018. ERU ADD values are calculated separately for each of the City's main pressure zones (Zone 1, 2, 3, and 4) since usage can vary across each zone. The ERUs are measured in gallons per unit per day (gpud). Total single-family residential water use has remained consistent within each pressure zone over the three-year period.

The average ERU ADD demand summarized in the *Average / Planning Values* row of **Table 2-6** will be used to calculate future water demand in each zone based on ERU projections. ERU ADD planning values used for projecting demand in future Zones 5, 6, and 7 are also included. The values for future zones assume demand similar to existing adjacent zones given similar land use and usage patterns.

Table 2-6 | Equivalent Residential Units by Pressure Zone

Year	Zone	Single Family Connections	Single Family Use (gpd)	ERU ADD (gpud)	Total Production (gpd)	Total Zone ERUs
2016	Zone 1	2,342	365,690	156	817,527	5,236
	Zone 2	932	182,128	195	199,011	1,018
	Zone 3	811	174,644	215	249,899	1,160
	Zone 4	739	148,993	202	154,805	768
2017	Zone 1	2,360	390,130	165	832,942	5,039
	Zone 2	951	189,240	199	226,562	1,139
	Zone 3	848	192,451	227	291,266	1,283
	Zone 4	755	155,926	207	166,825	808
2018	Zone 1	2,334	364,087	156	808,663	5,184
	Zone 2	943	192,927	205	236,299	1,155
	Zone 3	845	195,378	231	368,362	1,593
	Zone 4	751	149,477	199	166,063	834
Average / Planning Values	**Zone 1**			**159**		
	Zone 2			**200**		
	Zone 3			**225**		
	Zone 4			**202**		
	Zone 5 (Future)			**225**		
	Zone 6 (Future)			**225**		
	Zone 7 (Future)			**202**		

2.2.4 Water Production and Demand

Source water production measures the total quantity of water produced from the City's six operational wells. The water delivered to the system serves domestic, irrigation, commercial/industrial, construction, and firefighting purposes, as well as water lost to DSL. Water production data as recorded by well source meters from 2016 to 2018 is summarized in **Table 2-7**. **Figure 2-1** and **Table 2-8** present a breakdown of monthly production by source for 2018.

Table 2-7 | 2016–2018 Source Water Production

Source		Annual Production (MG)		
		2016	2017	2018
Upper Wellfield	Well 1	61	45	0
Lower Wellfield	Well 5	76	33	114
	Well 6	29	121	203
	Well 7	174	31	26
	Well 11	99	308	233
	Well 12	80	16	<1.0
	Total Production	**519**	**554**	**576**

Figure 2-1 | 2018 Monthly Production by Source

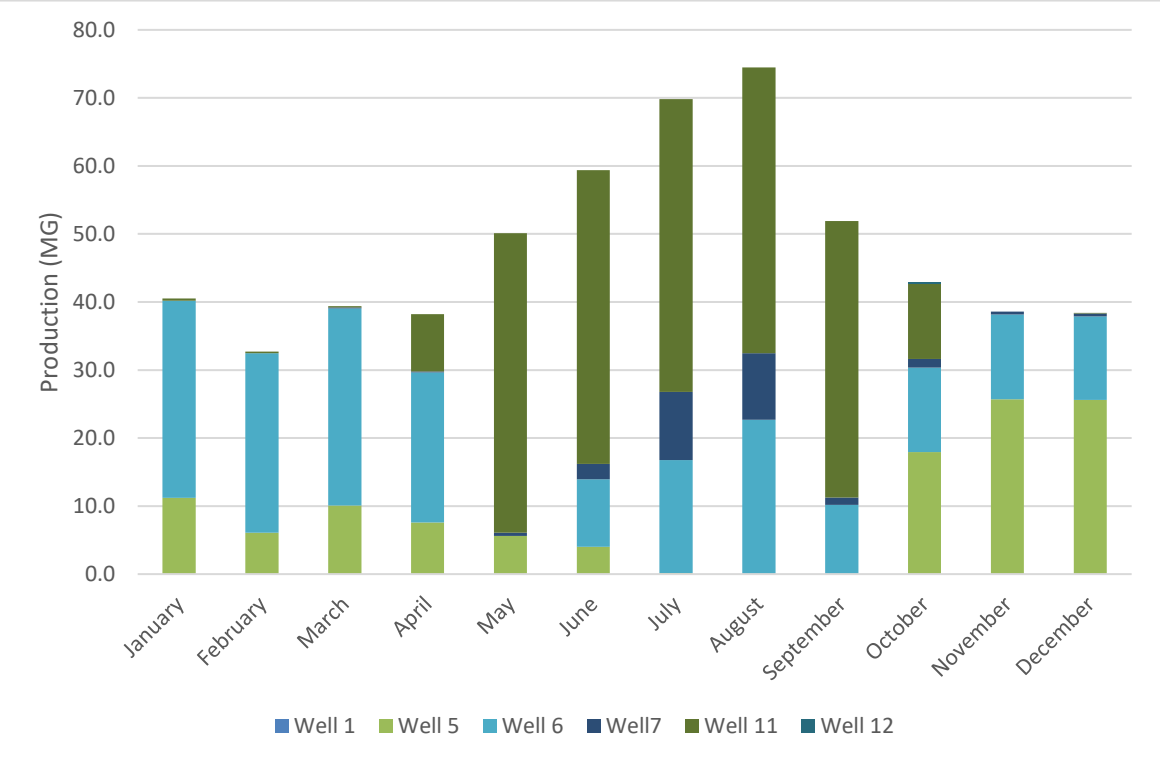


Table 2-8 | 2018 Monthly Source Water Production

Month	Production (MG)						
	Well 1	Well 5	Well 6	Well 7	Well 11	Well 12	Total to System
January	0.0	11.2	29.0	0.0	0.4	0.0	**40.5**
February	0.0	6.1	26.4	0.0	0.2	0.0	**32.7**
March	0.0	10.1	29.0	0.2	0.2	0.0	**39.4**
April	0.0	7.6	22.1	0.1	8.4	0.0	**38.2**
May	0.0	5.6	0.0	0.4	44.0	0.0	**50.1**
June	0.0	4.0	9.9	2.2	43.2	0.0	**59.4**
July	0.0	0.2	16.6	10.0	43.0	0.0	**69.8**
August	0.0	0.0	22.7	9.8	42.0	0.0	**74.5**
September	0.0	0.0	10.2	1.1	40.6	0.0	**51.9**
October	0.0	17.9	12.4	1.3	11.1	0.2	**43.0**
November	0.0	25.7	12.5	0.4	0.0	0.0	**38.6**
December	0.0	25.6	12.3	0.4	0.1	0.0	**38.4**
Total	**0.0**	**113.9**	**203.1**	**25.9**	**233.3**	**0.2**	576.5

The City encountered SCADA system issues in recent years that resulted in challenges operating Well 12 in auto mode, which is the reason for the decline in Well 12 production. The Lower Wellfield SCADA system is scheduled for upgrades in 2020 to resolve this issue. In 2018 the City discovered ruptures in the Well 1 casing and installed a liner. The liner installation was successful, and Well 1 was again operational in 2019.

Average Day Demand is the annual production divided by 365 days and is often expressed in units of mgd. The maximum day demand (MDD) is the largest quantity of water delivered to the system over a 24-hour period during the year while peak hour demand (PHD) is equal to the system demand rate during the hour of highest use. **Table 2-9** summarizes the ADD, MDD, and PHD for the period of 2016 to 2018 for each pressure zone. Corresponding peaking factors (PF) are also presented in the table for peaking ADD to MDD, and MDD to PHD, respectively. These values will be used for calculating the future MDD and PHD for each zone in the system. To be consistent with demand projections, peaking factors for future Zones 5 and 6 are assumed to be equal to peaking factors for existing Zone 3, and peaking factors for future Zone 7 are assumed to be equal to peaking factors for existing Zone 4.

Table 2-9 | Historical Water Demand by Pressure Zone

Demand	2016				2017				2018				Average			
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 1	Zone 2	Zone 3	Zone 4	Zone 1	Zone 2	Zone 3	Zone 4	Zone 1	Zone 2	Zone 3/5/6	Zone 4/7
ADD (MGD)	0.82	0.20	0.25	0.15	0.83	0.23	0.29	0.17	0.81	0.24	0.37	0.17	**0.82**	**0.22**	**0.30**	**0.16**
MDD (MGD)	1.56	0.54	0.49	0.80	1.51	0.70	0.58	0.49	1.45	0.63	0.65	0.49	**1.51**	**0.62**	**0.57**	**0.60**
PHD (MGD)	2.54	1.08	1.04	1.60	2.57	1.24	1.09	0.95	2.39	1.11	1.00	0.92	**2.50**	**1.14**	**1.04**	**1.16**
													Planning Values			
MDD Peaking Factor	1.90	2.71	1.98	5.18	1.82	3.07	1.97	2.95	1.79	2.66	1.77	2.97	**1.84**	**2.81**	**1.91**	**3.70**
PHD Peaking Factor	1.63	2.00	2.10	2.00	1.70	1.79	1.90	1.92	1.65	1.77	1.53	1.86	**1.66**	**1.85**	**1.84**	**1.93**

Notes:

1. PHD calculated using Washington State Department of Health (DOH) 2019 Water System Design Manual (WSDM) Equation 3-1 since hourly SCADA data was not available.

2.2.5 Water Loss

The component of demand that represents the difference between the total water produced and authorized consumption is classified as water loss. Water loss can be the result of real or apparent losses. Apparent losses can include meter inaccuracy, theft, or reporting errors. Real loss is most likely due to system leaks, main breaks, or tank overflows. Water for uses such as firefighting, hydrant flushing, and street sweeping is authorized, but typically unmetered and thus often included in the water loss calculations. The water system loss, or DSL, is calculated as the difference between the quantity of water measured by production meters and the actual quantity of water recorded by service meters. Historical DSL for the years 2016 to 2018 is summarized in Table 2-10.

Table 2-10 | 2016-2018 Distribution System Leakage

Year	Water Production (MG)	Water Consumption (MG)	DSL (MG)	DSL[1] (ERUs)	DSL (%)
2016	519	494	25	351	5%
2017	554	511	43	592	8%
2018	576	511	65	900	11%
		Average	**44**	**653**	**8%**

Notes:
1. DSL ERUs calculated as total DSL divided by the average ERU ADD for the corresponding year.

The City has prepared a water use efficiency program (WUE) to manage and reduce DSL. Each year the City prepares a WUE Annual Performance Report summarizing DSL for the year and water usage goals moving forward. The goal set in June of 2018 is for the city to eliminate private water mains that directly contribute to unaccounted for water. Other WUE measures include implementing enhanced metering at the end of City owned mains connecting to private mains and performing leak surveys every three years. The City's WUE goals and measures are discussed further in Chapter 4.

2.3 Future Water Demands

2.3.1 Population and ERU Projections

Population growth is the primary factor influencing future water demands in the City. The location of new population centers affects storage, transmission, and distribution of future water supplies. Therefore, population growth forecasts must be coordinated and based on approved land use plans and policies. Population projections within the city limits and urban growth area are based on the following, as developed in coordination with the City's Community Development Department (Community Development) and summarized in Table 2-11.

- 2019 population of 16,500 estimate based on recent OFM estimates
- 2035 population target of 22,347 in accordance with the 2015 Comprehensive Plan

- Average residential household size of 2.73 based on recent census estimates
- Non-residential ERU classification projected at three percent annual growth
- Population beyond 2035 projected at 1.9 percent annual growth to match pre-2035 growth rate
- Existing UGA zoning shown in **Figure 1-4**

Table 2-11 | Total System Population and ERU Projection Summary

Projected Population and ERUs	2019	2029	2039
WSA Population Projection	16,500	19,944	24,108
Equivalent Residential Units (ERUs)	9,029	11,480	14,615
Residential ERUs	4,870	6,263	7,977
Non-Residential ERUs	4,159	5,213	6,638

Projected ERUs by planning year and pressure zone are presented in **Table 2-12**. Projected residential ERUs are based on population growth projections and are allocated to each zone based on discussions with Community Development regarding where development is anticipated to occur. Non-residential ERU growth is dedicated to Zone 1, which contains most non-residential usage.

Table 2-12 | ERU Projections by Pressure Zone

Projected Population and ERUs		2019	2029	2039
Equivalent Residential Units (ERUs)	Zone 1	5,421	7,068	8,915
	Zone 2	1,216	1,341	1,541
	Zone 3	1,521	1,971	1,841
	Zone 4	871	1,021	1,410
	Zone 5	-	78	116
	Zone 6	-	-	392
	Zone 7	-	-	400
	Total	**9,029**	**11,480**	**14,615**

2.3.2 Water Demand Projections

Water supply planning requires both near and long-term demand forecasting. Near-term forecasts are necessary to define needed capital improvements anticipated within the next decade. Such improvements require lead-time for financing, design, and construction. Long-term forecasts are necessary to quantify anticipated water resource requirements. Such forecasts guide the sizing and identification of long-range supply facilities, securing necessary water rights, and management of water resources necessary to meet future demands.

For the purpose of this WSP, a total system demand forecast was developed for the 10-year and 20-year planning horizons, with 2019 as the base (existing) year for the demand forecast. Water demand forecasts were based on historical demand trends, population projections, and commercial/industrial growth within the UGA as previously discussed. Zone-specific ERU projections were developed in coordination with Community Development based on proposed and planned developments. ERU projections are multiplied by the pressure zone ERU ADD from Table 2-6 to obtain the individual pressure zone and total water system ADD forecasts.

Measures for WUE are established in the November 2007 *City of Washougal Water Use Efficiency Goals* and discussed in Chapter 4 of this WSP. These efficiency measures are anticipated to reduce annual water demand by one percent. Projected demands reflecting this reduction in annual water demand through conservation are also shown in Table 2-13 but are not used for the system analysis.

Table 2-13 presents the future ADD forecasts for existing and proposed pressure zones in the water system with and without water savings from conservation. The forecasted ADD (no conservation savings), MDD, and PHD are summarized in Table 2-14 and provide the basis of the Chapter 3 system analysis. The MDD and PHD are determined by applying the 3-year average peaking factors from Table 2-9.

Table 2-13 | Average Day Demand Projections

Pressure Zone	2019		2029			2039		
	ERUs	ADD (MGD)	ERUs	ADD (MGD)	ADD with Conservation (MGD)	ERUs	ADD (MGD)	ADD with Conservation (MGD)
1	5,421	0.86	7,068	1.12	1.10	8,915	1.42	1.32
2	1,216	0.24	1,341	0.27	0.27	1,541	0.31	0.30
3	1,521	0.34	1,971	0.44	0.43	1,841	0.41	0.40
4	871	0.18	1,021	0.21	0.20	1,410	0.29	0.27
5	-	-	78	0.02	0.02	116	0.03	0.02
6	-	-	-	-	-	392	0.09	0.09
7	-	-	-	-	-	400	0.08	0.07
Total	**9,029**	**1.62**	**11,480**	**2.06**	**2.02**	**14,615**	**2.62**	**2.44**

Table 2-14 | System Demand Projections

Zone	Demand (MGD)											
	2019				2029				2039			
	ERUs	ADD	MDD	PHD	ERUs	ADD	MDD	PHD	ERUs	ADD	MDD	PHD
1	5,421	0.86	1.58	2.63	7,068	1.12	2.07	3.43	8,915	1.42	2.61	4.33
2	1,216	0.24	0.68	1.27	1,341	0.27	0.75	1.40	1,541	0.31	0.87	1.60
3	1,521	0.34	0.65	1.20	1,971	0.44	0.84	1.56	1,841	0.41	0.79	1.45
4	871	0.18	0.65	1.26	1,021	0.21	0.76	1.47	1,410	0.29	1.06	2.04
5	-	-	-	-	78	0.02	0.03	0.06	116	0.03	0.05	0.09
6	-	-	-	-	-	-	-	-	392	0.09	0.17	0.31
7	-	-	-	-	-	-	-	-	400	0.08	0.30	0.58
Total	**9,029**	**1.62**	**3.57**	**6.36**	**11,480**	**2.06**	**4.46**	**7.92**	**14,615**	**2.62**	**5.83**	**10.40**
Total (GPM)		**1,127**	**2,480**			**1,430**	**3,098**			**1,820**	**4,050**	

2.4 Summary

Population growth and pressure zone-specific water system demands have been projected in this chapter. A population growth of approximately 1.9 percent annually was used for projections in accordance with the City's 2015 Comprehensive Plan future population projections. The distribution of future ERUs between pressure zones were developed in coordination with Community Development staff based on planned and anticipated future developments.

This growth corresponds to estimated increases in ADD requirements from 1.62 to 2.62 MGD by 2039. Through continued implementation of water conservation and efficiency measures, it is estimated that projected ADD will decrease by one percent annually. Moving forward, the City will update the WSP every ten years, which provides the opportunity to track the population and demand trends and update projections. As the City continues to collect data on its distribution system water loss, they should revisit these projections.

The projected demands for the next 20 years will be used to evaluate the hydraulic capacity of the system and identify improvements. The actual timing of any improvements should be based primarily on when the system reaches demand capacity thresholds versus specific predetermined timelines.

murraysmith

Section **3**

Chapter 3

System Analysis

3.1 Introduction

This chapter contains a description of the City's water system, an analysis of existing system capabilities and resources, and a summary of existing and future deficiencies.

3.2 System Description

3.2.1 Source

As described in Chapter 1, the City's water is supplied from six active groundwater production wells located in two wellfields. The Upper Wellfield is located at 28th and I Streets and the Lower Wellfield is on 1st Street between the Burlington Northern Railroad and C Street on the Camas/Washougal border. The current total capacity of production Wells 1, 5, 6, 7, 11, and 12 is approximately 5,475 gpm or 7.9 mgd. Table 3-1 summarizes the pertinent characteristics of each source.

The Department of Health (DOH) Water Right Self-Assessment Form (WRSA) evaluates the City's active water rights for the projected water demands for the planning period. The WRSA has been completed for the City's existing sources and is included as Appendix E.

Well No. 9, at what is now Hamllik Park, is no longer in use due to water taste and odor concerns. Well No. 10 is on standby as an emergency supply source with an approximate capacity of 400 gpm, though there is currently no pump installed in the well.

Table 3-1 | Water Source Capacities

Source	Date Constructed	Depth (ft)	Pump Type	Motor Size (hp)	Backup Power	Current Operating Capacity[1]		
						gpm	cfs	MGD
Well 1	2018	117	Vertical Turbine	75	Receptacle	900	2.01	1.30
Well 10 (Inactive)	1984	114	Vertical Turbine	N/A	Receptacle	400	0.89	0.58
Well 5	1954	98	Vertical Turbine	50	Generator	650	1.45	0.94
Well 6	1942	94	Vertical Turbine	50	Receptacle	675	1.50	0.97
Well 7	1947	94	Vertical Turbine	50	Receptacle	750	1.67	1.08
Well 11	1984	97	Vertical Turbine	75	Generator	1,000	2.23	1.44
Well 12	2009	82	Vertical Turbine	125	Receptacle	1,500	3.34	2.16
Total Operating Capacity[2]						**5,475**	**12.2**	**7.88**

Notes:
1. Capacities are listed for the existing pump and do not necessarily reflect the actual capacity of the well.
2. Total Operating Capacity does not include Well 10.

3.2.2 Water Quality and Treatment

3.2.2.1 Chlorination

Well 1 at the Upper Wellfield currently uses a sodium hypochlorite injection system for disinfection. The Lower Wellfield has a common sodium hypochlorite chemical storage and metering pump building that serves Wells 5, 6, 7, 11, and 12 via two injection vaults.

3.2.2.2 pH Adjustment

The City adjusts the pH of the groundwater supply to minimize the potential for lead and copper corrosion in the distribution system through the addition of liquid sodium hydroxide. The sodium hydroxide pumps for Wells 5, 6, 7, 11, and 12 are located in a chemical feed and storage building between Wells 5 and 11. Chemical storage and feed equipment are housed in a separate room at Well 1.

3.2.3 Distribution

The water supply and distribution system consists of seven reservoirs, three booster pump stations, and a pipe distribution network.

The water system ranges in elevation from approximately 20 feet to 677 feet at the overflow of Reservoirs 4 and 4B. This total span of 657 feet of elevation, which represents approximately 284 pounds per square inch (psi) of water pressure, has resulted in the water system being divided into four primary gravity pressure zones. The source of supply is provided by the wells in Zone 1 and feeds Zones 2, 3, and 4 through a series of pump stations and reservoirs. The sub-zones are served through PRVs.

3.2.3.1 Distribution Pipe Network

The system of pipelines used to transport water from the sources of supply and the storage facilities to the customers is referred to as the distribution network. The distribution network consists of approximately 83 miles of distribution pipeline ranging in size from 1.5 inches to 16 inches in diameter. A summary of pipe length by material classification is summarized in **Table 3-2**. 'Other' material types include asbestos cement, PVC, HDPE, and galvanized iron, and account for approximately two percent of the total distribution network. The largest of the City's water mains is 16 inches in diameter. The most predominant pipe size is 8-inch, which comprise approximately 50 percent of the total network. All new pipelines constructed in the water system are ductile iron, with the exception of PVC pipe for sizes smaller than 6 inches.

Table 3-2 | Water Distribution System Mains

Diameter (in)	Length by Material Type (ft)						Percent
	Ductile Iron	Cast Iron	Steel	Other	Unknown	Total	
<6	4,917	0	13,032	759	8,731	**27,438**	**6%**
6	8,600	3,218	21,781	2,409	10,605	**46,614**	**11%**
8	164,348	5,193	17,254	440	33,565	**220,799**	**51%**
10	16,248	252	11,916	1,136	2,745	**32,297**	**7%**
12	39,117	0	15,351	4,027	32,869	**91,363**	**21%**
14	4,220	0	7,812	0	5,677	**17,709**	**4%**
16	775	0	0	0	0	**775**	**0%**
Total	**238,225**	**8,663**	**87,145**	**8,771**	**94,193**	436,996	100%
Percent	**55%**	**2%**	**20%**	**2%**	**22%**	**100%**	

3.2.3.2 Pressure Zones

Water distribution systems are separated into pressure zones, established by the gravity storage reservoir or closed system pump station hydraulic grade line (HGL) and service area topography, to provide water service pressures within an acceptable range to all customers. The City's existing distribution system is separated into four primary pressure zones. The zones are designed to deliver water at operating pressures between a minimum normal service pressure of 30 psi and a maximum preferred service pressure of 90 psi. Conformance to this pressure range may not always be possible or practical due to topographic relief, existing system configuration, and economic considerations. The main pressure zones are connected to the sub-zones via PRV stations. **Table 3-3** summarizes the pressure zone service elevations and corresponding HGL. See **Chapter 1** for further discussion of each pressure zone.

Table 3-3 | Pressure Zones

Pressure Zone	Approximate Existing Service Elevations (ft)	Approximate HGL (ft)
Zone 1	20-160	236
Zone 2	60-300	362
Zone 2-2	60-180	274
Zone 3	100-540	658
Zone 3-2	340-450	537
Zone 3-3	120-400	495
Zone 3-4	140-280	353
Zone 3-5	100-240	296
Zone 4	220-600	677
Zone 4-2	300-440	532
Zone 4-3	220-360	425
Zone 4-4	320-400	535

3.2.3.3 Pressure Reducing Valves

The City's existing distribution system includes 15 PRV facilities. **Table 3-4** lists the PRVs by name and includes the upstream and downstream pressure zones and PRV settings, elevations, and diameters for each.

Table 3-4 | Pressure Reducing Valve Stations

PRV Name	Large Valve Diameter (in)	Small Valve Diameter (in)	Elevation (ft)	Pressure Setting (psi)	From Zone	To Zone
WHS (N.C.)[1]	6	3	100	56	2	1
Evergreen	6	2	50	80	2-2	1
Lebrun (N.C.)[1]	6	1.5	160	32	3	1
Sunset Ridge	6	2	135	60	2	2-2
Coda Ridge	6	2	357	78	3	3-2
Lookout Ridge 1	8	2	290	85	3	3-3
Lookout Ridge 2	6	2	390	34	3	3-3
N 10th Street	6	1.5	190	73	3	3-4
Columbia Ridge	6	2	250	40	3	3-4
Crown Pointe	6	1.5	180	50	3	3-5
Arborview	6	2	324	90	4	4-2
Columbia View	8	2	361	30	4	4-3
49th Street	6	3	338	30	4	4-3
57th Street	6	2	260	48	4-3	2
C-Dymond	6	2	415	52	4	4-4

Note:
1. PRVs are normally closed (N.C.).

3.2.3.4 Booster Pumping Stations

The water system includes three booster pump stations. Pump Stations 1 and 4 boost water from adjacent Reservoirs 1A/1B and 2A/2B respectively up to higher elevation reservoirs. Pump Station No. 3 boosts water from distribution mains in Pressure Zone 1 up to Reservoir 3. Pertinent characteristics for each booster pump station are summarized in **Table 3-5**.

Due to its relatively low elevation and high design head, the Pump Station No. 3 discharge pressure is approximately 250 psi. A transmission line break at this excessive discharge pressure has the potential to cause damage to both public and private property. High discharge pressures from Pump Station No. 3 also create excessive service pressures at higher elevations between the pump station and Reservoir 3. These high pressures are currently controlled with individual PRVs at each service.

Table 3-5 | Booster Pump Stations

Pump Station	Number of Pumps	Pumps From	Pumps To	Firm Capacity (gpm)	Full Capacity (gpm)	Motor (hp)	Type[1]	Backup Power
1	3	Zone 1	Zone 2	1,680	2,680	50	ESC	Yes
3	3	Zone 1	Zone 3	750	1,050	75	VT	Yes
4	3	Zone 2	Zone 4	600	900	50	ESC	Yes

Notes:

1. Pump types are noted as End Suction Centrifugal (ESC) or Vertical Turbine (VT).

3.2.3.5 Reservoir Storage

Storage is used in a water system to meet peak demands and provide a reliable supply in the event of a fire or failure of supply sources. The distribution system is served by six ground-level storage tanks and one standpipe with a total combined nominal capacity of 4.88 MG. All the tanks are steel construction; four are painted welded steel and three are glass fused bolted steel tanks. **Table 3-6** provides data pertaining to the storage tanks in the City water system.

Table 3-6 | Storage Reservoirs

Tank	Zone Served	Year Constructed	Material	Capacity (MG)	Diameter (ft)	Height (ft)	Overflow Elevation (ft)
1A	1	1970	Welded Steel	1.50	81.5	39.0	236.0
1B	1	1991	Welded Steel	1.00	75.0	34.0	236.0
2A	2	1991	Bolted Steel	0.16	30.0	28.0	362.0
2B	2	2005	Bolted Steel	0.45	56.0	23.5	361.5
3	3	2000	Bolted Steel	0.42	54.3	27.5	644.7
4	4	2003	Welded Steel Standpipe	0.1	30.0	99.0	677.0
4B	4	2011	Welded Steel	1.25	96.0	23.0	677.0

Reservoirs 1A and 1B share a site located on 32nd Street south of W Street. The two tank exteriors were re-coated in 2000. This work also included a cleaning and touch-up of the interior coating of

Reservoir 1B. Reservoirs 1A and 1B are filled through the distribution system by all production wells. A pressure transducer mounted on the common outlet for the reservoirs controls well operation based on reservoir level.

Reservoirs 2A and 2B share a site located on 37th Street north of W Street. The reservoirs are filled by Pump Station No. 1 which boosts water from the Reservoirs 1A and 1B site up to Zone 2. A transducer mounted on the inlet/outlet pipe of Reservoirs 2A and 2B monitors reservoir level and controls Pump Station No. 1 operation.

Reservoir 3 is located on Woodburn Hill west of the Washougal River, accessed from SE 313th Avenue. Reservoir 3 is filled by Pump Station No. 3 located on 10th Street north of Shepherd Road. A pressure transducer at Reservoir 3 controls pump station operation. Due to the remote location of Reservoir 3, a solar panel and battery pack powers the transducer and telemetry equipment. According to City staff, on rare occasions the battery pack has failed resulting in the overflow of Reservoir 3.

Reservoir 4 is a standpipe located in the northeast corner of the city limits off Lehr Road. Although the physical capacity of Reservoir 4 is 0.52 MG, approximately 0.1 MG is considered usable storage. Reservoir 4 is filled by Pump Station No. 4, which is located adjacent to Reservoirs 2A and 2B. Reservoir 4B was constructed in 2011 to provide additional storage to the Zone 4 service area. The reservoir is located on SE 352nd Avenue north of SE 20th Street outside the northeast corner of the UGA.

3.3 System Analysis

The analysis of the City's water system under existing and future conditions focuses on evaluating the hydraulic adequacy of the system and identifying any resulting deficiencies. Deficiencies based on age or condition are also included where information was available. Evaluation criteria has been established in accordance with DOH standards to evaluate the hydraulic capacity of the system. Water demand projections presented in Chapter 2 for the 10-year and 20-year planning horizons are applied to the system to identify potential deficiencies under future conditions. This chapter describes the analysis of the supply, pumping, storage, and distribution capacity of the system for the existing, 10-year and 20-year planning horizons.

3.3.1 Evaluation Criteria

The water distribution system needs to operate within certain performance limits under varying customer demand, fire flow, and operational conditions. The evaluation of the system is based on the criteria summarized in Table 3-7. These criteria are primarily based on Washington Administrative Code (WAC) as outlined in DOH guidelines. Minimum fire flow requirements are based on the 2018 International Fire Code (IFC) and coordination with the City fire marshal and are summarized in Table 3-8. The City fire marshal has approved the nesting of fire and standby storage.

The WAC pertaining to public water distribution systems requires a minimum pipe diameter of 6 inches. The City's Engineering Standards (included as Appendix F) requires a minimum pipe diameter of 8 inches where gridding or fire flow is a requirement. For areas serving existing or planned industrial, commercial, or mixed-use development, the minimum recommended pipe size is 12-inch diameter. The velocity criteria in Table 3-7 are used to identify areas in the existing distribution system with potentially undersized piping.

Minimum service pressures of 30 psi during peak hour demand (PHD) and 20 psi during maximum day demand (MDD) plus fire flow as shown in Table 3-7 are required under WAC 246-290-230. A pressure of 90 psi is considered the desirable upper limit for all pressure zones as defined in the City Engineering Standards.

Table 3–7 | Evaluation Criteria

System Attribute	Evaluation Criterion	Value
Supply	Firm Supply Capacity	Greater than MDD assuming storage is adequate for equalization and fire suppression storage
Storage	Operational Storage	The volume of water before sources turn on. The larger of the volume required to prevent excess pump cycling or volume needed for sensitivity of level sensors
	Equalization Storage	(PHD-maximum supply capacity) *150 min
	Fire Suppression Storage	Largest fire flow in a zone for duration of that flow
	Standby Storage	Minimum 200 gal/ERU
	Dead Storage	Storage that is unavailable for use or that can provide only substandard flows and pressures below 20 psi
Pump Stations[1]	Minimum No. of Pumps	2
	Firm capacity pumping to open system	ADD
	Total capacity when pumping to open system	MDD
	Capacity with largest "routinely used" pump out of service when pumping to closed system	MDD plus Fire Flow
	Firm capacity pumping to closed system	PHD
	Emergency Power	MDD plus largest fire flow (where standby and fire suppression storage are not adequate).
Service Pressure	Minimum during MDD plus fire flow	20 psi
	Minimum during PHD	30 psi
	Standard Range	40-90 psi
	Maximum	125 psi[2]
Distribution Piping[3]	Maximum Velocity for ADD or MDD	5 feet per second
	Maximum Velocity for PHD	8 feet per second
	Maximum Velocity during Fire Flow	10 feet per second
	Minimum Future Pipe Diameter	8-inch, except for dead ends
Fire Suppression	Minimum Fire Flow Requirements[4]	See **Table 3-8**

Notes:

1. Open system defined as a system (or pressure zone) with gravity water storage. Closed system defined as a system (or pressure zone) without gravity water storage.
2. For pressures greater than 80 psi, installation of individual PRVs is recommended in accordance with the Uniform Plumbing Code.
3. Velocity criteria is primarily for designing pipe improvements and these criteria alone will not typically result in recommendations for existing system improvements.
4. For all fire flow evaluations, it is assumed that flow for only one fire at a time must be available.

Table 3–8 | Minimum Fire Flow Requirements

Zoning Description or Facility	Recommended Fire Flow Rate (gpm)	Duration (hours)
Residential	1,000/1,500[1]	2
Neighborhood Commercial or Town Center District	2,000	2
Commercial or Industrial	3,500	3
Columbia Ridge Senior Living	1,500	2
Washougal High School	2,000	4

Notes:

1. 1,000 gpm fire flow requirement applies to residential homes that are less than 3,600 square feet. Since square footages of homes are unknown for undeveloped areas and vary significantly along existing mains, residential fire flow demands were conservatively modeled at 1,500 gpm and were not investigated individually.

3.3.2 Pressure Zone Analysis

Due to the City's rapidly rising topography north of the Washougal River, the City's pressure zone configuration includes PRV-controlled sub-zones. These sub-zones and PRVs at individual services are required to meet the service pressure criteria outlined above.

A PRV is used to reduce pressure from a higher elevation pressure zone (usually one served by gravity storage) to serve a lower elevation area at the service pressure range shown in Table 3-7. In the City's water system, pump stations deliver water to the reservoirs, so it is prudent to limit the use of PRVs where possible to avoid any unnecessary energy costs for pumping water to higher elevation storage reservoirs only to dissipate that energy through a PRV as water is delivered back to lower elevation customers. In steep water service areas similar to the City, the use of PRV-controlled sub-zones is generally more cost effective and requires less maintenance than providing pump stations and reservoirs to serve small groups of customers at similar elevations. In the long term, some of these sub-zones may be combined with currently undeveloped adjacent properties into larger pressure zones that are more effectively served by a dedicated reservoir rather than through PRVs from higher zones.

Future pressure zones and associated facilities will also need to be developed to serve customers within the City's future WSA and above the maximum elevations served by existing pressure zones. The City's future WSA includes properties at elevations up to 700 feet above msl. Zone 4, the City's highest elevation existing zone, can deliver water at the minimum service pressure of 30 psi to customers at an approximate maximum elevation of 605 feet above msl. Recommended pressure zone changes are summarized below and in Table 3-9.

3.3.2.1 Recommended 10-Year Pressure Zone Changes

3.3.2.1.1 Extension of Zone 3

The proposed Granite Highlands development north of V Street and west of N 14th Street and the proposed Northside development west of SE 293rd Avenue and north of W Dogwood Street in Zone 3 are anticipated to be constructed in the 10-year planning period, requiring installation of

new water mains in Zone 3 and the extension of water service to the northern edge of the city limits. Proposed improvements include construction of a new parallel transmission main from Reservoir 3 in conjunction with the Granite Highlands development and construction of a new Reservoir 3B north of W Dogwood Street with the Northside development. These projects will provide additional Zone 3 storage to satisfy projected future demands and to reduce the Zone 3 HGL sag from the existing Reservoir 3 to the west end of the pressure zone.

3.3.2.1.2 Proposed Zone 5

The proposed Zone 5 will serve higher elevation customers in the northwest area of the future WSA at the higher elevations of Woodburn Hill. Due to the small size of the proposed zone and lack of suitable sites west to construct a standpipe, Zone 5 is recommended to be served by a constant pressure closed system pump station located at the same site as the proposed Reservoir 3B. Approximate service elevations for Zone 5 would range from 540 up to 664 feet. Due to the services being located on a ridge top, Zone 5 would be surrounded by the future extended Zone 3. Construction of the Zone 5 pump station is proposed as part of the Northside development, located on the Reservoir 3B site.

3.3.2.1.3 Proposed Zone 3-7

It is recommended that an additional PRV-controlled sub-zone 3-7 be created to accommodate anticipated customers within the WSA in the new Greenview Estates development east of SE Woodburn Road and west of the Washougal River. Zone 3-7 will be supplied by the extension of Zone 3 piping at the east end of T Street and a new PRV.

3.3.2.2 Recommended 20-Year Pressure Zone Changes

3.3.2.2.1 Proposed Zone 6

Existing customers in Zone 3 are served through a combination of four PRV-controlled sub-zones and PRVs at individual services. Mainline pressures in this area, particularly near Pump Station No. 3 on 10th Court, exceed 150 psi and are as high as 200 psi. To reduce these high pressure areas, the City has completed preliminary design to develop an intermediate level Zone 6 between Zones 1 and 3. Zone 6 will serve customers between approximately 160 and 300 feet above msl.

Preliminary improvements for the development of Zone 6 were outlined in the 2012 WSP and further refined in the April 2015 *Reservoir #6 & Booster Pump Stations Preliminary Design Report* prepared by Wallis Engineering included as Appendix G. The proposed Zone 6 will be supplied by a new reservoir located on property purchased by the City on W Street in the Lookout Ridge development with an overflow elevation of approximately 416 feet. This reservoir will be supplied from Zone 1 by a new pump station located on City-owned property on Lebrun Boulevard near the Lebrun PRV site.

Additional improvements to create the new Zone 6 include abandonment of the Crown Pointe and North 10th Street PRVs to eliminate Zones 3-4 and 3-5, abandonment of Pump Station No. 3 and

construction of a new pump station at the Zone 6 reservoir site, and miscellaneous piping and valving improvements. Recommended improvements are discussed further in Chapter 8.

3.3.2.2.2 Proposed Zone 3-6

It is recommended that a PRV-controlled sub-zone 3-6 be created to serve anticipated customers within the future WSA on the south and east slopes of Woodburn Hill west of the Washougal River. Zone 3-6 will be fed by future Zone 3 piping at the east end of SE 30th Street.

3.3.2.2.3 Extension of Zone 4-2

Multiple properties are located northwest of Zone 4-2 outside the city limits but within the City's future WSA and are not currently served by the City. It is recommended that the City extend the existing 8-inch diameter water main on Y Street along SE 328th Avenue to the north around SE Eagle Woods Drive to serve these homes and future development as part of Zone 4-2. It is also recommended that the proposed water main is looped to the east along SE 34th Street connecting to the existing 8-inch diameter Zone 4 water main. This requires the addition of a new PRV facility that will provide redundant supply to Zone 4-2.

3.3.2.2.4 Proposed Zone 4-5

Properties to the northeast of Zone 4-3 may be incorporated into a new PRV-controlled sub-zone 4-5. Zone 4-5 would have an approximate HGL of 550 feet, serving customers at elevations between 340 and 460 feet. The creation of Zone 4-5 would be achieved by extending a Zone 4 main east on W Street from 49th Street and installing a new PRV to serve Zone 4-4. A large portion of Zone 4-5 would fall within the Campen Creek riparian area that is unlikely to be developed. Construction of Zone 4-5 facilities should be driven by development in this area. No distribution system improvements are recommended to serve this area in the planning period.

Table 3–9 | Existing and Proposed Pressure Zones

Zone	2019		2029		2039		Existing Supply Facilities	Facility Changes
	HGL (ft)	Approx Service Elev Range (ft)	HGL (ft)	Approx Service Elev Range (ft)	HGL (ft)	Approx Service Elev Range (ft)		
1	236	20-160	NO HGL OR SERVICE ELEV CHANGES				Reservoirs 1A and 1B; All supply wells; WHS, Evergreen Blvd, and Lebrun PRVs	None
2	362	140-300	NO HGL OR SERVICE ELEV CHANGES				Reservoirs 2A and 2B; PS No. 1; 57th Street PRV	None
2-2	274	60-180	NO HGL OR SERVICE ELEV CHANGES				Sunset Ridge PRV	None
3	658	160-540	NO HGL OR SERVICE ELEV CHANGES				Reservoir 3; PS No. 3	Construct Reservoir 3B in 10-year planning period. Construct Reservoir 6, new PS No. 6 and No. 3, and reconfigure pressure zones in 20-year planning period.
3-2	537	340-450	NO HGL OR SERVICE ELEV CHANGES				Coda Ridge PRV	Install additional 23rd and 30th Circle PRVs in northwest corner of UGA between Zone 3 and upper end of Zone 3-2.
3-3	495	120-400	NO HGL OR SERVICE ELEV CHANGES		505	230-410	Lookout Ridge 1 and 2 PRVs	Connect Lookout Ridge 1 PRV piping to Zone 6 at Lebrun Dr and Lookout Ridge Dr and abandon connection to Zone 3-3 with Zone 6. Install Crown Rd PRV in northwest corner of the UGA between Zone 3-2 and upper end of Zone 3-3 in 20-year period.
3-4	353	140-280	NO HGL OR SERVICE ELEV CHANGES		ELIMINATE SUB-ZONE		N 10th St and Columbia Ridge PRVs	Eliminate Zone 3-4: abandon N 10th St PRV and reconfigure Columbia Ridge PRV with proposed Zone 6.
3-5	296	100-240	NO HGL OR SERVICE ELEV CHANGES		ELIMINATE SUB-ZONE		Crown Pointe PRV	Eliminate Zone 3-5: abandon Crown Pointe PRV and split customers between Zones 1 and 6 in 20-year period.
3-6	OUTSIDE EXISTING WSA; 20-YEAR IMPROVEMENT				520	300-440	None	Install Woodburn Rd PRV serving Zone 3-7 in 20-year period.
3-7	UNDEVELOPED		380	165-260	NO HGL OR SERVICE ELEV CHANGES		None	Install N T Street PRV serving Zone 3-7 in 10-year period.
4	677	380-600	NO HGL OR SERVICE ELEV CHANGES				Reservoir 4 and 4B; PS No. 4	None
4-2	532	300-440	NO HGL OR SERVICE ELEV CHANGES				Arborview PRV	Install PRV between Zone 4 and Zone 4-2 in 20-year planning period.
4-3	425	220-360	NO HGL OR SERVICE ELEV CHANGES				Columbia View and 49th Street PRVs	Install new 57th Street PRV to provide redundant Zone 4-3 feed from Zone 7 and adjust existing PRV settings as needed in 20-year period.
4-4	535	320-400	NO HGL OR SERVICE ELEV CHANGES				C-Dymond PRV	None
4-5	UNDEVELOPED				550	340-460	None	Facilities to be determined when development occurs.
5	UNDEVELOPED		730	540-640	NO HGL OR SERVICE ELEV CHANGES		None	Install constant pressure PS No. 5 at Reservoir 3B site to serve proposed Zone 5 in 10-year period.
6	PART OF ZONE 3				416	160-300	None	Create Zone 6: construct Reservoir 6 and BPS 6, eliminate Zone 3-5, relocate BPS 3 to Reservoir 6 site, modify LeBrun PRV, eliminate Zones 3-4 and 3-5 in 20-year period.
7	OUTSIDE EXISTING WSA; 20-YEAR IMPROVEMENT				800	600-700	None	Construct Reservoir 7 and BPS 7 supplying from Zone 4 in northeast corner of UGA in 20-year period.

3.3.3 Supply Analysis and Water Rights

The system must be able to supply MDD to all pressure zones through firm source capacity. All of the City groundwater wells are located in Zone 1 and pumped to storage reservoirs serving the higher zones. Supply capacity was analyzed considering the combined MDD of all pressure zones. Table 3-10 identifies a slight supply deficiency in the 20-year planning period.

The City is currently exploring multiple source improvement alternatives as follows.

- Drilling was completed for the new Well 1R in 2016 that was intended to replace the aging Well 1 with increased capacity, however, testing indicated that the yield was less than anticipated. The project hydrogeologist recommended to operate Wells 1 and 1R together to achieve a combined short-term pumping rate of up to 1,325 gpm. Full development of Well 1R to supplement Well 1 and realize the full water right addresses the 20-year supply deficiency and is included as an improvement in Chapter 8.

- The Cities of Washougal and Camas are exploring the feasibility of transferring water produced by the City's Well 6 to the Camas distribution system. In exchange for the transfer of water produced from Well 6, Camas would support the drilling of an additional well at Washougal's Westside Wellfield. The new well is anticipated to produce 1,000 gpm or more, depending on wellfield operations. Potential increased capacity under this proposal is not included in the supply analysis.

- The Cities of Washougal and Camas submitted a water right to Ecology in 2009 and purchased property from the Port of Camas/Washougal for the proposed Steigerwald Wellfield. This future joint source is not anticipated for development in the 20-year planning period.

The DOH 2019 *Water System Design Manual* (*WSDM*) outlines recommended reliability criteria for water system sources. Though not required, the reliability criteria of meeting system wide MDD with 20 hours of well source pumping is included in Table 3-10. In addition, the City's existing sources also satisfy the additional reliability criteria of supplying system wide ADD with firm capacity (Well 12 offline) and replenishing fire suppression storage with 72 hours of supply pumping.

Table 3-10 | Well Supply Analysis

Wellfield		Well	Supply Capacity (gpm)		
			2019	2029	2039
Required Supply Criteria	Upper	1	900	900	900
		1R	0	0	425
		10	0	0	0
	Lower	5	650	650	650
		6	675	675	675
		7	750	750	750
		11	1,000	1,000	1,000
		12	1,500	1,500	1,500
	Firm Capacity[1] (gpm)		3,975	3,975	4,400
	System MDD (gpm)		2,480	3,098	4,050
	Surplus / (Deficiency) (gpm)		**1,495**	**877**	**350**
Reliability Criteria	Total Supply, 20 Hours of Pumping (gpm)		4,563	4,463	4,917
	System MDD (gpm)		2,480	3,098	4,050
	Surplus / (Deficiency) (gpm)		2,083	1,465	867

Note:
1. Firm capacity assumes the highest capacity supply source (Well 12) is offline and Well 10 is inactive.

All the City's water rights are for municipal supply purposes, with a place of use corresponding to the WSA shown in **Figure 1-3**. There are no known time-of-use limitations on any of the City's water right certificates or claims.

The City obtained approval of two water rights applications, G2-30564 and G2-30565 in 2011 that are non-additive water rights supplementing the City's existing water rights certificates and claims. The City's existing water rights include Claims 000773, 000774, 000776, 000777, and certificates G2-25796 and G2-24581. The two new permits authorize:

- Withdrawal of 1,325 gpm (Qi) and 2,120 acre-feet per year (Qa) from the Upper Wellfield.
- Withdrawal of 4,675 gpm (Qi) from the Lower Wellfield and a maximum total annual water allocation of 3,786 acre-feet per year (Qa) from all sources (including the Upper Wellfield).

The City's WRSA form and a copy of the City's existing water rights claims, permits, and certificates are included in **Appendix E**. Based on the water demands developed in **Chapter 2**, The City's current water right allocation is adequate to satisfy 20-year demand projections. **Table 3-11** summarizes the City's existing water rights adequacy for the planning period. The max instantaneous and annual ERU values shown are calculated using an average of the ERU ADD values for each zone.

Table 3-11 | Water Rights Analysis

Projected ERUs and Demand[1]	Year				
	2019	2029	2039	Max Instant.	Max Annual
ERUs	9,029	11,480	14,615	17,028	26,842
ADD (gpm)	1,127	1,430	1,820	-	3,661
MDD (gpm)	2,480	3,098	4,050	6,000	-
Water Rights for Available Sources[2]					
Upper Wellfield (gpm)	1,325	1,325	1,325	1,325	2,120 afy
Lower Wellfield (gpm)	4,675	4,675	4,675	4,675	3,786 afy
Total (gpm)	6,000	6,000	6,000	6,000	5,906 afy
Water Rights Surplus / (Deficiency) (gpm)	3,520	2,902	1,950	-	-

Notes:

1. Projected number of ERUs and demand forecast presented in Chapter 2.
2. Instantaneous water rights for available sources assumes all available sources are pumped 24 hours per day at the limit of instantaneous water rights.

3.3.4 Storage Analysis

Storage in the system is intended to serve four purposes: operational (OS), equalization (ES), fire suppression (FSS), and standby (SB) or emergency storage. The total storage required is the sum of these four components. Dead storage is the volume of water which is not available for system use or provides inadequate pressures.

The system has seven tanks as previously described in this chapter. The storage requirements and analysis are summarized in **Table 3-11**. Dead storage is calculated for each tank based on providing a minimum of 30 psi at the highest service elevation for each pressure zone. OS is based on the existing on and off setpoints for the supplying pump stations or wells, which vary between 4 and 7.5 feet in height for the City's storage tanks. ES is calculated as the difference between PHD and the supplying source capacity (pump station capacity for Zones 2, 3, and 4) for a duration of 150 minutes. SB was calculated as the equivalent volume of gpud in accordance with the DOH minimum SB recommendations. FSS was calculated as the largest fire flow in each pressure zone for the required duration. FSS was nested with SB for each pressure zone.

The City has sufficient storage in Zones 1, 2, and 4 to meet the storage requirements for the 20-year planning period. The City is currently working with the Northside development to construct the new Reservoir 3B as described in **Chapter 8** that will provide supplemental storage for Zone 3 and the proposed Zone 5 in conjunction with Reservoir 3 for the 20-year planning period. **Chapter 8** also includes new Reservoirs 6 and 7 that will be designed to provide sufficient storage for future Zones 6 and 7. A summary of the storage requirements and availability in each pressure zone is provided as **Table 3-12**.

Table 3-12 | Storage Analysis

Zone (Existing Reservoirs)	Year	ERUs	Pump/Well Capacity (gpm)		PHD (gpm)	Largest Fire Flow in Zone		Volume (MG)							
			Zone Total	Largest		Flow (gpm)	Duration (hrs)	OS	ES	FSS	SB	DS	Total Required	Available	Surplus (Deficit)
Zone 1 (1A and 1B)	2019	5,421	5,475	1,500	1,826	3,500	3	0.27	0.00	0.63	1.08	0.00	1.36	2.50	1.14
	2029	7,068	5,475	1,500	2,382	3,500	3		0.00	0.63	1.41		1.69		0.81
	2039	8,915	5,475	1,500	3,007	3,500	3		0.00	0.63	1.78		2.05		0.45
Zone 2 (2A and 2B)	2019	1,216	2,680	1,000	879	2,000	4	0.10	0.00	0.48	0.24	0.00	0.58	0.61	0.03
	2029	1,341	2,680	1,000	969	2,000	4		0.00	0.48	0.27		0.58		0.03
	2039	1,541	2,680	1,000	1,113	2,000	4		0.00	0.48	0.31		0.58		0.03
Zone 3 (3)	2019	1,521	1,050	400	834	2,000	2	0.08	0.00	0.24	0.30	0.00	0.38	0.42	0.04
	2029	1,971	1,050	400	854	2,000	2		0.01	0.24	0.41		0.50		(0.07)
	2039	1,841	1,050	400	974	2,000	2		0.00	0.24	0.39		0.47		(0.05)
Zone 4 (4A and 4B)	2019	871	900	300	873	1,500	2	0.42	0.00	0.18	0.17	0.06	0.66	1.35	0.69
	2029	1,021	900	300	1,023	1,500	2		0.02	0.18	0.20		0.70		0.65
	2039	1,410	900	300	1,413	1,500	2		0.08	0.18	0.28		0.84		0.51
Zone 6 (Future)	2039	392	815	400	233	2,000	2	0.19	0.00	0.24	0.08	0.00	0.43	0.00	(0.43)
Zone 7 (Future)	2039	400	800	400	401	2,000	2	0.13	0.06	0.24	0.08	0.00	0.43	0.00	(0.43)

3.3.5 Booster Pump Station Analysis

Pump stations supplying storage in one pressure zone that serves as the suction supply to a pump station in a higher zone should be sized to accommodate the demand of both zones. Sizing the lower elevation pump station to meet demands in both zones prevents excessive reservoir drawdown during high demand periods or emergencies in the higher elevation zone. For example, Pump Station No. 1 supplies Zone 2 reservoirs which are on the suction side of Pump Station No. 4. Therefore, Pump Station No. 1 should be sized to meet water demands in Zones 2 and 4 including all sub-zones.

Table 3-13 summarizes the pumping capacities for each pressure zone and whether there is a surplus or deficit based on projected future demands summarized in Chapter 2. The surplus/deficit values shown represent the minimum resulting from the two demand scenario requirements for open and closed systems. With Zone 1 supplied by the production wells, adequate existing pump station capacity is available to serve projected demands for Zones 2 and 3 for the 20-year planning period. There is a slight deficiency shown for Pump Station No. 4 under the 20-year MDD scenario. This deficiency is noted but not viewed as warranting an improvement since the calculation conservatively includes future Zone 7 demand and there is a surplus of available storage in Zone 4. Zones 5 and 6 are future service areas not currently served by the City, and Zone 6 serves a portion of the current Zone 3 service area.

Table 3-13 | Booster Pump Station Analysis

Year	BPS (Zone Served)	ERUs	Capacity (gpm)		Zone Demand (gpm)			Surplus (Deficit)[1,2]
			Total	Firm	ADD	MDD	PHD	
2019	1 (Zone 2+4)	2,087	2,680	1,680	291	927	1,751	1,389
	3 (Zone 3)	1,521	1,050	750	237	452	834	513
	4 (Zone 4)	871	900	600	122	453	873	447
2029	1 (Zone 2+4)	2,362	2,680	1,680	329	1054	1992	1351
	3 (Zone 3+5)	2,049	1,050	750	319	609	1,123	431
	4 (Zone 4)	1,021	900	600	143	531	1,023	369
	5 (Zone 5)	78	0	0	12	1,523[1]	43	(1,523)
2039	1 (Zone 2+4+7)	3,351	2,680	1,680	468	1542	2928	1138
	3 (Zone 3+5)	1,957	1,050	750	305	582	1,073	445
	4 (Zone 4+7)	1,810	900	600	254	941	1,814	(41)
	5 (Zone 5)	116	0	0	18	1,535	64	(1,535)
	6 (Zone 6+3+5)	2,349	0	0	366	698	1,288	(698)
	7 (Zone 7)	400	0	0	56	208	401	(208)

Notes:

1. For Zones 1, 2, 3, 4, 6, and 7: Surplus/Deficits calculated as the lesser of (1) the difference between total capacity and MDD and (2) the difference between the firm capacity and the ADD, in accordance with the *WSDM* Table 8-1.
2. For Zone 5: Surplus/Deficit calculated as the difference between total capacity and MDD plus fire flow in accordance with the *WSDM* Table 8-2. MDD value for Zone 5 shown includes 1,500 gpm residential fire flow.

3.4 Distribution System Analysis

The City's distribution system performance was assessed based on the service pressure criteria summarized in Table 3-7. Pressures should not fall below 30 psi under PHD conditions and 20 psi under MDD plus fire flow conditions. Typically, operating pressures should remain between 40-90 psi.

Pipe flow velocity criteria is applied to the distribution system analysis to indicate potential areas of undersized piping. Distribution piping was assessed based on a maximum velocity of 5 feet per second (ft/sec) under ADD and MDD conditions and 8 ft/sec under PHD conditions.

3.4.1 Hydraulic Model

A steady-state hydraulic network model was used to evaluate the performance of the distribution system under existing and future demand conditions to identify deficiencies and evaluate the adequacy of improvements. The modeling platform used was InfoWater by Innovyze, Inc. The purpose of the model is to determine pressure and flow relationships throughout the distribution system for a variety of demand, supply, and emergency conditions. The City's hydraulic model was updated to reflect current system conditions. The model was calibrated in 2009 as part of the 2012 WSP and has been maintained and checked for accuracy against ongoing City hydrant flow tests.

3.4.1.1 Modeling Conditions

System analysis was performed under Existing, 10-year, and 20-year demand conditions for ADD, MDD, PHD, and MDD plus fire flow conditions. Pressure criteria deficiencies were identified and used to develop the improvement projects outlined in Chapter 8.

3.4.1.1.1 Demand

Existing demand was allocated throughout the system based on the location of meters using 2018 billing records and was proportionally scaled to match current production. Future water demands are comprised of several components including metered demands, demand due to growth areas and infill, and water loss. The amount allocated for each component of future demands is described in Chapter 2.

3.4.1.1.2 Fire Flow

The fire flow requirements summarized in Table 3-8 were applied at representative areas throughout the distribution system for the fire flow analysis scenarios. The fire flow requirements are based on the 2015 IFC and coordination with the City fire marshal.

3.4.1.2 Distribution System Results

A system analysis was performed to assess the ability of the City's current distribution system to provide water for existing and projected future demands and emergency fire suppression. The model was also utilized to validate facility operations in conjunction with system distribution and

transmission capabilities. Potential improvement projects were evaluated for deficiencies occurring under each analysis scenario. Recommended improvements were selected based on hydraulic benefit and estimated cost.

3.4.1.2.1 Existing Scenario Analyses

The existing system was modeled under existing ADD, MDD, and PHD conditions. The resulting pressures for each demand condition were very similar and are illustrated for the PHD scenario in Figure 3-1. Pressures range from 30 to 215 psi across the scenarios. Under all conditions there are a handful of areas with operating pressures above 100 psi, specifically in the lower elevation service area of Zone 3. Under the MDD plus fire flow scenario there are areas in the system that cannot adequately meet the fire flow requirement for existing infrastructure. These deficiencies are shown as a fire flow availability deficit in Figure 3-2. The deficiencies are typically due to small diameter and/or dead-end pipe, and improvements are identified as outlined in Chapter 8. It is recommended the City continue to replace undersized (less than 6-inch diameter) pipe in the distribution system.

Pipe velocity exceedances alone do not typically trigger improvements; however, they are evaluated to check for potential restriction points in the system where high frictional losses may occur. The only locations where flow velocity exceeds the criteria for the existing MDD and PHD scenarios are the short runs of pipe immediately downstream from the Zone 1 and Zone 2 reservoirs. Velocities in all other distribution and transmission mains between the two existing scenarios are beneath the criteria threshold.

3.4.1.2.2 Future Scenario Analyses

Similar demand scenarios (ADD, MDD, PHD, and MDD plus fire flow) were modeled for the 10-year and 20-year planning horizons. For all scenarios, existing system infrastructure including improvements to address the existing deficiencies was used with future demand allocations to determine any deficiencies due to future demand conditions.

System pressures under the 10-year and 20-year scenarios were similar to existing conditions, which is to be expected due to the relatively modest growth that is projected in the system over the next 20 years. There are a handful of places with high pressures, but the addition of Zone 6 significantly reduced the high pressure service area at the lower elevations of the current Zone 3. In accordance with Uniform Plumbing Code, individual service PRVs should continue to be installed where static pressure exceeds 80 psi; property owners are responsible for installing and maintaining their PRV devices. No additional fire flow deficiencies were identified under future conditions.

3.4.1.3 Condition Based Pipe Replacement

The City currently does not have an annual pipe replacement program that focuses on replacement of leaking and undersized water mains since a majority of the distribution system is newer ductile iron or PVC pipe 8 inches in diameter or larger and the frequency of pipe leaks or breaks is low. Repairs or replacements have historically been made on an as-needed basis. It is

recommended that the City continue to document pipe leaks/breaks as well as locations with undersized pipes (typically 6 inches or less) to help coordinate water infrastructure renewal-replacement needs with other utilities. The City should continue these efforts to reduce water loss and keep system piping in working order and with appropriate life cycle expectations.

3.5 ERU Physical Capacity Analysis

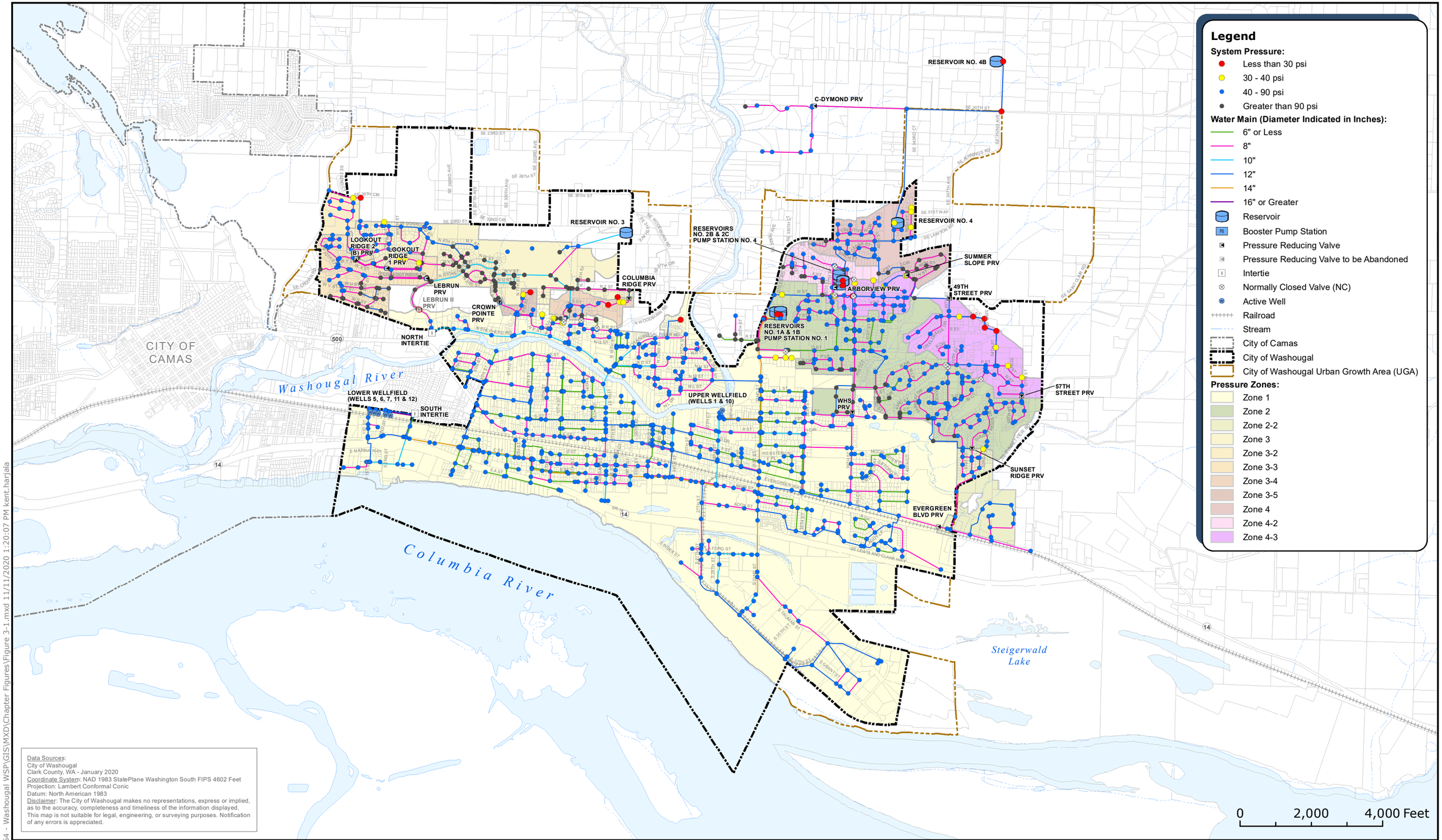
An analysis of the water system physical capacity by pressure zone was completed based on the *WSDM*. This worksheet identifies the limiting factor in water system capacity in terms of ERUs. Table 3-14 below summarizes the physical capacity of the water system components in ERUs. The limiting water system component is the existing source capacity of 7.88 MGD, which translates to 15,538 ERUs. The demand forecast in Chapter 2 indicates a 20-year ERU projection of 14,615 ERUs and ERU projections by pressure zone less than the transmission capacities indicated in Table 3-14.

Table 3-14 | Physical Capacity as ERUs

Water System Component[1,2]	Pressure Zone(s)	Component Capacity (MGD)	Capacity in ERUs
Sources[3]	All	7.88	15,538
Storage[4]	1	2.23	14,003
	2	0.51	2,561
	3	0.35	1,542
	4	0.87	4,308
Total		**3.96**	**22,414**
Transmission[5]	1	5.08	17,368
	2	2.54	4,520
	3	1.76	4,121
	4	2.54	3,392
Total		**11.91**	**29,403**
Water Rights (Qa)	All	5.27	26,842[6]
Water Rights (Qi)	All	8.64	17,028
System Physical Capacity (ERUs) (Based on limiting component above)			**15,538**

Notes:

1. Since there are no regulatory equalizing storage requirements, only standby storage capacity was included.
2. City's well production is not limited by chlorination or pH adjustment; therefore, the treatment component was not included.
3. Well 10 (emergency source) not included. Average of ERU MDDs for all pressure zones used.
4. Based on standby storage calculated as total storage volume minus sum of dead and operating storage. Fire suppression storage nested with standby storage, and equalizing requirement met through supply pumps. Capacity calculated using DOH recommended 200 gpd/ERU.
5. Calculated as flow rate at max velocity of 5 ft/sec divided by zone-specific ERU MDDs. Zone 1 transmission includes 12-inch diameter main from Lower Wellfield and 12-inch diameter main from Upper Wellfield. Zone 2 transmission includes 12-inch diameter main from BPS 1. Zone 3 transmission includes 10-inch diameter main from BPS 3. Zone 4 transmission includes 12-inch diameter main from BPS 4.
6. Calculated using average of ERU ADDs for each pressure zone, since Qa is an annual quantity.



Legend

System Pressure:
- Less than 30 psi
- 30 - 40 psi
- 40 - 90 psi
- Greater than 90 psi

Water Main (Diameter Indicated in Inches):
- 6" or Less
- 8"
- 10"
- 12"
- 14"
- 16" or Greater
- Reservoir
- Booster Pump Station
- Pressure Reducing Valve
- Pressure Reducing Valve to be Abandoned
- Intertie
- Normally Closed Valve (NC)
- Active Well
- Railroad
- Stream
- City of Camas
- City of Washougal
- City of Washougal Urban Growth Area (UGA)

Pressure Zones:
- Zone 1
- Zone 2
- Zone 2-2
- Zone 3
- Zone 3-2
- Zone 3-3
- Zone 3-4
- Zone 3-5
- Zone 4
- Zone 4-2
- Zone 4-3

Data Sources:
City of Washougal
Clark County, WA - January 2020
Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Disclaimer: The City of Washougal makes no representations, express or implied, as to the accuracy, completeness and timeliness of the information displayed. This map is not suitable for legal, engineering, or surveying purposes. Notification of any errors is appreciated.

murraysmith

City of Washougal

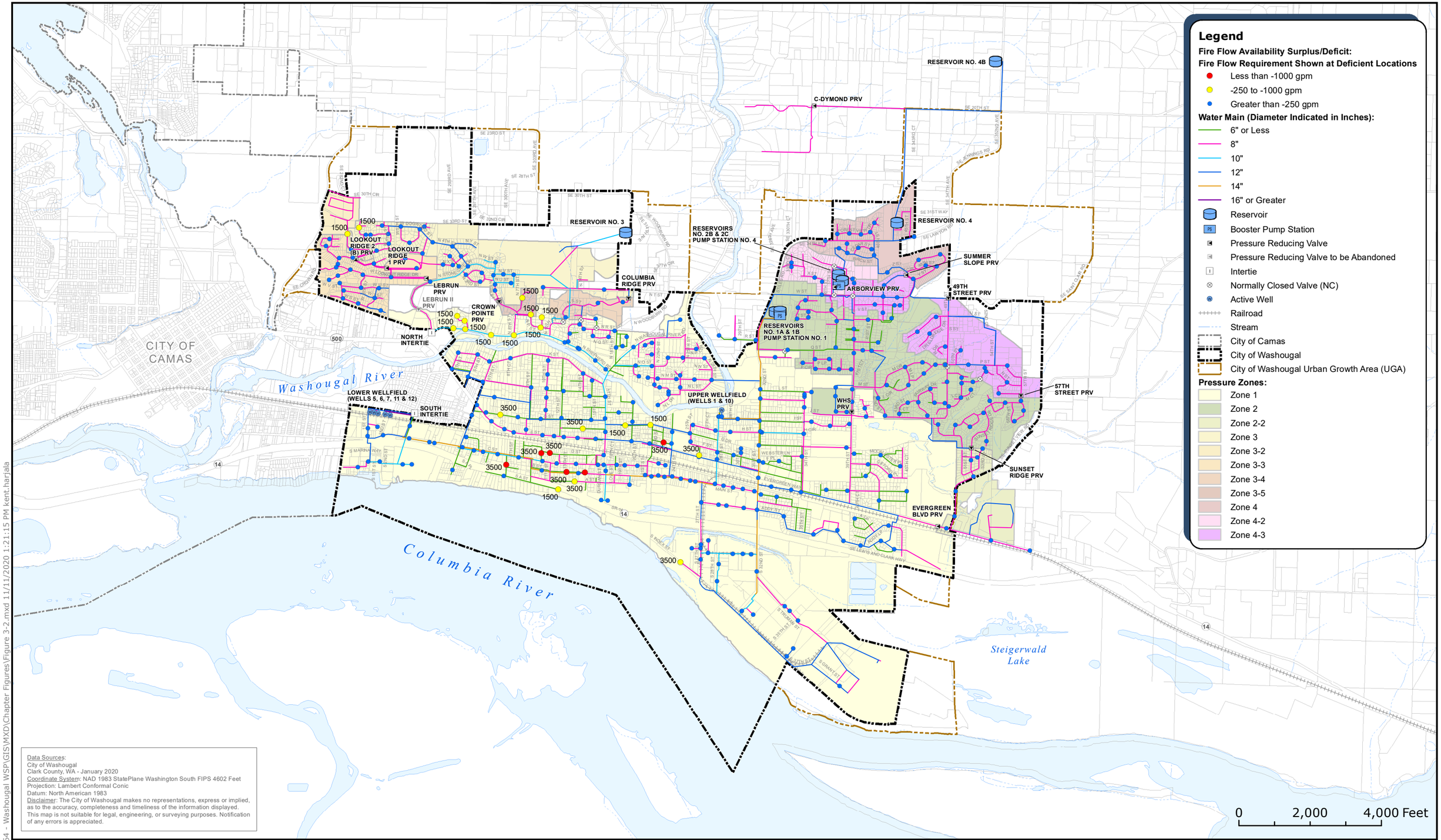
City of Washougal
Water System Plan Update

Figure 3-1
Existing System PHD Results

November 2020

19-2464

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Legend

Fire Flow Availability Surplus/Deficit:
Fire Flow Requirement Shown at Deficient Locations

- Less than -1000 gpm
- -250 to -1000 gpm
- Greater than -250 gpm

Water Main (Diameter Indicated in Inches):

- 6" or Less
- 8"
- 10"
- 12"
- 14"
- 16" or Greater
- Reservoir
- Booster Pump Station
- Pressure Reducing Valve
- Pressure Reducing Valve to be Abandoned
- Intertie
- Normally Closed Valve (NC)
- Active Well
- Railroad
- Stream
- City of Camas
- City of Washougal
- City of Washougal Urban Growth Area (UGA)

Pressure Zones:

- Zone 1
- Zone 2
- Zone 2-2
- Zone 3
- Zone 3-2
- Zone 3-3
- Zone 3-4
- Zone 3-5
- Zone 4
- Zone 4-2
- Zone 4-3

Data Sources:
City of Washougal
Clark County, WA - January 2020
Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Disclaimer: The City of Washougal makes no representations, express or implied, as to the accuracy, completeness and timeliness of the information displayed. This map is not suitable for legal, engineering, or surveying purposes. Notification of any errors is appreciated.

City of Washougal
Water System Plan Update

Figure 3-2
Existing System
Fire Flow Results

November 2020

19-2464

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Section **4**

Chapter 4

Water Resource Analysis and Water Use Efficiency

4.1 Introduction

Municipal water suppliers must enact measures to ensure the efficient use of water in exchange for water rights certainty and flexibility to meet future demands in accordance with the 2003 Municipal Water Law. This chapter includes an analysis of the City water rights adequacy, supply characteristics and reliability, and an update to the WUE program.

4.2 Water Use Efficiency Requirements

In compliance with the WUE Rules, this update to the City's WUE program titled *City of Washougal Water Use Efficiency Goals*, which was originally adopted in 2008, is being included as part of the WSP update. The WUE requirements include seven main categories.

1) Meters
2) Data collection
3) Distribution system leak
4) Goals
5) Efficiency program
6) Demand forecast
7) Performance reports

Table 4-1 lists the requirements of the Rule and City compliance with each of the current requirements.

Table 4-1 | Water Use Efficiency Requirements Checklist

Category	WAC Section	Requirement	City in Compliance?
1. Meters	246-290-496(1,2)	1. Meter all sources.	Yes, all sources are fully metered.
		2. Meter all service connections.	Yes, all service connections are metered.
2. Data Collection	246-290-100	1. Provide monthly and annual production/purchase numbers for each source.	Yes, provided in **Chapter 2** of this WSP.
		2. Provide annual consumption by customer class.	Yes, provided in **Chapter 2** of this WSP.
		3. Provide "seasonal variations" consumption by customer class.	Yes, provided in **Chapter 2** of this WSP.
		4. Provide annual quantity supplied to other public water systems.	Yes, no water has been supplied to other water systems in previous three years.
		5. Evaluate reclaimed water opportunities.	Yes, provided in Section 4.3.9.
		6. Consider water use efficiency rate structure.	Yes, the City currently utilizes a bi-monthly flat rate with a 3 CCF (100 cubic feet of water) allowance, with additional unit charges for use over 3 CCF. The City is phasing out the base allowance in favor of billing for total consumption.
3. Distribution System Leakage	246-290-820	1. Calculate annual volume and percent using formula defined in the Rule.	Yes. As presented in **Chapter 2**, Table 2-10, the City recorded an annual average water loss of 44 million gallons for the period of 2016-2018, or approximately 8 percent. A Water Loss Control Action Plan is not required.
		2. Report annually: annual leakage volume, annual leakage percent, and, for systems not fully metered, meter installation progress and leak minimization activities.	
		3. Develop water loss control action plan (if leakage is over 10 percent for 3-year average).	
4. Goals	246-290-830	1. Establish measurable (in terms of water production or usage) conservation goals and re-establish as part of the water system plan update. Provide schedule for achieving goals.	Yes, measurable goals defined in the City's WUE program were re-established through a public forum in June 2018. The information related to the goals is presented Section 4.3.10.
		2. Use a public process to establish the goals.	
		3. Report annually on progress.	

Table 4-1 | Water Use Efficiency Requirements Checklist (continued)

Category	WAC Section	Requirement	City in Compliance?
5. Efficiency Program	246-290-810	1. Describe existing conservation program.	Yes, provided in Section 4.3.
		2. Estimate water saved over last 6 years due to conservation program.	Yes, provided in Section 4.3.13.
		3. Describe conservation goals.	Yes, provided in Section 4.3.10.
		4. Implement or evaluate 1-12 measures, depending on size.	Yes, the City is required to implement or evaluate 6 measures, based on having between 2,500 and 9,999 connections. The City has chosen to implement or evaluate 9 measures. See Section 4.3.
		5. Describe conservation programs for next 6 years including schedule, budget, and funding mechanism.	Yes, provided in Section 4.3
		6. Describe how customers will be educated on efficiency practices.	
		7. Estimate projected water savings from selected measures.	
		8. Describe how efficiency program will be evaluated for effectiveness.	
		9. Estimate leakage from transmission lines (if not included in distribution system leakage).	Yes, transmission line leakage is included in distribution system leakage.
6. Demand Forecast	246-290-100	1. Provide demand forecast reflecting no additional conservation.	Yes, see **Chapter 2, Table 2-12.**
		2. Provide demand forecast reflecting savings from efficiency program.	Yes, see **Chapter 2, Table 2-12**.
		3. Provide demand forecast reflecting all "cost effective" evaluated measures, if not implementing the minimum number of measures.	N/A. The City is implementing the required minimum number of measures (6), therefore this forecast is not required.
7.Performance Reports	246-290-840	1. Develop annual report including goals and progress towards meeting them, total annual production, annual leakage volume and percent, and, for systems not fully metered, status of meter installation and actions taken to minimize leakage.	Yes. The performance reports are included in the City's Annual Report to Council and contain the required information.
		2. Submit annually by July 1 to DOH and customers and make available to the public.	

4.3 WUE and Conservation Program Overview

The inefficient use of water, particularly during the summer months, results in excessive consumption during peak demand periods. DOH requires municipal water suppliers to adopt specific mandatory WUE measures that contribute to the achievement of adopted WUE goals. The City's current conservation program has been implemented since 2008 and has defined supply- and demand-side goals that have been adopted by the City Council. The City's WUE program has consisted of the following conservation measures, selected and maintained based on effectiveness, the details of which are discussed below.

- Implementation of Enhanced Metering
- Implementation of Technology Benefits for Customers
- Rate Design
- Conservation Awareness Signs
- Consumption Data on Utility Bills
- Conservation Kits
- Leak Survey
- Notifications for High Usage
- Water Reclamation Opportunities

4.3.1 Implementation of Enhanced Metering

The City is committed to implementing enhanced metering at the City-owned mains at connection points to private mains, since unmetered private mains have been identified as a source of distribution system losses.

4.3.2 Implementation of Technology Benefits for Customers

Implement technology benefits aimed at providing increased customer service and usage monitoring to promote customer awareness and efficient water use.

4.3.3 Rate Design

The City currently utilizes a bi-monthly flat rate with a 3 CCF (equivalent to approximately 2,250 gallons) allowance, with additional unit charges for use over 3 CCF. The City is phasing out the base allowance in favor of billing for total consumption, which is intended to promote efficient water use by customers by giving them greater control over the billing. Additionally, the City has changed the base sewer rate to be the average of the winter water consumption for the previous year, which promotes conservative use by large water users and industries in particular.

4.3.4 Conservation Awareness Signs

Continue to implement the cost-effective measure of conservation awareness signs for public education and outreach. The City will focus on targeting messages to specific audiences.

4.3.5 Consumption Data on Utility Bills

The City has added historical water use bar graphs to utility bills as part of an increased effort to promote consumer knowledge and efficient use.

4.3.6 Conservation Kits

The City has committed to distributing water conservation kits to customers during public events or by request. The kits include low flow showerheads, faucet aerators, a water heater temperature gauge, a faucet drip gauge, and toilet leak tablets.

4.3.7 Leak Survey

The City maintains a relatively low water loss percentage and is committed to decreasing or maintaining the percentage. The City performs a leak detection survey every three years in an effort to identify and repair pipe leaks contributing to water loss.

4.3.8 Notifications for High Water Usage

The City will notify customers of high or abnormal water usage to promote customer awareness and efficient water use practices.

4.3.9 Water Reclamation Opportunities

The City's WUE program included a detailed examination of the potential for reclaiming wastewater treatment plant (WWTP) effluent for use as irrigation at local parks, schools, or grassy areas such as the Orchard Hills Golf Club. The evaluation is documented in the memorandum *WWTP Effluent Evaluation* (Wallis Engineering, 2004). The evaluation determined that the facilities required for construction of reuse facilities are cost prohibitive and not feasible. Therefore, the City has not implemented this measure.

4.3.10 Goals

The WUE program goals reflect the drivers behind a utility's pursuit of water conservation. Conservation drivers can include meeting regulatory requirements, minimizing impacts on water resources, decreasing operating costs, deferring capital costs, and obtaining new supply. The conservation driver(s) applicable to any one utility depend on that utility's specific supply situation and cost structures. The City's WUE program is primarily driven by maximizing available supply.

The City Council reestablished its WUE goal during its June 11, 2018 meeting. Customers were notified of the open public meeting and provided an opportunity to comment on the WUE goals. The City has established a customer (demand-side) goal of eliminating private water mains directly contributing to unaccounted for water. The WUE goal was adopted with Resolution No. 1146, included in Appendix H. The existing distribution system leakage or water loss is provided in

Chapter 2, along with forecast demands accounting for estimated water savings from water use efficiency measures.

4.3.11 Source and Service Meters

All the City's existing water sources and services are metered.

4.3.12 Funding

The City's WUE program is funded by ratepayers. The budget for the WUE program is estimated at $5k per year which is imbedded in the overall operating budget. The City projects that the program will expend approximately the same budget in subsequent years on similar WUE related investments.

4.3.13 Program Evaluation and Estimated Savings

The City has not seen a measurable quantity of water savings from continued implementation of the WUE program measures in recent years. The City is not currently aware of leaks in any private mains contributing to unaccounted for loss. The City's 6-year average DSL is approximately six percent, which is well below the threshold of 10 percent requiring development of a water loss control action plan. The savings achieved by the program, and the corresponding progress toward reaching the City's goal, will be estimated by changes in ADD and peak season demand on an annual basis.

The WUE rule requires annual performance reporting to system customers and DOH. The City prepares an annual performance report as an opportunity to review the effectiveness of adopted WUE measures and determines if established goals require revision or if new goals and/or conservation measures need to be implemented. The City distributes the performance report to customers in conjunction with the annual Consumer Confidence Report on or before July 1st. In addition, the report is available on the City's website or at City Hall. The City's 2019 WUE performance report is included in Appendix H.

4.3.14 Program Evaluation and Effect on Demand

The City will continue to compare individual customer use over time and help predict the impact of its conservation and leak reduction efforts. The City's WUE measures are anticipated to reduce annual water demand by one percent for the planning period. The impact on future demand projections for 2019 through 2039 is shown in Table 2-12.

4.4 Source Analysis

The purpose of the source of supply analysis is to evaluate the water supply characteristics and consider potential impacts to the quantity or quality of the source. The current system is comprised entirely of groundwater sources of supply consisting of the multiple wells at the Upper

and Lower Wellfield. As shown in Chapter 3, the City has adequate water rights to meet demand projections through the 2039 planning horizon. A small source production deficiency is forecast near the end of the 2039, which is addressed with final development of Well 1R. The potential risks and limitations of the City's groundwater sources are discussed in Chapter 5.

4.4.1 Climate Change

Some water utilities and cities are attempting to account for the anticipated effects of long-term climate change in water system planning. While there is now widespread acceptance among scientists, the public, and water managers that climate change can affect water demand and supplies, there is still uncertainty about the magnitude and timing of change.

Given the variability in possible impacts of climate change, forecasting the effects on water demand remains challenging. This analysis generally assumes that the primary impacts on demand would occur during the irrigation season. Furthermore, it is currently anticipated that climate change effects will be gradual, allowing time for the City to adapt over periods of years and decades.

Based on the issues noted above, climate change was not explicitly accounted for in the demand forecast or supply analysis. Rather, the City's current focus on continuing to maintain low water loss and manage water supply is expected to allow the City to effectively address climate change issues within the current planning period. Water management options to respond to climate change will include continued improvements through the WUE program. The City will monitor demand and weather variables in coming years and will re-evaluate this approach as needed.

4.5 Summary

The City has recently reestablished its WUE program goals and measures, primarily aimed at maintaining low water loss and reducing consumption. The City will continue to implement the WUE measures identified in this chapter and evaluate the effectiveness of the measures as more data becomes available.

Overall the City has sufficient water rights and maintains wells with adequate capacity and will develop supplemental source production to meet the 20-year demand projections presented in Chapter 2. All water system customers and sources are metered and the estimated 3-year average DSL is below the 10 percent threshold mandated by WUE requirements.

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Section **5**

Chapter 5

Source Water Protection

5.1 Introduction

The City produces all drinking water from the shallow PAA via six groundwater wells in two separate wellfields constructed between 1931 and 2009. Wells 5, 6, 7, 11, and 12 are in the City's Lower Wellfield, while Well 1 is in the City's Upper Wellfield. Well 10 at the Upper Wellfield is currently on standby as an emergency supply source and there is no pump installed in the well. The purpose of this chapter is to summarize the City's current wellhead protection program.

This chapter also summarizes the City's groundwater supply source water quality and relevant regulatory issues. It includes an overview of the Safe Drinking Water Act (SDWA) regulations and subsequent amendments, and possible changes in the regulations that may impact the City.

5.2 Wellhead Protection Program

5.2.1 Groundwater Contamination Susceptibility and Vulnerability

The City's *Wellhead Protection Assessment Report* (*WPAR*) was prepared by Pacific Groundwater Group in March 2012. Included in this report is a susceptibility assessment that is required of public drinking water purveyors as the initial step in the wellhead protection area (WHPA) delineation process. The assessment includes information on well construction and production, aquifer characteristics, and potential contamination sources. The assessment provides a susceptibility rating (high, medium, low) to the groundwater sources with respect to ease of contamination from land surface activities, as well as a vulnerability rating (high, medium, low) with respect to potential contaminant releases at the land surface. This assessment and the ratings serve two purposes: 1) to determine eligibility of waiver of certain water quality monitoring requirements; and 2) to establish minimum requirements for delineation of WHPAs.

The report rated the PAA as highly susceptible and highly vulnerable to potential contamination. The high susceptibility rating is based on the aquifer composition (permeable sand, gravel, and cobbles) and lack of an extensive confining layer above the shallow water table. Vulnerability is also considered high because of known and potential contaminant sources identified within the wellfield capture zone. The report provides further description and assessment of the PAA features and composition and is included as Appendix I to this plan.

5.2.1.1 Delineation of Wellhead Capture Zones

The City's 2012 *WPAR* delineated the WHPAs for the Upper and Lower Wellfield groundwater sources. The capture zone for the City's wellfields was estimated using a steady state computer groundwater flow model developed by the United States Geologic Survey (USGS). The capture area for the Lower Wellfield extends generally west to east and occupies large portions of the lowland area between the Washougal and Columbia Rivers. Capture for the Upper Wellfield extends only a short distance to the north where it intercepts the Washougal River.

5.2.1.2 Time-of-Travel Zones

A Time-of-Travel (TOT) zone is the area upgradient of a pumping well that will supply groundwater to the well within a specified period of time. The location of the zone provides a basis for identifying areas to direct future monitoring and data collection. TOT zones were estimated for 6-month, 1-year, and 5-year groundwater travel times. Since all groundwater in the groundwater recharge area is younger than 10 years, the 10-year TOT zone was not delineated. These areas are in addition to the sanitary control areas that immediately surround a well. TOT is defined for both the Upper and Lower Wellfields.

The TOT zones for the two wellfields are depicted in Figure 4 of the *WPAR* in Appendix I. The zones shown in the figure represent the estimated area of groundwater contribution to each group of wells within the indicated time period. The boundaries shown also represent the WHPA for each group of wells.

5.2.2 Contaminant Inventory

The purpose of a contaminant inventory is to identify past, present, and proposed activities that may present a risk of future contamination of the City's drinking water supply. The quantification of that risk starts with an inventory of potential contaminant sources and is followed up by a ranking of the relative threat posed by each source. The ranking of risk is a function of the type, location, and volume of potentially hazardous material being handled or stored within (or adjacent to) the area identified as serving the City's drinking water supply. These potential contaminant sources are addressed as part of the wellhead management strategies that minimize the risk of source water contamination.

The contaminant inventory provided in the *WPAR* is a snapshot in time and does not represent a "final" inventory. Known and potential sources of contamination change over time. As a result, DOH requires contaminant inventories to be updated every two years. The inventory has been updated in conjunction with the October 2020 wellhead protection notification letter which is included in Appendix I.

5.2.2.1 Land Use within WHPAs

The most common land use within the City's wellhead protection capture zones is residential followed by commercial, parks/open space, and industrial. Commercial and industrial areas pose

the highest threat to groundwater source quality. The majority of commercial and industrial use is located along SR-14 and the railroad corridors in the City's Zone 1. The zoning categories were mapped beneath the wellfield TOT zones in Figure 5 of the *WPAR* in Appendix I.

5.2.2.2 Potential Contaminant Sources

Table 5 of the City's *WPAR* summarized the 19 confirmed and potential contaminant sites that fell within the City's wellhead protection capture zones, and the potential contaminant sources were shown in Figure 6 of the *WPAR*. The contaminant sources were categorized by types of activities or risks as Underground Storage Tanks (UST/LUST), Cleanup Site (State Cleanup or Voluntary), and Hazardous Material Generator or Handler. Figure 6 also depicts the locations of existing septic systems, which are additional potential sources of contaminants.

5.2.2.3 Notification and Contact to Agencies and Owners-Operators

Following DOH guidelines, all owners/operators of known or potential contaminant sources must be notified of their location within the wellhead protection boundaries. The entities with addresses identified in the City's *WPAR* were each sent notification letters. A copy of the October 2020 notification letter is included in Appendix I.

In addition, notification is extended to the various regulatory agencies regarding the finding of the contaminant inventory and their locations within the wellhead protection boundaries. Notified agencies include the Washington Department of Ecology along with City health and emergency agencies.

5.2.2.4 Internal Coordination/Oversight of Contaminant Sources

City staff coordinate with the Fire Chief to identify potential hazardous materials/contaminant sources in the City and respond to spills, with particular emphasis on sites in proximity to well head protection areas. This coordination and exchange of information is ongoing and typically initiated as a result of notification from the Development Services Department through the permitting process.

The well head protection zones are identified in the City's geographic information system (GIS) data. Whenever development is proposed near the City water system wells, Development Services check GIS to ensure well head protection zones are not impacted. As part of the permit application, the applicant must list types and quantity of materials stored on site. The backflow specialist also reviews this information to determine if backflow prevention is required at the property.

5.2.2.5 Supply Contingency Plan

Contingency planning for wellhead protection is characterized as an assessment of the "preparedness" of the utility to provide water in the event that a source is lost (temporarily or for the longer term) by a contamination event.

As discussed in Chapter 3, the City's groundwater supply capacity is sufficient to supply the entire system demand through the planning period with the future completion of the proposed Well 1R. However, the risk of losing multiple wells from a single contamination release arise from the fact that most of the City's wells are clustered in close proximity to each other and may be susceptible to the same contamination event. Loss of the Lower or Upper Wellfield (considered to be a worst-case scenario) could be handled more effectively if the City possessed a larger spatial distribution of well sources. Development of future wells separated from the Lower and Upper Wellfields could provide this redundancy.

5.3 Continuity of Operations Plan

The City's Emergency Response Plan (ERP) describes appropriate response and protocol for many emergency situations including detection of contamination near the wellfields. The ERP evaluates current procedures and includes contingencies that describe actions that should be taken in case of temporary or permanent loss of water sources. It presents appropriate spill and incident response measures and identifies individuals who are responsible for decision-making during emergency situations. The plan describes the roles of parties, such as police, Fire Department, City officials, and environmental regulators, who may make up an emergency response team. A copy of the ERP is included in Appendix J.

5.4 Water Quality Review and Regulatory Compliance

By state law (WAC 246-290), the City is required to maintain an ongoing water quality testing and monitoring program. This program is administered by the DOH and is comprised of monitoring the water supply for specified chemical and physical contaminants. The DOH requires that the source water supply be monitored for primary and secondary contaminants. Primary drinking water standards establish absolute concentration limits called Maximum Contaminant Levels (MCL) and Maximum Contaminant Level Goal (MCLG). MCLs are enforceable standards, while MCLGs are non-enforceable public health goals.

5.4.1 Regulations

Since being introduced in 1974, the SDWA has been amended twice, once in 1986 and then again in 1996. The intent of these amendments is to strengthen the 1974 SDWA, primarily in setting regulations to ensure that public water supplies are safe. The Environmental Protection Agency (EPA) was mandated by Congress to establish rules and regulations relating to the SDWA and subsequent Amendments.

Several rules and regulations have been updated by the EPA for the purpose of implementing the SDWA and its amendments. Those that apply to the City's water system are in Table 5-1.

Table 5-1 | Drinking Water Rules

Regulation	Type	Rule
National Primary Drinking Water Regulations (NPDWR)	Chemical Contaminants	Arsenic Chemical Contaminant Lead and Copper Radionuclides
	Microbial Contaminants	Groundwater Disinfectant and Disinfection Byproducts Total Coliform & Revised Total Coliform
	Right-to-Know	Consumer Confidence Report Public Notification
National Secondary Drinking Water Regulations (NSDWR)	Aesthetic	Aluminum, Chloride, Color, Copper, Foaming Agents, Iron, Manganese, pH[1], Sulfate, Threshold Odor Number, Total Dissolved Solids, Zinc
	Cosmetic	Fluoride, Silver
	Technical	Aluminum, Chloride, Copper, Corrosivity, Iron, Manganese, pH, Total Dissolved, Solids, Zinc
Contaminant Candidate List	N/A	N/A

Note:
1. pH = Potential Hydrogen

5.4.1.2 Chemical Contaminant Rules

Chemical contaminants have been regulated in phases, which are referred to as the Chemical Contaminant Rules. The chemicals regulated fall in three categories: Inorganic Contaminants (IOCs), Synthetic Organic Contaminants (SOCs) and Volatile Organic Contaminants (VOCs). The Contaminant Rules regulate over 65 chemicals and establish recommended MCLGs and enforceable MCLs for each contaminant. The number of samples and monitoring frequency is based on numerous factors and can be reduced for some contaminants based on historic sampling levels. The Standardized Monitoring Framework (SMF) is used to standardize, simplify, and consolidate drinking water monitoring requirements across the contaminant groups. The monitoring framework is divided into 9-year compliance cycles which are further divided into three 3-year compliance periods.

5.4.1.2.1 Impact of the Chemical Contaminant Rules on the City

The City is in compliance with all Chemical Contaminant Rules, with a 9-year waiver through 2028 for IOC testing and a 6-year waiver through 2025 for VOC testing. The asbestos testing requirement is also once every nine years. The City is required to collect annual samples from each active groundwater source for nitrate analysis and have not had detected levels.

5.4.1.3 Radionuclide Rule

The Radionuclides Rule (RR) sets MCLGs at zero for all radionuclides, with MCL limits established for combined radium-226 and radium-228, gross alpha particle radioactivity, beta photon emitter radioactivity, and uranium. The current MCL standards are combined radium of 5.0 picocurie per liter (pCi/L), gross alpha of 15.0 pCi/L (not including radon and uranium) and uranium of 30.0 microgram per liter (µg/L). The MCL of beta photon emitters is 4 millirems (a traditional unit of radiation dose equivalent) per year.

5.4.1.3.1 Impact of the Radionuclide Rule on the City

The City is in compliance with the provisions set forth in the RR and is on a standard testing schedule every 6 years.

5.4.1.4 Arsenic Rule

The Arsenic Rule MCL is 0.01 milligrams per liter (mg/L). The MCLG for arsenic is zero. If any arsenic concentration exceeds ½ the MCL (0.005 mg/L) it must be reported in the annual Consumer Confidence Report (CCR). The rule applies to all community and non-transient, non-community water systems. All water systems that exceed the MCL of 10 parts per billion are required to come into compliance within 5 years after publication of the final rule.

5.4.1.4.1 Impact of Arsenic Rule on the City

The City is currently in compliance with all provisions set forth in the Arsenic Rule and has a waiver for the Complete Inorganic testing, including arsenic, so collects one sample every 9 years.

5.4.1.5 Source Water Protection

The SDWA (Section 1428) established a Wellhead Protection Program (WHPP) to protect groundwater that contributes to public water systems. Likewise, the Surface Water Treatment Rule established source protection requirements for unfiltered surface waters that contribute to public water systems. The DOH has expanded those Federal source protection regulations to include all Group A community and non-community water systems, including groundwater, groundwater under the influence of surface water, and filtered and non-filtered surface water sources. Accordingly, DOH has developed regulations that require all Group A water systems that maintain and operate their own sources to implement a WHPP (WAC 246-290-135(3).

Source water protection programs are planning tools to be used by water utilities to identify potential sources of water contamination, and to protect existing and future drinking water supplies. The objective is to minimize risk of accidental releases of contaminants in areas contributing water to the public water supply system. The three basic elements of a source water protection plan are:

- Definition of the WHPA that directly contributes to a water supply.

- Inventory of land uses and identification of potential sources of contamination within the WHPA.

- Management strategies including emergency spill response and contingency plans to minimize or eliminate the possibility of potential contamination of the water supply.

5.4.1.5.1 Source Water Protection Status

The City's *WPAR* is discussed earlier in this chapter. The potential contaminants list has been updated as part of this plan, and new notification letters have been distributed.

5.4.1.6 Revised Total Coliform Rule

The Revised Total Coliform Rule (RTCR) was published in 2013 with minor corrections in 2014 and is a revision to the Total Coliform Rule (TCR). The TCR establishes a zero MCL for total coliform (TC), which can be an indicator of disease-causing pathogens. The RTCR establishes testing procedures should a sampling location test positive for TC, including requiring that E. coli testing be done for any positive TC sample.

The required number of samples taken each month depends on the population served by the water system. The City must currently collect at least 20 samples each month. Within the 20-year horizon the population is not projected to exceed the threshold in this category.

A water system may choose to collect fewer than the required samples; however, different criteria would then apply in the event of a positive test for TC. For systems that collect fewer than 40 samples per month, no more than one sample may be TC positive. If two samples test as TC positive, then a set of samples must be collected and tested for fecal coliforms or E. coli.

5.4.1.6.1 Impact of RTCR on the City

The City is currently in compliance with all provisions set forth in the RTCR. The City currently collects 20 monthly samples for total coliform analysis from multiple sites in the distribution system. The most recent positive sample was in June 2012. The Coliform Monitoring Plan is included in Appendix K.

5.4.1.7 Lead and Copper Rule

The Lead and Copper Rule (LCR) establishes action levels (AL) of 0.015 mg/L for lead and 1.3 mg/L for copper based on the 90th percentile of samples. An AL exceedance is not a violation but can trigger other requirements including additional service and source monitoring, corrosion control treatment, public education, or lead service line replacement. The major difference between this regulation and most others is that the water is to be monitored at the customer's tap instead of the source discharge point. Lead and copper must be monitored at the customer's tap every 6 months at the highest risk locations. Systems can qualify for reduced monitoring if samples are

below the AL for multiple consecutive years. The City system is on reduced monitoring of every three years.

If the ALs are exceeded for either lead or copper, the water system must collect source water samples and submit all data to the state with a treatment recommendation to reduce concentrations below the AL. In addition, the water system must also provide a public education program to its customers within 60 days of the AL exceedance. The public education program must be continued as long as the water system exceeds the lead ALs.

All water systems that exceed the lead or copper ALs are also required to conduct a corrosion control study. Corrosion control studies must compare the effectiveness of pH and alkalinity adjustment, calcium adjustment, and addition of a phosphate or silica-based corrosion inhibitor. Large and medium systems are also required to monitor many other water quality parameters at the entry point to the distribution system and customer taps.

5.4.1.7.1 Impact of LCR on the City

The City water system is in full compliance with the provisions set forth in the LCR. The City currently must test 30 samples every 3 years. The City must send the LCR results to the customers sampled within 30 days of receiving the results and make DOH aware of the customer notification within 90 days of submitting the results to customers.

5.4.1.8 Disinfectants and Disinfection Byproducts Rule

The Stage 1 Disinfectants/Disinfection Byproducts Rule (DBPR) applies to all water systems that treat with a chemical disinfectant, such as chlorine, for either primary or residual treatment. The rule establishes MCLGs and MCLs for total trihalomethanes (TTHMS), haloacetic acids, chlorite, and bromate. It also establishes maximum residual disinfectant level goals (MRDLGs) and maximum residual disinfectant levels (MRDLs) for three chemical disinfectants: chlorine, chloramines, and chlorine dioxide. The Stage 1 DBPR also attempts to reduce general Disinfection Byproducts (DBP) formation by requiring specific levels of total organic carbon (TOC) removal by enhanced coagulation.

The Stage 2 DBPR builds on the Stage 1 DBPR by requiring different monitoring and reducing some MCLs for DBP. The Stage 2 DBPR requires the use of locational running annual averages (LRAA) to determine compliance with the MCLs for TTHMs and Five Haloacetic Acids (HAA5). This differs from the running annual average approach outlined in Stage 1 DBPR, where compliance was determined by calculating the running annual average of samples from all monitoring locations across the system. Stage 2 monitoring is intended to identify and add testing locations that are more likely to exhibit higher DBPs than a random system sampling. The MCLs for the DBPR are shown in Table 5-2.

Table 5-2 | Disinfectants and Disinfection Byproduct Rule Limits

Contaminant	MCL (mg/L)
TTHM	0.080 LRAA
Chloroform	0.07
Bromodichloromethane	0
Dibromochloromethane	0.06
Bromoform	0
HAA5	0.060 LRAA
Monochloroacetic acid	0.07
Dichloroacetic acid	0
Trichloroacetic acid	0.02
Bromoacetic acid	-
Dibromoacetic acid	-
Bromate	0.010
Chlorite	1.0
Chlorine/Chloramines	4.0

Note:
1. All systems must monitor during month of highest DBP concentrations.
2. Systems on quarterly monitoring must take dual sample sets every 90 days at each monitoring location.

5.4.1.8.1 Impact of the Disinfectant/ Disinfection Byproduct Rule on the City

The City is in compliance with all DBPRs and currently collects two samples every year.

5.4.1.9 Groundwater Rule

The final Groundwater Rule was published in November 2006. The Groundwater Rule seeks to reduce the risk of illness caused by microbial contamination and includes treatment technique requirements, compliance monitoring and source water monitoring. Treatment technique requirements include providing treatment that reliably achieves 4-log treatment of viruses and correcting all significant deficiencies. Compliance monitoring is composed of testing for minimum disinfectant residual concentrations. Source water monitoring adds fecal indicator bacterial testing of the water source, as well as regulatory steps, should a source water test return positive.

5.4.1.9.1 Impact of the Groundwater Rule on the City

The City currently uses chlorine disinfection at all of its groundwater supply locations. The City's distribution system chlorine residuals are monitored at 10 different sites and values typically range between 0.4 and 0.8 mg/L.

5.4.1.10 Consumer Confidence Report Rule

The CCR Rule requires systems to prepare and distribute an annual water quality report summarizing information about source water, detected contaminants, compliance, and

educational information. The CCR must be provided to DOH and delivered to customers by July 1 annually.

5.4.1.10.1 Impact of the CCR Rule on the City

The City is in compliance with Consumer Confidence Reporting and makes current and past copies of the CCR available on their website. A copy of the 2019 CCR is included in **Appendix H**.

5.4.1.11 Public Notification Rule

The Public Notification Rule requires systems to inform customers of any violation of National Primary Drinking Water Regulations or any situation posing a risk to public health. Ten required elements must be present in each public notice. There are three tiers of violations and required response times for each, with the most severe, Tier 1, violation requiring notice within 24 hours.

5.4.1.11.1 Impact of the Public Notification Rule on the City

The City has a procedure in place for notifying the public in accordance with the Public Notification Rule if required.

5.4.1.12 National Secondary Drinking Water Regulations

The National Secondary Drinking Water Regulations set non-mandatory water quality standards for 15 contaminants. These are not enforceable but recommended secondary maximum contaminant levels (SMCLs). They establish guidelines for managing aesthetic concerns such as taste, color, and odor that are not considered a risk to human health at the SMCL. Although SMCLs are not enforced, public notice is required if the fluoride SMCL is exceeded. A list of SMCLs is summarized in **Table 5-3**.

Table 5-3 | Secondary Drinking Water Standards

Contaminant	SMCL
Aluminum	0.05 - 2.0 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 TON (threshold odor number)
pH	6.5 - 8.5
Silver	0.1 mg/L
Sulfate	250 mg/L

Contaminant	SMCL
Total Dissolved Solids	500 mg/L
Zinc	5 mg/L

5.4.1.12.1 Impact of the Secondary Drinking Water Standards on the City

The City meets all Secondary Drinking Water Standards.

5.4.1.13 Contaminant Candidate List & Unregulated Contaminant Monitoring Rule

The 1996 amendment to the SDWA requires the EPA to list unregulated contaminants that are known or anticipated to occur in public water systems. Every five years, the EPA must publish this list of contaminants called the Contaminant Candidate List (CCL). The EPA uses the CCL to identify priority contaminants for decision making and information collection. After publishing, the EPA must also review at least five contaminants from the list and determine if they will be regulated in a separate process called Regulatory Determinations.

The EPA also has public water systems monitor for some unregulated contaminants to provide a basis for future regulatory actions.

5.4.1.13.1 Impact of the CCLs and UCMR on the City

The CCLs have no direct impact on the City since the lists by themselves do not impose any requirements on public water systems. However, the EPA may promulgate future regulations based on the listed contaminants. If this occurs, the City would need to follow specific requirements that are contained in the regulations.

As a Class A water system, the City complies with sampling and testing requirements of Unregulated Contaminant Monitoring Rule (UCMR). The fourth round of UCMR testing began in 2019.

5.5 Summary

The City maintains two separate groundwater wellfields (Upper and Lower) that draw water from the PAA. The City's 2012 *WPAR* delineates the capture zones for the wellfields and identifies potential contaminant sources located within the zones. A map of the wellfield capture zones and a list of potential contaminant sources has been updated and included in Appendix I along with a copy of the notification letters that were distributed to the owners and operators of the potential contaminant sources. The City maintains its ERP to address potential threats or interruptions to service including potential water shortages or hazardous waste spills.

By State law (WAC 246-290), the City is required to maintain an ongoing water quality testing and monitoring program. This program is administered by the DOH and is comprised of monitoring the water supply for specified chemical and physical contaminants. The DOH requires that the source

water supply be monitored for the primary and secondary contaminants. Primary contaminant levels are not to be exceeded for health reasons, while secondary contaminants should not be exceeded for aesthetic reasons. The City is required to monitor IOCs, VOCs, and radiological constituents. Distribution system water quality testing requirements include monitoring of many types of components including bacteriological, inorganic chemical, physical, DBPs and disinfection residual, radionuclides, organic chemicals and any other chemicals for which the state board of health determines MCLs.

Bacteriological samples are collected by City personnel monthly. Currently, a minimum of 20 bacteriological samples are taken each month. Monitoring of inorganic compounds is done every nine years, while monitoring of organic compounds is done every six years. Lead and copper monitoring is performed every three years at the customer tap based on a select sample group within the distribution system. DBP monitoring is performed every year. The City water system is of high quality and complies with all water quality regulations.

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Section 6

Chapter 6

Operations and Maintenance

6.1 Introduction

This chapter discusses the City's existing operations and maintenance (O&M) program including water system management and personnel, routine operation procedures, preventative maintenance, safety procedures, and customer complaint response procedures. Also included are descriptions of the City's organizational structure and the following.

- Water Quality Monitoring
- Vulnerability Assessment
- Emergency Response Plan
- Cross-Connection Control Program

6.2 Management and Personnel

The following section describes the various offices and positions integral to the operation of the water system. The water system operation is overseen by the Public Works Director who assigns day-to-day operations to the Water Superintendent. The Water Superintendent assigns daily tasks to the water personnel and ensures regular inspection, operations, repair, and maintenance of the water system facilities. The water system management and personnel are presented in Table 6-1.

Table 6-1 | Water System Personnel and Certification Status

Name	Position Title	Certifications[1,2,3]	Certification Number	Certification Expiration Date
Trevor Evers	Public Works Director	WDM4, WTPOIT, CCS	#8232	Annually 12/31
Ryan Baker	Water Superintendent	WDM3, CCS	#12855	Annually 12/31
Vaughn Barber	Water System Lead	WDM4, WTPOIT, CCS	#11258	Annually 12/31
Travis Davis	Water System Lead	WDM4, WTPOIT, CCS	#11699	Annually 12/31
Nathan Payne	Water System Staff	WDM1	#12896	Annually 12/31
Adam Connolly	Water System Staff	WDM2	#12484	Annually 12/31
Chris Delaney	Water System Staff	WDM2	#12485	Annually 12/31
Chris Strong	Water System Staff	WDM1	#12904	Annually 12/31
Scott Randall	Water System Staff	WDM2	#10172	Annually 12/31
Grant Lewis	Water System Staff	WDM3	#12146	Annually 12/31

Notes:
1. WDM = Water Distribution Manager
2. WTPOIT = Water Treatment Plant Operator In-Training
3. CCS = Cross-Connection Control Specialist

6.2.1 Position Responsibilities and Certification

The water system superintendent, lead, and staff share the responsibilities of an operator in "responsible charge" of a public water system as defined by the DOH. The DOH requires that public water system operators be certified to a level determined by the water system classification. The City has a Group 3 classification requiring a WDM3 certification for operators in responsible charge of the system in accordance with Table 4 of WAC 246-292-050. The City provides its water system staff with opportunities for continuing education to maintain current operator certifications. Water system operators are currently in compliance with DOH certification requirements and training is on-going to prepare additional public works staff for certification. Specific duties of each water system operator which require certification are listed below.

Water System Superintendent

- Plan, assign, distribute, and direct work of water division operators and personnel.
- Recruit, select, train, and develop water system staff and operators.
- Provide oversight and guidance for water system O&M programs.
- Ensure compliance with water system reporting and other regulatory requirements.
- Requisition materials, supplies, and equipment necessary for water system function.
- Inspect water system work to ensure compliance with standards; recognize and correct conditions that are in violation of safety or health standards.
- Manage and maintain water system budget, make budgetary recommendations to management.
- Confer with Assistant Public Works Director and Public Works Director to determine improvement project priorities; implement improvements.
- Communicate with department personnel and the public to resolve complaints, concerns, or questions related to water system work or activities.

Water System Lead

- Assign daily tasks to water division personnel.
- Ensure regular inspection of water quality monitoring stations, well houses, and reservoirs.
- Ensure compliance with state and federal water quality regulations.
- Oversee maintenance and repair of water and telemetry systems.

- Oversee repair and replacement of waterlines.
- Coordinate annual preventative maintenance programs.
- Maintain records of water system maintenance.
- Perform operational duties for the water system, including starting and stopping pumps and installing piping.
- Manage the water system through telemetry system monitoring.
- Administer the Cross Connection Control Program.

Water System Staff

- Tap and install new water services.
- Test water system pH and chlorine residual regularly.
- Troubleshoot problems in the water system.
- Prepare samples for water quality testing.
- Manage database for parts inventory, well flow and booster pump data, chlorine residual, and water quality testing results.
- Inspect water tank levels, chlorine tanks, and well heads. Inspect pumps to ensure proper operation.
- Answer emergency and after hours calls for field service.

6.3 Routine Operating Procedures and Preventative Maintenance

The following section describes the City's routine O&M procedures for the major water system facilities and associated components. Certified water operators are responsible for performing all operating procedures in accordance with the Public Works Safety Manual maintained by the City. Material Safety Data Sheets are managed through MSDSonline.

6.3.1 Water Supply

The City's water supply wells are located within two wellfields, Upper and Lower. The Upper Wellfield has only one active well, Well 1, and the remaining five wells are located in the Lower Wellfield. All raw water pumped from the wellfields is treated by sodium hypochlorite for disinfection and liquid sodium hydroxide for pH adjustment. The treated water is then delivered directly to the distribution system and finished water storage reservoirs in the lower pressure zones or via BPSs for the reservoirs that are constructed at higher elevations. All well houses are

inspected every two days and routine operating data collected via SCADA includes wells in operation, hours of operation, water production rate, and total volume. All operating records are reviewed daily.

6.3.2 Chlorination System and pH Adjustment

Well 1 at the Upper Wellfield currently uses a sodium hypochlorite injection system for disinfection. The Lower Wellfield has a common sodium hypochlorite chemical storage and metering pump building that serves Wells 5, 6, 7, 11, and 12 via two injection vaults. The chlorination systems are inspected daily to verify operation and to record chlorine residuals. Chlorine residuals are monitored at 10 different sites located in representative locations throughout the distribution system.

The City adjusts the pH of the groundwater supply wells to minimize the potential for lead and copper corrosion to the distribution system. The pH adjustment is achieved through the addition of liquid sodium hydroxide using pumps housed in a chemical feed and storage building at the Lower Wellfield and chemical storage and feed equipment housed in a separate room for Well 1 at the Upper Wellfield.

6.3.3 Finished Water Storage Reservoirs

The City operates and maintains seven finished water reservoirs. Reservoirs 1A and 1B are served directly from the wells whereas Reservoirs 2A, 2B, 3, 4A, and 4B are served via BPSs due to their high elevation relative to the wellfields. Water storage reservoirs are inspected every five years for the presence of sediment and other foreign materials and to assess the condition of interior and exterior coating and lining systems. When appropriate, reservoirs will be taken out of service for cleaning.

6.3.4 Booster Pump Stations

The City operates three BPSs serving customers in the upper pressure zones as summarized in Chapter 1. Water operations staff make two to three regular inspection visits to the BPSs each week. Pumps and motors are serviced on a regular basis per manufacturer recommendations.

6.3.5 Pressure Reducing Valves

There are 17 PRVs in the City's distribution system, two of which provide an emergency intertie to the City of Camas and are normally closed. The City performs biannual maintenance on the PRV stations.

6.3.6 Source and Service Meters

To maintain operation and ensure accurate flow measurement, the City's source meters are regularly serviced in accordance with the manufacturer's recommendations. The City also inspects

all service meters on an annual basis. The water meters are read bi-monthly by the City, with approximately half the system read each month. The City has replaced over 90 percent of all service meters with touch pad technology as part of an on-going meter replacement and upgrade project. During meter reading, the condition of the meter, meter box, and service line are observed. Items in need of replacement or repair are noted and attended to when convenient and appropriate. Large service meters are tested every year to ensure accurate operation.

6.3.7 Fire Hydrants

The Washougal Fire Department is responsible for inspecting all fire hydrants and performing flow tests. Approximately one-fifth of the existing fire hydrants are inspected annually in accordance with the National Fire Protection Association guidelines.

6.3.8 Equipment, Supplies, and Chemicals

Service representatives and suppliers for equipment and chemicals needed to operate the water system are listed in Table 6-2. The City also maintains an inventory of spare parts commonly required for routine maintenance of the system.

Table 6-2 | Chemical and Equipment Suppliers

Description	Supplier Name	Contact Number
Water System Equipment and Supplies		
Pressure Reducing Valves/Vaults (Cla-Val)	GC Systems, Inc.	(800)525-9425
Pump Maintenance and Repair (Wells and Boosters)	Mather Pump Service	(360)256-1310
Compliance Sampling	BSK Associates	(360)750-0055
Electrician (Jeff Downer)	Prestige Electric	(360)210-4269
Radio Services (Telemetry)	Quality Mobile Comms	(800)808-9839
Repair Parts, Piping and Inventoried Parts	HD Fowler Company	(503)656-3900
Metering Pumps (Grundfos Metering Pumps)	PumpTech, Inc.	(503)659-6230
System Integrator	Jacobs	(503)224-6040
Chlorine Application, Metering, and Monitoring	Engineered Control Prod.	(503)656-4880
Repair Parts, Piping, Meters, and Inventoried Parts	General Pacific Co.	(503)907-2900
Chlorine Application, Metering & Monitoring	HD Supply Waterworks	(360)256-6151
Water System Chemicals		
Sodium Hydroxide and Sodium Hypochlorite	Northstar Chemical	(503)625-3770

6.3.9 Landscape Maintenance

The City's operations staff performs landscape maintenance at the water facilities, as needed, to ensure safe and reliable access to each site.

6.3.10 Recordkeeping

The City currently maintains water system operating records indefinitely. Records include, but are not limited to, the following.

- Water quality analyses
- Records of action taken to correct MCL violations
- Sanitary survey data
- Records regarding a variance or exemption
- Records concerning public notification
- Treatment operating records
- Water consumption and production records
- Backflow incidents
- Cross-connection control activities

6.3.11 Customer Complaints

Water system customer complaints may be filed through the Citizen Referral form process at Washougal City Hall. Complaints regarding the water system are forwarded to water department staff members who then initiate a work order to investigate and address the customer concern. The City also accepts citizen comments and complaints through their website.

6.3.12 Operations and Maintenance Improvement Projects

The City identifies improvement projects as part of routine maintenance and system upkeep that includes tank maintenance, well upgrades, PRV replacement, and electrical and building upgrades. Current O&M priorities include upgrades to the Lower Wellfield SCADA system and AMR meter improvements. These projects are budgeted for under annual O&M.

6.4 Water Quality Monitoring Program

6.4.1 Sampling/Testing/Reporting Procedures

The City of Washougal obtains all its drinking water from groundwater sources. All sources are disinfected with chlorine and pH adjusted for corrosion control with sodium hydroxide. Water quality is monitored in accordance with WAC 246-290-300 for the following potential contaminants.

- Total Coliform (bacteriological)
- Chlorine Residual (residual disinfection)
- DBPs
- Organic Chemicals
    - SOCs
    - VOCs

- IOCs
    - Asbestos
    - Nitrate-N
- Lead and Copper

The City maintains 25 water quality sampling stations and an additional thirty seven lead and copper sample sites throughout the distribution system. All water quality sampling is performed by water system operators with delivery to a certified testing laboratory. If test results indicate a violation of treatment, monitoring, or MCL requirements, the lab results are immediately verified. If the results are confirmed, they are either sent directly to the DOH or reported by the City within 48 hours. The City's Water Quality Monitoring Schedule (WQMS) lists sampling requirements and is included in Appendix L. Operators complete monthly reports and submit them to the DOH.

6.4.2 Coliform Monitoring Plan

Currently, 20 routine bacteriological samples are taken each month by water system staff located at sites representative of the entire distribution system and in compliance with WAC 246-290-300. Ten samples are taken in the first half of the month and the remaining are taken at the end of the month. Two repeat sampling sites have been selected in close proximity to each routine sampling site. The City collects water samples at sites identified in the plan and sends them to a certified laboratory for analysis. Copies of the results are sent to the City and DOH. A copy of the City's coliform monitoring plan is included in Appendix K.

6.4.3 Residual Disinfection

In order to comply with Washington's drinking water disinfection standards, The City is required to maintain a trace amount of chlorine throughout the distribution system with a minimum residual of 0.2 mg/L at locations that are representative of the overall system. The City continuously monitors residuals at the various groundwater facilities. Chlorine residuals and pH are also measured via ten weekly samples from designated sample sites. Chlorine residuals typically range from 0.4 to 0.8 mg/L.

6.4.4 Disinfection Byproducts

The City samples two sites every year for DBPs in accordance with their WQMS. The EPA Stage 1 DBPR requires that the City measure TTHM and HAA5 once each August, the warmest month, at locations representing the longest residence time for disinfected water within the distribution system. Stage 2 rules require measurement of TTHM and HAA5 at additional monitoring sites within the distribution system: one monitoring site near the disinfection site, one at a location with average residence time, and four locations with the longest residence times in the distribution system. The number of monitoring sites required is determined based on the size of the system and the number of customers served. Measurements are taken quarterly in February, May, August, and November.

6.4.5 Asbestos

The City has a nine-year waiver granted to the City by the DOH and in accordance with WAC 246-290-200 through December 2028 that omits their requirement for the testing of asbestos.

6.4.6 Organic Chemicals

Both VOCs and SOCs are monitored according to EPA regulations. The City has a six-year waiver granted to the City by the DOH and in accordance with WAC 246-290-200 through December 2028 that omits their requirement for the testing of VOCs. Likewise, the City has a nine-year and a three-year waiver both through December 2022 for the sampling of herbicides and pesticides, respectively.

6.4.7 Inorganic Chemicals

The City tests each well for IOCs every nine years per a waiver granted to the City by the DOH and in accordance with WAC 246-290-200.

6.4.8 Lead and Copper Plan

The City's groundwater supply wells have a pH in the corrosive range. The City began treating the groundwater system in 2000 with sodium hydroxide to limit lead and copper leaching. The treatment has raised the water supply pH and reduced the concentration of copper. The City currently must test 30 samples at the customers tap every three years, most recently in June 2017. Customers will receive a letter notifying them of the lead and copper sample results and the contaminant level goal. The notification letter will also include an explanation of the health effects of lead and the steps they can take to reduce exposure to lead in drinking water. The City submits a Lead and Copper Consumer Notification Form to DOH.

6.4.9 Violation Procedures – Public Notification

The City follows the reporting and public notification procedures that are required by the DOH and identified in WAC 246-290-330. Significant aspects that are required to be reported include:

- A primary MCL violation under WAC 246-290-310
- Failure to comply with a:
    - Prescribed treatment technique
    - Monitoring requirement under WAC 246-290-300
    - Testing procedure
- Operating under a variance or exemption
- Failure to meet a variance or exemption schedule

When violations occur or MCLs have been exceeded, the DOH shall be notified. Depending on the nature of the MCL violation, notification procedures include publication of a notice in the local newspaper, posting in public places and/or direct customer contact by phone or mail. The notice shall contain all material facts regarding a violation, disclose the nature of the problem, the results of any additional sampling, mitigating or corrective measures the City is taking, and a balanced explanation of the seriousness to the public health.

6.5 Vulnerability Assessment

The vulnerability assessment was completed and submitted in June 2004 under Federal mandate. It is not available for public review to protect the City's water system security.

The City is planning to complete the Risk and Resilience Assessment and ERP update in 2021 as required under the America's Water Infrastructure Act (AWIA). This will involve reevaluating potential threats against the water system assets to determine baseline risk for each and potential countermeasure that can be incorporated at each asset to help mitigate the risk.

6.6 Emergency Response Plan

The City public works department has prepared an ERP in coordination with other service providers. This plan includes chain-of-command and responsibilities for water department staff, response actions for specific types of emergencies, public notification, and communication with other agencies including Washougal Fire and Rescue for large disaster response. The City's ERP is included as Appendix J.

6.6.1 Emergency Contacts

The critical elements in emergency response are strong communication, a good understanding of the principals and practices involved with the water system and an understanding of the workings and capabilities of the various systems and facilities that comprise the City's water utility. In any emergency response, the first considerations are public safety and public health.

All water system operators are equipped with cell phones and the City designates one operator to be on-call at all times, should an emergency arise. The term "emergency" is defined as customers being out of water service or any situation presenting clear danger to life and/or property. For less severe emergencies, the water system operators will identify and correct problems within the water system. A majority of the emergencies are the result of water main breaks which can be isolated and service restored to the customer.

In any emergency response, the first considerations are public safety and public health. The following emergency contact numbers are included for reference.

- Office of Drinking Water 24-hour Hotline: (877) 481-1901
- Office of Drinking Water Southwest Regional Office: (360) 236-3030

City of Washougal Operations:

- Water Emergency Hotline: (360)735-9509

The City contracts with Sonitrol Security to manage after-hours emergency calls from the public and the SCADA system. Sonitrol will contact on-call personnel as needed. The Water System Manager, Supervisor, Distribution Lead, and operators have the authority to make emergency decisions relating to system operation and rental of emergency equipment, supplies, and services. City operations staff will immediately notify the DOH by phone when an emergency arises which causes or threatens to cause a water service outage lasting more than 24 hours or impacts water quality such that public health might be threatened.

6.7 Cross-Connection Control Program

Cross-connection control is addressed in Ordinance 13.40 of the Washougal Municipal Code. The purpose of the cross-connection control and backflow prevention program is to protect the health of water consumers and the potability of the public water system. Appendix N includes the City's Cross-Connection Control Program and 2019 Annual Summary Report.

The City has developed a program that conforms to WAC 246-290-490 and includes all required elements. The plan is implemented and managed by Travis Davis, a state certified cross-connection control specialist (CCS). The City's cross-connection control program ensures that all backflow prevention assemblies in the City are inspected and tested on an annual basis.

6.8 Summary

The City has procedures and policies in place to operate and maintain its water system. It has an organizational structure that ensures each component of the system is managed and overseen by those with the appropriate certification. Routine operation tasks include daily rounds to visually check system facilities, monitoring flow and reservoir level recordings, and responding to customer inquiries and complaints. Preventive maintenance consists of regularly servicing pumps and motors, cleaning and painting reservoirs, and flushing dead-end pipelines. It is recommended that the City develops a formal valve exercising program to ensure proper operation. The City has projects identified to maintain the system and address areas requiring improvements as identified through system operations.

The City has water quality monitoring procedures in place to monitor and check water quality parameters such as coliform, lead and copper, and DBPs. It maintains a Cross-Connection Control Program through municipal code and reports on its status annually. There are emergency management and vulnerability assessments in place to address circumstances that could require increased levels of management under emergency conditions.

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Section **7**

Chapter 7

Design and Construction Standards

7.1 Introduction

This chapter discusses current City design and construction standards and the City's policies and procedure for reviewing and approving projects.

7.2 Design and Construction Standards

Material and construction requirements for changes and additions to the distribution system are in accordance with the current edition of the Washington State Department of Transportation's (WSDOT's) *Standard Specifications for Road, Bridge, and Municipal Construction*. These specifications are supplemented with the most current City Engineering Standards for Public Works Construction and the Washougal Municipal Code. The City's current Engineering Standards General Design Requirements and Water Specifications and Details are included as Appendix F.

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Section 8

Chapter 8

Capital Improvement Program

8.1 Introduction

This chapter presents the water system Capital Improvement Program (CIP) for the City's service area to address existing and projected deficiencies, as well as future expansion within the WSA. It includes projects recommended for the 10 and 20-year planning horizons.

8.2 Cost Estimates

All project descriptions and estimates represent AACE International Class 5, planning-level accuracy and opinions of cost (+50 percent to -30 percent). Total project costs will depend on actual labor and material costs, site conditions, competitive market conditions, regulatory requirements, project schedule, and other factors. During the preliminary design phase final sizing, location, and project components should be verified and the cost estimate refined. Project feasibility and any associated risks should be carefully reviewed prior to making specific financial decisions or establishing yearly project budgets to help ensure adequate project funding.

Unit costs for pipe projects were developed in 2020 dollars based on 2020 RS Means Heavy Construction Cost Data, material quotes, and City design standards. The pipe project costs presented include estimated construction charges, and allow for contingency, permitting, engineering, and administrative fees. Costs do not include any land or right-of-way acquisition unless specifically noted, and do not include any ongoing maintenance or operation expenses. Construction costs are based on the preliminary concepts and layouts of the water system components developed during the system analysis. The detailed cost methodology for pipe projects is presented in Appendix M.

Cost estimates for non-pipe projects were developed from either the water system CIP update completed in 2018 and inflated based on local Engineering News-Record (ENR) construction cost indices or previous project estimates provided by the City. Cost estimates for projects which have advanced through preliminary design include the Zone 6 improvements and Well 1R, based on project specific engineers estimates inflated to 2020 dollars based on ENR construction cost indices. The basis of the cost estimate for the Zone 6 improvements is the April 2015 *Reservoir #6 & Booster Pump Stations Preliminary Design Report* prepared by Wallis Engineering (Wallis Report), included as Appendix G. A preliminary design report was completed for Well 1R by Keller Associates, Inc. which included an opinion of probable construction cost; this cost was used as a basis for the Well 1R CIP project (W1R).

8.3 Project Descriptions

All projects in this plan are intended to address deficiencies related to hydraulic capacity and condition as well as the extension of water service for future development. The costs shown for all projects are intended to represent total project cost and do not account for the proportions of the cost that will be shared with developers, across funds, or other utilities unless specifically noted.

There are a number of projects that address existing fire flow deficiencies. It should be noted that fire flow driven projects were based on the existing zoning of each property in the water service area. Some piping improvements recommended to meet fire flow requirements are not necessary to meet the fire flow needs of the existing land use. For example, there are several residential areas near SR-14 that are zoned for commercial development but are currently fully developed residential neighborhoods. The recommended piping improvements will not be necessary to provide commercial fire flow until these properties are re-developed to a commercial use.

Projects for the 20-year planning period are presented in Figure 8-1. For all projects, as the City annually reviews system growth, available budget, and other factors, it is recommended that the project scope and prioritization order be confirmed as to schedule for completion under the current rate window, as actual needs may vary somewhat from the recommendations in this program.

8.3.1 Capital Improvement Program Years 1 to 10

The projects prioritized over the next 10 years are intended to address new transmission, source and storage improvements associated with increasing Zone 3 storage and transmission capacity, creation of Zone 5 and distribution improvements to address existing fire flow deficiencies at lower elevations in Zone 1.

The projects recommended over the next 10 years will likely be funded from various sources including the City's Water Utility Fund, and possibly a combination of grants, loans, bonds, and/or private development. Project costs include design and construction. A summary of the proposed 10-year improvement projects is summarized in Table 8-1 which includes project specific descriptions. Additional detailed project descriptions are provided below.

8.3.1.1 Distribution Improvement Projects

The distribution system improvement projects identified from the system analysis in Chapter 3 address fire flow deficiencies as well as new water mains to expand service for new growth. The pipe projects identified for the 10-year CIP are included in Table 8-1. The costs shown for the piping projects were developed in accordance with the methodology and assumptions outlined in Appendix M.

The distribution projects are a combination of fire flow pipe improvement projects, water service replacement / transfer projects, an allowance for major repairs and new water mains associated with the Northside Development expansion of Zone 3 and creation of Zone 5. The Northside development project costs reflect oversizing under a developer agreement.

8.3.1.2 Storage Improvement Projects

Three storage facility improvement projects have been identified for the 10-year planning period. These projects are included in Table 8-1 and summarized as follows.

- Project R1 provides an allowance to address seismic upgrades at Reservoirs 1A and 1B. A seismic evaluation of these reservoirs is currently being completed as part of the 2021 Risk and Resilience Assessment. Improvements are anticipated to include the installation of flexible expansion joints and isolation valves at the inlet and outlet piping connections to the existing reservoirs.

- Project R6 provides for site grading in preparation of the construction of the future Reservoir 6 in the 11 to 20-year CIP.

- Project R7 provides for a site alternatives analysis and property acquisition for construction of a reservoir to serve the future Zone 7 in the northeast corner of the City UGA. Construction of Reservoir 7 is included in the 11 to 20-year CIP.

8.3.1.3 Supply Improvement Projects

The City completed drilling and testing of the proposed Well 1R at the Upper Wellfield in July 2018. Project W1R has been included in Table 8-1 to complete construction of Well 1R. This new source will increase the production capacity of the Upper Wellfield to 1,325 gpm.

8.3.1.4 Northside Development Improvement Projects

The Northside Development is a new development in the northwest service area that requires the expansion of Zone 3 to the north and construction of a new Zone 5 serving higher elevation customers in this area, as shown on Figure 8-1. While the majority of the water system improvements associated with this service area expansion will be developer funded, the City will participate in financing of a new reservoir, booster pump station and oversizing of distribution mains as included in the 10-year planning period, summarized in Table 8-1, and as follows.

- Construction of a new 0.3 MG Reservoir 3B standpipe to provide additional Zone 3 storage, located north of W 2nd Street.

- Construction of a new 1,200 gpm BPS 5 on the proposed Reservoir 3B site. BPS 5 will be a constant pressure pump station supplying Zone 5 customers from Zone 3.

- Construction of new distribution system mains in the Northside Development.

Table 8-1 | Summary Capital Improvement Program Years 1 to 10

Category	Project ID	Description	Project Cost[1,2]									
			2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Storage Facilities	R1	Reservoirs 1A and 1B Seismic Upgrades				$164,000						
	R6	Reservoir 6 Site Grading		$330,000								
	R7	Reservoir 7 Site Alternatives Analysis and Property Acquisition						$34,800		$615,000		
		Storage Subtotal		**$330,000**		**$164,000**		**$34,800**		**$615,000**		
Source Facilities	W1R	Well 1R – 425 gpm well									$316,700	$1,957,200
		Source Subtotal									**$316,700**	**$1,957,200**
Northside Development[3]	R3	0.31 MG Reservoir 3B serving Zones 3 and 5										
	PS5	1,200 gpm BPS 5 serving Zone 5		$1,050,000	$1,050,000							
	P34	Northside Development Transmission										
		Northside Development Subtotal		**$1,050,000**	**$1,050,000**							
Distribution System	P7	J Street from 32nd Street to 34th Street, 1,190 feet (8-inch)					$394,000					
	P8	I Street from 32nd Street to 34th Street, 1,240 feet (8-inch)						$420,900				
	P9	G Street from 32nd Street to 34th Street, 1,190 feet (8-inch)							$413,200			
	P10	32nd Street from G Street to K Street, 20 Service Transfers from 4-inch to 14-inch				$164,000						
	P11	A Street from 7th Street to 10th Street, 2,670 feet (8-inch)							$938,600			
	P13	South 1st Street from Port Building West, 410 feet (8-inch)						$136,800				
	P14	3rd Avenue from 4th Street to Shepherd Road, 1,420 feet (12-inch)					$1,028,800					
	P16	S Street from 32nd Street, 220 feet (4-inch)		$50,000								
	P17	R Street, 825 feet (4-inch)		$75,000								
	P18	B Street from 11th Street to 14th Street, 20 Service Transfers from 6-inch to 14-inch									$190,100	
	P23	D Street from 11th Street to 12th Street, 270 feet (8-inch)				$73,300						
	P48	Woodburn Hill Transmission Main		$345,000								
		Major Repairs/Miscellaneous Pipe Improvements	$50,000	$50,000	$53,100	$54,700	$56,300	$58,000	$59,800	$61,500	$63,400	$65,300
		AMI Implementation	$296,000	$386,500	$410,000	$422,300	$450,300	$463,800	$477,700			
		Distribution System Subtotal	**$346,000**	**$906,500**	**$463,100**	**$714,300**	**$1,929,400**	**$1,079,500**	**$1,889,300**	**$61,500**	**$253,500**	**$65,300**
Planning		Rate and Connection Fee Study[4]				$71,000						
		AWIA Risk and Resilience Assessment and ERP		$105,000					$125,400			
		Water System Plan Update										$326,200
		System Capacity/CIP Update						$58,000				
		Planning Subtotal		**$105,000**	**$0**	**$71,000**	**$0**	**$58,000**	**$125,400**	**$0**	**$0**	**$326,200**
		Total:	**$346,000**	**$2,391,500**	**$1,513,100**	**$949,300**	**$1,929,400**	**$1,172,300**	**$2,014,700**	**$676,500**	**$570,200**	**$2,348,700**

Notes:
1. Costs shown were developed in 2020 dollars with a 3 percent annual escalation applied for inflation. Funding sources will vary including City water rates, loans, bonds, grants, and private developers.
2. Costs shown represent total project costs and include local sales tax at 8.4 percent.
3. Cost shown for Northside Development improvements reflects only portion of project cost that City is responsible for.
4. Current rate window through 2023.

8.3.1.5 Miscellaneous Improvements

Miscellaneous improvements included in the 10-year capital plan (Table 8-1) include continued investment in advanced metering infrastructure (AMI) metering improvements, a study to assess water utility rates and connections fees at the end of the current rate window, Risk and Resilience Assessment and ERP Update as required by the AWIA, and the next WSP update at the end of the 10-year planning period.

8.3.2 Capital Improvement Program Years 11 to 20

The projects scheduled for years 11 to 20 primarily include replacing small diameter pipe causing fire flow deficiencies associated with redevelopment and installation of new water mains and PRVs for service to expanded Zones 3, 4, 5, and the new Zones 6 and 7. Also included is construction of the new Zone 6 (discussed below), and construction of a 0.5 MG Reservoir 7 and 800 gpm BPS 7 supplying Reservoir 7 from the Zone 4 distribution system. A summary of all proposed 11 to 20-year projects are presented in Table 8-2. The complete scope and timing of these projects will be refined during the next WSP update. The costs presented are total costs in 2020 dollars, and do not account for developer financed distribution lines or participation in storage and booster pump station projects.

8.3.2.1 Zone 6 Improvements

The system analysis discussed in Chapter 3 includes a recommendation for constructing a new Zone 6 serving as a mid-level pressure zone between Zones 1 and 3 to allow for a more desirable water service pressure range for low-elevation customers in the existing Zone 3. The improvements recommended for construction of Zone 6 have been identified and evaluated in the Wallis Engineering Report included as Appendix G. These improvements have been included in Table 8-2 and summarized as follows.

- Construction of a new 1.0 MG Reservoir 6 to provide storage for Zone 6. The reservoir will be located at the Lookout Ridge site and will have an overflow elevation of 416 feet with a base elevation of 385 feet.

- Construction of a new 650 gpm BPS 3 at the Reservoir 6 site, including abandonment of the existing BPS 3. The new BPS 3 will supply Zone 3 from Reservoir 6.

- Construction of a new 815 gpm BPS 6 supplying Reservoir 6 from the Zone 1 distribution system. BPS 6 will be located at the Lebrun PRV site. BPS 6 will be designed to meet the 20-year water demands for Zone 6, Zone 3, and future Zone 5.

- Construction of distribution system improvements to complete the Zone 6/Zone 3 split as identified in Table 8-2.

Table 8-2 | Capital Improvement Program Years 11 to 20

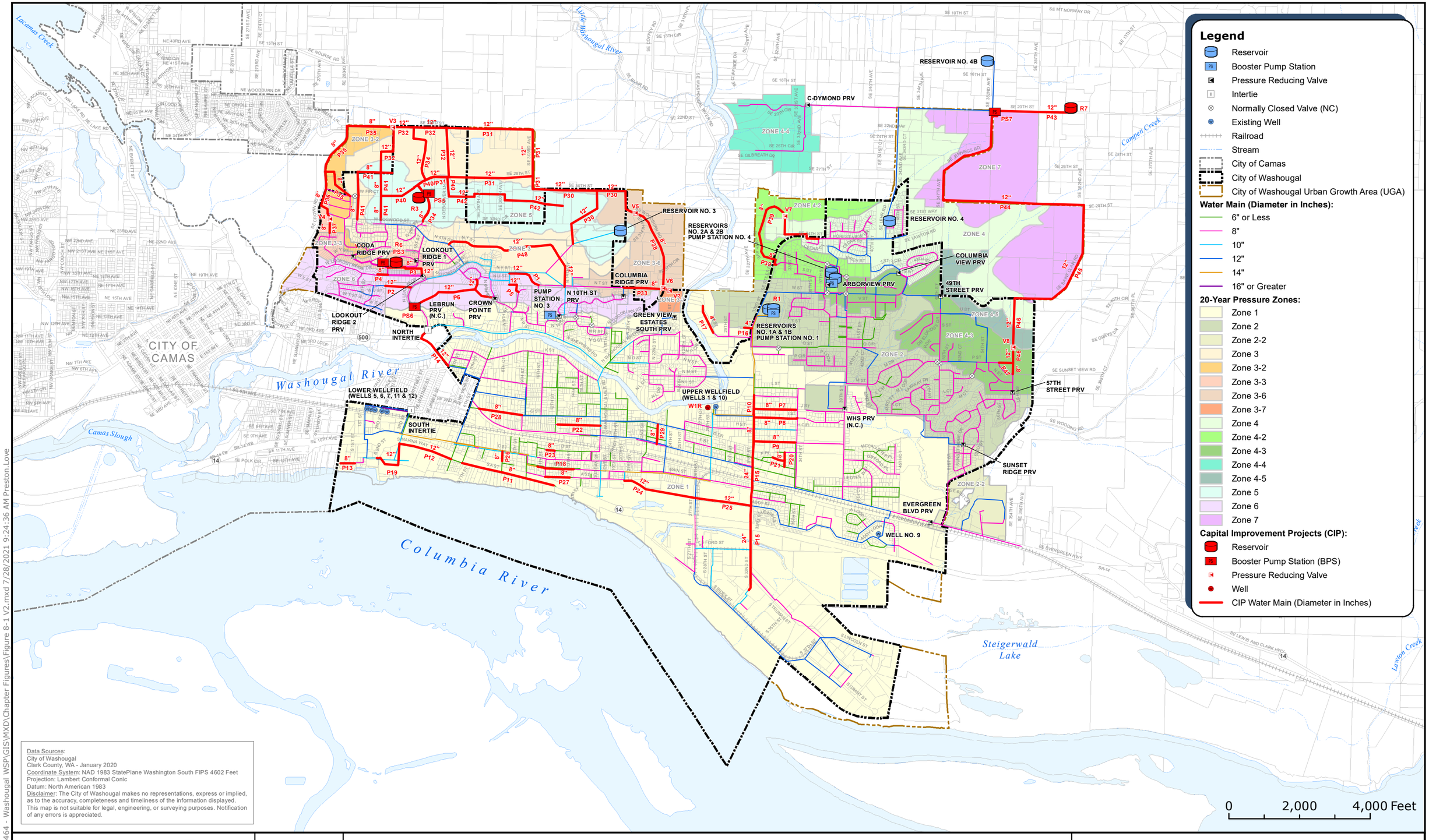
Category	Project ID	Description	Cost[1,2]
Storage Facilities	R6	1.00 MG Reservoir 6 – storage for mid-level Zone 6	$4,070,000
	R7	0.51 MG Reservoir 7 – storage for proposed Zone 7 in northeast UGA	$3,120,000
		Storage Facilities Subtotal	**$7,190,000**
Pumping Facilities	PS3	650 gpm BPS 3 at Reservoir 6 site including electrical service and abandon existing BPS 3	$1,710,000
	PS6	815 gpm BPS 6 – fills proposed Reservoir 6 from Zone 1	$1,470,000
	PS7	800 gpm BPS 7 – fills proposed Reservoir 7 from Zone 4	$1,070,000
		Pumping Facilities Subtotal	**$4,250,000**
Distribution System Pipes and Valves		***Pipe Improvements for Fire Flow***	
	P12	6th Street from C Street to S A Place, 1,790 feet (12-inch)	$914,000
	P15	32nd Street from A Street to Lewis Lane, 4,190 feet (24-inch)	$2,594,000
	P20	33rd Street from Webster Lane to F Street, 410 feet (8-inch)	$120,000
	P21	F Place from F Street to 33rd Street, 360 feet (8-inch)	$104,000
	P22	F Street from 12th Street to 14th Street, 1220 feet (8-inch)	$359,000
	P23	D Street from 11th Street to 12th Street, 270 feet (8-inch)	$67,000
	P24	A Street to Addy Street Connection, 2,100 feet (12-inch)	$748,000
	P25	Addy Street from S 27th Street to 32nd Street, 1,580 feet (12-inch)	$580,000
	P26	8th Street from C Street to B Street from C Street to B Street, 270 feet (8-inch)	$79,000
	P27	A Street from SR 14 to 14th Street from SR 14 Hwy to 14th Street, 710 feet (8-inch)	$208,000
	P28	G Street from Evergreen Highway to 9th Street from Evergreen Hwy to 9th Street, 1,250 fee (8-inch)t	$367,000
	P29	23rd Street from G Street to E Street from G street to E Street, 560 feet (8-inch)	$163,000
		Zone 3 Expansion between City Limits and northern UGA boundary	
	P30	Woodburn Road Loop (Woodburn Road to SE 30th Street, branching to Reservoir 3 transmission), 5,370 feet (12-inch)	$1,906,000
	P31	Central Main East Loop (SE 28th Street to SE 303rd Avenue to SE 23rd Street to SE 293rd Avenue), 6,500 feet (12-inch)	$2,301,000
	P32	Central Main West Loop (SE 293rd Avenue to SE 23rd Ave branching west then south, west of Northside development), 3,840 feet (12-inch)	$1,360,000
	P33	N T Street to SE Woodburn Road, 1,120 feet (8-inch)	$319,000
		Zone 3-2 Expansion between City Limits and northern UGA boundary	
	P35	SE 23rd Street PRV to SE Crown Road to SE 282nd Court, 3,970 feet (8-inch)	$1,136,000
	P36	SE Crown Road to SE McKever Road, 1,490 feet (8-inch)	$426,000
		Zone 3-3 Expansion north of City Limits	
	P37	Proposed Crown Road PRV connection to existing distribution (SE McKever Road to W 10th Street), 400 feet (8-inch)	$113,000
		Zone 3-7 Piping	
	P38	SE 314th Avenue and SE Woodburn Road Double Loop, 2,390 feet (8-inch)	$683,000
		Zone 4-2 Expansion north of City Limits	
	P39	Eagle Woods Loop (SE 34th Street to SE 330th Court to SE Eagle Woods Drive to SE 328th Avenue to Y Street), 4,170 feet (8-inch)	$1,193,000
		Zone 5 Piping	
	P40	Central Main (SE 28th Street extension west of SE 303rd Avenue to Northside Zone 5 piping to SE 30th Circle), 4,260 feet (12-inch)	$1,380,000
	P41	West Loop (north of SE 30th Circle to W 7th and 8th Streets), 3,710 feet (8-inch)	$1,062,000
	P42	SE 30th Street extension east of SE 300th Avenue, 1,020 feet (8-inch)	$361,000
		Zone 6 Piping	
	P1	N V Street from N 7th Street to N 14th Street, 1,650 feet (12-inch)	$347,000
	P2	W U Street from east of W 7th Street to N LeBrun Drive, 740 feet (12-inch)	$262,000
	P3	W Lookout Ridge Drive to proposed Reservoir 6, PBS 3, and loop with existing mains at W W St, 1,210 feet (12-inch)	$345,000
	P4	W Lookout Ridge Drive Zone 3 water main extension, 310 feet (8-inch)	$87,000
	P5	N U Street from east end of N U Street to N 6th Street, 390 feet (12-inch)	$136,000
	P6	N Lebrun Boulevard to N 3rd Street and N 6th Street, 2,700 feet (12-inch)	$957,000
	V1	Miscellaneous Zone 6 PRV and isolation valve modifications	$120,000
		Zone 7 Piping	
	P43	Reservoir 7 Transmission, 2,240 feet (12-inch)	$793,000
	P44	Jennings Road and 357th Loop (SE 357th Avenue to SE 31st Way and SE 347th Avenue down SE Jennings Road to SE 31st Way to SE 362nd Avenue), 7,530 feet (12-inch)	$2,672,000
	P45	Saint Clair Road Loop (SE 362nd Avenue to SE Saint Clair Road to W Street), 3,710 feet (12-inch)	$1,317,000
	P46	57th Street north extension (P Street to W Street to Saint Clair Loop), 2,040 feet (12-inch)	$724,000
	P47	Zone 4-3 Connection (P Street and 57th Street Fire Flow Improvements), 720 feet (8-inch)	$205,000
		Pressure Reducing Valves	
	V2	Green View Estates Development North PRV	$150,000
	V3	SE 23rd Street PRV	$150,000
	V4	Crown Road PRV	$150,000
	V5	SE Woodburn Road PRV	$150,000
	V6	SE Woodburn Road and N T Street PRV	$150,000
	V7	SE 330th Court PRV	$150,000
	V8	Second 57th Street PRV	$150,000
		Distribution System Subtotal	**$27,558,000**
Planning		Water System Plan Update	$150,000
		AWIA Risk and Resilience Assessment and ERP (x2)	$200,000
		Planning Subtotal	**$500,000**
		Total:	**$39,348,000**

Notes:

1. Costs are in 2020 dollars. Funding sources will vary including City water rates, loans, bonds, grants, and private developers.
2. Costs shown represent total project costs and include local sales tax at 8.4%.

8.4 Summary

Recommended capital improvement projects are divided between the 10 and 20-year planning periods. Projects are designed to address projected system deficiencies and system expansion during these planning periods but should be evaluated annually during City review of proposed developments, updated current and projected water demands, and available capital reserves. An updated rate study and updates to the WSP are also scheduled in addition to completion of the AWIA Risk and Resilience Assessment and ERP preparation. The total project cost (2020 dollars) within the 10-year timeframe is approximately $13.9 million; in the 11 to 20-year timeframe it is approximately $39.3 million.



Legend

- Reservoir
- Booster Pump Station
- Pressure Reducing Valve
- Intertie
- Normally Closed Valve (NC)
- Existing Well
- Railroad
- Stream
- City of Camas
- City of Washougal
- City of Washougal Urban Growth Area (UGA)

Water Main (Diameter in Inches):

- 6" or Less
- 8"
- 10"
- 12"
- 14"
- 16" or Greater

20-Year Pressure Zones:

- Zone 1
- Zone 2
- Zone 2-2
- Zone 3
- Zone 3-2
- Zone 3-3
- Zone 3-6
- Zone 3-7
- Zone 4
- Zone 4-2
- Zone 4-3
- Zone 4-4
- Zone 4-5
- Zone 5
- Zone 6
- Zone 7

Capital Improvement Projects (CIP):

- Reservoir
- Booster Pump Station (BPS)
- Pressure Reducing Valve
- Well
- CIP Water Main (Diameter in Inches)

0 2,000 4,000 Feet

Data Sources:
City of Washougal
Clark County, WA - January 2020
Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Disclaimer: The City of Washougal makes no representations, express or implied, as to the accuracy, completeness and timeliness of the information displayed. This map is not suitable for legal, engineering, or surveying purposes. Notification of any errors is appreciated.

N W E S

City of Washougal
Water System Plan Update

Figure 8-1
Capital Improvement Projects

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Section 9

Section 9

Financial Program

9.1 Introduction

The purpose of the financial program is to demonstrate the financial viability of the water utility during execution of the CIP identified in this WSP. The viability analysis considers historical performance, the sufficiency of utility revenues to meet current and future cost and policy obligations, and the impact of executing the CIP. Furthermore, this chapter provides a review of the utility's current rate structure with respect to rate adequacy, equity, promotion of water conservation and customer affordability.

The City routinely conducts water rate studies to identify the full cost of providing water service. Its most recent rate study was adopted in 2018, with a rate plan effective through 2023.

9.2 Historical Financial Condition

The historical financial condition of the utility is evaluated based on financial performance benchmarks, applied to data in the financial statements for the six-year period since the last plan.

Table 9-1 summarizes the water and sewer utility's Statement of Revenues, Expenses and Changes in Fund Net Position for the most recent six years available (2014 to 2019). The City maintains a combined Water and Sewer Enterprise fund, although water and sewer operations are tracked and treated as their own restricted sources of revenues. Historical audited financial statements for water-only activities are not available.

For the projections and rate planning contained in the remainder of this financial plan, a "Water Fund" model was developed to confirm the sufficiency of water rates, charges, and other funding to meet the operating, capital, and emergency needs of the City's water utility.

Key findings from the historical financial performance of the City's water and sewer enterprise include:

- Charges for Services for the combined water and sewer utility increased by 13.2 percent ($1.06 million). This was the result of both customer growth and rate increases over the period.

Table 9-1 | Comparative Statement of Revenues, Expenses, and Changes in Fund Net Assets for the Years Ended December 31, 2014 through December 31, 2019

	2014	2015	2016	2017	2018	2019
Operating Revenues						
Charges for Services	$8,052,902	$8,659,942	$8,691,094	$8,768,873	$9,122,001	$9,117,620
Intergovernmental Revenues	-	-	1,022,898	55,499	53,084	52,898
Miscellaneous Revenues	47,545	91,465	138,974	295,048	296,532	397,674
Total Operating Expenses	$8,100,447	$8,751,407	$9,852,966	$9,119,420	$9,471,617	$9,568,192
Operating Expenses						
General Government	$681,652	$845,541	$691,543	$792,607	$688,767	$635,993
Public Safety	-	207	-	-	-	-
Operations and Maintenance	3,502,119	3,757,407	3,775,822	4,062,973	4,598,050	4,442,678
Natural and Economic Environment	-	-	-	-	-	702,900
Transportation	-	-	79,079	31,872	12,594	-
Total Operating Expenses	$4,183,771	$4,603,155	$4,546,444	$4,887,452	$5,299,411	$5,781,571
Operating Income (Loss)	$3,916,676	$4,148,252	$5,306,522	$4,231,968	$4,172,206	$3,786,621
Non-Operating Revenues (Expenses)						
Other Financing Sources	$5,887	$334	$-	$-	$-	$-
Debt Proceeds	5,592,050	10,731,837	-	10,165,567	-	-
Custodial Activities	-	-	1,673	-	-	-
Other Resources (Uses)	-	-	(39,306)	(50,639)	433,370	186,129
Other Financing Uses	(50,335)	(2,145,269)	-	-	-	-
Debt Services	(1,912,354)	(2,521,064)	(2,716,445)	(13,051,235)	(2,680,877)	(2,669,972)
Capital Expenditures	(2,769,075)	(9,850,617)	(4,696,472)	(2,801,805)	(1,289,691)	(1,074,080)
Total Non-Operating Revenues (Expenses)	$866,173	$(3,784,779)	$(7,450,550)	$(5,738,112)	$(3,537,198)	$(3,557,923)
Income (Loss) Before Contributions and Transfers	$4,782,849	$363,473	$(2,144,028)	$(1,506,144)	$635,008	$228,698
Capital Contributions	-	-	-	-	-	-
Transfers In	172,816	151,647	96,177	96,328	95,952	94,464
Transfers Out	(579)	(735)	(661)	(437)	(275)	-
Change in Net Assets	$4,955,086	$514,385	$(2,048,512)	$(1,410,253)	$730,685	$323,162
Net Assets Beginning of Year	13,196,656	18,151,742	18,666,127	16,617,615	15,207,362	15,938,047
BOY GASB 68 Adjustment	-	-	-	-	-	-
Net Assets End of Year	18,151,742	18,666,127	16,617,615	15,207,362	15,938,362	16,261,209

- Total operating expenses increased by 38.2 percent ($1.60 million) largely due to a $702,900 expense related to biosolids (identified under Natural and Economic Environment) in 2019. This was a one-year expense unrelated to the water utility. General Administrative costs over the period ranged between $635,000 to $845,000 but did not materially increase over the historical period. Operations and Maintenance (O&M) increased by 26.9 percent ($940,000).

- Operating income has remained positive over the six-year period.

- In total, the net position of the utility increased by 23.2 percent ($3.06 million) over the six-year period.

- Annual debt service increased by 39.6 percent ($758,000) over the six-year period.

- Combined water and sewer debt service coverage for both parity and non-parity debt decreased from 2.05 to 1.42, corresponding to the increased borrowing and the one-time Natural and Economic Environment operating expense in 2019. The City's covenanted minimum for Revenue Bonds is 1.25 times coverage, and 1.0 for total debt coverage.

9.3 Revenue Requirement Analysis

9.3.1 Fiscal Policies

A brief summary of the key financial policies employed by the City in managing the utility, as well as those recommended and incorporated in the financial program are discussed below.

9.3.1.1 Minimum Fund Balances

Utility reserves serve multiple functions; they can be used to address variability and timing of expenditures and receipts; occasional disruptions in activities, costs, or revenues; utility debt obligations; and many other functions. The collective use of individual reserves helps to limit the City's exposure to revenue shortfalls, meet long-term capital obligations, and reduce the potential for bond coverage defaults.

An operating fund is designed to provide a liquidity cushion; it protects a utility from the risk of short-term variation in the timing of revenue collection or payment of expenses. Like other types of reserves, operating reserves also serve another purpose: they help smooth rate increases over time. Target funding levels for an operating reserve are generally expressed as a certain number of days of O&M expenses, with the minimum requirement varying with the expected revenue volatility. Industry practice for utility operating reserves ranges from 30 days (8 percent) to 120 days (33 percent) of O&M expenses, with the lower end more appropriate for utilities with stable revenue streams, based primarily on fixed service fees, and the higher end of the range more appropriate for utilities with a fee structure that results in revenue that varies with significant seasonal or consumption-based fluctuations.

The financial plan applies a minimum balance policy of 60 days of O&M expenses, and maximum of 90 days, above which funds are transferred and made available for capital funding. This approximately equates to between $470,000 and $705,000 based on the 2020 budget. This target range is appropriate for a water utility, given the variability in revenue collections due to changing weather patterns that can affect revenue collections during the summer season.

A capital fund is an amount of cash set aside in case of an emergency should a piece of equipment or a portion of the utility's infrastructure fail unexpectedly. Additionally, the reserve could be used for other unanticipated capital needs including capital project cost overruns. Industry practice ranges from maintaining a balance equal to 1 to 2 percent of fixed assets, an amount equal to a multi-year rolling average of CIP costs, or an amount determined sufficient to fund an equipment failure (other than catastrophic failure).

The financial program assumes the lower end of the industry standard at 1 percent of fixed assets, to ensure the balance adjusts with utility infrastructure investment. With water fixed assets at approximately $34 million, the minimum begins at the existing fixed policy level of $340,000 and grows to $480,000 by 2029.

A debt reserve is established as bond covenants often set reserve requirements as a means of protecting bondholders against the risk of nonpayment. Some state loans also have a reserve requirement. A reserve is typically funded at the time of borrowing as part of the debt principal. A reserve amount equal to annual debt service is used when the forecast assumes issuing revenue bonds. The City currently has a debt reserve fund, which maintains approximately one year's worth of bonded debt service.

9.3.1.2 Debt Service Coverage

There are two forms of debt service coverage: one applies to debt service from revenue bonds only, while the other applies to debt service on total debt, including state loans. Revenue bonds typically have a legal minimum coverage requirement of 1.25. State loans typically do not carry a minimum coverage requirement. A management revenue bond debt service coverage target of 2.0 is recommended for purposes of maintaining the City's creditworthiness. The financial program developed for this plan evaluates bond coverage to ensure that it remains at or above the 1.25 minimum, and estimates attaining an average coverage ratio of 2.81 with the recommended rate plan.

9.3.2 Operating Forecast

The financial forecast is developed from the foundation of the City's adopted 2020 and 2021 budgets to develop a projection of the utility's annual financial obligations over the planning period. The following is a list of key data and assumptions used to develop the forecast.

9.3.2.1 Revenue Projection Assumptions

- Customer Growth: 0.50 percent annually based on staff direction

- Interest earnings are projected at 0.30 percent based on historical Local Government Investment Pool rates. The interest rate is applied to beginning year cash balances to compute estimated interest earnings annually.

- Fund balances are based on 2019 starting balances for the operating, capital, and reserve funds and allocated between water and sewer funds.

9.3.2.2 O&M Projection Assumptions

- General Cost Inflation: 2.0 percent per year based on staff direction

- Construction Cost Inflation: 3.0 percent per year based on historical five-year Engineering News Record Construction Cost Index

- Labor Cost Inflation: 3.0 percent per year based on staff direction

- Benefits Cost Inflation: 5.0 percent per year based on staff direction

- Taxes owed are calculated based on prevailing rates:

    - State Excise Tax: 5.029 percent
    - State Business and Occupation Tax: 1.75 percent
    - City Utility Tax: 10.0 percent

9.3.2.3 Existing Debt

The City issues revenue bonds as a combined water and sewer enterprise but tracks the portion of each bond allocable to water and sewer functions separately. Table 9-2 outlines the water utility's portion of outstanding debt principal as of year-end 2019. There are five revenue bonds, one Public Works Trust Fund (PWTF) loan, and one real estate contract. In total, the water utility has just under $6.96 million in outstanding principal. Annual debt service obligations are approximately $635,000.

Table 9-2 | Outstanding Debt Principal

Debt Description	Principal Outstanding	Maturity Year
2005 Revenue Bond	$21,250	2020
2011 Revenue Bond	$1,318,750	2025
2012 PWTF Loan	$153,474	2031
2014 Revenue Bond	$1,021,250	2034
2015 Revenue Bond	$1,790,000	2040
2016 Revenue Bond	$2,488,070	2032
Real Estate Contract	$172,924	2025
Total	**$6,965,718**	

9.3.2.4 Rate Funded System Reinvestment

The purpose of system reinvestment funding is to provide for the replacement of aging system facilities to ensure sustainability of the system for ongoing operation. Each year, the utility's assets depreciate, and as they lose value they are moving toward eventual replacement. That accumulating loss in value and increase in future liability is typically measured for reporting purposes through annual depreciation expense, which is based on the original cost of the asset over its anticipated useful life. While this expense reflects the consumption of the existing asset and its original investment, the replacement of that asset will likely cost much more, factoring in inflation and construction conditions. Therefore, the actual annual replacement liability is even greater than the annual depreciation expense.

During the forecast period, the City plans to phase in its funding of rate funded system reinvestment to 100 percent of annual depreciation (approximately $860,000 per year by 2029).

9.3.3 Capital Forecast

The 2020-2039 CIP identifies $47.9 million in project costs, inflated to year of scheduled spending, over the 20-year planning horizon. Capital expenditures for 2020 come from the actual year-end spending. Annual CIP costs are stated in 2021 dollars and escalated to the year of planned spending at 3 percent annually. **Table 9-3** summarizes the annual costs associated with the 20-year CIP.

Table 9-3 | Water CIP 2020-2039

Year	Current $	Inflated $
2020	40,657	40,657
2021	2,646,843	2,646,843
2022	1,486,516	1,577,045
2023	868,744	949,300
2024	1,714,247	1,929,400
2025	1,011,236	1,172,300
2026	1,687,280	2,014,700
2027	550,056	676,500
2028	450,121	570,200
2029	1,800,083	2,348,700
Subtotal	**$12,255,783**	**$13,925,645**
2030 and Beyond	35,648,000	55,512,763
CIP Total	**47,903,783**	**69,438,408**

9.3.3.1 Capital Funding Resources

The Infrastructure Assistance Coordinating Council (IACC) frequently updates a report of capital funding opportunities in Washington State. The most recent list of opportunities is included as Appendix O.

9.3.3.2 Capital Funding Plan

A capital funding plan is developed to determine the total resources available to fund the CIP, including consideration of future rate increases and debt issuances. The capital fund begins 2020 with just under $4.22 million in cash reserves, with roughly $3.88 million of the balance available to fund capital projects in 2020 after accounting for the minimum fund balance.

Table 9-4 presents the 10-year Capital Financing Plan. Cash resources from capital revenues, coupled with transfers from the Operating Reserve and interest earnings, are forecasted to fund approximately 80 percent of the 10-year CIP. Revenue bond proceeds of $2.75 million are assumed to finance the balance of the identified funding need.

For purposes of the capital financing plan, revenue bonds are used as a conservative assumption for debt issuance, rather than assuming the availability of low-cost loans. Revenue bonds typically have a higher interest rate, bond coverage requirements, and repayment terms that combine to create a higher rate revenue requirement. The City should continue to pursue available low-cost loan options when debt is necessary.

Table 9-4 | Capital Financing Plan

Year	Capital Expenditures	Capital Expenditures Inflated	Cash Funding	Net Revenue Bond Financing	Total Financing Resources
2020	40,657	40,657	40,657	-	40,657
2021	2,646,843	2,646,843	2,646,843	-	2,646,843
2022	1,486,516	1,577,045	1,577,045	-	1,577,045
2023	868,744	949,300	949,300	-	949,300
2024	1,714,247	1,929,400	1,179,400	750,000	1,929,400
2025	1,011,236	1,172,300	1,172,300	-	1,172,300
2026	1,687,280	2,014,700	764,700	1,250,000	2,014,700
2027	550,056	676,500	676,500	-	676,500
2028	450,121	570,200	570,200	-	570,200
2029	1,800,083	2,348,700	1,598,700	750,000	2,348,700
CIP Total	**$12,255,783**	**$13,925,645**	**$11,175,645**	**$2,750,000**	**$13,925,645**

9.3.3.2.1 System Development Charges

The City uses System Development Charges (SDCs) as a component of its capital funding strategy. An SDC, as provided for by RCW 35.92.025, refers to a one-time charge imposed on new customers as a condition of connection to the utility system. The purpose of the SDC is two-fold: 1) to

promote equity between new and existing customers; and 2) to provide a source of revenue to fund capital projects.

The City recently updated the water utility's SDC. Table 9-5 summarizes the SDC schedule by meter size.

Table 9-5 | Current System Development Charge Schedule

Meter Size	System Development Charge
5/8"x3/4"	$44,183.00
1"	$7,378.06
1-1/2"	$14,711.94
2"	$23,547.94
3"	$44,180.00
4"	$73,648.06
6"	$147,251.94
8"	$235,611.94

Over the 10-year Study Period through 2029, revenues from SDCs are forecast to generate approximately $940,000, or 6.8 percent of the 10-year capital funding needs.

9.3.4 Revenue Sufficiency

The financial forecast, or revenue requirement analysis, projects the amount of annual revenue that needs to be generated by water rates. Consistent with system planning cycles, the forecast period includes the ten-year period 2020 – 2029. The analysis incorporates operating revenues, O&M expenses, debt service payments, system reinvestment funding, debt and policy obligations, and determines the sufficiency of the current level of rate revenue to meet the total annual utility obligations.

For this analysis, two revenue sufficiency criteria have been developed to reflect the financial goals and constraints of the utility: 1) cash needs must be met; and 2) debt coverage requirements must be realized. In order to operate successfully with respect to these goals, both tests of revenue sufficiency must be met.

The cash flow test identifies all known cash requirements for the utility in each year of the planning period. Capital needs are identified and a capital funding strategy is established. This may include the use of debt, cash reserves, outside assistance, and rate funding. Cash requirements to be funded from rates are determined and typically include O&M expenses, debt service payments, system reinvestment funding or directly funded capital outlays, and any additions to specified reserve balances. The total annual cash needs of the utility are then compared to projected cash revenues using the current rates. Any projected revenue shortfalls are identified and the rate increases necessary to make up the shortfall are calculated.

The coverage test is based on a commitment made by the City when issuing revenue bonds and some other forms of long-term debt. The City has existing revenue bonds, and for purposes of this analysis, revenue bond financing is assumed for any projected borrowing. Debt service coverage is expressed as a multiplier of the annual revenue bond debt service payment. A 1.25 coverage factor means revenues must be sufficient to pay O&M expenses, annual revenue bond debt service payments, plus an additional 25 percent of annual revenue bond debt service payments. The excess cash flow derived from the added coverage, if any, can be used for any utility purpose, including funding capital projects, though it typically overlaps, or nests, with the system reinvestment funding policy that is not included in the coverage calculation.

While the rate strategy focuses on a 10-year rate planning period, the proposed rates and rate assumptions should be reviewed annually to ensure that the rate projections developed remain adequate. Any significant changes should be incorporated into the financial plan and future rates should be adjusted as needed.

Table 9-6 summarizes the annual revenue requirement based on the forecast of operating revenue, expenditures, fund balances, fiscal policies, and capital funding.

A slight revenue deficiency in 2021 increases to approximately $1.06 million by 2029 as operations and maintenance costs increase with inflation, the utility increases its system reinvestment funding level, and the utility takes on additional debt to fund the remaining capital needs. However, the utility has sufficient existing reserves to mitigate this short-term annual revenue deficiency.

The 10-year financial plan finds that three percent annual rate increases are sufficient to meet the utility's financial obligations, to phase in to meeting the utility's performance objectives, and to meet the rate revenue requirements of the capital funding plan.

Table 9-7 shows a summary of the projected operating and capital balances. The operating fund ends 2029 at the high end of the policy target of 90 days of operating expenditures. The capital fund ends at $579,000 in 2029, sufficient to satisfy the minimum balance of $476,000.

Table 9-6 | Revenue Requirement Forecast (Thousands $)

Revenue Requirement	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Revenues										
Rate Revenues Under Existing Rates	$3,926	$3,945	$3,965	$3,985	$4,005	$4,025	$4,045	$4,065	$4,085	$4,106
Non-Rate Revenues	112	118	118	118	118	118	118	118	118	118
Total Revenues	**$4,037**	**$4,064**	**$4,083**	**$4,103**	**$4,123**	**$4,143**	**$4,163**	**$4,183**	**$4,204**	**$4,224**
Expenses										
Cash Operating Expenses	$2,857	$2,994	$3,072	$3,136	$3,210	$3,256	$3,335	$3,416	$3,500	$3,586
Existing Debt Service	704	651	593	652	652	651	616	617	616	616
New Debt Service	-	-	-	-	61	61	161	161	161	222
Rate Funded System Reinvestment	341	424	510	586	608	656	679	771	822	861
Total Expenses	**$3,903**	**$4,069**	**$4,176**	**$4,374**	**$4,531**	**$4,624**	**$4,792**	**$4,966**	**$5,099**	**$5,286**
Net Surplus (Deficiency	$134	$(5)	$(92)	$(271)	$(408)	$(481)	$(629)	$(782)	$(896)	$(1,061)
Additions to Meet Coverage	-	-	-	-	-	-	-	-	-	-
Total Surplus (Deficiency)	$134	$(5)	$(92)	$(271)	$(408)	$(481)	$(629)	$(782)	$(896)	$(1,061)
% of Rate Revenue	0.00%	0.12%	2.32%	6.80%	10.18%	11.95%	15.55%	19.24%	21.92%	25.85%
Annual Rate Adjustment	0.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Cumulative Annual Rate Adjustment	0.00%	3.00%	6.09%	9.27%	12.55%	15.93%	19.41%	22.99%	26.68%	30.48%
Rate Revenues after Rate Increase	$3,926	$4,064	$4,206	$4,354	$4,507	$4,666	$4,830	$5,000	$5,175	$5,357
Additional Taxes from Rate Increase	-	18	36	56	76	89	109	129	151	173
Net Cash Flow after Rate Increase	134	96	113	43	19	71	47	23	43	17
Coverage after Rate Increases	2.65	2.62	3.13	2.80	2.64	3.04	2.72	2.81	2.91	2.79

Table 9-7 | Ending Cash Balance Summary

Fund Balance	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Operating Fund										
Beginning Balance	$655	$705	$738	$758	$773	$792	$803	$822	$842	$863
Plus: Net Cash Flow After Rate Increase	134	96	113	43	19	71	47	23	43	17
Less: Transfer of Surplus to Capital Fund	(85)	(62)	(94)	(27)	(1)	(60)	(28)	(3)	(23)	-
Ending Balance	$705	$738	$758	$773	$792	$803	$822	$842	$863	$880
Minimum Target Balance	$470	$492	$505	$515	$528	$535	$548	$562	$575	$590
Days	90	90	90	90	90	90	90	90	90	90
Capital Fund										
Beginning Balance	$4,222	$4,744	$2,578	$1,671	$1,329	$754	$439	$523	$761	$1,176
Plus: RFSR/ Equipment Transfers	341	424	510	586	608	656	679	771	822	861
Plus: Transfers from Operating Fund	85	62	94	27	1	60	28	3	23	-
Plus: Grants/ Donations/ CIAC	-	-	-	-	-	-	-	-	-	-
Plus: Net Debt Proceeds Available for Projects	-	-	-	-	750	-	1,250	-	-	750
Total Funding Sources	$4,785	$5,225	$3,248	$2,279	$2,684	$1,612	$2,537	$1,437	$1,746	$2,928
Less: Capital Expenditures	(41)	(2,647)	(1,577)	(949)	(1,929)	(1,172)	(2,015)	(677)	(570)	(2,349)
Ending Working Capital Balance	$4,744	$2,578	$1,671	$1,329	$754	$439	$523	$761	$1,176	$579
Minimum Target Balance	$342	$365	$381	$389	$408	$420	$440	$447	$452	$476

9.4 Water Rate Evaluation

9.4.1 Existing Rate Structure

The City's current rate structure consists of the following components.

- A bi-monthly fixed charge based on meter size applicable to all customer classes
- For Residential customers:
    - A water use allowance per bi-monthly billing period that is being phased out by 2023
    - A three tiered rate structure:
        - Block One: Allowance - 12 ccf
        - Block Two: 13 - 30 ccf
        - Block Three: > 30 ccf
- For Multi-Family, Commercial, and Large Commercial customer:
    - A class-specific volume charge based on each class's cost of service

9.4.2 Proposed Rates

Table 9-8 presents a comparison of current and proposed rates. Based on the findings of the 2018 Rate Study, the City has adopted a rate plan through 2023 that phases out the Single Family usage allowance. This policy was enacted with the intent of both incentivizing conservation and of improving rate affordability by providing customers who use less than the allowance amount the ability to pay less for water service.

Rate increases after 2023 are applied "across-the-board", meaning the percentage increase is applied uniformly to each rate for each customer class.

Table 9-8 | Projected Rate Schedule

	Adopted 2020	Adopted 2021	Adopted 2022	Adopted 2023	Adopted 2024	Adopted 2025	Adopted 2026	Adopted 2027	Adopted 2028	Adopted 2029
Base Charge (All Customers)										
¾"	$66.22	$67.17	$69.18	$71.26	$73.40	$75.60	$77.87	$80.20	$82.61	$85.09
1"	74.50	76.72	79.02	81.39	83.83	86.35	88.691	91.61	94.35	97.18
1.5"	123.95	127.68	131.50	135.46	139.52	143.71	148.02	152.46	157.04	161.75
2"	181.78	187.23	192.85	198.64	204.60	210.74	217.06	223.57	230.28	237.19
3"	381.07	392.50	404.27	416.40	428.89	441.76	455.01	468.66	482.72	497.20
4"	575.20	592.46	610.24	628.54	647.40	666.82	686.82	707.43	728.65	750.51
6"	964.58	993.52	1,023.33	1,054.03	1,085.65	1,118.22	1,151.77	1,186.32	1,221.91	1,258.57
8"	1,609.30	1,657.57	1,707.30	1,758.51	1,811.27	1,865.60	1,921.57	1,979.22	2,038.60	2,099.75
Single Family Allowance (ccf)	3	2	1	0	0	0	0	0	0	0
Volume Charge										
Single Family Allowance – 12 ccf	$5.23	$4.70	$4.29	$3.95	$4.07	$4.19	$4.32	$4.45	$4.58	$4.72
12-30 ccf	9.81	10.10	10.40	10.72	11.04	11.37	11.71	12.07	12.43	12.80
>30 ccf	12.29	12.66	13.02	13.42	13.82	14.24	14.66	15010	15.56	16.02
Multi-Family	6.80	6.99	7.20	7.42	7.64	7.87	8.11	8.35	8.60	8.86
Commercial	6.74	6.693	7.14	7.36	7.58	7.81	8.04	8.28	8.53	8.79
Large Commercial	4.19	4.34	4.50	4.66	4.80	4.94	5.09	5.24	5.40	5.56

Note:
*1.5x Out of City Multiplier

9.4.3 Community Affordability Evaluation

The Washington State Department of Health and the State Public Works Board have historically used an affordability index to prioritize low-cost loan awards. The typical threshold looks at whether a system's rates exceed 1.5 to 2.0 percent of the median household income for the demographic area. As a result, if monthly bills are less than 2.0 percent of the median household income for the demographic area, they are generally considered affordable.

Based on the 2019 estimate from the U.S. Census Bureau American Community Survey, median household income for Washougal was estimated at $91,100. For purposes of the community affordability evaluation, median household income is escalated annually at 2.0 percent, consistent with the general cost inflation assumption used in the study. Table 9-9 presents an average single family bill with the projected annual rate increases for the forecast period, tested against the threshold. The City's rates are forecasted to remain within the indicated affordable range through 2029.

Table 9-9 | Affordability Table

Year	Inflation	Median HH Income[1]	Projected Monthly Bill[2]	% of Median HH Income
2020	2.00%	$92,922	$65.96	0.85%
2021	2.00%	$94,780	$67.19	0/85%
2022	2.00%	$96,676	$68.59	0.85%
2023	2.00%	$98,610	$70.05	0.85%
2024	2.00%	$100,582	$72,15	0.86%
2025	2.00%	$102,593	$74.32	0.87%
2026	2.00%	$104,645	$76.55	0.88%
2027	2.00%	$106,738	$78.84	0.89%
2028	2.00%	$108,873	$81.21	0.90%
2029	2.00%	$111,050	$83.64	0.90%

Notes:
1. Median Income Data: US Census Bureau, 2019 ACS 5-year estimate
2. Assume single family ¾", 14 ccf of bimonthly usage

9.4.4 Consumer Affordability Evaluation

The City has established an Emergency Utility Assistance Program designed to assist low-income customers who have a demonstrated need in paying their utility bills. The program is funded by donations from employees, customers and other. 100 percent of donations are directly used to assist qualifying customers. Eligible recipients can qualify for up to $250 in assistance every 12 months.

In addition to the Emergency Utility Assistance Program, the City has discussed the following other options to improve consumer affordability.

- Senior/low-income bill discounts

- Level billing
- Monthly billing

Currently, the City has not implemented these changes.

9.4.5 Water Use Efficiency

The City has established a rate structure that is conducive to WUE. Single Family customers are charged for usage based on a three-tiered system. As a customer consumes more water, they are charged at a higher rate per ccf. Additionally, the utility is phasing out the usage allowance that has previously been built into the base charge. By 2023, all usage will be billed.

Non-Single Family customers are currently charged for all their usage based on the cost to serve the customers.

9.5 Conclusion

The results of the financial program analysis indicates that annual rate increases are necessary to address current obligations, fund and finance the CIP, and satisfy financial policies. Implementation of the financial program and related rate increases target ongoing financial viability, while maintaining affordable rates. It is recommended that the proposed rate increases be implemented and become effective January 1st of each year, with annual review to ensure no significant deviation of actual performance from projected in maintaining the rate plan.

Appendix

murraysmith

APPENDIX A
WATER FACILITIES INVENTORY FORM

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

WATER FACILITIES INVENTORY (WFI) FORM

ONE FORM PER SYSTEM

Quarter: 1
Updated: 11/27/2019

Printed: 10/21/2020
WFI Printed For: On-Demand
Submission Reason: Pop/Connect Update

RETURN TO: Central Services - WFI, PO Box 47822, Olympia, WA, 98504-7822

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
93400 0	WASHOUGAL CITY OF	CLARK	A	Comm

6. PRIMARY CONTACT NAME & MAILING ADDRESS	7. OWNER NAME & MAILING ADDRESS
RYAN W. BAKER [WATER SUPERINTENDENT] 1701 C STREET WASHOUGAL, WA 98671	WASHOUGAL, CITY OF TREVOR A. EVERS 1701 C STREET WASHOUGAL, WA 98671 PW DIRECTOR
STREET ADDRESS IF DIFFERENT FROM ABOVE	**STREET ADDRESS IF DIFFERENT FROM ABOVE**
ATTN ADDRESS CITY STATE ZIP	ATTN ADDRESS CITY STATE ZIP

9. 24 HOUR PRIMARY CONTACT INFORMATION		10. OWNER CONTACT INFORMATION	
Primary Contact Daytime Phone: (360) 835-8501 x204		Owner Daytime Phone: (360) 835-8501 x202	
Primary Contact Mobile/Cell Phone: (360) 907-5751		Owner Mobile/Cell Phone: (360) 335-7567	
Primary Contact Evening Phone: (xxx)-xxx-xxxx		Owner Evening Phone: (xxx)-xxx-xxxx	
Fax:	E-mail: xxxxxxxxxxxxxxxxxx	Fax:	E-mail: xxxxxxxxxxxxxxxxxx

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] Commercial / Business
- [x] Day Care
- [x] Food Service/Food Permit
- [ ] 1,000 or more person event for 2 or more days per year
- [ ] Hospital/Clinic
- [x] Industrial
- [x] Licensed Residential Facility
- [x] Lodging
- [x] Recreational / RV Park
- [x] Residential
- [x] School
- [ ] Temporary Farm Worker
- [x] Other (church, fire station, etc.): _____

13. WATER SYSTEM OWNERSHIP (mark only one)

- [ ] Association
- [x] City / Town
- [ ] County
- [ ] Federal
- [ ] Investor
- [ ] Private
- [ ] Special District
- [ ] State

14. STORAGE CAPACITY (gallons)

4,076,000

- 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
93400 0	WASHOUGAL CITY OF	CLARK	A	Comm

15	16	17	18										19			20	21						22	23	24			
	SOURCE NAME	INTERTIE	SOURCE CATEGORY										USE				TREATMENT						DEPTH		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
S04	WELL #1 ABR668 CT6 Req.		X										X			Y		X				X	128	900	NW SE	08	01N	04E
S05	WELL #5 ABR670		X										X			Y		X				X	101	650	NW SE	12	01N	03E
S06	WELL #6 AFP633		X										X			Y		X				X	101	630	NW SE	12	01N	03E
S07	WELL #7 AFP632		X										X			Y		X				X	103	800	NW SE	12	01N	03E
S09	InAct 05/01/1988 WELL #9 CAPPED		X												X	N	X						184	495	SE NW	16	01N	04E
S10	InAct 01/11/2007 WELL #10		X												X	N	X						120	450	NE NW	47	01N	04E
S11	WELL #11 ABR669		X										X			Y		X				X	103	1000	NW SE	12	01N	03E
S12	10800\Camas Municipal Water Sewer	10800 2													X	N	X							0			00N	00E
S13	Well #12 APN125 16"		X										X			Y		X				X	72	1500	NW SE	12	01N	03E
S14	Pre-Active 03/21/2019 Well 1R BKX250		X										X			Y	X						68	425	NW NW	08	01N	04E

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
93400 0	WASHOUGAL CITY OF	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?)		5975	Unspecified
A. Full Time Single Family Residences (Occupied 180 days or more per year)	5,104~~4907~~		
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	187 ~~197~~		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	1058		
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)	138	138	
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	309 ~~279~~	279	
28. TOTAL SERVICE CONNECTIONS		6392	

29. FULL-TIME RESIDENTIAL POPULATION

A. How many residents are served by this system 180 or more days per year? ~~16500~~ 16,680

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?	21,130 ~~20950~~	21,130 ~~20950~~	21,130 20950	21,130 ~~20950~~	21,130 ~~20950~~	21,130 ~~20950~~	21,130 ~~20950~~	21,130 ~~20950~~	21,130 ~~20950~~	21,130 ~~20950~~	21,130 20950	21,130 ~~20950~~
B. How many days per month is water accessible to the public?	31	28	31	30	31	30	31	31	30	31	30	31

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?	3,866 ~~4015~~	3,866 ~~4015~~	3,866 ~~4015~~	3,866 ~~4015~~	3,866 ~~4015~~	3,866 ~~4015~~	1080	1080	3,866 ~~4015~~	3,866 ~~4015~~	3,866 ~~4015~~	3,866 ~~4015~~
B. How many days per month are they present?	20	20	20	20	20	20	20	20	20	20	20	20

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	20	20	20	20	20	20	20	20	20	20	20	20

34. NITRATE SCHEDULE	QUARTERLY	ANNUALLY	ONCE EVERY 3 YEARS
(One Sample per source by time period)		X	

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: Ryan D Baker DATE: 12/4/2020

PRINT NAME: Ryan Baker TITLE: Water/Wastewater Superintendent

murraysmith

APPENDIX B
EXISTING SERVICE AREA INTER-LOCAL AGREEMENTS

Resolution No. 1040

A RESOLUTION adopting the revised 2011 Clark County Coordinated Water System Plan; authorizing an Interlocal Agreement for Adjusting or Confirming Future Water Service Area Boundaries; and authorizing a Fire Hydrant Interlocal Agreement pertaining to extraterritorial fire hydrant services.

WHEREAS, the Cities of Washougal, Camas, Battle Ground, La Center, Ridgefield and Vancouver, the Town of Yacolt, Public Utility District No. 1 of Clark County, and Clark County (hereinafter together referred to as "governing bodies") manage aspects of land use, public health, and their respective water systems pursuant to an existing Clark County Coordinated Water System Plan and have established water service boundaries;

AND WHEREAS, the governing bodies have varying roles in developing, reviewing, approving and/or complying with capital facilities and land use planning under the Growth Management Act, as adopted and amended by the State of Washington;

AND WHEREAS, the Public Water System Coordination Act under RCW 70.116 and WAC 246-293-250 require the development of a Coordinated Water System Plan, including the establishment of future water service boundaries;

AND WHEREAS, the governing bodies have determined that it is necessary to revise the existing Coordinated Water System Plan and water service boundaries;

AND WHEREAS, in conjunction with the revisions to the Coordinated Water System Plan and water service boundaries, but under separate agreement, the governing bodies also desire to establish their respective responsibilities regarding extraterritorial fire hydrant services.

NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF WASHOUGAL as follows:

Section I

That the revised 2011 Clark County Coordinated Water System Plan is hereby adopted.

Section II

That the Interlocal Agreement for Adjusting or Confirming Future Water Service Area Boundaries, attached hereto as Exhibit "A," is hereby approved.

Section III

That the Fire Hydrant Interlocal Agreement, attached hereto as Exhibit "B," is hereby approved.

PASSED by the Council of the City of Washougal at regular meeting on the 7th day of November, 2011.

City of Washougal, Washington

Mayor

ATTEST:

Finance Director / City Clerk

APPROVED AS TO FORM:

City Attorney

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

Addendum A

FIRE HYDRANT INTERGOVERNMENTAL AGREEMENT

BETWEEN

THE CITIES OF BATTLE GROUND, CAMAS, LA CENTER, RIDGEFIELD, VANCOUVER, WASHOUGAL; THE TOWN OF YACOLT; CLARK COUNTY; AND CLARK PUBLIC UTILITIES

THIS AGREEMENT, entered into by and between the CITIES OF BATTLE GROUND, CAMAS, LA CENTER, RIDGEFIELD, VANCOUVER, WASHOUGAL; THE TOWN OF YACOLT; CLARK COUNTY; and CLARK PUBLIC UTILITIES (collectively the "Parties"), WITNESS THAT:

WHEREAS, the Parties conduct capital facilities and land use planning under the Growth Management Act as adopted by the State of Washington and subsequently amended; and

WHEREAS, Ch. 70.116 RCW Public Water System Coordination Act, and WAC 246-293-250 require the development of a Coordinated Water System Plan, including the establishment of future water service area boundaries; and

WHEREAS, the Parties intend to revise the existing Coordinated Water System Plan; and

WHEREAS, in conjunction with the revision of the Coordinated Water System Plan, but under the provisions of this separate agreement, the Parties intend to establish their respective responsibilities and obligations regarding the supply and servicing of fire hydrants and related infrastructure (collectively "Fire Hydrants") within the other Parties' jurisdictional boundaries, for general fire protection purposes; and

WHEREAS, Fire Hydrants are currently provided and maintained, or will be provided and maintained in the future, by individual Parties ("Serving Municipality") within the boundaries of another Municipality ("Benefited Municipality"); and

WHEREAS, it is recognized that the Benefited Municipality has an obligation to reimburse the Serving Municipality for providing and/or maintaining those Fire Hydrants.

NOW THEREFORE, in accordance with the Interlocal Cooperation Act (Ch. 39.34 RCW) and in consideration of covenants, conditions, performances, and promises hereinafter contained, the undersigned Parties hereto agree to the following:

I. Purpose

The purpose of this Agreement is to establish the Parties respective responsibilities and obligations regarding the supply and servicing of fire hydrants and related infrastructure within the other Parties' jurisdictional boundaries.

II. Effective Date

This Agreement shall become effective upon the occurrence of both the approval of this Agreement by the individual Parties' governing bodies and the execution of this document by their authorized representatives.

III. Duration

This Agreement shall remain effective with regard to the individual Parties until terminated. Such termination shall be effective one (1) year after the Party provides written notice (to all the other Parties) of such intent to terminate their participation in this Agreement.

IV. Property

Nothing in this Agreement shall create or transfer any real or personal property interest amongst the Parties.

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 Parties.

VI. Scope

If a Benefited Municipality wants the Serving Municipality to supply and/or service Fire Hydrants, within the Benefited Municipality's territorial boundaries, without making direct payment to the Serving Municipality for such services, Fire Hydrants shall be

provided to the Benefited Municipality by the Serving Municipality under the following conditions:

1) If the Serving Municipality currently provides general water services within the boundaries of the Benefited Municipality, and the Benefited Municipality does not provide potable water services, the Benefited Municipality shall not develop its own potable water system to compete with the Serving Municipality.

2) If the Serving Municipality currently provides general water services within the boundaries of the Benefited Municipality, and the Benefited Municipality also provides general water services within its territorial boundaries, the Benefited Municipality shall not offer competing potable water service to the Serving Municipality's existing water customers in that service area. This provision, however, does not prohibit the transfer of water customers by mutual agreement between the Parties.

3) The Benefited Municipality authorizes the Serving Municipality to occupy its right-of-way, for water utility purposes, within the Benefited Municipality's territorial boundaries. Such authorization is provided without cost or fee.

4) The Benefited Municipality shall not assess any fee(s) for permits, plan reviews, or review of other general maintenance activities of the Serving Municipality.

5) The Benefited Municipality shall not charge the Serving Municipality for its assistance (staff time) for the review and coordination of Capital Facility Plans, construction documents, Growth Management Plans, and water resource documents.

6) By providing these services, the Serving Municipality shall not be obligated to provide or maintain additional Fire Hydrants beyond the existing facilities currently maintained by the Serving Municipality or beyond agreed service areas. Service areas, if any, will be designated in a written document signed by both the Benefited Municipality and the Serving Municipality. Nothing in this Agreement obligates the Serving Municipality to provide general fire protection services within the Benefited Municipality's boundaries.

7) The Serving Municipality shall not assess a fee or other charge to the Benefited Municipality for providing Fire Hydrants, after the Effective Date of this Agreement, within the Benefited Municipality. The Parties recognize the mutual benefit and value of the exchange of services noted above and accept this exchange as fair and equitable compensation for these services.

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 both Parties that this Agreement shall be governed by the laws of the State of Washington. Venue shall be Clark County, Washington.

VIII. AMENDMENTS/MODIFICATION

The provisions of this Agreement may be amended only upon the mutual consent of the Parties. No additions to, or alterations of, the terms of this Agreement shall be valid unless made in writing and formally approved and executed by the duly authorized agents of the Parties.

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 Parties with respect to the subject matter covered or mentioned therein, and no prior Agreement shall be effective to the contrary.

XI. DOCUMENT FILING

The Parties agree that there shall be one (1) original of this Agreement procured and distributed for signature by the necessary officials of the Parties. Upon execution, this Agreement shall be retained by Clark Public Utilities and one copy shall be retained by each of the other Parties. Clark Public Utilities shall cause a copy of this Agreement to be recorded with the Clark County Auditor. Upon execution of the original and filing of a copy with the Clark County Auditor, each copy shall constitute an agreement binding upon all Parties.

IN WITNESS THEREOF, the undersigned Parties have caused this Agreement to be executed in their respective names by their duly authorized officers on the dates as set forth below.

_____ Date _____

John M. Williams, City Manager
City of Battle Ground

_____ Date _____

Mayor Scott Higgins
City of Camas

_____ Date _____

Commissioner Tom Mielke, Chair
Clark County Board of Commissioners

_____ Date _____

Wayne Nelson, General Manager
Clark Public Utilities

_____ Date _____

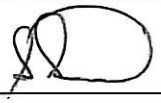
Mayor James T. Irish
City of La Center

_____ Date _____

Justin Clary, City Manager
City of Ridgefield

_____ Date _____

Eric Holmes, City Manager
City of Vancouver



_____ Date Oct. 17, 2011

Mayor Sean Guard
City of Washougal

_____ Date _____

Mayor James Weldon
Town of Yacolt

Addendum B

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

THIS AGREEMENT, entered into by and between the CITIES OF BATTLE GROUND, CAMAS, RIDGEFIELD, VANCOUVER, WASHOUGAL and CLARK PUBLIC UTILITIES, (hereinafter referred to as the Water Purveyors), WITNESS THAT:

WHEREAS, Clark County and the city 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 the development of a Coordinated Water System Plan, including the establishment of Future Water Service Area boundaries; and

WHEREAS, the designation of Future Water Service Area boundaries will help facilitate efficient planning and delivering of water services within Clark County, avoid unnecessary duplication of water services and foster water operation predictability for the Water Purveyors, Clark County and the residents served by public water systems; and

WHEREAS, the designation of Future Water Service Area boundaries will help assure that available water supply sources for the Water Purveyors will be utilized in an efficient manner.

NOW THEREFORE, in consideration of covenants, conditions, performances and promises hereinafter contained, the undersigned Water Purveyors hereto agree to the following:

I. PURPOSE

The purpose of this agreement is to adjust or confirm Future Water Service Area boundaries of the Water Purveyors that are parties to this agreement.

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, and the approval of this Agreement by the Clark County Board of Commissioners.

III. DURATION

This Agreement shall remain effective with regard to the individual Water Purveyors until terminated. Such termination shall occur 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 the 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 pursuant to this Agreement.

VI. SCOPE

1. *Services Area Boundaries*. The maps identifying the Future Water Service Area boundaries dated July 2011 and attached to this Agreement as Exhibit A accurately identify the water systems' Future Water Service Areas, and there are no service conflicts with adjacent Water Purveyors.

2. *Boundary Streets*. Where streets or portions of streets serve as a Future Water Service Area boundary, both Water Purveyors may extend service within the street. The Water Purveyor that is located to the north and/or east of the portion of the street serving as a boundary shall also be entitled to extend service across the water service area boundary to properties abutting the street. Any other service extensions into adjacent Future Water Service Areas shall require written agreement of the involved Water Purveyors.

3. *Boundary Adjustments.* If at some time in the future it is in the best interests of the undersigned Water Purveyors to make Future Water Service Area boundary adjustments, such modifications shall have the written concurrence of the involved Water Purveyors and Clark County, and shall be filed with Clark County GIS and Community Planning, and the Washington State Department of Health.

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 therein, and no prior Agreement shall be effective to the contrary.

XI. 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 Clark Public Community Planning and one copy shall be retained by each of the other Water Purveyors. Clark County Community Planning shall cause a copy of this Agreement to be recorded with the Clark County Auditor. Upon execution of the original and filing of a copy with the Clark

County Auditor, each copy shall constitute an agreement binding upon all Water Purveyors.

This agreement shall become effective once it is approved by the Clark County Board of Commissioners, as specified in WAC 246-293-250 Future *Water Service Area Agreements.*

This Interlocal Agreement for Adjusting or Confirming Future Water Service Area Boundaries is hereby approved:

_____ Date _____

John M. Williams, City Manager
City of Battle Ground

_____ Date _____

Mayor Scott Higgins
City of Camas

_____ Date _____

Wayne Nelson, General Manager
Clark Public Utilities

_____ Date _____

Justin Clary, City Manager
City of Ridgefield

_____ Date _____

Eric Holmes, City Manager
City of Vancouver

_____ Date Oct. 17, 2011

Mayor Sean Guard
City of Washougal

APPROVED BY THE CLARK COUNTY BOARD OF COMMISSIONERS

_____ Attest: _____

Commissioner Tom Mielke, Chair
Clark County Board of Commissioners

Rebecca Tilton
Clerk to the Board

Resolution No. _____

Date: _____

Approved as to form:

_____

Christine Cook
Deputy Prosecuting Attorney

murraysmith

APPENDIX C
LOCAL GOVERNMENT CONSISTENCY DETERMINATION

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Local Government Consistency Determination Form

Water System Name: City of Washougal PWS ID: 93400

Planning/Engineering Document Title: Water System Plan Update Plan Date: December 2020

Local Government with Jurisdiction Conducting Review: City of Washougal

Before the Department of Health (DOH) approves a planning or engineering submittal under Section 100 or Section 110, the local government must review the documentation the municipal water supplier provides to prove the submittal is consistent with **local comprehensive plans, land use plans and development regulations** (WAC 246-290-108). Submittals under Section 105 require a local consistency determination if the municipal water supplier requests a water right place-of-use expansion. The review must address the elements identified below as they relate to water service.

By signing this form, the local government reviewer confirms the document under review is consistent with applicable local plans and regulations. If the local government reviewer identifies an inconsistency, he or she should include the citation from the applicable comprehensive plan or development regulation and explain how to resolve the inconsistency, or confirm that the inconsistency is not applicable by marking N/A. See more instructions on reverse.

	For use by water system	For use by local government
Local Government Consistency Statement	**Identify the page(s) in submittal**	**Yes or Not Applicable**
a) The water system service area is consistent with the adopted land use and zoning within the service area.	Figure 1-4	Yes
b) The growth projection used to forecast water demand is consistent with the adopted city or county's population growth projections. If a different growth projection is used, provide an explanation of the alternative growth projection and methodology.	Pages 2-9, 2-10	Yes
c) For cities and towns that provide water service: All water service area policies of the city or town described in the plan conform to all relevant utility service extension ordinances.	Pages 1-11, 1-12	Yes
d) Service area policies for new service connections conform to the adopted local plans and adopted development regulations of all cities and counties with jurisdiction over the service area.	Pages 1-11, 1-12	Yes
e) Other relevant elements related to water supply are addressed in the water system plan, if applicable. This may include Coordinated Water System Plans, Regional Wastewater Plans, Reclaimed Water Plans, Groundwater Management Area Plans, and the Capital Facilities Element of local comprehensive plans.	Page 1-9	Yes

I certify that the above statements are true to the best of my knowledge and that these specific elements are consistent with adopted local plans and development regulations.

Signature

1/27/2021
Date

Mitch Kneipp, Community Development Director, City of Washougal
Printed Name, Title, & Jurisdiction

Consistency Review Guidance

For Use by Local Governments and Municipal Water Suppliers

This checklist may be used to meet the requirements of WAC 246-290-108. When using an alternative format, it must describe all of the elements; 1a), b), c), d), and e), when they apply.

For **water system plans (WSP)**, a consistency review is required for the service area and any additional areas where a municipal water supplier wants to expand its water right's place of use.

For **small water system management programs**, a consistency review is only required for areas where a municipal water supplier wants to expand its water right's place-of-use. If no water right place-of-use expansion is requested, a consistency review is not required.

For **engineering documents,** a consistency review is required for areas where a municipal water supplier wants to expand its water right's place-of-use (water system plan amendment is required). For noncommunity water systems, a consistency review is required when requesting a place-of-use expansion. All engineering documents must be submitted with a service area map (WAC 246-290-110(4)(b)(ii)).

A) Documenting Consistency: The planning or engineering document must include the following when applicable.

a) A copy of the adopted **land use/zoning** map corresponding to the service area. The uses provided in the WSP should be consistent with the adopted land use/zoning map. Include any other portions of comprehensive plans or development regulations that relate to water supply planning.

b) A copy of the **growth projections** that correspond to the service area. If the local population growth projections are not used, explain in detail why the chosen projections more accurately describe the expected growth rate. Explain how it is consistent with the adopted land use.

c) Include water service area policies and show that they are consistent with the **utility service extension ordinances** within the city or town boundaries. *This applies to cities and towns only.*

d) All **service area policies** for how new water service will be provided to new customers.

e) **Other relevant elements** the Department of Health determines are related to water supply planning. See Local Government Consistency – Other Relevant Elements, Policy B.07, September 2009.

B) Documenting an Inconsistency: Please document the inconsistency, include the citation from the comprehensive plan or development regulation, and explain how to resolve the inconsistency.

C) Documenting a Lack of Local Review for Consistency: Where the local government with jurisdiction did not provide a consistency review, document efforts made and the amount of time provided to the local government for review. Please include: name of contact, date, and efforts made (letters, phone calls, and emails). To self-certify, please contact the DOH Planner.

The Department of Health is an equal opportunity agency. For persons with disabilities, this document is available on request in other formats. To submit a request, please call 1-800-525-0127 (TTY 1-800-833-6388).

murraysmith

APPENDIX D
WATER SERVICE AND RATE POLICIES

Chapter 3.91
WATER RATES, CHARGES

Sections:

3.91.010 Schedule.

3.91.015 Water bill due date.

3.91.020 Unlisted services.

3.91.030 Unoccupied premises.

3.91.040 Turn-off – Turn-on.

3.91.050 New connections.

3.91.060 *Repealed.*

3.91.061 Collection of excise taxes on water connection fees.

3.91.065 Latecomer charges for sewer or water main or lateral line extension.

3.91.070 Subject to change without notice.

3.91.080 Special contracts.

3.91.090 Unusual customer requirements.

3.91.100 City liability.

3.91.120 Chargeable to premises supplied – Lien.

3.91.125 Billing date.

3.91.130 Payment delinquency – Service cut off.

3.91.134 *Repealed.*

3.91.135 Responsibility of property owner.

3.91.138 Sale of property.

3.91.140 Meter removal, inspection.

3.91.150 Water and garbage bill – Prepaid.

3.91.170 Application of remittances.

3.91.190 System development charge.

3.91.200 System development charge refunds.

3.91.210 Charges for replacement of a structure.

3.91.220 Water service modifications.

3.91.010 Schedule.

(1) The bimonthly water service charge for customers located within the service area of Washougal, according to classification established in this section, is as designated in subsection (10) of this section. The base charge is charged according to meter size as shown in Table 1 – Base Usage. Additional volume charges beyond the base usage are identified in Table 2 – Additional Volume Charges.

(2) As the water, sewer and stormwater department billings are handled through the same office and billed on a common bill, all services will be billed on a bimonthly basis as herein provided for water collection. The right to bill accounts on a monthly basis is reserved and may be implemented without further council action. If monthly billing is requested by the customer, the finance director shall be authorized to add an administrative fee to cover the costs of additional processing and any additional meter readings requested.

(3) Water and sewer service provided to buildings under construction will be billed to the property owner commencing with the period when a water meter is installed.

(4) In the event that water bills are not paid by the last day of the month following billing, the customers failing to pay shall be assessed a late charge of $10.00 or 10 percent of the past due amount, whichever is greater. If the last day of the month falls on a weekend or holiday, the next business day following shall be treated as the last day of the month.

(5) If more than one classification of service is maintained in the same or adjoining quarters in one structure, and use the same service pipe, then the base rate shall be the total of all classifications of service. Any excess usage over the composite minimum shall be charged based on the largest meter classification.

(6) For clarification purposes, each separate housekeeping establishment is considered as one unit and individual business establishment occupying individual quarters and under one structure is considered one unit.

(7) In calculating the domestic water consumption, deductions shall be made in units of 100 cubic feet and in making such deductions the two right-hand digits of the meter reading shall not be considered.

(8) Should any meter fail to register correctly, or if a leak should be detected, the city may adjust the billing accordingly.

It is the property owner’s responsibility to fix the leak and the city will adjust up to two billing cycles affected by the corrected leak.

(9) 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.

(10) Bimonthly Metered Rates.

Table 1 – Base Usage – Inside City

Meter Size	Bimonthly Base Charge – Inside City									
	Effective 1/1/2019	SF Allowance (CCF)	Effective 1/1/2020	SF Allowance (CCF)	Effective 1/1/2021	SF Allowance (CCF)	Effective 1/1/2022	SF Allowance (CCF)	Effective 1/1/2023	SF Allowance (CCF)
3/4"	$39.57	4	$40.76	3	$41.98	2	$43.24	1	$44.54	0
1"	$45.20	4	$46.56	3	$47.95	2	$49.39	1	$50.87	0
1 1/2"	$75.22	–	$77.47	–	$79.80	–	$82.19	–	$84.66	–
2"	$110.30	–	$113.61	–	$117.02	–	$120.53	–	$124.15	–
3"	$231.23	–	$238.17	–	$245.31	–	$252.67	–	$260.25	–
4"	$349.03	–	$359.50	–	$370.29	–	$381.40	–	$392.84	–
6"	$585.30	–	$602.86	–	$620.95	–	$639.58	–	$658.77	–
8"	$976.51	–	$1,005.81	–	$1,035.98	–	$1,067.06	–	$1,099.07	–

Table 1 – Base Usage – Outside City

Meter Size	Bimonthly Base Charge – Outside City									
	Effective 1/1/2019	SF Allowance (CCF)	Effective 1/1/2020	SF Allowance (CCF)	Effective 1/1/2021	SF Allowance (CCF)	Effective 1/1/2022	SF Allowance (CCF)	Effective 1/1/2023	SF Allowance (CCF)
3/4"	$63.31	4	$65.22	3	$67.17	2	$69.18	1	$71.26	0
1"	$72.32	4	$74.50	3	$76.72	2	$79.02	1	$81.39	0
1 1/2"	$120.35	–	$123.95	–	$127.68	–	$131.50	–	$135.46	–
2"	$176.48	–	$181.78	–	$187.23	–	$192.85	–	$198.64	–
3"	$369.97	–	$381.07	–	$392.50	–	$404.27	–	$416.40	–
4"	$558.45	–	$575.20	–	$592.46	–	$610.24	–	$628.54	–
6"	$936.48	–	$964.58	–	$993.52	–	$1,023.33	–	$1,054.03	–
8"	$1,562.42	–	$1,609.30	–	$1,657.57	–	$1,707.30	–	$1,758.51	–

Table 2 – Volume Charges – Inside City

Customer Class	Volume Charge – Inside City				
	Effective 1/1/2019	Effective 1/1/2020	Effective 1/1/2021	Effective 1/1/2022	Effective 1/1/2023
Single-family					
Block 1: 0 – 12 CCF	$3.70	$3.27	$2.94	$2.68	$2.47
Block 2: 12 – 30 CCF	$5.95	$6.13	$6.31	$6.50	$6.70
Block 3: Over 30 CCF	$7.45	$7.68	$7.91	$8.14	$8.39
Multifamily	$4.12	$4.25	$4.37	$4.50	$4.64
Commercial (all other uses than SF/MF)	$4.08	$4.21	$4.33	$4.46	$4.60
Large commercial (commercial users averaging > 5,000 CCF)	$2.53	$2.62	$2.71	$2.81	$2.91

Table 2 – Volume Charges – Outside City

Customer Class	Volume Charge – Outside City				
	Effective 1/1/2019	Effective 1/1/2020	Effective 1/1/2021	Effective 1/1/2022	Effective 1/1/2023
Single-family					
Block 1: 0 – 12 CCF	$5.92	$5.23	$4.70	$4.29	$3.95
Block 2: 12 – 30 CCF	$9.52	$9.81	$10.10	$10.40	$10.72
Block 3: Over 30 CCF	$11.92	$12.29	$12.66	$13.02	$13.42
Multifamily	$6.59	$6.80	$6.99	$7.20	$7.42
Commercial (all other uses than SF/MF)	$6.53	$6.74	$6.93	$7.14	$7.36
Large commercial (comm. > 5,000 CCF)	$4.05	$4.19	$4.34	$4.50	$4.66

(11) Temporary Hydrant Rental. Water may be temporarily withdrawn from a fire hydrant for temporary purposes, including, but not limited to, construction activities, testing, dust control and when a permanent connection is not available. Temporary withdrawal shall be limited in both time and quantity and shall not be done on a regular or recurring schedule, as determined by the director of public works. For uses other than temporary, a dedicated permanent connection shall be installed. To temporarily withdraw water from a fire hydrant, a water meter and inspection of the method of withdrawal are required. The following fees apply:

Meter deposit	$300.00
Installation fee	35.00
Monthly rental fee	
Inside city	4.50
Outside city	6.75

The fee for the water used will be charged pursuant to Table 2 of subsection (10) of this section for volume charges for commercial uses.

Meter deposit fee will be refunded upon return of the meter in satisfactory condition.

(12) Other Temporary Water Use. Water for temporary use of limited duration and quantity to be dispensed to a truck or vessel may be purchased for a daily use fee of $50.00 per fill up. Standards for the purchase and dispensing of qualifying limited duration and quantity temporary water use shall be as determined by the public works director. Trucks and receiving vessels are subject to inspection to verify compliance with cross-connection control regulations to ensure the safety of the public water system.

(13) Date Range. If a date range for monthly service charge rates has expired, then the monthly service charge under this chapter shall remain at the latest established rate as shown in the rate table adopted under subsection (10) of this section, until such rate table is amended. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1797 § 1 (Exh. A), 2016; Ord. 1785 § 2 (Exh. A), 2015; Ord. 1748 § 1 (Exh. A), 2013; Ord. 1733 § 1 (Exh. A), 2013; Ord. 1731 § 1 (Exh. A), 2012; Ord. 1682 § 1, 2010; Ord. 1675 § 1 (Exh. A), 2010; Ord. 1647 § 1 (Exh. A), 2009; Ord. 1596 § 1 (Exh. A), 2007; Ord. 1578 § 1 (Exh. A), 2007; Ord. 1537 § 1, 2005; Ord. 1533 § 1, 2005; Ord. 1501 § 1, 2005; Ord. 1440 § 1, 2002; Ord. 1425 § 2 (Exh. A), 2001; Ord. 1412 § 1 (Exh. A), 2001; Ord. 1392 § 1 (Exh. A), 2000; Ord. 1346 § 1, 1999; Ord. 1344 § 2, 1999; Ord. 1328 § 1 (Exh. A), 1998; Ord. 1297 § 1 (Exh. A), 1998; Ord. 1274 § 1 (Exh. A), 1998; Ord. 1218 § 1, 1996; Ord. 1186 § 1, 1995; Ord. 1145 § 1, 1994; Ord. 1123 § 1 (Exh. A), 1993; Ord. 1104 § 1 (Exh. A), 1993; Ord. 1087 § 1 (Exh. A), 1992; Ord. 1059 § 1, 1991; Ord. 1018 § 1, 1990; Ord. 969 (Exh. A), 1989; Ord. 874 § 1, 1987; Ord. 853 § 1, 1985; Ord. 808 § 1, 1983; Ord. 752 § 1, 1980; Ord. 746 § 1, 1980; Ord. 739 § 1, 1980; Ord. 716 § 1, 1979; Ord. 673 § 1, 1978; Ord. 649 § 1, 1977; Ord. 533 § 1, 1974; Ord. 413 § 1, 1980; Ord. 240 Art. 5 § 1, 1958. Formerly 13.20.010)

3.91.015 Water bill due date.

All charges for water shall be due upon receipt and payable at the office of the city clerk following mailing of the water bills by the city. All payments and collections for domestic water service should be paid into the water revenue funds. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 1412 § 1 (Exh. A), 2001; Ord. 1406 § 1, 2001. Formerly 13.20.015)

3.91.020 Unlisted services.

All other services for which a rate or charge is not specifically listed in WMC 3.91.010 shall be charged to the customer on the basis of time and material furnished plus administrative costs. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 1140 § 1, 1994; Ord. 240 Art. 5 § 2, 1958. Formerly 13.20.020)

3.91.030 Unoccupied premises.

There shall be no credit for vacant or unoccupied premises as to domestic water service; provided, that in the following instances the regular charges may be amended as follows:

At the customer's option, upon written notice to the director and turning off of domestic water service, charges for domestic water and sewer service shall cease until such time as the director has turned domestic water on again following notice by consumer to do so. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 1344 § 2, 1999; Ord. 1140 § 1, 1994; Ord. 240 Art. 5 § 3, 1958. Formerly 13.20.030)

3.91.040 Turn-off – Turn-on.

A turn-off, turn-on charge of $20.00 shall be made for turning off the water during normal business hours and later turning the water on. If the service is turned off for the purpose of installing or repairing a shut-off valve on the premises the charge will be waived. An emergency turn-off, turn-on charge shall be made for services performed during other than normal working hours unless special arrangements are made. The charge for emergency service will include two hours of call back time at the overtime rate, plus the time worked and equipment used. This charge is to represent the actual costs to the city for the service provided. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 1344 § 2, 1999; Ord. 1104 § 1 (Exh. A), 1993; Ord. 240 Art. 5 § 4, 1958. Formerly 13.20.040)

3.91.050 New connections.

In the case of all future new connections, the following connection and inspection charges shall be paid to the city by the person desiring to make such connections, which charges shall be payable at the time application is made for a permit to perform the work and make the connection:

Meter Installation:	**Inside City**	**Outside City**
Meter set only	Cost Recovery	Cost Recovery

(Ord. 1896 § 1 (Exh. A), 2019; Ord. 1853 § 2 (Exh. A), 2018; Ord. 1580 § 1 (Exh. A), 2007; Ord. 1533 § 1, 2005; Ord. 1518 § 1, 2005; Ord. 1276 § 1 (Exh. A), 1998; Ord. 1104 § 1 (Exh. A), 1993; Ord. 740 § 1, 1980; Ord. 536 § 1, 1975; Ord. 506 § 1, 1973; Ord. 392 § 1, 1969; Ord. 240 Art. 5 § 5, 1958. Formerly 13.20.050)

3.91.060 Connection to main – Costs.

Repealed by Ord. 1853. (Ord. 1533 § 1, 2005; Ord. 1344 § 2, 1999; Ord. 1104 § 1 (Exh. A), 1993; Ord. 816 § 1, 1983; Ord. 485 § 1, 1972; Ord. 240 Art. 5 § 6, 1958. Formerly 13.20.060)

3.91.061 Collection of excise taxes on water connection fees.

Excise taxes shall be charged on the amount of connection fees and collected from the customer at the current amount established by the State of Washington Department of Revenue. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 1114, 1993. Formerly 13.20.061)

3.91.065 Latecomer charges for sewer or water main or lateral line extension.
When a sewer or water main or lateral line is extended in accordance with the city's water and sewer plans and such cost is absorbed entirely by the property owner who has requested the hookup to city utilities, then future assessment for hookup to that line shall be paid to the original property owner until such time as the verified cost of extending the line has been repaid, or a period of 10 years has lapsed, whichever shall first occur. After that, all latecomer charges will accrue to the city. It is specifically understood that only area assessment and front footage charges shall be used in paying latecomer charges to such property owner.

If a property owner(s) is required to construct off-site utilities that benefit adjacent owners, a special latecomer's agreement can be granted by the city council. The request for consideration of a special latecomer's fee is to be filed with the public works department. The request should include a proposed area of assessment. Following the public works department review, the request will be forwarded to the city council for consideration.

Further, the charges to the original property owner who installed the line, i.e., the area assessment and front footage charge, shall also be subtracted from the cost of the original line when computing the amount of latecomer charges due. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 1288 § 1 (Exh. A), 1998; Res. 280, 1980. Formerly 13.20.065)

3.91.070 Subject to change without notice.
Except for special contracts, which specify the length of time to which the contract rates shall be extended, all rates, rules and regulations are subject to change or modification by the city without notice. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 240 Art. 5 § 7, 1958. Formerly 13.20.070)

3.91.080 Special contracts.
The city reserves the right to make special contracts, the provisions and conditions of which may be different from or have exceptions to the regular published rates. Such special contracts shall be in writing and signed by proper city officials and the customer to be served. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 240 Art. 5 § 8, 1958. Formerly 13.20.080)

3.91.090 Unusual customer requirements.
When a customer's requirements for water are unusual or large or necessitate considerable special or reserve equipment or special consideration, the city may require a contract for the extended period and may also require the person or customer to furnish security satisfactory to the city to protect the city against loss and guarantee of the performance of the provisions of the contract. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 240 Art. 5 § 9, 1958. Formerly 13.20.090)

3.91.100 City liability.
The city shall pay to the water department from the current expense fund the following amounts:

(1) For all water used in public buildings, parks and cemeteries, an amount figured at regular rates for each service installed. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 892, 1987; Ord. 240 Art. 5 § 10, 1958. Formerly 13.20.100)

3.91.120 Chargeable to premises supplied – Lien.
All charges for furnishing water within or without the corporate limits of the city shall be chargeable to the premises where water is supplied, and all charges for water connections and service provided in this chapter, or as it may be hereafter amended, together with penalties and interest thereon shall be a lien upon the property with which such connections are made or to which domestic water service is rendered, superior to all other liens and encumbrances whatsoever, except for general taxes and local special assessments. Enforcement of such lien or liens shall be in the manner provided by law. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 1344 § 2, 1999; Ord. 240 Art. 5 § 12, 1958. Formerly 13.20.120)

3.91.125 Billing date.
Billings for water, sewer and refuse will usually be mailed on the last business day of each month. A payment is considered made when it is receipted by a cashier during business hours at the payment office in City Hall. Should the last day of a month fall on a weekend or holiday, the delinquency and/or cutoff date will be the next business day after that weekend or holiday. The city will provide a drop box for payments after hours. Payments made by drop box may not be considered paid until the following business day. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 1344 § 2, 1999. Formerly 13.20.125)

3.91.130 Payment delinquency – Service cut off.
As an additional and concurrent method of enforcing the lien of the city for domestic water charges, the superintendent is authorized to terminate service between the fifteenth and twentieth of the month after the date of the first delinquency. All charges together with the additional sum of $20.00 if turned on during business hours and $50.00 if turned on after business hours must be paid prior to turn-on. If termination of service does not occur on the above dates, we reserve the right to still do so at a later time if payment is still outstanding. Payment arrangements may be made at the discretion of the finance director or his designee; provided, that any arranged payments missed will result in immediate shut-off. Returned payments will be treated as a missed payment.

Partial payments shall be posted as follows: miscellaneous, recycling, garbage tax, garbage, sewer and water. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 1412 § 1 (Exh. A), 2001; Ord. 1344 § 2, 1999; Ord. 1140 § 1, 1994; Ord. 1133 § 1 (Exh. A), 1994; Ord. 853 § 2, 1985; Ord. 646 § 1, 1977; Ord. 583 § 1, 1976; Ord. 240 Art. 5 § 13, 1958. Formerly 13.20.130)

3.91.134 Rental properties.
Repealed by Ord. 1633. (Ord. 1533 § 1, 2005; Ord. 1344 § 2, 1999. Formerly 13.20.134)

3.91.135 Responsibility of property owner.
All accounts of water, sewer and stormwater shall be kept in the name of the legal owner of record of the property and not in the name of the tenant; the owner of the property or the authorized agent shall be responsible for all utility charges. Utility bills will be sent to the address where services are provided unless owner or owner's legally authorized agent specifies in writing a different address for billing purposes. All accounts that are not in the name (for all uses in this section) of the legal owner or authorized agent at the time of passage of the ordinance codified in this section shall have until June 30, 2010, to comply with the provisions of this section. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1633 § 1 (Exh. A), 2009)

3.91.138 Sale of property.

When the sale of the real property occurs, it is the responsibility of the purchaser to contact the City Hall billing office and to make arrangements for water, sewer and refuse service. It is not the responsibility of the city to enforce payment of any billing which was against the property at the time of the sale against the seller. The billing and any liens against the property will remain against the property. The city will take no action to enforce payment of billings due at the sale date against the seller. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 1344 § 2, 1999. Formerly 13.20.138)

3.91.140 Meter removal, inspection.

Should at any time a customer receiving water service through one of the water department's meters request in writing to the water department that the meter be removed and checked for accuracy, such service will be performed for a charge of $10.00. Should the meter on checking be found to be delivering the amount equal to or greater than that recorded by the meter, the consumer so requesting the service shall become liable for the charge. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 240 Art. 5 § 14, 1958. Formerly 13.20.140)

3.91.150 Water and garbage bill – Prepaid.

As water, sewer and garbage are billed on a common bill and paid through the same office, the city shall not accept nor receive prepaid water charges except when the customer will also and does prepay his sewer and garbage bill for the same length of time as he prepays the water bill. Prepaid water, sewer and garbage collections will not be refunded to the customer. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 1344 § 2, 1999; Ord. 240 Art. 5 § 15, 1958. Formerly 13.20.150)

3.91.170 Application of remittances.

All remittances received in payment of accounts shall be applied to payment of the month or months furthest in arrears for the property chargeable and for which property the payment is received. Remittances shall first be applied in the following order: solid waste, recycling, tax, miscellaneous charges, sewer and water. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 1344 § 2, 1999; Ord. 240 Art. 5 § 17, 1958. Formerly 13.20.170)

3.91.190 System development charge.

(1) System Development Charge.

Meter Size	MCE	Charge
3/4"	1.00	$4,418.00
1"	1.67	$7,378.06
1.5"	3.33	$14,711.94
2"	5.33	$23,547.94
3"	10.00	$44,180.00
4"	16.67	$73,648.06
6"	33.33	$147,251.94

8"	53.33	$235,611.94

Charges shown represent minimum system development charges. System development charges for each of these service types will be reviewed by the director of public works to calculate supplemental fees, if any. Supplemental fees are used when sewage generation within the service type is found to be beyond expected standards. All supplemental fees require city council approval.

(2) A system development charge shall be paid for each service line based on meter size. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1572 § 1, 2006; Ord. 1533 § 1, 2005; Ord. 1276 § 1 (Exh. A), 1998; Ord. 1226 § 1 (Exh. A), 1997; Ord. 1157 § 1, 1995; Ord. 1104 § 1 (Exh. A), 1993; Ord. 621 § 1, 1977. Formerly 13.20.190)

3.91.200 System development charge refunds.

In the event the city receives system development charges due to mistake, error or misunderstanding, the same may be refunded only by council action. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 686 § 1, 1978. Formerly 13.20.200)

3.91.210 Charges for replacement of a structure.

When another structure or new residence unit or multifamily or commercial structure is placed on the property and water charges have already been paid for on a single unit, then the charges for the replacement unit shall be controlled by WMC 3.92.120. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1533 § 1, 2005; Ord. 761 § 1, 1980. Formerly 13.20.210)

3.91.220 Water service modifications.

Any water service modifications requested by a property owner shall be billed by the city on a time and material basis with a minimum charge of $250.00. (Ord. 1853 § 2 (Exh. A), 2018; Ord. 1656 § 1 (Exh. A), 2010)

Title 13
WATER

Chapters:

13.04 Definitions

13.08 *Repealed*

13.12 Service

13.14 Water Conservation

13.16 *Repealed*

13.20 *Recodified*

13.24 Mains

13.28 Meters

13.32 General Regulations

13.36 City Responsibility

13.40 Cross Connection Control

Chapter 13.04
DEFINITIONS

Sections:

13.04.010 Director.

13.04.020 Person.

13.04.030 Domestic water or domestic water system.

13.04.010 Director.

"Director" means the director of public works or his authorized deputy, agent or representative. (Ord. 1140 § 1, 1994; Ord. 492 § 2, 1973; Ord. 240 Art. 1, § 1, 1958)

13.04.020 Person.

"Person" means any individual, firm, company, association, society, corporation or group. (Ord. 240 Art. 1, § 2, 1958)

13.04.030 Domestic water or domestic water system.

"Domestic water" or "domestic water system" means that water, and the water system in which it is carried, which is for human consumption and normal household and business or industrial uses provided from the city's supply. (Ord. 240 Art. 1, § 3, 1958)

Chapter 13.08
DEPARTMENT PERSONNEL

(Repealed by Ord. 1876)

Chapter 13.12
SERVICE

Sections:

13.12.010 Application procedure.

13.12.020 Accepted application considered.

13.12.040 Location change – Cost provisions.

13.12.050 New pipes.

13.12.060 Owner responsibility for leaks – Meters to be city responsibility.

13.12.070 Out-of-town service.

13.12.010 Application procedure.

All application for water service installations and for water service shall be made at the office of the director on forms furnished by the city which applicant shall supplement with such information as deemed necessary by the director. All applications shall be made by the owner of the property to be served or his authorized agent, and all accounts shall be in the name of the owner of such property. No person shall make any connection with either the domestic system or add to an existing connection with any additional unit without first obtaining a permit as herein required. Water meters shall be installed by the city on all domestic water service lines as required herein. (Ord. 1140 § 1, 1994; Ord. 240 Art. 3 § 1, 1958)

13.12.020 Accepted application considered.

In case the premises of the application for water service are connected for service as a result of his application being accepted, the application given in writing shall be considered as a contract in which the applicant agrees to abide by such rates, rules and regulations as are in effect at the time of signing the application or as may be adopted thereafter by the city, and to pay all bills promptly. (Ord. 240 Art. 3 § 2, 1958)

13.12.040 Location change – Cost provisions.

When it is necessary for the convenience of the city or because of the installation of new water mains, or for any other reason, to change an existing domestic water meter, or domestic water service location, such new location shall be made at the cost and expense of the water department, except that the property owner shall reinstall his domestic water service pipes to connect with the water meter as relocated at his own expense. (Ord. 240 Art. 3 § 4, 1958)

13.12.050 New pipes.

All new service pipes shall be placed not less than 18 inches below the surface of the ground. (Ord. 240 Art. 3 § 5, 1958)

13.12.060 Owner responsibility for leaks – Meters to be city responsibility.

Owners of services are responsible for all leaks or damage on account of leaks from privately owned services. Privately owned services shall include all domestic service lines lying in or under the consumer's property. All water meters shall be and remain the property of the city and the

responsibility of the city. Such meters may be removed, replaced or changed as to size and type by the water department whenever deemed necessary. (Ord. 240 Art. 3 § 6, 1958)

13.12.070 Out-of-town service.

The city will not provide for city water and/or sanitary sewer service for any person and/or entity developing property and/or residing outside the city limits of the city, unless the person and/or entity shall agree to annex their respective property to the city as soon as such annexation is available. Each person and/or entity shall enter into a contractual agreement binding the person and/or entity to annexation of the unincorporated property when annexation is available. (Ord. 1140 § 1, 1994)

Chapter 13.14
WATER CONSERVATION

Sections:

13.14.010 Purpose.

13.14.020 Authority.

13.14.030 Policies and procedures.

13.14.040 Enforcement.

13.14.050 Variances.

13.14.060 Penalties.

13.14.010 Purpose.

It is in the public interest to promote the conservation of 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. (Ord. 1920 § 1 (Exh. A), 2020; Ord. 1551 § 1, 2006)

13.14.020 Authority.

The public works director, when necessary for the protection of the public health, safety and welfare, shall have the authority to declare various stages of water emergencies and to implement the water conservation measures set forth in this chapter. The public works director shall also have authority to determine whether the various stages of water emergencies and water conservation measures apply to the entire city utility service area or to such portions as may be particularly affected. The director shall at all times be subject to the direction and authority of the city manager. (Ord. 1920 § 1 (Exh. A), 2020; Ord. 1551 § 1, 2006)

13.14.030 Policies and procedures.

The following policies and procedures shall apply during the various stages of water emergencies as set forth in this section:

(1) Stage I – Anticipated Water Shortage – Internal Preparations. The public works director may declare a Stage I water emergency when a water shortage is anticipated but not immediate. The public works department shall conduct public education efforts regarding the benefits and necessity of conservation by the public.

(2) Stage II – Serious Water Shortage – Voluntary Conservation. The public works director may declare a Stage II water emergency when a water shortage exists such that immediate voluntary reductions in consumption are necessary. The public works department shall conduct an intensified public information campaign and shall institute a voluntary odd/even home irrigation program. The city shall reduce usage for designated park irrigation systems that do not affect sports fields.

(3) Stage III – Critical Water Shortage – Limited Outdoor Restrictions. The public works director may declare a Stage III water emergency when a water shortage exists such that water supplies

are critically impacted and water demand must be reduced. The public works director is authorized to establish certain specified days or hours for irrigating, sprinkling or watering lawns and gardens, and may prohibit or regulate other nonessential uses of water within the water system during such times as there is an actual or impending water shortage, extreme pressure loss in the distribution system, or for any other reasonable cause. The following nonessential uses of water may be prohibited on all properties connected to the city's water system, whether inside or outside of the city:

(a) Washing sidewalks, walkways, driveways, parking lots, patios, and other exterior paved areas by direct hosing, except as may be necessary to prevent or eliminate materials dangerous to the public health and safety;

(b) Escape of water through breaks or leaks within the customer's plumbing or private distribution system for any period of time beyond which such break or leak should reasonably have been discovered and corrected. It shall be presumed that a period of 48 hours after the customer discovers a leak or break, or receives notice from the city of such leak or break, whichever occurs first, is a reasonable time in which to correct the same;

(c) Noncommercial washing of privately owned motor vehicles, trailers, and boats, except from a bucket or hose using a shutoff nozzle for quick rinses;

(d) Lawn sprinkling and irrigation which allows water to run off or overspray the lawn area. Every customer is deemed to have knowledge of and control over his or her lawn sprinkling and irrigation at all times;

(e) Sprinkling and irrigation of lawns, ground cover, or other plants, between the hours of 9:00 a.m. and 6:00 p.m. or on any day not authorized by the established rotation schedule;

(f) Such other uses as the public works director deems appropriate.

(4) Stage IV – Emergency Water Shortage – Mandatory Outdoor Restrictions and Indoor Conservation. The public works director may declare a Stage IV water emergency when a water shortage exists such that maximum flow reduction is immediately required, water available to the city is insufficient to permit any irrigation, watering or sprinkling, and all available water is needed solely for human consumption, sanitation and fire protection. The public works director may prohibit all nonessential uses of water, including, but not limited to, all vehicle washing, all lawn watering, and all of the uses that may be prohibited for a Stage III water emergency. The public works and utilities department shall disseminate information using every available means to encourage customers to reduce indoor water usage to the maximum extent possible.

(5) Stage V – Regional Disaster – Water Rationing. The public works director may declare a Stage V regional disaster water emergency when a water shortage exists such that water rationing must be implemented and emergency water distribution may be necessary for customers without water. The public works director is authorized to restrict water use by rationing the amount of water used by residential users to a certain number of gallons per day per person residing within the dwelling unit, by rationing the amount of water used by nonresidential users based on a percentage of their historical usage as calculated by the city, and by any other type of rationing as the public works

director deems necessary and appropriate in the circumstances.

(6) Implementation Requirements. Prior to the implementation and enforcement of any of the above stages, the public works director shall take reasonable efforts to have information disseminated to affected customers regarding the rationing plan, which shall include, at a minimum, publication in the official newspaper of the city at least once, not less than one week in advance of the effective date of the declaration, information of the declaration of the applicable stage, a description of the limitations and restrictions that would apply, and identification of the effective date of the declared stage and limitations and restrictions. Notwithstanding the publication requirements set forth in this chapter, if it is determined by the public works director that exigent circumstances exist that necessitate immediate implementation and enforcement of any particular stages of water emergency, notice to affected customers may be provided by personal service of the notice on such customers, or by posting notices at the customers' residences (if the customers' residences are the affected sites), or by posting notices at the locations where the customers' utility services are received (if the affected sites are not their residences).

(7) Term of Stage and Scope. The public works director is also authorized to determine the geographic area to which the declared stage shall apply, and to determine the duration for which the declared stage and its limitations and restrictions shall be in effect. (Ord. 1920 § 1 (Exh. A), 2020; Ord. 1551 § 1, 2006)

13.14.040 Enforcement.

The public works director or designee, code enforcement officers, and police officers of the city shall have the authority to enforce the provisions of this chapter. (Ord. 1920 § 1 (Exh. A), 2020; Ord. 1551 § 1, 2006)

13.14.050 Variances.

The public works director may grant temporary variances for the prospective use of water otherwise prohibited by this chapter. Such temporary variances shall be in writing and shall be based on a determination by the director that, due to unusual circumstances, application of this chapter would cause an extraordinary hardship adversely affecting the health, sanitation, or fire protection of the applicant or the public. The director's determination shall be final unless appealed as follows: a party adversely affected by the director's determination may appeal the determination to the city manager or designee within 24 hours of the director's determination or such later time as the city manager may designate. The city manager's determination shall be final and nonappealable. The 24-hour periods shall exclude Saturdays, Sundays and legal holidays. (Ord. 1920 § 1 (Exh. A), 2020; Ord. 1551 § 1, 2006)

13.14.060 Penalties.

Violations of this chapter shall be punishable as follows:

(1) The first violation of any provision of this chapter shall be a civil infraction as provided for by RCW 7.80.120(1)(a), as now enacted or hereafter amended. Infractions shall be processed pursuant to the authority and provisions set forth in Chapter 7.80 RCW, as now enacted or hereafter amended, and the Infraction Rules for Courts of Limited Jurisdiction.

(2) For any second or subsequent violation of any provision of this chapter the violator may be charged as a misdemeanor punishable by imprisonment in jail for a maximum term fixed by the court of not more than 90 days, or a fine in an amount fixed by the court of not more than $1,000, or both such imprisonment and fine. (Ord. 1920 § 1 (Exh. A), 2020; Ord. 1551 § 1, 2006)

Chapter 13.16
CHANGE FUND

(Repealed by Ord. 1575)

Chapter 13.20
RATES, CHARGES

(Recodified under Chapter 3.91 WMC by Ord. 1533)

Chapter 13.24
MAINS

Sections:

13.24.010 Extensions – Petition procedure.

13.24.020 Contract for temporary service.

13.24.030 *Recodified.*

13.24.040 Additional system connection charge for properties connecting to water or sewer extension projects.

13.24.010 Extensions – Petition procedure.

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 contract with the petitioners under such conditions as the city may elect to use the work force account, using water revenue to pay the costs of such expansion or have the petitioners pay the total amount of costs to the city prior to installation of the main extension. Unless otherwise approved by the director, all main extensions shall be made to the furthest property line. Ordinarily, water main extensions must be paid for by the customer or customers to be served. (Ord. 1140 § 1, 1994; Ord. 240 Art. 6 § 1, 1958)

13.24.020 Contract for temporary service.

The city may enter into contracts allowing temporary services to mains on other streets, providing that the service shall be terminable when mains are installed in front of the consumer's property and the customer signs a contract agreeing to pay his proportionate share when a water main is installed in front of or abutting his property. (Ord. 240 Art. 6 § 2, 1958)

13.24.030 Water, sewer and storm system construction plans – Review, inspection and fees.

Recodified under Chapter 3.93 WMC by Ord. 1534.

13.24.040 Additional system connection charge for properties connecting to water or sewer extension projects.

(1) Whenever the city constructs a sewer or water main extension which will provide connections for or benefit only a limited number of properties within a defined geographic area, the owners of those properties who thereafter seek connection of the property and improvements to the city's water or sewer system through the extension shall be required to pay, in addition to the general connection charge then in effect, an additional connection charge consisting of an equitable share of the costs which have been incurred by the city to design, engineer, construct and install the water or sewer main extension. The foregoing additional connection charge shall be payable only with respect to those properties that have not previously been included in a local improvement district or utility local improvement district undertaken to finance all or a part of the costs of the water or sewer main extension.

(2) The amount of the water or sewer additional connection charge and the area or properties which will be required to pay the same shall be established by resolution or ordinance of the city council and the amount shall be determined generally by dividing the total costs of the project within the

public right-of-way or easement by the estimated maximum number of benefited. In determining the amount of the charges, the city council shall consider the costs which have been incurred to design, engineer, construct and install the water or sewer main extension.

(3) The additional connection charge will include an interest charge equal to the greater of six percent or 75 percent of the prime rate of Bank of America (as then in effect) from the completion of the improvement until the time of connection.

(4) The additional connection charge will be due and payable upon connection to the city's water and/or sewer system. (Ord. 1367 §§ 1 – 4, 1999)

Chapter 13.28
METERS

Sections:

13.28.010 Responsibility for installation and maintenance.

13.28.020 Location.

13.28.030 No charge to city for placement on private property.

13.28.040 Under-registering caused by tampering.

13.28.050 Damage by hot water – Repair cost responsibility.

13.28.060 Joint service.

13.28.010 Responsibility for installation and maintenance.

Water meters on domestic service shall be placed, installed and maintained within the discretion of the water department, and shall remain the property of the city regardless of location. (Ord. 240 Art. 7 § 1, 1958)

13.28.020 Location.

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 the meter will be installed outside the building and between 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 from damages from leaking meters, pipes or fittings. (Ord. 240 Art. 7 § 2, 1958)

13.28.030 No charge to city for placement on private property.

No rent or other charges whatever shall be made by the customer against the city for placing or maintaining meters upon the premises of the customer. (Ord. 1344 § 2, 1999; Ord. 578 § 1, 1976; Ord. 573 § 1, 1976; Ord. 240 Art. 7 § 3, 1958)

13.28.040 Under-registering caused by tampering.

If a meter under-registers the amount of water due to tampering with the meter, and/or piping, or in other ways causing under-registration, the service may be discontinued, and will not be reconnected until the customer has made adjustment for the loss of revenue and given satisfactory assurance that there will be no more tampering to cause under-registration. (Ord. 240 Art. 7 § 4, 1958)

13.28.050 Damage by hot water – Repair cost responsibility.

If a meter is damaged by hot water from the customer's line, the customer will be required to pay for the cost of repairs and for the loss of revenue occasioned by the damage, and further, the customer shall immediately make the necessary corrections to his own water lines to prevent further damage to the city meter. (Ord. 240 Art. 7 § 5, 1958)

13.28.060 Joint service.

When two or more houses, buildings or other premises are occupied by separate customers, and are supplied from a single service connection, the owner or owners shall immediately, upon notice from the director, separate each customer's lines 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. Such joint service may, however, be continued at the option of the director providing one owner is responsible and agrees to pay the total water bill for two or more premises. Computation of the total bill for flat rate services shall be made by adding the total of the separate use classifications of the premises. Computation of the total bill for meter services shall be based on multiplying the quantity in each bracket of the rate schedule by the number of consumers on one meter. The minimum monthly charge shall be the regular minimum monthly charge multiplied by the number of consumers served. (Ord. 1140 § 1, 1994; Ord. 240 Art. 7 § 6, 1958)

Chapter 13.32
GENERAL REGULATIONS

Sections:

13.32.010 Water heater requirements.

13.32.020 Use restrictions.

13.32.030 Service line prohibited above or below street.

13.32.040 Line shut-off for repair or replacement.

13.32.050 Permission required for hydrant use.

13.32.060 Tampering, destruction of equipment prohibited.

13.32.080 Unauthorized attachment to mains, connections prohibited.

13.32.090 Unauthorized turn-on, turn-off prohibited.

13.32.100 Authority of superintendent to adopt rules and regulations.

13.32.110 City authority to make decision.

13.32.120 Enforcement authority of police and fire departments.

13.32.130 Connections, turn-ons outside city.

13.32.010 Water heater requirements.

The city shall not be responsible for any damage caused by noncompliance with this title, nor shall the city be responsible for any damage caused by a loss of water for any reason. Any person who shall violate any of the provisions of this title shall become liable to the city for any expense, loss or damage occasioned by the city by reason of such violation. (Ord. 1140 § 1, 1994; Ord. 240 Art. 7 § 8, 1958)

13.32.020 Use restrictions.

No person supplied with water from the city mains shall be entitled to use it for any other purpose than stated in the application, or supply it in any way to other persons or premises. (Ord. 240 Art. 7 § 9, 1958)

13.32.030 Service line prohibited above or below street.

An individual may not have a water service line, hose or conduit cross on top of or under the surface of a road or street. (Ord. 240 Art. 7 § 10, 1958)

13.32.040 Line shut-off for repair or replacement.

The director is directed and authorized to immediately shut off all domestic lines whenever such water lines to the domestic water supplies of the city develop leaks or their condition is such as to constitute a danger to the domestic water supplies of the city. Such water lines shall remain shut off until properly repaired or replaced. (Ord. 1140 § 1, 1994; Ord. 240 Art. 7 § 11, 1958)

13.32.050 Permission required for hydrant use.
No person other than an authorized employee of the water department, the fire department or street department shall operate fire hydrants or interfere with fire hydrants in any way without first obtaining authority so to do from the director. (Ord. 1140 § 1, 1994; Ord. 240 Art. 7 § 12, 1958)

13.32.060 Tampering, destruction of equipment prohibited.
No unauthorized person shall maliciously, wilfully or negligently break, damage, destroy, uncover, deface or tamper with any structure, appurtenance, or equipment which is a part of the domestic water system. Each violation thereof shall be assessed the minimum fine of $100.00 which may not be suspended, plus the costs for time and materials plus 15 percent overhead for repair of the damage of said water line. (Ord. 485 § 2, 1972; Ord. 240 Art. 7 § 13, 1958)

13.32.080 Unauthorized attachment to mains, connections prohibited.
It shall be a violation of this title for any person or persons to attach to or detach from any water main or service pipe, or water connection through which water is supplied by the city, or to interfere in any manner with such pipes or connections without first obtaining the written consent of the director. (Ord. 1140 § 1, 1994; Ord. 240 Art. 7 § 15, 1958)

13.32.090 Unauthorized turn-on, turn-off prohibited.
It shall be a violation of these rules and regulations for any person to use or tamper with, any valve, curb, spout, meter, etc., which is the property of the city, for the purpose of turning water on or off, and the city shall hold any person responsible for the cost of repairing any damage to any city property caused by such usage or tampering. The city shall require every property owner to install his own valve and his own pipeline for the control, shut-off and turn-on of service to his premises. (Ord. 240 Art. 7 § 16, 1958)

13.32.100 Authority of superintendent to adopt rules and regulations.
The director, subject to the approval of the council, shall have power to adopt rules and regulations not inconsistent with the terms of this title for carrying out and enforcing the payment, collection and remittance of the rates herein provided for, and rules and regulations affecting the operation of the water system as such relate to services, connections, and the general requirements of the utility; and a copy of such rules and regulations shall be on file and available for public examination at the water department office. Failure to comply with any such rules and regulations shall be deemed a violation of this title. (Ord. 1140 § 1, 1994; Ord. 240 Art. 7 § 17, 1958)

13.32.110 City authority to make decision.
The city shall have the authority to decide any questions which may arise and which are not fully covered by any of the provisions of this title, and its decision in such cases shall be final. (Ord. 240 Art. 7 § 18, 1958)

13.32.120 Enforcement authority of police and fire departments.
It shall be the duty of the employees of the police and fire departments to give vigilant aid to the water department in the enforcement of its rules and regulations, and the enforcement of this title, and to this end they shall report all violations thereof which come to their knowledge, to the office of the director. (Ord. 1140 § 1, 1994; Ord. 240 Art. 7 § 19, 1958)

13.32.130 Connections, turn-ons outside city.

There shall be no further water connections or turn-ons outside the city unless a plumbing permit inspection is obtained from the city. (Res. 109, 1970)

Chapter 13.36
CITY RESPONSIBILITY

Sections:

13.36.010 Interruption or shortage of supply.

13.36.020 Loss or damage for defect in customer's line.

13.36.030 Damage due to failure to give shut-off notice.

13.36.040 Preference to customer during shortage.

13.36.010 Interruption or shortage of supply.

The city will exercise reasonable diligence and care to furnish and deliver a continuous and sufficient supply of pure water to the customers, and to avoid any shortage or interruption of delivery. The city will not be liable for high or low pressure conditions, chemical or bacteriological conditions, interruption or shortage or insufficiency of supply, or any loss or damage occasioned thereby. The use of water upon the premises of the customer is at the risk of the customer, and the responsibility of the city shall cease at the point of delivery. Unless otherwise specified in agreement, the point of delivery shall be the point where the city service line attaches to the customer's line. (Ord. 240 Art. 8 § 1, 1958)

13.36.020 Loss or damage for defect in customer's line.

The city shall not be liable for any loss or damage of any nature whatsoever caused by any defect in the customer's line, plumbing or equipment, and the city may, without further notice, discontinue service to any customer when a defective condition of plumbing or equipment upon the premises of the customer results, or is likely to result, in interference with proper service or likely to cause contamination of the water. The city does not assume the duty of inspecting the customer's line, plumbing and equipment, and shall not be responsible therefor and will not be liable for failure of customer to receive service on account of defective plumbing or apparatus on the customer's premises, or for excessive consumption. (Ord. 240 Art. 8 § 2, 1958)

13.36.030 Damage due to failure to give shut-off notice.

In cases where a water shut-off is necessary for repair, reconstruction, improvements, damage prevention, or similar causes, the water department will endeavor to give advance notices to its customers of such expected shut-off; provided, however, that the water department will not be responsible for any damage which may result from any cessation of service such as above outlined, nor for failure to give notice of shut-off when circumstances are such that it is impossible to give notice as above stated. (Ord. 240 Art. 8 § 3, 1958)

13.36.040 Preference to customer during shortage.

In case of shortage of supply, the city reserves the right to give preference in the matter of furnishing service to customers, as in the judgment of its representatives shall be for the best interests of the city, from the standpoint of public convenience and necessity. (Ord. 240 Art. 8 § 4, 1958)

Chapter 13.40
CROSS CONNECTION CONTROL

Sections:

13.40.010 Compliance with regulations.

13.40.020 Enforcement authority.

13.40.030 Approval of standards and backflow prevention assemblies.

13.40.040 Testing of backflow prevention assemblies and inspection of air gaps.

13.40.050 Access to user's premises.

13.40.060 Failure of customer to cooperate – Grounds for termination of service.

13.40.010 Compliance with regulations.

All users of the city's water supply shall comply with the Uniform Plumbing Code Chapter 10, State of Washington Cross Connection Regulations, WAC 246-290-490, and the current edition of the Cross Connection Control Manual – Accepted Procedure and Practice published by the Pacific Northwest Section of American Waterworks Association.

(1) Backflow Prevention Assemblies to Be Installed. In addition to situations requiring backflow prevention assemblies as set forth in this section, the city reserves the right, as a condition of water service, to require any party seeking water service to install a backflow prevention assembly when the director of public works, or designee, determines a need to protect the city's water system and/or facilities. Premises isolation for all service connections by an approved air gap or reduced pressure backflow assembly is required for all customers with access to unapproved auxiliary water supplies, as defined by WAC 246-290-010(283), connected to a piping system whether or not an interconnection exists between the unapproved auxiliary water supply and the city water system. All backflow prevention assemblies shall be installed and maintained by, and at the expense of, the customer. (Ord. 1897 § 1 (Exh. A), 2019; Ord. 1247 § 1 (Exh. A), 1997; Ord. 1033 § 1, 1991)

13.40.020 Enforcement authority.

The city shall enforce the provisions of these regulations through the director of public works. The director of public works may delegate responsibilities to a certified cross connection control specialist/inspector. The city's standards may supersede the state regulations, but in no case shall they be less stringent. (Ord. 1033 § 2, 1991)

13.40.030 Approval of standards and backflow prevention assemblies.

All approved standards for cross connections shall be approved by the director of public works or his designee. All backflow prevention assemblies required by these regulations shall be a model approved by the Washington State Department of Health. Further, approved backflow prevention assemblies required by these regulations shall be installed under the direction of the director of public works and/or under the supervision of the cross connection specialist/inspector per city standards. (Ord. 1033 § 3, 1991)

13.40.040 Testing of backflow prevention assemblies and inspection of air gaps.
All RPBAs, RPDAs, DCDAs, DCVAs and PVBAs are required to be tested at least annually and all air gaps installed in lieu of an approved backflow prevention assembly shall be inspected at least annually. Completed test reports shall be returned to the city within 30 days after receipt of the yearly test notification. Tests and inspections may be required on a more frequent basis at the discretion of the director of public works. (Ord. 1247 § 1 (Exh. A), 1997; Ord. 1033 § 4, 1991)

13.40.050 Access to user's premises.
Only authorized employees of the city with proper identification shall have reasonable access at reasonable hours of the day to the user's premises to which water is supplied. The city shall abide by all appropriate legal means to facilitate this access. Water service shall be refused or terminated to any premises for failure to allow necessary inspections upon the city's request as above set forth. (Ord. 1033 § 5, 1991)

13.40.060 Failure of customer to cooperate – Grounds for termination of service.
Failure of the customer to cooperate in the installation, maintenance, repair, inspection or testing of backflow prevention assemblies required by these regulations and incorporated in this chapter shall be grounds for termination of water service to the premises or the requirement for an air gap separation. This determination shall be made at the discretion of the public works director or his designee. (Ord. 1033 § 6, 1991)

murraysmith

APPENDIX E
WATER RIGHT SELF-ASSESSMENT FORM AND WATER RIGHTS

Water Right Self-Assessment Form for Water System Plan

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

Water Right Permit, Certificate, or Claim # *If water right is interruptible, identify limitation in yellow section below	WFI Source # If a source has multiple water rights, list each water right on separate line	Existing Water Rights Qi= Instantaneous Flow Rate Allowed (GPM 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
1. G2-30565	Lower Wellfield – Wells 5, 6, 7, 11, & 12	4,675 gpm	0 gpm	3,786 ac-ft/yr	0 ac-ft/yr	2,480 gpm	2,195 gpm	1,818 ac-ft/yr	1,968 ac-ft/yr	2,198 gpm	2,477 gpm	1,999 ac-ft/yr	1,787 ac-ft/yr	2,725 gpm	1,950 gpm	2,350 ac-ft/yr	1,436 ac-ft/yr
2. G2-30564	Upper Wellfield – Wells 1, 3, and 10	1,325 gpm	0 gpm	2,120 ac-ft/yr	0 ac-ft/yr	0 gpm	1,325 gpm	0 ac-ft/yr	0 ac-ft/yr	900 gpm	425 gpm	307 ac-ft/yr	1,813 ac-ft/yr	1,325 gpm	0 gpm	586 ac-ft/yr	1,534 ac-ft/yr
3																	
4																	
5																	
6																	
	TOTALS =	6,000 gpm		5,906 ac-ft/yr		2,480 gpm	3,520 gpm	1,818 ac-ft/yr	1,968 ac-ft/yr	3,098 gpm	2,902 gpm	2,306 ac-ft/yr	3,600 ac-ft/yr	4,050 gpm	1,950 gpm	2,936 ac-ft/yr	2,970 ac-ft/yr
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	8-12-2009	17,213 gpm	0 gpm	13,555 ac-ft/yr	0 ac-ft/yr

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. City of Camas (**Emergency Only**)	**Emergency Only**	**Emergency Only**	**None Specified**	**0 gpm**		**0 ac-ft/yr**		**0 gpm**		**0 ac-ft/yr**		**0 gpm**		**0 ac-ft/yr**	
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
1		
2		
3		

ADDITIONAL COMMENTS:

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
May 31, 1977	G 2-24581	G 2-24581 P	G 2-24581 C

NAME
CITY OF WASHOUGAL

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
1701 C. Street	Washougal	Washington	98671

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
	400	322.6

QUANTITY, TYPE OF USE, PERIOD OF USE
322.6 acre-feet per year — municipal supply — continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
800 feet north and 1300 feet east of the center of Section 16.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE. (E. OR W.) W.M.	W.R.I.A.	COUNTY
Joseph Gibbons DLC #49	16	1	4 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 City of Washougal.

PROVISIONS

"The total annual water quantity for the City of Washougal municipal supply for all rights shall be limited to 3,786 acre-feet per year."

Installation and maintenance of an access port as described in Ground Water Bulletin No. 1 is required. An air line and gauge may be installed in addition to the access port.

Owing to the proximity of neighboring wells, the certificate holder is reminded of his responsibility towards same and advised that he may be required to regulate his withdrawal pumping rate if existing rights are injuriously affected.

An approved measuring device shall be installed and maintained in accordance with RCW 90.03.360, WAC 508.64.020 through WAC 508-64-040 (Installation, operation and maintenance requirements attached hereto).

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* ...28th.. *day of* August, 1980

WILBUR HALLAUER, DIRECTOR
Department of Ecology

by E.W. Asselstine
E.W. Asselstine, Regional Manager

ENGINEERING DATA
OK RPM 8-28-80

FOR COUNTY USE ONLY

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 3, 1981	G 2-25796	G 2-25796 P	G 2-25796 C

NAME

CITY OF WASHOUGAL FOR BURLINGTON NORTHERN INC.

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
1701 "C" Street	Washougal	Washington	98671

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

2 wells

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	1100	1419.5

QUANTITY, TYPE OF USE, PERIOD OF USE		
1419.5 acre-feet per year	municipal supply	continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL

Well field: 1500 feet north and 1300 feet west of the Southeast corner of Section 12.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
David C. Parker DLC	12	1 N	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 City of Washougal.

PROVISIONS

"The total annual water allocation for the City of Washougal shall be limited to 3,786 acre-feet per year for municipal use from all rights."

The access port shall be maintained at all times on the well (s).

At such time that the Department of Ecology determines the regulation and management of the subject waters is necessary and in the public interest, an approved measuring device shall be installed and maintained in accordance with RCW 90.03.360 and WAC 508-64-020 through WAC 508-64-040.

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* April, *19* 82.

DONALD W. MOOS, Director
Department of Ecology

by E.W. Asselstine
E.W. Asselstine, Regional Manager

ENGINEERING DATA
OK 4-20-82

FOR COUNTY USE ONLY

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

May 8, 2012

City of Washougal
Attn Trevor Evers
1701 C Street
Washougal WA 98671

Re: Water Right Application No. G2-30564

Dear Mr. Evers:

Enclosed is a copy of the Department of Ecology's *Report of Examination.* This report contains our decision regarding your application.

Your application has been approved.

A Permit will be issued consistent with the enclosed *Report of Examination* after the appeal period has expired, if no appeals have been filed.

YOUR RIGHT TO APPEAL

You have a right to appeal this Order to the Pollution Control Hearing 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).

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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

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If you have any questions, please call (360) 407-6300.

Sincerely,

Michael J. Gallagher

Michael J. Gallagher
Section Manager
Water Resources Program

Enclosures: Report of Examination
Your Right To Be Heard

By Certified Mail: 7010 1670 0002 4158 1845

G2-30564

DEPARTMENT OF ECOLOGY
State of Washington

State of Washington
Report of Examination for Water Right

PRIORITY DATE	WATER RIGHT NUMBER
January 20, 2011	G2-30564

MAILING ADDRESS	SITE ADDRESS (IF DIFFERENT)
City of Washougal 1701 C Street Washougal, WA 98671	

Total Quantity Authorized for Withdrawal or Diversion

WITHDRAWAL OR DIVERSION RATE	UNITS	ANNUAL QUANTITY (AF/YR)
1,325	GPM	2,120

Purpose

	WITHDRAWAL OR DIVERSION RATE			ANNUAL QUANTITY (AF/YR)		
PURPOSE	ADDITIVE	NON-ADDITIVE	UNITS	ADDITIVE	NON-ADDITIVE	PERIOD OF USE (mm/dd)
Municipal Supply		1,325	GPM		2,120	01/01-12/31

REMARKS

IRRIGATED ACRES		PUBLIC WATER SYSTEM INFORMATION	
ADDITIVE	NON-ADDITIVE	WATER SYSTEM ID	CONNECTIONS
		93400	

SOURCE FACILITY/DEVICE	PARCEL	WELL TAG	TWN	RNG	SEC	QQ Q	LATITUDE	LONGITUDE
Well No. 1	73300050, 76516072, 76516074		1N	4E	8	NW SE, NE SW	45°34'N	122°20'W
Well No. 3	73300050, 76516072, 76516074		1N	4E	8	NW SE, NE SW	45°34'N	122°20'W
Well No. 10	73300050, 76516072, 76516074		1N	4E	8	NW SE, NE SW	45°34'N	122°20'W

Datum: NAD83/WGS84

Place of Use (See Attached Map)

PARCELS (NOT LISTED FOR SERVICE AREAS)

NA

LEGAL DESCRIPTION OF AUTHORIZED PLACE OF USE

Area served by the City of Washougal as described in the mostly recent Water System Plan approved by the Department of Health

Proposed Works

Upper Wellfield, consisting of existing Well Nos. 1,3, and 10, casings up to 16" in diameter and ranging in depth from 75 to 150 feet deep. Well Nos. 1 and 10 are currently in use and Well No. 3 is currently in standby status

Development Schedule

BEGIN PROJECT	COMPLETE PROJECT	PUT WATER TO FULL USE
Started	Completed	December 31, 2030

Measurement of Water Use

How often must water use be measured?	Weekly
How often must water use data be reported to Ecology?	Annually
What volume should be reported?	Total Annual Volume
What rate should be reported?	Annual Peak Rate of Withdrawal (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", WAC 173-173.

Department of Ecology personnel, upon presentation of proper credentials, must have access at reasonable 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.

WAC 173-173 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 for modifications to some of the requirements.

Proof of Appropriation

The water right holder must file the notice of Proof of Appropriation of water (under which the certificate of water right is issued) when the permanent distribution system has been constructed and

the quantity of water required by the project has been put to full beneficial use. The certificate will reflect the extent of the project perfected within the limitations of the superseding permit. Elements of a proof inspection may include, as appropriate, the source(s), system instantaneous capacity, beneficial use(s), annual quantity, place of use, and satisfaction of provisions.

Findings of Facts

Upon reviewing the investigator's report, I find all facts, relevant and material to the subject application, have been thoroughly investigated. Furthermore, I find the change of water right as recommended will not be detrimental to existing rights or the public welfare.

Therefore, I ORDER the requested approval of Application No. G2-30564 subject to existing rights and the provisions specified above.

Signed at Olympia, Washington, this 8th day of May 2012.

Michael J. Gallagher

Michael J. Gallagher, Section Manager

Your Right To Appeal

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INVESTIGATOR'S REPORT
Application for Water Right -- Washougal City
Water Right Control Number G2-30564
Phil Crane, Department of Ecology Contact

BACKGROUND

Cost Reimbursement

This application is being processed under a cost reimbursement agreement between the applicant, City of Washougal (City) and the Department of Ecology (Ecology). This report has been prepared by HDR Engineering, Inc. under a contract and Work Assignment with Ecology.

The City submitted an application to appropriate public ground water to Ecology on January 20, 2011. The application is for 1,325 gallons per minute (gpm) for municipal supply. The application was accepted by the Ecology Southwest Regional Office and was assigned as Ground Water Application G2-30564. A second application, G2-30565, was filed by the City at the same time for 4,675 gpm, also for municipal supply. Application G2-30565 is for the City's Lower Wellfield and Application G2-30564 is for the City's Upper Wellfield.

The intent of these two applications is to secure water rights which are non-additive and that authorize the current rate of withdrawal at each of the existing Upper and Lower Wellfields. The City's water rights are currently "capped" at an authorized total withdrawal of 3,786 acre-feet per year (af/yr).

Pacific Groundwater Group (PGG) completed a Phase I review for both applications which is documented in their letter report dated March 15, 2011.. The City requested that Ecology complete the Phase II review and process the water right application under the cost reimbursement program using an independent consultant on contract to Ecology. HDR Engineering was selected by the City to perform the Phase II services.

Description and Purpose of Proposed Application

Table 1 Application Summary

Attributes	Summary
Name	City of Washougal
Priority Date	1/20/2011
Instantaneous Quantity	1325 gpm (non-additive)
Annual Quantity	2120 af/yr (non-additive)
Purpose of Use	Municipal Supply
Period of Use	Year Round
Place of Use	Area served by the City of Washougal as described in a Department of Health approved Water System Plan

Table 2 Proposed Sources of Withdrawal or Diversion

Source Name	Parcel	WellTag	Twp	Rng	Sec	QQ Q	Latitude	Longitude
Well 1	73300050, 76516072, and 76516074		01N	04E	08	NWSE and NESW	45°34'N	122°20'W
Well 3	73300050, 76516072, and 76516074		01N	04E	08	NWSE and NESW	45°34'N	122°20'W
Well 10	73300050, 76516072, and 76516074		01N	04E	08	NWSE and NESW	45°34'N	122°20'W

Legal Requirements for Approval of Appropriation of Water

Chapters 90.03 and 90.44 RCW authorize the appropriation of public water for beneficial use and describes the process for obtaining water rights. Laws governing the water right permitting process are contained in RCW 90.03.250 through 90.03.340 and RCW 90.44.050. In accordance with RCW 90.03.290, determinations must be made on the following four criteria in order for an application for water rights to be approved:

- Water must be available
- There must be no impairment of existing rights
- The water use must be beneficial
- The water use must not be detrimental to the public interest

This report serves as the written findings of fact concerning the investigation regarding Water Right Application Number G2-30564.

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 area where the water is to be stored, diverted and used.

Notice of this application was published in the Columbian newspaper on February 10, 2001, and February 16, 2011. No protests were filed to this application. A copy of the Affidavit of Publication is included as Attachment A.

Consultation with the Department of Fish and Wildlife

The Department must give notice to the Department of Fish and Wildlife (WDFW) of applications to divert, withdraw or store water (RCW 77.57.020). The Department notified WDFW of this application by email and no response was received from WDFW.

State Environmental Policy Act (SEPA)

The combination of this application and the associated application, G2-30565, is greater than 2,250 gpm, so a SEPA threshold determination is needed for this application.

The City, acting as Lead Agency, issued a Determination of Nonsignificance (DNS) on August 26, 2011, according to the SEPA Rules, Chapter 197-11 WAC, as a non-project proposal relating to Application Nos. G2-30564 and G2-30565. This DNS was issued as a follow-up to the Environmental Checklist submitted on May 26, 2011. The DNS was distributed to numerous Federal, State, Regional, and Local agencies, as well as newspapers in the vicinity and local interest groups, with written comments accepted by the City until September 9, 2011. The City received just one written comment within this time frame, but it wasn't related to this non-project action, since the comment related to construction activity.

INVESTIGATION

Site Visit and Existing Reports

A site visit was conducted by Jerry Louthain of HDR on September 27, 2011 with City Engineer, Rob Charles. Mr. Charles pointed out the location of the Upper and Lower Wellfields and the specific locations for each of the wells in the two wellfields. For the Upper Wellfield, Well No. 1 was within a fenced area and is currently in use as a production well, with Well No. 10 used as a production well as needed in the summertime, and Well No. 3 is currently a standby well. Two other well houses also exist in this wellfield, which formerly housed production wells that have been abandoned. This Upper Wellfield is located just north of the intersection of 28th and I Street, between I Street and the Washougal River. Well No. 1 is nearest to I Street, and Well Nos. 3 and 10 are just north of Well No. 1. The two abandoned wells are just west of Well No. 1. The entire wellfield is within approximately a 60 foot by 300 foot area.

The following reports were reviewed as part of this investigation:

- *Phase 1 Assessment for City of Washougal Cost Recovery Agreement Water Right Applications G2-30564 and G2-30565*, March 15, 2011, Pacific Groundwater Group.
- *City of Camas Water Supply Alternatives Investigation,* including *Appendix A, Lower Washougal River Groundwater Flow Model,* October 22, 2004, Pacific Groundwater Group.
- *Technical Memorandum, Assessment of Changes in Washougal River Baseflow Associated with Potential Water Right Transfer*, December 16, 2011, Pacific Groundwater Group.

The following is a brief summary of the content of these reports:

Summary of *Phase 1 Report, PGG, March 2011*

This report described the purpose and intent of the two applications filed by the City and the production capacities for each of the wells in the Upper and Lower Wellfields. The report also discussed the hydrological setting for the wellfield areas, with a description of the geology and the two principal aquifers in the vicinity, the Pleistocene Alluvial Aquifer (PAA), and the Sand and Gravel Aquifer (SGA).

The Lower Washougal River Groundwater Flow Model that was developed by PGG was described and how PGG used this model to analyze the effects to other water users in the vicinity. Through the use of this model and the analysis by PGG it was determined that the shift in production of moving more ground water production from the Upper Wellfield to the Lower Wellfield would not be anticipated to impair any other water users, including the City of Camas Well 14.

In addition, this report clarified that since these two applications are non-additive, they are neutral to other water users and can be processed prior to any other pending water right applications within this same source.

Summary of *City of Camas Study and Lower Washougal River Groundwater Flow Model Report, PGG, Oct. 2004*

This study and groundwater flow model report was developed to plan for a future additional source of water supply for the City of Camas from the PAA. The model was used to develop an assessment of regional drawdown from ground water pumping and to plan out and design expansion of the Camas wellfield and to provide information needed for the City of Camas water right applications.

Summary of *Technical Memorandum, Assessment of Changes in Washougal River Baseflow Associated with Potential Water Right Transfer, PGG, December 2011*

In this technical memorandum, PGG described how the Camas/Washougal ground water flow model (described above) was used to assess the impacts of the proposed water rights applications by City of Washougal.

PGG ran the model to assess the effects of these two water right applications. PGG ran two scenarios to accomplish this evaluation. The first scenario evaluated pumping under the current water rights authorizations with 2,800 gpm pumping in the Upper Wellfield. The second scenario moved 1,525 gpm of pumping from the Upper Wellfield to the Lower Wellfield. PGG then determined the quantity of water exchanged between the aquifer and the Washougal River for each scenario and calculated the difference to determine the effects of the proposed exchange on river flow.

PGG determined that moving 1,525 gpm of pumping from the Upper Wellfield to the Lower Wellfield causes about 0.5 cfs *less* streamflow depletion in the lower Washougal River between the Upper Wellfield and the Lower Wellfield. This is because the aquifer at the Upper Wellfield is directly in hydraulic connection with the Washougal River whereas a portion of the aquifer in the Lower Wellfield area is disconnected from the river because of a bedrock high that is exposed near the river.

Proposed Use and Basis of Water Demand

The City filed this application for the wells in the Upper Wellfield, along with Application No. G2-30565 for the wells in the Lower Wellfield to request approval of the amount of water for each their wellfields to conform to the pumping capacity of each of the wellfields. This application is for 1,325 gpm and Application No. G2-30565 is for 4,675 gpm, for municipal supply, for a total of 6,000 gpm for the two wellfields. The applications do not increase the quantity or rate of water use. The City has filed these two applications to supplement their existing rights, with the requested total instantaneous pumping

rate from each of these applications to match the total production capability from each of the two wellfields.

It should be noted that Application No. G2-30564 for 1,325 gpm is limited to a maximum annual quantity that can be withdrawn at this pumping rate which is 2,120 afy, so this application could not be approved for more than this annual quantity.

The City is currently updating their Water System Plan, with the 20-year planning period shown to be through the year 2030. The current draft of the Water System Plan also shows that the year 2009 is the highest water production year in recent years as 611.79 million gallons(mg), which is equivalent to 1,878 afy. Projections to the year 2030 show the water demand to be 985 mg, which is equivalent to 3,024 afy.

Comparing this projected demand to the City's existing water rights of 3,786 afy shows that the City already has sufficient existing water rights to meet and exceed their 20-year projected demand.

Other Rights Appurtenant to the Place of Use

Table 3 below shows the City's existing water rights which consist of five water right claims and two certificates, with each document for a specific well or wells. The individual Qi and Qa is shown for each of these documents with the total Qi for these shown as 6,350 gpm. The individual values for Qa exceed the total "capped" amount of water rights of 3,786 afy, however the notation for Certificate No. G2-25796 states that this water right limits the total system Qa to 3,786 afy.

Table 3. City of Washougal Water Rights

*non-additive
**G2-25796 limits total water system to 3,786 ac-ft/yr

Water Right	*WR Qi (gpm)*	*WR Qa (ac-ft/yr)*
Claim 000733	1,100	1,777.75
Claim 000774	850	1,371
Claim 000755	850	1,371
Claim 000776	850	1,371
Claim 000777	1,200	1936
G2-25796	1,100	1,419.5
G2-24581	400	322.6*
Total	6,350	3,786**

Water Availability

For water to be available for appropriation, it must be both physically and legally available.

Physical and Legal Availability

In the case of this application, the water availability requirement has essentially already been satisfied in that the City already has in total, the existing water rights for the amount of water shown in the application and that no additional water is proposed to be appropriated under this application. This application is merely to obtain a water right for the Lower Wellfield that matches the City's existing pumping amounts from the wells in the Lower Wellfield. This application is supplemental on both a Qi and a Qa basis, to the City's existing water rights.

Impairment Considerations

Impairment is an adverse impact on the physical availability of water for a beneficial use that is entitled to protection. A water right application may not be approved if it would:

- Interrupt or interfere with the availability of water to an adequately constructed groundwater withdrawal facility of an existing right. An adequately constructed groundwater withdrawal facility is one that (a) is constructed in compliance with well construction requirements and (b) fully penetrates the saturated zone of an aquifer or withdraws water from a reasonable and feasible pumping lift.

- Interrupt or interfere with the availability of water at the authorized point of diversion of a surface water right. A surface water right conditioned with instream flows may be impaired if a proposed use or change would cause the flow of the stream to fall to or below the instream flow more frequently or for a longer duration than was previously the case.

- Interrupt or interfere with the flow of water allocated by rule, water rights, or court decree to instream flows. Degrade the water quality of the source to the point that the water is unsuitable for beneficial use by existing users (e.g., via sea water intrusion).

Impairment, Qualifying Ground Water Withdrawal Facilities, and Well Interference

Qualifying ground water withdrawal facilities are defined as those wells which in the opinion of the Department are adequately constructed. An adequately constructed well is one that (a) is constructed in compliance with well construction requirements; (b) fully penetrates the saturated thickness of an aquifer or withdraws water from a reasonable and feasible pumping lift (WAC 173-150); (c) the withdrawal facilities must be able to accommodate a reasonable variation in seasonal pumping water levels; and (d) the withdrawal facilities including pumping facilities must be properly sized to the ability of the aquifer to produce water.

From the review of the information provided in the documentation by PGG (the March, 2011 Phase 1 Report, and the 2004 Groundwater Flow Model Report and the December 2011 Technical Memorandum), it does not appear that there would be any impairment of existing water rights in the vicinity from the transfer of 1,525 gpm of pumping from the Upper Wellfield to the Lower Wellfield. The reason is that there is adequate transmissivity in the aquifer to support the ground water pumping that is already occurring. The existing wells are operating properly without excessive drawdown or well interference.

Impairment: Surface Water and Instream Flows

The PAA is in hydraulic connection with the Washougal River and, in places, the Columbia River. Ground water pumping under the current conditions reduces the amount of flow in the Washougal River by inducing water to flow from the river into the aquifer or capturing the discharge of ground water flowing into the river from the aquifer.

PGG used the Camas/Washougal ground water flow model to determine the effects of ground water pumping on Washougal River flow for the water rights authorizations for the current water rights and the proposed new water right. PGG determined that moving 1,525 gpm of pumping from the Upper Wellfield to the Lower Wellfield causes about 0.5 cfs *less* streamflow depletion. This is because the aquifer at the Upper Wellfield is directly in hydraulic connection with the Washougal River whereas a portion of the aquifer in the Lower Wellfield area is disconnected from the river because of a bedrock high that is exposed near the river. The 0.5 cfs change in river flow capture from the new water rights authorizations will likely be captured from the Columbia River. However, the Columbia River is not flow limited in this area.

Beneficial Use

The use of water for municipal supply purposes is defined in statute as a beneficial use (RCW 90.54.020(1)). Water has been used from this source for municipal supply purposes for many years under the authority of the City's existing water rights.

Public Interest Considerations

Approval of this water right for municipal supply purposes is in the public interest. No protests or objections have been filed to the approval of this application. In addition, Ecology notified the

Washington Department of Fish and Wildlife about this application to see if WDFW had any comments or specific concerns about this application and no response was received from WDFW.

Conclusions

In conclusion, approval of this application for the recommended quantities meets the following four criteria that must be met for a water right to be approved:

- Water must be available
- There must be no impairment of existing rights
- The water use must be beneficial
- The water use must not be detrimental to the public interest

RECOMMENDATIONS

Based on the above investigation and conclusions, I recommend that this request for a water right be approved in the amounts and within the limitations listed below and subject to the provisions listed above.

Purpose of Use and Authorized Quantities

The amount of water recommended is a maximum limit and the water user may only use that amount of water within the specified limit that is reasonable and beneficial:

Withdrawal Rate

1,325 gpm (Non-additive)

Annual Quantity

2,120 acre-feet per year (Non-additive)

Purpose of Use

Municipal Supply

Point of Withdrawal

NW¼SE¼ and NE ¼SW ¼, Section 8, Township 1 North, Range 4E.W.M.

Place of Use

Area served by the City of Washougal as described in a Department of Health approved Water System Plan.

Report Writer *Date*

Phil Crane 5/8/2012

Reviewed by Phil Crane *Date*

LIST OF ATTACHMENTS

Attachment A- Affidavit of Publication

If you need this publication in an alternate format, please call Water Resources Program at (360) 407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

Selected References

Phase 1 Assessment for City of Washougal Cost Recovery Agreement Water Right Applications G2-30564 and G2-30565. Pacific Groundwater Group, March 15, 2011

City of Camas Water Supply Alternatives Investigation, Pacific Groundwater Group, October 22, 2004

Lower Washougal River Groundwater Flow Model, (Appendix A of PGG, October 22, 2004 report)

File NR G2-30564
WR Doc ID

DEPARTMENT OF ECOLOGY
State of Washington

State of Washington

PERMIT

TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

PRIORITY DATE	WATER RIGHT NUMBER
January 20, 2011	G2-30564

MAILING ADDRESS	SITE ADDRESS (IF DIFFERENT)
City of Washougal 1701 C Street Washougal, WA 98671	

Quantity Authorized for Withdrawal or Diversion

WITHDRAWAL OR DIVERSION RATE	UNITS	ANNUAL QUANTITY (AF/YR)
1,325	GPM	2,120

Purpose

	WITHDRAWAL OR DIVERSION RATE			ANNUAL QUANTITY (AF/YR)		
PURPOSE	ADDITIVE	NON-ADDITIVE	UNITS	ADDITIVE	NON-ADDITIVE	PERIOD OF USE (mm/dd)
Municipal Supply		1,325	GPM		2,120	01/01 - 12/31

IRRIGATED ACRES		PUBLIC WATER SYSTEM INFORMATION	
ADDITIVE	NON-ADDITIVE	WATER SYSTEM ID	CONNECTIONS
		93400	

Source Location

COUNTY	WATERBODY	TRIBUTARY TO	WATER RESOURCE INVENTORY AREA
Clark	Groundwater	N/A	28

SOURCE FACILITY/DEVICE	PARCEL	WELL TAG	TWN	RNG	SEC	QQ Q	LATITUDE	LONGITUDE
Well No. 1	76516074		1N	4E	8	NW SE		
Well No. 3	76516072		1N	4E	8	NW SE		
Well No. 10	76516072		1N	4E	8	NW SE		

Place of Use (See Attached Map)

PARCELS (NOT LISTED FOR SERVICE AREAS)

N/A

LEGAL DESCRIPTION OF AUTHORIZED PLACE OF USE

Area served by the City of Washougal as described in the mostly recent Water System Plan approved by the Department of Health

Proposed Works

Upper Wellfield, consisting of existing Well Nos. 1,3, and 10, casings up to 16" in diameter and ranging in depth from 75 to 150 feet deep. Well Nos. 1 and 10 are currently in use and Well No. 3 is currently in standby status.

Development Schedule

BEGIN PROJECT	COMPLETE PROJECT	PUT WATER TO FULL USE
Begun	Completed	December 31, 2030

Measurement of Water Use

How often must water use be measured?	Weekly
How often must water use data be reported to Ecology?	Annually
What volume should be reported?	Total Annual Volume
What rate should be reported?	Annual Peak Rate of Withdrawal (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", WAC 173-173.

Department of Ecology personnel, upon presentation of proper credentials, must have access at reasonable 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.

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Proof of Appropriation

The water right holder must file the notice of Proof of Appropriation of water (under which the certificate of water right is issued) when the permanent distribution system has been constructed and the quantity of water required by the project has been put to full beneficial use. The certificate will reflect the extent

This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or 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 20th day of June, 2012.

Department of Ecology

OK PC

By Michael J. Gallagher
Michael J. Gallagher, Section Manager

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

May 8, 2012

City of Washougal
Attn Trevor Evers
1701 C Street
Washougal WA 98671

Re: Water Right Application No. G2-30565

Dear Mr. Evers:

Enclosed is a copy of the Department of Ecology's *Report of Examination.* This report contains our decision regarding your application.

Your application has been approved.

A Permit will be issued consistent with the enclosed *Report of Examination* after the appeal period has expired, if no appeals have been filed.

YOUR RIGHT TO APPEAL

You have a right to appeal this Order to the Pollution Control Hearing 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).

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If you have any questions, please call (360) 407-6300.

Sincerely,

Michael J Gallagher

Michael J. Gallagher
Section Manager
Water Resources Program

Enclosures: Report of Examination
Your Right To Be Heard

By Certified Mail: 7010 1670 0002 4158 1852

DEPARTMENT OF ECOLOGY
State of Washington

State of Washington
Report of Examination for Water Right

PRIORITY DATE
January 20, 2011

WATER RIGHT NUMBER
G2-30565

MAILING ADDRESS
City of Washougal
1701 C Street
Washougal, WA 98671

SITE ADDRESS (IF DIFFERENT)

Total Quantity Authorized for Withdrawal or Diversion

WITHDRAWAL OR DIVERSION RATE	UNITS	ANNUAL QUANTITY (AF/YR)
4,675	GPM	3,786

Purpose

	WITHDRAWAL OR DIVERSION RATE			ANNUAL QUANTITY (AF/YR)		
PURPOSE	ADDITIVE	NON-ADDITIVE	UNITS	ADDITIVE	NON-ADDITIVE	PERIOD OF USE (mm/dd)
Municipal Supply		4,675	GPM		3,786	01/01-12/31

REMARKS

IRRIGATED ACRES		PUBLIC WATER SYSTEM INFORMATION	
ADDITIVE	NON-ADDITIVE	WATER SYSTEM ID	CONNECTIONS
		93400	

SOURCE FACILITY/DEVICE	PARCEL	WELL TAG	TWN	RNG	SEC	QQ Q	LATITUDE	LONGITUDE
Well No. 5	89935000		1N	3E	12	NE SE, NW SE	45°34'N	122°22'W
Well No.6	89935000		1N	3E	12	NE SE, NW SE	45°34'N	122°22'W
Well No.7	89935000		1N	3E	12	NE SE, NW SE	45°34'N	122°22'W
Well No.11	89935000		1N	3E	12	NE SE, NW SE	45°34'N	122°22'W
Well No.12	89935000	APN125	1N	3E	12	NE SE, NW SE	45°34'N	122°22'W

Datum: NAD83/WGS84

Place of Use (See Attached Map)

PARCELS (NOT LISTED FOR SERVICE AREAS)

NA

LEGAL DESCRIPTION OF AUTHORIZED PLACE OF USE

Area served by the City of Washougal as described in the mostly recent Water System Plan approved by the Department of Health

Proposed Works

Lower Wellfield, consisting of existing Well Nos. 5, 6, 7, 11, and 12 with casings up to 16" in diameter and ranging in depth from 75 to 150 feet deep. All five wells are currently available for use

Development Schedule

BEGIN PROJECT	COMPLETE PROJECT	PUT WATER TO FULL USE
Started	Completed	December 31, 2030

Measurement of Water Use

How often must water use be measured?	Weekly
How often must water use data be reported to Ecology?	Annually
What volume should be reported?	Total Annual Volume
What rate should be reported?	Annual Peak Rate of Withdrawal (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", WAC 173-173.

Department of Ecology personnel, upon presentation of proper credentials, must have access at reasonable 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.

WAC 173-173 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 for modifications to some of the requirements.

Proof of Appropriation

The water right holder must file the notice of Proof of Appropriation of water (under which the certificate of water right is issued) when the permanent distribution system has been constructed and the quantity of water required by the project has been put to full beneficial use. The certificate will reflect the extent of the project perfected within the limitations of the superseding permit. Elements of a proof inspection may include, as appropriate, the source(s), system instantaneous capacity, beneficial use(s), annual quantity, place of use, and satisfaction of provisions.

Findings of Facts

Upon reviewing the investigator's report, I find all facts, relevant and material to the subject application, have been thoroughly investigated.

Therefore, I ORDER the requested approval of Application No. G2-30565 subject to existing rights and the provisions specified above.

Signed at Olympia, Washington, this 8th day of May 2012.

Michael J. Gallagher

Michael J. Gallagher, Section Manager

Your Right To Appeal

You have a right to appeal this Order to the Pollution Control Hearing 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 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.

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503 **Pollution Control Hearings Board** 1111 Israel RD SW Ste 301 Tumwater, WA 98501	**Department of Ecology** Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608 **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.

INVESTIGATOR'S REPORT
Application for Water Right -- Washougal City
Water Right Control Number G2-30565
Phil Crane, Department of Ecology Contact

BACKGROUND

Cost Reimbursement

This application is being processed under a cost reimbursement agreement between the applicant, City of Washougal (City) and the Department of Ecology (Ecology). This report has been prepared by HDR Engineering, Inc. under a contract and Work Assignment with Ecology.

The City submitted an application to appropriate public ground water to Ecology on January 20, 2011. The application is for 4,675 gallons per minute (gpm) for municipal supply. The application was accepted by the Ecology Southwest Regional Office and was assigned as Ground Water Application G2-30565. A second application, G2-30564, was filed by the City at the same time for 1,325 gpm, also for municipal supply. Application G2-30565 is for the City's Lower Wellfield and Application G2-30564 is for the City's Upper Wellfield.

The intent of these two applications is to secure water rights which are non-additive that authorize the current rate of withdrawal at each of the existing Upper and Lower Wellfields. The City's water rights are currently "capped" at an authorized total withdrawal of 3,786 acre-feet per year (af/yr).

Pacific Groundwater Group (PGG) completed a Phase I review for both applications which is documented in their letter report dated March 15, 2011. The City requested that Ecology complete the Phase II review and processing of the water right under the cost reimbursement program using an independent consultant on contract to Ecology. HDR Engineering was selected by the City to perform the Phase II services.

Description and Purpose of Proposed Application

Table 1 Application Summary

Attributes	Summary
Name	City of Washougal
Priority Date	1/20/2011
Instantaneous Quantity	4675 gpm (non-additive)
Annual Quantity	3786 af/yr (non-additive)
Purpose of Use	Municipal Supply
Period of Use	Year Round
Place of Use	Area served by the City of Washougal as described in a Department of Health approved Water System Plan

Table 2 Proposed Sources of Withdrawal or Diversion

Source Name	Parcel	WellTag	Twp	Rng	Sec	QQ Q	Latitude	Longitude
Well 5	89935000		01N	03E	12	NE SE, NW SE	45°34'N	122°N 22'W
Well 6	89935000		01N	03E	12	NE SE NW SE	45°34'N	122°N 22'W
Well 7	89935000		01N	03E	12	NE SE NW SE	45°34'N	122°N 22'W
Well 11	89935000		01N	03E	12	NE SE NW SE	45°34'N	122°N 22'W
Well 12	89935000	APN125	01N	03E	12	NE SE NW SE	45°34'N	122°N 22'W

Legal Requirements for Approval of Appropriation of Water

Chapters 90.03 and 90.44 RCW authorize the appropriation of public water for beneficial use and describes the process for obtaining water rights. Laws governing the water right permitting process are contained in RCW 90.03.250 through 90.03.340 and RCW 90.44.050. In accordance with RCW 90.03.290, determinations must be made on the following four criteria in order for an application for water rights to be approved:

- Water must be available
- There must be no impairment of existing rights
- The water use must be beneficial
- The water use must not be detrimental to the public interest

This report serves as the written findings of fact concerning the investigation regarding Water Right Application Number G2-30565.

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 area where the water is to be stored, diverted and used.

Notice of this application was published in the Columbian newspaper on February 10, 2001, and February 16, 2011. No protests were filed to this application. A copy of the Affidavit of Publication is included as Attachment A.

Consultation with the Department of Fish and Wildlife

The Department must give notice to the Department of Fish and Wildlife (WDFW) of applications to divert, withdraw or store water (RCW 77.57.020). The Department notified WDFW of this application by email and no response was received from WDFW.

State Environmental Policy Act (SEPA)

The combination of this application and the associated application, G2-30564, is greater than 2,250 gpm, so a SEPA threshold determination is needed for this application.

The City, acting as Lead Agency, issued a Determination of Nonsignificance (DNS) on August 26, 2011, according to the SEPA Rules, Chapter 197-11 WAC, as a non-project proposal relating to Application Nos. G2-30564 and G2-30565. This DNS was issued as a follow-up to the Environmental Checklist submitted on May 26, 2011. The DNS was distributed to numerous Federal, State, Regional, and Local agencies, as well as newspapers in the vicinity and local interest groups, with written comments accepted by the City until September 9, 2011. The City received just one written comment within this time frame, but it wasn't related to this non-project action, since the comment related to construction activity.

INVESTIGATION

Site Visit and Existing Reports

A site visit was conducted by Jerry Louthain of HDR on September 27, 2011 with City Engineer, Rob Charles. Mr. Charles pointed out the location of the Upper and Lower Wellfields and the specific locations for each of the wells in the two wellfields. For the Lower Wellfield, all five wells, Well Nos. 5, 6, 7, 11, and 12 are currently in use as production wells. This Lower Wellfield is located just north of the railroad track and west of Whitney Street. The wells are located along an east-west line, with the wells approximately 100 feet apart. The most westerly well is Well No. 6, and then Well No. 7, Well No. 5, Well No. 11, and Well No. 12 being the most easterly well within the wellfield. The entire wellfield is within approximately a 50 foot by 500 foot fenced area.

The following reports were reviewed as part of this investigation:

- *Phase 1 Assessment for City of Washougal Cost Recovery Agreement Water Right Applications G2-30564 and G2-30565*, March 15, 2011, Pacific Groundwater Group.
- *City of Camas Water Supply Alternatives Investigation,* including *Appendix A, Lower Washougal River Groundwater Flow Model,* October 22, 2004, Pacific Groundwater Group.
- *Technical Memorandum, Assessment of Changes in Washougal River Baseflow Associated with Potential Water Right Transfer*, December 16, 2011, Pacific Groundwater Group.

The following is a brief summary of the content of these reports:

Summary of *Phase 1 Report, PGG, March 2011*

This report described the purpose and intent of the two applications filed by the City and the production capacities for each of the wells in the Upper and Lower Wellfields. The report also discussed the hydrological setting for the wellfield areas, with a description of the geology and the two principal aquifers in the vicinity, the Pleistocene Alluvial Aquifer (PAA), and the Sand and Gravel Aquifer (SGA).

The Lower Washougal River Groundwater Flow Model that was developed by PGG was described and how PGG used this model to analyze the effects to other water users in the vicinity. Through the use of this model and the analysis by PGG it was determined that the shift in production of moving more ground water production from the Upper Wellfield to the Lower Wellfield would not be anticipated to impair any other water users, including the City of Camas Well 14.

In addition, this report clarified that since these two applications are non-additive, they are neutral to other water users and can be processed prior to any other pending water right applications within this same source.

Summary of *City of Camas Study and Lower Washougal River Groundwater Flow Model Report, PGG, Oct. 2004*

This study and groundwater flow model report was developed to plan for a future additional source of water supply for the City of Camas from the PAA. The model was used to develop an assessment of regional drawdown from ground water pumping and to plan out and design expansion of the Camas wellfield and to provide information needed for the City of Camas water right applications.

Summary of *Technical Memorandum, Assessment of Changes in Washougal River Baseflow Associated with Potential Water Right Transfer, PGG, December 2011*

In this technical memorandum, PGG described how the Camas/Washougal ground water flow model (described above) was used to assess the impacts of the proposed water rights applications by City of Washougal.

PGG ran the model to assess the effects of these two water right applications. PGG ran two scenarios to accomplish this evaluation. The first scenario evaluated pumping under the current water rights authorizations with 2,800 gpm pumping in the Upper Wellfield. The second scenario moved 1,525 gpm of pumping from the Upper Wellfield to the Lower Wellfield. PGG then determined the quantity of water exchanged between the aquifer and the Washougal River for each scenario and calculated the difference to determine the effects of the proposed exchange on river flow.

PGG determined that moving 1,525 gpm of pumping from the Upper Wellfield to the Lower Wellfield causes about 0.5 cfs *less* streamflow depletion in the lower Washougal River between the Upper Wellfield and the Lower Wellfield. This is because the aquifer at the Upper Wellfield is directly in hydraulic connection with the Washougal River whereas a portion of the aquifer in the Lower Wellfield area is disconnected from the river because of a bedrock high that is exposed near the river.

Proposed Use and Basis of Water Demand

The City filed this application for the wells in the Lower Wellfield, along with Application No. G2-30564 for the wells in the Upper Wellfield to request approval of the amount of water for each their wellfields to conform to the pumping capacity of each of the wellfields. This application is for 4,675 gpm and Application No. G2-3056 is for 1,325 gpm, for municipal supply, for a total of 6,000 gpm for the two wellfields. The applications do not increase the quantity or rate of water use. The City has filed these two applications to supplement their existing rights, with the requested total instantaneous pumping rate from each of these applications to match the total production capability from each of the two wellfields.

The City is currently updating their Water System Plan, with the 20-year planning period shown to be through the year 2030. The current draft of the Water System Plan also shows that the year 2009 is the highest water production year in recent years as 611.79 million gallons (mg), which is equivalent to 1,878 afy. Projections to the year 2030 show the water demand to be 985 mg, which is equivalent to 3,024 afy.

Comparing this projected demand to the City's existing water rights of 3,786 afy shows that the City already has sufficient existing water rights to meet and exceed their 20-year projected demand.

Other Rights Appurtenant to the Place of Use

Table 3 below shows the City's existing water rights which consist of five water right claims and two certificates, with each document for a specific well or wells. The individual Qi and Qa is shown for each of these documents with the total Qi for these shown as 6,350 gpm. The individual values for Qa exceed the total "capped" amount of water rights of 3,786 afy, however the notation for Certificate No. G2-25796 states that this water right limits the total system Qa to 3,786 afy.

Water Availability

For water to be available for appropriation, it must be both physically and legally available.

Physical and Legal Availability

In the case of this application, the water availability requirement has essentially already been satisfied in that the City already has in total, the existing water rights for the amount of water shown in the application and that no additional water is proposed to be appropriated under this application. This application is merely to obtain a water right for the Lower Wellfield that matches the City's existing pumping amounts from the wells in the Lower Wellfield. This application is supplemental on both a Qi and a Qa basis, to the City's existing water rights.

Table 3. City of Washougal Water Rights

Water Right	*WR Qi (gpm)*	*WR Qa (ac-ft/yr)*
Claim 000733	1,100	1,777.75
Claim 000774	850	1,371
Claim 000755	850	1,371
Claim 000776	850	1,371
Claim 000777	1,200	1936
G2-25796	1,100	1,419.5
G2-24581	400	322.6*
Total	6,350	3,786**

*non-additive
**G2-25796 limits total water system to 3,786 ac-ft/yr

Impairment Considerations

Impairment is an adverse impact on the physical availability of water for a beneficial use that is entitled to protection. A water right application may not be approved if it would:

- Interrupt or interfere with the availability of water to an adequately constructed groundwater withdrawal facility of an existing right. An adequately constructed groundwater withdrawal facility is one that (a) is constructed in compliance with well construction requirements and (b) fully penetrates the saturated zone of an aquifer or withdraws water from a reasonable and feasible pumping lift.

- Interrupt or interfere with the availability of water at the authorized point of diversion of a surface water right. A surface water right conditioned with instream flows may be impaired if a proposed use or change would cause the flow of the stream to fall to or below the instream flow more frequently or for a longer duration than was previously the case.

- Interrupt or interfere with the flow of water allocated by rule, water rights, or court decree to instream flows. Degrade the water quality of the source to the point that the water is unsuitable for beneficial use by existing users (e.g., via sea water intrusion).

Impairment, Qualifying Ground Water Withdrawal Facilities, and Well Interference

Qualifying ground water withdrawal facilities are defined as those wells which in the opinion of the Department are adequately constructed. An adequately constructed well is one that (a) is constructed in compliance with well construction requirements; (b) fully penetrates the saturated thickness of an aquifer or withdraws water from a reasonable and feasible pumping lift (WAC 173-150); (c) the withdrawal facilities must be able to accommodate a reasonable variation in seasonal pumping water levels; and (d) the withdrawal facilities including pumping facilities must be properly sized to the ability of the aquifer to produce water.

From the review of the information provided in the documentation by PGG (the March, 2011 Phase 1 Report, and the 2004 Groundwater Flow Model Report and the December 2011 Technical Memorandum), it does not appear that there would be any impairment of existing water rights in the vicinity from the transfer of 1,525 gpm of pumping from the Upper Wellfield to the Lower Wellfield. The

reason is that there is adequate transmissivity in the aquifer to support the ground water pumping that is already occurring. The existing wells are operating properly without excessive drawdown or well interference.

Impairment: Surface Water and Instream Flows

The PAA is in hydraulic connection with the Washougal River and, in places, the Columbia River. Ground water pumping under the current conditions reduces the amount of flow in the Washougal River by inducing water to flow from the river into the aquifer or capturing the discharge of ground water flowing into the river from the aquifer.

PGG used the Camas/Washougal ground water flow model to determine the effects of ground water pumping on Washougal River flow for the water rights authorizations for the current water rights and the proposed new water right. PGG determined that moving 1,525 gpm of pumping from the Upper Wellfield to the Lower Wellfield causes about 0.5 cfs *less* streamflow depletion. This is because the aquifer at the Upper Wellfield is directly in hydraulic connection with the Washougal River whereas a portion of the aquifer in the Lower Wellfield area is disconnected from the river because of a bedrock high that is exposed near the river. The 0.5 cfs change in river flow capture from the new water rights authorizations will likely be captured from the Columbia River. However, the Columbia River is not flow limited in this area.

Beneficial Use

The use of water for municipal supply purposes is defined in statute as a beneficial use (RCW 90.54.020(1)). Water has been used from this source for municipal supply purposes for many years under the authority of the City's existing water rights.

Public Interest Considerations

Approval of this water right for municipal supply purposes is in the public interest. No protests or objections have been filed to the approval of this application. In addition, Ecology notified the Washington Department of Fish and Wildlife about this application to see if WDFW had any comments or specific concerns about this application and no response was received from WDFW.

Conclusions

In conclusion, approval of this application for the recommended quantities meets the following four criteria that must be met for a water right to be approved:

- Water must be available
- There must be no impairment of existing rights
- The water use must be beneficial
- The water use must not be detrimental to the public interest

RECOMMENDATIONS

Based on the above investigation and conclusions, I recommend that this request for a water right be approved in the amounts and within the limitations listed below and subject to the provisions listed above.

Purpose of Use and Authorized Quantities

The amount of water recommended is a maximum limit and the water user may only use that amount of water within the specified limit that is reasonable and beneficial:

4,675 gpm (Non-additive)
3,786 acre-feet per year (Non-additive)

Municipal Supply

Point of Withdrawal

NE¼SE¼ and NW ¼SE ¼, Section12, Township 1 North, Range 3 E.W.M.

Place of Use

Area served by the City of Washougal as described in a Department of Health approved Water System Plan.

Report Writer — *Date*

Phil Crane — 5/8/2012

Reviewed by Phil Crane — *Date*

LIST OF ATTACHMENTS

Attachment A- Affidavit of Publication

If you need this publication in an alternate format, please call Water Resources Program at (360) 407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

Selected References

Phase 1 Assessment for City of Washougal Cost Recovery Agreement Water Right Applications G2-30564 and G2-30565. Pacific Groundwater Group, March 15, 2011

City of Camas Water Supply Alternatives Investigation, Pacific Groundwater Group, October 22, 2004

Lower Washougal River Groundwater Flow Model, (Appendix A of PGG, October 22, 2004 report)

File NR G2-30565
WR Doc ID

DEPARTMENT OF ECOLOGY
State of Washington

State of Washington
PERMIT
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

PRIORITY DATE	WATER RIGHT NUMBER
January 20, 2011	G2-30565

MAILING ADDRESS	SITE ADDRESS (IF DIFFERENT)
City of Washougal 1701 C Street Washougal, WA 98671	

Quantity Authorized for Withdrawal or Diversion

WITHDRAWAL OR DIVERSION RATE	UNITS	ANNUAL QUANTITY (AF/YR)
4,675	GPM	3,786

Purpose

	WITHDRAWAL OR DIVERSION RATE			ANNUAL QUANTITY (AF/YR)		
PURPOSE	ADDITIVE	NON-ADDITIVE	UNITS	ADDITIVE	NON-ADDITIVE	PERIOD OF USE (mm/dd)
Municipal Supply		4,675	GPM		3,786	01/01 - 12/31

IRRIGATED ACRES		PUBLIC WATER SYSTEM INFORMATION	
ADDITIVE	NON-ADDITIVE	WATER SYSTEM ID	CONNECTIONS
		93400	

Source Location

COUNTY	WATERBODY	TRIBUTARY TO	WATER RESOURCE INVENTORY AREA
Clark	Groundwater	N/A	28

SOURCE FACILITY/DEVICE	PARCEL	WELL TAG	TWN	RNG	SEC	QQ Q	LATITUDE	LONGITUDE
Well No. 5	89935000		1N	3E	12	NW SE		
Well No.6	89935000		1N	3E	12	NW SE		
Well No.7	89935000		1N	3E	12	NW SE		
Well No.11	89935000		1N	3E	12	NW SE		
Well No.12	89935000	APN125	1N	3E	12	NW SE		

Place of Use (See Attached Map)

PARCELS (NOT LISTED FOR SERVICE AREAS)

N/A

LEGAL DESCRIPTION OF AUTHORIZED PLACE OF USE

Area served by the City of Washougal as described in the mostly recent Water System Plan approved by the Department of Health

Proposed Works

Lower Wellfield, consisting of existing Well Nos. 5, 6, 7, 11, and 12 with casings up to 16" in diameter and ranging in depth from 75 to 150 feet deep. All five wells are currently available for use.

Development Schedule

BEGIN PROJECT	COMPLETE PROJECT	PUT WATER TO FULL USE
Begun	Completed	December 31, 2030

Measurement of Water Use

How often must water use be measured?	Weekly
How often must water use data be reported to Ecology?	Annually
What volume should be reported?	Total Annual Volume
What rate should be reported?	Annual Peak Rate of Withdrawal (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", WAC 173-173.

Department of Ecology personnel, upon presentation of proper credentials, must have access at reasonable 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.

WAC 173-173 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 for modifications to some of the requirements.

Proof of Appropriation

The water right holder must file the notice of Proof of Appropriation of water (under which the certificate of water right is issued) when the permanent distribution system has been constructed and the quantity of water required by the project has been put to full beneficial use. The certificate will reflect the extent

This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or 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 20th day of June, 2012.

Department of Ecology

OK PE

By Michael J. Gallagher
Michael J. Gallagher, Section Manager

DEPARTMENT OF ECOLOGY
State of Washington

State of Washington
Application for a Water Right Permit

☐ SURFACE WATER ☒ GROUND WATER
☒ Permanent ☐ Temporary ☐ Short Term

For Ecology Use (Date Stamp)

RECEIVED
AUG 12 2009
Washington State Department of Ecology

Follow the attached instructions. Attach additional sheets as necessary.

A NON-REFUNDABLE **MINIMUM** FEE OF $50.00 PAYABLE TO THE DEPARTMENT OF ECOLOGY MUST ACCOMPANY THIS APPLICATION.

Section 1. APPLICANT

Applicant/Business Name: Cities of Washougal and Camas	Phone No:360-835-2292; 360-817-1560	Other No: -
Address: Washougal: 1701 C Street Camas: 616 NE 4th Avenue		
City: Washougal; Camas	State: WA	Zip: Washougal: 98671 Camas: 98607
Email Address (optional): tevers@ci.washougal.wa.us; mbrachmann@ci.camas.wa.us		

Contact Name (if different from above): Chris Uber, P.E.	Phone No: 503-225-9010	Other No:
Relationship to Applicant: Consulting Engineer		
Address: 121 SW Salmon Street, Suite 900		
City: Portland	State: OR	Zip: 97204-2919
Email Address (optional): uberc@msa-ep.com		

Section 2. STATEMENT OF INTENT

Briefly describe the purpose of your proposed project:

Groundwater supply expansion for municipal use by the City of Washougal and the City of Camas

Anticipated length of time to complete your project: 40 years

Water Use List all purposes for which water will be applied to a beneficial use and list quantity required for each.

Purpose(s) of Use	Rate (check one box only) ☐ Cubic Feet per Second (CFS) ☒ Gallons per Minute (GPM)	Acre-Feet per Year (AF/YR) (If known)	Period of Use (Continuously or Seasonal)
Municipal Water Supply	17,213	13,555	Continuously
TOTAL:			

Short Term/Temporary Water Use

Is this a request for a short term project (less than four months and non-recurring)? ☐ YES ☒ NO

Is this request for a temporary permit? ☐ YES ☒ NO

If yes to either question above, indicate the dates that the water will be needed:

FROM: ____/____/____ TO: ____/____/____

Section 3. POINT OF DIVERSION OR WITHDRAWAL

Complete A or B, and C below

For Ecology Use	APPLICATION NO: G2-30528 SEPA: Exempt/Not Exempt
	Fee Paid: Check No: ECY Coding: 001-001-WR1-0285-000011
Date Returned By	Priority Date By WRIA: 28

A.) If Surface Water Source	B.) If Ground Water Source
☐ Spring ☐ Creek ☐ River ☐ Lake ☐ Other:_____ Source Name:_____ Tributary to:_____ Number of proposed diversion points:_____ Do you have an existing diversion? ☐ YES ☐ NO	☒ Well(s) ☐ Other:_____ Proposed 20-inch diameter, approximate maximum 250 feet below ground surface. Well diameter & depth:_____ Number of proposed points of withdrawal: 10 Do you have an existing well? ☒ YES ☐ NO If available, attach Water Well Report and pump test. Well Tag ID No. ALK-142 and ALK-143

C.) Point of Diversion/Withdrawal – Legal Description

Parcel No.	¼	¼	Section	Township	Range	County
135307000	NE		21	1N	4E	Clark

Lot(s)	Block(s)	Subdivision

If known, enter the distances in feet from the point of diversion or withdrawal to the nearest section corner:

_____ Feet (☐ North/☐ South) and _____feet (☐ East/☐ West)

from the (☐NW ☐SW ☐NE ☐SE ☐ ____) corner of Section_____.

Parcel No.	¼	¼	Section	Township	Range	County

Lot(s)	Block(s)	Subdivision

If known, enter the distances in feet from the point of diversion or withdrawal to the nearest section corner:

_____feet (☐ North/☐ South) and _____feet (☐ East/☐ West)

from the (☐NW ☐SW ☐NE ☐SE ☐____) corner of Section_____

NOTE: If more than two points of diversion/withdrawal attach additional information on a separate sheet of paper.

Do you own the land on which the proposed point of diversion/withdrawal is located? ☐ YES ☒ NO
If no, do you have legal authority to make this application for use of another's land? ☒ YES ☐ NO
Provide the owner name(s), address, and phone number:_____

Port of Camas-Washougal - 360-835-2196

Section 4. PLACE OF USE

Attach a copy of the legal description of the property (on which the water will be used) taken from a real estate contract, property deed or title insurance policy, or copy it carefully in the space below.

City of Washougal Water Service Area, City of Camas Water Service Area

¼	¼	Section	Twp.	Range	County	Parcel No.

Do you own all the lands on which the proposed place of use is located? ☐ YES ☒ NO.

If no, do you have legal authority to make this application for use of another's land? ☒ YES ☐ NO
Provide owner name(s), address, and phone number: Municipal water supply within the urban growth boundary.

Are there any other water rights or claims associated with this property or water system? ☒ YES ☐ NO

If yes, provide the water right and/or claim numbers: See attached

Attach a map of your project showing the point of diversion/withdrawal and place of use. If platted property, be sure to include a complete copy of the plat map.

If you need this document in an alternate format, please call the Water Resources Program at 360-407-6600.
Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

Section 5. WATER SYSTEM DESCRIPTION

Describe your proposed water system (include type and size of devices used to divert or withdraw water from source):

Approximately 10 proposed 20-inch diameter production wells to accommodate individual well yields of 2,000 gpm or more.

Well spacing anticipated to be 250 feet. The wells will be developed in the PAA system.

Section 6. DOMESTIC WATER SUPPLY SYSTEM INFORMATION

Complete A or B, and C below

A.) Domestic Water Systems only	B.) Municipal Water Systems only (*defined under RCW 90.03.015*)
Projected number of connections to be served:	Present population to be served water: 13,479 (Washougal); 17,415 (Camas)
Type of connections: *(e.g., home, recreational cabin)*	Estimate future population to be served: ~66,900 (2030); ~82,500 (2040) (20 year projection) ~98,900 (2053/Saturation Development)

C.) Water System Planning

Do you have a Water System Plan approved by the Washington State Department of Health, Drinking Water Division? [X] YES [ ] NO Washougal: 12/2004 (Update in progress) Camas: 2/2002 (2008 Draft in progress)

If yes, date plan was approved ____/____/____ Water System Number: 93400 (Washougal); 10800 (Camas)

Name of water system: City of Washougal and City of Camas

Are you within the service area of an existing water system? [ ] YES [ ] NO

If yes, explain why you are unable to connect to the system: N/A

Section 7. IRRIGATION/STOCKWATER/OTHER FARM USES

Irrigation

Total number of acres requested to be irrigated under this application = _____ACRES

NOTE: Outline the area to be irrigated on your attached map.

Stockwater

List number and kind of stock:

Is the proposed project for a dairy farm? [ ] YES [ ] NO

Other Proposed Farm Uses

Describe all proposed uses:

If you need this document in an alternate format, please call the Water Resources Program at 360-407-6600.
Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

Family Farm Water Act (RCW 90.66):

Calculate 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, and
- Acreage proposed to be irrigated under other pending application(s).

Is the combined acreage under existing rights greater than 6000 acres? ☐ YES ☐ NO

Do you have a controlling interest in a Family Farm Development Permit? ☐ YES ☐ NO

If yes, enter Permit No: _____

Section 8. OTHER WATER USES

Hydropower

Indicate total feet of head _____ and proposed capacity in kilowatts:_____

Describe works:_____

Indicate all uses to which power is to be applied:_____

FERC License No: _____

Mining/Industrial Use

Describe use, method of supplying and utilizing water:_____

Other Use

Section 9. WATER STORAGE

Will you be using a dam, dike, or other structure to retain or store water? ☐ YES ☒ NO

Are you proposing to store more than 10 acre-feet of water? ☐ YES ☒ NO

Will the water depth be 10 feet or more? ☐ YES ☒ NO

If you answered yes to any of the above questions, please describe:_____

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 complete an Application for Permit to Construct a Reservoir and a Dam Construction Permit and Application.

Section 10. DRIVING DIRECTIONS

Provide detailed driving directions to the project site:_____

From Olympia, WA, Take I-5 South to I-205 (97 mi); Merge onto I-205 South via Exit 7 toward WA-14/Salem/I-84;
Merge onto WA-14 East via Exit 27 toward Camas; Turn right onto South 32nd St.; Turn left onto Index St.; Turn right onto South Grant St.

Project site is approximately 0.8 mi east of the intersection of Index and South Grant St, on the left.

Site Address: 24 South A Street, Washougal, WA 98671 (Port of Camas-Washougal)
South Grant Street, Washougal, WA 98671 (Test Well Site)

If you need this document in an alternate format, please call the Water Resources Program at 360-407-6600.
Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

Section 11. REQUIRED SIGNATURES

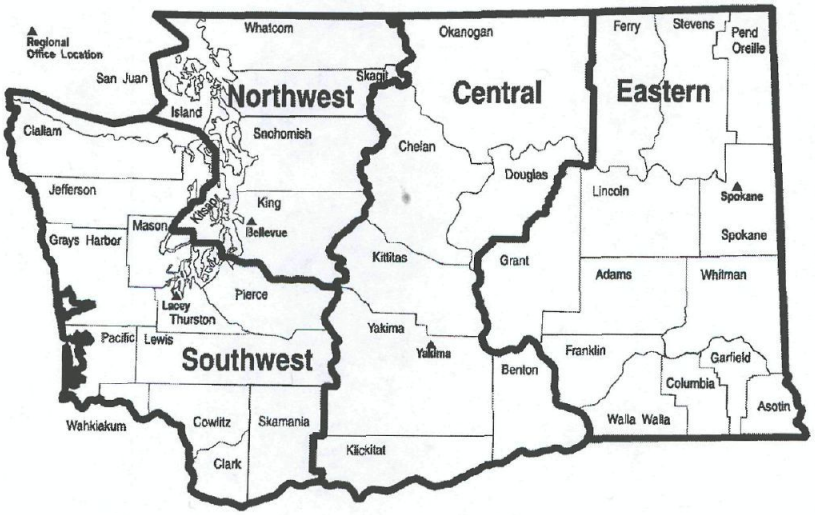
I certify that the information provided in this application is true and accurate to the best of my knowledge. I understand that in order to process my application, I grant staff from the Department of Ecology access to the site for inspection and monitoring purposes. Even though the employees of the Department of Ecology may have assisted me in the preparation of the above application, all responsibility for the accuracy of the information rests with me, the applicant.

Chris H. Uber, P.E. Print Name (Applicant or authorized representative)	Signature	7/17/09 Date
Stacee Sellers, Mayor, City of Washougal Print Name (Landowner of Place of Use)	Signature	8.6.09 Date
Paul Dennis, Mayor, City of Camas Print Name (Landowner of Place of Use)	Signature	7-23-09 Date
David Ripp, Executive Director, Port of Camas-Washougal Print Name (Landowner of Place of Use)	Signature	7-23-09 Date

Submit your application to: DEPARTMENT OF ECOLOGY
CASHIERING SECTION
PO BOX 47611
OLYMPIA, WA 98504-7611

Please check the region in which your proposed project is located.
☒ Southwest ☐ Northwest ☐ Central ☐ Eastern

Below is a map of the State of Washington, with outlines of the four Ecology regional offices. If you have questions about your application, contact the Water Resources program at the regional office in which your project is located.



Southwest Regional Office: 360-407-6300

Northwest Regional Office: 425-649-7000

Central Regional Office: 509-575-2490

Eastern Regional Office: 509-329-3400

If you need this document in an alternate format, please call the Water Resources Program at 360-407-6600.
Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

murraysmith

APPENDIX F
WASHOUGAL WATER SYSTEM DESIGN AND CONSTRUCTION STANDARDS

ENGINEERING STANDARDS



For

Public Works Construction

Trevor Evers
Director of Public Works
February 2010

ENGINEERING STANDARDS



For

Public Works Construction

Trevor Evers
Director of Public Works
February 2010

Chapter 1 – General Design Requirements
Chapter 2 – Erosion Control, Clearing and Grading
Chapter 3 – Streets
Chapter 4 – Storm Drainage
Chapter 5 – Water
Chapter 6 – Sanitary Sewer

Chapter 1

General Design Requirements

City of Washougal Engineering Standards for Public Works Construction
February 2010
Director of Public Works: Trevor Evers

Chapter 1
General Design Requirements

City of Washougal Engineering Standards for Public Works Construction
February 2010

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CHAPTER 1 - GENERAL DESIGN REQUIREMENTS

1.00 Requirements for Public Improvements

A. General

The purpose of this document is to set standards for the design and construction of public improvements. These include street, bikeway, drainage, water, and sanitary sewer improvements as required by the development review process, City ordinance, and other City policies adopted by the City. Standards for site grading, erosion control, parking lot, private street, and driveway construction on private property are also contained in these standards. No such work shall commence prior to City approval of the construction plans. Design submitted shall be stamped by a registered professional engineer licensed to practice in the State of Washington, or as otherwise approved by the Director.

All public improvements and private streets, parking lots, sidewalks, and driveways shall be designed and constructed in such a manner as to be readily accessible to and usable by individuals with disabilities as per the requirements of the Americans with Disabilities Act. This includes providing curb ramps at intersections with pedestrian crosswalks to allow a smooth transition between street and sidewalk elevations.

B. Shortened Designation

These City of Washougal Engineering Standards shall be cited routinely in the text as the "Standards."

C. Applicability

These Standards shall govern all new construction and upgrading of facilities both in the right-of-way and on-site for: transportation related facilities; storm drainage facilities and stream channel improvements; sewer and water improvements; and park, recreation, and open space facilities used by the public.

1.01 Precedence of Documents

If there is a conflict between approval documents, the document highest in precedence shall control. The precedence shall be:

First: Permits from other agencies or jurisdictions, as may be required by law.

Second: Modifications to the Engineering Standards as approved by the Director.

Third: Hearing examiner conditions of approval, facilities review, and site development permit.

Fourth: City of Washougal Ordinances.

Fifth: City of Washougal Engineering Standards and Standard Drawings.

Sixth: Plans and details prepared by the design engineer.

Seventh: WSDOT Standards Specifications for Road, Bridge, and Municipal Construction.

Eighth: Reference specifications.

Supplemental written agreements and approved revisions to plans and specifications by the appropriate jurisdiction will take precedence over documents listed above. Detailed plans shall have precedence over general plans.

1.02 Abbreviations and Definitions

Definitions, for these standards, shall be as defined in the Stormwater Management Manual for Western Washington (WWM) or as otherwise listed below:

AASHTO	American Association of State Highway and Transportation Officials.
AC	Asphaltic Concrete.
ACI	American Concrete Institute.
ADA	Americans with Disabilities Act.
ADT	Average Daily Traffic.
ALTA	American Land Title Association.
ANSI	American National Standards Institute.
Appurtenance	Any fixed object located adjacent to the roadway and deemed to be a possible safety hazard or as defined in the WWM.
APWA	American Public Works Association.
ASTM	American Society for Testing and Materials.
AWWA	American Water Works Association.
Bicycle	A vehicle having two tandem wheels, propelled solely by human power.
Bicycle Facilities	A general term denoting improvements and provisions that accommodate or encourage bicycling, including parking facilities, maps, signs, pathways, bike lanes, widened sidewalks, bikeways, and shared roadways designated for bicycle use.
Bicycle Lane (Bike Lane)	A portion of a roadway, which has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists.

Bicycle Path (Off-Street Pathway)	A paved pathway physically separated from motorized vehicular traffic by an open space or barrier within an independent right-of-way.
Bicycle Route (Bike Route)	A segment of a system of bikeways designated by the jurisdiction having authority with appropriate directional and informational markers, with or without a specific bicycle route number, or as designated on a bicycle map, brochure, or guidebook.
Bikeway	Any road, path or way specifically designated as being open to bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.
CARV	Combination Air and Vacuum Release Valve.
CBE	Crushed base equivalent (CBE) is the number that directly relates the traffic coefficient to the required number of inches of rock for street structural sections.
CBR	California Bearing Ratio.
CCCP	City of Washougal Cross Connection Control Plan.
City	City of Washougal.
Contractor	The agent of the developer completing the construction activities associated with a given project.
Developer	The owner and/or their agents or contractors responsible for a given project.
Director	Director of Public Works or their designee.
DOE	Washington State Department of Ecology.
DOH	Washington State Department of Health.
Driveway	A public or private way, located outside of right-of-way, which affords the principle means of providing access to a property.
Engineer	Engineer doing the project design.
EPA	U.S. Environmental Protection Agency.

FEMA	Federal Emergency Management Agency.
Gate	Movable barrier designed and constructed to prohibit or limit motor vehicle access from a public street to private property.
GPS	Global Positioning System.
IBC	International Building Code with Washington amendments.
IFC	International Fire Code with Washington amendments.
IE	Invert Elevation.
IMC	International Mechanical Code with Washington amendments.
IPC	International Plumbing Code with Washington amendments.
Intersection	Refers to the area jointed by two (2) or more roads intersecting. For approaches of a continuous street at an acute curve or some other angle point with different street names.
LID	Low Impact Development.
Low impact development	An approach to stormwater management that emphasizes the use of onsite natural and built features to reduce the impacts of increased flow rates and volumes associated with increases in impervious area.
LID Manual	Low Impact Development, Technical Guidance Manual for Puget Sound
Multi-Use Trail	A pathway designated for pedestrian or bicycle use.
MUTCD	Manual on Uniform Traffic Control Devices.
NEC	National Electric Code with Washington amendments.
OS and Y	Outside Stem and Yoke.
OSHA	Occupational Safety and Health Administration.
Parking Lot	Paved surfaces on private property intended for the movement and storage of six (6) or more vehicles.

PRV	Pressure Reducing Valve.
PSM	Storm Water Management Manual for the Puget Sound Basin.
RCW	Revised Code of Washington.
ROW	Right-of-Way.
Sidewalk	The portion of a street designed for preferential use by pedestrians.
Standards	City of Washougal Engineering Standards.
Standard Drawings	The latest edition of the City of Washougal's standard details for public works construction.
Street	A public or private way, which affords the principal means of access to abutting property.
TCDH	Traffic Control Device Handbook.
TIR	Technical Information Report.
Traffic Coefficient	A number used in determining the structural section of a street.
Trail	In the context of the General Plan - "Trail" is synonymous with Bicycle Path (off-street pathway).
UL	Underwriters Laboratory.
WAC	Washington Administrative Code.
WWHM	Western Washington Hydrologic Model.
WWM	Stormwater Management Manual for Western Washington.

Wetlands	Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Identification and delineation of jurisdictional wetlands and wetland boundaries shall be done by a qualified biologist using applicable State and Federal guidelines.
WMC	Washougal Municipal Code.
WSDOT	The Washington State Department of Transportation.
WSDOT Standard Specifications	The latest edition of the "Standard Specifications for Road, Bridge, and Municipal Construction" as published by the Washington State Department of Transportation and the American Public Works Association.
WSM	City of Washougal Water System Master Plan.

1.03 Permits

Permits, approvals, or agreements are required by the City and some-times other jurisdictions, prior to initiating any construction or demolition work elements described within these Standards.

The majority of work covered under these Standards will require multiple permit authority review and approvals. Several types of permits and approvals require prior approval from the authority before a building or other substantial permit can be issued. Any questions regarding information about permits, approvals, and agreements should be directed to the Director.

Grading permits, separate from construction plan approval, for developments may be issued at the discretion of the Director between July 1st and August 31st, provided that the Director may extend or shorten this time period on a case-by-case basis depending on actual weather conditions. The first review of the development's construction plans shall be completed prior to submittal of the grading permit application to the City.

1.04 Submittal Requirements

A. General

1. Submittal requirements consist of design plans, grading plans (where required), erosion control plans (where required), drainage calculations, geotechnical reports, and other information as required. Letters of transmittal referencing the project name shall accompany all submittals.

2. The Standard Specifications are hereby adopted and incorporated as part of this document by reference except as modified herein.

B. Design Plan Format

1. The plans shall be submitted on 22" x 34" sheets, landscape format.
2. Vicinity maps shall be located on the first sheet of all plans and shall show the location of the project in respect to the nearest major street intersection.
3. A north arrow shall be shown on each plan view sheet of the plans and adjacent to any other drawing, which is not, oriented the same as other drawings on the sheet.

   Site Development Plans shall be organized as follows:

   a. Title sheet to include:

      (i) Project name

      (ii) Vicinity map

      (iii) Name and mailing address of Developer/Owner, engineering firm, survey firm, and geotechnical engineer

      (iv) City Standard Construction Notes

      (v) Index of sheets

      (vi) Notice to excavators

      (vii) Legend that provides the name and symbol for all symbols used on the subsequent pages

      (viii) Signature block, in the lower right quadrant, for the Public Works Director, Planning Director, City Engineer, and Fire Chief

   b. Composite utility plan: include existing public and private utilities, and proposed public improvements.

   c. Sanitary sewer and water, including fire hydrant locations.

   d. Street and storm sewer, showing existing and finished contours at 2-foot intervals.

   e. Grading and erosion control plan with maximum contour intervals of 2 feet. Contours shall extend offsite a minimum of 50 feet. This sheet shall also note the source of information, date of field work, and location of original document.

   f. Approved preliminary plat (if it is a subdivision).

   g. Landscape plan including sidewalks, bikeways, retaining walls, landscaping, irrigation, and lighting.

   h. Signing and striping plan.

5. Details - All City Standard Drawings and details shall be full size.

6. The scale shall be 1-inch = 5 feet vertically, and 1-inch = 20 feet horizontally for all drawings. A scale of 1-inch = 10 feet may be used for more detailed drawings such as intersection drawings. The composite utility plan may be at a smaller scale if needed. Scale shall be shown with north arrow and within a title block.
7. Letter size shall not be smaller than 0.10 of an inch high.
8. The location and elevation of a National Geodetic Survey, United States Geological Survey, Clark County, or City of Washougal bench mark shall be shown. No other datum shall be used without permission of the City. Temporary control bench marks and elevations shall also be shown on the plans.
9. A title block shall appear on each sheet of the plan set and shall be placed in the lower right-hand corner of the sheet across the right-hand edge of the sheet. The title block shall include the name of the project, the engineering firm, the Owner, the sheet title, and the sheet number.
10. The seal of the registered Washington Professional Engineer responsible for preparation of the plans shall appear on each sheet.
11. The description and date of all revisions to the plans shall be shown on each sheet affected, and shall be approved and dated by the registered Professional Engineer of record as evidenced by an original signature or initial.
12. Through use of standard drafting symbols, indicate the location and direction of view for all sections.
13. The following statement shall appear on the cover sheet of all plans at a location immediately above or below the development engineer's professional stamp:

    "I hereby certify that these plans, and related design, were prepared in strict conformance with the City of Washougal's Engineering Standards for Public Works Construction."

14. Plans for private utility work shall be submitted with construction plans.

C. Plan View

Plan views shall show the following:

1. Right-of-way, property, tract, and easement lines (existing and proposed).
2. Subdivision name, lot numbers, street names, and other identifying labels. Subdivision and street names are subject to the approval of the City Planning Director, Fire Chief, and County Surveyor.
3. Location and stationing of existing and proposed street center lines and curb faces.
4. Horizontal alignment and curve data of street center lines and curb returns.
5. Existing underground utilities and trees over 6-inches in diameter within the construction limit.
6. Location of existing buildings, wells, septic tanks, drain fields, fuel tanks, and any other buried structures. An ALTA survey shall be required for at least 100 feet

surrounding any of the above items to remain.

7. Location, stationing, and size of all mains and service lines for storm drainage, sanitary sewer, and water; and location of all fire hydrants. Sanitary sewer lateral locations are required in a 'Lateral Table'. Stationing shall be located in relationship to the street stationing at all manholes or other key locations.
8. Match lines with sheet number references.
9. Provisions for cross-connection control must be clearly shown on the plans, including any retro-fitting of existing water service connections and existing auxiliary water supplies, conversions to City of Washougal water service that are required as a condition of development approval, upgrading of existing service connections by replacement of same, and any other cross connection control required by state and local rules and codes.
10. Street stationing to be noted at a minimum of 100-foot stations.
11. Top of curb elevations along curb returns at quarter-delta's and 100-foot stations.
12. Location of the low points of street grades and curb returns.
13. Sidewalk locations. This shall include ramps, transitions in location or width, and relationship with driveways. Differentiate what sidewalks are proposed to be constructed with the street and what sidewalks are proposed to be constructed with the buildings, with hatching. Crown lines along portions of streets transitional from one typical section to another.
14. Centerline stationing of all intersecting streets.
15. Location and description of existing survey monuments, including but not limited to: section corners, quarter corners, donation land claim corners, and City bench marks.
16. Location of proposed street intersection monument boxes.
17. FEMA designated 100-year flood plains and flood ways, or areas of flooding during a 100-year storm event.
18. Wetland areas and storm water quality undisturbed corridors (buffer strips).
19. Legend.
20. Developer's name, address, and phone number.
21. Any additional information that the City deems necessary.

D. Profile View

Profile Views shall show the following:

1. Stationing, elevations, vertical curve data (including curve k factors), and slopes for center of streets or top of curbs. For off-set or super elevation cross-sections, both curbs shall be profiled. Where curbs are not to be constructed, center line of street and ditch inverts shall be shown.
2. Original ground along the center line, and if necessary at the edges of the right-

of-way if grade differences are significant.

3. Center line, top of curb, and gutter flow lines of existing streets for a distance of at least 300 feet each way at intersections with proposed streets. For stub streets that may be extended in the future, the vertical alignment shall be designed for at least 300 feet beyond the scope of the proposed construction. At the discretion of the City Engineer, additional design information concerning the vertical and horizontal alignment of future street extensions may be required.
4. Vertical alignment of streets, including existing center line monumentation.
5. The top of curb for all cul-de-sacs, eyebrows, and curb returns.
6. All proposed drainage facilities; all invert and top elevations, slopes, materials, bedding, and backfill.
7. Existing drainage facilities, including off-site facilities, upstream and downstream that affect the design (i.e. downstream restrictions that back water onto project site). In addition, base flood elevations shall be shown on the profile.
8. Profiles for ditch and creek flowlines shall extend a minimum of 200 feet beyond the project, both upstream and downstream. Typical cross sections at 50-foot intervals shall also be submitted.
9. Designate structures using alpha or numeric labels on profiles to correspond to plan view notation.
10. Profile for existing and proposed storm, sanitary, and water mains. Profiles for water mains less than 12- inches in diameter shall not be required unless so directed by the City Engineer.
11. All existing and proposed sanitary, water, storm lines, and other utilities crossing the profile.

E. Site Grading Plan

The City of Washougal requires a site-grading plan as part of the application for any development that involves the excavation or fill of greater than 50 cubic yards of material. Grading contours (existing & proposed) shall be at no more than 2-foot intervals, and shall extend off-site a minimum of 50 feet. This sheet shall also note source of information, date of fieldwork, and location of original document.

All soil disturbing construction activity must adhere to the requirements of Chapter 2. A detailed erosion control plan shall be shown in conjunction with the site-grading plan.

F. Detail Sheets

Detail sheets shall be provided as part of the Site Development Plans. The detail sheet shall show all City Standard Drawings and special details necessary for the project.

All City Standard Drawings and details shall be full size.

G. Other Requirements

Other information to be shown on the construction drawings or other submittals includes:

The design elements such as:

a. Street classification;

b. Design speed;

c. Super elevation;

d. Average Daily Traffic (ADT) or Design Hourly Volume (DHV).

Structural construction plans and the necessary calculations stamped by a structural engineer shall be submitted for proposed structures (i.e. walls, box culverts, bridges). A letter from the engineer approving installation of the structure shall be submitted prior to as-built approval.

Any additional information that the Director deems necessary to review the plans and assure compliance with design standards.

H. Preliminary Stormwater Plan Purpose

The purpose of the preliminary stormwater plan is to allow the City to determine whether a proposal will meet the requirements of these standards

1. The preliminary stormwater plan submittal shall consist of:

   a. A preliminary development plan.

   b. A preliminary technical information report (TIR) prepared in the standardized format described in the sections below.

2. The preliminary stormwater plan shall identify how stormwater runoff, that originates on the site or flows through the site, is currently controlled and how this will change with the proposed development or redevelopment project.

3. The project engineer shall include a statement that all the required information is included in the preliminary stormwater plan and that the proposed stormwater facilities are feasible. <u>All plans, studies, and reports that are part of the preliminary and final stormwater plans shall be signed and dated by the registered soil scientist and the professional civil engineer(s) (registered in the state of Washington) responsible for preparation of the report.</u>

4. To ensure adequate public review and avoid multiple reviews of preliminary reports by City staff, the preliminary stormwater plan shall not be significantly modified after public notice of the final SEPA determination without issuance of a new SEPA determination.

5. A preliminary stormwater plan shall be submitted with a land use application.

I. Preliminary Development Plan

The preliminary development plan shall consist of 22-inch x 34-inch drawings and may be included in the design plans.

The preliminary development plan shall show the character of the existing site and proposed features, including but not limited to:

1. Existing and proposed property boundaries, easements, and rights-of-way.
2. Existing and proposed contours with a 2-foot maximum contour interval, unless the Director determines a lesser interval is sufficient to show drainage patterns and basin boundaries.
3. Offsite areas contributing runoff to the site.
4. Natural and manmade drainage features adjacent to the site, including existing and proposed (if known) stormwater facilities.
5. Existing onsite water wells, known agricultural drain tiles, areas of potential slope instability, structures, utilities, and septic tanks and drain fields.
6. Location of the 100-year floodplain, floodways, and shoreline management area limits on the site.
7. Existing water resource features on and adjacent to the site, including streams, wetlands, springs, sinks, and stormwater facilities.
8. Existing and proposed drainage flow routes for each threshold discharge area (TDA) to and from the site, including bypass flows.
9. Proposed location of structural source control BMPs implemented in accordance with Minimum Requirement 3 (Source Control of Pollution), where applicable.
10. Point of discharge locations from the proposed project site that preserve the natural drainage patterns and existing outfall locations, in accordance with Minimum Requirement 4 (Preservation of Natural Drainage Systems and Outfalls).
11. Areas of the project site where onsite stormwater management BMPs will be effectively implemented, in accordance with Minimum Requirement 5 (Onsite Stormwater Management), including low impact development BMPs. The plan shall show the areas of retained native vegetation, required flow lengths, and vegetated flow paths for proper implementation of these BMPs.
12. All existing drainage facilities, including structural water quality or flow control BMPs and conveyance systems.
13. Existing and proposed pollution-generating pervious surfaces (PGPS), including lawn, landscaped areas, and pasture areas.
14. Existing areas of the site predominantly covered by native vegetation (i.e., native trees, shrubs, and herbaceous plants as defined by the Washington State Department of Ecology [Ecology]) and areas of native vegetation to be preserved under proposed conditions.
15. Approximate location and size of proposed runoff treatment and flow control facilities implemented in accordance with Minimum Requirements 6 and 7.
16. The delineated wetland boundary (for sites that discharge stormwater to a wetland, either directly or indirectly through a conveyance system, and must meet Minimum Requirement 8 [Wetlands Protection]).

17. A conceptual grading plan that verifies the constructability of a stormwater facility (for sites with slopes greater than 5 percent).

18. The Director may require additional site or vicinity information if needed to determine the feasibility of the stormwater proposal.

J. Preliminary Technical Information Report (TIR)

The preliminary TIR shall contain all technical information and analyses necessary to determine that the proposed stormwater facilities are feasible. The required contents of the preliminary TIR are identified below.

Table of Contents

1. List of section headings and their respective page numbers.
2. List of tables with page numbers.
3. List of figures with page numbers.
4. List of attachments, numbered.
5. List of references.

Map Submittals

All maps shall contain a scale and north arrow.

1. **Vicinity Map:** All vicinity maps shall clearly show the project site.
2. **Soils Map:** The soils map shall show soils within the contributing area that drains to the site itself. Soils maps may be obtained from the following sources:
   - Updated version of the Soil Survey of Clark County, Washington, originally published in 1972 and updated by the Natural Resources Conservation Service (NRCS).
   - Geographic information system (GIS) maps of soils from Clark County GIS.
   - Washington soil survey data as available on the NRCS website (http://soils.usda.gov/).
   - If the maps do not appear to accurately represent the soils on the site, the applicant is responsible for verifying the actual soils on the site.

3. **Other Maps:** The following additional maps shall be required in the situations noted:
   - Wellhead Protection. If the site lies within the 10-year time-of-travel zone of a public water supply well or within a Category I or II critical aquifer recharge area (CARA), maps showing all of the zones of contribution that overlap the site are required.
   - Floodplains. If a floodplain mapped by the Federal Emergency Management Agency (FEMA) exists on or adjacent to the site, a map showing the floodplain is required.

- Shoreline Management Area. If the site requires a shoreline permit, a map showing the boundary of the shoreline management area in relation to the site is required.

Section A – Project Overview

1. Describe the site location.
2. Describe the topography, natural drainage patterns, vegetative ground cover, and presence of critical areas. Critical areas that receive runoff from the site shall be described to a minimum of ¼ mile away from the site boundary.
3. Identify and discuss existing onsite stormwater systems and their functions.
4. Identify and discuss site parameters that influence stormwater system design.
5. Describe drainage to and from adjacent properties.
6. For agricultural sites with drain tiles, discuss the impact of construction on the drain tiles, site drainage, and the impact of the drainage tiles on proposed stormwater facilities.
7. Describe adjacent areas, including streams, lakes, rivers, wetland and buffer areas, residential areas, and roads that might be affected by the construction project.
8. Generally describe proposed site construction, size of improvements, and proposed methods of mitigating stormwater runoff quantity and quality impacts.

Section B – Minimum Requirements

Describe the land-disturbing activity and document the applicable minimum requirements for the project site. (See Chapter 4 of this manual for guidance.) Include the following information in table format:

1. The amount of existing impervious surface.
2. The amount of new impervious surface.
3. The amount of replaced impervious surface.
4. The amount of native vegetation converted to lawn or landscaping.
5. The amount of native vegetation converted to pasture.
6. The total amount of land-disturbing activity.

Provide a statement that confirms the minimum requirements that will apply to the development activity. For land-disturbing activities where minimum requirements 1 through 10 must be met:

1. Provide the amount of effective impervious area in each TDA, and document through an approved continuous runoff simulation model (e.g., the Western Washington Hydrologic Model [WWHM]) the increase in the 100-year flood frequency from pre-developed to developed conditions for each TDA.
2. List the TDAs that must meet the runoff control requirements listed in Minimum Requirement

3. List the TDAs that must meet the flow control requirements listed in Minimum Requirement 7.
4. List the TDAs that must meet the wetlands protection requirements listed in Minimum Requirement 8.

Section C – Soils Evaluation

1. Describe the site's suitability for stormwater infiltration for flow control, runoff treatment, and low impact development (LID) measures.
2. Identify water table elevations, flow directions (where available), and data on seasonal water table fluctuations with minimum and maximum water table elevations where these may affect stormwater facilities.
3. Identify and describe soil parameters and design methods for use in hydrologic and hydraulic design of proposed facilities.
4. Report findings of testing and analysis used to determine the infiltration rate.
5. Where unstable or complex soil conditions exist that may significantly affect the design of stormwater facilities, the Director may require a preliminary soils report that addresses stormwater design considerations arising from soil conditions. The preliminary soils report shall be prepared by a registered professional engineer, licensed in the state of Washington, proficient in geotechnical investigation and engineering or a registered soil scientist. The preliminary soils report shall include a soils map developed using the criteria set in the NRCS National Soil Survey Handbook (NRCS 2007) and the SCS Soil Survey Manual (SCS 1993), at a minimum scale of 1:5,000 (12.7 inch/mile).

Section D – Source Control

If the development activity includes any of the activities listed in Section 2.2 of Volume IV of the Stormwater Management Manual for Western Washington (WWM), identify the source control BMPs to be used with the land-disturbing activity.

Section E – Onsite Stormwater Management BMPs

1. On the preliminary development plan or other maps, show the site areas where onsite stormwater management BMPs will be effectively implemented. (See Volume III, Chapter 3 and Volume V, Chapter 5 of the WWM). The plan must show the areas of retained native vegetation and required flow lengths and vegetated flow paths, as required for proper implementation of each onsite stormwater BMP. Arrows must show the stormwater flow path to each BMP.
2. Identify and describe geotechnical studies or other information used to complete the analysis and design of each onsite stormwater BMP.
3. Identify the criteria (and their sources) used to complete analyses for each onsite stormwater BMP.
4. Describe how design criteria will be met for each proposed onsite stormwater management BMP.

5. Describe any onsite application of LID measures planned for the project. Provide a plan that shows the proposed location and approximate size of each LID facility.
6. Identify and describe any assumptions used to complete the analysis.
7. Describe site suitability, including hydrologic soil groups, slopes, area of native vegetation, and adequate location of each BMP.

Section F – Runoff Treatment Analysis and Design

For land-disturbing activities where the thresholds within Minimum Requirement 6 indicate that runoff treatment facilities are required:

1. Document the level of treatment required (basic, enhanced, phosphorus, oil/water separation), based on procedures in Volume V, Chapter 2 of the WWM.
2. Provide background and description to support the selection of the treatment BMPs being proposed. Include an analysis of initial implementation costs and long-term maintenance costs.
3. Identify geotechnical or soils studies or other information used to complete the analysis and design.
4. Identify the BMPs used in the design, and their sources.
5. Summarize the results of the runoff treatment design and describe how the proposed design meets the requirements of the WWM.
6. Provide a table that lists the amount of pollution-generating pervious surfaces (PGPS) and pollution-generating impervious surfaces (PGIS).

Section G – Flow Control Analysis and Design

For land-disturbing activities where the thresholds within Minimum Requirement 7 indicate that flow control facilities are required:

1. Identify the site's suitability for stormwater infiltration for flow control, including tested infiltration rates, logs of soil borings, and other information.
2. Identify and describe geotechnical or other studies used to complete the analysis and design.
3. If infiltration cannot be provided for flow control, provide the following additional information:
   - – Identify the areas where flow control credits can be obtained for dispersion, LID, or other measures, per the requirements in the WWM.
   - – Provide the approximate sizing and location of flow control facilities for each TDA, per Volume III of the WWM.
   - – Identify the criteria (and their sources) used to complete the analyses, including pre-developed and post-developed land use characteristics.
   - – Complete a hydrologic analysis for existing and developed site conditions, in accordance with the requirements of Chapter 2, Volume III of the WWM, using

an approved continuous runoff simulation model (the Clark County version of WWHM). Compute existing and developed flow durations for all subbasins. Provide an output table from the continuous flow model.

– Include and reference all hydrologic computations, equations, graphs, and any other aids necessary to clearly show the methodology and results.

– Include all maps, exhibits, graphics, and references used to determine existing and developed site hydrology.

4. Submit electronic copies of the WWHM (.wdm, .prj, .usi) project files upon request.

Section H – Wetlands Protection

For projects with stormwater discharges to a wetland and/or wetland buffer, either directly or indirectly through a conveyance system, the preliminary TIR shall describe wetland protection measures to be implemented in accordance with Minimum Requirement 8. The narrative shall describe the measures that will maintain the hydrologic conditions, hydrophytic vegetation, and substrate characteristics necessary to support existing and designated uses.

Submit three (3) complete copies for review.

K. Final Stormwater Plan

1. Purpose. In accordance with Minimum Requirement 1 (as defined in Chapter 4 and the WWM), the final stormwater plan shall provide final engineering design and construction drawings for the stormwater aspects of a proposed new development or redevelopment project. The final stormwater plan shall be submitted and approved by the Director before construction of the development can begin.

2. Final Stormwater Plan Submittal

   The final stormwater plan submittal shall include the following:

   a. Any conditions of approval from the land use process.

   b. Any easements, covenants, or agreements necessary to permit construction.

   c. Final engineering plans that provide sufficient detail to allow construction of the stormwater facilities. These plans shall be stamped, signed, and dated by the engineer(s), registered in the state of Washington, responsible for hydrologic, hydraulic, geotechnical, structural, and general civil engineering design and by the project engineer responsible for the preparation of the final stormwater plan. The final engineering plan shall show all utilities to ensure that conflicts between proposed utility lines do not exist.

   d. The approved preliminary stormwater plan, with an explanation of any differences between the design concepts included in the preliminary and final stormwater plans. If a final stormwater plan differs from the approved preliminary stormwater plan in a manner that, in the opinion of the Director, raises material water quality or quantity control issues, it shall require another SEPA determination (if subject to the State Environmental Policy Act [SEPA])

and a plat alteration.

e. A final development plan (which may be a part of the final engineering plans or a separate plan). See the requirements identified below.

f. A final technical information report (TIR). See the requirements identified below.

g. A construction stormwater pollution prevention plan (SWPPP). See Section 3.5 below.

L. Final Development Plan

The final development plan shall be consistent with the preliminary development plan and may be combined with the final engineering plans. In addition to the information required in the preliminary development plan, the final plan requires the following information:

1. Threshold discharge area (TDA) delineations, and total impervious and pervious area delineations and acreages by TDA.
2. The acreage of pollution-generating pervious surfaces (PGPS) and pollution-generating impervious surfaces (PGIS) used in the hydraulic/hydrologic calculations both onsite and offsite that contribute surface runoff.
3. Directions and lengths of overland, pipe, and channel flow.
4. Outfall points from each TDA and overflow routes for the 100-year storm.
5. Onsite conveyance systems, including pipes, catch basins, channels, ditches, swales, and culverts.
6. Primary flow path arrows for drainage under developed conditions, with the calculated flow rates. Cross-reference the flow rates to the hydrological model output file used to calculate the flow rates.
7. Approved location for storm runoff from the building lots.
8. The Director may require additional site or vicinity information if needed to determine the feasibility of the stormwater proposal.

M. Final Technical Information Report (TIR)

The final TIR shall be a comprehensive report, supplemental to the final engineering plans, that contains all technical information and analyses necessary to complete final engineering plans based on sound engineering practices and appropriate geotechnical, hydrologic, hydraulic, and water quality design.

The final TIR shall be stamped, signed, and dated by the professional engineer(s), registered in the state of Washington, responsible for hydrologic, hydraulic, geotechnical, structural, and general civil engineering design.

The required contents of the final TIR, which is part of the final stormwater plan, are identified below.

Table of Contents

See the preliminary TIR requirements.

Map Submittals

See the preliminary TIR requirements.

Section A – Project Overview

Provide the information from the preliminary TIR, with the following additional elements:

1. Reference the conceptual design proposed in the preliminary stormwater plan.
2. Identify revisions to the conceptual design contained within the final engineering plans.

Section B – Minimum Requirements

Provide the information from Section B of the preliminary TIR, revised as necessary for the final design. Confirm the applicable minimum requirements identified in the preliminary TIR. For land-disturbing activities where minimum requirements 1 through 10 must be met, provide the required information listed in Section B of the preliminary TIR, revised to reflect the final design.

Section C – Soils Evaluation

See the preliminary TIR requirements.

Section D – Source Control

See the preliminary TIR requirements.

Section E – Onsite Stormwater Management BMPs

Provide the information from the preliminary TIR, with the following additional elements:

1. Reference the conceptual design proposed in the preliminary stormwater plan.
2. Identify revisions to the conceptual design contained within the final engineering plans.
3. For bioretention systems, provide the following:
    a. The proposed soil matrix for the facility.
    b. The planting plan, listing proposed plant types and locations.
    c. Detail drawings, including the following:

        – If an underdrain is used, show drain rock, pipe, and filter fabric specifications.

        – All stormwater piping associated with the facility, including catch basin, pipe materials, sizes, slopes, and invert elevations.

        – Rain garden width, length, side slopes, and maximum design water depth.

– Irrigation system, if installed.

– Designs for any retaining walls proposed. Structural walls shall meet City building permit requirements.

4. For porous pavements, provide the following:
   a. Supporting design calculations showing adequate infiltration rates to accommodate flows from all impervious surfaces directed onto any porous pavement.
   b. Geotextile specification.
   c. Base material gradation.
   d. Asphalt mix design and void calculations.
   e. Acceptance test procedures.
5. Detail drawings, including the following:
   a. Geotextile
   b. Base material
   c. Asphalt layer
6. For reversed slope sidewalks, show the following:
   a. Details on the planting plan for any areas receiving water from reversed slope sidewalks.

Section F – Runoff Treatment Analysis and Design

For land-disturbing activities where the thresholds within Minimum Requirement 6 indicate that runoff treatment facilities are required, provide the information from the preliminary TIR, with the following additional elements:

1. Reference the conceptual runoff treatment design proposed in the preliminary stormwater plan.
2. Identify revisions to the conceptual runoff treatment design contained in the preliminary stormwater plan.
3. Complete a detailed analysis and design of all proposed runoff treatment system elements, in accordance with Volume V of the WWM. Reference runoff treatment system elements to labeled points shown on the site location map or final development plan.
4. Include and reference all computations, equations, charts, nomographs, detail drawings, and other tabular or graphic aids used to design water quality system elements in the technical appendix.
5. Summarize the results of the runoff treatment design, and describe how the proposed design meets the requirements of the WWM.

Section G - Flow Control Analysis and Design

For land-disturbing activities where the thresholds within Minimum Requirement 7 indicate that flow control facilities are required:

1. Identify revisions to the conceptual design proposed in the preliminary stormwater plan.
2. Identify initial conditions, including stream base flows, beginning water surface elevations, hydraulic or energy grade lines, initial groundwater elevations, beginning storage volumes, and other data or assumptions used to complete the analyses of initial conditions. Reference the sources of information.
3. Describe any assumptions used to complete the analysis, including flow credits through the use of onsite stormwater BMPs or LID measures.
4. Complete a detailed hydrologic analysis for existing and developed site conditions, in accordance with the requirements of Chapter 2, Volume III of the WWM, using an approved continuous runoff simulation model (the Clark County version of WWHM). Compute pre-developed and developed flow durations for all subbasins. Provide an output table from the continuous flow model, including the following:
    a. Flow rates for the 2, 10, and 100-year return periods for pre-developed and developed conditions.
    b. A table listing the pass/fail rates for each flow level where duration statistics were calculated.
    c. A graph showing the flow rate on the y axis and percent time exceeding on the x axis for pre-developed conditions and post-developed mitigated conditions, from 50 percent of the 2-year through the 50-year flow rate.
5. Provide a hydraulic analysis of pipes and/or channels that lead to and/or from the outlet structure. The analysis should confirm the capacity of pipes and channels to convey the peak flow rates for the 2, 10, 50, and 100-year return period flow rate with the water surface elevation of the pond at the elevation for those return period flow rates.
6. Submit electronic copies of the WWHM (.wdm, .prj, .usi) project files to allow reviewers to run the model and confirm the model results.
7. Refer to labeled points shown on the site location map and development plan.
8. Include and reference all hydrologic and hydraulic computations, equations, rating curves, stage/storage/discharge tables, graphs, and any other aids necessary to clearly show the methodology and results.
9. Include all maps, exhibits, graphics, and references used to determine existing and developed site hydrology.

Section H - Flow Control System Plan

1. Provide an illustrative sketch of the flow control facility and its appurtenances.
2. Show basic measurements necessary to confirm storage volumes.

3. Show all orifice, weir, and flow restrictor dimensions and elevations.
4. The sketch shall correspond with final engineering plans. Alternatively, a final site grading plan that incorporates the above information may be included as an attachment to the final stormwater plan.
5. Provide electronic copies of the drawings used for analysis, measurement, and design inputs for the hydrologic analysis submitted with the final drawing in one of the following approved file formats: Portable Document Format (.pdf), AutoCAD (.dwg, .dxf), or MicroStation (.dgn).

Section I – Wetlands Protection

For projects with stormwater discharges to a wetland or wetland buffer, either directly or indirectly through a conveyance system, the TIR shall describe wetland protection measures to be implemented, in accordance with Minimum Requirement 8. The narrative shall describe the measures that will maintain the hydrologic conditions, hydrophytic vegetation, and substrate characteristics necessary to support existing and designated uses.

Section J – Other Permits

Construction of roads and stormwater facilities may require additional permits from other agencies. These permits may contain requirements that affect the design of the stormwater system. This section lists the titles of other possible required permits, the agencies that require the permits, and the permit requirements, if known, that affect the final stormwater plan. Approved permits that are critical to the feasibility of the stormwater facility design shall be included in this section.

Section K – Conveyance Systems Analysis and Design

1. Reference the conceptual drainage design proposed in the preliminary stormwater plan.
2. In the technical appendix, include and reference all computations, equations, charts, nomographs, detail drawings, and other tabular or graphic aids used to design water quality system elements.
3. Identify revisions to the conceptual drainage design contained in the preliminary stormwater plan.
4. Identify the criteria used to complete the analyses and their sources.
5. Identify and discuss initial conditions, including stream base flows, beginning water surface elevations, hydraulic or energy grade lines, beginning storage elevations, and other data or assumptions used to complete the analyses of initial conditions. Reference the sources of information.
6. Describe any assumptions used to complete the analyses.
7. Complete a detailed hydraulic analysis of all proposed collection and conveyance system elements and existing collection and conveyance elements, including outfall structures and outlet protection that influence the design or are affected by the

proposal, in accordance with Section 4.05 of these standards. Identify, compute, reference, verify, summarize and tabulate the following:

a. Design flows and velocities and conveyance element capacities for all conveyance elements within the development.

b. The 10-year recurrence interval stage for detention facility outfalls. Provide stage-frequency documentation from WWHM.

c. The existing 100-year floodplain elevations and lateral limits for all channels, and no net loss of conveyance or storage capacity from development.

d. The conveyance system elements to labeled points shown on the site location map or development plan.

e. The capacity of each conveyance system element to convey design flow and discharge at non-erosive velocities and the capacity of the onsite conveyance system to convey design flows that result from ultimate build-out of upstream areas.

f. All hydraulic computations, equations, pipe flow tables, flow profile computations, charts, nomographs, detail drawings, and other tabular or graphic aids used to design and confirm the performance of conveyance systems.

g. The results of system analyses, and how the proposed design meets the requirements of these standards.

Section L – Offsite Analysis

If applicable, provide the results of an offsite analysis prepared in accordance with Chapter 4 (Offsite Analysis and Mitigation) of this manual (see exemptions in Chapter 4.)

Section M—Approval Conditions Summary

List each preliminary approval condition related to stormwater control, wetlands, wetland buffers, floodplains, and other water-related issues and explain how the final design addresses or conforms to each condition.

Section N – Special Reports and Studies

Where site-specific characteristics, such as critical areas as described in the WMC, present difficult drainage and water quality design problems, the Director may require additional information or the preparation of special reports and studies that further address the specific site characteristics, the potential for impacts associated with the development, and the measures that would be implemented to mitigate impacts. Special reports shall be prepared by professionals with expertise in the particular area of analysis, who shall date, sign, stamp, and otherwise certify the report. Subjects of special reports may include, but are not be limited to:

1. Geotechnical
2. Wetlands

3. Floodplains and floodways
4. Groundwater
5. Structural design
6. Fluvial geomorphology (erosion and deposition)

All special reports and studies shall be included in the technical appendix.

Section O – Groundwater Monitoring Program

Where required, a groundwater monitoring program shall be included in the final stormwater plan. The groundwater monitoring program shall be prepared by a person with expertise in groundwater contamination investigation, prevention, and monitoring and shall clearly describe a comprehensive groundwater testing and evaluation program designed to ensure compliance with federal and state of Washington laws and these standards. The Director will review proposed groundwater monitoring programs on a site-specific basis.

Section P – Maintenance and Operations Manual

The project engineer shall prepare maintenance and operations manual for each stormwater control or treatment facility to be privately maintained and for those that constitute an experimental system to be maintained by the City. The manual, which may be brief, shall be written in an orderly and concise format that clearly describes the design and operation of the facility. The manual shall also provide an outline of required maintenance tasks, with recommended frequencies at which each task should be performed. The manual shall contain or reference procedures from the latest version of Clark County's Stormwater Facility Maintenance Manual.

Technical Appendix

All TIRs shall contain a technical appendix that includes all computations completed in the preparation of the TIR, together with copies of referenced data, charts, graphs, nomographs, hydrographs, stage-storage discharge tables, maps, exhibits, and all other information required to clearly describe the stormwater flow control and runoff treatment design for the proposed development activity. The format of the technical appendix shall follow as closely as possible the section format of the TIR and shall be adequately cross-referenced to ensure that the design may be easily followed, checked, and verified. The technical appendix shall also contain all special reports and studies, other than those included as attachments to the TIR.

Submit three (3) complete copies for review.

1. Review and Approval. All final stormwater reports require approval by the Director. Approval is only for conformance with City of Washougal standards and does not relieve the engineer of record of responsibility for the design.
2. Stormwater treatment and control facilities in urban residential subdivisions and short plats shall be located on separate tracts which are recommended, but not required, to meet minimum zoning lot size requirements. The plat or other dedication instrument shall indicate tract disposition in the event of City

abandonment or vacation.

1.05 Professional Qualifications

Professionals in the technical fields of Civil Engineering, Electrical Engineering, Geotechnical Engineering, Landscape Architecture, Soils Engineering, Structural Engineering, and Surveying who prepare or are responsible for the process of obtaining required permits/approvals shall be currently licensed or registered in the State of Washington and qualified by both experience and educational background in the specific technical areas as warranted by the specific needs of the proposed development project.

1.06 Changes to these Engineering Standards

From time to time changes may be needed to add, delete, or modify the provisions of these Standards. The Director may propose changes to these Standards and upon approval of the City Council; they shall become effective and shall be incorporated into the existing provisions.

1.07 Design Modification Process

A. Submittal

1. Requests to modify City Standards shall be submitted in writing by the Developer's engineer to the Director. This written request shall state the desired modifications(s), the reason(s) for the request(s) and a comparison between the specification(s), standard(s), and the modification(s).
2. Any request for modification or variance of City Standards should be documented with reference to nationally accepted specifications/standards.

B. Review

1. The request to modify shall be reviewed by the Director, who shall consult the appropriate review authorities and make one of the following decisions:
    a. Approve as is,
    b. Approve with changes, or
    c. Deny with an explanation.
2. The modification, if approved, is for project specific use. Approval of a request shall not constitute a precedent.

C. Appeal

1. All decisions regarding these standards shall be considered type 1 decisions and may be appealed to the Hearings Examiner in accordance with the WMC.

D. Criteria for Modification of Specification Standards

1. The Director may grant a modification to the adopted specifications or standards when all of the following conditions are met:

   a. The specification or standard does not apply in the particular application.

   b. Topography, right-of-way, or other geographic conditions impose an unusual or unique hardship on the applicant and an equivalent alternative which can accomplish the same design is available that does not compromise public safety or accessibility for the disabled.

   c. A change to a specification or standard is required to address a specific design or construction problem which if not enacted will result in an undue hardship.

1.08 Securities

Under certain circumstances or as required by code, securities may be required by the City to guarantee the performance of, or correct permitted work. The amount of security shall cover the City's cost to correct deficiencies. The type and amount of security shall be per code or, if not specified, be at the discretion of the Director. Types of securities include but are not limited to cash deposits, assigned savings, and bonds. Securities shall be released by the City upon satisfactory completion of the required work and satisfaction of any additional previously specified stipulations related to the work being performed.

Prior to final acceptance of the construction of any public improvements associated with any private project, the Developer shall furnish the City of Washougal with the following:

A. A two (2) year maintenance bond, as follows:

   1. In an amount equal to 20% of the cost of said public improvements (verified by a professional engineer licensed in the State of Washington and approved by the City).

   2. For a period of two (2) years following the date the plat is recorded or the as-builts are signed, whichever is later.

   3. In compliance with all requirements of a Contract Bond as specified in Section 1-03.4 of the WSDOT Standard Specifications.

B. A performance bond, as follows:

   1. In compliance with the requirements of Section 1-03.4 of the WSDOT Standard Specifications for all improvements not installed at the time of final acceptance (as approved by the Director) and shall remain in effect until such time as released in writing by the Director.

   2. In an amount equal to 150% of the cost of said improvements (estimated by a professional engineer licensed in the State of Washington and approved by the City).

   3. May not be used for the top lift of asphalt, street lights or any other improvement the Director deems necessary for the health and safety of the public.

1.09 Errors and Omissions

At the discretion of the City, any significant errors or omissions in the approved plans or information used as a basis for such approvals may constitute grounds for withdrawal of any approvals and/or stoppage of any or all of the permitted work. It shall be the responsibility of the Developer to show reason why such work should continue, and make such changes in plans that may be required by the City before the plans are re-approved.

1.10 Inspection

A. General Requirements

1. Work performed within the public right-of-way, or as described in these Standards; whether by or for private developer, City forces, or a City Contractor, shall be done to the satisfaction of the City and in accordance with the Standard Specifications, any approved plans, and these Standards. Unless otherwise approved, any revision to construction plans must be approved by the City before being implemented.

2. The City shall have authority to enforce the Standards as well as other referenced or pertinent specifications. The City will appoint project engineers, assistants, and inspectors as necessary to inspect the work and they will exercise such authority as the Director may delegate.

3. It is the responsibility of the Developer, Contractor, or their agents to have an approved set of plans, and/or permits on the job site wherever work is being performed.

   It is the responsibility of the Developer, Contractor, or their agents to notify the City in advance of the commencement of any authorized work. A preconstruction conference and/or field review are required before the commencement of any work.

4. Failure to comply with the provisions of these standards may result in stop work orders, removal of work accomplished, or other penalties as established by ordinance.

B. Substitution of Materials

It is not the intent of these Standards to exclude other equipment or materials of equal value, quality, or merit. Whenever a product is designated, or manufacturer's name, brand, or item designation is given or described, it shall be understood that the words "or approved equal" follows such name, designation, or description, whether in fact they do so or not. Determination of quality in reference to the project design requirement will be made by the Director. A Contractor shall not use an "equal" product without prior written approval of the Director.

C. City Inspector's Activities. Inspecting services provided by the City shall include:

1. Monitoring both work progress and performance testing results.

2. Performance of administrative and coordination activities as required supporting the processing and completion of the project.

3. Issuance of a corrective notice to the Contractor to make corrections to the work. The City's Project Inspector, at the discretion of the Director, may post a stop work order.
4. Maintaining a completion file containing the following:
   a. The original of the project completion certification; and
   b. A complete copy of the report file initialed by the City's Project Inspector;

      -and-

   c. The results of material tests, compaction tests, and soil analysis as detailed in the construction file.
5. Inform the Director of all proposed plan changes, material changes, corrective notices, stop work orders, or errors or omissions in the approved plans or specifications as soon as practical. Any revision to the approved plans must be at the direction of the Engineer. It shall be at the discretion of the City's Project Inspector as to whether the revision is significant enough to warrant review by the Director. If so, the Developer's engineer shall submit five (5) copies of the revised plans to the City for approval. No work affected by the revision shall be done until approved by the Director.

1.11 Contractor's Responsibility for Scheduling

A. Sequence of Operations

1. The Contractor shall plan construction work and execute operations with a minimum of interference with the operation of the existing public facilities, including but not limited to, water, sewer, and roads. It may be necessary to perform certain parts of the construction work outside normal working hours in order to avoid undesirable conditions, and it shall be the obligation of the Contractor to perform this work at such times. This scheduling, however, is subject to the City's approval and does not relieve the Contractor from making work available for inspection.
2. The Contractor shall notify the City at least 48 hours (two full working days) prior to any City inspection. Connections between existing work and new work shall not be made until necessary inspection and tests have been completed on the new work and it is found to conform in all respects to the requirements of the plans and specifications.

B. Inspections Steps

1. The following items of work shall be inspected by the City:
   a. Street or sidewalk work and subgrade (also tested by the Contractor) prior to placement of crushed surfacing.
   b. Crushed surfacing (also tested by the Contractor) prior to placement of paving, curb, or sidewalks.
   c. Notify the City prior to the placement of any paving, curb, or sidewalks.

2. Other items of inspection notification are included under the various items of work outlined in these Standards.

C. Progress of Construction

1. Construction shall proceed in a systematic manner that will result in a minimum of inconvenience to the public.

2. In the case of a pipe-laying job for sanitary sewer, storm drainage, and water improvements the trenching equipment at no time shall be greater than 100 feet ahead of the pipe-laying crew, without written permission from the Director.

3. The trench shall be backfilled so that no section of the trench or pipe is left open longer than 24 hours. Trenches located in a right-of-way or public street shall be completely backfilled or plated before the Contractor leaves the site each day. All piping is to be plugged with a serviceable expansion plug at the end of each workday.

1.12 Contractor's Requirement for Testing

A. General

1. Testing shall be performed by a certified independent testing lab hired by the Developer or Developer's contractor with the results being supplied to the Director. The Developer shall pay the cost of all testing as outlined herein.

2. The testing is not intended to relieve the Contractor from any liability for the trench restoration. It is intended to show the inspector and the City that the restoration meets these specifications.

B. Asphalt Testing

1. Compaction of all lifts of asphalt as specified in the Standard Specifications. Number of tests required:

a. For streets provide one (1) test per every 5,000 square feet of surface area.

b. For surface restoration of utility trenches provide one (1) test per every 200 feet of trench.

C. Subgrade and Crushed Surfacing Testing

1. Compaction testing as specified in the Standard Specifications. Number of tests required:

a. For streets, provide one test of the subgrade and one test of the crushed surfacing for every 5,000 square feet of surface area of pavement, curb, and sidewalk.

D. Bedding and Backfill for Utility Trenches

1. Compaction testing as specified in the Standard Specifications. Number of tests required:

a. For utility trenches provide one test at top of bedding for every 500 feet of trench.

b. For utility trenches provide one test for each lift of backfill for every 500 feet of trench.

E. Embankment for Subgrade

1. Compaction testing as specified in the Standard Specification. Number of tests required:

a. For each location where the fill is deeper than two (2) feet or greater than 300 cubic yards, provide one test per every two (2) vertical feet and every 500 cubic yards.

1.13 Safety Requirements

The Contractor is responsible for observing the safety of the work and all persons and property coming into contact with the work. The Contractor shall conduct his work in such a manner as to comply with all the requirements prescribed by OSHA. The City Project Inspector's role is not one of supervision or safety management, but is one of observation only.

Nothing contained in this section or elsewhere in these standards shall be interpreted to obligate the City to act in any situation, nor shift the Owner's responsibility for safety compliance to the City. No responsibility for the safety of the work or for construction means, methods, techniques, sequences, or procedures shall be attached to the City by virtue of its action or inaction under this section.

1.14 Preservation, Restoration, and Cleanup

A. Site Restoration and Cleanup

1. The Contractor shall keep the premises clean and orderly at all times during the work and leave the project free of rubbish or excess materials of any kind upon completion of the work. During construction, the Contractor shall stockpile excavated materials so as to do the least damage to adjacent lawns, grassed areas, gardens, shrubbery, trees, or fences, regardless of the ownership of these areas. All excavated materials shall be removed from these areas, and these surfaces shall be left in a condition equivalent to their original condition and free from all rocks, gravel, boulders, or other foreign material. Stockpiling of construction materials shall not be allowed on existing public rights-of way.

2. All existing storm systems adjacent to the project area shall be cleaned and flushed with a vactor truck and/or sewer jetter, and original drainage restored. Sediment, rock, and other debris shall be collected and disposed of in a proper manner. In no case shall debris be flushed down a storm or sanitary sewer for disposal. All damaged/impaired storm facilities, irrigation, and house drainage pipes, drain tiles, sewer laterals, and culverts shall be repaired expeditiously.

3. All areas disturbed by the Contractor's operations inside dedicated rights-of-way or easements shall be restored to original condition. Areas outside of the easements or rights-of-way which are disturbed by the Contractor's operations shall be restored to their original or better condition in a method acceptable to the property owner. The

Contractor shall obtain a written release from such property owners for any claims of injury or property damage prior to final acceptance of the work by the City.

B. Street Cleanup

1. The Contractor shall clean all spilled dirt, gravel, or other foreign material caused by the construction operations from all streets and roads at the conclusion of each day's operation unless it poses an erosion control threat. If any spilled material poses an erosion control threat, it shall be cleaned immediately. Cleaning shall be by grader and front-end loader, supplemented by power brushing, and hand labor, unless otherwise approved by the City. The Contractor shall follow the City's erosion control procedures.
2. As soon as practical after completion of all paving and gravel shoulder resurfacing, the Contractor shall remove all dirt, mud, rock, gravel, and other foreign material from the paved surface and storm drainage system.

C. Stream and Creek Crossings

1. The Contractor shall comply with all provisions of the permits required by the Washington State Departments of Wildlife and Fisheries, the U.S. Army Corps of Engineers, Washington State Department of Ecology, and the Washougal Municipal Code.
2. Before any work may be performed in any stream, the method of operation and the schedule of such work shall be approved in writing by the Director.

D. Protection of Property

1. The Contractor shall exercise all due care in protecting property along the route of the improvement. This protection shall include, but not be limited to, trees, yards, fences, drainage lines, mailboxes, driveways, shrubs, and lawns. If any of the above has been disturbed, they shall be restored to as near their original condition as possible.

E. Use of Explosives

1. All use of explosives is to follow Washington State Law.
2. Surrounding property owners affected by blasting are to be notified well in advance of the use of explosives.
3. Use of explosives should be done to limit the effects on surrounding neighbors.
4. Blasting permits are required per WMC.

1.15 Railroad Crossings

A. General

1. Crossings of railroad rights-of-way shall be done in a manner, which conforms with the requirements of the railroad having jurisdiction. If any bonds and/or certificates of insurance protection are required, they shall be furnished by the Contractor or Owner to the railroad company with the City as an additionally-named insured.

B. Permits or Easements

1. Crossing agreements, permits, and/or easements for such crossings will be obtained by the applicant and all the terms of such permits or easements shall be met by the Owner and Contractor.

1.16 Penalties

Failure to comply with these Standards will be cause for withholding or withdrawing approval of plans or plats, forfeiture of bond, withholding Temporary and/or Final Certificate of Occupancy, and/or other penalties as provided by law.

Chapter 5

Water

City of Washougal Engineering Standards for Public Works Construction
February 2010
Director of Public Works: Trevor Evers

Chapter 5
Water

City of Washougal Engineering Standards for Public Works Construction
February 2010

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Chapter 5
Water

City of Washougal Engineering Standards for Public Works Construction
February 2010

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CHAPTER 5 - WATER

5.00 Developer Extension Agreements

A. When extension of the existing water system is required for service, the Owner/Developer shall submit an application to the City as described within the Washougal Municipal Code.

B. Upon completion of the design and approval by the City, the Owner/Developer will be notified of requirements to be completed prior to construction. Upon completion of the pre-construction requirements and 48-hours notice, a pre-construction meeting will be held with the City, at which time construction inspection will be scheduled. No water main construction work shall commence prior to the pre-construction meeting. After completion of construction, testing, and submittal of required documents and fees, final acceptance will be given by the City, at which time service will be available by application following payment of fees for water meters.

C. Prior to commencing construction of any component of the public water system, the Developer shall submit to the City an approved performance bond in accordance with the requirements of Section 1.08 of these Standards.

D. Developer Extension projects shall be deeded to the City for maintenance and operation by letter after the system has been found to meet City standards.

5.01 Utility Tracts

All public utilities (storm, water, and sewer) shall be in public utility tracts. The tract shall be a minimum twenty (20) feet wide with a twelve (12) feet wide all weather surface. No obstructions are to be located within the public utility tracts.

5.02 General Design Considerations

A. In all residential and commercial developments water main extensions are required to assure orderly development of the water utility system. Where applicable, water main extensions shall conform to the requirements of the City's latest approved Water System Plan. Where the proposed extension is not addressed in the Water System Plan, the Developer shall pay the cost for any Water System Plan amendments required by the Washington State Department of Health, or Director. All proposed water main extensions must comply with the City's requirements for development, water quality, pressure zones, and fire protection requirements of the City.

B. Design and construction of water mains, including but not limited to, mainlines, valving, fire hydrants, fire sprinkler connections with backflow devices, domestic and irrigation services, pump stations, pressure reducing stations, telemetry and other appurtenances shall be in compliance with the City ordinances, special requirements of the City, these Standards, and the Standard Details.

C. The applicant is responsible for designing the Developer Extension Water system(s). The system(s) must be designed by a licensed engineer and approved by the City.

D. Water mains shall be extended through and to the extremes of the property being developed for gridding or future development, as determined by the City.

E. Dead end water main extensions shall be avoided. Unless specifically approved by the Director, all water main extensions shall be looped to other water mains within the pressure zone of that water main extension. Generally, looping of water main extensions is required for all extensions serving twenty (20) or more equivalent residential units.

F. Water main extensions for service to pressure zones different from the pressure zone from which the extension is made shall be avoided. Unless specifically approved by the Director, booster pump stations or pressure reducing valve stations shall not be permitted.

5.03 Sizing and Pressure Requirements

A. In areas where gridding or fire flow is a requirement, 8-inch diameter pipe is required. Nothing shall preclude the City from requiring the installation of a larger sized main if the City determines a larger size is needed to meet fire protection requirements or for future service. The Developer shall be required to pay the cost of all oversizing. Reimbursement for oversizing will be in accordance with the WMC.

B. Minimum size mains shall be 6-inch on runs less than three hundred (300) feet, when there will not be more than eight (8) 1-inch services, where no more than one (1) fire hydrant is required, and when there is no possibility of future extensions.

C. Dead end mains shall be avoided. If they are permitted, a blow off assembly will be required at the end of the pipeline. In the event that the "dead end" finishes where there is risk of a vacuum being created due to water shut down, then a Combination Air and Vacuum Release Valve shall be installed in accordance with the Standard Drawings.

D. All water system installation shall be designed to provide a pressure range at the residence of thirty (30) psi to ninety (90) psi at all times, including during peak demand, unless specifically approved.

E. An approved screen shall be located in the pressure reducing valve vault at a location upstream of the pressure-reducing valve. Pressure reducing valves may be required at the discretion of the City on individual services. Such valves will be installed after the meter and will be the responsibility of the homeowner to install and maintain.

F. Water service size shall be evaluated by the Developer's engineer. The requirements of this section shall be met and shall be no smaller than 1-inch. Booster pumps shall not be allowed on meter service lines in order to meet this requirement, unless specifically approved by the Director. The meter size shall be no smaller than the service line size unless approved by the Director, except that a ¾-inch meter shall have a 1-inch service line.

G. Where requested by the Director, the Developer's engineer shall provide a "pressure available" chart on the water system plan sheet of the construction plans. This sheet shall indicate the calculated pressures theoretically available to each lot during static and peak demand periods. In such cases it shall be the Developer's engineer's responsibility to determine pressures based upon an analysis of the system. All work associated with the

analysis shall be paid for by the Developer.

5.04 Shut-off Valves

A. Valves shall be located, whenever possible, at intersections (one (1) valve per each line radiating from the intersection). In general, sufficient valves should be provided to permit shutting down any section of the line, not exceeding five-hundred (500) feet, with valve operations in not more than three (3) locations.

B. Valves shall be installed in clusters at pipeline intersections.

C. Valves 8-inches and smaller shall be resilient seat gate valves.

D. Valves 10-inches and greater shall be butterfly valves.

5.05 Air-release Valves

At high points in the water system, combination air and vacuum release valves (CARV) shall be installed as required by the Director. All Air-Vac, Air Evacuation, and Vacuum Prevention Valves of sizes 2-inches and larger shall vent to the outside of the vault. If construction of the valve does not permit the venting of leakage to the outside of the vault, a screened drain to daylight of at least the supply line size must be provided at a level that will prevent cross connection and/or backflow problems. This decision will be made by the Director prior to the plan approval.

5.06 Hydrants

A. The number and locations of fire hydrants, fire flow requirements, and fire sprinkler components will be determined by the City Fire Department. Following are general requirements for fire hydrant locations:

1. **Commercial Buildings:** Fire hydrants shall be located so that no part of a commercial building is more than two-hundred and fifty (250) feet from a fire hydrant measured along a route accessible to fire department vehicles. When a fire department connection (FDC) is installed in conjunction with an automatic sprinkler system, it is required to have a fire hydrant located within seventy (70) feet of the FDC.

2. **Non-Commercial Buildings:** Fire hydrants shall be placed at a minimum at each street intersection. The Fire Marshall may request additional hydrants per Fire Code requirements.

   a. Intermediate hydrants are required when the distances to any part of non-commercial buildings exceeds five-hundred (500) feet measured along a route accessible to fire department vehicles.

B. Fire hydrants shall not be connected to mains less than 8-inches, or 6-inches in diameter where the length of 6-inch main is less than two-hundred (200) feet. As per the UFC, fire hydrants shall be located to allow a 5-foot clear space surrounding the hydrant. For example, street lights, sign posts, protective posts, or retaining walls shall be no closer than five (5) feet from the nearest portion of a hydrant. There shall also be no

obstructions directly in line with any of the ports of the hydrant.

C. Fire hydrants shall have Storz fittings (or approved equal).

D. Fire hydrants subject to possible vehicular damage shall be adequately protected with guard posts in accordance with Uniform Fire Code Section 8001.11.3. For marking, see Section 901.4.3. For obstruction, see Section 1001.7.

5.07 Water Meters

A. Water meters sized 1-inch shall be furnished and set by the City. The owner is required to make application and pay meter fees prior to the installation. The City will install meters and lock off meter setters and turn on as requested by the owner after acceptance by the City. Water meters will be set only after curb stop and box are at proper finished grade.

B. Meters 1 ½ -inch and larger shall be compatible with the City's MVRS and AMR system, installed by the owner as part of the construction project, and will be locked off by the City. The 1 ½ -inch and larger meters will be turned on by the City by request from the owner after acceptance by the City.

C. Meters shall be located outside of the sidewalk and/or drivepath within public right-of-way or as otherwise approved by the Director.

D. In plat and short plats, water meter applications will be processed for meter sets and water turned on after acceptance of the water mainline facility by the City.

E. All irrigation systems require plumbing permits and the installation of state approved backflow preventers.

All irrigation meters will be set and turned on after acceptance of the water system by the City. The City will not accept a water system until all the requirements of the Extension Agreement have been completed and all the fees have been paid.

F. Adjustments, repairs, or replacement of the service line, meter box, or setter shall be the responsibility of the property owner.

G. Water services are to be single runs from the main line to each meter. Manifolds with multiple meters shall be allowed in multi-family units with a single property owner.

5.08 Fees and Charges

All fees and charges related to development shall be in accordance with the latest requirements of the WMC.

5.09 Cross Connection Control

A. All water system connections to serve buildings or properties with domestic water, fire sprinkler systems, or irrigation systems shall comply with the minimum backflow requirements as established by the Department of Health (DOH), WAC 246-290-490, and the City. See the Washougal Cross Connection Control Program for information on City requirements.

B. A permit is required for the installation of all backflow preventers to protect the existing water system and users from possible contamination. These backflow preventers shall be installed in accordance with the requirements of the "Accepted Procedure and Practice in Cross Connection Control" manual, the Uniform Plumbing Code, Chapter 6 Washington State Amendments 603.0.

5.10 Contract for Reimbursement (Latecomer Agreements)

Should the Developer deem that the utility extension is an undue hardship and will significantly benefit other property owners, the Developer may request a latecomer agreement, in accordance with the WMC.

5.11 Water Quality

The quality, taste, and odor of water drawn from new construction water mains shall be the same as the water in the existing facility classed as acceptable for use by the City. Should the water not be acceptable for use because of taste, required steps as approved by the City shall be accomplished to attain water quality acceptable for use. Sampling for such water quality testing shall be performed by the use of a Kupferle (model #88 Eclipse) sampling station installed permanently and specifically for such testing. A sampling station shall be required for every fifty (50) EDU's or as determined by the Director. The location for said sampling stations will be determined by the Director.

5.12 Plans and Specifications

A. All extensions to the water system shall conform to the most recent edition of the Standard Specifications for Road, Bridge, and Municipal Construction. The system shall be capable of future expansion and be constructed of permanent materials.

B. The installation of water extensions shall be in accordance with construction plans and specifications prepared by the Developer's engineer and reviewed and approved by the City. Where conflicts exist the more stringent specification shall apply as approved by the City.

5.13 Connections to Existing Pipelines

A. Cut-ins shall be made in existing pipes. The work shall be conducted at such a time and in such a manner as to minimize the interruption of service. Cut-in time must be approved by the City. Necessary pipe, fittings, and gate valves shall be swabbed with chlorine and assembled at the site ready for installation prior to the shutting-off of water in the existing main. Once the water has been shut off, the work shall be performed vigorously, to minimize the interruption, and shall not be halted until the line is restored to service.

When approved by the Director, connections may be made to existing pipes under pressure with a tapping machine by determining the size and type of pipe and installing tapping sleeve to fit complete with tapping gate valve.

Operation of all water main line valves shall be by the City.

The City shall witness all wet taps and cut-in connections and requires 48-hours notice and approval by the City.

B. The Contractor shall have the responsibility of giving written notice to the City at least four (4) days and to affected customers at least 48-hours prior to disruption of service. Written notice to affected customers shall consist of, at a minimum, door hangers, as well as signs posted at the entrance to the customers streets.

C. Pipes to be abandoned shall be removed or capped watertight with mechanical couplings, as determined by the Director.

5.14 Roadway and Railway Crossing

The owner shall be responsible for obtaining all permits required when constructing within right-of-way outside of the City's jurisdiction. The design shall be acceptable to the City and the government or private agency having control of the right-of-way.

5.15 Trench Excavation

A. Clearing and grubbing where required shall be performed within the easement or public right-of-way and as permitted by the property owner and/or governing agencies. Debris resulting from the clearing and grubbing shall be disposed of by the Developer.

B. Trenching for water mains shall be completed in accordance with the Standard Specifications.

C. Trenching and shoring operations shall not proceed more than one-hundred (100) feet in advance of pipe laying without written approval of the City.

D. Where a utility crosses under an existing asbestos cement water main or where a trench alters the bedding of an existing asbestos cement water main, the existing A.C. pipe shall be cut three (3) feet minimum from each side of the trench wall and replaced with a corresponding size ductile iron pipe Class 52. The ductile iron pipe shall be connected to A.C. pipe with transition couplings.

E. Contractor shall furnish a watertight plug of the appropriate size which shall be installed in the end of water main when work is delayed or stopped at the end of the work shift.

5.16 Pipe in Filled Areas

Where pipe is to be installed in filled areas, special treatment may be required at the discretion of the City. This treatment may consist of compacting the backfill in 6-inch layers, careful choice of backfill materials, use of Mechanical Joint Ductile Iron Pipe in short lengths, or such other reasonable method or combinations as may be necessary or as required by the City.

5.17 Pipe Installation for Water Mains

The work necessary to excavate, bed, and backfill water pipelines shall conform to the requirements of the Standard Specifications and the Standard Drawings.

A. Pipe and Fittings

1. Use only Class 52 ductile iron pipe and fittings in accordance with the Standard Specifications.

B. Permissible Deflection of Joints

1. Wherever it is necessary to deflect pipe from a straight line either in a vertical or horizontal plane, or where long-radius curves are permitted, the amount of deflection allowed shall not exceed the values in the following Table 5.1.

Table 5.1
Maximum Deflection Permitted*
18-Foot Length Pipe

Dia. Inches	Mechanical Joint** Maximum Deflection Angle Degrees and Minutes	Mechanical Joint** Maximum Deflection Deflection Inches	Push-on Joint Maximum Deflection Angle Degrees	Push-on Joint Maximum Deflection Deflection Inches
4	8-18	31	5	18
6	7-07	27	5	18
8	5-21	20	5	18
10	5-21	20	5	18
12	5-21	20	5	18

* The maximum deflection shall be whichever is less; the table or that recommended by the pipe manufacturer.

** Safe deflection for one hundred and fifty pounds (150 lbs.) pressure. For higher pressure, reduce tabulated deflection proportionally ten percent (10%) for each one hundred and fifty pounds (150 lbs.) added pressure.

5.18 Bedding and Backfill

Use imported bedding for all water main pipe installed under pavement, curbs, sidewalks, or usable shoulder. Bed and backfill pipe and appurtenances in accordance with the Standard Specifications.

5.19 Hydrostatic Tests

The Contractor shall make pressure and leakage tests on all newly laid pipe. Test to be made at one hundred and fifty (150) psi or one and one-half times the normal working pressure, whichever is greater, for 1-hour with no loss. Test at higher pressures may be required depending upon installation. The Contractor shall furnish all necessary equipment and material, make all taps in the pipe as required, and conduct the tests. The City shall witness the test; if the test does not pass inspection for any reason, additional trips required to witness the test shall be at the owner's expense.

A. Correction of Excessive Leakage

Should any test of pipe laid disclose leakage greater than that allowed, the Contractor shall locate and repair the defective joints or pipe until the leakage of a subsequent test is within the specified allowance.

B. Isolation of Existing Systems Prior to Testing

Existing water pipelines shall be protected from contamination during the testing process for new construction. Use of special "blind flanges" will be necessary if the line being tested cannot be adequately separated from existing systems. The Developer's engineer shall submit shop drawings and proposed procedures to the City prior to installing any special testing device.

5.20 Sterilization and Flushing of Water Mains

Pipelines intended to carry potable water shall be sterilized before placing in service. Sterilizing procedures shall conform to the standard specifications as hereinafter modified or expanded.

A. Disposal of Sterilizing Water

Sterilizing water shall be disposed of in an approved manner. Sterilizing water shall not be allowed into a waterway without adequate dilution or other satisfactory method of reducing chlorine to a safe level. Dechlorinization procedures are to be submitted in writing and approved by the Director prior to flushing system.

5.21 Cross Connection Control and Backflow Assemblies

A. An approved backflow prevention assembly, as listed in “Backflow Prevention Assemblies for Installation in Washington State” (DOH PUB 331-137), is required on all fireline systems, domestic water service larger than 2-inches, and/or building in excess of thirty (30) feet above the water main. The assembly shall be installed at the location normally established for water meters, usually at the property line. A water service shall not be turned on until all required backflow prevention assemblies are installed, inspected, tested, approved, and registered with the City of Washougal. Costs of all installations, including all costs of inspection and testing fees, shall be the responsibility of the customer. The backflow prevention assembly will remain the property of the customer. The customer will be responsible for all maintenance and

testing of the assembly and vault.

B. When required, backflow prevention assemblies for protection of the public water system shall meet the requirements set forth in the current Washington State Department of Health regulations, Uniform Plumbing Code, and City ordinances. All installation shall meet AWWA Cross Connection Control Manual, May 1990, requirement.

C. There are two (2) types of backflow prevention assemblies, which the City will allow as protection of the public water system; reduced pressure backflow assemblies and double check (or double detector check) assemblies. The Washington State Department of Health provides a list of approved assemblies that meet these criteria.

The type of backflow prevention assembly required is determined by the aforementioned rules and codes, based on the type of premises to which water service is being provided, hydraulic condition, complexity of piping and determined by the State certified Cross Connection Control Specialist. The approved types of assemblies are listed below with some of the types of premises that must be protected by each type of assembly. However, these lists are not complete, they are only intended to provide some basic guidelines.

1. Reduced Pressure Backflow Assembly

   a. An approved Reduced Pressure Backflow Assembly shall be installed on the service connection above ground to the following:

   b. Any parcel or building that has an auxiliary water supply on or available to it. This will include any above or below ground water source. (The most commonly encountered type of auxiliary water supply is a private well);

   c. Buildings which are located within an industrial zone;

   d. Hospitals, medical centers, and clinics;

   e. Mortuaries and nursing homes;

   f. Gas stations;

   g. Car washes;

   h. Sewage pump and lift stations;

   i. Dry cleaners and commercial laundries;

   j. Any water system which has a pump to supplement pressure; and

   k. Irrigation systems, which are designed to use chemical injection.

2. Double Check Assembly or Double Detector Check Assembly

   An approved double check assembly or an approved double detector check assembly shall be required (provided that all internal plumbing is installed and maintained in accordance with the Uniform Plumbing Code), on the service connection to premises where there is:

a. Any fire system or water line to a private fire hydrant;

b. Multi-story buildings which are in excess of thirty (30) feet above the water main at the service connection;

c. Shopping centers or large retail stores; and

d. Restaurants or fast food establishments.

C. Installation and Testing

1. Backflow prevention assemblies shall be installed at the water service connection on the customer side of the meter. Backflow assemblies 3-inch diameter and larger shall be installed in a vault in accordance with these standards. Backflow prevention assemblies 1-inch and smaller shall be installed in a Carson Industries Box, series 1324 or an approved equal. 1 ½-inch and 2-inch assemblies shall be installed in a series 1730 box, or equal.

2. After installation, all backflow prevention assemblies that are installed must be tested upon installation by a State of Washington certified tester. The results of the testing shall be received by the City prior to issuance of "final occupancy."

3. Backflow prevention device assembly vaults shall be constructed in accordance with the standard drawings and requirements of this section. Backflow vaults shall be on private property and located outside of public easements.

5.22 Requirements for Water System Vault Installations

To ensure proper operation and accessibility of all assemblies, the following requirements shall apply to installation of these assemblies, unless otherwise approved by the City. Vaults shall be constructed per the Standard Details.

A. The vault shall be sealed with an asphalt base foundation coating on the outside of the vault. Vault penetrations shall be sealed with non-shrink grout from the outside. Apply waterproof coating over grout. Backfill around vault per manufacturer's specifications.

B. Access to be through an H-20 rated standard Bilco door, or approved alternate.

C. Provide approved ladder if the vault or chamber depth is 5’0” or greater and entry is through the vault or chamber roof. Ladders shall include a Model 1 Bilco LadderUP safety post or approved equal.

D. Adequate drainage for the vault or chamber shall be provided. (Drainage to piped storm systems allowed with check valve).

E. Vault must be equipped with a moisture proof light fixture if adequate lighting is not available.

F. Vault is to have no other use, except for use described by these Standards.

G. Vault shall be installed on undisturbed base or compacted 3/4"-0" gravel base.

H. No piping shall be installed in excess of three (3) feet above the vault floor.

I. Assembly is to be adequately supported from the floor, and suitably restrained from movement. Supports shall consist of steel supports or approved equal; no wood supports shall be used.

J. All electrical wiring shall be inspected by a Washington State Electrical Inspector (Permit is required).

K. The assembly shall be readily accessible with adequate room for maintenance.

All new services are to be pressure tested and disinfected by the contractor and proven to be bacteriologically safe from the existing main to the vault.

5.23 Fire Services and Domestic Services

A. No part of the backflow prevention assembly shall be submerged in water or installed in a location subject to flooding. In a vault or chamber, adequate drainage shall be provided; and test cocks shall be plugged. The plugs shall not be of dissimilar metals.

B. The backflow assembly shall be protected from freezing and other severe weather conditions.

C. All backflow assemblies shall have a minimum 12-inch clearance on the backside, 24-inch clearance on the test-cock side and 12-inches below the assembly.

D. Adequate clearance (6-inches minimum) must be maintained above gate-valve stem at full extension. Headroom of 6’0” is required in vaults without a full opening top. Access to the device and to any vault or chamber shall remain clear at all times.

5.24 Special for Fire Service Only

A. Fire Service backflow prevention assemblies shall be installed at the property line or edge of the public water line easement. The fire service from the public main to the backflow assembly shall be privately owned and meet all City's Standard Drawings.

B. Only approved resilient seat indicating valves are allowed on fireline assemblies.

C. Only approved Double Detector Check Valve Assemblies are to be used for system containment on fire line services in the City. The meter on the bypass detector shall read in cubic feet.

D. Fire Line Flow and Tamper Switches installed, as required by UBC sec. 3803, must be connected to a monitored Fire Detection System approved by the Fire Marshal. The tamper switches are required on the rising stem gate valves in the vault, as well as any other indicating control valves on the fire protection system. Electrical inspection and permit is required.

E. The remote reader (if allowed) shall be rigidly mounted on an exterior building wall (near the domestic meter), enclosed in a metal box with a slot opening which allows reading the remote without opening the box, and at an elevation of five (5) feet above the

ground level.

The remote reader shall have the same number configuration as the metering device itself, and read in cubic feet. All wires to the remote reader shall be enclosed in a heavy plastic or rigid metal conduit. All wiring shall be in conformance with appropriate sections of the National Electric Code.

5.25 Water Meter Vaults

The vault is to be provided and installed by the Contractor, per Standard Drawings.

5.26 Pressure Reducing Valve Vaults

PRV vaults are unique to each situation. The engineer shall detail the vault on the plans and submit for review. The City will review the vault for size and compliance with the general requirements listed under this section.

5.27 Appurtenances

Air and Vacuum Release Valves

A. Air and vacuum release valves shall be APCO - Valve and Primer Corporation, "Heavy-Duty," combination air release valve, or equal.

B. Installation shall be as shown on the Standard Details.

C. Piping and fittings shall be copper or brass. Location of the air release valves as shown on the plans will be approximate. The installation shall be set at the high point of the line. Water line must be constructed so the air release valve may be installed in a convenient location.

WATER SPECIFICATIONS:

7-09 WATER MAINS
SECTION 7-09.2; MATERIALS
PARAGRAPH 1 IS REPLACED WITH THE FOLLOWING:

MATERIALS SHALL MEET THE FOLLOWING SECTIONS:

PIPE	9-30.1
DUCTILE IRON PIPE (RESTRAINED JOINT)	9-30.1(1)
FITTINGS	9-30.2
DUCTILE IRON PIPE	9-30.2(1)
RESTRAINED JOINTS	9-30.2(6)
BOLTED SLEEVE-TYPE COUPLINGS FOR PLAIN END PIPE	9-30.2(7)
VALVES	9-30.3
GATE VALVES (3 INCHES TO 10 INCHES)	9-30.3(1)
BUTTERFLY VALVES (12 INCHES AND GREATER)	9-30.3(3)
VALVE BOXES	9-30.3(4)
VALVE MARKER POSTS	9-30.3(5)
VALVE STEM EXTENSION	9-30.3(6)
COMBINATION AIR RELEASE VALVES	9-30.3(7)
TAPPING SLEEVE AND VALVE ASSEMBLY	9-30.3(8)
HYDRANTS	9-30.5
(ALL BOLTS AND NUTS TO BE STAINLESS STEEL WITHANTI-SEIZE COMPOUND)	
SERVICE CONNECTIONS (2 INCHES AND SMALLER)	9-30.6

ALL DUCTILE IRON PIPE, FITTINGS AND APPURTENANCES SHALL HAVE RESTRAINED JOINTS BY THE USE OF MEGA-LUGS, ROMAC GRIP RINGS, FIELD-LOCK GASKETS, OR APPROVED EQUAL.

BOLTS AND NUTS FOR FLANGED PIPE AND FITTINGS SHALL CONFORM IN SIZE AND LENGTH WITH ANSI/AWWA C115/A21.15. ALL BOLTS AND NUTS SHALL BE MADE FROM COR-TEN STEEL IN ACCORDANCE WITH ANSI/AWWA C111/A21.11.

ALL FITTINGS TO HAVE THRUST BLOCKS AS INDICATED IN CITY STANDARD PLANS.

NOTE: THE CITY RESERVES THE RIGHT FOR ANY OR ALL SALVAGE RIGHTS TO ANY EXISTING MATERIALS REMOVED INCLUDING BUT NOT LIMITED TO FIRE HYDRANTS, CROSSES, TEES, GATE VALVES OR PIPE.

IT SHALL BE DETERMINED BY THE CITY AS TO WHAT MATERIALS WILL BE SALVAGED.

ANY MATERIAL REQUESTED FOR SALVAGE WILL BE DELIVERED BY THE CONTRACTOR TO THE CITY'S OPERATION CENTER AS DIRECTED BY THE CITY.

ALL COSTS ASSOCIATED WITH DELIVERY OR REMOVAL AND DISPOSAL SHALL BE BORNE BY THE CONTRACTOR.

7-09.3 CONSTRUCTION REQUIREMENTS
SECTION 7-09.3(5); GRADE AND ALIGNMENT
THIS SECTION IS SUPPLEMENTED WITH THE FOLLOWING:

A MINIMUM HORIZONTAL SEPARATION OF 10 FEET BETWEEN SANITARY SEWERS AND ANY EXISTING POTABLE WATER LINES, AND A MINIMUM VERTICAL SEPARATION OF 18 INCHES BETWEEN THE BOTTOM OF THE WATER LINE AND THE CROWN OF THE SEWER, SHALL BE MAINTAINED. THE DISTANCE SHALL BE MEASURED EDGE TO EDGE. SEWER LINE SHOULD BE LOWER THAN WATER LINE AND INSTALLED IN SEPARATE TRENCHES.

SECTION 7-09.3(9); BEDDING THE PIPE
SENTENCE 1 IS REPLACED WITH THE FOLLOWING:

BEDDING MATERIAL SHALL BE SELECT GRANULAR MATERIAL FREE FROM WOOD WASTE, ORGANIC MATERIAL, AND OTHER EXTRANEOUS OR OBJECTIONABLE MATERIALS AND SHALL BE CSTC.

7-09.3(19) CONNECTIONS
SECTION 7-09.3(19) A; CONNECTIONS TO EXISTING MAINS
PARAGRAPHS 1, 4, 5, AND 6 ARE REPLACED WITH THE FOLLOWING:

CONNECTIONS TO THE EXISTING WATER MAIN SHALL NOT BE MADE WITHOUT FIRST MAKING THE NECESSARY ARRANGEMENTS WITH THE CITY WATER DEPARTMENT IN ADVANCE. WORK SHALL NOT BE

STARTED UNTIL THE EXISTING MAIN HAS BEEN POTHOLED TO DETERMINE THE MATERIALS, EQUIPMENT, AND LABOR NECESSARY TO PROPERLY COMPLETE THE WORK. ALL THE MATERIALS, EQUIPMENT, AND LABOR NECESSARY TO PROPERLY COMPLETE THE WORK SHALL BE ASSEMBLED ON THE SITE BEFORE WORK IS STARTED. TORQUE TIGHTEN ALL NON-TEST BOLTS.

ONCE WORK IS STARTED ON A CONNECTION, IT SHALL PROCEED CONTINUOUSLY WITHOUT INTERRUPTION, AND AS RAPIDLY AS POSSIBLE UNTIL COMPLETED. NO SHUTOFF OF MAINS WILL BE PERMITTED OVERNIGHT, OVER WEEKENDS, ON MONDAYS OR FRIDAYS, OR ON HOLIDAYS. THE WATER MANAGER MUST BE NOTIFIED A MINIMUM OF 48 HOURS PRIOR TO ANY SHUTOFF AND MUST GIVE APPROVAL PRIOR TO THE SHUTOFF TAKING PLACE.

IF THE CONNECTION TO THE EXISTING SYSTEM INVOLVES TURNING OFF THE WATER, THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE RESIDENTS AFFECTED BY THE SHUTOFF A MINIMUM OF 48 HOURS PRIOR TO THE SHUTOFF. THE WATER MANAGER WILL ADVISE WHICH PROPERTY OWNERS ARE TO BE NOTIFIED.

CONNECTIONS MUST BE PERFORMED BETWEEN 8:00 A.M. AND 4:00 P.M. TUESDAY THROUGH THURSDAYS UNLESS OTHER ARRANGEMENTS HAVE BEEN MADE WITH THE WATER MANAGER. ANY OVERTIME COST BY CITY STAFF WILL BE INCURRED BY THE CONTRACTOR.

ALL WATERLINES AND SERVICES SHALL BE ABANDONED AT THE MAIN AND PROVIDE A ONE FOOT SEPARATION FROM THE WATERMAIN. FLUSHING MAY BE REQUIRED TO BE PERFORMED AT NIGHT (PER CITY DIRECTION) DURING NON-PEAK FLOWS.

SECTION 7-09.3(21); CONCRETE THRUST BLOCKING
THIS SECTION IS SUPPLEMENTED WITH THE FOLLOWING:

ALL FORMS FOR CONCRETE AND DEFORMED REBAR THRUST BLOCKING MUST BE APPROVED BY THE CITY ENGINEER PRIOR TO POURING THE CONCRETE.

SECTION 7-09 .3(23); HYDROSTATIC PRESSURE TEST
PARAGRAPHS 1, 4, AND 5 ARE REPLACED WITH THE FOLLOWING:

ALL WATER MAINS AND APPURTENANCES SHALL BE TESTED IN SECTIONS OF CONVENIENT LENGTH UNDER A HYDROSTATIC PRESSURE EQUAL TO 1.5 TIMES THAT UNDER WHICH THEY WILL OPERATE OR 200 PSI WHICHEVER IS GREATER. ALL PUMPS, GAUGES, PLUGS, SADDLES, CORPORATION STOPS, MISCELLANEOUS HOSE AND PIPING, AND MEASURING EQUIPMENT NECESSARY FOR PERFORMING THE TEST SHALL BE FURNISHED AND OPERATED BY THE CONTRACTOR. THE ENGINEERING DEPARTMENT MUST BE NOTIFIED A MINIMUM OF 48 HOURS PRIOR TO TESTING AND MUST BE PRESENT WHEN TESTS ARE PERFORMED.

THE MAINS SHALL BE FILLED WITH WATER AND ALLOWED TO STAND UNDER PRESSURE A SUFFICIENT LENGTH OF TIME TO ALLOW THE ESCAPE OF AIR AND ALLOW THE LINING OF THE PIPE TO ABSORB WATER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THE WATER NECESSARY TO FILL THE PIPELINES FOR TESTING PURPOSES.

THE TEST SHALL BE ACCOMPLISHED BY PUMPING THE MAIN UP TO THE REQUIRED PRESSURE, STOPPING THE PUMP FOR 2 HOURS, AND THEN PUMPING THE MAIN UP TO THE TEST PRESSURE AGAIN. DURING THE TEST, THE SECTION BEING TESTED SHALL BE OBSERVED TO DETECT ANY VISIBLE LEAKAGE. A CLEAN CONTAINER SHALL BE USED FOR HOLDING WATER FOR PUMPING UP PRESSURE ON THE MAIN BEING TESTED.

DISINFECTION OF WATER MAINS
SECTION 7-09.3(24)A; FLUSHING
PARAGRAPH 1 IS REPLACED WITH THE FOLLOWING:

SECTIONS OF PIPE TO BE DISINFECTED SHALL FIRST BE FLUSHED TO REMOVE ANY SOLIDS OR CONTAMINATED MATERIAL THAT MAY HAVE BECOME LODGED IN THE PIPE. TAP SHALL BE PROVIDED LARGE ENUGH TO DEVELOP A VELOCITY OF AT LEAST 6 FPS IN THE MAIN. HYDRANTS ARE NOT TO BE USED FOR PIPE FLUSHING; ONLY APPROVED BLOW OFF ASSEMBLIES ARE TO BE USED. CONNECTING TO CITY MAINS OR FLUSHING MAY BE REQUIRED AT NIGHT DEPENDING ON SYSTEM CONDITIONS AS DETERMINED BY THE ENGINEER. SIT FOR 24 HRS.

CONTRACTOR TO PROVIDE SAMPLING STATION POINT PER CITY STANDARDS.

SECTION 7-09.3(24)D; DRY CALCIUM HYPOCHLORITE

7-12 VALVES FOR WATER MAINS
CONSTRUCTION REQUIREMENTS
SECTION 7-12.3(1); INSTALLATION OF VALVE MARKER POST
THIS SECTION IS REPLACED WITH THE FOLLOWING:

WHERE REQUIRED, A VALVE MARKER POST SHALL BE FURNISHED AND INSTALLED WITH EACH VALVE. VALVE MARKER POSTS SHALL BE PLACED AT THE EDGE OF THE RIGHT-OF-WAY OPPOSITE THE VALVE AND BE SET WITH A MINIMUM OF 48" OF THE POST EXPOSED ABOVE GRADE. THE POST SHALL HAVE A BLUE REFLECTIVE "WATER VALVE" DECAL PLACED WITHIN 3" OF THE TOP OF THE POST. THE POST SHALL BE CARSONITE. THE POST SHALL FACE ON COMING TRAFFIC AT 4 FEET AWAY FROM THE VALVE.

A CONCRETE COLLAR SHALL BE POURED AROUND VALVE BOXES THAT ARE TO GRADE. A TWO HEADED ARROW STAMP WILL BE USED TO STAMP THE CONCRETE COLLAR TO SHOW DIRECTION OF FLOW FOR THE WATER MAIN.

ALL OPERATORS FOR BUTTERFLY VALVES SHALL BE ON CENTERLINE OF STREET SIDE OF THE MAIN.

THE CONTRACTOR SHALL NOT OPERATE ANY CITY VALVE. THE CITY MUST BE CONTACTED TO TURN ALL CITY VALVES FOR ALL PHASES OF CONSTRUCTION.

7-14 HYDRANTS
CONSTRUCTION REQUIREMENTS
SECTION 7-14.3(6); HYDRANT EXTENSIONS
THIS SECTION IS SUPPLEMENTED WITH THE FOLLOWING:

HYDRANT EXTENSIONS WILL NOT BE ALLOWED FOR NEWLY CONSTRUCTED HYDRANTS. THE LARGE PORT ON THE HYDRANT SHALL FACE THE ROAD.

7-15 SERVICE CONNECTIONS
SECTION 7-15.3; CONSTRUCTION REQUIREMENTS
PARAGRAPH 1 IS REPLACED WITH THE FOLLOWING:

WATER METER SERVICE SHALL NOT CONFLICT WITH ELECTRIC/GAS SERVICES, REQUIRED 5' HORZONTAL AND 18" VERTICAL SEPARATION. (10' HORIZONTAL AND 18" VERTICAL FROM SANITARY SEWER)

PERMISSIBLE HYDRANT METER LOCATION NOTE (CONSTRUCTION WATER)

CONTRACTOR SHALL APPLY FOR HYDRANT METER PERMIT BY COMPLETING THE APPROPRIATE FORM AND SUBMITTING TO WASHOUGAL CITY HALL AT 1701 C STREET, WASHOUGAL, WA 98671.

NO METERS INSTALLED WITHOUT FEE'S BEING PAID IN FULL.

CITY TO DETERMINE LOCATION FOR ALL HYDRANT METERS.

WATER NOTES ADDITIONAL

1. CONNECTION TO THE WATER SYSTEM SHALL BE INSPECTED BY PUBLIC WORKS DEPARTMENT. 48 HOURS (2 WORKING DAYS) NOTICE FOR INSPECTION.
2. ALL WATER SYSTEM FLUSHING, INCLUDING FIRE LINES, SHALL BE SCHEDULED THROUGH THE WATER DEPARTMENT WHO WILL BE PRESENT TO RECORD WATER USED AND TO OPERATE CITY VALVES.
3. UTILITY PERMITS MUST BE APPLIED AND PAID FOR PRIOR TO ANY CONNECTIONS BEING MADE TO THE WATER SYSTEM.
4. ALL BACKFLOW DEVICES MUST BE TESTED AND CERTIFIED BY A STATED CERTIFIED TESTER PRIOR TO THE WATER SERVICES BEING ACTIVATED FOR USE.
5. ONLY CITY WATER DEPARTMENT PERSONNEL SHALL OPERATE CITY VALVES.
6. SHUT DOWNS OF THE WATER SYSTEM FOR CONNECTIONS WILL BE DONE BETWEEN TUESDAY AND THURSDAY FROM 8 AM AND 4 PM. MAX TIME THE WATER MAY BE OFF IS 4 HOURS WITHOUT PRIOR APPROVAL.
7. SUBMITTALS AND SHOP DRAWINGS MUST BE APPROVED BEFORE THE SHUT DOWN IS SCHEDULED. CONTRACTOR IS REQUIRED TO NOTIFY THE CUSTOMERS AFFECTED 2 WORKING DAYS IN ADVANCE IN WRITTING WITH CITY APPROVED LETTER.

ALL BACKFILL SHALL BE ⅜" MINUS (CSTC).

FOUNDATION MATERIAL & GEO GRID SHALL BE INSTALLED AS DIRECTED BY THE CITY & TO THE DEPTH AS DIRECTED.

ALL PAVEMENT PATCHES SHALL BE 2" PLUS EXISTING IN DEPTH OR AS DIRECTED BY THE CITY.

ALL PAVEMENT SHALL BE FULL DEPTH SAWCUT & REPLACED PER THE LIMITS AS MARKED BY THE CITY AFTER CONSTRUCTION.

WATER NOTES:

1. SPECIFICATIONS FOR ALL MATERIALS AND CONSTRUCTION SHALL BE IN CONFORMANCE WITH THE CURRENT EDITION OF THE "STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION" AS PREPARED BY THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION.
2. THE CONTRACTOR SHALL NOTIFTY THE CITY PUBLIC WORKS DEPARTMENT (360.835.2662) 24 HOURS PRIOR TO THE START OF CONSTRUCTION. INSPECTION AND APPROVAL OF THE CONSTRUCTION WILL BE BY THE CITY PUBLIC WORKS OFFICE. A SATISFACTORY PRESSURE AND BACTERIOLOGICAL TEST FOR THE WATER CONSTRUCTION IS REQUIRED FOR APPROVAL.
3. WHEN CONSTRUCTION IS TO TAKE PLACE WITHIN A CITY RIGHT-OF-WAY A CITY APPROVED TRAFFIC CONTROL PLAN WILL BE REQUIRED PRIOR TO THE START OF CONSTRUCTION.
4. WHERE EXISTING SERVICE MUST BE INTERRUPTED, THE CONTRACTOR SHALL NOTIFY THE PUBLIC WORKS DEPARTMENT AND ALL CUSTOMERS AFFECTED AS TO THE DATE AND DURATION OF THE INTERRUPTION. NOTIFICATION MUST BE DONE 48 HOURS IN ADVANCE OF THE INTERRUPTION. THE CONTRACTOR SHALL SCHEDULE CONSTRUCTION TO PROVIDE MINIMUM INTERRUPTION OF SERVICES AS DETERMINED BY THE INSPECTOR. ALL SERVICE INTERRUPTIONS SHALL BE PERFORMED BY THE CITY.
5. NO EXCAVATED MATERIAL TO BE PLACED ON ROAD SURFACES UNLESS APPROVED BY A CITY REPRESENTATIVE.
6. ALL PIPE FURNISHED SHALL BE NEW AND CONFORM TO THE REQUIREMENTS OF AWWA C151-71.
7. ALL PIPE SHALL BE CLASS 52, DUCTILE IRON, UNLESS OTHERWISE NOTED ON THE PLANS.
8. ALL PIPE SHALL BE FURNISHED IN 18 TO 20 FOOT LENGTHS AND SHALL BE CEMENT MORTAR LINED.
9. ALL RUBBER GASKET JOINTS FOR DUCTILE IRON PIPE SHALL CONFORM TO THE REQUIREMENTS OF AWWA C111-80.
10. ALL FITTINGS SHALL CONFORM TO THE REQUIREMENTS OF AWWA C110-82 OR C153-85.
11. FITTINGS SHALL BE OF THE SIZE, TYPE, TYPE OF IRON, AND TYPE OF JOINT AS CALLED FOR ON THE PLANS. ALL DUCTILE IRON FITTINGS SHALL BE CEMENT LINED.
12. COMPACT FITTINGS WILL ONLY BE ALLOWED ON INSTALLATIONS THRU 12" DIAMETER. ALL COMPACT FITTINGS SHALL BE DUCTILE IRON, CEMENT LINED, AND HAVE A PRESSURE RATING OF 350 PSI.
13. ALL RUBBER GASKET JOINTS FOR DUCTILE IRON AND GREY IRON FITTINGS SHALL CONFORM TO THE REQUIREMENTS OF AWWA C111-80.
14. BED PIPE WITH SCREENING 6" BELOW AND 12" ABOVE.
15. TRENCH BACKFILL MATERIALS SHALL BE ACCORDING TO THE BACKFILL SECTION SHOWN ON THE PLANS AND/OR UTILITY PERMIT. NO DITCHES WILL BE LEFT OPEN AND TEMPORARY COLD MIX INSTALLED IF IN HIGH TRAFFIC AREAS. ALL PIPE WILL BE CAPPED OR PLUGGED WHEN LEFT UNATTENDED.
16. COMPACTION OF THE TRENCH BACKFILL SHALL BE ACCORDING TO SECTION 7-10 OF THE SPECIFICATIONS. EACH BACKFILL LAYER SHALL BE COMPACTED TO 95% OF THE MAXIMUM DENSITY AS DETERMINED BY THE COMPACTION CONTROL TEST.
17. COMPACTION CONTROL TESTS TO DETERMINE OPTIMUM MOISTURE CONTENT AND MAXIMUM DENSITY SHALL BE BY THE FOLLOWING METHODS:
    A. FOR NON-GRANULAR MATERIALS - METHOD OF TEST FOR COMPACTION CONTROL OF GRANULAR MATERIALS (WSDOT TEST METHOD NO. 609)
    B. FOR GRANULAR MATERIALS - METHOD OF TEST FOR COMPACTION OF GRANULAR MATERIALS (WSDOT TEST METHOD 606).
    C. FIELD MOISTURE AND DENSITY OF BACKFILL MATERIAL SHALL BE DETERMINED BY THE NUCLEAR MOISTURE/DENSITY GAUGE
18. THE SERVICES ARE TO BE INSTALLED BY THE CONTRACTOR, AND INSPECTED BY THE PUBLIC WORKS DEPARTMENT, 24 HOURS AFTER COMPLETION OF THE SERVICE LINES. THE WATER METERS WILL BE SET BY THE CITY. PRIOR TO INSTILLATION OF THE WATER LINES, IT IS REQUIRED THAT THE DEVELOPER SUPPLY THE CITY WITH A REPRODUCIBLE COPY OF THE PLAT MAP INDICATING THE ADDRESS OF EACH LOT IMMEDIATELY UPON COMPLETION OF THE PROJECT. NO WATER METERS WILL BE SET UNTIL THESE CONDITIONS ARE MET.
19. RESILIENT-SEATED VALVES WILL BE USED FOR VALVE INSTALLATIONS OF 8 INCH AND SMALLER.
20. RESILIENT-SEATED VALVES SHALL BE USED ON ALL FIRE HYDRANT AND FIRE PROTECTION SERVICE INSTALLATIONS.
21. RESILIENT-SEATED VALVES SHALL CONFORM TO AWWA C509-87 AND SHALL BE EPOXY COATED ON THE INSIDE
22. BUTTERFLY VALVES SHALL BE USED FAR ALL VALVE INSTALLATIONS 10 INCH AND LARGER.
23. BUTTERFLY VALVES SHALL MEET OR EXCEED ALL AWWA C504-80 SPECIFICATIONS AND SHALL BE CLASS 150-B WITH SHORT BODY.
24. BUTTERFLY VALVES SHALL BE REQUIRED TO HAVE A MINIMUM OF 28 TURNS TO MOVE FROM FLLY OPEN TO FULLY CLOSED POSITION. THE OPERATOR SHALL BE MOUNTED DIRECTLY ON THE VALVE WITH NO EXPOSED OR EXTERNAL COUPLINGS. UNITS SHALL BE FULLY GASKETED AND GREASED PACKED. VALVES SHALL BE INSTALLED WITH THE OPERATOR ON THE CENTERLINE OF THE ROAD SIDE OF THE PIPE.
25. ALL VALVES SHALL BE FURNISHED WITH AN UNDERGROUND MANUAL OPERATOR WITH AN AWWA 2 INCH SQUARE OPERATING NUT AND SHALL OPEN WITH A COUNTER-CLOCKWISE ROTATION. VALVES SHALL BE FURNISHED WITH JOINTS AS CALLED FOR ON THE PLANS.
26. ALL VALVES TO BE CENTERED IN VALVE BOXES ON RISERS.
27. ALL BLOW-OFFS TO BE CENTERED IN VALVE BOXES AND RISERS
28. .TAPPING SLEEVE SHALL BE 304 STAINLESS STEEL WITH STAINLESS STEEL FLANGE. JCM OR EQUIVALENT
29. ALL BOLTS FOR TAPPING SLEEVES SHALL BE 304 STAINLESS STEEL OR APPROVED EQUAL.
30. TAPPING SLEEVE AND VALVE SHALL BE SUPPORTED BY 6" MIN. CTSC OR AS DETERMINED BY INSPECTOR AND COMPACTED TO 95%.
31. A CITY REPRESENTATIVE MUST WITNESS AIR TEST AND BE PROVIDED WITH TAPPING COUPON.

WATER NOTES (CONT):

32. TAPPING SLEEVE EDGE SHALL BE A MINIMUM OF 18 INCHES FROM BELL OR SPIGOT END OF EXISTING PIPE, AND A MINIMUM OF 18 INCHES FROM ANY OTHER TAP OF FITTING.
33. CONTRACTOR SHALL SCHEDULE THE HOT TAP WITH THE CITY 48 HOURS (2 WORKING DAYS) IN ADVANCE.
34. SIZE ON SIZE TAPS ARE NOT PERMITTED.
35. CONCRETE THRUST BLOCKING FOR TAPPING SLEEVES TO BE CLASS 4000 AND SHALL BE THE SAME AS REQUIRED FOR AN EQUAL SIZED TEE.
36. VALVE BOXES SHALL BE FORT VANCOUVER PATTERN, CAST IRON, MANUFACTURED BY VARICAST OR APPROVED EQUAL.
37. VALVE BOX EXTENSIONS SHALL BE ONE PIECE SCHEDULE 40 PVC, 6" MINIMUM, LOCATE EXTENSION 4" BELOW CAST LID, WITH THE WORD "WATER" OR "W" CASTED ON LID.
38. VALVE BOXES NOT SET IN PAVED AREAS, SHALL BE SET IN A CONCRETE PAD, 24" SQUARE, 4"-6" THICK.
39. OPERATOR NUT SHALL HAVE A FACTORY EXTENSION ADDED, IF OVER 4' TO FINISH GRADE, TO A DISTANCE OF 18" FROM FINISHED GRADE.
40. HYDRANTS TO BE COVERED TO INDICATE UNDER CONSTRUCTION UNTIL ACCEPTED BY THE CITY.
41. FITTINGS SHALL BE OF THE SIZE, TYPE, TYPE OF IRON, AND TYPE OF JOINT AS CALLED FOR ON THE PLANS. ALL FITTINGS SHALL HAVE A PRESSURE RATING OF 250 PSI MINIMUM.
42. COMPACT FITTINGS WILL ONLY BE ALLOWED ON INSTALLATIONS THRU 12" DIAMETER, AND SHALL HAVE A PRESSURE RATING OF 350 PSI.
43. ALL REDUCERS SHALL BE MECHANICALLY RESTRAINED. BOLTS FOR FLANGED FITTINGS SHALL BE GALVANIZED OR ZINC-CADMIUM PLATED.
44. BOLTS FOR MECHANICAL JOINTS AND CAST IRON TAPPING SLEEVES SHALL BE NSS CORTEN STEEL.
45. THE MINIMUM COVER FOR ALL SIZES OF PIPE SHALL BE 3 FEET BELOW FINISHED STREET GRADE OR BELOW EXISTING GROUND, WHICHEVER IS GREATER. MAXIMUM COVER SHALL BE 5 FEET UNLESS APPROVED OTHERWISE.

No.	Revision	By

Designed By: JV
Drawn By: JV
Reviewed By:

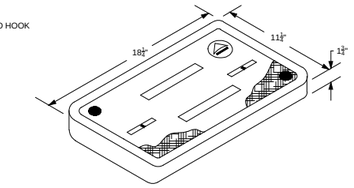
As Shown

STANDARD WATER DETAILS - SHEET 1

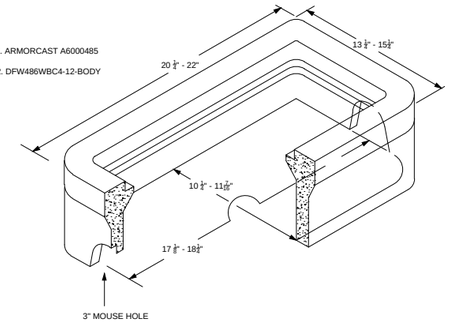
CITY OF WASHOUGAL

Drawing No.
1

1. A6000484-TH
2. DFW486C-4MT-<> LID NO HOOK

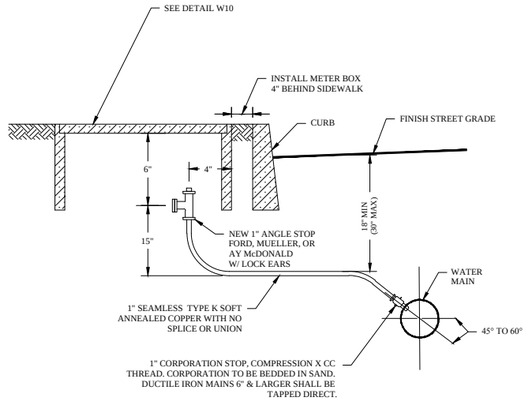


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2. DFW486WBC4-12-BODY



TRAFFIC COVER & BOX, TOUCH & RADIO APPLICATION - ¾" & 1" METER

DETAIL NO. - W10



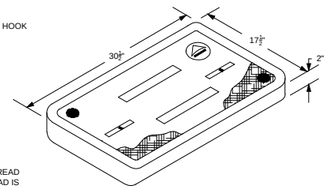
NOTES:

1. SERVICES MUST BE APPLIED FOR PRIOR TO INSTALLATION.
2. CONTRACTOR SHALL CONTACT CITY CONSTRUCTION MANAGER'S OFFICE (835-2662) 48 HOURS PRIOR TO INSTALLING ANY SERVICES.
3. CONTRACTOR IS HELD RESPONSIBLE TO AVOID CONFLICT WITH OTHER UTILITIES BY COORDINATION OF LOCATION. "ONE-CALL" 800-424-5555 OR 811.
4. NO CONNECTIONS WILL BE ALLOWED TO AN EXISTING SERVICE PRIOR TO AN APPROVED PURITY TEST. PURITY TEST SHALL PRECEDE PRESSURE TEST.
5. STUB SERVICES SHALL BE PRESSURE TESTED WITH THE MAIN LINE AND BE CAPABLE OF WITH-STANDING THE MAINS TEST PRESSURE.
6. LOCATION OF METER TO BE DETERMINED BY THE CITY.
7. STAMP 'W' ON THE CURB AT THE LOCATION THE SERVICE.

STANDARD 1" WATER SERVICE

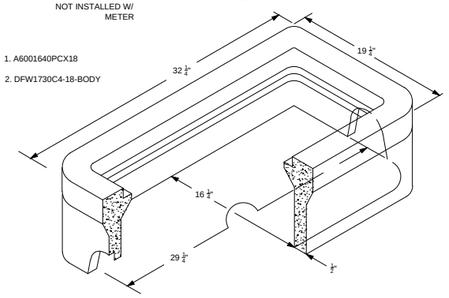
DETAIL NO. - W20

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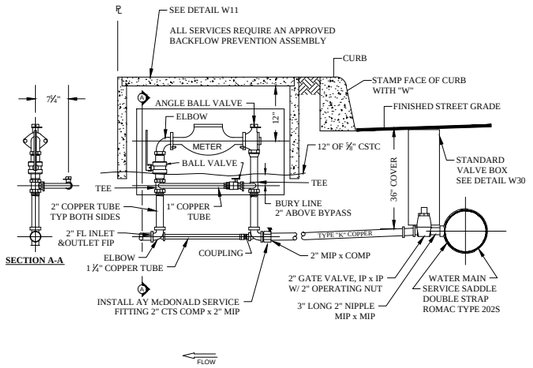
PLUG REMOTE READ
HOLE IF REMOTE READ IS
NOT INSTALLED W/
METER

1. A6001640PCX18
2. DFW1730C4-18-BODY



TRAFFIC COVER & BOX, TOUCH & RADIO APPLICATION - 1½" & 2" METER

DETAIL NO. - W11

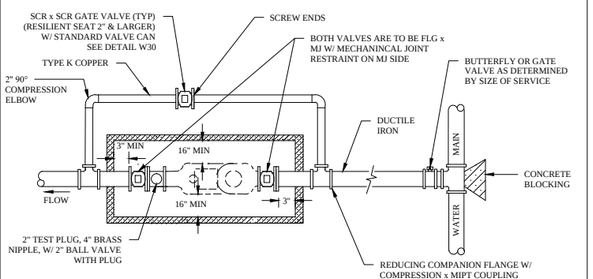


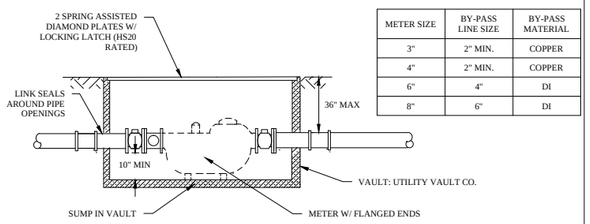
NOTES:

1. CLEARANCES:
   MIN. 5' FROM EDGE OF DRIVEWAY - NO METERS IN DRIVEWAY SECTION
   MIN. 10' FROM TREES
   MIN. 5' FROM OTHER UTILITIES, EXCEPT SEWER @ 10'
   MIN. DEPTH AT RIGHT OF WAY IS 36"
   MIN. DEPTH ON CUSTOMER SIDE IS 18"
2. CTS = COMPRESSION ON ALL BRASS & COPPER.THE SERVICE LINE SHALL BE CONTINUOUS WITHOUT COUPLINGS BETWEEN THE CORPORATION STOP AND CURB STOP VALVE UNLESS APPROVED BY THE ENGINEER.
3. NO DIRECT TAPS ALLOWED.
4. METER LOCATION TO BE DETERMINED BY THE CITY.
5. SADDLES SHALL BE DOUBLE BAND DUCTILE IRON, BRONZE, STAINLESS STEEL, OR BAND-TYPE WITH I.P. STANDARD TAPPING.
6. SERVICE PIPE SHALL BE A MINIMUM OF 2" TYPE K SOFT COPPER COMPRESSION COUPLING FOR USE IN CONNECTING PLAIN END WATER SERVICE PIPES SHALL BE APPLICABLE FOR THE TYPE OF PIPE BEING COUPLED. COMPRESSION COUPLINGS SHALL HAVE ARMORED GASKETS WHEN DIS-SIMILAR METAL PIPES ARE BEING JOINED.
7. WATER METERS SHALL NOT BE PLACED IN SIDEWALK.
8. CORPORATION STOPS AND COUPLINGS SHALL BE OF THE FOLLOWING MANUFACTURER BRANDS AND BE COMPRESSION DESIGN.
   MUELLER
   McDONALD
   FORD
9. METER BOX LIDS SHALL BE TOUCH READ APPLICATION WITH PLUG IN KNOCK-OUT.
10. ALL FITTINGS SHALL MEET SECTION 1412 SDWA.
11. METER LAYING LENGTH: 1 ½" = 13"
    2" = 17"
    PLUS ½" FOR GASKETS
12. ALL METERS SHALL READ IN ONE CUBIC FEET.
13. METER SIZE TO BE APPROVED BY THE CITY.
14. METER TO BE REMOTE READ TYPE.
15. 1 ½" METERS WILL REQUIRE 2" x 1 ½" METER FLANGE REDUCERS.
16. SETTER SHALL BE AY McDONALD #720R718WWFF 2" OR APPROVED EQUAL.

STANDARD 2" DOMESTIC WATER SERVICE

DETAIL NO. - W21





METER SIZE	BY-PASS LINE SIZE	BY-PASS MATERIAL
3"	2" MIN.	COPPER
4"	2" MIN.	COPPER
6"	4"	DI
8"	6"	DI

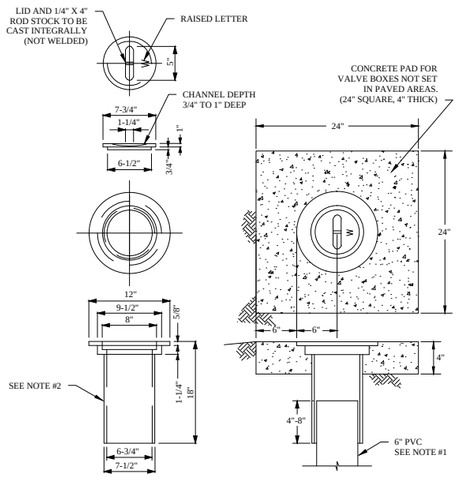
VAULTS SHALL BE PRE-APPROVED PRIOR TO INSTALLATION BY CITY PERSONNEL

NOTES:

1. ALL JOINTS SHALL BE RESTRAINED FROM THE MAIN LINE TEE TO PROVIDE FOR METER REMOVAL WHILE USING BY-PASS LINE.
2. PRIOR TO METER INSTALLATION, GATE VALVES SHALL BE ALIGNED & SPACED W/RIGID SPOOL. CONTACT CITY WATER DEPT. FOR DISTANCE BETWEEN METER GATE VALVES PRIOR TO INSTALLATION. (835-2662)

STANDARD 3" & LARGER METER INSTILLATION

DETAIL NO. - W22

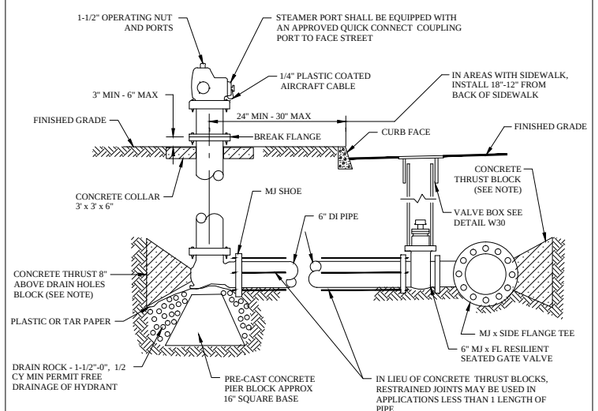


NOTES:

1. EXTENSIONS SHALL BE 6" ASTM D 3034 SDR 35 PVC PIPE (ONE PIECE)
2. VALVE BOX SHALL BE U.S. FILTER/PACIFIC WATER WORKS NO. 910 OR EQUAL.
3. THE LID SHALL INCLUDE THE FORT VANCOUVER LOGO AND "W" IN THE DESIGN.
4. IF THE ORIGIN IS OTHER THAN USA, THE COUNTRY OF ORIGIN SHALL BE CAST ON THE UNDERSIDE OF THE LID
5. THERE SHALL BE 1/2" CLEARANCE UNDER THE PIN CAST INTO THE LID.
6. THE OPERATOR NUT SHALL HAVE A DEPTH FROM 18"-36" FROM FINISH GRADE TO THE OPERATOR NUT.

STANDARD VALVE BOX & COVER

DETAIL NO. - W30



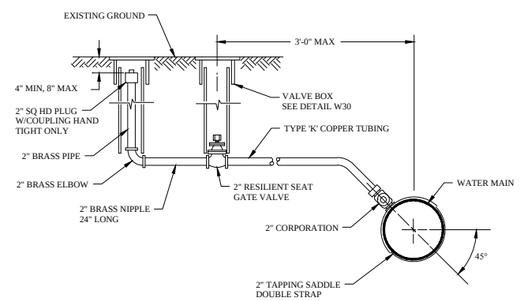
NOTES:

1. FIRE HYDRANT INSTALLATIONS SHALL BE INSPECTED PRIOR TO BACKFILLING.
2. FIRE HYDRANTS SHALL BE PAINTED (BRUSH APPLIED) AFTER INSTALLATION W/STANDARD AWWA, GLOSS B, YELLOW

APPROVED HYDRANTS
MEULLER SUPER CENTURION
CLOW MEDALLION
KENNEDY GUARDIAN

STANDARD FIRE HYDRANT ASSEMBLY

DETAIL NO. - W40



NOTE:

1. BLOWOFF SHALL BE INSTALLED 1'-0" FROM AN END OF A LINE.

STANDARD BLOWOFF ASSEMBLY

DETAIL NO. - W50

No.	Revision	By

Designed By: JV
Drawn By: JV
Reviewed By:

As Shown

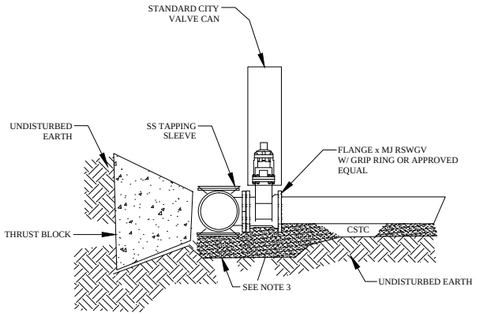
STANDARD WATER DETAILS - SHEET 2

CITY OF WASHOUGAL

Drawing No.
2

NOTES:

1. TAPPING SLEEVE SHALL BE 304 STAINLESS STEEL W/ STAINLESS STEEL FLANGE. JCM OR EQUIVALENT.
2. ALL BOLTS SHALL BE 304 STAINLESS STEEL OR APPROVED EQUAL.
3. TAPPING SLEEVE AND VALVE SHALL BE SUPPORTED BY 6" MIN. CTSC OR AS DETERMINED BY THE INSPECTOR & COMPACTED TO 95%.
4. CITY MUST WITNESS AIR TEST AND BE PROVIDED W/ WITH TAPPING COUPON.
5. TAPPING SLEEVE EDGE SHALL BE A MIN. OF 18" FROM BELL OR SPIGOT END OF EXISTING PIPE, AND A MIN. OF 18" FROM ANY OTHER TAP OR FITTING.
6. CONTRACTOR SHALL SCHEDULE THE HOT TAP WITH THE CITY 48 HOURS (2 WORKING DAYS) IN ADVANCE.
7. SIZE ON SIZE TAPS ARE NOT PERMITTED.
8. ALL THRUST BLOCKS TO BE CLASS 4000.



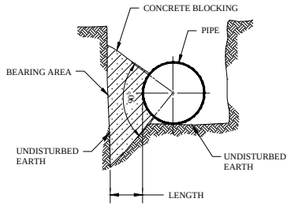
HOT TAP OF EXISTING WATER MAIN

DETAIL NO. - W60

SOIL BEARING = 2000 LB/FT²				
PIPE SIZE	HORIZ. BENDS	BEARING AREA S.F.	VOL. OF BLOCKING C.F.	LENGTH OF BLOCKING
4"	TEE	2.3	0.8	0.86
	90°	3.2	1.4	1.06
	45°	1.7	0.5	0.73
	22-1/2°	0.9	0.2	0.46
	11-1/4°	-	-	-
6"	TEE	4.7	2.4	1.24
	90°	6.6	4.0	1.53
	45°	3.6	1.6	1.05
	22-1/2°	1.8	0.6	0.66
	11-1/4°	0.9	0.2	0.39
8"	TEE	8.0	5.4	1.63
	90°	11.4	9.0	2.00
	45°	6.2	3.6	1.37
	22-1/2°	3.1	1.3	0.87
	11-1/4°	1.6	0.5	0.51
10"	TEE	12.1	9.9	2.00
	90°	17.1	16.7	2.46
	45°	9.3	6.6	1.69
	22-1/2°	4.7	2.4	1.08
	11-1/4°	2.4	0.9	0.63
12"	TEE	17.1	16.7	2.37
	90°	24.2	28.0	2.93
	45°	13.1	11.2	2.01
	22-1/2°	6.7	4.1	1.28
	11-1/4°	3.4	1.5	0.74
16"	TEE	23.8	27.3	2.73
	90°	33.6	46.0	3.37
	45°	18.2	18.3	2.29
	22-1/2°	9.3	6.7	1.42
	11-1/4°	4.7	2.4	0.80
18"	TEE	29.9	38.5	3.05
	90°	42.2	64.7	3.79
	45°	22.9	25.8	2.57
	22-1/2°	11.7	9.4	1.60
	11-1/4°	5.9	3.3	0.90
20"	TEE	36.6	52.3	3.38
	90°	51.8	87.9	4.19
	45°	28.1	35.0	2.84
	22-1/2°	14.3	12.7	1.77
	11-1/4°	7.2	4.5	1.00
24"	TEE	52.3	89.1	4.03
	90°	74.0	149.8	5.00
	45°	40.0	59.7	3.55
	22-1/2°	20.4	21.7	2.11
	11-1/4°	10.3	7.7	1.18

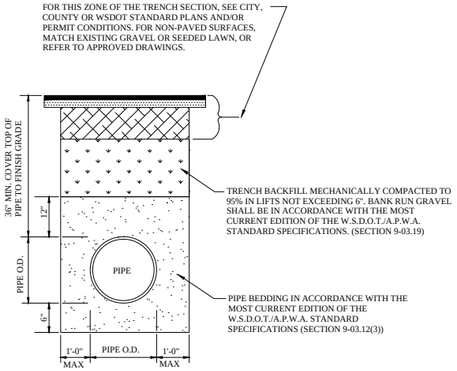
NOTES:

1. ALL BLOCKING SHALL BE POURED AGAINST FIRM UNDISTURBED SOIL.
2. WHEN POURING AGAINST PLUGS AND BLIND FLANGES, SEE SPECIAL PROVISIONS.
3. LAYOUT TO BE APPROVED BY THE INSPECTOR PRIOR TO AND AFTER CONCRETE POUR.
4. ALL CONCRETE BLOCKING SHALL BE POURED IN PLACE WITHOUT DIRECT CONTACT TO THE PIPE OR FITTINGS. SOME PROTECTIVE MATERIAL SUCH AS TAR PAPER SHALL BE PLACED BETWEEN THE CONCRETE AND PIPE OR FITTING.
5. CONCRETE FOR ALL BLOCKING SHALL HAVE A 28-DAY MINIMUM COMPRESSIVE STRENGTH OF 2,300 P.S.I.
6. CONCRETE BLOCKING FOR VERTICAL BENDS SHALL BE PER APWA STD. PLAN NO. 74.



STANDARD THRUST BLOCK

DETAIL NO. - W70

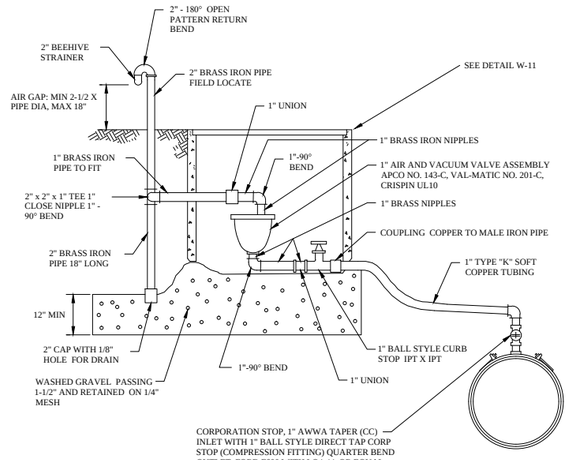


NOTE:

1. CLEAN NATIVE MATERIAL MAY BE USED AS TRENCH BACKFILL AS APPROVED BY CITY OF WASHOUGAL CONSTRUCTION INSPECTOR PER WSDOT SPECIFICATION (SECTION 9-03.12(3)).
2. CONTROL DENSITY FILL (CDF) MAY BE REQUIRED BASED ON THE LOCAL JURISDICTION'S STANDARDS.
3. OVERSIZE MATERIAL (4"+) SHALL NOT BE ALLOWED IN TRENCH.

WATER PIPE TRENCH BEDDING & BACKFILL

DETAIL NO. - W80

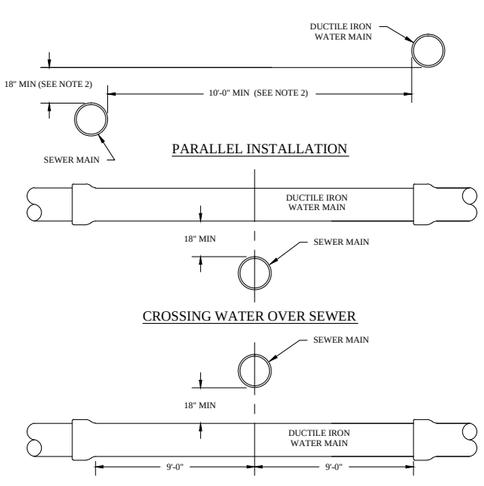


NOTES:

1. ALL FITTINGS TO BE BRASS OR COPPER FROM WATER MAIN TO 1" AIR & VACUUM ASSEMBLY.
2. AIR & VACUUM RELEASE VALVE ASSEMBLY MUST BE INSTALLED AT HIGHEST POINT OF LINE. IF HIGH POINT FALLS IN A LOCATION WHERE ASSEMBLY CANNOT BE INSTALLED, PROVIDE ADDITIONAL DEPTH OF LINE TO CREATE HIGH POINT AT A LOCATION WHERE ASSEMBLY CAN BE INSTALLED.

COMBINATION AIR RELEASE VALVE

DETAIL NO. - W90



NOTES:

1. EXCEPTIONS SHALL BE APPROVED BY THE CITY OF WASHOUGAL IN WRITING.
2. WHERE MINIMUM CLEARANCES CANNOT BE MET, THE SEWER MAIN SHALL BE PLACED IN SEPARATE TRENCHES AND CONSTRUCTED OF MATERIAL EQUIVALENT TO THE CITY OF WASHOUGAL WATER MAIN STANDARDS, INCLUDING PRESSURE TESTING. ADEQUATE RESTRAINT SHALL BE PROVIDED TO ALLOW TESTING TO OCCUR.
3. ALL SEWER CROSSINGS OVER OR UNDER WATER MAINS SHALL MAXIMIZE THE JOINT SEPARATION BY USING THE LONGEST STANDARD LENGTH PIPE AVAILABLE FROM THE MANUFACTURER FOR BOTH THE WATER AND SEWER MAINS. BOTH PIPES SHALL BE CENTERED AT THE POINT OF CROSSING.
4. ALL SEWER CROSSING OVER WATER MAINS SHALL BE CONSTRUCTED OF MATERIALS EQUIVALENT TO THE CITY OF WASHOUGAL WATER MAIN STANDARDS, INCLUDING PRESSURE TESTING.

WATER & SEWER SPACING

DETAIL NO. - W100

- ALL REDUCED PRESSURE AND BACKFLOW DEVICES SHALL BE WA STATE APPROVED, PER WAC 246-290.
- FIRE SPRINKLER AND IRRIGATION SYSTEMS SHALL BE PROTECTED WITH STATE APPROVED BACKFLOW PROTECTION AS PRESCRIBED IN WAC 246-290.
- ALL COMMERCIAL, INDUSTRIAL AND MULTI-FAMILY FACILITIES SHALL BE PROTECTED WITH WASHINGTON STATE APPROVED BACKFLOW PROTECTION.
- FURTHER BACKFLOW PREVENTION SHALL BE REQUIRED DEPENDING ON WATER USAGE, I.E. BOILERS, CHILLERS, CHEMICAL ADDITION, BOOSTER PUMPS, WELLS, MEDICAL EQUIP. SODA POP MACHINES ETC.
- ALL HOSEBIBS SHALL BE PROTECTED WITH VACUUM BREAKERS.
- IF CHEMICALS ARE ADDED TO THE FIRE PROTECTION SYSTEM, A REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER IS REQUIRED.
- AN APPROVED AIR GAP OR REDUCED PRESSURE BACKFLOW ASSEMBLY IS REQUIRED FOR ALL SERVICE CONNECTIONS AND FIRE PROTECTION SYSTEMS ON A SITE WITH ACCESS TO UNAPPROVED AUXILIARY WATER SUPPLIES CONNECTED TO A PIPING SYSTEM WHETHER OR NOT AN INTERCONNECTION EXISTS BETWEEN THE UNAPPROVED AUXILIARY WATER SUPPLY AND CITY WATER SYSTEM.
- WHERE A VAULT IS REQUIRED, A GALV. STEEL WALL MOUNTED CHAMBER LADDER W/EXTENSIONS IS REQUIRED AND SHALL BE CENTERED UNDER THE ACCESS DOOR.
- DOUBLE CHECK ASSEMBLIES SHALL BE INSTALLED IN AN APPROVED VAULT.
- REDUCED PRESSURE ASSEMBLIES SHALL BE INSTALLED OUTSIDE ABOVE GROUND.
- ALL BACKFLOW DEVICES SHALL BE PROTECTED FROM FREEZING.
- BACKFLOW PREVENTION ASSEMBLY VAULTS (I.E.: FIRE AND SERVICE PROTECTION) MUST BE INSTALLED AT THE CUSTOMER'S SIDE OF THE EASEMENT OR PROPERTY LINE. ALTERNATE LOCATIONS MUST BE REQUESTED IN WRITING AND APPROVED BY CITY OF WASHOUGAL WATER QUALITY SERVICES PRIOR TO INSTALLATION.
- NO PART OF THE BACKFLOW PREVENTION ASSEMBLY SHALL BE SUBMERGED IN WATER OR INSTALLED IN A LOCATION SUBJECT TO FLOODING. IF A BACKFLOW PREVENTION ASSEMBLY IS INSTALLED IN A VAULT, ADEQUATE DRAINAGE SHALL BE PROVIDED.
- ALL FIRE PROTECTION SERVICES SHALL HAVE A RSW GATE VALVE AT THE PUBLIC MAIN AND SHALL BE PRIVATE AFTER THE CITY ROW OR EASEMENT.
- ALL FIRE PROTECTION SERVICES SHALL BE CONSTRUCTED TO CITY OF WASHOUGAL PUBLIC MAIN MATERIAL AND RESTRAINT STANDARDS UP TO THE BACKFLOW DEVICE.
- ALL DOMESTIC SERVICES WITH BACKFLOW PROTECTION SHALL BE PRIVATE AFTER THE DOMESTIC WATER METER.
- ALL BACKFLOW PREVENTION DEVICES SHALL BE TESTED AFTER INSTALLATION AND PRIOR TO ACCEPTANCE, ALSO YEARLY THEREAFTER BY A CERTIFIED BACKFLOW ASSEMBLY TESTER. TEST RESULTS SHALL BE SENT TO THE CITY OF WASHOUGAL BY THE FOLOWING METHODS.

Mail, fax, or email test results to:

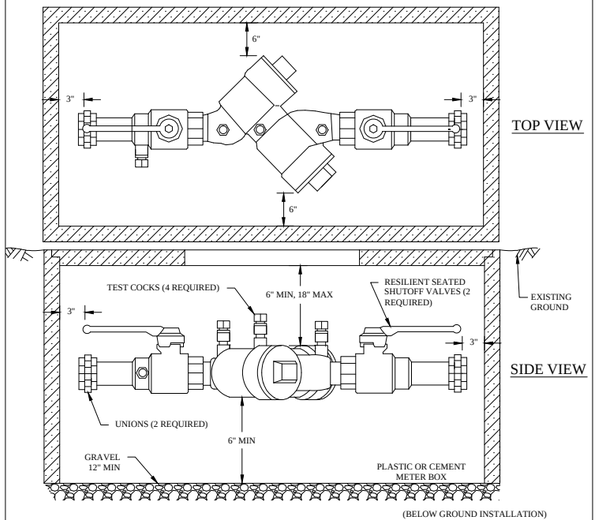
Operations Center - Water Quality Services
City of Washougal
1701 C Street
Washougal, WA. 98671

Fax# (360) 835-0792

EMAIL: backflowtestreports@cityofwashougal.us

GENERAL BACKFLOW NOTES

DETAIL NO. - W110



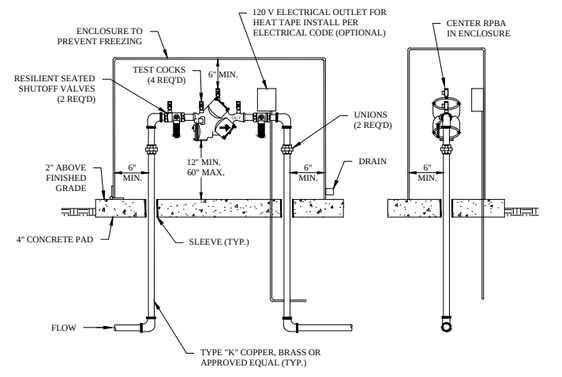
(BELOW GROUND INSTALLATION)

NOTES:

1. APPROVED DOUBLE CHECK VALVE ASSEMBLY TO LAY HORIZONTAL WITH GROUND. - DESIGNED FOR BACK SIPHONAGE AND BACK PRESSURE.
2. TEST COCKS TO EITHER FACE OUTWARDS OR UPWARDS FROM ASSEMBLY. - THOUROUGHLY FLUSH LINES PRIOR TO INSTALLATION OF BACKFLOW PREVENTER. INSTALL SO DATA PLATE & S/N ARE READABLE.
3. THE DCVA MAY BE INSTALLED ABOVE OR BELOW THE GROUND PROVIDED ALL CLEARANCES ARE MET - DO NOT INSTALL IN AN AREA SUBJECT TO FLOODING.
4. MUST BE PROTECTED FROM FREEZING CONDITIONS.
5. THE BACKFLOW ASSEMBLY SHALL BE A STATE APPROVED MODEL.
6. A PLUMBING PERMIT IS REQUIRED, PLEASE CONTACT YOUR LOCAL PLUMBING PERMIT CENTER.
7. MUST BE TESTED AFTER INSTALLATION AND YEARLY THEREAFTER BY A WASHINGTON STATE CERTIFIED BACKFLOW ASSEMBLY TESTER. TEST RESULTS SHALL BE SENT TO THE CITY OF WASHOUGAL ACCORDING TO DETAIL W110.

STANDARD DOUBLE CHECK VALVE ASSEMBLY - 2" & SMALLER

DETAIL NO. - W120



NOTES:

1. APPROVED REDUCED PRESSURE BACKFLOW ASSEMBLY (RPBA) TO LAY HORIZONTAL WITH GROUND. (VERTICAL ALLOWED IF APPROVED BY WA. DEPT. OF HEALTH)
2. DESIGN RPBA FOR BACK SIPHONAGE AND BACK PRESSURE.
3. THOROUGHLY FLUSH LINES PRIOR TO INSTALLATION OF BACKFLOW PREVENTER.
4. DO NOT INSTALL IN AN AREA SUBJECT TO FLOODING.
5. RPBA MUST BE ACCESSIBLE.
6. PROTECT RPBA FROM FREEZING.
7. A PLUMBING PERMIT IS REQUIRED-CONTACT THE APPROPRIATE JURISDICTION'S PERMITS COUNTER
8. RPBA MUST BE TESTED AFTER INSTALLATION, THEN ANNUALLY BY A WA. STATE CERTIFIED BACKFLOW TESTER. TEST RESULTS SHALL BE SENT TO THE CITY CROSS CONNECTION PROGRAM ADMINISTRATOR, (360) 835-2662 OR Backflowtestreports@cityofwashougal.us
9. RPBA SHALL BE APPROVED BY THE STATE OF WASHINGTON.
10. DRAIN SHALL BE SIZED PER THE AWWA CROSS CONNECTION CONTROL MANUAL
11. RPBA MUST BE RETESTED IF MOVED OR REPAIRED
12. AS OF JANUARY 4, 2014 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.

(ABOVE GROUND INSTALLATION ONLY)

2" & SMALLER REDUCED PRESSURE BACKFLOW ASSEMBLY & IRRIGATION SERVICE (OUTSIDE INSTILLATION)

DETAIL NO. - W130

No.	Revision	By

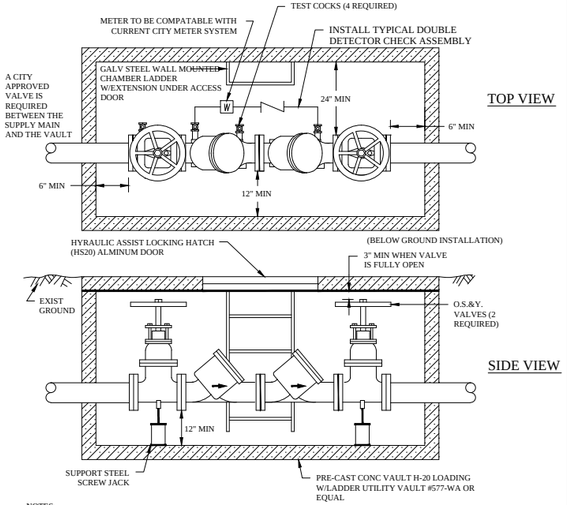
Designed By: JV
Drawn By: JV
Reviewed By:

As Shown

STANDARD WATER DETAILS - SHEET 3

CITY OF WASHOUGAL

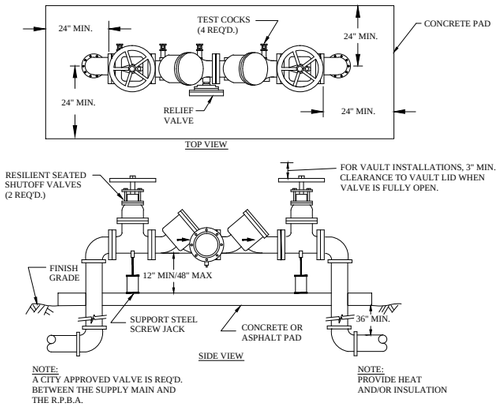
Drawing No.
3
3 of 4



NOTES:
1. APPROVED DOUBLE CHECK VALVE ASSEMBLY TO LAY HORIZONTAL WITH THE GROUND. DESIGNED FOR BACK SIPHONAGE AND BACK PRESSURE.
2. 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.
3. THE DCVA MAY BE INSTALLED ABOVE OR BELOW GROUND PROVIDED ALL CLEARANCES ARE MET.
4. ALL PIPE, VALVE, AND FITTING JOINTS, FROM THE SUPPLY MAIN, SHALL BE FLANGED AND RESTRAINED.
5. FIRE DEPT. CONNECTION SHALL NOT EXIT THROUGH THE TOP OF THE VAULT.
6. LINK SEAL PIPE ENTRANCE/EXIT.
7. ALL VAULTS SHALL BE PRE-APPROVED PRIOR TO INSALLATION.
8. VAULTS SHALL BE INSTALLED AT PROPERTY LINE OR EASEMENT LINE AND ON OWNERS PROPERTY.
9. VAULTS SHALL HAVE A MINIMUM OF 3' CLEARANCE FROM ALL STRUCTURES.
10. THE BACKFLOW ASSEMBLY SHALL BE TESTED AFTER INSTALLATION AND PRIOR TO ACCEPTANCE AND ALSO YEARLY THEREAFTER BY A WASH. STATE CERTIFIED BACKFLOW ASSEMBLY TESTER. TEST RESULTS SHALL BE SENT ACCORDING TO DETAIL W110.

STANDARD DOUBLE CHECK VALVE ASSEMBLY 2 ½" & LARGER

DETAIL NO. - W140



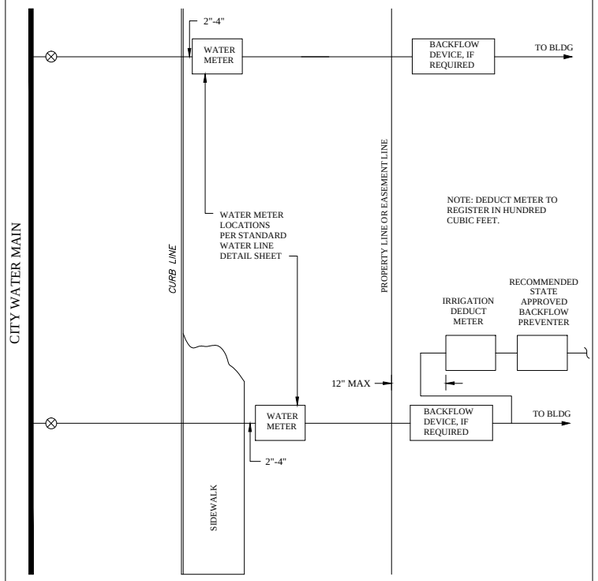
NOTE:
A CITY APPROVED VALVE IS REQ'D. BETWEEN THE SUPPLY MAIN AND THE R.P.B.A.

NOTE:
PROVIDE HEAT AND/OR INSULATION

NOTES:
1. APPROVED REDUCED PRESSURE BACKFLOW ASSEMBLY (RPBA) TO LAY HORIZONTAL ONLY. (VERTICAL IF APPROVED BY DEPT. OF HEALTH)
2. DESIGNED FOR BACK SIPHONAGE AND BACK PRESSURE.
3. THE WATER LINE SHALL BE DISINFECTED, FLUSHED AND PRESSURE TESTED PRIOR TO INSTALLING THE RPBA. THE RPBA SHALL BE PROTECTED FROM FREEZING AND FLOODING.
4. ALL UNDERGROUND PIPE, VALVES AND FITTING JOINTS SHALL BE RESTRAINED FROM THE SUPPLY MAIN. ALL ABOVE GROUND JOINTS SHALL BE FLANGED.
5. GROUT PIPE ENTRANCE AND EXIT IN VAULT, WITH WATERTIGHT GROUT.
6. ALL ENCLOSURES SHALL BE PRE-APPROVED PRIOR TO INSTALLATION.
7. RPBA SHALL BE INSTALLED AT PROPERTY LINE OR EASEMENT LINE AND ON OWNER'S PROPERTY.
8. ADEQUATE GRAVITY DRAINAGE SYSTEM REQUIRED WITH APPROVED AIR GAP.
9. MINIMUM 24" CLEARANCE ON ALL SIDES AROUND RPBA.
10. THE RPBA SHALL BE TESTED AFTER INSTALLATION AND PRIOR TO ACCEPTANCE, ALSO YEARLY THEREAFTER BY A CERTIFIED BACKFLOW ASSEMBLY TESTER. TEST RESULTS SHALL BE SENT ACCODING TO DETAIL W110.
11. HEAT AND/OR INSULATION SHALL BE PROVIDED TO PREVENT FREEZING

STANDARD REDUCED PRESSURE PRINCIPLE BACKFLOW ASSEMBLY 2 ½" & LARGER

DETAIL NO. - W150

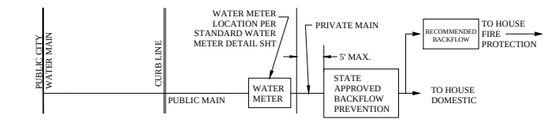


NOTE: THE CITY DOES NOT READ DEDUCT METERS

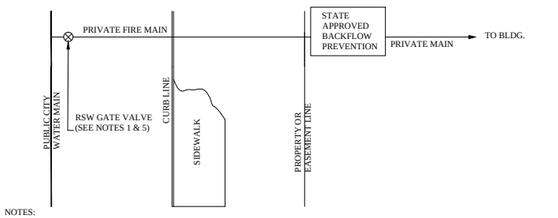
STANDARD DEDUCT METER & BACKFLOW LOCATION

DETAIL NO. - W160

SINGLE FAMILY FIRE PREVENTION INSTALLATION



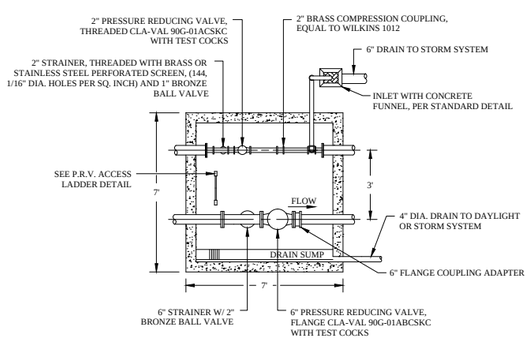
COMMERCIAL/MULTI-FAMILY BACKFLOW PREVENTION INSTALLATION



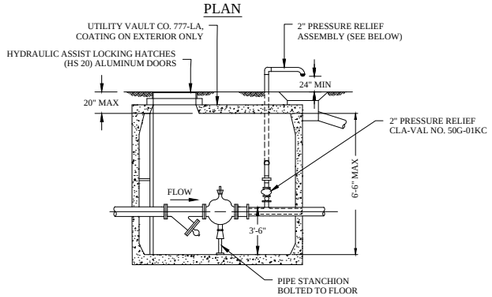
NOTES:
1. ALL STAND ALONE FIRE PROTECTION SERVICES (F.P.S.) SHALL HAVE A 4" OR LARGER IRON BODY GATE VALVE. VALVES SHALL BE LOCATED AT THE CONNECTION TO THE WATER MAIN.
2. FIRE PROTECTION SERVICES 2" AND SMALLER SHALL BE TYPE "K" COPPER AND F.P.S. LARGER THAN 2" SHALL BE 4" OR LARGER DUCTILE IRON PIPE.
3. ALL BACKFLOW DEVICES SHALL BE PER APPROVED PLAN.
4. ALL COMMERCIAL FIRE PROTECTION SERVICES SHALL BE PRIVATELY OWNED AND MAINTAINED DOWNSTREAM OF THE ROW OR EASEMENT.
5. REQUESTS FOR EXCEPTIONS TO THESE REQUIREMENTS MAY BE SUBMITTED IN WRITING WITH THE PLAN VIEW TO WATER DEPARTMENT, CROSS CONNECTION PROGRAM MANAGER.
6. ALL BACKFLOW DEVICES ARE PRIVATELY OWNED, TESTED AND MAINTAINED.
7. SINGLE FAMILY WATER METERS SHALL BE SIZED TO MEET THE REQUIRED FIRE FLOW.
8. PER RCW CHAPTER 70.119A.210, THE CITY OF WASHOUGAL SHALL NOT BE LIABLE FOR DAMAGES RESULTING FROM THE SHUTDOWN OF SINGLE FAMILY SERVICES DUE TO ROUTINE MAINTENANCE, NONPAYMENT; OR WATER SYSTEM EMERGENCIES.
9. ALL FIRE PROTECTION SERVICES, EXCEPT SINGLE FAMILY APPLICATIONS, SHALL BE TAPPED SEPARATELY FROM ALL DOMESTIC SERVICES AND FIRE HYDRANT LEADS.

STANDARD FIRE PROTECTION BACKFLOW LOCATION

DETAIL NO. - W161



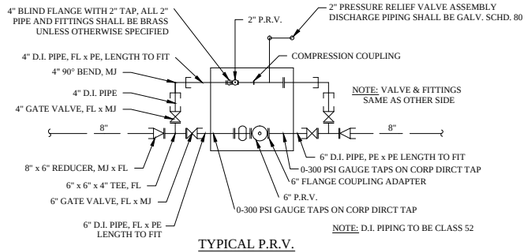
PLAN



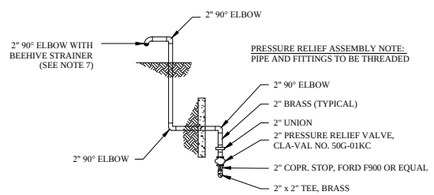
PROFILE

STANDARD PRESSURE REDUCING STATION

DETAIL NO. - W170



TYPICAL P.R.V.



2" PRESSURE RELIEF ASSEMBLY

NOTES

1. SIZING OF VALVES WILL BE MODIFIED FOR OTHER SIZES OF PIPE.
2. GALVANIZED LADDER TO BE SECURED TO VAULT PER STD. DTL.
3. ALL P.R.V.'s SHALL HAVE OPENING/CLOSING SPEED CONTROLS, EPOXY COATED BODY AND VALVE POSITION INDICATOR, CLA-VAL X101.
4. PILOT CONTROLS SHALL BE ON SIDE OF P.R.V. FACING INTERIOR OF VAULT TO PROVIDE EASY ACCESS.
5. ALL 90G MODEL CLA-VAL P.R.V.'s 3" AND SMALLER SHALL BE EQUIPPED WITH STAINLESS STEEL TRIM (SEAT, STEM, & COVER BEARING).
6. SEAL ALL PIPE PENETRATIONS THROUGH VAULT WITH LINK SEAL.
7. PRESSURE RELIEF DISCHARGE DOWNSPOUT SHALL DIRECT WATER TOWARDS CENTER OF INLET GRATE.

STANDARD PRESSURE REDUCING STATION

DETAIL NO. - W170A

No.	Revision	By

Designed By: JV
Drawn By: JV
Reviewed By:

As Shown

STANDARD WATER DETAILS - SHEET 4

CITY OF WASHOUGAL

Drawing No.
4
4 of 4

murraysmith

APPENDIX G
RESERVOIR #6 & BOOSTER PUMP STATIONS PRELIMINARY DESIGN REPORT

City of Washougal

Reservoir #6 & Booster Pump Stations
Preliminary Design Report

April 2015 | FINAL DRAFT

WE #1357A

Prepared by:

Wallis Engineering
215 W. 4th Street, Suite 200
Vancouver, WA 98660

City of Washougal Reservoir #6 & Booster Pump Stations Preliminary Design Report

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Section 1: Introduction

Purpose

The purpose of this report is to summarize the preliminary alternatives analysis and preliminary design for the proposed Pressure Zone 6 water storage and distribution system improvements recommended in the City of Washougal's *Draft 2012 Water System Plan* Update (WSP). This report refines the planning-level water system analysis summarized in the WSP and the *Technical Memorandum #2 – Zone 6 Reservoir Siting Analysis,* included in Appendix B.

Background

The City of Washougal's *Water System Plan Update* (WSP) recommended the development of a new pressure zone (Zone 6) in the Woodburn Hill area between Pressure Zone 3 and Pressure Zone 1. Zone 3 currently serves from elevations 160 feet to 540 feet, utilizing pressure reducing valves (PRVs) to serve the lower portions of the zone. The proposed Zone 6 improvements will create a new pressure zone for the portion of the existing Zone 3 between elevations 160 feet and 300 feet.

The WSP recommended the following improvements be constructed to create the proposed Pressure Zone 6:

- Abandonment of existing Booster Pump Station (BPS) #3 (which currently pumps from Zone 1 to the Zone 3 reservoir.
- New Zone 6 booster pump station to pump from Zone 1 to the proposed Zone 6 reservoir.
- New Zone 6 reservoir to serve the Woodburn Hill area between elevations 180 feet and 300 feet – Reservoir 6.
- New Zone 3 booster pump station to pump from Zone 6 to Zone 3 reservoir – BPS #3.
- Distribution system water mains to support the aforementioned booster pump station and reservoir improvements.

The WSP identified preliminary sizes, basic design features, and locations for the aforementioned proposed reservoir and booster pump station improvements.

In the summer of 2013, the City of Washougal elected to move forward with the design of the proposed Zone 6 water system improvements. Wallis Engineering was retained to provide the engineering services necessary to implement the Zone 6 improvements outlined in the WSP. The initial two tasks associated with that effort were focused upon completing a reservoir siting study. The first task was to complete a preliminary screening of potential reservoir sites. That study, which was summarized in Memorandum #1 dated November 4, 2013, concluded that the reservoir site identified in the WSP was less desirable than an alternative site to the west located on a vacant parcel of property owned by Hayden Homes (referred to as the Hayden Homes site). The second task was to further refine the engineering analysis presented in the WSP to verify the feasibility of the Hayden Home site, while also identifying a preferred site for the proposed Zone 6 Booster Pump Station. That analysis was summarized in *Technical Memorandum #2: Zone 6 Reservoir Siting Analysis,* included as Appendix B. It identified a preferred location for the proposed reservoirs and pump stations. Those are shown in Figure 1 of Appendix A.

In late 2014, the City authorized Wallis Engineering to further refine the design of the proposed Zone 6 improvements as needed to acquire property. This preliminary design report summarizes that effort.

Section 2: Design Criteria

General Design Criteria

Design criteria for proposed water system improvements were presented in Section 3 of the City's Water System Plan (WSP). They are summarized as follows:

1. Distribution system minimum pressure with reservoir at fire storage low point: 20 psi.
2. Distribution system minimum pressure with reservoir at standby storage low point: 30 psi.
3. Distribution system maximum preferred pressure: 90 psi.
4. Distribution system maximum allowable pressure: 125 psi.
5. Booster pump stations to supply peak demand with one pump out of operation. MDD OR PHD?
6. Booster pump station to have a standby generator with 24-hours of fuel.

All improvements will be designed to comply with the WSP, the 2010 City of Washougal Engineering Standards, and the 2009 Department of Health Water System Design Manual.

Zone 6 Boundaries

The WSP identified Zone 6 elevations as being between 160-foot and 300-foot elevations. The WSP recommended a Zone 6 Reservoir overflow elevation of 400 feet in order to meet pressure requirements in the Zone. However, *Technical Memorandum #2 – Zone 6 Reservoir Siting Analysis*, attached as Appendix B, revised the proposed reservoir overflow elevation to 416 feet to reflect a desire on the part of the City to increase minimum pressure in Zone 6 to 50 psi.

The WSP presented a hydraulic profile for the entire system. The western portion of that hydraulic profile, showing only the Woodburn Hill area, is shown in Figure 1, Appendix A. Figure 1 also shows pressure zones revised to reflect the proposed reservoir location.

Water Demand

Zone 6 will supply water to Zone 3 and future Zone 5. Both of these zones have the potential to develop beyond the 20-year timeline covered in the WSP. In order to size the Zone 6 water system improvements, the buildout ERU numbers were estimated based on zoning designations. The area analyzed included the entire Urban Growth Area (UGA) identified in the WSP. Table 2.1 provides a summary of ERU calculations for the pressure zones affected by the project for both the values covered in the WSP and for buildout by zoning categories.

TABLE 2.1: ERU Calculations

Pressure Zone	Current (2012)	20-Year (2032)	Buildout (UGA)
3	967	1,725	5,486
5	0	136	325
6	0	467	1,052

Using the average day demand (ADD) and maximum day demand (MDD) developed in the WSP of 227 gallons per day (gpd) and 503 gpd respectively, estimated capacities for the pump stations were developed. Table 2.2 lists the projected water system demands for the pressure zones affected by the project.

TABLE 2.2: Estimated Water Demand

Pressure Zone	Existing		20-Year		Buildout	
	ADD	MDD	ADD	MDD	ADD	MDD
3	152	338	272	603	865	1,917
5	0	0	22	48	52	114
6	0	0	74	164	166	368

PHD CAPACITY REQ'D

PHD = 172gpm

PHD = 278GPM

Reservoir #6 Capacity

The WSP recommended that the Zone 6 reservoir have a gross storage volume of 600,000 gallons to serve the 20-year urban growth boundary. However, in order to increase system reliability it is recommended to oversize Reservoir #6 to provide 1,000,000 gallons storage. This will provide additional standby storage to the western portion of Zone 1, thus providing additional reliability given the fact that all of the Zone 1 reservoir storage is concentrated in the east side of the City. A comparison of average reservoir storage capacity per ERU was completed, shown in Table 2.3. Initially, Reservoir #6 will have much greater storage capacity per ERU than other reservoirs in the City. However, at 20-year demand the storage capacity is comparable to other reservoirs.

TABLE 2.3: Average Reservoir Storage Capacity per ERU

	Existing			6-Year			20-Year		
Reservoir	Effective Storage (MG)[1]	ERU[2]	Gal/ERU[3]	Effective Storage (MG)[1]	ERUs[2]	Gal/ERU[3]	Effective Storage (MG)[1]	ERUs[2]	Gal/ERU[3]
1A, 1B	2.5	3928	636	2.5	4604	543	2.5	5458	458
2A, 2B**, 2C*	0.61	1959	312	1.3	2062	606	1.3	2273	550
3, 3B*	0.42	967	437	1.1	867	1269	1.1	1997	551
4, 4B	1.4	530	2547	1.4	641	2106	1.4	1316	1026
6*	-	-	-	1.0	251	3984	1.0	467	2141
7*	-	-	-	-	-	-	0.70	507	1381

*Proposed for construction. **Proposed for abandonment.

1. Effective reservoir storage volume per pressure zone ("City of Washougal WSP," 2012, p. 3-9, p. 3-30, p. 3-31).
2. Equivalent residential units (ERUs) served within an independent pressure zone ("City of Washougal WSP," 2012, p. 3-14).
3. Volume of effective reservoir storage per zone for each ERU served in that zone, obtained from V/N where V = effective reservoir storage volume per pressure zone and N = ERUs served within that zone.

To assess whether or not the increased size of the proposed reservoir would result in excessive water system detention time, resident times were estimated as shown in Table 2.4. The average residence time for Reservoir #6 sized at 1 million gallons is 4 days at 6-year demand and 2 days at 20-year demand. This is comparable to the other reservoirs within the City, and within DOH guidelines of 3-5 days. Therefore, a 1 million gallon reservoir is not anticipated to negatively impact water quality.

TABLE 2.4: Average Reservoir Residence Time

Reservoirs	Existing		6-Year		20-Year	
	Total ERUs Served[1]	Average Residence Time (days)[2]	Total ERUs Served[1]	Average Residence Time (days)[2]	Total ERUs Served[1]	Average Residence Time (days)[2]
1A, 1B	7,384	1	8,425	1	12,018	1
2A, 2B**, 2C*	2,489	1	2,703	2	4,096	1
3, 3B*	967	2	967	5	1,997	2
4, 4B	530	11	530	11	1,823	3
6*	-	-	1,118	4	2,328	2
7*	-	-	-	-	507	6

*Proposed for construction. **Proposed for abandonment.

1. Equivalent residential units (ERUs) served by reservoir storage within given pressure zone ("City of Washougal WSP," 2012, p. 3-14, p. 3-30, p. 3-31).
2. Average residence time per pressure zone, obtained from $V/(N*ADD)$ where V = effective storage volume per pressure zone as given in **Table 2-3**, N = ERUs served by reservoirs in each zone, and ADD = 227 gallons per day per ERU ("City of Washougal WSP," 2012, p. 2-5).

Booster Pump Station Capacity

Sizing of the booster pumps will be based on the Washington Department of Health Water System Design Manual. As such, station capacities will equal: 1) average day demand with the largest pump out of service and 2) maximum day demand with all pumps in service. In addition, pressures in the supplying zone, Zone 1, cannot drop below 30 psi during the Peak Hour Demand with the pump station on. The capacity of BPS #6 will need to be sufficient to supply Zone 6, Zone 3, and future Zone 5. The capacity of BPS #3 will need to be sufficient to supply Zone 3 and future Zone 5. Consideration will be given to the ultimate capacity requirements of the pump stations as recommended in the Water System Design Manual.

Booster pump station capacity was estimated for existing, 20-year, and buildout water demand. Booster Pump Station #3 was sized to supply water to Zone 3 and future Zone 5. Booster Pump Station #6 was sized to supply water to Zone 6, Zone 3, and Zone 5. Estimated capacity is shown below in Table 2.5.

TABLE 2.5: Estimated Booster Pump Station Capacity

Pump Station	Estimated Capacity of Pump Station (gpm)					
	Existing		20-Year		Buildout	
	ADD	MDD	ADD	MDD	ADD	MDD
BPS #3	152	338	294	651	917	2,031
BPS #6	-	-	368	815	1,083	2,399

ACCOUNT FOR 25 PHD!!
CLOSED SYSTEM?

Topographical Constraints

Extensive negotiations with the owners of the proposed Reservoir #6 and Booster Pump Station #3 site led to the selection of a parcel of property located on the south side of Oak Tree Park. That site is shown in Figure 2, Appendix A. Although the site is steep, there are no significant topographic constraints.

Geotechnical Constraints

A cursory geotechnical field visit to the site was completed during the siting study. Results of that evaluation are included in Appendix C. That screening concluded that there were no readily apparent soil issues that would prevent the proposed reservoir from being constructed on the Hayden Homes site.

Following identification of a preferred site on the Hayden Homes property, a preliminary geotechnical evaluation was completed to further assess where or not the reservoir location as proposed was feasible from a geotechnical perspective. Results of the evaluation are included in Appendix D. Two test pits were excavated. One pit was at the north side of the proposed reservoir footprint, and one at the south side. At the north pit, groundwater was found at an elevation of 389', and bedrock at 386'. At the south pit, bedrock was found at elevation 381.5'. Groundwater was not encountered in the south pit. The soil encountered was primarily unconsolidated fill composed of rock fragments, and imported fill with considerable fines. It was concluded that a temporary excavation slope of 1V:2H would be required if the slope was excavated during wet weather. It was also concluded that, if the hillside was excavated during dry weather, it was likely that the slope could be steepened to 1V:1H. See Section 4 for more detail on the proposed approach to site excavation.

Section 3: Alternative Evaluation

Reservoir #6 Location

A reservoir location alternative analysis was previously completed and summarized *Technical Memo #2 - Zone 6 Reservoir Siting Analysis*, which is included as Appendix B. Two sites were evaluated: one in the Granite Highlands neighborhood and one in the Lookout Ridge neighborhood. Although the Granite Highlands site is more central to the proposed pressure zone, the Lookout Ridge site is closer to the higher density development.

Each site was evaluated on the basis of site preparation costs, geotechnical constraints, proximity to existing water mains, onsite and local drainage facilities, ability to accommodate different reservoir materials, aesthetic impacts, and property costs. Based on the evaluation, it was concluded that both sites were feasible, but that the Lookout Ridge site is the preferred option.

Pump Station #3 Location

A preliminary pump station site alternative analysis was previously completed and summarized in *Technical Memo #2*, included as Appendix B. Three sites were evaluated: the new Reservoir #6 site, and two sites along Lebrun Boulevard near Lookout Ridge Drive.

Each site was evaluated on the basis of a hydraulic analysis, site preparation cost, environmental constraints, proximity to existing water mains, onsite and local drainage facilities, proximity to 3-phase power, and noise/neighborhood impact. However, the preliminary evaluation recommended further evaluation to determine the preferred site for Booster Pump Station #3.

In order to determine the preferred site, a new criterion was evaluated: reliability. The Reservoir #6 site is anticipated to provide the greater reliability due to the proximity to Reservoir #6. The greater the distance from the reservoir, the greater the risk of water main breaks impacting the pump station operations. Therefore, the Reservoir #6 site is the preferred site for Booster Pump Station #3.

Pump Station #6 Location

A preliminary pump station site alternative analysis was previously completed and summarized in *Technical Memo #2*, Appendix B. Three sites were evaluated: along North 8th Street near Shepherd Road, the new Sandy Swimming Hole parking lot on Shepherd Road, and at Lebrun Boulevard.

Each site was evaluated on the basis of a hydraulic analysis, site preparation cost, environmental constraints, proximity to existing water mains, onsite and local drainage facilities, proximity to 3-phase power, and noise/neighborhood impact. Based on the evaluation, it was concluded that the Lebrun Boulevard site is the preferred option for Booster Pump Station #6.

Hydraulic Analysis

The modeling analysis completed in conjunction with *Technical Memo #2*, Appendix B. The analysis concluded that the proposed booster pump station and reservoir locations and elevations would satisfy flow and pressure requirements in the distribution system. A follow up modeling analysis was completed to confirm those conclusions. The follow up analysis included two evaluations:

Evaluation #1. A steady state model of the Zone 1 distribution system was analyzed with the proposed Booster Pump Station #6 operating at the anticipated 20 year maximum daily demand design capacity of 815 gpm. In this scenario, the goal was to assess whether the increased demand at

BPS #6 would create an excessive pressure drop in the distribution system supplying water to the booster pump station.

Evaluation #2. An evaluation of the proposed Zone 6 reservoir operating elevations to determine if they were adequate to serve the proposed Zone 6 distribution system.

Evaluation #1 – Zone 1 Residual Pressures with BPS #6 Operating at 815 GPM

Zone 1 was modelled to determine if any of the junctions would fall below 30 psi while the Zone 6 BPS was operating at 815 gpm, which is the proposed design capacity. That analysis assumed:

- Pump station operating at its design capacity – 815 gpm.
- Maximum Daily Demand (MDD) in Zone 3 at 20-year ERU projections.
- Minimum residual pressure of 30 psi.
- Reservoir #1 elevation 230'.
- BPS #6 intake pipe at elevation 104'.
- Zone 1 MDD based on 20 year ERU projections.
- All well field pumps are off (note that with any of the well field pumps operating, the pressure at the proposed BPS #6 will increase.
- Proposed NE 3rd Ave Bridge Crossing to provide a 12-inch connection across the Washougal River at the west end of the City (currently not constructed).

Evaluation # 2 – Maximum Allowable Fire Flow in Zone 6 Using Reservoir #6 Only

Zone 6 was modelled to determine if the Zone 6 distribution system could provide the necessary flow rates with desired pressure ranges if the reservoir was constructed as proposed. That analysis assumed:

- Minimum required fire flow of 1,500 gpm.
- During fire flow conditions, minimum residual of 20 psi at the hydrant supplying fire flow.
- During fire flow conditions, minimum residual of 20 psi within the entirety of Zone 6.
- Reservoirs #3 and #6 were set to 360,000 gallons below the bottom of the equalizing storage assumed levels, which would reached after 4 hours of fire flow @ 1,500 gpm.

Conclusions

The evaluation outlined above concluded that:

1. The Zone 1 distribution system was capable of delivering the design flow rates to BPS #6, however, upgrades to that distribution system would be required. These include extending Pressure Zones 3 and 4 several hundred feet downhill, and the installation of a new water main across the Washougal River at the west end of the City. It is important to note that these improvements would not be required during the initial years of pump station operation, when the maximum flow rates would be much less than the 815 gpm flow rate. GOING TO LIMIT BPS OPERATION?
2. The Zone 6 distribution system was capable of delivering the design flow rates to most of the Zone 6 distribution system following the Zone 6 distribution system upgrades generally outlined in the WSP, but only with flow to the eastern area of the distribution system being supplied by Reservoir #3 through the Columbia Ridge PRV during peak demand.

Reservoir #6 Material

There are a variety of materials available for water reservoirs, including pre-stressed concrete, cast-in-place concrete, bolted steel, and welded steel. Based on the City's past experience, cast-in-place concrete and bolted steel were not considered. In general, welded steel and pre-stressed concrete are considered equivalent, with concrete being chosen as the more reliable material, and steel being selected when the cost difference warrants its selection. A comparison of the two materials is shown below in Table 3.1.

TABLE 3.1: Reservoir Material Comparison

Steel	Pre-stressed Concrete
Advantages	
• Lower construction cost • Watertight • Reservoir accessories readily available • Good contractor competition	• Watertight • Low maintenance • No cathodic protection needed • Fair contractor competition • Better freeze protection
Disadvantages	
• Vulnerable to corrosion • Cathodic protection required	• Higher initial cost

A cost comparison for welded steel and pre-stressed concrete reservoirs was completed. The steel reservoir will require a major retaining wall, costing approximately $300,000. Although the reservoir itself is estimated at $700,000, with the retaining wall the steel reservoir cost will be $1,000,000, which is the same as the pre-stressed concrete reservoir option. Construction costs and 60-year life cycle costs were evaluated. This cost comparison is shown below in Table 3.2. Costs shown are base reservoir construction costs without piping, sitework, landscaping, engineering, or contingencies.

TABLE 3.2: Reservoir Cost Comparison

	Welded Steel	Pre-Stressed Concrete
Construction Cost (million)	$1.0	$1.0
60-year Present Worth (million)	$2.2	$1.1

Although the construction cost of the welded steel reservoir and retaining wall are estimated to be the same as that of the concrete reservoir, the 60-year life cycle cost of the steel reservoir is much greater due to the fact that steel reservoirs require significantly more maintenance than pre-stressed concrete reservoirs in order to prevent corrosion. Based on the advantages shown in Table 3.1 and the 60-year present worth cost, pre-stressed concrete is the preferred alternative.

Reservoir #6 & Booster Pump Station 3 Site Layout

Figure 2, Appendix A shows the proposed Reservoir #6 and Booster Pump Station #3 site plan. Due to topography and aesthetic constraints, only one site layout was identified. The reservoir was located based on minimizing excavation, minimizing visual impacts, and providing a foundation on native soils. In order to ensure the proposed reservoir location is feasible, a preliminary construction grading plan and sections were also developed, shown on Figure 3. A temporary construction road up to and around the reservoir will be constructed. A portion of this road will remain as the access driveway to Booster Pump Station #3.

Pump Station #6 Site Layout

The Booster Pump Station #6 site layout is constrained by the topography of the site and the size of the property. Due to the property configuration, the pump station will require a hammerhead turnaround driveway for maintenance access. There are three basic alternatives for locating the pump station on the site, shown on Figure 4, Appendix A. All three alternatives are considered equivalent, with minor differences in aesthetic impacts and pump station impacts. Based on City input, Alternative 2 is the preferred alternative. A preliminary site plan has been developed for this alternative, and is shown on Figure 5, Appendix A.

Section 4: Preliminary Design Summary

Basis of Design

Design of the proposed improvements will be in accordance with the three Fieldsmart Design Guides included as Appendix E (WDG5 – Booster Pump Stations, WDG6 – Pressure Reducing Station, and WDG7 – Water Storage Reservoir). A hydraulic analysis was completed to ensure that all of the proposed improvements meet the design criteria discussed in Section 2, and a summary is included in Section 3. The following paragraphs summarize key design features of the proposed improvements.

Reservoir #6

As discussed previously, the proposed Reservoir #6 will be constructed to serve the new Zone 6, located within the city limits between elevation 160 feet and 300 feet. The proposed reservoir will be located at the Lookout Ridge site, as shown on Figure 1. Preliminary design information for Reservoir #6 is summarized below.

Reservoir Capacity & Elevation

The proposed reservoir will sized at 1 MG, with an overflow elevation of 416 feet. The reservoir will have a base elevation of 385 feet and 3.5 feet of freeboard, resulting in a top elevation of 419.5 feet. The reservoir diameter will be approximately 80 feet. Based on the results of the alternative evaluation, a pre-stressed concrete reservoir is recommended. Reservoir #6 design parameters are summarized below in Table 4.1. However, preliminary discussions with a pre-stressed concrete reservoir manufacturer have revealed several options to modify the reservoir depth and diameter to reduce costs. Final reservoir dimensions will be determined during design phase in order to optimize both cost and hydraulic performance.

TABLE 4.1 – Reservoir #6 Design Summary

Design Parameter	Value
Material	Pre-stressed Concrete
Volume	1 MG
Overflow Elevation	416'
Base Elevation	385'
Diameter	80'

Site Improvements & Layout

The reservoir will be located on the east side of the site, partially buried in the hillside. An access road will be constructed at the top of the hill for maintenance access from Oak Ridge Park. The site will also include a security fence around the reservoir.

Site Grading

The reservoir will be partially buried within the hillside below Oak Tree Park. That hillside currently slopes down at approximately 1V:5H from north to south. The need to protect an east-west row of oak trees with the park at the top of the bank above the reservoir establishes the northern

limits of excavation. Construction of the proposed reservoir requires a site approximately 10 feet beyond the footing of the proposed reservoir. The need to maintain a stable embankment slope above the pad upon which the reservoir will be constructed (prior to backfill and partial bury) establishes the southern boundary. The goal will be to locate the proposed reservoir as far north into the bank as possible without expensive shoring during construction. To realize that goal, the following implementation plan is proposed:

1. Phase #1. During the late summer of 2015, excavate the reservoir pad down to within five feet of the final foundation pad elevation. This will be a flat area approximately 20-foot greater diameter than the reservoir exterior wall). Stabilize the slope to prevent erosion through the winter. Remove all excavated material from the site.
2. Phase #2. Bid the reservoir project in mid-spring of 2016, with reservoir construction scheduled for mid-summer. As an initial step, require the contractor to excavate the reservoir pad down to the final foundation pad elevation, with the excess material stockpiled on-site to be used as backfill around the reservoir to return the hillside above and on each side of the proposed reservoir back to pre-construction grades.

Site Drainage

The reservoir site will drain down the hillside into the storm drainage system to be constructed with the Lookout Ridge Phase 6. This storm drainage system flows to a regional detention and treatment facility located at West Lookout Ridge Drive and West 8th Street. Because this regional stormwater facility was constructed to serve the proposed Lookout Ridge Phase 6 development, it is expected to have sufficient capacity to accept stormwater from the reservoir site.

Reservoir Design Features

The reservoir will include the following design features:

- Inlet entering just above the reservoir top slab, with a mixing system utilizing duckbill check valves.
- Outlet pipe separated by a swing check valve located in a valve vault, to maximize turnover and water quality.
- Reservoir outlet sample station.
- An overflow with rubber duck bill type check valve discharging to the storm drainage system.
- A drain pipe connected to the overflow discharge.
- A lockable caged external ladder.
- Two lockable roof access hatch and internal ladder.
- A screened roof vent.
- External water level indicator.
- Transducer level sensor integrated in the SCADA control system including high and low level alarms.
- Perimeter fencing secured with a locked gate.

Property Ownership & Access

The City is currently in the process of acquiring property for Reservoir #6 and Booster Pump Station #3. The owner of the Lookout Ridge property is currently in the preliminary stages of subdividing and developing the property, and seven lots are being purchased for Reservoir #6 and Booster Pump Station #3. Figure 6, Appendix A shows the property being purchased, as well as the proposed easement required for the water distribution improvements outside of the purchased property.

Booster Pump Station #3

To reliably supply current and future water demands in Zone 3, it is recommended that the existing Booster Pump Station #3 be replaced with a new booster pump station. The new Booster Pump Station #3 will be located at the Lookout Ridge reservoir site, as shown on Figure 1, Appendix A. The station will take suction from Reservoir #6 and discharge into the Zone 3 distribution network.

Booster Pump Station Capacity

The pump station will be designed to meet 20-year water demand for Zone 3 and future Zone 5. Pump station piping will be sized for buildout flow projections. Two identical pumps will be installed, each capable of supplying the projected 20-year ADD of 294 gpm. Both pumps together will be capable of supplying the projected 20-year MDD of 338 gpm. Additional space will be provided for a third pump to be added to meet buildout water demand. In order to accommodate a range of flow conditions at desired efficiencies, the two pumps will be equipped with variable frequency drive (VFD) motors.

With the base elevation of Reservoir #6 at 385 feet and the Reservoir #3 overflow elevation at about 658 feet, the pumps will need to provide a static lift of at most, 273 feet. This will allow Reservoir #3 to be taken offline and the pump station to take suction directly from the low service area.

Site Improvements & Layout

The pump station will be located near the west side of the site. A hammerhead driveway will provide maintenance access from West 7th Street. The site will also include a security fence and gate surrounding the pump station and driveway. See Figure 2, Appendix A for a preliminary site plan.

Site Grading

The Booster Pump Station #3 site consists of a steep hillside sloping at approximately 2:1 from north to south, and a flatter portion at the base of the hill sloping at approximately 7% to the west. The driveway will be constructed on the flat portion at the base of the steep slope, maintaining the existing grading pattern. The pump station will be cut into the steep hillside. A retaining wall will be constructed on the north side of the driveway, and the north, east, and west side of the pump station. See the preliminary site plan on Figure 2 for proposed site grading.

Site Drainage

See above for a discussion of drainage for the Reservoir #6 and Booster Pump Station #3 site.

Pump Station Building

The pumps, mechanical equipment, and generator will be building approximately 15 feet wide by 40 feet long. Because the building will be inset into the steep hillside, the north, east and west sides of the building will consist of a reinforced concrete retaining wall. The south wall of the building will be constructed of concrete masonry units. The building will have a metal shed roof, a rollup door, and standard door.

Electrical Service

The pump station will require 3-phase 480-volt electrical service be extended from a location at the southeast corner of the Hayden Home property – a distance of approximately 1300 feet.

Pump Station Design Features

The pump station will include the following design features:

- Two 815 gpm pumps with variable frequency drives, discharge check valves, and isolation valves.
- Magnetic flow meter with isolation valves.
- Backup diesel generator in a separate room from the pumping equipment.
- Pressure reducing valve for fire flow bypass from Zone 6 to Zone 1.
- Perimeter fencing secured with a locked gate.

A preliminary mechanical plan for Booster Pump Station #3 is shown on Figure 7, Appendix A.

Property Ownership & Rights-Of-Way

See above for a discussion of the Reservoir #6 and Booster Pump Station #3 property acquisition.

Booster Pump Station #6

Booster Pump Station #6 will be constructed to meet the current and future water demands in Zone 6. Because Zone 3 and future Zone 3 will also be supplied through Zone 6, the pump station will be constructed to meet the demands of those zones as well. The new Booster Pump Station #6 will be located at the Lebrun site, as shown on Figure 1, Appendix A. The station will take suction from the Zone 1 distribution network and discharge into the Zone 6 distribution network.

The pump station will be designed to meet 20-year water demand for Zone 6, Zone 3, and future Zone 5. Pump station piping will be sized for buildout flow projections. Two identical pumps will be installed, each capable of supplying the projected 20-year ADD of 368 gpm. Both pumps together will be capable of supplying the projected 20-year MDD of 815 gpm. Additional space will be provided for a third pump to be added to meet buildout water demand. In order to accommodate a range of flow conditions at desired efficiencies, the two pumps will be equipped with variable frequency drive (VFD) motors.

With ground elevations at the site of about 94 feet and the Reservoir #6 overflow elevation at about 416 feet, the pumps will need to provide a static lift of at most, 322 feet. This will allow Reservoir #3 to be taken offline and the pump station to take suction directly from the low service area.

Site Improvements & Layout

The pump station will be located near the middle of the property. A hammerhead driveway will provide maintenance access from LeBrun Boulevard. The site will also include a security fence and gate will surround the pump station and driveway. See Figure 5, Appendix A for the preliminary site plan.

Site Grading

The Booster Pump Station #6 site slopes approximately 15% to the southwest. Fill will be required on the site to decrease the access driveway slope to 10% up to the pump station building, and flat adjacent to the building. The pump station building will be partially constructed on fill, and partially

cut into the hillside. A retaining wall will be constructed on the east side of the building. A retaining wall will be constructed on the north side of the driveway, and the north, east, and west side of the pump station. See the preliminary site plan on Figure 5, Appendix A for proposed site grading.

Site Drainage

The pump station site currently drains southwest into a creek approximately 100 feet west of LeBrun Boulevard. Because this project will create more than 2000 square feet of impervious surfaces, stormwater from the site will need to be detained and treated. Water from the site will drain along south along the driveway, where it can be collected and sent to a stormwater facility on the southeast corner of the site. Stormwater will then be discharged into the creek to the west.

Pump Station Building

The pumps, mechanical equipment, and generator will be located in a building approximately 15 feet wide by 40 feet long. The building will be constructed with concrete masonry units, with the exception of the east wall which will be a reinforced concrete retaining wall. The building will have a metal shed roof, a rollup door, and standard door.

Pump Station Design Features

The pump station will include the following design features:

- Two 815 gpm pumps with variable frequency drives, discharge check valves, and isolation valves.
- Magnetic flow meter with isolation valves.
- Backup diesel generator in a separate room from the pumping equipment.
- Concrete masonry unit building with a pitched roof and dimensions of approximately 20 feet by 40 feet.
- Pressure reducing valve for fire flow bypass from Zone 6 to Zone 1.
- Perimeter fencing secured with a locked gate.

A preliminary mechanical plan for Booster Pump Station #6 is shown on Figure 8, Appendix A.

Property Ownership & Rights-Of-Way

The City is currently in the process of acquiring property for Reservoir #6 and Booster Pump Station #3. The owner of the Lookout Ridge property is currently in the preliminary stages of subdividing and developing the property, and seven lots are being purchased for Reservoir #6 and Booster Pump Station #3. Figure 5, Appendix A shows the property being purchased.

Distribution Improvements

In order to create the new Zone 6, various distribution improvements and modifications are required. These include new distribution piping, modifications to existing PRVs, and modification of existing valves (i.e. closing normally open valves, and opening normally closed valves). These improvements will be constructed in three phases as Zone 6 is expanded.

The first phase will include the new Reservoir #6, Booster Pump Station #3, and Booster Pump Station #6. A portion of Phase 1 distribution improvements within the proposed Lookout Ridge development will be developer built. These improvements are shown on Figure 9, Appendix A. In addition to the Zone 6 improvements, a Zone 1 water main on 8th Street will be relocated as part of

this project. This water main is currently buried under an existing house, and will be relocated into the street. Because the second phase depends upon waterlines required in the proposed Riverwatch subdivision, this phase will be completed with the completion of that development. The third phase will be completed when needed due to development in the east portion of Zone 6. The phased improvements are shown on Figure 1, Appendix A and described below.

Phase 1

- Construct Reservoir #6.
- Construct BPS #6.
- Construct BPS #3.
- Abandon existing BPS #3.
- Relocate or modify LeBrun PRV.
- Electrical service to BPS #3.
- Relocate Lookout Ridge PRV #1.
- Add 3 new isolation valves.
- Construct 750 feet of 12-inch water main connecting the main in West U Street to the main in North LeBrun Boulevard.
- Construct 1100 feet of 12-inch water main from Reservoir #6 to West Lookout Ridge Drive.
- Construct 450 feet of 8-inch water main extending the high pressure Zone #3 water main west along West Lookout Ridge Drive.
- Relocate 200 feet of 8-inch Zone 1 water main in 8th Street.
- Developer to construct 900 feet of 12-inch water main from BPS #3 to Zone 3 distribution piping in North X Street.

Phase 2

- Abandon Crown Point PRV.
- Close existing isolations valves in four locations.
- Open isolation valve which was closed during Phase I.
- Add new isolation valve.
- Developer to construct 2250 feet of 12-inch water main from North LeBrun Boulevard to North 6th Street through the proposed Riverwatch subdivision.
- Construct 2200 feet of 8-inch water main from proposed Riverwatch subdivision to North 3rd Street.

Phase 3

- Abandon North 10th Street PRV.
- Modify Columbia Ridge PRV.
- Install 2 new isolation valves.
- Close existing isolation valves in three locations.

- Open existing isolation valves in two locations.
- Construct 1650 feet of 12-inch water main from the east end of North V Street to North 14th Street.

Preliminary Cost Estimates

Estimates of total costs were prepared for each of the project components including reservoir, booster pump stations, distribution system improvements, and miscellaneous project needs (i.e. abandon PRV stations). These costs are based on the preliminary design, but do not include improvements that will be constructed by developers. Costs are presented in 2016 dollars and include a 40% contingency for tax, engineering, administration, and construction services. Table 4.2 presents preliminary cost estimates.

TABLE 4.2 – Preliminary Cost Estimate

Item Description	Cost
Phase 1	
Reservoir #6	$3,300,000
Booster Pump Station #6	$1,190,000
Booster Pump Station #3	$1,330,000
Abandon Existing Booster Pump Station #3	$14,000
Relocate or modify LeBrun PRV #2	$16,800
Electrical service to Booster Pump Station #3	$42,000
Relocate Lookout Ridge PRV #1	$25,200
3 New Isolation Valves	$21,000
1850 LF of 12-Inch Water Main	$323,750
450 LF of 8-Inch Water Main	$69,300
Relocate 200 LF of 8-inch Water Main	$30,800
Property/Easement Acquisition	$700,000
Phase 1 Total	***$7,062,850***
Phase 2	
Abandon Crown Point PRV	$5,000
New Isolation Valve	$7,000
2200 LF of 8-Inch Water Main	$338,800
Phase 2 Total	***$350,800***
Phase 3	
Abandon N. 10th St. PRV	$5,000
2 New Isolation Valves	$14,000
1650 LF of 12-Inch Water Main	$288,750
Phase 3 Total	***$307,750***
GRAND TOTAL	**$7,721,400**

LAND ?

Section 5: Implementation

Land Use and Environmental Review

Type II Site Plan Review

Both the Reservoir #6 and Booster Pump Station #6 (LeBrun) sites associated with this project are subject to Type II administrative review and do not require public hearing, unless a full variance is requested under WMC 18.80.040.2.

The Booster Pump Station #6 (LeBrun) site is zoned Community Commercial. Because the pump station is a public facility within the CC zone, it is a permitted use and SEPA review is required.

The Reservoir Site is zoned R.1-15. The reservoir is a public facility; within the R.1-15 zone, a public facility is a Permitted use. (See Ordinance 1758.) SEPA review is required.

Type II Site Plan review is anticipated to involve a technically complete application, a combined public notice and SEPA comment period, and an administrative decision. Site Plan approval is required to be gained per WMC 18.88.030 and the applicable Woodburn Hills overlay design criteria.

SEPA Checklist

SEPA checklists will be prepared for both the Reservoir and Booster Pump Station #6 improvements for submittal to the City of Washougal for determination as required by the Type II Site Plan process.

Critical Areas Clearances

City Critical Areas clearance will need to be gained as regulated under City of Washougal's Municipal Code (WMC) 16.04.055 for fish and wildlife habitat conservation areas.

Critical area assessments for fish and wildlife habitat at the preferred Reservoir #6 site and Booster Pump Station #6 site (Lebrun property).

Reservoir #6 Site

A geologic hazards memorandum will be prepared to address the engineering geology and geologic hazards for the Critical Area. There are White Oak Trees located in the vicinity of the proposed Reservoir location; previous consultation with Washington Department of Fish and Wildlife has indicated that the trees can be removed and mitigated for.

Booster Pump Station #6 Site

A Wetland Delineation and Mitigation Study will be completed under the guidelines of the Washougal Critical Areas Ordinance (WMC 16.04.070). A mitigation plan will be prepared to address compensation for wetland and habitat or associated buffer impacts of the study area under the guidelines of WMC 16.04.0455 and WMC 16.04.070.

Cultural Resources Permitting

An archaeological predetermination study will be conducted to determine if an archaeological site is likely within the project parcel. There are four locations that need to be included in a predetermination as they are anticipated to have below-ground disturbance during construction:

- Reservoir #6 and Booster Pump Station #4 site located in the area between West Lookout Ridge Drive and West 'Y' Street.
- A new waterline between Reservoir #6/Booster Pump Station #4 and LeBrun Blvd., on what will be West 7th Street and in an easement to connect with West Lookout Ridge Drive.
- Booster Pump Station #6 site west of LeBrun Boulevard and north of Shepherd Road, approximately 0.3 acre in size.
- Undergrounding for a short distance at the N. 8th and 'R' Street intersection, a paved area.

Construction Stormwater Permit

A Construction Stormwater Permit issued by Department of Ecology is anticipated to be required due to excavation area over one acre.

Building Permits

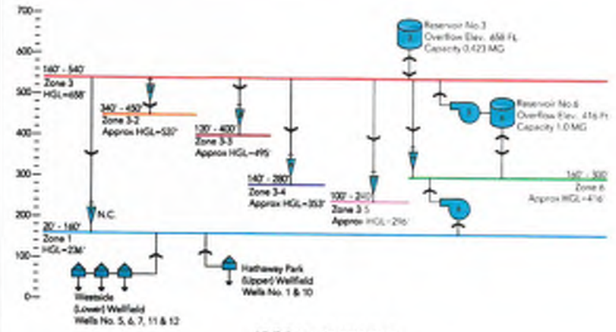
Building permits for the Pump Station and Reservoir structures will be required for approval by the City of Washougal Building office.

Scheduling

A detailed project schedule (updated March 26, 2015) is included as Figure 10, Appendix A. An overview of the current schedule is as follows:

- Finalize Property Acquisition – May 2016
- Design Development & Permitting – May-December 2015
- Bidding – January 2016
- Construction February – August 2016
- Reservoir Online – August 2016

Appendix A: Figures

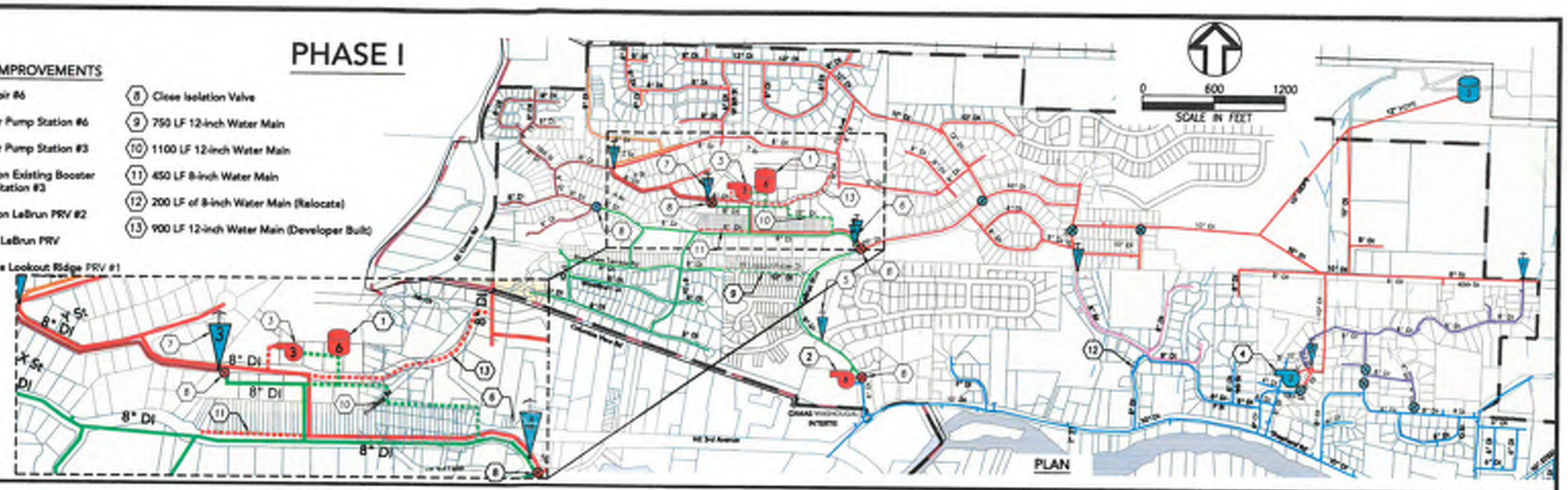


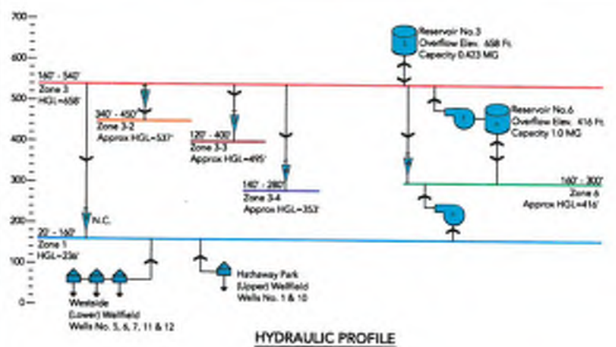
HYDRAULIC PROFILE

PHASE I

PHASE I IMPROVEMENTS

1. Reservoir #6
2. Booster Pump Station #6
3. Booster Pump Station #3
4. Abandon Existing Booster Pump Station #3
5. Abandon LaBrun PRV #2
6. Modify LaBrun PRV
7. Relocate Lookout Ridge PRV #1
8. Close Isolation Valve
9. 750 LF 12-inch Water Main
10. 1100 LF 12-inch Water Main
11. 450 LF 8-inch Water Main
12. 200 LF of 8-inch Water Main (Relocate)
13. 900 LF 12-inch Water Main (Developer Built)



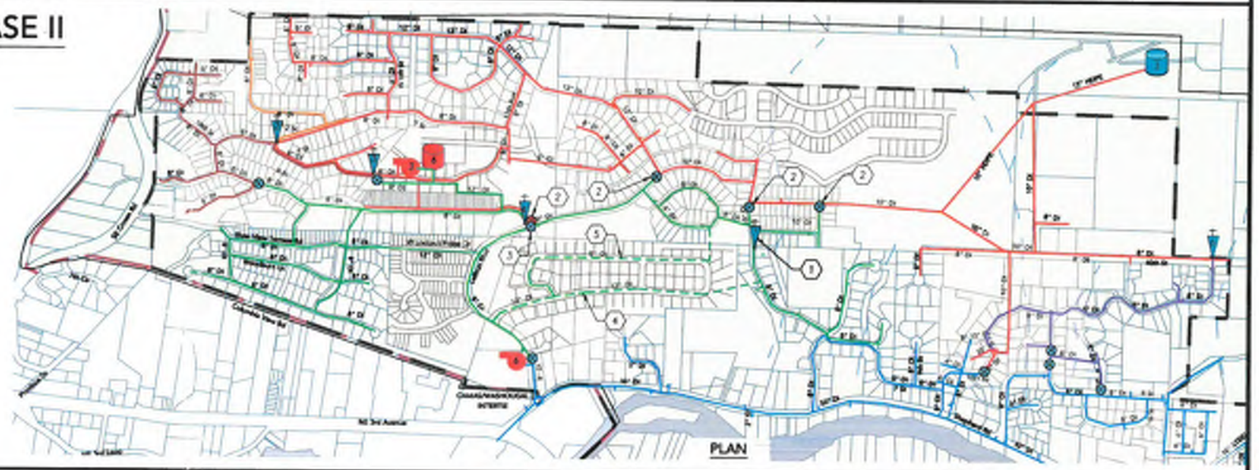


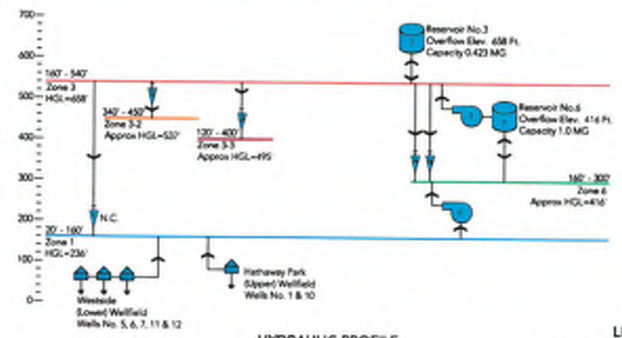
HYDRAULIC PROFILE

PHASE II

PHASE II IMPROVEMENTS

1. Abandon Crown Point PRV
2. Close Isolation Valve
3. Open Isolation Valve
4. 2250 LF 12-inch Waterline (Developer Built)
5. 2200 LF 8-inch Waterline (Developer Built)



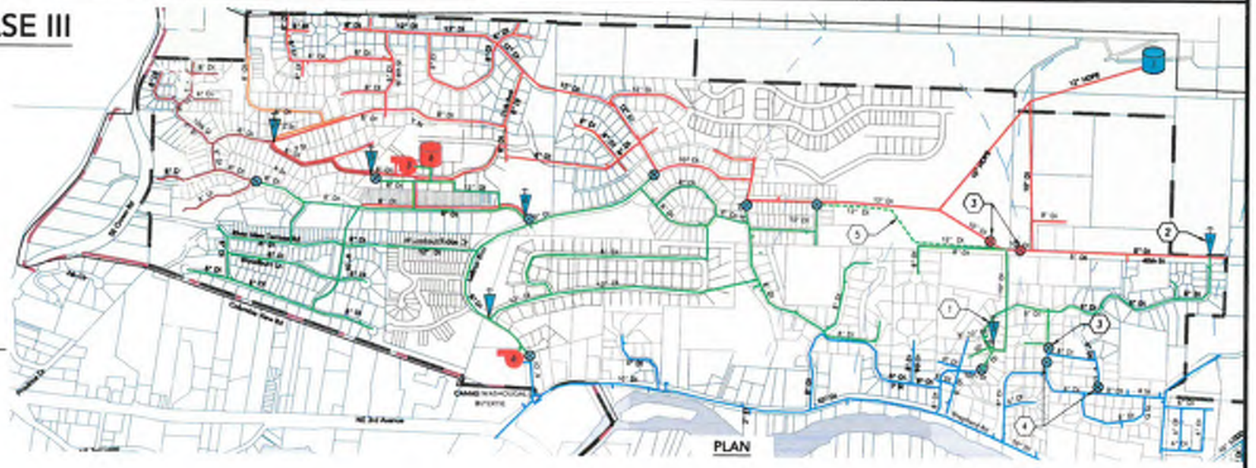


HYDRAULIC PROFILE

PHASE III

PHASE III IMPROVEMENTS

1. Abandon N. 10th Street PRV
2. Modify Columbia Ridge PRV
3. Close Isolation Valve
4. Open Isolation Valve
5. 1650 LF 12-inch Waterline



PRV SCHEDULE	
Lebrun #2 (N.C.)	N. 10th Street
Lookout Ridge #2	Columbia Ridge
Lookout Ridge #1	Crown Pointe
Lebrun	

LEGEND

- Location
- Existing Pressure Reducing Valve
- Existing Pump Station
- Existing Reservoir
- Existing Isolation Valve
- Proposed Pump Station
- Proposed Reservoir
- Proposed Isolation Valve

Existing Waterline (Size & Type As Noted)
- Zone 1 Waterline
- Zone 3 Waterline
- Zone 3-2 Waterline
- Zone 3-3 Waterline
- Zone 3-4 Waterline
- Zone 3-5 Waterline
- Zone 6 Waterline

Proposed Waterline (Size & Type As Noted)
- Zone 1 Waterline
- Zone 3 Waterline
- Zone 6 Waterline

FIGURE 1 - ZONE 6 PHASING PLAN

WASHOUGAL RESERVOIR NO. 6
& BOOSTER PUMP STATIONS

APRIL 2015

WE# 1357C

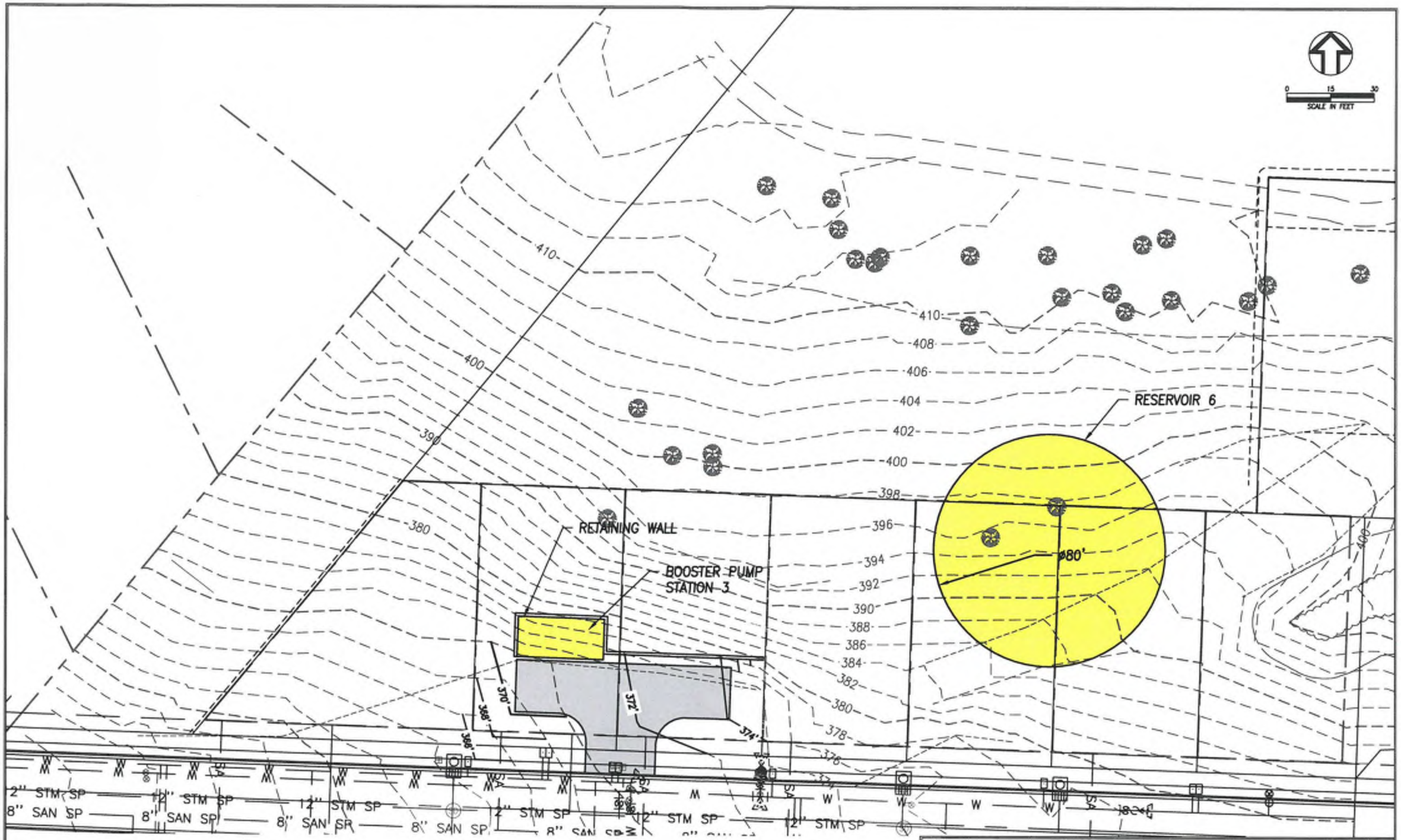
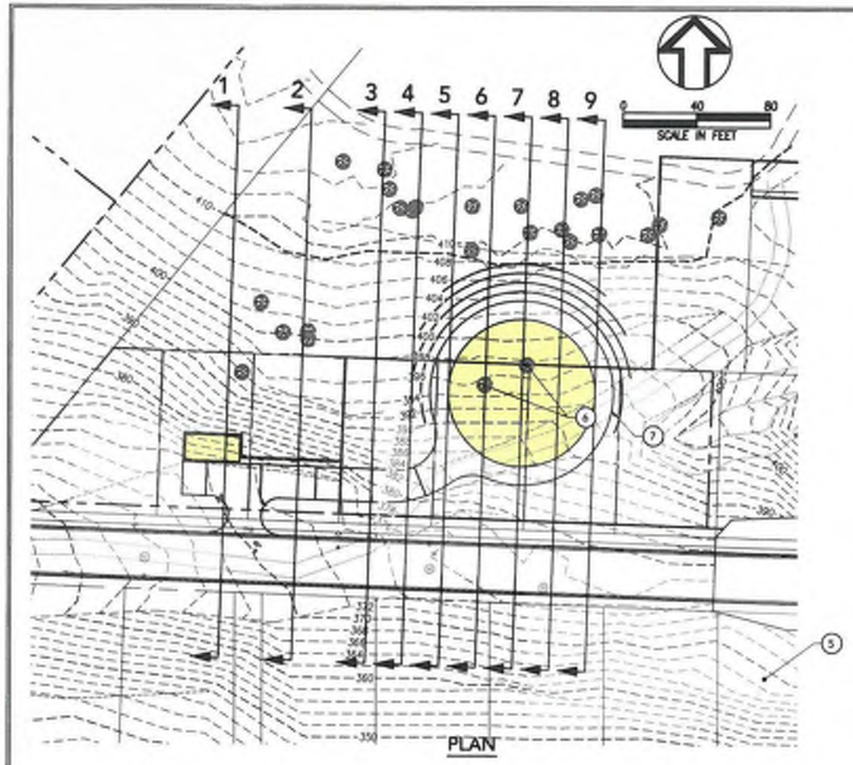
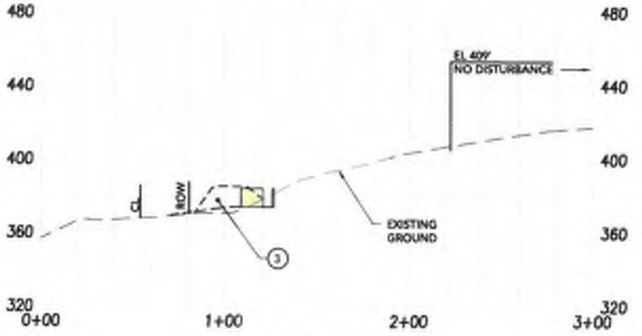


FIGURE 2 - RESERVOIR 6 & BPS 3 PRELIMINARY SITE PLAN

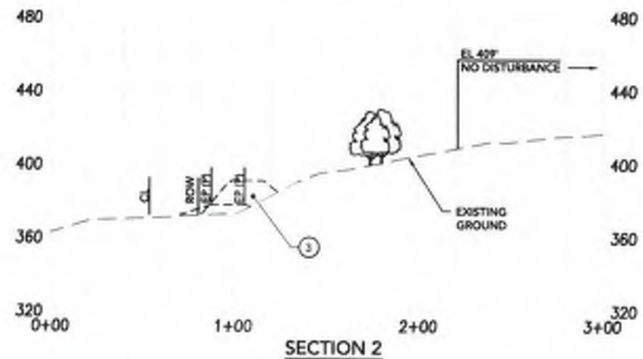
WASHOUGAL RESERVOIR 6 & BOOSTER PUMP STATION
APRIL 2015



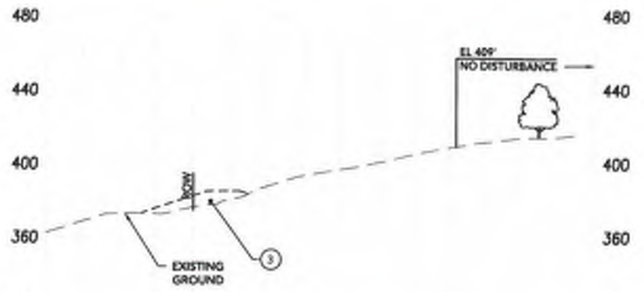
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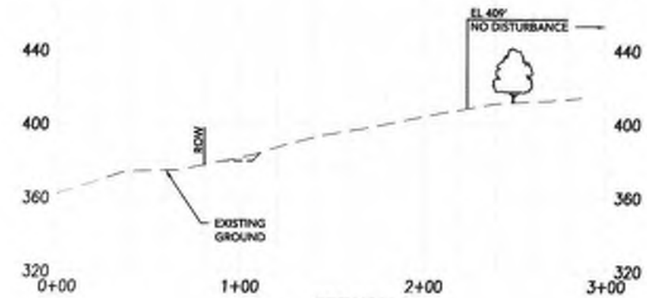
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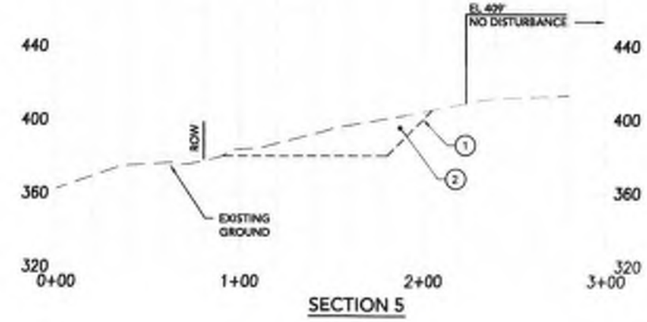
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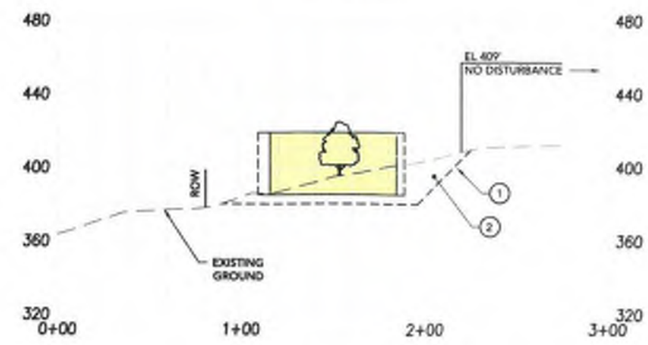
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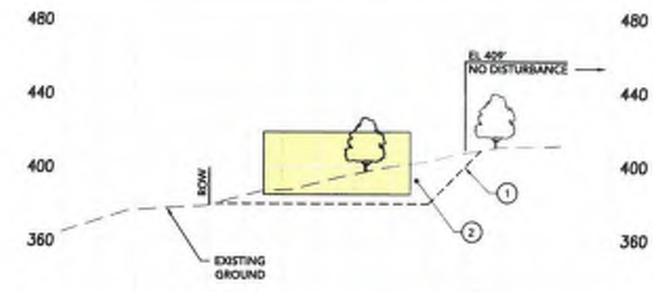
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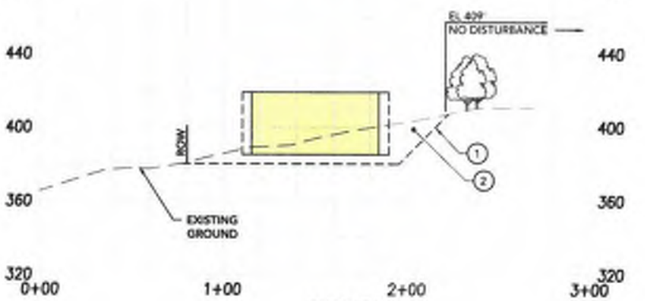
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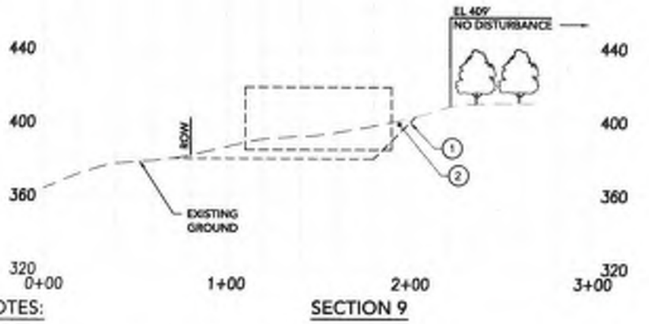
SECTION 6



SECTION 7



SECTION 8



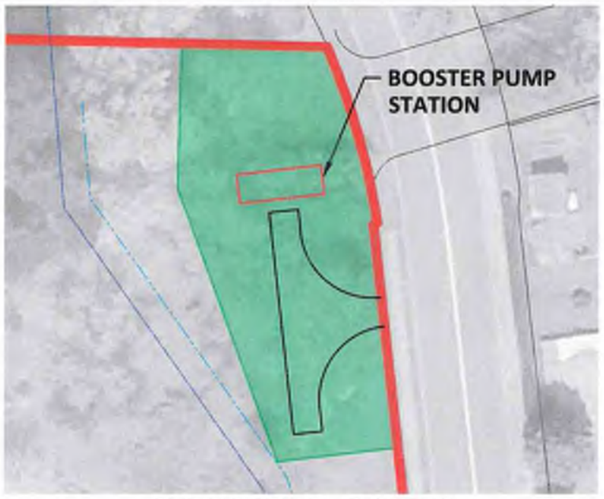
SECTION 9

KEY NOTES:

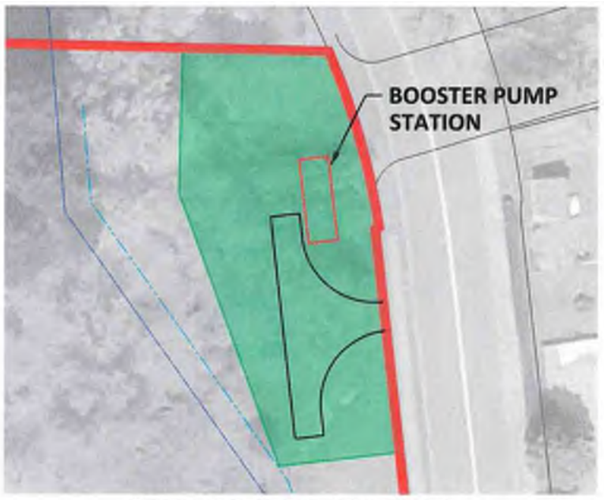
1. CUT BANK AT 1H:1V FOR RESERVOIR CONSTRUCTION
2. EMBANKMENT EXCAVATION 6000 CY TOTAL FOR RESERVOIR CONSTRUCTION
3. TEMPORARY STOCKPILE 1,000 CY FOR RESERVOIR EMBANKMENT BACKFILL.
4. PROPOSED GRADES SHOWN (_____) ARE TEMPORARY CUT SLOPES FOR RESERVOIR CONSTRUCTION
5. EXISTING CONTOURS
6. OAK TREES TO BE REMOVED AND MITIGATED
7. TEMPORARY GRADING FOR CONSTRUCTION OF RESERVOIR

FIGURE 3 - RESERVOIR 6 & BPS 3 CONSTRUCTION GRADING PLAN

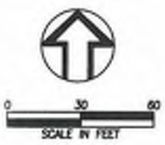
WASHOUGAL RESERVOIR 6 & BOOSTER PUMP STATION
APRIL 2015

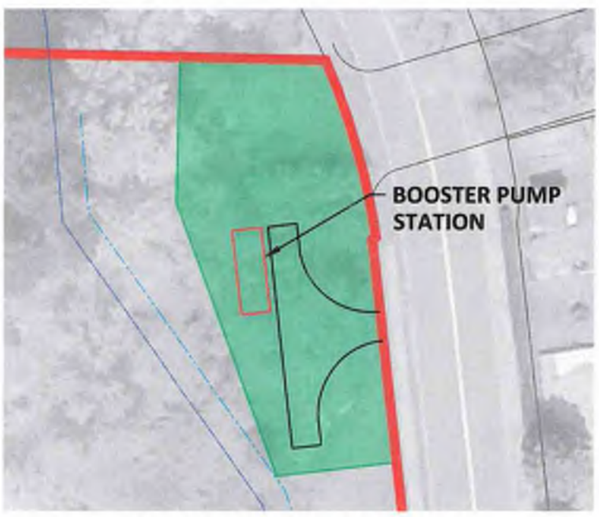


SITE LAYOUT ALTERNATIVE 1



SITE LAYOUT ALTERNATIVE 2





SITE LAYOUT ALTERNATIVE 3

FIGURE 4 - BOOSTER PUMP STATION 6 SITE LAYOUT OPTIONS

WASHOUGAL RESERVOIR 6 & BOOSTER PUMP STATION
APRIL 2015

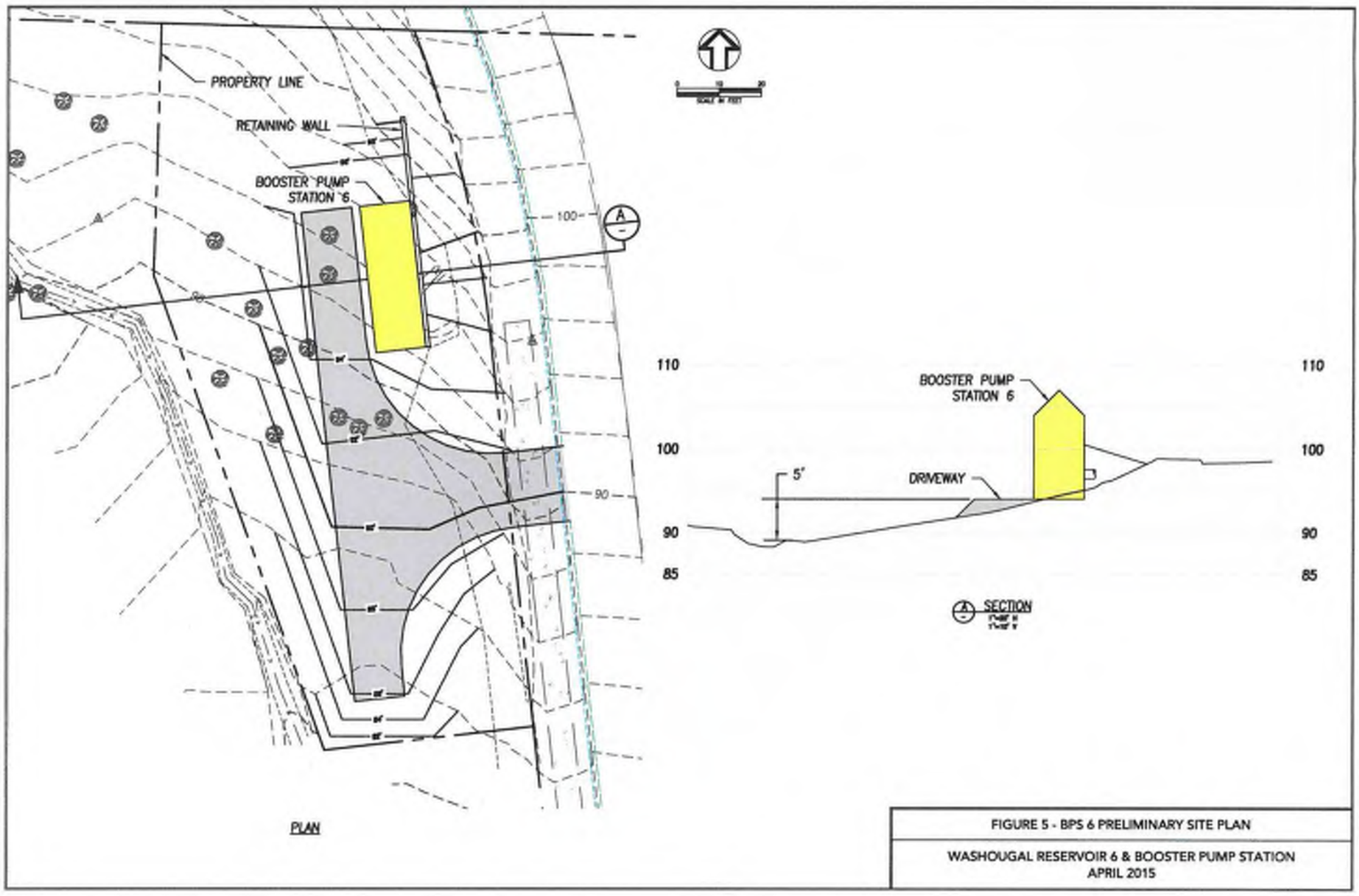
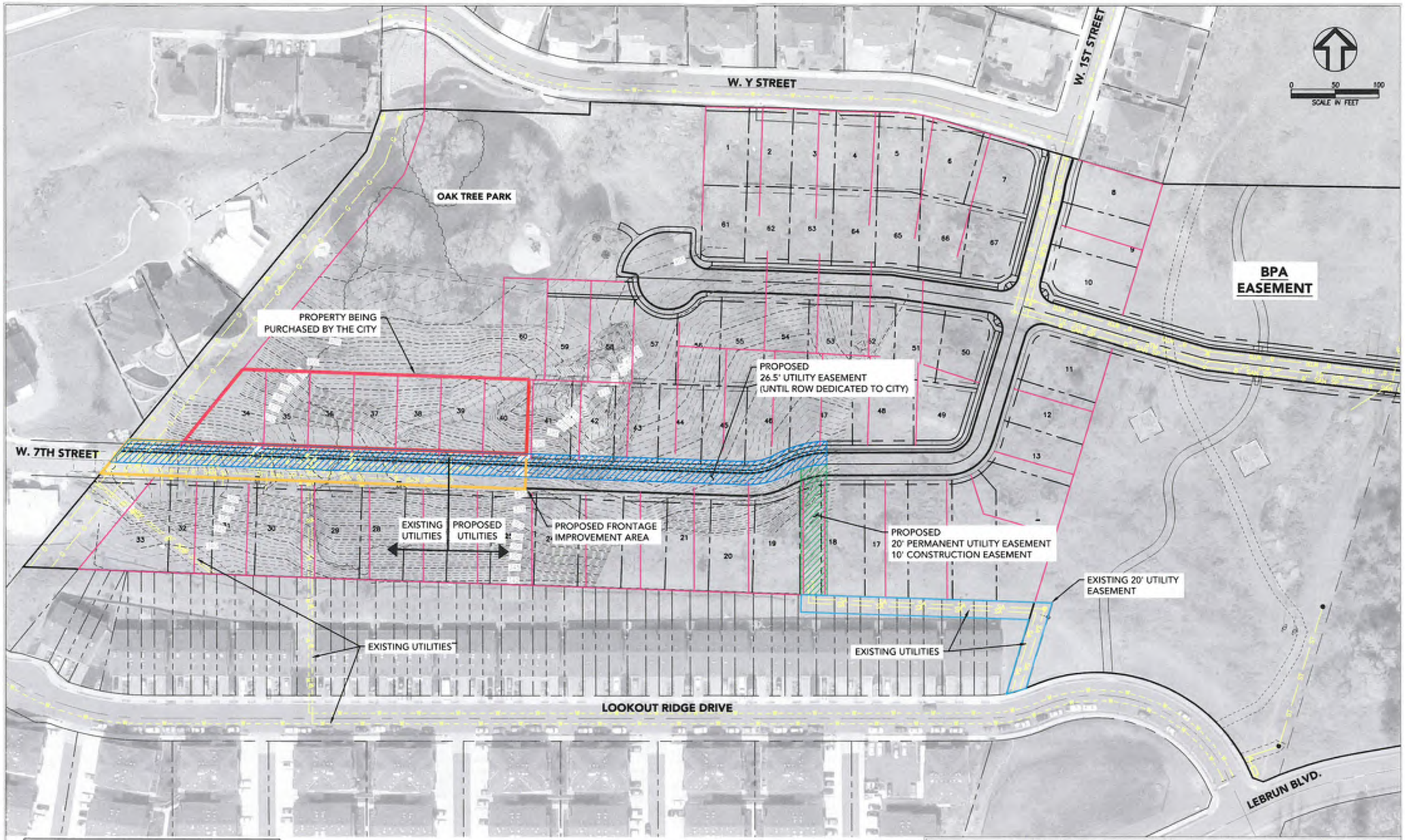


FIGURE 5 - BPS 6 PRELIMINARY SITE PLAN

WASHOUGAL RESERVOIR 6 & BOOSTER PUMP STATION
APRIL 2015



LOT LAYOUT LEGEND

- LOT LAYOUT FROM LOOKOUT RIDGE PRELIMINARY PLAT (SEPTEMBER 2006)
- PROPOSED LOT LAYOUT FROM LOOKOUT RIDGE PRELIMINARY PLAT (OCTOBER 2014)

FIGURE 6 - LOOKOUT RIDGE PROPERTY ACQUISITION & EASEMENTS

WASHOUGAL RESERVOIR 6 & BOOSTER PUMP STATION
APRIL 2015

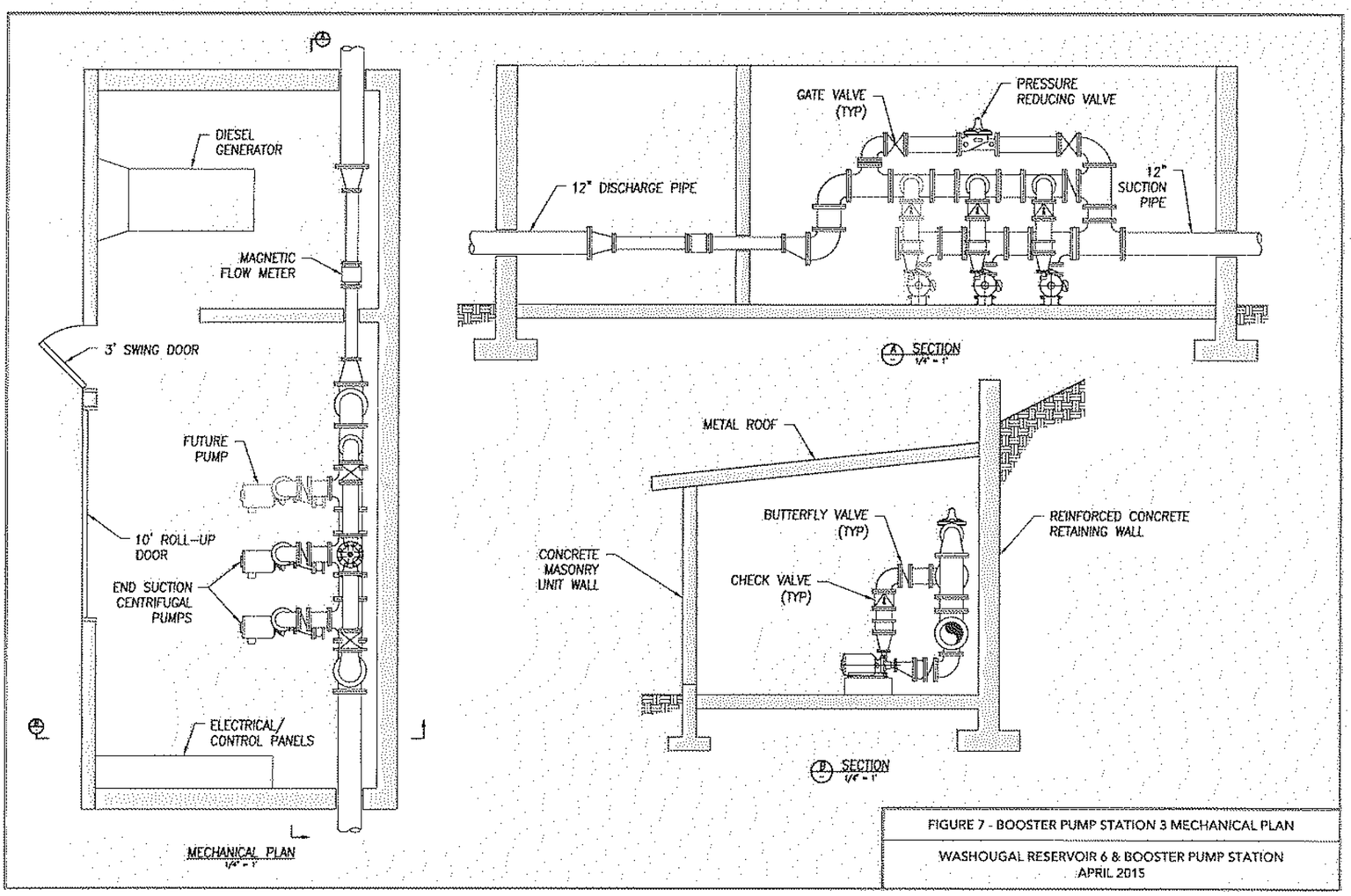


FIGURE 7 - BOOSTER PUMP STATION 3 MECHANICAL PLAN

WASHOUGAL RESERVOIR 6 & BOOSTER PUMP STATION
APRIL 2015

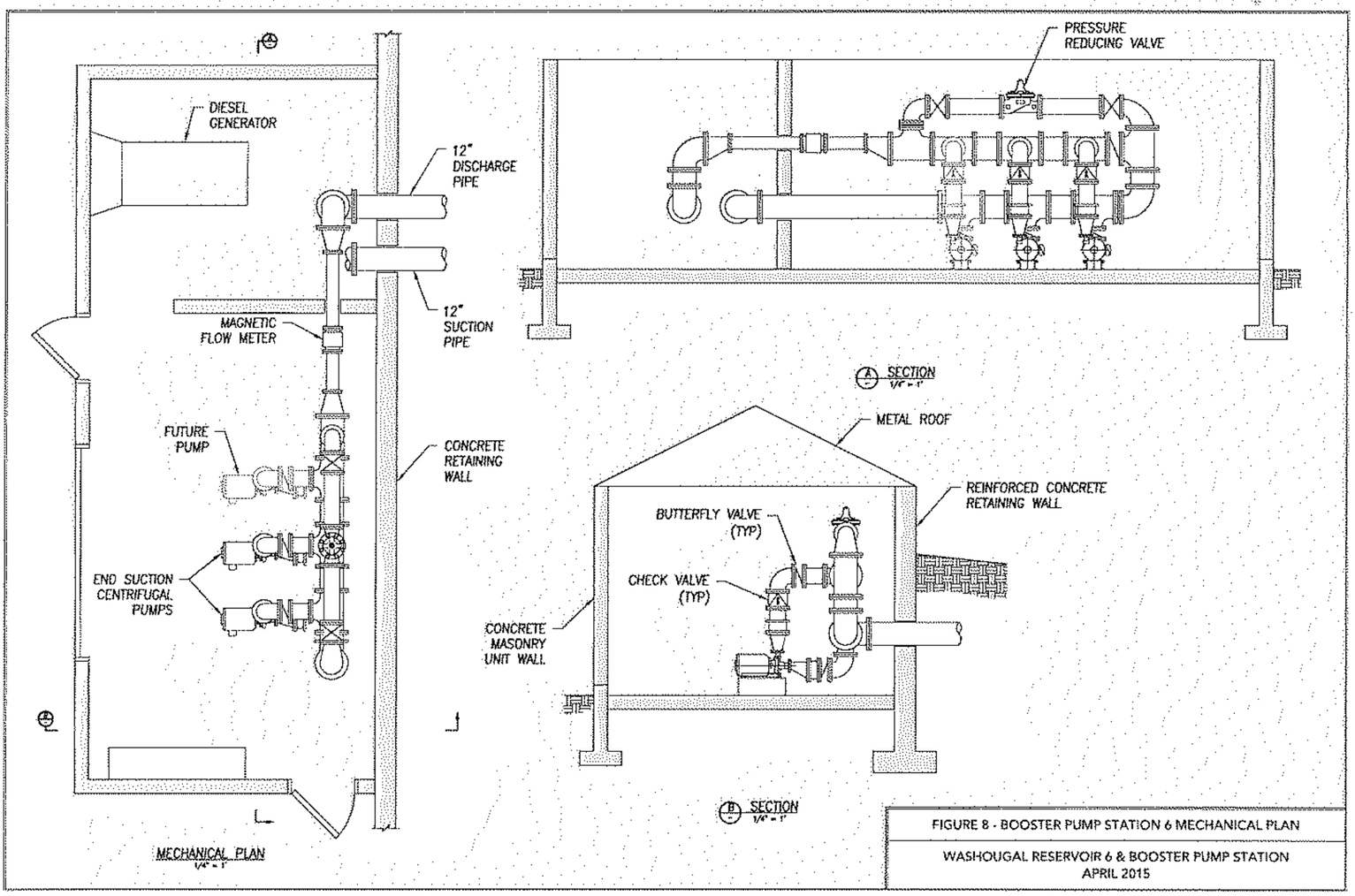
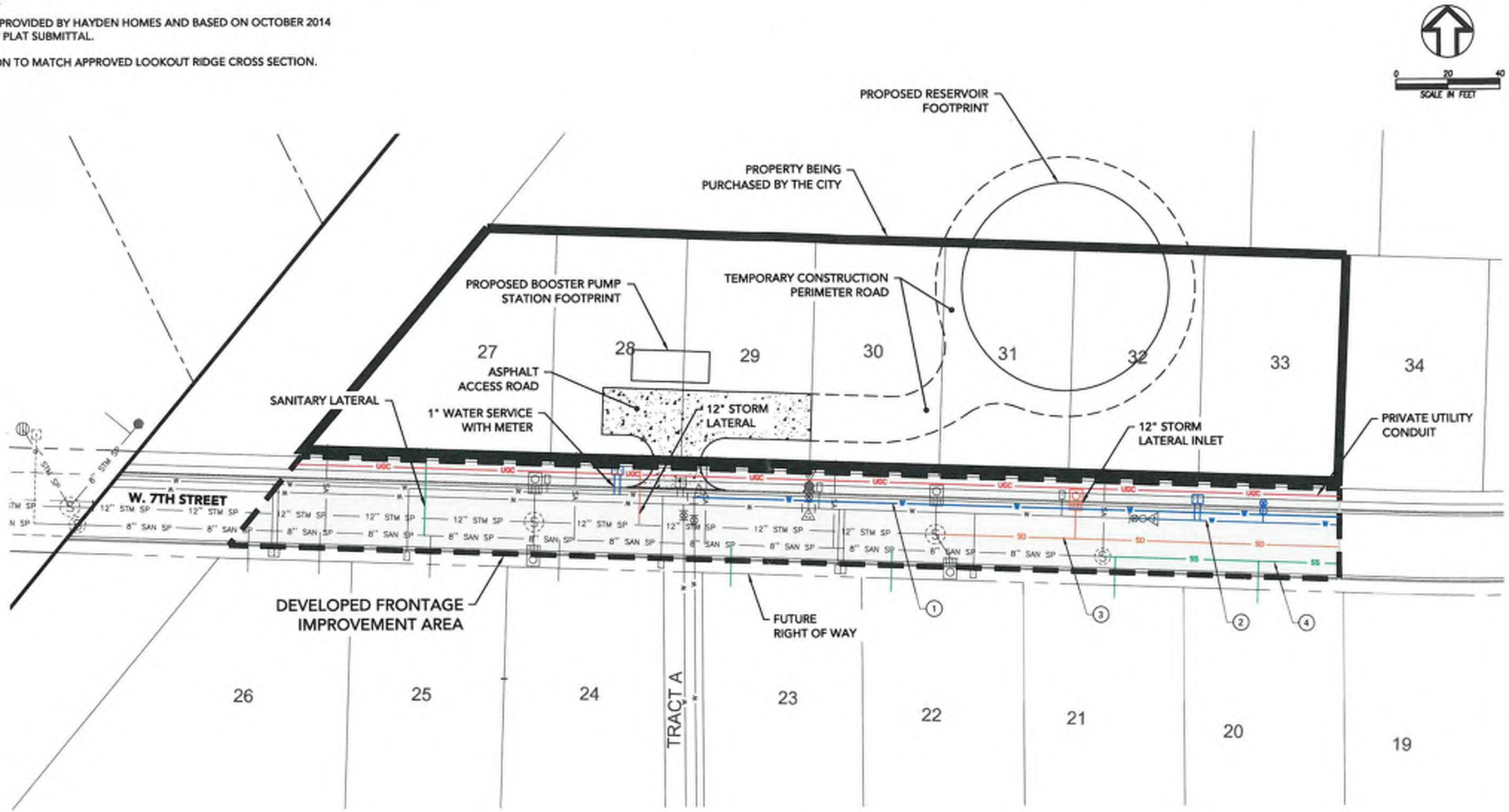


FIGURE 8 - BOOSTER PUMP STATION 6 MECHANICAL PLAN

WASHOUGAL RESERVOIR 6 & BOOSTER PUMP STATION
APRIL 2015

GENERAL NOTES:

1. LOT LAYOUT PROVIDED BY HAYDEN HOMES AND BASED ON OCTOBER 2014 PRELIMINARY PLAT SUBMITTAL.
2. ROAD SECTION TO MATCH APPROVED LOOKOUT RIDGE CROSS SECTION.



LEGEND

EXIST WATER LINE	PROP PRIVATE UTILITY CONDUIT
EXIST STORM LINE	PROP WATER LINE
EXIST SANITARY LINE	PROP STORM LINE
EXIST WATER METER	PROP SANITARY LINE
EXIST FIRE HYDRANT ASSEMBLY	PROP WATER METER
EXIST STORM INLET	PROP WATER VALVE
EXIST STORM MANHOLE	PROP STORM INLET

KEY NOTES:

1. 8" HIGH PRESSURE WATERLINE (ZONE 3)
2. 8" LOW PRESSURE WATERLINE (ZONE 6)
3. 12" STORM LINE
4. 8" SANITARY SEWER LINE & LATERALS

FIGURE 9 - LOOKOUT RIDGE DEVELOPER BUILT IMPROVEMENTS

WASHOUGAL RESERVOIR 6 & BOOSTER PUMP STATION
APRIL 2015

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APPENDIX H
WUE DOCUMENTS


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Resolution No. 1146

A RESOLUTION adopting a new water use efficiency goal for the City of Washougal.

WHEREAS, the City recognizes the need to use its water resources in the most efficient manner possible;

WHEREAS, the City of Washougal held a Water Use Efficiency Forum on Monday, June 11, 2018;

WHEREAS, by rule the City needs to set forth a goal and measures to remain compliant with its operating permit with the Washington State Department of Health.

NOW THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL FOR THE CITY OF WASHOUGAL, WASHINGTON as follows:

Section I

The City of Washougal Mayor, City Council and its residents have selected as a water use efficiency goal to, "Eliminate private water mains which directly contribute to unaccounted water"

Section II

PASSED by the Council for the City of Washougal at a regular meeting this 25th day of June, 2018.

City of Washougal, Washington

MAYOR

ATTEST:

Finance Director / City Clerk

APPROVED AS TO FORM:

City Attorney

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WUE FORUM PRESENTATION, JUNE 2018

City of Washougal
City Council Worksession

Water Use Efficiency Forum

June 11, 2018

Water Use Efficiency Forum
Presentation Agenda

- Background
- Past Goal & Measures
- Staff Recommended Future Goal & Measures
- Next Steps
- Questions/Discussion

Water Use Efficiency Forum
Background

- WUE Forum is required per the City operating permit with Washington State Department of Health.
- The key outcomes for the WUE Forum is to report on prior goal, set a future goal and measures for achieving water use efficiency.

Water Use Efficiency Forum
Background

- The City's general standards and measures for water use efficiency are:
  - Conservation Awareness Signage
  - Making conservation kits available
  - Leak Survey every 3 years
  - Notifying customers of high or abnormal water usage

Water Use Efficiency Forum
Past Goal

- In 2008 a goal was set to reduce residential peak day demand by 5% over a 6 year period.
- In 2007 the City produced 611,700,000 gallons of water; by 2013 the gallons produced dropped to 519,500,000, which is a drop of 15% over a 6 year period.

Water Use Efficiency Forum
Past Goal Measures

- The City was able to meet this goal by implementing the following measures:
  - Historical Bar Graph Data on billings
  - Rate Design Implementation (10 CCF base block down to 5 CCF base block)

Water Use Efficiency Forum
Future Staff Recommended Goal

- City Staff is recommending implementation of the following goal:

- Eliminate private water mains which directly contribute to unaccounted water.

Water Use Efficiency Forum
Future Goal Measures

- The City will meet this goal by implementing the following measures:
  - Implementation of enhanced metering at the end of City-owned mains at the connection of private mains
  - Comparing historical usage to evaluate water loss in private water mains, once they are brought up to standards
  - Implementing technology benefits to assist with customers service and usage monitoring
  - Continuation of Rate Design (5 CCF or less)

Water Use Efficiency Forum
Next Steps

- Adoption by Resolution of the 2018 – 2024 Water Use Efficiency Goal at the Council Meeting on June 25, 2018.

Water Use Efficiency Forum

Discussion/Questions



WUE FORUM,
JUNE 2018

June 11, 2018

WATER USE EFFICIENCY FORUM

CURRENT GOALS

i. Reduce residential peak day demand by 5 percent over a 6 year period (2007-2013)

WATER SAVED – CURRENT GOALS

Utilizing the annual volume from the meters at the well sites we can verify the following:

i. In 2008 we produced 611.7 million gallons of water and by 2013 we narrowed that down to 519.5 million gallons. We saved roughly 92.2 million gallons of water or 15 percent in our demand over 6 years. This was all accomplished while averaging 6 percent water loss over that same time period.

WUE MEASURES CURRENTLY IMPLEMENTED

I. Conservation awareness signs are posted during irrigation season
II. Historical bar graph representation of consumption utility bills
III. Providing conservation kits and recommendations to our customers at community events
IV. Leak survey performed every 3 years
V. Notify customers of high or abnormal water use

WATER USE EFFICIENCY MEASURES THAT HAVE BEEN EVALUATED

I. Leak survey – Surveys have resulted in fewer leaks located
II. Customer notification – This process has produced an excellent customer service tool and has assisted customers to discover leaks before they become very costly.
III. Conservation kits - We purchased several conservation kits and have them available for customers as needed. We can measure this process on the amount of kits we have given out.
IV. Conservation signs – While these were utilized it is hard to measure how affective they were.
V. Historical data – We have a bar graph available on our billing statements

NEW GOALS CHOICES

i. Maintain CCF reduction at 5 units to encourage water conservation where customers recognize savings while conserving.
ii. Eliminate private water mains which directly contribute to un-accounted for water, due to current owners reluctant to be responsible for leak testing and repairs.

NEW WATER USE EFFICIENCY MEASURES

i. Conservation awareness signs are posted during irrigation season
ii. Historical bar graph representation of consumption utility bills
iii. Providing conservation kits and recommendations to our customers at community events
iv. Leak survey performed every 3 years
v. Notify customers of high or abnormal water use
vi. Implement technology benefits to assist with customer service and usage monitoring

HOW WILL WE BE EDUCATING OUR CUSTOMERS

I. We have added informative tools to our website
II. Water conservation signs
III. Usage history included in the water bills
IV. We include paragraphs in our Consumer Confidence Report, describing Water Use Efficiency information and processes.
V. We will establish a coloring contest at the local elementary schools to promote water conservation to the youth in the community.

PROJECTION OF HOW MUCH WATER CAN BE SAVED BY OUR CHOSEN WUE MEASURES

Implementation of the proposed WUE measures is anticipated to satisfy the water saving benchmarks outlined in the Water Use Efficiency Goal. Meeting the proposed goals could result in the following:

i. Maintaining the CCF Reduction will provide stability to the WUE program and enable us to continue saving the 92.2 million gals of water established in the last goal cycle.
ii. Private water main elimination will secure water quality throughout the City of Washougal and allow the WUE program to be accurate and efficient. Therefor reducing our WUE Efficiency percent lower than our 9 year average of 5.6 percent.

HOW WILL WE EVALUATE OUR WUE PROGRAM

The WUE rule requires the completion of annual performance reporting to system customers and DOH. The City will use the preparation of the annual performance report as an opportunity to review the effectiveness of the WUE measures and determine if established goals require revision or if new goals and/or conservation measures need to be implemented. The annual effectiveness evaluation and DOH report will include the following elements:

- Calculation of distribution system leakage in terms of volume and percent of total production.
- Identification of WUE goals.
- Evaluation of established WUE goals, including estimating water savings achieved through implemented measures and progress towards satisfying goals. The City will distribute the performance report to customers in conjunction with the annual Consumer Confidence Report by July 1st. In addition, the report will be available at City Hall, Public Works office and the City's website.

DISTRIBUTION SYSTEM LEAKAGE EVALUATION

The distribution system leakage standard is a significant element of the WUE requirements. This standard requires that all water systems track authorized consumption – the volume of water authorized for use by the water system. All water that cannot be tracked under this definition is considered distribution system leakage. Distribution system leakage includes both apparent losses (water theft, meter inaccuracies, etc.) and real losses (leaking water mains, reservoir overflow, etc.). The WUE requirements mandate that water systems maintain distribution system leakage at 10% or less of total production based on a three year running average. The primary method for tracking authorized consumption is through the installation of meters on all customer services. Additional authorized uses that may not be metered, but are estimated and recorded, include hydrant use for firefighting and water distribution system flushing. As previously discussed, all customer services and well production sources are metered. Well production meter readings are recorded daily. Customer service meters are read every other month. The two emergency interties with the City of Camas are not currently metered, but are only activated in an emergency situation. City water production and consumption data collection is completed in accordance with WUE guidelines.

A review of historical consumption and production meter data indicates distribution system leakage in the range of 3.2-7.1% from 2009 to 2016. Proposed activities to improve water use accounting include billing software updates as discussed earlier, and improved documentation of unmetered uses such as distribution system flushing, hydrant testing, construction use and firefighting.

WATER SUPPLY CHARACTERISTICS

The City of Washougal produces drinking water from six existing wells with a maximum firm capacity currently adequate to meet existing demands. All of the City's wells produce water from a shallow aquifer referred to as the Pleistocene Alluvial Aquifer, with groundwater flowing generally in a southwesterly direction within this aquifer. Wells # 5, 6, 7, 11 and 12 are located in the City's Westside Wellfield, while Well # 1 is located in the City's Hathaway Park Wellfield. The Pleistocene Alluvial Aquifer is a shallow water table aquifer that occurs within the Pleistocene alluvial deposits. The deposits are approximately 100 feet thick in the vicinity of the City's Westside Wellfield. The aquifer is very permeable and serves as a source of supply to most of the industrial wells owned by Georgia Pacific as well as many of the municipal wells owned by the City of Camas. Depth to the water table ranges from 38-46 feet at the Westside Wellfield and 55 to 81 feet at the Hathaway Park Wellfield. Well capacities typically exceed 1,000 gpm and well specific capacities typically range between 250 and 500 gallons per minute per foot. Washougal well capacities are summarized in Table 1 below.

Table 1

WELL CAPACITY SUMMARY

Well Number	Single Operation	Combined Operation	Installed HP
1	925 GPM		75
5	635 GPM		50
6	630 GPM		50
7	635 GPM		75
10 (Standby)	400 GPM		NONE
11	960 GPM		75
12	1500 GPM		125
5 & 6		1,150 GPM	
5 & 7		1,325 GPM	
6 & 7		1,350 GPM	
5, 6, & 7		1,775 GPM	
5, 6, 7, & 11		2,380 GPM (estimated)	
5, 6, 7, 11 & 12		4,675 GPM (estimated)	
1, 5, 6, & 7		2,820 GPM (estimated)	

All City water rights are for municipal supply purposes. There are no known time of use limitations with any of the certificates or claims. There is a limiting condition associated with one certificate that states "The total annual water allocation for the City of Washougal shall be limited to 3,786 acre-feet per year for municipal use from all rights." There are no known legal constraints which could limit the City's ability to utilize the full water right.

Chemical tests performed on water samples from both wellfields reveal good water quality in terms of specific chemical and physical constituents. Critical elements are less than the maximum contamination levels mandated by federal and state regulations. However, the naturally low water pH results in the corrosion of copper pipes (service lines and customer piping) such that excessive levels of copper were recorded in past water sampling. A chemical treatment facilities provides for the addition of sodium hydroxide to increase pH, which has resulted in copper levels consistently below federal standards.

WATER DEMAND FORCASTS

Water demand forecasting identifies how much water the system will need to satisfy future demands. The primary factors examined in calculating future water supply requirements include historic water production/consumption, future population trends, and land use planning. The 2014 WSP included a comprehensive analysis of these factors in developing a 20-year water demand forecast.

For the purpose of setting WUE goals, the 2014 WSP water demand forecast will be utilized as presented in the attached tables.

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2019 WUE ANNUAL PERFORMANCE REPORT

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Date Submitted: 1/27/2020

Water Use Efficiency
Annual Performance Report - 2019

WS Name: WASHOUGAL CITY OF Water System ID# : 93400 WS County: CLARK

Report submitted by: *Ryan Baker*

Meter Installation Information:

Estimate the percentage of metered connections: *100%*

If not fully metered - Current status of meter installation:

Production, Authorized Consumption, and Distribution System Leakage Information:

12-Month WUE Reporting Period: *01/01/2019* To *12/31/2019*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*556,876,000* gallons
Authorized Consumption (AC) – Annual Volume	*522,561,592* gallons
Distribution System Leakage – Annual Volume TP – AC	*34,314,408* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*6.2 %*
3-year annual average	*7.4 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *06/11/2018* Has goal been changed since last performance report? *No*

Note: Customer goal must be re-established every 6 years through a public process

WUE Goals:

Customer Goal (Demand Side):

Eliminate private water mains which directly contribute to un-accounted for water.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

Currently finishing up with the identification of remaining private water mains within our service area and working on a prioritization of elimination and elimination type. Once this is complete a budgetary number will be set to being the physical process associated.

There have yet to be any measurable savings linked to this goal. Additionally, there are no known leaks that are contributing to our 6% water loss.

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

Current and new water use efficiency measures:
1. Implementation of enhanced metering at the end of city-owned mains at the connection of private mains.
2. Implementation of technology benefits to assist with customers service and usage monitoring.
3. Continuation of Rate Design (2019 included 4ccf in base charge; in 2023 0ccf will be included).
4. Conservation awareness signs are posted during irrigation season.
5. Historical bar graph representation on utility bills to show consumption of past 12 months.
6. Providing conservation kits and recommendations to our customers at community events.
7. Leak survey performed every 3 years.
8. Notify customers of high or abnormal consumption.

Do not mail, fax, or email this report to DOH

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WUE GOALS, NOVEMBER 2007

City of Washougal

Water Use Efficiency Goals

November 2007

WALLIS ENGINEERING

WE #889P

City of Washougal
Water Use Efficiency Goals

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Appendix A – November 2004 WWTP Effluent Reuse Evaluation

CITY OF WASHOUGAL

WATER USE EFFICIENCY GOALS

BACKGROUND

The Washington State Legislature passed the Municipal Water Law in 2003 to address the increasing demand on the state's water resources. This law requires all municipal water suppliers to enact measures to ensure the efficient use of this critical resource in exchange for water right certainty and flexibility to meet future demands.

The Legislature directed the Washington State Department of Health (DOH) to adopt a rule that establishes water use efficiency (WUE) requirements for all municipal suppliers. This rule includes the following key elements:

- *Water Use Efficiency Planning* – This element of the rule requires the collection of water production and consumption data, forecast of future water demands, evaluation of system leakage, evaluation of water rate structures and the implementation of water use efficiency measures. This plan is a required element of all Water System Plans prepared after January 2008.

- *Distribution Leakage Standard* – Municipal water suppliers are required to satisfy a distribution leakage standard equal to less than 10 percent of total production by July 2010.

- *Water Use Efficiency Goal-Setting and Performance Reporting* – Municipal water suppliers are required to set water use efficiency goals through a public process and report annually on their performance to customers and DOH. The deadline for establishing system goals is January 22, 2008. The first annual performance report will be completed by July 1, 2008.

The purpose of this document is to provide information necessary to satisfy the January 2008 WUE Goal-Setting deadline in accordance with *WAC 246-290-810* and the DOH *Water Use Efficiency Guidebook*. The development of WUE goals, including the evaluation and implementation of water use efficiency measures, is outlined in the following discussion. A complete Water Use Efficiency Program will be completed in conjunction with the next Water System Plan Update.

PROPOSED WATER USE EFFICIENCY GOAL AND ADOPTION PROCESS

The City of Washougal is adopting a Water Use Efficiency Goal to guide the City in achieving higher standards for the efficient use of water. Enacting this goal will result in improved system performance during peak water demand periods, and delay the cost of future infrastructure investment to serve new growth. The goal proposed by Public Works Staff for the consideration of the public and City Council follows:

Reduce residential peak day demand by 5% over a 6-year period.

The proposed Water Use Efficiency Goal will be achieved through the implementation of water use efficiency measures as presented in this document. A public forum for City leaders and staff to receive customer input will be held, following which the goal will be adopted by City Council.

CURRENT WATER CONSERVATION PROGRAM

The current water conservation program was developed in conjunction with the *Water System Plan Update* completed in 2004 (*2004 WSP*). The *2004 WSP* addressed conservation planning elements in accordance with the DOH *Conservation Planning Requirements* document which has been replaced by the July 2007 DOH *Water Use Efficiency Guidebook*. The City has implemented multiple measures to improve water use efficiency, including the following:

- Public Education. During the spring and summer months, water conservation signs are posted at the 17th & E Street and 32nd & Addy Street entrances to the City.

- Program Promotion. Water Department staff participate in public events with an outreach program complete with display boards and interactive promotions to deliver the water conservation message. Conservation reminders are also included in the annual Consumer Confidence Report.

- Technical Measures. The City completes distribution system leakage surveys on a 3-year schedule and annual commercial water meter calibration. Each leak detection survey covers approximately 50% of the distribution system. The most recent effort completed in 2003 and 2006 resulted in the repair of 23 leaks estimated to be responsible for nearly 77,000 gallons per day (gpd) of water loss.

- Customer Assistance. The City will assist residential, commercial and industrial customers as requested to provide conservation guidance and assist with leak detection.

The implementation of the current water conservation program has resulted in significant water savings, particularly through the identification and repair of distribution system leaks. Over the past six years, water savings are estimated at approximately 80,000 gpd. In conjunction with the *2004 WSP*, a system wide goal of reducing water demand by 2% through conservation was adopted.

WATER USE EFFICIENCY MEASURE EVALUATION AND IMPLEMENTATION

DOH requires the adoption of specific mandatory water use efficiency measures as evaluated below. Additional water use efficiency measures must be evaluated and a minimum number adopted based on the number of connections served. With a current active service connection total of approximately 4,560 combined residential, commercial and industrial water users, the City of Washougal is required to implement a minimum of 6 water use efficiency measures.

MANDATORY WATER USE EFFICIENCY MEASURES. DOH mandatory efficiency measures include the following. All measures include an action status. Noted cost estimates are preliminary, and will be finalized during the budget process with the scope of implementation adjusted accordingly.

Water Meters

Water systems must install meters for all production sources and customer services. All City of Washougal well sources and water system customers are currently metered.

Recent source metering improvements include the replacement of Well #5, #6, and #7 positive displacement meters with new magnetic flow meters in 2006. The new magnetic flow meters provide improved accuracy.

Individual customer service meters are currently inspected during each reading. In the event the meter appears damaged or unusual readings are recorded, the meter is scheduled for replacement. Nearly 85% of customer meters are less than 10 years old. In addition, all meters 3-inch and larger are flow tested on an annual basis to ensure accuracy.

The City of Washougal has two emergency interties with the City of Camas. These interties are not metered as allowed by DOH. The interties will operate only under emergency conditions.

WUE Measure Cost Estimate: N/A (System Currently Metered)
Estimated Water Savings: N/A (System Currently Metered)
WUE Measure Action Status: Currently Implemented

Customer Education

In addition to the current conservation program public outreach efforts previously discussed, the Water Department will begin coordinating with the Accounting Department the inclusion of water conservation education flyers with monthly bills. These flyers will be included on a seasonal basis to educate customers regarding indoor / outdoor water conservation, irrigation efficiency, etc.

WUE Measure Cost Estimate: $500
Estimated Water Savings: Seasonal – 2% Reduction In Peak Day Consumption
WUE Measure Action Status: To Be Implemented In 2008

ADDITIONAL WATER USE EFFICIENCY MEASURE EVALUATION AND IMPLEMENTATION. The following evaluation is provided for water use efficiency measures required (6 minimum) in addition to the mandatory measures described above. All measures include an action status. Noted cost estimates are preliminary, and will be finalized during the budget process with the scope of implementation adjusted accordingly.

Conservation Rate Structure

The City currently has a declining water rate structure for usage in excess of the allowance provided under the base monthly charge. A water and wastewater utility rate review is scheduled for early 2008. This evaluation will examine multiple rate options including rate schedules by customer class, adjustment of billing structure to reduce standard allowable usage, and implementation of a rising block excess use rate.

WUE Measure Cost Estimate: Cost Neutral. Additional revenue anticipated with the increasing block rate structure is conservatively expected to be negated by reduced consumption.
Estimated Water Savings: Seasonal – 2% Reduction In Peak Day Consumption
WUE Measure Action Status: To Be Implemented In 2008 Following Rate Evaluation

Reclaimed Water Opportunities

In conjunction with long-term wastewater planning efforts in 2004, an evaluation of wastewater treatment plant effluent reuse was completed as included in Appendix A. This evaluation examined the facilities necessary to produce reuse quality water, potential beneficial use sites within the City and associated costs.

WUE Measure Cost Estimate: $1.7M to supply Class A reuse water to industrial area (2004 $).
Estimated Water Savings: 500,000 gpd assuming industry demand would warrant investment.
WUE Measure Action Status: No Action - Not Cost Effective At This Time

Indoor Water Conservation Kits

New residential home and commercial building construction is required to satisfy the current Building Code that requires the installation of low flow water fixtures. A significant portion of existing residential development was constructed prior to the adoption of the existing Code water efficiency requirements. This measure would provide for the distribution of indoor water conservation kits during public events and by customer request. Kits include low flow showerheads, faucet aerators, water heater temperature gauge, faucet drip gauge and toilet leak tablets.

WUE Measure Cost Estimate: $5,000
Estimated Water Savings: 1,125,000 gallons per year (gpy)
WUE Measure Action Status: To Be Implemented In 2008

Outdoor Water Conservation Kits

The inefficient use of water during the summer months results in excessive consumption during peak demand periods. To promote the efficient use of water outdoors, the City will distribute outdoor water conservation kits during public events and by customer request. Kits include a spray nozzle, rain gauge, soil moisture gauge and hose repair kit.

WUE Measure Cost Estimate: $ 5,000
Estimated Water Savings: Seasonal - 2% Reduction In Peak Day Consumption
WUE Measure Action Status: To Be Implemented In 2008

Water Bill Showing Consumption History

The City Accounting Department is currently implementing new utility billing software that is scheduled for operation by January 2008. This software will provide customers with a history of past consumption on bimonthly billing statements. Providing historical consumption information encourages customers to conserve water and establishes benchmarks from which to track individual conservation efforts. Implementation of this measure will count as two implanted measures as it will be provided for both residential and industrial/commercial customers.

WUE Measure Cost Estimate: No Cost
Estimated Water Savings: 1% Reduction In Annual / Peak Day Consumption
WUE Measure Action Status: To Be Implemented In 2008 (Counts as 2 Measures)

Displays At Public Events

As previously discussed, Water Department staff currently participate in public events with a public outreach program complete with display boards and interactive promotions to deliver the water conservation message. In the last year, this program was presented during the "Taking City Hall To the Streets" and "Downtown Revitalization Project Dedication" events. Promotional materials provided to citizens at no cost included water bottles, indoor conservation kits and outdoor conservation kits.

WUE Measure Cost Estimate: $ 1,000
Estimated Water Savings: See Individual WUE Measure Discussion Above
WUE Measure Action Status: Currently Implemented

CUSTOMER EDUCATION

The City will expand the current customer education program. The following is a summary of measures currently adopted and proposed for implementation:

- Conservation Flyers: The inclusion of water conservation education flyers with monthly bills on a seasonal basis.

- Displays at Public Events: Display boards and interactive promotions to deliver the water conservation message.

- Water Bill Consumption History: Provide water consumption history on individual customer bills.

- Water Conservation Signs: In addition to the signs posted at 17th & E Street and 32nd & Addy Street, additional locations will be evaluated for the placement of conservation signs during the peak use summer months.

ESTIMATED WATER SAVINGS FROM WUE MEASURES

Implementation of the proposed WUE measures is anticipated to satisfy the water saving benchmarks outlined in the Water Use Efficiency Goal. Meeting the proposed goal of reducing residential peak day demand by 5% will result in water savings of approximately 165,000 gpd.

WATER USE EFFICIENCY PROGRAM EFFECTIVENESS EVALUATION

The WUE rule requires the completion of annual performance reporting to system customers and DOH. The City will use the preparation of the annual performance report as an opportunity to review the effectiveness of the WUE measures and determine if established goals require revision or if new goals and/or conservation measures need to be implemented. The annual effectiveness evaluation and DOH report will include the following elements:

- Calculation of distribution system leakage in terms of volume and percent of total production.
- Identification of WUE goals.
- Evaluation of established WUE goals, including estimating water savings achieved through implemented measures and progress towards satisfying goals.

The City will distribute the performance report to customers in conjunction with the annual Consumer Confidence Report by July 1st. In addition, the report will be available at City Hall, Public Works office and the City's website.

DISTRIBUTION SYSTEM LEAKAGE EVALUATION

The distribution system leakage standard is a significant element of the WUE requirements. This standard requires that all water systems track authorized consumption – the volume of water authorized for use by the water system. All water that cannot be tracked under this definition is considered distribution system leakage. Distribution system leakage includes both apparent losses (water theft, meter inaccuracies, etc) and real losses (leaking water mains, reservoir overflow, etc). The WUE requirements mandate that water systems maintain distribution system leakage at 10% or less of total production based on a three year running average.

The primary method for tracking authorized consumption is through the installation of meters on all customer services. Additional authorized uses that may not be metered, but are estimated and recorded, include hydrant use for fire fighting and water distribution system flushing.

As previously discussed, all customer services and well production sources are metered. Well production meter readings are recorded daily. Customer service meters are read every other month. The two emergency interties with the City of Camas are not currently metered, but are only activated in an emergency situation. City water production and consumption data collection is completed in accordance with WUE guidelines.

A review of historical consumption and production meter data indicates distribution system leakage in the range of 15-20%. Exact figures are not available, however, due to uncertainties with data accuracy. Proposed activities to improve water use accounting include billing software updates as discussed earlier, and improved documentation of unmetered uses such as distribution system flushing, hydrant testing, construction use and fire fighting.

The City will have until 2010 to satisfy the 10% leakage requirement. If this standard is not satisfied, a Water Loss Action Plan will be required. The initial requirement under the Water Loss Action Plan for systems with leakage between 10-20% is an assessment of data accuracy, collection methods and errors. The City will work to satisfy these requirements prior to the 2010 implementation date.

WATER SUPPLY CHARACTERISTICS

The City of Washougal produces drinking water from five existing wells with a maximum firm capacity currently adequate to meet existing demands. All of the City's wells produce water from a shallow aquifer referred to as the Pleistocene Alluvial Aquifer, with groundwater flowing generally in a southwesterly direction within this aquifer. Wells # 5, 6, 7 and 11 are located in the City's Westside Wellfield, while Well # 1 is located in the City's Hathaway Park Wellfield.

The Pleistocene Alluvial Aquifer is a shallow water table aquifer that occurs within the Pleistocene alluvial deposits. The deposits are approximately 100 feet thick in the vicinity of the City's Westside Wellfield. The aquifer is very permeable and serves as a source of supply to most of the industrial wells owned by Georgia Pacific as well as many of the municipal wells

owned by the City of Camas. Depth to the water table ranges from 38-46 feet at the Westside Wellfield and 55 to 81 feet at the Hathaway Park Wellfield. Well capacities typically exceed 1,000 gpm and well specific capacities typically range between 250 and 500 gallons per minute per foot.

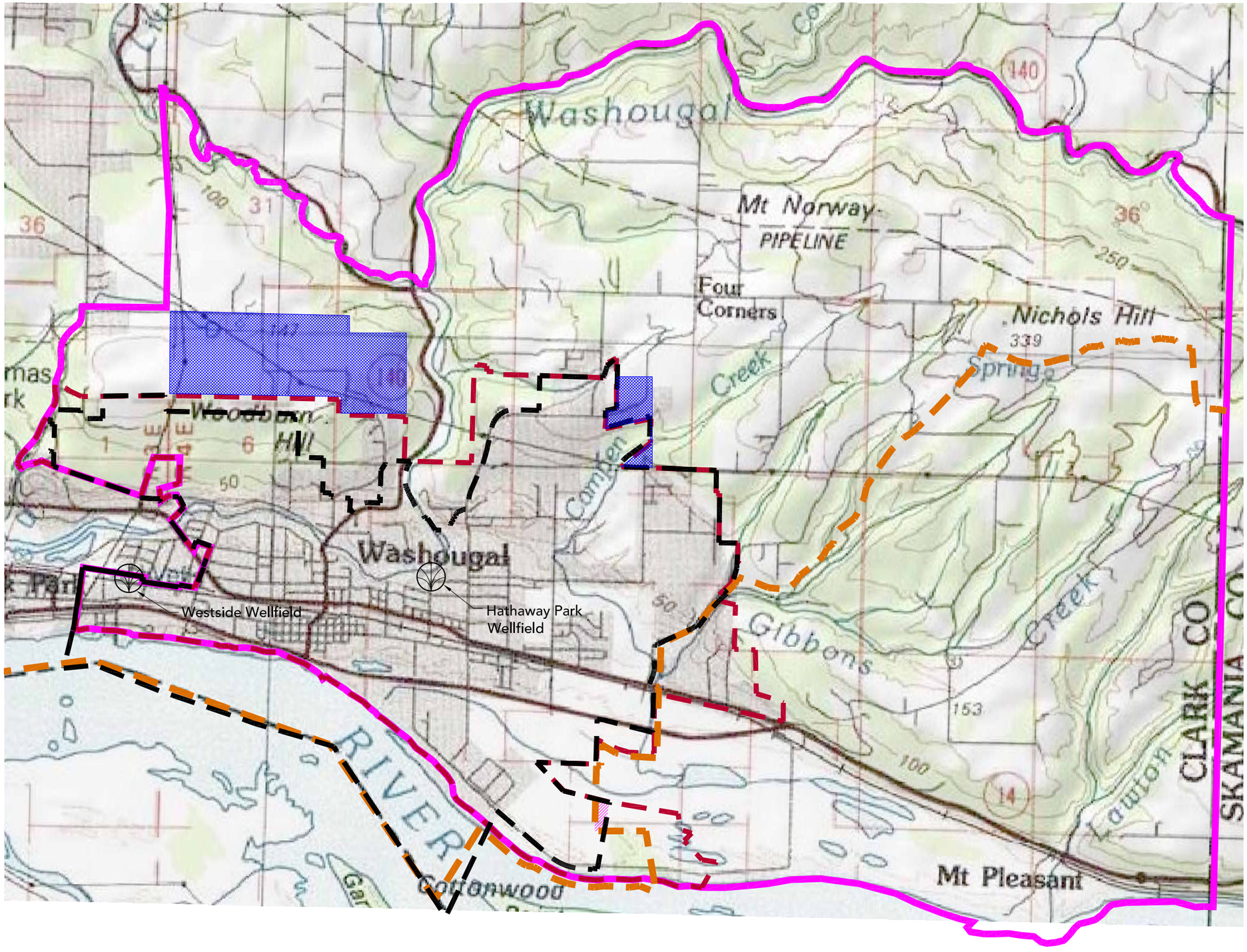
Washougal well capacities are summarized in Table 1 below. See also Figure 1 for the locations of the Westside and Hathaway Park Wellfields.

Table 1
WELL CAPACITY SUMMARY

Well Number	Single Operation	Combined Operation	Installed HP
1	925 GPM		75
5	635 GPM		50
6	630 GPM		50
7	635 GPM		75
11	960 GPM		75
5 & 6		1,150 GPM	
5 & 7		1,325 GPM	
6 & 7		1,350 GPM	
5, 6, & 7		1,775 GPM	
5, 6, 7, & 11		2,380 GPM (estimated)	
1, 5, 6, & 7		2,820 GPM (estimated)	

All City water rights are for municipal supply purposes. All wells have a place of use corresponding with the Washougal Water Service Area as outlined in Figure 1. There are no known time of use limitations with any of the certificates or claims. There is a limiting condition associated with one certificate that states "The total annual water allocation for the City of Washougal shall be limited to 3,786 acre-feet per year for municipal use from all rights." There are no known legal constraints which could limit the City's ability to utilize the full water right. A copy of the water rights self-assessment as completed in conjunction with the *2004 WSP* ("Table 4-2 Existing Water Rights(s) Status") is included as Figure 2. Based on water demands developed in the *2004 WSP*, this allocation is adequate to satisfy 20-year demand projections.

Chemical tests performed on water samples from both wellfields reveal good water quality in terms of specific chemical and physical constituents. Critical elements are less than the maximum contamination levels mandated by federal and state regulations. However, the naturally low water pH results in the corrosion of copper pipes (service lines and customer piping) such that excessive levels of copper were recorded in past water sampling. A chemical treatment facility located at the Westside Wellfield provides for the addition of sodium hydroxide to increase pH, which has resulted in copper levels consistently below federal standards.



NORTH

0 1500 3000

SCALE IN FEET

Legend

- City Limits (2007)
- Urban Growth Boundary (2003 Comp Plan)
- Water Service Area Boundary (Clark County WSP - 1997)
- Columbia River Gorge National Scenic Area Boundary (CRGNSA)
- Washougal Urban Reserve (2003 Comp Plan)
- Wellfield

Figure 1
City of Washougal Water Service Area & Wellfield Locations

Washougal Water Use Efficiency Goals
November 2007

P:\8\889\889P Water Eff Goals\Water Efficiency Goals Report\Figure 1 Wellhead Locations.dwg, Ledger, 11/27/2007 3:05:32 PM

Table 4-2 Existing Water Right(s) Status

Permit Certificate or Claim #	Name of Rightholder or Claimant	Priority Date	Source Name/ Number	Primary or Supplemental	Existing Water Rights		Existing Consumption		Current Water Right Satus (Excess/Deficiency)	
					Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
Permits/ Certificates										
1. G2-25796	Washougal	February 3, 1981	Well Nos. 6 & 7	Primary	1,100 gpm	1,419.5 ac-ft/yr	1,343 gpm	866 ac-ft/yr	(243 gpm)	916.5 ac-ft/yr
2.										
3.										
4.										
Claims										
1. G2-000773	Washougal	1931	Well No. 1	Primary	1,100 gpm	1,777.75 ac-ft/yr	925 gpm	595 ac-ft/yr	175 gpm	1,182.75 ac-ft/yr
2. G2-000777	Washougal	September 1942	Well No. 5	Primary	1,200 gpm	1,936 ac-ft/yr	549 gpm	343 ac-ft/yr	651 gpm	1,593 ac-ft/yr
3. G2-000774	Washougal	1925	Well No. 11	Supplemental	850 gpm	1,371 ac-ft/yr			850 gpm	1,371 ac-ft/yr
4.										
5.										
TOTAL	**********	********	********	**********	4,250 gpm	6,504.25 ac-ft/yr	2,817 gpm	1,802 ac-ft/yr	1,433 gpm	5,063.25 ac-ft/yr

Intertie Name/Identifier	Name of Purveyor Providing Water	Existing Limits on Intertie Water Use		Existing Consumption Through Intertie		Current Intertie Supply Status (Excess/Deficiency)	
		Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
1.							
2.							
3.							
TOTAL	**********						

Pending Water Right Application	Name on Permit	Date Submitted	Primary or Supplemental	Pending Water Rights	
				Maximum Instantaneous Flow Rate (Qi) Requested	Maximum Annual Volume (Qa) Requested
1. G2-30192	Washougal	April 30, 2004	Primary	1,000 gpm	645 ac-ft/yr
2.					
3.					
4.					

Figure 2 – City of Washougal Water Rights Summary

City staff has observed under past recurrent drought conditions that the Hathaway Park Wellfield Well No. 1 cannot be operated on a 24-hour basis under certain circumstances. Dropping water tables in the aquifer during summer and early fall pose the problem of the pump running out of water. The pump must be operated on a manual basis with close observation of the well drawdown. The Westside Wellfield has not been as severely impacted with lowering water table. The record low water table for the Westside Wellfield was recorded in fall 1994. This problem is again attributed to the drought condition affecting an otherwise excellent aquifer with a history of high production with little pump drawdown effects.

The Wellhead Protection Plan prepared by Pacific Groundwater Group in June 2001 rated the aquifer as highly susceptible and highly vulnerable to potential contamination. The high susceptibility rating is based on the aquifer composition (permeable sand, gravel and cobbles) and lack of an extensive confining layer above the shallow water table. Vulnerability is also considered high because of known and potential contaminant sources identified within the wellfield capture zone. The Wellhead Protection Plan is the basis of City efforts to protect this valuable resource through the implementation of public education, contaminant source management, water quality monitoring and land use and regulatory controls.

The City is currently developing a new well in the Westside Wellfield – Well #12. In conjunction with the development of this new source, aquifer testing was completed by GSI Water Solutions, Inc. Tests included step-drawdown and constant-rate testing to evaluate the long-term pumping rate for Well #12. Additional wells were operated during the tests to reveal potential interference from the operation of multiple sources. Tests revealed minimal drawdown at the 1,500 gpm recommended Well #12 design capacity, which will satisfy projected 20-year demands. This new source is anticipated to be fully operational in Spring 2008.

WATER DEMAND FORECAST

Water demand forecasting identifies how much water the system will need to satisfy future demands. The primary factors examined in calculating future water supply requirements include historic water production/consumption, future population trends, and land use planning. The *2004 WSP* included a comprehensive analysis of these factors in developing a 20-year water demand forecast.

For the purpose of setting WUE goals, the *2004 WSP* water demand forecast will be utilized as presented in the following Table 2. A summary of the planning criteria follows:

- Water demand projections are based on equivalent residential units (ERUs). An ERU service unit is defined as the amount of water consumed by a typical full-time single-family residence. Multi-family, commercial and industrial customers typically have demand patterns that vary from that of a single-family residence. This system of capacity analysis allows all customers to be compared on the basis of an average single-family residence.

- Existing water consumption for all customer classes was examined to determine year 2003 equivalent ERU values. Future 6 and 20-year ERU totals were then calculated based on growth assumptions as presented in the City of Washougal *February 2003 Comprehensive Plan Update*. Total ERU projections are divided into respective pressure zones.

- Table 2 future water demand projections for Average Day Demand (ADD) and Maximum Day Demand (MDD) conditions are based on historical source production trends. An average daily demand of 280 gal/ERU and 525 gal/ERU maximum daily demand were utilized.

- A second annual demand total was included in the *2004 WSP* based on the successful implementation of conservation plan measures. The anticipated water use reduction to be realized from this program was estimated at 2%. For the purpose of this WUE document, this assumption remains unchanged.

Table 2
WATER DEMAND PROJECTIONS BY PRESSURE ZONE

Year	Pressure Zone	ERUs	ADD		MDD		Annual Production (MG)	
			mgd	gpm	mgd	gpm	Total Base Demand	With Conservation
2003	Zone 1	5,025	1.36	945	2.76	1,914	496.71	
	Zone 2	736	0.20	138	0.40	280	72.75	
	Zone 3	116	0.03	22	0.06	44	11.47	
	Zone 4	66	0.02	12	0.04	25	6.52	
Total		5,943	1.61	1,118	3.26	2,264	587.45	575
2011	Zone 1	5,630	1.58	1,095	2.96	2,053	575.39	
	Zone 2	909	0.25	177	0.48	331	92.90	
	Zone 3	902	0.25	175	0.47	329	92.18	
	Zone 4	365	0.10	71	0.19	133	37.30	
Total		7,806	2.19	1,518	4.10	2,846	797.77	782
2025	Zone 1	6,773	1.90	1,317	3.56	2,469	692.20	
	Zone 2	1,276	0.36	248	0.67	456	130.41	
	Zone 3	2,020	0.57	393	1.06	736	206.44	
	Zone 4	967	0.27	188	0.51	353	98.83	
Total		11,036	3.09	2,146	5.79	4,024	1,127.88	1,105

Appendix A

November 2004 WWTP Effluent Reuse Evaluation

WALLIS
ENGINEERING

TECHNICAL MEMORANDUM

DATE: November 19, 2004

TO: Mr. Doug McKenzie
City of Washougal

FROM: Brent Gruber, P.E.

RE: Washougal WWTP Effluent Reuse Evaluation
Job No. 1159A

Wastewater reuse has received significant attention over the last several years as communities struggle to satisfy the water needs of a growing population. This technical memorandum has been completed in conjunction with the current wastewater treatment plant long-term planning effort to provide a general overview of the regulations associated with water reclamation, the potential impact of these regulations on the City wastewater treatment facility operations, identify potential beneficial use applications within the City, and the facilities necessary to produce reclaimed water.

BACKGROUND

The Reclaimed Water Act, Chapter 90.46 of the Revised Code of Washington (RCW), was created in order to gain public acceptance and support for reclaimed water use. The Departments of Health and Ecology were directed by the legislature to jointly develop reclaimed water standards for the reuse of wastewater from municipal treatment plants. This act encouraged using reclaimed water for land application, industrial and commercial uses and treating wastewater as a potential for reuse. The basic premise for reclamation is that the water must be used for direct, beneficial purposes.

TYPICAL APPLICATIONS

The driving force behind reuse often falls into three categories:

Receiving Water Limitations

Tightening water quality regulations, including the implementation of Total Maximum Daily Loads (TMDLs) for many waterways, have resulted in reduced effluent pollutant loadings on receiving waters. These limitations are often seasonal. Reuse is often selected as the preferred alternative for reducing the effluent discharge volume during critical water quality periods to satisfy these requirements.

317 Columbia Street, Vancouver, Washington 98660
telephone (360) 695-7041 fax (360) 694-1043

Community Driven "Green" Approach

Many communities are taking a pro-active approach in implementing environmentally friendly public works activities. Effluent reuse for the irrigation of park lands, golf courses or agricultural lands is often driven by this motivation.

Reduce Potable Water System Demands

The recently enacted Municipal Water Law, intended to reform the state's water laws, provides for coordination between the Departments of Health and Ecology on water planning issues. This legislation amended Chapter 90.46 to require public water systems serving 1000 or more connections to evaluate opportunities for reclaimed water when completing a water system plan. This effort is intended to identify potential uses for reclaimed water which could replace potable water in non-potable water applications. The ultimate goal is the conservation of existing potable water sources and extending the capacity of existing water supply sources and water rights.

REUSE CLASSIFICATIONS

The Department of Ecology has established four classifications for reclaimed water: Class A, B, C, and D. Reclaimed water suitable for reuse requires varying levels of treatment and disinfection beyond that provided by conventional wastewater treatment facilities as outlined in the following Table 1:

Table 1
Reclaimed Water Treatment Requirements

	Reclaimed Water Classification			
Treatment Criteria	**Class A**	**Class B**	**Class C**	**Class D**
Oxidized	X	X	X	X
Coagulation w/ Filtration	X			
Disinfection				
Average Total Coliform (per 100 mL)	2.2	2.2	23	240
Maximum Total Coliform (per 100 mL - Single Sample)	23	23	240	N/A

As outlined in Table 1, all reuse water must be oxidized. Oxidized wastewater is that in which organic matter has been stabilized, with a biochemical oxygen demand (BOD) less than 30 mg/L, total suspended solids (TSS) less than 30 mg/L, is nonputrescible, and contains dissolved oxygen. Class A reclaimed water must satisfy the most stringent treatment requirements which includes coagulation and filtration to a

turbidity level which does not exceed an average monthly operating turbidity of 2 NTU and maximum 5 NTU at any time. Classes B, C, and D differ in the allowable average and maximum total coliform counts.

The Washougal Wastewater Treatment Plant utilizes an activated sludge secondary treatment process to produce effluent with typical BOD and TSS levels of 5 mg/L and 7 mg/L respectively. These concentrations will likely increase with time as loadings increase. Ultraviolet disinfection results in average fecal coliform counts of 4 per 100 mL and maximum counts of 6 per 100 mL. While the NPDES discharge permit is based on fecal coliform counts, the reclaimed water standards measure disinfection performance based on total coliform. Though the treatment plant does not regularly test for total coliform, it is assumed the existing UV disinfection would satisfy Class C disinfection requirements at a minimum, and possibly Class A and B standards without additional treatment.

The reclaimed water classifications address a limited range of water quality parameters. Nitrogen compounds, for instance, are not specifically addressed in the classifications, though the quantity of nitrogen in reclaimed water is important when used for irrigation applications. Metals, organic and inorganic compounds, and dissolved gases are also constituents which require evaluation for potential effects depending on the particular beneficial use.

POTENTIAL USES FOR RECLAIMED WATER

Reclaimed water can be utilized for a variety of beneficial uses including irrigation, wetland enhancement, ground water recharge, and various commercial and industrial uses to name a few. The level of treatment is dependant on each specific application and is typically determined by the likelihood of human contact. Descriptions of reclaimed water uses and associated treatment requirements from the DOH Water Reclamation and Reuse Standards are included in Appendix A. The following is a brief summary of general wastewater reuse categories and applications:

Urban Reuse

Urban applications include the irrigation of public parks, golf courses, highway medians, and ornamental and residential landscape, as well as for fire protection and toilet and urinal flushing in commercial buildings. Class A reclaimed water is required for applications where the public has unrestricted access and the risk of exposure. In areas with restricted access limiting the possibility of exposure, reclaimed water must satisfy Class C standards.

Agricultural Reuse

Agricultural uses include the irrigation of crops, commercial nurseries, and pasture lands. Reclaimed water must satisfy Class D standards for the irrigation of trees, fiber and seed crops, and Class C for sod, commercial nursery stock and pasture for milking cows. Food crops may be irrigated with Class B reclaimed water, however, in cases of contact with the edible portion of the crop Class A requirements must be satisfied.

Environmental Reuse

The enhancement of natural wetlands, creation of artificial wetlands and stream flow augmentation are all applications for reuse. The water quality criteria for these applications is often regulated to a higher standard than that outlined in Table 1. In addition to lower concentration limits and total loading rates for BOD and TSS, limits on nitrogen, phosphorus, ammonia and metals are often applied.

Commercial and Industrial Reuse

Reclaimed water can be used for a wide variety of commercial and industrial applications including boiler feed, cooling and process water. The quality of water is dependant on use. For a closed system such as boiler feed, Class C or better is required. For cooling or process water where aerosols or worker exposure is possible, Class A water must be provided.

UNIT TREATMENT PROCESSES

The treatment processes discussed in this section are those required in addition to the existing secondary treatment facilities to satisfy the various reclaimed water class requirements. The existing process schematic is illustrated in the following Figure 1.

To ensure the reclaimed water product is safe, state regulations require the water be continuously and reliably treated. In order to comply with this requirement, redundant facilities are required in the treatment process. This is one of the primary differences between a wastewater treatment facility and a water reclamation facility. For every unit treatment process, a water reclamation facility requires a fully operational and functional backup component. The standards also require automated alarms, redundancy of treatment units, emergency storage, and stringent operator training and certification to meet the development criteria.

Coagulation and Filtration

Coagulation and filtration are required to satisfy Class A reclaimed water standards. Coagulation is the process of blending or mixing coagulating chemicals into a secondary waste stream to improve the removal of particulate and colloidal matter in a subsequent filtration step. Coagulants must be thoroughly mixed with the secondary effluent prior to filtration.

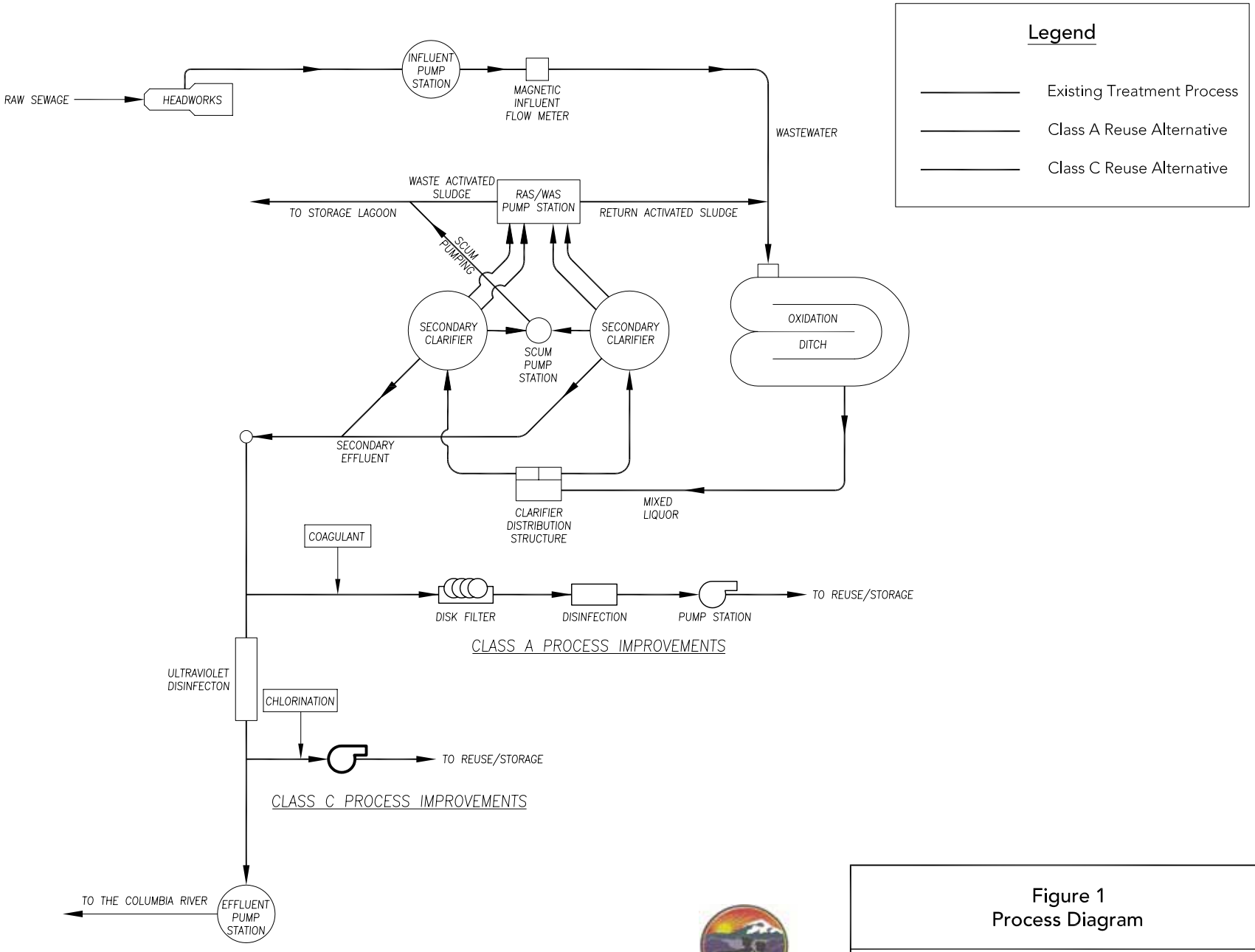


Figure 1
Process Diagram

City of Washougal
Effluent Reuse Evaluation

P:\11\1159A\Dwg\Figures for Water Reuse Study\Fig 1 Process Diagram Figure.dwg, Option 1, 11/20/2007 9:34:29 AM

Coagulated secondary effluent must be filtered to achieve a maximum average turbidity of 2 NTU. Many filtering techniques are available that are capable of providing this level of turbidity. Upflow sand media, continuous backflow upflow sand media and disk fabric filters are commonly used in Washington water reclamation facilities. From a capital and operating cost perspective, the disk fabric filter is very competitive and proven effective with limited required operator attention, and maintenance can be performed without significant downtime. This equipment is comprised of a rotating filter device consisting of a series of disks covered in a fine mesh fabric. Alum chemical facilities to achieve coagulation and a disk filter will provide the basis of estimating capital costs to produce a Class A effluent. These facilities are shown in Figure 1.

Disinfection

Disinfection is considered the most important step in the production of reclaimed water. The various classes of reclaimed water are largely differentiated by the respective levels of disinfection required as outlined in Table 1.

The City currently utilizes ultraviolet disinfection as previously discussed to achieve average fecal coliform counts of 4 per 100 mL. For the purpose of this evaluation, it is assumed that the existing UV treatment will achieve a Class C equivalent effluent. To satisfy Class A reuse requirements, filtration will take place prior to disinfection. Disinfection with UV or chlorine assuming adequate contact time are both options.

When chlorine is used as the disinfectant, a total chlorine residual of at least 1.0 mg/L after a contact time of at least 30 minutes is required. In addition, a minimum residual chlorine concentration of 0.5 mg/L must be maintained in the conveyance system to the reuse area. The maintenance of a chlorine residual is not required in reclaimed water storage ponds, and at the discretion of DOH, may not be required in the reclaimed water distribution from storage ponds.

Reclaimed Water Pump Station / Storage

A pump station to deliver reclaimed water to the point of use will be required. The need for storage will depend on the use to be served. Individual on-site storage in the form of a pond or area wide storage with a reservoir are two possible alternatives.

POSSIBLE WASHOUGAL WATER REUSE OPPORTUNITIES

The process of identifying potential beneficial uses for Washougal WWTP reclaimed water included the following:

Review of Water Billing Records

Water billing records were reviewed to identify existing large water users. This review identified several industrial customers who account for a significant portion of total City water production. Followup telephone conversations identified the uses for this water and minimum water quality requirements.

Review of Area Water Rights

Water rights for the Washougal area, as identified in the recent *Groundwater Supply Expansion* report, were reviewed to identify active non-City wells. This review identified the Orchards Hills Golf Course and several small industrial wells as possible candidates for the substitution of reclaimed water for existing groundwater withdrawals.

Review of Park, School and Open Space Lands

Maps were examined to identify potential sites for possible reclaimed water irrigation including parks, school fields and other open space parcels.

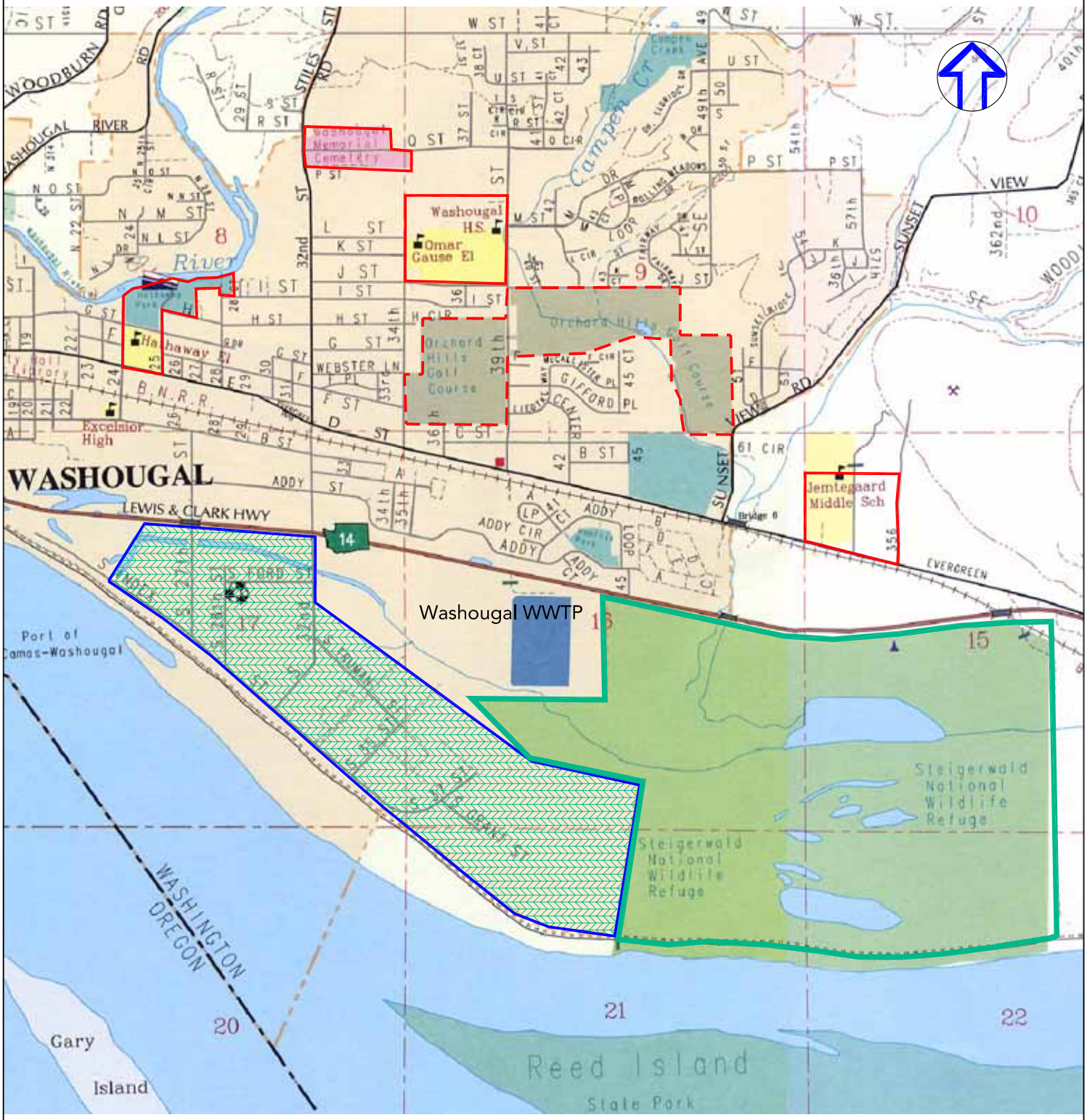
Based on the above analysis, three potential reclaimed water application centers were identified: the Port Industrial Area, Steigerwald Wildlife Refuge, and the Orchard Hills Golf Course/Schools as highlighted in Figure 2. These areas are discussed in further detail and considered as to their potential for future reclaimed water utilization.

Port Industrial Area

Currently, combined commercial and industrial water use in Washougal exceeds 42% of total water system consumption (*2004 Water Master Plan*). The largest industrial consumers of City water are Pendleton Woolen Mills (240,000 gpd), Kemira Chemical (20,000-200,000 gpd), and Saint-Gobain Crystals (40,000 gpd). Exterior Wood (20,000-30,000 gpd) is also a large consumer of private well water in the industrial park.

Two options are proposed for supplying reclaimed water to the industrial area. The first assumes the need for Class A water to meet existing industrial process requirements. Providing Class A water would provide the greatest flexibility to address the wide range of potential industrial uses and assure that aerosol and worker exposure risks are minimized. Transmission system improvements are based on delivering water to Pendleton Woolen Mills, a distance of almost 6,000 ft from the wastewater treatment plant. Based on an assumed 0.5 MGD demand, the following improvements and costs are estimated for Class A treatment improvements and distribution system to serve the Industrial Area:

Industrial Area Class A Reuse	
Coagulation and Disk Filter Improvements	$600,000
Disinfection Improvements	$150,000
100,000 gal Reservoir Storage and Pump Station	$250,000
6,000 lf Non-Potable Water Distribution System	$300,000
Ecology Permitting	$50,000
Engineering, Surveying, Contingency @ 25%	$325,000
TOTAL	$1,675,000



Legend

- Port Industrial Area
- Steigerwald Wildlife Refuge
- School/City Owned Properties
- Golf Course

Figure 2
Potential Reclaimed Water Users

City of Washougal
Effluent Reuse Evaluation

The second option would assume the siting of an industry requiring a large quantity of water for boiler feed or steam generation. Under this scenario, treatment to Class C standards is assumed. Past inquires regarding vacant Port properties for new industries have included requests for "impure" water at volumes approaching 0.8 MGD. Based on an assumed 0.5 MGD demand, the following improvements and costs are assumed:

Industrial Area Class C Reuse	
Chlorine Disinfection Improvements	$ 70,000
Pump Station	$150,000
6,000 lf Non-Potable Water Distribution System	$300,000
Ecology Permitting	$50,000
Engineering, Surveying, Contingency @ 25%	$130,000
TOTAL	$700,000

Steigerwald Wildlife Refuge

The approximately 1,000 acre Steigerwald Wildlife Refuge borders the Washougal Wastewater Treatment Plant site to the south and east. The refuge consists of historic riverine flood plain habitat, semi-permanent wetlands, cottonwood riparian corridors, and pastures. Discussions with refuge staff centered on two possible uses for reclaimed water. The first application would provide periodic flooding necessary for extending the zone of willows. The second use would be a constructed wetland. The first option would require only seasonal water usage, while the second may provide for a continuous water use.

It should be stressed that both of these options were discussed on a very conceptual basis and doubts were expressed concerning the feasibility of either. The regulatory barriers to such a project, as well challenges in obtaining state and federal funding, eliminate this option from further consideration at this time.

Orchard Hills Golf Course / School Irrigation

In determining possible reclaimed water irrigation options within the City of Washougal, current irrigation use was examined. Irrigated land areas within the City of Washougal utilizing public water and private wells are identified below:

Schools	Municipal	Private
Hathaway Elementary	Washougal Memorial Cemetery	Orchard Hills Golf Course
Washougal High School	Elizabeth Park	
Omar Gause Elementary	Hathway Park	
Jemtegaard Middle School	Campen Creek	
	Hamilik Park	

Figure 2 illustrates the location of the above sites. After examining the proximity of these sites to the Wastewater Treatment Plant, it was concluded that the Orchard Hills Golf Course, Washougal High School, Omar Gause Elementary, and Washougal Memorial Cemetery present the greatest potential for

reclaimed water irrigation. These sites lie approximately a half mile north of the Washougal WWTP and are clustered in relatively close proximity to one another.

Washougal High School and Omar Gause Elementary School irrigation is currently served by the Washougal water system. A review of monthly water billings estimates that irrigation water usage is approximately 6,500 gpd between the two schools.

The Orchard Hills Golf Course currently utilizes Camp Creek and two wells for irrigation water. These sources are combined together in an on-site irrigation pond. Golf course irrigation is seasonal, with summer (late May through September) irrigation rates up to 250,000 gpd.

The Washougal Memorial Cemetery is located northeast of the schools and golf course. Summer irrigation can reach up to 13,000 gpd in the summer.

Class A reclaimed water would be required for irrigation purposes in these areas due to the potential for human exposure. Improvements will be divided into two phases. The first phase would include the treatment upgrades to produce a Class A effluent (assumed 0.5 MGD demand) and transmission system to deliver the water to the existing Orchards Hills Golf Course irrigation pond. Providing irrigation to the school properties and Cemetery would require an additional pump station, chlorination and transmission lines under Phase 2. This alternative assumes the golf course would allow the use of the existing irrigation pond to be utilized for City uses also.

Phase 1 - Golf Course Class A Reuse	
Coagulation and Disk Filter Improvements	$600,000
Disinfection Improvements	$150,000
Pump Station	$150,000
2,500 lf Non-Potable Water Transmission Main	$125,000
Ecology Permitting	$50,000
Engineering, Surveying, Contingency @ 25%	$250,000
TOTAL	$1,325,000
Phase 2 - School/Cemetery Irrigation Extension	
Pump Station	$150,000
Chlorine Disinfection Improvements	$ 70,000
2,500 lf Non-Potable Water Distribution System	$125,000
Engineering, Surveying, Contingency @ 25%	$85,000
TOTAL	$430,000

CONCLUSIONS

1) Additional investigation into the need for water reclamation to satisfy future wastewater treatment plant NPDES permit requirements is not warranted at this time. It is not anticipated that the City will face

effluent discharge restrictions on the Columbia River which would require the examination of water reclamation as an option to meet stringent pollutant loading limits.

2) The construction of new water reclamation facilities to produce a Class A reuse quality water to offset existing industrial potable water use and delay the development of new ground water sources is not cost effective at this time. The estimated cost to produce a Class A effluent of approximately 0.5 MGD is nearly $1.7 million dollars. Estimates to develop a new 1.0 MGD groundwater source is approximately $1.2 million dollars (*2004 Water Master Plan*).

3) The future siting of an industry with the need for a large quantity of Class C or D non-potable water would warrant additional consideration. Development of a Class C or D resource may be cost effective compared to the equivalent development of potable water sources.

4) The Orchard Hills Golf Course, schools and cemetery provide an excellent opportunity for effluent reuse which eliminates the need for the golf course well and the use of potable water for school and Cemetery irrigation. These irrigation demands, however, currently have a minimal impact on the potable water system and the seasonal nature of the demand would provide for only seasonal operation.

RECOMMENDATION

The preliminary evaluation of beneficial reuse opportunities in the City of Washougal does not support a more detailed evaluation at this time. While reuse opportunities may exist, the cost of permitting and construction of necessary treatment facilities are cost prohibitive. It is recommended that this issue be revisited during the completion of the next Sewer Capital Facility Plan update in conjunction with the 6-year comprehensive planning cycle.

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murraysmith

APPENDIX I
WELLHEAD PROTECTION PLAN AND NOTIFICATION LETTERS

murraysmith

WELLHEAD PROTECTION ASSESSMENT REPORT, NOVEMBER 2012

City of Washougal
Hydrogeologic Summary and
Wellhead Protection Assessment Report

March 20, 2012

Pacific Groundwater Group
Seattle, Washington

JM1006

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Hydrogeologic Summary and
Wellhead Protection Assessment Report

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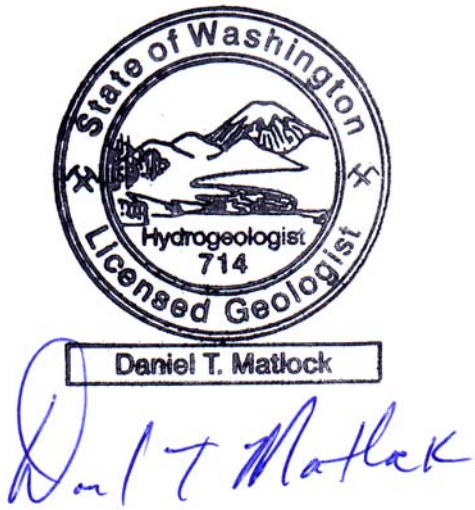
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List of Acronyms

BNSF	Burlington Northern Santa Fe
CARA	Critical Aquifer Recharge Area
EPA	Environmental Protection Agency
FSID	Facility Site Identification
GIS	Geographic Information System
GP	Georgia Pacific
LUST	Leaking Underground Storage Tank
MCL	Maximum Contaminant Level
MODFLOW	Modular Three-Dimensional Finite-Difference Ground-Water Flow Model
MTCA	Model Toxics Control Act
NPDES	National Pollutant Discharge Elimination System
PAA	Pleistocene Alluvial Aquifer
RA	Remedial Assessment
RCRA	Resource Conservation and Recovery Act
SGA	Sand and Gravel Aquifer
SHA	Site Hazardous Assessment
SSL	Site Screening Level
SWMP	Stormwater Management Plan
UST	Underground Storage Tank
VCP	Voluntary Cleanup Program
WAC	Washington Administrative Codes
WDOT	Washington Department of Transportation
WHPA	Wellhead Protection Area
WSP	Water System Plan
XQG	No Waste Generator

1 Introduction

This report summarizes the hydrogeology, municipal wellhead protection area ("WHPA") delineations, and contaminant risks to groundwater supplies for the City of Washougal ("the City"). Information presented in this report supports an update of the City's Water System Plan ("WSP") currently being prepared for the City by Murray, Smith & Associates, Inc.. The purpose of this report is to help the City better manage its groundwater supply wells and to better understand the contaminant risks posed to these sources.

The study area for this investigation focuses on the City's two supply wellfields: the Westside (Lower) Wellfield located near Goot Park and 1st Street and the Hathaway (Upper) Wellfield located near 28th and I streets (**Figure 1**). The City operates six wells for municipal supply including Wells 5, 6, 7, and 11 at the Lower Wellfield and Wells 1 and 10 at the Upper Wellfield (**Table 1**). In 2009, the City installed a new supply well (Well 12) at their Lower Wellfield. The City is currently working with the Department of Ecology in securing a new permit for Well 12 as well as clarifying instantaneous water right capacity of both wellfields. The City also owns one deeper supply well (Well 9) at Hamllik Park which is currently not used due low yield and taste and odor problems.

This report is organized in four 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 City's wellfield supply areas.

- **Section 4: Risk Assessment.** 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: Contingency and Spill Response Planning.** This section discusses the City's ability to deal with loss of supply in the event of a contamination release that would impact the supply sources.

This work was performed, and this report prepared, in accordance with generally accepted hydrogeologic practices at this time and in this area for the exclusive use of the City of Washougal for specific application to the study area. No other warranty, expressed or implied, is made.

2 Hydrogeologic Framework

2.1 Geology and Hydrogeology

The geology of the greater Clark County region and the study area is commonly divided into older rocks and younger sediments, which are semi-consolidated or unconsolidated. The older rocks crop out in the foothills and mountains in the north and east portions of Clark County, and occur at depth in the central and western portions of the County. Within the Washougal study area, the older rocks crop out north and east of the Washougal River. The younger sediments crop out in all other areas, and contain all of the principal aquifers noted in the County. The sedimentary units, from youngest to oldest, consist of:

- Recent alluvial deposits
- Pleistocene alluvial deposits
- Troutdale formation

These units are described below and shown on hydrogeologic cross section A-A′, B-B', and C-C' (**Figures 2** and **3**). Surface outcrop patterns for these units are shown on **Figure 1**, along with the cross section location. The main focus of attention for the existing Washougal groundwater sources is the Pleistocene alluvial deposits that occur in the Lower Washougal River lowland. All of the City's active supply wells are completed in these materials whereas Well 9 is completed in the deeper Troutdale formation.

The Troutdale formation does not occur in the immediate vicinity of the City's Lower Wellfield but underlies the Pleistocene alluvial deposits further to the east and south where it is tapped by Well 9. Although it is not an important source of water in the Washougal area, it does yield large quantities of water in other parts of Clark County. Throughout most of the county, the Troutdale formation contains three coarse-grained units that are separated by finer-grained confining units. The coarse units are:

- Upper Troutdale unit – variably cemented gravel in a matrix of sand and silt
- Lower Troutdale unit – relatively discontinuous occurrence of fine sand
- "SGA" - a deeper sand and gravel unit

2.2 Recent and Pleistocene Alluvial Deposits

2.2.1 Deposits Origin, Texture, Distribution

Recent floodplain alluvium consisting of silt, sand, and gravel occurs along many of the rivers and streams in the study area, including Lacamas Creek and the Columbia, Washougal, and Little Washougal rivers. The recent floodplain alluvium generally occurs in narrow bands (less than 1,000 feet wide) along the smaller rivers and streams, with thicknesses ranging from several feet to ten or twenty feet. It also forms a fairly

extensive veneer over older deposits along the Columbia River where it may be as much as 100 feet thick (Steigerwald vicinity).

During the late Pleistocene time, the ancestral Columbia River deposited a great deltaic fan emanating to the west from the mouth of the Gorge during a series catastrophic flood events known as the "Missoula floods". Near the City wellfields, textures are similar to those of the recent alluvium, which overlies the Pleistocene alluvium along streams and rivers. Due to textural similarities between Recent and Pleistocene alluvium, hydrogeologic distinction is not necessary between the two units.

The combined Recent and Pleistocene alluvial deposits are approximately 100 feet thick in vicinity of the City's wellfield. The deposits are underlain by clay and locally by bedrock near the Lower Wellfield and the Troutdale formation near the Upper Wellfield. The City of Washougal is located near the eastern limit of the area scoured by catastrophic Columbia River flooding during late Pleistocene times. Therefore, the sedimentary basin at Washougal is small compared to portions of Clark County farther to the west. The older bedrock exposed to the north of the wellfields is relatively impermeable and functions as an adjacent no-flow boundary.

2.2.2 Aquifer Definition, Recharge, Production, Capture

The Pleistocene Alluvial Aquifer (PAA), defined as the combination of the Recent and Pleistocene alluvial deposits found along the Columbia and lower Washougal rivers, is the principal aquifer near the City wellfields. The aquifer is recharged by incident precipitation, and induced recharge from the incised Columbia and Washougal rivers.

The productive zone of the aquifer is described on drillers' logs as a loose mixture of gravel, cobbles, boulders and little sand. Depending on the thickness of saturation, this aquifer can be very productive with well yields in excess of 1,000 gpm. Immediately north and east of the Washougal River, where this aquifer pinches out on top of bedrock or Troutdale deposits, well yields are substantially lower. Groundwater in the PAA near the City's wellfields occurs under unconfined conditions.

Groundwater flow directions in the PAA are relatively dynamic because the hydraulic connection to the Washougal and Columbia rivers causes groundwater levels to move up and down with the tides and with seasonal changes in runoff. Pumping at nearby supply wells operated by the City of Camas and Georgia Pacific also influences water levels and flow directions in the PAA. The City of Camas operates nine municipal supply wells and Georgia Pacific operates as many as 17 industrial supply wells. All of these wells are completed in the PAA at depths of approximately 50 to 120 feet. Total production from the Georgia Pacific wellfield may exceed 25 million gallons per day (mgd) at times whereas Camas' peak production is on the order of 9 mgd. This large scale pumping has a significant affect on water levels within Washougal's production wells with large declines occurring during summer when combined municipal and industrial production is at its peak.

2.2.3 Aquifer Susceptibility

The sensitivity of the City's groundwater sources to potential contamination was evaluated by assessing the relative susceptibility and vulnerability of the City's primary production aquifer. Aquifer susceptibility refers to the estimated ease of contaminant transport from the land surface to the aquifer. 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. 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 City's wellfields, coarse grained soils typically extend from ground surface to the water table which lies at depths of 30 to 60 feet. Drillers' logs from wells in the area indicate no laterally extensive low permeability layers exist between land surface and the underlying PAA. The combination of a shallow depth to water and relatively high permeability of the overlying sediments indicate the PAA has relatively high susceptibility to contamination.

Aquifer vulnerability combines the aquifer susceptibility discussed above, with an evaluation of the occurrence 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 wellhead protection plan is to evaluate the susceptibility of the system's aquifer(s), and the potential sources of contamination within the system's capture zones. Additional attention to potential contamination sources is recommended within the capture zones in high susceptibility aquifer areas 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 4**.

3 WHPA Delineations

3.1 WHPA Model

This section documents the methods used to delineate the wellhead protection areas (WHPAs) and presents the results of the analysis. The "capture zone" for the City's wellfields was estimated using a computer groundwater flow model (MODFLOW) that was developed by the US Geologic Survey (McDonald and Harbaugh, 1988). A capture zone is the area that supplies groundwater recharge to a pumping well or wellfield, in other words, its "zone of contribution." 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 wellhead. Each capture zone has a stagnation point, the furthermost "point of capture" down-gradient of the wellhead. The capture zone encompasses portions of the aquifer that surround the well. A time-related capture zone is the area 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.

The groundwater flow model developed for the Lower Washougal and Columbia River lowlands depicts the 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 and 2007). The model simulates three-dimensional flow using a three layer representation of the system. The upper two layers represent flow in the combined Recent and Pleistocene alluvial deposits while the third layer represents the SGA deposits. The model uses cell sizes ranging from 100 feet square to 600 feet square. Model boundary conditions include cells that represent the rivers, pumping wells, specified inflows from outside the model domain, and incident recharge applied to the top of the uppermost aquifer. The model was calibrated to observed summer drawdowns in the Camas/Washougal wellfield vicinities, summer seepage losses from the Washougal River, and groundwater level responses to tidal fluctuations and runoff events in the Columbia River.

The calibrated model was used to perform predictive simulations which included evaluation of capture zones for the Upper and Lower wellfields. The simulations assumed that the City would fully exercise all of their existing annual water rights (Qa) which are capped at 3,786 ac-ft/yr (2,347 gpm). The City is currently processing two new "umbrella" water right permits (G2-30564 and G2-30565) for their Upper and Lower wellfields which will clarify the instantaneous water right quantities (Qi) held under claims and certificates. At this time, we have assumed that the City will be able to secure the instantaneous rights presented in **Table 2** for their various wells. The instantaneous rates were normalized by the Qa/Qi ratio to obtain average operational rates for each source that were then used in the capture zone modeling analysis.

Wellhead protection capture zones were not delineated for Well 9 since the City has not used this water source since 1988 due to water quality and yield limitations.

Pumping rates for the City of Camas supply wells were specified at their annual water right of 11,090 ac-ft/yr (6,870 gpm). In addition, a high-end pumping was assumed for the Georgia Pacific wellfield (37.5 mgd or 26,040 gpm).

3.2 Capture Zone Analysis

Estimated capture zones for 6-month, 1-year, and 5-year times-of-travel for the City of Washougal wellfield supply areas are shown on **Figure 4.** All groundwater in the recharge area is younger than 10 years; therefore there are no 10-year time-of-travel delineations on **Figure 4**. 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.

The capture area for Washougal's Lower Wellfield extends generally west to east and occupies large portions of the lowland area between the Washougal and Columbia rivers. Capture for the Upper Wellfield extends only a short distance to the north where it intercepts the Washougal River. Evaluation of mass-balance calculations for the

groundwater flow model indicate that the majority of water captured by the Washougal welllfields 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 4 s**hows the average positions of the capture zones, not the temporal variations in the 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 4**. In order to account for the uncertainties associated with temporal variations in capture zone, an additional capture zone labeled Critical Aquifer Recharge Area (CARA) is shown. The CARA includes areas that were not included in the steady state capture zone analysis, but may likely contribute recharge during certain times of the year given variations in pumping, river elevation, and natural recharge.

4 Risk Assessment

4.1 Data Sources

Contaminant sources that lie within the vicinity of City of Washougal wellfield areas were investigated and mapped using data from two sources. The first, a parcel database that contains information on land use and zoning, was provided by Clark County. The second contains data from the Washington State Department of Ecology's Facility / Site database[1], including state cleanup sites, federal superfund sites, hazardous waste generators, solid waste facilities and underground storage tanks. 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 the City's production wells and WHPA (capture zone) delineations.

4.1.1 Land Use Database

Clark County's database contains a description of the land use within each parcel in the study area. A GIS analysis was used to identify land uses that could pose a risk to groundwater within the vicinity of the City's wellfields. Parcels where such land uses were identified were designated "parcels of concern." This approach provides a way to assess potential sources of contamination. The "parcels of concern" include those where potential activities could result in a release of contaminants to groundwater. **Table 3** summarizes the land use categories that are considered to be of concern.

Figure 5 shows the distribution of zoning throughout the study area. It also shows the parcels of concern that occur within the City's capture zone areas. Parcels of concern are

[1] http://www.ecy.wa.gov/fs/

shown as green cross-hatched areas. For the Washougal wellfields, 12 parcels of concern occur in the 6-month wellhead protection capture zone, 1 parcel falls within the one-year capture zone, and 15 parcels fall within the 5-year capture zone. Fourteen additional parcels fall outside of the capture zones, but within the defined CARA. Parcels of concern that fall within the various capture zones should be considered as potential contaminant sources, with the shorter time of travel zones being more critical for risk management.

4.2 Current Land Use and Zoning

Zoning information from the County's GIS was used to evaluate current and future land-use in the study area. The following zoning categories were mapped (**Figure 5**):

- Commercial
- Industrial
- Parks/Open Space
- Residential

The most commonly allowed land use within the City's wellhead protection capture zones is residential followed by commercial, parks/open space, 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 Avenue, and E Street (**Figure 5**).

4.3 Confirmed and Potential Contaminant Sources

Table 5 summarizes the 19 confirmed and potential contaminant sites that fall within the City's wellhead protection capture zones. **Figure 6** 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:


Underground Storage Tanks (UST/LUST)


Cleanup Site (State Cleanup or Voluntary Cleanup)


Hazardous Material Generator or Handler

Any combination of the three indicators is possible. In addition to the pie slices, a red circle around the outside of the pie indicates that a release to either groundwater or soils has occurred at the site.

4.3.1 Known/Confirmed Sources

Table 5 indicates two confirmed contaminant sources occur in the City's wellhead capture zones. Confirmed contaminated sites are shown on **Figure 6** by one of the following types of sites:

- State Cleanup Sites
- Leaking Underground Storage Tanks (LUST)

4.3.1.1 State Cleanup Sites

Both of the contaminant release sites in the City's wellhead protection capture zones are included on the State Cleanup List. A brief discussion of each of these sites follows, with additional information provided in **Appendix A**.

State Cleanup Sites			
Map ID	**FS ID**	**Facility Name**	**Wellhead Protection Zone (WHPZ)**
18	85837922	Goodyear Tire Camas	6-Months
21	22538744	Hi Way Fuel	CARA

Goodyear Tire (FSID 85837922) is located at 3440 Third Avenue, Camas. Following the removal of three 500-gallon underground storage tanks in 1999, a release to the soil was noted (Gasoline, Diesel and Waste Oil). After the removal of the impacted soil, sampling confirmed that all petroleum hydrocarbon impacted soil had been removed. On September 6, 2001 Ecology issued a no further action determination for the site. This facility is participating in the Voluntary Cleanup Program (VCP)

The Hi Way Fuel site (FSID 22538744) is located at 1250 E Street in Washougal. In August through October of 1996, Hi Way Fuel underwent renovation which included the decommissioning of five underground tanks and associated piping. During the process subsurface contamination was encountered in the area of the former tanks. Clean up efforts removed the most highly contaminated soil, but due to structural issues not all impacted soil was removed. Soil borings were installed to assess the remaining soil contamination. Groundwater was not encountered to the depth of exploration, and has not been assessed.

4.3.2 Other Potential Sources

This section discusses other potential sources of contamination within the wellhead protection capture zones based on Ecology's Facility database and Clark County's parcel, stormwater, and septic system databases. The following potential contamination sources have been identified within or near the capture zones for the Washougal wells:

- Hazardous materials
- On-site septic systems
- Underground storage tanks
- Stormwater
- Unused and improperly constructed wells
- Agriculture, golf courses, and parks
- Transportation corridors

4.3.2.1 Hazardous Materials

The commercial use of chemicals poses a major 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. Therefore, risk reduction strategies should target on-site waste management practices. The following facility activity classifications were included as hazardous materials sites:

Activity Code	Definition
HWG	Facilities that generate any quantity of a dangerous waste. They may be classified as small, medium or large quantity generators (SQG, MQG, or LQG) depending on hazardous waste generated for a given month.
HWOTHER	Facilities that are required to have a RCRA Site ID# 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.
HWTRNSFR	A transfer facility is a site, owned, leased or operated by a transporter of regulated hazardous waste shipments where any of the following occurs: 1) receives wastes from another transporter, 2) transfers wastes from one transport vehicle to another, 3) transfers waste from one container to another, or 4) stores waste within a vehicle or on property for 10 days or less. Examples of transfer facilities include a parking lot, warehouse, truck terminal, barge or steamship loading and unloading facility, or railroad spur loading or unloading facility.
HWTSDF	Facilities that treat store or dispose 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 most significant threats to groundwater are related to the use and storage of solvents. Solvents are persistent, both soluble and insoluble in water, and highly mobile. A large plume of contamination can be created with a small quantity of solvent.

The Washington State Facility Site database indicates that there are eleven sites within the City's wellhead protection capture zones that fall into one of the above hazardous waste classifications. Of these eleven sites, three have active status, the rest are inactive. Inactive status indicates that the sites do not have current permitting, and therefore, are not actively overseen by Ecology.

Active Hazardous Materials Sites			
FS ID	**Facility Name**	**WHPZ**	**Activity Code**
37125488	COLUMBIA WAREHOUSE	6-Month	TIER2
3264254	TARR INC WASHOUGAL	6-Month	TIER2
11338232	COLUMBIA STORAGE INC 2ND ST	CARA	TIER2

The facility site index database does not indicate whether the sites listed are large or small hazardous waste generators.

4.3.2.2 On-Site Septic Systems

4.3.2.2.1 Potential Risks

On-site septic systems pose a risk to groundwater where they are relatively high in density and/or where hazardous wastes are discharged to them. Potential contaminants from septic systems include pathogenic organisms (bacteria and parasites), toxic substances, and nitrogen compounds.

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 transport of microorganisms will be limited. 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 these chemicals pose to groundwater quality. 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 methemoglobinemia, or "blue baby" syndrome. 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). The maximum contaminant level (MCL) for nitrate is 10 mg-N/L. Nitrate levels in City supply wells are typically less than 2.5 mg/L.

Although significant portions of the urban area are served by sewer systems, some residents still rely on septic systems. Clark County maintains a GIS coverage of on-site septic system locations, locations are based on information provided by the Southwest Washington Health Department. The locations of the septic systems are plotted on **Figure 6**. This figure indicates that the Washougal wellhead protection capture zones have only 2 identified septic systems within the one-year capture zone, 19 systems within the 5 year capture zone, and 4 systems fall outside of these zones but within the CARA

boundary. Overall, 25 septic systems fall within the City of Washougal's Critical Aquifer Recharge Area boundary.

4.3.2.3 Underground Storage Tanks

Contamination in soil and groundwater caused by leaking USTs ("LUSTs") is a major environmental, legal, and regulatory issue. The most common causes of leaks are structural failure, corrosion, improper fittings, improper installation, and natural phenomena. 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 often occurs without detection. Even relatively small amounts of certain compounds can adversely impact groundwater quality. Once released from an UST, some volatile organic compounds (VOCs) and petroleum products 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 among 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 6 shows the locations of USTs in the WHPA that are summarized in **Table 5** These sites were identified from the Washington Department of Ecology (WDOE) UST site data. Most of them lie along the railroad corridor and within areas zoned industrial and commercial.

A total of ten USTs occur within the City's wellhead protection capture zones. Based on status information from Ecology, three are active and seven are inactive. Inactive USTs do not currently store materials.

4.3.2.4 Storm Water

Storm water (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 produce more runoff than rural areas because they have more impermeable and reduced permeability surfaces, such as rooftops, driveways, streets, and highways. 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.

Storm water 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. Roofing materials have also been identified as a diffuse source of metals in runoff, particularly zinc (Good, 1993). In general, contaminant concentrations in storm water are

similar for all land uses with slightly higher nitrate concentrations in residential areas and higher zinc concentrations in commercial areas. Concentrated sources of storm water contamination may also occur if undiluted pollutants (e.g., fertilizer, gasoline) are accidentally spilled or intentionally released and enter storm drains.

Storm water contamination has primarily been a concern for surface water pollution because most urban runoff is directed to streams, lakes, and other water bodies with fish and other aquatic life that are highly sensitive to common storm water contaminants. However, where storm water is discharged to infiltration areas, there is also potential for groundwater contamination.

4.3.2.4.1 Potential Risks

Concern over potential groundwater contamination from storm water has been recognized by several governmental agencies in western Washington. Storm water-related impacts to water quality are of particular concern in industrial, commercial, and high-density residential development areas, where runoff volumes can be large. Consequently, storm water runoff from highways and roads can introduce contaminants such as heavy metals, organic priority pollutants, pesticides, and coliform bacteria into the groundwater system. 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 Washougal study area. Storm water runoff from lawns and agricultural areas can introduce nitrate, herbicides, pesticides, and bacterial contaminants.

4.3.2.4.2 Dry Well Occurrence in the Washougal Area

Dry wells were historically used in many areas of Clark County for disposal of storm water. Dry well locations in the Washougal vicinity were obtained from Clark County GIS mapping. Dry well locations are presented on **Figure 6**. Most of the dry wells are in the older part of Washougal which includes the area bounded by 6th Street on the west, 32nd Street on the east, SR-14 on the south, and where Washougal River road crosses the Washougal River on the north. This area includes a portion of the 5-year wellhead protection capture zone for the City of Washougal's Lower wellfield. Dry wells are the most common storm water facility in the older parts of Washougal, whereas surface storm water facilities are the most common in newer developments of Washougal. All new construction of storm water facilities in Washougal include only surface storm water facilities such as biofiltration swales and retention ponds. These types of facilities tend to minimize introduction of contaminants to underlying aquifers.

4.3.2.5 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. Many older wells that were constructed before the implementation of Washington Administrative Code (WAC) 173-160 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.

Public water supplies have served most of the Washougal since the 1930s and few private wells exist in this area. Therefore, unused and improperly constructed wells do not pose a significant risk to the City's supply sources.

The City is not currently using Wells 2, 3 and 4 at their Upper Wellfield. According to John Roth, City Water and Wastewater Manager, Wells 2 and 3 are capped and Well 4 still has a motor in place. Although the City largely controls land use at the wellfield, it may be prudent to consider abandoning these wells per WAC 173-150-381 if there is no intent to use them for future supply.

4.3.2.6 Agriculture, Golf Courses, Parks, and Lawns

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. 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-square-foot lawn. Landscaping activities can also be the source of pesticides and herbicides such as EDB, DBCP, and dicamba.

Both of the City's wellfields lie adjacent to city parks (Goot and Hathaway parks). Residential lawns and landscaping occur throughout Washougal's WHPA. These are potential sources of nitrogen, pesticide and herbicide contamination to the groundwater. The risk of groundwater contamination is high in the PAA because the aquifer is unconfined and groundwater is relatively shallow. Historical landscaping activities do not appear to have any impact on wellfield water quality but should be managed wherever possible to minimize future impacts.

4.3.2.7 Transportation Spills

Vehicles transporting hazardous material can be a source of groundwater contamination through accidents and resultant chemical spills. Hazardous materials are transported through Washougal on a daily basis. The major transportation routes include:

- SR-14
- Burlington Northern Santa Fe Railroad
- 3rd Avenue

All of these transportation corridors go through the City's wellhead protection capture zones and are very close to the individual supply wells. A major spill along any of these routes could adversely impact groundwater pumped from all of the City's Lower

Wellfield supply sources. Transportation spills pose little risk to the Upper Wellfield supply sources.

About 32 to 45 Burlington Northern Santa Fe (BNSF) freight trains pass through the Washougal area on a daily basis (pers. comm. Read Fay, BNSF). Approximately 120 train cars per day contain hazardous materials (including petrochemicals). Maximum speed of these trains does not exceed 45 to 50 miles per hour. These low speeds and the durability of the tank cars minimize the possibility of a spill in the unlikely event of a derailment. However, an uncontrolled crossing in the City of Camas, approximately 0.4 miles west of the Lower Washougal Wellfield presents some added risk. BNSF has their own spill response plan and contracts with local firms to handle any hazardous material problems. In the event of a derailment and release, the highly permeable nature of the sediments in the vicinity of the wellfield may make containment and protection of the aquifer difficult. It is worth noting that in a worse case scenario, a release from a single train car could result in the nearly permanent loss of the Lower Wellfield as a source of potable water.

Because all gasoline powered vehicles carry some risk of a contaminant release, even relatively small roads pose some risk to water supply wells. This is especially true when the distance between the roads and the wells becomes small, and when the underlying aquifer has high susceptibility. For this reason, the Washington State Department of Health (DOH) generally discourages placement of roads within the sanitary control radius (SCA) of public water system wells. We understand that the City of Camas is exploring the possibility of providing access to the Anderson Property via a road that would be constructed along the north side, and within the SCA of Washougal's Lower Wellfield. Engineering controls such as storm water collection systems could reduce the risk associated with such a road. Such design considerations would need to be evaluated by DOH before a road could be constructed within the Lower Wellfield SCA.

4.4 Wellhead Susceptibility/Vulnerability Analysis

The sensitivity of the City's groundwater sources to potential contamination was evaluated by assessing the relative susceptibility and vulnerability of the City's Lower and Upper wellfield areas. 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.

4.4.1 Alluvial Aquifer – Lower Washougal Wellfield

As described in Section **2.2.1**, the PAA occurs in the floodplains of the Columbia and Washougal rivers and is predominantly comprised of permeable sand, gravel and cobble deposits. Reported depth to groundwater in the aquifer is as little as 30 feet below land surface in supply wells completed at the City's wellfields. While some fine-grained or cemented 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 layer exists between the land surface and the water table to protect the PAA from contaminants released at the land surface. The aquifer is therefore considered to exhibit relatively high susceptibility.

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 substantially 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 and oxides; (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 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 groundwater quality monitoring has detected minimal contamination 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. 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.

Aquifer vulnerability is typically expressed as a risk factor, calculated by multiplying ratings reflecting the ease of contaminant transport to the water table (susceptibility) by the potential for contaminant releases at the land surface. Thus, the risk of groundwater contamination depends on both the hydrogeologic framework and the activities conducted at the land surface. In the case of Washougal, the PAA should be considered *highly vulnerable* to potential contamination. While active, known/confirmed sources of groundwater contamination are limited, potential sources of contamination include:

- Known and unknown UST's and LUST's
- Hazardous waste generators
- Industrially or commercially zoned areas and related parcels of concern
- Dry wells and septic systems
- Transportation spills
- Other potential sources

Contingency and Spill Response Planning

4.5 Introduction

WAC 246-290-135 (Source Water Protection) requires that Wellhead Protection Plans include a contingency plan to ensure consumers have an adequate supply of potable water in the event that contamination results in the temporary or permanent loss of the principal source of supply (major well(s) or wellfield). A contingency plan is particularly important for the City of Washougal due to the concentration of the primary sources of supply in a relatively small area (Lower Wellfield), and the highly susceptible nature of the aquifer in that area.

4.6 Sources and Demand

Current and estimated year 2030 peak daily demands are 3.7 and 6.0 million gallons per day (mgd) respectively. The current capacity of all the system's active wells is 8.6 mgd, which is sufficient to provide peak capacity in the year 2030. Specific individual well capacities are listed in **Table 1.**

4.7 Potential Source Loss Scenarios

The loss of one of the City's supply wells due to contamination or other problems will result in a reduction in the overall system production capacity. However, the loss of even the systems largest capacity well (Well 12, 1500 gpm) would not result in an inability to meet current or future demands. Only the simultaneous loss of multiple wells (or other related infrastructure) could result in the city experiencing an inability to meet demand.

Risk of losing multiple wells from a single contamination release arises from the fact that most of the City's wells are clustered in close proximity to each other and may be susceptible to the same contamination event. Most of the City's current supply is provided by the Lower Wellfield. As discussed in Section **4.3.2.7**, the Lower Wellfield is at risk from spill / contaminant release along the BNSF railroad corridor.

The current combined capacity of the Lower Wellfield is 6.7 mgd, compared to the Upper Wellfield capacity of 1.9 mgd. In the event that the City's Lower Wellfield became inoperable due to a major contaminant release, the City could have difficulty meeting their entire water demand from the Upper Wellfield alone. In this event, the City would need to rely on its two interties with the City of Camas. The capacity of these interties to meet this sort of catastrophic loss has not been evaluated. Hydraulic modeling of a worst case scenario should be completed to assess the ultimate reliability of the system under summer peaking demands.

A worst case scenario (loss of the Lower Wellfield) event could be handled more effectively if the City possessed more balanced redundancy in terms of spatial distribution of production capacity. Development of an additional wellfield located in a different area from the Lower Wellfield could provide such redundancy.

The Cities of Camas and Washougal are currently working towards development of a regional wellfield supply source near the Steigerwald Wildlife Refuge southeast of Washougal (**Figure 1**). To date, the Cities have installed two test wells and completed other hydrogeologic characterization and modeling that demonstrates the viability of developing at least 15 mgd from this area (PGG, 2007). The Cities have also submitted a joint application (G2-30528) to the Department of Ecology that requests 17,213 gpm and 13,555 ac-ft/yr to meet the City's long term growth targets beyond the 20-year planning horizon. Development of the Steigerwald wellfield will likely be initiated in the next 10 to 15 years.

4.8 Spill Response Planning

The results of the susceptibility assessment should be utilized by local emergency responders to evaluate whether changes in spill / incident response measures are needed to better protect groundwater quality within the WHPA. Spill response plans related to the BNSF railroad corridor in the vicinity of the Lower Wellfield should receive a high level of attention.

5 References

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Table 1. Summary Information for Active Washougal Production Wells

Lower Wellfield	Elevation (ft-msl)	Type of Completion	Open Interval Top (ft-bgs)	Open Interval Bot (ft-bgs)	SWL (ft-bgs)	SWL Date	Well Cap. (gpm)
Well 5	50	Perf	84.5	98	29	6/1/1954	650
Well 6	50	Perf	84	94	43.5	1942	675
Well 7	50	Perf	80	94	33	7/10/1947	850
Well 11	50	Screen	66	97	41.1	1/26/1984	1000
Well 12	50	Screen	72	82	44.6	7/20/2007	1500
Upper Wellfield							
Well 1	90	Unknown	??	< 128	??		925
Well 10	94	Screen	88.5	113.5	64.2	2/3/1984	400

Table 2. Washougal Supply Well Pumping Rates for WHP Capture Zone Modeling

Lower Wellfield	Instantaneous (Qi) Rate (gpm)	Average Annual Rate (gpm)
Well 5	650	254
Well 6	675	264
Well 7	850	332
Well 11	1,000	391
Well 12	1,500	587
Subtotal	4,675	1,829
Upper Wellfield		
Well 1	925	362
Well 10	400	156
Subtotal	1,325	518
Totals	**6,000**	**2,347**

Table 3. Summary of Land Use Types of Concern

Parcel Land-Use Description	Number of Parcels Within WHPZs
Auto Body Shop	1
Bio-Filtration Swales/Ponds	1
Drive Through Car Wash	7
Electric power operating, maintenance, and repair building.	1
Feedlots.	1
Fleet Operation Centers & Storage	5
General repair & service garages	7
Mfg - Lumber & Wood Products	1
Parking Lot: Gravel, for adjoining building	3
SERVICE REPAIR SHOP	7
Service Station w/ Tanks & Pumps or Card Lock Station	1
Tires (includes retread tires), batteries, parts and accessories dealers	3
Veterinarians / Small Animal Hospitals.	1

Table 4. Summary Data for Parcels of Concern within Wellhead Protection Capture Zones

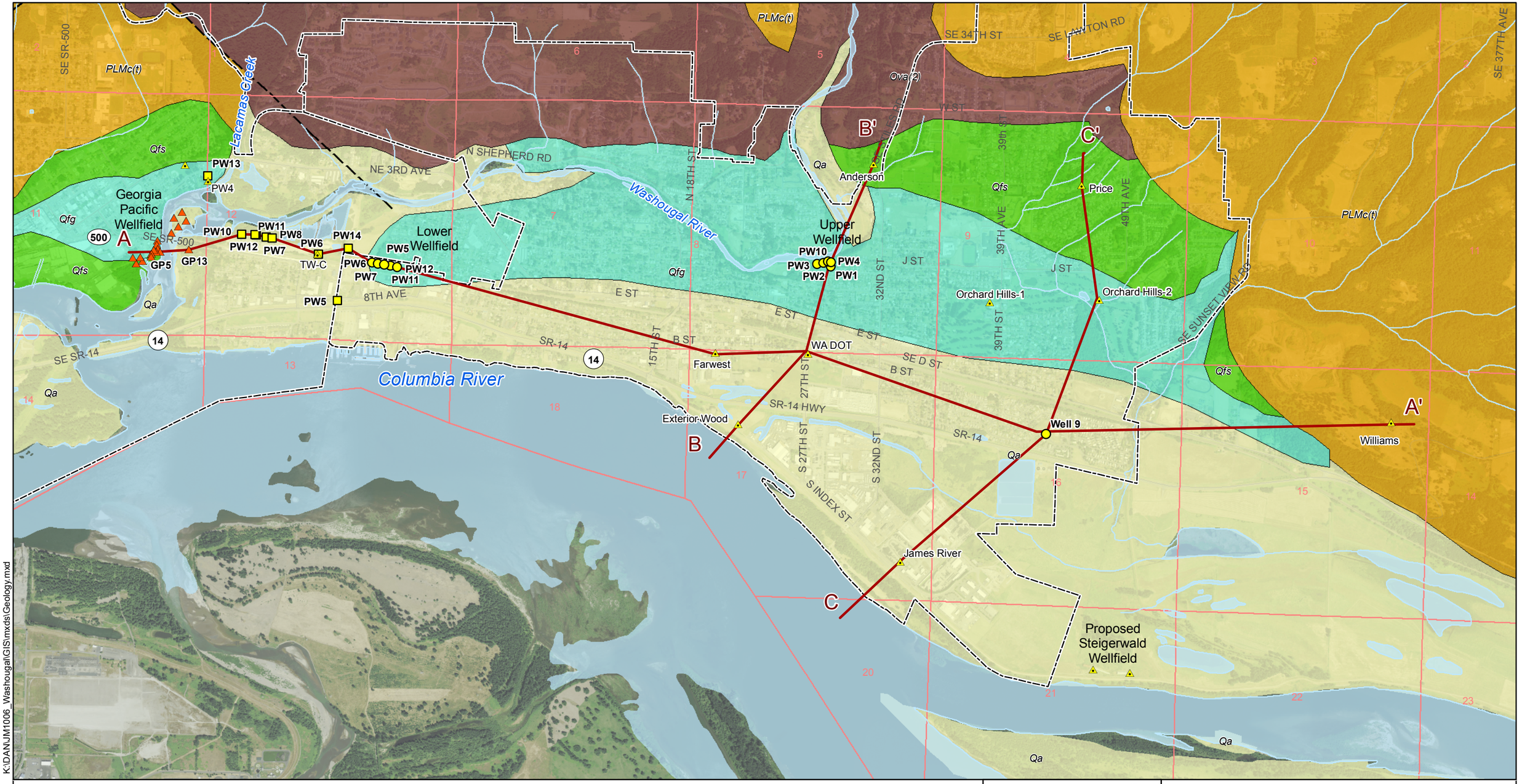
Parcel Serial Number	Owner Name	Owner Address	Site Address	Legal Description	Buisness Description	Zoning Abbreviation	WHPZ
131880000	SCHMID FAMILY LIMITED PARTNERSHIP I	PO BOX 66028, VANCOUVER, WA 98666	1407 32ND ST WASHOUGAL	#16 OF C C STILES DLC 20.65A	Fleet Operation Centers & Storage	R1-10	6-Month
75357051	M & M CARWASH INC	PO BOX 832, BORING, OR 97009	WASHOUGAL	R B JOHNSTON TRACTS LOT 14 BLK 2	Drive Through Car Wash	CV	6-Month
75357050	M & M CARWASH INC	PO BOX 832, BORING, OR 97009	469 E ST WASHOUGAL	R B JOHNSTON TRACTS LOT 13 BLK 2	Drive Through Car Wash	CV	6-Month
91045652	MANBER MIRIAM TRUST 1/3 INT	CSK AUTO CORP STORE #3146, CHICAGO, IL 60606	3440 NE 3RD AVE CAMAS	WEIR PARK LOTS 3 & 4 BLK 5	Tires (includes retread tires), batteries, parts and accessories dealers	RC	6-Month
91045666	FOUNTAIN ROBERT & FOUNTAIN NANCY	114 SE WEIR ST, CAMAS, WA 98607	114 NE WEIR ST CAMAS	WEIR PARK LOT 16 BLK 5	General repair & service garages	RC	6-Month
73134116	D3RW LLC	455 C ST, WASHOUGAL, WA 98671	453 C ST WASHOUGAL	#116 DAVID C PARKER DLC 1.11A	Parking Lot: Gravel, for adjoining building	CH	6-Month
71355005	TOWNSEND GREG & TOWNSEND MONICA	401 6TH ST, WASHOUGAL, WA 98671	401 6TH ST WASHOUGAL	#26-A #453-A #624-A #619-A #640-A AKA LOT 2 SP2-554 1.04A	Veterinarians / Small Animal Hospitals.	CH	6-Month
73134155		40220 SE GIBSON RD, WASHOUGAL, WA 98671	450 C ST WASHOUGAL	#155 D C PARKER DLC .38A	SERVICE REPAIR SHOP	CH	6-Month
75357048	M & M CARWASH INC	PO BOX 832, BORING, OR 97009	469 E ST WASHOUGAL	R B JOHNSTON TTS LOT 12 BLK 2	Drive Through Car Wash	CV	6-Month
91045584	KITTERMAN LLC 45.6%	811 NE 112TH AVE SUITE 104, VANCOUVER, WA 98662	CAMAS	WEIR PARK #1 LOT 8 BLK 1	Parking Lot: Gravel, for adjoining building	RC	6-Month
91045582	KITTERMAN LLC 45.6%	811 NE 112TH AVE SUITE 104, VANCOUVER, WA 98662	CAMAS	WEIR PARK #1 LOT 7 BLK 1	Parking Lot: Gravel, for adjoining building	RC	6-Month
75357049	M & M CARWASH INC	PO BOX 832, BORING, OR 97009	WASHOUGAL	R B JOHNSTON TT LOT 12 BLK 2 (SEE 075357-048-050 LAND AV)	Drive Through Car Wash	CV	6-Month
75359586	RADFORD BRIAN J	3000 H ST, WASHOUGAL, WA 98671	730 E ST WASHOUGAL	MIDLAND ACRE REPLT BLKS 1-5 & TTA #2 LTS 24 Z 26 BLK 1	General repair & service garages	CC	1-Year
71360000	HIGGINSON BLAINE & HIGGINSON BRIAN	984 WASHOUGAL RIVER RD, WASHOUGAL, WA 98671	984 WASHOUGAL RIVER RD WASHOUGAL	#19C OF RICHARD OUGH DLC .50A	SERVICE REPAIR SHOP	R1-10	5-Year
71741000	REHR RYAN N	1005 I STREET, WASHOUGAL, WA 98671	1005 I ST WASHOUGAL	#589 OF RICHARD OUGH DLC .35A	Feedlots.	R1-7.5	5-Year
131901042	CITY OF WASHOUGAL	1701 C ST, WASHOUGAL, WA 98671	WASHOUGAL	AUTUMN SLOPE TT A SUB 2004	Bio-Filtration Swales/Ponds	R1-10	5-Year
75359646	WASHOUGAL SCHOOL DIST #112	2349 B ST, WASHOUGAL, WA 98671	WASHOUGAL	MIDLAND ACRE REPLAT BLKS 1-5 & TT A #2 LOT 2 BLK A	Fleet Operation Centers & Storage	CC	5-Year
75359644	WASHOUGAL SCHOOL DIST #112	2349 B ST, WASHOUGAL, WA 98671	995 E ST WASHOUGAL	MIDLAND ACRES REPLAT BLKS 1-5 & TT A #1 LOT 2 BLK A	Fleet Operation Centers & Storage	CC	5-Year
75358010	WASHOUGAL SCHOOL DIST #112	2349 B ST, WASHOUGAL, WA 98671	971 E ST WASHOUGAL	ELLS SUB-DIV LOT 1	Fleet Operation Centers & Storage	CC	5-Year
71622000	WASHOUGAL SCHOOL DIST #112	2349 B ST, WASHOUGAL, WA 98671	WASHOUGAL	#420 OF RICHARD OUGH DLC	Fleet Operation Centers & Storage	CC	5-Year
71886000	JENSEN RONALD & JENSEN DONNA TRUSTEE	1076 N SHEPHERD RD, WASHOUGAL, WA 98671	1022 E ST WASHOUGAL	#777 RICHARD OUGH DLC	SERVICE REPAIR SHOP	CC	5-Year
71717002	MAHRE DONALD A (C/S)	1403 SE 283RD AVE, CAMAS, WA 98607	1315 E ST WASHOUGAL	#553 OF RICHARD OUGH DLC .14A	SERVICE REPAIR SHOP	CC	5-Year
71559000	MALFAIT RONALD & MALFAIT SHERYL	31914 SE 17TH ST, WASHOUGAL, WA 98671	1022 E ST WASHOUGAL	#315 OF RICHARD OUGH DLC	Drive Through Car Wash	CC	5-Year
71592000	MALFAIT RONALD & MALFAIT SHERYL	31914 SE 17TH ST, WASHOUGAL, WA 98671	WASHOUGAL	#367 OF RICHARD OUGH DLC	Drive Through Car Wash	CC	5-Year
71666000	MALFAIT RONALD & MALFAIT SHERYL	31914 SE 17TH ST, WASHOUGAL, WA 98671	1138 E ST WASHOUGAL	#473 OF RICHARD OUGH DLC	General repair & service garages	CC	5-Year
71706000	MALFAIT RONALD & MALFAIT SHERYL	31914 SE 17TH ST, WASHOUGAL, WA 98671	1204 E ST WASHOUGAL	#530 OF RICHARD OUGH DLC .25A	Tires (includes retread tires), batteries, parts and accessories dealers	CC	5-Year
71678002	VAUGHN PATRICIA	462 LILLIAN LN, ROSEBURG, OR 97470	1351 E ST WASHOUGAL	#487 OF RICHARD OUGH DLC .23A	Motor vehicle dealers, used cars and small trucks.	CC	5-Year
71680000	MALFAIT RONALD S	31914 SE 17TH ST, WASHOUGAL, WA 98671	1250 E ST WASHOUGAL	#489 OF RICHARD OUGH DLC .22A	Service Station w/ Tanks & Pumps or Card Lock Station	CC	5-Year
73134153	HAMBLETON BROS LUMBER CO	PO BOX 285, WASHOUGAL, WA 98671	335 S A ST WASHOUGAL	#153, #154, #178 DAVID C. PARKER DLC 14.91 A	Mfg - Lumber & Wood Products	CH	CARA
96158768	BUCK STEVEN E	PO BOX 324, WASHOUGAL, WA 98671	921 4TH ST WASHOUGAL	RIVERSIDE ESTATES LOT 5 SUB 96	Auto Body Shop	CC	CARA
91045167	SONDEREN ENTERPRISES LLC	6590 SW LOMBARD AVE, BEAVERTON, OR 97008	3136 NE 3RD AVE CAMAS	#176-A DAVID C PARKER DLC 2.13A	Tires (includes retread tires), batteries, parts and accessories dealers	RC	CARA
75130000	WEISSERT JEFFREY B & WEISSERT DOROTHY	33134 SE 34TH ST, WASHOUGAL, WA 98671	540 WASHOUGAL RIVER RD WASHOUGAL	WRIGHTS ADDN WASHOUGAL LOT 4 BLK 1	Mfg - Rubber & Plastic Products	CC	CARA
127950000	CLARK PUBLIC UTILITIES	PO BOX 8900, VANCOUVER, WA 98668	WASHOUGAL	#115 DAVID C PARKER DLC .96A	Electric power operating, maintenance, and repair building.	CH	CARA
71527002	R & T AUTO BODY INC	1434 E ST, WASHOUGAL, WA 98671	1434 E ST WASHOUGAL	#275 OF RICHARD OUGH DLC	General repair & service garages	CC	CARA
71528000	R & T AUTO BODY INC	1434 E ST, WASHOUGAL, WA 98671	1434 E ST WASHOUGAL	#276 OF RICHARD OUGH DLC	General repair & service garages	CC	CARA
71910000	SAMPLE RONALD N & LILJA-SAMPLE NANCY	2100 NE 249TH AVE, CAMAS, WA 98607	WASHOUGAL	#803 RICHARD OUGH DLC	General repair & service garages	CC	CARA
71505000		0 1628 E ST, WASHOUGAL, WA 98671	1628 E ST WASHOUGAL	#242 OF RICHARD OUGH DLC	Motor vehicle dealers, used cars and small trucks.	CC	CARA
71792000	HATTEN RANDALL & HATTEN BRENDA	PO BOX 141, WASHOUGAL, WA 98671	1320 E ST WASHOUGAL	#662 OF RICHARD OUGH DLC .31A	SERVICE REPAIR SHOP	CC	CARA
71683000	COLUMBIA ELECTRIC INC	PO BOX 473, WASHOUGAL, WA 98671	1338 E ST WASHOUGAL	#496 OF RICHARD OUGH DLC .21A	SERVICE REPAIR SHOP	CC	CARA
71832000	VAUGHN PATRICIA	462 LILLIAN LN, ROSEBURG, OR 97470	1405 E ST WASHOUGAL	#714 RICHARD OUGH DLC .23A	General repair & service garages	CC	CARA
71543000	VAUGHN PATRICIA	462 LILLIAN LN, ROSEBURG, OR 97470	1423 E ST WASHOUGAL	#293 OF RICHARD OUGH DLC	SERVICE REPAIR SHOP	CC	CARA
71542000	BKS ENTERPRISES INC	1641 E ST, WASHOUGAL, WA 98671	1641 E ST WASHOUGAL	#292 OF RICHARD OUGH DLC	Drive Through Car Wash	CC	CARA

Table 5. Summary of Environmental Sites within Wellhead Protection Capture Zones

Map ID	FS ID	Facility Name	Zone	Release	Affected Media[1]	Leaking Underground Storage Tank	Cleanup Site	Hazardous Materials	Underground Storage Tank	Halogenated Organics[2]	Petroleum Products[2]
1	18768638	All Seasons Auto Centers Inc Camas	6-Months	N		N	N	**Y**	N		
5	64124152	Brass Lamp Motor Inn	6-Months	N		N	N	**Y**	N		
15	37125488	Columbia Warehouse	6-Months	N		N	N	**Y**	**Y**		
18	**85837922**	**Goodyear Tire Camas**	**6-Months**	**Y**	**SL**	**Y**	**Y**	N	**Y**	**R**	**C**
28	52218486	Schucks Auto Supply Camus	6-Months	N		N	N	**Y**	N		
29	3264254	Tarr Inc Washougal	6-Months	N		N	N	**Y**	N		
34	16327542	Washougal Electric & Sheet Metal Inc	1-Year	N		N	N	N	**Y**		
37	57872946	Washougal Shell	1-Year	N		N	N	N	**Y**		
11	95756539	Clark County Pub Wks Washougal Site	5-Year	N		N	N	N	**Y**		
25	49392144	Overton Mfg Inc	5-Year	N		N	N	**Y**	N		
36	48371594	Washougal School Dist Bus Garage	5-Year	N		N	N	N	**Y**		
3	94778244	Asher Engine Service	CARA	N		N	N	**Y**	N		
14	11338232	Columbia Storage Inc 2nd St	CARA	N		N	N	**Y**	N		
21	**22538744**	**Hi Way Fuel**	**CARA**	**Y**	**GW, SL**	**Y**	**Y**	N	**Y**		**C**
22	86429735	Jimbos Deli Mart 2	CARA	N		N	N	N	**Y**		
23	79581825	Napa Washougal	CARA	N		N	N	**Y**	N		
26	35533354	RD Wakefield Property	CARA	N		N	N	N	**Y**		
27	64113396	S & S Food Mart	CARA	N		N	N	**Y**	**Y**		
33	3811629	US DOE BPA Camas Substation	CARA	N		N	N	**Y**	N		

1) GW - Groundwater
SL - Soil

2) C - Confirmed
R - Remediated



K:\DANJM1006_Washougal\GIS\mxds\Geology.mxd

- Washougal Supply Well
- Camas Supply Well
- Georgia Pacific
- Other Wels
- City Limits

Geologic Units (DGER 100K)

- Qa - alluvium
- Qfs - outburst flood deposits, sand and silt, late Wisconsinan
- Qfg - outburst flood deposits, gravel
- PLM(t) - continental sedimentary deposits or rocks (Troutdale Formation)
- Ova(2) - Andesite flows

- Normal Fault
- Cross Section Alignment

0 Feet 2,000

N

2007 Aerial Photo from Clark County

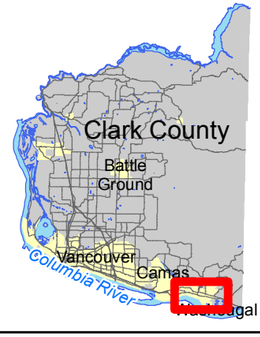
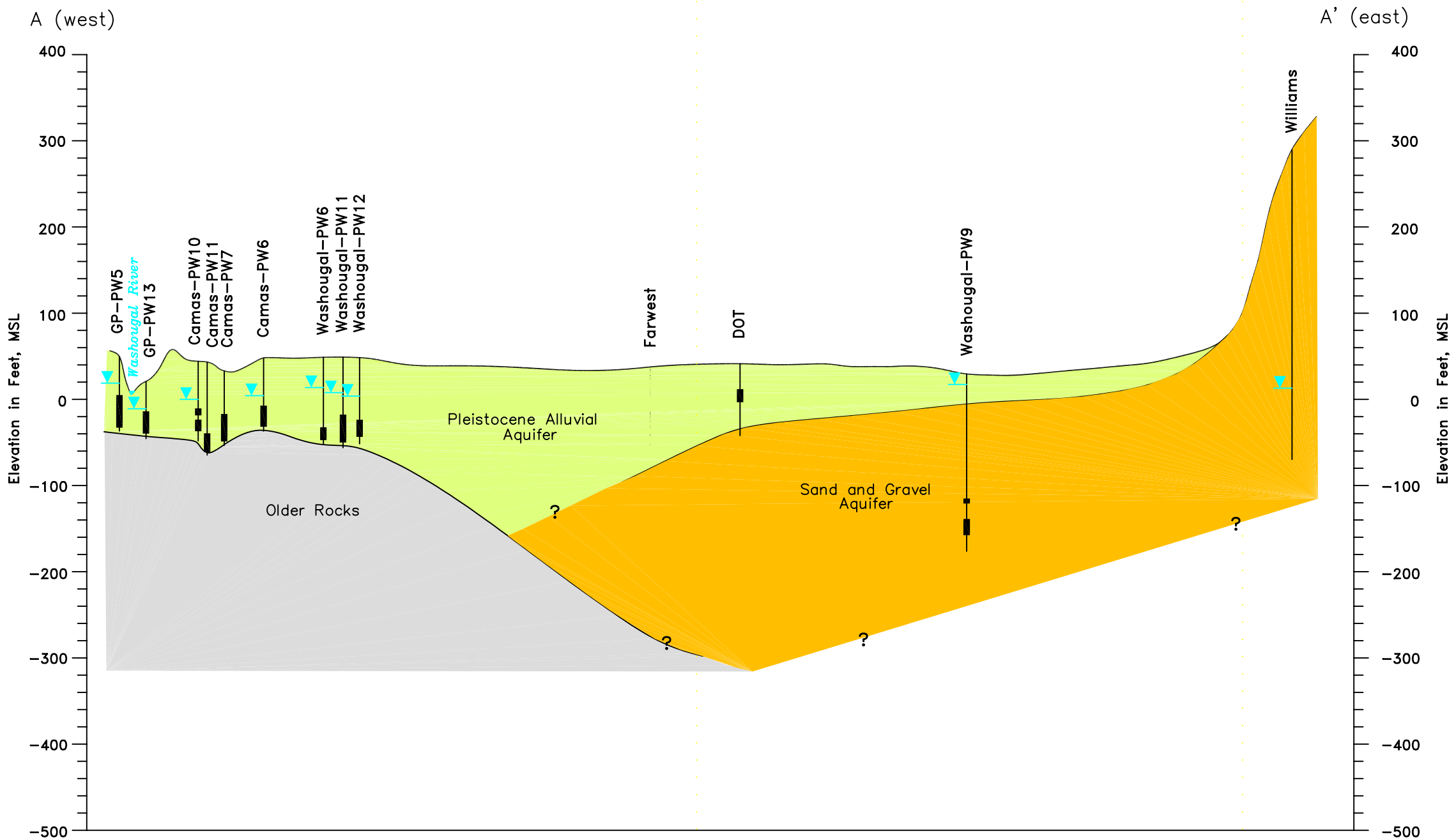


Figure 1
Surficial Geology, Cross Section & Wellfields

Washougal Wellhead Protection Plan

PgG



LEGEND

- Pleistocene Alluvial Aquifer
- Sand and Gravel Aquifer
- Older Rocks
- Well Water Level
- Well Completion Interval

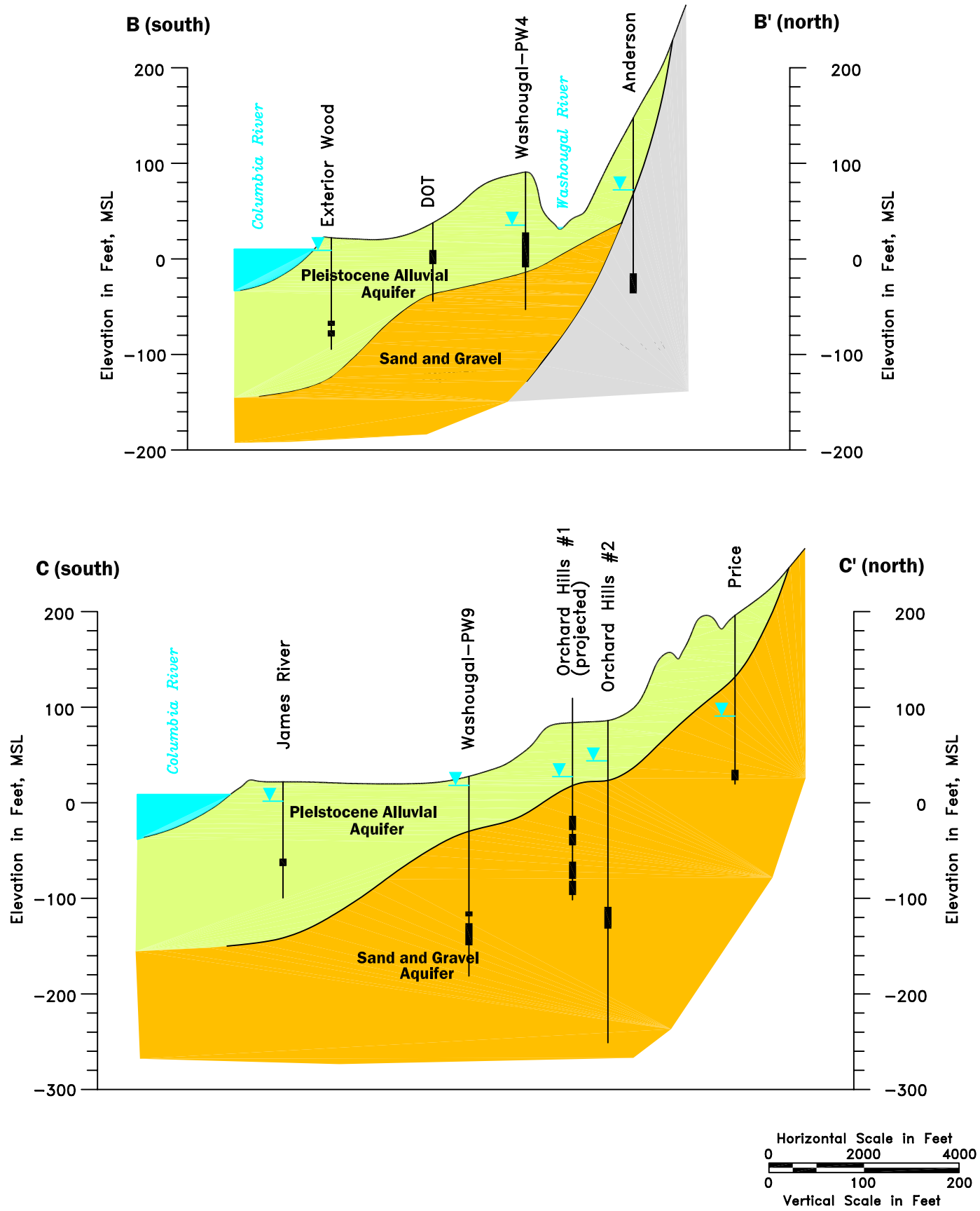
Horizontal Scale in Feet
0 2000 4000
0 100 200
Vertical Scale in Feet

FIGURE 2
Hydrogeologic Cross Section A-A'

Washougal Wellhead Protection Plan

JH1006, XSECA_1.DWG, March/2011

PgG



LEGEND

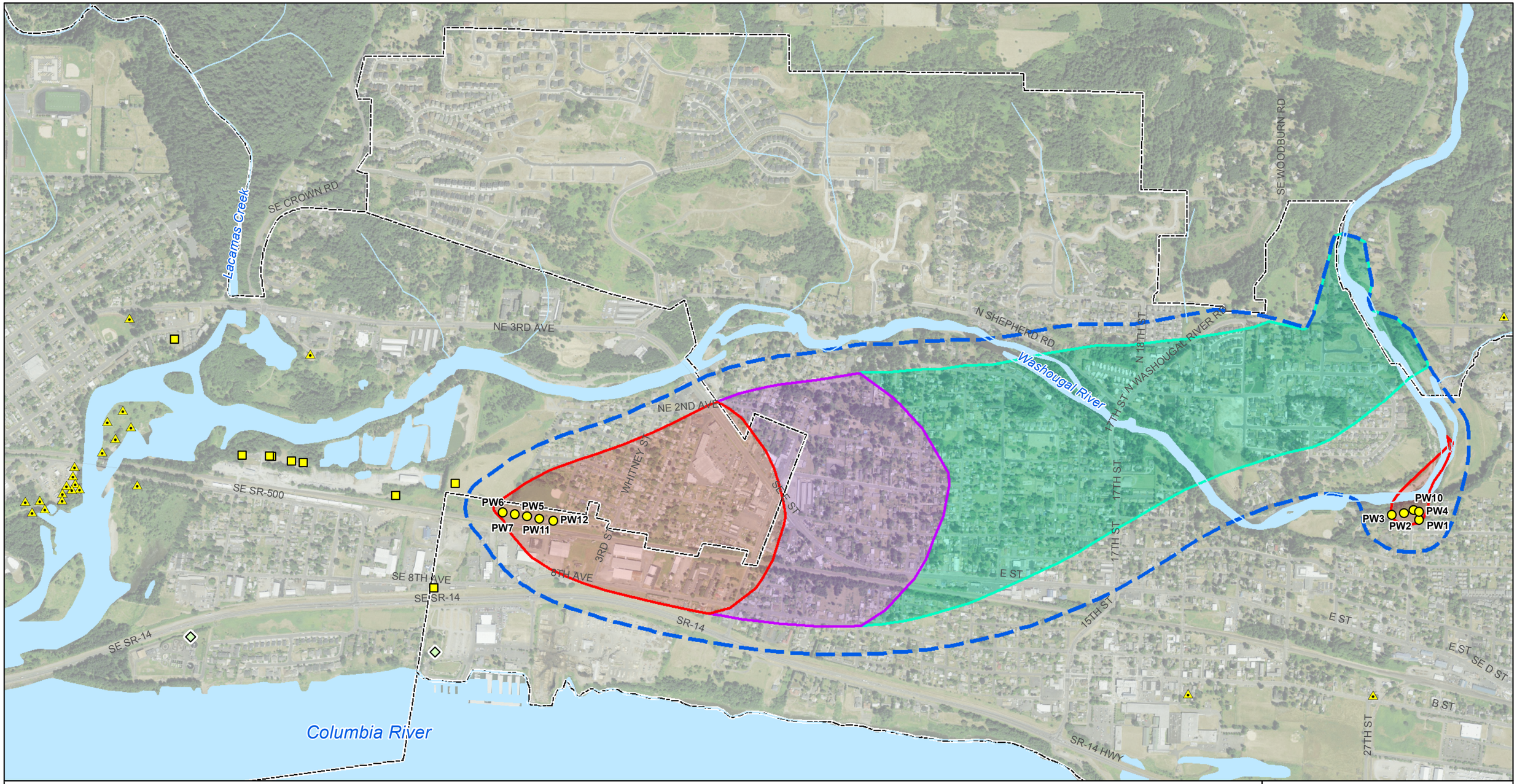
- Pleistocene Alluvial Aquifer
- Sand and Gravel Aquifer
- Older Rocks
- Well Water Level
- Well Completion Interval

FIGURE 3
Hydrogeologic Cross Sections
B-B' and C-C'

Washougal Wellhead Protection Plan

JM1006, XSECB&C_1.DWG, March/2011

PgG



Washougal Supply Well

Camas Supply Well

Camas Proposed Supply Well

Other Wells

Wellhead Protection Capture Zones

6 Month Capture Zone

1 Year Capture Zone

5 Year Capture Zone

Critical Aquifer Recharge Area (CARA)

City Limits

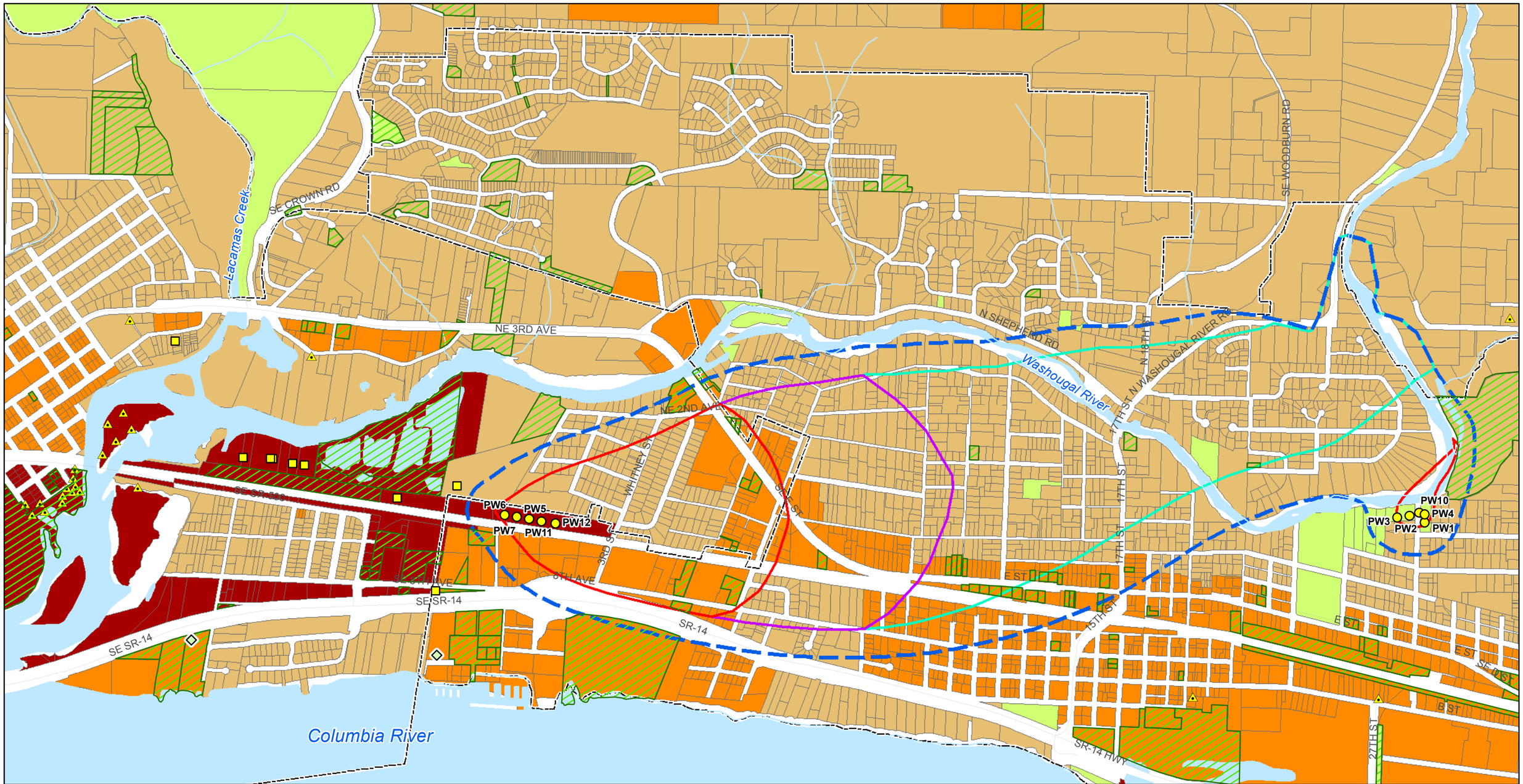
0 Feet 1,000

N

Figure 4
Wellhead Protection Capture Zones

Washougal Wellhead Protection Plan

PgG



Zoning Categories
- Industrial
- Residential
- Commercial
- Park/OS/Public

- Parcels of Concern
- City Limits

- Washougal Supply Well
- Camas Supply Well
- Camas Proposed Supply Well
- Other Wells

- Critical Aquifer Recharge Area (CARA)
- 6 Month Capture Zone
- 1 Year Capture Zone
- 5 Year Capture Zone

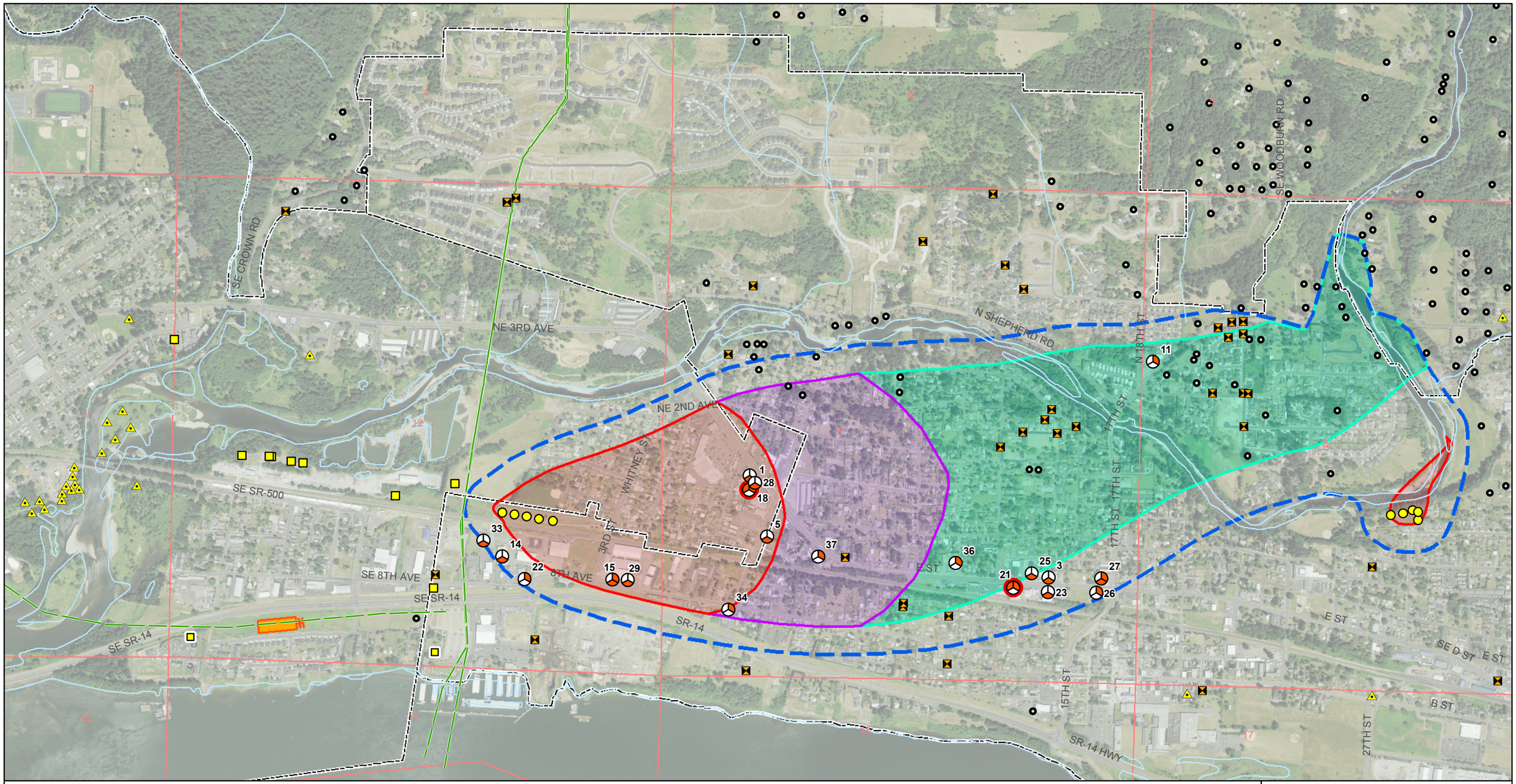
0 Feet 1,000

N

Figure 5
Zoning Categories

Washougal Wellhead Protection Plan

PgG



DOE Sites of Concern

Table 5 ID → 11

Cleanup Site → UST/LUST

Hazardous Materials

Refer to Section 4.3 and Table 5 for description.

- Septic Systems
- Drywells
- Gas Transmission Pipelines
- WSDOT Infiltration Area
- Camas Supply Well
- Camas Proposed Supply Well
- Washougal Supply Well
- Other Wells
- City Limits
- Critical Aquifer Recharge Area (CARA)

Wellhead Protection Capture Zones

- 6 Month Capture Zone
- 1 Year Capture Zone
- 5 Year Capture Zone

N

0 Feet 1,000

2007 Aerial Photo from Clark County

Figure 6
Hazardous Sites

Washougal Wellhead Protection Plan

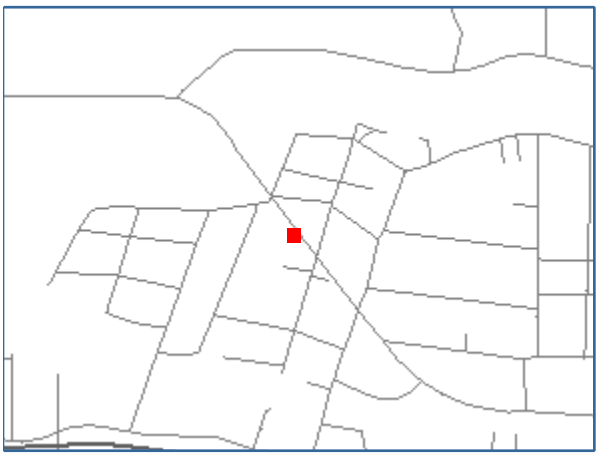
PgG

Appendix A

Environmental Sites Information

Facility/Site: 18768638 All Seasons Auto Centers Inc Camas

Also known as:



Larger Map



Larger Map

Address

3440 NE 3RD AVE

CAMAS WA 98607

Decimal Coordinates

Latitude: 45.58557

Longitude: -122.37007

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
Hazardous Waste Generator	HAZWASTE	(360) 407-6705	WAD027281427	10/30/1986	12/31/1996

Report generated on 09-29-2011

Industrial Codes (External Links Below)

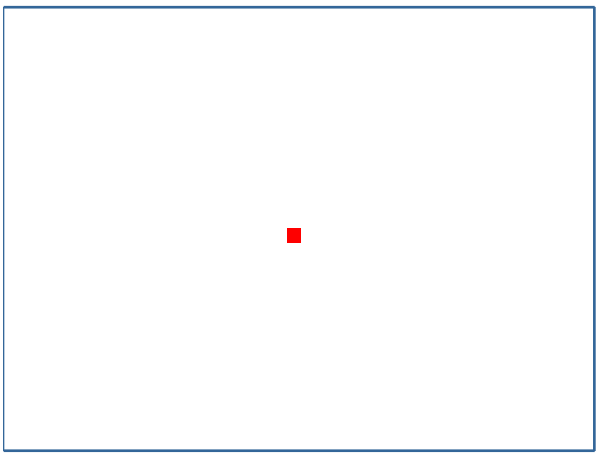
No NAICS information is available for this facility site.

SIC Code	SIC Description
7538	GENERAL AUTOMOTIVE REPAIR SHOPS

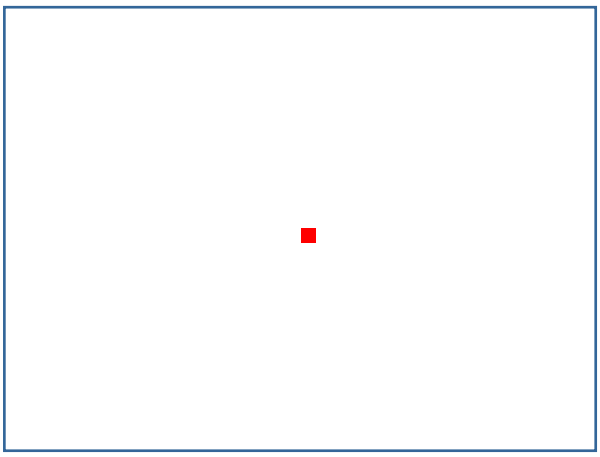
Report generated on 09-29-2011

Facility/Site: 64124152 Brass Lamp Motor Inn

Also known as:



Larger Map



Larger Map

Address

544 6TH ST

WASHOUGAL WA 98671

Decimal Coordinates

Latitude: 45.58158

Longitude: -122.36917

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
Hazardous Waste Generator	HAZWASTE	(360) 407-6705	WAD988498952	12/30/1991	12/31/1991

Report generated on 09-29-2011

Industrial Codes (External Links Below)

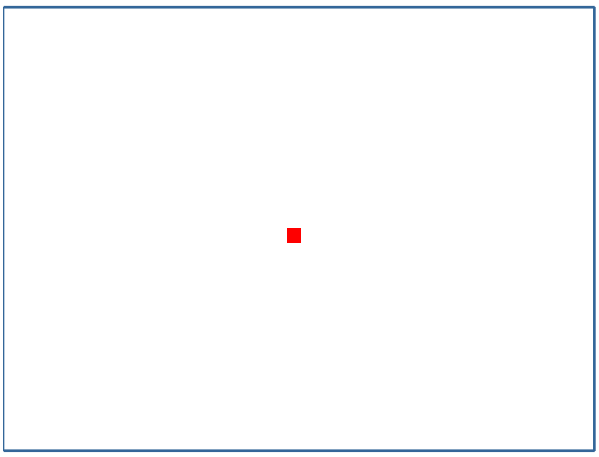
No NAICS information is available for this facility site.

SIC Code	SIC Description
9511	AIR, WATER, & SOLID WASTE MANAGEMENT

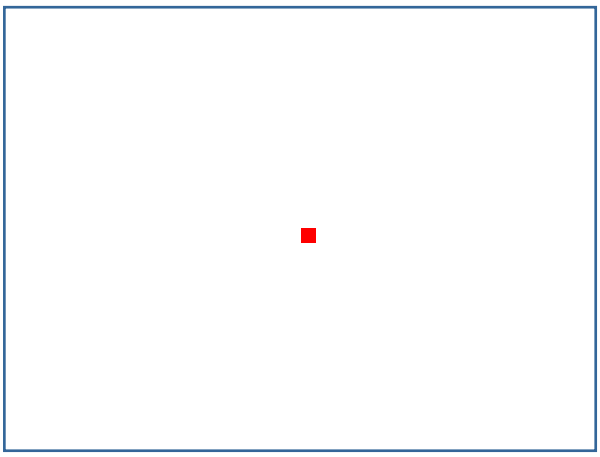
Report generated on 09-29-2011

Facility/Site: COLUMBIA WAREHOUSE 37125488

Also known as: COLUMBIA STORAGE INC C ST



Larger Map



Larger Map

Address

361 C ST

WASHOUGAL WA 98671

Decimal Coordinates

Latitude: 45.58079

Longitude: -122.37573

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
Underground Storage Tank	TOXICS	(360) 407-7224	6085	6/8/1998	3/22/2000

Report generated on 09-29-2011

Emergency/Haz Chem Rpt TIER2	HAZWASTE	(360) 407-6729	CRK000036900	1/1/1993

Industrial Codes (External Links Below)

No NAICS information is available for this facility site.

SIC Code	SIC Description
4225	GENERAL WAREHOUSING AND STORAGE

Report generated on 09-29-2011

Regulated Underground Storage Tanks Site List

CLARK COUNTY, Washougal | **Site Name: COLUMBIA WAREHOUSE**

Facility-Site ID: 37125488
UST Site ID: 6085

Location: 361 C ST PO BOX 530
Washougal, 98671

Responsible Unit: SOUTHWEST
Lat / Long: 45.58079 -122.37573

Tank Name	Tank Status	Install Date	Capacity Range	Compartment #	Substance Stored
TANK #1	Removed	12/31/1964		1	
TANK #2	Closed in Place	12/31/1964		1	
TANK #3	Removed	12/31/1964	111 TO 1,100 Gallons	1	Leaded Gasoline

[Report: TCP_web_reporting/RegulatedUSTs.rdl]

Clark COUNTY

Storage Tank: TANK #1

Tank ID: 41310

SITE INFORMATION

Site ID: 6085 **Site Tag #: none**
COLUMBIA WAREHOUSE
361 C ST PO BOX 530
WASHOUGAL, WA 98671
Phone #: (206) 835-8351 **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 37125488
COLUMBIA WAREHOUSE
361 C ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 50.8" / -122° 22' 32.6°

TANK INFORMATION

TANK NAME: TANK #1 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
December 31, 1964	August 6, 1996		No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Steel	Coated Steel
CONSTRUCTION :	Single Wall Tank	
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1			

Storage Tank: TANK #2

Tank ID: 41414

SITE INFORMATION

Site ID: 6085 **Site Tag #: none**
COLUMBIA WAREHOUSE
361 C ST PO BOX 530
WASHOUGAL, WA 98671
Phone #: (206) 835-8351 **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 37125488
COLUMBIA WAREHOUSE
361 C ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 50.8" / -122° 22' 32.6°

TANK INFORMATION

TANK NAME: TANK #2 **Status :** Closed in Place **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
December 31, 1964	August 6, 1996		No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Steel	
CONSTRUCTION :	Single Wall Tank	
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1			

Clark COUNTY

Storage Tank: TANK #3

Tank ID: 41304

SITE INFORMATION

Site ID: 6085 **Site Tag #: none**
COLUMBIA WAREHOUSE
361 C ST PO BOX 530
WASHOUGAL, WA 98671
Phone #: (206) 835-8351 **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 37125488
COLUMBIA WAREHOUSE
361 C ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 50.8" / -122° 22' 32.6°

TANK INFORMATION

TANK NAME: TANK #3 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
December 31, 1964	August 6, 1996		No Closed Date Recorded

CAPACITY RANGE : 111 TO 1,100 Gallons
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

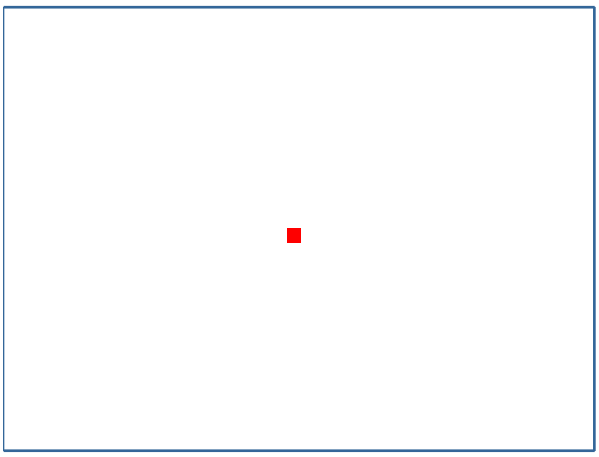
	TANK	PIPING
MATERIAL :	Steel	
CONSTRUCTION :		
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Leaded Gasoline		

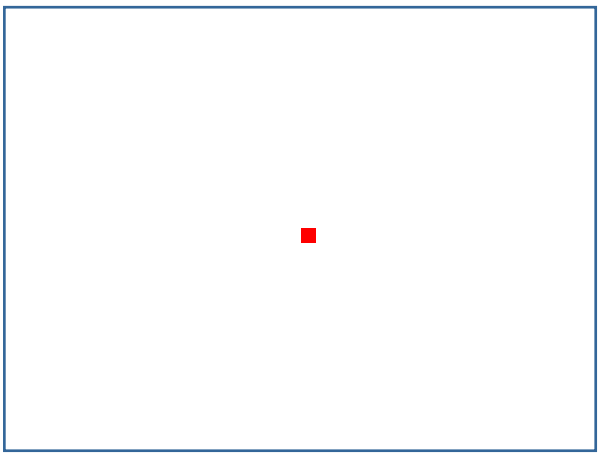
Report Information: Path TCP_Web_Reporting\TankDetails.rdl

Facility/Site: 85837922 GOODYEAR TIRE CAMAS

Also known as: GOODYEAR TIRE CAMAS, SCHUCKS AUTO SUPPLY



Larger Map



Larger Map

Address

3440 3RD AVE

CAMAS WA 98607

Decimal Coordinates

Latitude: 45.5838

Longitude: -122.36929

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
Voluntary Cleanup Sites	TOXICS	(360) 407-7224		8/3/2001	9/6/2001
LUST Facility	TOXICS	(360) 407-7224	496977	5/27/1999	9/6/2001

Report generated on 09-29-2011

Underground Storage Tank	TOXICS	(360) 407-7224	496977	5/10/1999	1/23/2007

Industrial Codes (External Links Below)

No NAICS information is available for this facility site.

SIC Code	SIC Description
5014	TIRES AND TUBES

Report generated on 09-29-2011

CLARK COUNTY

SITE I

GOODYEAR TIRE CAMAS

CleanupSite ID: **6772** FS ID: **85837922**

Alternate Name(s): GOODYEAR TIRE CAMAS, SCHUCKS AUTO SUPPLY

LOCATION:

Address: **3440 3RD AVE**
CAMAS **98607**

Lat/Long: **45.58380** **-122.36929**
Township/Range/Section: **1N** **4E** **53**

Legislative District: **18**
Congressional District: **3**

STATUS:

Ecology Status: **No Further Action**
WARM BIN#:

Responsible Unit: **Southwest**
Site Manager: **Szyszkowski, Marcel**
Statute: **MTCA**

Is Brownfield?
Environmental Covenant?
Is PSI Site?

UST Site ID: **496977**
WRIA ID: **28**

NFA Received? **Yes** NFA Date: **9/4/2001** NFA Reason: **NFA-Voluntary Cleanup Program Review**

SITE ACTIVITIES:

Applies to:	Related ID (Unit-LUST-VCP)	Activity Display Name	Status	Start Date	End Date	Legal Mechanism	Performed By	Project Manager
CleanupSite		Site Discovery/Release Report Received			5/27/1999			Szyszkowski, Marcel
CleanupSite		Site Status Changed to NFA			9/4/2001			
CleanupSiteMilestoneType		Ecology Routine Cleanup	Completed	5/27/1999	9/13/1999	Independent	PLP	Szyszkowski, Marcel
Lust	5274	LUST - Notification		5/27/1999	5/27/1999			Rankine, Craig
Lust	5274	LUST - Report Received		10/6/1999	9/13/1999			
VcpProject	SW0350	VCP Application	Completed	8/3/2001				
VcpProject	SW0350	VCP Termination	Completed		3/7/2002			
VcpProject	SW0350	VCP Opinion on Cleanup Action	Cancelled					Szyszkowski, Marcel

AFFECTED MEDIA & CONTAMINANTS:

	Media:					
Contaminant:	**Ground Water**	**Surface Water**	**Soil**	**Sediment**	**Air**	**Bedrock**
Halogenated Organics			R			

	Petroleum-Other			C			

Key:

B - Below Cleanup Level
C - Confirmed Above Cleanup Level
S - Suspected

R - Remediated
RA - Remediated-Above
RB - Remediated-Below

DEPARTMENT OF ECOLOGY
State of Washington

No Further Action (NFA) Site List

9/29/2011

Facility Site ID	CS ID	Site Address	City, Zip	NFA Basis	Rank	VCP	NFA Date
CLARK COUNTY							
85837922	6772	GOODYEAR TIRE CAMAS 3440 3RD AVE	CAMAS, 98607	NFA-VCP Review		☑	09/04/2001

No Further Action (NFA) Report Legend

This report includes all sites previously on the *Confirmed & Suspected Contaminated Sites list* that have received a 'No Further Action' (NFA) determination. Data in this report are subject to change at any time.

Explanation of Column Headings:

CS ID = Cleanup Site ID number

Rank: Indicates the outcome of the WAshington Ranking Model or 'WARM'. The WARM rank is always a number between 1 and 5, with a 1 indicating the greatest assessed risk to human health and the environment and a 5 indicating the lowest assessed risk. A zero in this column indicates that the site is either on the federal national Priorities List (NPL) or is a sub-site or operable unit of an NPL site. NPL sites are ranked separately under the federal Hazard Ranking System (HRS).

VCP = Voluntary Cleanup Program. A 'check' in this column indicates that the cleanup was conducted under the Voluntary Cleanup Program.

Explanation of 'NFA Type' Choices:

Cleanup Complete = Cleanup completed, not on Hazardous Sites List (HSL)
NFA-SHA = NFA after Site Hazard Assessment (SHA)
NFA-IRAP Review = NFA following earlier IRAP (Independent Remedial Action Program) Review
NFA-II = NFA following Initial Investigation (II)
NFA-SHA, IRAP, or VCP = NFA after Assessment, IRAP Review, or Voluntary Cleanup
NFA-VCP Review = NFA following review under the Voluntary Cleanup Program
Prior Authority = Cleaned up under prior statutory authority (predates Model Toxics Control Act)
NFA-ECO SUP / Conducted Cleanup = NFA after Ecology-Supervised or Conducted cleanup
RC, IC = Restrictive Covenant(s) or Institutional Control(s) required
Historic LUST NFA = Historical data, NFA under Leaking Underground Storage Tank (LUST) program
II = NFA after Initial Investigation (II)

Regulated Underground Storage Tanks Site List

CLARK COUNTY, Camas | **Site Name: GOODYEAR TIRE CAMAS**

Facility-Site ID: 85837922
UST Site ID: 496977

Location: 3440 3RD AVE
Camas, 98607

Responsible Unit: SOUTHWEST
Lat / Long: 45.5838 -122.36929

Tank Name	Tank Status	Install Date	Capacity Range	Compartment #	Substance Stored
1	Removed	01/01/1900	1,101 to 2,000 Gallons	1	Diesel
2	Removed	01/01/1900	1,101 to 2,000 Gallons	1	Diesel
3	Removed	01/01/1964		1	Unleaded Gasoline
4	Removed	01/01/1900		1	Diesel
5	Removed	01/01/1964		1	Used Oil/Waste Oil

[Report: TCP_web_reporting/RegulatedUSTs.rdl]

Clark COUNTY

Storage Tank: 2

Tank ID: 496991

SITE INFORMATION

Site ID: 496977 **Site Tag #: none**
GOODYEAR TIRE CAMAS
3440 3RD AVE
CAMAS, WA 98607
Phone #: () - **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 85837922
GOODYEAR TIRE CAMAS
3440 3RD AVE
CAMAS, WA 98607
Lat/Long 45° 35' 1.67" / -122° 22' 9.44°

TANK INFORMATION

TANK NAME: 2 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
January 1, 1900	December 10, 1999		No Closed Date Recorded

CAPACITY RANGE : 1,101 to 2,000 Gallons
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :		
CONSTRUCTION :		
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Diesel		2500

Storage Tank: 3

Tank ID: 559713

SITE INFORMATION

Site ID: 496977 **Site Tag #: none**
GOODYEAR TIRE CAMAS
3440 3RD AVE
CAMAS, WA 98607
Phone #: () - **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 85837922
GOODYEAR TIRE CAMAS
3440 3RD AVE
CAMAS, WA 98607
Lat/Long 45° 35' 1.67" / -122° 22' 9.44°

TANK INFORMATION

TANK NAME: 3 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
January 1, 1964	February 21, 2001		No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Steel	
CONSTRUCTION :		
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline		500

Clark COUNTY

Storage Tank: 5

Tank ID: 559723

SITE INFORMATION

Site ID: 496977 **Site Tag #: none**
GOODYEAR TIRE CAMAS
3440 3RD AVE
CAMAS, WA 98607
Phone #: () - **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 85837922
GOODYEAR TIRE CAMAS
3440 3RD AVE
CAMAS, WA 98607
Lat/Long 45° 35' 1.67" / -122° 22' 9.44°

TANK INFORMATION

TANK NAME: 5 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
January 1, 1964	February 21, 2001		No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Steel	
CONSTRUCTION :		
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Used Oil/Waste Oil		275

Storage Tank: 1

Tank ID: 496985

SITE INFORMATION

Site ID: 496977 **Site Tag #: none**
GOODYEAR TIRE CAMAS
3440 3RD AVE
CAMAS, WA 98607
Phone #: () - **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 85837922
GOODYEAR TIRE CAMAS
3440 3RD AVE
CAMAS, WA 98607
Lat/Long 45° 35' 1.67" / -122° 22' 9.44°

TANK INFORMATION

TANK NAME: 1 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
January 1, 1900	December 10, 1999		No Closed Date Recorded

CAPACITY RANGE : 1,101 to 2,000 Gallons
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :		
CONSTRUCTION :		
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Diesel		2500

Clark COUNTY

Storage Tank: 4

Tank ID: 559718

SITE INFORMATION

Site ID: 496977 **Site Tag #: none**
GOODYEAR TIRE CAMAS
3440 3RD AVE
CAMAS, WA 98607
Phone #: () - **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 85837922
GOODYEAR TIRE CAMAS
3440 3RD AVE
CAMAS, WA 98607
Lat/Long 45° 35' 1.67" / -122° 22' 9.44°

TANK INFORMATION

TANK NAME: 4 **Status : Removed** **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
January 1, 1900	February 21, 2001		No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Steel	
CONSTRUCTION :		
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Diesel		500

Report Information: Path TCP_Web_Reporting\TankDetails.rdl

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

September 6, 2001

Mrs. Randi Val Morrison
CSK Auto, Inc.
645 East Missouri Avenue
Phoenix, AZ 85012

Dear Mrs. Morrison:

Re: Goodyear Site, Camas, Washington

Thank you for submitting the results of your independent remedial action(s) for review by the State of Washington Department of Ecology (Ecology). Ecology appreciates your initiative in pursuing this administrative option under the Model Toxics Control Act (MTCA).

Ecology's Toxics Cleanup Program has reviewed the following information regarding the Goodyear Site located at 3440 Third Avenue, Camas, Washington 98607:

1. Underground Storage Tank Closure Report for 3440 Third Avenue, Camas, WA 98607, dated September 13, 1999, by Professional Service Industries, Inc along with the Request for No Further Action Determination.

The above listed report will be kept in the Central Files of the Southwest Regional Office (SWRO) of Ecology for review by appointment only. Appointments can be made by calling the SWRO resource contact Sherri Greenup at (360) 407 6365.

Based upon the above listed information Ecology has determined that, at this time, the release of diesel, heavy oil, and other petroleum hydrocarbons into the soil no longer poses a threat to human health or the environment. Therefore, Ecology is issuing this determination that no further remedial action is necessary at this site under MTCA, Chapter 70.105D RCW. However, please note that because your actions were not conducted under a consent decree with Ecology, this letter is written pursuant to RCW 70.105D.030(1)(i) and does not constitute a settlement by the state under RCW 70.105D.040(4) and is not binding on Ecology.

Ecology's no further action determination is made only with respect to the site identified in this letter. This no further action determination applies only to the area of the property at Goodyear Site located at 3440 Third Avenue, Camas, Washington 98607 and it does not apply to any release or potential release at the property, any other areas on the property, nor any other properties owned or operated by CSK Auto, Inc.

Ecology will update its database to reflect this "No Further Action" determination.

The state, Ecology, and its officers and employees are immune from all liability and no cause of action of any nature may arise from any act or omission in providing this determination.

If you have any questions, please contact me at (360) 407-6363.

Sincerely,

Marcel Szyszkowski, P.E.
Southwest Regional Office
Toxics Cleanup Program

MS:le(02/tcp)

cc: Mark Underhill, PSI
Chuck Cline, Ecology

psi Information To Build On
Engineering • Consulting • Testing

UNDERGROUND STORAGE TANK CLOSURE REPORT

For

3440 THIRD STREET
CAMAS, WASHINGTON 98607

Prepared for

CSK AUTO
18021 AURORA AVENUE NORTH
SHORELINE, WASHINGTON 98133

Prepared by

Professional Service Industries, Inc.
12812 NE Marx Street
Portland, OR 97230
Telephone (503) 254-8418

PSI PROJECT NO. 572-9G014

September 13, 1999

Michael Hauser, R.G.
Project Geologist

Gil Cobb, R.G.
Senior Technical Professional

1.0 EXECUTIVE SUMMARY

Professional Service Industries, Inc. (PSI) provided underground storage tank (UST) closure management services to CSK Auto for one 500-gallon gasoline UST, one 500-gallon diesel UST and one 500-gallon waste oil UST located at 3440 Third Avenue, Camas, Washington.

Michael Hauser, staff geologist for PSI, was present to provide oversight, document UST removal activities, and collect closure samples during the removal of the USTs. The findings and conclusions associated with the decommissioning of the three tanks are given below.

GASOLINE UST

Following removal of the gasoline UST on April 26, 1999, an inspection for signs of obvious contamination in the native soils beneath the former location of the tank and associated piping did not reveal any indications of a release. In addition, analytical results of two soil samples collected at each end of the excavation did not identify hydrocarbon concentrations above the laboratory method detection limits of 20 mg/kg gasoline, 50 mg/kg diesel, and 100 mg/kg heavy oil range hydrocarbons. Required regulatory closure information for this UST can be found in Appendix F.

DIESEL UST

During the decommissioning of the diesel UST on April 26, 1999, a release to the soil was noted. The diesel tank release was reported to DOE and assigned LUST file number 496977. After the removal of 28 tons of diesel impacted soil from the tank pit, soil samples from the sideS and bottom of the tank pit confirmed that all diesel range petroleum hydrocarbons impacted soil had been removed.

According to reporting requirements, this report should be submitted to the Washington DOE Regional Office for review. At that time a determination will be made, based on the data presented in this report, as to any further actions required by CSK Auto.

WASTE OIL UST

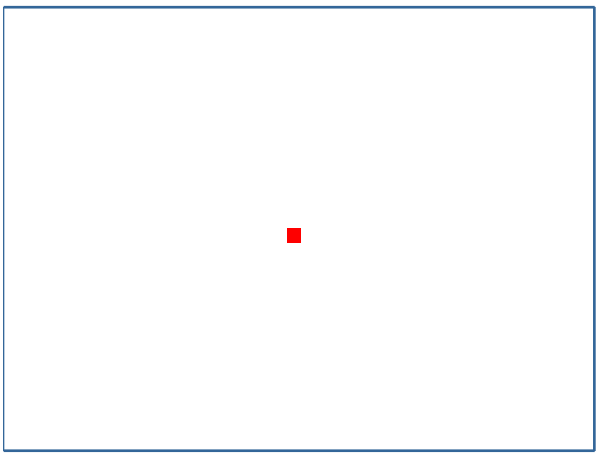
During the decommissioning of the waste oil UST on May 7, 1999, a release to the soil was noted. The waste oil tank release was reported to DOE and assigned LUST file number 496977. Analytical results from sample taken from beneath the tank indicated impact from petroleum hydrocarbons and VOC's. After the removal of 331 tons of impacted soil from the tank pit, soil samples from the sides and bottom of the tank pit confirmed that all petroleum hydrocarbons above MTCA Method A cleanup levels and VOC impacted soil had been removed.

According to reporting requirements this report should be submitted to the Washington DOE Regional Office for review. At that time a determination will be made, based on the data presented in this report, as to any further actions required by CSK Auto. Required regulatory closure information for this UST can be found in Appendix F.

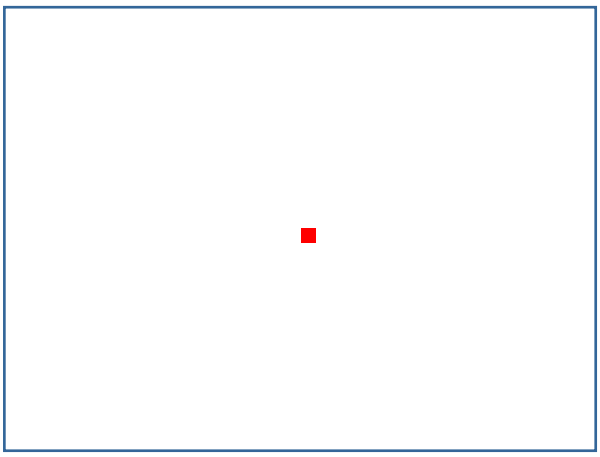
This summary does not contain all the information that is found in the full report. The report should be read in its entirety to obtain a more complete understanding of the information provided, and to aid in any decisions made or actions taken based on this information.

Facility/Site: Schucks Auto Supply Camus 52218486

Also known as: CSK AUTO INC DBA SCHUCKS AUTO SUPPLY



Larger Map



Larger Map

Address

3440 NE 3RD ST

CAMAS WA 98607

Decimal Coordinates

Latitude: 45.58511

Longitude: -122.36953

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
Hazardous Waste Generator	HAZWASTE	(360) 407-6705	WAH000008953	7/8/1999	9/13/1999

Report generated on 09-29-2011

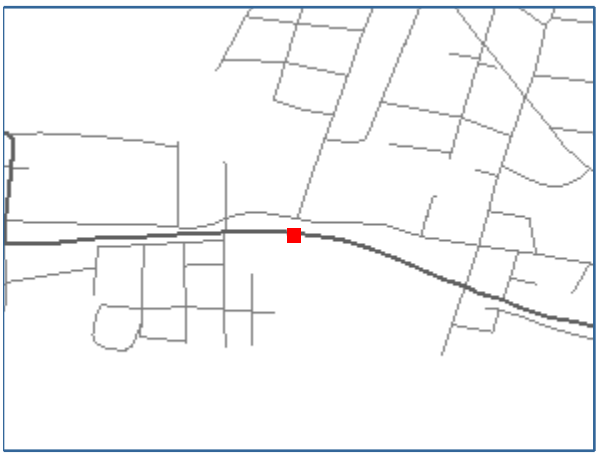
Industrial Codes (External Links Below)

No NAICS information is available for this facility site.	No SIC information is available for this facility site.

Report generated on 09-29-2011

Facility/Site: 3264254 TARR INC WASHOUGAL

Also known as:



Larger Map



Larger Map

Address

361B C ST

WASHOUGAL WA 98671

Decimal Coordinates

Latitude: 45.58078

Longitude: -122.37572

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
Emergency/Haz Chem Rpt TIER2	HAZWASTE	(360) 407-6729	CRK000054610	9/15/2003	

Report generated on 09-29-2011

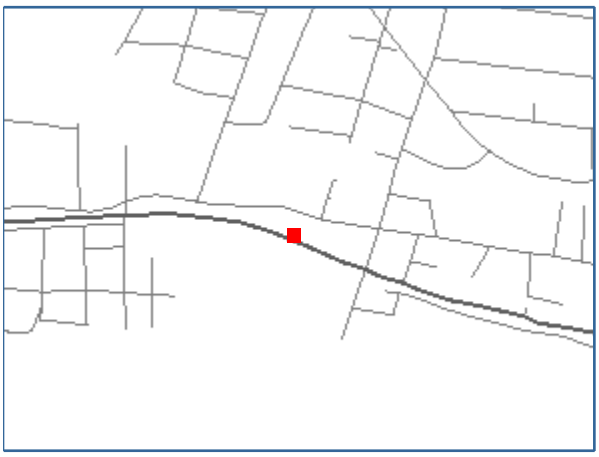
Industrial Codes (External Links Below)

No NAICS information is available for this facility site.	No SIC information is available for this facility site.

Report generated on 09-29-2011

Facility/Site: 16327542 WASHOUGAL ELECTRIC & SHEET METAL INC

Also known as:



Larger Map



Larger Map

Address

594 C ST

WASHOUGAL WA 98671-0005

Decimal Coordinates

Latitude: 45.5804

Longitude: -122.37235

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
Underground Storage Tank	TOXICS	(360) 407-7224	199	5/13/1996	3/22/2000

Report generated on 09-29-2011

Industrial Codes (External Links Below)

No NAICS information is available for this facility site.	No SIC information is available for this facility site.

Report generated on 09-29-2011

Regulated Underground Storage Tanks Site List

CLARK COUNTY, Washougal | Site Name: WASHOUGAL ELECTRIC & SHEET METAL INC

Facility-Site ID: 16327542
UST Site ID: 199
Location: 594 C ST PO BOX 5
Washougal, 986710005
Responsible Unit: SOUTHWEST
Lat / Long: 45.5804 -122.37235

Tank Name	Tank Status	Install Date	Capacity Range	Compartment #	Substance Stored
1	Removed	12/31/1964	111 TO 1,100 Gallons	1	Unleaded Gasoline

[Report: TCP_web_reporting/RegulatedUSTs.rdl]

Clark COUNTY

Storage Tank: 1

Tank ID: 42320

SITE INFORMATION

Site ID: 199 **Site Tag #: none**
WASHOUGAL ELECTRIC & SHEET METAL INC
594 C ST PO BOX 5
WASHOUGAL, WA 98671-0005
Phone #: (206) 835-3121 **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 16327542
WASHOUGAL ELECTRIC & SHEET METAL INC
594 C ST
WASHOUGAL, WA 98671-0005
Lat/Long 45° 34' 49.4" / -122° 22' 20.4°

TANK INFORMATION

TANK NAME: 1 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
December 31, 1964	August 6, 1996		No Closed Date Recorded

CAPACITY RANGE : 111 TO 1,100 Gallons
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

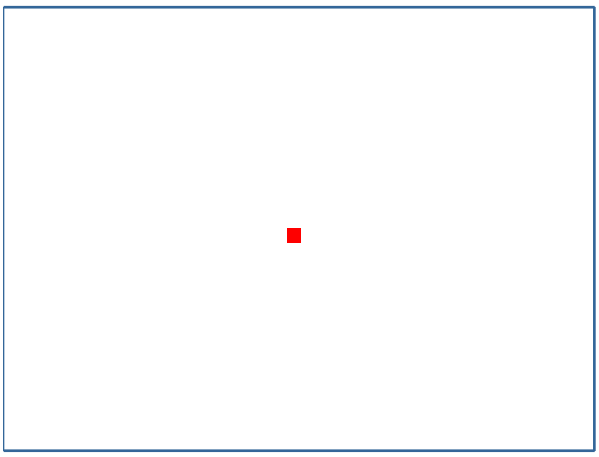
	TANK	PIPING
MATERIAL :		
CONSTRUCTION :		Above Ground Piping
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline		

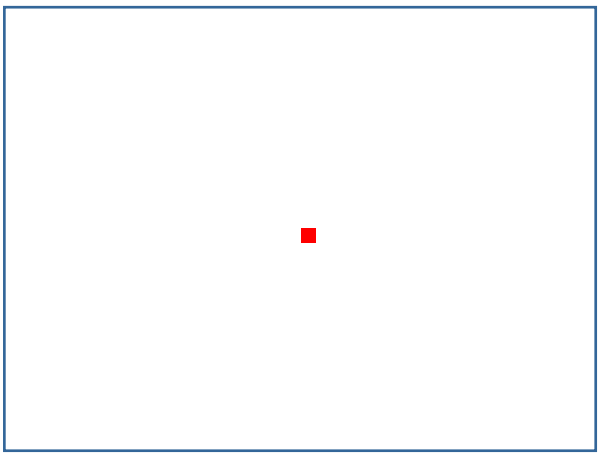
Report Information: Path TCP_Web_Reporting\TankDetails.rdl

Facility/Site: 57872946 WASHOUGAL SHELL

Also known as:



Larger Map



Larger Map

Address

730 E ST

WASHOUGAL WA 98671

Decimal Coordinates

Latitude: 45.58138

Longitude: -122.36502

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
Underground Storage Tank	TOXICS	(360) 407-7224	5887	6/8/1998	3/22/2000

Report generated on 09-29-2011

Industrial Codes (External Links Below)

No NAICS information is available for this facility site.	No SIC information is available for this facility site.

Report generated on 09-29-2011

Regulated Underground Storage Tanks Site List

CLARK COUNTY, Washougal | **Site Name: WASHOUGAL SHELL**

Facility-Site ID: 57872946
UST Site ID: 5887

Location: 730 E ST WASHOUGAL
Washougal, 98671

Responsible Unit: SOUTHWEST
Lat / Long: 45.58138 -122.36502

Tank Name	Tank Status	Install Date	Capacity Range	Compartment #	Substance Stored
1	Removed	12/31/1964		1	Unleaded Gasoline
2	Removed	12/31/1964		1	Leaded Gasoline
3	Removed	12/31/1964		1	Unleaded Gasoline

[Report: TCP_web_reporting/RegulatedUSTs.rdl]

Clark COUNTY

Storage Tank: 2

Tank ID: 41906

SITE INFORMATION

Site ID: 5887 **Site Tag #: none**
WASHOUGAL SHELL
730 E ST WASHOUGAL
WASHOUGAL, WA 98671
Phone #: (206) 835-8443 **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 57872946
WASHOUGAL SHELL
730 E ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 52.9" / -122° 21' 54.0°

TANK INFORMATION

TANK NAME: 2 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
December 31, 1964	August 6, 1996		No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Steel	
CONSTRUCTION :		
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Leaded Gasoline		

Storage Tank: 1

Tank ID: 41832

SITE INFORMATION

Site ID: 5887 **Site Tag #: none**
WASHOUGAL SHELL
730 E ST WASHOUGAL
WASHOUGAL, WA 98671
Phone #: (206) 835-8443 **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 57872946
WASHOUGAL SHELL
730 E ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 52.9" / -122° 21' 54.0°

TANK INFORMATION

TANK NAME: 1 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
December 31, 1964	August 6, 1996		No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Steel	
CONSTRUCTION :		
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline		

Clark COUNTY

Storage Tank: 3

Tank ID: 41847

SITE INFORMATION

Site ID: 5887 **Site Tag #: none**

WASHOUGAL SHELL
730 E ST WASHOUGAL
WASHOUGAL, WA 98671
Phone #: (206) 835-8443 **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 57872946

WASHOUGAL SHELL
730 E ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 52.9" / -122° 21' 54.0°

TANK INFORMATION

TANK NAME: 3 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
December 31, 1964	August 6, 1996		No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

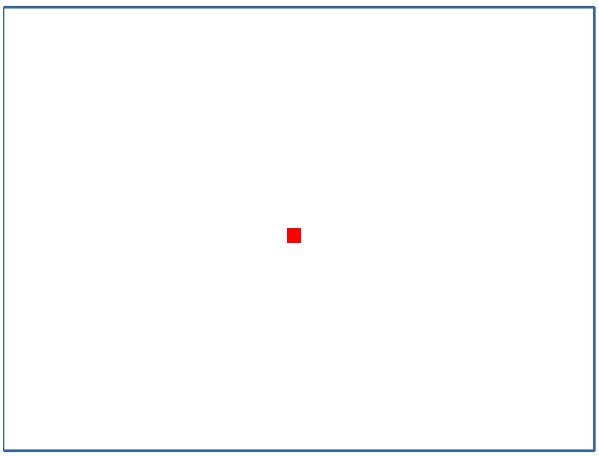
	TANK	PIPING
MATERIAL :	Steel	
CONSTRUCTION :		
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline		

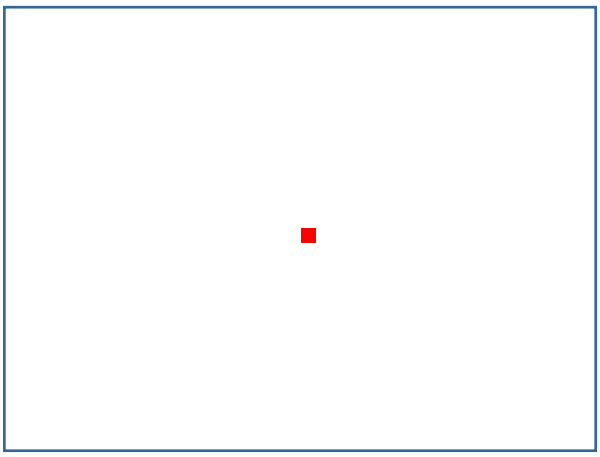
Report Information: Path TCP_Web_Reporting\TankDetails.rdl

Facility/Site: 95756539 CLARK COUNTY PUB WKS WASHOUGAL SITE

Also known as:



Larger Map



Larger Map

Address

4624 SE WASHOUGAL

WASHOUGAL WA 98671-9262

Decimal Coordinates

Latitude: 45.58782

Longitude: -122.35311

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
Underground Storage Tank	TOXICS	(360) 407-7224	6319	6/8/1998	3/22/2000

Report generated on 09-29-2011

Industrial Codes (External Links Below)

No NAICS information is available for this facility site.	No SIC information is available for this facility site.

Report generated on 09-29-2011

Regulated Underground Storage Tanks Site List

CLARK COUNTY, Washougal | **Site Name: CLARK COUNTY PUBLIC WORKS WASHOUGAL**

Facility-Site ID: 95756539
UST Site ID: 6319

Location: 4624 SE WASHOUGAL
Washougal, 986719262

Responsible Unit: SOUTHWEST
Lat / Long: 45.58782 -122.3531

Tank Name	Tank Status	Install Date	Capacity Range	Compartment #	Substance Stored
13-2	Removed	12/31/1964	10,000 to 19,999 Gallons	1	Leaded Gasoline
13-4	Removed	12/31/1964	1,101 to 2,000 Gallons	1	Diesel

[Report: TCP_web_reporting/RegulatedUSTs.rdl]

Clark COUNTY

Storage Tank: 13-4

Tank ID: 21791

SITE INFORMATION

Site ID: 6319 **Site Tag #: none**
CLARK COUNTY PUBLIC WORKS WASHOUGAL
4624 SE WASHOUGAL
WASHOUGAL, WA 98671-9262
Phone #: (206) 835-3404 **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 95756539
CLARK COUNTY PUB WKS WASHOUGAL SITE
4624 SE WASHOUGAL
WASHOUGAL, WA 98671-9262
Lat/Long 45° 35' 16.1" / -122° 21' 11.1°

TANK INFORMATION

TANK NAME: 13-4 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
December 31, 1964	August 6, 1996		No Closed Date Recorded

CAPACITY RANGE : 1,101 to 2,000 Gallons
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Steel	
CONSTRUCTION :	Single Wall Tank	
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Diesel		1500

Storage Tank: 13-2

Tank ID: 21848

SITE INFORMATION

Site ID: 6319 **Site Tag #: none**
CLARK COUNTY PUBLIC WORKS WASHOUGAL
4624 SE WASHOUGAL
WASHOUGAL, WA 98671-9262
Phone #: (206) 835-3404 **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 95756539
CLARK COUNTY PUB WKS WASHOUGAL SITE
4624 SE WASHOUGAL
WASHOUGAL, WA 98671-9262
Lat/Long 45° 35' 16.1" / -122° 21' 11.1°

TANK INFORMATION

TANK NAME: 13-2 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
December 31, 1964	August 6, 1996		No Closed Date Recorded

CAPACITY RANGE : 10,000 to 19,999 Gallons
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

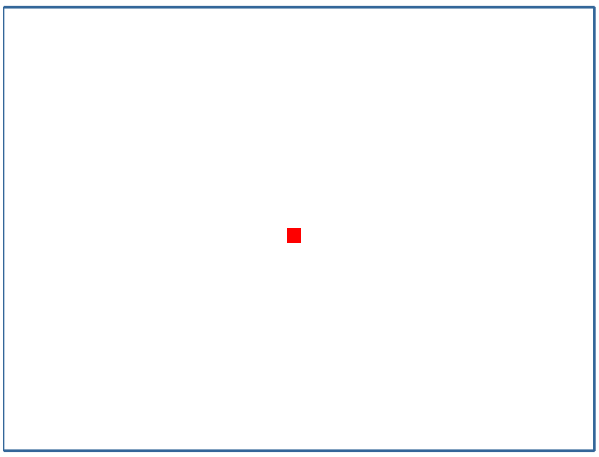
	TANK	PIPING
MATERIAL :	Steel	
CONSTRUCTION :	Single Wall Tank	
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Leaded Gasoline		10000

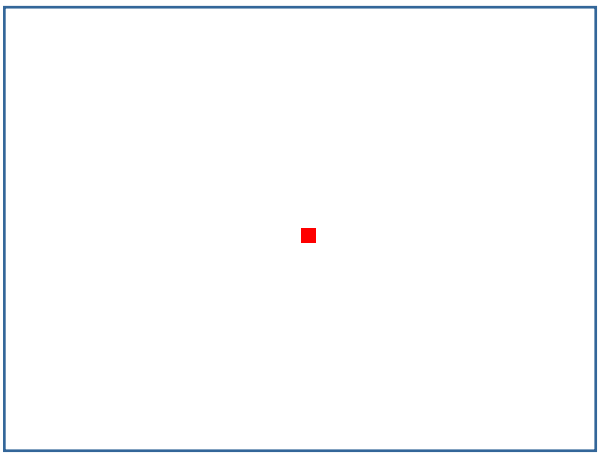
Report Information: Path TCP_Web_Reporting\TankDetails.rdl

Facility/Site: 49392144 Overton Mfg Inc

Also known as:



Larger Map



Larger Map

Address

1325 E ST

WASHOUGAL WA 98671-1410

Decimal Coordinates

Latitude: 45.5813

Longitude: -122.35738

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
Hazardous Waste Generator	HAZWASTE	(360) 407-6705	WAD988502308	3/5/1992	11/1/2000

Report generated on 09-29-2011

Industrial Codes (External Links Below)

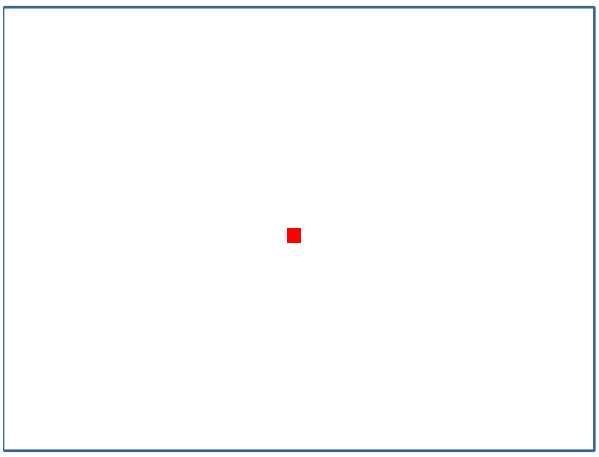
No NAICS information is available for this facility site.

SIC Code	SIC Description
3451	SCREW MACHINE PRODUCTS

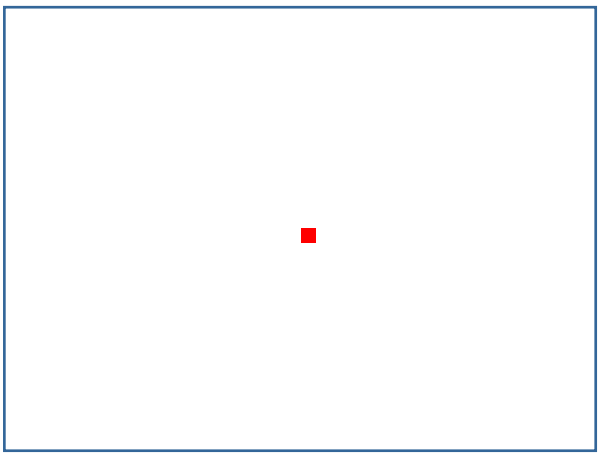
Report generated on 09-29-2011

Facility/Site: 48371594 WASHOUGAL SCHOOL DIST BUS GARAGE

Also known as: WASHOUGAL SCHOOL DIST BUS GARAGE



Larger Map



Larger Map

Address

995 E ST

WASHOUGAL WA 98671-1317

Decimal Coordinates

Latitude: 45.58126

Longitude: -122.36206

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
Industrial SW GP	WATQUAL	(360) 407-6400	WAR012253	6/1/2009	
Underground Storage Tank	TOXICS	(360) 407-7224	5819	6/8/1998	3/22/2000

Report generated on 09-29-2011

Industrial Codes (External Links Below)

No NAICS information is available for this facility site.

SIC Code	SIC Description
4151	SCHOOL BUSES

Report generated on 09-29-2011

Regulated Underground Storage Tanks Site List

CLARK COUNTY, Washougal | Site Name: WASHOUGAL SCHOOL DIST BUS GARAGE

Facility-Site ID: 48371594
UST Site ID: 5819
Location: 995 E ST
Washougal, 986711317
Responsible Unit: SOUTHWEST
Lat / Long: 45.58126 -122.36206

Tank Name	Tank Status	Install Date	Capacity Range	Compartment #	Substance Stored
1	Removed	12/31/1964	1		Unleaded Gasoline
2	Removed	12/31/1964	1		Unleaded Gasoline
3	Exempt	12/31/1964	1		

[Report: TCP_web_reporting/RegulatedUSTs.rdl]

Clark COUNTY

Storage Tank: 3

Tank ID: 29024

SITE INFORMATION

Site ID: 5819 **Site Tag #: none**
WASHOUGAL SCHOOL DIST BUS GARAGE
995 E ST
WASHOUGAL, WA 98671-1317
Phone #: (206) 835-5626 **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 48371594
WASHOUGAL SCHOOL DIST BUS GARAGE
995 E ST
WASHOUGAL, WA 98671-1317
Lat/Long 45° 34' 52.5" / -122° 21' 43.4°

TANK INFORMATION

TANK NAME: 3 **Status :** Exempt **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
December 31, 1964	August 6, 1996		Tank Open

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Steel	Steel
CONSTRUCTION :	Single Wall Tank	
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1			

Storage Tank: 1

Tank ID: 29165

SITE INFORMATION

Site ID: 5819 **Site Tag #: none**
WASHOUGAL SCHOOL DIST BUS GARAGE
995 E ST
WASHOUGAL, WA 98671-1317
Phone #: (206) 835-5626 **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 48371594
WASHOUGAL SCHOOL DIST BUS GARAGE
995 E ST
WASHOUGAL, WA 98671-1317
Lat/Long 45° 34' 52.5" / -122° 21' 43.4°

TANK INFORMATION

TANK NAME: 1 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
December 31, 1964	August 6, 1996		No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Steel	Steel
CONSTRUCTION :	Single Wall Tank	
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline		

Clark COUNTY

Storage Tank: 2

Tank ID: 28873

SITE INFORMATION

Site ID: 5819 **Site Tag #: none**
WASHOUGAL SCHOOL DIST BUS GARAGE
995 E ST
WASHOUGAL, WA 98671-1317
Phone #: (206) 835-5626 **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 48371594
WASHOUGAL SCHOOL DIST BUS GARAGE
995 E ST
WASHOUGAL, WA 98671-1317
Lat/Long 45° 34' 52.5" / -122° 21' 43.4°

TANK INFORMATION

TANK NAME: 2 **Status : Removed** **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
December 31, 1964	August 6, 1996		No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

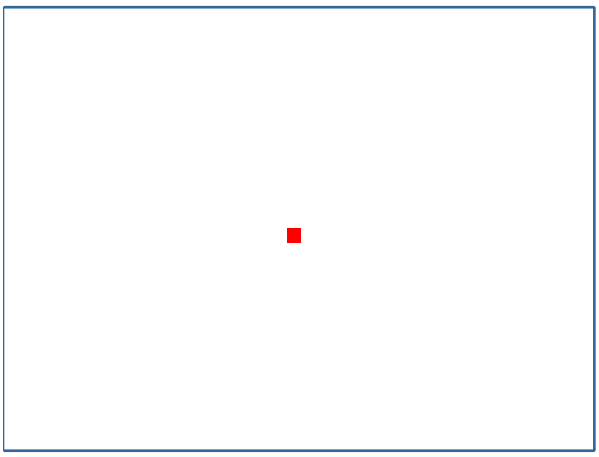
	TANK	PIPING
MATERIAL :	Steel	Steel
CONSTRUCTION :	Single Wall Tank	
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline		

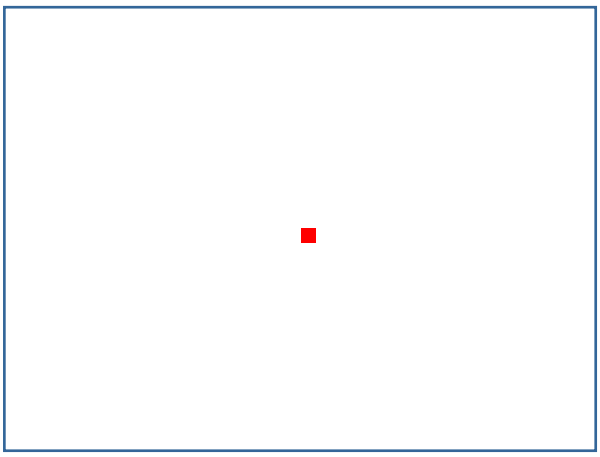
Report Information: Path TCP_Web_Reporting\TankDetails.rdl

Facility/Site: 94778244 Asher Engine Service

Also known as:



Larger Map



Larger Map

Address

1405 E ST

WASHOUGAL WA 98671

Decimal Coordinates

Latitude: 45.58126

Longitude: -122.35629

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
Hazardous Waste Generator	HAZWASTE	(360) 407-6705	WA0000470070	7/20/1994	12/31/1998

Report generated on 09-29-2011

Industrial Codes (External Links Below)

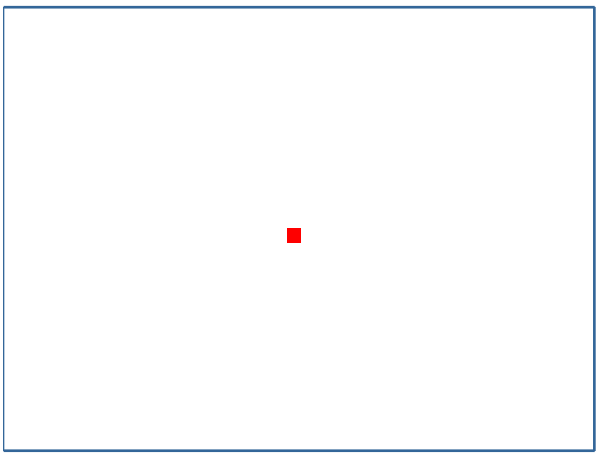
No NAICS information is available for this facility site.

SIC Code	SIC Description
7539	AUTOMOTIVE REPAIR SHOPS, NEC

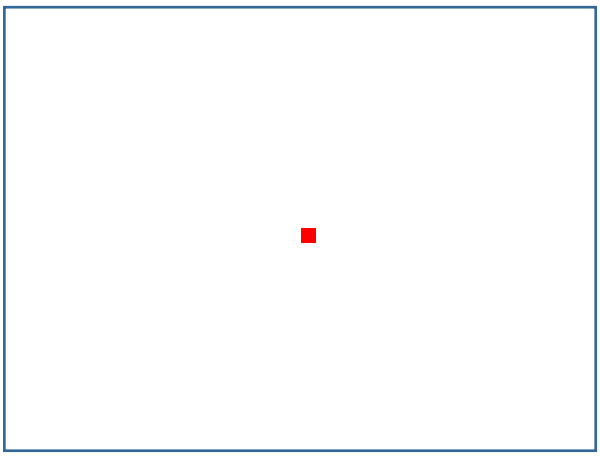
Report generated on 09-29-2011

Facility/Site: 11338232 COLUMBIA STORAGE INC 2ND ST

Also known as:



Larger Map



Larger Map

Address

365 2ND ST

WASHOUGAL WA 98671-2111

Decimal Coordinates

Latitude: 45.58107

Longitude: -122.38046

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
Emergency/Haz Chem Rpt TIER2	HAZWASTE	(360) 407-6729	CRK000042400	1/1/1994	

Report generated on 09-29-2011

Industrial Codes (External Links Below)

No NAICS information is available for this facility site.

SIC Code	SIC Description
4225	GENERAL WAREHOUSING AND STORAGE

Report generated on 09-29-2011

Facility/Site: 22538744 HI WAY FUEL

Also known as:



Larger Map



Larger Map

Address

1250 E ST

WASHOUGAL WA 98671

Decimal Coordinates

Latitude: 45.58122

Longitude: -122.35839

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
LUST Facility	TOXICS	(360) 407-7224	102163	8/21/1996	
Underground Storage Tank	TOXICS	(360) 407-7224	102163	6/1/1978	

Report generated on 09-29-2011

Industrial Codes (External Links Below)

No NAICS information is available for this facility site.	No SIC information is available for this facility site.

Report generated on 09-29-2011

Clark County

City of WASHOUGAL

Cleanup Site:	HI-WAY FUEL		**Cleanup Site ID:**	8323	**Latitude:**	45.581
	1250 E ST		**Facility ID:**	22538744	**Longitude:**	-122.358
	WASHOUGAL	98671				
Unit:	HI-WAY FUEL		**Unit Type:**	Upland	**Process Type:**	Independent Action
						* cuID: 8015
Release:				* Historic Release ID: 377975	UST ID: 102163	LUST ID: 4275

Detail:

Release Status	Date	Cause
LUST - Cleanup Started	8/21/1996	Overfill

Media Affected	Contaminant Type	Status
Groundwater	Petroleum-Other	C
Soil	Petroleum-Other	C

About the Leaking Underground Storage Tanks Site List:

The Cleanup Status assigned by the Department of Ecology to a Leaking Underground Tank Site is based on an informal review of the information we have received regarding the cleanup. A formal review could determine that the site has not been cleaned up to Model Toxics Control Act standards. Formal reviews including potential No Further Action determinations are available under the fee-based Voluntary Cleanup Program.

LUST = Leaking Underground Storage Tank
UST = Underground Storage Tank

Cleanup Status Definitions:

Awaiting Cleanup -- Discovered or reported release, yet no active cleanup measures taken; or,
Site check (identified the source) begun or completed, yet no active cleanup measures taken; or,
Site characterization begun or completed, yet no active cleanup measures taken.

Cleanup Started -- Responsible party has initiated physical, biological, or chemical management of release (e.g. soil excavated, groundwater pumped, vapors extracted, free product removed, oxygen added, etc.). Site investigations and emergency responses (e.g. venting explosive vapors, providing bottled water) do not qualify as activities under Cleanup Started.

Monitoring -- Groundwater monitoring is the only activity occurring at the site; or, Site has been characterized, only low levels of soil and/or groundwater contamination remain, and natural attenuation is the chosen cleanup method; or,
Confirmational monitoring following active cleanup measures.

No Further Action (NFA) -- Cleanup report has been formally reviewed by Ecology under the fee-based Voluntary Cleanup Program and resulted in a No Further Action status; and, Institutional controls may have been required due to soil contamination that may remain under existing structures or in otherwise inaccessible areas.

No Further Action (NFA) Determination II / SHA -- No further action based on an Initial Investigation (II) or Site Hazard Assessment (SHA).

Notification -- Used to track when Ecology is notified of a new LUST release. WAC 173-340-450 (2)(a) requires UST owners / operators to report confirmed releases to Ecology within 24 hours.

Reported Cleaned Up (Historic Data Only) -- Owner or consultant reports that contamination has been cleaned up; and/or.
Some soil contamination may remain under existing structures or in otherwise inaccessible areas if groundwater is not threatened and there has been no migration of contamination into the structure; and,
Cleanup report has not been formally reviewed by Ecology. A formal review could determine that the site has not been cleaned up to MTCA standards.

Contaminant Type Key:

B - Below Cleanup Level
C - Confirmed Above Cleanup Level
S - Suspected
R - Remediated; RA - Remediated-Above; RB - Remediated-Below

LustList03.rdl

CLARK COUNTY

SITE I

HI-WAY FUEL

CleanupSite ID: **8323** FS ID: **22538744**

Alternate Name(s): HI WAY FUEL, HI-WAY FUEL

LOCATION:

Address: **1250 E ST**
WASHOUGAL **98671**

Lat/Long: **45.58122** **-122.35839**
Township/Range/Section: **1N** **4E** **53**

Legislative District: **18**
Congressional District: **3**

STATUS:

Ecology Status: **Cleanup Started**
WARM BIN#:

Responsible Unit: **Southwest**
Site Manager: **Southwest Region**
Statute: **MTCA**

Is Brownfield?
Environmental Covenant?
Is PSI Site?

UST Site ID: **102163**
WRIA ID: **28**

NFA Received? NFA Date: NFA Reason:

SITE ACTIVITIES:

Applies to:	Related ID (Unit-LUST-VCP)	Activity Display Name	Status	Start Date	End Date	Legal Mechanism	Performed By	Project Manager
Lust	4275	LUST - Notification		8/21/1996	8/21/1996			
Lust	4275	LUST - Site Characterization Report						
Lust	4275	LUST - Report Received		12/30/2004	10/3/1997			
Lust	4275	LUST - Report Received		10/28/2002	9/27/2002			
Lust	4275	LUST - Report Received		10/11/1996	9/30/1996			

AFFECTED MEDIA & CONTAMINANTS:

Contaminant:	Media: Ground Water	Surface Water	Soil	Sediment	Air	Bedrock
Petroleum-Other	C		C			

Key:
B - Below Cleanup Level
C - Confirmed Above Cleanup Level
S - Suspected
R - Remediated
RA - Remediated-Above
RB - Remediated-Below

Regulated Underground Storage Tanks Site List

September 29, 2011

CLARK COUNTY, Washougal | **Site Name: HI-WAY FUEL**

Facility-Site ID: 22538744
UST Site ID: 102163

Location: 1250 E ST
Washougal, 98671

Responsible Unit: SOUTHWEST
Lat / Long: 45.58122 -122.35839

Tank Name	Tank Status	Install Date	Capacity Range	Compartment #	Substance Stored
1	Operational	11/15/1996	20,000 to 29,999 Gallons	1	Unleaded Gasoline
2	Operational	11/15/1996	10,000 to 19,999 Gallons	1	Unleaded Gasoline
3	Operational	11/15/1996	10,000 to 19,999 Gallons	1	Diesel
4	Operational	11/15/1996	10,000 to 19,999 Gallons	1	Heating Fuel
HIGH	Removed	06/01/1978	5,000 to 9,999 Gallons	1	Heating Fuel
LOW	Removed	06/01/1978	5,000 to 9,999 Gallons	1	Diesel
REG	Removed	06/01/1978	5,000 to 9,999 Gallons	1	Leaded Gasoline
SUPER	Removed	06/01/1978	2,001 to 4,999 Gallons	1	Unleaded Gasoline
UNLEAD	Removed	06/01/1978	5,000 to 9,999 Gallons	1	Unleaded Gasoline

[Report: TCP_web_reporting/RegulatedUSTs.rdl]

Clark COUNTY

Storage Tank: 1

Tank ID: 412220

SITE INFORMATION

Site ID: 102163 **Site Tag #: A1092**
HI-WAY FUEL
1250 E ST
WASHOUGAL, WA 98671-
Phone #: (360) 835-3956 **UBI:** 601-505-770 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 22538744
HI WAY FUEL
1250 E ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 52.3" / -122° 21' 30.2°

TANK INFORMATION

TANK NAME: 1 **Status :** Operational **Upgrade DT: 11/15/1996**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
November 15, 1996	May 7, 1997	January 31, 2012	Tank Open

CAPACITY RANGE : 20,000 to 29,999 Gallons
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : Spill Bucket/Spill Box
OVERFILL PREVENTION : Ball Float Valve (vent line)

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Fiberglass Reinforced Plastic	Flexible Piping
CONSTRUCTION :	Double Wall Tank	Double Wall Pipe
PRIMARY REL DETECT :	Interstitial Monitoring	Automatic Line Leak Detection
SECONDARY REL DETECT :		Interstitial Monitoring (sump sensor)
TIGHTNESS TEST :	Not Applicable	Not Required
CORROSION PROTECTION :	Corrosion Resistant	Corrosion Resistant

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline	Motor Fuel for Vehicles	20000

Storage Tank: HIGH

Tank ID: 27778

SITE INFORMATION

Site ID: 102163 **Site Tag #: A1092**
HI-WAY FUEL
1250 E ST
WASHOUGAL, WA 98671-
Phone #: (360) 835-3956 **UBI:** 601-505-770 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 22538744
HI WAY FUEL
1250 E ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 52.3" / -122° 21' 30.2°

TANK INFORMATION

TANK NAME: HIGH **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
June 1, 1978	August 6, 1996	January 31, 1997	No Closed Date Recorded

CAPACITY RANGE : 5,000 to 9,999 Gallons
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : None
OVERFILL PREVENTION : None

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :		
CONSTRUCTION :	Double Wall Tank	Single Wall Pipe
PRIMARY REL DETECT :	Manual Inventory Control (daily)	Other
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :	Impressed Current	None

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Heating Fuel		8000

Clark COUNTY

Storage Tank: 4

Tank ID: 412223

SITE INFORMATION

Site ID: 102163 **Site Tag #: A1092**
HI-WAY FUEL
1250 E ST
WASHOUGAL, WA 98671-
Phone #: (360) 835-3956 **UBI:** 601-505-770 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 22538744
HI WAY FUEL
1250 E ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 52.3" / -122° 21' 30.2°

TANK INFORMATION

TANK NAME: 4 **Status :** Operational **Upgrade DT: 11/15/1996**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
November 15, 1996	May 7, 1997	January 31, 2012	Tank Open

CAPACITY RANGE : 10,000 to 19,999 Gallons
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : Spill Bucket/Spill Box
OVERFILL PREVENTION : Ball Float Valve (vent line)

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Fiberglass Reinforced Plastic	Flexible Piping
CONSTRUCTION :	Double Wall Tank	Double Wall Pipe
PRIMARY REL DETECT :	Interstitial Monitoring	Automatic Line Leak Detection
SECONDARY REL DETECT :		Interstitial Monitoring (sump sensor)
TIGHTNESS TEST :	Not Applicable	Not Required
CORROSION PROTECTION :	Corrosion Resistant	Corrosion Resistant

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Heating Fuel	Heating Fuel for Resale	12000

Storage Tank: SUPER

Tank ID: 44346

SITE INFORMATION

Site ID: 102163 **Site Tag #: A1092**
HI-WAY FUEL
1250 E ST
WASHOUGAL, WA 98671-
Phone #: (360) 835-3956 **UBI:** 601-505-770 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 22538744
HI WAY FUEL
1250 E ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 52.3" / -122° 21' 30.2°

TANK INFORMATION

TANK NAME: SUPER **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
June 1, 1978	August 6, 1996	January 31, 1997	No Closed Date Recorded

CAPACITY RANGE : 2,001 to 4,999 Gallons
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : None
OVERFILL PREVENTION : None

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :		
CONSTRUCTION :	Double Wall Tank	Single Wall Pipe
PRIMARY REL DETECT :	Manual Inventory Control (daily)	Other
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :	None	None

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline	Motor Fuel for Vehicles	3000

Clark COUNTY

Storage Tank: 2

Tank ID: 412221

SITE INFORMATION

Site ID: 102163 **Site Tag #: A1092**
HI-WAY FUEL
1250 E ST
WASHOUGAL, WA 98671-
Phone #: (360) 835-3956 **UBI:** 601-505-770 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 22538744
HI WAY FUEL
1250 E ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 52.3" / -122° 21' 30.2°

TANK INFORMATION

TANK NAME: 2 **Status :** Operational **Upgrade DT: 11/15/1996**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
November 15, 1996	May 7, 1997	January 31, 2012	Tank Open

CAPACITY RANGE : 10,000 to 19,999 Gallons
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : Spill Bucket/Spill Box
OVERFILL PREVENTION : Automatic Shutoff (fill pipe)

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Fiberglass Reinforced Plastic	Flexible Piping
CONSTRUCTION :	Double Wall Tank	Double Wall Pipe
PRIMARY REL DETECT :	Interstitial Monitoring	Automatic Line Leak Detection
SECONDARY REL DETECT :		Interstitial Monitoring (sump sensor)
TIGHTNESS TEST :	Not Applicable	Not Required
CORROSION PROTECTION :	Corrosion Resistant	Corrosion Resistant

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline	Motor Fuel for Vehicles	12000

Storage Tank: REG

Tank ID: 27425

SITE INFORMATION

Site ID: 102163 **Site Tag #: A1092**
HI-WAY FUEL
1250 E ST
WASHOUGAL, WA 98671-
Phone #: (360) 835-3956 **UBI:** 601-505-770 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 22538744
HI WAY FUEL
1250 E ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 52.3" / -122° 21' 30.2°

TANK INFORMATION

TANK NAME: REG **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
June 1, 1978	August 6, 1996	January 31, 1997	No Closed Date Recorded

CAPACITY RANGE : 5,000 to 9,999 Gallons
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : None
OVERFILL PREVENTION : None

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :		
CONSTRUCTION :	Double Wall Tank	Single Wall Pipe
PRIMARY REL DETECT :	Manual Inventory Control (daily)	Automatic Line Leak Detection
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :	None	None

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Leaded Gasoline	Motor Fuel for Vehicles	8000

Clark COUNTY

Storage Tank: UNLEAD

Tank ID: 21511

SITE INFORMATION

Site ID: 102163 **Site Tag #: A1092**
HI-WAY FUEL
1250 E ST
WASHOUGAL, WA 98671-
Phone #: (360) 835-3956 **UBI:** 601-505-770 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 22538744
HI WAY FUEL
1250 E ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 52.3" / -122° 21' 30.2°

TANK INFORMATION

TANK NAME: UNLEAD **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
June 1, 1978	August 6, 1996	January 31, 1997	No Closed Date Recorded

CAPACITY RANGE : 5,000 to 9,999 Gallons
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : None
OVERFILL PREVENTION : None

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :		
CONSTRUCTION :	Double Wall Tank	Single Wall Pipe
PRIMARY REL DETECT :	Manual Inventory Control (daily)	Other
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :	None	None

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline	Motor Fuel for Vehicles	8000

Storage Tank: 3

Tank ID: 412222

SITE INFORMATION

Site ID: 102163 **Site Tag #: A1092**
HI-WAY FUEL
1250 E ST
WASHOUGAL, WA 98671-
Phone #: (360) 835-3956 **UBI:** 601-505-770 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 22538744
HI WAY FUEL
1250 E ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 52.3" / -122° 21' 30.2°

TANK INFORMATION

TANK NAME: 3 **Status :** Operational **Upgrade DT: 11/15/1996**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
November 15, 1996	May 7, 1997	January 31, 2012	Tank Open

CAPACITY RANGE : 10,000 to 19,999 Gallons
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : Spill Bucket/Spill Box
OVERFILL PREVENTION : Ball Float Valve (vent line)

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Fiberglass Reinforced Plastic	Flexible Piping
CONSTRUCTION :	Double Wall Tank	Double Wall Pipe
PRIMARY REL DETECT :	Interstitial Monitoring	Automatic Line Leak Detection
SECONDARY REL DETECT :		Interstitial Monitoring (sump sensor)
TIGHTNESS TEST :	Not Applicable	Annual
CORROSION PROTECTION :	Corrosion Resistant	Corrosion Resistant

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Diesel	Motor Fuel for Vehicles	12000

Clark COUNTY

Storage Tank: LOW

Tank ID: 14226

SITE INFORMATION

Site ID: 102163 **Site Tag #: A1092**
HI-WAY FUEL
1250 E ST
WASHOUGAL, WA 98671-
Phone #: (360) 835-3956 **UBI:** 601-505-770 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 22538744
HI WAY FUEL
1250 E ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 52.3" / -122° 21' 30.2°

TANK INFORMATION

TANK NAME: LOW **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
June 1, 1978	August 6, 1996	January 31, 1997	No Closed Date Recorded

CAPACITY RANGE : 5,000 to 9,999 Gallons
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : None
OVERFILL PREVENTION : None

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :		
CONSTRUCTION :	Double Wall Tank	Single Wall Pipe
PRIMARY REL DETECT :	Manual Inventory Control (daily)	Other
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :	None	None

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Diesel	Motor Fuel for Vehicles	8000

K&S Environmental, Inc.

October 3, 1997

Hi-Way Fuel
1250 E Street
Washougal, WA 98671

Attn: Scott Malfait

Re: Status of Treatment Pile from UST Cleanup at the
Hi-Way Fuel Facility Located at 1250 E Street in Washougal, WA

Dear Mr. Malfait:

This letter presents the results of soil samples collected from a treatment pile by a K&S Environmental, Inc. (K&S) engineer on September 19, 1997. The treatment pile consisted of approximately 100 cubic yards that had been actively treated over the past year by Scott Malfait through a process of mechanical mixing and aeration.

Background & Procedures

In August through October of 1996, the Hi-Way Fuel Facility underwent a major renovation which included the replacement of underground storage tanks at the site. During this process contaminated soil was encountered and removed from the site. The majority of the contaminated soil was taken to Wasco County Landfill under permit.

Approximately 100 tons of the least contaminated soil from the north end of the dispenser excavation was transported to a 17 acre piece of property located approximately 12 miles northeast of Washougal, WA where it was treated through a process of aeration. The average TPH concentration of this soil was estimated to be approximately 1000 ppm as gasoline. The soil treatment site is located outside the Clark County ozone non-attainment area and was owned by Scott Malfait, also the owner of Hi-Way Fuel. According to Tim Gould of the Southwest Air Pollution Control Authority (SWPCA), up to 100 tons of soil can be aerated outside the ozone non-attainment area if the concentration of TPH is less than 3000 ppm. The soil taken to Mr. Malfait's property meets these SWPCA requirements. A legal description of the soil treatment location is as follows. That portion of the South 3/4 of the North half of the Northwest quarter of Section 30, Township 2 North, Range 5 East of the Willamette Meridian, lying Northerly of County road No. 223 designated as the Alder Road. Mr. Martin Auseth of the Skamania County Health Department was apprised of the aeration procedures at the site by K&S.

The 100 tons of PCS was placed in a pre-constructed bermed area that was lined with 6 mil plastic. The soil was leveled to an average depth of 2-3 feet as part of the treatment preparation. The soil was mechanically turned and aerated on a periodic basis by Mr. Malfait. When the soil had been 'worked' sufficiently and it appeared as though the odor from the soil had decreased to a

4475 SW Scholls Ferry Road, Ste. 256, Portland, Oregon 97225
• Phone (503) 291-1454 • Fax (503) 291-5425

satisfactory level, soil samples were collected by a K&S engineer and analyzed for TPH-G and BTEX at a certified laboratory.

The soil samples were collected by digging into the soil approximately 8-18 inches using a clean shovel. The soil samples were placed into 9 ounce EPA approved glass containers using disposable Nitrile gloves. The samples were labeled and immediately placed on ice for transport to a certified laboratory accompanied by chain of custody documentation. The soil samples were randomly collected from four quadrants of the treatment area and represent soil approximately 1/3 of the distance from the bottom of the pile. This is considered the location of soil most likely to be representative of the highest remaining concentrations. The sample results are summarized below in Table 1. Certified analytical reports are attached to this report.

Table 1
Soil Samples Collected on 9/19/97

Sample ID	Location	WTPH-G	BTEX
S1	NW Quadrant	8.81 ppm	ND
S2	SW Quadrant	16.5 ppm	ND
S3	NE Quadrant	ND	ND
S4	SE Quadrant	ND	ND
MTCA Method A Cleanup Standard		**100 ppm**	

ND - None detected above reportable levels
ppm - parts per million

Conclusions

The samples collected b K&S in September 1997 indicate that the soil has been effectively treated to levels well below Ecology's most stringent cleanup standard of 100 ppm no further treatment of the soil is necessary. The soil will remain in its current location as permanent fill. K&S recommends that you maintain a copy of this letter with the property's permanent file. Please do not hesitate to call if you have any questions.

Sincerely,

Bill Knutson, P.E.
Environmental Engineer

102163

REC'D OCT 28 2002

K&S Environmental, Inc.

4475 SW Scholls Ferry Rd , #256 ▲ Portland, OR 97225
(503) 291-1454 ▲ Fax 291-5425

September 27, 2002

COPY

Jennifer Taylor
Washington State Department of Ecology
2108 Grand Blvd.
Vancouver, WA 98661

Re: Hi Way Fuel, 1250 E. Street, Washougal, WA
Ecology Site ID #102163

Dear Ms. Taylor:

K&S Environmental, Inc. (K&S) is submitting this letter on behalf of Scott Malfait, owner of the above referenced facility, to address Ecology's remaining concerns with the UST cleanup project completed at the site in 1996. General concerns with the cleanup project were presented in your July 10, 2002 letter to Mr. Malfait, and are addressed in the following paragraphs.

Project Summary

In August through October of 1996, the Hi Way Fuel Facility underwent a major renovation that included the decommissioning of five USTs and the associated piping and dispensing equipment. The UST system was replaced with a new system consisting of 3-12,000 gallon and 1-20,000 gallon double wall fiberglass tanks and all associated piping and dispensing equipment. The new system was installed to meet the 1998 Federally mandated upgrade requirements for underground storage tank systems.

During the decommissioning of the former UST system, subsurface soil contamination was encountered in the area of the former tanks and the area of the former dispensing islands. Cleanup was performed in both areas by Silversun Construction Company under the supervision of a K&S engineer. All contaminated soil was successfully removed from the area of the tanks to within acceptable MTCA Method A standards. Approximately 200 tons of gasoline contaminated soil was also excavated from the area of the former dispensing islands. The most highly contaminated soil was hauled off site to a permitted facility for disposal. Approximately 100 tons of the least contaminated soil excavated from the area was hauled to an off site location where it was treated through a process of aeration and natural attenuation.

Due to structural concerns with the adjacent building and a City waterline, Silver Sun was not able to excavate all the contaminated soil that exceeded Method A Cleanup Standards. To obtain additional data to better characterize the vertical and lateral extent of the remaining soil contamination, three soil borings were installed in the area of the remaining soil contamination and south of the remaining contamination. The results of the soil sampling completed by K&S during the UST system decommissioning and subsequent cleanup and investigation appears to indicate that the remaining soil contamination is more than 25 feet from groundwater (groundwater was not

encountered to the total depth explored at the site of 45 feet). The vertical extent of the remaining soil contamination was determined to be at a depth of 16.5 feet below the surface. The lateral extent of the soil contamination was determined to be the limits of the final excavation in the west and east directions, and the center to west end of the south wall. Contamination remains on the south sidewall, adjacent to the building, and in the northeast corner of the excavation, near the City and facility water lines.

Amount of Contaminated Soil Remaining at the Site

Based upon the inferred extent of the lateral extent of the remaining soil contamination along the south sidewall and northeast corner and a conservative estimate of vertical extent of the soil contamination of 16 feet, K&S estimates that less than 100 cubic yards of impacted soil remains at the site that exceeds current MTCA Method A Cleanup Standards. This total is based upon soil sampling results and field observations made during remedial excavation completed at the site in 1996. The inferred lateral extent of the remaining soil contamination is depicted on the attached site map.

Documentation of Treated Soil

Final soil sampling for the soil treatment pile located on Scott Malfait's property located north of Washougal, WA was completed on September 19, 1997. All results of this final soil sampling event indicate all soil has been treated to below Ecology's Method A Cleanup Standards, and the soil remains at the site being used as shallow fill. I have included the K&S October 3, 1997 report entitled 'Status of Treatment Pile from UST Cleanup at the Hi Way Fuel Facility Located at 1250 E Street in Washougal, WA.

Conclusions

In 1996, Hi Way Fuel completed the necessary UST system upgrades to meet the 1998 federally mandated requirements. Rather than upgrade the existing UST system, Scott Malfait opted to spend the additional money and decommission the existing system and install completely new equipment. During the decommissioning of the old UST system, soil contamination was encountered in the subsurface and Mr. Malfait authorized the excavation of approximately 250 cubic yards of contaminated soil. Because not all the contaminated soil could be removed due to structural concerns, a limited volume of impacted soil was left in place with the approval of Patty Martin of Ecology. To insure that the groundwater in the area was not at risk due to the remaining impacted soil, additional soil investigation was completed utilizing an air percussion ODEX drilling rig. It was determined through soil sampling that the groundwater in the area is greater than 45 feet below the surface, and that the vertical extent of any remaining soil contamination is less than 20 feet. Based upon the soil data accumulated during the soil remedial excavation activities and the subsequent subsurface drilling activities, it was concluded that the lateral extent of the remaining soil contamination is limited to a few feet in the northwest corner and along the south sidewall.

It has always been Hi Way Fuel's intent to meet all Ecology rules and regulations regarding UST cleanups and ultimately receive a 'No Further Action' (NFA) determination from the State. Scott Malfait, owner of Hi Way Fuel requests that you review the data presented in this letter and contact him with any additional specific requirements that might be necessary to officially close the project and obtain a NFA letter for the site. Please contact Mr. Scott Malfait of Hi Way Fuel at

360-835-3956 or Bill Knutson of K&S Environmental, Inc. at 503-291-1454 if you have any questions regarding the information presented in this letter. Your assistance in this matter is greatly appreciated.

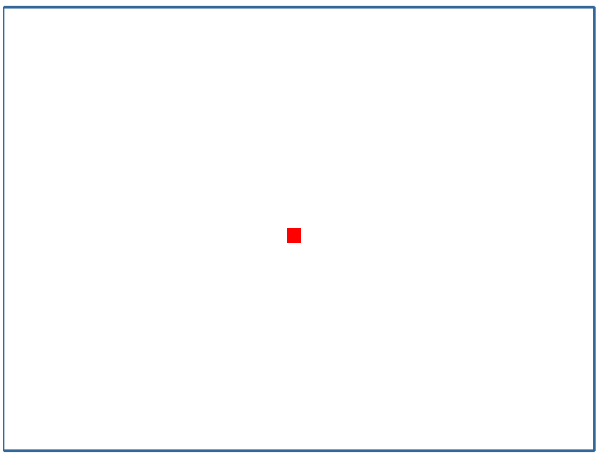
Sincerely,

Bill Knutson, P.E.
Environmental Engineer

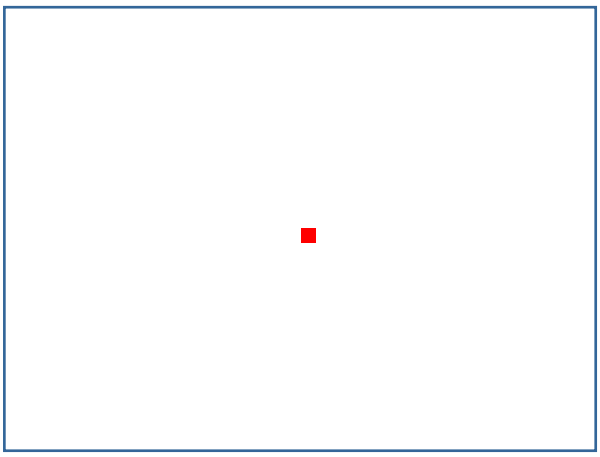
cc Scott Malfait, Hi Way Fuel

Facility/Site: JIMBOS DELI MART 2 86429735

Also known as:



Larger Map



Larger Map

Address

165 C ST

WASHOUGAL WA 98671

Decimal Coordinates

Latitude: 45.58101

Longitude: -122.37863

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
Underground Storage Tank	TOXICS	(360) 407-7224	662	1/20/1981	

Report generated on 09-29-2011

Industrial Codes (External Links Below)

No NAICS information is available for this facility site.	No SIC information is available for this facility site.

Report generated on 09-29-2011

Regulated Underground Storage Tanks Site List

CLARK COUNTY, Washougal | Site Name: JIMBOS DELI MART 2

Facility-Site ID: 86429735
UST Site ID: 662
Location: 165 C STREET
Washougal, 986712144
Responsible Unit: SOUTHWEST
Lat / Long: 45.58101 -122.37863

Tank Name	Tank Status	Install Date	Capacity Range	Compartment #	Substance Stored
1	Removed	01/20/1981		1	Leaded Gasoline
2	Removed	01/20/1981		1	Unleaded Gasoline
3	Removed	01/20/1981		1	Unleaded Gasoline
4	Removed	01/20/1981		1	
42	Operational	02/14/1997	10,000 to 19,999 Gallons	1	Diesel
42	Operational	02/14/1997	10,000 to 19,999 Gallons	2	Unleaded Gasoline
421506	Operational	02/14/1997	10,000 to 19,999 Gallons	1	Unleaded Gasoline
421511	Operational	02/14/1997	10,000 to 19,999 Gallons	1	Unleaded Gasoline

[Report: TCP_web_reporting/RegulatedUSTs.rdl]

Clark COUNTY

Storage Tank: 2

Tank ID: 34895

SITE INFORMATION

Site ID: 662 **Site Tag #: A1046**
JIMBOS DELI MART 2
165 C STREET
WASHOUGAL, WA 98671-2144
Phone #: (360) 835-3383 **UBI:** 600-423-757 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 86429735
JIMBOS DELI MART 2
165 C ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 51.6" / -122° 22' 43.0°

TANK INFORMATION

TANK NAME: 2 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
January 20, 1981	August 6, 1996	January 31, 1997	No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : None
OVERFILL PREVENTION : None

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :		
CONSTRUCTION :		Single Wall Pipe
PRIMARY REL DETECT :	Other	Other
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :	Other	None

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline	Motor Fuel for Vehicles	

Storage Tank: 4

Tank ID: 34853

SITE INFORMATION

Site ID: 662 **Site Tag #: A1046**
JIMBOS DELI MART 2
165 C STREET
WASHOUGAL, WA 98671-2144
Phone #: (360) 835-3383 **UBI:** 600-423-757 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 86429735
JIMBOS DELI MART 2
165 C ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 51.6" / -122° 22' 43.0°

TANK INFORMATION

TANK NAME: 4 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
January 20, 1981	August 6, 1996	January 31, 1997	No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : None
OVERFILL PREVENTION : None

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :		
CONSTRUCTION :	Single Wall Tank	Single Wall Pipe
PRIMARY REL DETECT :	Other	Other
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :	Other	None

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1		Motor Fuel for Vehicles	

Clark COUNTY

Storage Tank: 421511

Tank ID: 429048

SITE INFORMATION

Site ID: 662 **Site Tag #: A1046**
JIMBOS DELI MART 2
165 C STREET
WASHOUGAL, WA 98671-2144
Phone #: (360) 835-3383 **UBI:** 600-423-757 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 86429735
JIMBOS DELI MART 2
165 C ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 51.6" / -122° 22' 43.0°

TANK INFORMATION

TANK NAME: 421511 **Status : Operational** **Upgrade DT: 2/14/1997**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
February 14, 1997	December 10, 1999	January 31, 2012	Tank Open

CAPACITY RANGE : 10,000 to 19,999 Gallons
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : Spill Bucket/Spill Box
OVERFILL PREVENTION : Overfill Alarm

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Steel Clad with Corrosion Resistant Composite	Fiberglass
CONSTRUCTION :	Double Wall Tank	Double Wall Pipe
PRIMARY REL DETECT :	Interstitial Monitoring	Interstitial Monitoring (sump sensor)
SECONDARY REL DETECT :		Automatic Line Leak Detection
TIGHTNESS TEST :	Not Performed	No
CORROSION PROTECTION :	Corrosion Resistant	Corrosion Resistant

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline	Motor Fuel for Vehicles	10000

Clark COUNTY

Storage Tank: 1

Tank ID: 34920

SITE INFORMATION

Site ID: 662 **Site Tag #: A1046**
JIMBOS DELI MART 2
165 C STREET
WASHOUGAL, WA 98671-2144
Phone #: (360) 835-3383 **UBI:** 600-423-757 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 86429735
JIMBOS DELI MART 2
165 C ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 51.6" / -122° 22' 43.0°

TANK INFORMATION

TANK NAME: 1 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
January 20, 1981	August 6, 1996	January 31, 1997	No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : None
OVERFILL PREVENTION : None

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :		
CONSTRUCTION :		Single Wall Pipe
PRIMARY REL DETECT :	Other	Other
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :	Other	None

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Leaded Gasoline	Motor Fuel for Vehicles	

Storage Tank: 3

Tank ID: 34943

SITE INFORMATION

Site ID: 662 **Site Tag #: A1046**
JIMBOS DELI MART 2
165 C STREET
WASHOUGAL, WA 98671-2144
Phone #: (360) 835-3383 **UBI:** 600-423-757 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 86429735
JIMBOS DELI MART 2
165 C ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 51.6" / -122° 22' 43.0°

TANK INFORMATION

TANK NAME: 3 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
January 20, 1981	August 6, 1996	January 31, 1997	No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : None
OVERFILL PREVENTION : None

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :		
CONSTRUCTION :	Single Wall Tank	Single Wall Pipe
PRIMARY REL DETECT :	Other	Other
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :	Other	None

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline	Motor Fuel for Vehicles	

Clark COUNTY

Storage Tank: 421506

Tank ID: 429049

SITE INFORMATION

Site ID: 662 **Site Tag #: A1046**
JIMBOS DELI MART 2
165 C STREET
WASHOUGAL, WA 98671-2144
Phone #: (360) 835-3383 **UBI:** 600-423-757 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 86429735
JIMBOS DELI MART 2
165 C ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 51.6" / -122° 22' 43.0°

TANK INFORMATION

TANK NAME: 421506 **Status : Operational** **Upgrade DT: 2/14/1997**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
February 14, 1997	December 10, 1999	January 31, 2012	Tank Open

CAPACITY RANGE : 10,000 to 19,999 Gallons
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : Spill Bucket/Spill Box
OVERFILL PREVENTION : Overfill Alarm

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Steel Clad with Corrosion Resistant Composite	Fiberglass
CONSTRUCTION :	Double Wall Tank	Double Wall Pipe
PRIMARY REL DETECT :	Interstitial Monitoring	Interstitial Monitoring (sump sensor)
SECONDARY REL DETECT :		Automatic Line Leak Detection
TIGHTNESS TEST :	Not Performed	No
CORROSION PROTECTION :	Corrosion Resistant	Corrosion Resistant

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline	Motor Fuel for Vehicles	15000

Clark COUNTY

Storage Tank: 42

Tank ID: 429050

SITE INFORMATION

Site ID: 662 **Site Tag #: A1046**
JIMBOS DELI MART 2
165 C STREET
WASHOUGAL, WA 98671-2144
Phone #: (360) 835-3383 **UBI:** 600-423-757 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 86429735
JIMBOS DELI MART 2
165 C ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 51.6" / -122° 22' 43.0°

TANK INFORMATION

TANK NAME: 42 **Status : Operational** **Upgrade DT: 2/14/1997**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
February 14, 1997	December 10, 1999	January 31, 2012	Tank Open

CAPACITY RANGE : 10,000 to 19,999 Gallons
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : Spill Bucket/Spill Box
OVERFILL PREVENTION : Overfill Alarm

COMPARTMENT DETAILS

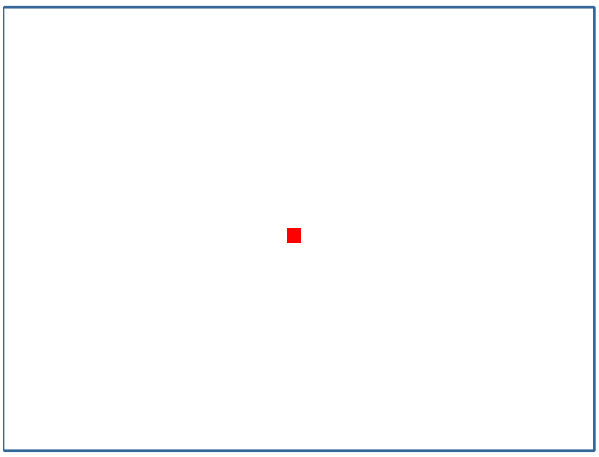
	TANK	PIPING
MATERIAL :	Steel Clad with Corrosion Resistant Composite	Fiberglass
CONSTRUCTION :	Double Wall Tank	Double Wall Pipe
PRIMARY REL DETECT :	Interstitial Monitoring	Interstitial Monitoring (sump sensor)
SECONDARY REL DETECT :		Automatic Line Leak Detection
TIGHTNESS TEST :	Not Performed	No
CORROSION PROTECTION :	Corrosion Resistant	Corrosion Resistant

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Diesel	Motor Fuel for Vehicles	5000
2	Unleaded Gasoline	Motor Fuel for Vehicles	5000

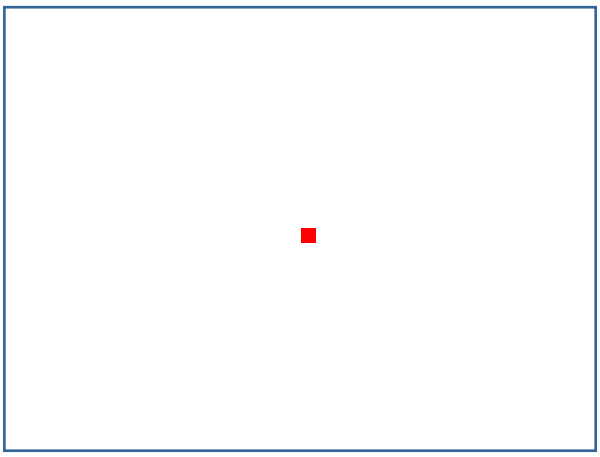
Report Information: Path TCP_Web_Reporting\TankDetails.rdl

Facility/Site: Napa Washougal 79581825

Also known as: MA ASSOCIATES INC DBA NAPA



Larger Map



Larger Map

Address

1414 E ST

WASHOUGAL WA 98671

Decimal Coordinates

Latitude: 45.58129

Longitude: -122.35622

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
Hazardous Waste Generator	HAZWASTE	(360) 407-6705	WAD027574318	2/10/1989	2/28/1989

Report generated on 09-29-2011

Industrial Codes (External Links Below)

No NAICS information is available for this facility site.

SIC Code	SIC Description
9999	NONCLASSIFIABLE ESTABLISHMENTS

Report generated on 09-29-2011

Facility/Site: 35533354 RD WAKEFIELD PROPERTY

Also known as:



Larger Map



Larger Map

Address

17TH & E ST

WASHOUGAL WA 98671

Decimal Coordinates

Latitude: 45.58101

Longitude: -122.35462

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
Underground Storage Tank	TOXICS	(360) 407-7224	509052	8/13/1999	1/23/2007

Report generated on 09-29-2011

Industrial Codes (External Links Below)

No NAICS information is available for this facility site.	No SIC information is available for this facility site.

Report generated on 09-29-2011

Regulated Underground Storage Tanks Site List

CLARK COUNTY, Washougal | Site Name: RD WAKEFIELD

Facility-Site ID: 35533354
UST Site ID: 509052
Location: 17TH AVE & E ST
Washougal, 98671
Responsible Unit: SOUTHWEST
Lat / Long: 45.581 -122.35461

Tank Name	Tank Status	Install Date	Capacity Range	Compartment #	Substance Stored
1	Removed	01/01/1900		1	Diesel
2	Removed	01/01/1900		1	Unleaded Gasoline
3	Removed	01/01/1900		1	Unleaded Gasoline

[Report: TCP_web_reporting/RegulatedUSTs.rdl]

Clark COUNTY

Storage Tank: 2

Tank ID: 509059

SITE INFORMATION

Site ID: 509052 **Site Tag #: none**
RD WAKEFIELD
17TH AVE & E ST
WASHOUGAL, WA 98671
Phone #: () - **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 35533354
RD WAKEFIELD PROPERTY
17TH & E ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 51.6" / -122° 21' 16.6°

TANK INFORMATION

TANK NAME: 2 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
January 1, 1900	December 10, 1999		No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :		
CONSTRUCTION :		
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline		675

Storage Tank: 1

Tank ID: 509054

SITE INFORMATION

Site ID: 509052 **Site Tag #: none**
RD WAKEFIELD
17TH AVE & E ST
WASHOUGAL, WA 98671
Phone #: () - **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 35533354
RD WAKEFIELD PROPERTY
17TH & E ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 51.6" / -122° 21' 16.6°

TANK INFORMATION

TANK NAME: 1 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
January 1, 1900	December 10, 1999		No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :		
CONSTRUCTION :		
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Diesel		1000

Clark COUNTY

Storage Tank: 3

Tank ID: 573476

SITE INFORMATION

Site ID: 509052 **Site Tag #: none**
RD WAKEFIELD
17TH AVE & E ST
WASHOUGAL, WA 98671
Phone #: () - **UBI:** --

FACILITY SITE INFORMATION

Facility Site ID: 35533354
RD WAKEFIELD PROPERTY
17TH & E ST
WASHOUGAL, WA 98671
Lat/Long 45° 34' 51.6" / -122° 21' 16.6°

TANK INFORMATION

TANK NAME: 3 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
January 1, 1900	June 26, 2001		No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

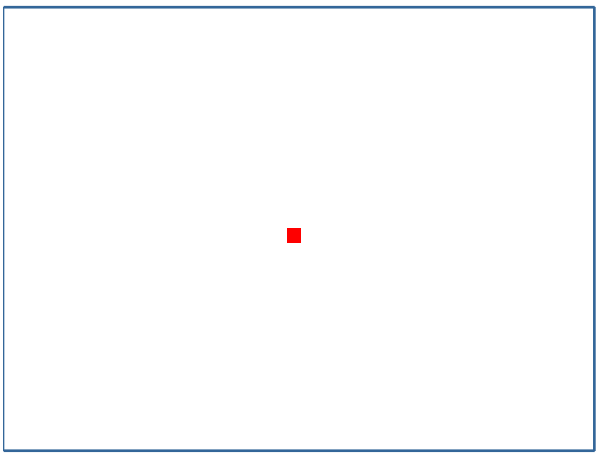
	TANK	PIPING
MATERIAL :		
CONSTRUCTION :		
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline		675

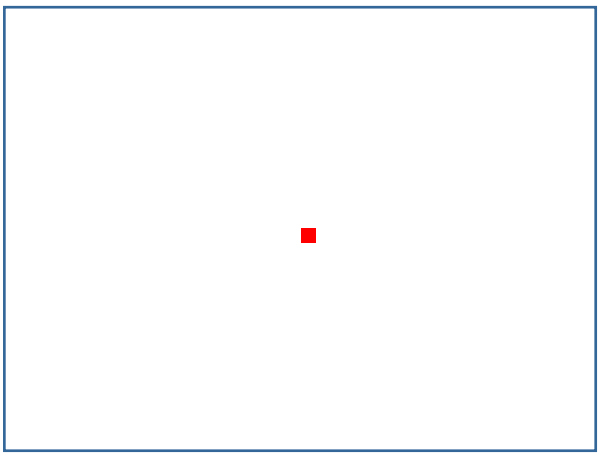
Report Information: Path TCP_Web_Reporting\TankDetails.rdl

Facility/Site: S & S FOOD MART 64113396

Also known as: JAMES C MOONEY, WILD WILLIES 1641 E ST



Larger Map



Larger Map

Address

1641 E ST

WASHOUGAL WA 98671-1430

Decimal Coordinates

Latitude: 45.58106

Longitude: -122.35543

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
Underground Storage Tank	TOXICS	(360) 407-7224	11194	3/20/2000	

Report generated on 09-29-2011

Emergency/Haz Chem Rpt TIER2	HAZWASTE	(360) 407-6729	CRK000042240	1/1/1995	7/4/1776

Industrial Codes (External Links Below)

No NAICS information is available for this facility site.

SIC Code	SIC Description
5541	GASOLINE SERVICE STATIONS

Report generated on 09-29-2011

Regulated Underground Storage Tanks Site List

CLARK COUNTY, Washougal | Site Name: S & S FOOD MART

Facility-Site ID: 64113396 **Location:** 1641 E ST **Responsible Unit:** SOUTHWEST
UST Site ID: 11194 Washougal, 98671 **Lat / Long:** 45.58106 -122.35543

Tank Name	Tank Status	Install Date	Capacity Range	Compartment #	Substance Stored
1	Removed	12/31/1964		1	Leaded Gasoline
2	Removed	12/31/1964		1	Unleaded Gasoline
3	Removed	12/31/1964		1	Unleaded Gasoline
4	Removed	12/31/1964		1	Unleaded Gasoline
5	Removed	12/31/1964		1	
6	Operational	03/15/1990	10,000 to 19,999 Gallons	1	Unleaded Gasoline
7	Operational	03/15/1990	10,000 to 19,999 Gallons	1	Unleaded Gasoline
8	Operational	03/15/1990	10,000 to 19,999 Gallons	1	Unleaded Gasoline

[Report: TCP_web_reporting/RegulatedUSTs.rdl]

Clark COUNTY

Storage Tank: 3

Tank ID: 25717

SITE INFORMATION

Site ID: 11194 **Site Tag #: A1080**
S & S FOOD MART
1641 E ST
WASHOUGAL, WA 98671-
Phone #: (360) 835-8040 **UBI:** 602-598-435 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 64113396
S & S FOOD MART
1641 E ST
WASHOUGAL, WA 98671-1430
Lat/Long 45° 34' 51.8" / -122° 21' 19.5°

TANK INFORMATION

TANK NAME: 3 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
December 31, 1964	August 6, 1996		No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Steel	Steel
CONSTRUCTION :	Single Wall Tank	
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline		

Storage Tank: 5

Tank ID: 25823

SITE INFORMATION

Site ID: 11194 **Site Tag #: A1080**
S & S FOOD MART
1641 E ST
WASHOUGAL, WA 98671-
Phone #: (360) 835-8040 **UBI:** 602-598-435 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 64113396
S & S FOOD MART
1641 E ST
WASHOUGAL, WA 98671-1430
Lat/Long 45° 34' 51.8" / -122° 21' 19.5°

TANK INFORMATION

TANK NAME: 5 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
December 31, 1964	August 6, 1996		No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Steel	Steel
CONSTRUCTION :	Single Wall Tank	
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1			

Clark COUNTY

Storage Tank: 4

Tank ID: 25899

SITE INFORMATION

Site ID: 11194 **Site Tag #: A1080**
S & S FOOD MART
1641 E ST
WASHOUGAL, WA 98671-
Phone #: (360) 835-8040 **UBI:** 602-598-435 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 64113396
S & S FOOD MART
1641 E ST
WASHOUGAL, WA 98671-1430
Lat/Long 45° 34' 51.8" / -122° 21' 19.5°

TANK INFORMATION

TANK NAME: 4 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
December 31, 1964	August 6, 1996		No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Steel	Steel
CONSTRUCTION :	Single Wall Tank	
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline		

Storage Tank: 6

Tank ID: 26049

SITE INFORMATION

Site ID: 11194 **Site Tag #: A1080**
S & S FOOD MART
1641 E ST
WASHOUGAL, WA 98671-
Phone #: (360) 835-8040 **UBI:** 602-598-435 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 64113396
S & S FOOD MART
1641 E ST
WASHOUGAL, WA 98671-1430
Lat/Long 45° 34' 51.8" / -122° 21' 19.5°

TANK INFORMATION

TANK NAME: 6 **Status :** Operational **Upgrade DT: 4/28/1998**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
March 15, 1990	August 6, 1996	March 31, 2012	Tank Open

CAPACITY RANGE : 10,000 to 19,999 Gallons
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : Spill Bucket/Spill Box
OVERFILL PREVENTION : Ball Float Valve (vent line)

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Coated Steel	Fiberglass
CONSTRUCTION :	Single Wall Tank	Double Wall Pipe
PRIMARY REL DETECT :	Automatic Tank Gauging	Automatic Line Leak Detection
SECONDARY REL DETECT :		
TIGHTNESS TEST :		Annual
CORROSION PROTECTION :	Sacrificial Anode	Corrosion Resistant

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline	Motor Fuel for Vehicles	12000

Clark COUNTY

Storage Tank: 2

Tank ID: 26007

SITE INFORMATION

Site ID: 11194 **Site Tag #: A1080**
S & S FOOD MART
1641 E ST
WASHOUGAL, WA 98671-
Phone #: (360) 835-8040 **UBI:** 602-598-435 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 64113396
S & S FOOD MART
1641 E ST
WASHOUGAL, WA 98671-1430
Lat/Long 45° 34' 51.8" / -122° 21' 19.5°

TANK INFORMATION

TANK NAME: 2 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
December 31, 1964	August 6, 1996		No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Steel	Steel
CONSTRUCTION :	Single Wall Tank	
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline		

Storage Tank: 7

Tank ID: 25759

SITE INFORMATION

Site ID: 11194 **Site Tag #: A1080**
S & S FOOD MART
1641 E ST
WASHOUGAL, WA 98671-
Phone #: (360) 835-8040 **UBI:** 602-598-435 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 64113396
S & S FOOD MART
1641 E ST
WASHOUGAL, WA 98671-1430
Lat/Long 45° 34' 51.8" / -122° 21' 19.5°

TANK INFORMATION

TANK NAME: 7 **Status :** Operational **Upgrade DT: 4/28/1998**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
March 15, 1990	August 6, 1996	March 31, 2012	Tank Open

CAPACITY RANGE : 10,000 to 19,999 Gallons
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : Spill Bucket/Spill Box
OVERFILL PREVENTION : Ball Float Valve (vent line)

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Coated Steel	Fiberglass
CONSTRUCTION :	Single Wall Tank	Double Wall Pipe
PRIMARY REL DETECT :	Automatic Tank Gauging	Automatic Line Leak Detection
SECONDARY REL DETECT :		
TIGHTNESS TEST :		Annual
CORROSION PROTECTION :	Sacrificial Anode	Corrosion Resistant

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline	Motor Fuel for Vehicles	12000

Clark COUNTY

Storage Tank: 1

Tank ID: 25786

SITE INFORMATION

Site ID: 11194 **Site Tag #: A1080**
S & S FOOD MART
1641 E ST
WASHOUGAL, WA 98671-
Phone #: (360) 835-8040 **UBI:** 602-598-435 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 64113396
S & S FOOD MART
1641 E ST
WASHOUGAL, WA 98671-1430
Lat/Long 45° 34' 51.8" / -122° 21' 19.5°

TANK INFORMATION

TANK NAME: 1 **Status :** Removed **Upgrade DT:**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
December 31, 1964	August 6, 1996		No Closed Date Recorded

CAPACITY RANGE :
PUMP SYSTEM :
SPILL PREVENTION :
OVERFILL PREVENTION :

COMPARTMENT DETAILS

	TANK	PIPING
MATERIAL :	Steel	Steel
CONSTRUCTION :	Single Wall Tank	
PRIMARY REL DETECT :		
SECONDARY REL DETECT :		
TIGHTNESS TEST :		
CORROSION PROTECTION :		

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Leaded Gasoline		

Storage Tank: 8

Tank ID: 25962

SITE INFORMATION

Site ID: 11194 **Site Tag #: A1080**
S & S FOOD MART
1641 E ST
WASHOUGAL, WA 98671-
Phone #: (360) 835-8040 **UBI:** 602-598-435 001 0001

FACILITY SITE INFORMATION

Facility Site ID: 64113396
S & S FOOD MART
1641 E ST
WASHOUGAL, WA 98671-1430
Lat/Long 45° 34' 51.8" / -122° 21' 19.5°

TANK INFORMATION

TANK NAME: 8 **Status :** Operational **Upgrade DT: 4/28/1998**

Install Date	Status Date	Permit Expiration Date	Permanently Closed Date
March 15, 1990	August 6, 1996	March 31, 2012	Tank Open

CAPACITY RANGE : 10,000 to 19,999 Gallons
PUMP SYSTEM : Pressurized System
SPILL PREVENTION : Spill Bucket/Spill Box
OVERFILL PREVENTION : Ball Float Valve (vent line)

COMPARTMENT DETAILS

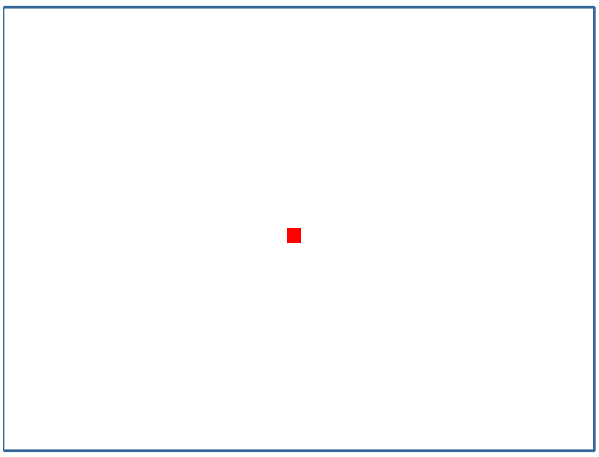
	TANK	PIPING
MATERIAL :	Coated Steel	Fiberglass
CONSTRUCTION :	Single Wall Tank	Double Wall Pipe
PRIMARY REL DETECT :	Automatic Tank Gauging	Automatic Line Leak Detection
SECONDARY REL DETECT :		
TIGHTNESS TEST :		Annual
CORROSION PROTECTION :	Sacrificial Anode	Corrosion Resistant

Compartment #	SUBSTANCE STORED	SUBSTANCE USED	ACTUAL CAPACITY
1	Unleaded Gasoline	Motor Fuel for Vehicles	8000

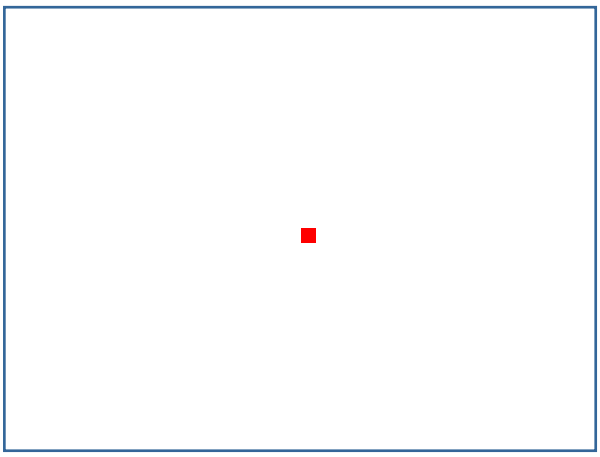
Report Information: Path TCP_Web_Reporting\TankDetails.rdl

Facility/Site: 3811629 US DOE BPA Camas Substation

Also known as:



Larger Map



Larger Map

Address

1ST ST 1 BLK N OF 8TH AVE

WASHOUGAL WA 98671

Decimal Coordinates

Latitude: 45.58176

Longitude: -122.38134

Geographic Information

Ecology Region: SWRO

County: Clark

Legislative District: 18

Congressional District: 3

WRIA: 28

Tribal Land: No

Ecology Interactions

Interaction Description	Ecology Program	Ecology Program Phone	Program ID	Start Date	End Date
Hazardous Waste Generator	HAZWASTE	(360) 407-6705	WA2891400150	1/15/1992	12/31/1993

Report generated on 09-29-2011

Industrial Codes (External Links Below)

No NAICS information is available for this facility site.

SIC Code	SIC Description
9199	GENERAL GOVERNMENT, NEC

Report generated on 09-29-2011

murraysmith

WELLHEAD PROTECTION LETTER, MAP, AND RECIPIENTS, OCTOBER 2020

City *of* Washougal
Memorandum

October 12, 2020

Re: City of Washougal Wellhead Protection Plan

To Whom it May Concern:

The City of Washougal has developed a Wellhead Protection Plan to help maintain drink water quality for our city residents. The plan is based on Washington Department of Health Washington Administrative Code (WAC) 246-290-135(3) regulations. As part of the plan, maps were prepared that show the areas around each city drinking water well when a chemical spill on the ground may cause contamination of the well/aquifer. These areas are Wellhead Protection Areas (WHPA). The plan also requires an inventory of potential sources of groundwater contamination within these wellhead protection areas.

The primary purpose of this letter is to notify you that your facility is located within our WHPA. Since your business or the activities conducted at your facility may involve the use of chemicals (e.g., gasoline, underground storage tanks, hazardous water, etc.) and the potential exists that a chemical spill from your facility may adversely impact the city drinking water supply, please notify the City of Washougal immediately if a chemical spill occurs at your facility. All spills should be reported by dialing 911 and requesting that the Camas/Washougal Fire Department and Southwest Washington Health Department be contacted.

Please note that the groundwater aquifer that supplies the City of Washougal's wells also supply the City of Camas wells. Therefore, immediate notification of the City of Washougal in the event of a spill also assists the City of Camas by protecting the water supply for the entire community.

Thank you for assisting us in protecting our water supply and groundwater resources. If you have any questions, please contact me at 360-835-2662 ext. 204.

Sincerely,

Ryan Baker
Water/Wastewater Superintendent
City of Washougal

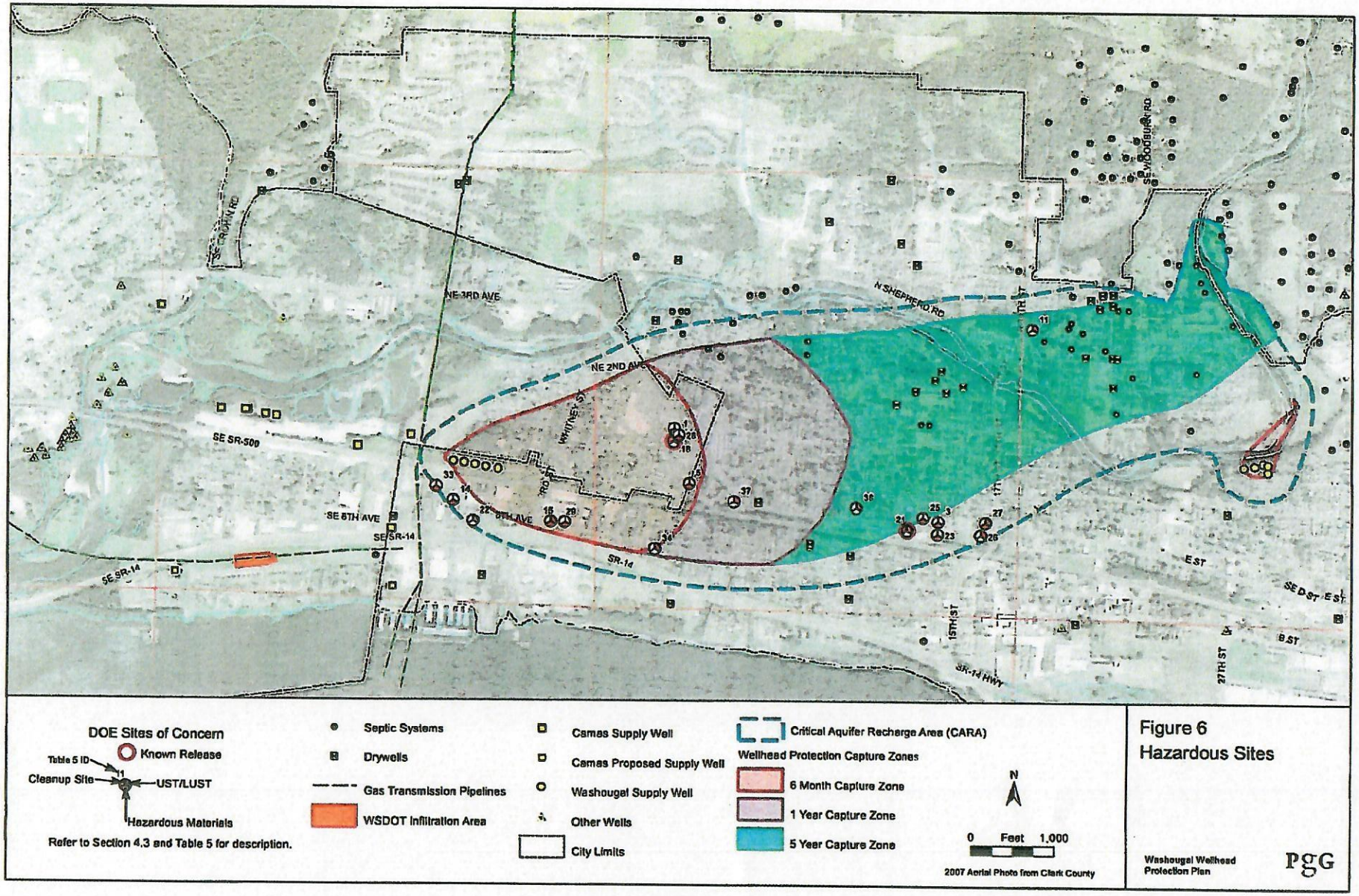


Figure 6
Hazardous Sites

Washougal Wellhead Protection Plan

pgG

Mr. Christopher Delargy
Terminal Superintendent
BNSF Railroad
1515 W 39th Street
Vancouver, WA 98660

Chief Nick Swinhart
Camas-Washougal Fire Department
616 NE 4th Avenue
Camas, WA 98607

Chief Mitch Lackey
Camas Police Department
2100 NE 3rd Avenue
Camas, WA 98607

Department of Ecology
Southwest Regional Office
PO Box 47775
Olympia, WA 98504-7775

Ron Schumacher
Division Chief / Fire Marshal
Camas-Washougal Fire Department
616 NE 4th Avenue
Camas, WA 98607

Chief Wendi Steinbronn
Washougal Police Department
1320 A Street
Washougal, WA 98671

O'Reilly Auto Parts
CSK Auto Corp Store #3146
C/O Thompson Reuters PTS
P.O. Box 06116
Chicago, IL 60606

Rama Inn
Attn: Owner/Manager
544 6th Street
Washougal, WA 98671

Dan's Top Notch
594 C Street
Washougal, WA 98671

Clark County Shed
4700 NE 78th Street
Vancouver, WA 98665

Washougal School District 112
Transportation Department
4855 Evergreen Way
Washougal, WA 98671

Goodwill Industries
1943 SE 6th Avenue
Portland, OR 97214

Hi-Way Fuel
31914 SE 17th Street
Washougal, WA 98671

Jimbo's Deli Mart #2
16109 NE 61st Avenue
Vancouver, WA 98686

E Street Market
642 Belle Center Road
Washougal, WA 98671

Wild Willies
1641 E Street
Washougal, WA 98671

Washougal 1st Substation
Clark Public Utilities
P.O. Box 8900
Vancouver, WA 98668

AutoZone Auto Parts - #4189
C/O Autozone Inc #4189
P.O. Box 2198 DEPT 8088
Memphis, TN 38101

ERS
754 SE Union Street
Camas, WA 98607

Liberty Services Diesel & Auto
3151 44th Street
Washougal, WA 98671

Mailed 10/13/2020

murraysmith

APPENDIX J
EMERGENCY RESPONSE PLAN

SECTION 1
EMERGENCY RESPONSE MISSION AND GOALS

General

A mission statement and emergency response goals help to focus the efforts and activities of an organization. The City of Washougal Public Works has developed and adopted the following mission statement:

> *"Public Works is dedicated to the quality of life of the citizens of Washougal. From the treatment of sanitary waste to water quality to transportation, it is our mission to provide a level of service and quality of life that the citizens of the City of Washougal can appreciate."*

A separate emergency planning and response action mission statement for the water system operations can provide guidance in responding to emergency events. This mission statement presented below was prepared by City staff specifically for emergency events and is congruent with the general Public Works mission statement presented above.

Table 1-1
Emergency Response Mission and Goals

Mission statement for emergency response	Protect consumer health by preparing for a variety of natural, man-made and accidental events that may result in contamination or disruption of the water supply.
Goal 1	Identify an emergency situation and begin response efforts in an efficient and timely manner.
Goal 2	Contact government agencies quickly, in addition to regional partners, to aid in the response efforts.
Goal 3	Protect public health by quickly and accurately identifying potential contamination of the water supply, and to quickly and effectively notify customers of the situation.
Goal 4	Have the necessary tools and contacts available to quickly respond to an event and repair damages to minimize service disruption.
Goal 5	Review emergency events and the response to those events for efficiency and effectiveness; improve emergency response after each event.

Summary

The emergency planning and response action mission statement and goals for the water system should be reviewed periodically, including after each emergency response action to ensure that the actions taken are consistent with the mission statement and that the emergency response goals are being met. As circumstances within the water system and the City change, the emergency planning and response action mission statement should be updated to reflect those changes.

SECTION 2
SYSTEM INFORMATION

General

In an emergency it is important to have basic system information readily accessible and have the ability to relay this information to those responding to an incident. This is especially important for those who are not familiar with the City's water system.

System Information

The following information should be updated and available for emergency responders, repair crews, and the news media when required.

Table 2-1
System Information

System identification number	WA 53-93400
System name and address	City of Washougal 1701 C Street Washougal, WA 98671
Location	Approximately twenty-five miles east of Vancouver, Washington on the north side of the Columbia River on State Highway 14 in the City of Washougal, Washington.
Population served and service connections	16,680 (as of 2020) people served through 5747 connections
System owner	The City of Washougal Contact: Trevor Evers, Public Works Director
Emergency meeting location – water system emergency	Washougal City Council Chambers (back-up location for a City-wide emergency)
Emergency meeting location – City wide or regional emergency	Camas Police Station 2100 NE 3rd Avenue, Camas, Washington 98607
Person responsible for maintaining and implementing the emergency plan	Ryan Baker Water System Manager 360-835-2662 ext. 204, Phone 360-907-5751, Cell

Basic description and location of system facilities	The City of Washougal water system has six groundwater wells located in two well fields. The groundwater wells pump into two storage reservoirs, Reservoir No. 1A and 1B. These two reservoirs along with Booster Pump Station No. 1 are located East of 32nd Street, at 2104 32nd Street. Booster Pump Station No. 1 pumps water up to Reservoir No. 2A and 2B. Reservoir No. 2A, 2B and Booster Pump Station No. 4 are located East of 37th Street, at 2396 37th Street. Booster Pump Station No. 3 is located off of N 10th Street, at 1822 N 10th Court, and pumps up to Reservoir No. 3. Reservoir No. 3 is located off of Woodburn Road, at 3210 SE Woodburn Road. Booster Pump Station No. 4 pumps up to Reservoir No. 4A located on Lehr Road at, 3141 34th Street and Reservoir 4B located on SE 352nd Ave, at 1312 SE 352nd Ave. The City also has an interagency agreement with the City of Camas to allow for emergency water supply via two interties. One intertie is located on Shepherd Road approximately 400 feet northeast of the intersection with 3rd Avenue in Camas, and the second is located at the Lower Well Field.
Directions to the Washougal City Hall	From Vancouver, head east on Highway 14, turn left onto Washougal River Road. Turn right onto "C" Street. City Hall is on the north side of the street at 1701 "C" Street.
Directions to the Water Department Office	From Vancouver, head east on Highway 14, turn left onto Washougal River Road and then turn right onto Main Street. The Water Department is located at 2247 Main Street.
Directions to the Lower Well Field	The Lower Well Field (also referred to as the Westside Well Field) is located on Burlington Northern Property, West of 3rd Street at 411 3rd Street. From Highway 14 take exit 14 to Union ST/2nd St. Go straight through the first round about on to Frontage Rd. At the second round about go North to a third round about and then go East onto "C" Street. Take a left onto 3rd Street and then take the first left after the RR tracks onto the access road, at 411 3rd Street.

Directions to the Upper Well Field	The Upper Well Field (also referred to as the Hathaway Well Field) is located at the intersection of 28th and "I" Streets adjacent to Hathaway Park at 2807 "I" Street. From Highway 14 turn north onto Washougal River Road. Turn right onto "G" Drive, and then turn left onto 28th Street. The well field is located north of the parking lot for Hathaway Park.

Summary

As infrastructure within the water system and the City changes, the emergency response system information should be updated to reflect those changes.

SECTION 3
WATER SYSTEM CHAIN OF COMMAND - LINES OF AUTHORITY

General

In an emergency it is important that each individual in the response team knows their respective responsibilities. The first response step in an emergency is to inform the person at the top of the chain of command. This person is responsible for managing the emergency, coordinating response efforts, and making key decisions.

Table 3-1 presented below summarizes the responsibilities of City staff who may assist in a water system incident response. This information should be reviewed and updated semiannually.

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/

Table 3-1
Chain of Command

Name and Title	Responsibilities During an Emergency	Contact Number(s)
City Administrator David Scott	• Act as City spokesperson (Public Information Officer, PIO).	360-835-8501
Public Works Director Trevor Evers	• Act as Incident Commander (IC) during water system emergency events. • Provide information to the City spokesperson (PIO) to be disseminated to the media and the public. • Contact state and federal agencies, if required. • Contact regulatory agencies and communicate with area local governments.	Office: 360-835-2662 Cell: 360-772-2977

Name and Title	Responsibilities During an Emergency	Contact Number(s)
Deputy Public Works Director/City Engineer Rob Charles	• Discharge all responsibilities of the Public Works Director in his / her absence.	Office: 360-835-2662 Cell: 360-607-9753
Water System Manager Ryan Baker	• Ultimate responsibility for decision making and directing staff to resolve emergency. • Organize facility repairs and coordinate with back-up water providers as required.	Office: 360-835-2662 Cell: 360-907-5751
Water Distribution Lead Vaughn Barber	• Contact the customers. • Assess water system facilities. • Assist in carrying out facility repairs.	Office: 360-835-2662 Cell: 360-772-2891
Water Quality Lead Travis Davis	• Contact the customers. • Assess water system facilities. • Assist in carrying out facility repairs	Office: 360-835-2662 Cell: 360-772-0042
Administrative Staff Kelly Brown	• Handle and direct incoming phone calls and provide administrative support. • Direct all media enquiries to the designated spokesperson.	Office: 360-835-2662
Fire Chief Nick Swinhart	• Coordinate with the Incident Commander to ensure water for firefighting is available in locations needed. • Coordinate with first responders to provide emergency services if necessary.	Office: 360-835-2211 24-hour: 360-834-2262
Police Chief Ron Mitchell	• Coordinate with first responders to provide emergency services. • Provide crowd control as necessary.	Office: 360-835-8701

Summary

As City staff changes the table should be updated to include the positions and names. Phone numbers and cell phone numbers should also be updated as they change. Review of the responsibility assignments after an incident may indicate that some responsibilities are misallocated. If this is determined to be true, adjustments to the respective responsibilities of each person should be made.

SECTION 4
EVENTS THAT CAUSE EMERGENCIES

General

A wide variety of events have the potential to cause water system emergencies. The probability or risk of such an event is based on the likelihood of occurrence and the likelihood of damage occurring to the water system due to the event. The list presented in Table 4-1 is based on existing local conditions and may change as conditions in the City of Washougal change. For example, new industries in the area may also cause changes or additions to the information presented below.

Table 4-1
Events That Cause Emergencies

Type of Event	Probability or Risk	Comments
Flood	High	Facilities located between the Columbia and Washougal Rivers may be vulnerable to flooding. The well fields are vulnerable to heavy rains and run-off that may cause flash floods.
Earthquake	Medium	The City facilities did not suffer any damage in the 2001 Nisqually earthquake. New facilities are designed to seismic code.
High Winds	Medium	High winds occasionally occur in the area and are especially prevalent near Reservoir No. 3. High winds may cause disruptions with communications and telemetry systems. They may also cause difficulties in reaching all facilities if trees or power lines are down.
Construction Accident	Medium	Potential for main breaks when in conflict with construction operations.
Rupture of Williams Pipeline	Medium	Rupture of the pipeline has occurred in nearby areas. Explosions are a possibility.
Chemical Spill	Medium	Potential for chemical spill at the Burlington Northern Railroad near the Lower Well Field. The City has a wellhead protection plan in place that addresses this event.
Volcanic Eruption	Low	The eruption of Mt. Hood could cause debris flows and major flooding in the Columbia River. The Lower Well Field could be affected. Ash fallout could also occur.
Ice Storm	Low	Ice storms are infrequent, but due to the high elevation of system components and the spread-out nature of the system, ice storms can cause difficulty reaching facilities and may down power lines or cause vehicles to run into fire hydrants.

Type of Event	Probability or Risk	Comments
Drought	Low	The City is beginning to develop a formal water shortage response plan in accordance with the Washington Department of Health (DOH) guidelines.
Terrorist Act	Low	The City has not experienced any overt terrorist activity directed at the water system. Based on national studies, additional training on suspicious activity may be needed.
Wild Fire	Low	The water system facilities are not located in areas that have been affected by wild fires in the past. Most of the water system facilities are in areas not prone to wild fires.
Lightening Storm	Low	Lightning storms are rare in the Pacific Northwest, yet do occur. Telemetry systems could be damaged and power outages may occur.
Blizzard	Low	Blizzards are rare in the Pacific Northwest, yet do occur. Power outages may result; water mains may freeze and burst. Weather may make accessing remote locations within the system difficult, and increase response times.

HAZARD IDENTIFICATION AND VULNERABILITY ANALYSIS

The City of Washougal 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 2011. 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 4-1 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 worse 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 4-1
Hazard Identification and Vulnerability Assessment Summary City of Washougal

Hazard Classification	Hazard	Probability	Vulnerability	Risk	Applies to City of Washougal 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		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

Summary

The emergency causing incidents described above may not fully encompass the range of incidents that may occur in the City of Washougal. Preparation in anticipation of the above events may help to prepare the City for a wide range of other incidents.

SECTION 5
SEVERITY LEVEL OF EMERGENCIES

General

The severity level of an emergency should be determined based on information from field staff, and the initial responders to the emergency, with the official determination being made by the Incident Commander. If the emergency event affects more City departments than the Water Department, the determination of the severity level of the emergency should be based on the overall emergency severity, not just that experienced by the water system. The information used to make such a determination should be reviewed after each emergency event in order to assist in making a more informed determination during the next emergency. As a knowledge base regarding emergency response is accumulated, the definition of emergency severity levels may change.

The level of severity for each emergency event should be communicated to all emergency responders as soon as it is determined. All emergency responders should be available via cell phones, pagers, or radios when they are in the field. Any geographical areas within the water system service area that are not within cell phone range should be documented to ensure that personnel responding in those areas are available via radio or other means of communication.

Level I - Routine Emergency Operations

A routine emergency is defined as an emergency that is generally resolved with the system returned to normal operations within 24 hours. The City is typically able to handle routine emergencies with no outside assistance.

The City of Washougal water system considers the following events to be typical of a Level I Emergency:

- Supply disruption such as a distribution line break.
- Short duration losses of electrical power.
- Minor incidents where public health is not in jeopardy.
- Minor mechanical problems with pump systems.

Level II - Enhanced Emergency Operations

An enhanced emergency is defined as an emergency that is generally resolved and the system returned to normal operations within 72 hours. Assistance from outside jurisdictions, agencies or contractors may be required.

The City of Washougal water system considers the following events to be typical of a Level II Emergency:

- Severe drought that significantly affects well production.

- An act of vandalism or terrorism involving unauthorized access or damage to a primary facility.
- A loss or complete malfunction of the chlorination or chemical feed system.
- Supply disruption such as a transmission main break.
- Complete loss of use of a well or booster pump.
- An initial positive coliform or E. coli sample.
- Flooding of the Washougal River or the Columbia River.

Level III - Full Emergency Operations

A full emergency is defined as an emergency that is generally not resolved quickly. It may take days or possibly weeks for the system to return to normal operations. Assistance may be required from county, state and federal agencies or private interests.

The City of Washougal considers the following events to be typical of a Level III Emergency:

- Earthquakes that shut down the system or impact sources, transmission or distribution lines, etc.
- Acts of terrorism possibly contaminating the water system with radioactive, biological or chemical agents.
- Flooding that disables system facilities or infiltrates and contaminates sources.
- Chemical spills within 2,000 feet of the Upper or Lower Well Fields.
- Storms that significantly damage the power grid or system facilities.

Summary

The above definitions of emergency levels are consistent with the Camas-Washougal Comprehensive Emergency Management Plan. As that plan is updated this water system Emergency Response Plan should be reviewed to for consistency and inclusion of updated information.

SECTION 6
EMERGENCY NOTIFICATION

General

In an emergency situation it may be necessary to contact many people and agencies in a short period of time. This section presents emergency notification call-up lists that can aid in completing these calls quickly and efficiently by reducing the amount of time spent finding contact numbers.

These lists pertain to emergencies within the water system. The Camas-Washougal comprehensive Emergency Management Plan should be followed for other types of emergency events. At this time the City of Washougal is working to train personnel and implement the National Incident Management System (NIMS) and the Incident Response System (ICS). After ICS has been implemented this Emergency Response Plan should be updated to ensure that the proper notification procedures under ICS are being followed.

Table 6-1
Public Agency Notification List

Agency	Daytime Contact Number	Nighttime Contact Number
Local Law Enforcement	360-835-8701 or 911	911
Sheriff	360-397-2211 or 911	911
Fire Department	360-835-2211 or 911	911
Ambulance Service	911	911
Hospital	360-256-2000	
Local Health Jurisdiction	360-664-0768	877-481-4901
Water Testing Laboratory	BSK Associates 360-750-0055	BSK Associates 360-750-0055
Local Emergency Management (Clark Regional Emergency Services Agency)	360-737-1911	
Water System Operator	360-835-2662	Sonitrol Answering Service 360-735-9509
The City of Camas	360-817-1563 ext. 4268	360-737-0592
Clark Public Utilities	360-992-3000	360-992-8000
Washington State Police	360-449-7999	360-449-7999

Agency	Daytime Contact Number	Nighttime Contact Number
Washington State Division of Drinking Water – SW Regional Office	360-236-3030	800-833-6388
Washington state testing laboratory	206-418-5400	206-418-5400
Washington State Dept. of Ecology	360-407-6300	
Washington State Dept. of Labor & Industries	360-902-5800	360-902-5800

Table 6-2
Private Contractor Contact List

Area of Expertise	Company Name and Daytime Contact Number	Company Name and Nighttime Contact Number
Electrician	Prestige Electric 360-210-4269	Prestige Electric (Jeff) 360-921-4700
Electric Utility *	Clark County Public Utilities 360-992-3000	Clark County Public Utilities 360-992-8000
Plumber *	McGee Plumbing 360-835-2859	McGee Plumbing 360-835-2859
Pump Specialist	Mather & Sons 360-256-1310	Mather & Sons 360-256-1310
Soil Excavator	McDonald Excavating Inc. 360-835-8794	McDonald Excavating (Ryan) 360-921-5276
Equipment Rental	Excavator Rental Service 360-210-7726	Excavator Rental Service (Jerry) 360-607-1646
Chemical Spill Cleanup Contractor *	Safety Kleen 503-655-5798	Safety Kleen 503-655-5798
Spill Containment Tanks *	Baker Tanks 503-775-7211	Baker Tanks 800-225-3712

Table 6-3
Media Contact List

Newspaper Name	Contact Phone Number
Post Record *	360-834-2141
The Columbian *	360-694-3391
The Oregonian *	503-221-8240
TV Station Name and Channel	**Contact Phone Number**
KATU Channel 2 *	503-231-4222
KPDX Channel 49 *	503-906-1249
KOIN Channel 6 *	503-464-0600
KNMT Channel 24 *	503 252-0792
KOPB-TV Channel 10 *	503-293-1905
KPTV Channel 12 *	503-736-0468
Radio Station Name and Call Number	**Contact Phone Number**
KEX Radio AM 1190 *	503-242-1190
KOTK Radio AM 1080 * KKSN Radio FM 97.1 * KNRK Radio FM 94.7 *	503-223-1441
KPAM Radio AM 860 *	503-225-0860
KXL Radio AM 750 *	503-517-6000
KPOJ Radio AM 620 * KKRZ Radio FM 100.3 *	503-323-6400
KIHR Radio FM 105.5 *	541-386-1511
KLTH Radio FM 106.7 *	503-323-1067
KINK Radio FM 101.9 *	503-517-6000
KGW Channel 8 *	503-226-5000
KOPB-FM 91.5 *	503-293-1905
KKOV Radio AM 1550 *	503-228-5523

Emergency Event Notification Procedure Summary

For each group that requires notification there is one person within the City's response team who is responsible to make that notification. In the event that someone is not available to take part in the response efforts, a back-up for that person's responsibilities must be designated. The following tables present information regarding who is responsible to contact the public agencies, private agencies, contractors, media and customers. Each table includes the contact procedures that should be followed.

Table 6-4
Notifying Water System Customers

Who is Responsible:	**Trevor Evers, Public Works Director, is responsible for making the decision to notify customers regarding a potential water shortage and the need for water use restrictions to be enacted.** **1st Alternate: Rob Charles City Engineer/Assistant PW Director** **2nd Alternate: Ryan Baker, Water System Manager** **3rd Alternate: Vaughn Barber or Travis Davis, Water Leads**
Procedures:	• Water System Manager confers with key staff to verify problems. • Water System Manager organizes staff to develop the message to be delivered to customers. • Water System Manager consults with state drinking water staff regarding the problem. • Water System Manager, with assistance from staff, prepares and signs radio message. • Water System Leads continue to investigate problem and make repairs as necessary. • The water shortage notification will be distributed by: 1. Field Staff placing "water shortage notices" at local businesses and along travel routes. 2. Staff will place signs on main travel routes into the community. 3. Water System Manager contacts KIHR FM Radio and requests issuance of the water shortage notice and request curtail water use. 4. Administrative support person will provide a pre-scripted message to phone callers and log in each phone call. • Water System Leads continuously updates the Water System Manager on water shortage. • Once the water shortage is resolved, re-notify customers, using the same procedures as were used for the original notification.

Table 6-5
Alerting Local Law Enforcement, State Drinking Water and Local Health Officials

Who is Responsible:	**Ryan Baker, Water System Manager, is responsible for contacting local law enforcement, state drinking water officials and local health officials.** **1st Alternate: Rob Charles, City Engineer/Assistant PW Director** **2nd Alternate: Vaughn Barber or Travis Davis, Water Leads** **3rd Alternate: Trevor Evers, PW Director**
Procedures:	The Public Works Director will direct staff to contact agencies, or will make contact himself.

Table 6-6
Alerting Local Emergency Responders

Who is Responsible:	**Ryan Baker, Water System Manager, is responsible for altering local emergency responders in the event of a water system emergency.** **1st Alternate: Rob Charles, City Engineer/Assistant PW Director** **2nd Alternate: Vaughn Barber or Travis Davis Water Leads** **3rd Alternate: Trevor Evers, PW Director**
Procedures:	The Public Works Director will direct staff to contact local emergency responders, or will make contact himself.

Table 6-7
Contacting Service and Repair Contractors

Who is Responsible:	**Ryan Baker, Water System Manager, is responsible for contacting service and repair contractors and technicians.** **1st Alternate: Vaughn Barber or Travis Davis, Water Leads** **2nd Alternate: Rob Charles, City Engineer/Assistant PW Director** **3rd Alternate: Trevor Evers, PW Director**
Procedures:	Water System Manager will direct staff to contact agencies, or will make contact himself.

Table 6-8
Contacting Neighboring Water Systems

Who is Responsible:	**Rob Charles, City Engineer/Assistant PW Director, is responsible for contacting the City of Camas regarding a water system emergency.** **1st Alternate: Ryan Baker, Water System Manager** **2nd Alternate: Trevor Evers, PW Director**
Procedures:	The Public Works Director will direct staff to contact agencies or will contact them himself.

Table 6-9
Issuing a Health Advisory

Who is Responsible:	**Trevor Evers, Public Works Director, is responsible for issuing a health advisory in a water system emergency.** **1st Alternate: Rob Charles, City Engineer/Assistant PW Director** **2nd Alternate: Ryan Baker, Water System Manager**
Procedures:	The Public Works Director will direct staff to contact agencies or will contact himself. The DOH may offer assistance in issuance of the health advisory.

Table 6-10
Coordinating with Media Outlets

Who is Responsible:	**David Scott, City Administrator, is responsible for coordinating with media outlets and issuing public statements in a water system emergency.** **1st Alternate: Trevor Evers, Public Works Director** **2nd Alternate: Rob Charles, City Engineer/Assistant PW Director** **3rd Alternate: Ryan Baker, Water System Manager**
Procedures:	• The Public Works Director will prepare statements regarding the emergency with the assistance of the Water System Manager and key staff. • The Public Works Director will relay the information and statements to the City Administrator. • The City Administrator will coordinate with media outlets to inform the public of the situation. • Prepared statements may also be distributed to administrative support staff for phone callers.

Summary

These lists should be reviewed and updated frequently, and should be available at each facility in addition to the emergency meeting location and emergency response headquarters. The contact procedures should be reviewed after each incident to ensure that they are complete.

SECTION 7
WATER QUALITY SAMPLING

General

In an emergency event the water source, supply, storage, or distribution systems may become contaminated with a variety of potential contaminants. If water contamination is suspected due to an initial positive, local health concerns, or terrorist act, the water system operators should contact and coordinate with the local health jurisdiction and Department of Health - Division of Drinking Water (DOH - DDW) regional office to help identify what water quality tests should be performed. Table 7-1 summarizes water sampling procedures for a variety of contaminants.

Table 7-1
Water Quality Sampling Procedures

Sampling Parameter	Do we have procedures? Yes/No	Basic steps to conduct sampling (sites, frequency, procedures, lab requirements, lab locations, contacts, etc.)
Coliform Bacteria	Yes	Take twenty samples per month, according to a set rotation. Eighteen sampling sites are available, and each has an upstream and downstream repeat sample site available. All sources treated or untreated, and all storage tanks may also be sampled. If a total coliform-positive result is returned, the sample must be tested for the presence of fecal coliform or E. coli and three repeat samples must be collected within 24 hours and analyzed for total coliform (and if total coliform-positive result, analyzed for fecal coliform or E. coli). Update plan for emergency sampling.
Total Halogenated Organic Carbon (TOX)	Yes	TOX is measured as part of the VOC testing performed by the system. Evaluate procedures and update plans for emergency sampling.
Chlorine Residual	Yes	Current chlorine residuals consistently test between 0.2 and 0.8 mg/L. Monthly records are maintained and sent to the DOH no later than the 10th of every month. DOH requires a minimum chlorine residual of 0.2 mg/L at points representative of the distribution system. The City tests Eleven distribution samples most days for chlorine residual. Update plan for emergency sampling.

Sampling Parameter	Do we have procedures? Yes/No	Basic steps to conduct sampling (sites, frequency, procedures, lab requirements, lab locations, contacts, etc.)
Heterotrophic Plate Count (HPC)	No	Procedures are currently being developed.
Nitrate/Nitrite	Yes	All of the City's sources are sampled annually for nitrate/nitrite as part of the complete inorganic contaminants test.
Total Organic Carbon (TOC)	Yes	Well Nos. 1, 6, 7, and 11 are tested once every six years for Volatile Organic Compound's (VOC). Well No. 5 is sampled every 3 years for VOC's. Well Nos. 1,5,6,7 & 11 are tested for Inorganic Compound's (IOC) every 9 years. Well No 12 is tested every 3 years. Evaluate procedures and update plans for emergency sampling.
Radionuclides	Yes	Regularly tested as required by State testing regulations. Evaluate procedures and update plans for emergency sampling.
Cyanide	Yes	Cyanide testing is part of a complete inorganic chemicals test. It was last tested for in 2000 and was found to be non-detectable. Evaluate procedures and update plans for emergency sampling.

Cross Connection Control Program

An ongoing cross connection control program is an important tool to prevent contamination of the water system. The City has an existing and ongoing cross connection control program that is written into the municipal Code Chapter 13.40.

Summary

Performing the proper sampling and water quality testing may assist in preventing illness and/or injury among customers. The DOH is prepared to provide assistance to public water systems within the state that are experiencing a potential contamination event.

SECTION 8
EFFECTIVE COMMUNICATION

General

Effective communication is essential to provide an efficient and effective response to an emergency event. Communication between emergency responders and between City officials and customers, the media, and the general public should be clear and concise. It is important that all information distributed to the news media and the public is consistent, calming, and shared in a timely manner.

Designated Public Spokesperson

The Public Works Director will act as the water system's contact (Incident Commander, IC) to the City's designated spokesperson (PIO) in all emergencies. If the Public Works Director is not available, the City Engineer/Assistant Public Works Director will act as the contact. News media contacts are presented in Section 6. The names and phone numbers of the designated spokesperson are presented below in Table 8-1.

Table 8-1
Designated Spokesperson

City Spokesperson (PIO)	Alternate 1	Alternate 2
City Administrator David Scott Phone: 360-835-8501	Public Works Director Trevor Evers Phone:360-835-2662 ext 202	City Engineer/Assistant PW Director Rob Charles Phone: 360-835-2662 ext 230

Key Messages

To the maximum extent possible, develop key messages in advance, and update them as the emergency develops. Some example messages are presented below.

- We are taking this incident seriously and are doing everything we can to resolve it.
- Our primary concern is protecting our customers' health.
- Another important concern is keeping the system operational and preventing damage.
- The most current information we have is <FILL IN AS APPROPRIATE TO THE CURRENT SITUATION>.
- The information we currently have is incomplete. We are closely monitoring the situation and will inform you as soon as we have more information.
- We have contacted state and local officials to aid in our response efforts.
- If you think you may be ill or need medical advice, contact a physician.
- We are sampling and testing the water to determine whether there is contamination.
- Other key points as appropriate.

Health Advisories

Many of the emergency events discussed in this plan may cause a water quality or human health concern. In such an instance it may be necessary to issue a public health advisory. The DOH can assist the City in determining if a health advisory needs to be issued. The advisory should include advice and recommendations to customers on how to protect their health. The advisory should also indicate for what purposes the water may safely be used. The City may want to evaluate the need to provide notices in prevalent foreign languages.

The DOH - DDW has prepared a variety of health advisory tools together on their web site at: http://www.doh.wa.gov/ehp/dw. The DOH should be advised in any instance when the City is preparing to issue a health advisory. The DOH may offer to assist in the preparation and distribution of the advisory, or with media communications.

Summary

Presenting a clear and concise message to the media and the public during an emergency event may help to maintain calm and reduce confusion. One designated spokesperson to present information to the media, and the public assists the City in presenting information quickly and accurately.

SECTION 9
THE VULNERABILITY ASSESSMENT

General

The vulnerability assessment (VA) is an evaluation of each water system component used to identify weaknesses or deficiencies that may make these facilities susceptible to damage or failure during an emergency. It also assesses facilities for security enhancements that may guard against unauthorized entry, vandalism, or terrorism.

Methodology

The City of Washougal water system VA was completed using the RAM-W™ methodology. This methodology provides a systematic approach to assessing relative risk within the water system. The findings of the VA are not included herein as that information is confidential and release of the information could compromise the security of the water system and safety of its customers.

Facilities

The City of Washougal water system is comprised of many facilities and system components that are distributed geographically throughout the City. The distance between each facility may increase the level of difficulty in securing the facility and in responding to emergency events, in the case of an event at more than one facility. The distance between facilities may also make it more difficult to damage multiple facilities at a time, as opposed to systems that are more centralized.

Summary

Findings from the VA are confidential and are not included in this document. Determinations of vulnerability within the system could compromise the security of the system if they become public knowledge. The Water System Manager has a secure copy of the VA and will allow access to that document as is required.

SECTION 10
RESPONSE ACTIONS FOR SPECIFIC EVENTS

General

Every emergency event requires a series of steps to be taken for the response efforts. Many of these general steps are the same for every kind of emergency. Many emergencies, however, require event-specific steps to be taken based on the event. General emergency response steps include:

- Confirmation and assessment of the type and severity of the emergency.
- Take immediate actions to protect public health, save lives and reduce injuries.
- Take action to reduce system damage.
- Make repairs based on priority demand.
- Monitor the situation and return the system to normal operation.

The following pages describe the more event-specific steps to be taken based on a given emergency event. Each event is briefly summarized, and response actions presented including, immediate actions, notifications, and follow-up actions.

Power Outage

Clark Public Utilities operates the local electrical power system. Historically, response to power outages affecting the water system operations has high priority.

Two of the production wells are equipped with automatic backup power up supply. Two additional wells have auxiliary electrical connections and the City owns and maintains a mobile diesel-powered generator to be connected and operated manually. All booster pump stations are equipped with an automatic backup power generator powered by natural gas. The chlorination system and the sodium hydroxide system require power for operation. Both systems are equipped with back-up power. The storage reservoirs are operated by gravity and are not affected by power outages. Generally, the system relies on storage for short-term power outages and can typically maintain service for short duration outage events. All future wells, treatment facilities and pump stations should be equipped with automatic back-up power supplies. In the event of an electrical power outage, the following response actions should be taken:

Immediate Actions

- Assess the situation and contact the power company to determine expected duration of power outage

- If the power outage is likely to last more than six hours:

  - Connect the back up generator to the system at Well No. 7 and check the back up power supply connections at the other wells and at all pump stations

  - Implement water shortage response actions to inform customers to cut back on water usage until power is restored

- If the power outage is likely to last less than six hours be alert for changing conditions and monitor the level in the storage tanks

- Inspect facilities and determine if any repairs need to be made

Notifications

- Chain of Command

- Clark Public Utilities to report outage and determine anticipated duration

  - Let the power company know that a public water system is experiencing an outage and the back-up generator will be turned on to provide power until power is restored

- Customers

  - Inform customers of power outage situation and request curtailment of water usage until power is restored

Follow-up Actions

- Return system to general power supply
- Inspect reservoirs and pumping facilities to ensure proper operation
- Determine if computer and other electronic systems were damaged by the outage – in stall surge protectors where not in use
- Review incident and response for efficiency and effectiveness

Transmission Main or Distribution Line Break

The water system has valves to allow isolation of individual line segments allowing operators to limit the area of service interruption while repairs are being made. In addition, much of the core distribution system is looped which may allow bypassing of a line that is out of service. Ongoing efforts to eliminate gaps in the distribution system would further improve the reliability of the system during water main breaks. In the event of a transmission main or distribution line break, the following response actions should be taken:

Immediate Actions

- Identify the break location
- Divert traffic as necessary
- Valve off the break location if possible (shut off each affected service line)
- Contact affected customers of loss of water and estimated duration of outage

- Repair break
- Disinfect affected length of main

Notifications

- Chain of Command
- Notify affected residents of the cause and expected duration of the water outage

Follow-up Actions

- Flush affect water main
- Bacteria sample to protect customers
- Notify affected customers that water has been restored and if they need to run the water prior to use
- Restore surfacing in the area of the repair and make plans for permanent repair if necessary
- Review incident and response for efficiency and effectiveness

Disinfection and Treatment Equipment Failure

The system includes multiple disinfection and treatment equipment installations. In the event of equipment failure, individual components can be relocated to provide for continued operations. For most treatment equipment the City has replacement parts on hand which can be swapped out as needed. In the event of a disinfection or treatment equipment failure the following response actions should be taken:

Immediate Actions

- Determine point of failure
- Take necessary safety precautions for working around chlorine gas
- Inspect failed assembly
- Switch production to utilize chlorinated water from undamaged assembly
- Begin repairs/replacement or contact repair company
- Contact the DOH if chlorine residuals fall below two parts per million
- Test repaired assembly and bring online

Notifications

- Chain of Command
- DOH - Regional office if necessary
- City of Camas if it is necessary to use the emergency intertie to provide disinfected water
- Chlorinator assembly repair contractor or supplier

Source Pump Failure

The system includes redundant sources of supply (wells and pumps) to allow for continued operation reliability. In the event of a source pump failure, the following response actions should be taken:

Immediate Actions

- Determine how long pump will be out of service
- Adjust production rates/pumping rates at other wells
- Begin operations to repair or replace the pump
- Perform start-up testing on repaired/new pump
- Bring pump back into operation

Notifications

- Chain of command
- Pump repair company or supplier

Follow-up Actions

- Review incident response for efficiency and effectiveness
- Set up preventative pump maintenance schedule
- Re-order any spare parts used in repair

Microbial (coliform, E. coli) Contamination

The Washougal water system limits the potential for microbial contamination through use of disinfection and treatment facilities. If a well field is contaminated, production may be switched to the uncontaminated well field, and an additional water supply may need to be secured. Water quality sampling may help in identifying the source of the 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 below. 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 Vandalism or Terrorist Attack shall be followed in addition to the procedures outlined here. Law enforcement authorities will need to be consulted prior to making public notifications.

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 A DOH Red folder. 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. In the event microbial contamination of the system is suspected, the following response actions should be taken:

Immediate Actions

- Take samples at the source and at reservoirs
- Try and determine cause of contamination
- Notify the DOH
- Draft and distribute water advisories
- Contact bottled water or bulk water distributor
- Drain, clean, repair and disinfect the system

Notifications

- Chain of command
- DOH - Regional office
- Other officials to safeguard public health
- Customers
- State testing laboratory

Follow-up Actions

- Re-sample as prescribed in the Coliform Monitoring Plan
- Flush the system
- Contact customers that water is safe for all uses including ingestion
- Document incident and send reports to proper governing agencies

Chemical Contamination

The aquifer the Washougal water system draws from may be affected by potential contamination. Contamination may also occur in the reservoirs or the distribution system. If the transmission or distribution system is contaminated by a chemical, whether an overdose of a treatment chemical or an outside chemical, the system must be flushed and disinfected. Water quality sampling may aid in determining the source and extent of the contamination. In the event that chemical contamination in the aquifer is suspected, the DOH should be notified immediately. In the event that chemical contamination in the transmission or distribution system is suspected, the following response actions should be taken:

Immediate Actions

- Consult Material Safety Data Sheets (MSDS) for suspected chemical, if available, to determine level of danger to public health
- Take necessary actions to control contamination
- Take samples
- Draft and distribute water advisories
- Contact bottled water or bulk water distributor
- Drain, clean, repair and disinfect the system

Notifications

- Chain of command
- Local Emergency Management Center (CRESA)
- DOH - Regional office
- Contact other officials necessary to protect public health
- Customers
- Bottled water or bulk water supplier
- State testing laboratory

Follow-up Actions

- Continue to monitor for contamination
- Contact customers that water is safe for all uses including ingestion
- Document incident and send reports to proper governing agencies

Vandalism or Terrorist Attack

Access to the wells, pumping stations, chlorination equipment, and reservoir sites are for the most part restricted by secure buildings and/or fencing. Access ladders at the reservoirs do not extend the full distance to the ground, and access hatches are locked. Virtually all parts of the distribution system are below ground or located in underground vaults. Valves and fire hydrants are easily accessible. In the event of a vandal or terrorist attack, the following response actions should be taken:

Immediate Actions

- Document what you see and keep notes as situation develops
- Assess the severity of the vandalism or terrorist act to protect public health
- Inspect facilities - do not disturb evidence
- Determine if there is biological or chemical contamination or damage that disrupts supply
- Consult with DOH to determine if any water advisories are warranted – if so, draft and distribute
- If contamination is suspected, collect samples
- If necessary, determine alternate supplies until regular supply can be reinstated
- If necessary, drain, clean, repair and disinfect the system

Notifications

- Notify Chain of Command
- Contact local law enforcement
- DOH - Regional office
- Alert others necessary to protect public health
- Contact local media- keep messages consistent and current

- Contact bottled water/bulk supplier if necessary
- Contact any clean up contractor that may be required

Follow-up Actions

- After consultation with DOH rescind water advisories
- Review incident and response for efficiency and effectiveness
- Prepare and submit incident reports to the necessary agencies
- Assess situation and facilities to work to prevent future acts

Reduction or Loss of Water in a Well

The Washougal water system has had no historical problems with the loss of source water. The production of each well is continuously monitored via the telemetry system. Volumes are summarized for daily, monthly and yearly periods. This information provides benchmark data against which well performance may be measured. Aquifer levels in the two well fields are also continuously monitored via the telemetry system. In the event of low water levels in a well, the following response actions should be taken:

Immediate Actions

- Review recent well production logs
- Determine if low aquifer levels will affect pump performance
- Determine if well production must be suspended

Notifications

- Chain of Command
- Public Works Director

Follow-up Actions

- Continue monitoring of well production and aquifer levels

Drought

The Washougal water system has not typically experienced excessively low aquifer levels in the past due to drought. Aquifer levels at each well field are continuously monitored along with other well production information. Operators review the well and aquifer information daily. The Public Works Director and the City Engineer/Assistant Public Works Director review the summary information monthly. If a specific concern arises regarding water levels reviews are conducted more frequently. In the event of a severe drought, the following response actions should be taken:

Immediate Actions

- Draft and distribute recommended water conservation measures
- Enforce water conservation measures
- Review well production information and forecast as needed
- Contact bottled water or bulk water distributor if water shortage is anticipated to determine what level of water, they can supply

Notifications

- Chain of command
- City leaders
- Law enforcement
- Customers
- Bottled or bulk water supplier

Follow-up Actions

- Continue to monitor water supply
- Rescind water conservation measures when appropriate
- Provide water curtailment success information to the City leaders and customers if appropriate
- Review incident and response
- Complete and submit required reports to state agencies

Flood

The Washougal water system lies near both the Columbia River and the Washougal River. Historically the Washougal water system has been most vulnerable to floods in excess of the 100-year event in the Washougal River. An event of this magnitude would have the potential to limit the ability to treat and supply water to customers.

Aside from the supply facilities, many of the facilities are elevated and not in danger of being flooded. In the event of a flood, the following response actions should be taken:

Immediate Actions

- As flood reports come in, sandbag around vulnerable facilities
- Assess the ability to supply water and continue to operate water treatment processes
- If flood crests and breaks through sandbagged wall, take measures to switch to unaffected source (other well field or bottled/bulk water)

Notifications

- Chain of command

- DOH - regional office
- Army Corps of Engineers regarding Columbia River flood levels
- Local law enforcement
- Sand bagging volunteer coordinator
- Customers if water supply is compromised

Follow-up Actions

- Clean up flood waters from water system facilities
- Ensure all facilities are in working condition
- Replace/repair any electrical or mechanical equipment that was damaged by the flood
- Review incident and response for efficiency and effectiveness
- Complete and submit incident reports to required agencies
- Schedule preventative anti-flood measures to be implemented
- Draft and release thank you statement to all volunteer sand baggers

Earthquake

The City has experienced some small seismic events. The largest in recent history was the Nisqually Quake in February 2001. The epicenter of this earthquake was located approximately 100 miles northwest of Washougal. This earthquake caused no damage to the water system, and new facilities are being built to seismic code.

An earthquake would likely trigger emergency events outside of the water system. In this case, the water system emergency actions must work within the overall Incident Command System activated City wide. Response actions and notifications are as follows:

Immediate Actions

- Assess the ability to supply water
- Determine if any above-ground facilities were damaged in the earthquake
- If facilities were damaged, take necessary precautions to protect against aftershocks.
  - If no above-ground facilities were damaged move on to transmission and distribution mains
- Isolate any broken water mains
- Take necessary precautions to avoid negative pressure events

Notifications

- Chain of command
- Local law enforcement
- Customers if water supply is compromised

Follow-up Actions

- Make necessary repairs and drain/flush/disinfect system as required
- Ensure that all facilities are in good working order
- Complete and submit incident reports to required agencies

Hazardous Materials Spill in Vicinity of Source or System Mains

The Lower Well Field is located on Burlington Northern Railroad property. If a rail car carrying hazardous materials were to spill in the vicinity of the well field contamination of the supply could occur. The remainder of the watershed is not generally vulnerable to hazardous materials spills.

Many instances of hazardous materials spill within the City may not directly affect the water system. In the event a hazardous material spill affects the water system and no other City departments or operations, the following response actions should be taken:

Immediate Actions

- Contact emergency services and spill center
- Begin first aid actions as necessary
- Contain the spill with absorbent materials
- Protect water system equipment
- Neutralize with soda ash if the material is an acid
- Obtain MSDS sheet and start clean-up operation
- If only one well field is affected switch all production to other well field
- Contact the City of Camas or a bottled water or bulk water supplier to provide citizens with water

Notifications

- Report the spill according to chain-of-command procedures
- Emergency service and spill center
- If spill is not containable, report spill to Ecology
- After containment, report the spill to Ecology, the City and a cleanup contractor such as Safety Kleen
- If required contact DOH
- If required contact customers regarding status of water

Follow-up Actions

- Determine if source is safe for use – if not, research potential other sources if the source may be unusable for a substantial length of time
- If necessary, drain, clean, repair and disinfect the system
- Review response to spill for efficiency

- Complete and file incident reports with all applicable agencies

Electronic Equipment Failure

The water system facilities are set-up to continue normal operation in the event that the SCADA system is down through operation in a manual mode setting. Back-up power is available for most sites. The facilities most vulnerable to equipment failure are the well pumps and the pump stations. In the event of an electronic system failure, the following response actions should be taken:

Immediate Actions

- Assess which facilities have been affected by the failure
- Manually adjust settings to ensure normal operation if possible and necessary
- Determine the mechanical/electronic cause of the failure
- Contact the vendor or repair technician

Notifications

- Chain of command
- Equipment repair/supplier
- DOH - regional office is necessary

Follow-up Actions

- Determine the root cause of the failure
- Determine if preventative maintenance may have prevented the failure
- Review the response actions for efficiency and effectiveness
- Complete and submit all required incident reports to applicable agencies

Cyber Attack

The water system is not generally susceptible to a cyber attack as no water system information is available over a local or internet network. If access was gained to the master human-machine-interface (HMI) terminal for the SCADA system some disruption could occur. If the SCADA system is available over a network in the future, this plan should be re-evaluated.

Volcanic Eruption

The City of Washougal is located in an area with potential for volcanic activity. The City could be impacted by a volcanic event at one of the mountains in the Cascade Range. Mt. St. Helens has been active recently, causing resurgence in public interest in preparing for a volcanic event.

A volcanic event will affect operations City wide, in addition to the water system. In an emergency that is likely to involve departments City wide in the response efforts the water system must be prepared to work within the City-wide incident Command System. Actions and notifications are as follows:

Immediate Actions

- Provide personal protective equipment to staff
- Assess damage to vital water system facilities
- Determine if water supply is compromised
- Follow the City-wide Emergency Operations Plan

Notifications

- Chain of command
- Customers

Follow-up Actions

- Advise customers to use water sparingly in clean-up efforts
- Protect dust sensitive equipment and facilities from ash
- Assist as able in the City-wide cleanup activities
- Review response efforts and actions for efficiency and effectiveness

Summary

Preparing response action plans prior to an emergency event provides responders with a framework to build event specific response efforts. The response action plans may also act as a checklist to ensure that no important notifications or actions are forgotten in the response effort. Response action plans should be reviewed after each emergency event to check for completeness.

SECTION 11
ALTERNATIVE WATER SOURCES

General

In the case of an emergency, the water system may not have the ability to provide customers with adequate or potable water. In these instances, the City staff may have made prior arrangements for an outside provider to supply water until the system can be returned to normal operations. These agreements to provide water in the case of an emergency should be formalized by interagency or intergovernmental agreements or by a contract if the supplier is a commercial vendor.

Existing Agreements

The City has an existing agreement with the City of Camas to supply water in the case of an emergency via existing emergency interties. One intertie is located at the Lower Well Field and the other is located at the intersection of Shepherd Road and Le Brun Boulevard. Both interties are regulated by pressure reducing valves as the City of Camas water system operates at a higher water pressure than the City of Washougal water system. The City of Camas is the only other municipal supplier within one-quarter of a mile of the City of Washougal.

Alternate Supplies

The following table presents potential alternate water supply sources. The City may need either short-term or long-term alternate sources depending on the type of emergency and the duration of the effects.

Table 11-1
Alternate Water Supplies

Alternative Sources	Names	Phone	Availability	Is the water safe for drinking?
Municipal neighbors	City of Vancouver	360-696-8478	May be available through the interties with the City of Camas	Yes
Bottled Water	H_20 Oregon	541-296-6550	One-gallon containers available within 24 hours	Yes
Artificial Recharge	Local Aquifer	N/A	Not at this time.	Yes, with conditioning

Alternative Sources	Names	Phone	Availability	Is the water safe for drinking?
Additional Groundwater Sources	Potential for future well field near Elizabeth Park	N/A	Not at this time. New well construction and permitting is a long-term process.	Yes, with conditioning

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)]. Southwest Regional Office – (360)236.3030.

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.

Summary

In an emergency event it may be necessary to secure an alternate water supply quickly. Having an existing agreement with a bulk water provider or tanker truck company may assist in quickly restoring water supply to the community. As conditions within the City or the system change the above table should be reviewed and updated.

SECTION 12
CURTAILING WATER USAGE

General

A shortage of water may result from a number of emergency situations. In some instances water may be brought in from alternate providers, but in certain instances, such as droughts, the water shortage may be eased by asking the customers to reduce their water usage.

The City of Washougal municipal code Section 13.36.010 addresses City liability in the event of a water shortage. The City also has an ordinance 13.14 for addressing the need and steps for implementing a water rationing plan.

13.14.020 Authority.

The public works director, when necessary for the protection of the public health, safety and welfare, shall have the authority to declare various stages of water emergencies and to implement the water conservation measures set forth in this chapter. The public works director shall also have authority to determine whether the various stages of water emergencies and water conservation measures apply to the entire city utility service area or to such portions as may be particularly affected. The director shall at all times be subject to the direction and authority of the mayor. (Ord. 1551 § 1, 2006)

13.14.030 Policies and procedures.

The following policies and procedures shall apply during the various stages of water emergencies as set forth in this section:

(1) Stage I – Anticipated Water Shortage – Internal Preparations. The public works director may declare a Stage I water emergency when a water shortage is anticipated but not immediate. The public works department shall conduct public education efforts regarding the benefits and necessity of conservation by the public.

(2) Stage II – Serious Water Shortage – Voluntary Conservation. The public works director may declare a Stage II water emergency when a water shortage exists such that immediate voluntary reductions in consumption are necessary. The public works department shall conduct an intensified public information campaign and shall institute a voluntary odd/even home irrigation program. The city shall reduce usage for designated park irrigation systems that do not affect sports fields.

(3) Stage III – Critical Water Shortage – Limited Outdoor Restrictions. The public works director may declare a Stage III water emergency when a water shortage exists such that water supplies are critically impacted, and water demand must be reduced. The mayor is authorized to establish certain specified days or hours for irrigating, sprinkling or watering lawns and gardens, and may prohibit or regulate other nonessential uses of water within the water system during such times as there is an actual or impending water shortage, extreme

pressure loss in the distribution system, or for any other reasonable cause. The following nonessential uses of water may be prohibited on all properties connected to the city's water system, whether inside or outside of the city:

(a) Washing sidewalks, walkways, driveways, parking lots, patios, and other exterior paved areas by direct hosing, except as may be necessary to prevent or eliminate materials dangerous to the public health and safety;

(b) Escape of water through breaks or leaks within the customer's plumbing or private distribution system for any period of time beyond which such break or leak should reasonably have been discovered and corrected. It shall be presumed that a period of 48 hours after the customer discovers a leak or break, or receives notice from the city of such leak or break, whichever occurs first, is a reasonable time in which to correct the same;

(c) Noncommercial washing of privately-owned motor vehicles, trailers, and boats, except from a bucket or hose using a shutoff nozzle for quick rinses;

(d) Lawn sprinkling and irrigation which allows water to run off or overspray the lawn area. Every customer is deemed to have knowledge of and control over his or her lawn sprinkling and irrigation at all times;

(e) Sprinkling and irrigation of lawns, ground cover, or other plants, between the hours of 9:00 a.m. and 6:00 p.m. or on any day not authorized by the established rotation schedule;

(f) Such other uses as the mayor deems appropriate.

(4) Stage IV – Emergency Water Shortage – Mandatory Outdoor Restrictions and Indoor Conservation. The public works director may declare a Stage IV water emergency when a water shortage exists such that maximum flow reduction is immediately required, water available to the city is insufficient to permit any irrigation, watering or sprinkling, and all available water is needed solely for human consumption, sanitation and fire protection. The public works director may prohibit all nonessential uses of water, including, but not limited to, all vehicle washing, all lawn watering, and all of the uses that may be prohibited for a Stage III water emergency. The public works and utilities department shall disseminate information using every available means to encourage customers to reduce indoor water usage to the maximum extent possible.

(5) Stage V – Regional Disaster – Water Rationing. The public works director may declare a Stage V regional disaster water emergency when a water shortage exists such that water rationing must be implemented, and emergency water distribution may be necessary for customers without water. The public works director is authorized to restrict water use by rationing the amount of water used by residential users to a certain number of gallons per day per person residing within the dwelling unit, by rationing the amount of water used by nonresidential users based on a percentage of their historical usage as calculated by the city, and by any other type of rationing as the public works director deems necessary and appropriate in the circumstances.

(6) Implementation Requirements. Prior to the implementation and enforcement of any of the above stages, the public works director shall take reasonable efforts to have information disseminated to affected customers regarding the rationing plan, which shall include, at a minimum, publication in the official newspaper of the city at least once, not less than one week in advance of the effective date of the declaration, information of the declaration of the applicable stage, a description of the limitations and restrictions that would apply, and identification of the effective date of the declared stage and limitations and restrictions. Notwithstanding the publication requirements set forth in this chapter, if it is determined by the public works director that exigent circumstances exist that necessitate immediate implementation and enforcement of any particular stages of water emergency, notice to affected customers may be provided by personal service of the notice on such customers, or by posting notices at the customers' residences (if the customers' residences are the affected sites), or by posting notices at the locations where the customers' utility services are received (if the affected sites are not their residences).

(7) Term of Stage and Scope. The public works director is also authorized to determine the geographic area to which the declared stage shall apply, and to determine the duration for which the declared stage and its limitations and restrictions shall be in effect. (Ord. 1551 § 1, 2006)

Water Curtailment Measures

The following measures may be implemented to reduce the water usage by a community:

- Restrict outdoor water use - lawn watering, pool filling, car washing, etc.
- Request limitation of indoor uses such as only running the dish washer when it is full and selecting proper load size when running the washing machine.
- Circulate information regarding additional curtailment of public use - City no longer watering lawns, operating fountains, etc.

Water Curtailment Procedures

In addition to the City restricting its use of water, a number of steps must be taken prior to and after an event requesting water curtailment from the customers. The City may also evaluate the need to provide such notices in foreign languages prevalent in the local community. These steps include:

- Make decision supported by City leaders.
- Draft public notices as well as media releases.
- Post public notices on customer doors as door hangers.
- Contact KIHR fm radio to announce curtailment message.
- Monitor usage and spot check meter usage as necessary.
- Continue monitoring usage and public notification messages as long as necessary.
- Draft notices to rescind restrictions.
- Rescind restriction - notify media outlets and post on customer doors.

Summary

Water curtailment measures are intended to reduce water demands in times of drought or other water shortage. The requested measures and the strong need for such measures must be clearly presented to the customers for optimal results.

SECTION 13
RETURNING TO NORMAL OPERATION

General

After an emergency event has occurred and been resolved, a series of steps must be taken to return the water system to normal operations. Many of these steps are the same for a variety of emergencies; however, some types of emergencies may require specific steps be taken. This section describes general steps needed to return the water system to normal operation.

Steps

The required steps to return to normal operations are outlined below in Table 13-1. The most important steps are to ensure that the water made available to customers is potable and safe for use, to notify the customers and the media that the water is now safe for use and the system has returned to normal, and to notify required regulatory agencies of the emergency and the response actions taken.

Table 13-1
Summary of Steps to Return to Normal Operations

Action	Description and Actions
Complete necessary repairs, etc.	Water Leads and Water Department staff locates affected facilities and obtain necessary tools, or support contractors to repair facility.
Inspect, flush and disinfect the system	Water System Operators should inspect all water system facilities and ensure all required tests have been performed. The system should be flushed and disinfected if necessary. The Water Leads makes a report to the Water Manager. The Water Manager and City Engineer/Assistant Public Works Director should make the decision that the condition of the system is sufficient to return the system to normal operations.
Verify water quality through test results	The Water Manager will review water quality sampling results.
Coordinate with DOH and partners	The Water Manager shall coordinate with DOH on the condition of the system, response actions and precautionary actions taken, and water quality test results.

Action	Description and Actions
Draft notice/memo regarding incident and response to City Council	City Engineer/Assistant Public Works Director reviews incident and recovery actions taken. A summary memo is drafted including cause of incident, response taken, and review of efficiency and effectiveness of response. The summary memo is included in the council packet and presented to the City Council at the next appropriate meeting.
Notify customers and follow up on situation	Water Manager meets with Water Leads and writes a notice to customers. Water Manager directs the lead to distribute public notice.
Submit required reports and notification to governing agencies	Follow up with DOH, Department of Labor and Department of Ecology to ensure that all necessary communications and reports have reached the appropriate personnel.

Summary

The water system is returned to normal operations as soon as safely possible following and emergency event. The safety of the public health should be carefully considered when evaluating the condition of the water system. The DOH may provide resources to aid in determining if the system is ready to return to normal operations.

SECTION 14
TRAINING AND REHEARSALS

General

Emergency response planning effectiveness is increased if the planned actions and procedures are followed in the case of an emergency. Emergency response training and rehearsals can increase the level of comfort that City staff has with the planned actions and procedures and prepare them to take those actions in the case of an actual emergency. The level of training and frequency of rehearsals depends on the complexity of the system and the needs of those involved in emergency responses.

Training

Suggested types of training and training intervals for various positions within the system are summarized below in Table 14-1. These suggestions should be reviewed periodically to determine if the training needs of the water system are being met.

Table 14-1
Training Schedule

Position	Name	Training Needs and Expectations
City Engineer/ Assistant Public Works Director	Rob Charles	Incident Command System Emergency response communications Emergency response planning Health advisory issuance
Water Manager	Ryan Baker	Incident Command System Emergency response communications Emergency response planning Suspicious activity training
Maintenance Workers	Vaughn Barber, Travis Davis, Grant Lewis, Adam Connolly, Chris Delaney, Chris Strong	Suspicious activity training Emergency response communications
Administrative Support	Kelly Brown	Familiarize staff with Emergency Response Plan Document Emergency response communications

Emergency Rehearsals

Emergency rehearsals may be coordinated with City wide training events. The water system operations staff should rehearse integrating their emergency response plan with the City-wide Emergency Operations Plan. The City has implemented an Incident Command System to respond to emergency events under the National Incident Management System guidelines. The water system should also rehearse coordinating with the Incident Command System when it is implemented throughout the City. A proposed emergency rehearsal schedule is presented below in Table 14-2.

Table 14-2
Rehearsal Schedule

Event	Description	People and Organizations Involved	Date
Emergency Rehearsal	Conduct actual emergency drill. The drill may be coordinated with a City-wide emergency event drill.	Water system staff	Unannounced annually
On-site training drill	Conduct specific drills, i.e., communications, water line breaks, water quality sampling with a professional trainer.	Water system staff and professional trainer	Bi-annually
Media Communication Rehearsal	Conduct mock interviews, to prepare for communications with the media during an emergency event.	Public Works Director and City Administrator	Bi-annually

Summary

Emergency rehearsals are recommended by the Environmental Protection Agency (EPA) as a tool to prepare for emergency events and determine if the response action plans will work in an actual emergency event, and if other planning and preparations are adequate to protect public health. The City may want to coordinate some emergency rehearsals City-wide and restrict others to individual systems such as the water system. The State Department of Heath coordinated an emergency rehearsal in July of 2004 which included several locations throughout the state. The results from that event will be published by the Department of Health and may provide the City with an additional resource when evaluating emergency response procedures.

SECTION 15
PLAN APPROVAL

Plan Approval

This plan is officially in effect when reviewed, approved, and signed by the following people:

Table 15-1
ERP Approval

Name/Title	Signature	Date
David Scott City Administrator		
Trevor Evers Public Works Director		
Rob Charles City Engineer/Assistant PW Director		
Ryan Baker Water Manager		

Summary

The Bioterrorism Act requires that the City maintain this Water System Emergency Response Plan for five years. This plan should be recognized as a working document and should be reviewed and updated as necessary to ensure that the information contained herein is correct and current.

murraysmith

APPENDIX K
COLIFORM MONITORING PLAN

Coliform Monitoring Plan for: City of Washougal

A. System Information

Plan Date: 09/2020

Water System Name City of Washougal	**County** Clark	**System I.D. Number** 934000
Name of Plan Preparer Ryan Baker	**Position** Superintendent	**Daytime Phone** **360-835-2662**
Sources: DOH Source Number, Source Name, Well Depth, Pumping Capacity	Source 04 – Well #1 ABR668 Depth – 128' Pumping Capacity 900 gpm	
	Source 05 – Well #5 ABR670 Depth – 101' Pumping Capacity 650 gpm	
	Source 06 – Well #6 AFP633 Depth – 101' Pumping Capacity 630 gpm	
	Source 07 – Well #7 AFP632 Depth – 103' Pumping Capacity 800 gpm	
	Source 11 – Well #11 ABR669 Depth – 103' Pumping Capacity 1,000 gpm	
	Source 13 – Well #12 APN125 Depth – 97' Pumping Capacity 1,500 gpm	
Storage: List and Describe	Reservoir 1A – 1.5 MG Tank	
	Reservoir 1B – 1.0 MG Tank	
	Reservoir 2A – 0.161 MG Tank	
	Reservoir 2B – 0.45 MG Tank	
	Reservoir 3 – 0.423 MG Tank	
	Reservoir 4A – 0.105 MG Tank	
	Reservoir 4B – 1.25 MG Tank	
Treatment: Source Number & Process	All chlorinated & pH adjustment. S04 contact line is CT6	
Pressure Zones: Number and name	12 total pressure zones through the system	
Population by Pressure Zone	n/a	
Number of Routine Samples Required Monthly by Regulation:		20
Number of Sample Sites Needed to Represent the Distribution System:		20
***Request DOH Approval of Triggered Source Monitoring Plan?**		**Yes** ☐ **No** ☐

*If approval is requested a fee will be charged for the review.

B. Laboratory Information

Laboratory Name **BSK Analytical Laboratories**	**Office Phone 360-750-0055** **After Hours Phone 360-750-0055**
Address 2517 E Evergreen Blvd, Vancouver, WA	**Cell Phone - -** **Email** dkarlsson@bskassociates.com
Hours of Operation M-F 0900 - 1700	
Contact Name Debra Karlsson	
Emergency Laboratory Name **BSK Analytical Laboratories**	**Office Phone 360-577-7222** **After Hours Phone 360-61-8248**
Address 2517 E Evergreen Blvd, Vancouver, WA	**Cell Phone - -** **Email**
Hours of Operation After-hours and weekends	
Contact Name Elizabeth Bunger	

C. Wholesaling of Groundwater

	Yes	No
We are a consecutive system and purchase groundwater from another water system.	☐	☒
If yes, Water System Name: Contact Name: Telephone Numbers Office - - After Hours - -		
We sell groundwater to other public water systems.	☐	☒
If yes, Water System Name: Contact Name: Telephone Numbers Office - - After Hours - -		

D. Routine, Repeat, and Triggered Source Sample Locations*

Location/Address for **Routine Sample Sites**	Location/Address for **Repeat Sample Sites**	Groundwater Sources for **Triggered Sample Sites****
X1. 421 C St	**1-1. 421 C St (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**1-2. Up – 165 C St**	**S4, S5, S6, S7, S11, S13**
	1-3. Down – 548 C St	**S4, S5, S6, S7, S11, S13**
X2. 324 N X St	**2-1. 324 N X St (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**2-2. Up – 374 N X St**	**S4, S5, S6, S7, S11, S13**
	2-3. Down – 314 N X St	**S4, S5, S6, S7, S11, S13**
X3. 541 W Dogwood	**3-1. 541 W Dogwood (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**3-2. Up – 541 W Dogwood**	**S4, S5, S6, S7, S11, S13**
	3-3. Down – 578 W Dogwood	**S4, S5, S6, S7, S11, S13**
X4. 493 N Shepherd Rd	**4-1. 493 N Shepherd Rd (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**4-2. Up – 513 N Shepherd Rd**	**S4, S5, S6, S7, S11, S13**
	4-3. Down 403 N Shepherd Rd	**S4, S5, S6, S7, S11, S13**
X5. 2324 N L St	**5-1. 2324 N L St (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**5-2. Up – 2363 N L St**	**S4, S5, S6, S7, S11, S13**
	5-3. Down – 2355 N L St	**S4, S5, S6, S7, S11, S13**

X6. 3780 Birch St	**6-1. 3780 Birch St (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**6-2. Up – 3831 Birch St**	**S4, S5, S6, S7, S11, S13**
	6-3. Down – 3760 Birch St	**S4, S5, S6, S7, S11, S13**
X7. 4283 M Dr	**7-1. 4283 M Dr (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**7-2. Up – 4273 M Dr**	**S4, S5, S6, S7, S11, S13**
	7-3. Down – 4313 M Dr	**S4, S5, S6, S7, S11, S13**
X8. 5525 I St	**8-1. 5525 I St (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**8-2. Up – 5540 I St**	**S4, S5, S6, S7, S11, S13**
	8-3. Down – 5520 I St	**S4, S5, S6, S7, S11, S13**
X9. 35300 Evergreen Blvd	**9-1. 35300 Evergreen Blvd (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**9-2. Up – 34900 Evergreen Blvd**	**S4, S5, S6, S7, S11, S13**
	9-3. Down – 35400 Evergreen Blvd	**S4, S5, S6, S7, S11, S13**
X10. 605 39th Street	**10-1. 605 39th St (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**10-2. Up – 702 39th St**	**S4, S5, S6, S7, S11, S13**
	10-3. Down – 3939 F Cir	**S4, S5, S6, S7, S11, S13**

X11. 2201 C St	**11-1. 2201 C St (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**11-2. Up – 415 22nd St**	**S4, S5, S6, S7, S11, S13**
	11-3. Down – 230 22nd St	**S4, S5, S6, S7, S11, S13**
X12. 661 K St	**12-1. 661 K St (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**12-2. Up – 634 K St**	**S4, S5, S6, S7, S11, S13**
	12-3. Down – 660 K St	**S4, S5, S6, S7, S11, S13**
X13. 02 W Dogwood	**13-1. 02 W Dogwood (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**13-2. Up – 161 W Dogwood**	**S4, S5, S6, S7, S11, S13**
	13-3. Down – 2550 N 4th St	**S4, S5, S6, S7, S11, S13**
X14. 776 W U St	**14-1. 776 W U St (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**14-2. Up – 756 W U St**	**S4, S5, S6, S7, S11, S13**
	14-3. Down – 776 W U St	**S4, S5, S6, S7, S11, S13**
X15. 2103 N O St	**15-1. 2103 N O St (SS**	**S4, S5, S6, S7, S11, S13**
Sample Station	**15-2. Up – 2093 N O St**	**S4, S5, S6, S7, S11, S13**
	15-3. Down – 2183 N O St	**S4, S5, S6, S7, S11, S13**

X16. 5193 N St	**16-1. 5193 N St (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**16-2. Up – 5227 N St**	**S4, S5, S6, S7, S11, S13**
	16-3. Down – 5165 N St	**S4, S5, S6, S7, S11, S13**
X17. 5192 I St	**17-1. 5192 I St (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**17-2. Up – 5223 I St**	**S4, S5, S6, S7, S11, S13**
	17-3. Down – 931 52nd St	**S4, S5, S6, S7, S11, S13**
X18. 1212 49th St	**18-1. 1212 49th St (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**18-2. Up – 1407 49th St**	**S4, S5, S6, S7, S11, S13**
	18-3. Down – 1112 49th St	**S4, S5, S6, S7, S11, S13**
X19. 4285 Addy St	**19-1. 4285 Addy St (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**19-2. Up – 4260 Addy St**	**S4, S5, S6, S7, S11, S13**
	19-3. Down – 4280 Addy St	**S4, S5, S6, S7, S11, S13**
X20. 3925 S Lincoln	**20-1. 3925 S Lincoln (SS)**	**S4, S5, S6, S7, S11, S13**
Sample Station	**20-2. Up – 3695 S Truman**	**S4, S5, S6, S7, S11, S13**
	20-3. Down – 4125 S Lincoln	**S4, S5, S6, S7, S11, S13**

*NOTE: If you need more than three routine samples to cover the distribution system, attach additional sheets as needed.

**** When you collect the repeats, you must sample every groundwater source that was in use when the original routine sample was collected.**

Important Notes for Sample Collector: See Emergency Notifications in ERP.

_____

_____

_____

_____

_____

_____

E. Reduced Triggered Source Monitoring Justification (add sheets as needed):

F. Routine Sample Rotation Schedule

Month	Routine Site(s)	Month	Routine Site(s)
January	ALL	July	ALL
February	ALL	August	ALL
March	ALL	September	ALL
April	ALL	October	ALL
May	ALL	November	ALL
June	ALL	December	ALL

G. Level 1 and Level 2 Assessment Contact Information

Name **Vaughn Barber**	**Office Phone 360-835-8501 x 215** **After Hours Phone 360-931-1368**
Address **1701 C Street, Washougal, WA 98671**	**Email** **vaughn.barber@cityofwashougal.us**
Name **Travis Davis**	**Office Phone 360-835-8501 x 216** **After Hours Phone 360-513-7201**
Address **1701 C Street, Washougal, WA 98671**	**Email** **travis.davis@cityofwashougal.us**

H. *E. coli*-Present Sample Response

Distribution System *E. coli* Response Checklist				
Background Information	**Yes**	**No**	**N/A**	**To Do List**
We inform staff members about activities within the distribution system that could affect water quality.	☒	☐	☐	☐
We document all water main breaks, construction & repair activities, and low pressure and outage incidents.	☒	☐	☐	☐
We can easily access and review documentation on water main breaks, construction & repair activities, and low pressure and outage incidents.	☒	☐	☐	☐
Our Cross-Connection Control Program is up-to-date.	☒	☐	☐	☐
We test all cross-connection control devices annually as required, with easy access to the proper documentation.	☒	☐	☐	☐
We routinely inspect all treatment facilities for proper operation.	☒	☐	☐	☐
We identified one or more qualified individuals who are able to conduct a Level 2 assessment of our water system.	☒	☐	☐	☐
We have procedures in place for disinfecting and flushing the water system if it becomes necessary.	☒	☐	☐	☐
We can activate an emergency intertie with an adjacent water system in an emergency.	☐	☒	☐	☐
We have a map of our service area boundaries.	☒	☐	☐	☐
We have consumers who may not have access to bottled or boiled water.	☐	☒	☐	☐
There is a sufficient supply of bottled water immediately available to our customers who are unable to boil their water.	☐	☒	☐	☐
We have identified the contact person at each day care, school, medical facility, food service, and other customers who may have difficulty responding to a Health Advisory.	☐	☒	☐	☒
We have messages prepared and translated into different languages to ensure our consumers will understand them.	☐	☒	☐	☒
We have the capacity to print and distribute the required number of notices in a short time period.	☒	☐	☐	☐
Policy Direction	**Yes**	**No**	**N/A**	**To Do List**
We have discussed the issue of *E. coli*-present sample results with our policy makers.	☐	☒	☐	☒
If we find *E. coli* in a routine distribution sample, the policy makers want to wait until repeat test results are available before issuing advice to water system customers.	☒	☐	☐	☐

(Cont.)

Distribution System *E. coli* Response Checklist				
Potential Public Notice Delivery Methods	**Yes**	**No**	**N/A**	**To Do List**
It is feasible to deliver a notice going door-to-door.	☐	☒	☐	☐
We have a list of all of our customers' addresses.	☒	☐	☐	☐
We have a list of customer telephone numbers or access to a Reverse 9-1-1 system.	☒	☐	☐	☐
We have a list of customer email addresses.	☐	☒	☐	☐
We encourage our customers to remain in contact with us using social media.	☒	☐	☐	☐
We have an active website we can quickly update to include important messages.	☒	☐	☐	☐
Our customers drive by a single location where we could post an advisory and expect everyone to see it.	☐	☒	☐	☐
We need a news release to supplement our public notification process.	☒	☐	☐	☐

Distribution System *E. coli* Response Plan

If we have *E. coli* in our distribution system we will immediately:

1. Call DOH.
2. Collect repeat and triggered source samples per Part D. Collect additional investigative samples as necessary.
3. Contact the Public Works Director / Public Officials
4. Immediately begin investigation of trigger source.
5. Isolate the trigger source.
6. Reroute directional flow to bypass trigger source.
7. Discuss with DOH whether to issue a Health Advisory based on the findings of steps 3-6.

***E. coli*-Present Triggered Source Sample Response Checklist – All Sources**				
Background Information	**Yes**	**No**	**N/A**	**To Do List**
We review our sanitary survey results and respond to any recommendations affecting the microbial quality of our water supply.	☒	☐	☐	☐
We address any significant deficiencies identified during a sanitary survey.	☒	☐	☐	☐
There are contaminant sources within our Wellhead Protection Area that could affect the microbial quality of our source water, and If yes, we can eliminate them.	☐ ☐	☒ ☐	☐ ☒	☐ ☐
We routinely inspect our well site(s).	☒	☐	☐	☐
We have a good raw water sample tap installed at each source.	☒	☐	☐	☐
After we complete work on a source, we disinfect the source, flush, and collect an investigative sample.	☒	☐	☐	☐
Public Notice	**Yes**	**No**	**N/A**	**To Do List**
We discussed the requirement for immediate public notice of an *E. coli*-present source sample result with our water system's governing body (board of directors or commissioners) and received direction from them on our response plan.	☐	☒	☐	☒
We discussed the requirement for immediate public notice of an *E. coli*-present source sample result with our wholesale customers and encouraged them to develop a response plan.	☐	☐	☒	☐
We have prepared templates and a communications plan that will help us quickly distribute our messages.	☐	☒	☐	☐

E. coli-Present Triggered Source Sample Response Checklist – Source S4, S5, S6, S7, S11, S13*

Alternate Sources	Yes	No	N/A	To Do List
We can stop using this source and still provide reliable water service to our customers.	☒	☐	☐	☐
We have an emergency intertie with a neighboring water system that we can use until corrective action is complete (perhaps for several months).	☐	☒	☐	☐
We can provide bottled water to all or part of the distribution system for an indefinite period.	☐	☐	☒	☐
We can quickly replace our existing source of supply with a more protected new source.	☒	☐	☐	☐
Temporary Treatment	**Yes**	**No**	**N/A**	**To Do List**
This source is continuously chlorinated, and our existing facilities can provide 4-log virus treatment (CT = 6) before the first customer. If yes, at what concentration? _____ mg/L	☒	☐	☐	☐
We can quickly introduce chlorine into the water system and take advantage of the existing contact time to provide 4-log virus treatment to a large portion of the distribution system.	☒	☐	☐	☐
We can reduce the production capacity of our pumps or alter the configuration of our storage quantities (operational storage) to increase the amount of time the water stays in the system before the first customer to achieve CT = 6.	☒	☐	☐	☐
We can alter the demand for drinking water (maximum day or peak hour) through conservation messages to increase the time the water is in the system prior to the first customer in order to achieve 4-log virus treatment with chlorine.	☒	☐	☐	☐

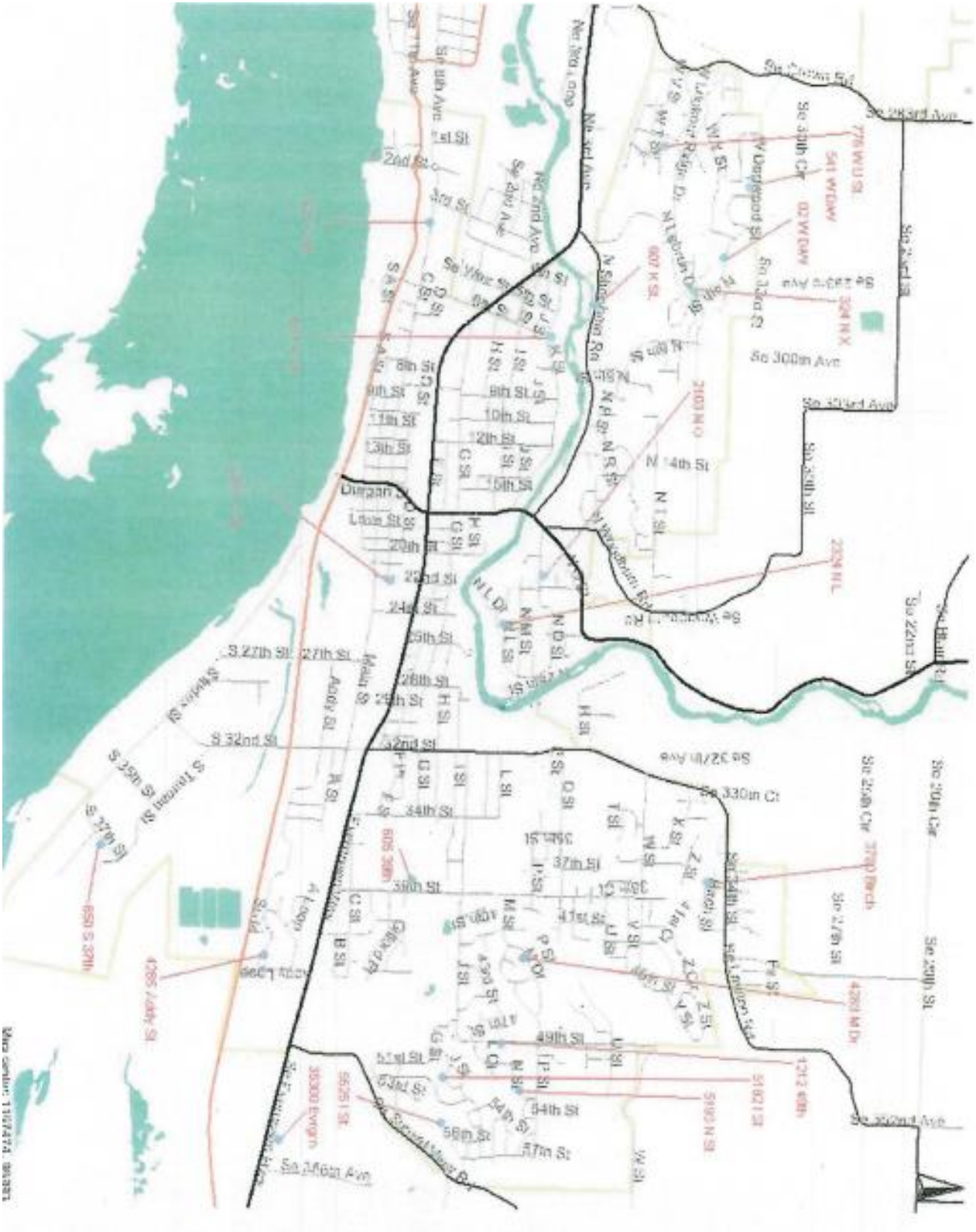
*NOTE: If your system has multiple sources, you may want to complete a separate checklist for each source.

E. coli-Present Triggered Source Sample Response Plan – Source ___

If we have *E. coli* in Source 4, 5, 6, 7, 11, 13___ water we will immediately:

1. Call DOH.
2. Begin immediate investigation of trigger source.
3. Isolate the trigger source.
4. Reroute directional flow to bypass trigger source.
5. Contact Public Works Director / Public Officials.

I. System Map


Se 300th Ave
Se 22nd St
Se 32nd Ave
Se 330th Ct
Se 29th St
Se 346th Ave
Se 22nd Ave
Se 30th Ct
Se 32nd Ave
Se 29th Ct
Se 346th Ave
Se 3rd Ave
Se 8th Ave
Se 2nd Ave
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APPENDIX L
WATER QUALITY MONITORING SCHEDULE

Water Quality Monitoring Schedule

System: WASHOUGAL CITY OF **PWS ID: 93400 0** **Region: SOUTHWEST**
Contact: Ryan W Baker **Group: A - Comm** **County: CLARK**

NOTE: To receive credit for compliance samples, you must fill out laboratory and sample paperwork completely, send your samples to a laboratory accredited by Washington State to conduct the analyses, AND ensure the results are submitted to DOH Office of Drinking Water. There is often a lag time between when you collect your sample, when we credit your system with meeting the monitoring requirement, and when we generate the new monitoring requirement.

Coliform Monitoring Requirements

	Jul 2021	Aug 2021	Sep 2021	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Apr 2022	May 2022	Jun 2022
Coliform Monitoring Population	18442	18442	21250	21228	21250	21228	21228	21301	21228	21250	21228	21250
Number of Routine Samples Required	20	20	20	20	20	20	20	20	20	20	20	20

- Collect samples from representative points throughout the distribution system.
- Collect required repeat samples following an unsatisfactory sample. In addition, collect a sample from each operating groundwater source.
- For systems that chlorinate, record chlorine residual (measured when the coliform sample is collected) on the coliform lab slip.

Chemical Monitoring Requirements

Distribution Monitoring

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*	
Lead and Copper	30	Jan 2021 - Dec 2023	standard - 3 year	07/31/2020	Jul 2023	
Asbestos	0	Jan 2020 - Dec 2028	waiver - 9 year			
Total Trihalomethane (THM)	2	Jan 2021 - Dec 2021	reduced - 1 year	12/08/2020	***Dec 2021***	
Halo-Acetic Acids (HAA5)	2	Jan 2021 - Dec 2021	reduced - 1 year	12/08/2020	***Dec 2021***	

Water Quality Monitoring Schedule

Notes on Distribution System Chemical Monitoring

For *Lead and Copper*:
- Collect samples from the COLD WATER side of a KITCHEN or BATHROOM faucet that is used daily.
- Before sampling, make sure the water has sat unused in the pipes for at least 6 hours, but no more than 12 hours (e.g. overnight).
- If you are sampling from a faucet that has hot water, make sure cold water is the last water to run through the faucet before it sits overnight.
- If your sampling frequency is annual or every 3 years, collect samples between June 1 and September 30.

For *Asbestos:* Collect the sample from one of your routine coliform sampling sites in an area of your distribution system that has asbestos concrete pipe.

For *Disinfection Byproducts (HAA5 and THM):* Collect the samples at the locations identified in your Disinfection Byproducts (DBP) monitoring plan.

Source Monitoring

- Collect 'source' chemical monitoring samples from a tap after all treatment (if any), but before entering the distribution system.
- Washington State grants monitoring waivers for various test panels /analytes. Please note that we may require some monitoring as a condition of some waivers. We have granted complete waivers for dioxin, endothal, glyphosate, diquat, and insecticides.
- Nitrate, arsenic, iron, and other individual inorganics are included as part of a Complete Inorganic (IOC) analysis when it is collected.

Source S04 *WELL #1 ABR668 CT6 Req.* *Well* *Use - Permanent* *Susceptility - High*

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Nitrate	1	Jan 2021 - Dec 2021	standard - 1 year	05/17/2021	
Complete Inorganic (IOC)	1	Jan 2020 - Dec 2028	waiver - 9 year	05/17/2021	
Volatile Organics (VOC)	1	Jan 2020 - Dec 2025	waiver - 6 year	05/17/2021	
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	08/20/2019	
Pesticides	0	Jan 2020 - Dec 2022	waiver - 3 year	07/07/2009	
Soil Fumigants	0	Jan 2020 - Dec 2022	waiver - 3 year		
Gross Alpha	1	Jan 2020 - Dec 2025	standard - 6 year	06/29/2016	Jun 2022
Radium 228	1	Jan 2020 - Dec 2025	standard - 6 year	06/29/2016	Jun 2022

Source S05 *WELL #5 ABR670* *Well* *Use - Permanent* *Susceptility - High*

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Nitrate	1	Jan 2021 - Dec 2021	standard - 1 year	03/25/2021	
Complete Inorganic (IOC)	1	Jan 2020 - Dec 2028	waiver - 9 year	05/22/2018	May 2027
Volatile Organics (VOC)	1	Jan 2020 - Dec 2022	standard - 3 year	05/07/2019	May 2022

Water Quality Monitoring Schedule

Source Monitoring

- Collect 'source' chemical monitoring samples from a tap after all treatment (if any), but before entering the distribution system.
- Washington State grants monitoring waivers for various test panels /analytes. Please note that we may require some monitoring as a condition of some waivers. We have granted complete waivers for dioxin, endothal, glyphosate, diquat, and insecticides.
- Nitrate, arsenic, iron, and other individual inorganics are included as part of a Complete Inorganic (IOC) analysis when it is collected.

Source S05	*WELL #5 ABR670*	*Well*	*Use - Permanent*	*Susceptility - High*	
Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	05/22/2018	
Pesticides	0	Jan 2020 - Dec 2022	waiver - 3 year	04/21/2009	
Soil Fumigants	0	Jan 2020 - Dec 2022	waiver - 3 year		
Gross Alpha	1	Jan 2020 - Dec 2025	standard - 6 year	05/22/2018	May 2024
Radium 228	1	Jan 2020 - Dec 2025	standard - 6 year	05/22/2018	May 2024

Source S06	*WELL #6 AFP633*	*Well*	*Use - Permanent*	*Susceptility - Moderate*	
Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Nitrate	1	Jan 2021 - Dec 2021	standard - 1 year	03/25/2021	
Complete Inorganic (IOC)	1	Jan 2020 - Dec 2028	waiver - 9 year	06/20/2018	Jun 2027
Volatile Organics (VOC)	1	Jan 2020 - Dec 2025	waiver - 6 year	05/09/2016	May 2022
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	04/24/2017	
Pesticides	0	Jan 2020 - Dec 2022	waiver - 3 year	04/05/2011	
Soil Fumigants	0	Jan 2020 - Dec 2022	waiver - 3 year		
Gross Alpha	1	Jan 2020 - Dec 2025	standard - 6 year	03/25/2021	
Radium 228	1	Jan 2020 - Dec 2025	standard - 6 year	03/25/2021	

Source S07	*WELL #7 AFP632*	*Well*	*Use - Permanent*	*Susceptility - Moderate*	
Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Nitrate	1	Jan 2021 - Dec 2021	standard - 1 year	03/25/2021	
Complete Inorganic (IOC)	1	Jan 2020 - Dec 2028	waiver - 9 year	06/20/2018	Jun 2027

Water Quality Monitoring Schedule

Source Monitoring

- Collect 'source' chemical monitoring samples from a tap after all treatment (if any), but before entering the distribution system.
- Washington State grants monitoring waivers for various test panels /analytes. Please note that we may require some monitoring as a condition of some waivers. We have granted complete waivers for dioxin, endothal, glyphosate, diquat, and insecticides.
- Nitrate, arsenic, iron, and other individual inorganics are included as part of a Complete Inorganic (IOC) analysis when it is collected.

Source S07	*WELL #7 AFP632*	*Well*	*Use - Permanent*	*Susceptility - Moderate*	
Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Volatile Organics (VOC)	1	Jan 2020 - Dec 2025	waiver - 6 year	04/20/2016	Apr 2022
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	05/15/2013	May 2022
Pesticides	0	Jan 2020 - Dec 2022	waiver - 3 year	07/26/2006	
Soil Fumigants	0	Jan 2020 - Dec 2022	waiver - 3 year		
Gross Alpha	1	Jan 2020 - Dec 2025	standard - 6 year	03/25/2021	
Radium 228	1	Jan 2020 - Dec 2025	standard - 6 year	03/25/2021	

Source S11	*WELL #11 ABR669*	*Well*	*Use - Permanent*	*Susceptility - Moderate*	
Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Nitrate	1	Jan 2021 - Dec 2021	standard - 1 year	03/25/2021	
Complete Inorganic (IOC)	1	Jan 2020 - Dec 2028	waiver - 9 year	03/25/2021	
Volatile Organics (VOC)	1	Jan 2020 - Dec 2025	waiver - 6 year	04/20/2016	Apr 2022
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	10/22/2013	Oct 2022
Pesticides	0	Jan 2020 - Dec 2022	waiver - 3 year	08/14/2007	
Soil Fumigants	0	Jan 2020 - Dec 2022	waiver - 3 year		
Gross Alpha	1	Jan 2020 - Dec 2025	standard - 6 year	03/25/2021	
Radium 228	1	Jan 2020 - Dec 2025	standard - 6 year	03/25/2021	

Source S13	*Well #12 APN125 16"*	*Well*	*Use - Permanent*	*Susceptility - Moderate*	
Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Nitrate	1	Jan 2021 - Dec 2021	standard - 1 year	06/09/2020	***Jun 2021***

Water Quality Monitoring Schedule

Source Monitoring

- Collect 'source' chemical monitoring samples from a tap after all treatment (if any), but before entering the distribution system.
- Washington State grants monitoring waivers for various test panels /analytes. Please note that we may require some monitoring as a condition of some waivers. We have granted complete waivers for dioxin, endothal, glyphosate, diquat, and insecticides.
- Nitrate, arsenic, iron, and other individual inorganics are included as part of a Complete Inorganic (IOC) analysis when it is collected.

Source S13 *Well #12 APN125 16"* *Well* *Use - Permanent* *Susceptility - Moderate*

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*	
Complete Inorganic (IOC)	1	Jan 2020 - Dec 2028	waiver - 9 year	10/25/2018	Oct 2027	
Volatile Organics (VOC)	1	Jan 2017 - Dec 2022	waiver - 6 year	12/03/2014	***Feb 2021***	***Past Due***
Herbicides	1	Jan 2020 - Dec 2028	waiver - 9 year	12/17/2019	Jun 2028	
Pesticides	0	Jan 2020 - Dec 2022	waiver - 3 year	12/17/2019		
Soil Fumigants	0	Jan 2020 - Dec 2022	waiver - 3 year	07/25/2007		
Gross Alpha	1	Jan 2020 - Dec 2025	standard - 6 year	12/06/2017	Dec 2023	
Radium 228	1	Jan 2020 - Dec 2025	standard - 6 year	12/06/2017	Dec 2023	

Water Quality Monitoring Schedule

Other Information

Other Reporting Schedules	*Due Date*
Measure chlorine residuals and submit monthly reports if your system uses continuous chlorination:	monthly
Submit Consumer Confidence Report (CCR) to customers and ODW (Community systems only):	07/01/2021
Submit CCR certification form to ODW (Community systems only):	10/01/2021
Submit Water Use Efficiency report online to ODW and to customers (Community and other municipal water systems only):	07/01/2021
Send notices of lead and copper sample results to the customers sampled:	30 days after you receive the laboratory results
Submit Certification of customer notification of lead and copper results to ODW:	90 days after you notify customers

Special Notes

None

Southwest Regional Water Quality Monitoring Contacts

For questions regarding chemical monitoring:	Sophia Petro: (360) 236-3046 or sophia.petro@doh.wa.gov
For questions regarding DBPs:	Regina Grimm, p.e.: (360) 236-3035 or regina.grimm@doh.wa.gov
For questions regarding coliform bacteria and microbial issues:	Southwest Office: (360) 236-3030 or SWRO.Coli@doh.wa.gov

Additional Notes

The information on this monitoring schedule is valid as of the date in the upper left corner on the first page. However, the information may change with subsequent updates in our water quality monitoring database as we receive new data or revise monitoring schedules. There is often a lag time between when you collect your sample and when we credit your system with meeting the monitoring requirement.

We have not designed this monitoring schedule to display all compliance requirements. The purpose of this schedule is to assist water systems with planning for most water quality monitoring, and to allow systems to compare their records with DOH ODW records. Please be aware that this monitoring schedule does not include constituents that require a special monitoring frequency, such as monitoring affiliated with treatment.

Any inaccuracies on this schedule will not relieve the water system owner and operator of the requirement to comply with applicable regulations.

If you have any questions about your monitoring requirements, please contact the regional office staff listed above.

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APPENDIX M
CIP COST ESTIMATING METHODOLOGY

Cost Estimating Methodology

C.1 Introduction

This appendix summarizes the approach used in development of unit costs and project costs used in the Capital Improvement Plan (CIP) for the City of Washougal (City) Water System Plan Update (WSP).

C.2 Cost Estimating

The probable costs estimated for each improvement are based on average costs from the 2018 RSMeans Heavy Construction Cost Data (RSMeans), City input, construction costs for similar projects across the Northwest, and local contractor and supplier rates. All costs identified in this section reference U.S. dollars. The *Engineering News Record Construction Cost Index* is a commonly used index for adjusting present estimates in the future if needed; the basis for Seattle, WA is 12,840 (December 2020).

Project cost estimates were prepared in accordance with the guidelines of AACE International. (AACE International Recommended Practice No. 56R-08 Cost Estimate Classification System - As Applied For The Building and General Construction Industries - TCM Framework: 7.3 - Cost Estimating and Budgeting Rev. December 31, 2011). The project cost estimates in this WSMP are categorized Class 4, as defined by AACE International:

> *Class 4 estimates are generally prepared based on very limited information, and subsequently have wide accuracy ranges. As such, some companies and organizations have elected to determine that due to the inherent inaccuracies, such estimates cannot be classified in a conventional and systemic manner.*
>
> *Class 4 estimates are prepared for any number of strategic business planning purposes, such as but not limited to market studies, assessment of initial viability, evaluation of alternate schemes, project screening, project location studies, evaluation of resource needs and budgeting, long-range capital planning, etc.*
>
> *Typical accuracy ranges for Class 4 estimates are -20% to -30% on the low side, and +30% to +50% on the high side, depending on the construction complexity of the project, appropriate reference information and other risks (after inclusion of an appropriate contingency determination). Ranges could exceed those shown if there are unusual risks.*

All project descriptions and cost estimates in this WSMP represent planning-level accuracy and opinions of costs (+50 percent, -30 percent). During the design phase of each improvement project, project definition, scope, and specific information (e.g., pipe diameter and length) should

be verified. The final cost of individual projects will depend on actual labor and material costs, site conditions, competitive market conditions, regulatory requirements, project schedule and other factors. Because of these factors, project feasibility and risks must be carefully reviewed prior to making specific financial decisions or establishing project budgets to help ensure proper project evaluation and adequate funding.

The project costs presented in this WSP include estimated construction costs, and allowances for permitting, legal, administrative, and engineering fees. A contingency factor is also added to each cost to help account for any unanticipated components of the project costs. Construction costs are based on the preliminary concepts and layouts of the water system components developed during the system analysis.

Total estimated project costs were developed through a progression of steps and multiple methodologies. The steps included development of component unit costs, construction costs and, finally, project costs. The component unit cost includes the sum of materials, labor and equipment of a project's basic features. The construction cost is the sum of component costs and mark-ups to determine the probable cost of construction (i.e., the contractor bid price). The project cost is the sum of construction costs with additional cost allowances for engineering, legal and administrative fees to determine the total project cost to the City.

The following costs are not included:

- Land or right-of-way acquisition
- Maintenance expenses
- Operation expenses

C.3 Component Unit Costs

C.3.1 Pipelines

The estimates for water system pipelines include the costs for pipe, valves, fittings, water connections, and special pipe crossings. The pipe material assumed for waterlines was Class 50 ductile iron with compression-type joints.

C.3.2 Pipe

For all pipeline installations including new and replacement projects, the water pipeline costs per linear foot is based on a cover depth of four feet and includes:

- Excavation
- Waste of material associated with the trenching (which includes haul, load, and dump fees)
- Imported bedding and zone material
- Native backfill (which includes minimal haul and compaction of material)
- Testing and disinfection

As the diameter of pipe and the trench width increase, the costs also increase. Therefore, a specific cost has been identified for each pipe diameter. See **Table 1** for costs per linear foot of pipe.

Table C-1
Water Pipeline Costs per Linear Foot

Pipe Diameter (inch)	Cost ($/linear foot)
4	43
6	42
8	52
12	72
14	85
16	96
24	142

C.3.2.1 Valves and Fittings

To account for fittings and valves an additional 30 percent of pipeline cost is added.

C.3.2.2 Water Connections

New and replacement water connections are assumed at an additional 10 percent of pipeline costs.

C.3.2.3 Special Pipe Crossings

Special pipe crossings are required for crossing the river, railroads and highways, or areas where traditional open cut construction is not possible. To approximate the cost of trenchless construction for crossings, bid tabs were reviewed and a factor of 10 was applied to the water pipeline cost per linear foot from **Table C-1** for the crossing length.

A summary of additional pipeline costs is provided in **Table C-2**.

Table C-2
Additional Pipeline Costs

Additional Pipeline Cost Factor	Additional Factor
Valves and Fittings	30%
Water Service Connections	10%
Special Pipe Crossings	10 times pipe cost per linear foot for crossing length

C.3.3 Surface Restoration

Surface restoration of construction sites is required to complete every project. As with the pipe installation costs, the surface restoration costs increase with the size of pipe, due to the larger trench that will need to be excavated. Therefore, a unit surface restoration cost has been developed for each pipe diameter. **Table C-3** tabulates costs for surface restoration. The tables are separated to define costs associated with local and arterial asphalt roadways. The surface restoration is developed from local supplier and RSMeans costs.

Table C-3
Surface Restoration Costs per Linear Foot

Pipe Diameter (inch)	Surface Condition Cost ($/linear foot)	
	Arterial[1]	Local[2]
8	52	42
10	54	42
12	54	44
14	56	44
16	56	46
18	58	46
24	62	48

Notes:
1. Road repair and replacement along trench. 4-inch asphalt and 6 inches of ¾-inch minus.
2. Road repair and replacement along trench. 3-inch asphalt and 4 inches of ¾-inch minus.

C.3.4 Facility

Facility project costs were developed for each individual facility project based on previous City projects and other similar projects in the Northwest. For each facility, the project cost includes basic site, civil, mechanical, electrical, and instrumentation and control facilities.

C.4 Construction Cost Allowances

The construction cost is the sum of pipe cost and adders, labor, equipment, mobilization, contractor's overhead and profit, and contingency for each project.

C.4.1 Traffic Control

Traffic control will be required for all projects that occur in roadways. The cost and level of effort for traffic control should be evaluated based on the scope and size of each project and as local conditions at the time of construction dictate. For planning purposes, the cost of traffic control is estimated at 0.5 percent for low traffic control areas in local streets or 2 percent for high traffic control areas in arterial streets depending on project location. Traffic control mark-up accounts

for the cost of signage, flagging and temporary barriers, street widening, pavement markings, lane delineators and lighting at flagging locations.

C.4.2 Erosion Control

Erosion control will be required for all projects. For planning purposes, the erosion control is estimated at 2 percent of the construction costs. Erosion control mark-up accounts for materials and practices to protect adjacent property, storm water systems, and surface water in accordance with regulatory requirements. The level of effort and cost for erosion control depends on the size and scope of a project, and the local conditions at the time of construction.

C.4.3 Contractor Overhead and Profit

A 15 percent mark-up accounts for the contractor's indirect project costs and anticipated profit.

C.4.4 Mobilization

A 10 percent mobilization mark-up accounts for the cost of the contractor's administrative and direct expenses to mobilize equipment, materials, and labor to the work site.

C.4.5 Contingency

A 30 percent increase was added in each project's construction cost to account for a contingency factor to cover the uncertainties inherent to planning-level development. The contingency is provided to account for factors such as:

- Unanticipated utilities
- Relocation and connection to existing infrastructure
- Minor elements of work not addressed in component unit cost development
- Details of construction
- Changes in site conditions
- Variability in construction bid climate

The contingency excludes:

- Major scope changes such as end product specification, capacities, and location of project
- Extraordinary events such as strikes or natural disasters
- Management reserves
- Escalation and currency effects

A summary of construction mark-ups is provided in Table C-4.

Table C-4
Additional Construction Costs

Additional Cost Factor	Percent
Low Traffic Control	0.5%
High Traffic Control	2%
Erosion Control	2%
Contractor Overhead and Profit	15%
Mobilization	10%
Contingency	30%

C.5 Total Project Cost

The total project cost is the sum of construction cost with additional cost allowances for legal, administrative, and engineering fees. Table C-5, shown below, presents the cost allowances for each additional project cost. The engineering costs include design, surveying, and construction administration, which is the cost associated with managing the construction of the project.

Table C-5
Summary of Additional Costs

Additional Cost Factor	Percent
Legal/Admin. Coordination	10%
Engineering Design	20%
Sales Tax	7.9%

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APPENDIX N
CROSS CONNECTION CONTROL

Chapter 13.40
CROSS CONNECTION CONTROL

Sections:

13.40.010 Compliance with regulations.

13.40.020 Enforcement authority.

13.40.030 Approval of standards and backflow prevention assemblies.

13.40.040 Testing of backflow prevention assemblies and inspection of air gaps.

13.40.050 Access to user's premises.

13.40.060 Failure of customer to cooperate – Grounds for termination of service.

13.40.010 Compliance with regulations.

All users of the city's water supply shall comply with the Uniform Plumbing Code Chapter 10, State of Washington Cross Connection Regulations, WAC 246-290-490, and the current edition of the Cross Connection Control Manual – Accepted Procedure and Practice published by the Pacific Northwest Section of American Waterworks Association.

(1) Backflow Prevention Assemblies to Be Installed. In addition to situations requiring backflow prevention assemblies as set forth in this section, the city reserves the right, as a condition of water service, to require any party seeking water service to install a backflow prevention assembly when the director of public works, or designee, determines a need to protect the city's water system and/or facilities. Premises isolation for all service connections by an approved air gap or reduced pressure backflow assembly is required for all customers with access to unapproved auxiliary water supplies, as defined by WAC 246-290-010(283), connected to a piping system whether or not an interconnection exists between the unapproved auxiliary water supply and the city water system. All backflow prevention assemblies shall be installed and maintained by, and at the expense of, the customer. (Ord. 1897 § 1 (Exh. A), 2019; Ord. 1247 § 1 (Exh. A), 1997; Ord. 1033 § 1, 1991)

13.40.020 Enforcement authority.

The city shall enforce the provisions of these regulations through the director of public works. The director of public works may delegate responsibilities to a certified cross connection control specialist/inspector. The city's standards may supersede the state regulations, but in no case shall they be less stringent. (Ord. 1033 § 2, 1991)

13.40.030 Approval of standards and backflow prevention assemblies.

All approved standards for cross connections shall be approved by the director of public works or

his designee. All backflow prevention assemblies required by these regulations shall be a model approved by the Washington State Department of Health. Further, approved backflow prevention assemblies required by these regulations shall be installed under the direction of the director of public works and/or under the supervision of the cross connection specialist/inspector per city standards. (Ord. 1033 § 3, 1991)

13.40.040 Testing of backflow prevention assemblies and inspection of air gaps.

All RPBAs, RPDAs, DCDAs, DCVAs and PVBAs are required to be tested at least annually and all air gaps installed in lieu of an approved backflow prevention assembly shall be inspected at least annually. Completed test reports shall be returned to the city within 30 days after receipt of the yearly test notification. Tests and inspections may be required on a more frequent basis at the discretion of the director of public works. (Ord. 1247 § 1 (Exh. A), 1997; Ord. 1033 § 4, 1991)

13.40.050 Access to user's premises.

Only authorized employees of the city with proper identification shall have reasonable access at reasonable hours of the day to the user's premises to which water is supplied. The city shall abide by all appropriate legal means to facilitate this access. Water service shall be refused or terminated to any premises for failure to allow necessary inspections upon the city's request as above set forth. (Ord. 1033 § 5, 1991)

13.40.060 Failure of customer to cooperate – Grounds for termination of service.

Failure of the customer to cooperate in the installation, maintenance, repair, inspection or testing of backflow prevention assemblies required by these regulations and incorporated in this chapter shall be grounds for termination of water service to the premises or the requirement for an air gap separation. This determination shall be made at the discretion of the public works director or his designee. (Ord. 1033 § 6, 1991)

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CROSS-CONNECTION CONTROL PROGRAM PLAN

Cross-Connection Control Program Plan
City of Washougal Water System

A. Requirement for Program

The City of Washougal, 934000,

Hereinafter referred to as "the City of Washougal and or water utility," has the responsibility to protect the public water system from contamination due to cross connections. A cross connection may be defined as *"any actual or potential physical connection between a potable water line and any pipe, vessel, or machine that contains or has a probability of containing a non-potable gas or liquid, such that it is possible for a non-potable gas or liquid to enter the potable water system by backflow."* All public water systems are required to develop and implement cross-connection control (CCC) programs. The CCC requirements are contained in Washington Administrative Code (WAC) 246-290-490 of the Group A Drinking Water Regulations. The minimum required elements of a CCC program are:

1. Establishment of legal authority and program policies;
2. Evaluation of premises for cross-connection hazards;
3. Elimination and/or control of cross connections;
4. Provision of qualified personnel;
5. Inspection and testing of backflow preventers;
6. Quality control of testing process;
7. Response to backflow incidents;
8. Public education for consumers;
9. Record keeping for CCC program;
10. Special requirements for reclaimed water use.

Other CCC program requirements include:

11. Coordination with the Local Administrative Authority (LAA), i.e., the local building or plumbing official regarding CCC activities;
12. Prohibition of the return of used water into the public water system (PWS) distribution system;
13. Inclusion of a written CCC program in a Water System Plan (WSP).

Note: Throughout the CCC program plan the term *customer* is used. *Customer* as used herein means the property owner and/or occupant of the premises served by the City of Washougal (i.e., whoever interfaces with the City of Washougal regarding water service). Also, unless otherwise defined, all CCC-related terms used in this program have the same definitions as those contained in WAC 246-290-010 of the Washington State Drinking Water Regulations.

B. Program Objectives

The objectives of the CCC program are to:
1.Reasonably reduce the risk of contamination of the public water distribution system.

2. Reasonably reduce the City of Washougal's exposure to legal liability arising from the backflow of any contaminant originating from the customer's plumbing system and then supplied to other customers.

C. Summary of Program Decisions

The following table summarizes the major policy and program decisions adopted for the City of Washougal water system. The items in the table represent CCC program areas that have more than one acceptable approach or option.

CCC Program Decision Summary Table for the City of Washougal

Decision Item	Decision
1. Type of Program [General, WAC 246-290-490(2)(e)]	
a. Premises isolation only	
b. Premises isolation and in-premises protection (combination program)	
2. Extent of Coordination with LAA [WAC 246-290-490(2)(d)]	
a. Information exchange	
b. Interaction	
c. Joint program	
3. Relationship with Customer [Element 1]	
a. Signed service agreement or contract	
b. Ordinance/resolution; implied service agreement	
4. Enforcement of Corrective Action [Element 1]	
a. Rely upon shut-off of water service	
b. Rely upon purveyor-installed premises isolation	
5. Assessment and Re-assessment of Hazard [Element 2]	
a. By purveyor's staff or equivalent	
b. By cross-connection control specialist (CCS) employed by customer; report reviewed by purveyor's CCS	
6. Location and Ownership of Premises Isolation Assembly [Element 3]	
a. On purveyor's service line	
b. On customer's service line	
7. CCS Option – Purveyor's Program Management [Element 4]	
a. Purveyor's staff member certified	
b. Inter-agency agreement or use other agency's CCS	
c. Contract with consultant CCS	
8. Testing of Assemblies [Element 5]	
a. By purveyor's staff or purveyor-employed backflow assembly tester (BAT)	
b. By customer-employed (contractor) BAT	
9. Cost Recovery [WAC 246-290-100(4)(h) and –105(4)(p)]	
a. Borne by all customers (general water rates)	
b. Assessed to specific class (commercial meters)	
c. Each customer directly bears cost	

Cross-Connection Control and Related Materials

Acronyms and Abbreviations

ABPA	American Backflow Prevention Association
AG	air gap
ANSI	American National Standards Institute
ASR	Annual Summary Report
AVB	atmospheric vacuum breaker
AWWA	American Water Works Association
BAT	backflow assembly tester
BPA	backflow prevention assembly
CCC	cross-connection control
CCS	cross-connection control specialist
CV	single-check valve
DCAV	dual-check with atmospheric vent
DCDA	double-check detector assembly
DCV	dual-check backflow preventer
DCVA	double-check valve assembly
DOH	Washington State Department of Health
EPA	U.S. Environmental Protection Agency
HBVB	hose bib vacuum breaker
IAPMO	International Association of Plumbing and Mechanical Officials
L&I	Washington State Department of Labor and Industries
LAA	Local Administrative Authority
MCL	maximum contaminant level
NTNC	non-transient non-community
PNWS-AWWA	Pacific Northwest Section - American Water Works Association
psi	pounds per square inch
PVBA	pressure vacuum breaker assembly
PVC	polyvinyl chloride
PWS	public water system
QA/QC	quality assurance/quality control
RCW	Revised Code of Washington
ROW	right-of-way
RPBA	reduced-pressure backflow assembly
RPDA	reduced-pressure detector assembly
SBCC	Washington State Building Code Council
SDWA	Safe Drinking Water Act
SRC4	Spokane Regional Cross-Connection Control Committee
SVBA	spill-resistant vacuum breaker assembly
SWSMP	small water system management plan

The Group	Western Washington Cross-Connection Prevention Professionals Group
TNC	transient non-community
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
UPC	Uniform Plumbing Code
USC	University of Southern California
USCFCCCHR	University of Southern California - Foundation for Cross-Connection Control and Hydraulic Research
WAC	Washington Administrative Code
WSP	water system plan

Washington Administrative Code 246-290-490

This section contains Washington State Department of Health drinking water regulations relating to cross-connection control, WAC 246-290-490. These regulations first became effective in April 1999. Below is a list, definitions, abbreviations and acronyms relating to cross connections. These have been extracted from **WAC 246-290-010**.

Definitions Related to Cross-Connection Control

"Approved air gap" means a physical separation between the free-flowing end of a potable water supply pipeline and the overflow rim of an open or non-pressurized receiving vessel. To be an air gap approved by the department, the separation must be at least:

• Twice the diameter of the supply piping measured vertically from the overflow rim of the receiving vessel, and in no case be less than one inch, when unaffected by vertical surfaces (sidewalls); and

• Three times the diameter of the supply piping, if the horizontal distance between the supply pipe and a vertical surface (sidewall) is less than or equal to three times the diameter of the supply pipe, or if the horizontal distance between the supply pipe and intersecting vertical surfaces (sidewalls) is less than or equal to four times the diameter of the supply pipe and in no case less than one and one-half inches.

"Approved atmospheric vacuum breaker" means an AVB of make, model, and size that is approved by the department. *AVBs that appear on the current approved backflow prevention assemblies list developed by the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research or that are listed or approved by other nationally recognized testing agencies (such as IAPMO, ANSI, or UL) acceptable to the local administrative authority are considered approved by the department.

"Approved backflow preventer" means an approved air gap, an approved backflow prevention assembly, or an approved AVB. The terms "approved backflow preventer," "approved air gap," or "approved backflow prevention assembly" refer only to those approved backflow preventers relied upon by the purveyor for the protection of the public water system. The requirements of WAC 246-290-490 do not apply to backflow preventers installed for other purposes.

"Approved backflow prevention assembly" means an RPBA, RPDA, DCVA, DCDA, PVBA, or SVBA of make, model, and size that is approved by the department. Assemblies that appear on the current approved backflow prevention assemblies list developed by the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research or other entity acceptable to the department are considered approved by the department.

"Backflow" means the undesirable reversal of flow of water or other substances through a cross connection into the public water system or consumer's potable water system.

"Backflow assembly tester" means a person holding a valid BAT certificate issued in accordance with chapter 246-292 WAC.

"Backpressure" means a pressure (caused by a pump, elevated tank or piping, boiler, or other means) on the consumer's side of the service connection that is greater than the pressure provided by the public water system and which may cause backflow.

"Backsiphonage" means backflow due to a reduction in system pressure in the purveyor's distribution system and/or consumer's water system.

"Combination fire protection system" means a fire sprinkler system that:

- Is supplied only by the purveyor's water;
- Does not have a fire department pumper connection; and
- Is constructed of approved potable water piping and materials that serve both the fire sprinkler system and the consumer's potable water system.

"Consumer" means any person receiving water from a public water system from either the meter, or the point where the service line connects with the distribution system if no meter is present. For purposes of cross-connection control, "consumer" means the owner or operator of a water system connected to a public water system through a service connection.

"Consumer's water system," as used in WAC 246-290-490, means any potable and/or industrial water system that begins at the point of delivery from the public water system and is located on the consumer's premises. The consumer's water system includes all auxiliary sources of supply, storage, treatment, and distribution facilities, piping, plumbing, and fixtures under the control of the consumer.

"Cross connection" means any actual or potential physical connection between a public water system or the consumer's water system and any source of nonpotable liquid, solid, or gas that could contaminate the potable water supply by backflow.

"Cross-connection control program" means the administrative and technical procedures the purveyor implements to protect the public water system from contamination via cross connections as required in WAC 246-290-490.

"Cross-connection control specialist" means a person holding a valid CCS certificate issued in accordance with chapter 246-292 WAC.

"Cross-connection control summary report" means the annual report that describes the status of the purveyor's cross-connection control program.

"Flow-through fire protection system" means a fire sprinkler system that:

- Is supplied only by the purveyor's water;
- Does not have a fire department pumper connection;
- Is constructed of approved potable water piping and materials to which sprinkler heads are attached; and
- Terminates at a connection to a toilet or other plumbing fixture to prevent the water from becoming stagnant.

"High health cross-connection hazard" means a cross connection which could impair the quality of potable water and create an actual public health hazard through poisoning or spread of disease by sewage, industrial liquids or waste.

"In-premises protection" means a method of protecting the health of consumers served by the consumer's potable water system, located within the property lines of the consumer's premises by the installation of an approved air gap or backflow prevention assembly at the point of hazard, which is generally a plumbing fixture.

"Local administrative authority" means the local official, board, department, or agency authorized to administer and enforce the provisions of the Uniform Plumbing Code as adopted

"Low health cross-connection hazard" means a cross connection that could cause an impairment of the quality of potable water to a degree that does not create a hazard to the public health, but does adversely and unreasonably affect the aesthetic qualities of such potable waters for domestic use.

“Premises Isolation” means a method of protecting a public water system by installation of approved air gaps or approved backflow prevention assemblies at or near the service connection or alternative location acceptable to the purveyor to isolate the consumer’s water system from the purveyor’s distribution system.

"Reclaimed water" means effluent derived in any part from sewage from a wastewater treatment system that has been adequately and reliably treated, so that as a result of that treatment, it is suitable for beneficial use or a controlled use that would not otherwise occur, and it is no longer considered wastewater.

"Unapproved auxiliary water supply" means a water supply (other than the purveyor's water supply) on or available to the consumer's premises that is either not approved for human consumption by the health agency having jurisdiction or is not otherwise acceptable to the purveyor.

"Uniform Plumbing Code" means the code adopted under RCW 19.27.031(4) and amended under chapter 51-46 WAC. This code establishes statewide minimum plumbing standards applicable within the property lines of the consumer's premises.

"Used water" means water which has left the control of the City.

Elements of The Program

The drinking water regulations for Group A public water systems in Washington, WAC 246-290, require CCC programs to include certain minimum elements. The elements are listed in WAC 246-290-490(3). This section describes how the City of Washougal intends to comply with each of the required program elements. Elements are numbered the same as they appear in the WAC.

Element 1: Adoption of a written legal instrument authorizing the establishment and implementation of a CCC program.

The City of Washougal water system has adopted a resolution City Resolution 922, reproduced as exhibit in appendix A, which authorizes the City of Washougal to implement a CCC program. The resolution also authorizes the water system to administer the Cross Connection Control Program. The primary method for protection of the distribution system will be the installation of a backflow preventer by the customer, at the customer's expense.

Prevention of Contamination

The customer's plumbing system, starting from the termination of the Purveyor's water service pipe, shall be considered a potential high-health hazard requiring the isolation of the customer's premises by a DOH-approved, customer-installed and maintained reduced-pressure principle backflow assembly (RPBA) or reduced-pressure detector assembly (RPDA). The RPBA or RPDA shall be located at the end of the Purveyor's water service pipe (i.e., immediately downstream of the meter). Water shall only be supplied to the customer through a DOH-approved, customer-installed and maintained RPBA or RPDA. Notwithstanding the aforesaid, the Purveyor, upon an assessment of the risk of contamination posed by the customer's plumbing system and use of water, may allow:

• A single-family or duplex residential customer to connect directly to the water service pipe, i.e., without a purveyor-approved DCVA or RPBA.
• Any customer other than a single-family or duplex residential customer, as a minimum, to be supplied through a DOH-approved, customer-installed and maintained double-check valve assembly (DCVA) or double-check detector assembly (DCDA).

Conditions for Providing Service
Water service is provided based on the following terms and limitations:

1. The customer agrees to take all measures necessary to prevent the contamination of the plumbing system within his/her premises and the Purveyor's distribution system that may occur from backflow through a cross connection. These measures shall include the prevention of backflow under any backpressure or backsiphonage condition, including the disruption of the water supply from the Purveyor's system that may occur during routine system maintenance or during emergency conditions, such as a water main break.

2. The customer agrees to install, operate, and maintain at all times his plumbing system in compliance with the current edition of the Uniform Plumbing Code having jurisdiction as it pertains to the prevention of contamination and protection from thermal expansion, due to a closed system that could occur with the present or future installation of backflow preventers on the customer's service and/or at plumbing fixtures.

3. For cross-connection control or other public health-related surveys, the customer agrees to provide for the Purveyor's employees or agents free access to all parts of the premises during reasonable working hours of the day for routine surveys and at all times during emergencies. Where agreement for free access for the Purveyor's survey is denied, the Purveyor may supply water service provided that premises isolation is provided through a DOH- approved reduced-pressure principle backflow assembly (RPBA).

4. The customer agrees to install all backflow prevention assemblies requested by the Purveyor and to maintain those assemblies in good working order. The assemblies shall be of a type, size, and make approved by DOH and acceptable to the Purveyor. The assemblies shall be installed in accordance with the Purveyor's cross connection control program and construction standards and specifications."

5. The customer agrees to:
(a) Have all assemblies (e.g., RPBAs and/or DCVAs) that the Purveyor relies upon to protect the public water distribution system tested upon installation, annually thereafter and/or more frequently if requested by the Purveyor, after repair, and after relocation;
(b) Have all testing done by a purveyor-approved and currently DOH-certified Backflow Assembly Tester (BAT);
(c) Have the RPBA or DCVA tested in accordance with DOH-approved test procedures; and

(d) Submit to the Purveyor the results of the test(s) on Purveyor-approved test report forms within the time period specified by the Purveyor.

6. The customer agrees to bear all costs for the aforementioned installation, testing, repair, maintenance and replacement of the RPBA, RPDA, DCVA or DCDA installed to protect the Purveyor's distribution system.

7. At the time of application for service, if required by the Purveyor, the customer agrees to submit to the Purveyor plumbing plans and/or a cross-connection control survey of the premises conducted by a purveyor-approved and DOH-certified Cross-Connection Control Specialist (CCS). The cross-connection control survey shall assess the cross-connection hazards and list the backflow preventers provided within the premises. The results of the survey shall be submitted prior to the Purveyor turning on water service to a new customer. The cost of the survey shall be borne by the customer.

8. For classes of customers other than single-family residential, when required by the Purveyor, the customer agrees to periodically submit a cross-connection control re-survey of the premises by a DOH-certified CCS acceptable to the Purveyor. The Purveyor may require the re-survey to be performed in response to changes in the customer's plumbing or water use, or performed periodically (annually or less frequently) where the Purveyor considers the customer's plumbing system to be complex or subject to frequent changes in water use. The cost of the re-survey shall be borne by the customer.

9. Within 30 days of a request by the Purveyor, a residential customer shall agree to complete and submit to the Purveyor a "Water Use Questionnaire" for the purpose of surveying the health hazard posed by the customer's plumbing system on the Purveyor's distribution system. Further, the residential customer agrees to provide within 30 days of a request by the Purveyor a cross-connection control survey of the premises by a DOH-certified CCS acceptable to the Purveyor.

10. The customer agrees to obtain the prior approval from the Purveyor for all changes in water use, and alterations and additions to the plumbing system, and shall comply with any additional requirements imposed by the Purveyor for cross-connection control.

11. The customer agrees to immediately notify the Purveyor and the local health jurisdiction of any backflow incident occurring within the customer’s premises (i.e., entry of any contaminant/pollutant into the drinking water) and shall cooperate fully with the Purveyor to determine the reason for the backflow incident.

12. The customer acknowledges the right of the Purveyor to discontinue the water supply within 72 hours of giving notice to the customer, or a lesser period of time if required to protect public health, if the customer fails to cooperate with the Purveyor in the survey of premises, in the installation, maintenance, repair, inspection, or testing of backflow prevention assemblies or air gaps required by the Purveyor, or in the Purveyor's effort to contain a contaminant or pollutant that is detected in the customer's system. Without limiting the generality of the foregoing, in lieu of discontinuing water service, the Purveyor may install an RPBA on the service pipe to provide premises isolation, and recover all costs for the installation and subsequent maintenance and repair of the assembly, appurtenances, and enclosure from the customer as fees and charges for water. The failure of the customer to pay these fees and charges may result in termination of water service in accordance with the Purveyor's water billing policies.

13. Where the Purveyor imposes mandatory premises isolation in compliance with DOH regulations, or agrees to the customer's voluntary premises isolation through the installation of a RPBA immediately downstream of the Purveyor's water meter, the customer acknowledges his obligation to comply with the other cross-connection control regulations having jurisdiction (i.e., Uniform Plumbing Code). Although the Purveyor's requirements for installation, testing, and repair of backflow assemblies may be limited to the RPBAs used for premises isolation, the customer agrees to the other terms herein as a condition of allowing a direct connection to the Purveyor's service pipe.

14. The customer agrees to indemnify and hold harmless the Purveyor for all contamination of the customer's plumbing system or the Purveyor's distribution system that results from an unprotected or inadequately protected cross connection within the customer’s premises. This indemnification shall pertain to all backflow conditions that may arise from the Purveyor's suspension of water supply or reduction of water pressure, recognizing that the air gap separation otherwise required would require the customer to provide adequate facilities to collect, store, and pump water for his/her premises.

15. The customer agrees that, in the event legal action is required and commenced between the Purveyor and the customer to enforce the terms and conditions herein, the substantially prevailing party shall be entitled to reimbursement of all incurred costs and expenses including, but not limited to, reasonable attorney's fees as determined by the Court.

16. The customer acknowledges that the Purveyor's survey of a customer's premises is for the sole purpose of establishing the Purveyor's minimum requirements for the protection of the public water supply system, commensurate with the Purveyor's assessment of the degree of hazard. It shall not be assumed by the customer or any regulatory agency that the Purveyor's survey, requirements for the installation of backflow prevention assemblies, lack of requirements for the installation of backflow prevention assemblies, or other actions by the Purveyor’s personnel constitute an approval of the customer's plumbing system or an assurance to the customer of the absence of cross connections therein.

17. The customer acknowledges the right of the Purveyor, in keeping with changes to Washington State regulations, industry standards, or the Purveyor's risk management policies, to impose retroactive requirements for additional cross-connection control measures. The Purveyor will record the customer's agreement to the above terms for service on an "Application for Water Service," "Application for Change of Water Service," or other such form prepared by the Purveyor and signed by the customer.

Implementation of the Cross-Connection Control Policy

The Purveyor will engage the services of a DOH-certified CCS to develop, implement and be in responsible charge of the City of Washougal's Water System's cross-connection control program. The Purveyor, under the direction of the aforementioned CCS, will prepare a written cross connection control program plan to implement the requirements of this resolution. The written program shall be consistent with this resolution and shall comply with the requirements of Chapter 246-290 WAC (Group A Drinking Water Regulations). The Purveyor will use the most recently published editions of the following publications as references and technical aids:

1. *Cross-Connection Control Manual, Accepted Procedures and Practice,* published by the Pacific Northwest Section, American Water Works Association, or latest edition thereof.

2. *Manual of Cross-Connection Control,* published by the Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California, or latest edition thereof.

3. *Cross-Connection Control Guidance Manual for Small Water Systems,* published by the DOH Office of Drinking Water.

4. The Purveyor will incorporate the written program plan into the Water System Plan and will submit the plan to DOH for approval when requested. The Purveyor, in consultation with the aforementioned CCS, shall have the authority to make reasonable decisions related to cross connections in cases and situations not provided for in the resolution or written program. If any provision in this resolution, or in the written cross-connection control program is found to be less stringent than or inconsistent with the Drinking Water Regulations (Chapter 246-290 WAC), or other Washington state statutes or rules, the more stringent state statute, rule, or regulation shall apply.

The attached resolution, an implied service contract, allows the City of Washougal to protect the distribution system from contamination through a City installed backflow preventer on a customer's service. The City however, reserves the right to terminate water service if conditions are such that the water service poses a health threat or is not in compliance with City Resolution 992 and this program. The written and implied contract terms are discussed further under Element 3.

<u>Element 2:</u> Procedures and schedules for evaluating new and existing service connections to assess degree of hazard.

1. For all **<u>New Non-Residential Services,</u>** the customer will be required to submit, with the application for water service, an evaluation (performed at customer's expense) by a DOH-certified cross connection control specialist (CCS) of the degree of hazard posed by the proposed plumbing system, with recommendations for the installation at the meter of either a double-check valve assembly (DCVA) or a reduced-pressure principle backflow assembly (RPBA).

   As an alternative to the above requirement for a survey by a CCS, the customer may agree to install an approved air gap (AG) or RPBA for premise isolation as a condition of service.

2. For all **<u>New Residential Services,</u>** the customer will be required to submit with the application for water service a completed "Water Use Questionnaire" (copy shown in appendix B). If the customer's questionnaire indicates special plumbing, such as a lawn sprinkler system, hazardous water use, or unapproved water source on the premises, the customer shall submit to the City an evaluation by a DOH-certified CCS of the hazard posed by the proposed special plumbing system, with recommendations for the installation at the meter of either a DCVA or an RPBA.

   As an alternative to the above requirement for a survey by a DOH-certified CCS, the City, at its discretion, may specify the backflow preventer assembly required to be installed as a condition of service.

3. For all **<u>Existing Non-Residential Services,</u>** the City will require the customer to submit to the water utility, within nine months of notification, an evaluation by a DOH-certified CCS, of the hazard posed by the plumbing system, with recommendations for the installation at the meter of either a DCVA or an RPBA. The City may accept the recommendations or submit the recommendations to a CCS employed by the Utility for peer review and concurrence, before acceptance.

   As an alternative to the above requirement for a survey by a DOH-certified CCS, the customer may agree to install an AG or RPBA for premise isolation within 90 days of notification by the City or alternate time period acceptable to the City.

4. For all **<u>Existing Residential Services,</u>** the City will require the customer to submit to the City, within four months of notification, a completed "Water Use Questionnaire." If the customer's reply indicates special plumbing or water use on the premises, the customer shall submit an evaluation by a DOH-certified CCS of the hazard posed to the water system by the customers plumbing system, with recommendations for the installation at the meter of either a DCVA or an RPBA.

As an alternative to the above requirement for a survey by a CCS, the City may specify the backflow preventer assembly required to be installed as a condition of service. The City's CCS will provide guidance on the type of assembly to be installed.

5. For **All Existing Services,** should the customer fail to supply the required information for a hazard assessment or fail to submit a completed "Water Use Questionnaire," the City may have the assessment made by a CCS employed by the City, require the installation or an RPBA for premises isolation, or take other such actions consistent with the previously stated policies and bill the customer for the associated costs.

Cross-Connection Hazard Survey Schedule for Initial Hazard Assessments

The Schedule for initial hazard assessment is outlined in the following table. The schedule starts from the date the CCC program is established.

Initial Assessment Task	Schedule
Assessment of all new connections	At time of application for water service
Identification and assessment of high-hazard premises which are listed on Table 9 of Washington Administrative Code (WAC) 246-290-490	Within twelve months
Identification and assessment of hazardous premises supplemental to Table 9 of WAC 246-290-490	Within eighteen months
Identification of residential connections with special plumbing facilities and/or water use on premises	Within twenty four months

Cross-Connection Hazard Survey Schedule for Subsequent Hazard Re-Assessments

For subsequent cross-connection hazard surveys, procedures for evaluating the backflow prevention requirements are:

1. For **Residential Services,** the City will require the customer to submit to the City, within two months of City notification, a completed "Water Use Questionnaire." The procedure used for evaluating the hazard re-assessment and the potential change in the required backflow prevention will be the same as used for the initial assessment.

2. For all **Non-Residential Services,** the City will Require the customer to submit to the City, within two months of City notification, a hazard re-assessment (at the customers expense) by a DOH-certified CCS.

The frequency of hazard re-assessments will be shown in the table below:

Type of Service	Frequency of Re-Evaluation
Any services with reduced-pressure principle backflow assembly (RPBA)installed for premises isolation.	None required as long as the RPBA passes annual tests and inspections
Commercial services with double-check valve assembly (DCVA) installed for premises isolation.	Every two years and upon change in use or ownership
Residential services with special plumbing where the City relies upon compliance with Uniform Plumbing Code (UPC)	Every 2-3 years (questionnaire)
Residential services with DCVA installed for premises isolation.	Every 4-5 years (questionnaire)
Residential services with no known special plumbing or water use on premises.	Every 4-5 years and upon change in use, ownership, or plumbing system (questionnaire)

The City will Inform the customer that the City's survey of a customer's premises (whether by a representative of the City or through the evaluation of a questionnaire completed by the customer) is for the sole purpose of establishing the City's minimum requirements for the protection of the public water supply system, and that the required backflow protection will be commensurate with the City's assessment of the degree of hazard.

The City will also inform the customer or any regulatory agencies when the City's survey, requires the installation of backflow prevention assemblies, lack of requirements for the installation of backflow prevention assemblies, or other actions by the city's personnel or agent do not constitute an approval of the customer's plumbing system or an assurance to the customer or any regulatory agency of the absence of cross connections.

<u>Element 3:</u> Development and implementation of procedures and schedules for elimination and/or control of cross-connections.

Backflow Preventer Requirements
The following service policy shall apply to all new and existing customers:

1. The City of Washougal will require that water service to all **non-residential customers** be isolated at the meter by a DOH-approved DCVA or RPBA acceptable to the City of Washougal. All high hazard connections of the type described in Table 9 of WAC 246-290-490 shall be isolated with an RPBA and or AG.

2. The City of Washougal will require all **residential customers** with facilities of the type described in Table 9 of WAC 246-290-490 to be isolated with an RPBA. All other residential customers with special plumbing or water use on the premises will be isolated with a DCVA. "Special plumbing" includes, but is not limited to, the following:

a. A lawn irrigation system;
b. A solar heating system;
c. An auxiliary source of supply, e.g., a well or creek;
d. Piping for livestock watering, hobby farming, etc.;
e. Residential fire sprinkler system; and
f. Property containing a small boat moorage.

3. **For all customers that have a written service contract with the City of Washougal, the required premises isolation DCVA or RPBA shall be:**

- Purchased and installed by the customer (at the customer's expense) immediately downstream of the water meter in accordance with the City of Washougal standards

- Maintained, tested, and inspected in accordance with the City of Washougal standards

For new customers, the City of Washougal will not turn on water (except for testing purposes) at the meter until the customer complies with the above requirements. The failure of the customer to comply with the City of Washougal installation and maintenance requirements shall constitute a breach of contract by the customer. The City of Washougal may then proceed with corrective action provisions stipulated in the contract.

4. **Customers without written contracts** are considered to have an implied contract that requires the customer to bear all reasonable costs of service. The City of Washougal will install the required DCVA or RPBA on the service, upstream of the meter, and charge the customer for the cost of the initial installation, and all future maintenance, testing, and repair, as set forth in the City of Washougal's schedule of rates and charges. The failure of the customer to pay these costs shall constitute a breach of contract by the customer, and the City of Washougal will proceed with the established delinquency of payment procedures.

As an alternative, the customer may sign a service contract and install the required backflow preventer downstream of the meter in accordance with the City of Washougal installation standards.

5. **Approved Backflow Preventers and Installation**

All backflow preventers relied upon by the City of Washougal to protect the public water system shall meet the definition of "approved backflow preventer" as contained in WAC 246-290-010. The City of Washougal will obtain and maintain a current list of assemblies approved for installation in Washington State from the DOH Office of Drinking Water. All backflow preventers will be installed in:

- The orientation for which they are approved;
- A manner and location that facilitates their proper operation, maintenance, and testing or inspection;
- A manner that will protect them from weather-related conditions such as flooding and freezing; and
- Compliance with applicable safety regulations.

Installation standards contained in the most recently published edition of the Pacific Northwest Section, American Water Works Association (PNWS-AWWA) *CCC Manual* or the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research (USCFCCCHR) *CCC Manual* shall be followed unless the manufacturer's requirements are more stringent.

The water utility has no regulatory responsibility or authority over the installation and operation of the customer's plumbing system. The customer is solely responsible for compliance with all applicable regulations and for prevention of contamination of his plumbing system from sources within his/her premises. Any action taken by the water utility to survey plumbing, inspect or test backflow prevention assemblies, or to require premises isolation (installation of DCVA or RPBA on service) is solely for the purposes of reducing the risk of contamination of the City of Washougal distribution system. The City of Washougal will inform the customer that any action taken by the water utility shall not be construed by the customer as guidance on the safety or reliability of the customer's plumbing system. The City of Washougal will not provide advice to the customer on the design and installation of plumbing other than through the general public education program discussed in Element 8.

Except for easements containing the City of Washougal distribution system, the City of Washougal will not undertake work on the customer's premises.

6**. Schedule for Installation of Backflow Preventers**

The following table shows the schedule that the City of Washougal will follow for installation of backflow preventers when they are required (based on the hazard evaluation).

Type of Service	Schedule
New connections with cross-connection hazards	Before service is initiated
Existing connections with Table 9-type hazards and other high cross-connection hazards	Within 90 days after notification
Existing connections with other than Table 9 of WAC 246-290-490 or high cross-connection hazards	Within 180 days after notification (suggested)
Existing fire protection systems using chemicals or supplied by unapproved auxiliary water source	Within 90 days after notification
Existing fire protection systems not using chemicals and supplied by purveyor's water	Within 1 year after notification (suggested)

The City of Washougal may consider granting an extension of time for installation of backflow prevention assembly for an existing connection if requested by the premises owner.

<u>Element 4:</u> Provision of qualified personnel, including at least one person certified as a CCS, to develop and implement the CCC program.

1. **Program Administration:** The responsibility for administration of the CCC Program rests with the City of Washougal. The City of Washougal Mayor and Council establish general policy direction and risk management decisions.

2. The City of Washougal will employ or have on staff at least one person certified by DOH as a CCS to develop and implement the CCC program. As an alternative, or when no staff or employees are properly qualified, the City of Washougal may retain a DOH-certified CCS on contract to provide the necessary expertise and services.

3. The following cross-connection related tasks will be performed by or under the direction of the City of Washougal certified CCS (on staff or under contract):

• Preparation of and recommendations regarding changes to the CCC program;
• Performance of and/or reviews of CCC hazard evaluations;
• Recommendations on the type of backflow preventer to be installed;
• Recommendations on schedules for retrofitting of backflow preventers;
• Inspections of backflow preventers for proper application and installation;
• Reviews of backflow preventer inspection and test reports;
* Reviews of proposed design drawings of the water system for the purposes of eliminating or controlling cross connections;

• Reviews of backflow testing quality control information;
• Recommendations and/or the granting of exceptions to mandatory premises isolation;
• Participation in or cooperation with other water utility staff in the investigation of backflow incidents and other water quality problems;
• Completion of Backflow Incident Reports; and
• Completion of CCC Activity and Program Summary Reports.

4. The City of Washougal may delegate other CCC program activities to other personnel who are not certified CCSs, including clerical support staff. These activities include:

• Administration of paperwork associated with service agreements;
• Mailing, collecting, and initial screening of hazard evaluation/water use questionnaires;
• Mailing of assembly testing notices;
• Receiving and screening of assembly testing reports;
• CCC program database administration and record keeping;
• Dissemination of public education material; and
• Assisting tasks associated with coordination with the LAA.

5. The following table identifies the current CCS employed or retained on contract by the City of Washougal to manage the City of Washougal CCC program and/or act as the CCC technical resource for the City of Washougal:

Name of CCS	
Address	
City, State, Zip	
Telephone Number	
CCS Certification Number	

<u>Element 5:</u> Development and implementation of procedures to ensure that approved backflow preventers are inspected and/or tested (as applicable).

1. Inspection and Testing of Backflow Preventers

All backflow preventers that the City of Washougal relies upon for protection of the water system will be subject to inspection and, if applicable, testing.

Inspection and testing of backflow preventers will be as follows:

• The City of Washougal DOH-certified CCS will inspect backflow preventers for proper application (i.e., to ensure that the preventer installed is commensurate with the assessed degree of hazard).

• Either a DOH-certified CCS or backflow assembly tester (BAT) will perform inspections of backflow preventers for correct installation.

• A DOH-certified backflow assembly tester will test all assemblies relied upon by the City of Washougal to protect the public water system.

2. Frequency of Inspection and Testing
Inspection and testing of backflow preventers will be conducted:

• At the time of installation;
• Annually after installation;
• After a backflow incident; and
• After repair, reinstallation, relocation, or re-plumbing.

The City of Washougal may require a backflow preventer to be inspected and/or tested more frequently than once a year, when it protects against a high-health hazard or when it repeatedly fails tests or inspections.

3. Responsibility for Inspection and Testing

The City of Washougal will be responsible for inspection and testing of all City of Washougal owned backflowpreventers. The City of Washougal will require the customer to be responsible for inspection and testing of backflow preventers owned by the customer. The customer shall employ, at customer expense, a DOH-certified BAT pre-approved by the City of Washougal to conduct the inspection and test within the time period specified in the testing notice sent by the City of Washougal. The test report shall be completed and signed by the BAT, then countersigned and returned by the customer to the City of Washougal, before the due date specified by the City of Washougal. The customer may request an extension of the due date for returning a test report by submitting a written request to the City of Washougal. The City of Washougal may grant one extension up to 90 days.

4. Approved Test Procedures

The City of Washougal will require that all assemblies relied upon to protect the public water system be tested in accordance with DOH-approved test procedures as specified in WAC 246-290-490(7)(d). Any proposal to use alternate test procedures must be approved by the City of Washougal CCS.

5. Notification of Inspection and/or Testing

The City of Washougal will notify in writing all customers who own backflow preventers that are relied upon to protect the public water system to have their backflow preventer(s) inspected and/or tested. Notices will be sent out not less than 30 days before the due date of the inspection and/or test. The notice will also specify the date (up to 30 days after the due date of the inspection and/or test date) by which the inspection/test report must be received by the City of Washougal.

6. Enforcement

When a customer fails to send in the inspection/test report within 15 days after the due date specified, and the City of Washougal has not approved an extension to the due date, the City of Washougal will take the following enforcement action:

- The City of Washougal will send a second notice giving the customer an additional 15 days to send in the inspection/test report.

- If the customer has not sent in the inspection/test report within 10 days of the due date given in the second notice, the City of Washougal will send a third notice, by certified mail, giving the customer an additional 15 days to send in the report. The notice will also inform the customer that failure to satisfactorily respond to this notice will result in water service shut-off.

- The City of Washougal will send copies of the third notice to the owner and occupants of the premises (if different from the customer) and to the LAA.

- If the owner and/or occupants have not responded satisfactorily to the City of Washougal within 10 days of the due date specified in the third notice, the City of Washougal will implement water service shut-off procedures.

<u>Element 6:</u> Development and implementation of a backflow prevention assembly testing quality assurance/quality control program

1. The City of Washougal will maintain a list of local, DOH-certified BATs that are pre-approved by the City of Washougal to perform the following activities:

- Backflow preventer inspection for proper installation; and
- Backflow assembly testing.

Pre-Approval Qualifications

BATs who wish to be included on the City of Washougal preapproved list and/or provide testing in the City of Washougal service area must apply to the City of Washougal and furnish the following information:

- Evidence of current DOH certification in good standing;
- Make and model of testing equipment
- Evidence of test equipment verification of accuracy and/or calibration within the past 12 months

2. Quality Assurance

The City of Washougal CCS will review within 30 days of receipt the backflow preventer inspection/test report forms submitted by the customer. The City of Washougal CCS will provide follow up on test reports that are deficient in any way. The City of Washougal CCS will report incidences of fraud or gross incompetence on the part of any BAT or CCS to DOH Operator Certification program staff.

<u>Element 7:</u> Development and implementation (when appropriate) of procedures for responding to backflow incidents.

1. Backflow Incident Response Plan

The City of Washougal CCS will participate in developing a backflow incident response plan that will be part of the water system's emergency response program as required by WAC 246-290-415(2). The incident response plan will include, but will not be limited to:

- Notification of affected population;
- Notification and coordination with other agencies, such as DOH, the LAA, and the local health jurisdiction;
- Identification of the source of contamination;
- Isolation of the source of contamination and the affected area(s);
- Cleaning, flushing, and other measures to mitigate and correct the problem; and
- Apply corrective action to prevent future backflow occurrences.

2. Technical Resources

The City of Washougal will use the most recently published edition of the manual, *Backflow Incident Investigation Procedures*, published by the PNWS-AWWA as a supplement to the Backflow Incident Response Plan for the City of Washougal.

<u>Element 8:</u> Development and implementation of a cross-connection control public education program.

1. Customer Education

The City of Washougal will distribute with water bills or some other means, at regular intervals, public education brochures to system customers. For residential customers, such brochures will describe the cross-connection hazards in homes and the recommended assemblies or devices that should be installed by the homeowner to reduce the hazard to the public water system. The education program will emphasize the responsibility of the customer in preventing the contamination of the public water supply. The City of Washougal staff will produce the public education brochures or the City of Washougal will obtain brochures from:

• PNWS-AWWA;
• Spokane Regional Cross-Connection Control Committee (SRC4);
• Western Washington Cross-Connection Prevention Professionals Group (The Group);
• USC FCCCHR;
• Other national backflow prevention associations, such as the American Backflow Prevention Association (ABPA); and/or
• Other water utilities.

The information distributed by the City of Washougal will include, but not be limited to, the following subjects:

• Cross-connection hazards in general;
• Irrigation system hazards and corrective actions;
• Fire sprinkler cross-connection hazards;
• Importance of annual inspection and/or testing of backflow preventers; and
• Thermal expansion in hot water systems when backflow preventers are installed for premises isolation.

The City of Washougal will distribute information brochures to all customers every two to three years, and to every new customer at the time the service agreement is signed.

2. Public Outreach

In cooperation with other water utilities, the City of Washougal will participate in an outreach program consisting of participation in fairs, exhibits, and other events.

<u>Element 9:</u> Development and maintenance of cross-connection control records.

1. Types of records and data to be maintained

The City of Washougal will maintain records of the following types of information required by WAC 246-290-490:

• Service connections/customer premises information including:
o Assessed degree of hazard; and
o Required backflow preventer to protect the public water system.

• Backflow preventer inventory and information including:
o Air gap (AG) location, installation and inspection dates, inspection results and person conducting inspection;
o Backflow assembly location, assembly description (type, manufacturer, make, model, size, and serial number), installation, inspection and test dates, test results and data, and person performing test; and
o Information on atmospheric vacuum breakers used for irrigation system applications, including manufacturer, make, model, size, dates of installation and inspections, and person performing inspections.

The City of Washougal will maintain records on all assemblies that protect the public water system from contamination. At a minimum, the City of Washougal will maintain records on all premises isolation assemblies required to protect the public water system.

2. Reports to be Prepared and Submitted to DOH

The City of Washougal will prepare the following reports required by WAC 246-290-490 including:

- Cross-connection control program activities report for the calendar year, to be sent to DOH when requested;
- Cross-connection control program summary information, when required, or when there are significant policy changes;
- Backflow incident reports to DOH (and voluntarily to the PNWS-AWWA CCC Committee); and
- Documentation when exceptions to mandatory premises isolation are granted.

At a minimum, the City of Washougal's CCS will prepare and sign the exceptions reports.

The City of Washougal CCS will review all CCC-related reports for correctness and the manager of the public water system shall sign the CCC reports before submission to DOH.

<u>Element 10:</u> Additional cross-connection control requirements for reclaimed water.

At this time the City of Washougal does not receive or distribute reclaimed water. In the event that reclaimed water use is proposed within the City of Washougal service area, the City of Washougal will make all cross-connection control requirements mandated by the Permitting Authority in accordance with Chapter 90.46 RCW part of the written CCC program plan and comply with such additional requirements.

Other Provisions

1. Coordination with Local Administrative Authority Both WAC 246-290-490 and the Uniform Plumbing Code amended for Washington require coordination between the water purveyor and the Local Administrative Authority (LAA) in all matters pertaining to cross-connection control. The water utility will provide a copy of this CCC program to the City of Washougal Building Department. The water utility will inform the LAA of any changes in policy or procedure that may impact the LAA. The water utility will provide information to the LAA in a timely manner regarding any:

- Requirement imposed on a residential customer for the installation of a DCVA or an RPBA on the service, with a description of the cross-connection hazard identified;
- Upgrade of the premises isolation backflow preventer, i.e., from a DCVA to an RPBA;

• Action taken to discontinue water service to a customer; and
• Backflow incident known by the water utility to have contaminated the public water system or a customer's plumbing system.

2. The water utility will pursue development of a written agreement with the Local Administrative Authority regarding the details of the coordination on CCC issues between the two parties. The agreement will include, but not be limited to, the following items:

• The purpose of the written agreement;
• Identification of the parties and other interested agencies;
• Delineation of responsibilities;
• Procedures regarding new service connections;
• Procedures regarding existing and changes to existing services;
• Special policies and procedures, such as for fire protection and irrigation services;
• Procedures regarding water service shut-offs, backflow incidents, and other events;
• Communications between parties; and
• Other contingencies."

3. Prohibition of Return of Used Water. The water utility must prohibit the intentional return of used water to the City of Washougal distribution system per WAC 246-290-490 (2)(l).

Used water is defined as water that has left the control of the City of Washougal. This includes water used for heating and cooling purposes and water that may flow back into the distribution system from customers with multiple connections.
It is the policy of the City of Washougal water system to:

• Prohibit the intentional return of used water to the distribution system by any customer served by the public water system; and
• Require that all customers with multiple connections, where the hydraulics permit the potential return of used water, to install a backflow preventer (DCVA or RPBA) commensurate with the degree of hazard at each point of connection.

4. "Unapproved Auxiliary Supplies. All water supplies
other than those owned by the City of Washougal are considered unapproved auxiliary supplies as defined in WAC 246-290-010. The City of Washougal will require backflow protection for customers with auxiliary supplies on their premises as follows:

• Per Table 9 of WAC 246-290-490, the City of Washougal will require the installation of an RPBA for premises isolation at the service connection to any customer having an unapproved auxiliary supply on the premises that is served by the City of Washougal water system.

5. "Tanker Trucks. The City of Washougal may allow tanker trucks to obtain water from the City of Washougal's water system under the following conditions:

• The tanker truck is equipped with an approved AG or an approved RPBA with a current satisfactory inspection or test report."

6. "Temporary Water Connections. The City of Washougal will not supply water through temporary connections, such as those used for construction projects or main disinfection, except through a backflow preventer arrangement approved by the City of Washougal. The applicant for the temporary connection shall document that the backflow preventer is a DOH-approved model and has passed an inspection and/or test within the past 12 months and/or upon relocation, whichever is more recent."

Relationship to Other Planning and Operations Program Requirements

The City of Washougal will consider the requirements and consequences of the CCC program on the utility's planning and operations requirements. Such considerations include, but are not limited to ensuring:

• Promoting adequate communication between CCC program personnel and other water utility staff;
• That adequate training is provided to all staff to recognize potential cross-connection control problems;
• That cross-connection issues be considered in water quality investigations;
• That the design of the water distribution system makes adequate provisions for expected head losses incurred through the installation of backflow assemblies;
• That CCC program personnel be consulted in the design of water and wastewater treatment facilities and when proposals are made to receive or distribute reclaimed water;
• That operations under normal and abnormal conditions do not result in excessive pressure losses; and
• That adequate financial and administrative resources are available to carry out the CCC program.

tomers of such expected shut-off; provided, however, that the water department will not be responsible for any damage which may result from any cessation of service such as above outlined, nor for failure to give notice of shut-off when circumstances are such that it is impossible to give notice as above stated. (Ord. 240 Art. 8 § 3, 1958)

13.36.040 Preference to customer during shortage.

In case of shortage of supply, the city reserves the right to give preference in the matter of furnishing service to customers, as in the judgment of its representatives shall be for the best interests of the city, from the standpoint of public convenience and necessity. (Ord. 240 Art. 8 § 4, 1958)

Chapter 13.40

CROSS CONNECTION CONTROL

Sections:

13.40.010 Compliance with regulations.
13.40.020 Enforcement authority.
13.40.030 Approval of standards and backflow prevention assemblies.
13.40.040 Testing of backflow prevention assemblies and inspection of air gaps.
13.40.050 Access to user's premises.
13.40.060 Failure of customer to cooperate – Grounds for termination of service.

13.40.010 Compliance with regulations.

All users of the city's water supply shall comply with the Uniform Plumbing Code Chapter 10, State of Washington Cross Connection Regulations, WAC 246-290-490, and the current edition of the Cross Connection Control Manual – Accepted Procedure and Practice published by the Pacific Northwest Section of American Waterworks Association. (Ord. 1247 § 1 (Exh. A), 1997; Ord. 1033 § 1, 1991)

13.40.020 Enforcement authority.

The city shall enforce the provisions of these regulations through the director of public works. The director of public works may delegate responsibilities to a certified cross connection control specialist/inspector. The city's standards may supersede the state regulations, but in no case shall they be less stringent. (Ord. 1033 § 2, 1991)

13.40.030 Approval of standards and backflow prevention assemblies.

All approved standards for cross connections shall be approved by the director of public works or his designee. All backflow prevention assemblies required by these regulations shall be a model approved by the Washington State Department of Health. Further, approved backflow prevention assemblies required by these regulations shall be installed under the direction of the director of public works and/or under the supervision of the cross connection specialist/inspector per city standards. (Ord. 1033 § 3, 1991)

13.40.040 Testing of backflow prevention assemblies and inspection of air gaps.

All RPBAs, RPDAs, DCDAs, DCVAs and PVBAs are required to be tested at least annually

and all air gaps installed in lieu of an approved backflow prevention assembly shall be inspected at least annually. Completed test reports shall be returned to the city within 30 days after receipt of the yearly test notification. Tests and inspections may be required on a more frequent basis at the discretion of the director of public works. (Ord. 1247 § 1 (Exh. A), 1997; Ord. 1033 § 4, 1991)

13.40.050 Access to user's premises.

Only authorized employees of the city with proper identification shall have reasonable access at reasonable hours of the day to the user's premises to which water is supplied. The city shall abide by all appropriate legal means to facilitate this access. Water service shall be refused or terminated to any premises for failure to allow necessary inspections upon the city's request as above set forth. (Ord. 1033 § 5, 1991)

13.40.060 Failure of customer to cooperate – Grounds for termination of service.

Failure of the customer to cooperate in the installation, maintenance, repair, inspection or testing of backflow prevention assemblies required by these regulations and incorporated in this chapter shall be grounds for termination of water service to the premises or the requirement for an air gap separation. This determination shall be made at the discretion of the public works director or his designee. (Ord. 1033 § 6, 1991)

Washington State Department of Health

Office of Drinking Water

Public Water System Cross-Connection Control Activities Annual Summary Report for Year 2011

Part 1: Public Water System (PWS) and Cross-Connection Control Specialist (CCS) Information

PWS ID: 93400	PWS Name: WASHOUGAL, CITY OF	County: CLARK
Provide name and Cert No. of CCS who develops and implements your CCC program		
CCS Name (last, first & mi): Davis, Travis V.		CCS Phone: (360) 835-8501
CCS Cert No.: 11699	BAT Cert. No. (if applicable): B5186	
CCS is (check one):	PWS owner or employee ☑	On contract to PWS ☐ Volunteer or other ☐

Part 2: Status of Cross-Connection Control (CCC) Program at end of 2011

PWS has(check one box in each column below):	
A written CCC program plan Y ☑ N ☐	CCC implementation activities Y ☑ N ☐

(Written program may be a separate document, or part of water system plan or small water system management program).

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 Currently:	
		Included in Written Program	Being Implemented or Is Completed
1	Legal Authority Established	Y ☑ N ☐	Y ☑ N ☐
2	Hazard Evaluation Procedures and Schedules	Y ☑ N ☐	Y ☑ N ☐
3	CCC Procedures and Schedules	Y ☑ N ☐	Y ☑ N ☐
4	Certified CCS Provided	Y ☑ N ☐	Y ☑ N ☐
5	Backflow Preventer Inspection and Testing	Y ☑ N ☐	Y ☑ N ☐
6	Testing Quality Control Assurance Program	Y ☑ N ☐	Y ☑ N ☐
7	Backflow Incident Response Procedures	Y ☑ N ☐	Y ☑ N ☐
8	Public Education Program	Y ☑ N ☐	Y ☑ N ☐
9	CCC Records	Y ☑ N ☐	Y ☑ N ☐
10	Reclaimed Water Permit	Y ☐ N ☐ N/A ☑	Y ☐ N ☐ N/A ☑

Part 3A: System Characteristics at End of 2011

Indicate the number of connections of each type that the PWS serves (whether or not they are protected by backflow preventers). **Estimate if necessary.**

Type of Service Connection	Number
Residential (As defined by PWS)	4488
All Other (Include dedicated fire sprinkler and irrigation lines and PWS-owned facilities such as water and wastewater treatment plants and pumping stations, parks, piers and docks.)	468
Total Number of Connections	4956

Part 3B: Cross-Connection Control for High-Hazard Premises or Systems Served by the PWS

If PWS does not serve any high-hazard premises or systems, check here ☐ and go to Part 4A.

- Complete all cells. Enter zero (0) in cells if PWS does not serve such premises.
- Estimate number of connections served if necessary (OK to use phone book).
- Hazard evaluations do not need to be done to complete this table.

Type of High-Hazard Premises or Systems [WAC 246-290-490(4)(b)]	Number of Connections at end of 12/31/2011			
	A. Being Served Water by PWS[1]	B. With Premises Isolation by AG/RP	C. With Column B AG Inspected or RP Tested [2]	D. Granted Exception from Mandatory Premises Isolation
Agricultural (farms and dairies)	0	0	0	0
Beverage bottling plants (including breweries)	0	0	0	0
Car washes	3	3	3	0
Chemical plants	4	4	4	0
Commercial laundries and dry cleaners	0	0	0	0
Both reclaimed water and potable water provided	0	0	0	0
Film processing facilities	0	0	0	0
Dedicated fire protection systems with chemical addition or using unapproved auxiliary supplies	0	0	0	0
Food processing plants (including canneries, slaughter houses, rendering plants)	0	0	0	0
Hospitals, medical centers, nursing homes, veterinary, medical and dental clinics, and blood plasma centers	9	7	7	0
Separate irrigation systems using purveyor's water supply and chemical addition[4]	0	0	0	0
Laboratories	1	1	1	0
Metal plating industries	0	0	0	0
Petroleum processing or storage plants	0	0	0	0
Piers and docks	1	1	1	0
Radioactive material processing plants or nuclear reactors	0	0	0	0
Survey access denied or restricted	0	0	0	0
Wastewater lift/pump stations (non-residential only)	14	14	14	0
Wastewater treatment plants	1	1	1	0
Unapproved auxiliary water supply interconnected with potable water supply	3	3	3	0
Wood Pressure Treater/Lumber Mill	2	2	2	0
Totals	38	36	36	0

[1]Count multiple connections or parallel installations as ***separate*** connections.

[2]Count only those connections with AG or RPBA installed for premises isolation. Don't include connections with in-premises protection only, or connections with DCVA/DCDAs installed for premises isolation.

[3]Count only those connections whose premises isolation preventers were inspected (AG) or tested (RPBA) during 2011.

[4]For example, dedicated lines to irrigation systems in parks, playgrounds, golf courses, cemeteries, estates, etc.

[5]Premises with hazardous materials or processes (requiring isolation by AG or RPBA) 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, e.g.: other manufacturing or other commercial. If needed, attach additional sheet giving same information as requested in table.

Part 3C: Cross-Connection Control for Medical Category High-Hazard Premises Served by the PWS

If PWS does not serve any medical type premises, check here ☐ and go to Part 4A.

- Complete all cells. Enter zero (0) in cells if PWS does not serve such premises.
- Estimate number of connections served if necessary (OK to use phone book).
- Hazard evaluations do not need to be done to complete this table.

Type of High-Hazard Premises or Systems [WAC 246-290-490(4)(b)]	Number of Connections at end of 12/31/2011			
	A. Being Served Water by PWS[1]	B. With Premises Isolation by AG/RP	C. With Column B AG Inspected or RP Tested[2]	D. Granted Exception from Mandatory Premises Isolation
Hospitals				
Hospitals (include psychiatric hospitals and alcohol and drug treatment centers)	0	0	0	0
Facilities for Treatment and Care of Patients Not Located in Hospitals Counted Above				
Same day surgery centers	0	0	0	0
Out-patient clinics and offices	0	0	0	0
Alternative health out-patient clinics and offices	0	0	0	0
Psychiatric out-patient clinics and offices	0	0	0	0
Chiropractors	2	1	1	0
Hospice care centers	0	0	0	0
Childbirth centers	0	0	0	0
Kidney dialysis centers	0	0	0	0
Blood centers	0	0	0	0
Dental clinics and offices	4	4	4	0
Facilities for Housing Patients				
Nursing homes	0	0	0	0
Boarding homes	1	0	0	0
Residential treatment centers	0	0	0	0
Other Medical-Related Facilities				
Mortuaries	0	0	0	0
Morgues and autopsy facilities (not in hospitals)	0	0	0	0
Veterinarian offices, clinics and hospitals	2	2	2	0
All other (describe in Part 6: Comments on page 6)	0	0	0	0
Totals	9	7	7	0

[1]Count multiple connections or parallel installations as ***separate*** connections.

[2]Count only those connections with AG or RPBA installed for premises isolation. Don't include connections with in-premises protection only, or connections with DCVA/DCDAs installed for premises isolation.

[3]Count only those connections whose premises isolation preventers were inspected (AG) or tested (RPBA) during 2011.

Part 4A: Backflow Preventer Inventory and Testing Data During Year 2011

- Complete all cells. Enter zero (0) if there are no backflow preventers in that category.
- Count only the backflow preventers that the PWS relies upon for protection of the distribution system. If your records do not distinguish between premises isolation and in-premises protection preventers, enter all data in Premises Isolation section and check the box.
- Count AVBs on irrigation systems only. **If you do not track AVBs, enter "UNK".**
- Count multiple tests or failures for any particular backflow preventer as one test or failure for that backflow preventer.
- Multiple Service or Parallel Connections: Count each assembly separately.
- Assemblies on Dedicated Fire or Irrigation Lines: Count as Premises Isolation Assemblies.

If PWS does not track AVBs Check here: ☑

	Backflow Preventer Category and Testing/Inspection Information	Air Gap	RPBA	RPDA	DCVA	DCDA	PVBA	SVBA	AVB
Premises Isolation, including preventers isolating PWS-owned facilities. ***If In-Premises Protection preventers are also included, check here.*** ☐									
Rows 1-3 pertain ONLY to Premises Isolation preventers in service at beginning of 2011									
1	In service on 1/1/2011	13	59	1	15	0	0	0	unk
2	Inspected and/or Tested in 2011[1]	13	55	1	14	0	0	0	unk
3	Failed Inspection or Test in 2011	0	5	0	2	0	0	0	unk
Rows 4 - 6 pertain ONLY to NEW Premises Isolation preventers installed during 2011									
4	New preventers installed in 2011[2]	0	3	0	1	0	0	0	unk
5	Inspected and/or Tested in 2011[1]	0	3	0	1	0	0	0	unk
6	Failed inspection or test in 2011[3]	0	0	0	0	0	0	0	unk
7	Preventers taken out of service in 2011[3]	0	0	0	0	0	0	0	0
Premises Isolation Total at end of 2011[4]		13	62	1	16	0	0	0	unk
In-Premises Protection (Fixture Protection or Area Isolation), including preventers within PWS-owned facilities.									
Rows 8 - 10 pertain ONLY to In-Premises Protection Preventers in service at beginning of 2011									
8	In service on 1/1/2011	0	51	0	1085	36	7	0	unk
9	Inspected and/or Tested in 2011[1]	0	49	0	1009	35	7	0	unk
10	Failed Inspection or Test in 2011	0	9	0	35	2	0	0	unk
Rows 11 - 13 pertain ONLY to NEW In-Premises Protection Preventers installed during 2011									
11	New preventers installed in 2011[2]	0	1	0	35	3	0	0	unk
12	Inspected and/or Tested in 2011[1]	0	1	0	35	3	0	0	unk
13	Failed inspection or test in 2011	0	0	0	5	0	0	0	unk
14	Preventers taken out of service in 2011[3]	0	0	0	0	0	0	0	0
In-Premises Protection Total at end of 2011[4]		0	52	0	1120	39	7	0	unk
Grand Total at end of 2011		13	114	1	1136	39	7	0	unk

[1]Initial and/or routine annual inspection (for proper installation and approval status) and/or test (for testable assemblies only using DOH/USC test procedures).Includes preventers installed on connections where backflow prevention was not previously required and any preventers that replaced those in service at beginning of 2011. Replacement preventers may be of a different type than the original.

[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 2011. Replacement preventers may be of a different type than the original.

[3]New or existing preventers taken out of service, whether or not they were replaced by the same type or different type of preventer.

[4]Total at end of 2011 should be equal to the number of preventers in service at beginning of 2011 plus those installed during 2011 minus the number of preventers taken out of service during 2011.

Part 4B: Other Implementation Activities in 2011

Complete all cells. Enter zero (0) if not applicable.

Activity or Condition	Number
New service connections evaluated for cross-connection hazards to PWS in 2011.	58
New service connections requiring backflow protection to protect PWS.[1]	43
Existing service connections evaluated for cross-connection hazards to PWS in 2011.	16
Existing service connections requiring backflow protection to protect PWS.[1,2]	16
Exceptions granted to high-hazard premises per WAC 246-290-490(4)(b) in 2011.[3]	0
CCC enforcement actions taken by PWS during 2011.[4]	0

[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]A DOH Exceptions to Hazard Premises Form *must* be attached for each exception granted during the year.

[4]"Enforcement actions" mean actions taken by the PWS (such as water shut-off, PWS installation of backflow preventer) when the customer fails to comply with PWS's CCC requirements.

Part 5: Backflow Incidents and "Off-Normal" Events in 2011

	Backflow Incidents, Risk Factors and Indicators during 2011	Number (Enter 0 if none)	Check if Data Not Available
Backflow Incidents during 2011			
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 2011			
3	Distribution main breaks per 100 miles of pipe.	3.13	☐
4	Low pressure events (<20 psi in PWS distribution system).	0	☑
5	Water outage events.	0	☑
Indicators of Possible Backflow during 2011			
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 outages events.	0	☐

[5]Complete and submit a Backflow Incident Report form for each known backflow incident.

[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 or clarifications to any of the information included in this report. Note for on-screen completion: Comments will not "word wrap" from one line to the next. Press to continue on new line. Maximum length of each comment is 255 characters, including spaces.

Part No.	Date Added	Comment
Pt 3C	2/8/10	The PWS serves one chiropractor and one boarding home (assisted living facility) that do not have premise isolation backflow preventers. They were assessed initially and found to have no hazards present necessitating premise isolation. This year (2010) we will perform hazard surveys on both facilities to determine if their degree of hazard has changed.
Pt 3C	2/7/11	Hazard assessments were performed on the two facilities that do not have premise isolation - the Assisted living facility, and a Chiropractors office. Neither facility was found to have any hazards to the pws that warrant retrofitting premise isolation assemblies. After reviewing the activities that take place in both facilities, it is my professional opinion that neither of them qualify as a "medical" type establishment. Both facilities have adequate point of use - or in premise protection where needed, and access to both premises was given without hesitation. The requirement for premise isolation or granted exception does not apply.
Pt 4A	2/8/11	Again this year, assemblies not tested were either vacant homes or commercial bldgs that were isolated from the PWS by the utility owned shut-off valves. All of which will be required to have testing performed within a reasonable amount of time as a condition of restoring service.
Pt 4A	2/27/12	Again this year, assemblies not tested were vacant homes and commercial spaces that were not using water. They were isolated from the PWS by the utility owned shut-off valves. All of which will be required to have testing performed within a reasonable amount of time as a condition of restoring service.
Pt 4A	2/28/12	Both Premise isolation and in premise protection assembly inventory start of year numbers differ from 2010's end of year numbers because we have been looking at facilities and the location and nature of their water service. Some of the assemblies were reclassified from premise isolation to in premise protection. Part of an ongoing process of cleaning up our database to ensure the accuracy of our data.

Part 7: Report Completion Information

I certify that the information provided in this CCC Activities Report is complete and accurate to the best of my knowledge.		
CCC Program Mgr. Name[1]: Travis V. Davis		Title: Maintenance Worker III
Signature:		Date: 02/28/2012
Phone: (360) 835-8501	E-mail: tdavis@ci.washougal.wa.us	
I have reviewed this report and certify that the information provided is complete and accurate to the best of my knowledge.		
PWS Mgr./Owner Name[2]: John Roth		Title: Water System Manager
Signature:	Op. Cert. No.: 10060	Date: 02/28/2012

[1] CCC Program Manager is generally the CCS who is responsible for development and implementation of the PWS's CCC Program.

[2] The person that the CCC Program Manager reports to or other manager having direct responsibility and/or oversight of the CCC program.

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2019 CROSS-CONNECTION CONTROL PROGRAM ANNUAL SUMMARY REPORT

ASR Feedback Report

Report Run Date: 03/27/2019

The ASR Feedback report card has been created to help utilities and Department of Health staff evaluate the effectiveness of Cross-Connection Control program efforts.

PWS ID: 934000

PWS Name: WASHOUGAL, CITY OF

PWS Manager Name: Ryan Baker

Email: ryan.baker@cityofwashougal.us

CCS Manager Name: Travis Davis

Certification Number: 11699

Email: tdavis@ci.washougal.wa.us

Phone: 360-835-2662 ext- 216

Status of Written CCC Program

Reporting Year	Year Last Updated	Percentage of Elements in the Written Program	Percentage of Elements Implemented
2018	06/04/2012	100%	100%
2017	06/04/2012	100%	100%
2016	06/04/2012	100%	100%
2015	06/04/2012	100%	100%
2014	NULL	100%	100%

PWS's are expected to have complete written programs and full implementation (WAC 246-290-490(3)). Written CCC Program must be updated at least every 10 years.

CCC for Severe Health Hazard Facilities

Reporting Year	Number Served	Protected	Unprotected	Percent Protected
2018	1	1	0	100%
2017	1	1	0	100%
2016	1	1	0	100%
2015	1	1	0	100%

PWS's are expected to have 100% protection of Severe Health Hazard Premises (WAC 246-290-490(4)).

CCC for High-Hazard Premises

Reporting Year	Number Served	Protected by AG or RP	Exceptions Granted	Unprotected	Percent Protected
2018	43	43	0	0	100%
2017	42	42	0	0	100%
2016	42	42	0	0	100%
2015	42	42	0	0	100%
2014	40	40	0	0	100%

PWS's are expected to have 100% protection of High Hazard Premises (WAC 246-290-490(4)).

Backflow Preventer Inspection and Testing Data

Reporting Year	Number of Assemblies	Assemblies Tested	Percentage Tested and Inspected
2018	1415	1221	86%
2017	1371	1307	95%
2016	1364	1298	95%
2015	1318	1168	88%
2014	1277	1200	93%

Inspection and testing of backflow assemblies, air gaps, and AVB's is vital for proper operation and protection (WAC 246-290-490(7)). Public Health performance goal is 100% testing.

Hazard Surveys

Reporting Year	Number of Connections	On-Site Surveys	Questionnaires	Percentage of Connections Evaluated
2018	5579	68	25	1%
2017	5552	43	43	1%
2016	5460	103	87	1%
2015	5480	58	0	1%
2014	5300	70	0	1%

Periodic hazard evaluations are vital to ensure backflow protection is commensurate to the degree of hazard (WAC 246-290-490(3)(c)). Hazard survey frequency is specified in the CCC Program.

Backflow Incidents, Risk Factors, and Indicators

Reporting Year	Backflow Incidents	Main Breaks / 100 Miles	Low-Pressure Events	Water Outages
2018	0	8.00	0	0
2017	0	28.00	0	0
2016	0	6.00	0	0
2015	0	2.00	0	0
2014	0	0.31	0	0

Increased frequency of backflow incidents, risk factors, and indicators may determine changes in maintenance practices or operational strategies.

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APPENDIX O
FUNDING PROGRAM SUMMARY

Funding Programs for Drinking Water and Wastewater Projects

Updated 5-10-21

Type of Program	Pages
Planning/ Pre-Construction	2 - 5
Pre-Construction Only	6 - 7
Construction	8 - 12
Emergency	13 - 14

You can find the latest version of this document at http://www.infrafunding.wa.gov/resources.html

Please contact Cathi Read at cathi.read@commerce.wa.gov if you would like to update your program information

PLANNING **Programs**	**Eligible Projects**	**Eligible Applicants**	**Funding Available**	**How To Apply**
CDBG Community Development Block Grant – General Purpose Grant Fund – Planning-Only Activities	• Comprehensive plans • Non-routine infrastructure plans • Feasibility studies • Community action plans • Low-income housing assessments	Projects must principally benefit low- to moderate-income people in non-entitlement cities and counties. • Cities or towns with fewer than 50,000 people • Counties with fewer than 200,000 people	Grant • Up to $30,000 for a single jurisdiction.	2021 CDBG General Purpose application materials are due June 2, 2021. Grant awards early September. **Contact:** Jon Galow 509-847-5021 jon.galow@commerce.wa.gov Visit www.commerce.wa.gov/cdbg and click on the General Purpose grant menu for information and forms.
SOURCE WATER PROTECTION GRANT PROGRAM	Source water protection studies (watershed, hydrogeologic, feasibility studies). Eligible activities can lead to reducing the risk of contamination of a system's drinking water sources(s), or they can evaluate or build resiliency for a public water supply. They must contribute to better protecting one or more public water supply sources.	Non-profit Group A water systems. Local governments proposing a regional project. Project must be reasonably expected to provide long-term benefit to drinking water quality or quantity.	Grants • Funding is dependent upon project needs, but typically does not exceed $30,000.	Applications accepted anytime; grants awarded on a funds available basis. **Contact:** Corina Hayes Source Water Protection Program Manager 360-236-3114 corina.hayes@doh.wa.gov http://www.doh.wa.gov/CommunityandEnvironment/DrinkingWater/SourceWater/SourceWaterProtection.aspx Grant guidelines https://www.doh.wa.gov/Portals/1/Documents/Pubs/331-552.pdf

PLANNING **Programs**	**Eligible Projects**	**Eligible Applicants**	**Funding Available**	**How To Apply**
ECOLOGY: INTEGRATED WATER QUALITY FUNDING PROGRAM State Water Pollution Control Revolving Fund (SRF) Centennial Clean Water Fund	Planning projects associated with publicly-owned wastewater and stormwater facilities. The integrated program also funds planning and implementation of nonpoint source pollution control activities.	Counties, cities, towns, conservation districts, or other political subdivision, municipal or quasi-municipal corporations, and tribes	Loan: $7,500,000 reserved for preconstruction statewide Interest rates (SFY 2022) • 6-20 year loans: 1.2% • 1-5 year loans: 0.6% Preconstruction set-aside (Distressed Communities) 50% forgivable principal loan and 50% loan	Applications due October 12, 2021. **Contact:** David Dunn 360-407-6503 david.dunn@ecy.wa.gov https://ecology.wa.gov/About-us/How-we-operate/Grants-loans/Find-a-grant-or-loan/Water-Quality-grants-and-loans
RD PRE-DEVELOPMENT PLANNING GRANTS (PPG) U.S. Dept. of Agriculture Rural Development – Rural Utilities Service – Water and Waste Disposal Direct Loans and Grants	Water and/or sewer planning; environmental work; and other work to assist in developing an application for infrastructure improvements.	Low-income, small communities and systems serving areas under 10,000 population.	Planning grant to assist in paying costs associated with developing a complete application for RD funding for a proposed project. Maximum $30,000 grant. Requires minimum 25% match.	Applications accepted year-round, on a fund-available basis. **Contact:** Janice Roderick 360-704-7739 janice.roderick@usda.gov http://www.rd.usda.gov/wa
RD 'SEARCH' GRANTS: SPECIAL EVALUATION ASSISTANCE FOR RURAL COMMUNITIES U.S. Dept. of Agriculture Rural Development – Rural Utilities Service – Water and Waste Disposal Direct Loans and Grants	Water and/or sewer planning; environmental work; and other work to assist in developing an application for infrastructure improvements.	Low-income, small communities and systems serving areas under 2,500 population.	Maximum $30,000 grant. No match required.	Applications accepted year-round, on a fund-available basis. **Contact:** Janice Roderick 360-704-7739 janice.roderick@usda.gov http://www.rd.usda.gov/wa

PLANNING **Programs**	**Eligible Projects**	**Eligible Applicants**	**Funding Available**	**How To Apply**
CERB PLANNING AND FEASIBILITY GRANTS Community Economic Revitalization Board – Project-Specific Planning Program	Project-specific feasibility and pre-development studies that advance community economic development goals for industrial sector business development.	Eligible statewide • Counties, cities, towns, port districts, special districts. • Federally recognized tribes • Municipal corporations, quasi-municipal corporations w/ economic development purposes.	Grant • Up to $50,000 per application. • Requires 25% (of total project cost) matching funds.	Applications accepted year-round. The Board meets six times a year. **Contact:** Janea Delk 360-725-3151 janea.delk@commerce.wa.gov
RCAC Rural Community Assistance Corporation Feasibility and Pre-Development Loans	Water, wastewater, stormwater, and solid waste planning; environmental work; and other work to assist in developing an application for infrastructure improvements.	Non-profit organizations, public agencies, tribes, and low-income rural communities with a 50,000 population or less, or 10,000 or less if proposed permanent financing is through USDA Rural Development.	• Typically up to $50,000 for feasibility loan. • Typically up to $350,000 for pre-development loan. • Typically up to a 1-year term. • 5% interest rate. • 1% loan fee.	Applications accepted anytime. **Contact**: Michael Archer 406-593-0065 marcher@rcac.org Applications available online at http://www.rcac.org/lending/environmental-loans/
DWSRF Drinking Water State Revolving Fund Preconstruction Loans	Preparation of planning documents, engineering reports, construction documents, permits, cultural reports, environmental reports.	Group A (private and publicly-owned) community and not-for-profit non-community water systems, but not federal or state-owned systems.	• $500,000 maximum per jurisdiction • 0% annual interest rate • 2% loan origination fee • 2-year time of performance • 10-year repayment period	On-line applications accepted year-round until funding exhausted. Approximately $3 million available to award each year. **Contact:** Janet Cherry 360-236-3153 Janet.cherry@doh.wa.gov For information and forms visit: http://www.doh.wa.gov/DWSRF

PLANNING **Programs**	**Eligible Projects**	**Eligible Applicants**	**Funding Available**	**How To Apply**

Economic Development Administration (EDA)
United States Department of Commerce
 	
EDA Public Works Program:
Planning, Feasibility Studies, Preliminary Engineering Reports, Environmental Consultation for distressed and disaster communities.
	Drinking water infrastructure; including pre-distribution conveyance, withdrawal/harvest (i.e. well extraction), storage facilities, treatment and distribution.
	
	Waste water infrastructure; including conveyance, treatment facilities, discharge infrastructure and water recycling.
		Municipalities, counties, cities, towns, states, not-for-profit organizations, ports, tribal nations.	Grants:
			• EDA investment share up to $1M.
			• Cost sharing required from applicant **up to** 50% of total project cost.
			• Grants w/ cost sharing:
			  ○ 50%/50% to 80%/20%
			  ○ Up to 100% for Tribal Nations
				Information:
				EDA.gov
				
				Contact:
				Laura Ives
				206-200-1951
				lives@eda.gov
				
				Apply at:
				grants.gov

PRECONSTRUCTION ONLY **Programs**	**Eligible Projects**	**Eligible Applicants**	**Funding Available**	**How To Apply**
ECOLOGY: INTEGRATED WATER QUALITY FUNDING PROGRAM State Water Pollution Control Revolving Fund (SRF) Centennial Clean Water Fund Stormwater Financial Assistance Program (SFAP)	Design projects associated with publicly-owned wastewater and stormwater facilities. The integrated program also funds planning and implementation of nonpoint source pollution control activities.	Counties, cities, towns, conservation districts, or other political subdivision, municipal or quasi-municipal corporations, and tribes.	Loan: $7,500,000 reserved for preconstruction statewide Interest rates (SFY 2022) • 6-20 year loans: 1.2% • 1-5 year loans: 0.6% Preconstruction set-aside (Distressed Communities) 50% forgivable principal loan and 50% loan	Applications due October 12, 2021. A cost effectiveness analysis must be complete at the time of application. **Contact:** David Dunn 360-407-6503 david.dunn@ecy.wa.gov https://ecology.wa.gov/About-us/How-we-operate/Grants-loans/Find-a-grant-or-loan/Water-Quality-grants-and-loans
PWB PRE-CON Public Works Board Pre-Construction Program	Low-interest loans to fund pre-construction activities that prepare a specific project for construction. Water, sanitary sewer, stormwater, roads, streets, bridges, solid waste, and recycling facilities.	Counties, cities, special purpose districts, and quasi-municipal organizations that meet certain requirements. School districts and port districts are not eligible.	• Approximately $10 million available for preconstruction • Maximum loan amount $1 million per jurisdiction per biennium. • 5-year loan term. • Interest rates vary. • Pre-construction work must be completed within 2 years.	Check the Public Works Board website periodically at http://www.pwb.wa.gov to obtain the latest information on program details or to contact Public Works Board staff. **Contact:** Connie Rivera 360-704-9535 connie.rivera@commerce.wa.gov

PRECONSTRUCTION ONLY **Programs**	**Eligible Projects**	**Eligible Applicants**	**Funding Available**	**How To Apply**
RCAC Rural Community Assistance Corporation Feasibility and Pre-Development Loans	Water, wastewater, stormwater, or solid waste planning; environmental work; and other work to assist in developing an application for infrastructure improvements.	Non-profit organizations, public agencies, tribes, and low-income rural communities with a 50,000 population or less, or 10,000 or less if proposed permanent financing is through USDA Rural Development.	• Typically up to $50,000 for feasibility loan. • Typically up to $350,000 for pre-development loan. • Typically a 1-year term. • 5% interest rate. • 1% loan fee.	Applications accepted anytime. **Contact**: Michael Archer 406-593-0065 marcher@rcac.org Applications available online at http://www.rcac.org/lending/environmental-loans/

Economic Development Administration (EDA)
United States Department of Commerce
 	
EDA Public Works Program:
Design and/or Construction
for distressed and disaster communities.
	Drinking water infrastructure; including pre-distribution conveyance, withdrawal/harvest (i.e. well extraction), storage facilities, treatment and distribution.
	
	Waste water infrastructure; including conveyance, treatment facilities, discharge infrastructure and water recycling.
		Municipalities, counties, cities, towns, states, not-for-profit organizations, ports, tribal nations.	Grants:
			• EDA investment share up to $10M.
			• Cost sharing required from applicant **up to** 50% of total project cost.
			• Grants w/ cost sharing:
			  ○ 50%/50% to 80%/20%
			  ○ Up to 100% for Tribal Nations
				Information:
				EDA.gov
				
				Contact:
				Laura Ives
				206-200-1951
				lives@eda.gov
				
				Apply at:
				grants.gov

CONSTRUCTION AND DESIGN/CONSTRUCTION Programs	**Eligible Projects**	**Eligible Applicants**	**Funding Available**	**How To Apply**
CDBG-GP Community Development Block Grant General Purpose Grants	• Final design and construction of wastewater, drinking water, side connections, stormwater, streets, and community facility projects. • Infrastructure in support of economic development or affordable housing. • Planning activities	Projects must principally benefit low- to moderate-income people in non-entitlement cities and counties. • Cities or towns with fewer than 50,000 people • Counties with fewer than 200,000 people	Maximum grant amounts: • $900,000 for construction and acquisition projects. • $500,000 for local housing rehabilitation programs. • $250,000 for local microenterprise assistance programs. • $30,000 for planning-only activities.	2021 CDBG General Purpose application materials are due June 2, 2021. Grant awards early September. **Contact:** Jacquie Andresen 360-688-0822 Jacquie.andresen@commerce.wa.gov Visit www.commerce.wa.gov/cdbg and click on the General Purpose Grants menu for information and forms.
PWB Public Works Board Construction Program	New construction, replacement, and repair of existing infrastructure for stormwater, solid waste, recycling, road or bridge projects.	• Counties, cities, special purpose districts, and quasi-municipal organizations. • No school districts, port districts, or tribes per statute.	• Approximately $114 million available for construction projects. • Maximum loan amount $10 million per jurisdiction per biennium. • 20-year loan term. • Interest rates vary. • Construction must be completed within 5 years.	Applications are due July 9, 2021. Awards announced in August 2021. **Contact:** Connie Rivera 360-704-9535 connie.rivera@commerce.wa.gov Please visit: http://www.pwb.wa.gov

CONSTRUCTION AND DESIGN/CONSTRUCTION Programs	**Eligible Projects**	**Eligible Applicants**	**Funding Available**	**How To Apply**
DWSRF Drinking Water State Revolving Fund Construction Loan Program	Drinking water system infrastructure projects aimed at increasing public health protection. There is a limited amount of principal forgiveness for communities with high affordability index numbers and water system restructuring/ consolidation projects.	Group A (private and publicly-owned) community and not-for-profit non-community water systems, but not federal or state-owned systems. Tribal systems are eligible provided the project is not receiving other national set-aside funding for the project.	Loan • 1.0% loan fee (water systems receiving subsidy are not subject to loan fees). • $5 million maximum per jurisdiction. • 1.25 – 1.75% interest rate. • Loan repayment period: 20 years or life of the project, whichever is less. • No local match required. • $50 million expected to be available this cycle.	Online applications available and accepted October 1 through November 30, 2021. NOTE: The timeframe for applications may be modified to coincide with infrastructure stimulus funding. Check the DWSRF webpage for updates. **Contact:** Janet Cherry 360-236-3153 janet.cherry@doh.wa.gov For information and forms visit: http://www.doh.wa.gov/DWSRF
ECOLOGY: INTEGRATED WATER QUALITY FUNDING PROGRAM State Water Pollution Control Revolving Fund (SRF) Centennial Clean Water Fund Stormwater Financial Assistance Program (SFAP)	Construction projects associated with publicly-owned wastewater and stormwater facilities. The integrated program also funds planning and implementation of nonpoint source pollution control activities.	Counties, cities, towns, conservation districts, or other political subdivision, municipal or quasi-municipal corporations, and tribes. Hardship Assistance Jurisdictions listed above with a population of 25,000 or less.	Loan: $150,000,000 available statewide. Interest rates (SFY 2022) • 21-30 year loans: 1.6% • 6-20 year loans: 1.2% • 1-5 year loans: 0.6% Hardship assistance for the construction of wastewater treatment facilities may be available in the form of a reduced interest rate, and up to $5,000,000 grant or loan forgiveness. Stormwater grant maximum award per jurisdiction: $5,000,000, with a required 25% match.	Applications due October 12, 2021. A cost effectiveness analysis must be complete at the time of application. **Contact:** David Dunn 360-407-6503 david.dunn@ecy.wa.gov https://ecology.wa.gov/About-us/How-we-operate/Grants-loans/Find-a-grant-or-loan/Water-Quality-grants-and-loans

CONSTRUCTION AND DESIGN/CONSTRUCTION Programs	**Eligible Projects**	**Eligible Applicants**	**Funding Available**	**How To Apply**
RD U.S. Dept. of Agriculture Rural Development - Rural Utilities Service Water and Waste Disposal Direct Loans and Grants	Pre-construction and construction associated with building, repairing, or improving drinking water, wastewater, solid waste, and stormwater facilities.	• Cities, towns, and other public bodies, tribes and private non-profit corporations serving rural areas with populations under 10,000.	Loans; Grants in some cases • Interest rates change quarterly; contact staff for latest interest rates. • Up to 40-year loan term. • No pre-payment penalty.	Applications accepted year-round on a fund-available basis. **Contact:** Janice Roderick 360-704-7739 janice.roderick@usda.gov http://www.rd.usda.gov/wa
CERB Community Economic Revitalization Board Construction Program	Public facility projects required by private sector expansion and job creation. Projects must support significant job creation or significant private investment in the state. • Bridges, roads and railroad spurs, domestic and industrial water, sanitary and storm sewers. • Electricity, natural gas and telecommunications • General purpose industrial buildings, port facilities. • Acquisition, construction, repair, reconstruction, replacement, rehabilitation	• Counties, cities, towns, port districts, special districts • Federally-recognized tribes • Municipal and quasi-municipal corporations with economic development purposes.	Loans; grants in unique cases • Projects without a committed private partner allowed for in rural areas. • $3 million maximum per project, per policy. • Interest rates: 1-3% Based on Debt Service Coverage Ratio (DSCR), Distressed County, and length of loan term. • 20-year maximum loan term • Match for committed private partners: 20% (of total project cost). • Match for prospective partners: 50% (of total project cost). • Applicants must demonstrate gap in public project funding and need for CERB assistance. • CERB is authority for funding approvals.	Applications accepted year-round. The Board meets six times a year. **Contact:** Janea Delk 360-725-3151 janea.delk@commerce.wa.gov
RCAC Rural Community Assistance Corporation Intermediate Term Loan	Water, wastewater, solid waste and stormwater facilities that primarily serve low-income rural communities.	Non-profit organizations, public agencies, tribes, and low-income rural communities with a 50,000 population or less.	• For smaller capital needs, normally not to exceed $100,000. • Typically up to a 20-year term • 5% interest rate • 1% – 1.125% loan fee	Applications accepted anytime. **Contact**: Michael Archer 406-593-0065 marcher@rcac.org Applications available online at http://www.rcac.org/lending/environmental-loans/

CONSTRUCTION AND DESIGN/CONSTRUCTION Programs	**Eligible Projects**	**Eligible Applicants**	**Funding Available**	**How To Apply**
RCAC Rural Community Assistance Corporation Construction Loans	Water, wastewater, solid waste and stormwater facilities that primarily serve low-income rural communities. Can include pre-development costs.	Non-profit organizations, public agencies, tribes, and low-income rural communities with a 50,000 population or less, or 10,000 populations or less if using USDA Rural Development financing as the takeout.	• Typically up to $3 million with commitment letter for permanent financing • Security in permanent loan letter of conditions • Term matches construction period. • 5% interest rate • 1.125% loan fee	Applications accepted anytime. **Contact**: Michael Archer 406-593-0065 marcher@rcac.org Applications available online at http://www.rcac.org/lending/environmental-loans/
RURAL WATER REVOLVING LOAN FUND	Short-term costs incurred for replacement equipment, small scale extension of services, or other small capital projects that are not a part of regular operations and maintenance for drinking water and wastewater projects.	Public entities, including municipalities, counties, special purpose districts, Native American Tribes, and corporations not operated for profit, including cooperatives, with up to 10,000 population and rural areas with no population limits.	• Loan amounts may not exceed $100,000 or 75% of the total project cost, whichever is less. Applicants will be given credit for documented project costs prior to receiving the RLF loan. • Interest rates at the lower of the poverty or market interest rate as published by USDA RD RUS, with a minimum of 3% at the time of closing. • Maximum repayment period is 10 years. Additional ranking points for a shorter repayment period. The repayment period cannot exceed the useful life of the facilities or financed item.	Applications accepted anytime. **Contact**: Tracey Hunter Evergreen Rural Water of WA 360-462-9287 thunter@erwow.org Download application online: http://nrwa.org/initiatives/revolving-loan-fund/

Economic Development Administration (EDA)
United States Department of Commerce
 	
EDA Public Works Program:
Design and/or Construction for distressed and disaster communities.
	Drinking water infrastructure; including pre-distribution conveyance, withdrawal/ harvest (i.e. well extraction), storage facilities, treatment and distribution.
	
	Waste water infrastructure; including conveyance, treatment facilities, discharge infrastructure and water recycling.
		Municipalities, counties, cities, towns, states, not-for-profit organizations, ports, tribal nations.	Grants:
			• EDA investment share up to $10M.
			• Cost sharing required from applicant **up to** 50% of total project cost.
			• Grants w/ cost sharing:
			  ○ 50%/50% to 80%/20%
			  ○ Up to 100% for Tribal Nations
				Information:
				EDA.gov
				
				Contact:
				Laura Ives
				206-200-1951
				lives@eda.gov
				
				Apply at:
				grants.gov

CONSTRUCTION AND DESIGN/CONSTRUCTION Programs	**Eligible Projects**	**Eligible Applicants**	**Funding Available**	**How To Apply**
Energy Retrofits for Public Buildings Program: Energy Efficiency Grant *(formerly Energy Efficiency & Solar)* Washington State Department of Commerce	Retrofit projects that reduce energy consumption (electricity, gas, water, etc.) and operational costs on existing facilities and related projects owned by an eligible applicant. Projects must utilize devices that do not require fossil fuels whenever possible.	• Washington State public entities, such as local agencies, public higher education institutions, school districts, federally recognized tribal governments, and state agencies. • Some percentage of funds are reserved for projects in small towns or cities with populations of 5,000 or less. • Priority will be given to applicants who have not received funding previously, and to school districts demonstrating positive heal outcomes for reductions of PCBs.	2021: Funds available to be determined. • Maximum grant: $500,000 • Minimum match requirements will apply. • Other State funds cannot be used as match. • Application schedule to be determined.	**Contact:** Kristen Kalbrener 360-515-8112 EEandS@commerce.wa.gov Visit https://www.commerce.wa.gov/growing-the-economy/energy/energy-efficiency-and-solar-grants/ for more information.
Energy Retrofits for Public Buildings: Solar Grants *(formerly Energy Efficiency & Solar)* Washington State Department of Commerce	Purchase and installation of grid-tied solar photovoltaic (electric) arrays net metered with existing facilities owned by public entities. Additional points for 'Made in Washington' components.	• Washington State public entities, such as local agencies, public higher education institutions, school districts, federally recognized tribal governments, and state agencies. • Minimum payback period of 50 years. Priority will be given to applicants who have not received funding previously.	2021: $3,465,810 • Maximum amount per awardee: $350,000 • Minimum match requirements will apply. • Application scheduled to open in June 2021.	**Contact:** Jill Eikenhorst 360-522-0000 EEandS@commerce.wa.gov Visit https://www.commerce.wa.gov/growing-the-economy/energy/energy-efficiency-and-solar-grants/ for more information.

EMERGENCY **Programs**	**Eligible Projects**	**Eligible Applicants**	**Funding Available**	**How To Apply**
RD – ECWAG U.S. Dept. of Agriculture Rural Development Emergency Community Water Assistance Grants	Domestic water projects needing emergency repairs due to an incident such as: a drought; earthquake; flood; chemical spill; fire; etc. A significant decline in quantity or quality of potable water supply that was caused by an emergency.	Public bodies, tribes and private non-profit corporations serving rural areas with populations under 10,000.	Grant; pending availability of funds • $150,000 limit for incident related emergency repairs to an existing water system. • $500,000 limit to alleviate a significant decline in potable water supply caused by an emergency.	Applications accepted year-round on a fund-available basis. **Contact:** Janice Roderick 360-704-7739 janice.roderick@usda.gov http://www.rd.usda.gov/wa
DWSRF Department of Health – Drinking Water State Revolving Fund Emergency Loan Program	Will financially assist eligible communities experiencing the loss of critical drinking water services or facilities due to an emergency.	• Publicly or privately owned (not-for-profit) Group A community water systems with a population of fewer than 10,000. • Transient or non-transient non-community public water systems owned by a non-profit organization. Non-profit non-community water systems must submit tax-exempt documentation. • Tribal systems are eligible provided the project is not receiving other national set-aside funding for the project.	Loan • Interest rate: 0%, no subsidy available • Loan fee: 1.5% • Loan term: 10 years • $500,000 maximum award per jurisdiction. • Time of performance: 2 years from contract execution to project completion date. • Repayment commencing first October after contract execution.	To be considered for an emergency loan, an applicant must submit a completed emergency application package to the department. **Contacts:** Department of Health Regional Engineers or Janet Cherry 360-236-3153 Janet.cherry@doh.wa.gov For information and forms visit: http://www.doh.wa.gov/DWSRF
PWB Public Works Board Emergency Loan Program: Repair, replace, rehabilitate, or reconstruct eligible systems to current standards for existing users.	A public works project made necessary by a natural disaster, or an immediate and emergent threat to the public health and safety due to unforeseen or unavoidable circumstances. Demonstrate financial need through inadequate local budget resources.	Counties, cities, special purpose districts, and quasi-municipal organizations. No school districts, port districts, or tribes per statute. Water, sanitary sewer, storm water, roads, streets, bridges, solid waste, and recycling facilities.	• Approximately $5 million for emergency loan funding. • Maximum loan amount $1 million per jurisdiction per biennium. • 20-year loan term or life of the improvement, whichever is less. • Interest rates vary. • Application cycle is open until appropriated funds are exhausted.	Check the Public Works Board website periodically at: http://www.pwb.wa.gov to obtain the latest information on program details or to contact Public Works Board staff. **Contact:** Connie Rivera 360-704-9535 connie.rivera@commerce.wa.gov

EMERGENCY **Programs**	**Eligible Projects**	**Eligible Applicants**	**Funding Available**	**How To Apply**
ECOLOGY – Clean Water State Revolving Fund Emergency Funding Program	Water quality-related projects that meet the definition of "environmental emergency" in WAC 173-98-030(27) and have received a Declaration of Emergency from the local government. Eligible projects may result from a natural disaster or an immediate and emergent threat to public health due to water quality issues resulting from unforeseen or unavoidable circumstances.	Counties, cities, towns, federally-recognized tribes, and special purpose districts serving a population of 10,000 or less.	Loan • 10-year loan term or the life of the project, whichever is less. • 0.0% interest rate. • $5,000,000 maximum total per year. • $500,000 maximum per jurisdiction per year. • 2 years to complete project after loan execution. • Repayment begins 1 year after completion.	Applications accepted any time. **Contact:** Daniel Thompson 360-407-6510 daniel.thompson@ecy.wa.gov Funding Guidelines and Applicant Prep Tool: https://apps.ecology.wa.gov/publications/documents/2010042.pdf
HAZARD MITIGATION GRANT PROGRAM FEMA/WA Emergency Management Division	Disaster risk-reduction projects and planning after a disaster declaration in the state.	Any state, tribe, county, or local jurisdiction (incl., special purpose districts) that has a current FEMA-approved hazard mitigation plan.	Varies depending on the level of disaster, but projects only need to compete at the state level. Local jurisdiction cost-share: 12.5%	Applications will be opened after a disaster declaration. **Contact**: Tim Cook State Hazard Mitigation Officer 253-512-7072 Tim.cook@mil.wa.gov
PUBLIC ASSISTANCE PROGRAM FEMA/WA Emergency Management Division	Construction, repair to, and restoration of publicly owned facilities damaged during a disaster. Debris-removal, life-saving measures, and restoration of public infrastructure.	State, tribes, counties, and local jurisdictions directly affected by the disaster.	Varies depending on the level of disaster and total damage caused.	Applications are opened after disaster declaration. **Contact:** Gary Urbas Public Assistance Project Manager 253-512-7402 Gary.urbas@mil.wa.gov
RURAL WATER REVOLVING LOAN FUND Disaster area emergency loans	Contact staff for more information on emergency loans.	Public entities, including municipalities, counties, special purpose districts, Native American Tribes, and corporations not operated for profit, including cooperatives, with up to 10,000 population and rural areas with no population limits.	90-day, no interest, disaster area emergency loans with immediate turn-around. Download application online: http://nrwa.org/initiatives/revolving-loan-fund/	Applications accepted anytime. **Contact**: Tracey Hunter Evergreen Rural Water of WA 360-462-9287 thunter@erwow.org

murraysmith

APPENDIX P
WATER SYSTEM PLAN INFORMATIONAL MEETING AND APPROVAL RESOLUTION

To be Included in Final Document

murraysmith

APPENDIX Q
SEPA CHECKLIST AND DNS

SEPA ENVIRONMENTAL CHECKLIST

Purpose of checklist:

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for Lead Agencies:

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals:

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

A. Background [HELP]

1. Name of proposed project, if applicable: **2019 Water System Plan Update**

2. Name of applicant: **City of Washougal Public Works Department**

3. Address and phone number of applicant and contact person:

Applicant Contact:	Mitch Kneipp
Position/Title:	Community Development Director
Address:	1701 “C” Street, Washougal, WA 98671
Phone:	(360) 835-8501

4. Date checklist prepared: **January 29, 2021**

5. Agency requesting checklist: **City of Washougal, WA**

6. Proposed timing or schedule (including phasing, if applicable):
Development of the Water System Plan Update occurred between 2019 and early 2021.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.
The Water System Plan Update includes a 10-year and 20-year Capital Improvement Program (CIP). Projects in the CIP are anticipated to be implemented as need and available financing warrant.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.
None.

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.
This Water System Plan Update was concurrently submitted to the Washington State Department of Health (DOH) Drinking Water Program fro review and approval.

10. List any government approvals or permits that will be needed for your proposal, if known.
Approval of this Water System Plan Update by DOH is required prior to adoption by the City. Local agency approval and permits will be obtained for any CIP projects implemented based on the recommendations in this Plan.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

- **Chapter 1 – provides water system history and summary of existing facilities.**
- **Chapter 2 – presents planning data and water demand projections used to estimate future water use.**
- **Chapter 3 – develops system analysis criteria and presents analysis of existing water system facilities including pressure zones, storage, pump stations, water supply, and distribution piping based on this criteria and estimated water demands.**
- **Chapter 4 – outlines the City’s water use efficiency program including conservation efforts and water use reduction goals.**
- **Chapter 5 – provides a summary of the wellhead protection areas for the City’s well sources and identifies potential contaminants located within the time-of-**

travel zones for each well. Also provides a summary of current and anticipated water quality regulations.

- **Chapter 6 – provides an update to the City's current Operations and Maintenance program, including management and personnel, routine operating procedures and preventive maintenance, the water quality monitoring program, and the cross-connection control program.**
- **Chapter 7 – provides a summary of the City's current design and construction standards.**
- **Chapter 8 – develops and summarizes the CIP for the water system plan, including recommended projects and planning level opinions of probable project cost.**
- **Chapter 9 – presents a financial analysis including water rate and system development charge (SDC) evaluation.**
- **Appendices – includes water rights information, City Operations and Maintenance program information, wellhead protection assessment, a summary of methodolgoies for developing opinions of probable project costs for the CIP, and local service agreements and rate policies.**

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.
This Plan pertains to the City's Urban Growth Area (UGA) in Clark County between the City of Camas and the Columbia River Gorge National Scenic Area (CRGNSA). See Figure 1-1 in the Plan document for a vicinity map.

B. Environmental Elements [HELP]

SECTION EXCLUDED

C. Signature [HELP]

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: _____

Name of signee _____

Position and Agency/Organization _____

Date Submitted: _____

D. Supplemental sheet for nonproject actions [HELP]

(**IT IS NOT NECESSARY** to use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

Temporary construction impacts for identified CIP projects will be evaluated on a project specific basis.

Proposed measures to avoid or reduce such increases are:

Construction management best practices.

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

No impact is expected as a result of this Water System Plan Update.

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

3. How would the proposal be likely to deplete energy or natural resources?

No anticipated depletion of resources as a result of this Water System Plan Update.

Proposed measures to protect or conserve energy and natural resources are:

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Construction of identified CIP projects has the potential to damage wetlands or flodplains; however, construction will generally occur adjacent to existing roadways in urbanized areas.

Proposed measures to protect such resources or to avoid or reduce impacts are:

Project site selection will be evaluated to minimize disturbance in sensitive areas and construction management best practices.

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Proposed projects in the CIP are consistent with existing land use plans.

Proposed measures to avoid or reduce shoreline and land use impacts are:

Does not apply.

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

No increased transportation or public service demand anticipated. Utility needs to be determined on a project specific basis.

Proposed measures to reduce or respond to such demand(s) are:

Does not apply

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

The Water System Plan Update does not knowingly conflict with any local, state, or federal law.