City of Port Orchard

2020 Water System Plan

October 2021

Port ORCHARD

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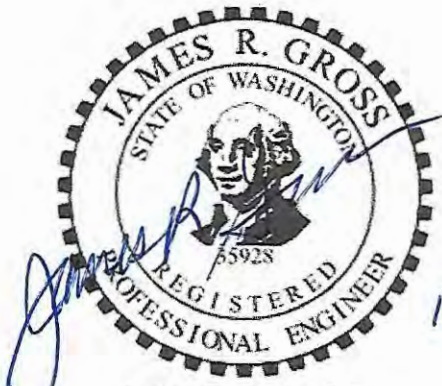
ACKNOWLEDGEMENTS

The Water System Plan was developed under the direct supervision of Jim Gross, P.E. of BHC Consultants, LLC.



10/21/2024

James R. Gross, P.E.
Project Manager

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List of Abbreviations

AC	Asbestos Cement
AFY	Acre-Feet/Year
ANSI	American National Standards Institute
APWA	American Public Works Association
ASTM	ASTM International
AWIA	America's Water Infrastructure Act
AWWA	American Water Works Association
BHC	BHC Consultants, LLC
BPS	Booster Pump Station
CCCP	Cross Connection Control Program
CCR	Consumer Confidence Report
CCS	Cross Connection Specialist
CEMP	Comprehensive Emergency Management Plan
CERB	Community Economic Revitalization Board
cf	Cubic Feet
CI	Cast Iron
CIP	Capital Improvement Plan
City	City of Port Orchard
CMU	Concrete Masonry Unit
COP	Copper
COPO	City of Port Orchard
County	Kitsap County
CWSP	Coordinated Water System Plan
DBP	Disinfection By Products
DI	Ductile Iron
DOH	Department of Health
DSL	Distribution System Leakage
DWSRF	Drinking Water State Revolving Fund Program
Ecology	Department of Ecology
EDR	Environmental Data Resources, Inc.
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
ERU	Equivalent Residential Unit
fps	Feet per Second
FSS	Fire Flow Storage
ft	Feet
GMA	Growth Management Act
gpd	Gallons per Day
gpm	Gallons per Minute

HDD	Horizontal Directional Drilling
HDPE	High-Density Polyethylene
HET	High Efficiency Toilet
HGL	Hydraulic Grade Line
IACC	Infrastructure Assistance Coordinating Council
LID	Local Improvement District
MCL	Maximum Contaminant Level
MDD	Maximum Daily Demand
MG	Million Gallons
MHI	Median Household Income
MRDL	Maximum Residual Disinfectant Level
MWWC	McCormick Woods Water Company
O&M	Operations and Maintenance
OFM	Office of Financial Management
Plan	Water System Plan
Plant	Wastewater Treatment Plant
PRV	Pressure Reducing Valve
psi	Pounds per Square Inch
PSRC	Puget Sound Regional Council
PUD	Planned Unit Development
PUD	Public Utility District
PVC	Polyvinyl Chloride
PWSCA	Public Water System Coordination Act
QA/QC	Quality Assurance/Quality Control
RCW	Revised Code of Washington
RRA	Risk and Resilience Assessment
SDWA	Safe Drinking Water Act
SEPA	State Environmental Policy Act
SKFR	South Kitsap Fire and Rescue
SOC	Synthetic Organic Chemicals
UGA	Urban Growth Area or Urban Growth Boundary
ULID	Utility Local Improvement District
UPC	Uniform Plumbing Code
USDA-DR	US Department of Agriculture-Rural Development
USEDA	Economic Development Administration
VOC	Volatile Organic Chemicals
WA-WARN	Washington State Water/Wastewater Agency Response Network
WAC	Washington Administrative Code
WDM	Water Distribution Manager
WHPP	Wellhead Protection Plan
WRIA	Water Resource Inventory Area

WSDOT	Washington State Department of Transportation
WTPO	Water Treatment Plant Operator
WUE	Water Use Efficiency

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Chapter 1 Description of Water System

1.1 Ownership and Management

The City of Port Orchard (City) is located on the Kitsap Peninsula of Washington State. The City's water system is managed and maintained by the City of Port Orchard Public Works Department under the supervision of the Public Works Supervisor. The City provides water and sewer service to most Port Orchard residences and businesses, including the McCormick Woods community. The Port Orchard City limits overlap with the West Sound Utility District, which provides services to areas within Port Orchard.

The City's water system consists of two separate municipal water systems, both owned and operated by the City of Port Orchard. The City System serves most of the area within City limits, and the McCormick Woods System serves the McCormick Woods area in the western portion of the City. As of December 2018, the systems served approximately 3,245 connections in the City System and 890 connections in the McCormick Woods System. The general location of Port Orchard is shown on Figure 1-1.

Port Orchard is a Group A public water system. Under Washington State Law (WAC-246-290) all Group A water systems serving 1,000 or more services are required to have a comprehensive water system plan approved by the State Department of Health (DOH) and other agencies having jurisdiction. This document represents the City's most recent water system planning effort and updates and supersedes previous water system planning efforts. It has been prepared in conjunction with the City's land use, sewer system and transportation planning efforts to achieve consistency between the myriad of planning requirements undertaken by the City. As demonstrated throughout this Water System Plan (Plan), a variety of other planning efforts by the City and coordinated water system planning for the region were utilized in the development of this document.

In accordance with State Department of Health requirements, this document:

- Identifies and describes the retail water service area;
- Provides a summary of historical and projected water use within the system;
- Describes the existing water system serving the two systems (City System and McCormick Woods System) that are owned, operated, and maintained by the City;
- Establishes minimum design criteria for evaluation of the water system(s);
- Identifies system deficiencies and presents a capital facilities plan;
- Provides an implementation plan for the recommendations contained herein; and
- Complies with appropriate regulations regarding the Kitsap County Coordinated Water System Plan (CWSP), the Municipal Water Law, and the State Environmental Policy Act.

A computerized hydraulic water system model was developed for previous water system planning efforts and is utilized on an ongoing basis for evaluation of new development proposals. The hydraulic model was updated and used to facilitate an evaluation of the water system and to simulate alternatives for water system improvements.

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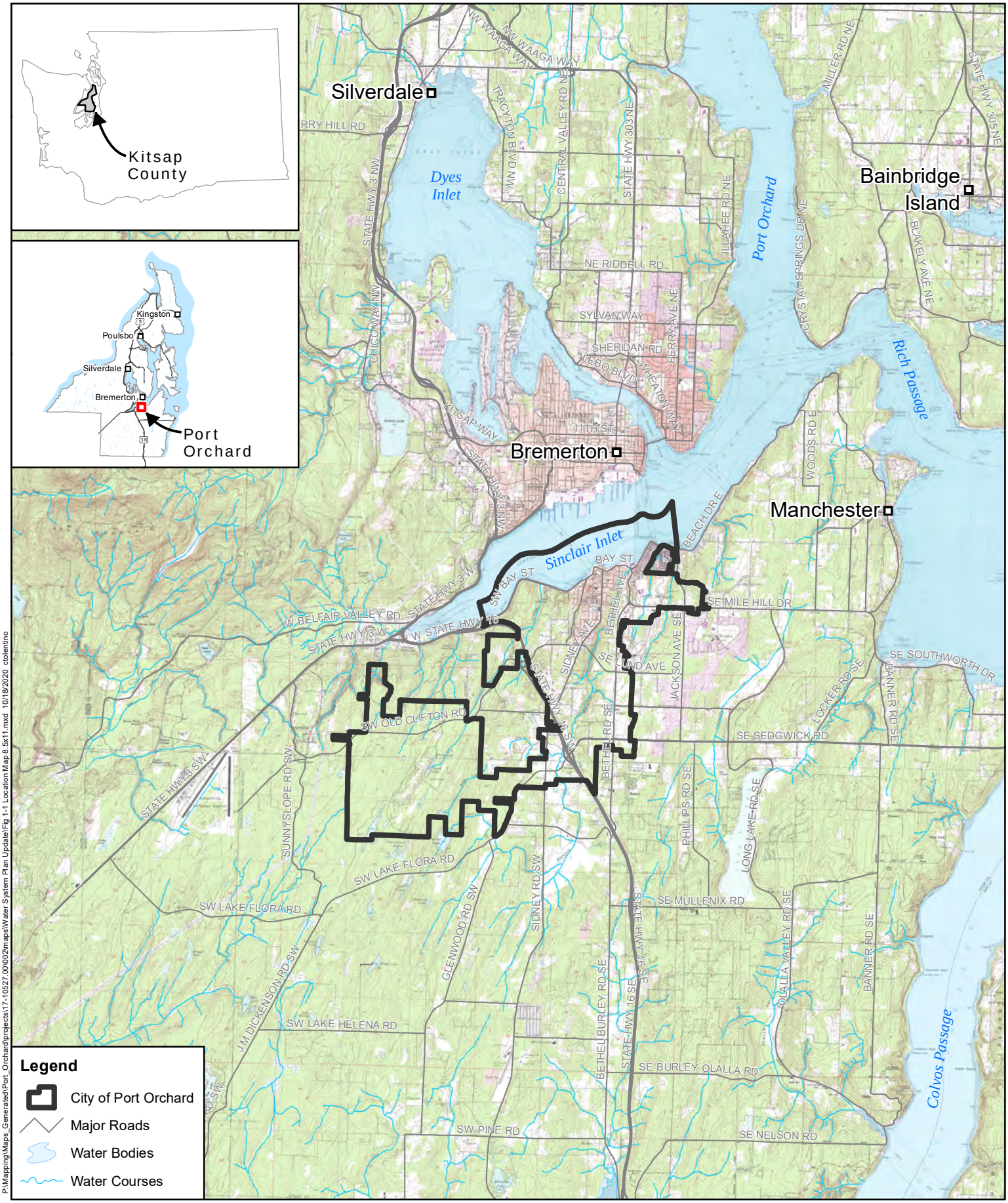

P:\Mapping\Maps_Generated\Port_Orchard\projects\17-10527.00\002\mxds\Water System Plan Update\Fig 1-1 Location Map 8.5x11.mxd 10/18/2020 ctolentino

Image: USGS 2003
This map is a geographic representation based on available information. No warranty is made concerning the accuracy, currency, or completeness of data depicted on this map.

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Port ORCHARD

Location Map

Water System Plan Update
City of Port Orchard, Washington
October 2020

Figure 1-1

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1.2 Authorization

In 2014 the City acknowledged the need to update the Water System Plan adopted in 2011. The City authorized BHC Consultants, LLC (BHC) to prepare this document in accordance with applicable rules and regulations and with the City's existing code, policies, and procedures.

1.3 Goals and Objectives

A variety of goals and objectives guide the operation of the City's public water system. These goals and objectives are in addition to the policy statements discussed at the end of this chapter. They have been verified and utilized in both the evaluation of the current water system and the development of this Plan and are summarized as follows:

- Maintain drinking water quality in accordance with State and Federal standards to ensure the quality of drinking water delivered to customers of the water system.
- Provide high quality domestic and fire protection service to all areas within the retail service area.
- Utilize City-owned and operated sources of supply to maximize efficiency and cost effectiveness of the water system.
- Maintain water system facilities to ensure a high level of service is provided to all customers and maximize the life of facilities to protect the investment of ratepayers.
- Construct new facilities as required to serve the existing and future populations of the established water service area and City of Port Orchard Urban Growth Area (UGA).
- Develop a long-range program for interconnecting the City's main water system with the independent facilities serving the City's 580 and 660 Pressure Zones (McCormick Woods System). This will allow for the two existing systems to be combined under one water system identification number.
- Implement and maintain water use efficiency and conservation programs to discourage water waste, promote the prudent use of water resources, and support protection of habitat and the environment.
- Work with neighboring water utilities, participate in regional water planning efforts to establish common goals of uniform water system standards, and facilitate coordination of efforts toward the adequate provision of water service throughout the region.
- Conduct water system operations in a manner that ensures high quality service in accordance with all applicable rules and regulations, at the lowest reasonable cost.

1.4 Purpose and Objective of the Plan

The purpose of this water system plan update is to provide the City with a guideline for future development of its water system. As development within the service area progresses, modifications to the recommendations of the Plan may be required. Significant changes, such as a change in the water service area, may require a Plan amendment to accurately reflect the future needs of the City and to keep neighboring jurisdictions informed of those needs. Changes in the Capital Improvement Plan (CIP) schedule, however, may occur from time to time as actual development dictates the exact need and location for water system improvements, extensions and facilities, and as the City reviews its capital improvement needs in relation to available funds and project priorities. These minor changes are anticipated and are not expected to require Plan amendments. Instead, these changes are anticipated as part of the City's annual budgeting process.

The overall objective of this study is to establish a plan for the City that provides for orderly development of water system facilities in a manner that meets the needs of existing and future customers of the City's system as well as the requirements of all applicable regulations governing operation of a public water supply. The process used to meet this objective is summarized by the following activities:

- Presentation of descriptions and characteristics of the water service area, land use and population, water consumption trends, and water system features and characteristics.
- Identification of minimum design criteria and updates to the hydraulic computer model for evaluating the existing source, storage and pumping facilities, and the distribution system's capabilities to meet existing and projected system demands.
- Identification of existing and projected water system deficiencies, alternatives for improvements, and recommendations for system improvements.
- Evaluation of City-owned sources of supply and intertie connections and development of a water supply strategy that ensures adequate supply for projected development conditions as well as water resource management. Key considerations include water quality monitoring, watershed protection, water use efficiency and water shortage response.
- Presentation of a capital improvement program and implementation plan, including project cost estimates and proposed project sequencing, scheduling, and financing.
- Completion of an environmental checklist considering the environmental ramifications of implementing the Plan and issuance of a State Environmental Policy Act (SEPA) Determination.

1.5 System Background

1.5.1 Location and History

The City of Port Orchard is in Kitsap County, Washington along the shoreline of Sinclair Inlet on the Puget Sound. The City is located south of the City of Bremerton. From downtown Port Orchard, one can look directly north across the inlet at the Puget Sound Naval Shipyards. Port Orchard was the first city in Kitsap County and was incorporated in 1890 under its original name of Sidney. In 1903, the City was renamed to Port Orchard. The first water system components were installed in 1911.

The City has grown to a vibrant waterfront community with a variety of commercial and governmental activity as well as a strong residential community. The area has experienced significant growth in more recent years and serves in part as a bedroom community to naval shipyard employees and residents that commute by ferry to downtown Seattle for employment.

1.5.2 Overview of Existing Water System

The water system has grown with the City. The majority of existing pipe in the City System was installed in the 1960's. Additional wells and other general facilities have been constructed to accommodate the growing population and comply with regulations associated with operating a public water system. The City System includes all the 260 Pressure Zone and the 390 Pressure Zone. A small portion of the City is served by the West Sound Utility District (formerly known as Annapolis Water District), whose service area lies east of Port Orchard and includes portions of the City's eastern potential annexation, or urban growth area. The City's 260 Pressure Zone water supply is augmented during high demand or emergency conditions through an intertie with the City of Bremerton.

An independent system known as the McCormick Water Company was constructed in the late 1980's to serve a 1,300-acre residential community known as the McCormick Woods Planned Unit Development (PUD). The City assumed ownership of the McCormick Woods Water Company in 1998 and the area was annexed in 2009. The McCormick Woods System is located in the 580 Pressure Zone and is supplied with City-owned McCormick Woods Wells 1, 2, and 3, and from a backup supply intertie with the City of Bremerton. The McCormick Woods System is currently hydraulically separate from the City System.

Expansion of the McCormick Woods system is planned to serve additional development in the southwestern portion of the City and a new 660 Pressure Zone is being planned.

1.6 Inventory of Existing Facilities

Although plans are underway to connect the City and McCormick systems, for consistency with previous planning documents they are referred to in this chapter as the City System and the McCormick Woods System. Analysis of each system and the proposed strategy for interconnection are described in Chapter 3. Both systems are fully metered and together they serve a total of approximately 4,200 connections, most of which are single family residential. The existing systems are indicated on the Water System Plan Map shown on Figure 1-2 and illustrated on the hydraulic profile shown in Chapter 3.

1.6.1 City System *(260 and 390 Pressure Zones)*

The area known as Port Orchard's City System served approximately 5,600 Equivalent Residential Units (ERUs) through approximately 3,300 service meters at the end of 2018. The City System is comprised of primarily single-family residential connections and a downtown area with small commercial establishments. In addition, the City System provides service to multi-family residences, schools, commercial complexes, and the government offices of both the City of Port Orchard and Kitsap County. The system includes the older portions of the City along the waterfront, as well as the more rapidly developing uplands.

The associated water service area is generally bounded by the Sinclair Inlet waterfront on the north, SW Sedgwick Road in the vicinity of State Highway 16 on the south, McCormick Woods on the west, and the West Sound Utility District on the east.

The City System consists of three pressure zones to regulate pressure within the community. These zones have historically been referred to as the City High, Low, and Intermediate Zones. The (390) High and (260) Low zones are shown on Figure 1-2. The (336) Intermediate Zone serves only a small area near the intersection of Sidney Avenue and Sroufe Street and is not shown on Figure 1-2. The Intermediate Zone will be incorporated into the 390 Zone as part of this Plan's Capital Improvement Program. This Plan includes the hydraulic grade line (HGL or tank overflow elevation) of each zone for ease and clarity in describing the system(s). The Low or 260 Zone extends from sea level to an approximate maximum service elevation of 210 feet and serves approximately 45% of the existing population and employment base served by the City System.

A network of approximately 80 miles of water pipe, two groundwater wells, and four storage tanks serve the City System, which provides water to most of the City.

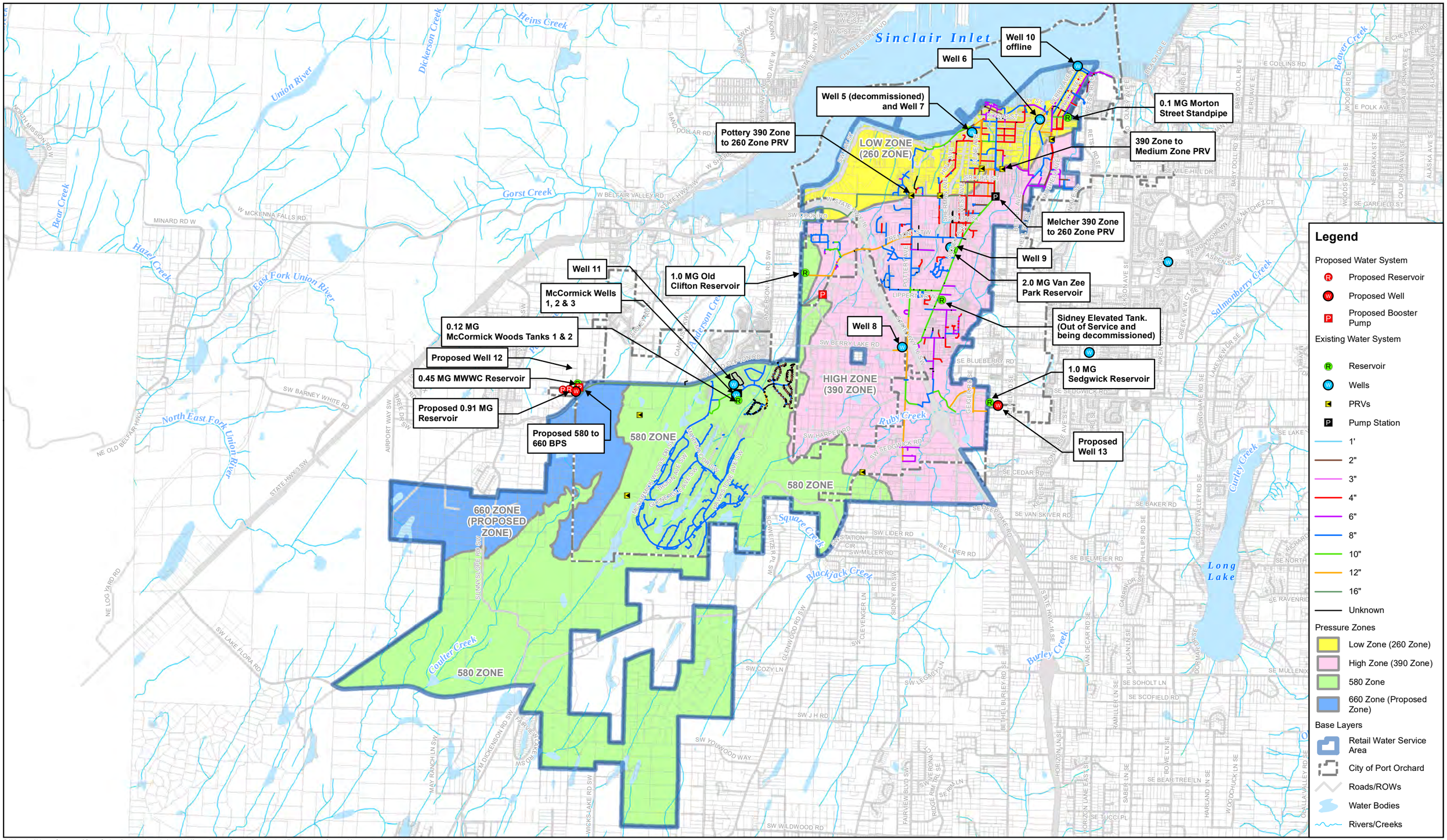
The 260 Zone is fed primarily by Wells 6 and 7 but can receive supply from a wholesale meter connection to the City of Bremerton system west of the City. Water from Well 7 is pumped through the City Hall Pump Station which includes a stilling basin that is utilized for settling and hydrogen sulfide dissipation. Fire flow in the higher elevations of the 260 Zone is supplemented by parallel pipes and hydrants from the 390 Zone. The 260 Zone has approximately 2.1 million gallons of storage in two facilities: the Morton Street Standpipe and the Van Zee Park Reservoir. The High or 390 Zone of the City System serves approximately 55% of current connections to the City System in the residential uplands of the City and commercial area in the east. The 390 Zone serves elevations from approximately 135 feet to just over 325 feet.

Well 8 located in the 2500 block of Sidney Avenue, Well 9 and an intertie with the City of Bremerton are the primary sources to the 390 Zone. Additional supply can also be received from the 260 Zone through the Melcher Street Pump Station. Approximately 2.0 million gallons of storage in this zone are provided in the Old Clifton and Sedgwick reservoirs. An intertie to the West Sound Utility District provides a backup source to the southernmost reaches of the City limits; however, this connection is not currently being used. The 6-inch West Sound intertie is located on the 1 million-gallon Sedgwick Reservoir site.

To improve pressures in the higher elevations of the City located east of Blackjack Creek, the 390 Zone was expanded in 1983 with a 12-inch main that crosses the Creek. Interties with West Sound Utility District in this area, as well as the ability to revert to serving the area from the 260 Zone, provide the necessary reliability for the isolated portion of the 390 Zone. The Intermediate or 336 Zone was created in 1984 to provide satisfactory water pressure to a small area north of Kendall Street in the vicinity of Harrison Avenue. The 336 Zone is supplied by a pressure reducing valve (PRV) from the 390 Zone located just south of Kendall and Harrison and storage is provided from the 390 High Zone. The 336 Zone is fed by the 390 Zone and because of hydraulic continuity and the small size of the Zone, it has been considered and analyzed in conjunction with the 390 Zone.

1.6.2 McCormick Woods System *(580 Pressure Zone)*

The McCormick Woods System began as a private water company serving a residential golf course and clubhouse, and a commercial development in an unincorporated portion of the Port Orchard water service area. The City of Port Orchard assumed ownership of this water system in 1998. On December 26, 2001 an interlocal agreement was created that detailed various aspects of water system construction, assumption of the system by Port Orchard, and the terms of an intertie with the City of Bremerton that can supply water to the McCormick Woods area. This agreement was terminated upon execution of a new agreement between the City of Port Orchard and the City of Bremerton, signed November 21, 2019. A copy of the new agreement, which includes a copy of the terminated 2001 agreement, is included in Appendix F.



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Water System: City of Port Orchard.
Kitsap County base data.
Data sources supplied may not reflect current or actual conditions. This map is a geographic representation based on information available. It does not represent survey data. No warranty is made concerning the accuracy, currency, or completeness of data depicted on this map.
BHC Consultants LLC., assumes no responsibility for the validity of any information presented herein, nor any responsibility for the use or misuse of the data.

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Port ORCHARD

Water System Map

Water System Plan Update
City of Port Orchard, Washington
July 2021

Figure 1-2

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Port Orchard and Bremerton currently share the use of an existing 16-inch water transmission main and the existing 450,000 gallon 580 Zone standpipe. The Port Orchard-owned tank provides storage to the Bremerton 580 Zone north of the McCormick Woods System per the 2001 and the 2019 agreements. Water system planning for this portion of the water system has been accomplished through updates to the original Water System Plan and was completed in 2000 and amended in 2003 under the title McCormick Woods Water Company Water Comprehensive Plan Amendment(s). This Water System Plan updates previous planning activities.

The McCormick Woods System consists of an independent source of supply, a network of 6- to 16-inch distribution and transmission mains and pumping and storage facilities. Two groundwater wells (McCormick Woods Wells 1 and 3) have historically provided water supply to the area. A third well (McCormick Well 2) was drilled but never used as a source of supply due to high concentrations of sand in the well. In 2009, an additional domestic supply well (Well 11) was drilled into a deep aquifer to replace the three previous shallow wells. Well 11 is currently in the design phase of being developed into a replacement source for the shallow wells. Golf course irrigation is accomplished under the terms of an interlocal agreement allocating a portion of Well 4B to this purpose. The November 21, 2019 agreement with City of Bremerton provides for a continuous supply of up to 750 gpm subject to the conditions contained in the agreement.

Storage consists of a 450,000-gallon steel tank connected to the system by a 16-inch transmission main and two low level concrete tanks located adjacent to the wells. Water from the supply wells is pumped directly to the two concrete tanks. A pump station transfers water from there to the 450,000-gallon tank with an overflow elevation of 580 feet. As of this Water System Plan, the entire McCormick Woods System is served by gravity from the 580 tank and is referred to as the 580 Zone. Future development of McCormick Woods West will dictate the need for an additional 660 Pressure Zone.

1.6.3 Water Supply

A summary of existing and pending water rights and planned source development is presented in Chapter 4 and additional water rights information is contained in Appendix C. The requisite water rights self-assessment is provided in Appendix C in accordance with Municipal Water Law requirements. The existing water supply characteristics are discussed below.

City System (260 and 390 Pressure Zones)

Supply to the City System is primarily through City-owned and operated groundwater wells. The City maintains three existing water rights to the various wells that serve the City portion of the system during normal conditions (City Wells 6, 7, and 8/9). Treatment is provided to reduce hydrogen sulfide, iron, and manganese. Chlorine and fluoride are added to the City System. A water rights application for Well 13 is currently pending (see Chapter 4). The City also obtains water through an intertie with the City of Bremerton as discussed earlier in this chapter and maintains an emergency intertie with West Sound Utility District.

McCormick Woods System (580 Pressure Zone)

The McCormick Woods System, or the 580 Zone, is served by two existing domestic supply wells (McCormick Wells 1 and 3) from the shallow aquifer underlying the area. No treatment except chlorination is provided in the McCormick Woods System. As discussed earlier in this chapter, the 580 Zone is intertied with the City of Bremerton's water system. By agreement, fluoridated water is prohibited from entering the Bremerton system. An agreement was reached with the McCormick Land Company to use Well 4B for both golf course irrigation and municipal (potable water) uses. Well 11 was drilled in 2009 and is currently in the design phase. It is

expected to be brought online in 2021 but has not been completed with a pump or connected to the water system. The volume of water that can be produced by Well 11 is uncertain. A water rights application for Well 12 is currently pending (see Chapter 4).

Water Rights

The existing water rights and pending water rights applications for both systems are included in Table 1-1 below.

Table 1-1
Water Rights

Permit Certificate or Claim #	Source Name/Number	Supplemental Limitation	Water Right Quantity	
			Instantaneous Flow Rate (Qi) (gpm)	Annual Volume (Qa) (AFY) Supp/*Primary*
G1-*04166C[4] (Cert. 3334-A)	City 6	No	350	***560***
G1-24586C[4]	City 7	No	750	***1,210***
G1-25019C	City 8 and 9	Yes[1]	500	560
G1-26119P[4]	City 10	Partial[2]	500	211.5/***594.5***
G1-26729P[6]	City 4 & 5	Partial[2]	50	11/***59***
G1-24437P[4]	McCormick 1, 2, 3, City 11[3]	No	600	***450***
G1-26454P[4]	City 11[3]	Partial[2]	150	63/***179***
G1-26447P(A)[4]	McCormick 4B	Partial[2]	400	169.5/***475.5***
TOTAL MUNICIPAL QUANTITY			3,351.3	***3,610.8***
Interties				
City of Bremerton[5] (11/21/2019 interlocal agreement)			750	***178***
Applications				
G1-28162A	City 12		500	***560***
G1-28476A	City 13		750	***1,210***

Notes:

1) The annual quantity (560 AFY) of G1-25019C is supplemental to existing rights from Cert. 3334-A, G1-24586C, and G1-000911CL, but provides the City with additional pumping capacity.
2) The aggregate cap limitation on permits G1-26119, G1-26447, G1-26454, and G1-26729 grants the City an additional 1,308 acre-feet per year of primary rights for the four water rights combined, and limits the total annual quantity withdrawn from all City of Port Orchard sources, which "shall not exceed 3,528 acre-feet per year."
3) MC Well 5 was renamed PO Well 11; it was intended to replace MC wells 1, 2 & 3, with a combined Qi of 750 gpm and a combined Qa of 672 AFY but is not online at this time.
4) Change application pending to add Well 12 or 13 to this water right.
5) No rights are included for the City of Bremerton intertie with the City System as consumption through the intertie is replenished by the City with no net loss to either side.
6) Assumed to be for Well 4 and Well 5. Well 4 has been paved over and is unusable and well 5 was decommissioned. This is still a valid claim and a change application has been submitted to ECY.

1.6.4 Pumping

City System (260 and 390 Pressure Zones)

Due to the topography of the area and for reliability and operational flexibility, the City relies on three pump stations, in addition to well pumps, to move water throughout the system.

The City Hall Booster Station pumps water from Well 7 near Port Orchard Boulevard and High Avenue into the City's 260 Zone. The station consists of a stilling basin to allow sand sediment to settle and provide time for dissipation of hydrogen sulfide. Chlorine and fluoride injection is also provided at the City Hall Booster station. This station is over 60 years old and could be abandoned depending on the outcome of a planned study to assess the condition of the Well 7 facility. This station is equipped with a single pump and backup power.

The Well 6 pump station pumps treated water from the clear well into the 260 Zone. It is located on Maple Street west of Bethel Avenue. This station is over 60 years old. In the future, the City plans to keep the pump station and well operational for emergency use only. This station is equipped with two pumps and does not have standby power.

The Melcher Street Pump Station was constructed in 1960 and supplements supply from the 260 Zone to the 390 Zone. The station is equipped with two pumps and standby power.

McCormick Woods System (580 Pressure Zone)

The McCormick 580 Pump Station transfers water from two 60,000-gallon low level concrete tanks on the McCormick Well site (McCormick Wells 1, 2, and 3) to the City's 450,000-gallon 580 tank that serves the current McCormick Woods development. The station is equipped with three separate pumps that were originally designed to maintain pressure in the system during varying demand conditions but have since been redirected through a 16-inch transmission main on Old Clifton Road to the tank. Emergency power is provided at the station.

City System and McCormick Woods System pump stations are shown in Table 1-2.

Table 1-2
Pump Stations

Station Name	Pump No.	Capacity (gpm)	@ Head	Motor HP	Zone Served
City Hall	1	790	300	75	260
	2	620	300	60	
Melcher Street	1	700	154	75	390
	2	550	154	50	
Well 6 Booster	1	495	300	25	260
McCormick 580	1	125	170	10	580
	2	350	170	20	
	3	350	170	20	

1.6.5 Storage Tanks

As mentioned previously, the City owns and operates seven separate storage tanks. Furthermore, two 50,000-gallon stilling basins provide additional storage to the Low Zone. Table 1-3 lists the existing and proposed tanks in the City and McCormick Woods systems.

Table 1-3
Storage Tanks

Tank	Date Constructed	Capacity (MG)	Diameter (ft)	Height (ft)	Construction Type	Zone Served
Van Zee Park	-	2.0	130		Buried Concrete	260 Zone
Morton Street	1990	0.1	14.59	100	Standpipe	260 Zone
Old Clifton	1977	1.03	100	30	Concrete	390 Zone
Sedgwick	2000	1.09	68	40	Steel	390 Zone
McCormick Woods 580	1995	0.45		42	Steel	580 Zone
McCormick Woods Tank 1	1986	0.06	25	15	Concrete	431 Pumped to 580 Zone
McCormick Woods Tank 2	1992	0.06	25	15	Concrete	431 Pumped to 580 Zone
Proposed 580 Tank	Proposed					580 Zone
Proposed 660 Tank	Proposed					660 Zone

1.6.6 Distribution System

The distribution system consists of a network of pipes ranging in size from 16 inches in diameter to less than 4 inches in diameter, as shown in Table 1-4. The system was continuously constructed as the City developed, but much of the system was installed in the 1960s. One pressure reducing valve supplies the 336 Intermediate Zone from the 390 Zone. The 390 and 260 Zones are connected by the Melcher Street Pump Station supplying water to the 390 Zone, and manual intertie valves at seven separate intersections.

The values in Table 1-4 came from the City's GIS data and were updated based on information from the City. The GIS data did not indicate if pipe materials or pipe size were or were not service lines. The updated information incorporated a recent development in McCormick Woods and involved the PVC and 8-inch quantities in Table 1-4.

Table 1-4 Pipe Size and Material			
Pipe Material	**Estimated Quantity (ft)**	**Pipe Size**	**Estimated Quantity (ft)**
Asbestos Cement (AC)	8,341	< 4-inch	18,697
Cast Iron (CI)	109,273	4-inch	52,490
Copper (COP)	1,744	6-inch	39,716
Ductile Iron (DI)	104,476	8-inch	155,201
Galvanized	7,095	10-inch	23,559
PVC	74,729	12-inch	28,448
Steel	2,777	16-inch	21,175
Unknown	42,960	Unknown	12,108
Total	**351,395**	**Total**	**351,395**

Notes:
1) GIS Data Source: P:\Mapping\Maps_Generated\Port_Orchard\projects\17-10527.00\002\data\Pipe Size & Material Inventory\data.gdb\COPO_WaterMains_March_2019

1.7 Previous Planning Studies

Development of this Plan has been coordinated with a variety of previous plans and studies prepared by and for the City of Port Orchard. The documents listed below were utilized as source material or are referenced herein as a source for additional information regarding specific elements of the City operation and facilities:

- City of Port Orchard 2009 Comprehensive Water System Plan, City of Port Orchard.
- City of Port Orchard Wellhead Protection Program, 2012, Pace Engineers, Inc.

  City of Port Orchard 2016 Comprehensive Plan, City of Port Orchard.
- Kitsap County Coordinated Water System Regional Supplement 2004 Revision, HDR/EES.
- West Sound Utility Water System Plan, 2012.
- City of Bremerton Water System Plan, 2012.
- Gorst Watershed Plan, 2013.
- Kitsap Watershed (WRIA 15) Water Resources Program, November 2016.
- Kitsap County Comprehensive Plan Update, 2016, Kitsap County.

1.8 Existing Service Area Characteristics

1.8.1 Neighboring Utilities

West Sound Utility District

The West Sound Utility District serves within and east of the City of Port Orchard. The two agencies maintain interties to assist each other during emergency situations. An interlocal agreement is in place and is included in Appendix F for reference.

City of Bremerton

The City of Bremerton serves the area west of Port Orchard and maintains two wholesale intertie connections with the Port Orchard water system. A 260 Zone intertie is located near the waterfront at the western edge of the City limits. An intertie agreement is in place between the two cities and is included in Appendix F. The City of Bremerton also has a pump station and 16-inch water main to serve new development north of Old Clifton Road and west of Anderson Hill Road. This extension is consistent with the existing Port Orchard 580 Zone/Bremerton 580 Zone Plan for Cooperative Water System Development agreement between the two cities. The existing 16-inch water main is intertied with the City of Port Orchard's 580 Zone system. The City of Port Orchard is currently developing plans to construct a new 1.0 MG 580 Zone storage tank and transmission main and anticipates building a new 660 Zone storage tank in the future to serve existing and proposed development in the McCormick Woods area.

The City's Well 11, or proposed Wells 12 and 13, will need to be developed to serve the McCormick Woods system without assistance from the City of Bremerton. According to a recently signed agreement between Port Orchard and Bremerton, Bremerton will obtain ownership of the existing 580 tank and the 16-inch transmission main along Old Clifton Road after the construction of additional storage is completed and brought online. As part of this existing November 21, 2019 agreement the Cities of Port Orchard and Bremerton have agreed to consider retaining an emergency connection to the existing 580 tank. It is anticipated that this intertie would only be activated to provide water from Bremerton to Port Orchard since Bremerton's system has many more source and pumping redundancies. In the unlikely event that Bremerton was in need of water from the Port Orchard system, two options exist: 1) Port Orchard temporarily suspends fluoridation during the emergency and flushes the fluoridated water before supplying Bremerton, or 2) Bremerton suspends their non-fluoridated water policy during the emergency.

Other Water Systems

Several water systems operate adjacent to the City of Port Orchard's existing water system facilities and within the City's established service area. Other adjacent systems include the Sunnyslope Water System to the north and west of McCormick UGA and the Clifton Water System to the west of Anderson Hill Road. No interties exist or are contemplated with these purveyors. Several small systems occur within the vicinity of ultimate service area boundary for Port Orchard and are recognized by the Kitsap County Coordinated Water System Plan (CWSP). These include the Clifton Water System, the Clifton Water Works and the Weyer Lane Water System. Although no specific plans for takeover of these systems is discussed in this Plan, the City does acknowledge that assistance to these purveyors could be provided as the Port Orchard water system expands into the areas served by the independent water systems noted. At such time that it may become necessary due to source failure or the desire of the smaller systems to receive direct service from a larger purveyor, direct connection to the City System may provide a practical solution. A map of all neighboring utilities is provided on Figure 1-3.

1.9 Future Service Area

Figure 1-4 highlights the City limits, UGA, and retail water service area for the City of Port Orchard. The study area for this Plan is the City's retail water service area as put forth and agreed to in the Kitsap County CWSP. The 15.5 square mile service area includes the western portion of the City, as well as considerable land area that has not yet been annexed. While the City maintains water service to the majority of its estimated resident population of 14,000 people, the West Sound Utility District (formerly known as Annapolis Water District) serves the eastern portion of the City and abuts the Port Orchard water system. The western portion of the service area contains the McCormick Woods residential community and was annexed into the City of Port Orchard in August of 2009. McCormick Woods is provided water service by a hydraulically separate water utility (with a distinct and separate Department of Health (DOH) System Identification Number). While the system is physically independent of the Port Orchard water system serving the majority of the City, it is owned, operated, and maintained under the City of Port Orchard's single water utility. All proposed development within the McCormick Woods area is addressed in this Plan, including proposed connection of the two systems, and merging them into one water system.

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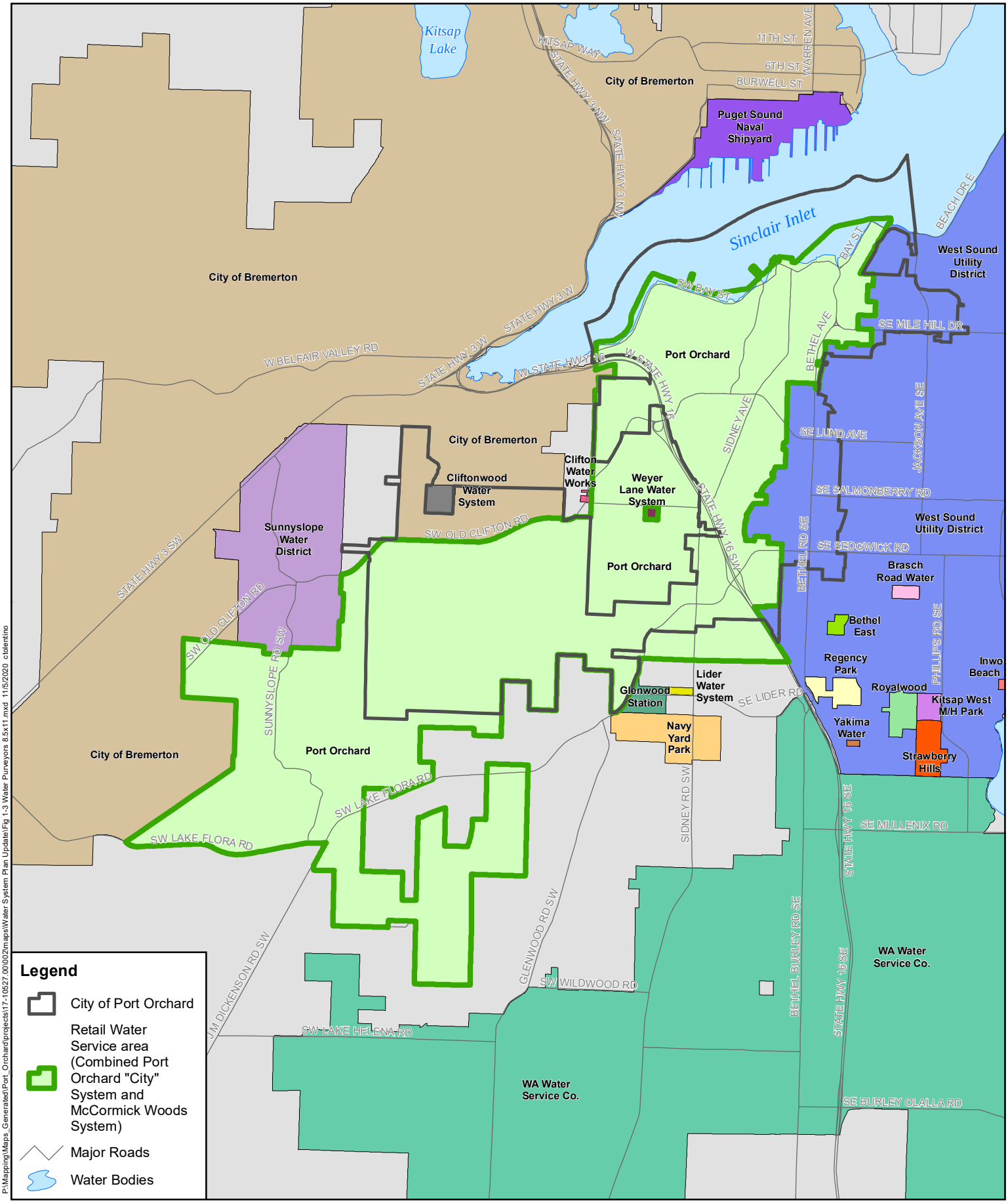

P:\Mapping\Maps_Generated\Port_Orchard\projects\17-10527.00\002\maps\Water System Plan Update\Fig 1-3 Water Purveyors 8.5x11.mxd 11/5/2020 ctolentino

GIS Data: City of Port Orchard & Kitsap County.
This map is a geographic representation based on available information. No warranty is made concerning the accuracy, currency, or completeness of data depicted on this map.

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Port ORCHARD

Water Service Area & Adjacent Water Purveyors

Water System Plan Update
City of Port Orchard, Washington
October 2020

Figure 1-3

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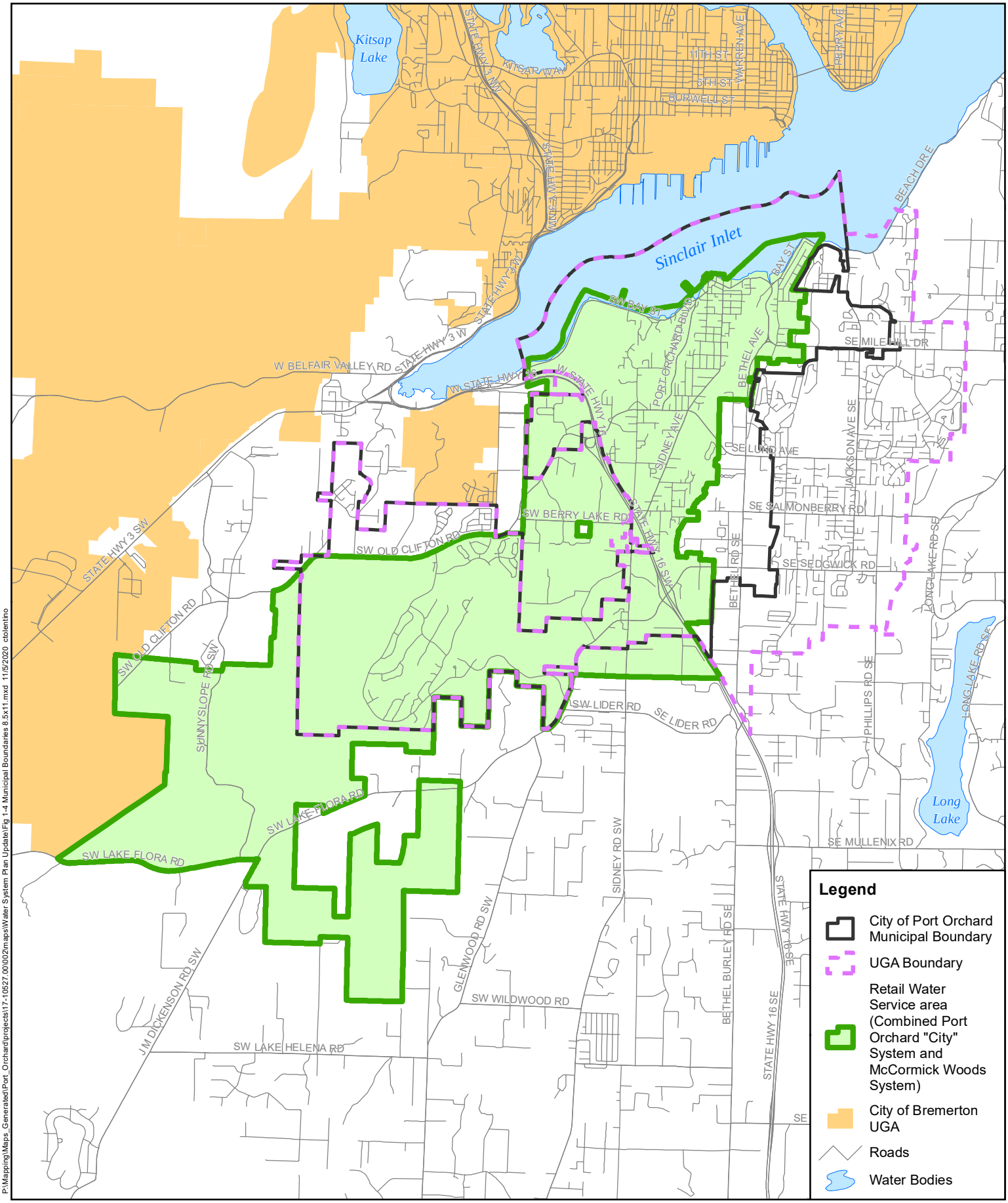

P:\Mapping\Maps_Generated\Port_Orchard\projects\17-10527.00\002\maps\Water System Plan Update\Fig 1-4 Municipal Boundaries 8.5x11.mxd 11/5/2020 ctolentino

GIS data: City of Port Orchard & Kitsap County.
This map is a geographic representation based on available information. No warranty is made concerning the accuracy, currency, or completeness of data depicted on this map.

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Port ORCHARD

Municipal & Retail Water Service Area Boundaries

Water System Plan Update
City of Port Orchard, Washington
October 2020

Figure 1-4

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1.10 Service Area Agreements

The City maintains interlocal agreements with neighboring purveyors that have been considered in development of this Water System Plan and impacts both planning and operation of the City water system. These agreements are provided in Appendix F for reference.

- City of Bremerton Wholesale Water Supply Agreement.
- West Sound Utility District (Annapolis Water District) Intertie Agreements.
- Kitsap County Coordinated Water System Plan Service Area Agreement.
- Port Orchard 580 Zone/Bremerton 580 Zone Plan for Cooperative Water System Development.
- Contract 090-14, Interlocal Agreement for Water Supply, City of Port Orchard and City of Bremerton, 24 November 2014.
- Assignment Regarding Use of Well 4B Water Rights and Rescission of Assignment (CO53-14), City of Port Orchard and C & M Golf, LLC, 22 April 2014.

1.11 Service Area Policies

A variety of general goals and policies are put forth in the City of Port Orchard's 2016 Comprehensive Plan addressing Growth Management Act (GMA) requirements and land use planning. The following service area policies provide more detailed information regarding how the system is operated and expanded.

1.11.1 Responsibility and Authority

Ultimate responsibility for the City's water utility is with the seven-person City Council, and the City's Water and Sewer Committee, comprised of three Council members that monitor the activities of water utility. The City's Public Works Director oversees general operation of the utility, and a field operations crew is responsible for system operation and maintenance.

1.11.2 Annexation

The primary policy of the City Council is that water service will be provided to properties within the City limits. If capacity is available, water service will be provided to residents of the Urban Growth Area (UGA) outside the City limits. Properties within the UGA requesting water service are expected to annex to the City before service is provided. The City Council may consider exemptions to this policy if it is determined to be in the best interest of the community. In such instances, the City will accept a Developer's Extension Agreement which includes provisions that prohibit the property owner from protesting future annexation proposals. Until such time that the property is annexed, customers will pay a 50% surcharge on their water bills. In the event that the City annexes a property that is adequately served by another water utility authorized under the laws of the State of Washington, the City will not require a change in water service based solely on the annexation. Consideration of long-term adjustments to the City's service area, however, may be required as development occurs within the City's Urban Growth Area and existing water service area.

1.11.3 Service Area

The City's retail service area is shown on Figure 1-2. Municipal water suppliers such as the City of Port Orchard have a duty to serve customers within their retail service area (RCW 43.20.260). Expansion of the Port Orchard service area beyond that established in the Kitsap County CWSP is not contemplated in this planning document. Any service area exchange or change would require specific negotiation with the neighboring jurisdiction and consideration by

the Water Utility Coordinating Committee. With the Sinclair Inlet of Puget Sound to the north, the West Sound Utility District to the east and the City of Bremerton on the west, little opportunity for expansion of the service area exists. However, minor adjustments to the service area are possible. Such adjustments in the service area, if required, would be handled using procedures outlined in the CWSP. Service area adjustments and interlocal agreement procedures are provided in the Kitsap County Coordinated Water System Plan Regional Supplement, 2005 Revision.

It is the intent of the City of Port Orchard to maintain service to all areas within its existing service area and the City recognizes the right to assume responsibility for water service to all areas within the City limits. The West Sound Utility District serves the eastern portion of the City as stipulated in the Kitsap County CWSP. Other utilities adjacent to or surrounded by the City of Port Orchard's established service area are recognized in the Kitsap County CWSP. No plans for assumption of service responsibility of other utilities currently exist. However, the City recognizes that extension of service to the areas served by small independent systems may be prudent under certain circumstances. Examples could include source failure in the small water system; if the Port Orchard water system were to become a more cost effective and viable alternative for water service, or if takeover of the system were requested.

1.11.4 Other Local Government Policies Affecting Provision of Water

The City will require all new developments such as subdivisions, to connect to the City water system. All new connections must comply with all applicable City standards. New developments outside the City limits at the time of development but served by the City's water system must meet City standards. New developments which are outside the City limits, are not currently served with City water but are located within the City's service area as established by the Kitsap County CWSP are required to meet City and CWSP standards.

1.11.5 Water Meters and Interties

All water services are metered to facilitate customer billings. The City maintains a wholesale connection from the City of Bremerton that is used from time to time as required to supplement water production from wells but does not wholesale water to other utilities. A second intertie with Bremerton provides water to the McCormick Woods portion of the system as discussed previously in this chapter. Emergency intertie connections with other utilities are permitted and considered on a case-by-case basis and dependent on available water supply. Interlocal agreements dictating the financing and use of emergency interties are required. The City has an emergency intertie with West Sound Utility District. The intertie is located adjacent to the near the City's Sedgwick Reservoir on Bethel Road.

1.11.6 Rates and Charges

Water rates and charges are established by the City Council and periodically reviewed and updated to ensure system viability and that current rates are viable. The City has recently undergone a detailed rates gap analysis to evaluate and adjust utility system rates, including water system rates.

In addition to monthly rates and charges, all customers of the water system are required to pay an equitable share of the cost of water systems serving their individual properties and the cost of overall facilities required for the entire system. New connections to the system are required to pay for the extension of water service to their property and a connection charge for their share of large-scale system components such as water supply, storage, and transmission facilities.

Water system extensions and improvements may be financed using Local Improvement Districts (LID's) whereby properties in a given area contribute to area-wide improvements and/or Latecomer Agreements where developers receive a payback for facilities constructed as part of a developer's extension and provide a benefit to properties that are developed at a later date. Consideration of this type of financing would be by the City Council on a case-by-case basis.

All new water accounts will pay fees in lieu of assessment or latecomer costs unless the property has participated in a Local Improvement District or other similar water system improvement. The City Council can waive the fee in lieu of assessment if the new development constructed a water system improvement which substantially improved the water system, as long as these improvements have been identified in the City's Comprehensive Water System Plan. Normally, developers finance water system improvements required to serve their property and deed the improvement to the City. The City Council retains the right to participate in joint improvements or to extend the water system as needed. If a developer extends the water system the City will allow a utility extension, or latecomers agreement to be implemented. This agreement identifies specific properties that could benefit from the developer-financed improvement and assess a fair share of the cost based on the termini or front foot method of assessment. A public hearing is required prior to implementing such an agreement. City Ordinance 1385 describes the agreement process.

1.12 Satellite Management

The City of Port Orchard may consider satellite management of other water systems whereby the City would own, operate, or assist with developments within its established service area. Such arrangements would be considered on a case-by-case basis and would require approval of the City Council. At this time, no such agreements exist, and the City is not registered as a satellite management agency with the State Department of Health.

The City recognizes that other water districts border the City and that under RCW 35.13A.030 "whenever a portion of a district equal to at least sixty percent of the area or sixty percent of the assessed valuation of the real property lying within such district, is included within the corporate boundaries of a city, the city may assume by ordinance the full and complete management and control of that portion of the entire district not included within another city…"

1.13 Conditions of Service

Water and sewer system improvements are considered separately for new developments.

Connection to sanitary sewer is not a prerequisite to water service connection.

1.14 Complaints

Complaints may be submitted to the City of Port Orchard either by phone, electronic submission, or by mail to the Public Works Department. All complaints, whether related to issues of water system pressure, water quality, billing inquiries, or other financial questions, are addressed by staff in a timely manner. Complaints are entered into a tracking system by Public Works clerks and a work order is issued for each complaint. Work orders are sent to the Public Works Foreman for resolution. Water quality complaints are also tracked by the billing department. The complaint record is available at the City of Port Orchard's administrative office for inspection.

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Chapter 2 Planning Data and Water Demand Forecasting

2.1 Land Use

2.1.1 Topography

The City of Port Orchard (City) is located along the Sinclair Inlet of the Puget Sound. The water service area generally slopes toward the north and east. Elevations within the City's 260 Zone and 390 Zone service area range from 327 feet in the southern portion of the service area to sea level along the shores of the Puget Sound. Elevations in the McCormick System range from 470 feet in the western portion of the system to 320 feet in the southern portion of the system. The general characterization of the topography in the area is that of small hills, ravines, and other minor landforms.

The topography of the area currently necessitates four pressure zones: The current City System is composed of the 390 (High), 336 (Intermediate) and 260 (Low) Zones that serve the main portion of the system. Future capital improvement projects include consolidating the 336 Zone and a portion of the 260 Zone into the 390 Zone. The 580 Zone serves the McCormick UGA area of the system. A future 660 Zone will be required to serve proposed development west of the existing McCormick Woods service area. Elevations in this area range from 460 feet to 540 feet.

2.1.2 Land Use and Zoning

Land use and zoning within the service area is under the jurisdiction of the City of Port Orchard and Kitsap County (County). Figure 2-1 presents a map of the zoning and land use in the City. Most of the service area is designated for residential use with the highest concentration and density of residential development occurring in the downtown area and newer residential construction occurring in the area south of Tremont Street. More rural and less dense residential development occurs in the southern portion of the service area. Additional development within the western portion of the service area is proposed and includes the McCormick West projects proposed for development within the planning period. Also, the area east of McCormick Woods is zoned Residential and allows development at a density of up to 12 dwelling units per acre. Development of the area is proposed to begin during the ten-year life of this Plan and would require extension of water service. This extension of service would be accomplished by the developing property owners and provides an opportunity for interconnection of the water system serving the 580 Zone with the main City water system.

2.2 Population and Employment

Table 2-1 lists the historical and projected population and employment within the existing City and service area. Population and employment data within the service area through year 2017 was obtained from the Puget Sound Regional Council (PSRC). Population projections were developed using PSRC population projections and anticipated units associated with large proposed developments in the McCormick Woods area provided by developers. Employment projections were based on PSRC employment projections. Office of Financial Management (OFM) information, developer plans, local zoning, and land use were reviewed to verify consistency with other City and County Plans.

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Sinclair Inlet

CITY OF PORT ORCHARD
Retail Water Service Area:
City and County Zoning Designations

City Limit
- Port Orchard
- City of Port Orchard Water Retail Service Area

City Zoning Designation
- Greenbelt
- Residential 1
- Residential 2
- Residential 3
- Residential 4
- Residential 6
- Neighborhood mixed use (NMU)
- Business professional mixed use (BPMU)
- Commercial mixed use (CMU)
- Downtown mixed use (DMU)
- Gateway mixed use (GMU)
- Commercial corridor (CC)
- Commercial heavy (CH)
- Industrial flex (IF)
- Light industrial (LI)
- Civic and institutional (CI)
- Parks and recreation (PR)
- Public facilities (PF)

County Zoning Designation
- RR - Rural Residential (1 DU/5 Ac)
- Mineral Resource/Rural Residential
- RP - Rural Protection (1 DU/10 Ac)
- Mineral Resource/Rural Protection
- RW - Rural Wooded (1 DU/20 Ac)
- FRL - Forest Resource Lands (1 DU/40 Ac)
- Mineral Resource/Forest Resource Lands
- BC - Business Center
- IND - Industrial
- Mineral Resource/Industrial
- Commercial (10-30 DU/Ac)
- NC - Neighborhood Commercial (10-30 DU/Ac)
- Low Intensity Commercial (10-30 DU/Ac)
- RCO - Rural Commercial
- RI - Rural Industrial
- UR - Urban Restricted (1-5 DU/Ac)
- UL - Urban Low Residential (5-9 DU/Ac)
- UM - Urban Medium Residential (10-18 DU/Ac)
- UH - Urban High Residential (19-30 DU/Ac)
- Park
- CITY - Incorporated City
- MIL - Military
- Lake

City of Port Orchard Department of Community Development
216 Prospect Street, Port Orchard, WA 98366
Phone: (360) 874-5533 Fax: (360) 876-4980
www.cityofportorchard.us

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Port ORCHARD

Port Orchard Zoning Map

Water System Plan Update City of Port Orchard, Washington
October 2020

Figure **2-1**

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Table 2-1
Population and Employment

Year	City of Port Orchard Water Service Area	
	Population	Employment
2017	11,261	5,771
2020	13,416	6,065
2029	19,920	6,354
2039	21,314	7,993

Notes:
1) The City of Port Orchard Water Service Area is shown on Figure 1-2.
2) Population and employment projections were based on data provided for the Water Service Area by the Puget Sound Regional Council (PSRC) and proposed developments in the McCormick Woods System. Population and employment shown for year 2020 is based on these projections.
3) Population projections in the McCormick System were based on developments planned in the McCormick System through 2030. Development in the City System and development in the McCormick Woods System after 2030 was based on an assumed buildout growth rate of 0.05% based on PSRC based population growth rates between 2035 and 2040. Note that since future population forecasts for this Water System Plan were based on population counts recorded in 2016, recently recorded population employment and residential population data for 2017 and 2020 were obtained from PSRC so that actual population could be compared against projected future population trends. Actual population and employment populations were lower than projected 2017 and 2020 values by 27% - 47% and 35% - 32%, respectively. Growth in the city has been lower than originally projected and as such, future system demands presented in this Water System Plan are conservative.

Based on an assumed constant household size, the population projections provided by the McCormick Woods developers exceeded PSRC population projections in 2030 by several thousand people. Developer projections were used in lieu of PSRC projections until 2030 as these numbers were more conservative and anticipated to be more reliable. Development of McCormick Woods West is assumed to be phased addition of 1,545 dwelling units by 2030. Proposed development within McCormick Woods is estimated at 430 dwelling units by 2030. Two proposed developments east of the McCormick Woods development (Stetson Heights and McCormick East) are anticipated to build an additional 1,020 units to be served by the 580 Zone by 2030. PSRC projections showed a steady decline in growth rate over the 20-year planning horizon. The final growth rate projected by PSRC between 2035 and 2040 was approximately 0.5%. This rate is assumed to represent growth in Port Orchard once the area is largely built-out. As such, the 0.5% growth rate was used to estimate growth within the City System starting in 2018 and in the McCormick Woods System starting in 2030. The total population projected in the water service area in 2037 that was determined using a combination of developer and PSRC projections, was approximately 13% higher than that of the raw PSRC projections.

As indicated in Table 2-1, the 2017 water service area includes a population of approximately 11,261 people and, based on regional growth projections and information known at the time on proposed developments, could increase to 21,300 people by 2037. This represents a total increase in population of approximately 90% and an average annual growth rate of approximately 3%. Employment within the service area is estimated at approximately 4,500 currently and estimated to reach nearly 7,500 by 2035. This represents an overall employment increase of nearly 30% and an average annual growth rate of approximately 1.3%.

The City does not currently serve the entire service area and residents of the rural outlying area receive water from individual or small community ("six-pack") wells. Demand projections are based on the existing connections, anticipated future connections provided by developers, and growth rates provided by PSRC. As such, projected demands are not impacted by the small number of residences within the service area that are not served by the City

2.3 Water Use

Identification of historical and projected water system demands is critical in the evaluation of a water system's ability to meet the needs of current and future populations of the water service area and also provides the basis for water system modeling and analysis. The following paragraphs outline the methodology used for assessing historical water use and developing future water demand projections.

Water demands are extremely vulnerable to influences such as weather patterns and conservation programs. In addition, the types of water users (commercial versus residential) will have a significant impact on seasonal variations in demands and peaking factors.

Water system demands have been evaluated from a production (water from wells and interties) and consumption (water sales) standpoint and analyzed for the two independent water systems as well as for the combined system. The two systems are the City of Port Orchard system that serves the central City area and the McCormick Woods System that serves the rapidly growing McCormick Woods area that was annexed in August 2009. Water use per residential connection in the McCormick Woods System is nearly twice that for the City System. Similarly, peaking factors associated with summer water use are significantly higher in the McCormick System. Variation in water use patterns are valuable for the identification of how water use efficiency programs may impact the residents of Port Orchard, especially as the City comes closer to connecting the two systems and operating as one. Water system demand projections have been presented for two scenarios; one assuming water use patterns will continue consistent with historical trends, and one that assumes conservation will reduce per capita water use.

Supporting data for water production and sales is provided in Appendix C which contains both Water Rights documentation and Water Use Efficiency (WUE) demand reports for the years 2012 through 2019.

2.3.1 Historical Water Demands

In order to calculate future water system demands and associated source of supply, storage, and transmission requirements, water purchases must be compared to actual water sales, and historical water use characteristics of the various types of connections served must be assessed. A summary of overall water supply is provided in Table 2-2.

As indicated in Table 2-2, non-revenue water refers to water loss through leaks, breaks and unmetered water use. While the City's overall non-revenue water has ranged from 2.2% to 11.1% from 2013 to 2017, the actual distribution system leakage (DSL) rate has been between 1.2% and 8.3%. Authorized non-revenue water was used primarily for construction purposes and water system operational uses such as flushing and facility maintenance; this data was not available for 2015. Non-revenue water accounted for an average of 3.5% of production between 2015 and 2017. A slightly more conservative non-revenue water allowance of 5% was used for future projected demands.

Table 2-2
Combined Systems Historical Production and Sales (in Gallons)

		2013	2014	2015	2016	2017
Water Production and Purchases		337,537,881	357,048,011	358,825,499	368,779,417	351,512,059
Authorized Consumption	Water Sales	314,738,810	317,283,761	350,906,860	351,272,840	339,642,845
	Authorized Other uses [1]	8,397,613	10,016,547	6,000	7,243,040	8,352,000
Distribution System Leakage [2]	Quantity	14,401,458	29,747,703	7,918,639	10,263,537	3,517,184
	% of Production and Purchases	4.3%	8.3%	2.2%	2.8%	1.0%
Non-Revenue Water [3]	Quantity	22,799,071	39,764,250	7,912,639	17,506,577	11,869,184
	% of Production and Purchases	6.8%	11.1%	2.2%	4.7%	3.5%
Average Daily Demand (Production) (MGD)		0.92	0.98	0.98	1.01	0.96
Average Daily Demand (Sales) (MGD)		0.86	0.87	0.96	0.96	0.93

Notes:
1) This category represents unbilled authorized consumption, such as flushing, firefighting, etc.
2) This category represents distribution system leakage as defined in the State Water Use Efficiency Rule as water production and purchases minus authorized consumption.
3) This calculation is water production and purchases minus billed consumption. These numbers are used to develop the non-revenue portion of the demand forecast.
4) No data was available for authorized other uses in 2015.
5) Calculated DSL differs from previously reported DSL values in WUE in 2016 and 2017 due to differences in categorization of authorized consumption and production data.

Irrigation meters are installed on many existing residences in the McCormick Woods area. In addition, irrigation at the McCormick Woods Golf Course is supplied by an allowance of water from McCormick Woods Well 4B.

A summary of water use by customer class is presented in Table 2-3 and Figure 2-2. This information provides generalized data for detailed water demand forecasting, especially when larger scale residential or commercial activities are proposed. For the purpose of this Plan, detailed historical demand data is summarized to provide water use documentation for future demand projections.

Table 2-3
Combined Systems Historical Water Sales by Customer Class (in Gallons)

	2013	2014	2015	2016	2017
Residential	207,753,790	206,519,561	229,042,290	221,516,970	224,766,775
Commercial	58,157,440	57,679,430	61,872,360	61,417,340	57,663,065
Irrigation	19,685,220	22,940,770	29,738,870	28,422,260	24,224,490
City Uses	945,390	1,111,850	1,148,370	1,345,600	2,078,810
Other Government	27,189,630	27,950,730	27,885,080	27,638,990	29,864,720
Churches	1,007,340	1,081,420	1,426,090	1,239,250	1,426,050
Total	**314,738,810**	**317,283,761**	**350,912,860**	**351,276,840**	**339,109,875**
Average Day Demand (ADD)	862,298	869,271	961,389	962,391	930,528
Residential Connections (Units)	3,949	3,971	4,062	4,152	4,243
ADD per ERU (Gal/Res Conn/Day)	144	142	N/A	N/A	145

Notes:
1) 2015 and 2016 residential connection numbers were unavailable. Numbers shown in table were interpolated for between 2014 and 2017 values.
2) Total sales for 2015 through 2017 do not match sum of billing totals by category as billing records by customer category did not match overall annual billing totals within the City. Totals varied by approximately <1%, 3%, and <1% in 2015, 2016, and 2017, respectively. Discrepancies are believed to have resulted from incomplete categorization of billing data.

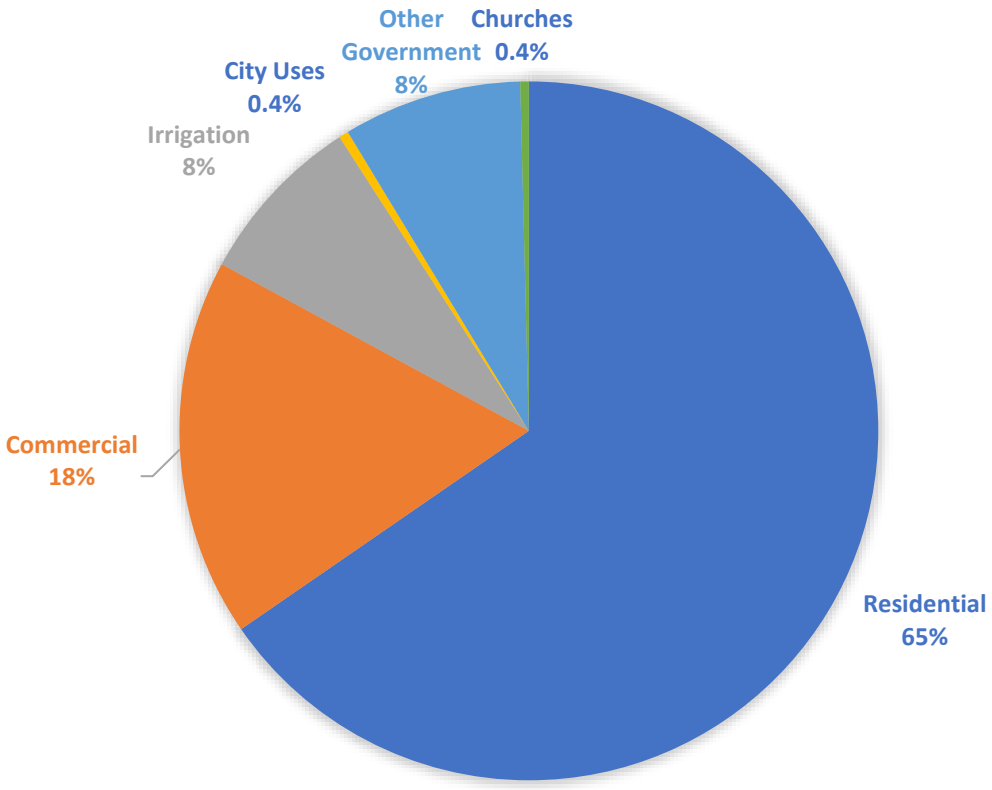

Figure 2-2 Average Water Demand by Customer Class

As indicated, residential water sales constitute the bulk of water sales in the City with single-family connections accounting for approximately 65% of the total annual water demand between 2015 and 2017. Commercial customers used approximately 18% total water demand, irrigation (through dedicated irrigation meters) accounted for 8%, governments other than the City of Port Orchard used 8%, the City of Port Orchard used approximately 0.4%, and churches used approximately 0.4% of the average annual demand between 2015 and 2017.

Table 2-4 presents more detailed data on a monthly basis and as discussed below, provides the basis for more detailed analyses and design criteria.

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Table 2-4
Monthly Water Production vs. Annual Sales

	City System					McCormick Woods System				
	2013	**2014**	**2015**	**2016**	**2017**	**2013**	**2014**	**2015**	**2016**	**2017**
January	18,900,448	13,349,090	21,294,855	20,332,950	19,617,756	3,628,937	4,128,985	4,068,318	3,965,626	3,811,322
February	17,512,404	11,899,680	18,361,283	17,411,945	17,505,892	2,970,642	3,733,545	3,245,231	2,746,912	3,537,006
March	19,441,856	15,298,600	20,405,750	18,825,652	19,565,253	3,611,112	4,599,244	4,268,258	3,931,091	4,007,470
April	18,819,795	14,575,300	19,436,900	19,667,911	18,062,085	3,878,043	5,529,603	4,571,747	5,737,210	3,886,231
May	21,012,617	14,132,480	26,018,666	25,264,973	21,667,507	6,163,924	7,430,018	8,385,124	10,405,916	5,308,556
June	23,358,416	17,861,620	33,199,959	28,390,413	29,085,934	7,753,924	12,433,716	14,378,607	13,679,979	11,963,234
July	27,514,556	23,888,300	33,294,638	28,980,708	34,759,040	12,875,204	18,025,438	17,044,946	9,058,938	16,233,325
August	26,126,190	24,144,120	33,464,159	30,240,000	28,594,624	12,744,277	15,640,293	12,574,055	16,660,398	16,922,624
September	21,512,020	20,036,458	21,815,625	23,574,079	24,495,308	9,128,063	8,691,924	6,300,162	10,080,744	10,912,052
October	18,898,620	15,920,480	22,425,325	19,402,669	20,470,070	5,413,035	7,169,385	4,544,325	5,387,197	4,483,822
November	17,357,024	15,454,642	17,202,921	18,188,244	18,610,578	3,955,289	5,339,837	4,480,397	2,912,858	3,414,698
December	17,476,077	14,285,748	17,942,967	18,476,280	18,223,331	3,712,727	5,350,580	3,780,196	3,580,866	4,001,447
Production*	**261,702,705**	**271,981,532**	**268,354,628**	**282,687,224**	**267,138,796**	**75,835,177**	**85,066,479**	**90,470,871**	**86,092,193**	**84,373,263**
Sales	**240,703,810**	**240,054,761**	**263,980,640**	**267,667,240**	**257,609,875**	**74,035,000**	**77,199,000**	**86,926,220**	**83,605,600**	**82,033,000**
Non-Revenue Water	**20,998,895**	**31,926,771**	**4,373,988**	**15,019,984**	**9,528,921**	**1,800,177**	**7,867,479**	**3,544,651**	**2,486,593**	**2,340,263**
Residential Sales	133,718,790	129,290,561	152,405,070	151,733,370	155,828,775	74,035,000	66,236,000	73,306,220	69,783,600	68,938,000
Residential Units	3,246	3,383	3,201	3,286	3,337	740	861	866	878	906
Use per ERU (Sales)	113	105	133	126	128	274	211	232	218	208
% Non-Rev. Water	8%	12%	2%	5.3%	4%	2%	9%	4%	3%	3%
Total Demand per ERU	**123**	**119**	**133**	**134**	**133**	**281**	**232**	**241**	**224**	**214**
Estimated ERUs	**5,843**	**6,281**	**5,915**	**5,797**	**5,517**	**740**	**1,004**	**1,027**	**1,052**	**1,078**
Peak Day Demand	**1,023,196**	**1,190,105**	**1,476,518**	**1,764,634**	**1,528,644**	**689,160**	**983,510**	**869,300**	**772,596**	**864,135**
Peaking Factor	**1.4**	**1.6**	**2.0**	**2.3**	**2.1**	**3.3**	**4.2**	**3.5**	**3.3**	**3.7**

Notes:
1) Residential units for the City System were not available for years 2015 and 2016. Residential units for these years were estimated based on the interpolated total residential connections (see Table 2-3) and the known connections in the McCormick System over these years.
2) Monthly production data is based on daily well meter readings and bi-monthly water transfer quantities from the City of Bremerton. Sum of monthly totals do not match annual production totals previously determined by City. Discrepancy in annual production totals is believed to result from data recording errors. Monthly sums and annual totals vary in either direction and result in an average of 3% difference between 2015 and 2017.
3) Estimated ERUs were developed using PSRC population projections plus anticipated ERUs associated with currently known large developments in the McCormick Woods area as provided by developers. See Section 2.2.

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Table 2-4 presents detailed information on the historical water demand for years 2013 through 2017. Review of this data, together with daily water production data from each source, indicates that a peak day for the City System was on average 2.1 times the average day demand (down from 2.2 in the previous Water System Plan). The average peaking factor of 2.1 is used for future water system planning in the City System; the higher peaking factor that results in 2016 is the only value that exceeds 2.1 over the last 6 years and is believed to be an outlier. The average demand per ERU between 2015 and 2017 was 126 gpd in the City System; a value of 130 gpd/ERU was used to project future City demands.

Water production rates for McCormick Woods System indicate that peaking factors ranged from approximately 3.3 to 4.2 in the past five years with an average peaking factor of 3.6. The selected peaking factor of 3.8 used for the McCormick Woods System is slightly greater than the average to account for variability across years. The future development areas in the McCormick Woods System are anticipated to have lower demand due to the significantly reduced lot size. The decrease in lot size is anticipated to result in reduced lawn watering during the summer months when demands are highest. The average demand per ERU between 2015 and 2017 was 220 gpd in the McCormick System; this value was used to project future demands in the existing McCormick Woods System, but reduced by 15% for future development in the 580 and 660 Zones due to the reduced lot size.

The seasonal water use summary (Figure 2-3) presents the average bi-monthly water use by customer class between 2015 and 2017. The data presented is for billing months and typically represents a one-month lag from actual water use.

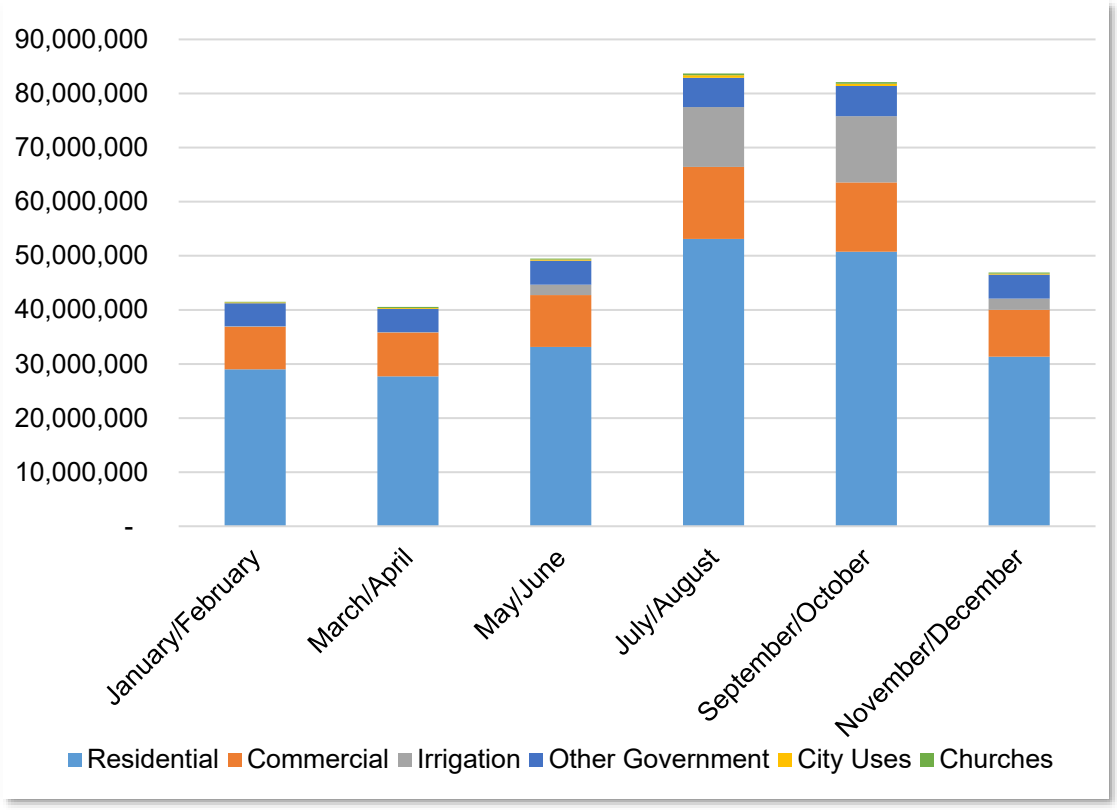

Figure 2-3 Total Bi-Monthly Water Production by Customer Class

Figure 2-4 presents the total bi-monthly consumption over the last three years.

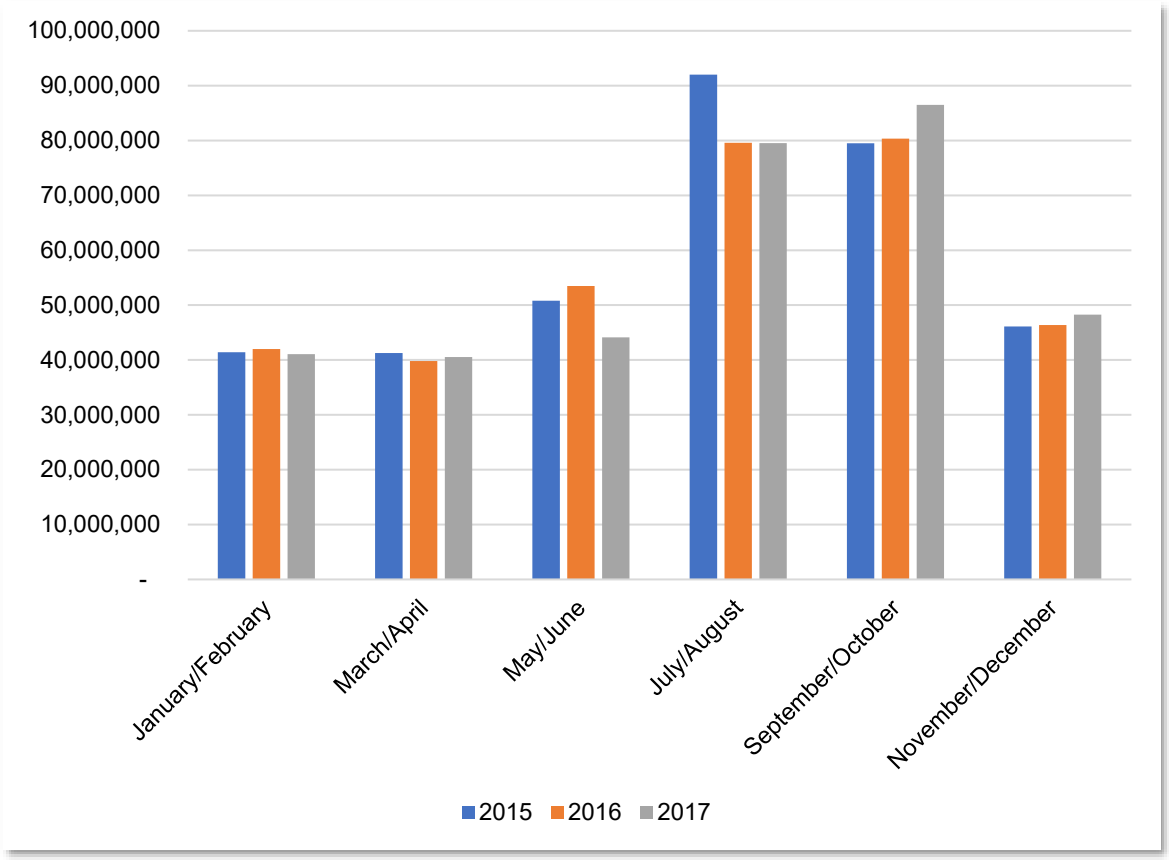

Figure 2-4 Total Bi-Monthly Water Production History

Bi-monthly consumption remained relatively consistent between 2015 and 2017. No clear trends in seasonal use patterns are evident over this period (i.e., 2015 consumption vs 2017 consumption).

2.3.2 Projected Water Demands

Water system demand projections have been developed based on documented past water use and historical growth trends. Separate projections for water use with and without conservation are presented in Table 2-5 and Table 2-6. The City's conservation goals which are reflected in Table 2-6 represent a 5 gpd/ERU demand reduction by 2030. Conservation goals are discussed in greater detail in Chapter 4. The projections assume that development within the established service area will be served by the water system.

Commercial demands were assumed to increase in proportion to population projections provided by PSRC. All other non-residential demands (i.e., irrigation, City uses, other government, and churches) were projected to increase in proportion to the growth in dwelling units.

The 660 Zone will be comprised entirely of new development; however, the 580 Zone will be comprised of both existing and new development. The average demand per ERU in the 580 Zone shown in Table 2-5 and Table 2-6 declines over the 20-year planning horizon due to the introduction of new development with a lower estimated average demand per ERU, as discussed earlier in this Chapter. Thus, the average demand per ERU within the 580 Zone declines as the proportion of the zone that is new development increases. Note that the decline in average demand per ERU in Table 2-5 does not account for any conservation.

The projections reflect significant growth in certain parts of the service area, especially in the western area surrounding McCormick Woods and development near Glenwood Road and are based on the growth projections discussed previously in this chapter. Note that 650 ultimate ERUs associated with the area near Glenwood Road have been included with the McCormick Woods, or 580 Zone, projected demands. Development in this area is anticipated to include the Stetson Heights Development and the McCormick East Development. As described under the system analysis section of the Plan, this area will interconnect the City and the McCormick Woods Systems. This will allow for source and storage to these developments to be a combination of the two currently separate systems (see Chapter 3 for discussion of future hydraulic analysis).

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Table 2-5
ERUs and Demands by Pressure Zone without Conservation
(Demands Expressed in Million Gallons Annually)

Zone	2017		2018		2019		2020		2021		2022		2023		2029		2039	
	ERUs	Use (mg)	ERUs	Use (mg)	ERUs	Use (mg)	ERUs	Use (mg)	ERUs	Use (mg)	ERUs	Use (mg)	ERUs	Use (mg)	ERUs	Use (mg)	ERUs	Use (mg)
City 260	2,601	123	2,601	123	2,601	123	2,601	123	2,601	123	2,606	124	2,623	124	2,709	129	2,985	142
City 390	3,178	151	3,178	151	3,178	151	3,178	151	3,178	151	3,185	151	3,206	152	3,311	157	3,649	173
City Total	**5,779**	**274**	**5,779**	**274**	**5,779**	**274**	**5,779**	274	**5,779**	**274**	**5,792**	**275**	**5,829**	**277**	**6.021**	**286**	**6,634**	**315**
McCormick Woods 580	1,125	90	1,287	101	1,412	109	1,662	126	2,037	126	2,411	176	2,786	202	3,410	244	3,564	254
McCormick West 660	0	0	249	17	458	31	564	38	6,70	38	956	65	1,062	72	1,697	115	1,974	133
McCormick Total	1,125	**90**	**1,536**	**118**	**1,869**	**140**	**2,226**	164	2,706	164	3,368	241	3,848	273	5,106	358	5,538	387
Total	**6,904**	**364**	**7,315**	**392**	**7,648**	**414**	**8,005**	**438**	**8,485**	**438**	**9,159**	**516**	**9,677**	**550**	**11,127**	**644**	**12,172**	**702**
City System gpd/ERU	130		130		130		130		130		130		130		130		130	
McCormick Woods 580	220		214		211		207		203		200		198		196		195	
McCormick West 660 gpd/ERU	185		185		185		185		185		185		185		185		185	

Notes:
1) Future demand projections for the 580 Zone include developable lands located both inside and outside the existing McCormick Woods development area.
2) ERUs and demand forecasts are based on population data available in 2017. As of 2020 no development had occurred in the 660 Pressure Zone.

Table 2-6
ERUs and Demands by Pressure Zone with Conservation
(Demands Expressed in Million Gallons Annually)

Zone	2017		2018		2019		2020		2021		2022		2023		2029		2039	
	ERUs	Use (mg)	ERUs	Use (mg)	ERUs	Use (mg)	ERUs	Use (mg)	ERUs	Use (mg)	ERUs	Use (mg)	ERUs	Use (mg)	ERUs	Use (mg)	ERUs	Use (mg)
City 260	2,601	123	2,601	123	2,601	122	2,601	121	2,601	120	2,606	120	2,623	120	2,709	124	2,985	136
City 390	3,178	151	3,178	150	3,178	149	3,178	148	3,178	147	3,185	146	3,206	146	3,311	151	3,649	166
City Total	**5,779**	**274**	**5,779**	**272**	**5,779**	**271**	**5,779**	**269**	**5,779**	**267**	**5,792**	**266**	**5,829**	**266**	**6.021**	**275**	**6,634**	**303**
McCormick Woods 580	1,125	90	1,287	100	1,412	108	1,662	124	2,037	149	2,411	173	2,786	196	3,410	237	3,564	248
McCormick West 660	-	-	249	17	458	31	564	38	670	44	956	63	1,062	70	1,697	111	1,974	130
McCormick Total	**1,125**	**90**	**1,536**	**117**	**1,869**	**139**	**2,226**	**162**	**2,706**	**193**	**3,368**	**236**	**3,848**	**266**	5,106	**349**	5,538	**377**
Total	**6,904**	**365**	**7,315**	**389**	**7,648**	**409**	**8,005**	**431**	**8,485**	**460**	**9,159**	**502**	**9,677**	**532**	**11,127**	**624**	**12,172**	**680**
City System gpd/ERU	130		129		128		128		127		126		125		125		125	
McCormick Woods 580	220		213		210		205		200		196		193		191		190	
McCormick West 660 gpd/ERU[1]	185		184		183		183		182		181		180		180		180	

Notes:
1) Future demand projections for the 580 Zone include developable lands located both inside and outside the existing McCormick Woods development area.
2) ERUs and demand forecasts are based on population data available in 2017. As of 2020 no development had occurred in the 660 Pressure Zone.

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Chapter 3 System Analysis

3.1 Design, Construction, and Water Quality Standards

Minimum design criteria for the City of Port Orchard's water system must be in accordance with the standards and requirements put forth by the U.S. Environmental Protection Agency, the Washington State Department of Health (DOH), Kitsap County, and the City. The minimum design criteria of the City must also be in accordance with the criteria established by the Kitsap County Coordinated Water System Plan.

Minimum design criteria include water supply requirements, storage volume, distribution system and transmission main capacity, and water quality standards. These criteria were used to determine deficiencies in the existing water system and establish design requirements for the future water system within the City's service area. The City of Port Orchard's Water System Standards are provided in Appendix G.

3.1.1 State Agency Regulations

The Washington State Department of Health's "Water System Design Manual" (2019) is the primary document governing the sizing and design of Group A public water systems in the state of Washington. This publication sets forth the minimum design guidelines and planning requirements for the supply, storage, distribution, and quality of potable water within Group A public water systems.

3.1.2 Reference Datum

The datum used for planning of facilities in this study and for City design work is based on NAD 83 State Plane Washington North.

3.1.3 General Considerations

Design Period

In planning water facilities, it is necessary for the design to be adequate over a specific time period. The period of design for this study is approximately 20 years. This means that in the facilities proposed in this study may have reached their maximum supply capacity, assuming the population projections are reached, within a 20-year period. Many of the components of the water system, however, have much longer useful lives than 20 years and will continue to serve the community far beyond the design period.

Public water systems should be designed to provide fire suppression capability in accordance with the requirements of the local Fire Marshal.

Phased development is permitted where full development will take several years.

Reliability

Multiple water sources are recommended in combination with adequate emergency reserve in gravity storage to allow for interruption of supply, while still maintaining water supply to the system at the design rate.

Looping and upsizing of small water mains to improve circulation quality and fire flow is an on-going goal of the City.

Pumping stations are to contain multiple booster pumps of sufficient capacity to meet the maximum day demands with the largest pump out of service.

Auxiliary power is required where adequate gravity storage is not provided.

3.1.4 Water Supply Recommendation and Requirements

The DOH Water System Design Manual sets forth the following recommendations for water supply systems and pump stations, with additional requirements for booster pump stations.

Water Supply and Source Pump Stations

Source capacity must meet the maximum day demand of the system. It is also recommended that the source is sufficient to meet the maximum day criteria while concurrently replenishing the fire suppression storage volume within 72 hours of its depletion. Port Orchard recognizes that alternate and independent sources of supply, such as interties with other water systems, coupled with adequate storage capacity may provide a sufficient level of reliability on an interim basis.

Water source pump stations should be capable of providing the maximum day demand for the system with 18 hours of pumping.

Pump stations shall be provided with a minimum of 20 pounds per square inch (psi) at the inlet side of the pumps under peak hour demand or fire flow plus maximum day demand rate conditions.

Pump stations shall have an automatic shut-off in place for when the inlet pressure drops below 10 psi.

Pump stations shall have power connections available to independent primary public power sources or provision for in-place auxiliary power if the pumps provide fire flow or are pumping from ground level storage.

Booster Pump Stations

Open system Booster Pump Stations (BPS), which transfer water to a higher-pressure zone governed by an atmospheric storage tank, shall be capable of providing source capacity as established for water supply sources in the previous section.

Closed system Booster Pump Stations, which transfer water to a higher-pressure zone closed to the atmosphere, shall provide peak hourly demand with a minimum of 30 psi of pressure at all connections. It is recommended that this design requirement is satisfied with the largest pump off-line.

Closed system BPS shall provide fire flow in conjunction with maximum daily demand with 20 psi of residual pressure. Additionally, since this system is located in an area governed by the Public Water System Coordination Act of 1977 (PWSCA), this capability must be provided with the largest pump off-line.

3.1.5 Water Distribution Recommendations and Requirements

Water Pressure

Water systems shall be designed to provide peak hourly demand with a positive pressure of 30 psi at every connection to the system, which is normally at the property line of the service connection.

For fire flow, the distribution system shall be designed to provide the required fire flow and maximum daily demand at a residual pressure of 20 psi throughout the system. Required fire flow shall be established by the local Fire Marshal.

Maximum pressures in the distribution system shall not exceed 100 psi.

When pressures exceed 80 psi, the customer should provide and maintain individual pressure reducing valves (PRV) in accordance with the provisions of the Uniform Plumbing Code (UPC).

Pipe Sizing and Materials

Maximum velocity in distribution pipelines shall not exceed 8 feet per second (fps) under peak hour demand conditions. Flow velocities during fire events may exceed this maximum limit but shall remain below 10 fps.

Minimum pipe diameter for all distribution mains and mains providing fire flow is 6-inches nominal inside diameter, except for looping and dead-end mains beyond hydrants as approved by the City. All pipelines shall be designed and constructed to accommodate domestic and fire flow conditions as determined by the City.

Dead end mains are generally not accepted by the City, except in phased development projects or where no potential for future interconnection of facilities exists. Approved dead end mains, which will not serve fire hydrants, may be 6-inches in diameter in residential areas and 8-inches in commercial areas or as hydraulically justified and approved by the City.

New water mains shall be constructed of cement mortar lined, ductile iron pipe conforming to AWWA C 151 and C 104, minimum thickness Class 52 conforming to ANSI/APWA C 105-72.

All water main fittings are to be cement mortar lined, ductile iron conforming to AWWA C 110 or C 153, with 250 psi minimum working pressure.

All push-on and mechanical joints are to conform to AWWA C-111, and restrained joints shall conform to City requirements.

All water system pipelines shall be constructed of "lead-free" materials (a weighted average of 0.25 percent calculated across the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures and 0.2 percent for solder and flux).

Minimum cover over pipes 12-inches in diameter and smaller shall be 36 inches minimum, and 48 inches minimum cover over pipes greater than 12-inches in diameter. Maximum cover over pipe shall be 60 inches.

Transmission and distribution pipelines shall be at least 10 horizontal feet from any existing or proposed sanitary sewer utilities and 5 horizontal feet from other utilities, measured edge-to-edge. At least 18 inches of vertical separation (measured edge-to-edge) shall be maintained between the top of a sanitary sewer main and the bottom of a water line. A minimum vertical separation of 6 inches, measured edge-to-edge, is required between all other utilities. Exceptions to these minimum standards must meet the special requirements set forth by the Washington State Department of Ecology and must be approved by the City.

Valves

Valves shall be ductile iron and shall be installed in a configuration that permits isolation of lines.

Valves should be installed at intersections, and with normal maximum spacing at 500 feet in commercial, industrial, and multi-family areas, 600 feet in residential areas, and 1/4 mile in transmission mains. Additional isolation valving may be required by the City and will be determined on a case-by-case basis.

Air entrainment, air release, or combined air-vacuum relief valves are to be installed at appropriate points of high elevation in the system. All piping in the system shall be sloped to permit escape of any entrained air.

Zone isolation valves shall be installed at zone boundaries to permit future pressure zone realignment without the need for pipe realignment.

A blow-off assembly or fire hydrant shall be installed on all dead end runs and at designated points of low elevation to provide a means for adequate flushing of the system. The blow-off assembly shall be installed in a utility right-of-way, except where a written access and construction easement is provided to the water utility. In no case shall the location be such that a possibility of back-siphonage into the distribution system exists.

The blow-off assembly shall be sized to achieve a minimum flow velocity of 2.5 feet per second in the main.

Fire Hydrants

Fire hydrants shall comply with the minimum requirements established by the local Fire Marshal having jurisdiction and meet the type, location and spacing requirements of the agency having jurisdiction in the project area. In general, minimum spacing for hydrants in commercial and multi-family areas shall be 300 feet on center and 600 feet on center in single-family residential areas.

Cross Connection Control

Where the possibility of contamination of potable water exists, water services shall be equipped with appropriate cross connection control assemblies in accordance with DOH requirements and the City's Cross Connection Control Program (CCCP). The CCCP is established by Port Orchard Municipal Code 13.04.100, a copy of which is located in Appendix J. The CCCP is in compliance with WAC 246-290-490 and addresses the nine key elements required for Cross Connection Control. The need and location of cross connection assemblies shall be determined by the City.

3.1.6 Storage Recommendations and Requirements

Storage requirements are based on five components: operational storage, equalizing storage, standby storage, fire suppression storage, and dead storage. The minimum requirements for each of the components of the total storage requirement are summarized in Chapter 7. The minimum amount of storage required shall be adequate to provide for equalizing storage plus the larger of standby or fire suppression storage. The recommended storage volume is equal to the sum of the equalizing, standby and fire suppression storage components. See Chapter 7 for an illustration of the various storage components of total required storage. A complete analysis of the City's water storage requirements and existing capacities is provided in Chapter 4.

3.1.7 General Facility Replacement

All piping, pumping, source, storage and other facilities, shall be located in public rights-of-way, dedicated utility easements or on City-owned property. Utility easements must be a minimum of 15 feet in width, and piping shall be installed no less than 5 feet from the easement's edge. Any exceptions to this minimum easement will be at the discretion of the City. Unrestricted access shall be provided to all public water system lines, appurtenances, and fire hydrants.

The location of utilities shall be in accordance with the standards and guidelines established by local jurisdiction criteria. Where existing utilities or storm drains are in place, new facilities shall conform to these standards while also being compatible with the existing installations.

3.1.8 Water Quality Standards

Section 3.2 of this Plan puts forth detailed information regarding the maximum contaminant levels allowed in drinking water supplies as put forth by the Washington State Department of Health (DOH) at the time of publication of this Plan. Additional requirements of the federal Safe Drinking Water Act (SDWA) are also discussed, along with the City's plans for additional future monitoring.

3.1.9 Standard Plans and Details

In accordance with WAC 246-290-120, the City maintains standard plans and details on file with the State Department of Health. These standards address construction requirements for: the installation of hydrants, valves, fittings and meters; repair or replacement of system components with similar components; and maintenance or painting of surfaces not contacting potable water. The standard plans and specifications also constitute a waiver form formal submittal and approval of specific distribution main improvements provided that construction of such projects are certified by a registered professional engineer and provided that the City submits required documentation to DOH prior to placing the distribution pipeline into service. All other water system improvement projects require submittal to and approval by the Washington State Department of Health. A copy of the City's standards is on file at the City and is included in the Appendices to this document. The City uses the current version of the WSDOT specifications and corresponding APWA specifications.

3.2 Water Quality Analysis

This section summarizes the City of Port Orchard's status with respect to regulated drinking water contaminants covered by WAC 246-290 and anticipated water quality regulations and discusses water quality issues facing the City.

3.2.1 Regulatory Background

The City's water system is regulated by the federal Environmental Protection Agency (EPA) and the state Department of Health (DOH). EPA has delegated primacy (primary enforcement responsibility for water quality) to the State of Washington under the provisions of the federal Safe Drinking Water Act (SDWA). To maintain primacy, the state must adopt drinking water regulations at least as strict as the federal regulations.

In 1974, the SDWA was enacted, requiring EPA to set enforceable health-related drinking water quality standards for all public water systems (PWSs) serving 25 persons or more. EPA set interim standards in 1975 based upon the 1962 USPHS guidelines. The health-related standards, also known as National Primary Drinking Water Regulations (NPDWRs) or "primary standards," set maximum contaminant level goals (MCLGs) and maximum contaminant levels (MCLs) for different contaminants. In 1986 and 1996, the SDWA was amended, resulting in a substantial increase in the number of regulated compounds. Water utilities were also required to monitor for many unregulated compounds for which MCLs had not been developed. Currently there are NPDWRs for 84 contaminants.

The SDWA also required EPA to set non-enforceable secondary drinking water standards for contaminants that adversely impact the aesthetic water quality. These standards are not enforced and are referred to as secondary MCLs. Table 3-1 lists the primary and secondary maximum contaminant levels.

Table 3-1
Primary and Secondary Maximum Contaminant Limits (MCL)

Parameter	Units	MCL	Detection Limit	Comments
Inorganics/Primary				
Antimony (Sb)	mg/L	0.006	0.002	
Arsenic (As)	mg/L	0.01	0.01	a
Asbestos	1 E^6 fibers/L	7 (> 10 um)		
Barium (Ba)	mg/L	2.0	0.1	
Beryllium (Be)	mg/L	0.004	0.002	
Cadmium (Cd)	mg/L	0.005	0.002	
Chromium (Cr)	mg/L	0.1	0.01	
Copper (Cu)	mg/L	b	0.2	a
Cyanide (HCN)	mg/L	0.2	0.05	
Fluoride (F)	mg/L	4.0	0.2	
Lead (Pb)	mg/L	b	0.002	a
Mercury (Hg)	mg/L	0.002	0.0005	
Nickel (Ni)	mg/L	0.1	0.04	
Nitrate (as N)	mg/L	10.0	0.2	
Nitrite (as N)	mg/L	1.0	0.2	
Selenium (Se)	mg/L	0.05	0.005	
Sodium (Na)	mg/L	b	5	a
Thallium (Tl)	mg/L	0.002	0.001	

Table 3-1 Primary and Secondary Maximum Contaminant Limits (MCL)				
Parameter	**Units**	**MCL**	**Detection Limit**	**Comments**
Inorganics/Secondary				
Chloride (Cl)	mg/L	250.0	–	
Fluoride	mg/L	2.0	0.2	
Iron (Fe)	mg/L	0.3	0.03	
Manganese (Mn)	mg/L	0.05	0.01	
Silver (Ag)	mg/L	0.1	0.01	
Sulfate (SO_4)	mg/L	250.0	–	
Zinc (Zn)	mg/L	5.0	0.05	
Physical Characteristics/Secondary				
Color	Color Units	15	5.0[b]	At 25°C
Hardness	mg/L $CaCO_3$	None	N/A	
Specific Conductivity	µmhos/cm	700	–	
TDS	mg/L	500	–	[b]
Disinfection By-Products/Primary				
Total Trihalomethanes (TTHM)	mg/L	0.080	–	
Haloacetic Acids	mg/L	0.060	–	
Bromate	mg/L	0.010	-	
Chlorite	mg/L	1.0	-	
Pesticides				
Endrin	mg/L	0.0002	0.00001	
Lindane	mg/L	0.004	–	
Methozychlor	mg/L	0.1	0.0001	
Toxaphene	mg/L	0.005	0.001	
2, 4-D	mg/L	0.1	–	
2, 4, 5-TP Silvex	mg/L	0.01	–	
Radionuclides/Primary				
Uranium	µg/L	30.0		
Combin1ed Radium–226 and Radium-228	PCi/L	5.0		
Gross Alpha Particle	PCi/L	15.0		
Beta/Photon Emitters	Mrem/yr	4.0		
Volatile Organic Chemicals/Primary				
Vinyl Chloride	mg/L	0.002	0.0005	
Benzene	mg/L	0.005	0.0005	
Carbon Tetrachloride	mg/L	0.005	0.0005	
1, 2-Dichloroethane	mg/L	0.005	0.0005	

Table 3-1 Primary and Secondary Maximum Contaminant Limits (MCL)				
Parameter	**Units**	**MCL**	**Detection Limit**	**Comments**
Trichloroethylene	mg/L	0.005	0.0005	
Volatile Organic Chemicals/Primary				
Para-Dichlorobenzene	mg/L	0.075	0.0005	
1, 1-Dichloroethylene	mg/L	0.007	0.0005	
1, 1, 1-Trichloroethane	mg/L	0.2	0.0005	
Cis-1, 2-Dichloroethylene	mg/L	0.07	0.0005	
1, 2-Dichloropropane	mg/L	0.005	0.0005	
Ethylbenzene	mg/L	0.7	0.0005	
Monochlorobenzene	mg/L	0.1	0.0005	
o-Dichlorobenzene	mg/L	0.6	0.0005	
Styrene	mg/L	0.1	0.0005	
Tetrachloroethylene	mg/L	0.005	0.0005	
Toluene	mg/L	1	0.0005	
Trans-1, 2-Dichloroethylene	mg/L	0.1	0.0005	
Xylenes (total)	mg/L	10	0.0005	
Dichloromethane	mg/L	0.005	0.0005	
1, 2, 4-Trichlorobenzene	mg/L	0.07	0.0005	
1, 1, 2-Trichloroethane	mg/L	0.005	0.0005	
Synthetic Organic Compounds/Primary				
Alachlor	mg/L	0.002	0.0004	
Aldicarb	mg/L	0.003	0.001	
Aldicarb sulfoxide	mg/L	0.004	0.0018	
Aldicarb sulfone	mg/L	0.002	0.0007	
Atrazine	mg/L	0.003	0.0002	
Carbofuran	mg/L	0.04	0.002	
Chlordane	mg/L	0.002	0.0004	
Dibromochloropropane	mg/L	0.0002	–	
2, 4-D	mg/L	0.07	0.0002	
Ethylene dibromide	mg/L	0.00005	–	
Heptachlor	mg/L	0.0004	0.00008	
Heptachlor epoxide	mg/L	0.0002	0.00004	
Lindane	mg/L	0.0002	0.00004	
Methoxychlor	mg/L	0.04	0.0002	
Polychlorinated biphenyls	mg/L	0.0005	–	
Pentachlorophenol	mg/L	0.001	0.00008	
Toxaphene	mg/L	0.003	0.002	

Table 3-1 Primary and Secondary Maximum Contaminant Limits (MCL)				
Parameter	**Units**	**MCL**	**Detection Limit**	**Comments**
2, 4, 5-TP	mg/L	0.05	0.0004	
Benzo[a]pyrene	mg/L	0.0002	0.00004	
Dalapon	mg/L	0.2	0.002	
Synthetic Organic Compounds/Primary				
Di (2-ethylhexyl) adipate	mg/L	0.4	0.0013	
Di (2-ethylhexyl) phthalate	mg/L	0.006	0.0013	
Dinoseb	mg/L	0.007	0.0004	
Diquat	mg/L	0.02	–	
Endothall	mg/L	0.1	–	
Endrin	mg/L	0.002	0.00004	
Glyphosate	mg/L	0.7	–	
Hexachlorobenzene	mg/L	0.001	0.0002	
Hexachlorocyclopentadiene	mg/L	0.05	0.0002	
Oxamyl (Vydate)	mg/L	0.2	0.004	
Picloram	mg/L	0.5	0.0002	
Simazine	mg/L	0.004	0.00015	
2, 3, 7, 8-TCDD (Dioxin)	mg/L	3E-8	–	

Notes:

a. Although the state board of health has not established MCLs for copper, lead, and sodium, there is sufficient public health significance connected with these elements to require inclusion in inorganic chemical and physical source monitoring. For lead and copper, EPA has established distribution system related levels at which a system is required to consider corrosion control. The levels, called “action levels,” are 0.015 mg/L for lead and 1.3 mg/L for copper and are applied to the highest concentration in 10 percent of all samples collected from the distribution system. EPA has also established a recommended level of 20 mg/L for sodium as a level of concern for those consumers with restricted diets of daily sodium intake.

b. Required only when specific conductivity exceeds 700 µmhos/cm.

3.2.2 Current Regulations, Data, and Impacts

This section discusses drinking water regulations, the current operations data, and impacts on the City. The data shows that the City has high quality water from the well sources and in the distribution system. The regulations discussed in this section include:

- Total Coliform Rule (TCR)
- Fluoride Regulation
- Lead and Copper Rule (LCR)
- Phase I - Volatile Organic Compounds (VOCs)
- Phases II and V - Synthetic Organic Compounds (SOCs) & Inorganic Compounds (IOCs)

- Iron and Manganese
- Wellhead Protection
- Stage 2 Disinfectants/Disinfection Byproducts Rule
- Radionuclides Rule
- Arsenic Rule
- Consumer Confidence Reports Rule (CCRs)
- State Regulated Contaminants

Revised Total Coliform Rule

The RTCR requires utilities to develop a coliform monitoring plan. The City is currently required to collect a minimum of fifteen routine coliform samples in the City system and three in the McCormick Woods system every month.

If one or more coliform bacteria are detected in a sample (positive sample), the City is required to collect and analyze three repeat samples for each positive sample. One repeat sample must be taken from the same location as the original positive sample. A repeat sample must be collected within five service connections of each side of the original positive sample location. All routine and repeat samples that are positive for coliform must be analyzed for fecal coliform or Escherichia coli (E. coli.). Fecal coliform or E. coli are indicators of potential recent sewage or animal waste contamination of the water and are cause for increased public health concern.

The most recent update to the City's Coliform Monitoring Plan is included in Appendix E. The City collects fifteen samples in the City's system and three samples in McCormick Woods per month. The sample locations are divided among the City's wells, storage tanks, and set sample stations in the distribution system. Samples are analyzed by an Ecology-certified laboratory as required. The City's system had no samples test positive in 2017 and 2018. The McCormick Woods system had no samples test positive for Coliform for the years 2017 and 2018. The goal is 0% samples with total coliform per month, and the MCL is greater than 5% samples with total coliform per month.

As the City's customer base continues to grow, the sampling requirements will increase. No action besides continued monitoring is required at this time.

Fluoride Regulation

EPA has reduced the target fluoridation level to 0.7 milligrams per liter (mg/L). The purpose of the fluoride MCL is to reduce the public health risk of contracting skeletal or dental fluorosis (mottled tooth enamel) due to excessive fluoride concentrations in drinking water. Water quality must be monitored for fluoride annually for surface water supplies and every third year for groundwater supplies. There is a 2.0 mg/L secondary MCL for fluoride.

The City triennially collects samples for fluoride analysis from its well sources. Data reports were reviewed for samples collected in 2011 and 2015. For these samples reported concentrations in treated water varied from 0.5 to 0.9 mg/l and untreated concentrations were less than 0.2 mg/L for all well sources. The CCR for 2018 shows Fluoride concentrations varying between less than 0.2 mg/L and 1.0 mg/L. The City's water is fluoridated to 1.0 mg/L.

Because the City's source concentrations of fluoride are well below the MCL, fluoride is added. However, the City receives unfluoridated water from the City of Bremerton. The quantity of unfluoridated water the City receives will vary. It is anticipated that fluoride concentrations will vary throughout the City when City of Bremerton water is used.

Lead and Copper Rule

EPA adopted the Lead and Copper Rule for drinking water in 1992. Lead or copper in tap water is predominantly related to corrosion of plumbing system components, including copper pipes, lead-based solder used to join segments of copper pipe, and brass faucets that contain lead and copper.

The rule requires samples be collected from targeted high-risk sites. The Lead Action Level is exceeded if more than 10 percent of the samples collected from the targeted sites exceed 15 micrograms per liter (µg/L) in a 6-month monitoring period. The Copper Action Level is exceeded if more than 10 percent of the samples exceed 1.3 mg/L in a 6-month monitoring period. If the monitoring results for a public water system (PWS) exceed the Lead Action Level, the water system must conduct a public information campaign and if either the Lead or Copper Action Level is exceeded, the utility must implement and optimize corrosion control strategies.

The City conducts triennial sampling for lead and copper in the distribution system. Sampling performed in 2018 showed no levels above the action level for either Lead or Copper. In the City system, the Copper concentrations varied from 0.02 to 0.05 mg/l and the Lead concentrations varied from 1 to 3 µg/L. In the McCormick Woods system, the Copper concentrations varied from 0.02 to 0.2 mg/l and the Lead concentrations varied from 1 to 4 µg/L. All measured lead and copper levels were well below the action level.

The City has low lead and copper concentrations in the samples. No impacts are anticipated.

Phase I – Volatile Organic Compounds

In 1987, EPA promulgated MCLs for eight Phase I VOCs as shown in Table 3-2. In addition, monitoring was required for an additional 51 unregulated organic compounds. Groundwater systems are required to sample each entry point into the distribution system. State regulatory agencies with primacy are allowed to reduce the sampling frequency for groundwater systems if VOCs were not detected and the system is considered not vulnerable. If no VOCs were verified during the initial 12-month monitoring period, the utility is required to monitor every 36 months.

Table 3-2
Volatile Organic Compounds (VOC)

EPA Regulated Compound	Sample Results µg/L						
	Well 6	Well 7	Well 8	Well 9	McCormick Wells 1, 2, 3	Broadstone	Sedgewick Unical
Chloroform	2.1	0.5	0.5	0.7	0.5	0.5	0.5
Bromodichloromethane	1.1	0.5	0.5	0.5	0.5	0.5	0.5
Dibromochloromethane	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Bromoform	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Trihalomethane	3.7	ND	ND	0.7	ND	ND	1.5

The City collects samples for VOC monitoring every 6 years for every well.

Because chloroform is regulated as a THM and the MCL for TTHM is 80 µg/L, the amount of chloroform detected in the samples was not a concern.

Based on historical data taken between 2012 and 2017, the City groundwater complies with the established MCLs. No impacts are anticipated other than the continued cost of monitoring.

Phases II and V – SOCs and IOCs

On January 1, 1993, EPA established regulations for 38 Phase II and 23 Phase V Synthetic Organic Compounds (SOCs) and Inorganic Compounds (IOCs). The contaminants regulated under Phase II and Phase V are listed in Table 3-3.

A 9-year compliance cycle containing three 3-year compliance periods was established in 1993. Systems must complete base monitoring and increase monitoring based on trigger levels. Monitoring requirements for asbestos, nitrate, and nitrite are distinct from the standardized monitoring framework set up for the other SOC/VOCs.

Asbestos monitoring is conducted every 9 years unless the MCL is exceeded; then quarterly monitoring is required. Nitrate monitoring requires an initial round of quarterly samples followed by annual monitoring. If the nitrate results exceed 50 percent of the MCL, the system is required to continue taking quarterly samples. Nitrite monitoring requires an initial sample and then, if the initial sample exceeds 50 percent of the MCL, may require quarterly monitoring. No waivers are given for nitrate and nitrite monitoring due to the acute danger of methemoglobinemia.

The City monitors each well every 9 years for IOCs. Table 3-2 summarizes the sample concentrations collected by the City for Phase II IOCs. None of the samples collected at the wellheads had any inorganic contaminant concentrations that exceeded an established MCL.

Table 3-3
Inorganic Contaminant Monitoring Results
2018

Inorganic Contaminant	Concentration Range Measured for All Active Wellheads in City System (mg/L)	Concentration Range Measured for All Active Wellheads in McCormick Woods System (mg/L)	Established MCL(b) (mg/L)
Asbestos	State waiver through December 2019	State waiver through December 2019	7 mf/L(a)
Antimony	less than 0.003	less than 0.005	0.006
Barium	less than 0.10	less than 0.10	2
Beryllium	less than 0.003	less than 0.003	0.004
Cadmium	less than 0.001	less than 0.001	0.005
Chromium	less than 0.007	less than 0.01	0.1
Cyanide	less than 0.05	less than 0.05	0.2
Mercury	less than 0.002	less than 0.0005	0.002
Nickel	less than 0.005	less than 0.04	0.1
Nitrate (as N)	less than 0.1	less than 0.35	10
Nitrite (as N)	less than 0.1	less than 0.01	1
Selenium	less than 0.002	less than 0.005	0.05
Thallium	less than 0.001	less than 0.002	0.002

Note:
(a) MF/L - million fibers per liter greater than 10 microns in length.
(b) From Table 3-1.

Nitrate and nitrite are of interest because their presence is indicative of heavy fertilizer use or water contaminated with sewage. The nitrate concentrations as tested in 2018 for Wells 6, 7, 8, and 9 and McCormick Woods were all less than 0.4 mg/L. The City samples for Nitrate yearly at each source.

For Phase II and Phase V SOC monitoring, the City samples two samples each three years at each well except Well 9 which is sampled once per quarter. Organic Waivers are currently granted for Dioxin, Glyphosphate, Diquat, Endothall, insecticides, and EDB and other soil fumigants for all sources; through December 2019.

Iron and Manganese

EPA established secondary MCLs for iron and manganese based on aesthetic considerations. The MCLs for iron and manganese are 0.3 mg/L and 0.05 mg/L, respectively.

Table 3-4 Untreated Iron and Manganese Concentrations (2002)		
Well Number	**Iron, mg/L (MCL = 0.3 mg/L)**	**Manganese mg/L (MCL = 0.05 mg/L)**
McCormick 1, 3	ND	ND
7	ND	0.04
6	ND	0.04
8	ND	ND
9	ND	0.05

Neither iron nor manganese is considered toxic at the concentrations found in the City's water supply. Well 9 has an ATEC filtrations system for manganese removal that was put online in August, 2019. EPA has listed manganese on the Drinking Water Contaminant Candidate List to be used in selecting contaminants for regulation. Manganese is identified as a high priority for EPA to determine whether it should be regulated. It is anticipated that if manganese is regulated as a primary contaminant, the MCL will likely be higher than the current secondary MCL. No additional treatment impacts on the City are expected due to this regulation.

Wellhead Protection

Federal and State laws require the City to implement a wellhead protection program. The first phase of implementation was to define protection areas for each wellhead. These areas were delineated in the Port Orchard Wellhead Protection Area Investigation (AGI Technologies 1997). The Wellhead Protection Plan is updated as part of bringing any new wells online. It was last updated in 2011 with the addition of Well 11 and will be updated again as proposed Wells 12 and 13 are brought online. As recommended in the previous Water System Plan, the City has implemented the notification program identified in the Wellhead Protection Program, which was adopted in 2012.

Stage 2 Disinfectants and Disinfection Byproducts Rule

Amendments to the SDWA in 1996 required the EPA to develop rules to balance the risks between microbial pathogens and disinfection by-products. In December 1998, EPA promulgated the Stage 1 Disinfectants and Disinfection By-Products Rules (Stage 1 D/DBPR) as one of the first set of rules under the 1996 SDWA amendments. In January 2006, Stage 2 D/DBPR was promulgated and remains the current regulation.

While effective in controlling many microorganisms, disinfecting chemicals commonly react with natural and organic matter in water to form disinfection by-products. Recent epidemiology studies have suggested a weak association between certain cancers and reproductive/development effects and exposure to chlorinated water. Further, disinfection by-products such as bromodichloromethane, bromoform, dichloroacetic acid, and bromate are shown to be carcinogenic in lab animals.

The Stage 2 D/DBPR updated and superseded the Stage 1 regulations, providing additional Maximum Contaminant Level Goals (MCLGs) that comprise the TTHM and HAA5 substances already defined under Stage 1. Most impactful, compliance was changed from meeting system-wide running annual average contaminant levels for all sampled locations to being compliant at every location. Table 3-5 contains the MCLs and Maximum Disinfectant Residual Level (MDRLs) established under the Stage 2 DBPR.

Table 3-5
Disinfection Byproducts

Disinfection By-Product	MCL (mg/L)	MCLG (mg/L)
Total Trihalomethanes (TTHMs)[a]	0.080	
Chloroform	–	0.070
Bromodichloromethane	–	Zero
Dibromochloromethane	–	0.060
Bromoform	–	Zero
Haloacetic Acids (five) (HAA5)[b]	0.060	–
Monochloroacetic Acid	–	0.070
Dichloroacetic Acid	–	Zero
Trichloroacetic Acid	–	0.2
Bromoacetic Acid	–	–
Dibromoacetic Acid	–	–

Notes:
a. Total trihalomethane is the sum of the concentrations of chloroform, bromodichloromethane, dibromochloromethane, and bromoform.
b. Haloacetic acids (five) are the sum of the concentrations of mono-, di-, and trichloroacetic acids and mono- and dibromoacetic acids.

The City disinfects drinking water with calcium hypochlorite at wells 6 and 7 and with on-site chlorine generation at wells 8, 9, and the McCormick Woods water system. Each well treatment site may be considered a "Water Treatment Plant" under the D/DBP Rule. The City is required to collect two sets of TTHM and HAA5 samples from the portions of the distribution system with the oldest water each year. When water is supplied through one of the Bremerton water system connections for more than 15 days in any given calendar quarter, the City is required to collect one set of TTHM and HAA5 samples for that quarter. It is unlikely that the City would develop a DBP problem from the water produced by City wells.

Radionuclides Rule

Radionuclides are compounds that emit radioactive particles, which essentially "destabilize" nearby cells. Resulting cell "destabilization" in humans and animals is thought to result in increased likelihood of cancer and/or birth defects.

The 1986 Safe Drinking Water Act (SDWA) Amendments required the EPA to promulgate a revised radionuclide rule by June 1989. EPA did not meet the Congress mandated deadline and consequently a lawsuit was filed against them, the result of which was that the EPA entered into a series of consent agreements that required them to issue non-radon radionuclides regulations by November 21, 2000. In 1991, the EPA proposed new regulations for uranium and revisions to the existing radionuclides regulations.

The revised Radionuclides Rule, which went into effect in 2003, establishes an MCL for uranium while retaining the existing MCLs for combined radium-226/228, gross alpha particle, and beta particle/photon radioactivity listed under the EPA National Primary Drinking Water Regulations, establishing MCLG of zero for all ionizing radiation, and establishing new radionuclide monitoring requirements. The MCLs/MCLGs proposed in the revised rule are shown in Table 3-6.

Table 3-6
Radionuclide Rule MCLs

Regulated Radionuclide	MCL	MCLG
Beta/Photon Emitters	4 mrem/yr	Zero
Gross Alpha Particle	15 pCi/L	Zero
Combined Radium-226–228	5 pCi/L	Zero
Uranium	30 ug/L	Zero

Systems determined initial compliance with the revised rule by collecting four consecutive quarterly samples at each entry point to the water distribution system. Compliance is determined based on the annual average of the quarterly samples. Systems exhibiting annual average radionuclide concentrations below the MCL will be eligible for reduced monitoring as follows:

- If an entry point's annual average concentration for gross alpha, uranium, and combined radium-226/228 is below the detection limit, the system will be allowed to reduce monitoring to one sample every 9 years at that entry point (40 CFR 141.26[a][3][i]).
- If an entry point's annual average concentration for gross alpha, uranium, and combined radium-226/228 is at or above the detection limit, but at or below one-half the MCL, the system will be allowed to reduce monitoring to one sample every 6 years at that entry point (40 CFR 141.26[a][3][ii]).
- If an entry point's annual average concentration for gross alpha, uranium, and combined radium-226/228 above one-half the MCL, but at or below the MCL, the system will be allowed to reduce monitoring to one sample every 3 years at that entry point (40 CFR 141.26[a][3][iii]).

Systems that exhibit an average radionuclide concentration exceeding the MCL will be required to continue sampling and coordinate with DOH to develop treatment strategies.

The City currently samples for Radium 228 at each well one sample every six years. Sampling conducted between 2015 and 2017 found Radium 228 levels to be well below the MCL in all active wells.

Arsenic Rule

Arsenic is a naturally occurring element found in water supplies. EPA promulgated a rule controlling arsenic concentrations in drinking water in January 2001. Increased skin cancer occurrence and possibly increased internal cancer are health risks associated with elevated arsenic concentrations in drinking water. The previous MCL of 50 µg/L will be lowered to 10 µg/L effective January 2006.

Using recent sampling data from 2018 and 2019, detected values were 0.003 mg/L and 0.0033 mg/L. With the MCL set at 0.01 mg/L, no treatment impacts are anticipated.

Consumer Confidence Reports Rule

EPA issued the Consumer Confidence Reports (CCR) Rule August 19, 1998. The CCR Rule establishes requirements for water systems to provide annual reports to all customers. The first CCR was required to be issued to customers by October 18, 1999.
The City annually prepares and distributes CCRs each Spring. The CCRs for years 2018 and 2019 are included in Appendix D.

State Regulated Contaminants

The State Department of Health regulates the following additional contaminants and qualities that are not currently regulated by the EPA. Sodium, Hardness, Conductivity, Turbidity, and Color have "State Reporting Levels" that are shown in Table 3-7 along with the City's testing data from 2018.

Table 3-7
State Regulated Contaminants

Contaminant	Concentration Range Measured for All Active Wellheads (mg/L)	Established State Reporting Level	MCL
Sodium	5.19 to 5.45	5 mg/L	
Hardness	44	10 mg/L	
Conductivity	122 to 163	10 uS/cm	700 uS/cm
Turbidity	less than 0.05 to 0.35	0.1 NTU	1 NTU
Color	less than 5	5 color units	15 color units

3.2.3 Recent Regulations

This section discusses regulations that were recently issued by EPA that may impact the City. The regulations discussed in this section include:

- Stage 2 Disinfection Byproduct Rule
- Ground Water Rule (GWR) (formerly Groundwater Disinfection Rule)

3.2.3.1 Disinfectants and Disinfection Byproduct Rules

The Stage 1 Disinfectants and Disinfection Byproducts Rule (DBPR) reduces drinking water exposure to disinfection byproducts. The Rule applies to community water systems and non-transient non-community systems, including those serving fewer than 10,000 people that add a disinfectant to the drinking water during any part of the treatment process.

The Stage 2 DBPR strengthens public health protection by tightening compliance monitoring requirements for Trihalomethanes (TTHM) and Haloacetic acids (HAA5). The rule targets public water systems (PWSs) with the greatest risk.

Taken together, the Stage 1 and Stage 2 Disinfectants and Disinfection Byproducts Rules (DBPRs) improve drinking water quality. The rules do this by providing protection from disinfection byproducts. Byproducts, if consumed in excess of EPA's standard over many years, may increase health risks.

Drinking water comes from source water locations such as:

- Lakes,
- Rivers,
- Tanks, and
- Ground water aquifers.

Pathogens, such as *Giardia*, *Cryptosporidium*, and viruses, are often found in source water and can cause gastrointestinal illness. Illnesses include diarrhea, vomiting, cramps and other health risks. In many cases, water needs to be disinfected to inactivate (or kill) these microbial pathogens. However, disinfectants can react with naturally-occurring materials in the water to form byproducts including:

- Trihalomethanes (THM),
- Haloacetic acids (HAA),
- Chlorite, and
- Bromate.

EPA has developed the DBPRs to limit exposure to these disinfectant byproducts.

3.2.3.2 Groundwater Rule

The SDWA 1996 amendments require the EPA to develop regulations requiring groundwater source disinfection as needed to protect public health. The Final Groundwater Rule (GWR) was published in the Federal Register on November 8, 2006, and GWR compliance was required on December 1, 2009.

The GWR is based on the need to protect against disease-causing microorganisms found in systems that serve groundwater as drinking water. The GWR establishes protective measures and target systems to identify water systems at high risk for contamination. The general requirements or actions of the GWR are summarized as follows:

- Regular sanitary surveys of the public water systems to look for significant deficiencies in key operational areas.
- Triggered source water monitoring when a system that does not sufficiently disinfect drinking water identifies a positive sample during its Total Coliform Rule monitoring and assessment monitoring (at the option of the state) targeted at high-risk systems.
- Implementation of corrective actions by groundwater systems with a significant deficiency or evidence of source water fecal contamination to reduce the risk of contamination.
- Compliance monitoring for systems that are sufficiently disinfecting drinking water to ensure that the treatment is effective at removing pathogens.

The City is disinfecting all of its groundwater supplies, and additional compliance measures under the GWR have not been imposed by DOH due to the distribution system's historical lack of coliform presence and low level DBPs.

3.2.4 City of Bremerton Water Supply

The City of Bremerton's water supply is primarily from a surface water source treated with chlorination, ultraviolet light, and corrosion treatment to increase pH. The City of Port Orchard's well water is disinfected and fluoridated. On the occasions when the City of Bremerton's water supply is used, the level of fluoride in the water will be decreased in the areas served by the mixed supply. Through an interlocal agreement between Bremerton and Port Orchard, the City of Bremerton provides a 750 gpm intertie to the 580 Pressure Zone. Since the McCormick Woods 580 zone system has been operating hydraulically separate from the existing "City" system's 260 and 390 zones, there is currently infrequent mixing of Bremerton non-fluoridated water with Port Orchard's fluoridated water.

When the McCormick Woods 580 zone becomes interconnected with the Port Orchard 260 and 390 zone, fluoridated water could comingle in Bremerton's system. However, with the construction of new 580 zone storage and Well 12 supply, the City of Port Orchard plans to reduce the use of the Bremerton supply. The interlocal agreement defines how the two cities are planning to separate the two systems. An emergency intertie between the two systems is planned to remain in place. It is anticipated that this intertie would only be activated to provide water from Bremerton to Port Orchard since Bremerton's system has many more source and pumping redundancies. In the unlikely event that Bremerton was in need of water from the Port Orchard system, two options exist: 1) Port Orchard temporarily suspends fluoridation during the emergency and flushes the fluoridated water before supplying Bremerton, or 2) Bremerton suspends their non-fluoridated water policy during the emergency.

3.2.5 Treatment Improvements

The City has implemented groundwater disinfection and fluoridation at each well. Water treatment is planned for Well 11 and proposed wells 12 and 13 includes filtration and backwash, and fluoridation and chlorination feed systems.

3.3 Storage Analysis

The recommended storage capacity for a water system per DOH and the minimum requirement established for the City of Port Orchard is equal to the sum of the equalizing, standby, and fire suppression storage. Each of these storage components are described and the volumetric basis for each is provided in Chapter 7. Figure 3-1 presents a hydraulic profile of the existing system. As discussed below, new storage in the future 660 pressure zone is planned and a new 580 pressure zone tank is planned to replace the existing 580 tank. The proposed hydraulic profile is presented in Figure 3-2. A total of seven water tanks currently provide 4.78 MG of storage in the City's water system. Table 3-8 shows the existing and projected storage requirements for each pressure zone.

3.3.1 260 and 390 Zone (City System) Storage Analysis

Two tanks (Van Zee Park and Morton Street) serve the 260 Zone with 2.10 million gallons of storage. The Old Clifton and Sedgewick tanks provide the 390 Zone with 2.11 million gallons of storage. The 390 Zone tanks also serve a small service area that is fed through PRVs and operates as an Intermediate Zone at a hydraulic grade line of 336-feet.

There are currently a small number of residential service connections near the Sedgwick Reservoir that cannot meet the required 20 psi residual pressure during fire flow conditions without the use of dead (unavailable) storage in the tank. These few service connections have individual booster pumps to augment their pressure. The highest customers being served in the 390 zone above approximate elevation 300-feet require that unavailable dead storage be provided to maintain residual pressure at these connections. The City is also receiving development proposals for the Sedgwick area that would require new connections to the system be made at elevations above 300-feet.

A small, pressurized zone to serve the higher elevation connections immediately surrounding the Sedgwick Tank would be required to rectify the pressure problem in areas above elevation 300-feet. The dead storage at the bottom of the tank can be added to usable storage by placing the low pressure services near the tank on the small, pressurized zone.

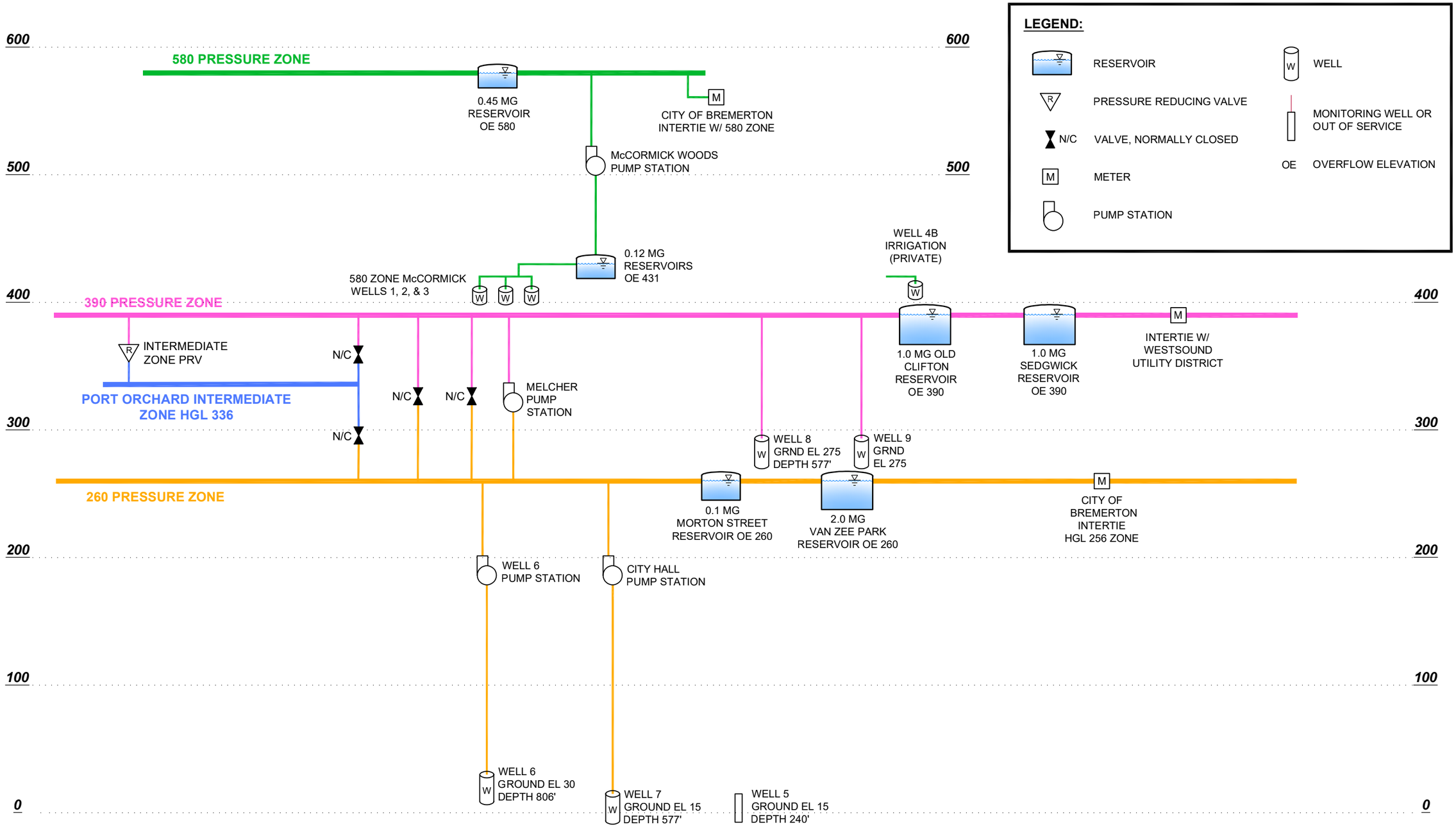
This Plan assumes the highest fire flow requirement is in the 260 zone downtown businesses. A fire flow of 3,500 gpm for two hours is recommended for this area. For the 390 zone, 1,500 gpm for three hours is assumed adequate as sprinkler systems are utilized. For fire storage in the 260 zone, it is assumed that storage in the 390 zone and 260 zone tanks will be reliably available following installation of additional PRV's.

3.3.2 580 Zone (McCormick System) Storage Analysis

Three tanks currently serve the 580 Zone (McCormick) System. A total of 0.57 million gallons of storage is provided by the 580 Reservoir (0.45 million gallons) and McCormick Woods Tanks 1 and 2 (0.06 million gallons each). The storage deficit shown for McCormick Woods and Glenwood JPA areas is anticipated due to growth in the area, particularly in the Glenwood JPA. The projections, however, do not include the McCormick Woods North or areas served by the City of Bremerton.

The City of Port Orchard is currently in the design phase of constructing a new 580 tank to serve the McCormick Woods area and remaining portions of the 580 Pressure Zone. An additional 1.2 million-gallon tank of usable storage is needed to accommodate new development in the McCormick system. The cities of Port Orchard and Bremerton have recently (November 2019) entered into an interlocal agreement whereby the existing City-owned 0.45 MG 580 tank will be conveyed to the City of Bremerton once the new tank, Well 12 and associated infrastructure is online.

It is assumed that a maximum fire flow of 1,875 gpm for two hours is provided for the 580 zone. This value has been confirmed with the local Fire Marshall. A 1.8-million-gallon tank is planned to serve the future 660 Zone. Replacement of the existing 0.06 MG concrete tanks at the Well Nos. 1, 2, and 3 site is planned for use with Well 11.



BHC CONSULTANTS

Port ORCHARD

Existing Hydraulic Profile

Water System Plan

October 2020

Figure

3-1

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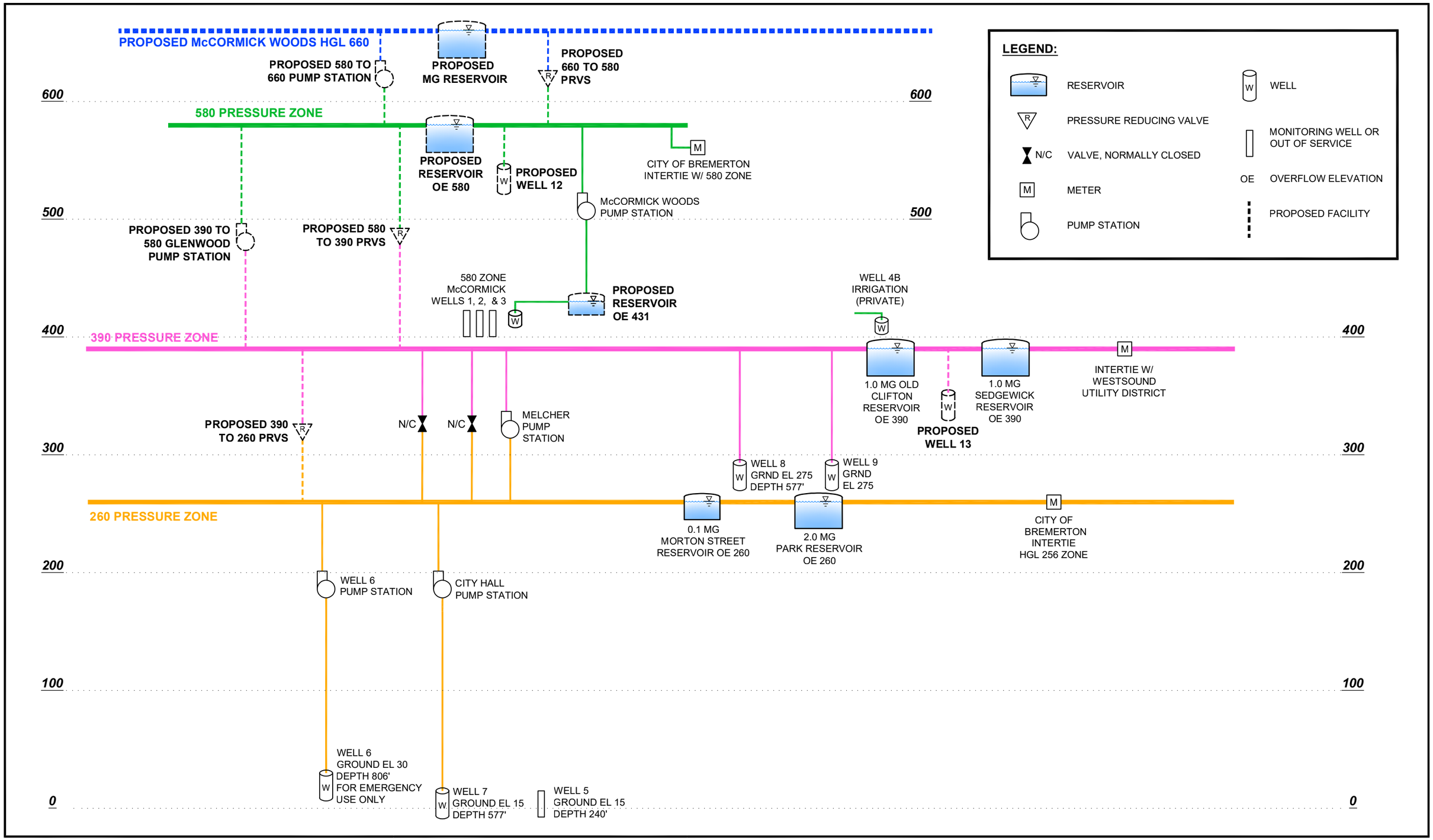

BHC CONSULTANTS

Port ORCHARD

Proposed Hydraulic Profile

Water System Plan

October 2020

Figure

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Table 3-8
City and McCormick Woods Existing Storage Analysis

Year	Zone	ERUs	gpd/ ERU	Demands			Source of Supply		Component Requirements			Available Storage						Required Storage			
				ADD	MDD	PHD	Total Instantaneous Supply (Qs)	Largest Source (Qs)	Equalizing Storage	Standby Storage	FSS	Existing Storage	Operational Storage	Dead @ 20 psi	Dead @ 30 psi	Total Available Storage (gal)		Total Required (gal)		Surplus (Deficit) (gal)	
				(mgd)	(mgd)	(gpm)	(gpm)	(gpm)	(gal)	(gal)	(gal)	(gal)	(gal)	(gal)	(gal)	@20 psi	@30 psi	@20 psi	@30 psi	@20 psi	@30 psi
2017	City-260	2601	130	0.34	0.71	816	1,793	800	0	520,110	180,000	2,102,545	201,069	1,805,474	1,901,477	96,003	0	700,110	0	(604,107)	0
	City-390	3178	130	0.41	0.87	997	750	443	37,124	826,397	180,000	2,113,651	100,000	842,020	2,013,651	1,171,631	0	1,043,520	37,124	128,110	(37,134)
	City - Subtotal	**5779**		**0.75**	**1.58**	**1,814**	**2,543**	**800**	**0**	**1,155,800**	**180,000**	**4,216,197**	**301,069**	**2,647,494**	**3,915,127**	**1,267,633**	**0**	**1,335,800**	**0**	**(68,166)**	**0**
	McW 580 Zone	1125	220	0.25	0.89	1,066	888	410	26,739	225,069	225,000	450,000	53,571	0	72,857	396,429	323,571	476,808	26,739	(80,379)	296,832
	McW 660 Zone	0	185	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bremerton 580	**975**	**181**	0.18	0.53	**636**	**0**	**0**	95,374	352,855	180,000	0	0	0	0	0	0	628,229	95,374	(628,229)	(95,374)
	MCW - Subtotal	**2,100**		**0.42**	**1.42**	**1,702**	**888**	**410**	**122,113**	**420,016**	**225,000**	**450,000**	**53,571**	**0**	**72,857**	**396,429**	**323,571**	**767,129**	**122,113**	**(370,700)**	**201,459**
2023	City-260	2623	130	0.34	0.72	823	0	0	123,452	682,043	180,000	2,102,545	201,069	(1,713,227)	609,116	3,614,704	1,292,361	985,495	123,452	2,629,209	1,168,909
	City-390	3206	130	0.42	0.88	1,006	2,250	1,500	0	641,237	180,000	2,113,651	100,000	(1,291,323)	248,684	1,171,631	1,764,967	821,237	0	350,394	1,764,967
	City - Subtotal	**5829**		**0.76**	**1.59**	**1,829**	**2,250**	**1,500**	**0**	**1,165,885**	**180,000**	**4,216,197**	**301,069**	**(3,004,550)**	**857,800**	**6,919,678**	**3,057,328**	**1,345,885**	**0**	**5,573,793**	**3,057,328**
	McW 580 Zone	2786	198	0.55	1.79	2,078	750	750	199,157	1,104,110	225,000	1,015,076	104,100	0	199,446	910,976	711,530	1,528,266	199,157	(617,290)	512,373
	McW 660 Zone	1062	185	0.20	0.59	684	1,000	1,000	0	392,996	360,000	2,200,000	36,667	847,000	1,270,500	1,316,333	892,833	752,996	0	563,337	892,833
	MCW - Subtotal	**3848**		**0.75**	**2.38**	**2,762**	**1,750**	**1,000**	**151,742**	**769,587**	**360,000**	**3,215,076**	**140,767**	**847,000**	**1,469,946**	**2,227,309**	**1,604,363**	**1,281,328**	**151,742**	**945,981**	**1,452,622**
	Total	**9,677**		**2**	**4**	**4,591**	**4,000**	**2,500**	**88,579**	**1,935,472**	**360,000**	**7,431,273**	**441,836**	**(2,157,550)**	**2,327,746**	**7,013,644**	**4,661,691**	**2,384,051**	**88,579**	**4,629,593**	**4,573,112**
2029	City-260	2709	130	0.35	0.74	849	0	0	127,372	704,442	180,000	2,102,545	201,069	(1,713,227)	609,116	3,614,704	1,292,361	1,011,814	127,372	2,602,890	1,164,990
	City-390	3311	130	0.43	0.90	1,038	1,943	1,500	0	662,296	180,000	2,113,651	100,000	(1,291,323)	248,684	3,304,974	1,764,967	842,296	0	2,462,678	1,764,967
	City - Subtotal	**6021**		**0.78**	**1.64**	**1,887**	**1,943**	**1,500**	**0**	**1,204,174**	**180,000**	**4,216,197**	**301,069**	**(3,004,550)**	**857,800**	**6,919,678**	**3,057,328**	**1,384,174**	**0**	**5,535,503**	**3,057,328**
	McW 580 Zone	3410	185	0.63	2.02	2,319	750	750	235,321	1,261,537	225,000	1,015,076	104,100	0	199,446	910,976	711,530	1,721,858	235,321	(810,882)	476,209
	McW 660 Zone	1697	185	0.31	0.94	1,081	1,000	1,000	12,159	627,759	360,000	2,200,000	36,667	847,000	1,270,500	1,316,333	892,833	999,918	12,159	316,415	880,674
	MCW - Subtotal	**5106**		**0.94**	**2.96**	**3,400**	**1,750**	**1,000**	**247,480**	**1,021,241**	**360,000**	**3,215,076**	**140,767**	**847,000**	**1,469,946**	**2,227,309**	**1,604,363**	**1,628,721**	**247,480**	**598,588**	**1,356,884**
	Total	**11,127**		**1.73**	**4.61**	**5,287**	**4,000**	**2,500**	**193,028**	**2,225,416**	**360,000**	**7,431,273**	**441,836**	**(2,157,550)**	**2,327,746**	**9,146,987**	**4,661,691**	**2,778,444**	**193,028**	**6,368,543**	**4,468,663**
2039	City-260	2985	130	0.388	0.81	933	0	0	139,923	776,162	180,000	2,102,545	201,069	(1,713,227)	609,116	3,614,704	1,292,361	1,096,085	139,923	2,518,619	1,152,439
	City-390	3649	130	0.474	1.00	1,140	2,250	1,500	0	729,725	180,000	2,113,651	100,000	(1,291,323)	248,684	3,304,974	1,764,967	909,725	0	2,395,249	1,764,967
	City - Subtotal	**6634**		**0.86**	**1.81**	**2,073**	**2,250**	**1,500**	**0**	**1,326,773**	**180,000**	**4,216,197**	**301,069**	**(3,004,550)**	**857,800**	**6,919,678**	**3,057,328**	**1,506,773**	**0**	**5,412,905**	**3,057,328**
	McW 580 Zone	3564	185	0.66	2.111	2,417	750	750	249,988	1,318,703	225,000	1,015,076	104,100	0	199,446	910,976	711,530	1,793,691	249,988	(882,715)	461,542
	McW 660 Zone	1974	185	0.37	1.10	1,255	1,000	1,000	38,208	730,434	180,000	2,200,000	100,000	847,000	1,270,500	1,253,000	829,500	948,642	38,208	304,358	791,292
	MCW - Subtotal	**5538**		**1.02**	**3.21**	**3,671**	**1,750**	**1,000**	**288,196**	**1,107,642**	**225,000**	**3,215,076**	**204,100**	**847,000**	**1,469,946**	**2,163,976**	**1,541,030**	**1,620,837**	**288,196**	**543,138**	**1,252,834**
	Total	**12,172**		**1.89**	**5.02**	**5,744**	**4,000**	**2,500**	**261,635**	**2,434,414**	**405,000**	**7,431,273**	**505,170**	**(2,157,550)**	**2,327,746**	**9,083,653**	**4,598,357**	**3,101,049**	**261,635**	**5,982,604**	**4,336,723**

Notes:
1) Analysis includes proposed 580 and 660 storage under years 2029 and 2039. Tank design not complete and DS based on estimated location and height.
2) "Cumulative" Storage requirement assumes one fire in the McCormick Woods and City systems in 2017 and assumes one fire in the system in 2029 and 2039, once the two systems are anticipated to be connected. Adequate flows between zones are assumed.
3) Source quantity increases associated with Wells 11, 12, and 13 and identified in Table 6-2 are included. Qs for standby storage is assumed to be 75% of instantaneous capacity due to assumed maximum 18 hours of pumping per day.
4) Storage Surplus/Deficit by Zone does not consider water transfer between the 260 and 390 Zones.
5) Required storage equals equalizing plus the greater of standby and fire storage (Nested Storage). Available storage is the total storage minus the operating and dead storage
6) The estimates put forth herein are not a guarantee of ERU's to any development, property owner or specific area of the City.
7) Total source capacity does not include booster pump stations. Source capacity for each zone does include booster pump stations which transfer water between zones.

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3.4 Booster Station Analysis

There are three pump stations in the City System and one in the 580 Zone (McCormick Woods) System. Evaluations of facilities within each system are presented below:

3.4.1 City System (260 Zone and 390 Zone) Pumping Analysis

The two pump stations serving the City System were evaluated using criteria established by DOH. Both stations were of adequate capacity under current conditions and configuration, however the Well 6 Pump Station and the City Hall Pump Station have become antiquated. Well 6 has an artesian flow with a head of about 5 psi. The well discharges to a clear well to remove hydrogen sulfide and is then treated with chlorine and fluoride prior to being pumped into the system. Only one pump is available, no standby power exists at this site and major upgrades are needed.

The Well 6 Pump Station and the City Hall Pump Station currently lift water from Well 6 and Well 7 to the 260 Zone, respectively. The City plans to transition Well 6 to a monitoring or emergency well and transfer the associated water rights to Well 13, and abandon the City Hall Pump Station by developing treatment and pumping capacity at the Well 7 site.

3.4.2 McCormick (580 Zone) System Pumping Analysis

The McCormick Wood's 580 Pump Station is of adequate capacity to meet the immediate service area needs of the McCormick Woods Development. Well 11, which will replace McCormick Wells 1, 2, and 3, will be equipped with a filtration system, fluoridation system, and chlorination system.

Once online, Wells 11 and 12 will provide additional supply to the McCormick system. A pumping Permit for Well 11 has been approved, however the application for water rights at Well 12 is currently pending. To maximize the existing water rights available to the City and improve system reliability, interconnection of the City and McCormick Systems is required. A 10 to 12-inch transmission main along Old Clifton Road and a new PRV will provide desired redundancy and allow for future sources in the McCormick area to benefit the 390 and 260 City Zones. Additional distribution piping which will connect the two systems along SW Sedgwick Road is anticipated to be constructed by developers. A developer funded booster pump and PRV station along SW Sedgwick Road near the Glenwood JPA is also planned to allow bidirectional flow between the 580 and 390 Zones. The new pump station from the JPA area would supply proposed development in the immediate area and augment supply to the McCormick Woods and McCormick Woods West areas. It is recommended that the pump station is sized for installation of a 600 gpm booster pump station. A detailed engineering report will be required prior to final design of the required facilities.

3.5 Water System Model and Distribution System Hydraulic Analysis

A water system hydraulic model was constructed to evaluate the City of Port Orchard water system. The model included all system components, including pipes 4-inches and larger that comprise the historical City System (260 and 390 Pressure Zones) and the McCormick Woods system (580 Pressure Zone). Future conditions scenarios also incorporated a proposed 660 Pressure Zone, which is planned for the area west of the existing McCormick Woods system. The extent of the modeled system is shown in Figure 3-3. Pipes shown in grey have not yet been constructed.

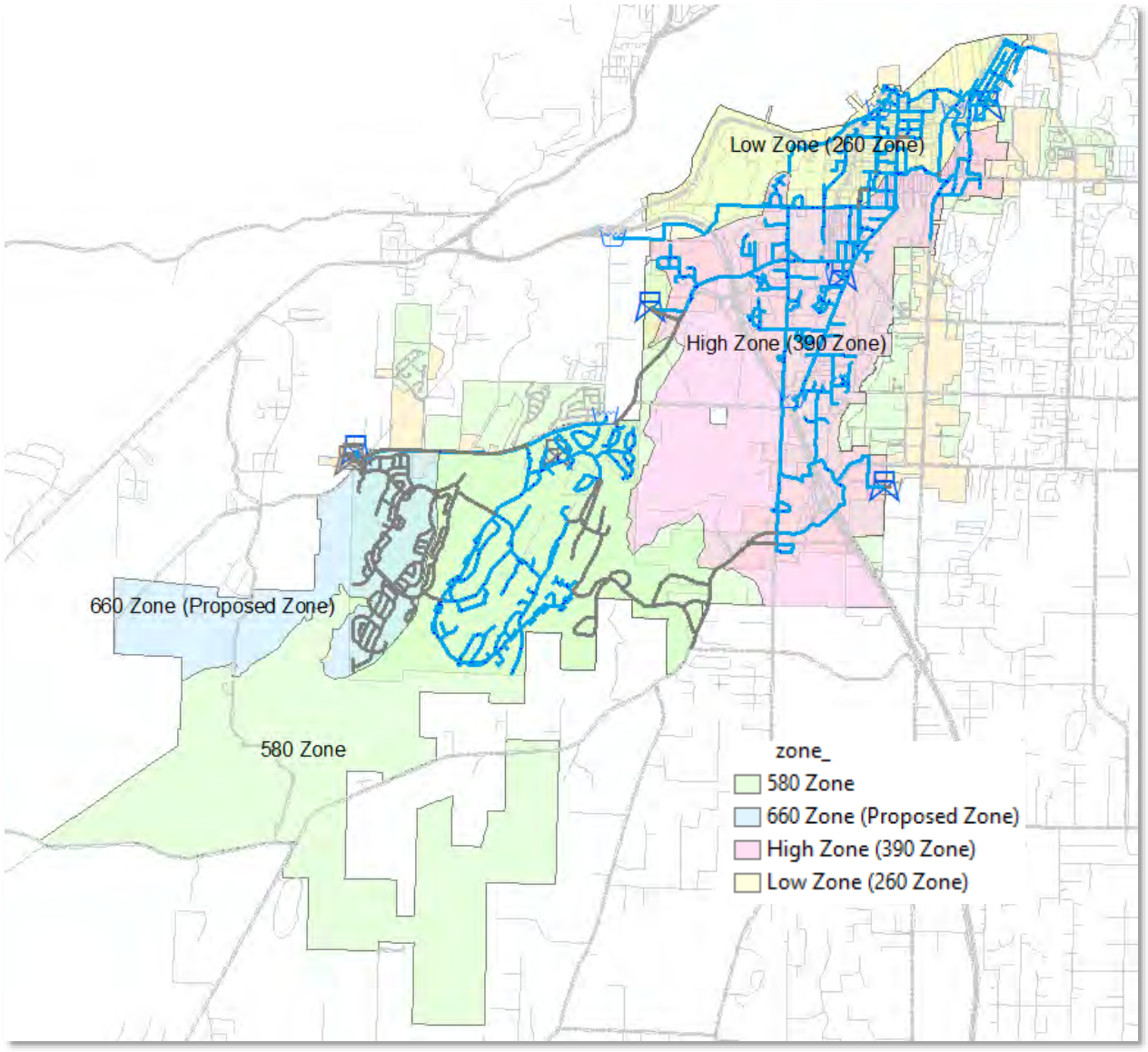

Figure 3-3 City of Port Orchard Water System Model

3.5.1 Hydraulic Modeling Software

The computer model is a useful tool for analyzing water systems, allowing many different demand conditions and system configurations to be simulated in a short timeframe. Developer extensions, and other improvements can be modeled as they occur, allowing design and construction of the most effective and cost-efficient system. The computer program used for analysis of the Port Orchard water system is InfoWater Suite 12.4, a product produced and supported by Innovyze, Inc. The program uses the Hazen-Williams formula to calculate pipe head loss, flows, and velocities with associated node pressures. InfoWater offers additional modeling capabilities that allow analyzing efficiencies, including the following:

- Operates within a GIS framework, leveraging the use of the City's GIS datasets and County data such as Lidar-based topography.
- Changes system demands globally, by domain (group), or node by node for each customer class.

- By batch run, calculates available fire flows throughout a system when given specified minimum residual pressures.
- Allows simple addition, removal, replacement or deactivation of pipes, nodes, pumps, PRVs, tanks, and sources.
- Simulates changing operational conditions, such as shutting down sources, changing storage tank levels, valve closures, and fluctuating demands.

The water system model was converted from H2ONET to InfoWater in March of 2016. In January of 2019, the model was updated to reflect newly available pipe data and information from the City's GIS. The locations of the pipes and nodes in the model network were matched to the locations of the GIS layer. Model configuration, substantially the same as the previous model, was updated based on a review of the consistency with current GIS data. Ground elevations for all nodes were updated and interpolated from City contours (NAD83 HARN), generated from County Lidar data. The hydraulic model was calibrated in September of 2019 using data collected during hydrant tests conducted at ten locations throughout the system. The calibration of the hydraulic model is presented in the Hydraulic Model Calibration Technical Memorandum, dated September 5, 2019. A copy of is provided in Appendix D.

3.5.2 Hydraulic Analysis

The model was used to determine areas within the water system where deficiencies exist, or are likely to develop, under various system demand and source of supply conditions. These deficiencies include areas of high or low pressure, areas with high flow velocities in pipelines, and areas with insufficient fire flow availability. The following scenarios were modeled to characterize the existing condition of the water system: average daily demand (ADD), maximum day demand (MDD), and peak hour demand (PHD). ADD, MDD, and PHD scenarios were also simulated with loadings for future years 2017, 2027, and 2037.

The system was analyzed using the minimum design criteria put forth in Section 5, which are based on recommended Department of Health criteria. Present and future conditions were analyzed using the following pertinent design criteria:

- Steady state analysis and conditions.
- An acceptable pressure range of 40 psi to 100 psi for ADD.
- A minimum system pressure of 30 psi throughout the City under PHD conditions.
- A minimum system pressure of 20 psi under maximum day demand plus required fire flow conditions.
- A maximum pipeline velocity of 12 feet per second under fire flow conditions.
- The analysis was performed assuming all water to the system is being supplied from the tanks only, with the Melcher Pump Station inactive.
- System modeling was completed with the tank elevations described below:
  - ADD: Tank levels at top of operating storage
  - MDD: Tank levels depleted of operating, equalizing, and fire suppression storage
  - PHD: Tank levels depleted of operational and equalizing storage
- By using these criteria, existing and potential pressure issues were identified. These are discussed below and further presented in the Capital Facilities Plan.

3.5.3 Pressure Evaluation

Simulation results indicate that the water velocities in all modeled pipes are within acceptable limits, i.e. less than five feet per second (fps), for each scenario, with the exception where large fire flows are required to pass through some 4-inch and 6-inch pipe segments in the older portions of the system.

Simulation results indicate that for all scenarios, system pressures fell generally within the specified working range of 40 to 100 pounds per square inch (psi). Simulated pressures at nodes that were above or below this range tend to occur in the extreme upper and lower elevations of the Pressure Zones.

260 and 390 Zone Pressure Analysis

Specific observations related to system pressure are summarized below and portrayed in Figure 3-4 and Figure 3-5.

Average Day Demand Low Pressure Areas

Pressures below 30 psi were simulated in both the 260 and 390 zones, as can be observed in Figure 3-4. Distribution system pressures significantly lower than 40 psi were found at the following locations:

- Division St.
- Kendall St.
- Melcher St.
- Sherman Ave.
- Sidney Ave. (some locations were less than 20 psi)
- Becky Ave.
- Goldenrod St.
- Fireweed St.
- Geiger Rd. SE

Average Day Demand High Pressure Areas

Pressures above 100 psi were found in the lower 260 zone at the following locations:

- Pressures up to 110 psi were observed on Bay Street along the length of the waterfront. In this area, street elevations are less than 15-feet in elevation and located at the lowest point in the 260 zone. Reduction of pressure to working limits along the waterfront on Bay Street may require the installation of multiple PRVs and the creation of a third pressure zone. Therefore, unless the City is experiencing significant problems, it is not recommended that these upgrades be performed. Alternatively, PRVs can be installed at individual services if required. All new customers will be notified in advance of connecting to the water system if they are in areas where water pressures are anticipated to be above 80 psi.

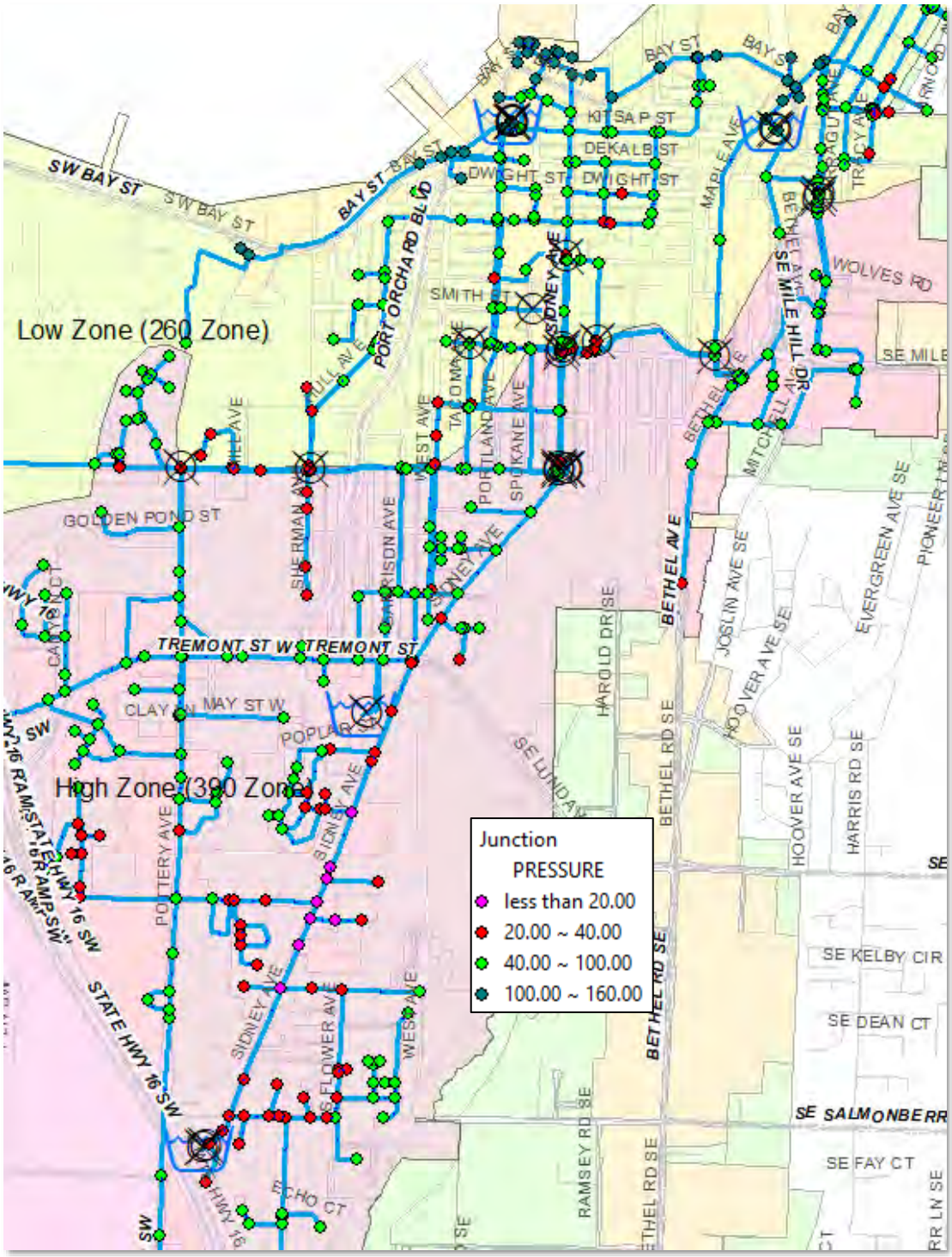

Figure 3-4 Low Pressure Areas – 2017 Average Day Demand

Peak Hour Demand Low Pressure Areas

During PHD, the preferred minimum system pressure is 30 psi. Figure 3-4 shows the locations within the system where pressures during PHD are lower than 30 psi. It can also be seen that the model predicts that some locations experience pressures less than 20 psi. The model predicted these low pressures where ground elevations are located at the highest elevations within the 260 and 390 Pressure Zones.

Low pressure areas in the 260 zone can be improved by incorporating the high elevation areas within the zone into the 390 zone. This will require installing PRVs at key locations and incorporating the existing 336 Intermediate Pressure Zone into the 390 zone.

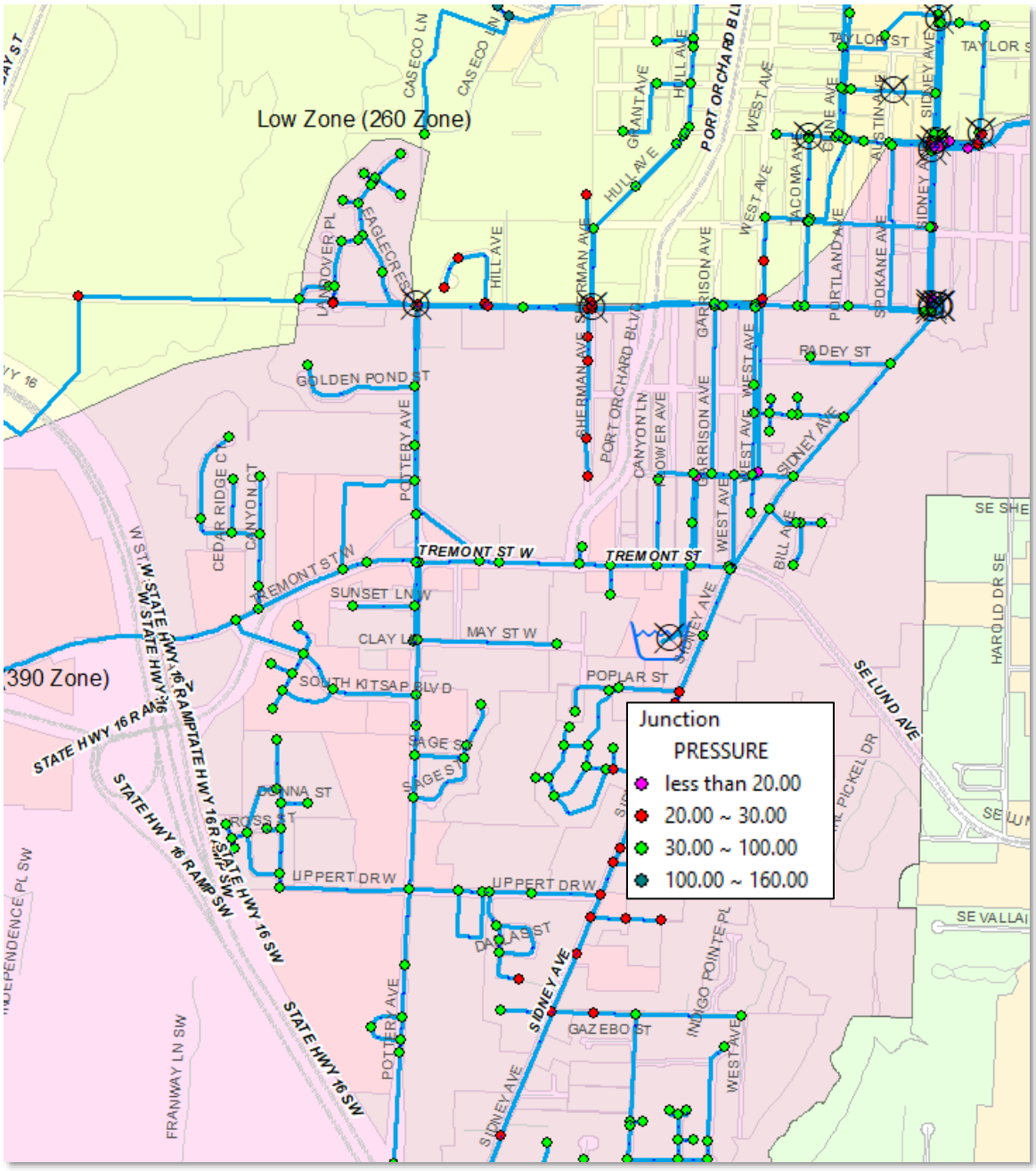

Figure 3-5 Low Pressure Areas – 2017 Peak Day Demand

Table 3-9 260 and 390 Pressure Zones Low Pressure Zone Analysis (Residual Below 20 psi)	
260 Zone Deficient Area Description	**390 Zone Deficient Area Description**
Near Melcher Pump Station 4-inch mains between Sidney Ave. and Kitsap St. The Intermediate Zone near South Street	4-inch pipe at High/Intermed Zone break at Sidney Ave and Kendall St 6-inch pipe terminating at Goldenrod and West Streets 4-inch pipe terminating below Tremont Street 4-inch pipe on Melcher St. from West St. through Sroufe St. 6-inch diameter pipe on Sroufe St. between Bethel and Mitchell
The High/Low Zone cut off on Kendall and Maple	6-inch pipe terminating on Granat Street
8- and 4-inch diameter lines on Sherman Rd. between Melcher and Cline Streets The 260/390 Pressure Zone boundary above Kitsap High School	6-inch pipe end node on Tracy near Chester Streets 6-inch on South Flower Street 6-inch pipe on Goldenrod Street 8-inch pipe terminating on Lippert Drive 6-inch pipes on Mitchell Avenue between Sroufe St. and Plisko Lane through connection with the 8-inch pipe from Plisko through Taylor St 12-inch main at Kendall and Maple feeding the Bethel/Mitchell area
10-inch dead end main at the west end of Bay Street Most nodes in the old town area between Morton, Bay, and Tracy Streets The nodes on DeKalb Street near Tank 4	6-inch pipe on Sedgwick Rd. and the 12-inch from Tank 5 crossing Sedgwick Rd. 10-inch main on Sidney between Fireweed Rd and Alpha Lane and between Forest, Park and Melcher Streets 6-inch main on Sherman Road at Echo Court 8-inch main on Forest Park St. between Sidney Rd. and West Ave. 8-inch main on Pottery (from Group Health to Eaglecrest)
6-inch pipes along Bay Street 12-inch pipes on Cline Ave. near Taylor Street 8-inch mains on Sidney Ave. between Sweaney and Dwight Streets	Alternating 10 and 12-inch pipeline along Pottery to Hwy 16 The 10-inch diameter on Sidney at Goldenrod Roads The 8 to 6-inch connection on Sherman Road near Hwy 16 The 10-inch main on Sidney Ave. between Bothwell St. and South St. The 8-inch pipe on Pottery Rd. from Tremont St. through Alder Lane The 10- pipe on Lloyd Parkway

580 Zone Pressure Analysis

Specific observations related to pressure are summarized below:

- Within a small area of the 580 Zone, modeled pressures are as high as 122 psi during ADD. The high pressures affect only a few customers along Hibernia Ave. SW where street elevations range between 320-feet and 350-feet. Individual PRVs are recommended to resolve the issue if problems are reported.
- There were no areas with water pressures lower than 30 psi identified in the 580 zone. However, some locations in the southern portion of the McCormick Woods West development above approximate elevation 445-feet were found to have MDD pressures in the low to mid 30s range.

Table 3-10
580 Pressure Zone Deficient Areas[1]

Deficient Area Description
4-inch main on Turnberry Place Southwest
4-inch main on Killeen Place Southwest
4-inch main on Southwest Galway Court
4-inch main on Kinfig Place Southwest
6-inch main South of St. Clare Drive Southwest (Pipe P-115)
6-inch main South of St. Clare Drive Southwest (Pipe P-114)
6-inch diameter main just east of Hawkstone Avenue Southwest
8-inch loop just South of St. Clare Drive SW (Pipes P-107, P-108, P-109, P-117)
8-inch main on Baltray Place Southwest
8-inch main on Broadstone Place Southwest
8-inch main just east of Turnberry Place Southwest
6-inch main just northwest of McCormick Woods Reservoir
4-inch main on Ashridge Avenue Southwest
6-inch main just northeast of McCormick Woods Reservoir
8-inch main on Southwest Dunraven Court
4-inch main just west of McCormick Woods Reservoir

1.Water pressures shown are as predicted by the model. Field testing has shown that no pressure deficiency exists in the system in service.

3.5.4 Fire Flow Evaluation

Fire flows for the system were modeled at different demands for the ultimate development to determine the extent of deficiencies present. The minimum pipe diameter modeled for the analysis was 4-inches and fire flow demands for specific node classes were as shown in Table 3-11. The analysis generally indicated that adequate flows were available in all pressure zones, but that some deficiencies are present. It was assumed for all analyses that the Melcher Street pump station was off, no wells were actively pumping, and the connection to the Bremerton system was closed. Critical residual pressure for nodes in all the fire flow analyses was set at 20 psi. The fire flow simulations were run with all other pumps turned off to assess the ability of the system to operate with supply only from storage tanks.

Table 3-11 Modeled Fire Flow Demands		
Land Use	**FF Demand (gpm)**	**Comment on Basis**
Residential	1,000	Relatively low density with acceptable distance between structures; 2 times the minimum requirements (500gpm) defined in WAC 246-293-640
Light Commercial and Multifamily	1,500	Twice the minimum requirements (750gpm) defined in WAC 246-293-640
Commercial	3,500	More than the minimum requirements (750gpm) defined in WAC 246-293-640
Industrial	NA	NA
Institutional (Hospitals)	3,500	
Institutional (Schools)	3,500	
Christ the Rock Church	1,875	As directed by the Fire Marshall

To determine the general availability of fire flow in the system, an initial fire flow demand of 2,000 gpm was applied to every node in the City of Port Orchard's system and 1,500 gpm to every node in the 580 Zone. Individual zones were then modeled separately. Fire storage requirements were coordinated with the Deputy Fire Marshall of South Kitsap Fire and Rescue.

The results of the fire flow analysis indicated generally that adequate flows, up to 4,000 gpm, were available for the 260 and 390 pressure zones and 1,500 gpm in the 580 Zone. Fire flows of 1,500 gpm are available in the residential portions of the 580 Zone and approximately 2,700 gpm at the McCormick Woods Club House.

A number of areas were observed to have deficiencies, i.e. node residual pressures dropping below 20 psi during fire events.

260 and 390 Pressure Zone Fire Flow Analysis

A general summary of 260 and 390 zone results is provided below.

- Available Fire Flows of less than 1,000 gpm are found at dead and closed pipe ends, in pipes with diameters of less than 6-inches, and in the vicinity bound by Central Street on the north, Mitchell Avenue on the east, Sroufe Street on the south, and Rockwell Avenue to the west. In addition, the Intermediate Pressure Zone has nodes that are not capable of a 1,000 gpm flow. At the South Kitsap High School, the 8-inch diameter High Zone main that dead-ends there was found to have a flow of 2,000 gpm.
- The Eaglecrest Neighborhood, the Intermediate Pressure Zone area, and the 6-inch diameter mains on South Flower Street and Goldenrod Street have available fire flows below 1,500 gpm.
- Potential problem areas were revealed with the 6-inch pipes in the southeast and at the northeast corner of the 390 Zone that includes Bethel Road and Mitchell Avenue.

The following presents a summary of the analysis performed to determine availability of fire flows at specific facilities requiring high fire flows:

- 390 Zone:

- South Kitsap High School: the node nearest the hydrant in front of the school can only flow 1,500 gpm. A separate fire line would have to be run from the nearest 260 Zone hydrant (at least 500 ft away to the south) to get the remaining 2,000 gpm necessary to reach the 3,500 gpm typically required for schools. Upsizing pipes may be needed to obtain the 3,500 gpm fire flow. Completion of the planned hydraulic rezoning CIP will not address this situation (it is noted that the school is fully sprinklered and may not require more than 2,000 gpm).
    - Hi Joy Bowl: this node can only reach 2,400 gpm of the required 3,000 gpm for commercial facilities. In addition, nodes in the Bethel/Mitchell area sequentially show residuals pressures below 20 psi through the connection with the 12-inch diameter main from South Street to the Melcher Pump Station. The Pancake House and South Kitsap Mall are located on the same mains and experience the same problems.
    - Group Health: this node can only reach 2,500 of the anticipated required 3,500 gpm for institutions.
    - Peninsula Work Release: this node on Lloyd Parkway can meet the required 3,500 gpm of an institution but when this demand is applied, nodes north of this location have residual pressures at or below 20 psi.
    - Shari's Restaurant: 3,000 gpm fire flow on this node on Sedgwick Road causes pressure to drop slightly below 20 psi. However, this area typically has low pressure due to its proximity to Tank 5 and so this is not considered to be a significant problem.
    - City System – 260 Zone: The High Users in this area are Holiday Inn Express and the Kitsap County Admin Building (J160). All of these nodes can reach 3,000 gpm as required by code. However, nodes in the Intermediate Zone and areas near the Melcher Pump Station that are connected to the Low Zone drop below 20 psi residual pressure. In addition, the 4-inch diameter pipe located between Dwight and Kitsap Streets drops below 20 psi at the fire flow demand on the above users. A maximum flow for these nodes, the High Users, is approximately 1,500 gpm. Analyses of fire flow results indicate that several areas in the existing water system have velocities above 12 fps during fire events. These areas are primarily along Bay and Kitsap Streets in the Low Zone and in the Bethel Road and Mitchell Avenue areas in the High Zone.

580 Pressure Zone

A general summary of 580 Zone results for these areas is presented below.

- The high user in this area is the McCormick Woods Clubhouse. Under the build out MDD scenario, the Clubhouse can maintain a fire flow of approximately 2,700 gpm while maintaining a minimum 20 psi pressure within the overall water system.
- Although fire flows of greater than 2,000 gpm can be provided in certain areas, fire storage is calculated at 1,875 gpm for a Two-hour fire (225,000 gallons) for the 580 zone.
- The few areas of inadequate fire flow within this zone can be attributed to long dead end water mains, undersized water mains, and lack of global and localized water main looping.

3.5.5 Fire Flow Improvements

Improvements that are necessary to improve the system's ability to meet future fire flow demands generally consist of the following:

- Replacing existing 4 and 6-inch diameter mains with a minimum of 8-inch diameter mains
- Looping water mains
- Installing interties to connect to the water system of adjacent water purveyors.
- Incorporating a portion of the existing 260 Pressure Zone and the Intermediate Pressure Zone into the 360 Pressure Zone will also improve the system's ability to meet fire flow demands.

Improvements listed in the Annual Main Replacement Program element of the Capital Improvement Plan were identified and are prioritized based on enhancing fire suppression. Improvements are listed in the order that will provide highest benefit to the system first. See Chapter 9.

3.5.6 Small Main Replacements

It is recommended that the City embark on an ongoing water main replacement program to be implemented over several years and in conjunction with new development, street overlays, and sewer system improvements. This will improve system pressure, availability of fire suppression flows and accommodate for future demand capacity. Water mains identified in the Annual Main Replacement Program are listed in Table 8-2.

3.5.7 Analysis of Potential Capital Improvement Projects

The following potential CIP projects were modeled to assess their impact upon system fire flow capacity. Not all alternatives considered were incorporated into the final Capital Improvement Program. The alternatives that considered are as follows:

Installation of PRVs to interconnect portions of the 260 and 390 Zones

Alternative 1: Simulation results indicated that fire flows in the old town area of the City were increased by the installation of PRVs at Maple and Kendall Streets and at Dwight Street and Mitchell Avenue. In addition, the analysis indicated that 260 Zone fire flows were increased by the installation of a PRV at the intersection of Pottery Road and Melcher Street. Included in CIP 2.

Interconnecting the 580 Zone and the City's System

A plan was proposed to extend a 12-inch main beginning near the intersection of Sidney Road SW and SW Sedgwick Road to the southwest through the Glenwood Road JPA area and then west to the McCormick Woods Loop Road (10-inch main). The selected final route may be different. A booster station would need to be constructed with an initial pump capacity of 650± gpm (2 - 650 gpm pumps and with a future capacity of 1,200± gpm). The station would transfer water from the 390 Zone to the 580 Zone. The size of the pump station will depend on the volume of water that proposed wells 12 and 13 can produce and on future development in the 580 Pressure Zone. Additional analysis is recommended at the time of design to identify a specific pump station location and other design parameters.

The booster pump station will most likely be located on SW Sedgwick Rd. or on Glenwood Rd. SW near the 390/580 pressure zone boundary.

Additional interconnection of the McCormick and City systems is proposed through a new 10- to 12-inch main along Old Clifton Road to intertie the 580 Pressure Zone to the 390 Pressure Zone. These projects are included in CIP projects 4, 8, 11, 12, and 13.

3.5.8 New 660 Pressure Zone and Reservoir

For development to occur above elevation 478'- 480'±, a new pressure zone or a new constant pressure booster station will be required. The option to construct a new booster pump station supplying future 660 zone storage tank was evaluated. The future tank will be required to provide storage for all flow conditions including a 2-hour 1,500 gpm fire flow. The pump station would require having standby power capabilities which would allow continuous operation in the case of a power outage. The booster station will pump from the 580 Zone storage facilities into a new 660 tank. These projects are included in CIP 14 and 15.

Due to the topography, zoning, and planned development locations, a recent analysis of the proposed 660 zone shows that it would currently be best served by installing a storage tank (and accompanying booster station) with an overflow of 640' elevation. This interim 660 zone will be called the McCormick 660 zone and is shown on Figure 3-6. The rest of the 660 zone area does not have the zoning density to warrant installation of facilities to serve at this time. It will be served by a future booster station and possible additional storage tank based on the population density zoning at that time.

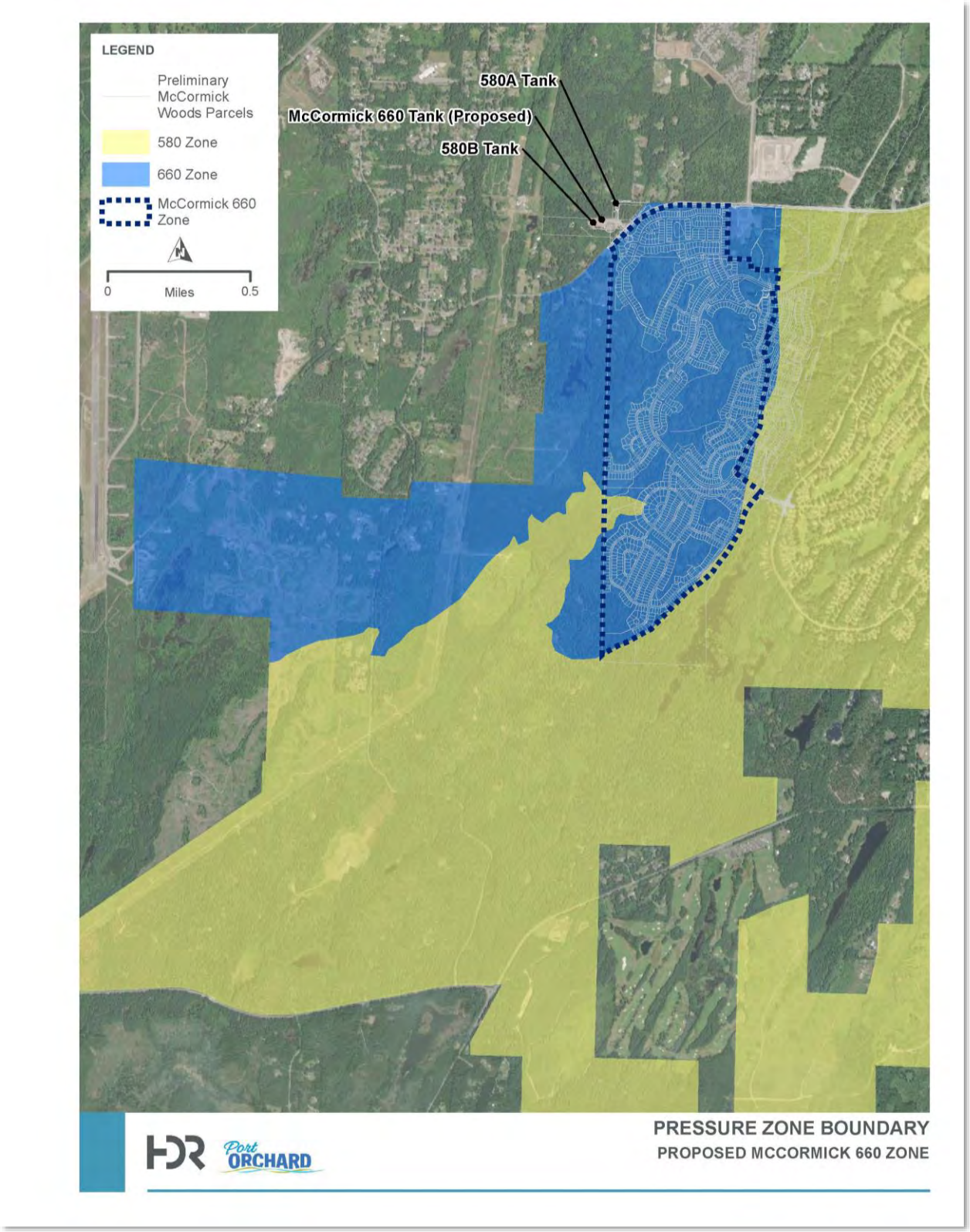

Figure 3-6 Proposed McCormick Woods 660 Pressure Zone Boundary

3.5.9 New 580 Zone Reservoir

As previously discussed, there is an anticipated storage deficit based on current water use and projections for the McCormick Woods area. This includes the McCormick Woods West and Glenwood JPA areas and the new 660 Zone service area. To eliminate this storage deficit, a new 1 million-gallon tank is proposed at the City's existing 580 Reservoir site in addition to the 660 Zone reservoir discussed above. The reservoir height would have an overflow elevation of 580-feet to match other facilities serving the McCormick Woods area, including the existing Bremerton 580 intertie. The City is planning to develop Well 12 on the 580 Reservoir Site to supply both the new 580 storage and the new 660 storage facilities. The new 580 zone storage is CIP 1.

3.5.10 Melcher Pump Station Upgrade

The Melcher pump station allows for the transfer of water from the 260 Pressure Zone to the 390 Pressure Zone. Significant improvements are needed at the aging Melcher Pump Station. Pumping capacity of the station should be increased by a minimum of 650 gpm, which would allow for the transfer of water to the 390 Zone. This improvement may not be immediately necessary depending upon the availability of water from Wells 10 and 13 for the 390 Zone. Additional flow may be needed depending on the development of Well 12 at the 580 Zone Reservoir site.

3.5.11 Hydraulic Analysis General Conclusions

The current water system is sufficient to handle domestic use ADD and MDD flows through 2025 while generally maintaining working pressures above 40 psi. Pressures below 40 psi exist at the following locations:

- Higher elevations near tanks.
- On the 4-inch diameter pipes modeled in the 260 Zone, through the entire Intermediate Pressure Zone, and the Melcher Pump Station feed line.
- In the 390 zone in the area along Sidney Ave. between Lippert Dr W and Alpha Ln. where elevations are above 300-feet. The model predicts static pressure in this area to be between 20-30 psi, with the Melcher pump station off. However, staff reported that no pressure complaints have been received from the area.

These areas can become problems during fire flow events and may require larger diameter mains, 8-inch diameter minimum, to be installed as the City upgrades its water system.

Based upon fire flow results, the Bethel Road and Mitchell Avenue sections of the 390 Zone may need larger or additional looping of water mains to maintain 20 psi residual pressures while providing adequate flows. Specifically, an 8-inch diameter looping main could be installed from the 12-inch diameter main on Kendall Street south and through the existing loop to connect to the 8-inch main at Plisko Lane and Mitchell Avenue. The Melcher Pump Station may also be able to alleviate this area in the event of a fire flow. Primary distribution mains within the 580 Zone are generally large enough to supply fire flow capacity to the rest of the distribution system. However, areas within the 580 Zone will require future looping and upsizing to meet required fire flows. Future water main extensions should be analyzed on a case by case basis to determine adequate pipe capacity.

The 6-inch diameter lines in the southeastern portion of the 390 Pressure Zone may need to be replaced by 8-inch lines depending on the changing local uses or demand for future commercial or industrial growth.

3.5.12 Water Quality Issues in the 390 Zone

Currently, the primary source of water for the 390 zone is Well 9. Well 9 has high iron (which does not exceed MCL) and high manganese (which slightly exceeds MCL). The introduction of chlorine to the water causes the oxidation of the iron and manganese. The City has recently installed a filtration treatment method for Well 9 water to alleviate this situation.

3.6 Summary of System Deficiencies

In summary, the biggest challenge facing the City of Port Orchard is meeting the needs of future development while maintaining sufficient yield from its permitted ground water supply. While water rights are sufficient to meet both short and long term needs of the City, the ability to withdraw, treat, and supply water is currently limited. Construction of Wells 12 and 13 supply, treatment, storage, and transmission will be critical to alleviating the declining supply yields from existing wells. Consideration of additional water rights and/or transfer of rights may become equally important if yields from other wells continue to decrease.

Another critical consideration for system operation and regulatory simplification is combining the City and McCormick water systems into one system. While construction of additional storage and continued use of the Bremerton supply to 580 Zone provides an interim solution, development of the Glenwood JPA cannot occur without a connection between the City and McCormick Systems. This will bring additional supply to McCormick 580 and McCormick West (660) Zones, allow for integration of the systems, provide operating independence, improve reliability, and reduce paperwork, testing and confusion associated with operating as two separate water systems.

The system is currently storage deficient in maintaining adequate residual pressure in some areas. As a result, dead storage is required to provide adequate pressure. The Deputy Fire Marshall for South Kitsap Fire and Rescue temporarily allowed the City to calculate storage as “nested storage” until a new, larger 580 zone storage reservoir was constructed. The new reservoir is now in service.

Lastly, portions of the City Water System have reached or will soon approach the end of their useful life. Funding for needed upgrades and replacement of the aging water infrastructure is needed to improve fire flows, replace undersized mains and source facilities. A systematic, annual renewal program is preferred rather than the more costly replacements following facility failure.

Analysis through the water system planning process indicates that the system can meet the City’s water needs for the 10- and 20-year planning period with the following improvements underway:

- Development of Well 11 (formerly named McCormick Woods Well 5). The well has been drilled but is not fully developed or online. It is expected to yield beyond the permitted 750 gallons per minute yield. Large quantities of good quality water have been confirmed at this location. Developing a strategy for future increase of water rights at this location is under discussion.
- Construction of approximately 1.0 million gallons of usable storage (excluding dead storage) to support the 580 Zone, alleviate pressure on sources of supply to meet maximum day demands. Design of this tank, located on the proposed Well 12 water campus near the existing 580 tank, has occurred and has been submitted to DOH.

- Construction of Well 13 in the 390 zone and associated treatment facilities is needed. Construction of this well should bring an initial 1,500 gpm of water (limited by water rights) to the City's 260 and 390 Zones. Construction and development of this well is currently underway. The City has secured plans to pursue transfer of additional water rights from older City wells that are experiencing declining yields to improve source yield and reliability and maximize the investment in a new treatment facility for Well 13 at the existing Sedgwick 390 tank site.
- Consideration of a new well (Well 12) in the 580 Zone is underway and being discussed with Ecology. Well 12 will provide the source needed to support the long term needs of the 260, 390 and 580 zones. Well 12 would provide source water for a new 580 zone storage tank and for a proposed 660 zone tank. Construction of Well 12 and the new 580 and 660 zone storage tanks will reduce the 580 zone's dependence on the City of Bremerton 580 intertie and allow for separation of the Port Orchard and Bremerton systems. It will also allow development in the future 660 zone, provide adequate storage for future development, and simplify interconnection between the 580, 390 and 260 zones via transmission mains planned along SW Old Clifton Rd.

With these improvements or other options that that will achieve the same results, such as redevelopment of existing wells with declining yields if the transfer of water rights is not possible, the City is able to support the estimated 10,650 ERU's in 2026 and up to an additional 500 to 1000 ERUs through use of existing and proposed storage and contracted source of supply from Bremerton. In reviewing the various analyses put forth previously in this Section, it is important to note that pumping or gravity flow between pressure zones will be required to serve all areas adequately. Beyond 2025, additional water rights may be required, however, the City will want to keep detailed water use records and monitor peaking rates. With reductions in water use due to conservation, type of development changes, or lifestyle changes, it is possible that the existing system could support over 11,000 ERUs projected by 2033. As noted throughout this document, historical water use information does not provide detailed peaking factor information. Based on water use records form daily production reads, peaking factors have been estimated at 2.1 for the City System and 3.8 for the McCormick Woods area. These conservative estimates were used to ensure that facility sizing is adequate, but this approach results in very conservative estimates of the number of ERUs that can be served.

Chapter 4 Water Resource Analysis

4.1 Water Use Efficiency

The City of Port Orchard developed a Water Use Efficiency Goal for compliance with the Water Use Efficiency Rule of the Municipal Water Law. The City has adopted the following goals after the requisite public process and has developed a plan for monitoring progress toward the established goal and reevaluation of water use efficiency measures on an annual basis. Additional documentation regarding the Water Use Efficiency Program is provided in Appendix C.

GOAL #1: Reduce Residential Usage by 0.5% per year through 2030

Over the next ten-year period, the City of Port Orchard plans to reduce water consumption by 0.5% per year. The following measures will be implemented to assist in attaining this goal:

- Include water conservation information in the City's annual Consumer Confidence Report (annual water qualtiy report to consumers).
- Evaluate the inclusion of inserts as part of the monthly water bills that present information regarding the importance of water conservation and actions individuals can implement to reduce their water use.
- Investigate a Water Conservation School Outreach Program that may include school presentations, preparation of curriculum material, water conservation education handout material, and tours of water system facilities.
- Provide water conservation materials at public outreach events.
- Use Conservation Rate concepts in rate setting.
- Show consumption history on water bills.

GOAL #2: Continue and Expand Educational Outreach with Customers

The City is a member of the County-wide conservation board and the Water Purveyors Association of Kitsap County (WaterPAK), the City is active in planning, setting up, and manning the WaterPAK booth at the Kitsap County Fair. Conservation is a principal message at the booth. WaterPAK's projects include distributing County-wide indoor conservation kits, summer lawn water calendars, and high efficiency toilet (HET) rebates; establishing coordination between water purveyors, fire districts, Kitsap County, and state agencies; coordinating the development of a groundwater model with USGS; and developing the County-wide Coordinated Water System Plan (CWSP).
The City also maintains a page on their website (https://www.cityofportorchard.us/) which describes the benefits of conservation and links to other resources regarding conservation-at-home measures to help educate its customers about water use efficiency.

4.2 Water Conservation Program

Water conservation is an important and viable means of reducing water system demands and in the City of Port Orchard's 2009 Water System Plan, a target goal of a 5 gpd/ERU reduction in demand prior to the year 2015 was established.

The premise of the program established in the previous Water System Plan remains unchanged, with the City relying heavily on the conservation messages of larger agencies as a means of education and awareness and implementing internal measures conducive to stewardship of clean water as a finite resource. Key elements of the conservation program are outlined in the following paragraphs.

4.2.1 Internal Conservation Measures

Water meters are a key element of an effective conservation program. Source meters are provided and maintained on all permanent sources and recommended for emergency interties. Individual customer meters are required on every connection to the Port Orchard Water system.

- Source Meters - The City of Bremerton (Bremerton) currently has master source meters in place at all its well supplies and at the metered intertie with the City. Meters are recommended for emergency interties.
- Water Meters - All connections to the water system are metered. Irrigation meters are available for interested customers and required on new irrigation accounts.
- Hydrant Meters - Hydrant meters are currently required for all water drawn from hydrants except that associated with emergency use (such as a fire). Hydrant permits are required in addition to the permit fee, and permit holders are charged for water use.
- Consumption History - Consumption history is provided on bi-monthly billings to promote conservation.
- Non-Revenue Water - The City's on-going maintenance and repair schedule provides for routine inspection of facilities and results in the prompt repair of leaks and valve failures that contribute to non-revenue water. In addition, field crews perform routine maintenance and operation in a conscientious manner to reduce the amount of water used for these activities. Hydrant meters are for all non-emergency water use.
- Leak Detection - The City retains the services of leak detection specialists biennially to identify leaks in the system. No major leaks were identified in the last leak detection analysis. All identified leaks were subsequently repaired.
- Pressure Regulation - The City maintains four separate pressure zones to ensure adequate fire flows and pressures are maintained in all areas of the system. By effective management of the pressure zones, water consumption can be reduced by controlling pressures at a safe level in accordance with State Department of Health guidelines. Isolated areas of high pressure are controlled by individual pressure reducing valves.

4.2.2 Conservation Program Promotion

Utilizing public information and promotional materials to encourage conservation is key to any conservation strategy. The City's annual newsletter is recommended as a way to distribute conservation tips and raise awareness. Water bills also provide an avenue for conservation program promotion. Further program promotion through distribution of conservation materials produced by others (i.e., WaterPAK, AWWA, DOH, and Kitsap County PUD) is also performed.

4.2.3 Rate Setting to Encourage Conservation

The City has implemented a water rate schedule to encourage conservation that employs a block rate structure whereby water use in excess of established thresholds is priced higher. The rate structure provides a threshold for evaluating conservation by various customer types and helps determine what type of education and conservation programs will be most useful in the future. Annual review of the impact of any adjustments to the water rate schedule on

conservation and water use is accomplished as part of overall Water Use Efficiency tracking and reporting in accordance with State regulations. Review of irrigation policies and charges is highly recommended. A summary of current water rates is provided in Chapter 9 of this Plan.

4.2.4 Encouraging Water Saving Devices

The City has adopted the most current version of the Uniform Building and Plumbing Codes to regulate and enforce the provision of low water use fixtures in all new construction. Future consideration of low water use landscaping provisions in the City Code is recommended.

4.2.5 Water Efficient Toilets and Appliances

The City relies on the public messages of regional water purveyors and the appliance industry to promote water efficient appliances, especially washing machines. It is estimated that the vast majority of toilets within the City are high flow toilets (toilets installed before 1980 are typically 5 to 7 gallons/flush, toilets installed between 1980 and 1992 are 3.5 gallons/flush, and toilets installed after 1992 are 3.5 to 1.6 gallons/flush). Residents who take advantage of the program receive a cash rebate of $100 on the installation of a low flow toilet.

4.2.6 Water Reuse and Recycling

The City and West Sound Utility District jointly own a wastewater treatment plant (Plant) that was recently upgraded to increase capacity and generally improve the Plant operations. The two agencies may consider working together to pursue opportunities for reuse of treated effluent from the Plant in the future. All potential water reuse opportunities will be considered with respect to Ecology and DOH requirements. Specific review and analysis of irrigation opportunities is recommended.

4.3 Conservation Program Implementation and Monitoring

Water Use Efficiency and Conservation program monitoring to quantify and document the effectiveness of the conservation program is accomplished through an ongoing data collection effort. In accordance with State requirements, the City achieves this by annually reviewing water use records and comparing these records to previous years. Water use data is kept by customer classification in order to identify annual and specific trends for summer and winter water use. This data, coupled with information regarding weather and implementation of any new conservation programs, provides a mechanism for monitoring overall water conservation efforts.

Continued participation with neighboring purveyors and WaterPAK is required to ensure that consistent conservation messages are being delivered throughout the South Kitsap County area and to develop new ideas for water conservation mechanisms and programs. City employees are encouraged to participate in water conservation data collection, seminars, and workshops that are relevant to their particular field.

4.4 Water Rights and Source of Supply Analysis

This section presents the analyses performed to evaluate the City of Port Orchard water system's ability to meet the needs of current and projected customers of the City. It is important to recognize that while the State Department of Health requires that physically independent systems be analyzed separately, the City operates the Port Orchard (City) System and the McCormick Woods System under one utility department.

A fundamental component of this Plan is the desire for the City System(s) to operate autonomously from neighboring utilities under anticipated operating conditions. To achieve this, interconnection of the two systems should be accomplished as soon as possible. The analyses presented herein identifies the system requirements for the existing systems independently but considers ultimate combination of the systems into one entity.

As such, future improvements are based on the plan to connect the 260 and 390 (City) Zones and the McCormick 580 Zone as development occurs in the 580 Zone and in the area east of the existing McCormick Woods System. This plan for interconnection is supported by the Department of Ecology's consideration of water rights applications. Ecology has established source of supply requirements and issued water rights for the combined systems servicing the City's overall water service area as established by the CWSP.

The analyses put forth herein utilize current data and the projected growth scenarios established in Chapter 2. The primary focus of the analyses is to determine the type and magnitude of improvements required to meet the projected needs of the service area(s), and not to determine the specific needs or timing of individual development proposals. For large scale and costly facilities such as source of supply, transmission lines and storage tanks, the ultimate service area needs have been considered to ensure general facility improvements will be of sufficient capacity and location to meet the City's future needs. For distribution system facilities, the primary goal is to develop a program to meet the fire flow requirements of current and anticipated development, and the regular renewal and replacements to protect the investment of ratepayers to the system.

Transmission, storage, and pumping facilities required to connect the City System to the McCormick System have been evaluated. The interconnection is planned to occur along SW Sedgwick Road to the south and along the SW Old Clifton Road corridor to the southwest. Timing will be dependent on development and construction of a new 580 Zone storage facility, possibly as early as 2021.

4.4.1 Combining of City System and McCormick Woods Water System

The City's water system consists of two separate water systems, both owned and operated by the City of Port Orchard. The City System, which includes the 260 Pressure Zone and the 390 Pressure Zone serves most of the City limits, and the McCormick Woods System 580 Pressure Zone serves the McCormick Woods area in the western portion of the City. As of December 2017, the two systems served approximately 3,132 connections in the City System and 814 connections in the McCormick Woods System.

The City is currently developing a long-range program for interconnecting the City's main water system (the 260 and 390 Pressure Zones) with facilities serving the McCormick Woods System (the 580 Pressure Zone and a future 660 Pressure Zone). This will allow for the two existing systems to be combined under one water system identification number.

The McCormick System is in the western portion of the City and eventually will be connected to the City System from new transmission mains along SW Sedgwick Road and along SW Old Clifton Road. The City also plans to install PRV connections from the 580 Zone to the 390 Zone via the new SW Old Clifton Road transmission main and at the proposed 390 to 580 pump station near SW Sedgwick Road.

All of the water rights currently serving the City System and the McCormick Woods Water System meet the statutory definition of "municipal water supply purposes." Pursuant to the Municipal Water Law of 2003, the effect of Department of Health approval of the City's last water system plan in 2009, and the continuing effect of approval of this current Plan, is that: (1) these water rights are considered valid and in good standing; (2) they are exempt from statutory relinquishment for nonuse; and (3) they can be used throughout the combined Port Orchard Water Service Area for municipal water supply purposes. See Figure 1-4, Water Service Area Map.

4.4.2 Water Rights

The scope and validity of municipal water rights has become one of the most critical issues for planning a water system's future expansion. State-issued water rights have become increasing difficult to secure as a result of instream flow protection rules and legal precedents that limit the availability of surface and groundwater in order to protect senior instream flow water rights. This puts a premium on properly assessing existing water rights. The City hired water rights attorney Thomas M. Pors to research its water rights and prepare the water rights self-assessment for this 2020 Water System Plan update. Mr. Pors' assessment is reflected in this section, including the contents of Table 4-1, and in the self-assessment forms included in Appendix C.

As demonstrated in Section 4.4.3, the City's water rights are adequate to meet current water demands and projected demands through 2022. With approval of the new water rights and water right change applications described in Section 4.4.3, the City's water rights and new Well 12 and Well 13 sources should be adequate to meet projected demands through 2040.

Primary and Supplemental Water Rights

The City's water rights are noted as either primary (additive) or supplemental (non-additive) water rights, and where appropriate these interpretations are explained in footnotes to Table 4-1 and/or in the text below. Generally, primary water rights are additive to pre-existing rights and can be used to the full extent of the authorized quantities, regardless of the use being made under other water rights. The use of supplemental water rights is conditional based on the language in the water right decision documents and is often dependent on the use being made under prior rights. In most cases, supplemental water rights can be used as an alternative source for previously issued water rights, and do not increase the total authorized annual quantity of water allowed to be withdrawn and used by the City. A water right can be partially supplemental and partially primary.

4.4.2.1 City Water System Water Rights

The City has five post-Water Code water rights dating back to 1955 allowing the use of wells to provide municipal water service within its original service area. Water rights for earlier sources of supply, such as Wells 1, 2, and 3, were either never obtained or were not maintained in good standing by the City and are not discussed at length in this assessment.

Certificate 3334-A (G1-*04166C), with a priority date of November 17, 1955, authorizes Well 6 and is a primary (additive) water right for 350 gpm and 560 AFY. Well 6 provides artesian flow into a stilling basin and provides one of the City's primary sources for the 260 Zone that serves downtown and the City's lower elevation residential areas, along with Well 7.

Certificate G1-24586C, with a priority date of December 24, 1984, authorizes Well 7 and is a primary (additive) water right for 750 gpm and 1210 AFY. Well 7 provides artesian flow to the clear well at City Hall and is the principal source of supply for the 260 Zone.

Certificate G1-25019C, with a priority date of May 29, 1987, authorizes Wells 8 and 9 for up to 500 gpm and 560 AFY, but these quantities are supplemental to Certificates 3334-A and G1-24586C, and claim G1-000911CL. Wells 8 and 9 supply the High (390) Zone with installed pumps. Well 9 was added to this water right pursuant to a 2001 change application that was approved by the Department of Ecology (Ecology) on March 29, 2004.

Permit G1-26119P, with a priority date of March 22, 1991, authorizes Well 10 for up to 500 gpm and 806 AFY, but these quantities are partially supplemental to existing water rights. See Section 4.4.2.3, *"Aggregate Cap Condition."* In 2007, the City applied for additional instantaneous and annual quantity for Well 10, to maximize the utility of drilling a large, deep aquifer municipal well, and the application was assigned number G1-28476. The City has not completed this well due to updated engineering plans for the water system, and in 2016 it applied to Ecology to add Well 13, located adjacent to the intersection of Bethel Road SE and SE Sedgwick Road, to both Permit G1-26119P and Application G1-28476. Proposed Well 13 is discussed further below in Section 4.4.3. The development schedule for Permit G1-26119P requires completion of construction by December 31, 2028 and full beneficial use by December 31, 2030. The City expects that these deadlines will be extended consistent with this Water System Plan update when the pending applications are processed.

Permit G1-26729P, with a priority date of September 14, 1992, is thought to authorize Well 4 and Well 5 for their artesian flow in the amount of 50 gpm and 80 AFY. This quantity is partially supplemental to existing water rights. See Section 4.4.2.3, *"Aggregate Cap Condition."* The development schedule for Permit G1-26119P requires completion of construction by December 31, 2028 and full beneficial use by December 31, 2030. Well 4 presumably has been paved over and is unable to be located. Well 5 has been decommissioned. However, this is a valid permit and a change form has been submitted to the Washington State Department of Ecology.

Other Water Right Claims. In 1970, the City filed water right claims for Wells 6 and 7. The claims for Wells 6 and 7 were unnecessary because these sources were authorized by properly issued permits and the priority date for these sources is after the June 6, 1945 effective date of the Ground Water Code. The claim filings are included in Appendix C, but they will not be included in the Water Right Self-Assessment unless new information is discovered by the City relating to their separate validity as vested water right claims.

4.4.2.2 McCormick Water System Water Rights

The McCormick Woods Water Company (MWWC) was created by the developers of McCormick Woods PUD to serve the 1,300-acre residential development and golf course in the southwest section of the City. In 1986, the City acquired the MWWC, including its wells, pumps, storage facilities, water mains, water rights, and water right applications, and took over its operation. The City's last two water system comprehensive plans described the process of integrating the MWWC into the City Water System. As a result of the City's acquisition of the MWWC water rights, there is now a common service area and place of use for all the City and MWWC water rights. That service area and place of use may expand or contract with Department of Health approved changes to the City's water service area map. See RCW 90.03.386(2).

Permit G1-24437P, with a priority date of January 24, 1984, authorizes MC Wells 1, 2, and 3, up to 600 gpm and 450 AFY for municipal supply and irrigation of 100 acres, and is a primary (additive) water right. These shallow aquifer wells supply the 580 Zone tank. The permit document provides that 300 AFY of this right was intended to serve 1,200 homes, but this notation is not a limitation on the number of homes or other connections the City can serve with this water right, by operation of the Municipal Water Law at RCW 90.03.260(5). In 2014 the City

filed a Notice of Compliance form with Ecology adding Well 11 (formerly known as MC Well 5) to this water right as an additional point of withdrawal, but Well 11 has not yet been completed with a pump or connected to the water system. A Showing of Compliance for Well 11 is included in Appendix C. In 2016 the City filed a change application to add Well 12 to this water right in order to consolidate the McCormick Woods area water supply from one or two deep aquifer wells in proximity to upper zone storage facilities. The change application is discussed with other pending applications in Section 4.4.3, below.

On March 3, 2017, Ecology approved an extension of the development schedule for Permit G1-24437P to February 15, 2022. It is expected that a further extension of this development schedule will be approved when Ecology approves the City pending change applications.

Permit G1-26454P, with a priority date of January 17, 1992, authorizes Well 11 for an additional 150 gpm and 242 AFY of withdrawals from the McCormick well field for municipal purposes, increasing the total withdrawals from this wellfield to a maximum of 750 gpm and 692 AFY. This additional quantity is partially supplemental to existing water rights. See Section 4.4.2.3, *"Aggregate Cap Condition."* A condition of this permit is to deactivate the shallow MC Wells 1, 2, and 3 within 1 year of activation of the new well to be completed in the Sea Level Aquifer (or deeper). Well 11 has been drilled, but not completed as a production well or connected to the City's water system. In 2016 the City filed a change application to add Well 12 to this water right – the application is discussed with other pending applications in Section 4.4.3, below. The development schedule for Permit G1-26454P requires completion of construction by December 31, 2028 and full beneficial use by December 31, 2030. It is expected that a further extension of this development schedule will be approved when Ecology approves the City's pending change applications.

Permit G1-26447P, with a priority date of January 17, 1992, authorizes Well MC 4B for up to 400 gpm and 645 AFY for both municipal purposes and irrigation of the McCormick Woods Golf Course. This quantity is partially supplemental to existing water rights. See Section 4.4.2.3, *"Aggregate Cap Condition."* The well is located on golf course property, but the water right was assigned to the City in 2015. In 2016 the City filed a change application to administratively divide the water right into its irrigation and municipal parts, and to add Wells 11 and 12 to the municipal water right. This application is discussed with other pending applications in Section 4.4.3, below. The municipal portion of this primary (additive) water right is 420 AFY, based on the total irrigation demand for the golf course. However, because the golf course irrigation demand is considered part of the City water supply, the total instantaneous and annual quantity is used in Table 4-1 and in the self-assessment forms in Appendix C4.

4.4.2.3 Aggregate Cap Condition in Permits G1-26119P, G1-26447, G1-26454P, and G1-26729P

When Ecology investigates a municipal water right application, it must tentatively determine the scope and validity of that municipality's existing water rights in order to decide how much additional water may be needed to serve future water demands. Ecology's authority to make tentative determinations regarding existing water rights is limited, and does not include the authority to diminish or "adjudicate" pre-existing water rights, because only the superior courts of Washington State have that authority, *Rettkowski v. Ecology*, 122 Wn.2d 219, 227, 858 P.2d 232 (1993). The four most-recently issued of the City's water rights include what is commonly known as an "aggregate cap" condition, which is a type of tentative determination by Ecology regarding the scope of existing water rights along with the water right just granted. This aggregate cap condition is essentially a supplemental water right limitation on the use of the water rights thus granted, however, it is legally questionable whether the scope of pre-existing

water rights can be limited by such a condition. The identical aggregate cap condition for these four permits states:

> "The annual quantity of water authorized represents a portion of the total water rights owned by the City of Port Orchard. The total annual quantity withdrawn by the City of Port Orchard under G1-26119, G1-26447, G1-26454 and G1-26729 shall not exceed 1,308 acre-feet per year. The total annual quantity withdrawn from all City of Port Orchard sources shall not exceed 3,528 acre-feet per year."

The accompanying text in the investigative report for these water right decisions explains Ecology's basis for this annual quantity limitation, as follows:

> "The total quantity of water allocated in the four concurrent water right decisions (G1-26119, G1-26447, G1-26454 and G1-26729) was determined by estimating future water demand within the City of Port Orchard service area. According to their estimates as part of their on-going revision of their Water System Plan (PACE 2005), the City of Port Orchard projects it will supply water to a population of 26,225 by 2030. The water usage rate based on historical data is 115 gallons per day per person. Using this average rate, the City is expected to require 3,378 acre-feet per year. Additionally, there is the demand of 150 acre-feet per year for irrigation of McCormick Woods Golf Course. Therefore, the total annual demand for the City in 2030 is estimated to be 3,528 acre-feet. The City of Port Orchard controls 2,220 acre-feet of existing certified water rights. The estimated future usage of 3,528 acre-feet per year represents an anticipated increase of 1,308 acre-feet per year."

Thus, these four permits increased the City's total primary annual quantity by 1,308 acre-feet per year.

4.4.2.4 Interties

Pursuant to Interlocal Agreements between the cities of Port Orchard and Bremerton (Appendix F), Port Orchard purchases wholesale water from the City of Bremerton through a 16-inch transmission main and intertie on Anderson Hill Road. The intertie allows water to be supplied by either system to the other, but in practice the City of Port Orchard has been purchasing water from Bremerton to supply growth in the McCormick Woods area for over twenty years. The most recent update to the Interlocal Agreement (dated November 2019), provides for the sale of Port Orchard's existing 580 Zone tank, the 16-inch transmission main, and associated assets to Bremerton. Bremerton has agreed to supply water to Port Orchard during the affective dates of the agreement, at a rate of 750 gpm. Once Port Orchard has constructed a new 580 Zone tank, Well 11 and future Well 12 are online, and constructed necessary transmission and distribution infrastructure, the Bremerton and Port Orchard systems can operate as separate systems. Port Orchard and Bremerton also agree to consider an emergency intertie agreement at the conclusion of the current agreement. The City intends to reduce or eliminate its reliance on the Bremerton intertie with construction of the Well 12 and Well 13 projects and approval of the pending applications described in Section 4.4.3.

Table 4-1
Port Orchard Water Rights

Permit Certificate or Claim #	Source Name/Number	Supplemental Limitation	Water Right Quantity	
			Instantaneous Flow Rate (Qi)	Annual Volume (Qa) Supp/*Primary*
G1-*04166C (Cert. 3334-A)	PO 6	No	350	***560***
G1-24586C	PO 7	No	750	***1,210***
G1-25019C	PO 8 and 9	Yes[1]	500	560
G1-26119P	PO 10	Partial[2]	500	211.5/***594.5***
G1-26729P[4]	PO 4 & 5	Partial[2]	50	11/***59***
G1-24437P	McCormick 1, 2, 3, PO 11[3]	No	600	***450***
G1-26454P	PO 11[3]	Partial[2]	150	63/***179***
G1-26447P(A)	McCormick 4B	Partial[2]	400	169.5/***475.5***
TOTAL MUNICIPAL QUANTITY			3,300	***3,528***
Interties				
City of Bremerton (12/17/2001 interlocal agreement)			unspecified	***178***
City of Bremerton (11/21/2019 interlocal agreement)			750	unspecified
Applications				
G1-28162A	PO 12		500	***560***
G1-28476A	PO 13		750	***1,210***

Notes:
1) The annual quantity (560 AFY) of G1-25019C is supplemental to existing rights.
2) The aggregate cap limitation on Permits G1-26119, G1-26447, G1-26454, and G1-26729 grants the City an additional 1,308 acre-feet per year of primary rights for the four water rights combined, and limits the total annual quantity withdrawn from all City of Port Orchard sources, which "shall not exceed 3,528 acre-feet per year." For purposes of Table 4-1 and the City's water right self-assessment, the 1308 AFY of new primary Qa is apportioned among the four water rights.
3) MC Well 5 was renamed PO Well 11; it was intended to replace MC wells 1, 2 & 3, with a combined Qi of 750 gpm and a combined Qa of 672 AFY but is not online at this time.
4) Assumed to be for Well 4 and Well 5. Well 4 has been paved over and is unusable and well 5 was decommissioned. This is still a valid claim and a change application has been submitted to ECY.

4.4.3 Pending Water Right Change Applications and New Applications

For many years, the City has experienced declining yields in its older wells. New wells have been drilled to augment the City's supply, but their location in relation to proposed development presents challenges with transmission lines, storage, and substantial pumping lifts. The City has two new well projects designed to add high-yield, deep aquifer wells at higher elevations on each side of the City's dual-lobed service area, which will facilitate a more efficient gravity distribution system than relying on wells located at or near sea level. Other objectives are to increase system-wide storage capacity and security with newer wells and pumps, to reduce

reliance on the Bremerton Interties, and to source groundwater from deeper aquifers to improve base flow recharge to area streams. These well projects rely on a combination of new water right applications and change applications to shift pumping from older sources located at the bottom of the system or shallow wells to new deep wells located at the top of the system.

Well 12 Project. Application G1-28162 was filed by the City in 2002 to provide an additional source for the expanding McCormick Woods area next to the City's 450,000-gallon 580 Pressure Zone storage tank. The application seeks an additional 1,000 gpm and 1,080 AFY from the sea-level or deeper aquifer. The City also filed several change applications in 2016 to add Well 12 as an authorized point of withdrawal for the McCormick Woods wellfield water rights and Well 11, including Permits G1-24437P (MC Wells 1, 2, 3), G1-26454P (Well 11), and G1-26447P (MC Well 4B). A preliminary permit has been issued by Ecology to allow Well 12 to be drilled and pump tested, including conditions for hydrogeologic investigations. Drilling and testing activities are underway. Approval of these applications would enable the City to convert MC Wells 1, 2, and 3 to observation and emergency backup wells. The overall effect of moving to a deeper sub-sea level aquifer in the same body of public groundwater is to diminish the magnitude of base flow capture from area streams, while possibly expanding the regional extent of a smaller magnitude of impacts. The City is developing a mitigation plan to address any modeled impacts to streamflow from the change to a deeper aquifer to be tapped by Well 12.

Well 13 Project. Application G1-28476 was filed by the City in 2007 to increase the capacity of Well 10 for an additional 1,000 gpm and 1,600 AFY. In 2016, the City amended this application to change the proposed well site from Well 10, located at sea level near the shoreline, to Well 13 located in the Bethel area within the NE1/4, NE1/4 of Section 11, T23N, R1E, W.M and near the City's existing Sedgwick Reservoir. The City also filed several change applications to add Well 13 as an authorized point of withdrawal for Cert. 3334-A (Well 6), G1-24586C (Well 7), and G1-26119P (Well 10). A preliminary permit has been issued by Ecology to allow Well 13 to be drilled and pump tested, including conditions for hydrogeologic investigations. Drilling and testing activities are currently under way. Approval of these applications would enable the City to cap and monitor Wells 6, 7, and 10 as observation and emergency backup wells. The overall effect of moving to a deeper sub-sea level aquifer in the same body of public groundwater is to diminish the magnitude of base flow capture from area streams, while possibly expanding the regional extent of a smaller magnitude of impacts. The City is developing a mitigation plan to address any modeled impacts to streamflow from the change to a deeper aquifer to be tapped by Well 13.

System Analysis

Table 4-2 summarizes the existing and anticipated available supply and water rights by 2037. Table 4-2 includes Wells 11, 12, and 13, which are not yet online as discussed earlier in this chapter.

Table 4-2 Instantaneous Sources of Supply by Zone and Year (gpm)				
Source Available by Active Capacity	**2017**	**2023**	**2029**	**2039**
260 Zone	1,793	-	-	-
390 Zone	443	1,943	1,943	1,943
Subtotal City	**2,236**	**1,943**	**1,943**	**1,943**
580 Zone	888	750	750	750
660 Zone	-	1,000	1,000	1,000
Subtotal McCormick	**888**	**1,750**	**1,750**	**1,750**
Total	**3,124**	**3,693**	**3,693**	**3,693**
Source Available by Rights	**2017**	**2023**	**2027**	**2037**
260 Zone	2,500	-	-	-
390 Zone	500	2,000	2,000	2,000
Subtotal City	**3,000**	**2,000**	**2,000**	**2,000**
580 Zone	1,100	750	750	750
660 Zone	-	1,000	1,000	1,000
Subtotal McCormick	**1,100**	**1,750**	**1,750**	**1,750**
Total	**4,100**	**3,750**	**3,750**	**3,750**

Notes:
1) Installed Capacity assumes capacity upgrades or water rights transfers to Wells 11, 12, and 13 will be accomplished to attain withdrawals up to permitted water rights.
2) The average capacity of Wells 8 and 9 is included in this table and used for analysis as the water right does not allow for the wells to be run simultaneously.
3) Instantaneous water rights and capacity associated with the Bremerton Interties are included in 2017 only. Intertie sources include 850 gpm into the 260 Zone and 350 gpm into the 580 Zone. By interlocal agreement, the 580 Zone intertie capacity was increased to 750 gpm in November 2019.

Table 4-3 presents a source analyses for the water system(s) through the year 2039 and focuses on installed capacity. System reliability is further ensured by not including emergency interties in the source analyses. This approach is based on the desire to operate the system independent of neighboring jurisdictions. The supply surplus/deficit was assessed under the three criteria established by DOH discussed earlier in this chapter and summarized below:

- Source capacity capable of supplying MDD (required)
- Source capacity capable replenishing fire flow storage (FSS) during MDD over 72 hours (recommended)
- Source capacity capable of supplying MDD with 18 hours of pumping (recommended)

The source capacity shown in Table 4-3 includes the existing source capacity under 2019. In subsequent years, the source capacity listed in Table 4-3 reflects the City's plans to incorporate new sources, obtain additional water rights, transfer existing water rights, and transition the existing interties with the City of Bremerton to emergency interties. Supply sources in 2023 and all subsequent years include Well 11 (drilled but not online), Well 12 (under design), and

Well 13 (under construction) but do not include supply from McCormick Wells 1 and 3, City Wells 6 and 7, or Bremerton.

In 2019 the existing source of supply is sufficient to meet all required and recommended criteria in the City System (Table 4-3). However, only the required criteria is met in the McCormick System in 2017. Once the two systems are connected, the current surplus of instantaneous supply in the City System can be shared with the McCormick Woods System. Construction of a 390 Zone to 580 Zone Booster Pump Station and a 580 Zone to 390 Zone PRV in association with the anticipated Stetson Heights Development will connect the two systems and is anticipated to occur within the next 6-years. Thus, the total supply for both systems is expected to be available to either system by 2023. In order to meet both DOH supply recommendations described above, the City may require developers to construct a 580 to 660 Booster Pump Station or obtain additional 660 Zone supply; these improvements are not required to meet the minimum DOH supply criteria.

Table 4-3
Source Analysis (By Capacity)

Year	Zone	MDD (MGD)	MDD (gpm)	FSS (gpm)	MDD + FSS (gpm)	Existing (gpm)[1,6]	75% Existing (gpm)[4]	Surplus (Deficit) (gpm)		
								MDD Supplied in 24 Hours (Required)	MDD + Fire Flow Replenished Over 72 Hours (Recommended)	MDD Replenished with 18 Hours of Pumping/Day (Recommended)
2017	City-260	0.71	493	42	535	1,793	1,345	1,300	1,258	810
	City-390	0.87	603	42	644	443	443	(160)	(202)	(202)
	City-Subtotal	**1.58**	**1,096**	**42**	**1,137**	**2,236**	**1,787**	**1,140**	**1,098**	**650**
	McCormick-580	0.89	619	52	671	888	666	269	217	(5)
	McCormick-660	0.00	0	0	0	0	0	0	0	0
	McCormick-Bremerton [5]	0.53	368	42	409	0	0	(368)	(409)	(409)
	McCormick Subtotal	**1.42**	**986**	**52**	**1,039**	**888**	**666**	**(98)**	**(151)**	**(373)**
2023	City-260	0.72	497	42	539	0	0	(497)	(539)	(539)
	City-390	0.88	608	42	650	1,943	1,568	1,335	1,293	918
	City-Subtotal	**1.59**	**1,105**	**42**	**1,147**	**1,943**	**1,568**	**837**	**796**	**421**
	McCormick-580	1.79	1,245	52	1,297	750	563	(495)	(547)	(735)
	McCormick-660	0.59	409	83	493	1,000	750	591	507	257
	McCormick Subtotal	**2.38**	**1,654**	**83**	**1,738**	**1,750**	**1,313**	**96**	**12**	**(425)**
	Total	**3.97**	**2,759**	**83**	**2,843**	**3,693**	**2,769**	**933**	**850**	**(73)**
2029	City-260	0.74	514	42	555	0	0	(514)	(555)	(555)
	City-390	0.90	628	42	669	1,943	1,568	1,315	1,273	898
	City-Subtotal	**1.64**	**1,141**	**42**	**1,183**	**1,943**	**1,568**	**801**	**759**	**384**
	McCormick-580	2.02	1,403	52	1,455	750	563	(653)	(705)	(893)
	McCormick-660	0.94	654	83	737	1,000	750	346	263	13
	McCormick Subtotal	**2.96**	**2,057**	**83**	**2,140**	**1,750**	**1,313**	**(307)**	**(390)**	**(828)**
	Total	**4.61**	**3,198**	**83**	**3,282**	**3,693**	**2,769**	**494**	**411**	**(512)**
2039	City-260	0.81	566	42	608	0	0	(566)	(608)	(608)
	City-390	1.00	692	42	733	1,943	1,568	1,251	1,209	834
	City-Subtotal	**1.81**	**1,258**	**42**	**1,299**	**1,943**	**1,568**	**685**	**643**	**268**
	McCormick-580	2.11	1,466	52	1,518	750	563	(716)	(768)	(955)
	McCormick-660	1.10	761	42	803	1,000	750	239	197	(53)
	McCormick Subtotal	**3.21**	**2,227**	**52**	**2,279**	**1,750**	**1,313**	**(477)**	**(529)**	**(966)**
	Total	**5.02**	**3,484**	**52**	**3,537**	**3,693**	**2,769**	**208**	**156**	**(767)**

Notes:
1) Source Analysis is based on active capacities indicated in Tables 6-1 and 6-2 and include emergency supplies from Bremerton under the 2017 scenario only. Sources include supply from Wells 11, 12 and 13 under all future scenarios. Wells 11, 12 and 13 have been drilled and are undergoing testing. Water rights applications for Wells 12 and 13 are pending.
2) The planned connection of the City system and the McCormick system anticipated within the 10-year planning horizon will allow supply from the 390 Zone to be transferred to the McCormick Woods system and vice versa.
3) The estimates put forth herein are not a guarantee of ERU's to any development, property owner or specific area of the City.
4) Well 8/9 was assumed to be capable of operating for 24 hours a day hours of pumping as the wells are redundant and can be alternated.
5) Demands from Bremerton (McCormick North) on the 580 Zone were included only in the existing scenario. The two systems are planned to be separated within the next 6-years.
6) Please note that the City's total Qi of 3300 gpm includes 400 gpm from Permit G1-26447P, currently associated with McCormick Well 4B, which is located at the McCormick Woods golf course. The City has applied to Ecology to divide Permit G1-26447P and to associate the City's portion of this water right (400 gpm, 645 acre-feet/year) with Wells 11 and 12. The City agrees that its total existing instantaneous quantity is 2900 gpm until this change application is approved.

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Figure 4-1 presents the projected MDD for both systems and the existing available instantaneous supply over the 20-year planning horizon. As discussed previously, the City currently supplies a portion of Bremerton's water service area through the McCormick Woods System. The MDD for the McCormick Woods System only and for the McCormick Woods System and Bremerton combined are shown on Figure 4-1. However, the Bremerton demands are believed to be applicable only during the near term as it is anticipated that Bremerton will serve this area directly within the 20-year planning horizon.

As noted on Table 4-3 and Figure 4-1, the McCormick Woods System MDD are approaching instantaneous supply capacity. Source deficiencies in the 580 Zone are due to development within McCormick Woods, McCormick West, Stetson Heights, and McCormick East. While the current (November 2019) Bremerton intertie agreement with the McCormick Woods System is for 750 gpm in emergency situations, Bremerton is capable of supplying up to 1,800 gpm to the 580 Zone. Regardless, the City recognizes implementation of supplemental sources and separation of the two systems is a priority. Maintaining an emergency supply connection between the Bremerton 580 Zone source and the Port Orchard 580 Zone is planned.

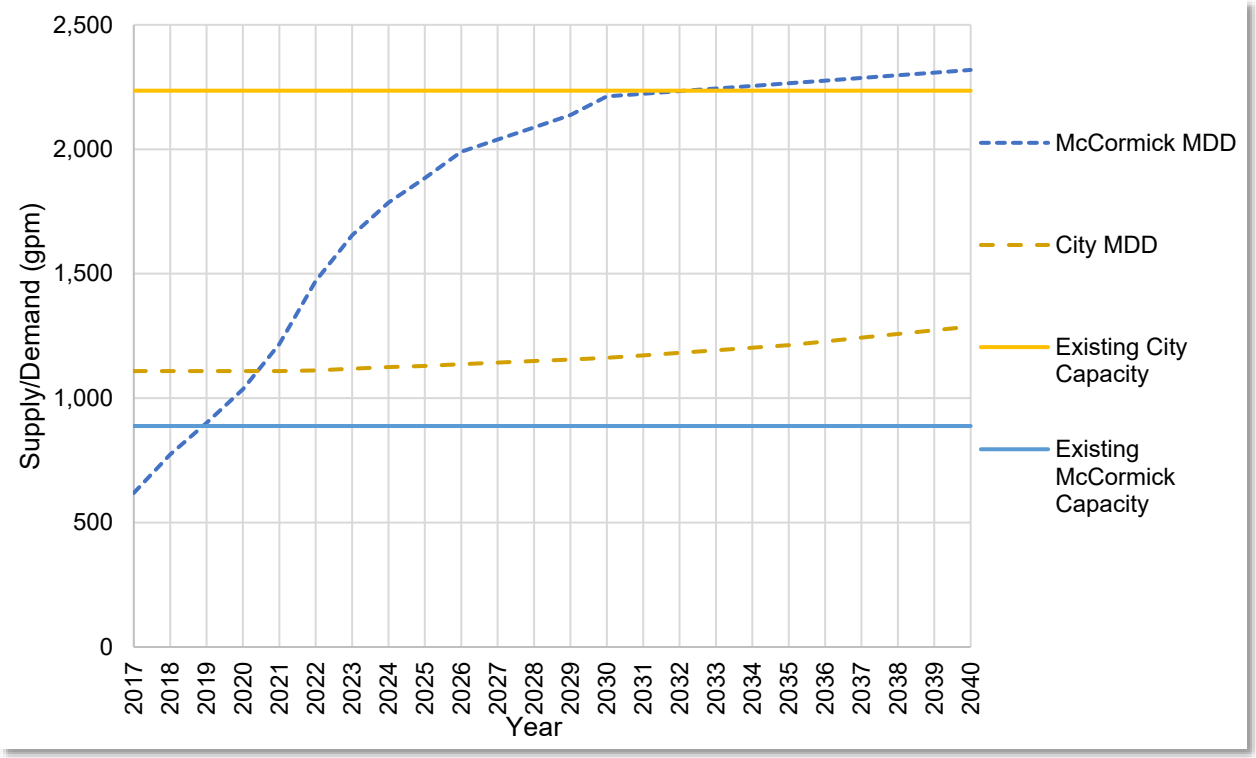

Figure 4-1 McCormick Woods and City Systems MDD and Existing Supply

Figure 4-2 presents the projected MDD and the anticipated new sources of supply for both systems. Bremerton customer demands currently served by Port Orchard are not shown on Figure 4-2, as these customers are anticipated to be served directly from Bremerton within the 6-year planning horizon and before the McCormick Woods and City Systems are connected.

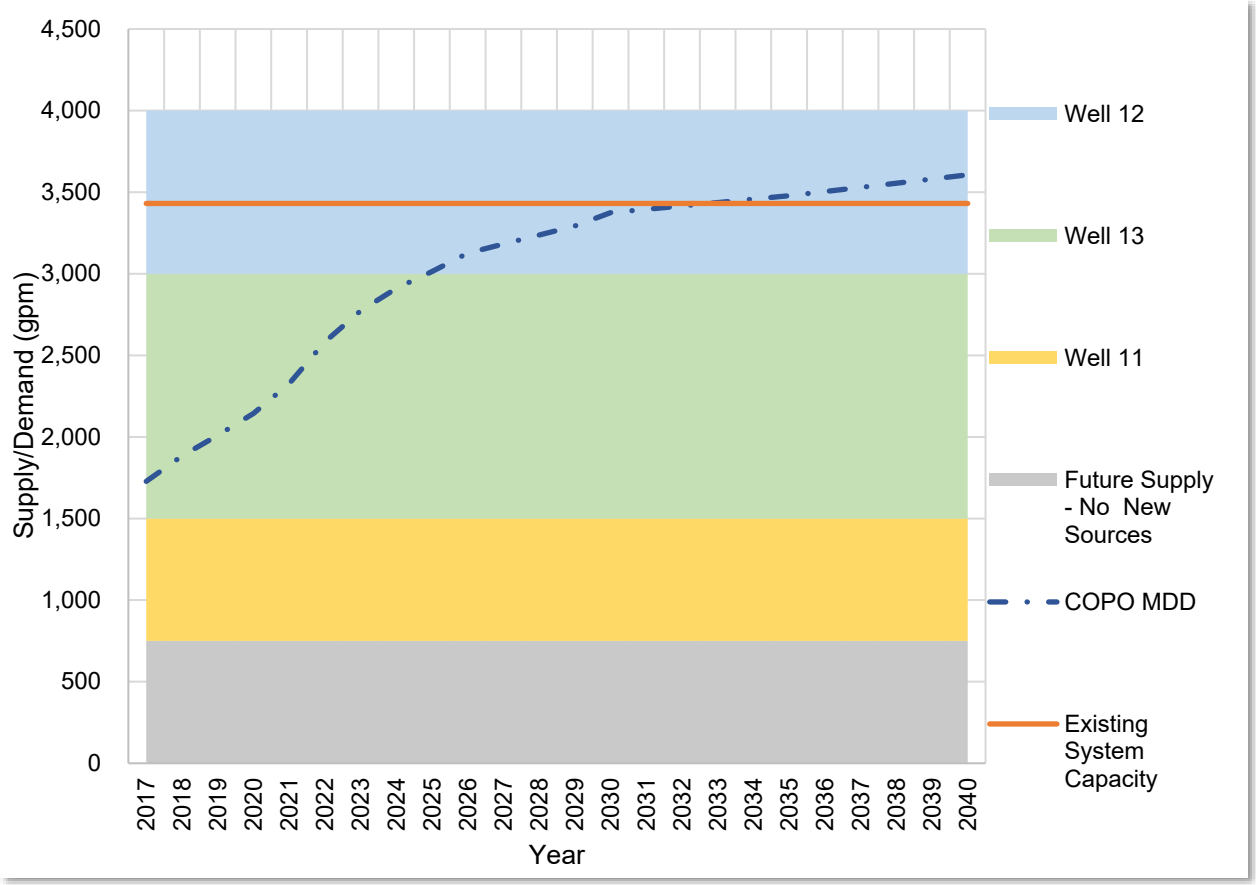

Figure 4-2 Port Orchard MDD and Existing and Projected Supply

Wells 7, 8 and 9 are the only existing sources of supply that are anticipated to be maintained over the 20-year planning horizon; the average capacity of these two sources is shown at the bottom of the graph in gray. The proposed additional sources are stacked on top of the existing sources to be maintained in Figure 4-2. As identified on Figure 4-2, the existing sources of supply are sufficient to support the connected systems until 2022. If all proposed source changes are approved and constructed by the City, a deficiency of supply is projected to occur in 2026 and a deficiency of approximately 550 gpm is anticipated at the end of the 20-year planning horizon. If not all pending water rights are approved, the City will face a source of supply deficiency before 2026. Additional supply may be obtained by procuring water rights for Wells 8 and 9 which allow for simultaneous pumping and by rehabilitating Well 8 it is capable of reaching the existing instantaneous water right of 500 gpm.

4.5 Water Right Evaluation

The existing and pending water rights for the City are listed in Table 1-1. The City's primary water source is groundwater. Groundwater sources are currently supplemented with supply from Bremerton, though plans are in place to terminate use of Bremerton water. The location of each well is identified on Figure 1-2 and the depth provided in the Water Facilities Inventory Report Form in Appendix H. The City has water rights certificates and permits for 13 wells, 7 of which are currently in service. All wells excluding Well 4B are used for domestic water service. Well 4B provides irrigation water to the McCormick Land Co. Total instantaneous authorized rights for the 13 wells total 3,513 gpm. Primary water rights allow withdrawal of 3,610 acre-feet per year. As discussed previously in this chapter, the City has pending water rights applications for proposed Wells 12 and 13.

In 2017 the City produced approximately 800 acre-feet of water from the 4 domestic water wells currently in use. This was less than a quarter of the City's certificated annual water rights of 3,528 acre-feet per year. While the City System currently has sufficient instantaneous supply, the McCormick Woods System is using nearly all of the available supply. Existing and forecasted water rights are summarized in Table 4-2. Projected demands for each system and for the combined system are presented in Figures 4-1 and 4-2, respectively.

4.6 Water System Reliability Analysis

In accordance with DOH's Water System Reliability Handbook, the three components required to summarize system reliability are source reliability, water right adequacy, and facility reliability.

4.6.1 Source Reliability

Future sources of supply (Well 11, 12, and 13) will tap into the deep sub-sea level aquifer and will resolve multiple public health and safety issues related to aging water system infrastructure by allowing the replacement of old wells and siting of new high-capacity, deep aquifer wells at the top of the system. This will both extend the useful life of the City's wells for more than a generation and provide system reliability and cost efficiencies.

4.6.2 Water Right Adequacy

Water right adequacy is discussed in Sections 4.4 and 4.5 of this Plan.

4.6.3 Facility Reliability

A summary of facility reliability is included in Chapter 3 of the Plan.

4.6.4 Water Shortage Response Planning

The City of Port Orchard's Water Shortage Response is discussed in Section 6.9.

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Chapter 5 Source Water Protection

5.1 Wellhead Protection Plan (WHPP)

All Group A water systems are required to prepare a WHPP by Section 1428 of the 1986 Amendments to the Federal Safe Drinking Water Act (SDWA). The City's WHPP is intended to be proactive and designed to prevent contamination of ground water used for public drinking water. The objective is to protect human health through the development of management zones around public wells. The EPA administers the federal program and provides guidelines for state programs. In response to the federal mandate, DOH developed a State WHPP that was implemented by revision to the State Drinking Water Code (WAC 246-290) in July 1994. Pursuant to these regulations, the City prepared a Wellhead Protection Plan in 1997 (AGI Technologies). An updated Wellhead Protection Plan was issued in 2012 (PACE Engineers). A copy of the WHPP is provided in Appendix I and is available at the City's office. The primary function of the WHPP was to define the wellhead protection areas (WHPAs) and prepare an inventory of potential contaminant sources to evaluate potential threats to the groundwater.

Since the issuance of the 2012 WHPP, Well 11 has been drilled and is in the design phase. Well 13 is currently being developed and is anticipated to come online in 2021 and a pilot well has been drilled for Well 12. The Wellhead Protection Plan should be updated to include the completion of these wells.

5.1.1 Wellhead Protection Area Information

The wellhead protection areas and zones are provided in the 2012 WHPP in Appendix I. The EPA Wellhead Protection Area analytical model used aquifer characteristics and withdrawal data to predict the ground water capture zone shape for each well. The aquifer information and the pumping rates were the basis of delineating the 6-month,1-year, 5-year, and 10-year zones. The Wellhead Protection Plan will need to be updated to include future Wells 12 and 13.

5.1.2 Contaminant Source Inventory

A critical component of the WHPP is to identify the types of land uses that exist in Port Orchard's WHPA and maintain an inventory list of potential contaminant sources within the wellhead protection areas. The inventory is updated with the WHPP as new wells are brought online and provides the City with a basis upon which a protection program can be built and implemented. A records check was prepared by independent environmental data consultant Environmental Data Resources, Inc. (EDR) when the WHPP was prepared. The report showed that within a calculated fixed radius ranging from 1 mile (Well 8, McCormick Woods wells) to 1.75 miles (all other wells), there were 163 records found in 123 unique locations within the 10-year time of travel zone that are known or have been known to contain potential contaminants or environmental hazards.

After searching 33 databases and eliminating duplicates from the more than 300 records discovered, 163 potential contaminant sources were spatially mapped according to the four time-of-travel capture zones (6-month,1-year, 5-year, and 10-year) they were located in, based on longitude and latitude coordinates. A full list of current and historic hazardous sites is kept on file at the City's Public Works Department.

5.1.3 Ongoing Efforts

The WHPP presents five categories and associated action items or tasks under each category essential to accomplishing long term protection. The categories are:

- Coordination with Other Agencies
- Advocacy
- Security Measures
- Data Collection and Maintenance
- Communication and Educational Measures

The WHPP education program is targeted for distribution of information regarding septic tank maintenance, fuel oil storage tank maintenance and abandonment, residential use of herbicides, pesticides, and fertilizers, and other hazardous material use, storage, and disposal. The target audience includes landowners and managers within the WHPA. Information analyzed from an environmental records check was compared with current land use records provided by Kitsap County's property assessor's office. For current landowners, businesses, and residents, an outreach education program ensures proper care of contaminants and spill response procedures are followed. A sample letter prepared for notifying and educating business owners and residents is provided in the WHPP.

5.2 Watershed Control Program

The City does not collect surface water as a source of supply; hence, a watershed control program does not apply to the City.

Chapter 6 Operations Program

6.1 Introduction

Operations and Maintenance plays a crucial role in a utility's capacity to provide a safe and reliable source of potable water. An aggressive preventive maintenance program will prolong the life of a water system along with increasing a system's reliability. The climate in which water utilities now operate is fundamentally different than that of 20 or even 10 years ago. A growing regulatory burden, increasing operations costs, and aging infrastructure now demand that water utilities have in place an organized, efficient, and aggressive operations and maintenance program.

This chapter outlines the overall operation of the City of Port Orchard's water system, which includes both the City System (the 260 and 390 Pressure Zones) and the McCormick Woods System (the 580 and future 660 Pressure Zones). The two systems were previously owned and operated separately; however, after the City of Port Orchard annexed the McCormick Woods area, ownership and operation of the McCormick Woods System was taken over by the City.

A summary of day-to-day operations, routine maintenance of the system, and emergency operating procedures is provided. Detailed information related to specific facilities such as operations manuals are not included herein but considered an integral part of overall system operation and maintenance. Similarly, the City has prepared a water system vulnerability assessment and maintains a City-wide Emergency Response Plan that includes the water system.

6.2 General Information

Primary Contact:	Secondary Contact:
Jacki Brown, Utility Manager	Mark Dorsey, P.E., Public Works Director/City Engineer
216 Prospect Street	216 Prospect Street
Port Orchard, WA 98366	Port Orchard, WA 98366
Telephone: 360.876.4991	Telephone: 360.876.4991
FAX: 360.876.4980	FAX: 360.876.4980

Emergency After Hours: 9-1-1:

State Dept of Health Identification Number (City System): 68900
State Dept of Health Identification Number (McCormick Woods System): 40529
State Department of Health Contact Information:
Southwest Regional Office: (360) 236-3030
After-Hours Emergency:1-877-481-4901
Environmental Protection Agency System ID: WA9868900

Additional water system contact information is contained in the above referenced City-wide emergency response plan, a confidential document that is kept up to date and on file at City Hall.

6.3 Responsibility and Authority

The City of Port Orchard water system is one component of the City's Public Works Department and under the direct supervision of the Public Works Director/City Engineer. Among the responsibilities of this position is preparation of the biannual budget, preparation of the capital improvement plan for Public Works, and implementation of the approved improvements. In addition to reporting to and implementing direction from the mayor and seven-member City Council, the Public Works Director/City Engineer oversees in-house field operations of the water system. Day-to-day management of field operations and maintenance of the system is the responsibility of the Utility Manager and the Operations Manager through the Public Works Foreman. A field staff of 12 employees carries out water system operations, maintenance, and emergency response. An organization chart showing the names and positions of personnel is shown in Figure 6-1.

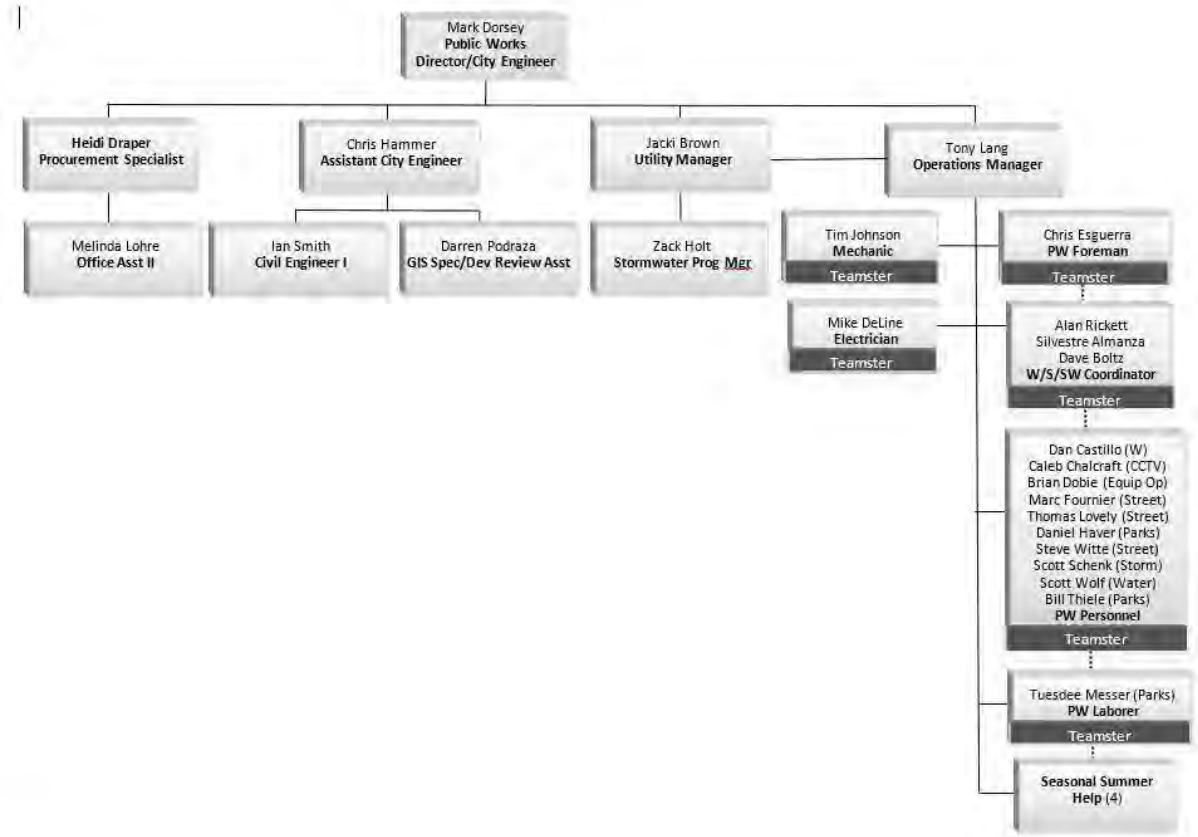

Figure 6-1 Public Works Department Organization Chart

6.4 Personnel Certification

Under regulations established by the Washington Department of Health (DOH), the City is required to maintain the services of a State Certified Water Distribution Manager 2 (WDM-2), a State Certified Water Treatment Operator 1 (WTPO-1), and a State Certified Cross Connection Specialist (CCS). A listing of current water system operations related certifications held by City staff is provided in Table 6-1.

Table 6-1 Water System Certification	
Operator	**Certification(s)**
Jacki Brown, Utilities Manager	WDM 4, WTPO 2, CCS
Mark Dorsey, PW Director	WDM 2
Tony Lang, Operations Manager	WDM 2, WTPO-OIT, CCS
Dan Castillo	WDM 2, CCS
Marc Fournier	Water Distribution Specialist, CCS
Dave Boltz	WDM 2, WTPO-OIT, CCS
Alan Rickett	WDM 2, CCS
Bill Thiele	Water Distribution Specialist
Scott Schenk	WDM 1
Brian Dobie	WDM 3
Scott Wolf	WDM 3, CCS
Silvertre Almanza	WDM 1
Thomas Lovely	WDM 1
Darren Podraza	WDM 2, CCS
Mike DeLine	WDM 2

The City of Port Orchard encourages state certifications of water system personnel and sponsors attendance at appropriate safety and technical seminars.

6.5 Routine Operations

The City of Port Orchard maintains a detailed routine operation and maintenance program to ensure proper operation of all mechanical facilities and maximize the efficiency and life of the system. Routine operations include making daily rounds to visually check system facilities and reservoir reading devices on a regular basis, monitoring flow, service and main line repairs, meter repairs and calibration and responding to customer inquiries, as necessary. Additionally, preventative maintenance, such as regularly servicing pumps and motors, exercising valves and hydrants, cleaning and painting tanks, and flushing pipelines, is required to ensure adequate overall operation and maintenance of the system. The following sections generally outline the routine operations and maintenance practices and schedule for primary system components.

In addition to the routine operation and maintenance, the City repairs service lines, mains, meters, and fire hydrants as needed. The City has a program for replacing all meters in the system with updated technology over time. The City's telemetry system allows for enhanced continuous electronic monitoring to ensure proper operation, accuracy, and intrusion.

6.5.1 Supply Wells

The supply wells are visited daily to check security, monitor source quality and quantity, and verify site conditions. In addition, daily monitoring of water quality as described later in this chapter is accomplished. The City has an approved Wellhead Protection Plan to ensure on-going protection of the groundwater supply.

6.5.2 Storage Tanks

Storage tanks are visited daily to verify security and check overall site conditions. Tanks are cleaned while in service, or otherwise inspected periodically and at least every five years. Inspection of the integrity of tank coatings is accomplished as part of the tank cleaning process and tanks are spot painted as required to prevent rusting or degradation of coating systems. Complete recoating of tanks is scheduled based on the results of these periodic cleanings and inspections.

6.5.3 Pump Stations

Pump Stations are checked daily to verify site conditions and security and the proper operation of all equipment. Pump data is recorded by the operational telemetry system and monitored to identify any irregularities in the system. Pumps are serviced regularly as determined by hours of service.

6.5.4 Valves and Hydrants

Port Orchard has a valve maintenance schedule which includes annual exercising of all valves in the system. Hydrants are exercised biannually and tested as appropriate. Pressure regulating valves are inspected monthly and calibrated as required.

6.5.5 Distribution System

The City maintains an annual leak detection program whereby outside leak detection specialists are utilized to identify leaks within the distribution system. All leaks identified are repaired. In addition, City staff respond to reported leaks and water quality issues immediately.

Dead-end mains in the 260 and 390 Pressure Zones are flushed bi-annually and in the 580 Pressure Zone they are being flushed at least annually to provide necessary cleaning of potential water quality problem areas. Additionally, water mains are flushed as necessitated by customer complaints or pipeline repairs or other operations that may result in water quality degradation. The City maintains a record of all flushing operations to assist with determination of non-revenue water and long-range conservation monitoring.

6.5.6 Inspection

Water system personnel also assist with new construction inspection, especially for developer extension projects. Additional assistance can be obtained by direct contract with contractors listed on the City's small works roster of approved contractors. This resource is utilized when City personnel are not available, not qualified for the type of construction being accomplished or when the project costs exceed the statutory limits.

6.6 Water Quality Monitoring

The City of Port Orchard's Coliform Monitoring Plan is presented in Appendix E of this Plan. The City's recent Water Quality Reports for the City System and the McCormick Woods System, copies of recent water quality tests, and Port Orchard's Consumer Confidence Reports (CCRs) are included in Appendix E.

The City is currently working on compliance with Stage 2 Disinfection By Products (DBP) Monitoring. Recognizing that the State of Washington Department of Health has recently assumed primacy for DBP monitoring, any program additions, changes, or modifications will be submitted to the appropriate DOH representatives.

6.7 Cross Connection Control

The City's Cross Connection Control Program (CCCP) is established by Port Orchard Municipal Code 13.04.100, a copy of which is included in Appendix J. No cross connections may be created, installed, used or maintained within the service boundaries served by City of Port Orchard except in accordance with WAC 246-290-490 and the latest adopted edition of the Cross Connection Control Manual as published by the Pacific Northwest Section-AWWA. The CCCP is in compliance with WAC 246-290-490 and addresses the following ten key elements required for Cross Connection Control:

Element 1: Establish Legal Authority

Port Orchard City Code 13.04.100 establishes legal authority to implement a cross connection control program and references Ordinances relevant to the implementation of the Cross Connection Control Program.

Element 2: Procedures/Schedules for Hazard Evaluations

The City evaluates new and existing service connections to make sure the connection does not pose a danger to the distribution system and to ensure that adequate pressure is available to prevent negative system pressure. Hazard evaluations are performed when tenant or use changes are initiated by the owner or consumer. All known commercial and/or industrial sites have backflow prevention commensurate with the degree of hazard.

The City is in the process of creating a new staff position to perform periodic inspections of premises for compliance with the Cross Connection Control and the FOG Elimination and Reduction Programs.

Element 3: Procedures/Schedules to Eliminate/Control Cross Connections

The City requires installation of approved backflow protection assemblies commensurate to the degree of hazard to protect the public water supply. The City allows a combination of fixture and premises isolation to protect the water supply as determined adequate by a City Cross Connection Specialist. At a minimum, annual testing of the backflow assemblies at the owner's expense is required. Port Orchard is currently developing a customer education program for property owners using irrigation systems for additional control and protection of groundwater sources. This is expected to include special mailings to customers in areas of the system where irrigation systems are commonplace (i.e. McCormick Woods).

Element 4: Provide Qualified Personnel

The City of Port Orchard maintains several fulltime certified Cross Connection Specialists, as indicated in Table 6-1. The Cross Connection Control Program is managed by the Utilities Manager or the Operations Manager if the Utility Manager is unavailable.

Element 5: Procedures/Schedules for Backflow Preventer Inspection and Testing

At a minimum, the City requires annual testing of the backflow devices at the owner's expense.

Element 6: Assembly Testing Quality Assurance/Quality Control (QA/QC)

The City ensures that results from backflow prevention assembly inspections and tests are documented and reported in an acceptable manner. The City also monitors tester certifications and test kit calibrations and requires test reports to be filled out completely and to be submitted in a timely manner.

Element 7: Backflow Incident Response Plan

The City follows procedures identified in WAC 246-290-490 for responding to a backflow incident and implementing enforcement.

Element 8: Public Education

Port Orchard provides cross connection educational material for customers that include pamphlets, periodic bill inserts, and as noted under Element 3 above, special mailings for public education regarding irrigation systems. Educational materials used in the past or currently under consideration include reports on the CCCP, its purpose and rationale. This information may also be included in Consumer Confidence Reports.

Element 9: Establish/Maintain Cross Connection Control Records

The City's Cross Control Specialists (CCS) have developed and maintained cross connection control records according to WAC 246-290-490(3)(j) and (8). A data base, maintained by the PW Clerk and overseen by the Utilities Manager, tracks all relevant information including a master list of service connections, inventory information, backflow incidents, and annual summary reports.

Element 10: Meet Additional Reclaimed Water Requirements

The City of Port Orchard and West Sound Utility District may consider working together to pursue opportunities for reuse of treated effluent from the plant in the future. Evaluation of any potential opportunities will include consideration of cross connection control in accordance with all applicable rules, regulations, and standards. Property owners will have ultimate responsibility for cross connection associated with reclaimed water use and the City may require a more frequent schedule of device inspection and control, depending on the specific application of reclaimed water.

6.8 Emergency Plan

The City of Port Orchard has performed a vulnerability assessment of its system in accordance with Environmental Protection Agency requirements and maintains a City-wide response program that includes water system operation under emergency conditions. The most critical sources and booster stations are equipped with permanent on-site power generation equipment. This includes Wells 7 & 9, the Melcher Pump Station, and the McCormick Woods Water Supply. An adequate supply of parts, disinfectant and maintenance equipment is kept on-hand to

respond to routine emergencies or system failures. All storage tanks are equipped with shut-off valves in the event of contamination and the City has an ongoing effort to install additional upgrades to the telemetry monitoring system to increase its ability to detect and respond to emergency conditions.

The City's Comprehensive Emergency Management Plan (CEMP) program is overseen by the Police Department and specifically by Chief Matt Brown. Public Works are a critical element of the emergency response program and are addressed in the Plan. Key City Emergency Response numbers are updated regularly, and both posted in key locations in the maintenance facilities and distributed to system personnel.

The City enjoys good working relationships and informal mutual aid agreements with neighboring water purveyors and agencies. This arrangement is very beneficial for local emergency conditions but does not provide the security of back-up assistance in more widespread emergency conditions that would limit resources. A small works roster of contractors available to assist under emergency conditions is maintained and updated regularly. The City is also a member of the "One Call System" for which the City has a 24-hour to and from response time. This system, which was established by the major utilities providers in the Puget Sound region, provides coordination and assistance for preventing damage to existing facilities during maintenance work or new construction. Additionally, the City is a member of the Washington State Water/Wastewater Agency Response Network (WA-WARN). The City's Emergency Call-Up List is provided in Table 6-2.

Table 6-2
Emergency Call-Up List

Kitsap County Fire Marshal	360-337-5777
City of Port Orchard Police Department	360-876-1700
City of Port Orchard Roads (Public Works)	360-876-4991
DOH -ODW SW Regional Office	360-236-3030
DOE NW Regional Office	425-649-7000
City of Bremerton Water	360-473-5920
West Sound Utility District	360-876-2545
Kitsap County Roads (Public Works)	360-337-5777

6.8.1 Emergency Response

Although it is impossible to anticipate all potential types of emergencies, and impractical to develop procedures for every possibility, there are several key procedures that will address the majority of emergencies that would be expected in the system. These types of emergencies have been verified by the City through a vulnerability assessment and hazard mitigation planning and include:

- Power Failure
- Severe Earthquake
- Severe Snowstorm
- Water Quality Issues such as Bacteriological Detection or VOC/SOC and Inorganic Chemical Detection.

- Flooding

The City-wide emergency response procedures for power outages, earthquakes, floods, and snowstorms address the common response for water system facilities. Generally, these types of emergencies require evaluation of the system for breaks, inspection to ensure that emergency power supplies are in working order and water system personnel continue to monitor the condition of the system and respond appropriately to system issues. Of particular concern and importance to water system operations is the threat of and response to contamination of supply. A summary of procedures is provided in Section 6.8.2.

6.8.2 Contamination of Water Supply

Water contamination is when impurities enter the potable water supply. The cause of the contamination can be anything from rotting vegetation or backflow of hazardous material, to bacterial contamination of the water supply. Table 6-3 addresses the possible emergency events and response actions that should be taken in the event of the contamination of the water supply.

Table 6-3
Contamination – Emergency Response Actions

If possible, locate the source of the contamination
Distribution System Contamination
Disinfect and flush distribution lines as dictated by the nature of the contamination
Perform chemical and free chlorine residual analysis at various locations
Storage Contamination
Isolate storage facility from system
Check distribution system for presence of contamination
Re-sample to confirm contamination
Inspect vent screens, hatches, and piping to identify source of contamination
If tank water is contaminated and therefore water is determined unsuitable for consumption: drain and clean tank.
Consider disinfecting tank if bacteriological standards are exceeded. Follow AWWA Standards.

If there is suspicion of an unknown substance present in the water, due to a consumer taste and/or odor complaint or other potential contamination, the Utilities Manager and Operations Manager are notified immediately. While it is impossible to anticipate every possible scenario and each instance must be analyzed on its own merit, the following steps are a general procedural guideline:

1. Ascertain if the complaint is valid;
2. Inquire of nearby consumers if they have experienced the same or a similar issue;
3. Collect a bacteriological sample;
4. Inspect the area for possible cross connections;
5. Flush the surrounding area;
6. Contact the DOH-ODW helpline for advice if the problem persists.

Notification procedures for notifying system customers, the local health department, and DOH of water quality emergencies are an important component of an emergency response program. Public water systems occasionally detect positive coliform samples, mainly as a result of minor contamination in distribution mains or sample taps, or improper bacteriological sampling procedures. Detection of coliform in the water supply, particularly E. coli or fecal bacteria, may require issuing a public boil water notice to ensure the health and safety of the water customers. The City maintains a sample "Boil Water Notice" for use in such instances. WAC 246-290-320 requires water utilities to follow specific procedures in the event coliform bacteria are detected in the water system.

Bacteriological Presence Detection Procedure

Positive coliform samples in the distribution system require water utilities to follow specific procedures. WAC 246-290-320 and 40 CFR 141.21 describe the required procedures a water system must follow in the event coliform bacteria are detected within the distribution system. Emergencies such as floods, earthquakes, and other disasters may affect water quality as a result of damage to water system facilities, thereby warranting a boil water order in advance of supply.

VOC/SOC and Inorganic Characteristics Detection Procedures

Volatile organic chemicals (VOC's), synthetic organic chemicals (SOC's), inorganic chemicals and certain physical characteristics are monitored according to WAC 246-290-300. Water quality standards are based on maximum contaminant levels (MCL's) and maximum residual disinfectant levels (MRDL's). WAC 246-290-320, & -480 describe the required protocol following an MCL or MRDL violation.

Public Notification

The Federal Safe Drinking Water Act (SDWA) and WAC 246-290-330 require purveyors to notify their customers if any of the following occurs:

- Failure to comply with a primary MCL described under WAC 246-290-310.
- Failure to comply with a surface water treatment technique.
- Failure to comply with monitoring requirements under WAC 246-2 90.
- Failure to comply with testing requirements.
- Failure to comply with a DOH order.
- Failure to comply with a variance or exemption schedule from DOH.
- If system is identified as a source of waterborne disease outbreak.
- If DOH issues the system a category red operating permit.
- If DOH issues an order.
- If the system is operating under a variance or exemption.

The required content, distribution channels, and time limit requirements of notifications are specified in WAC 246-290-330.

6.9 Water Shortage Response

Redundancy in water supply wells in the Port Orchard water system and interties with the City of Bremerton and West Sound Utility Water District provide a great deal of protection against an emergency related water shortage. In the event of a drought related water shortage, the City will work with neighboring purveyors to develop a consistent drought awareness program and recommendations for reducing water demands. In addition, the City would work with high water users (government facilities, irrigation accounts, etc.) to request curtailment in water use until water supplies can be reestablished.

Chapter 7 Minimum Design Criteria

7.1 Introduction

Minimum design criteria for the City of Port Orchard's water system must be in accordance with the standards and requirements put forth by the U.S. Environmental Protection Agency, the Washington State Department of Health (DOH), Kitsap County, and the City. The minimum design criteria of the City must also be in accordance with the criteria established by the Kitsap County Coordinated Water System Plan.

Minimum design criteria addressed herein and in Appendix G include the City's internal process used for review of water system project reports and construction documents, water supply requirements, storage volume, distribution system and transmission main capacity, and water quality standards. These criteria are used to determine deficiencies in the existing water system and establish design requirements for the future water system within the City's service area.

7.2 State Agency Regulations

The Washington State Department of Health's "Water System Design Manual" (2019) is the primary document governing the sizing and design of Group A public water systems in the state of Washington. This publication sets forth the minimum design guidelines and planning requirements for the supply, storage, distribution, and quality of potable water within Group A public water systems.

7.3 Reference Datum

The datum used for planning of facilities in this study and for City design work is based on North American Vertical Datum 88 (NAD 88).

7.4 General Considerations

7.4.1 Design Period

In planning water facilities, it is necessary for the design to be adequate over a specific period of time. The period of design for this study is approximately 20 years. This means that in the facilities proposed in this study may have reached their maximum supply capacity, assuming that the population projections are reached, within a 20-year period. Many of the components of the water system, however, have much longer useful lives than 20 years and will continue to serve the community far beyond the design period.

Public water systems should be designed to provide fire suppression capability in accordance with the requirements of the local Fire Marshal.

Phased development is permitted where full development will take several years.

7.4.2 Reliability

Multiple water sources are recommended in combination with adequate emergency reserve in gravity storage to allow for interruption of supply at one point, while still maintaining water supply to the system at the design rate.

Looping of the water mains to improve circulation quality and fire flow is an on-going goal of the City.

Pumping stations are to contain multiple booster pumps with sufficient capacity to meet the maximum day demands with the largest pump out of service.

Auxiliary power is required where adequate gravity storage is not provided.

7.5 Water Supply Recommendations and Requirements

The DOH Water System Design Manual sets forth the following recommendations for water supply systems and pump stations, with additional requirements for booster pump stations.

7.5.1 Water Supply and Source Pump Stations

Source capacity must meet the maximum day demand of the system. It is also recommended that the source is sufficient to meet the maximum day criteria while concurrently replenishing the fire suppression storage volume within 72 hours of its depletion. Port Orchard recognizes that alternate and independent sources of supply, such as interties with other water systems, coupled with adequate storage capacity may provide a sufficient level of reliability on an interim basis.

Water source pump stations should be capable of providing the maximum day demand for the system with 18 hours of pumping.

Pump stations shall be provided with a minimum of 20 pounds per square inch (psi) at the inlet side of the pumps under peak hour demand or fire flow plus maximum day demand rate conditions.

Pump stations shall have an automatic shut-off in place for when the inlet pressure drops below 10 psi.

Pump stations shall have power connections available to independent primary public power sources or provisions for in-place auxiliary power if the pumps provide fire flow or are pumping from ground level storage.

7.5.2 Booster Pump Stations

Open system Booster Pump Stations (BPS), which transfer water to a higher pressure zone governed by an atmospheric storage tank, shall be capable of providing source capacity as established for water supply sources in Section 7.5.1.

Closed system Booster Pump Stations, which transfer water to a higher-pressure zone closed to the atmosphere, shall provide peak hourly demand with a minimum of 30 psi of pressure at all connections. It is recommended that this capability be provided with the largest pump off-line.

Closed system BPS shall provide fire flow in conjunction with maximum daily demand with 20 psi of residual pressure. Additionally, since this system is located in an area governed by the Public Water System Coordination Act of 1977 (PWSCA), this capability must be provided with the largest pump off-line.

7.6 Water Distribution Recommendations and Requirements

7.6.1 Water Pressure

Water systems shall be designed to provide peak hourly demand with a positive pressure of 30 psi at every connection to the system (normally measured at the property line of the service connection).

For fire flow, the distribution system shall be designed to provide the required fire flow plus maximum daily demand at a residual pressure of 20 psi throughout the system. Required fire flow shall be established by the local Fire Marshal.

Maximum pressures in the distribution system shall not exceed 100 psi.

When pressures exceed 80 psi, the customer should provide and maintain individual pressure reducing valves (PRV) in accordance with the provisions of the Uniform Plumbing Code (UPC).

7.6.2 Pipe Sizing and Materials

Maximum velocity in distribution pipelines shall not exceed 8 feet per second (fps) under peak hour demand conditions. Flow velocities during fire events may exceed this maximum limit but shall remain below 10 fps.

Minimum pipe diameter for all distribution mains and mains providing fire flow is 6-inches nominal inside diameter, except for looping and dead end mains beyond hydrants as approved by the City. All pipelines shall be designed and constructed to ultimate domestic and fire flow conditions as determined by the City.

Dead end mains are generally not accepted by the City, except in phased development projects or where no potential for future interconnection of facilities exists. Approved dead end mains, which will not serve fire hydrants, may be 6-inches in diameter in residential areas and 8-inches in commercial areas or as hydraulically justified and approved by the City.

New water mains shall be constructed of cement mortar lined, ductile iron pipe conforming to AWWA C 151 and C 104, minimum thickness Class 52 conforming to ANSI/APWA C 105-72, or approved HDPE pipe per ANSI/ AWWA C906 or PVC pressure pipe per ANSI/APWA C900 or ANSI/APWA C905.

All ductile iron water main fittings are to be cement mortar lined, ductile iron conforming to AWWA C 110 or C 153, with 250 psi minimum working pressure, or approved HDPE per ANSI/APWA C906. Fittings for PVC pressure pipe shall be the same as specified for ductile iron pipe.

All push-on and mechanical joints for ductile iron pipe are to conform to AWWA C 111, and restrained joints shall conform to City requirements. HDPE pipe joints shall be joined via thermal butt fusion per ASTM D2657. PVC joints shall conform to ASTM D3139 using a restrained rubber gasket per ASTM F477 (solvent welded pipe joints are not allowed).

All water system pipelines shall be constructed of "lead-free" materials (a weighted average of 0.25 percent calculated across the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures and 0.2 percent for solder and flux).

Minimum cover over pipes 12-inches in diameter and smaller shall be 36 inches minimum, and 48 inches minimum cover over pipes greater than 12-inches in diameter. Maximum cover over pipe shall be 60 inches.

Transmission and distribution pipelines shall be at least 10 horizontal feet from any existing or proposed sanitary sewer utilities and 5 horizontal feet from other utilities, measured edge-to-edge. At least 18 inches of vertical separation (measured edge-to-edge) shall be maintained between the top of a sanitary sewer main and the bottom of a water line. A minimum vertical separation of 6 inches, measured edge-to-edge, is required between all other utilities. Exceptions to these minimum standards must meet the special requirements set forth by the Washington State Department of Ecology and must be approved by the City.

7.6.3 Valves

Valves shall be ductile iron and shall be installed in a configuration that permits isolation of lines.

Valves should be installed at intersections, and with normal maximum spacing at 500 feet in commercial, industrial, and multi-family areas, 800 feet in residential areas, and 1/4 mile in transmission mains. Additional isolation valving may be required by the City and will be determined on a case-by-case basis.

Air entrainment, air release, or combined air-vacuum relief valves are to be installed at appropriate points of high elevation in the system. All piping in the system shall be sloped to permit escape of any entrained air.

Zone isolation valves shall be installed at zone boundaries to permit future pressure zone realignment without the need for pipe realignment.

A blow-off assembly or fire hydrant shall be installed on all dead end runs and at designated points of low elevation to provide a means for adequate flushing of the system. The blow-off assembly shall be installed in a utility right-of-way, except where a written access and construction easement is provided to the water utility. In no case shall the location be such that a possibility of back-siphonage into the distribution system exists.

The blow-off assembly shall be sized to achieve a minimum flow velocity of 2.5 feet per second in the main.

7.6.4 Fire Hydrants

Fire hydrants shall comply with the minimum requirements established by the local Fire Marshal having jurisdiction and meet the type, location, and spacing requirements of the agency having jurisdiction in the project area. In general, minimum spacing for hydrants in commercial and multi-family areas shall be 300 feet on center and 600 feet on center in single-family residential areas.

7.6.5 Cross Connection Control

Where the possibility of contamination of potable water exists, water services shall be equipped with appropriate cross connection control assemblies in accordance with DOH requirements and the City's Cross Connection Control Program. The need and location of cross connection assemblies shall be determined by the City.

7.7 Storage Recommendations and Requirements

Storage requirements are based on five components: operational storage, equalizing storage, standby storage, fire suppression storage, and dead storage. The minimum requirements for each of the components of the total storage requirement are summarized below. The minimum amount of storage required shall be adequate to provide for equalizing storage plus the larger of standby or fire suppression storage. The recommended storage volume is equal to the sum of the equalizing, standby, and fire suppression storage components. Figure 7-1 illustrates the various storage components of total required storage. Chapter 3 of this document includes a complete analysis of the City's water storage requirements and existing capacities.

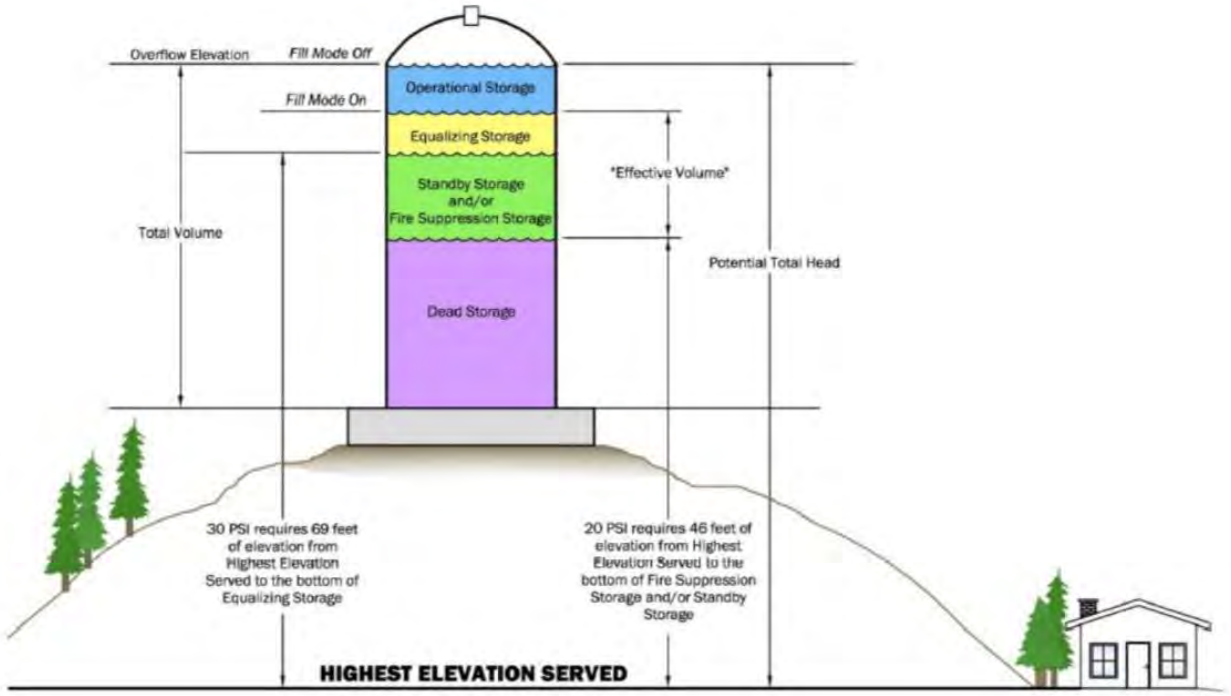

Figure 7-1 Storage Tank Schematic

7.7.1 Operational Storage

The operational storage is the volume of water available to supply the system under normal operating conditions while the source is considered "off" (WAC 246-290-010). This volume varies according to the sensitivity of the water level sensors controlling the source pumps and the configuration of the tank(s) designed to provide the required volume while preventing excessive cycling of the supply pumps. Variance in the volume of operational storage is dependent upon pump design parameters and by the minimum design parameters set forth by DOH.

7.7.2 Equalizing Storage

Equalizing storage must be provided when source pumping capacity cannot meet the peak hourly demand (WAC 246-290-235(4)). The volume of equalizing storage must be sufficient to meet peak hourly water system demands in excess of the rate of supply and must be at an elevation sufficient to meet these demands at a minimum delivery pressure of 30 psi. The volume of required equalizing storage is to be calculated in accordance with the current edition of the DOH Water System Design Manual.

7.7.3 Fire Suppression Storage

Fire suppression storage must be equal to the amount of water required to accommodate fire demand while maintaining a minimum system pressure of 20 psi (WAC 246-290-221(5)). Fire flow requirements are determined by the Fire Marshal having jurisdiction and generally conform to the procedures utilized by the Washington Surveying and Rating Bureau as set forth in a pamphlet entitled "Guide for Determination of Required Fire Flow" published by the Insurance Services Office, Municipal Survey Service. Fire suppression storage is required by the Fire Marshal to be stacked within Port Orchard's service area. However, the South Kitsap Fire and Rescue (SKFR) has agreed to allow the City to calculate storage in the existing 450,000-gallon 580 Pressure Zone storage tank as a "nested" reservoir, until such time as the new 580 Zone "stacked" Reservoir is completed. The new 580 Zone "stacked" reservoir is referred to in this Water System Plan as Capital Improvement Project No. 1.

7.7.4 Standby Storage

Standby storage can be provided to augment the available supply of water during abnormal operating conditions or during a period of restricted flow from the supply source. Restriction of flow may be caused by a pumping equipment failure, supply line failure, maintenance or repair, or other conditions that may cause interruption in supply. For single source systems, standby storage requirements are twice the average day demand for a system, deliverable at 20 psi. For a multiple source system, the standby storage is calculated as twice the average day demand, less the flow available with the largest source out of service, multiplied by the amount of time the remaining sources will be pumped each day. It is recommended that standby storage not be less than 200 gallons per connection per day.

7.7.5 Dead Storage

Dead storage is the volume of water not available to all customers at the minimum design pressure (WAC 246-290-230(5) and (6)). Dead storage is not considered when determining volumes to provide operational, equalizing, standby, or fire suppression storage.

7.8 General Facility Placement

All piping, pumping, source, storage and other facilities, shall be located in public rights-of-way, dedicated utility easements or on City-owned property. Utility easements must be a minimum of 15 feet in width, and piping shall be installed no less than 5 feet from the easement's edge. Any exceptions to this minimum easement will be at the discretion of the City. Unrestricted access shall be provided to all public water system lines, appurtenances, and fire hydrants.

The location of utilities shall be in accordance with the standards and guidelines established by local jurisdiction criteria. Where existing utilities or storm drains are in place, new facilities shall conform to these standards as nearly as practicable and yet be compatible with the existing installations.

7.9 Water Quality Standards

Chapter 3 of this Plan provides detailed information regarding the maximum contaminant levels allowed in drinking water supplies as put forth by the Washington State Department of Health (DOH) at the time of publication of this Plan. Additional requirements of the federal Safe Drinking Water Act (SDWA) are also discussed, along with the City's plans for additional future monitoring. Appendix E presents the City's recent Water Quality Monitoring Reports, the City's Water Quality Monitoring Plan, and Consumer Confidence Reports.

7.10 Standard Plans and Details

In accordance with WAC 246-290-120, the City maintains standard plans and details on file with the State Department of Health. These standards address construction requirements for the installation of hydrants, valves, fittings, and meters; repair or replacement of system components with similar components; and maintenance or painting of surfaces not contacting potable water. The standard plans and specifications also constitute a waiver from formal submittal and approval of specific distribution main improvements provided that construction of such projects are certified by a registered professional engineer and provided that the City submits required documentation to DOH prior to placing the distribution pipeline into service. All other water system improvement projects require submittal to and approval by the Washington State Department of Health. A copy of the City's standards is on file at the City and is included in Appendix G of this document. The City uses the current version of the WSDOT specifications and corresponding APWA specifications.

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Chapter 8 Capital Improvements Plan

8.1 Objectives

Previous chapters of the Plan have concentrated on projected demographics within the City and service area, evaluation of existing facilities in relation to these projections and identification of recommended systems improvements. This chapter presents, in summary form, the recommended future water system improvements within the City's service area. Note that specific projects for Developer Extensions or new developments are not included in this Capital Improvements Plan (CIP) and will be determined at the time of application for water availability.

The objectives of the CIP are to group various system needs, to evaluate alternatives that are cost-effective and operationally sound, and then to organize and prioritize the recommended improvements for implementation by the City in its annual budgeting process.

8.2 Project Cost Estimates and Schedules

Planning-level cost estimates are required to provide long range planning of proposed water system improvements. These planning-level cost estimates are based on a variety of factors, including: documented costs of performing similar kinds of work in the recent past; engineering judgment; the availability of labor; the time of year of construction; competitive conditions; and other intangibles affecting construction costs at the time that the work is performed. The planning level estimates provided herein are intended to be conservative estimates that will be refined during the design process. Actual design of the improvements and possible changes made during that design could significantly alter the cost of the project from the planning level estimates presented herein. Prior to the initiation of the projects shown, current conditions should be reviewed, and cost estimates updated to reflect the conditions, selected construction methods and materials, and current bid climate.

The cost estimates presented are based on 2019 prices (Engineering New Record Construction Cost Index of 10145.2). Cost estimates reflect total project costs, including construction plus a contingency, sales tax and overhead costs to cover project administration, engineering, permitting, environmental, legal fees, etc. Overhead costs are estimated at 30 percent of construction cost.

8.3 Capital Improvement Plan

Following is the Capital Improvement Plan (CIP) list for the City of Port Orchard 2020 Water System Plan. The projects in the CIP list were identified based on current and future land development, hydraulic re-zoning of the City's water system, water source revisions, general water system upgrades, and water system modeling.

The grouping and sequencing of projects are dependent on several factors, such as:

- The 580 Zone transmission and distribution main from the new 580 Zone storage tank to McCormick Woods Drive along Old Clifton Road needs to be constructed to supply water from the new 580 tank to the system. With the tank being currently designed, these projects will occur earlier in the CIP process.

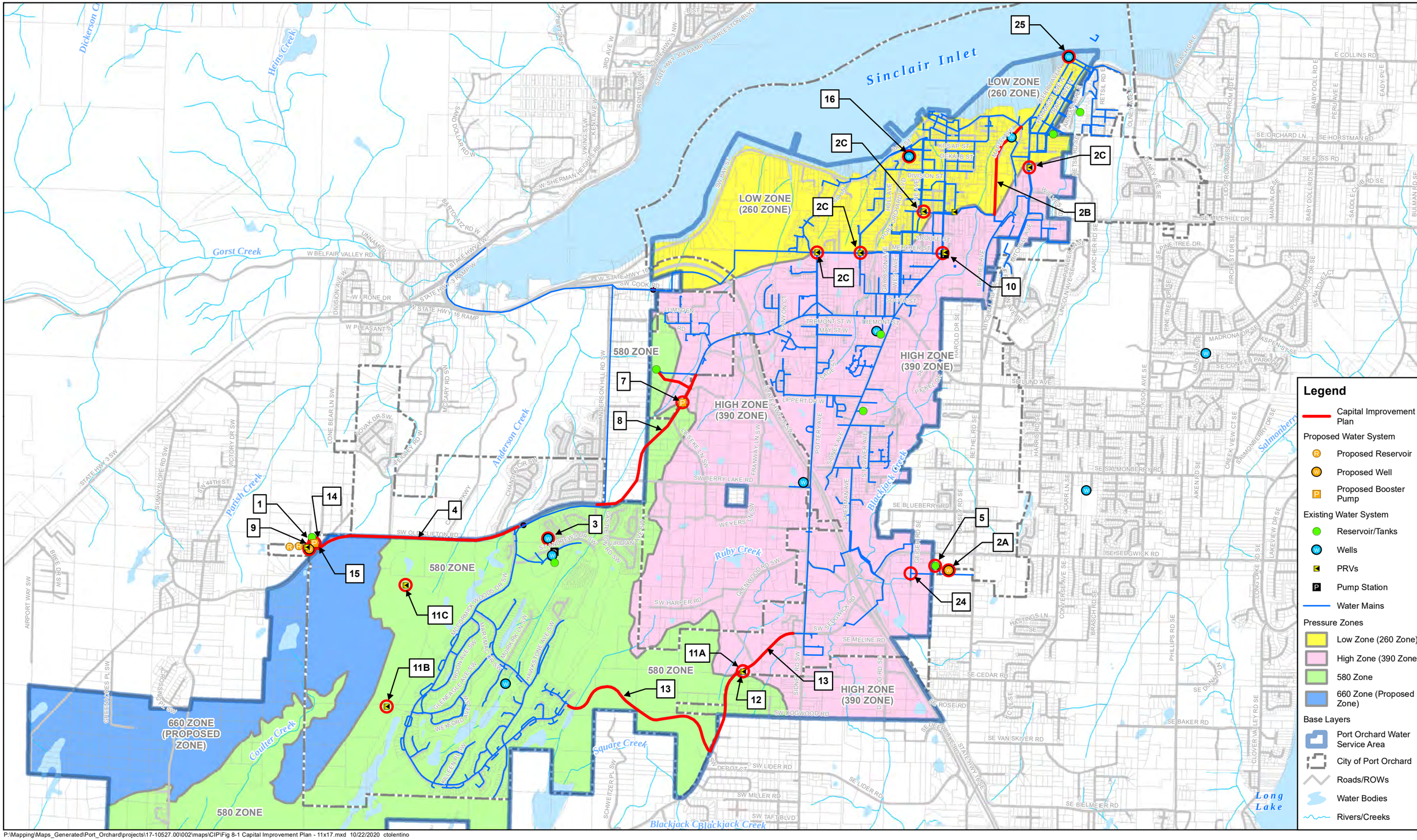
- To remove the Bremerton Intertie water supply from the 580 Zone, per an agreement between the Cities of Port Orchard and Bremerton, the transmission and distribution mains along Old Clifton Road need to be constructed, the 580 to 390 PRV on Old Clifton Road needs to be installed, and the future Well 11 needs be to online, including the water treatment and booster pump station. These projects are shown to occur earlier in the first 10 years of the CIP process.
- The future 660 Zone tank will require Well 12, including treatment and booster station, to be online, construction of a transmission main, and the installation of a 660/580 PRV.
- Additional projects are also associated with the Glenwood Pump Station project. These include the water supply main to the pump station, a transmission main from the pump station to McCormick Woods Drive, and distribution mains within McCormick Woods. When these projects are needed is dependent on future growth.
- There are eleven (11) projects listed that are associated with the installation of the four PRVs for the 390/260 Rezone under the Well 13 project (CIP 17). Many of these projects need to occur at the same time or shortly after the Well 13 PRVs are online.
- The projects listed under the Annual Main Replacement Program were prioritized from fire flows identified in the water system model within the 390 and 260 Zones and are required in order to address identified deficiencies. The two main priority categories were: fire flows less than 500 gpm and flows between 500 gpm and 1,000 gpm. Within these two categories, the projects were further prioritized by the number of hydrants located on the street. Some projects were included for better flow conditions, such as a 4-inch pipe being upsized to an 8- or 10-inch pipe because the pipes connecting to the 4-inch run, at both ends, were larger.
- The decommissioning of wells and associated pump stations were not included in the CIP list. Operations and Maintenance (O&M) projects, such as tank coating and pump replacements were not added in this CIP list.

The Capital Improvement Plan for the City of Port Orchard water system (including the McCormick Woods system) is presented in Table 8-1 and shown in Figure 8-1. The following paragraphs summarize the scope and need for each project.

Project 1 - 580 Zone Storage

- **Estimated Cost: $2,850,000**
- **Priority: High**
- **Schedule: 2021**

The 580 Water Tank will serve the Port Orchard 580 Zone to resolve current storage deficiencies and to serve future growth in the McCormick Woods area. The new 580 tank will be located at the Well 12 Water Campus off SW Old Clifton Rd. The City currently maintains and operates an existing 450,000-gallon water storage tank at the Well 12 Campus. The existing tank will be sold to the City of Bremerton once the new 580 Zone tank and other necessary improvements are constructed and brought online, including the development of Well 11 (CIP 3) and Well 12 (CIP 9). A 660 tank (CIP 15) to serve the future 660 Zone will be constructed on the Well 12 Water Campus later, currently scheduled for 2027. The new 580 tank will replace the City's existing tank.



P:\Mapping\Maps_Generated\Port_Orchard\projects\17-10527.00\002\maps\CIP\Fig 8-1 Capital Improvement Plan - 11x17.mxd 10/22/2020 ctolentino

BHC CONSULTANTS

Water System: City of Port Orchard.
Base data: Kitsap County.
Data sources supplied may not reflect current or actual conditions. This map is a geographic representation based on information available. It does not represent survey data. No warranty is made concerning the accuracy, currency, or completeness of data depicted on this map.
BHC Consultants LLC., assumes no responsibility for the validity of any information presented herein, nor any responsibility for the use or misuse of the data.

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Port ORCHARD

Capital Improvement Plan

Water System Plan Update
City of Port Orchard, Washington
October 2020

Figure 8-1

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A 580 Zone transmission and distribution main from the new 580 Zone tank to McCormick Woods Drive along SW Old Clifton Rd (CIP 4) needs to be constructed in conjunction with the new tank. The above projects will occur earlier in the CIP process. Construction of the tank is currently underway.

The 580 Water Tank project includes:

- Construction of a new .97 million-gallon tank sized for ultimate development in the 580 Zone.
- A pipe connection from the new 580 Zone tank to a proposed 580 to 660 Zone Booster Pump Station (CIP 14).
- Mechanical and electrical support systems.
- An on-site standby generator.
- Site development including clearing, site grading, access roads, stormwater management, security, lighting, landscaping, sewer routing, fencing, and parking will be required.

Project 2 - Combined Projects 2A, 2B, and 2C

- **Estimated Cost: $11,200,000**
- **Priority: High**
- **Schedule: 2021**

Project 2A - Well 13 Development and Treatment

With the installation of Well 13, the City of Port Orchard will install a well pump to convey water from the well, through a water treatment system and to the existing Sedgwick tank. A treatment building will be constructed to house the treatment unit. The treatment system will consist of 8 to 12 vessels containing filter media. The water will also be chlorinated and fluoridated.

Project 2B - Maple Ave Improvements and Water Main Replacement

The Maple Avenue project involves the installation of approximately 3,000 linear feet of 12-inch diameter water main that runs in a north-south orientation from near South Street to near Bay Street. The water main alignment is within existing City right of way and an easement that parallels Blackjack Creek. Ravine sloughing has occurred along one stretch of the pipeline easement, which is also located along the Sunset Lane Memorial Cemetery. Through this area, the water main will be installed via horizontal directional drilling (HDD).

Project 2C - 390 to 260 Rezone Pressure Reducing Valves

With the installation of Well 13, the City of Port Orchard is redefining the hydraulic pressure zones in portions of their water system. The rezoning will require the installation of four (4) pressure reducing valve (PRV) stations between pressure zones 390 and 260. The new PRV's will improve storage, circulation, and water quality in the 260 Zone.

Project 3 - Well 11 Development, Treatment, and Booster Pump Station

- **Estimated Cost: $8,000,000**
- **Priority: High**
- **Schedule: 2022**

Well 11 is located on the existing McCormick well/treatment/pumping site near the McCormick Woods Golf Course. This project included the drilling of a new deep aquifer well. The well has been drilled but has not yet been completed with a pump or connected to the water system. When completed, Well 11 will allow for the decommissioning of existing shallow aquifer McCormick Wells 1 & 2. Well 3 will be retained as a monitoring and emergency well. The three wells currently have a combined water right for 600 gpm. In exchange for pumping water from the deep aquifer with Well 11, the City's water right will increase to 750 gpm at this location.

The Well 11 improvements include:

- A small well house, well pump, valves, meter, and piping to convey well water to the new on-site booster pump station/water treatment building. A well has been drilled and capped.
- Booster pump station with water treatment systems. The pump station will pump water to a new on-site water tank. The treatment systems will include:
    - Chlorination feed system
    - Filtration backwash system, if water quality analyses dictate
    - Provisions for backwash water disposal, if needed
    - Fluoridation feed system (possibly depending on citizen vote outcome)
- The pump station will be a CMU or prefabricated building with the necessary mechanical and electrical support systems. An on-site standby generator is included.
- A water storage tank. BHC estimates a 500,000-gallon tank would be required for a well production rate of 750 gpm. Tank sizing will need to be confirmed during design. This improvement also includes the required inlet/outlet pipe(s).
- The City currently maintains and operates two 60,000-gallon concrete tanks, a small pump station, and three wells at the Well 11 Campus. The existing structures and wells would be re-purposed, decommissioned, and/or removed as indicated previously.
- Site piping will be required, including piping from the tank to the project site boundary and interconnection to the 580 Pressure Zone.
- Site development will include site grading, access road improvements, stormwater management, security, lighting, landscaping, sewer routing, fencing, and parking.

Project 4 - 580 Zone Transmission and Distribution Main

- **Estimated Cost: 1,235,000**
- **Priority: As Required by Development**
- **Schedule: 2021**

CIP 4 includes construction of a 10- to 12-inch transmission main along SW Old Clifton Rd between the new 580 Zone tank to the existing 580 zone pipe network at the intersection of SW Old Clifton Rd and McCormick Woods Dr SW. In combination with CIP 8, this new transmission main will provide flow to the north side of McCormick Woods and provide a fundamental link with the 390 Zone through the McCormick Woods system. The water main will be approximately 6,700 feet in length.

Construction of this transmission main, along with the new 580 Zone tank (CIP 1), Wells 11 and 12 (CIP 3 and 9), and connection to the 390 Pressure Zone (CIP 8) are necessary to hydraulically separate the City's water system from the City of Bremerton's system.

Project 5 - 390 Zone Storage

- **Estimated Cost: $3,000,000**
- **Priority: High**
- **Schedule: 2025**

Additional storage will be needed in the 390 Pressure Zone. Timing will depend on the rate of growth in the Sidney/Sedgwick area.

Project 6 - Telemetry Upgrades

- **Estimated Cost: $100,000**
- **Priority: Medium**
- **Schedule: 2028**

This project includes addition of telemetry equipment at various water system facilities and connection to newly upgraded central telemetry equipment.

Project 7 - 390 to 580 Zone Booster Station (Old Clifton)

- **Estimated Cost: $750,000**
- **Priority: High**
- **Schedule: 2022**

This project would allow water to be pumped up from the 390 zone to the 580 zone through the COPO-McCormick Woods intertie as the systems become one. This would allow for an alternate water supply in the event of a failure in the McCormick Woods system supply.

Project 8 - 580 to 390 Zone Transmission Main (580/390 PRV to Old Clifton Tank)

- **Estimated Cost: $1,325,000**
- **Priority: Medium**
- **Schedule: 2024**

Connection of the 580 Zone to the 390 Zone through a transmission main along Old Clifton Road has been identified as a valuable addition to the long-term goal of interconnecting the McCormick and City systems. Construction of this transmission main, along with the new 580 Zone tank (CIP 1), Wells 11 and 12 (CIP 3 and 9), and connection to the 580 Pressure Zone (CIP 4) are necessary to hydraulically separate the City's water system from the City of Bremerton's system.

CIP 8 includes construction of a 10- to 12-inch transmission main along SW Old Clifton Rd between an existing 8-inch water main located near the intersection of SW Old Clifton Rd and Bantry Bay Loop SW and connecting to the Old Clifton 390 Pressure Zone tank. In combination with CIP 4, this new transmission main will provide a fundamental link between the 580 and 390 pressure zones through the McCormick Woods system.

The 12-inch main will be approximately 6,000 feet in length. A 580 to 390 PRV station will be required at the boundary between the two pressure zones.

Project 9 - Well 12 Development, Treatment, and Booster Pump Station

- **Estimated Cost: $7,000,000**
- **Priority: High**
- **Schedule: 2024**

Significant growth is expected in the McCormick Woods area, which is served by the 580 and future 660 Pressure Zones. Improvements to the source supply are necessary to meet the growing water demand. Well 12 will be located on City-owned property in the northwest corner of the City, referenced in this Plan as the Well 12 Water Campus. An existing 450,000-gallon tank at the site currently provides storage for the 580 Zone.

The Well 12 improvements include:

- A new well with an approximate 1,000 gpm nominal capacity that is anticipated to be approximately 1,500 feet deep. Also associated with the new well is a small well house, well pump, and piping to convey well water to the new on-site booster pump station/water treatment building.
- Treatment systems will include:
    - Chlorination feed system
    - Filtration backwash system, if water quality analyses dictate
    - Provisions for backwash water disposal, if needed
    - Fluoridation feed system (possibly depending on citizen vote outcome)
- The City currently maintains and operates an existing 450,000-gallon water storage tank at the Well 12 Campus, which will be sold to the City of Bremerton once Well 12, the new 0.97 MG 580 Zone tank (CIP 1) and connection piping is online. A pipe connection from the booster pump station to the proposed 580 Zone tank and an emergency tie-in to the existing tank are proposed. Stub outs to a proposed 580 Zone transmission pipeline (CIP 4) and to a proposed 580 to 660 Zone Booster Pump Station and storage (CIP 14) are required.
- Site development including clearing, site grading, access roads, stormwater management, security, lighting, landscaping, sewer routing, fencing, and parking will be required.

Project 10 - Melcher Street Pump Station Upgrade

- **Estimated Cost: $500,000**
- **Priority: Medium to High**
- **Schedule: 2022**

The Melcher Pump Station moves water, when required, from the 260 Zone to the 390 Zone. This project includes installing additional pumps and controls to accommodate added transfer of water from the 260 Zone to the 390 Zone. This will extend the useful life of the pump station but due to the age of the facility, upgrades are needed to maintain it in a fully functioning condition.

Project 11 – Pressure Reducing Valve Improvements per Hydraulic Model

- **Estimated Cost: $350,000**
- **Priority: Medium**
- **Schedule: 2023**

Project 11 includes proposed pressure reducing valves that were identified in the modeling activities. The PRV stations will be beneficial to the interzone transfer of water and would allow water produced by Wells 12 and 13 to move between the 390, 580, and future 660 pressure zones. The PRV stations would be located at the following sites:

A. 580 to 390 Zone PRV: Near the proposed 390 to 580 Glenwood Booster Pump Station (CIP 12).

B. 660 to 580 Zone PRV: At the pressure zone boundary between the future 660 Zone and the 580 Zone, in the future development area west of the existing McCormick Woods area (South PRV).

C. 660 to 580 Zone PRV: At the pressure zone boundary between the future 660 Zone and the 580 Zone, in the future development area west of the existing McCormick Woods area (North PRV).

Project 12 - 390 to 580 Booster Pump Station (Glenwood – 1st Lift)

- **Estimated Cost: $900,000**
- **Priority: As Required by Development**
- **Schedule: 2021**

This project includes construction of a 390 to 580 Zone transfer station constructed as required by development with costs borne by the owners of developing properties. Although initial planning level sizing of the pump station includes two (2) 650-gpm pumps with room for a future 600-gpm pump, verification is required based on final location and elevation of future storage. Locating the tank at a lower elevation will require a larger station to achieve required pumping at higher head. It is assumed fire flows in the 580 Zone development area will be provided from the 580 Zone. If temporary fire flows are required from the City's 390 Zone, additional pumping capacity will be needed. In addition, the station should be equipped with standby power. A budget of $525,000 is assumed for the pump station. Actual costs, however, will depend on sizing for fire flows and whether the station will initially be operated as a constant pressure pumping system and later converted to a 390 to 580 Zone transfer station.
Project 12 is directly tied to Project 13 and together the projects provide a connection between the City system 390 Zone and the southeast side of the McCormick Woods 580 Zone. Several benefits are associated with the interconnection including elimination of the McCormick Woods System ID Number and operation of both water systems as one consolidated utility. It is noted, however, that the mixing of water between the two currently independent systems carries the potential issue associated with the fact that Bremerton does not permit fluoridated water into its system.

Project 13 - 390 to 580 Booster Pump Station (Glenwood – 2nd Lift)

- **Estimated Cost: $725,000**
- **Priority: As Required by Development**
- **Schedule: 2021**

A Consolidation Study conducted in March, 2021 indicates that it will require a second booster station to provide adequate pressure for lifting water from the 390 to the 580 pressure zones in the Glenwood area.

Project 14 - 390 to 580 Transmission Main (Sedgwick to Glenwood)

- **Estimated Cost: $2,750,000**
- **Priority: As Required by Development**
- **Schedule: 2021**

As noted in Project 12 above, Projects 12 and 13 provide an intertie between the 390 Zone of the City system and the 580 Zone of McCormick Woods system. The two systems are currently under the City of Port Orchard's ownership but operate independently and under two DOH) water system ID Numbers. Project 13 provides a pipeline to transfer water from the City's 390 Zone to the McCormick Woods area. It would be constructed by development as required. Assuming 1,100 linear feet of 12-inch transmission main, the budget for this project is estimated at approximately $2,750,000. Achieving the goal of intertying the system and transmission of water between the two zones may be accomplished using portions of the 580 Zone distribution system, in which case oversizing of new 8-inch distribution mains to 12-inch may benefit the system as a whole.

Project 15 - 660 Zone Booster Station

- **Estimated Cost: $750,000**
- **Priority: As Required by Development**
- **Schedule: 2027**

This project involves construction of a water booster station that would pump from the outlet side of the new 580 tank (CIP 1) to a new 660 tank (CIP 15). The station will be located at the Well 12 Water Campus off SW Old Clifton Rd and sized sufficiently to provide maximum day and fire flow demands for the 660 Zone. The pump station will be a CMU or prefabricated building with the necessary mechanical and electrical support systems. A 660 to 580 PRV may be included and an on-site standby generator is required.

Project 16 - 660 Zone Storage

- **Estimated Cost: $2,850,000**
- **Priority: As Required by Development**
- **Schedule: 2027**

The 660 Zone tank will serve a future 660 Zone required for growth in the western portion of the annexed McCormick Woods area. The tank will be located at the Well 12 Water Campus off SW Old Clifton Rd near the proposed 580 to 660 Zone Booster Station (CIP 14), which will provide water for the tank. The 660 Zone tank needs to be constructed in coordination with CIP 14.

The 660 tank project includes:

- Construction of a new storage tank sized for build-out development in the 660 Zone.
- A pipe connection to a proposed 580 to 660 Zone Booster Pump Station (CIP 14).
- Mechanical and electrical support systems.
- An on-site standby generator is included.
- Site development including clearing, site grading, access roads, stormwater management, security, lighting, landscaping, sewer routing, fencing, and parking will be required.

Project 17 - Well 7 Treatment/Pump Station Upgrades

- **Estimated Cost: $750,000**
- **Priority: Medium**
- **Schedule: 2025**

Well 7 currently supplies water to the City's 260 Zone with an artesian flow of about 725 gpm. The well has a water right of 750 gpm and produces high quality water with the exception of hydrogen sulfide. Treatment of Well 7 water is currently located at the City Hall facility. By installing treatment for Well 7 at the Well 7 site, or alternative locations, City Hall facilities can be abandoned. This facility is old and in need of upgrades. Also, Well 7 is also quite old and located on a small parcel with minimal room for treatment on the site.

A two-phased approach is recommended. Phase 1 includes a study to assess the condition of the Well 7 facility and consider upgrade and treatment options. Phase 2 would include implementation of the study's recommendations.

Project 18 - Combined Water Main Replacements from Hydraulic Modeling

- **Estimated Cost: $500,000 per Year 2021, 2022, 2023, 2024**
- **Priority: High**
- **Schedule: 2021 through 2024**

There are eleven projects identified that are associated with the installation of the three PRVs for the 390/260 Rezone project (CIP 17). Many of these projects need to occur at the same time or shortly after the Well 13 PRVs are online. Brief descriptions of each project follow:

- Install approximately 25 LF of 8" Main on Kendall St. and connect to 8" x 12" x 4" tee on Sidney Ave. with Cross.
- Connect existing 12" crossing mains on Kendall St. (between Cline Ave and Sidney Ave).
- Upsize approximately 1,200 LF of 4" Main to 8" on Hull Ave (between Kendall St. and Division St).
- Upsize approximately 1,100 LF of 4" Main to 8" on Division St (between Hull Ave and Cline Ave).
- Connect 8" Mains on Sidney Ave and Kendall St. with approximately 60 LF of 8" Pipe.
- Connect 8" 260 Zone Pipe to 8" 390 Zone Pipe with 60 LF of pipe at Sherman Ave and Melcher St.

- Install approximately 100 LF of 8" Main along Mitchell Ave (north of Dwight St.) to connect 390 to 260 Zone.
- Upsize 200 LF of 4" Main to 8" on Kendall St (between Tacoma Ave and Cline Ave) and connect to existing 12" on Cline Ave.
- Reconnect 2 services from the 260 to the 390 Zone Pipe on Melcher St. (between Heron Ridge Ave and Sherman Ave).
- Install approximately 950 LF of 8" Main along West Ave and Sroufe St.
- Install approximately 850 LF of 8" New Main along Sidney Ave and Division St.

Project 19 - Annual Main Replacement Program

❖ **Estimated Cost: $250,000 Annually**

There are areas in the older portions of the system that were constructed using 1-inch through 4-inch diameter water mains. Although static pressure is adequate in most locations, many of the small diameter mains cannot convey current fire flow rates without experiencing significant pressure loss. Multiple main replacements for the Annual Main Replacement Program are outlined on Table 8-2 following the CIP. Existing mains sized 1-inch through 4-inches in diameter should be upsized to 6-inch or 8-inches in diameter.

Projects are shown in order of relative priority with respect to each project's benefit to the City in conveying fire flow demands. Higher priority projects will provide higher fire suppression flow or residual pressure than lower priority projects and should be constructed first. Street locations, existing and proposed diameters and the approximate length of each project is provided in Table 8-2. It is recommended that the City consider constructing water system improvements simultaneously with sanitary sewer improvements or street restoration projects to reduce the combined overall cost to the City.

Project 20 - Annual Valve Replacement Program

❖ **Estimated Cost: $80,000 Annually**

The City's water system currently utilizes nearly 1,300 valves to control flow, separate pressure zones and provide isolation of selected areas of the system when repairs are necessary. Consistent preventive maintenance including the replacement or repair of the valves can extend the life of these assets and reduce the overall risk of failure and cost of maintaining the system. The City plans to extend its current Annual Valve Replacement Program and has set aside $80,000 per year to address this need.

Project 21 - Annual Hydrant Replacement Program

❖ **Estimated Cost: $50,000 Annually**

The City's water system currently utilizes nearly 400 water hydrants that are used for fire suppression and main flushing activities. Consistent preventive maintenance including the replacement or repair of the valves can extend the life of these assets and reduce the overall risk of failure, which is of concern during a fire. The City plans to continue its current Annual Hydrant Replacement Program and has set aside $50,000 per year to address this need.

Project 22 - Foster Pilot Mitigation Projects

- **Estimated Cost: $1,000,000**
- **Priority: High**
- **Schedule: 2022**

The City of Port Orchard is one of five pilot projects designated by the Washington Legislature under Section 301 of ESSB 6091for the demonstration of water resource mitigation sequencing under the conditions established in the bill (RCW 90.94.090). To update its aging wells located at the bottom, northern end of the system, Port Orchard has applied for water right changes and new water rights for new Wells 12 and 13. These applications are for the deep sub-sea level aquifer, which will reduce impacts on Kitsap County streams from existing shallower municipal wells, but which could result in smaller impacts to a larger geographic area. The Foster Pilot Mitigation projects outlined in the *City of Port Orchard's Conceptual Mitigation Plan* includes projects aimed at mitigating impacts to water resources in the city's service area.

Thirteen (13) potential habitat mitigation projects were identified in the Blackjack Creek watershed assessment for the Lower Blackjack Creek subbasin. The City of Port Orchard proposes to construct one or more of these projects, to be chosen in consultation with the Suquamish Tribe, the Department of Fish & Wildlife, and the Department of Ecology, as the Tier 3 component of its Conceptual Mitigation Plan. Final selection of the project(s) will occur after completion of the impact modelling and identification of impacts not mitigatable with water replacement measures. The City is applying for grant funding from the Department of Ecology under the Streamflow Restoration Grant Program for some of these projects. The availability of grant funding for project construction will also be a factor in the final mitigation proposal.

Project 23 - 390 Zone Low Pressure Booster Pumps for Existing Water Services

- **Estimated Cost: $600,000**
- **Priority: High**
- **Schedule: 2022**

The area immediately surrounding the Sedgwick tank is served by the 390 Zone and directly from the Sedgwick tank transmission main. Lack of difference in elevation between water levels in the tank and the highest customers served in the zone effectively impounds a significant volume of water (Dead Storage) in the tank. Dead Storage is unavailable for fire, standby, or other uses without reducing service pressure to unacceptable levels. This affects properties above approximate elevation 300-feet and results in a shortage of storage in the 390 Zone that could be resolved in one of several ways.

The recommended solution is to reduce dead storage in the Sedgwick and Old Clifton storage tanks by locally boosting pressure to services at elevation 300-feet and higher located near the intersection of Geiger Rd SE and SE Sedgwick Rd. This requires constructing a water booster station to provide water to an independent high zone by pumping from the Sedgwick tank. This could be a domestic only zone with smaller diameter distribution pipe because fire protection is available in the existing 12-inch transmission main that is currently serving the area.

Future development in the area near the Sedgwick tank is currently being planned that will be located above elevation 300-feet. These services will also require pressure boosting. An evaluation should be conducted to evaluate costs and benefits for locally boosting pressure to existing services only, and for boosting pressure to both existing and future services with a combined booster pump station.

Because of the many options available, a preliminary budget of $600,000 is estimated. A final budget would be set up after a study is completed to evaluate the options.

Project 24 – Black Jack Creek Crossing at Kendall Street

- **Estimated Cost: $750,000**
- **Priority: Low**
- **Schedule: 2028**

There are two water mains – one in the 260 pressure zone and one in the 390 pressure zone – that cross Black Jack Creek at Kendall Street. The mains are daylighted under a foot bridge and are vulnerable to natural disasters and vandalism. This project would underground both mains by boring under the creek and removing the portion of the system exposed to the environment.

Project 25 - Well 10 Rehabilitation, Activation, and Water Main

- **Estimated Cost: $3,092,000**
- **Priority: Low**
- **Schedule: 2031**

This project is for the development of a future source for the City of Port Orchard. In the event that a well fails or a planned capacity is not met, this drilled but undeveloped well would be rehabilitated to provide additional supply to the City.

Table 8-1
City of Port Orchard Water System
Capital Improvement Plan

CIP Project	Project Description	Funding Source	Cost ($1,000s)	Construction Year
1	580 Zone Storage	CFC	2,850	2021
	CIP 2 Combined	CFC/rates	11,200	2021
2A	Well 13 Development & Treatment			2021
2B	Maple Ave Improvements and Water Main Replacement			2021
2C	390 to 260 Rezone PRVs (4 each)			2021
3	Well 11 Development, Treatment, and Booster Pump Station	CFC/rates	8,000	2022
4	580 Zone Transmission & Distribution Main	CFC/rates	1,235	2021
5	390 Zone Storage	CFC	3,000	2025
6	Telemetry Upgrades	CFC/rates	100	2028
7	390 to 580 Zone Booster Station (Old Clifton)	CFC/rates	750	2022
8	580 to 390 Zone Transmission Main (580/390 PRV to Old Clifton Tank)	CFC/rates	1,325	2024
9	Well 12 Development, Treatment, and Booster Pump Station	CFC	7,000	2024
10	Melcher Pump Station Upgrade	CFC/rates	500	2022
11	PRV Improvements per Hydraulic Model	CFC/rates	350	2023
12	390 to 580 Zone Booster Station (Glenwood – 1st Lift)	Developer	900	2021
13	390 to 580 Zone Booster Station (Glenwood – 2nd Lift)	Developer	725	2021
14	390 to 580 Zone Transmission Main (to Glenwood PS)	CFC/rates	2,750	2021
15	580 to 660 Zone Booster Station	CFC	750	2027
16	660 Zone Storage	CFC/rates	2,850	2027
17	Well 7 Treatment/Pump Station Upgrades	rates	750	2025
18	Combined Water Main Replacements from Hydraulic Modeling	CFC/rates	500	2021-2024
19	Annual Main Replacement Program (Upsize 1"-4" main to 6"-8") See Table 1	rates	250	Annually

Table 8-1
City of Port Orchard Water System
Capital Improvement Plan

CIP Project	Project Description	Funding Source	Cost ($1,000s)	Construction Year
20	Annual Valve Replacement Program	rates	80	Annually
21	Annual Hydrant Replacement Program	rates	50	Annually
22	Foster Pilot Mitigation Projects	CFC	1,000	2022
23	390 Zone Low Pressure Booster Pumps for Existing Water Services	CFC	600	2022
24	Black Jack Creek Crossing at Kendall St.	rates	750	2028
25	Well 10 Rehabilitation, Activation, and Water Main	CFC	3,092	2030

CFC = Capital Facilities Charges; charged to the customer when a new connection to the water system is applied for and used to partially fund the CIP.

Table 8-2
Annual Main Replacement Program

	Project Description	Existing Pipe Diameter (in)	Existing Pipe Type[1]	Length (LF)	New Diameter (in)	Construction Year
1	Bethel Ave (South of Mile Hill Drive)	2	CI	1,250	8	2020
2	Sherman Ave (South of Fireweed St)	6	CI	1,950	10	2020
3	Fireweed St (Sidney Ave to Sherman Ave)	6	CI	600	10	2021
4	Pottery Ave (May St to Melcher St)	4	CI	2,550	8	2021
5	Farragut Ave (Mahan St to north of Chester St)	2 & 4	CI	850	8	2022
6	Goldenrod St (Sidney Ave to Indigo Pointe PL)	6	CI	1,050	8	2022
7	North of Bay St between Orchard Ave and Sidney	6	Q and CI	1,100	8	2022
8	Granat St (off of Sidney Ave)	6	CI	550	8	2023
9	Bothwell St (off of Sidney Ave)	6	CI	550	8	2023
10	S Flower Ave (Leora Park St to Goldenrod St)	4 & 6	AC & CI	1,750	8	2023
11	Fireweed St (Sherman Ave to S Flower Ave)	6	CI	500	8	2024
12	Arnold Ave E (off of Beach Dr E)	4 & 6	CI	550	8	2024
13	Farragut Ave (Gus Wetzel St to Mahan St)	6	CI	950	8	2024
14	Rockwell Ave (Bay St to Kitsap St)	4	CI	750	8	2024
15	South St (Flower Ave to Sidney Ave)	4	CI	1,050	8	2025
16	Melcher St (Garrison Ave to Sidney Ave	4	CI	1,650	8	2025
17	Flower Ave (from South St to Tremont St)	4	CI	675	8	2026

Table 8-2
Annual Main Replacement Program

	Project Description	Existing Pipe Diameter (in)	Existing Pipe Type[1]	Length (LF)	New Diameter (in)	Construction Year
18	Tracy St (Guy Wetzel to Mahan St)	4	CI	950	8	2026
19	Sroufe St (from Tacoma Ave to Sidney Ave)	2	Q	950	8	2026
20	Sidney Ave (at End Near Hwy 16)	6		400	10	2027
21	Mahan St (from Farragut Ave to Perry Ave)	4	CI	250	8	2027
22	Cline Ave (from Dwight St to Kitsap St)	4	CI	650	8	2027
23	Tracy Ave (Mahan St to Bay St)	6	CI	1,250	8	2027
24	Division St (from Sidney Ave to Harrison Ave)	4	CI	475	8	2028
25	Seattle Ave (Division St to Dwight St)	4	CI	300	8	2028
26	Sidney Ave (from Kendall St to Melcher St)	4	CI	1,250	8	2028
27	Cline Ave (from Kendall St to Division St)	4	CI	1,000	8	2029
28	Radey St (at Sidney Ave)	2	Galv	600	8	2029
29	Tacoma Ave (from Melcher St to Kendall St)	4	CI	1,300	8	2029
30	Kitsap St (Sidney Ave to Rockwell Ave)	4	CI	1,250	8	2030
31	Farragut Ave (Dekalb St to Gus Wetzel St)	4	CI	1,000	8	2030
32	Kitsap St (Sidney Ave to Rockwell Ave)	4	CI	1,250	8	2031-2040
33	Dekalb St (Harrison Ave to Seattle Ave)	4	CI	500	8	2031-2040
34	Harrison Ave (Division St to Dekalb St and Ada St to Taylor St)	4	CI	620	8	2031-2040

Table 8-2
Annual Main Replacement Program

	Project Description	Existing Pipe Diameter (in)	Existing Pipe Type[1]	Length (LF)	New Diameter (in)	Construction Year
35	Jones Drive (at Sidney Ave)	4	CI	440	8	2031-2040
36	Becky Ave (at Dallas St)	4	DI	350	8	2031-2040
37	Kendall - Grant - Smith (at Hull Ave)	4	CI	875	8	2031-2040
38	Chester St (from Farragut Ave to Tracy Ave)	4	CI	225	8	2031-2040
39	West Ave (from Melcher St to South St)	4	AC	1,313	8	2031-2040
40	Poplar St (at Sidney Ave)	4	DI	950	8	2031-2040
41	Melcher St (Sherman Ave to Garrison Ave)	4	CI	950	8	2031-2040
42	Dekalb St (Bay St to east of Cline Ave)	4	CI	900	8	2031-2040
43	Smith St (from Cline Ave to Sidney Ave)	4	DI	700	8	2031-2040
44	Dallas St (at Becky St)	4	DI	675	8	2031-2040
45	Seattle Ave (Kitsap St to Dwight St)	4	CI	650	8	2031-2040
46	Alder Lane West (from Tremont St to Pottery Ave)	2	CI	550	8	2031-2040
47	Sidney Ave (at Forest Park St)	1	Galv	410	8	2031-2040
48	Sunset Lane West (at Pottery Ave)	4	CI	500	8	2031-2040
49	Dwight St (from Cline Ave to Austin Ave)	4	CI	400	8	2031-2040
50	Garden Drive (north of Fireweed St)	4	CI	220	8	2031-2040
51	Bill Ave (at Jones Drive)	4	CI	300	8	2031-2040

Table 8-2
Annual Main Replacement Program

	Project Description	Existing Pipe Diameter (in)	Existing Pipe Type[1]	Length (LF)	New Diameter (in)	Construction Year
52	Guthrie St (from Garrison Ave to West Ave)	2	Galv	310	8	2031-2040
53	Coles Lane (at Rockwell Ave)	4	Q	120	8	2031-2040
54	Taylor St (at Hull Ave)	2	CI	200	8	2031-2040
55	Stockton St (at Farragut Ave) - 4"DI	4	DI	290	8	2031-2040
56	High Ave/Givens St: off of Division St	4	CI	350	8	2031-2040
57	Flower Ave (north of South St)	1	Galv	490	8	2031-2040
58	Garrison Ave (from Melcher St to South St)	4	AC	1,310	8	2031-2040
59	West Ave (from South St to Tremont St)	4	CI	650	8	2031-2040
60	Ada St. (from Harrison Ave to Sidney Ave)	4	CI	350	8	2031-2040

Notes:
1) Q = Unknown; CI = Cast Iron; DI = Ductile Iron; AC = Asbestos Cement; Galv = Galvanized

Chapter 9 Financial Program

9.1 Introduction

This chapter summarizes the City of Port Orchard's water utility financial history, identifies funding sources and a plan for funding the recommended capital improvements and provides a ten-year financial plan, with the impact on rates. This chapter was prepared by Katy Isaksen & Associates.

9.2 Financial History

The City owns and operates a water utility along with sewer and stormwater utilities. The water utility includes two systems, City of Port Orchard and McCormick Woods water systems. The self-supporting water utility is accounted for separately in water fund 411 that includes water operating expenses and transfers to the water capital reserve 413 to carry out the capital improvement projects, and rate stabilization and debt funds. The ending fund balance remains to provide for future use of the water utility. Table 9-1 provides a three-year financial history of the water fund based on the City's financial reports.

Table 9-1
Three Year Financial History

WATER OPERATING FUND 411	2017	2018	2019	Budget 2020
Operating Revenue				
Water Sales - Residential	1,801,146	2,043,348	2,238,125	2,383,300
Water Sales - Commercial	552,629	607,541	703,009	740,700
Water Sales - Irrigation	99,862	117,441	133,239	132,800
Construction Water Sales	4,533	12,975	18,075	8,800
Other Fees - Connects	21,450	33,196	22,649	12,900
Water Inspection Fees	6,556	4,749	5,040	6,700
Plan Review Fees	1,574	22,882	202	1,700
Other Planning & Development Service	1,050	2,250	1,800	1,200
Penalties	17,001	20,297	39,088	-
Investment Interest	12,351	32,793	23,256	8,600
Rents & Leases	31,464	36,983	74,371	56,500
Miscellaneous	242,063	25,372	8,473	-
Intergovernmental Loan Proceeds	-	14,342		
Transfers In for CIP	-	719,705		
Subtotal W Revenue	**2,791,679**	**3,693,874**	**3,267,327**	**3,353,200**

Table 9-1 Three Year Financial History				
WATER OPERATING FUND 411	**2017**	**2018**	**2019**	**Budget 2020**
Expenses				
Salaries - Water Admin	516,244	558,587	598,675	630,900
Benefits - Water Admin	217,246	273,056	274,805	331,900
Supplies - Administration	14,813	35,192	12,763	5,200
Services - Administration	222,888	367,509	639,185	293,045
Intergovernmental Services & P	242,627	291,739	290,765	282,800
Supplies - Distribution	98,247	139,638	68,086	57,050
Services - Distribution	219,511	191,182	20,116	30,950
Supplies - Source	496,589	515,293	347,465	441,500
Services - Source	7,167	11,148	113,625	116,000
Supplies - Storage	3,353	4,378	1,651	300
Services - Storage	10,495	11,113	11	6,000
Refundable Deposit	-	-	9,600	-
Debt Payments LT, notes	16,615	94,202		
Salaries/Benefits - Capital Outlay	-	9,583		
Other Improvements	-	1,711,511		
Machinery & Equipment	-	4,786		
Operating Transfers – Out (412 W Stab)			100,000	290,000
Operating Transfers – Out (413 W Capital)			100,000	237,500
Operating Transfers – Out (414 W Debt))			30,128	-
Transfer - 500 ER&R O&M			24,256	35,300
Transfer - 500 ER&R Replacement			142,430	27,193
Subtotal W Expenses	**2,065,796**	**4,218,918**	**2,773,561**	**2,785,638**
Annual Increase/(Use) of Reserves	**725,884**	**(525,043)**	**493,767**	**567,562**

At the bottom of Table 9-1, the Annual Increase/ (Use) of Reserves line provides a quick view of whether the water revenue was sufficient to meet the expenditures in each year. If revenue is greater than expenses, the reserve levels are increased. If revenues are less than expenditures, the reserves are used to balance the budget for the year. This may work for a couple of years as long as capital improvement funding is higher than typical but is not sustainable in the long run. The water utility has been setting aside funds for capital improvements that are underway and under design per the 2014 gap analysis rate study and six-year financial plan. A multi-year rate schedule was adopted by the City Council for 2016-2020.

Prior to 2019 the City had a combined water/sewer operating fund. In 2019, the City split the combined utility fund into separate water and sewer funds. The water utility now includes 4 funds: operating 411, rate stabilization 412, capital reserve 413, and debt 414.

Monthly water service charges are the primary source of ongoing revenue for the water utility, including sales to residential, commercial, irrigation and construction. Other revenue includes connection and inspection fees, plan review and other development services, investment interest and rents/leases. Miscellaneous includes sale of surplus, miscellaneous, refunds and insurance recoveries. The capital facilities charges collected from new or upsized water connections are deposited directly into capital fund 413.

9.2.1 Water Utility Funds

The water operating fund balance at the beginning of 2020 was $2,207,000 as shown in Table 9-2. One time transfers out during 2020 include $1.2 million to capital reserve 413 for CIP and upsizing contributions, and $319,000 to debt 414 to set up the required debt reserve on the existing DWSRF loan. The model shows $561,000 will be available from rates after meeting operating expenses and debt payments. After subtracting a three month cash flow reserve of $525,000, the remaining $724,000 is available for future system investment or water fund use.

Table 9-2
Water Fund Balance 411

Water Operating Fund 411	**2020**	**Comments**
Beginning Fund Balance	**$2,206,979**	2019 actual year end
Transfer to Capital Reserve 413 for CIP	(1,200,000)	one time
Transfer to Debt 414 for Debt Reserve	(319,000)	set up reserve for DWSRF
Annual Increase /(Use) of Reserves	523,138	
Estimated Ending Fund Balance	**$1,211,117**	
Target Minimum Balance		
Cash Flow Reserve	525,000	90 days operating expense
Available Balance	**$686,117**	for future investment

The water capital reserve began 2020 with a balance of $2,365,000 as shown in Table 9-3. Anticipated 2020 income includes the $1.2 million transfer from water operating 411, capital facilities charges of $297,000, $854,000 in loan proceeds from the existing DWSRF loan, and an operating transfer from rates for capital improvements of $401,000. The 2020 planned capital expenditures are $1,654,000. After subtracting $500,000 for an emergency reserve, the remaining $2,963,000 is available for water system improvements.

Table 9-3 Water Capital Fund Balance 413		
Water Capital Fund 413	**2020**	**Comments**
Beginning Fund Balance	**$2,364,572**	2019 actual year end
Transfer from Water 411 for CIP	1,200,000	one time
Capital Facilities Charges	297,500	
Existing DWSRF Loan Proceeds	853,698	
Transfer from 411 - CIP Funded by Rates	400,924	
CIP Program Expense	(1,653,698)	
Estimated Ending Fund Balance	**$3,462,746**	
Target Minimum Balance		
Emergency Reserve	500,000	maintain for emergencies
Available Balance	**$2,962,746**	for capital improvements

In addition to the water operating and capital reserve funds, the utility also has a water stabilization fund 412 established in 2019. The 2020 beginning balance is $101,000, with planned contributions from rates of $290,000 per year over 2020-22. The water utility also has a debt fund 414 used to make necessary debt payments.

9.3 Outstanding Debt

The water utility has two outstanding debt issues in the form of a note to McCormick Woods Communities for the McCormick Woods Water Company, and a Drinking Water State Revolving Fund (DWSRF) low-interest loan to Washington State Department of Health.

The McCormick Woods note payment is $50,000 per year, paid from capital facilities charges collected.

The DWSRF loan was approved for a principal amount of $6,060,000 at 1.5% interest to be repaid over 20 years. This loan is being used for the Well 13 improvements that are underway and expected to be complete in 2021. Repayment begins the October after project completion and will be based on the actual amount borrowed. Interest is accruing on the draws taken and the first payment of interest only is anticipated to be due in 2021 at $320,000. Beginning 2022, the principal and interest payments will be made each year. It is anticipated that payments will be $319,000 principal + 1.5% interest on the outstanding balance ($410,000 in 2022), due each October through 2040.

The State of Washington designed the DWSRF program to be junior in lien to outstanding parity debt, typically revenue bonds. The City does not currently have any revenue bonds outstanding that pledge the revenue of the combined waterworks utility.

The City issued general obligation bonds in 2013 for the City Hall upgrades. The water utility was contributing its share each year and the bonds were paid off in 2019.

9.4 Current Rates and Charges

The City Council has authority to set rates and charges for the water utility to ensure it remains self-sufficient and meets all covenants on outstanding debt. The rates are reviewed annually during the budget process. Current water rates and fees are included in the COPO Municipal Code, Chapter 13.04.

9.4.1 Monthly Water Rates

The City reads meters and bills customers every 2 months (bimonthly) for water service. All customers pay a base fee per water meter or unit plus a volume charge based on metered water use. There are 2 levels of base fee for a 3/4" single family water meter, either 0-3,000 gallons or 3,001-5,000 gallons. Water usage is charged per 1,000 gallons for all usage above 5,000 gallons in 5 additional tiers to promote conservation: 5,001-10,000 gallons, 10,001-20,000 gallons, 20,001-30,000 gallons, 30,001-50,000 gallons, and 50,001+ gallons per two-month billing period. Larger meters pay a larger base fee with up to 5,000 gallons included, and multiple connections, where multiple units are served through one meter are on a per unit basis with meter size differential. Outside city customers pay a 50% surcharge.

The current residential base rate is $81.50 for 2 months and includes 5,000 gallons. A reduced base rate of $57.50 is offered for usage up to 3,000 gallons. The typical single family residence currently pays $88.80 for 7,000 gallons per 2-month bill or $44.40 per month for 3,500 gallons of water. Current water rates are in Table 9-4.

Table 9-4
Current Water Rates

Water Rates - Bimonthly	Base + Water	2020
3/4" Meter, 0-3,000 gal	Base	$53.50
3/4" Meter, 3,001-5,000 gal	Base	$81.50
Water Usage in excess of base allowance		
5,001-10,000 gal	per 1000g	$3.65
10,001-20,000 gal	per 1000g	$3.85
20,001-30,000 gal	per 1000g	$4.05
30,001-50,000 gal	per 1000g	$4.30
50,001+ gal	per 1000g	$4.60

9.4.2 Water Capital Facilities Charges

Water capital facilities charges (also referred to as system development fees, general facilities charges, connection charges or participation fees) are collected from each new or upgraded connection to the water system. These charges are for the right to connect into and make use of the system. All connections must obtain a water permit, pay water meter and service installation fees and inspection fees as appropriate and described in COPO Municipal Code, Chapter 13.04. The 2020 Water Capital Facilities Charge for a new single family residence inside the city limits is $5,945 and has been in effect since 2017. Table 9-5 summarizes the current water capital facilities charge.

Table 9-5 Current Water Capital Facilities Charge	
Water Capital Facilities Charge	**Current**
Residential	
Per ERU	$5,945
Nonresidential – Based on Meter Size	
3/4"	$5,945
1"	$9,928
1-1/2"	$19,797
2"	$31,687
3"	$59,450
4"	$99,103
Irrigation	No CFC

9.5 Capital Improvement Funding

9.5.1 Capital Funding Sources

The City has preferred to avoid taking on new utility debt when possible and has relied on low interest loan programs from Washington State when necessary, including Public Works Trust Fund (PWTF) and Drinking Water State Revolving Fund (DWSRF). The City has also worked with developers and the City of Bremerton to secure water supply and facilities when in the best interest of the City's ratepayers. In addition, local sources of capital funding include connection fees, developer extensions with latecomer agreements, monthly rates, and capital reserves. These are the primary sources of capital funding available for water. The following discussion outlines the City's major water funding source opportunities.

The Washington State Department of Health (DOH) typically has four DWSRF funding opportunities each year: grants for consolidation in April and May; loans for preconstruction are open year-round; construction loans in October and November; and emergency loans open year-round. The opportunities require funding from the State capital budget and federal capital budget. Specific information is available on the DOH website (www.doh.wa.gov, DWSRF page). A 1-percent loan fee is included in a successful construction application and the standard interest rate is currently 1.75 percent for a 20-year loan term. Disadvantaged systems and consolidation projects qualify for 1.25 percent interest rate, up to 50 percent principal forgiveness (subsidy), and up to 30-year loan term. This is partially a federally funded program under the U.S. Environmental Protection Agency (EPA) (partially State funded) and there are a number of federal requirements that must be met. EPA has a new focus on asset management. Bonus points are available for attending asset management training and for submitting a completed asset inventory. The DWSRF program scores all project applications based on the health risk being addressed. The goal is to provide loans for capital improvements that increase public health protection and compliance with drinking water regulations and protect the health of people throughout the State by ensuring safe and reliable drinking water.

The Public Works Board, operating with the Washington State Department of Commerce, offers public works financing under the traditional programs (formerly the Public Works Trust Fund

program). The program is focused on completing necessary infrastructure projects, including domestic water, to recirculate the funds to the next round of projects. This requires that projects be ready to proceed and thus the loans must be drawn within 36 months of approval. The program relies on the State capital budget appropriation, primarily in the budget setting legislative sessions for the first year of each biennium, in odd numbered years. The program will accept applications throughout the year when funds are available. The 2021 legislative session provided funding into the Public Works Assistance Account. The bulk of the funds were awarded in the first round in August, submittal deadline in July 2021 for construction or preconstruction loans. For construction loans, the maximum loan is $10 million per jurisdiction per biennium and the maximum interest rate is 0.94 percent, less for distressed communities based on affordability and the length of the loan (less than 5 years or 5-20 years). For pre-construction loans, the maximum loan is $1 million per jurisdiction per biennium, with a maximum interest rate of 0.47 percent. Emergency loans are offered year-round as long as funds are available, up to a maximum of $1 million, and require a declaration of emergency. More detailed information is available on the Public Works Board website (www.pwb.wa.gov).

Other funding sources include the Washington State Department of Commerce energy efficiency grants and the Community Economic Revitalization Board (CERB) program geared to infrastructure improvements for job creation.

On the federal assistance side, new Coronavirus Pandemic-related funding may be available for capital projects that meet specific program restrictions, such as the American Rescue Plan for water/sewer infrastructure. Funding will be available to meet eligible projects to be prioritized within the City utilities as rules become available.

Communication with the local legislative representatives and federal congressional members is important to keep in mind for potential appropriations that may become available.

To keep current with infrastructure funding programs, a database is provided by the Washington State Office of the State Treasurer. The City can use this database to monitor available funding and contact information. The database can be accessed at https://www.wafunddirectory.wa.gov/.

9.5.2 Local Funding Sources

Monthly water rates can provide an on-going level of funds for planned capital repairs, system replacement, and improvements. These funds are appropriate for repair and replacement of the water system to serve existing customers. Capital facilities charges from new connections are also available to fund improvements to the water system. The water utility is able to borrow from the above-mentioned financial assistance programs and any loans will need to be repaid by monthly rates and connection charges. The water utility is able to sell revenue bonds and/or general obligation bonds to fund planned system improvements. Revenue bonds will be repaid by water rates and connection fees. General obligation bonds can be repaid by water rates and charges or general City tax revenue.

Some of the projects will be the responsibility of developers to connect their property to the system. When developers complete projects that are approved by the City, the infrastructure is deeded over to the City. The developer can negotiate a latecomer or recovery agreement with the City to be reimbursed by new development making use of the facilities constructed by the developer for a specified period of time allowed by state law. In certain instances, on a case by

case basis, such as when additional capacity is provided by a developer-funded project, the City may opt to participate in a cost sharing mechanism.

The City has the option to complete area-specific projects and be reimbursed as new development occurs through a special connection charge. The City also has the option to establish a utility local improvement district (ULID), where the properties specially benefiting from an infrastructure investment would pay their share through an assessment.

9.5.3 Affordability

The EPA requires DOH to award subsidy, or principal forgiveness, of at least 20 percent of the EPA capitalization grant award. In order to determine how best to award the subsidy, communities are evaluated on affordability of water compared to the median household income (MHI). EPA defines affordable water rates as 2 percent of MHI for a community. This also reflects the test applied by DOH to determine the level of hardship in a community when applying for grants (subsidy) and loans for water improvement projects. The level of hardship can influence the financial assistance offer. If the cost of water service is higher, the community will be considered in hardship and could be eligible for some financial assistance in the offer, resulting in a grant (subsidy), a lower interest rate loan, or a combination of the two.

Ecology publishes a convenient MHI table each year in their funding guidelines. For the City, the current MHI is $70,598 based on the early 2020 American Community Survey (Ecology Funding Guidelines, August 2020, Appendix). The threshold for hardship at 2.0 percent of MHI would be residential water rates of $117.66 per month. A lower threshold of 1.5 percent of MHI, with residential rates of $88.25 per month could result in a 0.5% reduction in the interest rate. A typical residence in Port Orchard currently pays $44.40 per month for water service. This level is considered affordable and would not be eligible for subsidy.

Another measure of affordability is what residents in local jurisdictions are paying. Table 9-6 compares 2020 water rates for a typical single-family residence, ¾-inch meter using 3,500 gallons of water per month (468 cubic feet). Using this measure, Port Orchard is clearly higher than local communities. The average cost of water in the communities listed is $30.00 per month, or $59.00 per 2-month bill which are less than current City rates. The comparison will vary depending on the amount of water used in a home, the rate structure (base fee and usage tiers), and timing of the next rate adjustment.

Table 9-6
Residential Water Rate Comparison 2020

Residential Water Service	2-Month Bill @ 7,000 gallons	Per Month @ 3,500 gallons
Port Orchard	**$88.80**	**$44.40**
Gig Harbor	$65.20	$32.60
Kitsap PUD	$64.29	$32.14
West Sound UD	$56.32	$28.16
Bremerton	$53.29	$26.64
Poulsbo	$52.76	$26.38
Bainbridge Island	$35.48	$17.74
7,000 gallons converts to 936 cubic feet of water, or 468 cf per month.		

9.6 Water Capital Improvements

Chapter 8 of this WSP identifies in excess of $52 million in recommended capital improvements for the water system during the 20-year planning horizon, $48.8 million are recommended for the first 10 years (2020-2029) and $3.8 million for the second 10 years (2030-2039). These cost estimates are in 2020 dollars.

It is reasonable to assume that the costs will be higher in the future when projects are scheduled for completion. The estimated costs will be escalated to make sure the funding is appropriate to match the anticipated cost escalation. The financial projections include construction cost escalation of 4.0 percent per year.

9.6.1 Ten-Year Capital Improvement Funding

The 10-year projects are displayed by year over the planning period as shown in Table 9-7. The colors are intended to indicate funding sources, although projects may have multiple sources. The estimated costs in this table have been escalated from 2020 dollars to the scheduled year at 4% per year. The total estimated planning level cost for the ten years is $51.6 million after construction cost escalation. The average annual cost is $5.16 million.

The 10-year CIP projects have been reviewed for potential funding sources, such as developer funding, grants, capital facilities charges, borrowing, capital reserves and rates. The City plans to schedule the projects as necessary to balance the engineering need, system capacity for growth and ability to fund the CIP. Grants will always be reviewed and pursued when appropriate.

Table 9-8 summarizes the funding sources to support the planned CIP projects. Developer-funded improvements total $14.2 million. The existing DWSRF loan proceeds total $3.6 million, with new borrowing of $21.8 million. Capital reserves of $0.7 million will be used, and rates will contribute $8.4 million over the ten years. With the conservative growth scenario of 50 new ERU per year, capital facilities charges are projected to bring in $2.9 million.

When the new 580 zone reservoir project is finalized and capacity is confirmed, the City will know whether further transactions with McCormick Woods are necessary, and in which direction. These are not included in this scenario.

Table 9-9 estimates the annual debt payments for the “Borrow for CIP” funding source. The model assumed standard DWRF loans with a 1.0% loan origination fee, 20-year repayment term and interest as shown, 2.0% for the 2022 loan and 2.5% for later loans.

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Table 9-7
Water 10-Year Capital Improvement Program (CIP), 2020-2029

2020 Cost Estimates have been Escalated to Year Shown at 4% per year

CIP No.	Project	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
1	580 Zone Storage		**2,184,000**								
2	CIP No. 2 Combined	853,698	2,978,277								
2A	Well 13 Development & Treatment										
2B	Maple Ave Improvements & W Main Replacement										
2C	390 to 260 Rezone PRVs (4 each)										
3	Well 11 Development, Treatment, and Booster Pump Station	300,000	700,000	7,250,000							
4	580 Zone Transmission & Distribution Main		**1,284,000**								
5	390 Zone Storage							3,796,000			
6	Telemetry Upgrades									137,000	
7	390 to 580 Zone Booster Station (Old Clifton)				591,000						
8	580 to 390 Zone Transmission Main (580/390 PRV to Old Clifton Tank)					1,550,000					
9	Well 12 Development, Treatment, and Booster Pump Station					**8,189,000**					
10	Melcher Pump Station Upgrade			541,000							
11	PRV Improvements per Hydraulic Model				394,000						
12*	390 to 580 Zone Booster Station (Glenwood)		**546,000**								
13*	390 to 580 Zone Transmission Main (to Glenwood PS)		**1,430,000**				1,916,000				
14	580 to 660 Zone Booster Station								658,000		
15	660 Zone Storage								2,895,000		
16	Well 7 Treatment/Pump Station Upgrades						912,000				
17	Main Replacements per Hydraulic Model			541,000	562,000	585,000	608,000				
18*	Feasibility Study for Consolidation and Fluoridation		30,000								
19	Risk and Resiliency Study for AWIA		52,000								
20	Annual Main Replacement Program (Upsize 1"-4" main to 6"-8") See Table 9-1		250,000	260,000	270,000	281,000	292,000	304,000	316,000	329,000	342,000
21	Annual Valve Replacement Program		75,000	78,000	81,000	84,000	88,000	91,000	95,000	99,000	103,000
22	Annual Hydrant Replacement Program		50,000	52,000	54,000	56,000	58,000	61,000	63,000	66,000	68,000
23	Foster Pilot Mitigation Projects	500,000	540,000								
24*	390 Zone Low Pressure Booster Pumps for Existing Water Services						**730,000**				
25	Well 10 Rehab, Activation, and Water Main										4,400,880
	Total Ten-Year Water Improvements	**$1,653,698**	**$10,119,277**	**$8,722,000**	**$1,952,000**	**$10,745,000**	**$4,604,000**	**$4,252,000**	**$4,027,000**	**$631,000**	**$4,913,880**

*Project Funding notes:
1) Project #3 cost adjusted per previously unknown well rehab - $300k for 30% design, $700k to get to 100% design, not enough info to adjust constr. cost at this time.
2) Project #12 is developer funded, model est. $546k
3) Project #13 is split between 2021 & 2025; for 2021 amount, approx. $200k to be rate contribution for upsizing from 8" (developer requirement) to 12" (city request).
4) Project #18, feasibility study has $30k grant
5) Project #24 is developer funded, model est. $600k, possible that an earlier project will solve this issue.

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Table 9-8
Water 10-Year CIP Funding Sources, 2020-2029

CIP Funding Sources	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
New ERU's	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*
Capital Facilities Charges	297,250	297,250	297,250	297,250	297,250	297,250	297,250	297,250	297,250	297,250
Grants		30,000								
Developer Funded	**0**	**5,244,000**			**8,189,000**	**730,000**				
Existing DWSRF Loan	853,698	2,752,602								
Borrow for CIP			7,250,000		1,550,000	1,916,000	3,796,000	2,895,000		4,400,880
Reserves	64,326	625,675		483,500			-297,250	360,750	-263,000	-297,250
CIP Funded by Rates	438,424	1,169,750	1,174,750	1,171,250	708,750	1,660,750	456,000	474,000	596,750	513,000
Total 10-Year CIP Funding Sources	**$1,653,698**	**$10,119,277**	**$8,722,000**	**$1,952,000**	**$10,745,000**	**$4,604,000**	**$4,252,000**	**$4,027,000**	**$631,000**	**$4,913,880**
Colors attempt to indicate funding sources										

Table 9-9
Estimated New Debt Annual Payments for CIP

New Debt for CIP	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
DWSRF 2022 (20 yr, 2.0%)			448,000	448,000	448,000	448,000	448,000	448,000	448,000	448,000
DWSRF 2024 (20 yr, 2.5%)					100,000	100,000	100,000	100,000	100,000	100,000
DWSRF 2025 (20 yr, 2.5%)						124,000	124,000	124,000	124,000	124,000
DWSRF 2026 (20 yr, 2.5%)							246,000	246,000	246,000	246,000
DWSRF 2027 (20 yr, 2.5%)								188,000	188,000	188,000
DWSRF 2029 (20 yr, 2.5%)									begin 2030	285,000
Total New Debt for CIP	**$0**	**$0**	**$448,000**	**$448,000**	**$548,000**	**$672,000**	**$918,000**	**$1,106,000**	**$1,106,000**	**$1,391,000**
Estimated new debt payments - begin year after borrowing, DWSRF includes 1% loan fee										

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9.7 Ten Year Financial Plan

The 10-year financial plan was developed and discussed with Public Works, Finance and Planning to support the recommend capital improvements. The base year is the adopted 2020 budget.

9.7.1 Key Assumptions

Several key assumptions were used in making the 10-year projections and are shown in Table 9-10. These include the number of new connection equivalent residential units (ERU's) per year, cost escalation factors, the residential water capital facilities charge and the bimonthly single family base rate.

Table 9-10
Key Financial Assumptions

Assumptions:	Amount
New Customer ERU's per year	50
General Cost Escalation	3.0%
Construction Cost Escalation	4.0%
Water Capital Facilities Charge	$5,945
Single Family Base Rate (2-Months)	$81.50

The financial outlook assumes the bimonthly water rate is held constant at $81.50 including 5,000 gallons for a single family residence to calculate the impact on existing water rates to carry out the plan.

9.7.2 Ten-Year Outlook - Summary Growth Scenarios

The 10-year rate outlook for the water utility was developed with a conservative growth scenario of 50 new ERU's per year. After reviewing the development activity in the planning and permitting pipeline, several other growth scenarios were developed and discussed with Public Works, Finance and Community Development. A second moderate growth scenario of 100 new ERU's per year was determined achievable to provide a reasonable range for financial planning. Of course, the actual level of growth will not be known ahead of time.

Summary 10-Year Outlook – Conservative Growth @ 50 ERU per year

For the conservative growth scenario of 50 new ERU per year, the 10-year rate outlook for Water Fund 411 was developed. In order to fund the CIP with a combination of rates, water capital reserves, capital facilities charges, development activity and borrowing, the current residential bimonthly base rate of $81.50 would need to increase $29.00 in 2020 to $110.00 by 2029. This represents an increase of 35% over the planning period, or an average of 3.9% per year. Table 9-11 shows the cumulative impact on rates needed to balance the Annual Increase/ (Use) of Reserves. The cumulative impact on rates refers to the percentage increase over the current $81.50 base rate for 2-months needed to fund the CIP program and bring the top line to zero. Caution, this is not the increase needed each year. The percentage rate impact is assumed to be applied to all customer classes and water rates.

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Table 9-11 Summary 10-Year Outlook - Conservative Growth @ 50 ERU per year										
WATER UTILITY 10-YEAR OUTLOOK	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
Annual Increase/(Use) of Reserves	**523,138**	**(557,650)**	**(746,850)**	**(940,765)**	**(519,780)**	**(1,615,195)**	**(580,260)**	**(892,175)**	**(1,253,140)**	**(1,222,005)**
Percentage Impact on Rates - cumulative		*17%*	*23%*	*28%*	*15%*	*48%*	*17%*	*26%*	*36%*	*35%*
2-Month Base Rate - if Balanced	**$81.50**	**$95.35**	**$99.91**	**$104.52**	**$94.13**	**$120.47**	**$95.40**	**$102.72**	**$111.10**	**$110.17**
This conservative growth scenario with 50 new ERU per year requires a rate adjustment of 35% over the 10-year period, an average of 3.9% per year.										

Summary 10-Year Outlook – Moderate Growth @ 100 ERU per year

For the moderate growth scenario of 100 new ERU per year, the 10-year rate outlook for Water Fund 411 is summarized in Table 9-12. In order to fund the 10-year CIP with a combination of rates, water capital reserves, capital facilities charges, development activity and borrowing, the current residential bimonthly base rate of $81.50 would need to increase $22.00 in 2020 to $105.00 by 2029. This represents an increase of 27% over the planning period, or an average of 3.0% per year.

Table 9-12 Summary 10-Year Outlook - Moderate Growth @ 100 ERU per year										
WATER UTILITY 10-YEAR OUTLOOK	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
Annual Increase/(Use) of Reserves	**523,138**	**(236,400)**	**(400,600)**	**(569,515)**	**(123,530)**	**(1,193,945)**	**(431,260)**	**(718,175)**	**(1,054,140)**	**(998,005)**
Percentage Impact on Rates - cumulative		*7%*	*12%*	*17%*	*4%*	*34%*	*12%*	*20%*	*29%*	*27%*
2-Month Base Rate - if Balanced	**$81.50**	**$87.33**	**$91.23**	**$95.14**	**$84.42**	**$109.29**	**$91.40**	**$97.76**	**$105.04**	**$103.49**
This moderate growth scenario with 100 new ERU per year requires a rate adjustment of 27% over the 10-year period, an average of 3.0% per year.										

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A reminder that annual averages are helpful for comparing scenarios, but the model indicates that a larger increase is necessary in 2021 as debt payments on the DWSRF loan for Well 13 begin.

The City will manage the budget and improvements to fit as necessary and will consider rate increases as needed to complete the recommended improvements to provide safe, reliable water service to ratepayers for many years to come. The City plans to review rates following submittal of this plan and may consider another multi-year rate schedule to provide consistency to ratepayers as the current multi-year ordinance schedule runs out in 2020.

9.7.3 Water Fund 411 Revenue

The water revenue is based on the 2020 budget, including a conservative estimate for water sales and growth. The current water rates are held constant to allow the model to calculate the impact on existing rates in order to have a balanced program (yellow line equals zero). It is assumed that 50 new residential customers using 7,000 gallons per bimonthly period are added each year to the 2020 budgeted rate revenue. Other revenue is held flat throughout the 10-year outlook. Additional new customers will positively impact the water bottom line and be available to fund additional projects, or to borrow less.

9.7.4 Water Fund 411 Expenses

The operating expenses reflect 2020 budget and are generally projected to increase by cost escalation as shown in Table 9-10. With the completion of the 580-Zone storage reservoir project, the City will no longer need to purchase water from Bremerton. This shows up as a reduction in the 2020 budget amount for Supplies – Source. In addition to operations, the expenditures include estimated new loan payments for the existing DWSRF loan beginning 2021 and 3 annual contributions to the water rates stabilization fund 412.

After deducting the estimated water expense before CIP from the water revenue, the net income available for capital is shown. The rate portion of the CIP and estimated new CIP debt are included as expenses in 411.

The bottom yellow line shows the Annual (Use) of Water Reserves in every year between 2020 and 2029. For one year, this can be addressed by applying reserves. However, with multiple on-going years, the model estimates the impact on rates to bring the yellow line (Increase/ (Use) of Reserves) to zero. The City has the choice to address annual deficits by reducing expenses, increasing rates and fees, and/or new customer growth exceeding expectations.

9.7.5 Detailed 10-Year Outlook

Table 9-13 provides the detailed 10-year outlook for the conservative growth scenario of 50 new ERU’s per year. Additional connections would provide additional funding for capital improvements, and additional ratepayers to share in the operating costs and debt payments.

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Table 9-13
Water 10-Year Financial Outlook - Conservative Growth @ 50 ERU per year

WATER UTILITY 10-YEAR OUTLOOK	Budget 2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Comments
Operating Revenue											
Water Sales - Residential	2,383,300	2,408,000	2,432,000	2,456,000	2,480,000	2,504,000	2,528,000	2,552,000	2,576,000	2,600,000	add new cust
Water Sales - Commercial	740,700	741,000	741,000	741,000	741,000	741,000	741,000	741,000	741,000	741,000	flat
Water Sales - Irrigation	132,800	133,000	133,000	133,000	133,000	133,000	133,000	133,000	133,000	133,000	flat
Construction Water Sales	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	flat
Other Fees - Connects	12,900	12,900	12,900	12,900	12,900	12,900	12,900	12,900	12,900	12,900	flat
Water Inspection Fees	6,700	6,700	6,700	6,700	6,700	6,700	6,700	6,700	6,700	6,700	flat
Plan Review Fees	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	flat
Other Planning & Development Svcs	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	flat
Interest	8,600	8,600	8,600	8,600	8,600	8,600	8,600	8,600	8,600	8,600	flat
Rents & Leases	56,500	56,500	56,500	56,500	56,500	56,500	56,500	56,500	56,500	56,500	flat
Misc (surplus,misc,refund,ins recov)	-	-	-	-	-	-	-	-	-	-	flat
Subtotal W Revenue	**3,353,200**	**3,378,400**	**3,402,400**	**3,426,400**	**3,450,400**	**3,474,400**	**3,498,400**	**3,522,400**	**3,546,400**	**3,570,400**	
Expenses											
Salaries & Benefits -Water Admin	962,800	991,700	1,021,500	1,052,100	1,083,700	1,116,200	1,149,700	1,184,200	1,219,700	1,256,300	by gen'l escal.
Supplies - Administration	5,200	5,400	5,600	5,800	6,000	6,200	6,400	6,600	6,800	7,000	by gen'l escal.
Services - Administration	293,045	301,800	310,900	320,200	329,800	339,700	349,900	360,400	371,200	382,300	by gen'l escal.
Intergovernmental Services & P	282,800	291,300	300,000	309,000	318,300	327,800	337,600	347,700	358,100	368,800	by gen'l escal.
Supplies - Distribution	57,050	58,800	60,600	62,400	64,300	66,200	68,200	70,200	72,300	74,500	by gen'l escal.
Services - Distribution	30,950	31,900	32,900	33,900	34,900	35,900	37,000	38,100	39,200	40,400	by gen'l escal.
Supplies - Source (reduce Brem W purch 20-22)	285,000	285,000	347,000	357,400	368,100	379,100	390,500	402,200	414,300	426,700	by gen'l escal.
Services - Source	116,000	119,500	123,100	126,800	130,600	134,500	138,500	142,700	147,000	151,400	by gen'l escal.
Supplies - Storage	300	300	300	300	300	300	300	300	300	300	by gen'l escal.
Services - Storage	6,000	6,200	6,400	6,600	6,800	7,000	7,200	7,400	7,600	7,800	by gen'l escal.
Transfer - 500 ER&R O&M/Replacement	62,493	64,400	66,300	68,300	70,300	72,400	74,600	76,800	79,100	81,500	by gen'l escal.
Subtotal Operations	2,101,638	2,156,300	2,274,600	2,342,800	2,413,100	2,485,300	2,559,900	2,636,600	2,715,600	2,797,000	
Existing DWSRF Loan - Well 13	-	320,000	409,900	405,115	400,330	395,545	390,760	385,975	381,190	376,405	estimate, int. only 2021
Transfer to Water Stabilization 412	290,000	290,000	290,000	-	-	-	-	-	-	-	20-22 per reserve policy
Subtotal W Expense Before CIP	**2,391,638**	**2,766,300**	**2,974,500**	**2,747,915**	**2,813,430**	**2,880,845**	**2,950,660**	**3,022,575**	**3,096,790**	**3,173,405**	
Net Income Available For Capital	***961,562***	***612,100***	***427,900***	***678,485***	***636,970***	***593,555***	***547,740***	***499,825***	***449,610***	***396,995***	
Water CIP Funded by Rates	438,424	1,169,750	1,174,750	1,171,250	708,750	1,660,750	456,000	474,000	596,750	513,000	see CIP20
New Debt for CIP	-	-	-	448,000	448,000	548,000	672,000	918,000	1,106,000	1,106,000	see CIP20
Subtotal CIP Program	**438,424**	**1,169,750**	**1,174,750**	**1,619,250**	**1,156,750**	**2,208,750**	**1,128,000**	**1,392,000**	**1,702,750**	**1,619,000**	
Annual Increase/(Use) of Reserves	**523,138**	**(557,650)**	**(746,850)**	**(940,765)**	**(519,780)**	**(1,615,195)**	**(580,260)**	**(892,175)**	**(1,253,140)**	**(1,222,005)**	
Percentage Impact on W Rates - cumulative		*17%*	*23%*	*28%*	*15%*	*48%*	*17%*	*26%*	*36%*	*35%*	*over existing rates*
2-Month Single Family Base Rate - if Balanced	**$81.50**	**$95.35**	**$99.91**	**$104.52**	**$94.13**	**$120.47**	**$95.40**	**$102.72**	**$111.10**	**$110.17**	
Average Residence @ 7,000 gallons-if Balanced	$88.80	$103.89	$108.86	$113.89	$102.56	$131.26	$103.95	$111.92	$121.05	$120.04	

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9.7.6 Water Fund 411 Balance and Cash Flow Reserve

The 2020 beginning balance is based on the utility's actual year end 2019 balance. The model transfers $1 million for CIP funding to water capital reserve 413, along with $200,000 that has been collected from rates for upsizing contributions. A second transfer is assumed to fund the required debt reserve for the DWSRF loan of $410,000 for one year's principal and interest payment. After the ending balance is estimated, a target minimum balance is tested. The target minimum cash flow reserve of 90 days of operating expense is set aside within the fund balance. The remainder of the funds are available to water.

Table 9-14
Water Fund 411 Balance and Cash Flow Reserve

WATER OPERATING FUND 411	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Comments
Beginning Fund Balance	**2,206,979**	1,120,217	1,120,217	1,120,217	1,120,217	1,120,217	1,120,217	1,120,217	1,120,217	1,120,217	2019 actual year end
Transfer to Capital Reserve 413 for CIP	(1,200,000)	includes $200k collected from rates for upsizing contributions									
Transfer to Debt 414 for Debt Reserve	(409,900)										
Annual Incr/(Use) of Reserves	523,138	If rates are adjusted to balance the yellow line, then the reserves should remain.									
Ending Fund Balance	**1,120,217**	**1,120,217**	**1,120,217**	**1,120,217**	**1,120,217**	**1,120,217**	**1,120,217**	**1,120,217**	**1,120,217**	**1,120,217**	
Target Minimum Balance											
Cash Flow Reserve - 3 months operation exp.	525,000	539,000	569,000	586,000	603,000	621,000	640,000	659,000	679,000	699,000	90 days operating expense
Available Balance	**595,217**	**581,217**	**551,217**	**534,217**	**517,217**	**499,217**	**480,217**	**461,217**	**441,217**	**421,217**	for future investment

9.7.7 Water Capital Reserve 413 Outlook

The water capital reserve revenue is based on the actual 2019 ending balance. The model assumes this fund collects revenue for future system improvements for several sources, including the one-time transfer in from 411 described above, water capital facilities charges for conservative growth at 50 ERU's per year, a grant for the feasibility study, developer funded projects, existing DWSRF loan proceeds, new borrowing for CIP and an annual transfer from Water Fund 411 for the rate-funded portion to complete the CIP. The projects funded are then shown in the Water CIP Program line as the funds are expended. An existing note to McCormick Woods has an annual payment of $50,000 and is transferred to the debt fund 414 to make payment.

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Table 9-15
Water Capital Reserve Fund 413 Balance and Cash Flow Reserve

WATER CAPITAL RESERVE FUND 413	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Comments
Resources											
Beginning Fund Balance	**2,364,572**	3,450,246	2,774,571	2,724,571	2,191,071	2,141,071	2,091,071	2,338,321	1,927,571	2,140,571	2019 actual year end
Transfer from 411 for CIP (one time)	1,200,000										
Capital Facilities Charges	297,250	297,250	297,250	297,250	297,250	297,250	297,250	297,250	297,250	297,250	
Grants	0	30,000	0	0	0	0	0	0	0	0	
Developer Funded	0	5,244,000	0	0	8,189,000	730,000	0	0	0	0	
Existing DWSRF Loan Proceeds	853,698	2,752,602	0	0	0	0	0	0	0	0	
Borrow for CIP	0	0	7,250,000	0	1,550,000	1,916,000	3,796,000	2,895,000	0	4,400,880	
Transfer In (411) - CIP Funded by Rates	438,424	1,169,750	1,174,750	1,171,250	708,750	1,660,750	456,000	474,000	596,750	513,000	
Subtotal Capital Resources	**5,153,944**	**12,943,848**	**11,496,571**	**4,193,071**	**12,936,071**	**6,745,071**	**6,640,321**	**6,004,571**	**2,821,571**	**7,351,701**	
Expense											
W CIP Program	1,653,698	10,119,277	8,722,000	1,952,000	10,745,000	4,604,000	4,252,000	4,027,000	631,000	4,913,880	
Transfer Out (414) - McCW Note	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	
Subtotal Capital Expense	**1,703,698**	**10,169,277**	**8,772,000**	**2,002,000**	**10,795,000**	**4,654,000**	**4,302,000**	**4,077,000**	**681,000**	**4,963,880**	
Estimated Ending Capital Balance	**3,450,246**	**2,774,571**	**2,724,571**	**2,191,071**	**2,141,071**	**2,091,071**	**2,338,321**	**1,927,571**	**2,140,571**	**2,387,821**	
Target Minimum Balance											
Emergency Reserve	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	
Available for Future Improvements	**2,950,246**	**2,274,571**	**2,224,571**	**1,691,071**	**1,641,071**	**1,591,071**	**1,838,321**	**1,427,571**	**1,640,571**	**1,887,821**	

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After accounting for the revenue sources and spending on the CIP, the ending balance is estimated. The target minimum balance includes an emergency reserve of $500,000. The remainder is available for future improvements and system replacement.

Table 9-15 is based on the conservative growth scenario. If additional new connections are made, the City will be in a better position to fund necessary CIP.

9.8 Financial Conclusion

There are not sufficient funds available at the existing water rates to pay for the recommended 10-year capital improvements. The CIP list has been prioritized and planned for annual investment in system repair/replacement/improvement to continue to provide safe, reliable water service for future generations. The goal is to do so in an affordable manner with annual investment funded by water rates, development contributions and capital facilities charges from new connections. Of course, the City will seek grants to assist where appropriate.

The financial model estimates the impact on residential bimonthly water rates to complete the 10-year CIP. The model assumes that all water rates would be impacted on a similar percentage basis. The impacts are summarized as follows:

- **Conservative Growth Scenario @ 50 ERU per year** – In order to fund the 10-year CIP with a combination of rates, water capital reserves, capital facilities charges, development activity and borrowing, the current residential bimonthly base rate of $81.50 would need to increase $29.00 in 2020 to $110.00 by 2029. This represents an increase of 35% over the planning period, or an average of 3.9% per year.
- **Moderate Growth Scenario @ 100 ERU per year** – In order to fund the 10-year CIP with a combination of rates, water capital reserves, capital facilities charges, development activity and borrowing, the current residential bimonthly base rate of $81.50 would need to increase $22.00 in 2020 to $105.00 by 2029. This represents an increase of 27% over the planning period, or an average of 3.0% per year.

A reminder that annual averages are helpful for comparing scenarios, but the model indicates that a larger increase is necessary in 2021 as debt payments on the DWSRF loan for Well 13 begin.

The City will manage the budget and improvements to fit as necessary and will consider rate increases as needed to complete the recommended improvements to provide safe, reliable water service to ratepayers for many years to come. The City plans to review rates and charges following submittal of this draft plan to be sure they are recovering the necessary costs in a fair and equitable manner. They may consider another multi-year rate schedule to provide consistency to ratepayers as the current multi-year ordinance schedule runs out in 2020.

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City of Port Orchard
2020 Water System Plan

APPENDICES

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Appendix A

SEPA Checklist

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

1. Name of proposed project, if applicable:
   City of Port Orchard 2020 Water System Plan

2. Name of applicant:

City of Port Orchard

3. Address and phone number of applicant and contact person:

City of Port Orchard Public Works Department
216 Prospect Street
Port Orchard, WA 98366
(360) 876-4991
Mark R. Dorsey, P.E., Public Works Director

BHC Consultants, LLC
1601 Fifth Ave, Suite 500
Seattle, WA 98101
(206) 505-3400
Jim Gross, PE, Project Manager

4. Date checklist prepared:
June 11, 2020

5. Agency requesting checklist:
City of Port Orchard Planning Department Washington State Department of Health Washington State Department of Ecology

6. Proposed timing or schedule (including phasing, if applicable):
The proposed date for adoption of the 2020 Water System Plan (Plan) by the Port Orchard City Council is expected to be Fall of 2020.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.
This is a non-project action adopting the Plan. In addition to the City's CIP and Schedule as noted above, incremental water system facilities may be constructed in conjunction with private development, as they occur. In addition, amendments to the Plan may occur in the future as additional needs are identified to meet the water system requirements of the service area. Finally, updates to the Plan will be accomplished at least every six years, in accordance with State Department of Health requirements.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.
City of Port Orchard Comprehensive Plan, adopted June 2016, revised July 2020, Nov 2019, and July 2020
City of Port Orchard General Sewer Plan Update, July 2016, revised Sept 2020
Kitsap County Comprehensive Plan Update, June 2016
Additional environmental documents may be required for implementation of specific projects recommended in the Plan. Completion of environmental documentation will be accomplished in accordance with the threshold determination and other requirements fo the State Environmental Policy Act.

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.
Property owners and developers have, and are expected to apply for approval of developments that will require water service. These developments are not addressed specifically in the Plan. The Plan provides for the public water system improvements necessary to support such development in accordance with the development code. All project-level improvements will be subject to environmental review at the time of their application. No pending proposals will affect this non-project action.

10. List any government approvals or permits that will be needed for your proposal, if known.

The Plan must be approved by the Washington State Department of Health and the Washington State Department of Ecology. Review by other jurisdictions and agencies include Kitsap County, West Sound Utility District, The City of Bremerton, the City of Port Orchard City Council and the Kitsap County Health District.

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.)
As needed for demonstrating compliance with the Growth Management Act (GMA), this proposal contemplates the adoption of the Plan. This involves adoption of amendments to the City of Port Orchard's 2009 Comprehensive Water System Plan Update (2009 Plan), which addresses future water service to all areas within the City's service area as described in the Plan. The Plan puts forth a capital improvement schedule in accordance with water system demand projections, hydraulic analyses and minimum design criteria developed as part of the Plan. The amendments identify three categories of action:

<u>Programmatic</u>- Updating the 2009 Plan to address a revised population forecast for the urban growth area which has been expanded since the 2009 Plan. This will enable the City to address future needs for water system service within the defined urban growth area.

<u>Capital Projects</u>- Updating the list of specific capital projects that are necessary to implement the Plan. These will be included in the Capital Improvements Plan. Subsequent project-level environmental review will be conducted at the time these projects are proposed for implementation.

<u>Operation, Maintenance & Repair</u>- Day-to-day and periodic projects necessary to maintain the current and future water system in working order are described in the Plan, as further addressed in Chapter 6 • Operations and Maintenance Program.

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.
As indicated in Figures 1-3 and 1-4, the service area covered by the Plan includes area within the current City of Port Orchard city limits and portions of the designated Urban Growth Area (UGA), which includes established service boundaries of the City of Bremerton and West Sound Utility District. In general, Port Orchard is located on the Kitsap Peninsula along the south shore of Sinclair Inlet. While the original water system serves the majority of the City's customer base, a separate water system serves the recently developed McCormick Woods Community, which was annexed into the City's incorporated limits in July 2009. The City plans to integrate the two water systems into a single system.

B. Environmental Elements

1. *Earth*

a. General description of the site:

(circle one): **Flat, rolling, hilly, steep slopes,** mountainous, other _____
The City of Port Orchard is characterized by shoreline adjacent to Sinclair Inlet. The topography is generally hilly with some steep slopes and flat areas.

b. What is the steepest slope on the site (approximate percent slope)?
There are steep slopes with in the City (up to 100% slope in places), however, this non-project action will not impact slopes generally, and any project proposed under this ordinance will be reviewed separately for SEPA compliance where required.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.
Soils and soil types are not generally impacted by this non-project action. An extensive discussion of the soils and their properties can be found in the USDA Soil Survey of Kitsap County.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.
Unstable soils and steep slopes do exist, but will not generally be impacted by this non-project action. Separate site-specific review will determine impacts to soils and slopes and SEPA compliance.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.
No filling or grading is proposed as part of this non-project action. Fill or grading related to site-specific proposals under this ordinance will be reviewed separately for SEPA compliance.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.
No clearing or construction is proposed as part of this non-project action.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?
No construction is proposed as part of this non-project action.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:
No specific measures are proposed as part of this non-project action. Each project will be evaluated as part of site-specific project review for compliance with SEPA and other regulations in the Port Orchard Municipal Code.

2. Air

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.
This non-project action will have no impact on air quality. Air quality will be evaluated as part of site-specific project review and SEPA analysis.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.
This non-project action will have no impact on air quality. Air quality will be evaluated as part of site-specific project review and SEPA analysis.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:
This non-project action will have no impact on air quality. Air quality will be evaluated as part of site-specific project review and SEPA analysis.

3. Water

a. Surface Water:

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.
Port Orchard is bordered on the north by the waters of Puget Sound. There are numerous wetlands, streams and creeks within the area. Impacts on shoreline, surface water, seasonal streams and wetlands will be evaluated as part of site-specific project review and SEPA analysis.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.
This non-project action will not require any work over, in or adjacent to these waters. Impacts on wetlands, surface water, seasonal streams and shoreline will be evaluated as part of site-specific project review and SEPA analysis.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.
This non-project action will not require any filling or dredging. Impacts as a result of filling or dredging will be evaluated as part of site-specific project review and SEPA analysis.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.
This non-project action will not require any surface water withdrawals or diversions. The proposed permit, policy, and ordinances will provide additional protection for all water bodies. Impacts of this type will be evaluated as part of site-specific project review and SEPA analysis.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.
This non-project action does not impact flood areas specifically. Any proposal involving flood areas will comply with Chapter 15.38, Flood Damage Prevention, of the Port Orchard Municipal Code and will be evaluated as part of site- specific review and SEPA analysis.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.
This non-project action will not require discharge of materials to surface waters. The proposed ordinance will prohibit the discharges of water materials and provide additional protection for all water bodies. Impacts of this type will be evaluated as part of site-specific project review and SEPA analysis.

b. Ground Water:

1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.
This non-project action will not require any withdrawal of groundwater or discharge to groundwater. Impacts of this type will be evaluated as part of site-specific project review and SEPA analysis.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.
This non-project action will not require any discharge of waste material to groundwater.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.
This non-project action will not impact surface and stormwater. Stormwater flow and outfall will be evaluated as part of site-specific project review and SEPA analysis.

2) Could waste materials enter ground or surface waters? If so, generally describe.
This non-project action will not impact ground or surface waters and the goals to minimize the effects of discharge of waste materials. Possible contamination of ground or surface waters with waste materials will be evaluated as part of site-specific project review and SEPA analysis.

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.
This non-project action will not alter or otherwise affect drainage patterns within the service areas.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:
This non-project action will not have an effect on surface, ground or runoff waters. Possible impacts surface, ground, and runoff water impacts will be evaluated as part of site-specific project review and SEPA analysis.

4. Plants

a. Check the types of vegetation found on the site:

__X__deciduous tree: alder, maple, aspen, other
__X__evergreen tree: fir, cedar, pine, other
__X__shrubs

__X__grass
__X__pasture
__X__crop or grain
____ Orchards, vineyards or other permanent crops.
__X__ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
__X__water plants: water lily, eelgrass, milfoil, other
____ _other types of vegetation

b. What kind and amount of vegetation will be removed or altered?
This non-project action will have no effect on vegetation removal or alteration. Vegetation removal and enhancement will be evaluated as part of site-specific project review and SEPA analysis.

c. List threatened and endangered species known to be on or near the site.
This non-project action will have no impact on threatened or endangered species. Flora will be evaluated as part of site-specific project review and SEPA analysis.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:
No landscaping is proposed as part of this non-project action. Open space and planting regulations will be evaluated as part of site-specific project review and SEPA analysis.

e. List all noxious weeds and invasive species known to be on or near the site.
There are noxious weeds and invasive species listed by EDDMaps.org as being present in Kitsap County. The presence of these species will be evaluated as part of a site-specific project review and SEPA analysis.

5. Animals

a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site.

Examples include:

birds: **hawk, heron, eagle, songbirds, other: Water Foul**
mammals: **deer**, **bear**, elk, **beaver**, **other**: **Sea Lion, Racoon**
fish: **bass, salmon, trout, herring, shellfish**, other _____

b. List any threatened and endangered species known to be on or near the site.
This non-project action will not have an effect on wildlife. Effects of proposals on wildlife will be evaluated as part of site-specific project review and SEPA analysis.

c. Is the site part of a migration route? If so, explain.
Puget Sound, including Port Orchard, is an important nesting place, feeding area, and wintering ground for thousands of birds in the Pacific Flyway. This non-project action will have no effect on migration patterns. Effects on wildlife will be evaluated as part of site-specific project review and SEPA analysis.

d. Proposed measures to preserve or enhance wildlife, if any:

This non-project action will not have an effect on animals or birds. Effects of individual proposals on wildlife will be evaluated as part of site-specific project review and SEPA analysis.

e. List any invasive animal species known to be on or near the site.
There are invasive animal species listed by EDDMaps.org as being present in Kitsap County. The presence of these species will be evaluated as part of a site-specific project review and SEPA analysis.

6. Energy and Natural Resources

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.
No energy is required for this non-project action. Energy consumption will be evaluated as part of site-specificproject review and SEPA analysis and in accordance with the Washington State Energy Code which the City has adopted.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.
This non-project action will have no effect on solar access. Solar access will be evaluated as part of site-specificproject review and SEPA analysis.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:
None. The City uses the Washington State Energy Code to enhance electricity conservation. Energy conservation features will be evaluated as part of site-specific project review and SEPA analysis.

7. Environmental Health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.
This non-project action does not affect threats of environmental health hazards. Environmental health hazards will be evaluated as part of site-specific project review and SEPA analysis.

1) Describe any known or possible contamination at the site from present or past uses.
Does not apply to this non-project action and would be evaluated at the site-specific project level.

2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.
Does not apply to this non-project action and would be evaluated at the site-specific project level.

3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating

life of the project.
Does not apply to this non-project action and would be evaluated at the site-specific project level.

4) Describe special emergency services that might be required.
No special emergency measures will be required as part of this non-project action.

5) Proposed measures to reduce or control environmental health hazards, if any:
No measures to reduce or control environmental health hazards are necessary as part of this non- project action.

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?
Noise levels in Port Orchard are regulated under Chapter 9.24 (Offenses Against Public Order) of the Port Orchard Municipal Code. This non-project action will not affectnoise levels.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.
This non-project action will have no effect on noise levels. Noise impacts of individual proposals will be evaluated as part of site-specific project review and SEPA analysis.

3) Proposed measures to reduce or control noise impacts, if any:
Noise levels on Port Orchard are regulated under Chapter 9.24 (Offenses Against Public Order) of the Port Orchard Municipal Code.

8. Land and Shoreline Use

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.
Land uses in Port Orchard are primarily residential and commercial, with some industrial, light manufacturing, recreation, and open space areas. This non-project action will not affect shoreline use.

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?
Does not apply to this non-project action. Past land uses would be addressed at the site-specific project level. This non-project action will not affect or convert forest or farmlands.

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:
This non-project action will not be affected by working forest or farmlands.

c. Describe any structures on the site.
Existing structures within the Plan area are residential and commercial, with government and community buildings, and some industrial structures. There are no structures associated with this proposal.

d. Will any structures be demolished? If so, what?
This non-project action requires no demolition. Any future proposed demolition will be evaluated as part of site-specific project review and SEPA analysis.

e. What is the current zoning classification of the site?
Zoning in Port Orchard is mostly residential and commercial according to the Official Zoning Map, which is available at the Department of Planning and Community Development and shown on Figure 2-1.

f. What is the current comprehensive plan designation of the site?
Comprehensive plan designations are mostly residential and commercial according to the official Comprehensive Plan Map, which is available at the Department of Planning and Community Development.

g. If applicable, what is the current shoreline master program designation of the site?
Jurisdictional shoreline within the plan area is mainly along Sinclair Inlet and varies as shown on the City of Port Orchard Shoreline Environmental Designations map, which is available at the Department of Planning and Community Development.

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.
Various areas within the plan area are classified as critical areas by the City of Port Orchard. Critical areas will not be affected by this non-project action and will be evaluated at the site-specific project level.

i. Approximately how many people would reside or work in the completed project?
None as a result of this non-project action.

j. Approximately how many people would the completed project displace?
None as a result of this non-project action.

k. Proposed measures to avoid or reduce displacement impacts, if any:
Does not apply. this non-project action would not result in displacements.

L. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:
The Plan incorporates elements of the City's adopted Comprehensive Plan.

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:
This non-project action would have no impact on agricultural and forest lands, if any.

9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.
None as a result of this non-project action.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.
None as a result of this non-project action.

c. Proposed measures to reduce or control housing impacts, if any:
This non-project action would have no impacts on housing.

10. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?
Does not apply to this non-project action.

b. What views in the immediate vicinity would be altered or obstructed?
None as a result of this non-project action.

c. Proposed measures to reduce or control aesthetic impacts, if any:
There would be no impacts to aesthetics as a result of this non-project action.

11. Light and Glare

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?
None as a result of this non-project action.

b. Could light or glare from the finished project be a safety hazard or interfere with views?
There would be no impacts from light or glare as a result of this non-project action.

c. What existing off-site sources of light or glare may affect your proposal?
None as a result of this non-project action.

d. Proposed measures to reduce or control light and glare impacts, if any:
There would be no impacts from light or glare as a result of this non-project action.

12. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity?
Does not apply to this non-project action.

b. Would the proposed project displace any existing recreational uses? If so, describe.
There would be no recreational displacements as a result of this non-project action.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:
Does not apply to this non-project action.

13. Historic and cultural preservation

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers ? If so, specifically describe.
Archeological and historic resources are recorded at the State of Washington Departments of Community, Trade and Economic Development, Office of Archeology and Historic Preservation.

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.
A map and listing of all the historic resources is available at the Department of Planning and Community Development, 207 Prospect Street, Port Orchard, WA. 98366.

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.
Does not apply to this non-project action.

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.
Does not apply to this non-project action.

14. Transportation

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.
State Route 16 connects the City with the balance of the Kitsap Peninsula. The City has an extensive system of arterials, suburban and local public streets. Location of, and access to, public streets and highways will be evaluated as part of site-specific project review and SEPA analysis.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?
The City is served by Kitsap Transit. Kitsap Transit operates a commuter system which is coordinated with the ferry schedules in neighboring communities in addition to a dial-a-ride service.

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?
This is a non-project action. Parking requirements are contained in Chapter 16.45, Parking Standards, of the Port Orchard Municipal Code.

d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).
This non-project action will not create the need for any new or improved streets. Transportation facilities will be evaluated as part of site-specific project review and SEPA analysis.

e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.
The various modes of transportation will be evaluated as part of site-specific project review and SEPA analysis.

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?
This non-project action will have no direct impact on vehicular trips. Trip generation and the cumulative impact will be evaluated as part of site-specific project review and SEPA analysis.

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.
This non–project action will not interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the Plan area.

h. Proposed measures to reduce or control transportation impacts, if any:
This non-project action will have no direct impact on transportation. Transportation impacts will be evaluated as part of site-specific project review and SEPA analysis.

15. Public Services

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.
This non-project action will have little effect on public services, except as would normally be required for individual proposals. The need for public services will be evaluated as part of site- specific project review and SEPA analysis.

b. Proposed measures to reduce or control direct impacts on public services, if any.
This non-project action will have no effect on public services.

16. Utilities

a. Circle utilities currently available at the site:
electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other _____

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.
This non-project action will not directly affect public utilities. The provision of utilities for individual proposals will be evaluated as part of site-specific project review and SEPA analysis.

C. Signature

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: Jim Gross, PE

Position and Agency/Organization Director of Engineering, BHC Consultants

Date Submitted: 1013/20

D. Supplemental sheet for nonproject actions

(**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?
This non-project action will typically result in the construction of potable water infrastructure such as water distribution and transmission pipelines, pump stations, water storage facilities, valves and wells. Except as a possible result of construction activities, these types of projects do not increase discharge to water, emissions to air, production, storage, or release of toxic or hazardous substances, or produce noise. Each project proposed will be evaluated as part of a site-specific project review and SEPA analysis.

Proposed measures to avoid or reduce such increases are:
Individual project proposed in the Plan will be evaluated on a case-by-case basis.

2. How would the proposal be likely to affect plants, animals, fish, or marine life?
Individual projects proposed in the Plan will be evaluated on a case-by-case basis.

Proposed measures to protect or conserve plants, animals, fish, or marine life are:
Site-specific project review and SEPA analysis will determine which potential impacts on wildlife could be.

3. How would the proposal be likely to deplete energy or natural resources?

Proposed measures to protect or conserve energy and natural resources are:
The City is committed to reducing energy consumption. Goal 4 of the City's 2018 Comprehensive Plan supports and promotes energy conservation as follows:
Policy UT-25

Encourage and support development of renewable energy projects and technologies.
Policy UT-26 Support renewable energy incentives to businesses and groups for comprehensive renewable energy effort.
Policy UT-27 Establish incentives to lessen use of resources.
Policy UT-28 Encourage programs to educate utility users on the benefits and means of conservation

Individual projects proposed in the Plan will be evaluated on a case-by-case basis.

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?
The types of activities likely to result from this nop-project proposal will generally not be constructed in environmentally sensitive areas. Each project proposed will be evaluated as part of a site-specific project review and SEPA analysis.

Proposed measures to protect such resources or to avoid or reduce impacts are:
The City is committed to minimizing environmental impacts. Goal 3 of the City's 2018 Comprehensive Plan supports and promotes to Minimize environmental and aesthetic impact of utility facilities as follows:
Policy UT-21 Place utility facilities along public rights-of-way and encourage underground distribution lines in accordance with state rules and regulations.
Policy UT-22 Encourage siting of large, above ground utilities (e.g. antennas, towers) in industrial or commercial areas or along appropriate transportation and utility corridors.
Policy UT-23 Minimize the visual impact of utility facilities on view corridors, vistas and adjacent properties by developing design guidelines for cellular towers, antennas and other types of utility facilities.
Policy UT-24 For new development, retrofitting and major remodels, including upgrades to site utilities, the City shall require the undergrounding of future or existing utility lines including gas, cable television, electric distribution lines, and telephone as appropriate during the design review process and in accordance with local, regional and state rules, regulations and tariffs.

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?
The Plan is consistent with local shoreline comprensive plans or policies. The types of activities likely to result from this non-project proposal will generally not be constructed near shorelines and will not promote incompatible shoreline uses.

Proposed measures to avoid or reduce shoreline and land use impacts are:
Individual projects proposed in the Plan will be evaluated on a case-by-case basis.

6. How would the proposal be likely to increase demands on transportation or public services and utilities?
The Growth Management Act requires that public utilities, including the City of Port Orchard, "shall be adequate to serve development at the time the development is available for occupancy and use..." The types of activities likely to result from this non-project proposal will be required to meet water demands due to population growth or for operation and maintenance of the existing water system, and will not increase demands on transportation or other public services.

Proposed measures to reduce or respond to such demand(s) are:
The City is committed to decreasing water use through the implementation of conservation measures. Water conservation measures are described in Chapter 4 of the Plan, and promoted by the City in annual Consumer Confidence Reports and in billing inserts, and promulgated in the Water System Standards section of the Municipal Code. See Appendices E and G of the Plan.

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.
The Plan will not conflict with other jurisdiction's environmental protection requirements. Each project proposed will be evaluated as part of a site-specific project review and SEPA analysis.

CITY OF PORT ORCHARD
Department of Community Development
216 Prospect Street, Port Orchard, WA 98366
Phone: (360) 874-5533 • Fax: (360) 876-4980
planning@cityofportorchard.us
www.cityofportorchard.us

CITY OF PORT ORCHARD
PROGRAMMATIC DETERMINATION OF NON-SIGNIFICANCE (DNS)
City of Port Orchard 2020 Water System Plan

DESCRIPTION OF PROPOSAL: The City of Port Orchard has prepared an update to the City's 2009 Comprehensive Water System Plan ("Plan"). The updated Plan provides a summary of the City's current water capacities and an analysis of the impact of projected growth on the City's water system and proposes a Capital Improvement Program to alleviate system deficiencies and the implement the Plan. It also documents the water utility's policies, operations and maintenance practices, and financial condition. The Plan complies with the Washington State Department of Ecology regulations for a comprehensive water plan as provided in WAC 246-290-100.

PROPONENT: City of Port Orchard Public Works Department

LOCATION OF PROPOSAL: This is a programmatic, non-project action to update the 2009 Comprehensive Water System Plan, which covers areas within the current City limits and portions of the City's urban growth area.

LEAD AGENCY: City of Port Orchard

SEPA OFFICIAL: Nicholas Bond, AICP
Director of Community Development
216 Prospect Street
Port Orchard, WA 98366
(360) 874-5533

DETERMINATION: The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). The decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request. The proposal (update of the Plan) is a non-project action per WAC 197-11-774; however, all project-level improvements will be subject to individual environmental review at the time of their application.
The DNS is issued pursuant to WAC 197-11-340(2)(a)(v); the lead agency will not act on this proposal for 15 days from the date of issue.

DATE OF ISSUANCE: October 26, 2020
COMMENT DEADLINE: November 9, 2020

Signature: _____ Date: 10/26/20
Nicholas Bond, AICP, Department of Community Development Director

APPEAL PERIOD: Pursuant to RCW 43.21C, any person wishing to appeal this determination may file an appeal within fourteen (14) days from the date of the end of the comment period. You should be prepared to make specific factual objections. There is a fee to appeal this determination.

Appendix B

Municipal Water Law

Water System Planning Requirements

From Washington State Department of Health

https://www.doh.wa.gov/CommunityandEnvironment/DrinkingWater/WaterSystemDesignandPlanning/PlanningRequirements

Water System Plans

Planning is the foundation of a safe, successful, and sustainable public water system. The categories of community systems identified below are required to submit a Water System Plan (WSP) for review and approval.

A Group A community water system must submit a WSP or a Plan update under WAC 246-290-100 if it meets any of the following conditions.

- Serves 1,000 or more connections, or
- Is a new Group A water system, or
- Proposes to do any of the following:
  - Make infrastructure changes to increase the approved number of connections.
  - Expand the service area identified in a previously approved planning document or engineering project.
  - Expand the geographical area where direct service is already provided if a planning or engineering document has not been previously approved.
- Seeks to be eligible for the "document submittal exception" process, or
- Is directed to submit a WSP because of demonstrated operational, managerial, or financial problems, or
- Is municipally owned or located in a critical water supply area. If your system falls into this category, but it is not expanding, contact your regional planner about the appropriate planning document, or
- Seeks to be eligible for Drinking Water State Revolving Fund (DWSRF) resources and does not have a current WSP that addresses the proposed project.

More information is available on the Rulemaking webpage.

The City of Port Orchard meets multiple criteria listed above, and as such is required to prepare a Water System Plan. A pre-plan meeting was held on April 14, 2016. Attendees included staff from the Department of Health Office of Drinking Water and the City of Port Orchard.

Appendix C

Water Supply Information

Appendix C1

Water Rights Claims

STATE OF WASHINGTON
DEPARTMENT OF WATER RESOURCES
DIVISION OF WATER MANAGEMENT

WATER RIGHT CLAIM

RECEIVED
DEPARTMENT OF ECOLOGY
JUL 21 7000 1192
CASH___OTHER___NONE✓

RECEIVED
DEPARTMENT OF ECOLOGY
JUL 23 7000 1317
CASH___OTHER✓NONE___

1. NAME City of Port Orchard

ADDRESS P. O. Box 186

Port Orchard, Washington ZIP CODE 98366

2. SOURCE FROM WHICH THE RIGHT TO TAKE AND MAKE USE OF WATER IS CLAIMED: Ground Water
(SURFACE OR GROUND WATER)

W.R.I.A. 15
(LEAVE BLANK)

A. IF GROUND WATER, THE SOURCE IS Artersian Well #7

B. IF SURFACE WATER, THE SOURCE IS Not applicable

3. THE QUANTITIES OF WATER AND TIMES OF USE CLAIMED:

A QUANTITY OF WATER CLAIMED 113.1 PRESENTLY USED 113.1
(CUBIC FEET PER SECOND OR GALLONS PER MINUTE)

B. ANNUAL QUANTITY CLAIMED 182.5 PRESENTLY USED 182.5
(ACRE FEET PER YEAR)

C. IF FOR IRRIGATION, ACRES CLAIMED Not applicable PRESENTLY IRRIGATED Not applicable

D. TIME(S) DURING EACH YEAR WHEN WATER IS USED: 24 hr./da 365 da./yr/

4. DATE OF FIRST PUTTING WATER TO USE: ___ MONTH April YEAR 1962

5. LOCATION OF THE POINT(S) OF DIVERSION/WITHDRAWAL: 2450 FEET W AND 1,750 FEET N FROM THE SE CORNER OF SECTION 26

BEING WITHIN SW¼ NW¼ SE¼ OF SECTION 26 T. 24 N. ___ R. 1E (E.OR W.) W.M.

IF THIS IS WITHIN THE LIMITS OF A RECORDED PLATTED PROPERTY, LOT 3 BLOCK 2 OF

Replat of Central Addition to Sidney
(GIVE NAME OF PLAT OR ADDITION)

6. LEGAL DESCRIPTION OF LANDS ON WHICH THE WATER IS USED Within corporate limits of the City of Port Orchard

COUNTY Kitsap

7. PURPOSE(S) FOR WHICH WATER IS USED: Municipal supply, domestic use, recreation, industrial suppl

8. THE LEGAL DOCTRINE(S) UPON WHICH THE RIGHT OF CLAIM IS BASED: Order of Incorporation

DO NOT USE THIS SPACE

THE FILING OF A STATEMENT OF CLAIM DOES NOT CONSTITUTE AN ADJUDICATION OF ANY CLAIM TO THE RIGHT TO USE OF WATERS AS BETWEEN THE WATER USE CLAIMANT AND THE STATE OR AS BETWEEN ONE OR MORE WATER USE CLAIMANTS AND ANOTHER OR OTHERS. THIS ACKNOWLEDGEMENT CONSTITUTES RECEIPT FOR THE FILING FEE.

DATE RETURNED REGISTRY NUMBER

JUL 28 71 000913 ← THIS HAS BEEN ASSIGNED WATER RIGHT CLAIM REGISTRY NO.

John F. Fiddler
ASSISTANT DIRECTOR DIVISION OF WATER MANAGEMENT-DEPARTMENT OF WATER RESOURCES

I HEREBY SWEAR THAT THE ABOVE INFORMATION IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF

X Paul D. Powers Mayor Pro-Tem
PAUL D. POWERS

DATE July 17th, 1970

IF CLAIM FILED BY DESIGNATED REPRESENTATIVE, PRINT OR TYPE FULL NAME AND MAILING ADDRESS OF AGENT BELOW.

☒ ADDITIONAL INFORMATION RELATING TO WATER QUALITY AND/OR WELL CONSTRUCTION IS AVAILABLE

A FEE OF $7.00 MUST ACCOMPANY THIS WATER RIGHT CLAIM

ORIGINAL
COPY

RETURN ALL THREE COPIES WITH CARBON INTACT ALONG WITH YOUR FEE TO
DEPARTMENT OF WATER RESOURCES
DIVISION OF WATER MANAGEMENT
UNION AVE BUILDING OLYMPIA WASHINGTON 98501

STATE OF WASHINGTON
DEPARTMENT OF WATER RESOURCES
DIVISION OF WATER MANAGEMENT

WATER RIGHT CLAIM

RECEIVED
DEPARTMENT OF ECOLOGY
JUL 21 70001193
CASH___ OTHER___ NONE ✓

RECEIVED
DEPARTMENT OF ECOLOGY
JUL 29 70001316
CASH___ OTHER ✓ NONE___

1. NAME City of Port Orchard

ADDRESS P. O. Box 186

Port Orchard, Washington ZIP CODE 98366

2. SOURCE FROM WHICH THE RIGHT TO TAKE AND MAKE USE OF WATER IS CLAIMED: Ground Water (SURFACE OR GROUND WATER)

W.R.I.A. 15 (LEAVE BLANK)

A. IF GROUND WATER, THE SOURCE IS Artesian Well #6

B. IF SURFACE WATER, THE SOURCE IS Not applicable

3. THE QUANTITIES OF WATER AND TIMES OF USE CLAIMED:

A. QUANTITY OF WATER CLAIMED 113.1 GPM PRESENTLY USED 113.1 GPM (GALLONS PER MINUTE)

B. ANNUAL QUANTITY CLAIMED 182.5 PRESENTLY USED 182.5 (ACRE FEET PER YEAR)

C. IF FOR IRRIGATION, ACRES CLAIMED Not applicable PRESENTLY IRRIGATED Not applicable

D. TIME(S) DURING EACH YEAR WHEN WATER IS USED: 24 hr./da 365 da/1 yr.

4. DATE OF FIRST PUTTING WATER TO USE: ____ MONTH October YEAR 1956

5. LOCATION OF THE POINT(S) OF ~~DIVERSION~~ withdrawal: 700 FEET E AND 2400 FEET N FROM THE SW CORNER OF SECTION 25

BEING WITHIN NE¼ NW¼ SW¼ OF SECTION 25 T. 24 N. ____ R. 1E (E. OR W.) W.M.

IF THIS IS WITHIN THE LIMITS OF A RECORDED PLATTED PROPERTY, LOT 3 BLOCK 3 OF

Wheeler's Addition
(GIVE NAME OF PLAT OR ADDITION)

6. LEGAL DESCRIPTION OF LANDS ON WHICH THE WATER IS USED. Within corporate limits of the City of Port Orchard, Washington

COUNTY Kitsap

7. PURPOSE(S) FOR WHICH WATER IS USED: Municipal supply, domestic use, recreation, industrial supply. See attachment.

8. THE LEGAL DOCTRINE(S) UPON WHICH THE RIGHT OF CLAIM IS BASED: Order of Incorporation

DO NOT USE THIS SPACE

THE FILING OF A STATEMENT OF CLAIM DOES NOT CONSTITUTE AN ADJUDICATION OF ANY CLAIM TO THE RIGHT TO USE OF WATERS AS BETWEEN THE WATER USE CLAIMANT AND THE STATE OR AS BETWEEN ONE OR MORE WATER USE CLAIMANTS AND ANOTHER OR OTHERS. THIS ACKNOWLEDGEMENT CONSTITUTES RECEIPT FOR THE FILING FEE.

DATE RETURNED REGISTRY NUMBER

JUL 29 70 000912 < THIS HAS BEEN ASSIGNED WATER RIGHT CLAIM REGISTRY NO.

John A. Biebe
ASSISTANT DIRECTOR DIVISION OF WATER MANAGEMENT-DEPARTMENT OF WATER RESOURCES

I HEREBY SWEAR THAT THE ABOVE INFORMATION IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF

X Paul D. Powers Mayor Pro-Tem
Paul D. Powers

DATE July 17th, 1970

IF CLAIM FILED BY DESIGNATED REPRESENTATIVE PRINT OR TYPE FULL NAME AND MAILING ADDRESS OF AGENT BELOW

☒ ADDITIONAL INFORMATION RELATING TO WATER QUALITY AND/OR WELL CONSTRUCTION IS AVAILABLE

A FEE OF $2.00 MUST ACCOMPANY THIS WATER RIGHT CLAIM.

ORIGINAL
DWR

RETURN ALL THREE COPIES WITH CARBONS INTACT ALONG WITH YOUR FEE TO
DEPARTMENT OF WATER RESOURCES
DIVISION OF WATER MANAGEMENT
UNION AVE BUILDING-OLYMPIA WASHINGTON 98501

PORT ORCHARD, WASHINGTON

COUNTY SEAT OF KITSAP COUNTY, WASHINGTON

WATER RIGHTS CLAIM
Attachment

ITEM #7 - Purpose for which water is used

A. Municipal Supply
   1. City Hall
   2. Fire Stations 1 & 2
   3. Police Station
   4. Public Works Buildings 1 & 2
   5. Sewage Treatment Plant

B. Domestic Supply
   1. 1350 Metered users

C. Federal Supply
   1. Post Office

D. State Supply
   1. Liquor Store

E. County Supply
   1. Courthouse
   2. Juvenile Home

F. School Supply
   1. Givens Grade School
   2. South Kitsap High School
   3. Cedar Heights Junior High School

G. Recreation Supply
   1. Givens Playfield
   2. Central Playfield
   3. Active Club Building

H. Commercial Supply
   1. Grocery Stores (Refrigeration)
   2. Convalescent Homes
   3. Mobile Home Parks
   4. Proposed Hospital
   5. Doctor's Clinics

I. Industrial Supply
   1. Light Manufacturing

STATE OF WASHINGTON
DEPARTMENT OF WATER RESOURCES
DIVISION OF WATER MANAGEMENT

WATER RIGHT CLAIM

RECEIVED
DEPARTMENT OF ECOLOGY
JUL 21 7000 1194
CASH___ OTHER___ NONE ✓

RECEIVED
DEPARTMENT OF ECOLOGY
JUL 29 7000 1315
CASH___ OTHER ✓ NONE___

1. NAME City of Port Orchard

ADDRESS P. O. Box 186

Port Orchard, Washington ZIP CODE 98366

2. SOURCE FROM WHICH THE RIGHT TO TAKE AND MAKE USE OF WATER IS CLAIMED: Ground Water (SURFACE OR GROUND WATER)

W.R.I.A. 15 (LEAVE BLANK)

A. IF GROUND WATER, THE SOURCE IS Artesian Well #5

B. IF SURFACE WATER, THE SOURCE IS Not applicable

3. THE QUANTITIES OF WATER AND TIMES OF USE CLAIMED:

A. QUANTITY OF WATER CLAIMED 51.3 PRESENTLY USED 51.3 (GALLONS PER MINUTE)

B. ANNUAL QUANTITY CLAIMED 82.8 PRESENTLY USED 82.8 (ACRE FEET PER YEAR)

C. IF FOR IRRIGATION, ACRES CLAIMED Not applicable PRESENTLY IRRIGATED Not applicable

D. TIME(S) DURING EACH YEAR WHEN WATER IS USED. 24 hr./day 365 da/yr.

4. DATE OF FIRST PUTTING WATER TO USE: ____ MONTH February YEAR 1946

5. LOCATION OF THE POINT(S) OF ~~DIVERSION~~ WITHDRAWAL 2,440 FEET W AND 1,760 FEET N FROM THE SE CORNER OF SECTION 26

BEING WITHIN SW¼ NW¼ SE¼ OF SECTION 26 T. 24 N. ____ R. 1E (E. OR W.) W.M.

IF THIS IS WITHIN THE LIMITS OF A RECORDED PLATTED PROPERTY, LOT 3 BLOCK 2 OF

Replat of Central Addition to Sidney
(GIVE NAME OF PLAT OR ADDITION)

6. LEGAL DESCRIPTION OF LANDS ON WHICH THE WATER IS USED: Within corporate limits of the City of Port Orchard, Washington

COUNTY Kitsap

7. PURPOSE(S) FOR WHICH WATER IS USED: Municipal supply, Domestic use, recreation, Industrial supply

8. THE LEGAL DOCTRINE(S) UPON WHICH THE RIGHT OF CLAIM IS BASED: Order of Indorporation

DO NOT USE THIS SPACE

THE FILING OF A STATEMENT OF CLAIM DOES NOT CONSTITUTE AN ADJUDICATION OF ANY CLAIM TO THE RIGHT TO USE OF WATERS AS BETWEEN THE WATER USE CLAIMANT AND THE STATE OR AS BETWEEN ONE OR MORE WATER USE CLAIMANTS AND ANOTHER OR OTHERS. THIS ACKNOWLEDGEMENT CONSTITUTES RECEIPT FOR THE FILING FEE.

DATE RETURNED. REGISTRY NUMBER

JUL 29 7000 0911 THIS HAS BEEN ASSIGNED WATER RIGHT CLAIM REGISTRY NO.

ASSISTANT DIRECTOR DIVISION OF WATER MANAGEMENT-DEPARTMENT OF WATER RESOURCES

I HEREBY SWEAR THAT THE ABOVE INFORMATION IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF

X Paul D. Powers Mayor Pro-Tem
PAUL D. POWERS

DATE July 17th, 1970

IF CLAIM FILED BY DESIGNATED REPRESENTATIVE PRINT OR TYPE FULL NAME AND MAILING ADDRESS OF AGENT BELOW

☑ ADDITIONAL INFORMATION RELATING TO WATER QUALITY AND OR WELL CONSTRUCTION IS AVAILABLE

A FEE OF $5.00 MUST ACCOMPANY THIS WATER RIGHT CLAIM

RETURN ALL THREE COPIES WITH CARBONS INTACT ALONG WITH YOUR FEE TO DEPARTMENT OF WATER RESOURCES DIVISION OF WATER MANAGEMENT UNION AVE. BUILDING OLYMPIA, WASHINGTON 98

ORIGINAL

PORT ORCHARD, WASHINGTON

COUNTY SEAT OF KITSAP COUNTY, WASHINGTON

WATER RIGHTS CLAIM
Attachment

ITEM #7 - Purpose for which water is used

A. Municipal Supply
   1. City Hall
   2. Fire Stations 1 & 2
   3. Police Station
   4. Public Works Buildings 1 & 2
   5. Sewage Treatment Plant

B. Domestic Supply
   1. 1350 Metered users

C. Federal Supply
   1. Post Office

D. State Supply
   1. Liquor Store

E. County Supply
   1. Courthouse
   2. Juvenile Home

F. School Supply
   1. Givens Grade School
   2. South Kitsap High School
   3. Cedar Heights Junior High School

G. Recreation Supply
   1. Givens Playfield
   2. Central Playfield
   3. Active Club Building

H. Commercial Supply
   1. Grocery Stores (Refrigeration)
   2. Convalescent Homes
   3. Mobile Home Parks
   4. Proposed Hospital
   5. Doctor's Clinics

I. Industrial Supply
   1. Light Manufacturing

State of Washington
Department of Ecology

Water Right Claims Registration

Water Right Claim

RECEIVED
DEPARTMENT OF ECOLOGY
APR 11 74089969
CASH OTHER 1 NONE

Name City of Port Orchard

(Short Form) 15 yes

Address P.O. Box 186

Port Orchafd, Wash Zip Code 98366

Phone No. TR 6-4407

1) Source from which the right to take and make use of water is claimed: ☐ Surface Water ☒ Ground Water

If surface water, please indicate source; give name if known:

(River, stream, lake, pond, spring, etc.)

2) Purpose(s) for which water is used: Tremont Street Park and Playground (Two Wells)

☐ Domestic ☐ Stockwatering ☒ Irrigation (lawn and ~~garden~~ shrubbery) ☐ Other Use (specify)

3) Legal description of lands on which water is used:

SEE ATTACHED WARRANTY DEED FOR DESCRIPTION

If located within the limits of a recorded platted property:

Lot Block of
(Give name of plat or addition)

In addition, please indicate Sec. 35 T. 24 N., R. 1 E E/W, W.M.

County in which lands are located Kitsap (but within the City limits of Port Orchard)

DO NOT USE THIS SPACE

The filing of a statement of claim does not constitute an adjudication of any claim to the right to use of waters as between the water use claimant and the state or as between one or more use claimants and another or others. This acknowledgment constitutes receipt for the filing fee.

Date Registered

This has been assigned Water Right Claim Registry No.

JAN 7 75 100145

Director, Department of Ecology

I hereby swear that the above information is true and accurate to the best of my knowledge and belief.

X R. G. Lloyd, City Clerk

Date April 4, 1974

If claim filed by designated representative print or type full name and mailing address of agent below.

☒ Additional information relating to water quality and/or well construction is available.

A FEE OF $2.00 MUST ACCOMPANY THIS WATER RIGHT CLAIM

Return all three copies with carbons intact, along with your fee to:
Department of Ecology, Water Right Claims Registration, Olympia, Washington 98504

ORIGINAL DOE

Appendix C2

Showing of Compliance for Well 11

DEPARTMENT OF ECOLOGY
State of Washington

WATER RESOURCES PROGRAM
Showing of Compliance with RCW 90.44.100(3)

Water Right Certificate or Permit Number: G1-24437P

Parcel tax identification number: 09230120022003

Landowner(s) name: City of Port Orchard

Part of complying with RCW 90.44.100(3) is for the project proponent to notify the Department of Ecology (Ecology) that the statutory criteria of RCW 90.44.100(3) have been satisfied. Please attach to this document the water well report for the additional or replacement well and any additional information you have to support your affidavit.

Affidavit:

I, Jay Cookson, do certify that I caused the well described in the attached water well report to be drilled as an additional or replacement well(s) for use under Water Right Number G1-24437P. This notice and attached documents describe and support my assertion that the replacement or additional well(s) complies with RCW 90.44.100(3) (a-g) and RCW 90.44.100(4):

Please check one:

☒ This is an additional well (Attach well log)

☐ This is a replacement well (Attach well log for new well & Decommissioning log for old well)

a. The well is an additional or replacement well(s) that will tap the same body of public ground water as the original well;

b. If a replacement well is constructed, the use of the original well(s) shall be discontinued and the original well(s) shall be properly decommissioned;

c. The combined withdrawal of water from the additional or replacement well(s) and the original well authorized by the water right certificate does not enlarge the water right conveyed by the original water right certificate to the extent the certificate has been developed (perfected) and maintained by use of water;

d. The construction and use-of the additional or replacement well(s) does not interfere with or impair water rights with an earlier priority date;

e. The additional or replacement well(s) is located no closer than the original well to a well or surface water body it might interfere with;

f. A specified manner of construction for the additional or replacement well(s) has been complied with, if required, and the new well was constructed in compliance with chapter 18.104 RCW and chapter 173-160 WAC;

g. The additional or replacement well(s) is located within the area described as the point of withdrawal in the public notice published for the original application for water right, or the most current legal description published for the right. Both the original well and the additional or replacement well(s) are

located in NE1/4, NW1/4 Section 9, Township 23 North, Range 1 East in Kitsap County, Washington ____ (legal description).

Therefore the well is in compliance with the requirements for a statutorily granted amendment to the water right permit or certificate.

I understand the acceptance of this affidavit, and any attachments, by the Department of Ecology shall not be construed as affirming the validity of any water right permit or certificate. The responsibility to comply with RCW 90.44.100(3) is with the water right permit or certificate holder asserting an amendment pursuant to RCW 90.44.100(3).

Jay Cookson — 3.21.11

Name — Date

Acknowledgement:

State of Washington
County of Kitsap

I certify that I know or have satisfactory evidence that JAY COOKSON *is the person who appeared before me, and said person acknowledged that (he/she) signed this affidavit and acknowledged it to be (his/her)free and voluntary act for the uses and purposes mentioned in the affidavit.*

Dated: 3.21.2011

Janine Dennon
(Signature)
Port Orchard WA 98366
Residing in
Notary Office Assistant
Title
My appointment expires: 11-15-2014

If you have any questions please contact the Water Resources Section of the closest regional office. Please submit copies of new well logs and decommissioned well logs along with this completed and notarized form to the nearest regional office.

Northwest Regional Office
3190 - 160th Avenue SE
Bellevue, WA 98008-5452
(425) 649-7000

Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775
(360) 407-6300

Eastern Regional Office
4601 N. Monroe Street
Spokane, WA 99205-1295
(509) 329-3400

Central Regional Office
15 W. Yakima Ave., Suite 200
Yakima, WA 98902-3452
(509) 575-2597

Vancouver Field Office
2108 Grand Boulevard

Bellingham Field Office
1204 Railroad Ave., Suite 200

WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

Construction/Decommission *("x" in circle)*

☒ Construction

☐ Decommission *ORIGINAL INSTALLATION*

Notice of Intent Number W210118

PROPOSED USE: ☐ Domestic ☐ Industrial ☒ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other _____

TYPE OF WORK: Owner's number of well (if more than one) 11

☒ New well ☐ Reconditioned *Method:* ☐ Dug ☐ Bored ☐ Driven ☐ Deepened ☒ Cable ☒ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 12 inches, drilled 1080 ft. Depth of completed well 963 ft.

CONSTRUCTION DETAILS

Casing Installed: ☒ Welded 20" Diam. from +1 ft. to 355 ft.
☐ Liner installed 16" Diam. from +2 ft. to 597 ft.
☐ Threaded 12" Diam. From +2.3 ft. to 776 ft.

Perforations: ☐ Yes ☒ No

Type of perforator used _____

SIZE of perfs _____ in. by _____ in. and no. of perfs _____ from _____ ft. to _____ ft.

Screens: ☒ Yes ☐ No ☐ K-Pac Location _____

Manufacturer's Name Alloy

Type SS Model No. PS

Diam. 8 Slot size .040 from 813 ft. to 953 ft.

Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel/Filter packed: ☒ Yes ☐ No Size of gravel/sand 8x12

Materials placed from 713 ft. to 963 ft.

Surface Seal: ☒ Yes ☐ No To what depth? 20 ft.

Material used in seal bentonite chips

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? _____ Depth of strata _____

Method of sealing strata off _____

PUMP: Manufacturer's Name _____

Type: _____ H.P. _____

WATER LEVELS: Land-surface elevation above mean sea level 420 ft.

Static level 218.8 ft. below top of well Date 1/4/11

Artesian pressure _____ lbs. per square inch Date _____

Artesian water is controlled by _____ cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? ☒ Yes ☐ No If yes, by whom? RN

Yield: 1,000 gal./min. with 133 ft. drawdown after 21.5 hrs.

Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.

Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
59	263.5				
1560	229.9				

Date of test Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.

Airtest gal./min. with stem set at _____ ft. for _____ hrs.

Artesian flow _____ g.p.m. Date _____

Temperature of water 48 Was a chemical analysis made? ☒ Yes ☐ No

CURRENT

Notice of Intent No. W210118

Unique Ecology Well ID Tag No. APP 308

Water Right Permit No. G1-26454

Property Owner Name City of Port Orchard

Well Street Address 5171 St. Andrews Dr

City Port Orchard County Kitsap

Location NE 1/4-1/4 NW 1/4 Sec 9 Twn 23N R 1E

EWM ☒ Or WWM ☐

Lat/Long (s, t, r Still REQUIRED) Lat Deg ____ Min ____ Sec ____ Long Deg ____ Min ____ Sec ____

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Brown gray claybound gravel	0	20
brown gray claybound gravel	20	
and sand		70
brown silty gravel sand WB	70	94
brown silt and clay	94	105
brown gray claybound gravel	105	159
brown silt clay & wood	159	170
brown claybound gravel	170	212
brown silty sand & gravel WB	212	267
brown silty sand clay layers	267	350
gray sticky clay	350	371
gray silty sand	371	392
gray brown silty sand	392	435
gray sticky clay	435	473
gray silt some sand	473	498
gray silty sand WB	498	512
gray silty sand wood WB	512	539
gray sticky clay	539	797
gray brown snad gravel wood	797	811
gray sand and grave WBl	811	833
gray sand and clay	833	856
gray snad gravel WB	856	875
gray snad gravel some clay WB	875	909
gray gravel and sand WB	909	934
brown sand WB	934	956
gray brown clay	956	978
gray clay sand and silt	978	1080

Start Date 9/10/09 Completed Date 1/07/11

Tax Parcel No. 092301-2-002-2003

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Driller or trainee License No. 1476

Name (Print Last, First) Mickelsen , Todd

Driller/Engineer/Trainee Signature

IF TRAINEE: Driller's License No:

Driller's Signature:

Drilling Company Charon Drilling Inc.

Address 12719 E 224th Street

City, State, Zip Graham , WA, 98338

Contractor's Registration No. CHARODI133NF Date 3/19/07

Appendix C3

Water Rights

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

NOTICE OF APPLICATION TO APPROPRIATE PUBLIC WATERS

TAKE NOTICE:

That CITY OF PORT ORCHARD

of PORT ORCHARD, WASHINGTON on 9-14-92 under

Application No. G1-26729 filed for permit to appropriate public waters, subject to existing rights,

from WELL #5

in the amount of 50 GALLONS PER MINUTE

each year, for MUNICIPAL SUPPLY - YEAR ROUND AS NEEDED

The source of the proposed appropriation is located within LOT 3 BLOCK 2 REPLAT OF CENTRAL ADDITION TO SIDNEY

of Section 26, Township 24N N., Range 1E W.M., in KITSAP County.

Protests or objections to approval of this application must include a detailed statement of the basis for objections; protests must be accompanied by a two dollar ($2.00) recording fee and filed with the Department of Ecology, at the address shown below, within thirty (30) days from

(Last date of publication to be entered above by publisher)

Department of Ecology
Northwest Regional Office;
3190 - 160th SE:
Bellevue, WA 98008

NOTICE

CERTIFICATE RECORD NO. 7 PAGE NO. 3334-A

STATE OF WASHINGTON, COUNTY OF Kitsap

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That THE TOWN OF PORT ORCHARD, WASHINGTON

~~of~~ _____, has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of a well

located within Lots 3 and 4, Block 3 of Wheeler's Addition

Sec. 25, Twp. 24 N., R. 1 E. W. M.,

for the purpose of municipal supply

under and subject to provisions contained in Ground Water Permit No. 4030 issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume 7 at page 3334-A;

that the right hereby confirmed dates from November 17, 1955; that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 350 gallons per minute; 560 acre-feet per year for municipal supply.

A description of the lands to which such ground water right is appurtenant, and the place where such water is put to beneficial use, is as follows:

Town of Port Orchard, Kitsap County, Washington

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 4th day of May, 19 59.

M. Brouker

State Supervisor of Water Resources.

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
December 24, 1984	G1-24586	G1-24586P	G1-24585C

8610210138

NAME
The City of Port Orchard

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
216 Prospect Street	Port Orchard	Washington	98366

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC 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
---	750	1210

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal supply - continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N	RANGE, E. OR W.M.	W.R.I.A.	COUNTY
--	26	24	1E	15	Kitsap

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)
3	2	Replat of Central Addition to Sidney

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by the City of Port Orchard within Kitsap County, Washington.

FILED FOR RECORD
REQUEST Wash. State Dept. of Ecology
1986 OCT 21 AM 11 51
SHERRIL HUFF
KITSAP COUNTY AUDITOR

Flowing wells shall be so constructed and equipped with valves to ensure that the flow of water can be completely stopped when not being used. Likewise, the well shall be so maintained as to prevent the waste of water through leaky casings, pipes, fittings, valves, or pumps - either above or below land surface.

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 Redmond, *Washington, this* 15 *day of* October, *19* 86.

Department of Ecology

8

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

CERTIFICATE OF WATER RIGHT

9002160128

☐ 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 29, 1987	G1-25019	G1-25019P	G1-25019C

NAME
City of Port Orchard

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
216 Prospect Street	Port Orchard	Washington	98366

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC 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
---	500	560*

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal water supply - continuously

*Supplemental to existing water rights.

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NW¼ SW¼	2	23	1E	15	Kitsap

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 Port Orchard within Kitsap County, Washington.

FILED FOR RECORD
REQ OF State of Washington Dept. of Ecology
90 FEB 16 PM 12:37
KAREN E. FINN
KITSAP COUNTY AUDITOR
DEPUTY

REEL529PR1561

9002160128

ECY 040-1-2 (Rev. 4-81) (SEE REVERSE SIDE) CERTIFICATE

PROVISIONS

All water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells).

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.

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).

Monitoring of static water level, pumping water level, instantaneous discharge (gpm) and total quantities pumped shall be done on a monthly basis. This data will be supplied to the Department of Ecology upon request.

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 Redmond *Washington, this* 15th *day of* February, *19* 90

STATE OF WASHINGTON - DEPARTMENT OF ECOLOGY
ENGINEERING DATA
OK

Department of Ecology

by Herman H. Huggins
Herman H. Huggins, Section Supervisor Water Resources

FOR COUNTY USE ONLY

9002160128

REEL529PA1562

Appendix C4

Water Supply Self-Assessment Form

Water Right Self-Assessment Form for Water System Plans

331-372 • 1/13/2017

All water right permits, claims, and certificates must be evaluated in a water right self-assessment for all sources used to supply the water system. The self-assessment compares the parameters and other limitations of existing water rights against current and forecasted water production, as described in your water system plan, to determine whether the rights are adequate to serve your system's current and future water needs.

You must account for all sources of supply and total quantities of water withdrawn from the source. If you purchase water from another purveyor through a non-emergency intertie, you must complete the INTERTIES section of the self-assessment.

A Note on Exempt Wells

If you're seeking DOH approval of a new Group A or Group B water system using an exempt well, you must complete the self-assessment, although certain fields will not apply. Talk to your DOH regional planner about using the Water Right Self-Assessment form for a Small Water System Management Program instead of this version.

Local governments must ensure that an adequate potable water supply is available from the exempt well before issuing a building permit. Before developing a permit exempt well, check with your local authorities on their criteria for establishing an adequate potable water supply for your planned public water system.

Water Right Parameters

Below is a brief description of the parameters associated with a typical water right. For the self-assessment, you only need to describe the last two bulleted items if they apply to your water rights.

Source Type – this refers to whether the source is surface water, groundwater or a spring.

Source Location – this refers to the location of points of groundwater withdrawal or surface water diversion for each right.

Purpose of Use – this refers to the type of use, such as municipal water supply, community domestic, industrial or agricultural purposes.

Place of Use – this describes where water can be put to beneficial use under the right. Under the 2003 Municipal Water Law, RCW 90.03.386, the place of use for a water right held for municipal water supply purposes may be the system's service area as identified in an approved water system plan or small water system management program. See Ecology Policy 2030 for information on how Ecology administers the Municipal Water Law.

Washington State Department of Health

If you need this publication in an alternative format, call 800.525.0127 (TDD/TTY call 711). This and other publications are available at www.doh.wa.gov/drinkingwater.

Period of Use – this refers to time-of-year limitations in which the water right may be put to use. If any water right has a time-of-year limitation, please include this information in the INTERRUPTIBLE WATER RIGHTS section.

Provisions or Limiting Conditions – this refers to any provisions or conditions placed on the water right. If a water right has a limiting condition or other provision, such as a collection and reporting requirement, other than a time-of year limitation, include this information in the ADDITIONAL COMMENTS section at the bottom of the self-assessment and in the water system plan narrative.

See Ecology Policy 1040 for more information on water right terminology. If you have questions about your water rights, please contact the Ecology regional office in your area.

Completing the Water Right Self-Assessment Form

The self-assessment is a Word document to allow users to make changes or to expand the document. You may use another format, if preferred, as long as all required information is included. Below is a description of all fields and how to complete them. This form is divided into four different sections. Each section is described in the headings below.

See the column identifiers (A, B, C, etc) at the bottom of each column for guidance in completing the necessary calculations.

Water Right Permit, Certificate, or Claim Number: This number is assigned by Ecology when a permit application is filed. It's listed at the top of the permit or certificate. For water right claims, this is the registration number stamped in the lower left hand corner of the claim form.

WFI Source #: Identify the individual sources (e.g. well #1, well #2) as defined on the DOH Water Facilities Inventory form. If a water right is associated with multiple sources, list all sources in the same row in this column. If a source is associated with multiple water rights, identify each water right on a separate row.

If you have any source(s) that is not currently being used (categorized as standby, back-up, or emergency), and the source has an associated water right that is not listed in column #1, please include the source and water right information in the ADDITIONAL COMMENTS section. This will identify that the source is still intended for a beneficial use under RCW 90.03.015(4). See Ecology Policy 1040.

EXISTING WATER RIGHTS SECTION *(olive green color, top section)*

This section refers to existing water rights. It does not include any water right applications that have been submitted to Ecology.

Primary Qi (Instantaneous Quantity): This is also known as instantaneous flow rate. It's the amount of water allowed to be taken under the right from the source during a period of peak operation. For surface water, this is generally expressed in terms of cubic feet per

second (cfs). For groundwater, this is generally expressed in terms of gallons per minute (gpm). One cfs equals 448.8 gpm. Please indicate the units of measurement you are using for each source. If there are situations where the flow rate will be limited (e.g. limitations established on the source when other sources are utilized), please note them in the ADDITIONAL COMMENTS section in the form and in the WSP narrative.

Non-Additive Qi: This term was formally known as "supplemental." Your water rights may use the old terminology. See Ecology Policy 1040 for more information. Not all water rights have non-additive quantities. If a water right has non-additive Qi quantities, include the non-additive quantity in this field. This is generally listed in the "quantity, type of use, period of use" section on both permits and certificates. *Non-additive quantities should not be included in the primary Qi totals.*

Primary Qa (Annual Quantity): This is the amount of water that can be taken from the source under the right on an annual basis. It's usually expressed in terms of acre-feet. An acre-foot is the amount of water necessary to submerge an acre of land to a depth of one foot. One acre-foot equals 43,560 cubic feet or 325,851 gallons of water.

Non-Additive Qa: This term was formerly known as "supplemental." Your water rights may use the old terminology. See Ecology Policy 1040 for more information. Not all water rights have non-additive quantities. If a water right has non-additive Qa quantities, include the non-additive quantity in this field. This is generally listed in the "quantity, type of use, period of use" section on both permits and certificates. *Non-additive quantities should not be included in the primary Qa totals.*

CURRENT SOURCE PRODUCTION SECTION *(light green color, top section)*

This section refers to how much water is withdrawn from the source under each water right for the most recent full calendar year. You will need to determine any excess or deficiency for each water right after calculating how much water was withdrawn compared to how much water is allowed under each water right. If demand has decreased over past years, you may wish to include historic maximum production information in the ADDITIONAL COMMENTS section. This will provide a more complete picture of the use of your water rights.

Use the water use data and demand projections from your water system plan to define current and projected water needs. You can determine if you'll need additional water rights based on the comparison of existing water rights, current water production, and projected 10- and 20-year needs.

Total Qi (Instantaneous Quantity): This refers to the total maximum instantaneous flow rate withdrawn from the source under each water right during the most recent calendar year. For surface water, this is expressed in terms of cubic feet per second (cfs). For groundwater, this is expressed in terms of gallons per minute (gpm). One cfs equals 448.8 gpm.

Current Excess or Deficiency (Qi): Please calculate the excess or deficiency for each water right after comparing the total amount withdrawn against each water right. Please use parentheses for deficient amounts.

Total Qa (Annual Quantity): This refers to the total volume of water withdrawn from each source under each water right during the most recent calendar year. It's usually expressed in acre-feet.

Current Excess or Deficiency (Qa): Please calculate the excess or deficiency for each water right after comparing the total amount withdrawn against each water right. Please use parentheses for deficient amounts.

10-YEAR FORECASTED SOURCE PRODUCTION SECTION *(light blue color, top section)*

This section refers to how much water you project to withdraw from each source in ten years as determined in your water system plan. Please complete this section in the same manner (using the same units of measurement) as the current source production section using your 10-year forecasted amounts.

20-YEAR FORECASTED SOURCE PRODUCTION SECTION *(darker blue color, top section)*

This section refers to how much water you project to withdraw from each source in twenty years as determined in your water system plan. Please complete this section in the same manner (using the same units of measurement) as the current source production section using your 20-year forecasted amounts. If you are unable to provide 20-year forecasts for each source, you may choose to include the combined 20-year total at the bottom.

PENDING WATER RIGHTS SECTION *(second section of form)*

Please complete this section for any water right applications that have been submitted to Ecology. Please include the application number, whether it's a new or a change application, the date submitted, and the total quantities requested.

INTERTIES SECTION *(third section of form)*

This section must be completed by purveyors who purchase any amount of wholesale water. If your system sells water to another public water system, include the quantity sold in the CURRENT SOURCE PRODUCTION section.

Purchasers of wholesale water must account for all water obtained through the intertie for non-emergency supply purposes. This is to ensure that all sources of supply are considered when evaluating whether new water rights are needed within 20 years.

Please identify the maximum quantity of water, expressed in the same manner as the above sections, allowed under each intertie contract. If there are limiting conditions or temporary

agreements that effect the long-term use of the intertie, you must account for such limiting conditions when evaluating the current and forecasted water supply needs in your water system plan.

Finally, purchasers of wholesale water are responsible for ensuring that the underlying water right (held by the purveyor selling water) are adequate for such use. You should confirm that the selling system has accounted for the wholesale area in their water system plan to ensure that the water right authorizes the distribution of water through the intertie.

INTERRUPTIBLE WATER RIGHTS SECTION *(bottom section of form)*

This section refers to water rights that have an annual time-of-year interruption. Please complete this section for any water right listed in the above fields that has a time-of-year interruption. Please include the water right number, describe the limitation, and the time period of interruption. Purveyors with interruptible rights should develop a water shortage response plan as part of their water system plan to describe how demand will be met during periods of interruption through aggressive demand-side conservation, fixing leaks or other means.

ADDITIONAL COMMENTS SECTION *(bottom section of form)*

If the system has any source that is not currently being used on a regular basis (such a source may be categorized as stand-by, back-up, emergency), you should identify the source in this section if the source has an associated water right that is not listed in the above sections. The purpose is to identify that such water rights are still intended for a future beneficial use as required under RCW 90.03.015(4). See Page 2, Item 9 (b) in ECY Policy 2030. For these water rights, please briefly describe the future intended use of the source and when you expect to utilize the water right. This does not refer to sources categorized as seasonal sources.

You should also include any other comments in this section that will explain aspects of your water right portfolio that are not identified above.

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
G1-*04166C (Cert. 3334-A)	COPO S01 (Well 6)	350 gpm		560 af/y		128 gpm	222 gpm	62.58 af/y	497.42 af/y								
G1-24586C	COPO S02 (Well 7)	750 gpm		1210 af/y		800 gpm	(50 gpm)	431.93 af/y	778.07 af/y	750 gpm		1210 af/y		750 gpm		1210 af/y	
G1-25019C	COPO S05 & S08 (Wells 8,9)	500 gpm			560[i] af/y	525 gpm	(25 gpm)	273.92 af/y	286.08 af/y	500 gpm		560 af/y		500 gpm		560 af/y	
G1-26119P	COPO Well 10 (not yet active)	500 gpm		594.5 af/y	211.5[ii] af/y												
~~G1-000911CL~~	~~COPO S06 (Well 5) (decommissioned)~~	~~51.3 gpm~~			~~82.8[iii] af/y~~												
G1-26729P	COPO S07(Wells 4 & 5) (4 inactive; 5 decommissioned)	50 gpm		59 af/y	11[ii] af/y												
G1-24437P[iii]	MW S01, S02, S03 (Wells 1,2,3)	600 gpm		450 af/y		S01 128 gpm; S03 423 gpm	49 gpm	S01 74.39 af/y; S03 232.23 af/y	143.38 af/y	600 gpm		450 af/y		600 gpm		450 af/y	
G1-26454P	MW Well 11 (not yet active)	150 gpm		179 af/y	63[ii] af/y					150 gpm		179 af/y		150 gpm		179 af/y	
G1-26447P	MW (irrigation only at this time) (Well 4B)	400 gpm		475.5 af/y	169.5[ii] af/y												
	TOTALS =	3,351.3		3,528.0		2,004.0	1,347.3	1,075.05	2,452.95	1,250	2,101.3	1,189	2,339	1,250	2,101.3	1,189	2,339
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
G1-28162	New	12/24/2002	500 gpm		560 af/y	
G1-28476	New	01/12/2007	750 gpm		1,210 af/y	

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 Bremerton to City of Port Orchard	unspecified	unspecified	unspecified	unspecified		191.29. af/y		0 gpm		0 af/y		0 gpm		0 af/y	
2 City of Bremerton to McCormick Woods	750 gpm	unspecified	12/31/2024	750 gpm		23.56 af/y		0 gpm		0 af/y		0 gpm		0 af/y	
3															
TOTALS =	750 gpm	unspecified				214.85 af/y									
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:

[i] The annual quantity (560 AFY) of G1-25019C is supplemental to existing rights from Cert. 3334-A, G1-24586C, and G1-000911CL.
[ii] An aggregate cap limitation on permits G1-26119, G1-26447, G1-26454 and G1-26729 states: "The annual quantity of water authorized represents a portion of the total water rights owned by the City of Port Orchard. The total annual quantity withdrawn by the City of Port Orchard under G1-26119, G1-26447, G1-26454 and G1-26729 shall not exceed 1,308 acre-feet per year. The total annual quantity withdrawn from all City of Port Orchard sources shall not exceed 3,528 acre-feet per year."
[ii] The City of Port Orchard believes this claim to be valid and includes the Qa in its total.

Appendix C5

Water Use Efficiency Reports (2009-2019)

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

Date Submitted: 6/9/2010

Water Use Efficiency
Annual Performance Report - 2009

WS Name: PORT ORCHARD WATER DEPT Water System ID# : 68900 WS County: KITSAP

Report submitted by: *Donna Phipps*

Meter Installation Information:

Is your water system fully metered? *Yes*

If not fully metered - Current status of meter installation:

Production, Authorized Consumption, and Distribution System Leakage Information:

12-Month WUE Reporting Period: *01/01/2009* To *12/31/2009*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*282,598,167* gallons
Authorized Consumption (AC) – Annual Volume	*278,897,090* gallons
Distribution System Leakage – Annual Volume TP – AC	*3,701,077* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*1.3 %*
3-year annual average	*3.9 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *07/14/2009* 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):

Single families in 2008 used approximately 160 gallons per day. It is the goal for the City that single family use be reduced by 2014 to 155 gallons per day.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

The City has adopted a toilet rebate program thru public process and continue to run the annual leak detection program

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

"Over the next six year period, the City of Port Orchard will reduce Single-Family Residential water consumption by 5 gallons per day per home. This reduction in single-family residential use will save approximately 2.5 million gallons per year over this six year period."

In 2008, the average daily water production and purchases totaled approximately 1.03 million gallons per day (MGD), or 375 million gallons for the entire year. Single families in 2008 used approximately 160 gallons per day. It is the goal for the City that single family use be reduced by 2014 to 155 gallons per day.

To comply with requirements established by the State's Municipal Water Law, seasonal water consumption for the various types of water customers in the City is being recorded, and all water sources and service connections in City's Water System currently have meters. This allows the City to easily track its Distribution System Leakage rate, which in 2008 was estimated to be approximately 11% of their total water production and purchases. System Leakage, defined as the amount of water lost due to leaks, water main breaks, or illegal connections, is an unavoidable phenomenon for water systems. The City mains a leakage rate that is slightly higher than the maximum allowable rate of 10% (for a 3-year period) set by the Municipal Water Law. Each year, the City hires a consultant to identify leaks in the distribution system so that they can be repaired. As the City begins tracking uses such as water used in the treatment process, flushing for water quality, and other uses easily accounted-for, their system leakage is expected to be more accurate and will decline over time.

In late 2008 and early 2009, Port Orchard made significant strides on improving their conservation program. The City began developing a School Outreach Program in order to provide guidance to local schools on educating youth about ways to conserve water. Other educational efforts slated for 2009 include the deve

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

Date Submitted: 6/14/2011

Water Use Efficiency
Annual Performance Report - 2010

WS Name: PORT ORCHARD WATER DEPT Water System ID# : 68900 WS County: KITSAP

Report submitted by: *Donna Phipps*

Meter Installation Information:

Is your water system fully metered? *Yes*

If not fully metered - Current status of meter installation:

Production, Authorized Consumption, and Distribution System Leakage Information:

12-Month WUE Reporting Period: *01/01/2010* To *12/31/2010*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*247,880,100* gallons
Authorized Consumption (AC) – Annual Volume	*244,230,783* gallons
Distribution System Leakage – Annual Volume TP – AC	*3,649,317* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*1.5 %*
3-year annual average	*4.4 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *07/14/2009* 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):

Established a low flow toilet program. Using the program S.K. School Dist went from 5,893,100 gallons in 2009 to 5,555,200 gallons in 2010. Cedar Heights Jr High went from 2,973,700 in 2009 to 1,687,200 in 2010.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

“Over the next six year period, the City of Port Orchard will reduce Single-Family Residential water consumption by 5 gallons per day per home. This reduction in single-family residential use will save approximately 2.5 million gallons per year over this six year period.” In 2008, the average daily water production and purchases totaled approximately 1.03 million gallons per day (MGD), or 375 million gallons for the entire year. Single families in 2008 used approximately 160 gallons per day. It is the goal for the City that single family use be reduced by 2014 to 155 gallons per day. To comply with requirements established by the State’s Municipal Water Law, seasonal water consumption for the various types of water customers in the City is being recorded, and all water sources and service connections in City’s Water System currently have meters. This allows the City to easily track its Distribution System Leakage rate, which in 2008 was estimated to be approximately 11% of their total water production and purchases. System Leakage, defined as the amount of water lost due to leaks, water main breaks, or illegal connections, is an unavoidable phenomenon for water systems. The City mains a leakage rate that is slightly higher than the maximum allowable rate of 10% (for a 3 -year period) set by the Municipal Water Law. Each year, the City hires a consultant to identify leaks in the distribution system so that they can be repaired. As the City begins tracking uses such as water used in the treatment process, flushing for water quality, and other uses easily accounted-for, their system leakage is expected to be more accurate and will decline over time. In late 2008 and early 2009, Port Orchard made significant strides on improving their conservation program. The City began developing a School Outreach Program in order to provide guidance to local schools on educating youth about ways to conserve water. Other educational efforts slated for 2011. The City is now a member of Partnership for Water Conservation. The City provides educational info on the website and post water use efficiency info on the bulletin boards.

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

Date Submitted: 6/4/2012

Water Use Efficiency
Annual Performance Report - 2011

WS Name: PORT ORCHARD WATER DEPT Water System ID# : 68900 WS County: KITSAP

Report submitted by: *Donna Phipps*

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: *01/01/2011* To *12/31/2011*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*248,404,600* gallons
Authorized Consumption (AC) – Annual Volume	*243,889,863* gallons
Distribution System Leakage – Annual Volume TP – AC	*4,514,737* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*1.8 %*
3-year annual average	*1.5 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *07/14/2009* 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):

Established a low flow toilet program. Working with South Kitsap School District and the Public for Education Outreach. Providing flyers to residents with examples of what they can do to save water. Representative at the County Fair with demostrations on how to use Water more efficiently. Show steps on how to water their gardens and lawns more efficiently.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

2011 Proposed water rate increase. Low Flow Toilet program continuing. Fines for meter tampering in place. Hydrant meters to Capture the volume of water used during hydrant flushing. Leak Detection program continuing. Hydrant meters to capture volume of water for contstruction use. Adding master meter to apartment complexex

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

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

Date Submitted: 5/28/2013

Water Use Efficiency
Annual Performance Report - 2012

WS Name: PORT ORCHARD WATER DEPT Water System ID# : 68900 WS County: KITSAP

Report submitted by: *Donna Phipps*

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: *01/01/2012* To *12/31/2012*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*280,866,128* gallons
Authorized Consumption (AC) – Annual Volume	*253,333,214* gallons
Distribution System Leakage – Annual Volume TP – AC	*27,532,914* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*9.8 %*
3-year annual average	*4.4 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *06/14/2011* Has goal been changed since last performance report? *Yes*

Note: Customer goal must be re-established every 6 years through a public process

WUE Goals:

Customer Goal (Demand Side):

Over the next six year period the City of Port Orchard will reduce Single-Family Residential (SFR) water consumption by 5 gallons per day per home. This reduction in SFR use will save approximately 2.5 million gallons per year over this six year period.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

The City has implemented a water rate schedule to encourage conservation that employs a block rate structure whereby water use in excess of established thresholds is priced higher.
Encouraging water saving devices, the City uses UBC and the UPC to regulate and enforce the provision of low water use fixtures in all new construction.
The City will continue to evaluate and reestablish WUE goals in the future during the water system planning process, or at minimum of every 6 years.

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

Internal Conservation Measures by using the following resources: Source Meters, Water Meters, Hydrant Meters, Consumption History, Prompt repair of leaks and valve failures that contribute to non-revenue water, Annual Leak Detection Program, and Pressure Regulation.

Utilizing public information and promotional materials to encourage conservation. Thru the UBC and UPC the City enforces the use of water saving devices. The City and WSUD jointly own a wastewater treatment plant that was recently upgraded to increase capacity and generally improve the plant operation. The two agencies worked together to provide reclaim water for irrigation.

The City regularly performs leak detection surveys and replaces old distribution lines. By continuing these efforts, the City can continue to reduce DSL. Over the next six years the City also plans to calibrate or replace source meters and discourage water theft.

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

Date Submitted: 7/1/2014

Water Use Efficiency
Annual Performance Report - 2013

WS Name: PORT ORCHARD WATER DEPT Water System ID# : 68900 WS County: KITSAP

Report submitted by: *Donna Phipps*

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: *01/01/2013* To *12/31/2013*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*261,702,705* gallons
Authorized Consumption (AC) – Annual Volume	*248,288,311* gallons
Distribution System Leakage – Annual Volume TP – AC	*13,414,394* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*5.1 %*
3-year annual average	*5.6 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *06/14/2011* 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):

Over the next six year period the City of Port Orchard will reduce Single-Family Residential (SFR) water consumption by 5 gallons per day per home. This reduction in SFR use will save approximately 2.5 million gallons per year over this six year period.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

The City has implemented a water rate schedule to encourage conservation that employs a block rate structure whereby water use in excess of established thresholds is priced higher. Encouraging water saving devices, the City uses UBC and the UPC to regulate and enforce the provision of low water use fixtures in all new construction. The City will continue to evaluate and reestablish WUE goals in the future during the water system planning process, or at minimum of every 6 years.

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

Additional Information: Internal Conservation Measures by using the following resources: Source Meters, Water Meters, Hydrant Meters, Consumption History, Prompt repair of leaks and valve failures that contribute to non-revenue water, Annual Leak Detection Program, and Pressure Regulation. Utilizing public information and promotional materials to encourage conservation. Thru the UBC and UPC the City enforces the use of water saving devices. The City and WSUD jointly own a wastewater treatment plant that was recently upgraded to increase capacity and generally improve the plant operation. The two agencies worked together to provide reclaim water for irrigation. The City regularly performs leak detection surveys and replaces old distribution lines. By continuing these efforts, the City can continue to reduce DSL. Over the next 6 years the City also plans to calibrate or replace source meters and discourage water theft.

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

Date Submitted: 7/1/2015

Water Use Efficiency
Annual Performance Report - 2014

WS Name: PORT ORCHARD WATER DEPT Water System ID# : 68900 WS County: KITSAP

Report submitted by: *Thomas Hunter*

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: *01/01/2014* To *12/31/2014*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*271,981,532* gallons
Authorized Consumption (AC) – Annual Volume	*250,119,308* gallons
Distribution System Leakage – Annual Volume TP – AC	*21,862,224* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*8.0 %*
3-year annual average	*7.6 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *06/14/2011* 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):

Over the next six year period the City of Port Orchard will reduce Single-Family Residential (SFR) water consumption by 5 gallons per day per home. This reduction in SFR use will save approximately 2.5 million gallons per year over this six year period.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

The City has implemented a water rate schedule to encourage conservation that employs a block rate structure whereby water use in excess of established thresholds is priced higher. Encouraging water saving devices, the City uses UBC and the UPC to regulate and enforce the provision of low water use fixtures in all new construction. The City will continue to evaluate and reestablish WUE goals in the future during the water system planning process, or at minimum of every 6 years.

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

Additional Information: Internal Conservation Measures by using the following resources: Source Meters, Water Meters, Hydrant Meters, Consumption History, Prompt repair of leaks and valve failures that contribute to non-revenue water, Annual Leak Detection Program, and Pressure Regulation. Utilizing public information and promotional materials to encourage conservation. Thru the UBC and UPC the City enforces the use of water saving devices. The City and WSUD jointly own a wastewater treatment plant that was recently upgraded to increase capacity and generally improve the plant operation. The two agencies worked together to provide reclaim water for irrigation. The City regularly performs leak detection surveys and replaces old distribution lines. By continuing these efforts, the City can continue to reduce DSL. Over the next 6 years the City also plans to calibrate or replace source meters and discourage water theft.

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

Date Submitted: 7/1/2016

Water Use Efficiency
Annual Performance Report - 2015

WS Name: PORT ORCHARD WATER DEPT Water System ID# : 68900 WS County: KITSAP

Report submitted by: *Thomas Hunter*

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: *01/01/2015* To *12/31/2015*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*268,354,628* gallons
Authorized Consumption (AC) – Annual Volume	*263,980,640* gallons
Distribution System Leakage – Annual Volume TP – AC	*4,373,988* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*1.6 %*
3-year annual average	*4.9 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *06/14/2011* 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):

Over the next six year period the City of Port Orchard will reduce Single-Family Residential (SFR) water consumption by 5 gallons per day per home. This reduction in SFR use will save approximately 2.5 million gallons per year over this six year period.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

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

Date Submitted: 6/29/2017

Water Use Efficiency
Annual Performance Report - 2016

WS Name: PORT ORCHARD WATER DEPT Water System ID# : 68900 WS County: KITSAP

Report submitted by: *Thomas Hunter*

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: *01/01/2016* To *12/31/2016*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*277,858,531* gallons
Authorized Consumption (AC) – Annual Volume	*267,667,240* gallons
Distribution System Leakage – Annual Volume TP – AC	*10,191,291* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*3.7 %*
3-year annual average	*4.4 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *11/24/2015* Has goal been changed since last performance report? *Yes*

Note: Customer goal must be re-established every 6 years through a public process

WUE Goals:

Customer Goal (Demand Side):

As the City has reduced its annual usage through education outreach and prudent leak detection, council passed a new rate structure via ordinance on November 24th 2015 that incentivizes customers to use less water by an aggressive teared rate structure. Our goal is to see a reduction of 5 gallons a day per ERU within the next 6 years. This would save about 7.3 million gallons of water a year.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

The City has an annual leak detection program and we have replaced/refurbished most of the older source meters. Additionally we track source production daily to see if we have any unexplained spikes in production.

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

Date Submitted: 6/26/2018

Water Use Efficiency
Annual Performance Report - 2017

WS Name: PORT ORCHARD WATER DEPT Water System ID# : 68900 WS County: KITSAP

Report submitted by: *Thomas Hunter*

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: *01/01/2017* To *12/31/2017*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*267,138,796* gallons
Authorized Consumption (AC) – Annual Volume	*257,609,875* gallons
Distribution System Leakage – Annual Volume TP – AC	*9,528,921* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*3.6 %*
3-year annual average	*3.0 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *11/24/2015* 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):

As the City has reduced its annual usage through education outreach and prudent leak detection, council passed a new rate structure via ordinance on November 24th 2015 that incentivizes customers to use less water by an aggressive teared rate structure. Our goal is to see a reduction of 5 gallons a day per ERU within the next 6 years. This would save about 7.3 million gallons of water a year.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

Since the adoption of the new rate structure in late 2015, the City has reduced it's consumptive use by about 4%. This is a net saving of about 12 million gallons.

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

Since the adoption of the new rate structure in late 2015, the City has reduced its consumptive use by about 4%. This is a net saving of about 12 million gallons.

Do not mail, fax, or email this report to DOH

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

Date Submitted: 7/12/2019

Water Use Efficiency
Annual Performance Report - 2018

WS Name: PORT ORCHARD WATER DEPT Water System ID# : 68900 WS County: KITSAP

Report submitted by: *Tony Lang*

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: *01/01/2018* To *12/31/2018*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*305,494,416* gallons
Authorized Consumption (AC) – Annual Volume	*269,650,890* gallons
Distribution System Leakage – Annual Volume TP – AC	*35,843,526* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*11.7 %*
3-year annual average	*6.3 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *11/24/2015* 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):

As the City has reduced its annual usage through education outreach and prudent leak detection, council passed a new rate structure via ordinance on November 24th 2015 that incentivizes customers to use less water by an aggressive teared rate structure. Our goal is to see a reduction of 5 gallons a day per ERU within the next 6 years. This would save about 7.3 million gallons of water a year.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

As the City has reduced its annual usage through education outreach and prudent leak detection, council passed a new rate structure on November 24th, 2015 that incentivizes customers to use less water by an aggressive tiered rate structure. Our goal is to see a reduction of 5 gallons a day per ERU within the next 6 years. This would save about 7.3 million gallons of water a year.

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

Do not mail, fax, or email this report to DOH

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

Date Submitted: 6/23/2020

Water Use Efficiency
Annual Performance Report - 2019

WS Name: PORT ORCHARD WATER DEPT Water System ID# : 68900 WS County: KITSAP

Report submitted by: *Jacki Brown*

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	*312,726,730* gallons
Authorized Consumption (AC) – Annual Volume	*271,860,151* gallons
Distribution System Leakage – Annual Volume TP – AC	*40,866,579* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*13.1 %*
3-year annual average	*9.5 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *11/24/2015* 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):

As the City has reduced its annual usage through education outreach and prudent leak detection, council passed a new rate structure via ordinance on November 24th 2015 that incentivizes customers to use less water by an aggressive teared rate structure. Our goal is to see a reduction of 5 gallons a day per ERU within the next 6 years. This would save about 7.3 million gallons of water a year.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

The City has reduced its annual usage through educational outreach and prudent leak detection, council passed a new rate structure via ordinance on November 24th 2015 that incentivizes customers to use less water by an aggressive teared rate structure. Our goal is to see a reduction of 5 gallons a day per ERU within the next 6 years. This would save about 7.3 million gallons of water a year.

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

Do not mail, fax, or email this report to DOH

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

Date Submitted: 6/14/2011

Water Use Efficiency
Annual Performance Report - 2010

WS Name: MCCORMICK WOODS Water System ID# : 40529 WS County: KITSAP

Report submitted by: *Donna Phipps*

Meter Installation Information:

Is your water system fully metered? *Yes*

If not fully metered - Current status of meter installation:

Production, Authorized Consumption, and Distribution System Leakage Information:

12-Month WUE Reporting Period: *01/01/2010* To *12/31/2010*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*73,402,065* gallons
Authorized Consumption (AC) – Annual Volume	*66,223,792* gallons
Distribution System Leakage – Annual Volume TP – AC	*7,178,273* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*9.8 %*
3-year annual average	*8.3 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *07/14/2009* 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):

Established a low flow toilet program. Working with schools and the public for education outreach regarding water efficiency use program.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

“Over the next six year period, the City of Port Orchard will reduce Single-Family Residential water consumption by 5 gallons per day per home. This reduction in single-family residential use will save approximately 2.5 million gallons per year over this six year period.” It is the goal for the City that single family use be reduced by 2014 to 155 gallons per day. To comply with requirements established by the State’s Municipal Water Law, seasonal water consumption for the various types of water customers in the City is being recorded, and all water sources and service connections in City’s Water System currently have meters. This allows the City to easily track its Distribution System Leakage rate. Each year, the City hires a consultant to identify leaks in the distribution system so that they can be repaired. In late 2008 and early 2009, Port Orchard made significant strides on improving their conservation program. The City began developing a School Outreach Program in order to provide guidance to local schools on educating youth about ways to conserve water. Other educational efforts slated for 2011. The City is now a member of Partnership for Water Conservation. The City provides educational info on the website and post water use efficiency info on the bulletin boards.

Do not mail, fax, or email this report to DOH

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

Date Submitted: 6/4/2012

Water Use Efficiency
Annual Performance Report - 2011

WS Name: MCCORMICK WOODS Water System ID# : 40529 WS County: KITSAP

Report submitted by: *Donna Phipps*

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: *01/01/2011* To *12/31/2011*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*69,670,856* gallons
Authorized Consumption (AC) – Annual Volume	*66,160,982* gallons
Distribution System Leakage – Annual Volume TP – AC	*3,509,874* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*5.0 %*
3-year annual average	*5.9 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *07/14/2009* 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):

Established a low flow toilet program. Working with South Kitsap School District and the public for education outreach. Providing flyers to residents with examples of what they can do to save water. Representative at the County Fair with demostrations on how to use Water more efficently. We have an annual leak detection program in place.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

2011 Proposed water rate increase.
Low Flow Toilet program in place.
Fines for tampering in place.
Hydrant meters to Capture the volume of water used during hydrant flushing.
Leak Detection program in place.
Hydrant meters to capture volume of water for construction use.
Adding master meter to apartment complexes.

Do not mail, fax, or email this report to DOH

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

Date Submitted: 5/28/2013

Water Use Efficiency
Annual Performance Report - 2012

WS Name: MCCORMICK WOODS Water System ID# : 40529 WS County: KITSAP

Report submitted by: *Donna Phipps*

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: *01/01/2012* To *12/31/2012*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*101,024,236* gallons
Authorized Consumption (AC) – Annual Volume	*96,643,892* gallons
Distribution System Leakage – Annual Volume TP – AC	*4,380,344* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*4.3 %*
3-year annual average	*6.4 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *06/14/2011* Has goal been changed since last performance report? *Yes*

Note: Customer goal must be re-established every 6 years through a public process

WUE Goals:

Customer Goal (Demand Side):

Over the next six year period the City of Port Orchard will reduce Single-Family Residential (SFR) water consumption by 5 gallons per day per home. This reduction in SFR use will save approximately 2.5 million gallons per year over this six year period.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

The City has implemented a water rate schedule to encourage conservation that employs a block rate structure whereby water use in excess of established thresholds is priced higher.
Encouraging water saving devices, the City uses UBC and the UPC to regulate and enforce the provision of low water use fixtures in all new construction.
The City will continue to evaluate and reestablish WUE goals in the future during the water system planning process, or at minimum of every 6 years.

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

Internal Conservation Measures by using the following resources: Source Meters, Water Meters, Hydrant Meters, Consumption History, Prompt repair of leaks and valve failures that contribute to non-revenue water, Annual Leak Detection Program, and Pressure Regulation.

Utilizing public information and promotional materials to encourage conservation. Thru the UBC and UPC the City enforces the use of water saving devices. The City and WSUD jointly own a wastewater treatment plant that was recently upgraded to increase capacity and generally improve the plant operation. The two agencies worked together to provide reclaim water for irrigation.

The City regularly performs leak detection surveys and replaces old distribution lines. By continuing these efforts, the City can continue to reduce DSL. The City also plans to calibrate or replace source meters and discourage water theft.

Do not mail, fax, or email this report to DOH

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

Date Submitted: 7/1/2014

Water Use Efficiency
Annual Performance Report - 2013

WS Name: MCCORMICK WOODS Water System ID# : 40529 WS County: KITSAP

Report submitted by: *Donna Phipps*

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: *01/01/2013* To *12/31/2013*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*75,835,176* gallons
Authorized Consumption (AC) – Annual Volume	*74,848,112* gallons
Distribution System Leakage – Annual Volume TP – AC	*987,064* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*1.3 %*
3-year annual average	*3.5 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *06/14/2011* 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):

Over the next six year period the City of Port Orchard will reduce Single-Family Residential (SFR) water consumption by 5 gallons per day per home. This reduction in SFR use will save approximately 2.5 million gallons per year over this six year period.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

The City has implemented a water rate schedule to encourage conservation that employs a block rate structure whereby water use in excess of established thresholds is priced higher. Encouraging water saving devices, the City uses UBC and the UPC to regulate and enforce the provision of low water use fixtures in all new construction. The City will continue to evaluate and reestablish WUE goals in the future during the water system planning process, or at minimum of every 6 years.

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

Additional Information: Internal Conservation Measures by using the following resources: Source Meters, Water Meters, Hydrant Meters, Consumption History, Prompt repair of leaks and valve failures that contribute to non-revenue water, Annual Leak Detection Program, and Pressure Regulation. Utilizing public information and promotional materials to encourage conservation. Thru the UBC and UPC the City enforces the use of water saving devices. The City and WSUD jointly own a wastewater treatment plant that was recently upgraded to increase capacity and generally improve the plant operation. The two agencies worked together to provide reclaim water for irrigation. The City regularly performs leak detection surveys and replaces old distribution lines. By continuing these efforts, the City can continue to reduce DSL. Over the next 6 years the City also plans to calibrate or replace source meters and discourage water theft.

Do not mail, fax, or email this report to DOH

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

Date Submitted: 7/1/2015

Water Use Efficiency
Annual Performance Report - 2014

WS Name: MCCORMICK WOODS Water System ID# : 40529 WS County: KITSAP

Report submitted by: *Thomas Hunter*

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: *01/01/2014* To *12/31/2014*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*85,066,479* gallons
Authorized Consumption (AC) – Annual Volume	*77,181,000* gallons
Distribution System Leakage – Annual Volume TP – AC	*7,885,479* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*9.3 %*
3-year annual average	*5.0 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *06/14/2011* 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):

Over the next six year period the City of Port Orchard will reduce Single-Family Residential (SFR) water consumption by 5 gallons per day per home. This reduction in SFR use will save approximately 2.5 million gallons per year over this six year period.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

The City has implemented a water rate schedule to encourage conservation that employs a block rate structure whereby water use in excess of established thresholds is priced higher. Encouraging water saving devices, the City uses UBC and the UPC to regulate and enforce the provision of low water use fixtures in all new construction. The City will continue to evaluate and reestablish WUE goals in the future during the water system planning process, or at minimum of every 6 years.

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

Additional Information: Internal Conservation Measures by using the following resources: Source Meters, Water Meters, Hydrant Meters, Consumption History, Prompt repair of leaks and valve failures that contribute to non-revenue water, Annual Leak Detection Program, and Pressure Regulation. Utilizing public information and promotional materials to encourage conservation. Thru the UBC and UPC the City enforces the use of water saving devices. The City and WSUD jointly own a wastewater treatment plant that was recently upgraded to increase capacity and generally improve the plant operation. The two agencies worked together to provide reclaim water for irrigation. The City regularly performs leak detection surveys and replaces old distribution lines. By continuing these efforts, the City can continue to reduce DSL. Over the next 6 years the City also plans to calibrate or replace source meters and discourage water theft.

Do not mail, fax, or email this report to DOH

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

Date Submitted: 7/1/2016

Water Use Efficiency
Annual Performance Report - 2015

WS Name: MCCORMICK WOODS Water System ID# : 40529 WS County: KITSAP

Report submitted by: *Thomas Hunter*

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: *01/01/2015* To *12/31/2015*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*90,470,871* gallons
Authorized Consumption (AC) – Annual Volume	*86,932,220* gallons
Distribution System Leakage – Annual Volume TP – AC	*3,538,651* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*3.9 %*
3-year annual average	*4.8 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *06/14/2011* 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):

Over the next six year period the City of Port Orchard will reduce Single-Family Residential (SFR) water consumption by 5 gallons per day per home. This reduction in SFR use will save approximately 2.5 million gallons per year over this six year period.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

The City has implemented a water rate schedule to encourage conservation that employs a block rate structure whereby water use in excess of established thresholds is priced higher. Encouraging water saving devices, the City uses UBC and the UPC to regulate and enforce the provision of low water use fixtures in all new construction. The City will continue to evaluate and reestablish WUE goals in the future during the water system planning process, or at minimum of every 6 years.

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

Additional Information: Internal Conservation Measures by using the following resources: Source Meters, Water Meters, Hydrant Meters, Consumption History, Prompt repair of leaks and valve failures that contribute to non-revenue water, Annual Leak Detection Program, and Pressure Regulation. Utilizing public information and promotional materials to encourage conservation. Thru the UBC and UPC the City enforces the use of water saving devices. The City and WSUD jointly own a wastewater treatment plant that was recently upgraded to increase capacity and generally improve the plant operation. The two agencies worked together to provide reclaim water for irrigation. The City regularly performs leak detection surveys and replaces old distribution lines. By continuing these efforts, the City can continue to reduce DSL. Over the next 6 years the City also plans to calibrate or replace source meters and discourage water theft.

Do not mail, fax, or email this report to DOH

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

Date Submitted: 6/29/2017

Water Use Efficiency
Annual Performance Report - 2016

WS Name: MCCORMICK WOODS Water System ID# : 40529 WS County: KITSAP

Report submitted by: *Thomas Hunter*

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: *01/01/2016* To *12/31/2016*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*83,677,846* gallons
Authorized Consumption (AC) – Annual Volume	*83,609,600* gallons
Distribution System Leakage – Annual Volume TP – AC	*68,246* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*0.1 %*
3-year annual average	*4.4 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *11/24/2015* Has goal been changed since last performance report? *Yes*

Note: Customer goal must be re-established every 6 years through a public process

WUE Goals:

Customer Goal (Demand Side):

As the City has reduced its annual usage through education outreach and prudent leak detection, council passed a new rate structure via ordinance on November 24th 2015 that incentivizes customers to use less water by an aggressive teared rate structure. Our goal is to see a reduction of 5 gallons a day per ERU within the next 6 years. This would save about 7.3 million gallons of water a year.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

The City has an annual leak detection program and we have replaced/refurbished most of the older source meters. Additionally we track source production daily to see if we have any unexplained spikes in production.

In the past, water that was purchased from a neighboring utility was not tracked appropriately and that error has been corrected, resulting in a dramatic increase in efficiency.

Do not mail, fax, or email this report to DOH

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

Date Submitted: 6/26/2018

Water Use Efficiency
Annual Performance Report - 2017

WS Name: MCCORMICK WOODS Water System ID# : 40529 WS County: KITSAP

Report submitted by: *Thomas Hunter*

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: *01/01/2017* To *12/31/2017*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*84,373,263* gallons
Authorized Consumption (AC) – Annual Volume	*81,500,000* gallons
Distribution System Leakage – Annual Volume TP – AC	*2,873,263* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*3.4 %*
3-year annual average	*2.5 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *11/24/2015* 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):

As the City has reduced its annual usage through education outreach and prudent leak detection, council passed a new rate structure via ordinance on November 24th 2015 that incentivizes customers to use less water by an aggressive teared rate structure. Our goal is to see a reduction of 5 gallons a day per ERU within the next 6 years. This would save about 7.3 million gallons of water a year.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

Since the adoption of the new rate structure in late 2015, the City has reduced its consumptive use by about 4%. This is a net saving of about 12 million gallons.

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

Since the adoption of the new rate structure in late 2015, the City has reduced its consumptive use by about 4%. This is a net saving of about 12 million gallons.

Do not mail, fax, or email this report to DOH

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

Date Submitted: 7/3/2019

Water Use Efficiency
Annual Performance Report - 2018

WS Name: MCCORMICK WOODS Water System ID# : 40529 WS County: KITSAP

Report submitted by: *Tony Lang*

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: *01/01/2018* To *12/31/2018*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*105,212,017* gallons
Authorized Consumption (AC) – Annual Volume	*101,582,290* gallons
Distribution System Leakage – Annual Volume TP – AC	*3,629,727* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*3.4 %*
3-year annual average	*2.3 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *11/24/2015* 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):

As the City has reduced its annual usage through education outreach and prudent leak detection, council passed a new rate structure via ordinance on November 24th 2015 that incentivizes customers to use less water by an aggressive teared rate structure. Our goal is to see a reduction of 5 gallons a day per ERU within the next 6 years. This would save about 7.3 million gallons of water a year.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

Since the new rate structure implemented in late 2015, the City reduced its consumptive use by almost 25 million gallons as compared to 2017. This is a produced reduction by both systems of 7% for the year 2018.

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

Since the new rate structure implemented in late 2015, the City reduced its consumptive use by almost 25 million gallons as compared to 2017. This is a produced reduction of just over 7% for the year 2018.

Do not mail, fax, or email this report to DOH

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

Date Submitted: 6/22/2020

Water Use Efficiency
Annual Performance Report - 2019

WS Name: MCCORMICK WOODS Water System ID# : 40529 WS County: KITSAP

Report submitted by: *Jacki Brown*

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	*107,588,945* gallons
Authorized Consumption (AC) – Annual Volume	*100,757,850* gallons
Distribution System Leakage – Annual Volume TP – AC	*6,831,095* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*6.3 %*
3-year annual average	*4.4 %*

Goal-Setting Information:

Date of Most Recent Public Forum: *11/24/2015* 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):

As the City has reduced its annual usage through education outreach and prudent leak detection, council passed a new rate structure via ordinance on November 24th 2015 that incentivizes customers to use less water by an aggressive teared rate structure. Our goal is to see a reduction of 5 gallons a day per ERU within the next 6 years. This would save about 7.3 million gallons of water a year.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

Since the water conservation rates were adopted in 2015, the per capita consumption has decreased each year. During 2019, the total consumer demand was reduced by 1% even though 58 new connections were added to the system.

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

Do not mail, fax, or email this report to DOH

Appendix C6

Washington State Department of Health

Worksheet 4-1 – ERU Capacity Summary

Worksheet 4-1—ERU Capacity Summary

From Water System Design Manual, dated 6/1/2021

Introduction

Projected system demands and calculated system capacities shown throughout the Water System Plan are generally based on demand per service. They do not directly correlate to the demand per ERU for each of the service categories. Worksheet 4-1 was prepared to document the calculated demand per ERU for each service category indicated and to identify the limiting system components.

As discussed elsewhere, the City of Port Orchard owns and operates two water systems, the City of Port Orchard Water System also referred to as the City System, and the McCormick Woods Water System. Planning is underway to integrate the two water systems into one. Topography within the service area varies greatly and recent growth has extended toward higher elevations near the water system boundaries and close to existing storage reservoirs.

Due to the dual nature of the Port Orchard water systems, three Worksheets 4-1 were prepared, one for the City System, one for the McCormick Woods system, and one for the Combined System.

Findings from Worksheet 4-1 show that capacity is limited by standby storage in City System, annual water rights in the McCormick Woods System, and by standby storage in the Combined system.

This City of Port Orchard is managing these limitations in the following manner:

- Individual booster pumps in the Port Orchard system are used to raise service pressure when needed at the few properties located at too high an elevation to allow 30 psi at PHD.
- The Fire Marshal has allowed the use of nested storage until new storage facilities can be constructed.
- At this time the city has constructed new storage in the McCormick Woods 580 Pressure Zone and plans to bring it online soon.
- Planning is underway for construction of additional storage in the 660 Pressure Zone and in the 390 Pressure Zone.
- PRV stations are being constructed to allow inter-zone movement of water between pressure zones.

Worksheet 4-1—ERU Capacity Summary

6/1/2021

Specific Single-Family Residential Connection Criteria (*Measured or estimated demands.*)

Average Day Demand (ADD): 130 gpd/ERU.

Maximum Day Demand (MDD) 275 gpd/ERU.

Water System Connections Correlated to ERUs			
Service Classification	**Total MDD for the classification, gpd**	**Total # Connections in the classification**	**ERUs**
Residential	CITY SYSTEM		
Single-family	491,150	1,786	1,786
Multifamily	426,525	1,551	1,551
Nonresidential			
Industrial			
Commercial	331,760	380	1,206
Governmental	323,158	56	1,175
Agricultural			
Recreational			
Other (specify)	Church 8,205	8	30
DSL	26,107	N/A	95
Other (identify)			
Total existing ERUs (Residential + Nonresidential + DSL + Other) =5,843			

Service Capacity as ERUs and Gallons Per Day		
Water System Component (Facility)	**ERU Capacity for EachComponent**	**GPD Capacity for EachComponent**
Source(s)	9,757	2,683,200 gpd
Treatment	9,757	2,683,200 gpd
Equalizing Storage	No ES required	No ES required
Standby Storage	6,338	1,267,633
Transmission	>10,000	Determined ample
Water Rights (Qa and Qi)	Qi = 9,382 ERU Qa = 7,869 ERU	Qi = 2,580,000 gpd Qa = 2,164,007 gpd
Other (specify)		
Water System Service Capacity (ERUs) = 6,338 Limited by Standby Storage *(Based on the limiting water system component shown above.)*		

***Note: F**or the purposes of capacity analyses and water system plans, this form needs to be accompanied by the calculations that were used to come up with the ERU capacity figures.*

Worksheet 4-1—ERU Capacity Summary

6/1/2021

Specific Single-Family Residential Connection Criteria (*Measured or estimated demands.*)

Average Day Demand (ADD): 220 gpd/ERU.

Maximum Day Demand (MDD) 835 gpd/ERU.

Water System Connections Correlated to ERUs			
Service Classification	**Total MDD for the classification, gpd**	**Total # Connections in the classification**	**ERUs**
Residential	McCORMICK WOODS SYSTEM		
Single-family	756,510	906	906
Multifamily			
Nonresidential			
Industrial			
Commercial			
Governmental			
Agricultural			
Recreational			
Other (specify)			
DSL	7,872	N/A	9
Other (identify)			
Total existing ERUs (Residential + Nonresidential + DSL + Other) =915			

Service Capacity as ERUs and Gallons Per Day		
Water System Component (Facility)	**ERU Capacity for EachComponent**	**GPD Capacity for EachComponent**
Source(s)	1,276	1,065,600
Treatment	1,276	1,065,600
Equalizing Storage	2,551	323,571
Standby Storage	1,982	396,429
Transmission	>5,000	Determined ample
Water Rights (Qa and Qi)	Qi = 1,653 ERU Qa = 1,180 ERU	Qi = 1,380,000 gpd Qa = 985,587, gpd
Other (specify)		
Water System Service Capacity (ERUs) = 1,180 Limited by Qa *(Based on the limiting water system component shown above.)*		

***Note: F**or the purposes of capacity analyses and water system plans, this form needs to be accompanied by the calculations that were used to come up with the ERU capacity figures.*

Worksheet 4-1—ERU Capacity Summary

6/1/2021

Specific Single-Family Residential Connection Criteria (*Measured or estimated demands.*)

Average Day Demand (ADD): 146 gpd/ERU.

Maximum Day Demand (MDD) 365 gpd/ERU.

Water System Connections Correlated to ERUs			
Service Classification	**Total MDD for the classification, gpd**	**Total # Connections in the classification**	**ERUs**
Residential	COMBINED SYSTEM		
Single-family	982,580	2,692	2,692
Multifamily	426,525	1,551	1,169
Nonresidential			
Industrial			
Commercial	331,760	380	909
Governmental	323,158	56	885
Agricultural			
Recreational			
Other (specify)	Churches 8,205	8	22
DSL	33,979	N/A	93
Other (identify)			
Total existing ERUs (Residential + Nonresidential + DSL + Other) =5,770			

Service Capacity as ERUs and Gallons Per Day		
Water System Component (Facility)	**ERU Capacity for EachComponent**	**GPD Capacity for EachComponent**
Source(s)	10,271	3,748,800
Treatment	10,271	3,748,800
Equalizing Storage	No ES required	No ES required
Standby Storage	8,320	1,664,062
Transmission	>10,000	Determined ample
Water Rights (Qa and Qi)	Qi = 10,849 ERU Qa = 8,629 ERU	Qi = 3,960,000 gpd Qa = 3,149,594 gpd
Other (specify)		
Water System Service Capacity (ERUs) = 8,320 Limited by Standby Storage *(Based on the limiting water system component shown above.)*		

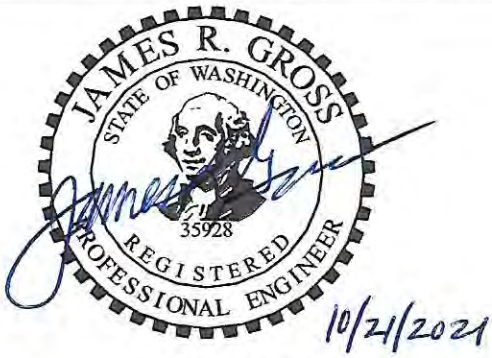
***Note: F**or the purposes of capacity analyses and water system plans, this form needs to be accompanied by the calculations that were used to come up with the ERU capacity figures.*

Appendix D

Model Calibration Memo

MEMORANDUM

Date: September 5, 2019
To: Jacki Brown, Utility Manager, City of Port Orchard
From: Lauren Miller, EIT, Jim Gross, P.E., BHC Consultants, LLC
CC: Mark Dorsey; PE, Mike Pleasants; PE, City of Port Orchard
Subject: Model Calibration



James R. Gross, PE
BHC Consultants, LLC

1. Introduction

This memorandum describes the calibration update performed for the City of Port Orchard (City) distribution system hydraulic model. Periodic calibration of the model is recommended to verify/update model accuracy. This calibration effort includes the following tasks:

- Identify field hydrant flow tests, including test locations, recommendations for operational settings and preparation of working maps for each test. Identify hydrants for flow and pressure monitoring.
- Obtain City reservoir levels and pump status during each hydrant flow test. Create individual model scenarios, with unique operational settings matching those supplied by the City.
- Perform model simulations of each hydrant flow test and adjust model parameters so that simulation results provide an acceptable match to the test data recorded in the field.

The intent of the hydrant flow tests is to identify Hazen-Williams roughness coefficients, or 'C' values, for the different pipe materials that comprise the City's distribution system. 'C' values are an indication of pipe wall roughness and vary based on pipe material and age. The primary method used to calibrate the computer model is by adjusting 'C' values, until simulated pressure drops match pressure drops observed in the field, for each hydrant test performed. Other factors, however, can affect the ability of the model to accurately simulate flow and pressure in the distribution system, including

- Magnitude and distribution of system demands present during field hydrant flow testing
- Facility and model node elevations
- Minor losses
- Pressure Reducing Station elevations and pressure settings
- Anomalies such as partially closed valves
- Incomplete or inaccurate representation of pipes within the model.

2. Collection of Hydrant Flow Test Data

Calibration of the hydraulic model is based on matching hydrant flow and related pressure drops simulated in the model, to corresponding data collected in the field. Field hydrant flow tests were performed at nine locations in the City's distribution system.

Locations of the hydrant flow tests were selected to identify flow and pressure drop relationships under a variety of conditions, including pipe material and varying supply conditions, such as those represented with separate pressure zones. The hydrant flow tests were performed by City Operations staff, using City equipment. Flow rates were measured with the Hydrant Pro gauge, manufactured by Pollard Water. During tests, flow rate gauge readings fluctuated by approximately 150 gpm. This fluctuation was deemed to be normal by the manufacturer, and the average of the high and low flow readings was used in model calibration simulations, at the recommendation of the flow gauge manufacturer. The pressure gauges used for the testing provide pressure readings in increments of 2 psi; accordingly, readings are believed to have been read within a ± 2 psi margin of error.

A primary goal in locating and performing hydrant flow tests is the ability to achieve a pressure drop of at least 10 psi. Inaccuracies in field data collection are often on the order of several psi.

At pressure drops less than 10 psi, these inaccuracies become a significant portion of the overall pressure drop, decreasing the ability to calibrate the model. Preliminary model simulations were performed to identify test locations with the potential for larger pressure drops. Supply sources were also investigated in the model, to weigh the benefits of achieving larger drops in system pressure against the potential disadvantages of shutting supply sources off during hydrant flow testing. A total of ten test locations were initially identified and nine of those were performed; Test 'C' was not performed due to drainage limitations. The figures in Appendix A identify the locations of each hydrant flow test, along with corresponding locations for monitoring pressure. Hydrant flow test data included in Appendix B, summarizes pertinent test data provided by the City. Flow tests are labeled "A" through "J."

3. Model Simulation of Hydrant Flow Tests

The City provided pump status and reservoir levels for each test (Appendix C). Separate model scenarios were then created for each test, and model settings (reservoir levels and pump status) were adjusted for each scenario, to match facility field settings identified by the City. The system demand was assumed to be comparable to that of an average day demand in 2017. After reviewing and updating 'C' value data in the model, simulations were performed to replicate each hydrant test, and field-recorded versus simulated pressure drops were compared. Only limited age data was available for pipes within the system. Accordingly, the 'C' factor value was selected for each pipe material, regardless of pipe age.

Results of hydrant flow simulations in the model are summarized in Table 1. These results are compared to corresponding field hydrant flow test data.

Model results for Test 'A' showed the largest differences between model results and field recorded pressure drops. Trial simulations indicate that pressure drops from these hydrant tests are inconsistent with the other hydrant tests. A reduction in 'C' values necessary to match the pressure drop at Test 'A' would result in a significant overestimation of pressure drops at the other hydrant tests. Hydrant Test 'B' was also performed in the 260 Zone and produced a much closer match between field and model results. Like Test 'A', both Tests 'B' and 'F' were conducted within areas with significant lengths of cast iron pipe.

Table 1 Field vs Model Hydrant Test Comparison							
Hydrant Flow Test	**Pressure Zone**	**Flow Rate (gpm)**	**Field Static/Dynamic[1] Pressure (psi)**	**Field Pressure Drop (psi)**	**Model Static/Dynamic[1] Pressure (psi)**	**Model Pressure Drop (psi)**	**Variance (Model-Field)**
A[2]	260	500	56/24	32	57.2/43.6	14	-18.4
			70/30	40	70.3/56.4	14	-26.1
B	260	1,200	108/81	27	105/75.8	29.2	2.2
			100/71	29	98.9/69.6	29.3	0.3
D	390	1,225	76/55	21	75.1/49.3	25.8	4.8
			81/75	6	82/72.7	9.3	3.3
E	390	1,328	102/81	21	101.2/73.1	28.1	7.1
			98/73	25	98.7/70.6	28.1	3.1
F	390	1,105	70/55	15	69/45.8	23.2	8.2
			53/41	12	53.9/35.7	18.2	6.2
G	390	1,025	100/78	22	98.8/75	23.9	1.9
			106/86	20	106.8/88.8	18.0	-2.0
H	580	925	66/45	21	65.9/45.8	20.1	-0.9
			65/44	21	65.2/48.6	16.6	-4.4
I	580	500 + 925	67/1	35	65.4/32.1	33.3	-1.7
			61/26	35	59.8/25.2	34.5	-0.5
J	580	745	66/34	32	65.6/43.6	26.3	-5.7
			65/35	30	69.9/40.1	29.8	-0.2

Notes:
1) Static – prior to hydrant flow test/Dynamic – during hydrant flow test.
2) See text regarding discrepancy between field data and model simulation results.

However, neither Test ‘B’ nor Test ‘F’ mirrored the significantly higher field pressure drop as compared to the model pressure drop, as was noted at Test ‘A’. City Operations staff verified that all valves in the vicinity of the test were open. The excessively large field pressure drop at Test ‘A’ may have resulted from localized corrosion in the looped 4-inch cast iron pipe where the test was located. ‘C’ values that produced acceptable results for the other hydrant tests would have to be altered to unreasonable values to match results from Test ‘A’. Significant corrosion at a valve could also have contributed to excessive pressure losses in Test ‘A’. It is recommended that additional hydrant flow testing be conducted in the vicinity of Test ‘A’ at a later date to verify the test results and determine the extents of the excessive pressure losses and/or hydrant deficiencies. The high pressure losses at the site of Test 'A’ that were not replicated in the model are believed to result from a localized deficiency, and are not believed to impact the calibration of the model as a whole. Accordingly, Test ‘A’ results were not used to calibrate the model. Supplemental testing might allow the City to determine whether any minor improvements could improve the capacity at these hydrants, such as replacement of a corroded valve.

Initial calibration results within the McCormick Woods system showed unreasonably high pressure drops in the field relative to model results. As a result of these discrepancies, a closed valve was identified along the 10-inch pipe at the intersection of Wentworth Avenue and McCormick Woods Drive. This valve was closed in the model to reflect the system during hydrant testing; subsequent model results were in reasonable agreement with field results.

Nearly all tests within the City system excluding Test ‘A’ were skewed in the same direction with greater pressure drops produced in model results than in field results. An increase in ‘C’ values necessary to match the pressure drop at these tests would result in unreasonable ‘C’ values for the material and approximate age of the pipe. The highest reasonable ‘C’ value for each material was utilized in the model; the pressure drops produced in the model were on average approximately 4 psi greater than in the field. This variation is believed to be reasonable, given the margin of error in flow and pressure measurements.

It is suspected that there may be pipes within the system that are not included in the model, or pipes within the model that do not accurately reflect the existing diameter in the field. It is recommended that the City implements a valve turning program to exercise valves and ensure valves are not left closed unnecessarily, and that the City performs a GIS data review to confirm diameters listed in GIS are accurate.

4. Summary and Conclusions

Table 2 illustrates 'C' values for each pipe material:

Table 2
Pipe 'C' Values by Material

Material	'C' Value	% of System
Ductile Iron	135	26%
Cast Iron	135	30%
PVC	140	27%
Copper	135	4%
Galvanized	135	2%
Asbestos Concrete	135	2%
Steel	135	1%
Unknown	135	8%

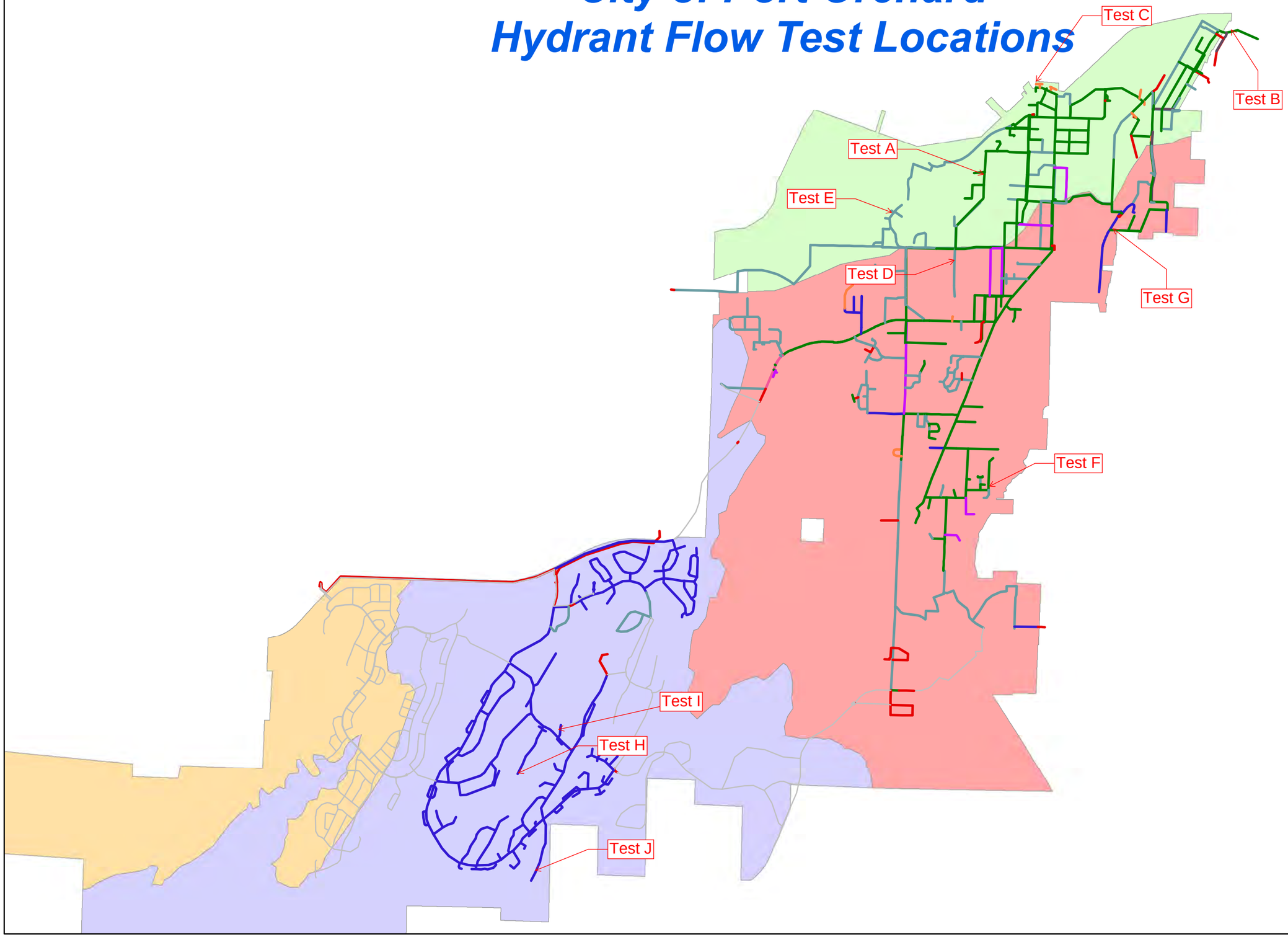
In general, calibration results indicate a reasonably accurate simulation of the hydrant flow tests. The results of Test 'A' were not used to calibrate the model, as it is believed that the excessive pressure losses that occurred during this test were a product of localized distribution system limitations. However, reasonable results were obtained from all other hydrant tests. It is concluded that an acceptable calibration of the model has been achieved.

BHC CONSULTANTS

APPENDIX A

Port Orchard Hydrant Flow Test Location Figures

City of Port Orchard
Hydrant Flow Test Locations



City of Port Orchard
Hydrant Flow Test Location A

SW BAY ST
SW BAY ST
BAY ST
BAY ST
SW WILKINS DR
WILKINS PL SW
SHORT AVE
GRANT AVE
Monitor Pressure (2)
HULL AVE
DIVISION ST
4-inch
DIVISION ST
4-inch
CLINE AVE
SWEANY ST
SWEANY ST
HULL AVE
4-inch
CLINE AVE
12-inch
TAYLOR ST
4-inch
4-inch
Flow Hydrant
HULL AVE
4-inch
PORT ORCHARD BLVD
TAYLOR ST
12-inch
4-inch
CLINE AVE
SMITH ST
SMITH ST
4-inch
SMITH ST
8-inch
WEST AVE
Monitor Pressure (1)
GRANT AVE
4-inch
HULL AVE
4-inch
CLINE AVE
4-inch
KENDALL ST
KENDALL ST
8-inch
KENDALL ST
12-inch
4-inch
4-inch
4-inch

City of Port Orchard
Hydrant Flow Test Location B

Flow Hydrant (2)

Monitor Pressure (2)

Flow Hydrant (1)

Monitor Pressure (1)

8-inch

BAY ST

8-inch

8-inch

LAWRENCE ST

BAY ST

TRACY AVE N

8-inch

8-inch

LAWRENCE ST

6-inch

6-inch

TRACY AVE N

4-inch

BAY ST

BAY ST

BAY ST

BEACH DR E

6-inch

ARNOLD AVE E

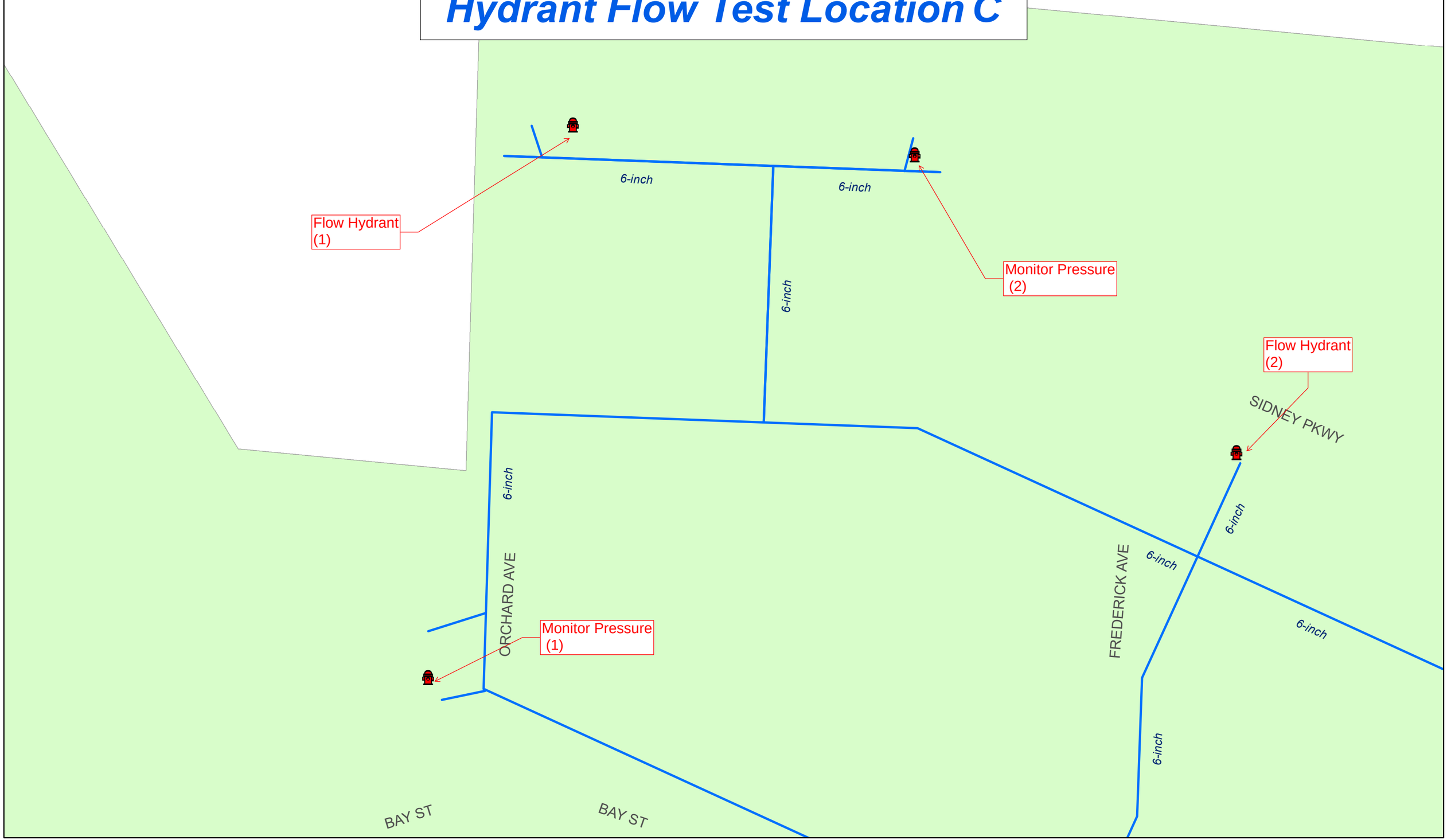
6-inch

ARNOLD AVE E

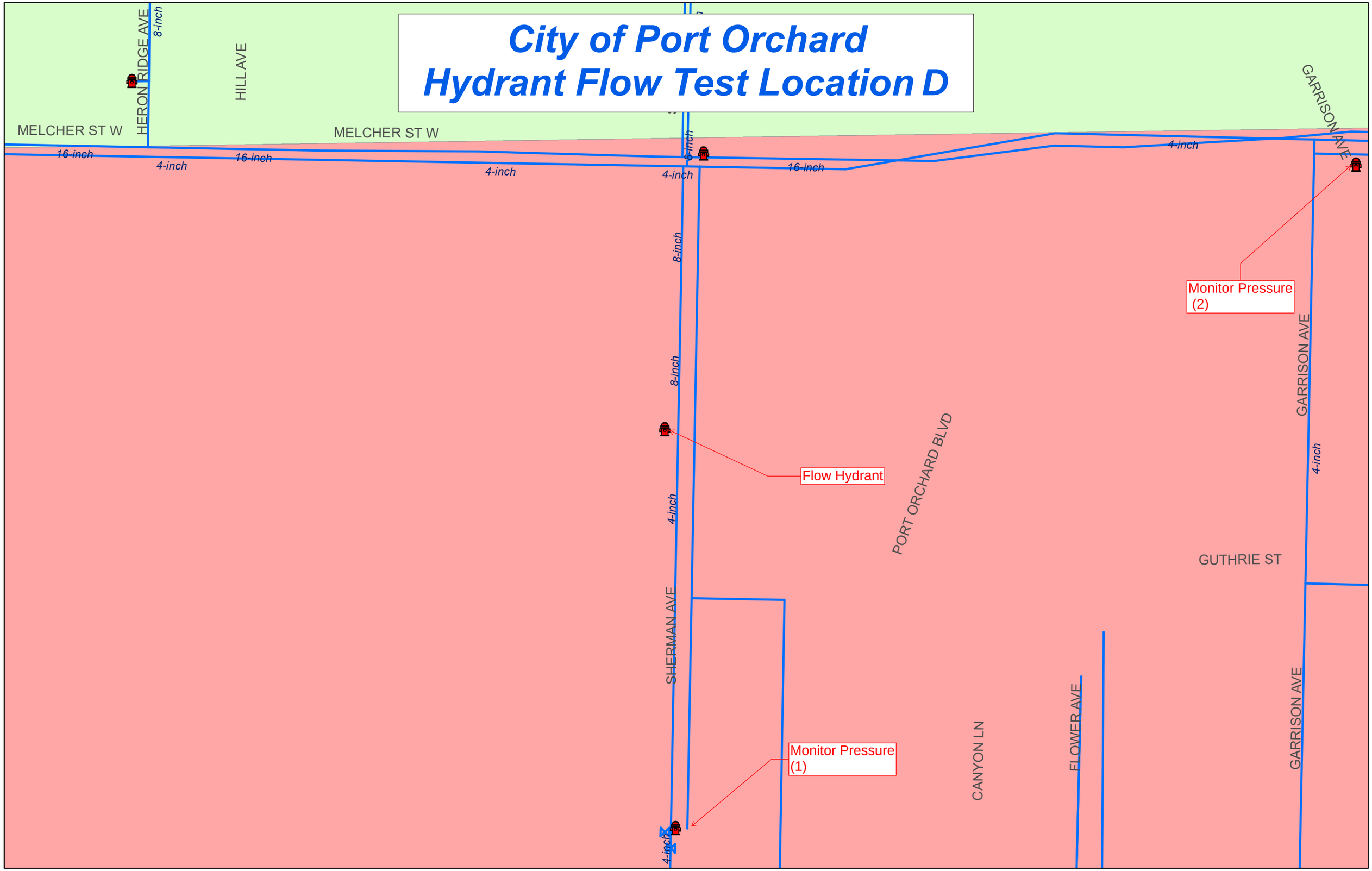
4-inch

RETSIL RD E

City of Port Orchard
Hydrant Flow Test Location C



City of Port Orchard
Hydrant Flow Test Location D



City of Port Orchard
Hydrant Flow Test Location E

CASECO LN

Flow Hydrant (1)

EAGLECREST PL

BAYCREST CT

8-inch

8-inch

8-inch

WALES CT

8-inch

EAGLECREST PL

Monitor Pressure (1)

SCOTLAND CT

8-inch

8-inch

EAGLECREST PL

Monitor Pressure (2)

LANDOVER PL

8-inch

Flow Hydrant (2)

BLACKSTONE CT

8-inch

LANDOVER PL

16-inch

8-inch

4-inch

16-inch

16-inch

MELCHER ST W

4-inch

HERON RIDGE AVE

8-inch

City of Port Orchard
Hydrant Flow Test Location F

Monitor Pressure (2)

Flow Hydrant (1)

Flow Hydrant (2)

Monitor Pressure (1)

S FLOWER AVE

FOX GLOVE CT

CARNATION CT

FLOWER MEADOWS ST

GARDEN DR

FIREWEED ST

FLOWER MEADOWS ST

S FLOWER AVE

4-inch

6-inch

8-inch

City of Port Orchard
Hydrant Flow Test Location G

12-inch

6-inch

2-inch

8-inch

6-inch

6-inch

8-inch

8-inch

8-inch

Monitor Pressure (2)

6-inch

6-inch

6-inch

BETHEL AVE

Monitor Pressure (1)

Flow Hydrant (2)

2-inch

6-inch

6-inch

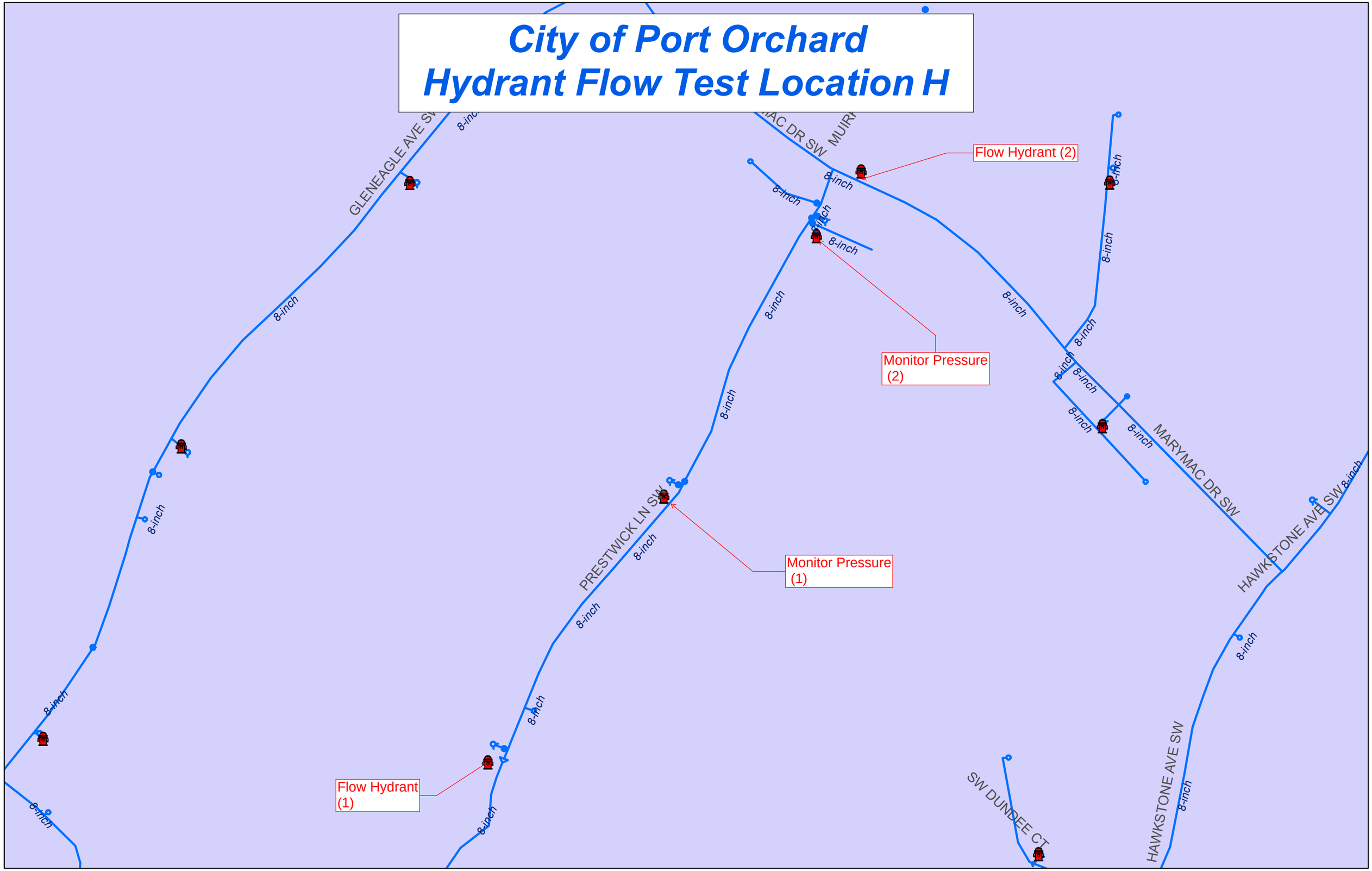
6-inch

6-inch

MITCHELL AVE

Flow Hydrant (1)

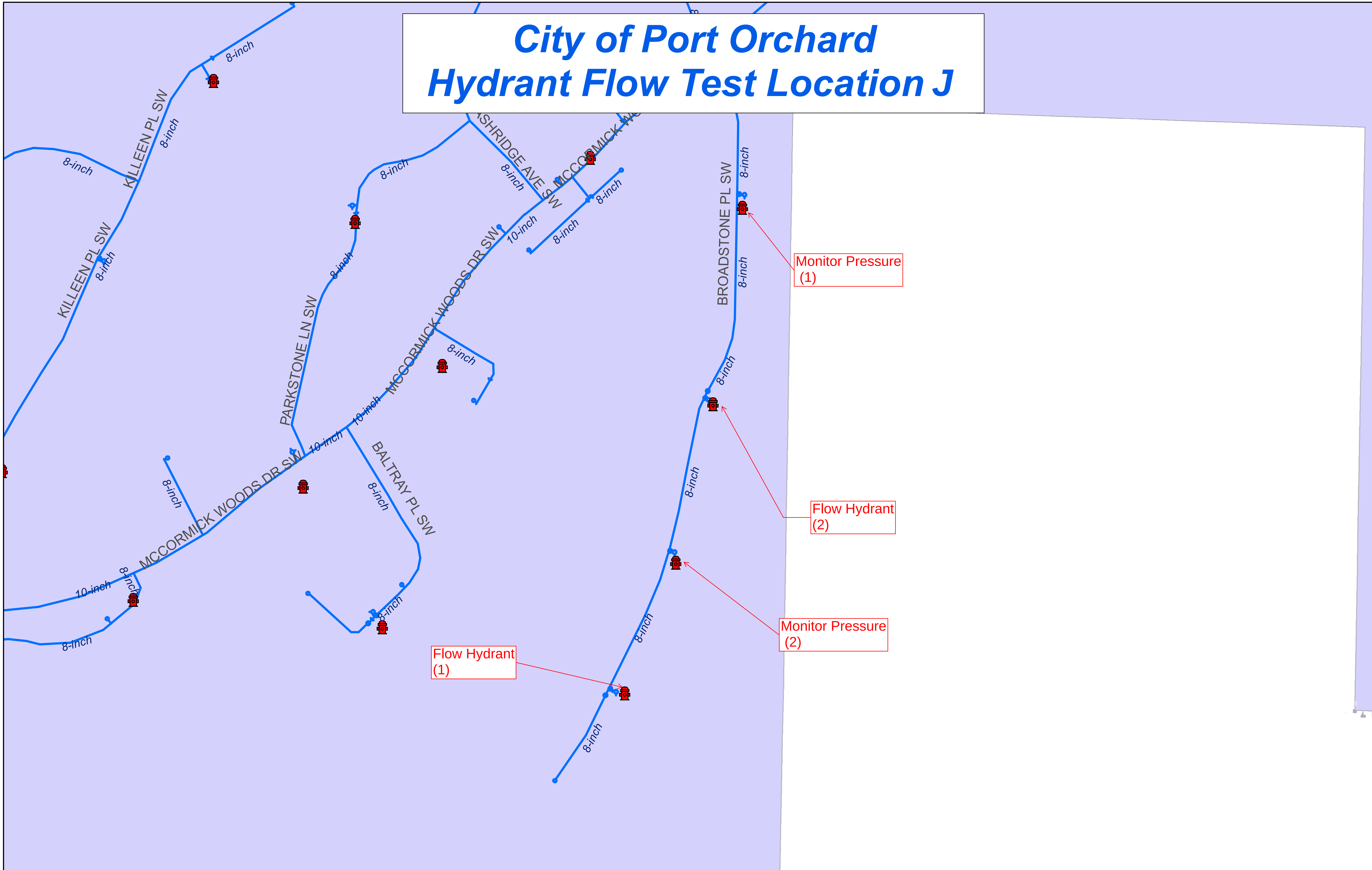
City of Port Orchard
Hydrant Flow Test Location H



City of Port Orchard
Hydrant Flow Test Location I

8-inch
8-inch
MARYMAC DR SW
MUIRKIRK LN
Monitor Pressure (1)
Flow Hydrant (1)
8-inch
8-inch
8-inch
8-inch
8-inch
8-inch
8-inch
PRESTWICK LN SW
Flow Hydrant (2)
8-inch
8-inch
8-inch
MARYMAC DR SW
8-inch
8-inch
8-inch
8-inch
Monitor Pressure (2)

City of Port Orchard
Hydrant Flow Test Location J



APPENDIX B

Flow Testing Results

FLOW TESTING

TEST LOCATION	FLOWED HYDRANT (GPM)		STATIC PRESSURE (psi)		PRESSURE DURING TEST (psi)		PRESSURE DROP (psi)		Time
	1	2	1	2	1	2	1	2	
A	450-550	X	56	70	24	30	32	40	11:12am
B	1200-1350	N/A	108	100	81	71	27	29	10:38am
C	Did not flow due to water run-off limitations								
D	1150-1300	X	76	81	55	75	21	6	2:58pm
E	1250-1405	N/A	102	98	81	73	21	25	2:05pm
F	1060-1150	N/A	70	53	55	41	15	12	2:31pm
G	950-1100	N/A	100	106	78	86	22	20	10:14am
H	850-1000	N/A	66	65	45	44	21	21	10:05am
I	450-550	1000	67	61	32	26	35	35	1:20pm
J	650-840	N/A	66	65	34	35	32	30	10:38am

*Flowed GPM is a best guess range due to pressure gauge needle fluctuations during testing. Original submitted numbers were from the high end of the range.

APPENDIX C

Reservoir Levels and Pump Status During Flow Testing

FLOW TESTING

260 Zone

Location A:

Site	Pump Status	Flow Rate	Reserv. Level
1. Well 6 PS	Off	N/A	**X**
2. City Hall PS	Off	N/A	**X**
3. Melcher PS	Off	N/A	**X**
4. Bremerton PS	Off	N/A	**X**
5. Morton St. Reservoir	**X**	**X**	80.4
6. 2Mil. Reservoir	**X**	**X**	19.9
7. Maple St. Reservoir	**X**	**X**	N/A

Location B:

Site	Pump Status	Flow Rate	Reserv. Level
1. Well 6 PS	Off	N/A	**X**
2. City Hall PS	Off	N/A	**X**
3. Melcher PS	Off	N/A	**X**
4. Bremerton PS	Off	N/A	**X**
5. Morton St. Reservoir	**X**	**X**	80.4
6. 2Mil. Reservoir	**X**	**X**	19.9
7. Maple St. Reservoir	**X**	**X**	N/A

Location C:

Site	Pump Status	Flow Rate	Reserv. Level
1. Well 6 PS	Did Not flow this location		**X**
2. City Hall PS			**X**
3. Melcher PS			**X**
4. Bremerton PS			**X**
5. Morton St. Reservoir	**X**	**X**	
6. 2Mil. Reservoir	**X**	**X**	
7. Maple St. Reservoir	**X**	**X**	

FLOW TESTING

390 Zone

Location D:

Site	Pump Status	Flow Rate	Reserv. Level
1. Melcher PS	Off	N/A	**X**
2. Well 8	Off	N/A	**X**
3. Well 9	Off	N/A	**X**
4. 1Mil. Reservoir (Old Clifton)	**X**	**X**	24.2
5. Sedgwick Reservoir	**X**	**X**	34.3

Location E:

Site	Pump Status	Flow Rate	Reserv. Level
1. Melcher PS	Off	N/A	**X**
2. Well 8	Off	N/A	**X**
3. Well 9	Off	N/A	**X**
4. 1Mil. Reservoir (Old Clifton)	**X**	**X**	24.7
5. Sedgwick Reservoir	**X**	**X**	34.8

Location F:

Site	Pump Status	Flow Rate	Reserv. Level
1. Melcher PS	Off	N/A	**X**
2. Well 8	Off	N/A	**X**
3. Well 9	Off	N/A	**X**
4. 1Mil. Reservoir (Old Clifton)	**X**	**X**	24.4
5. Sedgwick Reservoir	**X**	**X**	34.5

Location G:

Site	Pump Status	Flow Rate	Reserv. Level
1. Melcher PS	Off	N/A	**X**
2. Well 8	Off	N/A	**X**
3. Well 9	Off	N/A	**X**
4. 1Mil. Reservoir (Old Clifton)	**X**	**X**	24.9
5. Sedgwick Reservoir	**X**	**X**	35

FLOW TESTING

580 Zone

Location H:

Site	Pump Status	Flow Rate	Reserv. Level
1. McCormick Woods PS	Off	N/A	**X**
2. City of Bremerton Intertie	unknown	unknown	**X**
3. .45 MG Reservoir	**X**	**X**	40

Location I:

Site	Pump Status	Flow Rate	Reserv. Level
1. McCormick Woods PS	Off	N/A	**X**
2. City of Bremerton Intertie	unknown	unknown	**X**
3. .45 MG Reservoir	**X**	**X**	40.8

Location J:

Site	Pump Status	Flow Rate	Reserv. Level
1. McCormick Woods PS	Off	N/A	**X**
2. City of Bremerton Intertie	unknown	unknown	**X**
3. .45 MG Reservoir	**X**	**X**	38.4

Appendix E

Water Quality Monitoring & Consumer Confidence Reports

Appendix E1

Water Quality Monitoring

Water Quality Monitoring Schedule

System: PORT ORCHARD WATER DEPT **PWS ID: 68900 V** **Region: SOUTHWEST**
Contact: Thomas A Hunter **Group: A - Comm** **County: KITSAP**

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

	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019
Coliform Monitoring Population	12637	12637	12637	12637	12637	12637	8644	8644	8644	12637	12637	12637
Number of Routine Samples Required	10	10	10	10	10	10	10	10	10	10	10	10

- 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 2016 - Dec 2018	standard - 3 year			
Asbestos	0	Jan 2011 - Dec 2019	waiver - 9 year			
Total Trihalomethane (THM)	2	Jan 2018 - Dec 2018	reduced - 1 year	08/21/2018		
Halo-Acetic Acids (HAA5)	2	Jan 2018 - Dec 2018	reduced - 1 year	08/21/2018		

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 S01 *WELL #6 No Tag* *Well* *Use - Permanent* *Susceptility - Moderate*

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Nitrate	1	Jan 2018 - Dec 2018	standard - 1 year	04/23/2018	
Complete Inorganic (IOC)	1	Jan 2011 - Dec 2019	waiver - 9 year	07/06/2016	
Volatile Organics (VOC)	1	Jan 2014 - Dec 2019	waiver - 6 year	04/06/2017	
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	07/23/2018	
Pesticides	1	Jan 2014 - Dec 2022	waiver - 9 year	07/23/2018	
Soil Fumigants	0	Jan 2017 - Dec 2019	waiver - 3 year		
Gross Alpha	1	Jan 2014 - Dec 2019	standard - 6 year	04/06/2017	
Radium 228	1	Jan 2014 - Dec 2019	standard - 6 year	04/06/2017	

Source S02 *WELL #7 No Tag* *Well* *Use - Permanent* *Susceptility - Moderate*

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Nitrate	1	Jan 2018 - Dec 2018	standard - 1 year	04/23/2018	
Complete Inorganic (IOC)	1	Jan 2011 - Dec 2019	waiver - 9 year	07/25/2012	
Volatile Organics (VOC)	1	Jan 2014 - Dec 2019	waiver - 6 year	04/06/2017	

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 S02	*WELL #7 No Tag*	*Well*	*Use - Permanent*	*Susceptility - Moderate*	
Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	07/23/2018	
Pesticides	1	Jan 2014 - Dec 2022	waiver - 9 year	07/23/2018	
Soil Fumigants	0	Jan 2017 - Dec 2019	waiver - 3 year		
Gross Alpha	1	Jan 2014 - Dec 2019	standard - 6 year	05/04/2015	
Radium 228	1	Jan 2014 - Dec 2019	standard - 6 year	05/04/2015	

Source S05	*WELL #8*	*Well*	*Use - Permanent*	*Susceptility - Low*	
Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Nitrate	1	Jan 2018 - Dec 2018	standard - 1 year	04/23/2018	
Complete Inorganic (IOC)	1	Jan 2011 - Dec 2019	waiver - 9 year	04/10/2012	
Volatile Organics (VOC)	1	Jan 2014 - Dec 2019	waiver - 6 year	08/15/2012	***Aug 2018***
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	07/23/2018	
Pesticides	1	Jan 2014 - Dec 2022	waiver - 9 year	07/23/2018	
Soil Fumigants	0	Jan 2017 - Dec 2019	waiver - 3 year		
Gross Alpha	1	Jan 2014 - Dec 2019	standard - 6 year	06/15/2015	
Radium 228	1	Jan 2014 - Dec 2019	standard - 6 year	06/15/2015	

Source S07	*WELL #4 No Tag*	*Well*	*Use - Permanent*	*Susceptility - High*	
Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Nitrate	1	Jan 2018 - Dec 2018	standard - 1 year	12/21/2016	***Mar 2018***
Complete Inorganic (IOC)	1	Jan 2011 - Dec 2019	waiver - 9 year	07/25/2012	

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 #4 No Tag* *Well* *Use - Permanent* *Susceptility - High*

Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Iron	1	Jan 2017 - Dec 2019	standard - 3 year	07/25/2012	May 2019
Volatile Organics (VOC)	1	Jan 2014 - Dec 2019	waiver - 6 year	05/23/2011	***Feb 2018***
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	06/16/2009	***Jun 2018***
Pesticides	1	Jan 2014 - Dec 2022	waiver - 9 year	06/16/2009	***Jun 2018***
Soil Fumigants	0	Jan 2017 - Dec 2019	waiver - 3 year		
Gross Alpha	1	Jan 2014 - Dec 2019	standard - 6 year	05/04/2015	
Radium 228	1	Jan 2014 - Dec 2019	standard - 6 year	05/04/2015	

Source S08 *Well #9 AGP499* *Well* *Use - Permanent* *Susceptility - Low*

Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Nitrate	1	Jan 2018 - Dec 2018	standard - 1 year	04/23/2018	
Complete Inorganic (IOC)	1	Jan 2011 - Dec 2019	waiver - 9 year	06/14/2016	
Manganese	1	Jan 2017 - Dec 2019	standard - 3 year	06/14/2016	Sep 2019
Volatile Organics (VOC)	1	Jan 2014 - Dec 2019	waiver - 6 year	01/15/2016	
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	10/17/2016	
Pesticides	1	Jan 2014 - Dec 2022	waiver - 9 year	10/17/2016	
Soil Fumigants	0	Jan 2017 - Dec 2019	waiver - 3 year		
Gross Alpha	1	Jan 2014 - Dec 2019	standard - 6 year	05/04/2015	
Radium 228	1	Jan 2014 - Dec 2019	standard - 6 year	05/04/2015	

Water Quality Monitoring Schedule

Other Information

Other Reporting Schedules	*Due Date*
Submit Consumer Confidence Report (CCR) to customers and ODW (Community systems only):	07/01/2018
Submit CCR certification form to ODW (Community systems only):	10/01/2018
Submit Water Use Efficiency report online to ODW and to customers (Community and other municipal water systems only):	07/01/2018
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) 236-3046 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.

Water Quality Monitoring Schedule

System: MCCORMICK WOODS **PWS ID: 40529 X** **Region: SOUTHWEST**
Contact: Thomas A Hunter **Group: A - Comm** **County: KITSAP**

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

	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019
Coliform Monitoring Population	1922	1922	1922	1922	1922	1922	1922	1922	1922	1922	1922	1922
Number of Routine Samples Required	2	2	2	2	2	2	2	2	2	2	2	2

- 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	10	Jan 2016 - Dec 2018	standard - 3 year			
Asbestos	0	Jan 2011 - Dec 2019	waiver - 9 year			
Total Trihalomethane (THM)	1	Jan 2018 - Dec 2018	reduced - 1 year	08/21/2018		
Halo-Acetic Acids (HAA5)	1	Jan 2018 - Dec 2018	reduced - 1 year	08/21/2018		

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 | *WF (SO1, 2, & 3) Disinfec. Required* | *Well Field* | *Use - Permanent* | *Susceptility - Moderate*

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Nitrate	1	Jan 2018 - Dec 2018	standard - 1 year	04/23/2018	
Complete Inorganic (IOC)	1	Jan 2011 - Dec 2019	waiver - 9 year	01/05/2011	
Volatile Organics (VOC)	1	Jan 2014 - Dec 2019	waiver - 6 year	09/26/2017	
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	07/23/2018	
Pesticides	1	Jan 2014 - Dec 2022	waiver - 9 year	07/23/2018	
Soil Fumigants	0	Jan 2017 - Dec 2019	waiver - 3 year		
Gross Alpha	1	Jan 2014 - Dec 2019	standard - 6 year	04/20/2017	
Radium 228	1	Jan 2014 - Dec 2019	standard - 6 year	04/20/2017	

Water Quality Monitoring Schedule

Other Information

Other Reporting Schedules	*Due Date*
Submit Consumer Confidence Report (CCR) to customers and ODW (Community systems only):	07/01/2018
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Submit Water Use Efficiency report online to ODW and to customers (Community and other municipal water systems only):	07/01/2018
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

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Additional Notes

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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.

Appendix E2

Coliform Monitoring Plan

CITY OF PORT ORCHARD
COLIFORM MONITORING PLAN

A. PART A – SYSTEM INFORMATION

1. System Information

Name:	City of Port Orchard DOH ID #68900
	McCormick Woods Water System DOH ID #40529
Address:	216 Prospect
	Port Orchard, Washington 98366
Phone:	(360) 876-4991
Fax:	(360) 876-4980
Contact Person:	Jacki Brown, Utility Manager

2. Geographic Location

The City of Port Orchard maintains two separate public water systems, both of which are Group A public water systems. Both systems are located on the Kitsap Peninsula of Washington State along the southern shore of Sinclair Inlet of the Puget Sound. This Coliform Monitoring Plan covers both the Port Orchard and McCormick Woods water systems. The Retail Water Service Area for the City of Port Orchard and McCormick Woods Water Systems are illustrated in the Coliform Monitoring Locations Map included in Part F of this document.

3. Sources of Supply

Supply to the Port Orchard System is primarily through City-owned and operated groundwater wells, some of which are flowing artesian wells. The City holds water rights for the various wells that serve the system under normal conditions (PO Wells 6, 7, 8, and 9). These wells are treated by the addition of chlorine and fluoride. Well 9 also has a pressure filter system for the removal of iron and manganese. Additionally, the City of Port Orchard buys water from the City of Bremerton to augment our well supplies. The supplemental water needed by the City of Port Orchard is primarily on a seasonal basis.

Supply to the McCormick Woods Water System is through City-owned and operated groundwater wells and through a water purchase agreement with the City of Bremerton. The City holds water rights for the wells (MW Wells 1 and 3). These wells are treated by the addition of chlorine.

TABLE 1 SUPPLY AND SOURCE CAPACITIES				
Well No.	**Location**	**Diam./ Depth**	**Zones Served**	**Installed Capacity (gpm)**
PO6	Maple Street	10 inches 806 Feet	Low Zone	250
PO7	Port Orchard Blvd	10 inches 769 Feet	Low Zone	750
PO8	Sidney Avenue	12 inches 429 feet	High Zone	450
PO9	Sidney Avenue	12 inches 478 Feet	High Zone	500
MW1	St. Andrews Drive	12 inches 229 feet	McCormick Woods	500
MW3	St. Andrews Drive	12 inches 171 feet	McCormick Woods	

4. Storage Reservoirs

The City owns and operates nine separate storage reservoirs in the Port Orchard system, in addition to two 50,000 gallon stilling basins for additional storage to the Low Zone.

The McCormick Woods Water System has one 450,000 gallon reservoir and two 60,000 gallon low level reservoirs.

5. Pressure Zones

The topography of the City is such that two separate pressure zones (high and low) are delineated to deliver adequate pressures to all areas of the City. The City's pressure zones are indicated on the Coliform Monitoring Locations Map included herein. Coliform samples are collected from representative points in each pressure zone each month.

The McCormick Woods Water System is contained within one pressure zone with coliform samples collected monthly.

6. Population

The estimated population of the City's water service area in 2019 is approximately 8,000 residents and 2,000 employees. These people are served through approximately 3,500 metered connections.

The McCormick Woods Water System currently serves approximately 2,000 residents.

B. Part B – LABORATORY INFORMATION

The contract laboratory for the City of Port Orchard is Spectra Laboratories – Kitsap. The local office is located at 1786 SE Mile Hill Drive, Port Orchard. The phone number is **(360)443-7845** and their hours are 8 AM to 5 PM, Monday through Thursday and 9 AM to 5 PM on Fridays. An afterhours emergency number for text or phone calls is **(360)633-6466**. Additionally, the lab manager can be reached at (352)573-7935.

C. Part C – ROUTINE, REPEAT, AND TRIGGERED SOURCE SAMPLE INFORMATION

Fifteen samples are collected from the City of Port Orchard Water System and three from the McCormick Woods Water System each month split between the first two Mondays (or Tuesday, in the event of a City holiday) of each month. The locations and addresses established for routine and repeat sampling are provided in Table 2 below. To ensure that no less than the minimum number of samples required are collected each month, sampling at each station occurs once in the 1st or 2nd week of each month.

TABLE 2:
LOCATIONS OF SAMPLE STATIONS & SCHEDULE of SAMPLING

Site Name	Sampling Location	Samples per month	Pressure Zone	Repeat Site Location	Repeat Site Address
Tremont Roundabout	*1500 Pottery Avenue*	2	High Zone	Above Below	1562 Pottery Ave 1391 Pottery Ave
Sidney/Kendall	*900 Sidney Avenue*	1	High Zone	Above Below	817 Kendall St 817 Sidney St
South Shed	*2051 Sidney Avenue*	2	High Zone	Above Below	2239 Sidney Avenue 1971 Sidney Avenue
Active Club	*1025 Tacoma Avenue*	2	High Zone	Above Below	1036 Tacoma Ave 1010 Tacoma Ave
Western Field	*4611 Sidney Road SW*	2	High Zone	Above Below	4949 SW Hovde Rd 4557 Sidney Rd SW
Seattle Street	*200 Seattle Street*	2	Low Zone	Above Below	931 Kitsap Street 1019 Kitsap Street
Dekalb	*1400 Dekalb Street*	1	Low Zone	Above Below	265 Tracy 247 Farragut
429 Bay St	*429 Bay St*	2	Low Zone	Above Below	514 Bay Street 405 Bay Street
Roundabout	*1011 Bethel Ave*	1	Low Zone	Above Below	1034 Bethel Ave 981 Bethel Ave
6400 McCormick	*6400 McCormick Woods Drive*	1	McCormick	Above Below	6364 McCormick 6710 McCormick
7400 McCormick	*7400 McCormick Woods Drive*	1	McCormick	Above Below	7410 Kells Lane 7198 Dunraven
St. Andrews	*6000 St. Andrews Drive*	1	McCormick	Above Below	4788 Rutherford 2275 Donnegal

D. Part D - UNSATISFACTORY SAMPLES

1. If a Sample is Coliform Positive

In the event of a sample indicating total coliform presence, the lab will further test the sample for fecal coliform and E. coli. Once those results are determined, the lab will immediately notify the City by phone. Repeat samples are collected within 24 hours of such notification at the original sampling location, and at service connections located within five addresses upstream and downstream of each site.

2. Triggered Source Water Monitoring

The Groundwater Rule portion of the Revised Total Coliform Rule requires that sources be sampled for E. coli when a routine sample is total coliform positive. A sample must be collected from each source operating on the day the original sample was collected within 24 hours of notification that a sample is total coliform positive. These samples must be collected from the sources prior to treatment. Additionally, since both the City of Port Orchard Water System and the McCormick Woods Water System purchase water from the City of Bremerton, Bremerton shall be notified within 24 hours of notification that a sample is total coliform positive in accordance with WAC 246-290-300(3)(h)(vi)(A)-(C) and the Statement of Understanding between Port Orchard and Bremerton.

3. Positive repeat samples

If any of the repeat samples or the raw water source samples are positive for total coliform, fecal coliform or E. coli, contact the Utility Manager, the Operations Manager, or the Public Works Director immediately to create a response plan and effect the necessary notifications. E. coli Response Checklist and E. coli-Present Triggered Source Sample Response Checklist forms are attached in Part G.

The Revised Total Coliform Rule requires water systems to assess their entire system—from sample collection point to source of supply—and submit a Level 1 Assessment report to us within 30 days after receiving two or more total coliform-positive samples in the same month of if three repeat samples for every total coliform-positive sample are not collected. A Level 2 Assessment is required when either a system has an E. coli MCL violation or there is a second Level 1 treatment technique trigger within a rolling 12 month period. The Utility Manager, Operations Manager, and the Public Works Director are qualified and authorized to conduct both Level 1 and Level 2 Assessments.

4. Month Following Unsatisfactory Sample

Regulations require that the usual number of routine samples be collected.

E. Part E - Preparation Information

System Name: City of Port Orchard and McCormick Woods Water System
Date Plan Completed: 8/31/2021
Name of Plan Preparer: Jacki Brown
Position: Utility Manager
Daytime Phone: (360) 876-4991
State Reviewer: _____
Date Last Review: _____

F. Response Checklists

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. Inspect our water system facilities for proper operation.
4. Interview staff to determine if anything unusual was happening in the service area in the recent past, including main breaks and new construction.
5. Discuss a possible Health Advisory with ODW based on findings.
6. .Respond appropriately to repeat sample results.- either lift the HA or request assistance from ODW.

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	☐ ☐	☒ ☐	☐ ☒	☐ ☐
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.	☐	☐	☐	☒

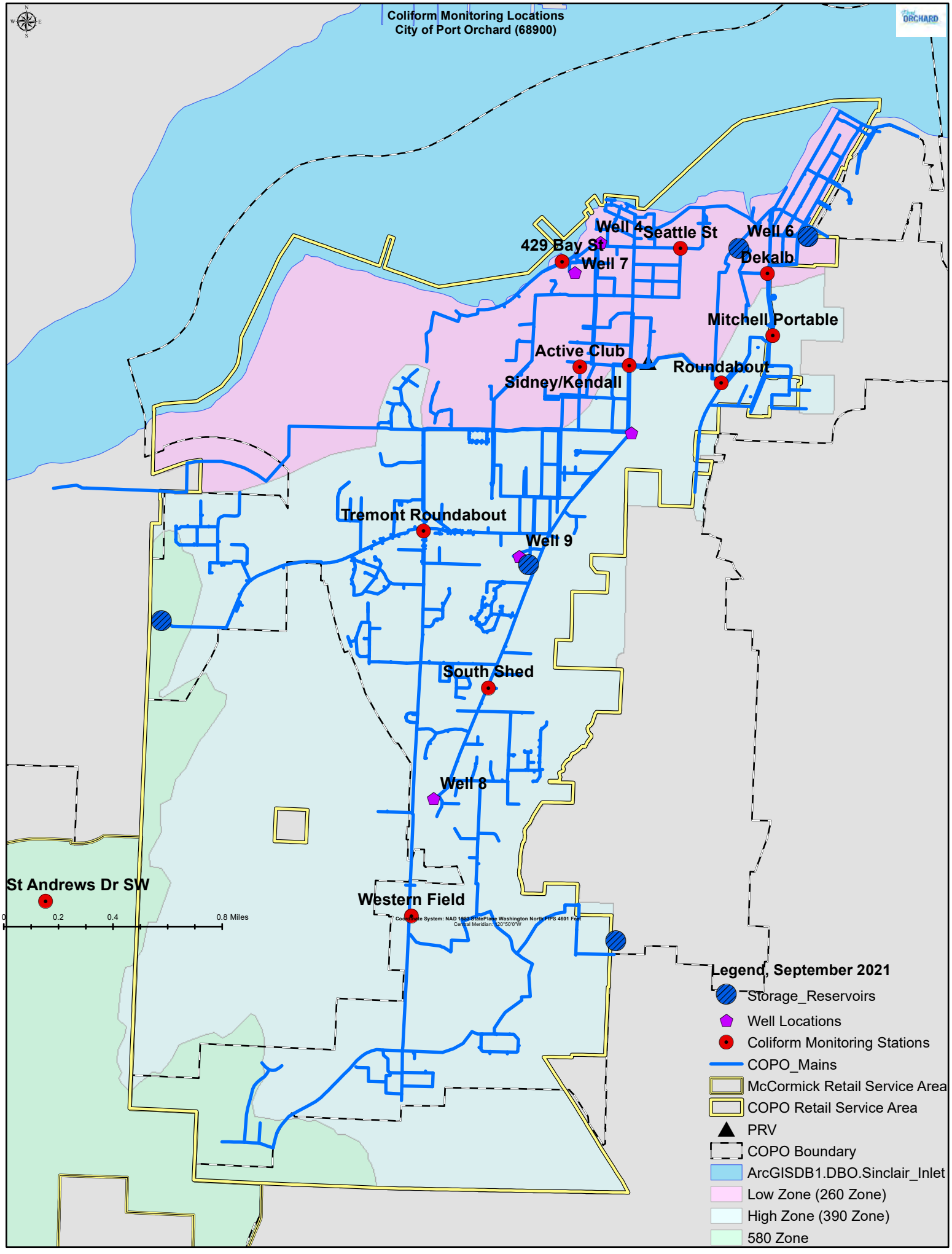
E. coli*-Present Triggered Source Sample Response Checklist – Source S__				
Alternate Sources	**Yes**	**No**	**N/A**	**To Do List**
We can stop using this source and still provide reliable water service to our customers.	☒	☐	☐	☐
We have an emergency intertie with a neighboring water system that we can 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? _0.2_ 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.	☐	☒	☐	☐

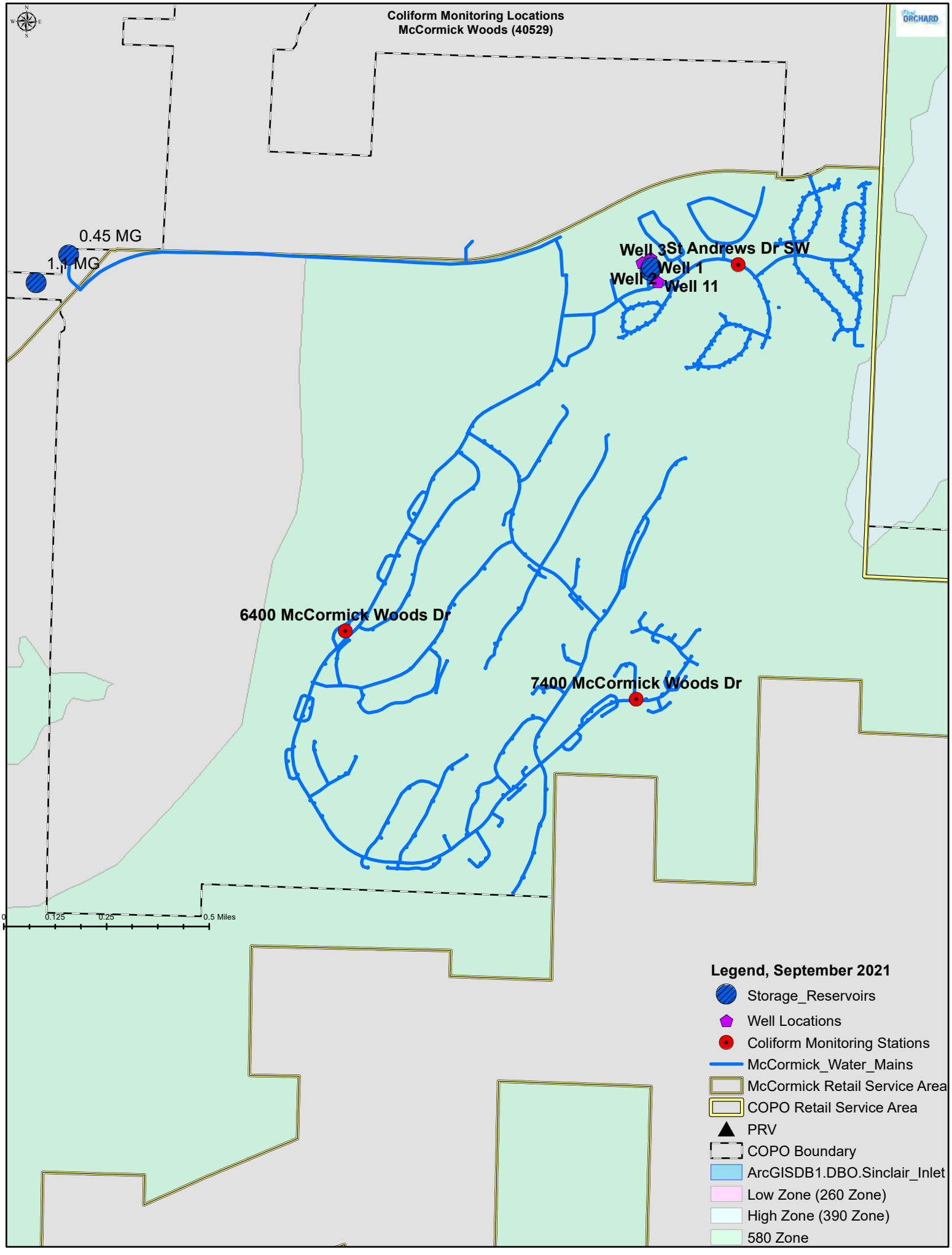
*NOTE: If your system has multiple sources, you may want to complete a separate checklist for each source.

E. coli-Present Triggered Source Sample Response Plan – Source ALL

If we have *E. coli* in any source water, we will immediately:

1. Call DOH.
2. Distribute required notice.
3. Begin compliance monitoring at the entry point to the distribution system.
4. Ask ODW to review the Contact Time analysis and acknowledge that we have 4-log virus treatment before the first customer.


Coliform Monitoring Locations
City of Port Orchard (68900)
Well 4
Seattle St
Well 6
429 Bay St
Well 7
Dekalb
Mitchell Portable
Active Club
Roundabout
Sidney/Kendall
Tremont Roundabout
Well 9
South Shed
Well 8
St Andrews Dr SW
Western Field
0
0.2
0.4
0.8 Miles
Legend, September 2021
Storage_Reservoirs
Well Locations
Coliform Monitoring Stations
COPO_Mains
McCormick Retail Service Area
COPO Retail Service Area
PRV
COPO Boundary
ArcGISDB1.DBO.Sinclair_Inlet
Low Zone (260 Zone)
High Zone (390 Zone)
580 Zone


Coliform Monitoring Locations
McCormick Woods (40529)
0.45 MG
1.1 MG
Well 3St Andrews Dr SW
Well 1
Well 2
Well 11
6400 McCormick Woods Dr
7400 McCormick Woods Dr
0
0.125
0.25
0.5 Miles
Legend, September 2021
Storage_Reservoirs
Well Locations
Coliform Monitoring Stations
McCormick_Water_Mains
McCormick Retail Service Area
COPO Retail Service Area
PRV
COPO Boundary
ArcGISDB1.DBO.Sinclair_Inlet
Low Zone (260 Zone)
High Zone (390 Zone)
580 Zone

Statement of Understanding

Between City of Bremerton and Consecutive Water Systems for

Coordinated Routine Distribution System Sampling

The City and its consecutive systems agree that they will coordinate their routine Coliform Rule distribution sampling such that consecutive systems sample on the same day or the day following the City of Bremerton's sampling as follows:

The City of Bremerton routine distribution samples taken in compliance with the Coliform Rule will be collected on Mondays. If there is a City-recognized holiday on Monday, then samples will be collected on Tuesday.

The consecutive system will collect routine distribution samples for compliance with the Coliform Rule on Mondays or Tuesdays.

Should there be a problem with this schedule or the consecutive system needs to report a coliform-positive result, the consecutive system will notify Bremerton during business hours at 360-473-5920 (Customer Response Line) or after hours at 360-509-0746 (Water Utility Manager) or 360-710-8805 (Water Operations Supervisor).

WHOLESALE WATER SYSTEM

Bremerton, City of – 08200R
System Name and ID Number

Cami A. Apfelbeck, Water Utility Manager
Responsible Party Name and Title (Printed)

Cami A. Apfelbeck
Responsible Party Signature

8/7/20
Date

(See above)
24-hour Contact Number

CONSECUTIVE SYSTEM

PORT ORCHARD WATER DEPT. WSID#68900
System Name and ID Number

JACK, BROWN, UTILITY MANAGER
Responsible Party Name and Title (Printed)

Jacki Brown
Responsible Party Signature

8-14-2020
Date

360-871-1485
24-hour Contact Number

Appendix E3

City of Port Orchard
Consumer Confidence Report
2018

WATER QUALITY REPORT-2018

Current Water Treatment Improvements:

- Construction of well 13 in the Sedgwick area
- Construction of well 12 in McCormick Woods
- Currently constructing a new drinking water treatment plant in Van Zee Park
- Additional Treatment Plant Improvements
- Increase in capital investments through rate structure adjustments
- 2018 Interior Reservoir cleaning
- 2017/18 System Flushing

SECURING A BETTER WATER FUTURE

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It is a primary focus of the City to not only protect this resource, but to make improvements as we look toward the future. Our water has always been within the federal regulations set by the EPA, however we are striving to not just meet these federal standards but to make every effort to provide the best quality water possible. In doing this we plan to be able to provide exceptional water quality for years to come.

Part of striving for such high water quality standards includes capital planning both in the short and long term. The city is currently in the construction phase of a major treatment plant designed to remove aesthetically displeasing particles like Manganese. Manganese is a naturally occurring mineral that can be found in water. Although our water is below the Federal standard, it can still cause minor discoloration in drinking water.

Additionally the City is planning to bring some new wells online soon. This project is also in a planning and design phase and will see work to begin as soon as this year. These wells are designed and located in areas that allow us not only to have enough water today, but also for the demand of tomorrow as the City continues to grow.

"Water is our most precious resource and as stewards of that water we strive to protect and deliver the best quality drinking water to the people we serve everyday" This is a principle that we focus on daily and we hope that you see that today and as we move forward together.

"Our water is a vital part of this community. Managing our resource in a way that focuses not just on today but generations to come is a primary focus of this city, and I am proud to be apart of it."

Water System Coordinator—Alan Rickett

The average water consumption last year for the City of Port Orchard was just over a million gallons a day. That is about 459 Grande coffee's per Port Orchard Citizen...

Exceptional Standards

EPA Regulated Inorganic Compounds

COMPOUND	MCL,	DETECTED
Arsenic	.05	<0.003
Cadmium	.005	<0.001
Chromium	0.1	<0.007
Mercury	0.002	<0.002
Selenium	0.05	<0.002
Beryllium	0.004	<0.003
Nickel	0.1	<0.005
Antimony	0.006	<0.003
Thallium	0.002	<0.001
Cyanide	0.2	<0.05
Fluoride	4	0.2-1.0
Nitrite-N	1	<0.1
Nitrate-N	10	<0.1

Secondary Compounds

COMPOUND	MCL, mg/l	DETECTED
Iron	0.3	<0.1
Manganese	0.05	0.04
Silver	0.1	<0.01
Chloride	250	3.61
Zinc	5	<0.2

State Regulated

COMPOUND	MCL, mg/l	DETECTED
Sodium		7.33 mg /l
Hardness		44 mg/l
Conductivity	700 umhos/cm	150 to 163 umhos/cm
Turbidity		.05-.35 NTU
Color	15 color units	<5 color units

Contaminant	Date Tested	MCL	Level	Major Source
Inorganic Contaminant: Copper	Aug 2015	1.3 mg/l	<0.2 mg/l	Corrsion of household plumbing. Erosion of natural deposits.
Lead	Aug 2015	0.015 mg/l	<0.004 mg/l	Corrsion of household plumbing. Erosion of natural deposits.
Microbiological: Total Coliform	Monthly	>0.5%	>0.3	
DBP	*Bi-Annually*		Not Detectable	
Total Violations	2017			None

Why we publish this report?

Congress passed the Safe Drinking Water Act over 30 years ago and gave the EPA the job of establishing rules to ensure the drinking water in the U.S. is safe. In 1996, Congress revised these rules and required the drinking water systems to give their consumers important information about their water. This report is in accordance with the EPA Code of Federal Regulations, National Drinking Water Regulations Parts 141 and 142.

The City of Port Orchard supports this legislation as we feel that it is important to keep our citizens informed about the water that rely on everyday. In this report you will see information regarding the quality of our water, records that we meet or surpass federal regulations, important updates about our water system, and improvements that are in various stages.

City Council meets at 6:30 PM on the 2nd and 4th Tuesday nights of each month at the Robert Geiger Council Chambers, City Hall, 216 Prospect Street. The public is always encouraged to attend. For questions about our water contact the Public Works Director, Mark Dorsey, P.E., at (360) 876-4991

A message from the EPA regarding water contaminants

What substances might be present in water?

Drinking water, including bottled water, may reasonably be expected to contain very small amounts of some contaminants. The presence of contaminants does not necessarily mean that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800) 426-4791.

In source water, there is the potential for microbial contaminants, inorganic contaminants, pesticides, herbicides, radioactive substances, and organic chemical contaminants. Microbial contaminants, such as viruses and bacteria, may come from human and animal activity.

Inorganic contaminants, such as salt and metals, can be naturally occurring or result from storm runoff, wastewater discharges, or farming. Pesticides and herbicides can come from either agricultural or residential uses. Organic chemical contamination, including synthetic and volatile organic chemicals, can originate from industrial processes, gas stations, stormwater runoff, and septic tanks.

Is our water safe for everyone? Some people may be more vulnerable to drinking water contaminants than the general population. Immuno-compromised persons, such as people with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/Centers for Disease Control guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline 1(800) 426-4791

City of Port Orchard Testing Schedule

Test Type	Interval
Inorganic	Every 36 Months
Volatile Organic Chemicals	Every 36 Months
Microbiological	Monthly
Nitrates	Annually
Synthetic Organic Chemicals	Every 36 Months
Disinfection Byproduct (DBP)	Bi-Annually

We are pleased to report that your water supply meets and exceeds all federal drinking water standards. The City water supply is chlorinated and treated with fluoride. In 2017, all the monthly water samples passed.

Where your water comes from

The system is supplied by groundwater from several wells that vary in depth and range from 240 feet to 806 feet below ground level. They draw from different aquifers in the community. In addition, the City periodically purchases water from the City of Bremerton, which is supplied by wells and their reservoir behind Casad Dam.

Keeping your water safe

In general, the installation of plumbing in compliance with the plumbing code will provide adequate protection for your plumbing system from contamination.

However, the water purveyor may require (as a condition of service) the installation of a backflow prevention assembly on the water service to provide additional protection for the public water system. A backflow prevention assembly will normally be required where a single-family residence has special plumbing that increases the hazard above the normal level found in residential homes, or where a hazard survey cannot be completed.

To help determine if a backflow prevention assembly is required, the water purveyor may send residential customers a Cross Connection Control Survey Questionnaire. The water purveyor will evaluate the returned questionnaires to assess the risk of contamination to the public water system. Based on the results of the evaluation, the installation of backflow prevention assemblies may be required on services to some customers.

The City of Port Orchard is proud to serve this beautiful area and all those that come here whether to live or play. Understanding the needs of our region is paramount in establishing a future that provides clean, abundant drinking water for years to come, and that is the future we plan to provide.

Appendix E4

City of Port Orchard
Consumer Confidence Report
2019

WATER QUALITY REPORT FOR 2019

PORT ORCHARD WATER DEPARTMENT, ID#68900

SECURING A BETTER WATER FUTURE

The City of Port Orchard boasts a vibrant and active community in one of the most beautiful waterfront scenes of the Pacific Northwest. It is the combination of great people and excellent resources that make the City a desired place in which to be connected. Part of that connection is the precious resource of water that we all treasure so much.

It is a primary focus of the City to not only protect this resource, but to make improvements as we look toward the future. Our water has always been within the federal regulations set by the EPA, however we are striving to not just meet these federal standards but to make every effort to provide the best quality water possible. In doing this we plan to provide exceptional water quality for years to come.

Part of striving for such high water quality standards includes capital planning both in the short and long term. In 2019, the city completed a major treatment plant designed to remove aesthetically displeasing particles like Manganese. Manganese is a naturally occurring mineral that can be found in water. Although our water is below the Federal standard, it can still cause minor discoloration in drinking water.

Additionally the City is planning to bring some new wells online. Two of these projects are in the construction phase with another being designed this year. These wells are designed and located in areas that allow us not only to have enough water today, but also for the demand of tomorrow as the City continues to grow.

As Mark Dorsey, Public Works Director/City Engineer puts it, ***"Water is our most precious resource and as stewards of that water we strive to protect and deliver the best quality drinking water to the people we serve everyday."*** This is a principle that we focus on daily and we hope that it is apparent to you today and as we move into the future.

City Council meets at 6:30 PM on the 2nd and 4th Tuesdays of each month at the Robert Geiger Council Chambers, City Hall, 216 Prospect Street. The public is always encouraged to attend. For questions about our water contact the Utility Manager, Jacki Brown, at (360) 876-4991

Why we publish this report—

Congress passed the Safe Drinking Water Act over 30 years ago and gave the EPA the job of establishing rules to ensure the drinking water in the U.S. is safe. In 1996, Congress revised these rules and required the drinking water systems to give their consumers important information about their water. This report is in accordance with the EPA Code of Federal Regulations, National Drinking Water Regulations Parts 141 and 142.

The City of Port Orchard supports this legislation as we feel that it is important to keep our citizens informed about the water that rely on everyday. In this report you will see information regarding the quality of our water, records that we meet or surpass federal regulations, important updates about our water system, and improvements that are in various stages.

The City of Port Orchard uses chlorine to ensure our water remains safe to drink throughout the distribution system. Additionally, we add trace amounts of fluoride to the water to promote dental health. Protecting our water sources is of the utmost importance and to that end, our Wellhead Protection Plan was adopted in 2012. It identifies our well recharge areas and potential sources of contamination and is available for viewing in the Public Works Department at City Hall. The Washington State Department of Health, Office of Drinking Water has rated our wells in the low and moderate susceptibility ranges. Source water assessments for all Class A Community Water Systems in the State are available online at http://www.doh.wa.gov/communityandenvironment/drinkingwater/sourcewaterprotection/assessment.aspx.

In Washington State, lead in drinking water comes primarily from materials and components used in household plumbing. The more time water has been sitting in pipes, the more dissolved metals, such and lead, it may contain. Elevated levels of lead can cause serious health problems, especially in pregnant women and young children. To help reduce potential exposure to lead, ***flush water through the tap until the water is noticeably colder before using it for drinking or cooking.*** You can use the flushed water for water plants, washing dishes, or general cleaning. ***Only use water from the cold water tap for drinking, cooking, and especially for making baby formula.*** Hot water is likely to contain higher levels of lead. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water is available from EPA's Safe Drinking Water Hotline at 1-800-426-4791 or online at http://www.epa.gov/safewater/lead.

To ensure that tap water is safe to drink, the Department of Health and EPA prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration and the Washington State Department of Agriculture regulations establish limits for contaminants in bottled water that must provide the same protection for public health.

A message from the EPA regarding water contaminants:

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (1-800-426-4791).

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their helath care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

The sources of drinking water (both tap and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and well. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Microbial contaminants, such as viruses and bacteria, may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife. Inorganic contaminants, such as salts and metals, can be naturally occurring or result from urban storm water runoff, industrial, or domestic wastewater discharges, oil and gas production, mining, or farming. Pesticides and herbicides may come from a variety of sources such as agriculture, urban storm water runoff, and residential uses. Organic chemical contaminants, including synthetic and volatile organic chemicals, are by-products of industrial processes and petroleum production. They can come from gas stations, urban storm water runoff, and septic systems. Radioactive contaminants can be naturally occurring or the result of oil and gas production and mining activities.

Water Quality Data

The water quality information presented in this table is from the most recent round of testing done according to the regulations. The presence of contaminants in the water does not necessarily indicate that the water poses a health risk. The EPA, through the Washington State Department of Health, Office of Drinking Water, requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants do not change frequently. Some of the data, though representative of the water quality, is more than one year old. The Office of Drinking Water reduced the monitoring requirements for Inorganic, Synthetic Organic, and Volatile Organic Chemicals because the sources are not at risk of contamination. The last sample collected for these contaminants was found to meet all applicable standards.

Contaminants	MCL	MCL G	Highest Level	Range of Detection	Sample Date	Violation	Typical Source of Contamination
Arsenic (ppb)	10	0	3.3		4/18	No	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes
Fluoride (ppm)	4	4	0.56		7/16	No	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories
Nitrate (ppm)	10	10	0.45		4/16	No	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits
Gross Alpha (ppb)	15	N/A	3.3	-0.3–3.3	4/17	No	Erosion of natural deposits
Radium (ppb)	5	N/A	0.8	.0.1–0.8	4/17	No	Erosion of natural deposits
Haloacetic Acids (ppb)	60	N/A	2.6	ND–2.6	12/19	No	By-product of drinking water disinfection
Total trihalomethanes (ppb)	80	N/A	10	7.1–10	12/19	No	By-product of drinking water disinfection
Contaminants with Action Levels rather than MCLs	**AL**	**MCL G**	**90th % Level**	**Range of Detection**	**Sample Date**	**Exceeds AL**	**Typical Source**
Copper (ppm)	1.3	1.3	0.02	ND–0.05	9/18	No	Corrosion of household plumbing; Erosion of natural deposits
Lead (ppb)	15	0	0.001	ND–0.004	9/18	No	Corrosion of household plumbing; Erosion of natural deposits
Unregulated Contaminants							
Germanium (ppb)			0.317	0.317	6/19	N/A	EPA has not established standards for unregulated contaminants. The purpose of this monitoring is to help EPA determine their occurrence in drinking water and potential need for future reg-

Definitions

Action Level (AL) - The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

Lead and Copper 90th Percentile—Out of every 10 homes sampled, 9 were at or below this level.

Maximum Contaminant Level (MCL) - The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLG as feasible using the best available treatment technology.

Maximum Contaminant Level Goal (MCLG) - The level of contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Parts Per Million (PPM) - One part per million or one milligram per liter (mg/L) corresponds to one penny in $10,000.

Treatment Trigger (TT) - A required process intended to reduce the level of a contaminant in drinking water.

ND— Not detected in the sample

Where your water comes from

The system is supplied by groundwater from four wells located throughout the City that vary in depth from 240 feet to 806 feet below ground level including two flowing artesian wells. In addition, the City periodically purchases water from the City of Bremerton, which is supplied by numerous groundwater wells and their reservoir behind Casad Dam on the Union River. The City also has an emergency intertie with West Sound Utility District's water system.

Protecting Your Drinking Water

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Appendix E5

McCormick Woods
Consumer Confidence Report
2018

MCCORMICK WOODS WATER QUALITY REPORT-2018

Current Water Treatment Improvements:

- Construction of well 13 in the Sedgwick area
- Construction of well 12 in McCormick Woods
- Currently constructing a new drinking water treatment plant in Van Zee Park
- Additional Treatment Plant Improvements
- Increase in capital investments through rate structure adjustments
- 2018 Interior Reservoir cleaning
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EPA Regulated Inorganic Compounds

COMPOUND	MCL,	DETECTED
Arsenic	.05	<0.002
Cadmium	.005	<0.001
Chromium	0.1	<0.01
Mercury	0.002	<0.0005
Selenium	0.05	<0.005
Beryllium	0.004	<0.003
Nickel	0.1	<0.04
Antimony	0.006	<0.005
Thallium	0.002	<0.002
Cyanide	0.2	<0.05
Nitrite-N	1	<0.01
Nitrate-N	10	<0.35

Secondary Compounds

COMPOUND	MCL, mg/l	DETECTED
Iron	0.3	<0.01
Manganese	0.05	0.04
Silver	0.1	<0.01
Chloride	250	<5.0
Zinc	5	<0.2

State Regulated

COMPOUND	MCL, mg/l	DETECTED
Sodium		3.37 mg /l
Hardness		44 mg/l
Conductivity	700 umhos/cm	122 umhos/cm
Turbidity		.0-.06 NTU
Color	15 color units	<5 color units

Contaminant	Date Tested	MCL	Level	Major Source
Inorganic Contaminant: Copper	Aug 2015	1.3 mg/l	<0.01 mg/l	Corrsion of household plumbing. Erosion of natural deposits.
Lead	Aug 2015	0.015 mg/l	<0.001 mg/l	Corrsion of household plumbing. Erosion of natural deposits.
Microbiological: Total Coliform	Monthly	>0.5%	>0.3	
DBP	*Yearly*		Not Detectable	
Total Violations	2017			None

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City of Port Orchard Testing Schedule

Test Type	Interval
Inorganic	Every 36 Months
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Synthetic Organic Chemicals	Every 36 Months
Disinfection Byproduct (DBP)	Bi-Annually

We are pleased to report that your water supply meets and exceeds all federal drinking water standards. The City water supply is chlorinated and treated with fluoride. In 2017, all the monthly water samples passed.

Where your water comes from

The system is supplied by groundwater from several wells that vary in depth and range from 240 feet to 806 feet below ground level. They draw from different aquifers in the community. In addition, the City periodically purchases water from the City of Bremerton, which is supplied by wells and their reservoir behind Casad Dam.

Keeping your water safe

In general, the installation of plumbing in compliance with the plumbing code will provide adequate protection for your plumbing system from contamination.

However, the water purveyor may require (as a condition of service) the installation of a backflow prevention assembly on the water service to provide additional protection for the public water system. A backflow prevention assembly will normally be required where a single-family residence has special plumbing that increases the hazard above the normal level found in residential homes, or where a hazard survey cannot be completed.

To help determine if a backflow prevention assembly is required, the water purveyor may send residential customers a Cross Connection Control Survey Questionnaire. The water purveyor will evaluate the returned questionnaires to assess the risk of contamination to the public water system. Based on the results of the evaluation, the installation of backflow prevention assemblies may be required on services to some customers.

The City of Port Orchard is proud to serve this beautiful area and all those that come here whether to live or play. Understanding the needs of our region is paramount in establishing a future that provides clean, abundant drinking water for years to come, and that is the future we plan to provide.

Appendix E6

McCormick Woods
Consumer Confidence Report
2019

WATER QUALITY REPORT FOR 2019

MCCORMICK WOODS WATER SYSTEM, ID#40529

SECURING A BETTER WATER FUTURE

The City of Port Orchard boasts a vibrant and active community in one of the most beautiful waterfront scenes of the Pacific Northwest. It is the combination of great people and excellent resources that make the City a desired place in which to be connected. Part of that connection is the precious resource of water that we all treasure so much.

It is a primary focus of the City to not only protect this resource, but to make improvements as we look toward the future. Our water has always been within the federal regulations set by the EPA, however we are striving to not just meet these federal standards but to make every effort to provide the best quality water possible. In doing this we plan to provide exceptional water quality for years to come.

Part of striving for such high water quality standards includes capital planning both in the short and long term. In 2019, the city completed a major treatment plant designed to remove aesthetically displeasing particles like Manganese. Manganese is a naturally occurring mineral that can be found in water. Although our water is below the Federal standard, it can still cause minor discoloration in drinking water.

Additionally the City is planning to bring some new wells online. Two of these projects are in the construction phase with another being designed this year. These wells are designed and located in areas that allow us not only to have enough water today, but also for the demand of tomorrow as the City continues to grow.

As Mark Dorsey, Public Works Director/City Engineer puts it, ***"Water is our most precious resource and as stewards of that water we strive to protect and deliver the best quality drinking water to the people we serve everyday."*** This is a principle that we focus on daily and we hope that it is apparent to you today and as we move into the future.

City Council meets at 6:30 PM on the 2nd and 4th Tuesdays of each month at the Robert Geiger Council Chambers, City Hall, 216 Prospect Street. The public is always encouraged to attend. For questions about our water contact the Utility Manager, Jacki Brown, at (360) 876-4991

Why we publish this report—

Congress passed the Safe Drinking Water Act over 30 years ago and gave the EPA the job of establishing rules to ensure the drinking water in the U.S. is safe. In 1996, Congress revised these rules and required the drinking water systems to give their consumers important information about their water. This report is in accordance with the EPA Code of Federal Regulations, National Drinking Water Regulations Parts 141 and 142.

The City of Port Orchard supports this legislation as we feel that it is important to keep our citizens informed about the water that rely on everyday. In this report you will see information regarding the quality of our water, records that we meet or surpass federal regulations, important updates about our water system, and improvements that are in various stages.

The City of Port Orchard uses chlorine to ensure our water remains safe to drink throughout the distribution system. Additionally, we add trace amounts of fluoride to the water to promote dental health. Protecting our water sources is of the utmost importance and to that end, our Wellhead Protection Plan was adopted in 2012. It identifies our well recharge areas and potential sources of contamination and is available for viewing in the Public Works Department at City Hall. The Washington State Department of Health, Office of Drinking Water has rated our wells in the low and moderate susceptibility ranges. Source water assessments for all Class A Community Water Systems in the State are available online at http://www.doh.wa.gov/communityandenvironment/drinkingwater/sourcewaterprotection/assessment.aspx.

In Washington State, lead in drinking water comes primarily from materials and components used in household plumbing. The more time water has been sitting in pipes, the more dissolved metals, such and lead, it may contain. Elevated levels of lead can cause serious health problems, especially in pregnant women and young children. To help reduce potential exposure to lead, ***flush water through the tap until the water is noticeably colder before using it for drinking or cooking.*** You can use the flushed water for water plants, washing dishes, or general cleaning. ***Only use water from the cold water tap for drinking, cooking, and especially for making baby formula.*** Hot water is likely to contain higher levels of lead. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water is available from EPA's Safe Drinking Water Hotline at 1-800-426-4791 or online at http://www.epa.gov/safewater/lead.

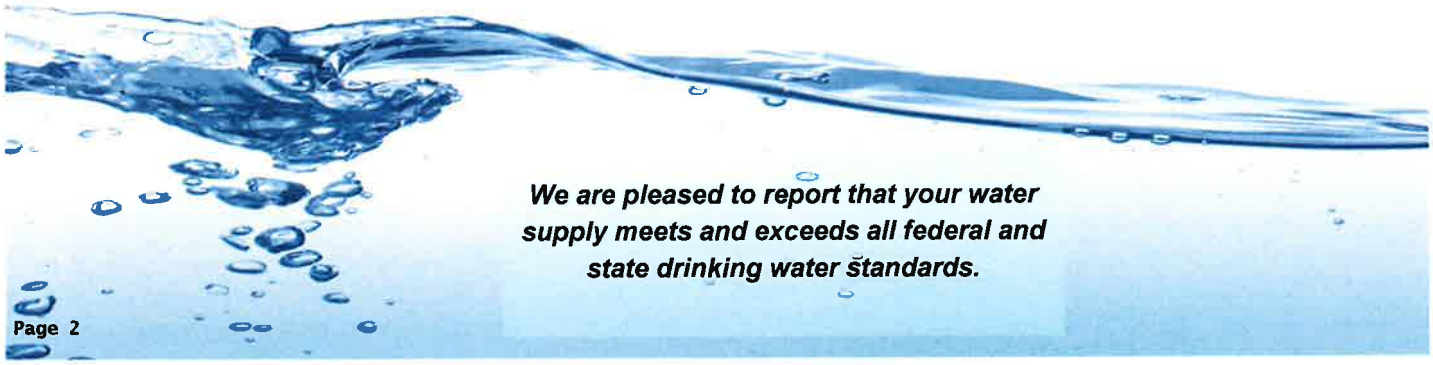
To ensure that tap water is safe to drink, the Department of Health and EPA prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration and the Washington State Department of Agriculture regulations establish limits for contaminants in bottled water that must provide the same protection for public health.

A message from the EPA regarding water contaminants:

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (1-800-426-4791).

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their helath care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

The sources of drinking water (both tap and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and well. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Microbial contaminants, such as viruses and bacteria, may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife. Inorganic contaminants, such as salts and metals, can be naturally occurring or result from urban storm water runoff, industrial, or domestic wastewater discharges, oil and gas production, mining, or farming. Pesticides and herbicides may come from a variety of sources such as agriculture, urban storm water runoff, and residential uses. Organic chemical contaminants, including synthetic and volatile organic chemicals, are by-products of industrial processes and petroleum production. They can come from gas stations, urban storm water runoff, and septic systems. Radioactive contaminants can be naturally occurring or the result of oil and gas production and mining activities.



Water Quality Data

The water quality information presented in this table is from the most recent round of testing done according to the regulations. The presence of contaminants in the water does not necessarily indicate that the water poses a health risk. The EPA, through the Washington State Department of Health, Office of Drinking Water, requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants do not change frequently. Some of the data, though representative of the water quality, is more than one year old. The Office of Drinking Water reduced the monitoring requirements for Inorganic, Synthetic Organic, and Volatile Organic Chemicals because the sources are not at risk of contamination. The last sample collected for these contaminants was found to meet all applicable standards.

Contaminants	MCL	MCLG	Highest Level	Sample Date	Violation	Typical Source of Contamination
Nitrate (ppm)	10	10	.35	4/17	No	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits
Gross Alpha (ppb)	15	N/A	-0.5	4/17	No	Erosion of natural deposits
Radium (ppb)	5	N/A	0.3	4/17	No	Erosion of natural deposits
Haloacetic Acids (ppb)	60	N/A	ND	12/19	No	By-product of drinking water disinfection
Total trihalomethanes (ppb)	80	N/A	27	12/19	No	By-product of drinking water disinfection
Contaminants with Action Levels rather than MCLs	**AL**	**MCLG**	**90th % Level**	**Range of Detection**	**Sample Date**	**Typical Source**
Copper (ppm)	1.3	1.3	0.02	ND–0.05	8/18	Corrosion of household plumbing; Erosion of natural deposits
Lead (ppb)	15	0	0.001	ND–0.004	8/18	Corrosion of household plumbing; Erosion of natural deposits

Definitions

Action Level (AL) - The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

Lead and Copper 90th Percentile—Out of every 10 homes sampled, 9 were at or below this level.

Maximum Contaminant Level (MCL) - The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLG as feasible using the best available treatment technology.

Maximum Contaminant Level Goal (MCLG) - The level of contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Parts Per Million (PPM) - One part per million or one milligram per liter (mg/L) corresponds to one penny in $10,000.

Treatment Trigger (TT) - A required process intended to reduce the level of a contaminant in drinking water.

ND— Not detected in the sample

Where your water comes from

The system is supplied by groundwater from four wells located throughout the City that vary in depth from 240 feet to 806 feet below ground level including two flowing artesian wells. In addition, the City periodically purchases water from the City of Bremerton, which is supplied by numerous groundwater wells and their reservoir behind Casad Dam on the Union River. The City also has an emergency intertie with West Sound Utility District's water system.

Protecting Your Drinking Water

In general, the installation of plumbing in compliance with the plumbing code will provide adequate protection for your plumbing system from contamination.

However, the water purveyor may require (as a condition of service) the installation of a backflow prevention assembly on the water service to provide additional protection for the public water system. A backflow prevention assembly will normally be required where a single-family residence has special plumbing that increases the hazard above the normal level found in residential homes, or where a hazard survey cannot be completed.

To help determine if a backflow prevention assembly is required, the water purveyor may send residential customers a Cross Connection Control Survey Questionnaire. The water purveyor will evaluate the returned questionnaires to assess the risk of contamination to the public water system. Based on the results of the evaluation, the installation of backflow prevention assemblies may be required on services to some customers.

The City of Port Orchard is proud to serve this beautiful area and all those that come here to live or to visit. Understanding the needs of our region is paramount in establishing a future that provides clean, abundant drinking water for years to come, and that is the future we plan to provide.

Appendix F

Interlocal Agreements

Appendix F1

Matrix of Interlocal Agreements

Interlocal Agreements available for City of Port Orchard 2020 WSP

Date assembled: 05/07/20

Item No.	Agreement Document Name	Date Signed	Partner	Expiration Date	Agreement	Details on Agreement	Additional Details on Agreement	Replaced	Replacement Agreement
1	Interlocal Agreement for Water Supply	Sep-96	City of Bremerton	Dec-96				yes	Item 6: Interlocal Agreement for Water Supply
2	Interlocal Agreement Between the City of Port Orchard and Annapolis Water District For the Bethel Emergency Intertie	Aug-03	Annapolis Water District			Former name of West Sound Utility District. Assume that new name doesn't modify the agreement.			
3	Interlocal Agreement For Establishing Water Utility Retail Service Area Boundaries in Accordance with the Kitsap County Coordinated Water System Plan Preamble	Dec-04	Kitsap County						
4	Interlocal Agreement for Cooperative Water System Development in the Port Orchard 580 Zone / Bremerton 580 Zone	Jan-02	City of Bremerton					yes	item 8: Interlocal Agreement for Purchase and Sale of Assets in the 580 Zone
5	Port Orchard 580 Zone / Bremerton 580 Zone Plan for Cooperative Water System Development	Dec-01	City of Bremerton	31-Dec-19	Port Orchard will provide up to 1,700 gpm of emergency fireflow for up to 3 hours to the Bremerton system via Old Clifton Road connection (pg. 6 of 11) Goal for cooperation plan is to meet Port orchard ADD of 290 gpd and MDD of 650, and Bremerton ADD of 202 gpd and MDD of 392 gpd	City of Bremerton and Port Orchard have agreed to cooperate in a plan to develop their adjacent water systems in 4 phase to benefit reliability and efficiency of service, deferral phasing of Bremerton infrastructure, sharing of existing Port Orchard Reservoir Site, elimination of duplicate pump stations, and satisfaction of Port Orchard Water source	Continuation of maintenance of water system intertie in order to supply domestic water between two systems during emergency condition Both agree to sell and deliver wholesale water for the needs of inhabitants. Bremerton will sell Min of 58 million gallons per year to Port Orchard for $50,000 per year	yes	Item 8: Interlocal Agreement for Purchase and Sale of Assets in the 580 Zone
6	Interlocal Agreement for Water Supply	Nov-14	City of Bremerton	31-Dec-19			Bremerton will sell Min of 58 million gallons per year to Port Orchard for $50,000 per year (pg. 2) The minimum purchase amount ended 12-31-18. We now pay for what we need.		
7	Agreement Regarding Use of Well 4B Water Rights and Rescission of Assignment	Apr-14	C&M Golf, LLC						
8	Interlocal Agreement for Purchase and Sale of Assets in the 580 Zone	Nov-19	City of Bremerton						
9	Appendix B to #8 Interlocal Agreement for Cooperative Water System Development in the Port Orchard 580 Zone / Bremerton 580 Zone	Dec-01	City of Bremerton					yes	item 8: Interlocal Agreement for Purchase and Sale of Assets in the 580 Zone
10	Appendix B to #8 Addendum No. 1 to Interlocal Agreement for Cooperative Water System Development in the Port Orchard 580 Zone / Bremerton 580	Dec-01	City of Bremerton					yes	item 8: Interlocal Agreement for Purchase and Sale of Assets in the 580 Zone
11	Appendix B to #8 Deed of Conveyance	Nov-19	City of Bremerton						
12	Appendix B to #8 Quit Claim Deed	Nov-19	City of Bremerton						

Appendix F2

Interlocal Agreements

INTERLOCAL AGREEMENT FOR WATER SUPPLY

THIS AGREEMENT is made and entered into this 26th day of September, 1996, by and between the CITY OF BREMERTON, a municipal corporation, hereinafter referred to as "Bremerton," and the City of Port Orchard, hereinafter referred to as "Port Orchard."

FACTUAL BACKGROUND:

1. The parties desire to provide the highest reliability of service to their customers at reasonable cost.

2. The parties recognize that water resources are finite and vulnerable and that prudent use and management of these resources could be facilitated by cooperation among water utilities.

3. Bremerton and Port Orchard have water facilities which are interconnected.

4. RCW 39.34 and 35.92.200 empower Bremerton and Port Orchard to enter into a cooperative agreement for providing outside water service.

IT IS AGREED:

1. **SCOPE:** Subject to the terms and conditions set forth herein, Bremerton and Port Orchard agree to the continuation and maintenance of a water system intertie at Anderson Hill Road and SR 16 for the purpose of supplying domestic water between the two systems during emergency conditions.

Bremerton agrees to sell and deliver to Port Orchard and Port Orchard agrees to purchase from Bremerton surplus water for the needs of inhabitants of Port Orchard and adjacent areas for domestic, irrigation, and fire protection purposes.

2. **TERM:** The term of this Agreement shall run from the date of this agreement until December 1996, with automatic renewal through the last day of the next following December and each December of successive years, unless one or both of the utilities furnish written notice to the other utility of non-renewal before December 1 of the then current calendar year.

3. **SUPPLY:** Port Orchard agrees to purchase water from Bremerton each calendar year. The amount to be purchased will be identified on or before February 1, each calendar year by letter which will include a written projection of how much water Port Orchard will

purchase from Bremerton during each of the calendar months of the year.

Bremerton agrees to deliver surplus water from its watershed and reservoirs at the purity and quality in effect for residential customers of Bremerton.

If Bremerton has a need for an emergency water supply, it shall notify Port Orchard of this and of the volume required prior to opening t he valve between the two systems. Notification of this need on Bremerton's part may be verbal, but it will be followed up within 10 working days by written confirmation.

4. **COMPENSATION:** The initial unit price of water sold to either jurisdiction during 1996 shall be $0.3529 per 100 cubic feet. The rate for any subsequent calendar year shall be computed by multiplying the 1996 base price by the ratio of (1) the National Consumer Price Index for All Urban Consumers of the United States Department of Labor Statistics for the Seattle/Everett, WA area, as of the November preceding such rate revision, and (2) the same consumer price index for November 1995.

5. **INTERTIE FACILITIES:** All surplus or emergency water supply delivered pursuant to this Agreement shall be measured by the delivering municipality using suitable measuring equipment, of standard manufacture,

to be furnished, installed, maintained, and calibrated by Port Orchard at the expense of Port Orchard. Port Orchard shall retain ownership of said meters. Calibration shall be done at least once each three (3) years and a copy of calibration results submitted to Bremerton.

Bremerton shall have access to and be permitted to install and maintain its own monitoring and recording system at its expense.

In the event any intertie meter fails to register, or it registers incorrectly, the Bremerton Water Utility Billing Department shall estimate the amount of water delivered for the period during which such meter failed to register by taking an average of the total deliveries of water through such meter for the preceding two months in which water was delivered.

Each utility shall install, operate, and maintain isolation valves and related facilities on their respective water mains at the point where those mains are interconnected. Each utility shall cooperate with the other utility in coordinating the operation of the isolation valves and related facilities for the purposes of this Agreement.

6. **PRIORITY OF BREMERTON WATER CUSTOMERS AND THE PUGET SOUND NAVAL SHIPYARD:** It is distinctly

understood and agreed between parties hereof that Bremerton is, by prior agreement, selling part of its surplus water supply to Puget Sound Naval Shipyard and that it will give precedence to any and all needs and requirements of Bremerton's water customers and the Puget Sound Naval Shipyard for surplus water. Surplus water to be supplied to Port Orchard under this Agreement shall be such as Bremerton may have on hand over and above the requirements of the present users of the Bremerton system and the requirements of Puget Sound Naval Shipyard.

7. **NOTICES:** All notices and other written communications required by this Agreement shall be in writing and, except as expressly provided elsewhere in this Agreement, shall be deemed to have been given at the time of delivery if personally delivered or at the time of mailing if mailed by first class, postage pre-paid and addressed to the part at its address as stated below or at such address as any party may designate at any time in writing.

Director of Public
Works & Utilities
City of Bremerton
3027 Olympus Drive
Bremerton, WA 98310-4799

City Engineer
City of Port Orchard
216 Prospect Street
Port Orchard, WA
98366

8. **SEVERABILITY:** If any provision of this Agreement or its application is held invalid, the remainder of this Agreement or the application of the remainder of this Agreement shall not be affected.

9. **MODIFICATION:** This Agreement represents the entire agreement between the parties. No change, termination or attempted waiver of any of the provisions of this Agreement shall be binding on either of the parties unless executed in writing by authorized representatives of each of the parties. This Agreement shall not be modified, supplemented, or otherwise affected by the course of dealings between the parties.

10. **BENEFITS:** This agreement is entered into for the benefit of the parties to this Agreement only and shall confer no benefits, direct or implied, on any third persons.

The rights granted by this Agreement may not be assigned without the written consent of the Mayor of the City of Bremerton and the Mayor of the City of Port Orchard.

12. **ARBITRATION:** Disputes under this Agreement shall be settled through binding arbitration and the parties agree and stipulate pursuant to MAR 8.1 that

the Mandatory Arbitration Rules for Superior Court shall apply, except Section VIII, Trial De Novo.

IN WITNESS WHEREOF the parties hereto execute this Agreement this 26 day of Sept, 1996.

CITY OF BREMERTON

BY: _____
Lynn Horton, Mayor

ATTEST:

_____
Kathleen L. McCluskey, Clerk

APPROVED AS TO FORM:

_____
Ian R. Sievers, City Attorney

CITY OF PORT ORCHARD

BY: _____
Mayor

ATTEST:

_____
Clerk

APPROVED AS TO FORM:

_____ 23579
City Attorney

DEPARTMENTAL APPROVAL:

_____
W. Eugene Sampley, P.E.
Director of Public Works & Utilities

INTERLOCAL AGREEMENT
Between the
City of Port Orchard and Annapolis Water District
For the
Bethel Emergency Intertie

This AGREEMENT is made and entered into this 11 day of August, 2003 by and between the ANNAPOLIS WATER DISTRICT, a municipal corporation, hereinafter referred to as Annapolis, and the CITY OF PORT ORCHARD, hereinafter referred to as Port Orchard.

FACTUAL BACKGROUND:

1. Location – The City of Port Orchard has constructed a 1-million gallon reservoir and is within 300 feet of the Annapolis water system in Bethel Road.

2. Reliability and Efficiency of Service – Port Orchard and Annapolis desire to provide the highest reliability of service to their customers at reasonable cost. The water purveyors recognize that water distribution systems are subject to emergencies that could unexpectedly curtail delivery of water to the system. The water purveyors agree that an emergency supply of water minimizes the risk of system failure and provides essential redundancy to the supply of water. By connecting the City and Annapolis systems for emergency response, the following will be achieved:

   - Improve overall system reliability,
   - Enhance the manageability of the systems,
   - Provide opportunities for conjunctive use of water supplies,
   - Result in cost efficiencies for both systems.

3. Construction of an Emergency Intertie – Currently, the City and Annapolis water systems are not connected. Any need for an emergency connection would require modification to a proposed intertie that has never been activated. By connecting the two systems with the required valves and meters, the response time for any emergency connection would be reduced from days to minutes.

4. Legislation – RCWs 39.34 and 35.92.200 empower Annapolis and Port Orchard to enter into a cooperative AGREEMENT.

IT IS AGREED:

1. **Cooperative Water System Development Plan:** Port Orchard and Annapolis agree to cooperate in the design, installation, operation and management of the Bethel Emergency Intertie.

2. **Construction Cost:** Port Orchard shall be responsible for the permitting, construction, and associated costs for construction of the water connection between the two systems.

3. **Operational Cost:** Port Orchard shall be responsible for the infrastructure used to construct the Bethel Emergency intertie, except for the water meter which shall be supplied and paid

for by Annapolis. Annapolis shall be responsible for the maintenance and replacement, if ever necessary, of the water meter.

4. **Service Area:** Nothing in this AGREEMENT is to be construed as changing or altering the water service area boundaries of Port Orchard and Annapolis that exist as of the date of this AGREEMENT.

5. **Water Supply:** The water purveyor requiring the water shall contact the other purveyor and obtain its consent prior to activating the Bethel Intertie. Except for emergency needs, the receiving water purveyor shall request the water at least one business day prior to using it. Consent from the supplying water purveyor shall be verbal, timely, and not denied unless there is a reason as identified in this Agreement, or other good faith substantially based reason, to deny the request. The contact individuals for purposes of this section shall be as identified in section 8. hereof.

6. **Water Quality:** Both Port Orchard and Annapolis treat their respective water supplies with chlorine and fluoride. Both parties shall continue to operate their water systems in accordance with Washington State Department of Health water quality requirements. Neither water purveyor shall supply water to the other party without first advising the receiving party of any known discrepancy in water quality standards.

7. **Compensation:** For purposes of this agreement, the cost of Annapolis water shall be the "commercial flat rate" (cost per hundred cubic feet), as defined in the Annapolis rate structure, and as may be amended from time to time in the future. The cost of Port Orchard water shall be the same as the "commercial flat rate" as would have been charged by Annapolis to Port Orchard. Payment for supplied water shall be made monthly or bi-monthly by the receiving utility, upon receipt of an invoice from the supplying utility.

   Compensation is limited to the purchase of water used, and shall not include standby charges, general facility fees, connection fees, or similar costs.

   The AGREEMENT is based on the Annapolis current rate structure, as of the date of this AGREEMENT. It is acknowledged that changes to this rate structure may occur during the life of this AGREEMENT.

   During drought conditions or other supply shortages suffered by one purveyor for any reason, it is agreed the purveyor that is receiving the water will comply with similar restrictions and conservation measures required or requested by the water supplier. PROVIDED, HOWEVER, AND NOTWITHSTANDING ANYTHING TO THE CONTRARY HEREIN, if the supply of water from one party to the other would jeopardize the supplying party's ability to meet the historically normal water needs of its district or city customers as the case may be, for that time of year, then the party to whom the request for water is made may deny or curtail the request for water as appropriate so that its ability to supply a normal flow of water to its customers for that time of year will not be curtailed.

8. **Notices:** Except as expressly provided elsewhere in this AGREEMENT, all notices and other written communications required by this Agreement shall be in writing and shall be deemed to have been given at the time of delivery, if personally delivered, or at the time of mailing if mailed by first class, postage pre-paid and addressed to the party at its address as stated below, or at such address as any party may designate at any time in writing.

General Manager
Annapolis Water District
2924 SE Lund Avenue
Port Orchard, WA 98366
Phone: (360) 876-2545
Cell: (360)-731-4839

City Engineer
City of Port Orchard
216 Prospect Street
Port Orchard, WA 98366
Phone: (360) 876-4991
Cell: (360) 731-1931

Alternate Contact persons if the General Manager for Annapolis or City Engineer for the City is/are not available:

For Annapolis: Name/Title: Joe Redfern, Maintenance Foreman
Phone: (360) 876-2545 Cell: (360) 731-5597

For City: Name/Title: Jay Cookson , Public Works Foreman
Phone: (360) 876-2722

9. **Duration and Termination:** The term of this Agreement shall be for five (5) years beginning on the effective date, and shall be automatically renewed for successive twelve (12) month periods; provided, however, either party may terminate the Agreement after the first five (5) years by first notifying the other party at least sixty (60) days prior to the termination date stated in the notice, which termination date shall fall on the last day of the month stated in the termination notice.

   This AGREEMENT may also be terminated by operation of law, if the terms hereof are ever deemed illegal by any local, state, or federal laws or regulations.

10. **Severability:** It is the intent of the parties that if any provision of this contract or its application is held by a court of competent jurisdiction to be illegal, invalid, or void, the validity of the remaining provisions of this contract or it application to other entities, or circumstances shall not be affected. The remaining provisions shall continue in full force and effect. The rights and obligations of the parties shall be construed and enforced as if the contract did not contain the particular invalid provision. However, if the invalid provision or its application are found by a court of competent jurisdiction to be substantive and to render performance of the remaining provisions unworkable and non-feasible, it is found to seriously affect the consideration and/or is inseparably connected to the remainder of the contract, the entire contract shall be null and void.

11. **Modification:** This AGREEMENT represents the entire AGREEMENT between the parties. No change, termination, or attempted waiver of any of the provisions of this AGREEMENT shall be binding on either of the parties unless executed in writing by authorized representatives of each of the parties. This AGREEMENT shall not be modified, supplemented, or otherwise affected by the course of dealings between the parties.

12. **Benefits:** This AGREEMENT is entered into for the benefit of the parties to this AGREEMENT only and shall confer no benefits, direct or implied, on any third persons.

    The rights granted by this AGREEMENT may not be assigned without the written consent of the Board of Commissioners of the Annapolis Water District and the Mayor of the City of Port Orchard.

13. **Arbitration:** Disputes under this AGREEMENT shall be settled through binding arbitration and the parties agree and stipulate pursuant to MAR 8.1 that the Mandatory Arbitration Rules for Superior Court shall apply, except Section VIII, Trial De Navo.

14. **Consent:** Whenever it is provided in this contract that the prior written consent or approval of either party is required as a condition precedent to any actions, the requested consent or approval shall not be unreasonably withheld. This provision does not apply to requests for amendments of this contract.

15. **Emergency Situations:** The water purveyor shall have the right to terminate the supply of water to the receiving water purveyor if there is a valid emergency or bona fide set of conditions that adversely affects the water supplier's reasonable ability to serve both its customers and the receiving purveyor. The termination period shall last as long as the emergency or bona fide set of conditions are in effect.

16. **No Joint Venture – Individual Liability:** This is not an agreement of joint venture or partnership. No provision of this contract shall be construed so as to make either party individually or collectively a partner or joint venture with the other party. Neither party is an agent of the other. Neither party shall be liable for the acts of the other in any representative capacity whatsoever.

17. **Water Rights:** This AGREEMENT does not transfer water rights from one water purveyor to the other.

18. **Complete AGREEMENT:** This contract represents the entire AGREEMENT between the parties hereto concerning the subject matter hereof. This contract may not be amended except as provided herein.

19. **Venue, Jurisdiction, and Specific Performance:** In the event of litigation between the parties, venue and jurisdiction shall lie with the Kitsap County Superior Court of the State of Washington. Once litigation has commenced, the provisions of section 13. hereof shall apply. The parties shall be entitled to specific performance of the terms hereof. In any action brought to enforce any provision of this Agreement, the prevailing party (the party who substantially prevails) shall be entitled to recover from the losing party all of its reasonable costs and attorney fees incurred in the suit.

20. **Default:** In the event of default of any provision of the contract, the non-defaulting party shall send written notice to the other party setting forth the nature of the default. If the default is for a monetary payment due hereunder, the defaulting party shall have thirty (30) days to cure the default. In the event of other defaults, the defaulting party shall use its best efforts to cure the default within ninety (90) days. If such a default cannot be reasonably cured within such ninety (90) day period, the defaulting party shall, upon written request prior to the expiration of the ninety (90) day period, be granted an additional sixty (60) days to cure the default.

21. **Force Majeure:** The time periods for either party's performance under any provisions of this contract shall be extended for a reasonable period of time when either party's performance is prevented, in good faith, due to fire, flood, earthquake, lockouts, strikes, embargoes, acts of God, war, and civil disobedience. If this provision is invoked, the invoking party agrees to immediately take all reasonable steps to alleviate, cure, minimize or avoid the cause preventing such performance, at its sole expense.

22. **Successors:** This contract shall inure to the benefit of and be binding upon the parties and their successors and assigns.

23. **Filing with County Auditor.** Inter-local agreements such as this one must be filed with the County Auditor. The parties shall therefore execute this Agreement in triplicate, and thereafter each party shall retain an original hereof and the City shall insure the third original is filed in a timely manner with the County Auditor.

24. **Agreement Approval.** The City approved the terms of this AGREEMENT at its regularly scheduled City Council meeting held on the 14 day of July, 2003. Annapolis approved the terms of this AGREEMENT at is regularly scheduled Board of Commissioners Meeting held on the 28 day of July, 2003. The **effective date** of this AGREEMENT shall be deemed the latter of the two dates stated in this section 24.

IN WITNESS WHEREOF the parties hereto execute this AGREEMENT on this 11 day of August, 2003.

ANNAPOLIS WATER DISTRICT

BY:

Commissioner

Commissioner

Commissioner

CITY OF PORT ORCHARD

BY:

Mayor

ATTEST:

Clerk

APPROVED AS TO FORM:

District Attorney

APPROVED AS TO FORM:

City Attorney

Exhibit 3-2

INTERLOCAL AGREEMENT

FOR ESTABLISHING WATER UTILITY RETAIL SERVICE AREA BOUNDARIES

IN ACCORDANCE WITH THE KITSAP COUNTY

COORDINATED WATER SYSTEM PLAN

PREAMBLE

This Interlocal Agreement assigns a water utility retail service area, including a planning area for future retail service that identifies the external boundary of the area for which the designated water purveyor has assumed retail water service responsibility. The responsibilities accepted by the water purveyor are outlined in the Kitsap County Coordinated Water System Plan (CWSP) and are contained in the adopted rules and regulations of the State Department of Health (DOH). This agreement does not create a new government entity nor does it give new authorities or responsibilities to the water purveyor or to the County or State regulatory agencies, but rather acknowledges the geographical area for designated service responsibilities. This agreement is in effect so long as the water utility remains as a public water system purveyor and continues to carry out the obligations inherent in the agreement or until an agreement amendment is executed.

The terms used within this Agreement shall be as defined in the implementing regulations of **Chapter 70.116 RCW**, except as identified below.

1. Kitsap County Water Utility Retail Service Area Map shall mean the map referenced in the Interlocal Agreement as Attachment A that defines the retail water utility service area for the designated water system.

2. Retail Water Utility Service Area shall mean the designated geographical area in which a purveyor is responsible for planning and providing water service to its customers. The service area is composed of both a current and future service area as described in the CWSP. A wholesale water supplier shall not provide water to individual customers in another purveyor's retail service area except with the written concurrence of the purveyor responsible for the geographical area in question. The retail service area may be amended in accordance with the CWSP procedures and with the concurrence of the affected water purveyors.

3. Lead Agency for administering the Kitsap County water utility service area agreements and retail service area maps shall be the Kitsap County Health District (KCHD) unless otherwise established by amendment to the CWSP.

The authority for this Agreement is granted by the Public Water System Coordination Act of 1977, **Chapter 70.116 RCW**, having been properly initiated through the provisions of **RCW 70.116.040.**

WHEREAS, Such an Agreement is required in **WAC 248-56-730**, Service Area Agreements-Requirements, of the Public Water System Coordination Act; and

WHEREAS, Designation of retail water utility service areas, together with the cooperation of adjacent water utilities, will help assure that time, effort, and money are best used by avoiding unnecessary duplication of service; and

WHEREAS, Definite future water utility retail service areas will facilitate efficient planning for, and provision of, water system improvements within Kitsap County as growth occurs; and

WHEREAS, Definite retail utility service areas will help assure that water reserved for public water supply purposes within Kitsap County will be utilized in the future in an efficiently planned manner; and

WHEREAS, no separate legal or administrative entity will be created by this Agreement;

NOW, THEREFORE, the undersigned parties, having entered into this Agreement by their signature, concur with and will abide by the following provisions:

Section 1. **Water Utility Retail Service Area Boundaries** The undersigned acknowledge that the Kitsap County Water Utility Retail Service Area Map(s) included as Attachment A to this Agreement, identify the current and future area of retail water utility service and planning responsibilities for the designated utility. The undersigned further acknowledge that there are no retail service area conflicts with adjacent water utilities, or, where such conflict exists, agrees that no new water service will be extended within disputed areas until such conflicts are resolved. Retail service area conflicts are noted on **Attachment A.**

Section 2. **Common Water Utility Retail Service Areas** It is understood that utilities may agree to special service arrangements inside certain areas. Such common retail service areas, if they exist, are described in **Attachment B** to this agreement. Also included in **Attachment B** are copies of, or a list of, all associated resolutions, ordinances, or agreements.

Section 3. **Water Utility Retail Service Area Boundaries** will normally be along parcel boundaries. Exceptions are noted in **Attachment A.**

Section 4. **Boundary Streets** Unless separate agreements exist with adjacent water utilities, the party agrees that the utility, which is located to the north and/or east of boundary line streets between adjacent water utilities, will be entitled to provide future retail water utility service on both sides of those streets. Depth of service on boundary streets shall be limited to one platted lot or as otherwise agreed by the utilities. Existing services on boundary streets shall remain as connected unless both parties, as per **Section 2**, agree to transfer of service. These provisions do not disallow the placement of mains in the same street by adjacent utilities where geographic, economic, or other constraints make such placement desirable.

Section 5. Boundary Adjustments If, at some time in the future, it is in the best interest of adjacent water utilities to make retail service area boundary adjustments, such modifications must be by modified water utility service area agreements executed by the involved utilities. The modified agreements must be signed and filed with KCHD and DOH. A copy will be forwarded to Kitsap Public Utility District for inclusion in the countywide retail service area map. It is understood by the designated utility that it may decline to provide service within its water utility retail service area boundary, but in that case, an applicant may be referred to other adjacent utilities, or to a state certified Satellite Management Agency (SMA), or a new utility may be created. The original water utility retail service area boundary will be adjusted accordingly.

Section 6. Service Extension Policies The undersigned utility agrees that in order to expand its current water utility retail service area, other than by addition of retail customers to existing water mains, or to serve in the capacity of a state certified SMA, it shall have adopted design standards and utility service extension policies. The design standards shall meet or exceed the Kitsap County Coordinated Water System Plan Minimum Standards and Specifications.

Section 7. Systems Placed in Receivership State law provides that whenever an action is brought in superior court to place a public water system in receivership, the petition to the court shall name candidates for receiver who have consented to assume operation of the water system. The undersigned water utility agrees to be named as receiver in such action initiated for systems surrounded by its water utility retail service area. By this consent, the undersigned does not waive its rights to appear and participate in the court proceedings to determine acceptable conditions of receivership.

This agreement by reference includes the following attachments:

Attachment A: Kitsap County Water Utility Retail Service Area Map. (See **Section 1**)

Attachment B: Common Service Area Agreement - Optional - Utility may attach copies or list such agreements if relevant. (See CWSP **Section 2**)

IN WITNESS WHEREOF, the undersigned parties acknowledge having the authority to, and have executed this Agreement as of _____.

_____	_____
Water Utility	Adjacent Water Utility
_____	_____
Representative	Representative
_____	_____
Title	Title

(add places for signatures as necessary to accommodate all adjacent purveyors)

Receipt Acknowledged and adjacent purveyor concurrence certified:

_____
(KCHD)

_____

Date

Exhibit 3-3A

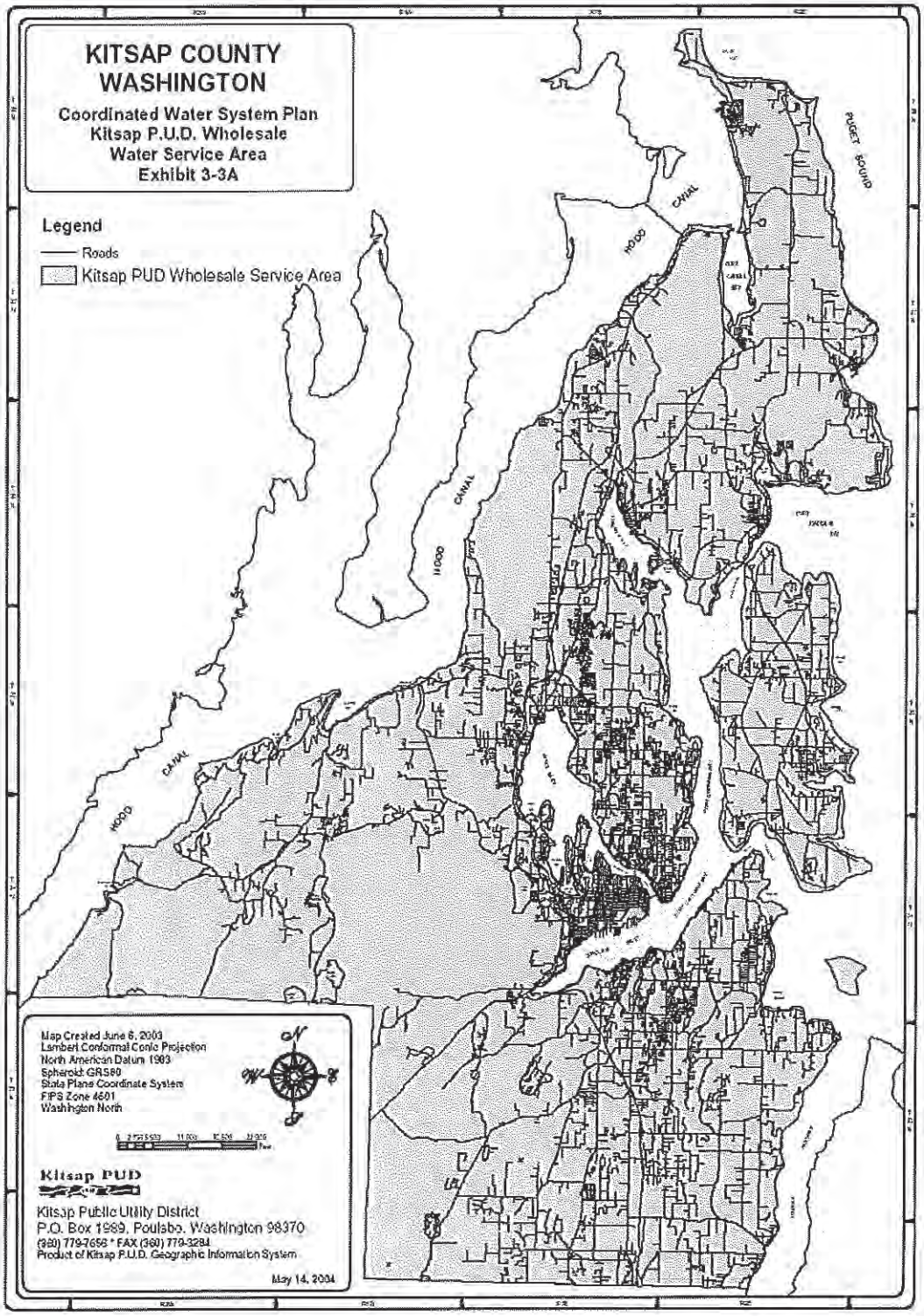
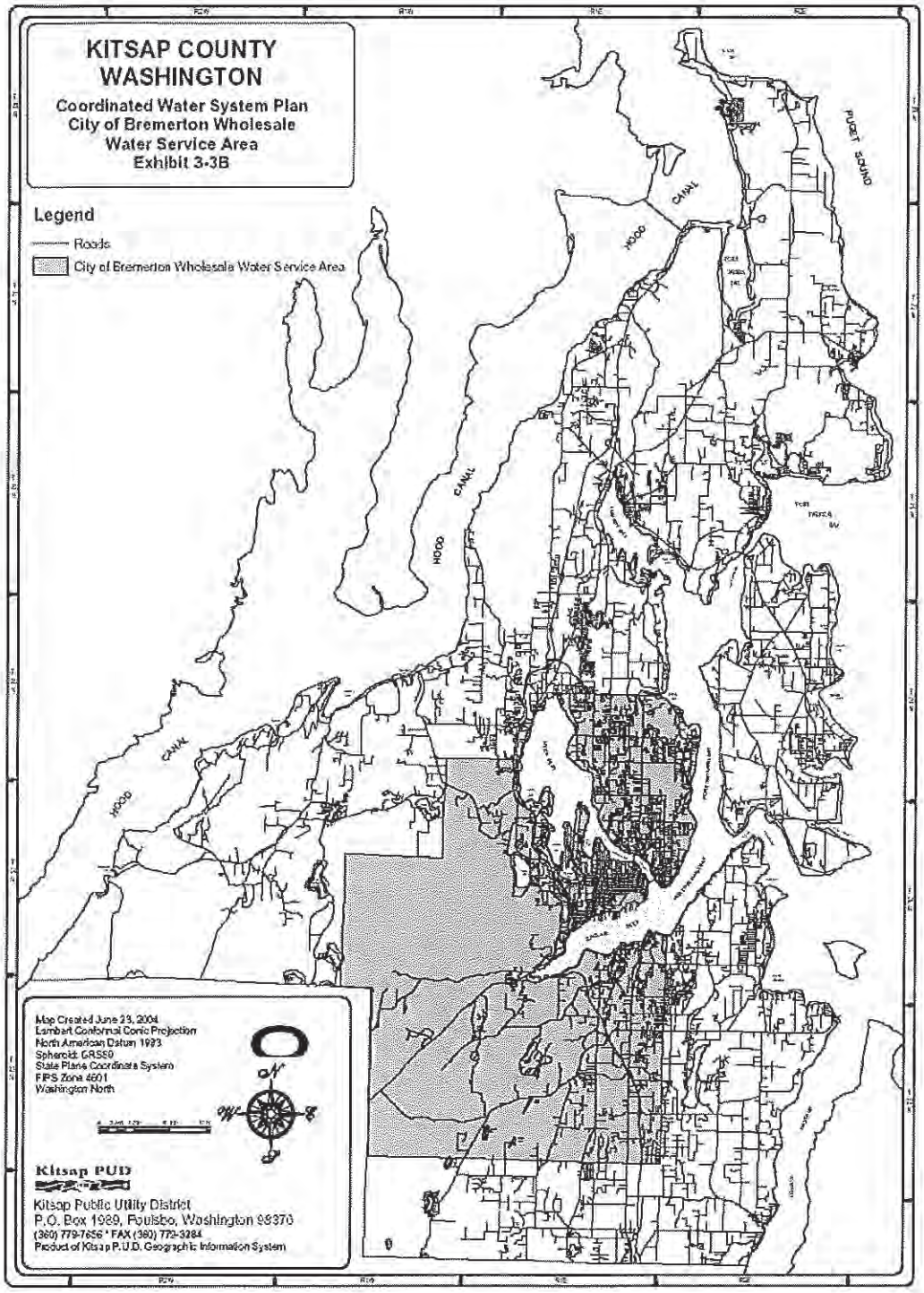

KITSAP COUNTY
WASHINGTON
Coordinated Water System Plan
Kitsap P.U.D. Wholesale
Water Service Area
Exhibit 3-3A
Legend
Roads
Kitsap PUD Wholesale Service Area
PUGET SOUND
HOOD CANAL
Map Created June 6, 2003
Lambert Conformal Conic Projection
North American Datum 1983
Spheroid GRS80
State Plane Coordinate System
FIPS Zone 4601
Washington North
Kitsap PUD
Kitsap Public Utility District
P.O. Box 1989, Poulsbo, Washington 98370
(360) 779-7656 * FAX (360) 779-3284
Product of Kitsap P.U.D. Geographic Information System
May 14, 2004

Exhibit 3-3B


KITSAP COUNTY
WASHINGTON
Coordinated Water System Plan
City of Bremerton Wholesale
Water Service Area
Exhibit 3-3B
Legend
Roads
City of Bremerton Wholesale Water Service Area
PUGET SOUND
HOOD CANAL
Map Created June 23, 2004
Lambert Conformal Conic Projection
North American Datum 1983
Spheroid: GRS80
State Plane Coordinate System
FIPS Zone 4601
Washington North
Kitsap PUD
Kitsap Public Utility District
P.O. Box 1989, Poulsbo, Washington 98370
(360) 779-7656 * FAX (360) 779-3284
Product of Kitsap P.U.D. Geographic Information System

AGREEMENT REGARDING USE OF WELL 4B WATER RIGHTS

AND RESCISSION OF ASSIGNMENT

C053-14

This Agreement Regarding Use of Well 4B Water Rights and Rescission of Assignment (Agreement) is dated for reference purposes only April 22, 2014 and is executed by and between the City of Port Orchard (City), a municipal corporation, and C&M Golf, LLC (C&M Golf), a Washington corporation. Collectively the City and C&M Golf are referred to as the Parties.

RECITALS

A. Well 4B is a water well that discharges water at a rate of 400 gpm to nearby North Lake where the water is pumped into the McCormick Woods golf course irrigation system, which is owned and operated by C&M Golf; and

B. On September 1, 1998, the City and McCormick Water Company entered into an agreement whereby the City purchased the assets of McCormick Water including but not limited to Wells 1, 2, and 3 as well as pending water right applications; and

C. Pursuant to the terms of the 1998 Agreement McCormick Water retained the right to draw from Well 4B, at no charge, up to 56.1 million gallons of water per irrigation season until it received a permanent water right for an alternative source or December 31, 2002, whichever came first; and

D. On November 25, 2002, the City and McCormick Land Company amended the 1998 Agreement so as to extend the date that McCormick could withdraw water from Well 4B until not later than December 31, 2012; and

E. On April 25, 2003, the City and McCormick Woods Partners executed an agreement whereby McCormick assigned its rights in water right application G1-26447 (Well 4B) to the City to process with the Washington Department of Ecology and the City agreed to assign the water right for Well 4B back to McCormick upon receipt of the water right permit (2003 Agreement); and

F. On September 3, 2003 C&M Golf purchased the assets of the McCormick Woods golf course including but not limited to the rights and obligations held by McCormick under the terms of the agreements entered into between the City and McCormick in 1998, 2002, and 2003; and

G. In or around December 2005, the Washington Department of Ecology approved four water right applications submitted by the City, including application number G1-26447 (Well 4B); and

H. The water right issued to the City pursuant to application number G1-26447 (Well 4B Permit) allows for a maximum instantaneous withdrawal rate of 400 gpm and a maximum annual quantity of 645 acre feet per year; provided, the total annual withdrawal from the City's water system shall not exceed 3,528 acre feet per year; and

I. On May 5, 2008, the City and C&M Golf executed an Assignment of Application or Permit to Appropriate or Store Water (2008 Assignment), in conformance with the 2003 Agreement between the City and C&M Golf's predecessor in interest, McCormick Woods Partners, whereby the City assigned the water right permit for Well 4B to C&M Golf; and

J. The Parties acknowledge that the 2008 Assignment was invalid and must be rescinded because the transfer was contrary to the Department of Ecology's approval of the Well 4B Permit and its certification of the total annual quantity of water that can be withdrawn by the City as part of its municipal water system; and

K. The City and C&M Golf now desire to enter into an agreement restoring the Parties to their positions prior to the 2008 Assignment as it relates to the Well 4B Permit and the withdrawal of water for irrigation purposes, and addressing other matters relating to the City's operation of its municipal water system and C&M Golf's operation of the irrigation system for the McCormick Woods golf course.

NOW, THEREFORE, in consideration of the recitals set forth above, which are made a substantive part of this Agreement, and the mutual obligations set forth below, the City and C&M Golf agree as follows:

AGREEMENT

1. **Rescission of 2008 Assignment of Well 4B Permit.**

1.1. The Parties acknowledge and agree they mistakenly believed the City could transfer the Well 4B Permit to C&M Golf without reducing the City's right, as certified by the Department of Ecology, to withdraw 3,528 acre-feet per year from all City water sources. As a result of this mutual mistake, the Parties agree to rescind the 2008 Assignment, a copy of which is attached as Exhibit A and incorporated by this reference, and do hereby release each other from all obligations associated with the 2008 Assignment.

1.2. The Parties agree to cooperate with each other and to execute such documents as the Department of Ecology may require the Parties to file to verify the rescission of the 2008 Assignment.

1.3. The Parties agree that the Well 4B Permit shall be available to serve the City's municipal water system and that, except as provided in Section 2 below, the maximum acre feet per year of water that can be appropriated pursuant to the Well 4B water right shall be withdrawn from City municipal wells.

2. **Perpetual Water Usage by C&M Golf.**

2.1. Upon execution of this Agreement and such documents as the Department of Ecology may require, the City and C&M Golf hereby agree to the following concerning the right to appropriate or store water from the Well 4B water right:

2.1.1. C&M Golf shall have the perpetual right to withdraw up to 225 acre feet per year of water from Well 4B without having to pay the water rate consumption charges set forth in Chapter 13.04 "Water and Sewers" of the Port Orchard Municipal Code, as now or hereafter amended. A year shall mean January 1 through December 31.

2.1.2. C&M Golf's water usage from Well 4B shall only be used to serve the McCormick Woods golf course irrigation system.

2.1.3. C&M Golf's right to withdraw 225 acre feet per year water shall be in effect for as long as the City holds the right to withdraw 225 acre feet per year or more of water from Well 4B pursuant to Application/Permit Number G1-26447, as now or hereafter amended.

2.1.4. In the event C&M Golf's annual consumption of water exceeds 225 acre feet, C&M Golf shall pay the water rate consumption subject to the requirements of Chapter 13.04 "Water and Sewer" of the Port Orchard Municipal Code, as now or hereafter amended.

2.1.5. Except as otherwise provided in this Agreement, C&M Golf shall be subject to the requirements of Chapter 13.04 "Water and Sewer" of the Port Orchard Municipal Code, as now or hereafter amended.

3. **Ownership of Well 4B Site and Equipment.**

3.1. Well 4B, together with all associated structures, equipment, controls, pumps, engines, and pipes, is among the assets of the McCormick Woods golf course irrigation system, which assets are owned by C&M Golf.

3.2. Well 4B is located on real property owned by C&M Golf.

3.3. The City has no legal or equitable interest in the McCormick Woods golf course irrigation system or the real property on which the system is located and no such interest is created by this Agreement.

4. **Operation, Maintenance, and Repair of Well 4B.**

4.1. C&M Golf shall be solely responsible for the cost of operating, maintaining, and repairing Well 4B, and all associated structures, equipment, controls, valves, pumps, engines, and pipes, including but not limited to compliance with federal, state, and local regulations, as applicable, for their water usage of up to 225 acre feet per year.

4.2. On or before the date this Agreement is executed, C&M Golf shall install, and shall thereafter maintain and/or repair, a measuring device for the withdrawal of water from Well 4B in accordance with "Requirements for Measuring and Reporting Water Use," Chapter 173-173 WAC.

4.2.1. After twenty-four (24) hours' notice from the City (except in cases of emergency, when no notice shall be required), C&M Golf shall permit City and its agents, employees and contractors to access the Well 4B site for the purposes of reading the Well 4B water meter. Provided, this section shall not impose any repair or other obligation upon the City not expressly stated elsewhere in this Agreement.

5. **Option to Purchase Well 4B**. In further consideration of the obligations and responsibilities set forth in this Agreement, C&M Golf hereby grants to City an exclusive option to purchase Well 4B, together with all associated structures, equipment, controls, pumps, engines, and pipes, under the terms and conditions set forth below, free of encumbrances of any nature except covenants, conditions, and restrictions of record.

5.1. This option may only be exercised if C&M Golf notifies City in writing that it no longer requires the use of water drawn from Well 4B for the allowable purpose set forth in this Agreement.

5.2. Upon receipt of the notice described above:

5.2.1. The City shall have 30 calendar days to exercise the option by notifying C&M Golf in writing; and

5.2.2. The City shall have the right to access Well 4B for inspection, tests, evaluation, and other purposes incidental to determining the feasibility of Well 4B for the City's intended use. All such costs of inspection, tests, or evaluation shall be paid by City.

5.3. The purchase price for Well 4B shall be negotiated by the Parties at the time the option is exercised. If the Parties cannot agree on a purchase price, the Parties shall select one person who is knowledgeable concerning the construction, operation, and maintenance of water wells in the state of Washington to appraise Well 4B and determine a fair market value, which shall be binding on the Parties.

5.4. The Parties shall cooperate in the preparation, execution, and filing (if necessary) of any documents required to effect the sale of Well 4B to the City.

6. **Effective Date**. The effective date of this Agreement shall be January 1, 2013.

7. **Assignment**. C&M Golf's right to assign or transfer its rights and obligation under this Agreement shall be limited to a third party purchaser of the golf course and the assignment or transfer shall be subject to the City's consent, which consent shall not be unreasonably withheld.

8. **Termination**. This Agreement and C&M Golf's right to withdraw up to 225 acre feet of water per year from Well 4B shall terminate upon the occurrence of any one or more of the following events:

   8.1. Upon the written agreement of the Parties;

   8.2. C&M Golf breaches the terms of this Agreement;

   8.3. Upon the closing of the sale of Well 4B to the City as provided in Section 5; or

   8.4. The City no longer holds the right to withdraw 225 acre feet per year or more of water from Well 4B pursuant to Application/Permit Number G1-26447, as now or hereafter amended; provided, however, the City will not intentionally terminate Permit Number G1-26447 if doing so would jeopardize C&M Golf's right to withdraw 225 acre feet per year of water from Well 4B, unless otherwise agreed by the parties.

9. **Reclaimed Water**. Both parties agree to work in good faith to utilize reclaimed water as a replacement source when reclaimed water becomes available.

10. **Warranties and Representations of C&M Golf**. C&M Golf hereby makes the following representations and warranties to City, which representations and warranties are made for the express purpose of inducing City to enter into this Agreement. Unless explicitly stated otherwise, all of the warranties and representations shall be continuing.

    10.1. C&M Golf is a corporation duly organized, validly existing and in good standing under the laws of the State of Washington and has the corporate power and authority to own or lease its properties and to carry on its business as now being conducted. C&M Golf has full power and authority to execute and deliver this Agreement and consummate the transactions contemplated hereby. This Agreement is the valid and legally binding agreement of C&M Golf.

    10.2. C&M Golf is in compliance with all laws and regulations which pertain to the operation of its business, the violation of which would have a material adverse effect on the transfer of the Well 4B Permit.

    10.3. The Well 4B Permit is free and clear of all encumbrances, security interest, liens, charges, conditional sales agreements, or claims by any person of any kind.

10.4. There are no claims or litigation against C&M Golf and/or its officers or directors, actual, pending or threatened, from any party, including creditors, which may materially and adversely affect the transfer of the Well 4B Permit.

11. **Warranties and Representations of City**. The City hereby makes the following representations and warranties to C&M Golf, which representations and warranties are made for the express purpose of inducing C&M Golf to enter into this Agreement. Unless explicitly stated otherwise, all of the warranties and representations shall be continuing.

11.1. City is a municipality duly authorized, validly existing, and in good standing under the laws of the state of Washington.

11.2. The execution and delivery of this Agreement and all agreements and documents contemplated herein by City, and the consummation by it of the transaction contemplated hereby, have been duly authorized by requisite municipal action.

12. **Indemnification**.

12.1. C&M Golf's Indemnity.

12.1.1. C&M Golf agrees to and shall indemnify, defend, and hold City, its elected officials, employees, agents, and representatives, harmless from and against any and all loss, damage, or expense, including attorney's fees, arising from C&M Golf's negligence or any misrepresentation made, or breach of warranty given or covenant made in this Agreement.

12.2. City's Indemnity.

12.2.1. City agrees to and shall indemnify, defend, and hold C&M Golf, its, employees, agents, and representatives, harmless from and against any and all loss, damage, or expense, including attorney's fees, arising from City's negligence or any misrepresentation made, or breach of warranty given or covenant made in this Agreement.

12.3. Nothing in this section shall be construed to create a liability or a right of indemnification in any third party.

13. **Notices**. All notices, requests, demands and other communications hereunder shall be in writing and shall be deemed to have been duly given if delivered or if mailed, by United States certified or registered mail, postage prepaid, to the parties or their representatives at the following addresses.

If to C&M Golf:

Shawn Cucciardi

C&M Golf, LLC

5155 McCormick Woods Drive SW

Port Orchard, WA 98366

360-895-0142

If to City:

Mayor Tim Matthes

216 Prospect Street

Port Orchard, WA 98366

360-876-4407

With a copy to:

Gregory A. Jacoby

City Attorney

McGavick Graves, P.S.

P.O. Box 1317

Tacoma, WA 98401

253-627-1181

14. **Miscellaneous.**

14.1. This Agreement (including all exhibits) supersedes all oral statements and prior written agreements and contains the entire agreement among the Parties with respect to the subject matter hereof.

14.2. No change or modification of this Agreement shall be valid unless the same is in writing and is signed by authorized representatives of the Parties.

14.3. This Agreement shall be binding upon, and inure to the benefit of the respective legal representatives, beneficiaries, successors, and assigns of C&M Golf and the City.

14.4. This Agreement shall be construed and enforced in accordance with the laws of the state of Washington.

14.5. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. Facsimile copies of this Agreement may be signed as counterpart originals.

14.6. The parties agree the venue of any suit or action between them will be in Kitsap County Superior Court.

IN WITNESS WHEREOF, the Parties have duly executive this Agreement on the date first written above.

CITY OF PORT ORCHARD

By: Cindy Lucarelli

Tim Matthes, Mayor

Cindy Lucarelli, Mayor Protem

ATTEST:

By:

C&M GOLF, LLC

By:

Shawn Cucciardi

Its: MANAGER

Brandy Rinearson, City Clerk

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

ASSIGNMENT OF APPLICATION OR PERMIT TO APPROPRIATE OR STORE WATER

A NON-REFUNDABLE $50.00 FEE MUST ACCOMPANY THE FILING OF THIS ASSIGNMENT.
Please read the instructions on the back of this form

1. I/We, City of Port Orchard, the holder(s) of the application or permit number G1-26447 for the appropriation of the waters of McCormick Woods Well 4B, do assign, transfer and set over to C&M Golf, LLC all, that portion described within an attachment to this assignment, of my right, title and interest therein.

2. This assignment is being made for the following reason(s):

Prior contractual agreement

3. This assignment relates to the following property identified as all or a portion of the place of use within the application/ permit being assigned: County Parcel Number(s): See attachment, located within Kitsap County, Section 9, Township 23 N., Range 1, E. W. M.

4. [X] The permit includes a development schedule. The development schedule can be met.

[ ] The development schedule cannot be met and I've included a proposal for a new development schedule.

5.

Application or permit holder(s):	Assignee(s):
Hon. Larry Coppola	Shawn Cucciardi
Mayor, City of Port Orchard	C&M Golf, LLC
Address:	Address:
216 Prospect Street	5155 McCormick Wolds Drive SW
Port Orchard, WA 98366	Port Orchard, WA 98366
Phone: (360) 876-4407	Phone: (360) 895-0142

6. Notary Signature:

State of Washington
County of Kitsap
I, Larry Coppola, being first sworn, disposed and say that I have read the above assignment of application or permit to appropriate or store water; that I know the contents thereof; and that the facts therein stated are true.

IN WITNESS WHEREOF, I have hereunto set my hand this 5 day of May, in the year 2008.

Applicant(s)/Permittee(s)

Applicant(s)/Permittee(s)

Subscribed and sworn before me this 5 day of May, in the year 2008

JENNIFER L. CHRISTIE NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES 02-27-12

Notary Signature

My appointment expires 2-27-12

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.

INTERLOCAL AGREEMENT FOR PURCHASE AND SALE OF ASSETS IN THE 580 ZONE

This Interlocal Agreement ("Agreement") is entered into by and between the City of Bremerton, a municipal corporation of the first class ("Bremerton"), and the City of Port Orchard, a municipal corporation of the first class ("Port Orchard").

RECITALS

WHEREAS, Bremerton and Port Orchard each own and operate separate 580 Zone water systems that are contiguous to each other; and

WHEREAS, Bremerton and Port Orchard share the use of an existing 16" water transmission main (Transmission Main) and an existing 0.45 MG storage reservoir ("Reservoir") located within the 580 Zone under the terms of an existing interlocal agreement; and

WHEREAS, Port Orchard currently owns, operates and maintains the 580 Zone Transmission Main, Reservoir, and underlying 4.63-acre property listed under tax parcel number 082301-2-001-2005 ("Property") as shown on **Exhibit A**; and

WHEREAS, Port Orchard currently owns, operates and maintains an 8" water distribution main and fire hydrant ("Distribution Main") serving McCormick Village Park within Bremerton Water Service Area, which must be conveyed to Bremerton in accordance with the Kitsap County Coordinated Water System Plan; and

WHEREAS, Port Orchard is constructing additional storage within its 580 Zone, which will allow for the surplus sale of the above-mentioned Reservoir, Transmission Main, Property, and Distribution Main to Bremerton; and

WHEREAS, Bremerton desires to purchase, own, operate, and maintain the City of Port Orchard's existing 580 Zone Reservoir, Transmission Main, Distribution Main, and Property; and

WHEREAS, Bremerton currently has an easement, recorded under Auditor's File Number 201006020014, which allows for the future construction of water storage reservoirs on property which is owned by Port Orchard and listed under tax parcel number 072301-1-006-2003, adjacent to the Property, as shown on **Exhibit A**; and

WHEREAS, Bremerton desires to purchase Port Orchard's 580 Zone Transmission Main, Reservoir, Property, and Distribution Main through the sale and delivery of water to Port Orchard in the 580 Zone on an interim basis, until system improvements are completed that will allow for the separation of the two systems; and

WHEREAS, Bremerton currently sells water to Port Orchard in the 580 Zone, and there is an existing agreement in place that establishes the water volumes and flowrates which apply to the sale of water to Port Orchard attached as **Exhibit B**; and

WHEREAS, Port Orchard owns Well 11 in the 580 Zone for which Port Orchard has secured Permits to Appropriate Public Waters equal to 750 gallons per minute and is pursuing the development of Well 11 to replace the current shallow Wells 1, 2, and 3; and

WHEREAS, Port Orchard has required McCormick Communities to drill and pump test the future Well 12 in the 580 Zone; and

WHEREAS, Bremerton and Port Orchard wish to define the terms and conditions by which Port Orchard will purchase water and Bremerton, in turn, will assume ownership, operations, and maintenance of the City of Port Orchard's 580 Zone Reservoir, Transmission Main, Distribution Main, and Property; and

WHEREAS, the South Kitsap School District owns real property for the development of a future high school (School Site) which will require substantial fire flow. This property is listed under tax parcel number 0523010-3-037-2004; and

WHEREAS, it is Bremerton and Port Orchard's desire to reduce above average water use in Port Orchard's 580 Zone;

NOW, THEREFORE, based upon the above recitals, and in consideration of the mutual covenants contained herein, the parties hereby warrant, covenant, and agree as follows:

AGREEMENT

1. Existing and Future Agreements.

1.1 Existing 580 Zone Agreement. The existing Interlocal Agreement for Cooperative Water System Development in the Port Orchard 580 Zone/Bremerton 580 Zone date December 26, 2001 is hereby terminated. (See **Exhibit B**)

I.2 Future Emergency Intertie. Port Orchard and Bremerton agree to consider an emergency intertie agreement at the conclusion of this Agreement.

2. Assets Purchased and Liabilities Assumed.

2.1 Assets Purchased. On the terms and conditions hereinafter set forth, Bremerton agrees to purchase from Port Orchard, and Port Orchard agrees to sell to Bremerton, all of the assets of Port Orchard relating to the existing 0.45 MG Reservoir; existing 16-inch Transmission Main; existing 8" Distribution Main, Fire Hydrant and Meters in McCormick Village Park; and Tax Parcel 082301-2-001-2005 (the "Purchased Assets"), as listed in **Exhibit C**, upon completion and agreement of the below:

a. A new Port Orchard 580 Zone water storage reservoir will be completed on tax parcel 072301-1-006-2003 by April 30, 2021.

b. Port Orchard will continue the active operation and maintenance of the existing Reservoir; Transmission Main; Distribution Main; and Property including all scheduled maintenance and inspections until the transfer of ownership to Bremerton is complete.

c. Bremerton will vacate the Water Reservoir Easement on tax parcel 072301-1-006-2003 and recorded under auditors file number 201006020014, attached in **Exhibit A**.

d. Port Orchard will modify the existing drain piping for the Reservoir to allow shared use of the drainage pipe and pond, if necessary, as shown in **Exhibit A.**

e. Port Orchard will grant to Bremerton an easement for the 8" Distribution Main, Fire Hydrant and three Water Meters serving McCormick Village Park.

2.2 These improvements allow the complete separation of the two water systems with the exception of any service connection or emergency intertie allowed by the two parties. The sale of the Purchased Assets shall be by a Deed of Conveyance in the form of **Exhibit D** attached hereto and no warranty as to the condition of the Purchased Assets shall be provided. The real estate associated with the purchased assets shall be conveyed by Quit Claim Deed in the form of **Exhibit E** attached hereto.

2.3 Assignment of Contract Rights. Contract rights and licenses relating to the Purchased Assets shall be assigned to Bremerton pursuant to such instruments of assignment as are mutually acceptable to and agreed by Bremerton and Port Orchard and their respective legal counsel. Port Orchard shall obtain any required consents or waivers with respect to such assignments at or prior to Closing.

3. Purchase Price.

The total purchase price for Purchased Assets is established as **$804,000** and will be paid on the basis of the value of water sold to Port Orchard over an extended period of time as outlined below:

3.1 Purchased Assets Value. The value of the Reservoir and Property tax parcel #082301-2-001-2005 (including appurtenances) is established at $434,000.

3.2 Purchased Asset Value. The total length of the transmission main is 6,900 feet. The value of the asset is established at $345,000.

3.3 Purchased Asset Value. The value of the Distribution Main, Fire Hydrant and three Water Meters serving McCormick Village Park is established at $25,000. The total length of the distribution main is approximately 330 feet. An easement shall be provided to Bremerton.

3.4 Water Value. The value of the water supplied to the Port Orchard 580 Zone by Bremerton shall be calculated at 95% of Bremerton's most current published outside retail water service rates with no monthly service charge.

4. Rate of Water Supplied to Port Orchard by Bremerton.

Bremerton agrees that water supplied to Port Orchard between the effective date of this Agreement and the completion of the new Port Orchard 580 Zone Reservoir, Well 11, and Well 12 improvements (the date on which the last component is completed or the expiration of the Term of this Agreement pursuant to Section 10 below, whichever occurs first) shall be 750 Gallons Per Minute (GPM) as the maximum rate of supply required to supplement and deliver Port Orchard's Maximum Day Demand. This commitment shall not survive the Term of this Agreement.

Port Orchard and Bremerton agree to cooperatively provide adequate fire flow to the School Site. Bremerton agrees to collaborate with Port Orchard when determining the fire flow capacity available from both utilities. Any infrastructure required to provide adequate fire protection will be determined by both Bremerton and Port Orchard.

5. Water Quality.

Bremerton agrees to deliver water to Port Orchard at the purity and quality in effect for residential customers of Bremerton. Port Orchard agrees to deliver water to Bremerton at the purity and quality in effect to residential customers of Port Orchard, except that water delivered by Port Orchard to Bremerton shall not be fluoridated. In the event of water quality problems in either system, Bremerton and Port Orchard agree to work cooperatively and diligently to determine the source/location of the problem and correct it. Regardless of the source/location of water quality problems, each party agrees to assume the cost of correcting water quality problems within its own system.

6. Port Orchard Commitment for Source and Storage.

Port Orchard agrees to ensure that the new Port Orchard 580 Zone Reservoir is completed and operational by April 30, 2021. Port Orchard agrees to prepare complete bid ready PS&E for the Well 11 Project in 2020 and pursue construction in 2021. Port Orchard has secured a commitment from McCormick Communities for the construction of Well 12.

6.1 McCormick Village Splash Pad. Port Orchard agrees to retrofit the Splash Pad at McCormick Village Park with a recirculating water supply system by April 30, 2021.

6.2 McCormick Village Park. Bremerton agrees not to charge Port Orchard for water used at McCormick Village Park until May 1, 2021 at which time Bremerton will assume ownership of any Water Meters serving said Park.

6.3 Port Orchard Water Conservation Program. Port Orchard will establish and

implement a Water Conservation Program designed for the users of the McCormick Woods Water System. The goal of this program is to reduce domestic water consumption in the Port Orchard 580 Zone. Conservation efforts by Port Orchard will be enumerated in the annual Water Use Efficiency report to the Office of Drinking Water and is available online through Sentry Internet on the Office of Drinking Water website.

6.4 Drought Conditions. During drought conditions or other supply shortages suffered by Bremerton for any reason, it is agreed that Port Orchard customers supplied with water will comply with similar restrictions and conservation measures required or requested of Bremerton customers according to Bremerton's Water Shortage Contingency Plan.

6.5 Alternative Sources. Port Orchard agrees to actively pursue the development of alternative sources for the 580 Zone. Projects for consideration to accomplish this include installing an intertie between Port Orchard's 390 and 580 Zones and development of an alternative and/or additional well site.

7. Accounting.

7.1 Accounting for Water Supplied to Port Orchard in the 580 Zone. Bremerton will provide a quarterly accounting of Port Orchard's water consumption in the 580 Zone and billing under the existing agreements located in **Exhibit B** but defer any payment by Port Orchard until the purchase price of the Reservoir, Property, Distribution Main, and Transmission Main has been satisfied in accordance with this Agreement. The quantity of water delivered to Port Orchard shall be determined by Bremerton by deducting the volume measured by the three 10-inch master meters (Account numbers 4647120, 4647110, 4647090) from the total volume delivered by Pump Station 2A as measured by the pump station mag meter (Account number 4626960).

7.2 Value of Water Supplied to Port Orchard. Bremerton will provide an accounting at the end of each year that identifies the value of water consumed by Port Orchard which has been applied to the amount owed by Bremerton.

8. Taxes.

8.1 Taxes Resulting from Sale. To the extent applicable to this transaction, Bremerton shall be responsible for and shall pay at closing all local and state use or excise taxes that are applicable on the sale of the Purchased Assets to Bremerton, if any. Bremerton and Port Orchard agree to split equally the excise taxes due on the real property conveyed by Port Orchard to Bremerton.

8.2 Prior Taxes Owing. Port Orchard shall be responsible for all personal property taxes, B&O taxes, and other taxes owing in connection with the conduct of Port Orchard's business prior to Closing.

9. Closing Date and Delivery Date of the Assets.

The Closing shall be scheduled at such time as mutually agreed that the physical separation of the two water systems is possible without a detrimental effect on either system. At the Closing, Port Orchard shall deliver to Bremerton the Deed of Conveyance in the form attached hereto as **Exhibit D** and shall convey the real estate by Quit Claim deed in the form attached hereto as **Exhibit E.**

10. Term.

It is understood by both parties that this Agreement should remain in effect until such time that Port Orchard has acquired adequate source to provide water to Port Orchard's 580 Zone. The term of this Agreement shall run from the date of this Agreement until December 31, 2024. Upon written agreement, the term of this Agreement may be extended by the Mayor of each of the parties hereto, for successive one-year terms with the same terms and conditions.

11. Notices.

All notices, requests, demands and other communications hereunder shall be in writing and shall be deemed to have been duly given if delivered or if mailed, by United States certified or registered mail, postage prepaid, to the parties or their assignees at the following addresses (or at such other single address as shall be given in writing by one party to the other):

Notice to Bremerton shall be sent to:
City of Bremerton
Attn: Public Works & Utilities Director
100 Oyster Bay Avenue North
Bremerton, WA 98312

Notice to Port Orchard shall be sent to:
City of Port Orchard
Attn: Public Works Director
216 Prospect Street
Port Orchard, WA 98366

12. Severability.

If any portion of the Agreement or its application is held invalid, the remainder of the Agreement or the application of the remainder of this Agreement shall not be affected.

13. Modification.

This Agreement represents the entire agreement between the parties. No change,

termination, or attempted waiver of any of the provisions of this Agreement shall be binding on either of the parties unless executed in writing by authorized representatives of each of the parties.

14. Benefit.

This Agreement shall be binding upon, and inure to the benefit of, the respective legal representatives, beneficiaries, successors and assigns of Port Orchard and Bremerton. Without limiting the foregoing, Port Orchard's rights hereunder may be enforced by it in its own name. In the event that Bremerton causes the assets and business of Port Orchard to be transferred to some other corporation, the rights of Bremerton and of Port Orchard hereunder may be enforced by such other corporation in its own name.

15. Dispute Resolution.

Any claim by either party against the other related to this Agreement shall be filed in Kitsap County Superior Court. Each party is responsible for its own attorney's fees and litigation costs.

16. Indemnification.

Each party shall defend, indemnify and hold the other party, its officers, officials, employees, agents and volunteers harmless from any and all claims, injuries, damages, losses or suits, including all legal costs and attorney fees, arising out of or in connection with its performance of this Agreement. In cases of concurrent fault of the City and County, the provision requiring each party to defend, indemnify and hold harmless the other party are valid and enforceable only to the extent of the fault of the respective party.

17. Entire Agreement.

This Agreement (including all exhibits and schedules attached hereto and all documents delivered as provided for herein) supersedes all oral statements and representations and contains the entire agreement among the parties hereto with respect to the subject matter hereof and the transactions contemplated hereby.

18. Effective Date.

This Agreement shall become effective upon execution by both parties.

IN WITNESS WHEREOF, the parties below have duly executed this Agreement.

CITY OF BREMERTON

By: Greg Wheeler
its: Mayor

CITY OF PORT ORCHARD

By: Robert Putaansuu
its: Mayor

Date: 11/21/2019
Attest:
Angela Hoover
City Clerk

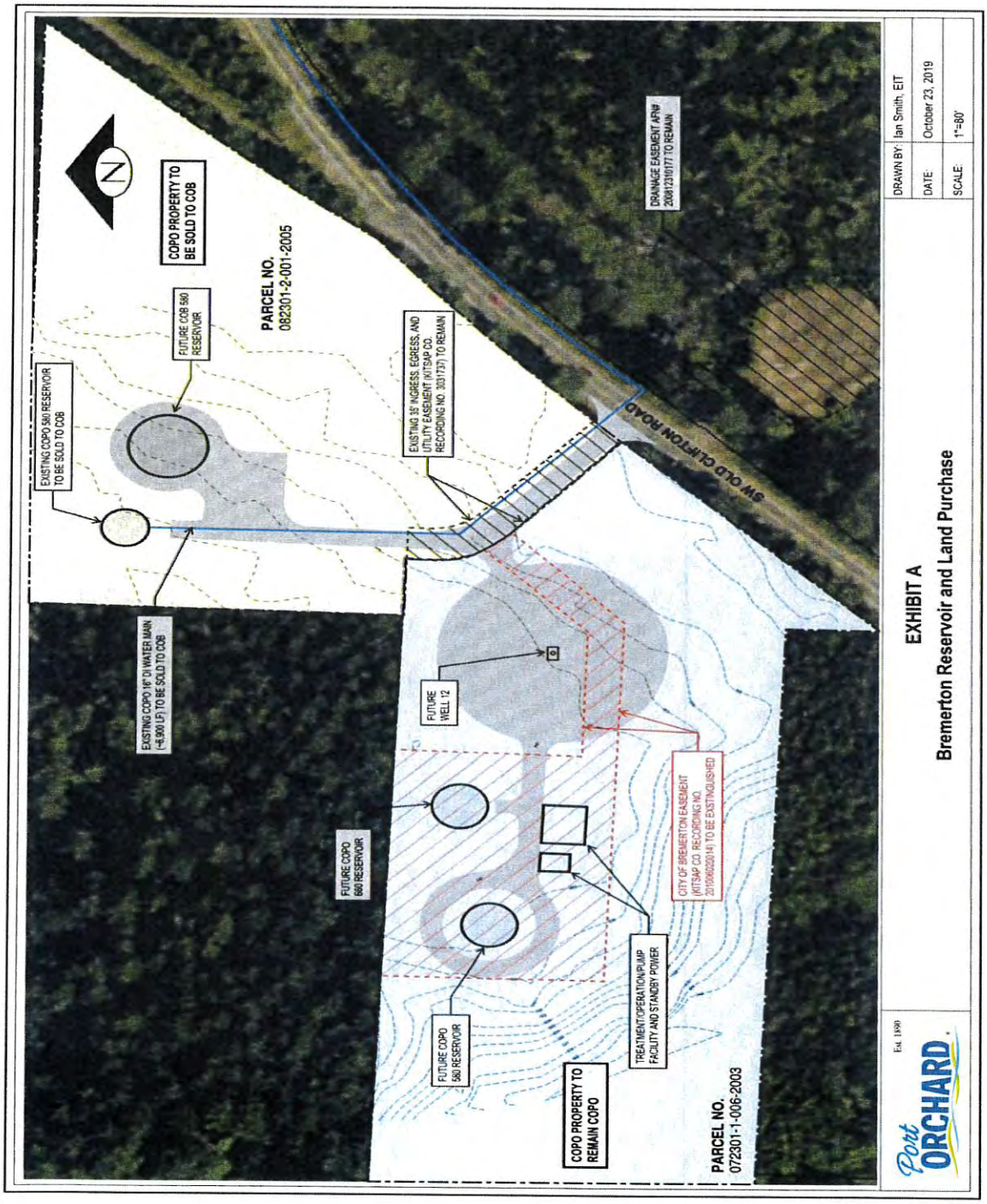
Approved as to form:
Roger A. Lubovich
City Attorney

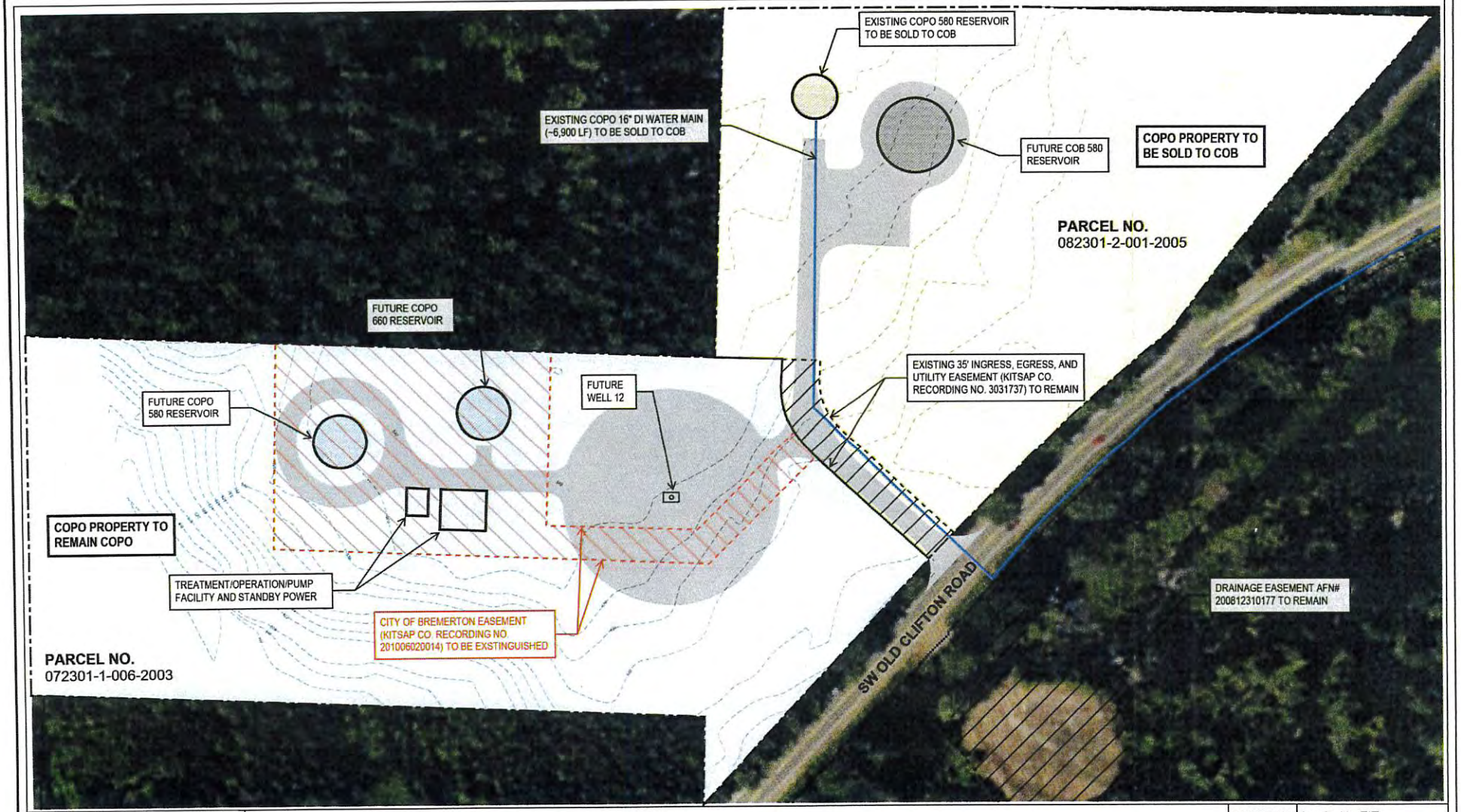
Date: 11/13/2019
Attest:
City Clerk

Approved as to form:
Jennifer S. Robertson
Attorney for Port Orchard

EXHIBIT A

BREMERTON RESERVOIR AND LAND PURCHASE





Port ORCHARD Est. 1890

EXHIBIT A

Bremerton Reservoir and Land Purchase

DRAWN BY:	Ian Smith, EIT
DATE:	October 23, 2019
SCALE:	1"=80'

EXHIBIT B

INTERLOCAL AGREEMENT FOR COOPERATIVE WATER SYSTEM DEVELOPMENT IN THE PORT ORCHARD 580 ZONE/BREMERTON 580 ZONE

INCLUDING ADDENDUM NO. 1 TO INTERLOCAL AGREEMENT

INTERLOCAL AGREEMENT
for
Cooperative Water System Development
In the
Port Orchard 580 Zone / Bremerton 580 Zone

THIS AGREEMENT is made and entered into this 21st day of December, 2001, by and between the CITY OF BREMERTON, a municipal corporation, hereinafter referred to as Bremerton, and the CITY OF PORT ORCHARD, hereinafter referred to as Port Orchard.

FACTUAL BACKGROUND:

1. Port Orchard's 680 zone water system and the Bremerton's 580 zone water system abut at Old Clifton Road.

2. Reliability and Efficiency of Service - Port Orchard and Bremerton desire to provide the highest reliability of service to their customers at reasonable cost. The Cities recognize that water resources are finite and vulnerable and that prudent use and management of these resources can be facilitated by cooperation among water utilities. The Cities agree that cooperation in the construction, operation and management of the water systems that serve the Port Orchard 580 and Bremerton 580 zones will:

- Improve overall system reliability,
- Enhance the manageability of the systems,
- Provide opportunities for conjunctive use of water supplies,
- Delay the need to develop new water sources, and
- Result in cost efficiencies for both systems

3. Deferral/Phasing of Bremerton Infrastructure - Currently, Bremerton has no significant system improvements in its 580 zone. To serve the 580 zone, Bremerton must construct new pumping, storage, transmission and distribution facilities. Port Orchard has existing storage and transmission mains in its 680 zone. These facilities have excess capacity on an interim basis. The Port Orchard 580 and Bremerton 580 zones can be made hydraulically consistent so that the excess capacity of the Port Orchard system can be utilized by Bremerton. Cooperation with Port Orchard will allow phasing of Bremerton system improvements, deferring capital expenditures and reducing the overall system cost.

4. Sharing of Existing Port Orchard Reservoir Site - Bremerton requires a site for a future reservoir to serve its 580 zone. Port Orchard owns a site at the regional topographic high point. The site is large enough to accommodate a future Bremerton reservoir.

5. Elimination of Duplicate Pump Stations - A portion of the Port Orchard service area is too high to be served by the existing Port Orchard 580 zone reservoir. Port Orchard plans to create a new 660 pressure zone, served by a new pump station, to serve this high area. A portion of the Bremerton 580 zone is also too high to be served by its future Bremerton reservoir and

service to this area will also require a new high pressure zone and pump station. It is logical and cost effective to coordinate service to these adjacent high areas so that only a single new high pressure zone and pump station is required.

6. Satisfaction of Port Orchard Water Source Requirements - Port Orchard requires an additional source of supply to satisfy its 2017 system growth projections. Port Orchard has applications pending for additional water rights, but the ultimate disposition of these applications is uncertain. Bremerton has available source of supply to provide to the City of Port Orchard on a long term, uninterruptible basis.

7. RCW 39.34 and 35.92.200 empower Bremerton and Port Orchard to enter into a cooperative agreement for providing outside water service.

IT IS AGREED:

1. **COOPERATIVE WATER SYSTEM DEVELOPMENT PLAN:** Port Orchard and Bremerton agree to cooperate in the design, installation, operation and management of major water system infrastructure and water supply to serve the Port Orchard 580 zone, the Bremerton 580 Zone and the future Port Orchard/Bremerton 660 zone, as outlined in the attached Cooperative Water System Development Plan, (The Cooperative Plan). The Cooperative Plan, which is attached and made a part hereof, has been reviewed and is approved upon adoption of the Interlocal Agreement by the City Councils for Bremerton and Port Orchard.

2. **SERVICE AREA:** Nothing in this agreement is to be construed as changing or altering the water service area boundaries that exist as of the date of this agreement.

3. **RESALE:** Water supplied under this agreement shall not be resold to third party utilities without the prior written consent of the supplying utility.

4. **WATER SUPPLY:**

4200 Feigley Property - Port Orchard agrees to supply water for domestic use and fireflow to the 4200 Feigley Property from its 580 pressure zone via its 16 inch water main in Old Clifton Road, until such time as a separate Bremerton watermain in Old Clifton Road (or its equivalent) is constructed and operational. Fireflow rates/volumes and domestic/ fireflow service pressures supplied by Port Orchard will be a minimum of 1,700 gpm for one hour at a minimum of gradient of 640 at the connection. Bremerton agrees to supply water to Port Orchard, via its 12 inch Campus Parkway watermain (Old Clifton Road connection), to replenish the water supplied by Port Orchard to the 4200 Feigley property. The water supplied by Bremerton to Port Orchard will be delivered at a minimum hydraulic gradient of 580. The volume of water supplied by Port Orchard to the 4200 Feigley property shall be replenished by Bremerton on a continuous basis, or as otherwise agreed to.

660 Zone - Upon implementation of the 660 zone, Port Orchard agrees to supply water for domestic use and fireflow to Bremerton's 660 service area, via the 660 pump station. Fireflow rates/volumes and domestic/fireflow service pressures supplied by Port Orchard will be agreed to and approved by both Port Orchard and Bremerton prior to implementation of the 660 zone. Bremerton agrees to supply water to Port Orchard, via the Campus Parkway connection or reservoir site connection, as applicable, to replenish the water supplied by Port Orchard to Bremerton's portion of the 660 service area. The water supplied by Bremerton to Port Orchard will be delivered at a minimum hydraulic

gradient of 580. The volume of water supplied by Port Orchard to Bremerton's 660 service area shall be replenished by Bremerton on a continuous basis, or as otherwise agreed to.

Fireflow and Emergency Supply - Port Orchard agrees to supply the Bremerton 680 zone with fireflow, via the Old Clifton Road connection or reservoir site connection, as applicable, until such time as a separate Bremerton storage reservoir is constructed and operational. Fireflow will be provided at a maximum rate of 1,700 gpm for a maximum period of 3 hours at a minimum gradient of 540 at the connection.

If either Bremerton or Port Orchard has a need for an emergency water supply (other than fireflow), it shall notify the other utility of this and of the volume required prior to activating the connection between the two systems. Notification of this need may be verbal, but it will be followed up within 10 working days by written confirmation. The emergency supply of water between each system shall not be unreasonably be denied by either party.

The volume of water supplied for fireflow or emergency supply shall be replenished by the receiving utility to the supplying utility within 24 hours after the emergency, or as otherwise agreed to.

Bremerton Uninterruptible Supply to Port Orchard - Beginning on January 1, 2004 (or at a later time agreed by the parties, Bremerton agrees to supply a uninterruptible water supply to the Port Orchard 580 Zone of up to a maximum of 285 ac.-ft. on a yearly basis, at a maximum rate not to exceed 360 gpm, via the Old Clifton Road connection or reservoir site connection, as applicable. This supply is in addition to water supplied by Bremerton to Port Orchard for service of the 4200 Felgley property, the Bremerton 660 zone, emergency purposes or for service of other portions of the Bremerton service area that may be included in this agreement (and served via the Port Orchard system) in the future. The water supplied by Bremerton to Port Orchard will be delivered at a minimum hydraulic gradient of 580. Port Orchard agrees to compensate Bremerton for this long term water supply in accordance with the terms of this agreement.

The water supplied by Bremerton to Port Orchard shall be firm and uninterruptible until such future time as Port Orchard may secure new water rights to replace the Bremerton supply. Port Orchard agrees to make diligent, continuous, best efforts to acquire water rights to replace the Bremerton supply. Nothing in this Agreement shall abrogate Port Orchard's obligation to provide its water supply needs through its own sources at the earliest possible date. Bremerton agrees that if new water rights are not secured, the water supplied by Bremerton will continue indefinitely. For purposes of this Agreement Port Orchard is a wholesale customer of the City of Bremerton and will make no claim to any Bremerton water right.

5. **WATER QUALITY:** Bremerton agrees to deliver water to Port Orchard at the purity and quality in effect for residential customers of Bremerton. Port Orchard agrees to deliver water to Bremerton at the purity and quality in effect for residential customers of Port Orchard, except that water delivered by Port Orchard to Bremerton shall not be fluoridated. In the event of water quality problems in either system, Bremerton and Port Orchard agree to work cooperatively and diligently to determine the source/location of the problem and correct it. Regardless of the source/location of water quality problems, each party agrees to assume the cost of correcting water quality problems in its own system.

6. **COMPENSATION:** For purposes of this agreement the cost of water shall be fixed at ninety-five percent (95%) of Bremerton's County retail rate. In calculating costs, the Master

Connection between the Port Orchard and Bremerton systems shall be assumed to be an 8 inch meter (regardless of actual meter size). For all other connections between the systems, the meter size for billing purposes shall be the actual installed size. All water provided from or to either utility will be charged at this cost, unless otherwise agreed to. Payment for supplied water shall be made monthly by the receiving utility, upon receipt of an invoice from the supplying utility.

Any and all fixed costs for a meter connection shall cease at such time that the receiving utility notifies the supplying utility that the connection is no longer necessary for normal domestic supply. After this notification, if the connection remains in place for purposes of emergency supply, it will not be subject to the fixed cost portion of a rate structure, although any water used for emergency purposes will be subject to the agreed upon unit rate for water use.

This agreement is based on the City of Bremerton's current rate structure, as of the date of this agreement. This rate structure consists of two parts: a fixed cost (based on meter size) and a variable cost (based on the actual volume of water purchased). It is acknowledged that changes to this rate structure may occur during the life of this agreement. It is agreed by the parties that any further rate structure changes to add progressive rates for increased water usage, will accommodate the fact that the water supplied under this agreement will serve a large number of ERU's and that the estimated total number of ERU's served will be used to calculate the volume of water in each rate tier.

7. **WATER CONSERVATION:** Port Orchard has begun to prepare and implement a water conservation plan for the Port Orchard 580 zone. The goal of this plan is to reduce domestic water consumption in the Port Orchard 580 zone. Upon execution of this agreement, Port Orchard will move to complete and implement the conservation plan.

During drought conditions or other supply shortages suffered by Bremerton for any reason, it is agreed that Port Orchard customers using Bremerton supplied water will comply with similar restrictions and conservation measures required or requested of Bremerton customers according to Bremerton's Water Conservation Plan.

8. **NOTICES:** All notices and other written communications required by this Agreement shall be in writing and, except as expressly provided elsewhere in this Agreement, shall be deemed to have been given at the time of delivery, if personally delivered, or at the time of mailing if mailed by first class, postage pre-paid and addressed to the party at its address as stated below, or at such address as any party may designate at any time in writing.

Director of Public Works & Utilities
City of Bremerton
3027 Olympus Drive
Bremerton, WA 98310-4799

City Engineer
City of Port Orchard
216 Prospect Street
Port Orchard, WA 98366

9. **SEVERABILITY:** It is the intent of the parties that if any provision of this contract or its application is held by a court of competent jurisdiction to be illegal, invalid, or void, the validity of the remaining provisions of this contract or its application to other entities, or circumstances shall not be affected. The remaining provisions shall continue in full force and effect. The rights and obligations of the parties shall be construed and enforced as if the contract did not contain the particular invalid provision. However, if the invalid provision or its application is found by a court of competent jurisdiction to be substantive and to render performance of the remaining provisions unworkable and non-feasible, it is found to seriously affect the consideration and/or is inseparably connected to the remainder of the contract, the entire contract shall be null and void.

10. MODIFICATION: This Agreement represents the entire agreement between the parties. No change, termination or attempted waiver of any of the provisions of this Agreement shall be binding on either of the parties unless executed in writing by authorized representatives of each of the parties. This Agreement shall not be modified, supplemented, or otherwise affected by the course of dealings between the parties.

11. BENEFITS: This Agreement is entered into for the benefit of the parties to this Agreement only and shall confer no benefits, direct or implied, on any third persons.

The rights granted by this Agreement may not be assigned without the written consent of the Mayor of the City of Bremerton and the Mayor of the City of Port Orchard.

12. ARBITRATION: Disputes under this Agreement shall be settled through binding arbitration and the parties agree and stipulate pursuant to MAR 8.1 that the Mandatory Arbitration Rules for Superior Court shall apply, except Section VIII, Trial De Novo.

13. **Consent:** Whenever it is provided in this contract that the prior written consent or approval of either party is required as a condition precedent to any actions, the requested consent or approval shall not be unreasonably withheld. When prior consent is sought, failure of the party to respond in writing within 90 days of the request shall be deemed as the party's consent or approval. This provision does not apply to requests for amendments of this contract.

14. **Emergency Situations:** Nothing in this contract shall be deemed to preclude either party from taking necessary action to maintain or restore water supply in emergency situations and such action shall not be deemed a violation of this contract.

15. **No Joint Venture - Individual Liability:** This is not an agreement of joint venture or partnership. No provision of this contract shall be construed so as to make either party individually or collectively a partner or joint venture with the other party. Neither party is an agent of the other. Neither party shall be liable for the acts of the other in any representative capacity whatsoever.

16. **Complete Agreement:** This contract represents the entire agreement between the parties hereto concerning the subject matter hereof. This contract may not be amended except as provided herein.

17. **Venue, Jurisdiction and Specific Performance:** In the event of litigation between the parties, venue and jurisdiction shall lie with the Kitsap County Superior Court of the State of Washington. The parties shall be entitled to specific performance of the terms hereof.

18. **Default:** In the event of default of any provision of the contract, the non-defaulting party shall send written notice to the other party setting forth the nature of the default. If the default is for a monetary payment due hereunder, the defaulting party shall have thirty (30) days to cure the default. In the event of other defaults, the non-defaulting party shall use its best efforts to cure the default within ninety (90) days. If such default cannot be reasonably cured within such ninety (90) day period, the non-defaulting party shall, upon written request prior to the expiration of the ninety (90) day period be granted an additional sixty (60) days to cure the default.

19. **Force Majeure:** The time periods for either party's performance under any provisions of this contract shall be extended for a reasonable period of time when either party's performance is prevented, in good faith, due to fire, flood, earthquake, lockouts, strikes,

embargoes, acts of God, war and civil disobedience. If this provision is invoked, the invoking party agrees to immediately take all reasonable steps to alleviate, cure, minimize or avoid the cause preventing such performance, at its sole expense.

20. **Successors:** This contract shall inure to the benefit of and be binding upon the parties and their successors and assigns.

IN WITNESS WHEREOF the parties hereto execute this Agreement this 24th day of January, 2002.

CITY OF BREMERTON

BY: _____
Mayor

ATTEST: _____
Clerk

APPROVED AS TO FORM: _____
City Attorney

DEPARTMENTAL APPROVAL: _____
Director of Public Works & Utilities

CITY OF PORT ORCHARD

BY: _____
Mayor

ATTEST: _____
Clerk

APPROVED AS TO FORM _____
City Attorney

Port Orchard 580 Zone / Bremerton 580 Zone

Plan for

Cooperative Water System Development

This Document provides a plan for cooperative water system development between the City of Port Orchard and the City of Bremerton. The Cooperative Water System Development Plan ("The Cooperative Plan") outlined below describes phased water improvements in the Port Orchard 580 and Bremerton 580 zones which will provide safe, reliable service in an efficient and cost effective manner. Cooperation between the City of Bremerton and the City of Port Orchard in the development of their adjacent water systems will result in the following benefits:

A. Reliability and Efficiency of Service - Water resources are finite and vulnerable and the prudent use and management of these resources can be facilitated by cooperation among water utilities. Cooperation in the construction, operation and management of the water systems that serve the Port Orchard 580 and Bremerton 580 zones will:

- Improve overall system reliability,
- Enhance the manageability of the systems,
- Provide opportunities for conjunctive use of water supplies,
- Will delay the need to develop new water sources, and
- Result in cost efficiencies for both systems

B. Deferral/Phasing of Bremerton Infrastructure - Currently, Bremerton has no significant system improvements in its 580 zone. To serve the 580 zone, Bremerton must construct new pumping, storage, transmission and distribution facilities. Port Orchard has existing storage and transmission mains in its 580 zone. These facilities have excess capacity on an interim basis. The Port Orchard 580 and Bremerton 580 zones can be made hydraulically consistent so that the excess capacity of the Port Orchard system can be utilized by Bremerton. Cooperation with Port Orchard will allow phasing of Bremerton system improvements, deferring capital expenditures and reducing the overall system cost.

C. Sharing of Existing Port Orchard Reservoir Site - Bremerton requires a site for a future reservoir to serve its 580 zone. Port Orchard owns a site at the regional topographic high point. The site is large enough to accommodate a future Bremerton reservoir.

D. Elimination of Duplicate Pump Stations - A portion of the Port Orchard service area is too high to be served by the existing Port Orchard 580 zone reservoir. Port Orchard plans to create a new 660 pressure zone, served by a new pump station, to serve this high area. A portion of the Bremerton 580 zone is also too high to be served by its future Bremerton reservoir and service to this area will also require a

new high pressure zone and pump station. It is logical and cost effective to coordinate service to these adjacent high areas so that only a single new high pressure zone and pump station is required.

E. Satisfaction of Port Orchard Water Source Requirements - Port Orchard requires an additional source of supply to satisfy its 2017 system growth projections. Port Orchard has applications pending for additional water rights, but the ultimate disposition of these applications is uncertain. Bremerton has available source of supply to provide to the City of Port Orchard on a long term, uninterruptible basis.

The Cooperative Plan will be implemented in four phases, as described below. Attached is a summary chart which provides a quick one page synopsis of the main points of The Cooperative Plan. Also attached is a map of The Cooperative Plan area (Figure 1) with key landmarks noted.

For purpose of this Cooperative Plan, a Port Orchard 580 zone ERU connection is defined as a single family residential connection or, if other than single family, a connection which has an average daily demand of 290 gpd and a maximum daily demand of 650 gpd, and a Bremerton 580 zone ERU connection is defined as a single family residential connection or, if other than single family, a connection which has an average daily demand of 202 gpd and a maximum daily demand of 392 gpd.

Phase 1

Term:

Phase 1 extends from the present through 923 Port Orchard ERU connections in the Port Orchard 580 Zone (approximately year 2004) or through 1,260 Bremerton ERU connections, in the Bremerton 580 Zone, whichever occurs first.

During Phase 1 the 4200 Feigley property will be served by Port Orchard with water replenished by Bremerton, Phase I of the Northwest Corporate Campus will be served by the Bremerton system, and the McCormick Woods PUD and McCormick West will be served by the Port Orchard system.

Phase 1 Water System Plan:

In Phase 1, Bremerton will construct new Pump Station 2A, a new 12 inch transmission main in Campus Parkway (from pump station 2A to Old Clifton Road) and a new connection between the Port Orchard and Bremerton systems at Old Clifton Road (termed the Old Clifton Road connection). Port Orchard will provide up to 1,700 gpm of emergency fireflow for up to 3 hours to the Bremerton system, via the new Old Clifton Road connection. This will defer the need for Bremerton to construct a separate new storage reservoir in the 580 zone and a separate new water main in Old Clifton Road. Water will also be supplied from Bremerton to Port Orchard, via this connection, in the event of a supply emergency in the Port Orchard system.

The 4200 Feigley property is within the Bremerton service area and its internal water system will be constructed, owned and operated by Bremerton. In Phase 1, the 4200 Feigley project will connect to, and be supplied water from, the existing Port Orchard 16 inch water main

in Old Clifton Road. This will defer the need for Bremerton to construct a separate new water main in Old Clifton Road.

Bremerton will supply water to the Port Orchard system, via the Old Clifton Road connection, to replenish the water supplied by Port Orchard to the 4200 Felgley property. Port Orchard and Bremerton will also replenish and/or reimburse each other for water supplied for emergency and/or fireflow purposes.

Specific responsibilities in Phase 1 are:

Consistent Pressure Gradient - A consistent pressure gradient between the Bremerton and Port Orchard systems is required to facilitate cooperative service. Therefore, as part of Phase 1, Bremerton will adjust its adjacent water system to a 580 pressure gradient so that it is consistent with the hydraulic gradient in the Port Orchard system. The adjustment of Bremerton's hydraulic gradient may require revisions to the design of Bremerton's planned Pump Station 2A. These revisions are the responsibility of Bremerton. All planning and design revisions necessary to accomplish the change in hydraulic gradient shall commence upon execution of this agreement and be completed by January 1, 2002.

Bremerton Pump Station 2A - In Phase 1, Bremerton will construct, operate and maintain pump station 2A to supply a minimum of 1,600 gpm at a hydraulic gradient of 580 at the Port Orchard reservoir. Pump Station 2A will be equipped with a standby power generator sufficient to maintain operation of the pump station during a power outage. The pump station will be completed and operational by July 1, 2002.

12 Inch Transmission Main in Campus Parkway - Bremerton will construct, operate and maintain a 12 inch transmission main in Campus Parkway from Pump Station 2A to the Old Clifton Road connection with the existing Port Orchard 16 inch water main. This transmission main shall be completed and operational by July 1, 2002.

Connection between the Bremerton and Port Orchard Systems at Old Clifton Road - Bremerton will construct a connection (including meter) between the 12 inch transmission main in Campus Parkway and the existing Port Orchard 16 inch water main in Old Clifton Road (Old Clifton Road connection). The meter shall be capable of measuring the flow of water both from Bremerton to Port Orchard and from Port Orchard to Bremerton. The specific design and method of operation of the connection/meter shall be approved by both Port Orchard and Bremerton prior to installation. Construction and maintenance of the connection/meter is the responsibility of Bremerton but the cost of construction, operation and maintenance will be shared equally by both Port Orchard and Bremerton. The connection shall be completed and operational by July 1, 2002.

Port Orchard and Bremerton shall work together to secure Washington State Department of Health and Washington State Department of Ecology approval of the connection. If amendments to water system plan documents are required these shall be completed by each system at its own expense. If additional specific studies/designs are required to secure approval of the connection these shall be completed as agreed to and the cost shared equally by both Port Orchard and Bremerton.

Fireflow for Northwest Corporate Campus - Fireflow for the Northwest Corporate Campus is reported by Bremerton to be 1,700 gpm for 3 hours. Port Orchard has approximately 306,000

gallons of available storage in its existing reservoir which allows Port Orchard to provide up to 1,700 gpm of fireflow for 3 hours to the Bremerton system (at a minimum hydraulic gradient of 540). With Port Orchard supplying 1,700 gpm fireflow, Bremerton need not supply any fireflow directly from Pump Station 2A. If the fireflow requirement at Northwest Corporate Campus increases above 1,700 gpm due to unforeseen circumstances, Bremerton will supply the fireflow amount above 1,700 gpm.

Port Orchard's supply of 1,700 gpm for 3 hours for fireflow is contingent on the approval of the local fire district and the Washington State Department of Health to allow standby and fireflow storage to utilize the same volume (in the Port Orchard 580 reservoir). Port Orchard and Bremerton will work together to secure these approvals.

Service to 4200 Feigley Property - Bremerton will construct a connection (including meter) between the 4200 Feigley water system and the existing Port Orchard 16 inch water main in Old Clifton Road (Feigley connection). The meter shall be capable of measuring the flow of water from the Port Orchard system to the 4200 Feigley system. The specific design and method of operation of the connection/meter shall be approved by both Port Orchard and Bremerton prior to installation. Construction, operation, maintenance and all associated costs of the connection /meter is the responsibility of Bremerton.

660 Pressure Zone - Port Orchard will create a 660 pressure zone by designing, constructing, operating and maintaining a new pump station at the 580 reservoir site. The 660 pump station will be designed and constructed to service area in both Port Orchard and Bremerton. The 660 pump station will be designed to supply domestic demands and fireflow, in accordance with applicable state regulations. The 660 pump station will be equipped with a standby power generator sufficient to maintain operation of the pump station during a power outage, in accordance with applicable state regulations. Design and construction of the 660 pump station, and implementation of the 660 zone, will begin at a future date to be agreed on by Bremerton and Port Orchard. Design of the 660 pump station, the 660 zone boundaries, the number of connections to be served and required fireflow will be approved by both Port Orchard and Bremerton prior to implementation.

The cost of design and construction of the 660 pump station will be shared by Bremerton and Port Orchard on a pro-rata basis, based on the total number of ERU connections within the 660 zone. Distribution mains within the 660 zone will generally be the individual responsibility of Port Orchard and Bremerton, depending on which service area they serve. The cost of shared distribution facilities in the 660 zone, if any, will be shared by Bremerton and Port Orchard on a pro-rata basis based on the total number of ERU connections served by the facility.

Water supplied from the 660 pump station to the Bremerton service area will be metered. The specific design and method of operation of the connection/meter shall be approved by both Port Orchard and Bremerton prior to installation. Construction, operation, maintenance and all associated costs of this connection/meter is the responsibility of Bremerton. Bremerton will supply water to the Port Orchard system, via the Old Clifton Road connection, to replenish the water supplied by Port Orchard to the Bremerton service area within the 660 zone, including domestic, fireflow and emergency supply.

Phase 2

Term:

Phase 2 extends from 923 Port Orchard ERU connections in the Port Orchard 580 Zone (approximately year 2004) through 1,500 Port Orchard ERU connections (approximately year 2007) or through 3,350 Bremerton ERU connections in the Bremerton 580 Zone, whichever occurs first.

Phase 2 Water System Plan:

In Phase 2, Bremerton will provide a long term, uninterruptible source of supply to the Port Orchard system of up to 285 ac.-ft. on a yearly basis, at a maximum rate not to exceed 350 gpm. This supply is in addition to water supplied by Bremerton to Port Orchard for service of the 4200 Feigley property, the 660 zone or for emergency purposes. This source of supply will be provided by upgrading the capacity of Bremerton Pump Station 2A (unless it was oversized in Phase 1).

In Phase 2, Port Orchard will continue to provide up to 1,700 gpm of emergency fireflow for up to 3 hours to the Bremerton system at a minimum hydraulic gradient of 540, via the Old Clifton road connection, and Port Orchard will continue to supply water to 4200 Feigley via the Feigley connection, deferring Bremerton transmission main and storage improvements. In Phase 2 water will also be supplied between the systems, via the Old Clifton Road connection, in the event of a water supply emergency in either system.

Specific responsibilities during Phase 2 are:

Bremerton Pump Station 2A - In Phase 2, Bremerton will upgrade the capacity of Pump Station 2A to accommodate the supply of a maximum of 350 gpm to the Port Orchard water system. All incremental costs associated with the required capacity upgrades to Pump Station 2A will be the responsibility of Port Orchard. The pump station capacity upgrades will be completed and operational within one year of Port Orchard's request, in writing, that the source be made available, but no sooner than January 1, 2004.

12 inch Transmission Main in Campus Parkway - If the supply of an additional 350 gpm to the Port Orchard system requires upgrading the capacity of transmission mains in Campus Parkway, the cost of these upgrades will be the responsibility of Port Orchard. However, Bremerton will cooperate with Port Orchard to minimize the need for transmission main upgrades by managing its system as efficiently as possible, including utilizing distribution mains as transmission facilities where feasible.

Bremerton Uninterruptible Supply to Port Orchard - Beginning in Phase 2, Bremerton will provide a uninterruptible source of supply to the Port Orchard 580 Zone of up to a maximum of 285 ac.-ft. on a yearly basis, at a maximum rate not to exceed 350 gpm, via the Campus Parkway or reservoir site connection, as applicable. This supply is in addition to water supplied by Bremerton to Port Orchard for service of the 4200 Feigley property, 660 zone or for emergency purposes. The water supplied by Bremerton to Port Orchard will be delivered at a minimum hydraulic gradient of 580 (at the 580 reservoir).

The water supplied by Bremerton to Port Orchard shall be firm and uninterruptible until such future time as Port Orchard may secure new water rights to replace the Bremerton supply. Port Orchard agrees to make diligent, continuous, best efforts to acquire water rights to replace the Bremerton supply. Nothing in this Agreement shall abrogate Port Orchard's obligation to provide its water supply needs through its own sources at the earliest possible date. Bremerton agrees that if new water rights are not secured, the water supplied by Bremerton will continue indefinitely. For purposes of this Agreement Port Orchard is a wholesale customer of the City of Bremerton and will make no claim to any Bremerton water right.

Bremerton will coordinate its operation and maintenance of pump station 2A so that interruptions, if any, in water supplied to Port Orchard occur during low water use periods.

Regulatory Approvals - Port Orchard and Bremerton shall work together to secure Washington State Department of Health and Washington State Department of Ecology approval of Bremerton's supply to Port Orchard. If amendments to the water system plan documents are required these shall be completed by each system at their own expense. If additional specific studies/designs are required to secure approval these shall be completed as agreed to and the cost shared equally by both Port Orchard and Bremerton.

Phase 3

Term:

Phase 3 extends from 1,500 Port Orchard ERU connections in the Port Orchard 580 Zone (approximately year 2007) through 2835 Port Orchard ERU connections in the 580 Zone (full buildout - approximately year 2018) or through 3,350 Bremerton ERU connections in the Bremerton 580 Zone, whichever occurs first.

Phase 3 Water System Plan:

After approximately 1,500+/- ERU connections in the Port Orchard 580 Zone, the existing Port Orchard 16 inch main in Old Clifton Road may not have sufficient capacity to supply fireflow to the Bremerton system. In Phase 3 Bremerton will construct a permanent transmission main in Old Clifton Road from Campus Parkway to the Port Orchard reservoir and 4200 Feigley will be disconnected from the Port Orchard 16 inch main and served from this new Bremerton main. In Phase 3 the connection between the Port Orchard and Bremerton systems at Old Clifton Road will be relocated to the Port Orchard reservoir site (termed the reservoir connection).

In Phase 3, Port Orchard will continue to provide up to 1,700 gpm of emergency fireflow for up to 3 hours to the Bremerton system at a minimum gradient of 540, via the reservoir connection, deferring the need for Bremerton to construct a separate new storage reservoir in the 580 zone.

During Phase 3, Port Orchard will construct a second reservoir on its existing reservoir site to satisfy its growth requirements in its 580 zone. Port Orchard will coordinate the design of this second reservoir with Bremerton so that space is available at the Port Orchard site for a future Bremerton reservoir(s).

Specific responsibilities during Phase 3 are:

Bremerton 12 inch Transmission Main in Old Clifton Road - Bremerton will construct, operate and maintain a 12 inch transmission main in Old Clifton Road from Campus Parkway to a connection with the Port Orchard water system at the Port Orchard reservoir site (reservoir connection). The transmission main will be completed and operational within 1 year of Port Orchard's request, in writing, that the main be constructed, but no sooner than 2007.

If Bremerton's long term supply of 350 gpm to the Port Orchard system requires upgrading the capacity of the Bremerton transmission main in Old Clifton Road, the cost of this upgrade will be the responsibility of Port Orchard. However, Bremerton will cooperate with Port Orchard to minimize the need for transmission main upgrades by managing its system as efficiently as possible, including utilizing distribution mains as transmission facilities where feasible.

Relocation of the Connection between the Bremerton and Port Orchard Systems - As an element of the installation of its transmission main in Old Clifton Road, Bremerton will relocate the Old Clifton Road connection and meter to the Port Orchard reservoir site (reservoir connection). The specific design and method of operation of the connection/meter relocation shall be approved by both Port Orchard and Bremerton prior to installation. Installation and maintenance of the connection/meter at the reservoir site is the responsibility of Bremerton, but the cost of installation, operation and maintenance will be shared equally by both Port Orchard and Bremerton. The construction schedule for relocation of the connection/meter shall be coordinated with Port Orchard to avoid disruptions in supply to Port Orchard.

Regulatory Approvals - Port Orchard and Bremerton shall work together to secure Washington State Department of Health and Washington State Department of Ecology approval of the connection relocation. If amendments to the water system plan documents are required these shall be completed by each system at their own expense. If additional specific studies/designs are required to secure approval these shall be completed as agreed to and the cost shared equally by both Port Orchard and Bremerton.

Phase 4

Term:

There is no specific timetable for the start of Phase 4. Phase 4 begins when Bremerton requires separate standby storage in its 580 Zone and/or when separation of the Port Orchard and Bremerton systems is desired by either City, whichever occurs first.

Phase 4 Water System Plan:

In Phase 4, the Bremerton and Port Orchard systems will be functionally separated. Bremerton will construct separate storage reservoir(s) on the Port Orchard reservoir site(s) and a separate distribution main in Old Clifton Road (if necessary). In Phase 4 Bremerton will provide its own fireflow. Port Orchard will provide space within its reservoir site to Bremerton for a reservoir, when requested to do so by Bremerton.

Specific responsibilities during Phase 4 are:

Bremerton Storage Reservoir(s) to be located on the Port Orchard Reservoir Site(s) (Tax Parcel Nos. 0723-011-006-20 and 0823-012-001-20) - Port Orchard will make land available on its reservoir site(s) for Bremerton to construct, operate and maintain a separate storage reservoir or reservoirs to serve the Bremerton 580 zone. The exact location of the Bremerton reservoir(s) will be determined by mutual agreement prior to construction. Title for the land on which the Bremerton reservoir(s) are built will remain with Port Orchard. Port Orchard will grant a permanent easement to allow Bremerton to construct, maintain and operate the reservoir(s) and associated water mains and appurtenances on the site in perpetuity, at no cost to Bremerton.

Each party shall be responsible for the cost of construction, site restoration, operation and maintenance of its own reservoirs and water system infrastructure on the reservoir site(s). After construction of the Bremerton reservoir, the cost of routine maintenance of the reservoir grounds and access roads will be shared equally by Bremerton and Port Orchard.

Due to uncertainties regarding future land use and sensitive area codes, Port Orchard will not warrant that any specific area, size or shape of land will be available for use by Bremerton. However, from the date of this agreement Port Orchard will coordinate with Bremerton regarding its future space requirements prior to constructing any additional infrastructure on the site(s).

Separation of the Bremerton and Port Orchard Systems - Separation of the Bremerton and Port Orchard systems and/or restoration of both systems to a permanent configuration may require the removal and/or relocation of temporary piping, valving meters, etc., the addition of new connections at the reservoir site, etc. The cost of these miscellaneous adjustments will be shared equally between Bremerton and Port Orchard unless it is clearly demonstrated that the work is for the benefit of a particular system.

Monitoring of Supplied Water

All water supply delivered as described in this plan shall be measured by the supplying utility using electronic metering equipment of a type which is agreeable to each utility. Meters shall be read and metering results shall be reported to the receiving utility on a monthly basis, or at such frequency as may otherwise be agreed to by the parties. The metering equipment shall be furnished, installed, maintained, and calibrated by the receiving utility, as specified below. Calibration shall be done at least once every three (3) years and a copy of calibration results submitted to the supplying utility. Both utilities shall have access to and be permitted to install and maintain its own monitoring and recording system at its own expense.

4200 Felgley meter - For this connection Port Orchard is the supplying utility and Bremerton is the receiving utility.

660 Zone meter - For this connection Port Orchard is the supplying utility and Bremerton is the receiving utility.

Old Clifton Road connection and/or Reservoir connection meters - For these connections Bremerton is the supplying utility and Port Orchard is the receiving utility. However, Bremerton will be responsible for furnishing, installing, maintaining, and calibrating the metering equipment for these connections, and the cost shall be shared jointly.

In the event any meter fails to register, or it registers incorrectly, the Water Utility Billing Department for the supplying utility shall estimate the amount of water delivered for the period during which such meter failed to register by taking an average of the total deliveries of water through such meter for the preceding two months in which water was delivered.

Each utility shall install, operate, and maintain isolation valves and related facilities on their respective water mains at the point where those mains are interconnected. Each utility shall cooperate with the other utility in coordinating the operation of the isolation valves and related facilities for the purposes of this Agreement.

Port Orchard 580 Zone / Bremerton 580 Zone
Cooperative Water System Development Plan - Summary Chart

Phase	Timing	Responsibilities			Comments
		Port Orchard	Bremerton	Joint	
1	• Up to 923 ERU in Port Orchard 580 (2004) or • Up to 1,260 ERU in Bremerton 580	• Provide fireflow to Bremerton, max 1,700 gpm for 3 hrs. (min. 540 gradient) • Create 660 pressure zone when necessary and agreed to • Provide domestic supply and fireflow to 4200 Feigley	• Adjust HGL of Zone to 580 • Construct interim Pump Station 2A • Construct 12" transmission main from Pump Station 2A to Old Clifton Rd. • Construct connection between Port Orchard & Bremerton systems (incl. meter) at Old Clifton Rd. • Construct connection between 4200 Feigley & exist. Port Orchard 16" main (incl. meter) • Provide water source for 4200 Feigley and Bremerton portion of 660 zone via Old Clifton Rd. connection	• Secure local fire district and DOH approval for reservoir vol. sharing • Share cost of Old Clifton Rd. connection • Share cost of 660 pressure zone improvements	• Defers permanent Bremerton storage reservoir(s), transmission main in Old Clifton Rd. and distribution main in Old Clifton Rd.
2	• Up to 1,500 ERU in Port Orchard 580 (2007) or • Up to 3,350 ERU in Bremerton 580	• Pay incremental cost of upgrading Pump Station 2A to provide additional 350 gpm.	• Upgrade capacity of Pump Station 2A to provide long term Uninterruptible source (350 gpm) to Port Orchard	• Work together to secure all regulatory approvals	• Defers permanent Bremerton storage reservoir(s) and transmission main in Old Clifton Rd. and distribution main in Old Clifton Rd.
3	• Satisfies buildout requirements of Port Orchard 580 (2,835 ERU) (2018) • or Up to 3,350 ERU in Bremerton 580	• Construct 2nd reservoir in Port Orchard 580 Zone	• Construct permanent transmission main in Old Clifton Rd. - remove Feigley connection • Relocate Old Clifton Rd. connection to reservoir site (reservoir connection)	• Share cost of relocating Old Clifton Rd. connection • Work together to secure all regulatory approvals	• Defers permanent Bremerton storage reservoir(s) and distribution main in Old Clifton Rd.
4	• Required when Bremerton requires significant standby storage in 580 Zone or when separation of systems if required • Satisfies buildout requirements of Bremerton zone	• Provide space on Port Orchard reservoir site for Bremerton reservoir	• Construct separate storage reservoir on Port Orchard reservoir site • Construct permanent distribution main in Old Clifton Rd. (if required)	• Share cost of removal of all temporary piping and any adjustments of connection control valves, meters to permanent configuration	• All major infrastructure components for both systems are constructed in their permanent configuration

ADDENDUM NO. 1 TO
INTERLOCAL AGREEMENT
For
Cooperative Water System Development
In the
Port Orchard 580 Zone / Bremerton 580 Zone

This Addendum No. 1 amends the Interlocal Agreement (the "Agreement") entered into between the City of Bremerton, a municipal corporation, hereinafter referred to as "Bremerton," and the City of Port Orchard, hereinafter referred to as "Port Orchard" executed on December 26, 2001, and

WHEREAS, the parties mutually desire to modify the responsibilities of each party with respect to the agreed upon provision of water; NOW THEREFORE

All provisions in the Agreement shall remain in full force and effect except as expressly modified by this document.

For valuable consideration and by mutual consent of the parties, the modifications to the Agreement are as follows:

I.

1. **Amend Section 4. entitled "Water Supply" as follows:**

Delete the section titled "4200 Feigley Property" in its entirety and replace it with the following;

Bremerton West 580 Zone Supply
Port Orchard agrees to supply water for domestic use and fireflow to the Bremerton West 580 pressure zone via its 16 inch water main in Old Clifton Road, until such time as a separate Bremerton storage reservoir is constructed and operational. Fireflow rates/volumes and service pressures supplied by Port Orchard will be a minimum of 1,700 gpm for three hours at a minimum gradient of 540 feet at the connection. Bremerton agrees to supply water to Port Orchard, via its connection to the 16 inch Port Orchard watermain in Clifton Road (Old Clifton Road connection), to replenish the water supplied by Port Orchard to the Bremerton West 580 pressure zone. The water supplied by Bremerton to Port Orchard will be delivered at a minimum hydraulic gradient of 580. The volume of water supplied by Port Orchard to the Bremerton West 580 pressure zone shall be replenished by Bremerton on a continuous basis, or as otherwise agreed to. Distribution piping, as required by the City of Bremerton, will be extended by others from Port Orchard's water main in Old Clifton Road. Connection locations and details require approval from the City of Port Orchard. Master meters will be installed at the point of connection. Domestic meters will be installed and maintained by the City of Bremerton, or as otherwise agreed to, and be billed directly to the customer.

2. **Transmission Main:**

Delete all references in the agreement to the City of Bremerton **"12-inch transmission main"** and replace them with **"16-inch transmission main"**.

3. **Plan for Cooperative water System Development**

Amend the section entitled "Monitoring of Supplied Water" on page 8 of 11 as follows:

Delete "4200 Feigley meter – For this connection Port Orchard is the supplying utility and Bremerton is the receiving utility." and replace it with the following:

"West 580 Zone supply Meters - For these connections Port Orchard is the supplying utility and Bremerton is the receiving utility."

The parties whose names appear represent that they are authorized to enter into a contract amendment that is binding on the parties of this contract.

IN WITNESS WHEREOF, the parties have executed this Addendum 1. to the Agreement on the day fully executed below.

CITY OF PORT ORCHARD

By Kim E. Abel
Its Mayor

DATE: July 2, 2004

APPROVED AS TO FORM:

ATTEST:

Carol L. Etgen
CAROL L. ETGEN
City Clerk

CITY OF BREMERTON

By Cary Bozeman
Its Mayor

DATE:

APPROVED AS TO FORM:

For
Roger A. Lubovich
Bremerton City Attorney

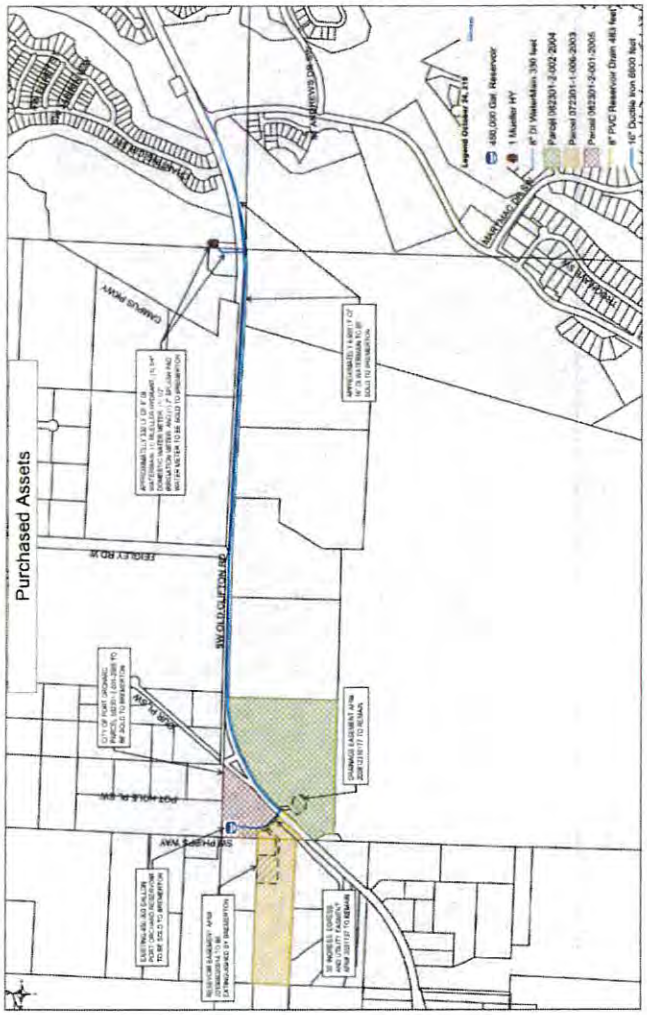
ATTEST:

Paula Johnston
City Clerk

EXHIBIT C

PURCHASED ASSETS

1. Tax Parcel 082301-2-001-2005 consisting of 4.63 acres;
2. 0.45 MG storage reservoir located on the parcel noted above;
3. 6,900 feet of 16" ductile iron Transmission Main located in the Right of Way of Old Clifton Road between the 0.45 MG Reservoir and the intersection of Old Clifton Road and McCormick Woods Drive;
4. 330 feet of 8" ductile iron Water Main, a Mueller Fire Hydrant, a ¾" domestic meter, a 1-1/2" irrigation meter, and a 2" meter to the Splash Pad all located within McCormick Village Park.



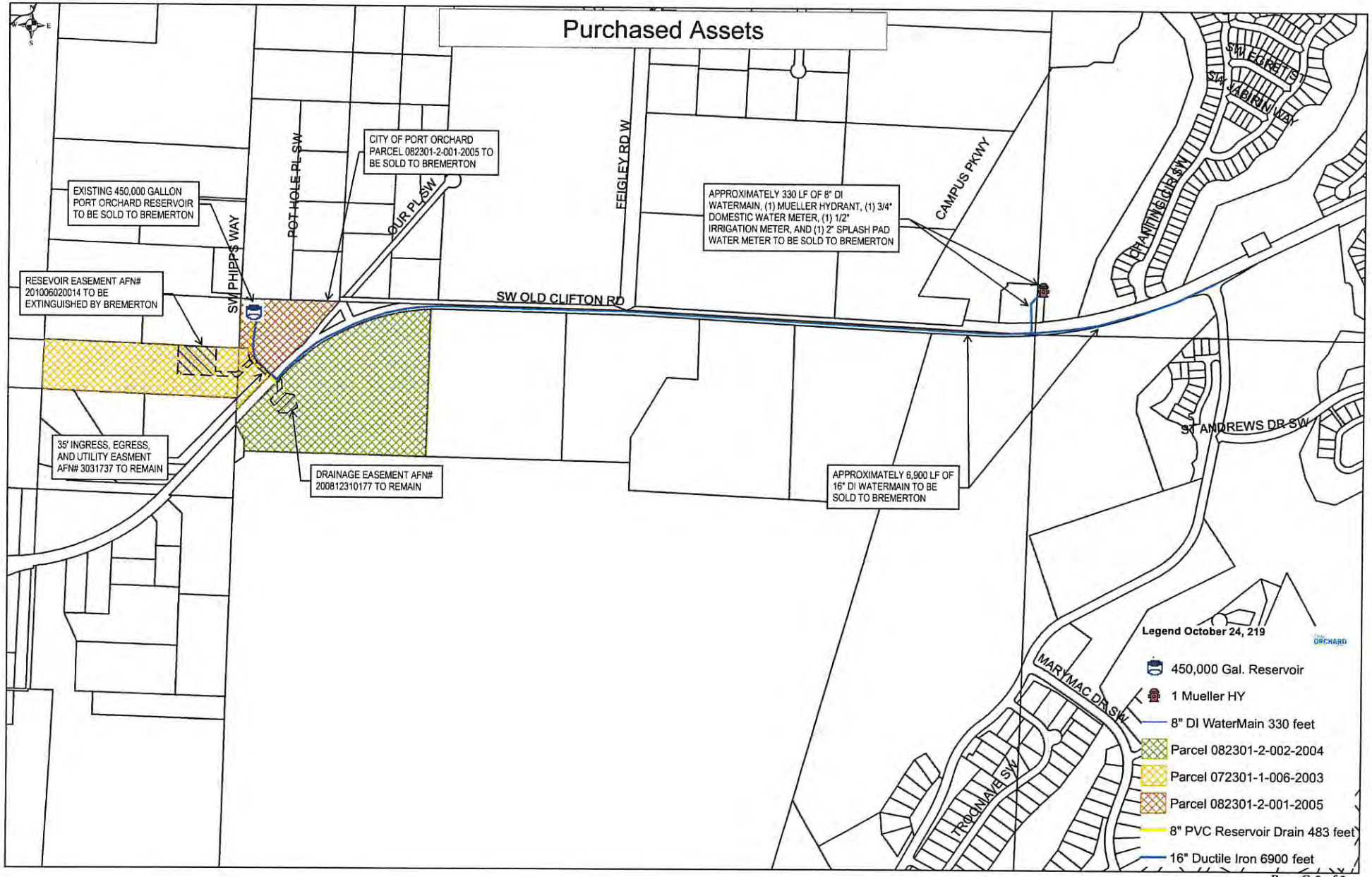

Purchased Assets
EXISTING 450,000 GALLON PORT ORCHARD RESERVOIR TO BE SOLD TO BREMERTON
RESEVOIR EASEMENT AFN# 201006020014 TO BE EXTINGUISHED BY BREMERTON
35' INGRESS, EGRESS, AND UTILITY EASMENT AFN# 3031737 TO REMAIN
CITY OF PORT ORCHARD PARCEL 082301-2-001-2005 TO BE SOLD TO BREMERTON
DRAINAGE EASEMENT AFN# 200812310177 TO REMAIN
APPROXIMATELY 330 LF OF 8" DI WATERMAIN, (1) MUELLER HYDRANT, (1) 3/4" DOMESTIC WATER METER, (1) 1/2" IRRIGATION METER, AND (1) 2" SPLASH PAD WATER METER TO BE SOLD TO BREMERTON
APPROXIMATELY 6,900 LF OF 16" DI WATERMAIN TO BE SOLD TO BREMERTON
SW OLD CLIFTON RD
SW PHIPPS WAY
POT HOLE PL SW
OUR PL SW
FEIGLEY RD W
CAMPUS PKWY
CHANNEL DR SW
SW EGRET ST
SW SABRINA WAY
ST ANDREWS DR SW
MARYMAC DR SW
TROCNAVE SW
Legend October 24, 219
450,000 Gal. Reservoir
1 Mueller HY
8" DI WaterMain 330 feet
Parcel 082301-2-002-2004
Parcel 072301-1-006-2003
Parcel 082301-2-001-2005
8" PVC Reservoir Drain 483 feet
16" Ductile Iron 6900 feet

EXHIBIT D

DEED OF CONVEYANCE

When recorded return to:

City of Bremerton
Attn. City Clerk
345 6th Street, Suite 600
Bremerton WA 98337

DEED OF CONVEYANCE

Grantor: City of Port Orchard, a Washington municipal corporation
Grantee: City of Bremerton, a Washington municipal corporation
Abbreviated Legal: Resultant Parcel A of Boundary Line Adjustment Recorded Under Auditor's File No. 3031737
Assessor's Tax Parcel Number: 082301-2-001-2005

THE GRANTOR, City of Port Orchard, a municipal corporation of the first class ("Port Orchard"), hereby transfers, conveys and sells to the GRANTEE, City of Bremerton, a Washington municipality ("Bremerton"), the assets of Port Orchard identified as the "Purchased Assets" pursuant to, and as more particularly described as:

1. Tax parcel #082301-2-001-2005 (conveyed via **Exhibit E** – Quit Claim Deed) and the 0.45 MG Reservoir located on said parcel valued at $434,000;
2. 6900' of Ductile Iron Water Main (Transmission Main) located in the Right-of-Way on Old Clifton Road between the Reservoir and McCormick Woods Drive valued at $345,000;
3. 330' of 8" Ductile Iron Water Main (Distribution Main), a Mueller Fire Hydrant, a ¾" Domestic Water Meter, a 1-1/2" Irrigation Water Meter, and a 2" Water Meter serving the Splash Pad all located within the McCormick Village Park and valued at $25,000.

Port Orchard hereby warrants and defends the conveyance of the Purchased Assets made to Bremerton, and its assigns, against all and every person and persons whomsoever lawfully claiming the same. The City of Port Orchard makes no warranty as to the condition of the Purchased Assets. The City of Bremerton has had the opportunity to inspect the Purchased Assets and accepts the Purchased Assets, "as is, where is."

Port Orchard and Bremerton have hereunto set their hand and seals effective as of _____ day of _____, 20____.

CITY OF BREMERTON

_____
By: _____
its: Mayor
Date: _____

CITY OF PORT ORCHARD

_____
By: _____
its: Mayor
Date: _____

Approved as to form:

_____
Bremerton City Attorney

Attest:

_____
City Clerk

Approved as to form:

_____
Attorney for Port Orchard

EXHIBIT E

QUIT CLAIM DEED

When recorded return to:

City of Bremerton
Attn. City Clerk
345 6th Street, Suite 600
Bremerton WA 98337

QUIT CLAIM DEED

Grantor: City of Port Orchard, a Washington municipal corporation
Grantee: City of Bremerton, a Washington municipal corporation
Abbreviated Legal: Resultant Parcel A of Boundary Line Adjustment Recorded Under Auditor's File No. 3031737
Assessor's Tax Parcel Number: 082301-2-001-2005

THE GRANTOR City of Port Orchard, a municipal corporation in Kitsap County, Washington for and in consideration of valuable consideration as described under the Agreement For Purchase and Sale of Assets of West 580 Zone Reservoir executed by the parties on November 20, 2019 in hand paid, conveys and quit claims to the City of Bremerton, a municipal corporation in Kitsap County, Washington, the following described real estate, situated in the County of Kitsap, State of Washington together with all after acquired title of the grantor(s) herein:

RESULTANT PARCEL A OF BOUNDARY LINE ADJUSTMENT RECORDED UNDER AUDITOR'S FILE NO. 3031737; THAT PORTION OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 8, TOWNSHIP 23 NORTH, RANGE 1 EAST, W.M., KITSAP COUNTY, WASHINGTON, LYING NORTHWESTERLY OF FIEGLEY ROAD SW AND OLD CLIFTON ROAD SW (COUNTY ROAD NO. 234) AND LYING NORTHWESTERLY OF OLD CLIFTON ROAD SW (ALDER ROAD); EXCEPT THAT PORTION THEREOF DESCRIBED AS FOLLOWS: BEGINNING AT THE NORTHWEST CORNER OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SAID SECTION 8; THENCE S1*55'45 W, ALONG THE WEST LINE OF SAID NORTHWEST QUARTER, A DISTANCE OF 330.14 FEET TO THE SOUTHWEST CORNER OF THE NORTH 330.14 FEET OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SAID SECTION 8 AND THE TRUE POINT OF BEGINNING; THENCE CONTINUIING S1*55'45 W ALONG THE WEST LINE OF THE NORTHWEST QURTER OF SAID SECTION 8, A DISTANCE OF 412.36 FEET TO THE NORTHWESTERLY RIGHT-OF-WAY MARGIN OF OLD CLIFTON ROAD; THENCE N42*51'37 E, ALONG SAID RIGHT-OF-WAY MARGIN, A DISTANCE OF 306.20 FEET; THENCE N47*08'23 W A DISTANCE OF 140.10 FEET TO THE BEGINNING OF A 95.00 FOOT RADIUS CURVE TO THE RIGHT; THENCE NORTHWESTERLY (CLOCKWISE) ALONG SAID CURVE, THROUGH A CENTRAL ANGLE OF 49*04'08 E, AN ARC DISTANCE OF 81.36 FEET; THENCE N1*55'45 E A DISTANCE OF 18.02 FEET TO THE SOUTH LINE OF THE NORTH 330.13 FEET OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SAID SECTION 8; THENCE N88*34'43 W, ALONG SAID SOUTH LINE, A DISTANCE OF 62.00 FEET TO THE TRUE POINT OF BEGINNING; SUBJECT TO A NON-EXCLUSIVE EASEMENT FOR INGRESS, EGRESS AND UTILITIES PURPOSES OVER, UNDER, ACROSS AND THROUGH A STRIP OF LAND 35.0 FEET IN WIDTH, THE SOUTHWESTERLY AND WESTERLY LINE OF WHICH IS DESCRIBED AS FOLLOWS: BEGINNING AT THE NORTHWEST CORNER OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SAID SECTION 8; THENCE S1*55'45 W, ALONG THE WEST LINE OF SAID NORTHWEST QUARTER, A DISTANCE OF 742.50 FEET TO THE NORTHWESTERLY RIGHT-OF-WAY MARGIN OF OLD CLIFTON ROAD; THENCE N42*51'37 E, ALONG

SAID RIGHT-OF-WAY MARGIN, A DISTANCE OF 306.20 FEET TO THE TRUE POINT OF BEGINNING OF SAID DESCRIBED LINE; THENCE N47*08'23 W A DISTANCE OF 140.10 FEET TO THE BEGINNING OF A 95.00 FOOT RADIUS CURVE TO THE RIGHT; THENCE NORTHWESTERLY (CLOCKWISE) ALONG SAIDCURVE, THROUGH A CENTRAL ANGLE OF 49*04'08 E, AN ARC DISTANCE OF 81.36 FEET; THENCE N1*55'45 E A DISTANCE OF 18.02 FEET TO THE SOUTH LINE OF THE NORTH 330.13 FEET OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SAID SECTION 8 AND THE TERMINUS OF SAID DESCRIBED LINE; THE NORTHEASTERLY AND EASTERLY LINE OF SAID STRIP SHALL BE PROLONGED OF SHORTENED, AS THE CASE MAY REQUIRE, TO INTERSECT THE NORTHWESTERLY RIGHT-OF-WAY MARGIN OF OLD CLIFTON ROAD AND TO TERMINATE AT THE SOUTH LINE OF THE NORTH 330.13 FEET OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SAID SECTION 8. ATTACHED AS EXHIBIT F

DATED this _____ day of _____, 20__.

THE CITY OF PORT ORCHARD, a municipal corporation

By:_____
Its: Mayor

ATTEST:

_____
Port Orchard City Clerk

APPROVED AS TO FORM:

_____
Attorney for Port Orchard

STATE OF WASHINGTON)
) ss.
COUNTY OF KITSAP)

I certify that I know or have satisfactory evidence that Mr. Rob Putaansuu is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he was authorized to execute the instrument and acknowledged it as the Mayor of Port Orchard to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

Dated: _____ 20____

_____

_____
(print or type name)
NOTARY PUBLIC in and for the
State of Washington, residing at:

_____

My Commission expires: _____

Appendix G

Water System Standards

City of Port Orchard

Public Works Engineering

Standards and Specifications

2019

Chapter 8

DESIGN STANDARDS FOR WATER EXTENSIONS

8.1 Design Standards

A. General
B. Plans
C. Mechanical (Water)
D. Cross-Connection Control Regulations

8.2 Standard Specifications for Construction

A. General
B. Site Work
C. Concrete
D. Special Construction (Pipeline Casings)

8.1 Design Standards

A. General

All extensions to the water system must conform to the design standards of the City and shall meet the requirements of the latest Kitsap County Fire Protection Ordinances and International Fire Codes. In addition, plans and specifications for system extensions must be approved in accordance with the requirements of the State Department of Health. All materials used for construction, operations, and maintenance of water facilities, water distribution systems, and other associated water appurtenances shall conform to NSF 60 and NSF 61.

The water system must provide adequate domestic and fire flow supply for the fire protection requirements. If fire flow is required, the plan must be approved by the South Kitsap Fire & Rescue Fire Marshall.

In all cases where public road right of way will be used for mains or other improvements, or where water facilities are proposed to be installed in easements, the City Engineer must approve the plan. All easements for water facilities must be on an approved form and the City must be listed as the "Grantee." The legal description and attached map showing the location and size of the easement must be approved by the City Engineer prior to recording.

In all cases where a County road right of way will be used for mains or other improvements, the County Road Department must also approve the plan in addition to the City.

The system must be capable of future expansion and must be constructed of permanent materials.

The City of Port Orchard is a party to the Kitsap County Coordinated Water System Plan.

Project Datum: The site survey shall use North American Vertical Datum 88 (NAVD 88). Design submittals including water plan and profile and well pump station elevations shall be based on NAVD 88.

B. Plans

1. General

   The developer shall submit plans and specifications in accordance with individual permit requirements. City standards are adequate to serve as the technical specifications for the project, however the Applicant may propose deviations from the Standards. The City may also require additional specifications if project conditions warrant. Plans and specifications for all projects must be prepared and stamped by a professional engineer registered in the state of Washington, with the exception of extensions for single family residences. After the review, the developer shall submit copies of the final version of the plans in accordance with permit requirements.

2. Criteria for Plans

The plans shall be prepared in accordance with criteria listed in Chapter 1 – Land Development with the addition of the following:

a. Profiles: Water line profiles shall be provided when the water lines are to be installed over un-graded terrain. In general, the City will not require profiles of water lines to be installed in streets or other graded terrain where specified depth of cover will be adequate to determine the location of the line in the ground. Elevations shall be shown on the plans which are adequate to determine the pressure differential in the lines due to change in elevation and for placement of pressure reducing valves if required. Clearances between sewer lines and water mains shall be shown at all sewer line crossings.

3. Plan Revisions

4. The City shall be informed of all plan revisions which affect the design of the water system prior to implementation. The City reserves the right to withdraw approval if in the opinion of the City the changes will cause the design of the extension to be below the City's standards.Facility Placement

   All water mains and other facilities, unless a private system, shall be installed in public rights-of-way or in recorded utility easements dedicated to the City. The developer or his engineer shall check with the City prior to beginning of design of the extension to determine if there is a preferred main location.

5. Public Rights of Way

   All locations of City facilities within the City right-of-way must be approved by the City Engineer. Utilities located in the road right-of-way must comply with franchise requirements outlined in ordinances passed by the City Council authorizing such use of the road and right-of-way. Where no ordinance applies, water mains shall be installed to be compatible with the existing water system, the terrain, geology, and the location of other utilities.

   Where the water line is installed in a public right of way, itshall not be located under curbs or sidewalks. Deviations from approved locations must receive prior written approval by the City Engineer, be documented, and be accompanied by accurate record drawings.

6. Easements

   Utility easements will be a minimum of 15 feet in width and piping will be installed no closer than five feet from the easement's edge. Water line constructed deeper than 7.5-feet below finished ground surface shall require an easement width greater than 15 feet to encompass a 1:1 slope from the bottom of the pipe.

7. Private Roads

   If it is necessary to install a water main within a private road, the easement shall be the width of the traveled surface plus one foot on either side.

8. Water and Sewer Line Separation Distances

   Transmission and distribution water piping shall be separated at least ten feet horizontally from waste disposal piping, drain fields, and/or sanitary sewer gravity or force mains. The bottom of the water main shall be 18 inches above the top of the sewer component. All parallel and crossing installations of water and sewer lines shall be in accordance with provisions of WAC 248-96 (septic systems) and the "Recommended Standards for Water Works" - Ten State Standards. Where local conditions prevent such horizontal and/or vertical separation, closer spacing is permissible where design and construction meet the special requirements of the Department of Ecology criteria for Sewage Works Design.

   When a water line crosses a sanitary sewer or force main, it shall be specified that the water main be installed a minimum of two feet above the sewer line with joints a minimum of five feet from the sewer line on each side. Controlled density fill shall be placed over the sewer line.

9. Main Layout and Sizing

   The City shall be consulted as to the size of the water main.

   In general, the minimum size water main which will be allowed to serve developments is 8 inch inside diameter, unless otherwise approved by the City. Looped six-inch diameter mains will be allowed within a development if no fire hydrants are connected to the main. Where dead end mains are allowed in cul-de-sacs, they may be 4-inch diameter from the last fire hydrant to the remaining residences, if approved by the City Engineer.

   In general, dead end water mains are not permitted. Wherever possible, all water line extensions shall form a looped system. Mains must be extended to the far side of a property to be served. For commercial and residential developments on corner lots, the mains must be extended to the far side of both sides of property fronting roads. Commercial developments which are required to upgrade city roads will be required to upgrade the water main in the road to the size indicated in the City's Water System Plan.

   It is the intent of these requirements to ensure that the water pipe sizing will supply the required domestic and fire protection flows while maintaining adequate system pressure under existing and future demand conditions. The City may, at its discretion, require the developer to pay for the City or its Consultant to conduct an analysis and run the hydraulic model developed specifically for the City's water system. The purpose of this analysis is to confirm the actual flow rate that is available and the size of needed system improvements to provide water service.

10. Fire Hydrants

    Water line extensions shall include fire hydrants if required by City Standards and Specifications, or if not, be designed to permit placement of fire hydrants in accordance with South Kitsap Fire and Rescue (SKF&R) standards, unless a modification is authorized

by the Fire Marshall. Fire hydrants shall be placed at street intersections wherever possible, and located to minimize damage due to traffic. Fire hydrants installed in residential areas shall have a maximum spacing of 600 feet measured along the street frontage. Hydrants located at intersections shall be installed at the curb return. All others shall be located on property lines between lots. Fire hydrants in commercial, industrial and multifamily areas shall have a maximum spacing of 300 feet and shall be placed not more than 150 feet or less than 50 feet from a building. Variation from hydrant spacing standards will be allowed when it can be demonstrated that alternate spacing will better serve the site layout. The SKF&R may require additional hydrants.

11. Water Pressure Requirements

    Water systems shall be designed to maintain a minimum residual pressure of 30 psi at meter outlets under maximum demand flow conditions, excluding fire demand. Unless specifically approved otherwise by the City, water systems shall be hydraulically designed to provide a maximum pressure no greater than 100 psi, with a desired range of 40-90 psi. In

    cases where a booster pump station will be required, a bladder tank will be installed. For water systems requiring fire flow capability, the design shall be adequate to maintain, under fire flow conditions, positive pressure throughout the system and a 20-psi residual pressure in mains supplying fire hydrants in use as per WAC 246-290 requirements. The City may require the engineer to submit a hydraulic analysis showing the required flows and pressures can be met. The City may, at its discretion, require that the City's hydraulic model be used and run by the City or City's Consultant. Developer shall pay for costs to accomplish this analysis.

12. Pipe Cover

    The depth of trenching, installation of pipes, and backfill shall be such as to give a minimum cover of 36 inches over the top of the pipe. This standard applies to transmission, distribution, and service piping. Backfill and compaction will be in accordance with applicable construction standards identified below. Materials capable of damaging the pipe or its coating shall be removed from the backfill material.

13. Isolation Valves

    Valves shall be installed at all crosses and tees. The number of valves at each intersection shall at a minimum equal the number of connecting pipes less one. Lengths of pipe between valves should not exceed 500 feet in school, commercial, or multi-family areas, and 800 feet in other residential service areas. Valves shall be located on tees and crosses at street intersections, or at other locations as determined by the City. If it is necessary to install valves between street intersections, they shall be located on property lines between lots and on fire hydrant tees wherever possible.

14. Air and Air-vacuum Relief Valves

    In order to minimize problems associated with air entrainment, air or combined air-vacuum relief valves shall be installed at points of high elevation throughout each

system. To prevent freezing, the vault lid and vault cavity will be insulated as directed by the City.
These valves shall be installed as per standard specifications and detail drawings.

15. Blow-off Valves

    A blow-off valve assembly shall be installed on all permanent dead-end runs and at designated points of low elevation within the distribution system. The blow-off valves shall be installed on public rights-of-way except where a written access and construction easement is provided to the City. In no case shall the location be such that there is a possibility of back-siphoning into the distribution system.

16. Fire Protection Systems on Private Property

    A double detector check valve installation shall be required on all fire protection systems to private property. The detector check shall be approved for the type of use by Washington

    State Department of Health. An OS&Y valve shall be installed on the inlet side along with a 1-inch by-pass. The by-pass shall include a water meter and double check valve assembly.

    The property owner is responsible for the fire line from the City main to the fire suppression system.

17. Record Plans for the City

    Any deviations from originally approved plans and specifications shall be in accordance with Section 8.1.B.2 Plan Revisions. Upon completion of the project, the following will be provided to the City:

    a. Electronic Auto CADD files (2013 compatible version),

    b. a digital format such as "pdf" of the record plans on CD (2 copies).

    Record drawings must show all new water facilities and related appurtenances which, at a minimum, shall include the locations of all mains, fire mains, valves, hydrants, back flow assemblies, and fittings, giving sizes and types of each. Record drawings for new sewer improvements shall include all mains, manholes, clean-outs and similar appurtenances. The drawings shall show the exact location of water/sewer mains including distances of mains from property lines. The applicant shall make every reasonable effort to assist the City in acquiring all necessary information for record drawings.

C. Mechanical (Water)

1. General

   This division covers that work necessary for furnishing and installing mechanical appurtenances and accessories as described in these specifications and as shown on the plans.

   All pipe, valves, meters, hydrants, fittings, and special material shall be new, undamaged,

and designated for use in potable water systems. All material suppliers shall be bonded sufficiently for the value of material supplied. Material used on water projects shall comply with AWWA Standards, and each project's detailed plans and specifications.

shall furnish all materials necessary for the installation of the water system facilities including but not limited to meter boxes and service connection materials.

2. Submittals

   Submittal information shall be provided to the City for the following items:

   a. Ductile Iron Pipe
   b. Ductile Iron Fittings
   c. Stainless Steel Pipe and Fittings
   d. Poly Pipe and Fittings
   e. PVC Pipe and Fittings
   f. Isolation Valves
   g. Control Valves
   h. Fire Hydrants
   i. Double Check Valves
   j. Other Mechanical Components

3. Pipe and Fittings

   Provide piping, plumbing, fittings and appurtenances necessary to make all piping systems complete, tested, and ready for operation as specified herein and as shown on the plans. All pipe sizes, as shown on the drawings, and as specified herein, are in reference to "nominal" diameter, unless otherwise indicated. All pipe shall meet the City's standard specifications. One type of pipe shall be used throughout entire projects, except as necessary to match existing piping, or as otherwise specified in writing by the City Engineer. Where relocation of, or replacement of, existing piping is necessary during construction, materials used shall be subject to the written approval of the City Engineer.

4. Ductile Iron Pipe

   Ductile iron pipe shall be thickness Class 52 and shall conform to standards of ANSI Standard A21.51 (AWWA C-151).

   All pipe shall be restrained joint pipe= and shall be ductile iron manufactured in accordance with requirements of ANSI A21.51 (AWWA C-151). Push on joints or mechanical joints shall be in accordance with ANSI 21.11 (AWWA C-111). Pipe shall be Tyton Joint Pipe or approved equal. Gaskets shall be Field Lok or approved equal. Pipe thickness shall be designed in accordance with ANSI A21.50 (AWWA C-150). Standard thickness cement -mortar lining shall be in accordance with ANSI A21.4 (AWWA C-104).

   Where Mega-Lug joints arerequired, they shall be Mega-Lug Series 1100, as

manufactured by EBAA Iron, or approved equal. Mega-Lugs shall be used on all mechanical joints.

When requested, furnish certification from manufacturer of pipe and gasket being supplied that all of the specified inspections and tests have been made and the results comply with requirements of this standard.

5. Ductile Iron Fittings

   All fittings shall be ductile iron where possible. Steel fittings will not be accepted. Ductile iron fittings shall be short body, cement lined, and have a minimum working pressure of 250 psi. Metal thickness and manufacturing processes shall conform to applicable portions of ANSI Standards A21.20, A21.11, B16.2, and B16.4. Standard cement lining shall be in accordance with ANSI Standard A21.4 (AWWA C-104). Mechanical joint (MJ), ductile iron, compact fittings 3 inches through 24 inches shall be in accordance with AWWA C-153.

   Ductile iron flange (FL) fittings shall be in accordance with AWWA C-110, with bolt pattern to match adjacent pipe and 250 psi pressure rating. Gasket material for flanges shall be neoprene, bunan, chlorinated butyl, or cloth inserted rubber. Gaskets shall be full face ring type.

6. Type of ends shall be specified as mechanical joint (MJ), restrained joint (RJ), plain end (PE), or flanged (FL). Mega-Lugs shall be used on all mechanical joints.Polyvinyl Chloride (PVC) Pipe

   PVC pipe in excess of 2 inches will not be used for new installations. Larger size PVC piping may be used to replace small sections of existing PVC piping in emergencies only. PVC pipe shall conform to the requirements of AWWA C-900 specifications. PVC pipe for distribution pipelines shall be pressure class 200. The pipe shall bear the seal of the National Sanitation Foundation for potable water pipe. All pipe shall be listed by the Underwriters Laboratories, Inc.

   PVC pipe shall be made from Class 12454-A or Class 12454-B virgin compounds, as defined in ASTM D1784. Joints shall conform to ASTM D3139 using a restrained rubber gasket conforming to ASTM 3477. Solvent welded pipe joints will not be permitted.

   PVC pipe shall be Johns Manville, or approved equivalent.

7. Galvanized Iron Pipe (GI)

   Galvanized iron pipe shall conform to the latest revision of ASTM A-120 or A53; Grade A, Schedule 40, seamless pipe that has been manufactured in the United States. Pipe shall be hot-dip galvanized. Pipe fittings shall be galvanized and threaded.

8. Flexible Couplings

   Flexible couplings shall be as manufactured by Smith Blair or Romac, or equal; MJ sleeve couplings shall be as manufactured by Griffen or U.S. Pipe or equal.

9. Bolts in Piping

Bolts shall be zinc or chrome plated cast iron. Stainless steel bolts are not allowed.

10. Valves and Appurtenances Valves noted on the plans or in other parts of the specifications shall meet the requirements herein. Valves shall be designed for the intended service. Prior to placement in the trench, valves shall be fully opened and closed to check the action and a record made of the number of turns required to fully open or close the valve. For valves 16 inches or larger, a member of the water utility shall be present to check the action and record the number of turns. The inside of all valves shall then be thoroughly cleaned and the valve installed.
    Install valves in strict accordance with manufacturer's instructions and as shown on the plans. Buried valves shall have all operators or valve box installed so that wrenches or operators perform freely and without binding or other interference. Bed and backfill buried valves according to the requirements of the pipe to which they are attached. Provide concrete supports for operators where required, as shown on the plans.

    a. Resilient Seat Gate Valves: All gate valves for water lines 2" and larger shall be of the resilient, wedge-type, non-rising stem and shall meet or exceed the performance requirements of AWWA C-509 and be suitable for installation with the type and class of pipe being installed. The wedge shall be fully encapsulated with vulcanized SBR rubber. Valves to be equipped with mechanical joints or flange ends of Class 125 in accordance with ANSI B16.1 unless otherwise specified. Valve opening direction shall be counter- clockwise. Provide fusion epoxy coating and 2 inch operating nut. Gate valves shall be Dresser, Kennedy, or approved equivalent.

    b. Butterfly Valves: Butterfly valves shall be approved for use only where special applications are required. Butterfly valves shall meet or exceed all AWWA C-504 specifications and shall be Class 150-B valves with short body which are suitable for direct bury. When they are installed, they shall have a position indicator which clearly shows the position of the disc. All butterfly valves shall be installed with the operator nut located toward the center line of the street. All valves shall be equipped with an underground manual operator with AWWA 2-inch square nut, shall open with a counterclockwise rotation, and have mechanical joint or flanged ends of Class 125 in accordance with ANSI B16.1 unless otherwise specified. All butterfly valves shall be Dresser, Pratt, or approved equivalent.

    c. Check Valves: Check valves, three inches or larger, shall be iron body, iron disc, bronze-mounted, swing type, clearway, quiet closing, lever and spring valves with flanged ends. All valves shall comply with AWWA C-508 specifications.

        Check valves, smaller than three inches, shall be bronze body, bronze-mounted, swing type with flanged or threaded ends depending upon installation.

        Check valves shall be Dresser, Mueller, or approved equivalent.

    d. Pressure Reducing Valves: Pressure reducing valves shall be diaphragm actuated,

single seat, hydraulically operated valves with a single operating chamber sealed by a synthetic rubber diaphragm. Control of the valve shall be from a single direct acting hydraulic pilot valve that is controlled by hydraulic pressure acting on a spring acked diaphragm. The main valve shall have a single removable seat and a resilient disc. The stem shall be guided at both ends by a bearing in the valve cover and an integral bearing in the valve seat. No external packing glands are permitted, and there shall be no pistons operating the main valve or any pilot controls. The pilot control shall be a direct-acting, adjustable, spring-loaded, normally open, diaphragm valve, designed to permit flow when controlled pressure is less than the spring setting. The control system shall include a fixed orifice. The diaphragm shall be set to open at any pressure below its preset set point and to close at any pressure above an adjustable dead band, to maintain downstream pressure within 2.5 psi of the pressure set point. Downstream pressure control shall not be based on changing upstream pressures. The valve shall be rated for 250 psi working pressure.

A bypass line of suitable size with isolation valves and pressure reducer will be installed in parallel to the main Pressure Reducing Valve (PRV) to manage low flows and assure continuity of service in event of main PRV failure.

Pressure reducing valves shall be Cla-Val model 90-01 or approved equivalent.

11. Tapping Sleeve and Valve

    Provide restrained mechanical joint with flanged outlet tapping sleeve with a minimum 150 psi rating. The sleeve shall be grade 18-8 type 304 stainless steel and SBR rubber gasket, Romac Style SST, Ford Style FAST, or approved equal.

    The valve shall be 200 psi pressure rated, resilient seated, non-rising stem, AWWA C-509, with flanged by mechanical joint connection. The valve shall have a cast or ductile iron body with AWWA C-550 epoxy coating. The valves shall be M&H style 3751-NRS, or approved equal.

12. Fire Hydrant Assembly

    Fire hydrants shall conform to AWWA Standard C-502 for post-type, dry-barrel, self-draining hydrants suitable for at least a 54-inch depth. Each hydrant shall have a six-inch inlet, a minimum valve opening of 5-1/4 inches, two 2-1/2 inch hose connections, and a 4- 1/2 inch pumper port with a 5 inch Storz pumper connection. All ports shall have National Standard Threads or other connection devices consistent with local fire protection authority requirements. All valves and caps shall open counterclockwise and have a 1-1/2-inch flat point pentagon operation and cap nuts. Hydrants shall be break-away traffic models.

    The configuration of the fire hydrant assembly shall be as shown on Standard Detail 881. The assembly shall have a cast iron tee (with mechanical joint connections to the main) a flanged tee, a six-inch flanged by mechanical joint gate valve with valve box, and a six-inch ductile iron pipe extension. All mechanical joints shall be secured with mega-lugs. Push on pipe joints shall be secured with field lock gaskets. Shackle rods to connect the

hydrant to the auxiliary valve at the main are not permitted.

Provide a minimum of seven cubic feet of washed gravel surrounding the 90 degree bend below the hydrant. Gravel shall be 1-1/2 inch minus and be retained on 1/4 inch mesh for drain.

Hydrants added to existing systems will be installed by wet tap.

The hydrant shall have at least an 18 inch clearance between the ground and the lower port, and a 36 inch unobstructed radius around it for operation of a hydrant wrench. The steamer/pumper port shall face the street or the most likely direction of emergency approach.

Hydrants shall be coated with two coats of yellow Rustoleum paint or equal in accordance with coating manufacturer's recommendations.

Fire hydrants shall beClow Medallion, M&H 129S.

13. Blow off Valve Assembly

    Two-inch blow off assemblies shall be provided in accordance with Standard Detail 880 at locations shown on the plans or prescribed by the City.

14. Miscellaneous Mechanical

    a. Air and Air/Vacuum Release Valves: Provide air and air/vacuum release valve's body and cover fabricated from cast iron. Provide internal parts, including float, seat, needle, linkage, level pins, retaining rings, and screws, fabricated from either stainless steel or bronze. Air release valve shall have 2 inch inlet, 3/32 inch orifice, and shall be designed for operating service to 150 pounds per square inch (psi). Air and air-vacuum relief valve assembly materials shall conform to Standard Detail 883.

       Air release valve shall be equal to APCO Model No. 55. Air and air-vacuum relief valves shall be APCO Model #142 or #143C for one-inch, or #144 or #145C for two-inch, or approved equivalent.

    b. Gate Valves: Gate valves 2 inches and smaller for steel pipe shall be Crane No.1320 or equal, with 250 psi pressure rating having non-rising stem, screwed bonnet, solid wedge disc, bronze construction and threaded ends.

       Install valves and fittings in accordance with manufacturer's recommendations and the plans. Verify alignment and adjustments after installation.

    c. Valve Boxes: All valve boxes shall be two-piece cast iron, and equipped with a suitable extension for a 36-inch to 65-inch trench depth. Top sections and lids will be designed for installation in vehicular areas. Lids will be labeled "WATER", and lid tabs will point in the direction of the water main. The valve boxes shall have a design loading meeting

       AASHTO H-20. All valves and valve boxes will be set plumb with the valve box centered on the valve. Valve box installation shall comply with Standard Detail 884.

Cast iron valve boxes shall be Olympic Foundry, Rich Box No. 920 or approved equivalent and must be compatible with the City's system.

d. Valve Marker Posts: A fiberglass valve marker post shall be furnished and installed with each single or closely grouped combination of valves. Marker posts shall be located as directed by the City. Size of valve and distance (to the nearest foot) shall be stenciled on the face of the post with a 1 1/2-inch black painted figure.

   Valve marker posts shall be blue in color, 4 inches wide (flat), 72 inches high and beveled top. Carsonite Curve-Flex marker or approved equal.

e. Hydrant Guard Posts: Guard posts are not required.

f. Warning Tape: Locator tape WILL NOT be used as an alternative to wire but will be used in addition to the wire. Continuous metallic tape, brightly colored, 2 inch minimum width, imprinted in 1 inch letters with "Caution Buried Water Line" shall be repeated at not less than 4 foot intervals. Install warning tape above water line approximately 18 in. below the finished grade.

g. Locating Wire: All pipe shall be laid with one piece of 10-gauge or thicker insulated copper wire. The locating wire shall be situated immediately adjacent to the pipe and connected to all valves. Locating wire shall also connect to all service lines and meters.

15. Backflow Prevention

    Backflow prevention devices including Double Check Valves and Reduced Pressure Backflow Assemblies shall be installed according to detailed installation plans prepared by the engineer or the Contractor and approved by the City Engineer. Installation shall comply with standards of Accepted Procedure and Practice in Cross Connection Control, AWWA, and Pacific Northwest Section. All backflow assemblies shall be approved on the latest approved list of the Washington State Department of Health.

16. Service Connections

    Water service installations shall comply with the City's Standard Detail 860 and 861. The location and type of corporation stop, meter setters, and locating wire on all individual services must be as indicated on Standard Details 860 and 861. In addition, if pressure reducing valves are required for individual service connections where static pressure at the meter exceeds 80 psi, they normally will be installed after the meter. Meter sets and yokes will be specified by the City.

    a. Service Saddle: Ductile iron body, stainless steel straps, nuts, and bolts, Buna N or SBR O-ring gasket, with iron pipe tap. Saddles 1½ inches and larger shall be double strap. Saddles shall be Romac 101S or 202S, Smith Blair 311, or approved equal.

    b. Corporation Stops: Corporation stops for one-inch to two-inch service saddles shall be bronze body, male iron pipe threaded inlet, pack joint (compression) outlet, Mueller H- 10013, Ford FB1100, or approved equivalent conforming to AWWA C-800. Direct taps for services are not allowed.

c. Polyethylene Pipe (Blue Poly): Polyethylene pipe for service connections shall conform to AWWA C-901, PE 3406, SDR 9, copper tubing size. Pipe shall have a cell classification meeting ASTM D3350 and a pressure rating of 160 psi. Joints shall be pack joint with stainless steel insert stiffener.

d. Meter Setter: Meter sets shall be installed using a meter yoke equipped with a locking angle meter valve and an angle check valve. Meter yoke inlets and outlets shall have male iron pipe size threads.

e. Meter yoke assemblies shall be Mueller H-1434-2 or H-1422, Ford VH 72-12W with valve, or approved equal. If meters need to be raised, Mueller H-14118 Meter Relocater, or approved equivalent shall be used.

17. Meter Boxes

18. SIGMA-Raven HDPE Meter Box Model RMB 1324-SW or RMB 1730-SW and HDPE Lid with touch-read, and meter reader door per standard detail, or approved equal. Individual Pressure Reducing Valves

    Where static water pressure exceeds 80 psi, pressure reducing valves shall normally be installed after the meter as directed by the City. Individual service pressure reducing valves shall be of bronze body construction with a renewable stainless steel seat, stainless steel integral strainer, and temperature resistant diaphragm. Pressure reducing valves 2-inches and smaller for individual water service lines shall be Wilkins 600 Series or equal.

19. Pipe and Fittings Installation

    a. General: Use materials and installation methods in accordance with Uniform Plumbing Code, latest edition, and local codes and regulations which are applicable. Install ductile iron water mains in accordance with AWWA C600-93 and manufacturer's recommendations. Use types and sizes of pipes as specified herein and/or as shown on the approved plans. Where sizes of small pipe are omitted from the plans and not mentioned in the specifications, use sizes corresponding to code requirements, and as required by equipment and plumbing fixtures and appurtenances. In any event, properly size any un-designated pipe sizes for functions to be performed.

    b. Materials Delivery: Pipe and appurtenances shall be handled in such a manner as to ensure delivery to the trench in a sound, undamaged condition. Particular care shall be taken not to injure the pipe, pipe coating, or lining. Before installation, the pipe and appurtenances shall be cleaned of foreign material and inspected for defects. Valves shall be cleaned of all foreign material and operated before installation to ensure proper functioning.

       Pipe shall not be strung out along a trench or shoulder of a road in a manner which causes a safety hazard to the public.

       Rubber gaskets shall be stored in a cool, dark place to prevent damage from the

direct rays of the sun.

c. Alignment: Pipe shall be laid to specified grade and alignment as staked in the field. Alignment deviation shall not exceed 0.5 feet. Replacement of stakes lost or destroyed shall be made at the Developer's expense and in accordance with Agreement Plans, including modifications specified by the City. All construction staking shall be provided by the Contractor.

d. Grade: Prior to installation of the water line all roadways shall be graded to the finished rough grade. The water line shall be installed three (3) feet below finished grade. Any modification of the main or appurtenances required to adjust to grade changes will be at the expense of the Contractor.

e. Installation: Carefully lay pipe and support at proper lines and grades. Follow piping runs shown on the plans as closely as possible, except for minor adjustment to avoid architectural and structural features. Make minor relocations, if required, in a manner acceptable to the City.

   Pipe passing through or under concrete or rock walls or slabs shall be placed in casing.

   Keep openings in pipes closed during progress of work.

f. Polyethylene Encasement: Where shown on the plans, the Contractor shall lay ductile iron pipe with a polyethylene encasement. Pipe and polyethylene encasement shall be installed in accordance with AWWA C105.

g. Thrust Blocking: All valves, tees, and bends shall be restrained as indicated in Section C.4 and C.5 of this chapter. Thrust block is not required unless specified by the City Engineer.. Only concrete thrust blocking is acceptable for installation of water system facilities. Concrete blocking shall be commercial concrete mix, poured in place against undisturbed soil. All concrete blocking shall have a minimum compressive strength of 3,000 psi. Thrust blocking shall comply with the provisions of Standard Detail 803. All fittings which may come in contact with poured thrust blocks shall be wrapped with 8 mil thick plastic sheet. Form thrust blocking so that bolts, joints, gaskets, and flanges of adjacent joints are clear of concrete and so that bolts and joints can be dismantled without removing concrete.

   The City does not use thrust blocks for fire hydrants. Each fire hydrant shall be secured with mega lugs and tie backs per the standard detail.

h. Sanitation Requirements: Extreme care should be used in checking and cleaning all pipe and fittings of dirt, debris and foreign matter during installation. All material shall be kept clean. Plugs shall be used to seal installed water mains when they are to be left for any period of time, including lunch breaks, coffee break, overnight, etc. Material contaminated by petroleum products or questionable chemicals will be rejected. No trench water shall be allowed to enter installed water mains.

i. During construction, new water mains must be separated from the existing system (eg. with a gate valve). All new water mains require satisfactory flushing, disinfection,

and bacteriological sampling. The final testing shall be performed in the presence of a City inspector.

j. Only City personnel are permitted to operate valves on the potable water side of a system and at wet taps. The City will fine the Contractor for system tampering if unauthorized personnel operate water system valves per *Port Orchard Municipal Code*
13.04.170 Violation.

20. Water Main Inspection and Testing

Furnish all required personnel and equipment and make all tests required to demonstrate the integrity of finished installation to approval of the City and all agencies having jurisdiction.

a. Water Main Cleaning: Prior to testing, the inside of each completed pipeline shall be thoroughly cleaned of all dirt, loose scale, sand and other foreign material. Cleaning shall be accomplished by flushing with a minimum velocity of 2.5 feet per second.

The Contractor shall install temporary strainers, temporarily disconnect equipment and take other appropriate measures to protect equipment while cleaning. Cleaning shall be completed after any repairs.

Flushing shall allow four complete exchanges of water at flushing velocity.

b. Water Main Disinfection and Flushing: After preliminary purging of the system, chlorinate entire potable water system in accordance with AWWA C-651-92 and any subsequent modifications thereof for flushing and disinfecting water mains, current adopted WSDOT Standard Specifications Section 7-09.3(24), and in accordance with all other pertinent rules and regulations. Upon completion of sterilizing, thoroughly flush entire potable water system at a minimum velocity of 2.5 feet per second, allowing four complete exchanges of contents. Discharge of disinfection water into a storm drain, drainage ditch or natural channel is prohibited without thoroughly neutralizing the

chlorine residual (0.1 parts per million or less) remaining in the water and volumetrically and velocity controlled to prevent re-suspension of sediments in the stormwater system.

After final flushing and before the water pipe is connected to or hydrostatically tested, the Contractor shall request that the City arrange to have a sample or samples collected for bacteriological testing. At least one sample will be collected from each branch of the pipe. A City Inspector must be present when samples for bacteriological testing are taken. The City will supply bottles and submit them for testing to a Washington State certified laboratory. Copies of test results shall be retained by the City. A copy of the test results will be delivered to the Contractor for review. The water pipe will not be charged for hydrostatic testing prior to satisfactory bacteriological testing results.

If test results are not satisfactory, lines shall again be disinfected, flushed, and tested until two consecutive, satisfactory series of samples are obtained. If the new water pipes are exposed to contaminants or pressure drop after acceptance of a successful bacteriological test the Contractor shall be required to repeat the disinfection process at the City's discretion and the Contractor's expense.

c. Hydrostatic Pressure Testing: All water mains and appurtenances shall be tested under a hydrostatic pressure equal to 250 psi for 1-hour. Water service lines will be visually inspected for leakage. All pumps, gauges, plugs, saddles, corporation stops, backflow prevention devices, miscellaneous hose and piping, and other equipment shown on the construction plans and that are necessary for performing the test shall be furnished and operated by the Contractor. The pipeline trench shall be backfilled sufficiently to prevent movement of the pipe under pressure. All thrust blocks shall be in place and sufficiently cured to reach design strength before testing. Where permanent blocking is not required, the Contractor shall furnish and install temporary blocking and remove it after testing.

   The mains shall be filled with water and allowed to stand under pressure for a minimum of 24 hours to allow the escape of air and/or allow the lining of the pipe to absorb water. The City will furnish the water necessary to fill the pipelines for testing purposes at a time of day when excess quantities of water are available for normal system operation.

   Gauges used in the test may be required to be certified for accuracy at a laboratory chosen by the City.

   Any visible leakage detected shall be corrected to the satisfaction of the City regardless of the allowable leakage specified. Should the test section fail to meet the pressure test successfully as specified in the Agreement, the Contractor shall, at his own expense, locate and repair the defects and then retest the pipeline. After the test has been completed, each valve shall be tested by closing each in turn and relieving the pressure beyond. This test of the valves will be acceptable if there is no immediate loss of pressure on the gauge when the pressure comes against the valve being checked. The Contractor shall verify that the pressure differential across the valve does not exceed the rated working pressure of the valve. All tests shall be made with the hydrant auxiliary valve open and pressure against the hydrant valve.

   Prior to calling out the City to witness the pressure test, the Contractor shall have all equipment completely set up and ready for operation and shall have successfully performed the test to assure that the pipe is in satisfactory condition.

   Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants.

   The test shall be accomplished by pumping the main up to the required pressure, stopping the pump for fifteen minutes 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 pressure on the main being tested. This makeup water shall be sterilized by the addition of chlorine to a concentration of 50 mg/l.

Acceptability of the test will be determined in accordance with the current adopted WSDOT Standard Specification Section 7-09.3(23). There shall not be an appreciable or abrupt drop in pressure during the 1-hour test period.

21. Construction Acceptance

    Construction Acceptance by the City will not occur until all new mains have been satisfactorily inspected and tested, and all punch list items have been satisfactorily corrected.

22. Generator

    Water well, water pump stations, and other appurtenances which require power at all times shall have a generator installed. The generator should have the quiet package enclosure with either Cummins power or be Kohler with John Deere power. The City shall approve the generator prior to installation.

D. Cross-Connection Control Regulations

The City established regulation of cross connections in Port Orchard Municipal Code 13.04.100. No cross connections shall be created, installed, used or maintained within the service boundaries served by City of Port Orchard except in accordance with WAC 246-290-490.

W.A.C. 246-290-490 and the latest adopted edition of the Cross Connection Control Manual as published by the Pacific Northwest Section-AWWA, shall be used to determine installation requirements.

8.2 Standard Specifications for Construction

A. General

This document outlines the general and specific construction requirements for water systems operated and maintained by or for the City of Port Orchard (City). All references to the City Engineer shall mean the City Engineer or his/her authorized representative.

1. Standard Specifications

   In general, all construction activities and material specifications shall conform to the latest City adopted edition of:

   a. City's Design Standards for Water Extensions.

   b. Applicable City of Port Orchard rules, regulations, ordinances and standards.

   c. "Standard Specifications for Road, Bridge, and Municipal Construction", Washington State Department of Transportation/American Public Work

Association, (WSDOT/APWA), latest edition (Standard Specifications).

d. Standards of the American Water Works Association, latest revision.

e. Rules and regulations of the State Board of Health regarding the Health aspects of Public Water Systems, WAC 246-290, latest revision.

f. Recommendations of the manufacturer of materials or equipment.

2. Permits and Licenses

The applicant/Contractor shall acquire the required permits for construction within public rights of way. The Developer and/or his engineer shall provide and complete all necessary forms and submit to the County/City/State agencies with the applicable fees.

All construction shall conform to the requirements of the respective permits.

3. Pre-Construction Conference

The City will schedule a pre-construction conference with the applicant, Contractor, and affected County/City/State agencies prior to start of construction. The Contractor shall submit the following to the City at the pre-construction conference:

a. Material submittals

b. Safety and traffic control plan, if needed

c. Copies of all necessary city, county, and state permits necessary for the conduct of the work. No work will be allowed to proceed without a copy of the necessary permits being provided to the City.

d. Evidence of insurance with the City named as additional insured in accordance with the Developer Extension Policies. An endorsement to the insured's policy will be considered as evidence of insurance.

4. Submittal and Shop Drawings

In accordance with the City's Technical and Standard Specifications, applicants or their Contractor shall submit a list of all brands, sizes, types, grades, and standard materials to be used. The City may reject certain brands and will provide approval, disapproval, and/or comment by letter.

a. Submittal data for each item shall contain sufficient information on each item to determine if it is in compliance with the Agreement requirements. Items that are installed in the work that have not been approved through the submittal process shall be removed and an approved product shall be furnished, all at the Developer's expense. Shop drawing review will be limited to general design requirements only, and shall not relieve the Developer from responsibility for errors or omissions, or responsibility for consequences due to deviations from the Agreement documents. No changes may be made in any submittal after it has been reviewed except with written notice and approval from the City Engineer prior to implementation. Shop drawings shall be submitted on 8½" x 11", 11" x 17", or 22" x 34" sheets and shall

contain the following information:

i. Project Name

ii. Prime Developer and Applicable Subcontractor

iii. City's Name

b. Submittals that do not comply with these requirements may be returned to the Developer for re-submittal. Acceptable submittals will be reviewed as promptly as possible, and transmitted to the Developer not later than 10 working days after receipt by the City Engineer. Revise and submit as necessary.

Submittals shall contain the following information for all items:

i. Equipment drawings, dimensions, and weights (pump stations only).

ii. Catalog information.

iii. Manufacturer's specifications.

iv. Special handling instructions (pump stations and pumps only).

v. Maintenance requirements (pump stations and pumps only).

vi. Wiring and control diagrams (pump stations and pumps only).

Specific submittal requirements are listed in each section of these specifications.

5. Substitutions

a. The approved Developer Extension Agreement, construction plans, and City technical and standard specifications shall be followed. No deviations will be allowed without request for change and approval in writing from the City Engineer or designee. The City reserves the right to order changes, which conform to the City's standard specifications; in the event conditions or circumstances are discovered during construction, which indicate changes are prudent. The applicant shall be notified in writing of any changes. Such changes will be mutually accepted.

b. Deviations from standard locations and/or approved plans must be documented, receive prior written approval by the City Engineer, and be accompanied by accurate record drawings.

6. Site Control

a. The Contractor shall be responsible for surveying and staking and will stake out the locations of the permanent easements, temporary easements, rights-of way, and all major facilities shown on the Plans and permits.

b. Replace all damaged survey monuments in accordance with RCW 332-120.

7. Waste Material Control

a. Adhere to all requirements of federal, state, and local statutes and regulations dealing with pollution. Permit no public nuisances.

b. Use only dump sites that are approved by the regulatory agency having jurisdiction and present proof of approval upon request. Obtain any and all permits required by regulatory agencies.

c. At all times, keep the construction area clean and orderly and upon completion of the work, restore all work or equipment storage areas to their original condition. Remove all miscellaneous unused material resulting from the work and dispose of it in a manner satisfactory to the City.

d. The Contractor shall follow all requirements and guidelines of the Puget Sound Air Pollution Control Agency and other associated agencies.

e. Use water sprinkling, temporary enclosures, or other methods to limit dust and dirt from rising and scattering in the air. Surface water runoff that is contaminated with site debris, silt, or other material that adversely affects water quality shall be collected and cleaned prior to discharge.

f. Do not use water to control dust when it may create hazardous or objectionable conditions such as ice formation, flooding, or pollution.

8. Spill Response

   The Contractor shall prepare a spill response plan for the site and provide a copy to the City Engineer. The Contractor shall maintain a current copy of the approved spill response plan on site at all times and provide any updates to the City Engineer as they occur. All necessary materials and equipment necessary to respond to spills shall be kept readily available on site.

9. Erosion Control

   The Contractor shall prepare an erosion control plan for approval by the regulatory agency. The Contractor shall maintain a copy of the approved erosion control plan on site at all times.

10. Construction Notification

    Contractors shall notify the City Engineer, a minimum of 48 hours in advance of construction, to facilitate project coordination and notification of affected property owners.

11. Construction Shutdowns

    a. Construction under this Agreement may involve replacement or modification of the existing water system, which must continue to provide service to all buildings and homes during construction. Connections and service changes must be programmed to provide the least possible interruptions of service.

    b. A Water Main Shutdown Agreement must be completed by the Contractor if a connection to an existing system involves turning off the water. The Contractor shall notify the City Engineer at least five (5) days in advance of any required shutdowns so that affected customers may be notified. City personnel will notify

properties affected by the shutoff.

c. Prior to any shutdown, all traffic control, materials, fittings, supports, equipment, and tools shall be on the site and all necessary labor scheduled prior to starting any connection work. In general, shutdowns shall not exceed four hours in duration unless specifically authorized by the City Engineer.

d. The Contractor may be required to install and maintain temporary water to all houses and other buildings affected by frequent service disruptions caused by construction activities. Installation and maintenance of temporary facilities will be at the Contractor's expense. All temporary piping and connections shall be approved by the City Engineer and disinfected as specified herein before being put into service.

e. All work under this Agreement shall be conducted in a manner that will minimize shutdowns, open roadways, or traffic obstructions caused by construction. Shutdowns causing damage to adjacent public and private property shall be the sole responsibility of the Contractor.

f. Planned utility service shutdowns shall be accomplished during periods of minimum use. In some cases, this will require night or weekend work. In such instances, the Developer/Contractor will be required to pay overtime inspection fees.

g. Coordinate all work so that service will be restored in the minimum possible time, and cooperate with the City in reducing shutdowns of the utility system to a minimum.

h. No utility interruption will be permitted without the prior approval of the City. Any unauthorized tampering with the water system is subject to fines.

12. Connection to Existing Systems

a. Connections to existing water mains shall not be made without first completing the necessary arrangements with the City. Work shall not be started until all traffic control, materials, equipment, and labor necessary to properly complete the work are assembled on the site. Once work is started on a connection, it shall proceed continuously, without interruption, and as rapidly as possible until complete. No shut- off of mains will be permitted overnight, over weekends, or during weeks with holidays.

b. Contractors shall acquaint themselves with all aspects of existing systems prior to starting construction on new mains. Pertinent information concerning existing systems may be obtained from City personnel and may be verified from City records. Contractors shall locate existing water mains and service lines prior to beginning work so they may be properly protected and maintained in service during construction.

c. Taps or new extension connections from existing mains must be made in the presence of designated City personnel. No taps or connections are to be made

without designated City personnel being present.

d. Only City personnel are permitted to operate valves on the certified, potable waterside of a line, including emergencies unless personnel safety is threatened. Exposing a potable water line during construction without the City Engineer's concurrence will result in a penalty being imposed.

13. Work on Non-City Rights-of-Way

a. Work on a state highway, county road, street or any other right-of-way not owned by the City, shall conform to the requirements of the authority having jurisdiction over such right-of-way. Contractors are responsible for notifying the proper authorities and acquiring permits before beginning work on a right-of-way. Contractors will ascertain restoration requirements and determine that schedules of operations proposed are satisfactory to applicable authorities. Work will not be permitted to proceed without evidence of having obtained the required permits.

b. When city streets, SR 160 or SR 166 within City Limits, are involved, the Contractor must coordinate all trenching and restoration activities with the City Engineer and WSDOT. Open cuts must be approved by the City Engineer.

c. When county roads are involved, the Contractor must coordinate all trenching and restoration activities with the Kitsap County Department of Public Works and the City. Open cuts must be approved by the Kitsap County Department of Public Works.

14. Traffic Maintenance

Contractors shall conduct work so as to interfere as little as possible with public travel. Required traffic control shall be in place prior to commencement of work. Access for firefighting equipment shall be provided at all times, and Contractors shall keep the local fire protection authorities informed of the location of construction operations and fire lanes. Contractors shall also notify the authorities in charge of any municipal, private, or school transportation system at least 48 hours in advance of road closures that will force a change in the regular routing of the transportation system. Contractors shall also provide and maintain suitable detour routes for the system. Road closures will not be allowed without written permission from the City Engineer, except verbal permission may be used in an emergency. Work which involves State, County road or City Streets rights of way shall be restricted to the hours between 8:00 AM and 4:00 PM and no work shall be allowed in such right of way on Saturdays, Sundays or Holidays unless authorized by the City Engineer.

15. Safety

Contractors will be solely and completely responsible for conditions at job sites, including safety of all persons and property during the performance of work. This requirement will apply continuously and not be limited to normal working hours.

16. Inspection Requirements

a. Unless previously authorized by the City Engineer, work on water mains shall not proceed without a City Inspector being present. The City may refuse acceptance of any water mains installed without a City inspection. To permit scheduling an inspector, the City Engineer must receive a hard copy of the construction schedule at least two full working days before construction activities covered by the schedule begin. The City must be kept advised of changes to the construction schedule. When significant breaks in construction occur, the Contractor must give two working days notice before resuming work. The inspector shall have authority to reject defective material and to suspend any work that is not conducted in accordance with the City's Technical Standards and Specifications.

b. All mains shall be inspected by the City Inspector before closure of any excavation. Inspectors will have access to work sites as necessary to keep the City informed of the progress of the work and the manner in which it is being done, to keep records, to act as liaison between the Contractor and the City Engineer, and to report any deviations from Plans or Specifications. Failure of the Inspector to call the attention of a

   Contractor to faulty work or deviations from the Plans or Specifications shall not constitute acceptance of said work.

c. Any personal assistance, which an Inspector may give a Contractor, will not be understood as the basis of any assumption of responsibility in any manner, financial or otherwise, by the Inspector, the Engineer, or the City.

d. The presence or absence of an Inspector on any job will be at the sole discretion of the City Engineer. Such presence or absence of an Inspector will not relieve a Contractor of responsibility to deliver the construction results specified in the Agreement documents.

e. City Inspectors will not be authorized to issue instructions or to approve or accept any portion of the work, which is contrary to the Plans and Specifications. Approvals, acceptances, or instructions, when given, must be in writing and signed by the City Engineer or his/her designated representative. Inspectors will have authority to reject defective material. The failure of an Inspector to reject defective material or any work which deviates from the Agreement documents will not constitute acceptance of such work.

f. Kitsap County may have an inspector on site when working on County rights-of-way.

17. Overtime and Holiday Work

    Should a Contractor elect to work more than eight hours per day, or more than five days per week or on holidays during the course of a project, all costs of resulting City overtime/holiday engineering and inspection will be charged to the Contractor at 2.5 times the normal rates.

18. As-Constructed and Warranty Records

a. Prior to final acceptance of the work by the City, the Developer shall deliver a complete set of acceptable as-constructed records to the City Engineer. Drawings shall be made on clean, unmarked prints of the project, and the final submittal shall include the following:

   i. Electronic Auto CADD files, version 2013 compatible;

   ii. a digital format such as "pdf" or "tif" of the record plans on CD (2 Copies)

b. The Developer shall provide as-constructed information on all items and work shown on the plans showing details of the finished product including dimensions, locations, outlines, and changes. The information must be in sufficient detail to allow City personnel to locate, maintain, and operate the finished product and its various components.

B. Site Work

1. General

   This division covers the work that is necessary for providing materials and performing all site work as called for on the approved plans.

2. General Construction Procedures

   a. Standards

      Construction procedures shall be in full accordance with the City's Standard Specifications for Water Main Construction and the most recent edition of the American Water Works Association (AWWA) Standards.

      Certain other referenced standards used in this specification are from the latest editions of:

      i. DOE — Washington State Department of Ecology
      ii. IBC — International Building Code
      iii. UPC — Uniform Plumbing Code
      iv. IMC — International Mechanical Code
      v. NEC — National Electrical Code
      vi. AWWA — American Water Works Association
      vii. ANSI — American National Standards Institute
      viii. ASA — American Standards Association
      ix. ASTM — American Society for Testing and Materials

   b. Contractor

      All main extensions shall be installed by a Contractor approved by the City.

3. Submittals

Submittal information shall be provided to the City for the following items:

a. Erosion and Sedimentation Control Plan
b. Erosion Control Fence Fabric
c. Dewatering Plan
d. Shoring Plan and Calculations
e. Dump Site Permits
f. General Fill
g. Structural Fill
h. Pipe Bedding
i. Trench Backfill
j. Gravel Base Course
k. Crushed Surfacing
l. Paving
m. Compaction Test Results
n. Hydro-seed

4. Erosion and Sedimentation Control

   a. All erosion/sedimentation control systems including fencing, earth berms, grasses, straw, mulch, culverts, drain pipe, outfalls and other items required for this project, are the responsibility of the Developer and fall under the jurisdiction of Kitsap County or the City of Port Orchard (depending on the location of the extension).

   b. All erosion/sedimentation control (ESC) systems specified in the approved erosion control plan must be installed prior to commencing any work that could result in off-site storm water or material flows. Erosion/sedimentation controls must remain in place throughout the duration of the construction activities.

   c. The Contractor shall add additional ESC facilities or processes as necessary to ensure that erosion and sedimentation problems do not occur. The Contractor shall inspect the ESC facilities daily and maintain the systems as necessary to prevent off-site drainage.

5. Dewatering

   a. The Developer is to determine the scope, type, size, quantity, method of installation, operation, and removal of the dewatering system necessary to keep all excavations de- watered to an elevation below the base of the excavation. The system shall also be sufficient to stabilize the soils in the excavation and the surrounding areas, and to prevent flotation of partially completed structures.

   b. The Contractor shall control groundwater and surface water to prevent the softening

of the bottom of excavations, or formation of quick conditions or boils during excavation. Ground water shall be lowered to 3 feet below the base of the excavation at all times. Determination of unsuitable soil conditions for supporting the improvements shall be determined by the City Engineer. When the dewatering system does not meet the specified requirements, and as a consequence there is a loosening or disturbance of the foundation soils, instability for the slopes, or damage to the foundation or structures occur, the Developer shall at its own expense repair said disturbance. This shall include

supplying all materials, labor, and equipment, and performing all work required for the restoration of foundation soil, slopes, or structure to the satisfaction of the City Engineer.

c. It is solely the Developer's and the Contractor's responsibility to meet all regulatory requirements governing the disposal of dewatering flows and to prevent damage to adjacent property. Disposal of these waters into existing City sewer mains or trunk lines is strictly prohibited. Drainage of water through the pipeline under construction is also prohibited.

d. All dewatering wells installed by the Contractor shall be removed and backfilled in accordance with applicable Federal and State regulations.

6. Construction Access

   The Contractor shall provide temporary site access for City personnel and shall maintain vehicular site access at all times.

7. Clearing and Grubbing

   Clearing and grubbing shall be performed by the Contractor to remove and dispose of unwanted debris, vegetative matter, and other items noted on the construction drawings within the construction limits. This shall conform to Section 2-01 of the WSDOT Standard Specifications.

8. Excavation

   a. The Contractor shall excavate as necessary to construct the improvements shown on the construction drawings. Excavation includes utility excavation, structural excavation, and grading excavation.

   b. Grading excavation shall be to the finished rough grade of the roadway or easement and shall be completed prior to utility excavation. Grade staking, when required, will be done by the developer's/owner's engineer, or surveyor, prior to installation of the mains.

   c. Utility excavation shall be performed to the depths necessary to complete the construction work shown. Utility excavation shall be performed in accordance with the WSDOT Standard Specifications, Section 2-09, with a minimum cover of 36 inches.

d. The base of the excavation shall be examined by the City Engineer to determine if it is suitable for backfilling. The City Engineer will evaluate the stability of the base of excavation by determining if all significant organic soils or other unsuitable materials have been removed. The Contractor per direction of the City Engineer shall perform excavation required by the City that is beyond the depth shown at their expense.

e. All excavated material shall be removed from the site unless approved as backfill material by the City Engineer. Weather conditions may make previously excavated

material unsuitable for backfill requiring the material to be removed from the project site. Approval of material as backfill will be made just prior to placement of material as backfill.

f. If the trench soil is unsuitable for trench backfill, as determined by the Inspector, the Contractor shall remove and dispose of unsuitable material and backfill the trench with approved backfill. The Contractor will keep the City Engineer informed of the disposal site of all unusable material removed from the project. New or refuse material must not be dumped on neighboring properties.

g. Excavation within City right of way areas shall be in accordance with the City of Port Orchard Public Works Right of Way Permit.

9. Shoring

Where shoring, sheet piling, sheeting, bracing, lagging, or other supports are necessary to prevent cave-ins or damage to existing structures, it shall be the responsibility of the Contractor to design, furnish, place, maintain, and remove supports in accordance with applicable laws, codes, and safety requirements including Chapter 296-155 of WAC, A Safety Standards for Construction Work, Part N, Excavation, Trenching, and Shoring. Design, planning, installation, and removal of sheeting, shoring, piling, lagging, and bracing shall be accomplished in such a manner as to maintain the undisturbed state of soil below and adjacent to excavation. Failure to maintain shoring in accordance with the submitted shoring plan will result in shut down of the job by the City Engineer until required shoring is in place.

10. Hazardous Content of Fill Material

All imported fill material shall be free of hydrocarbons (e.g., gasoline, diesel oil, etc.), pesticides, herbicides, and other hazardous volatile organic compounds (VOCs) and synthetic organic chemicals (SOCs). If required, the Contractor shall provide certification to the City Engineer that the fill is free of these chemicals.

11. General Fill

a. All fill required for the project that is not specifically defined as another type shall be "General Fill".

b. General fill shall be free of organics, debris, and other deleterious materials. General

fill shall conform to Section 9-03.10 "Aggregate for Gravel Base" of the WSDOT Standard Specifications. The moisture content of the material and weather conditions at the time of placement will be used to determine the suitability of native materials for backfill as general fill. All general fill shall be compacted in uniform layers not to exceed 8 inches in loose thickness and compacted to at least 95 percent maximum dry density based on the ASTM D-1557 test procedure.

12. Structural Fill

    a. All fill placed below and against building components, building structures, vaults, manholes, handholds, slabs, sidewalks, and drives shall be "Structural Fill".

    b. Structural fill shall be free of organics, debris, and other deleterious and conform to Section 9-03.12 (2), "Gravel Backfill for Walls" of the WSDOT Standard Specifications. The City Engineer shall determine if native on-site materials are suitable for use as structural fill. The moisture content of the material and weather conditions at the time of placement will be used to determine the suitability of native materials for backfill as structural fill. Structural fill shall bear on a firm base and be placed in uniform layers not exceeding 8 inches in loose thickness. The backfill area must be free of standing water and the sub-grade soils must be stable. Each layer of structural fill shall be compacted to at least 95 percent of its maximum dry density based on the ASTM D-1557 test procedure.

13. Pipe Bedding

    a. All fill placed below and around buried utilities shall be "Pipe Bedding". Pipe bedding shall be placed when the trench base is deemed unsuitable by the City Engineer.

    b. Bedding material shall surround the pipe and conduits to the limits shown on the construction drawings and provide uniform support along the entire length without allowing concentrated loading at joints or bells. Bedding material shall conform to Section 9-03.12(3) of the WSDOT Standard Specifications. All bedding material shall bear on firm sub-grade and be compacted to at least 95 percent of maximum dry density based on the ASTM D-1557 test procedure.

14. Trench Backfill

    a. Unless the trench is backfilled with Control Density Fill, all fill material placed above the pipe bedding in a trench shall be "Trench Backfill."

    b. Trench backfill shall be placed and compacted above the pipe bedding to finish grade elevations in un-restored areas or to sub-grade elevations in restored areas. Trench backfill shall consist of a well-graded sand or sand and gravel mixture conforming to Section 9-03.12 (2),"Gravel Backfill for Walls" of the WSDOT Standard Specifications and have less than 5 percent passing the U.S. No. 200 sieve based on the fraction passing the 3/4 inch sieve. Trench backfill shall bear on a firm base and be constructed in uniform layers not exceeding 8 inches in thickness. Each lift shall

be compacted in uniform layers not to exceed 8 inches in loose thickness and compacted to at least 95 percent maximum dry density based on the ASTM D-1557 test procedure. The City Engineer shall determine if native on-site materials are suitable for use as trench backfill.

c. Finished backfill shall leave all existing drainage ditches, culverts, and other appurtenances in a useable condition equal to or better than their original condition.

15. Gravel Base Course

    a. All fill placed under paving and next to native material shall be "Gravel Base Course".

    b. Aggregate for gravel base course shall conform to Section 9-03.10 of the WSDOT Standard Specifications.

16. Gravel Top Course

    a. All fill placed under paving and next to paving material shall be "Gravel Top Course" or crushed surfacing.

    b. Aggregate for gravel top course shall conform to Section 9-03.09(3) of the WSDOT Standard Specifications.

17. Paving

    a. Cement concrete pavement, sidewalks, and curb shall be Class B concrete (3,000 psi) as specified in the concrete section of these specifications. Construction shall comply with Section 5-05 of the WSDOT Standard Specifications.

    b. Asphalt concrete pavement shall comply with Section 5-04 of the WSDOT Standard Specifications and the utility permit for the work. Finish, place, spread, and compact Class B asphalt concrete pavement to the thickness shown on the construction drawings or specified in the utility permit. The minimum compacted thickness of asphalt concrete pavement shall be 2-inches.

    c. All paving shall be inspected and approved by the agency issuing the utility permit.

18. Compaction Testing

    a. The Contractor shall arrange, at his own expense, for in place density testing to be performed at intervals not less than every 500 linear feet of pipe run and where required by the City Engineer. At a minimum, density tests shall be performed at 50% of the trench depth and at the surface of the trench. Other depths of the trench may be required by the City Engineer.

    b. The Contractor shall excavate to the depths required to perform the tests and shall provide sheeting, shoring, and bracing of the trench as necessary. Backfill, in all sections where density requirements are not satisfied, shall be removed from the trench, re- compacted, and re-tested until conforming to specifications.

    c. A certified independent testing laboratory acceptable to the City Engineer shall

perform density testing. All test results shall be submitted directly to the City Engineer.

d. The City shall have the right, but not the obligation, to perform such additional density testing, as the City Engineer deems necessary. If the tests show that the density requirements are not satisfied, the Contractor shall reimburse the City for all costs for

the tests, and shall remove the unsatisfactory backfill from the trench and re-compact and retest it until conformance with the specifications is obtained.

e. All compaction shall meet the approval of the agency issuing the utility permit.

19. Surface Restoration

a. Roads, driveways, shoulders, landscaping and all other areas removed, broken, caved-in, settled, or otherwise damaged as a result of construction work, shall be repaired and/or resurfaced to match the existing surface or landscaped areas.

b. Existing shoulders and gravel surfaces shall be restored with like, crushed rock surfacing. Existing lawns shall be restored with sod after proper backfilling and settling. Existing landscaping, fences, mailboxes, ornamentation, etc. shall be restored as close to original conditions as possible. Private driveways, walks, and other surfaced areas shall be repaired, patched, or resurfaced as required to match the original surface condition.

c. Contractors shall furnish and install new asphalt surface at all locations where the existing asphalt surface or asphalt driveway has been removed or damaged by construction work. Trenches shall be backfilled with select granular material approved by the City Engineer. It shall be mechanically tamped to 95 percent compaction in six- inch lifts. The top four inches shall consist of two inches of crushed surfacing top course and two inches compacted depth of asphaltic concrete, Class B.

C. Concrete

1. General

This division covers that work necessary for furnishing and installing all concrete as described in these specifications and shown on the plans.

2. Submittals

Submittal information shall be provided to the City Engineer for the following items:

a. Concrete design and admixtures

b. Special placement procedures for hot or cold weather

c. Schedule of surface finishes

d. Control Density Fill design mix

Concrete performance mixes shall be submitted to the City Engineer for approval a minimum of two weeks prior to placing any concrete. The performance mix shall include the amounts of cement, fine and coarse aggregate, water and admixtures, as well as the water cement ratio, slump, concrete yield and substantiation strength data in accordance with ACI 318-95, Chapter 5. The use of a performance mix requires batch plant inspection, the cost of which shall be paid by the Contractor. Review of mix submittals by the City

indicates only that information presented conforms generally to Agreement documents. Contractor or supplier maintains full responsibility for special performance.

3. Control Density Fill (CDF)

   a. At least 10 days before placing CDF, the Contractor shall submit a mix design for the material to be used. The mix design shall include trial laboratory and testing data with cylinder breaks performed at 7, 14, and 21 days. The mix design shall be approved by the agency issuing the utility permit.

   b. CDF shall be proportioned to be a non-segregating, free flowing, self-consolidating, low shrink slurry.

   c. The Contractor and its supplier shall determine the materials and proportions used to meet the requirements of these Specifications. The mix design shall be prepared for the range of aggregate gradations that are expected to be used.

   d. The unconfined compressive strength at 28 days shall be 200 psi (+50 psi) as per ASTM D4832.

   e. Contain CDF in trench sections using bulkheads or fill materials to confine the flow of material. Take appropriate precautions to prevent pipe displacement and/or flotation.

   f. CDF shall be placed in lifts not exceeding 6 feet in height, with a time interval of not less than 1 hour between lifts.

   g. Provide steel plates to span trenches and prevent traffic contact if necessary. No traffic or construction equipment shall be allowed on CDF for at least 24 hours after placement or until the material is hard enough to prevent rutting or damage. Work shall not proceed unless plates are on the jobsite.

4. Concrete Materials

   a. Concrete shall be mixed, conveyed, and proportioned in accordance with IBC section 1905. The performance mix shall include the amount of cement, fine and coarse aggregate, water, and admixtures as well as water cement ratio, slump, concrete yield, and sustaining strength data in accordance with these specifications, the minimum requirements of the current adopted International Building Code, Section 1905, and the requirements of ACI 318-99.

   b. Materials shall conform to the following standards:

i. Cement: ASTM C-105
ii. Coarse Aggregate: ASTM C-33
iii. Fine Aggregate: ASTM C-33
iv. Admixtures: ASTM C-494
v. ir entraining Admixtures: ASTM-260
vi. Water used in concrete shall be potable.
vii. Fly ash may be substituted for up to 15% of the required cement.

5. Thrust Blocking, Driveways, and Sidewalks

a. Cement: ASTM C-105
b. Coarse Aggregate ASTM C-33
c. Fine Aggregate: ASTM C-33
d. Admixtures: ASTM C-494
e. 28-day strength: 3,000 psi minimum
f. Cement content: 5.5 sacks/CY minimum
g. Water/Cement ratio: 6 gals/95 lb sack maximum
h. Fine aggregate ratio: 45% max by weight
i. Coarse aggregate limits: 7/8 inch maximum
j. Entrained air ratio: 3% minimum to 5% maximum
k. Slump: 4 inches maximum

Conform to Standard Details for General Blocking, Vertical Blocks, and Deadman Blocking. All fittings to be blocked shall be wrapped with 8-mil polyethylene plastic. Concrete blocking shall be properly formed with plywood or other acceptable forming materials and shall not be poured around joints. The forms shall be stripped prior to backfilling. All blocking must be inspected by the City Inspector prior to backfill.

The City does not use thrust blocks for fire hydrants. Each fire hydrant shall be secured with mega lugs and tie backs per the standard detail. For mains crossing other pipes, the City will require additional restraints.

D. Special Construction (Pipeline Casings)

1. General

This division covers the boring and jacking of pipeline casings and the installation of carrier pipe.

2. Submittals

Submit the following for review:

a. Casing pipe drawings, details, and thickness calculations
b. Carrier pipe placement method and equipment
c. Utility crossing permits

3. Quality Assurance

   The boring contractor shall have regularly engaged in work of this nature for at least 5 years.

4. Other Utilities

   No other utilities are allowed to be placed inside the casing without the prior express written consent of the City Engineer and a satisfactory hold harmless Agreement.

5. Casing Pipe

   a. Provide welded steel pipe of the minimum diameter and thickness approved by the City Engineer. The casing ID shall be at least four inches larger than the carrier bell OD. Provide pipe of sufficient wall thickness and axial strength to withstand the forces encountered during the jacking operation, but in no case less than 3/8 inch. The casing shall be designed to withstand all imposed loads plus a corrosion allowance of 1/4 inch.

   b. Fabricate the pipe in conformance with ASTM A 252, Grade 2 except the hydrostatic test is waived. Provide tapped grout holes at the top of the casing at reasonable intervals. Install plugs in the tapped holes.

6. Joints

   Weld sections of casing pipe with a continuous circumferential weld. Provide stress transfer across the joints capable of resisting the jacking forces involved.

7. Casing End Seals

   Seals shall be ¼-inch (minimum) thickness, pull on style end seals fabricated from EPDM synthetic rubber with stainless steel bands and clamps. End seals shall be as manufactured by PSI Industries or approved equal.

8. Carrier Pipe Skids

   Provide custom engineered skids/isolators to isolate the carrier pipe from the casing. The insulator shall consist of a PVC insulating liner (90 mil minimum thickness), 12-inch wide, 12-gauge (minimum) steel bands with steel risers and glass reinforced plastic or ultra-high molecular weight runners. The skids shall be designed to properly support the pipe filled with water. The runners shall be designed so that the carrier pipe joints clear the casing by two inches. The ferrous components of the insulator and steel bands shall be shop coated with a minimum of 10 mills PVC heat fusion coating. All miscellaneous hardware including stud bolts, washers, and nuts shall be 316 stainless steel. Skids shall center the pipe in the casing. Provide skids as manufactured by PSI

Industries, Cascade Manufacturing Co., or approved equal. The minimum number of required skids is 3 per pipe length for the entire length of the casing.

9. Sand

   Unless specifically required by the City Engineer, sand shall not be used in a casing for filling between the casing and carrier pipe. In those instances where the City Engineer does require sand, it shall be clean and 90-100 percent will pass the No. 4 sieve. Not more than 5 percent will pass the No. 200 sieve. Sand shall be free from clay and organic material.

10. Casing Excavation and Installation

    Prior to installing the casing, thoroughly investigate the locations of existing utilities. The Contractor shall pothole the casing location to verify that there are no interferences.

    Equip the leading section of casing pipe with a jacking head securely anchored to prevent any wobble or variation in alignment during jacking operation. Make every effort to avoid loss of ground outside the jacking head. If excessive ground loss occurs, stop excavation and fill void with grout.

    The casing shall be installed in such a manner that it is not damaged or deflected to reduce its true circular diameter.

11. Tolerances

    A maximum horizontal and vertical tolerance of three inches per 100 linear feet of jacked casing is permitted.

12. Grouting

    After jacking is completed, fill voids by pumping grout through grout holes in the casing at any locations of ground loss and elsewhere where voids are suspected. Plug grout holes after grouting. Take care to avoid over-pumping grout and disturbing the improvements the casing was jacked under.

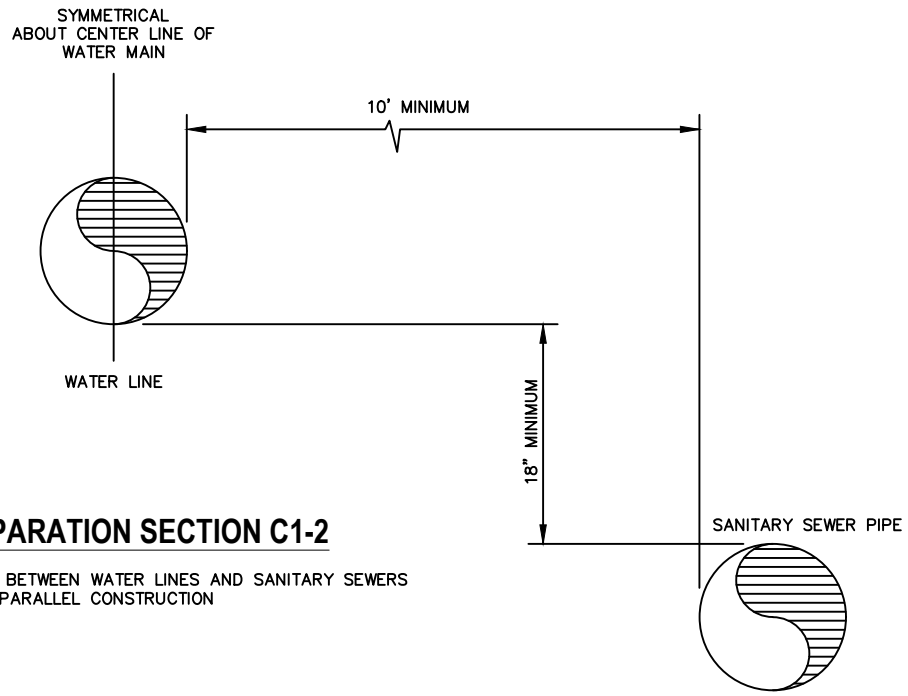
13. Carrier Pipe

    a. All pipe installed in casing shall have restrained joints.

    b. Protect pipe as necessary during installation to insure against damage. Install the carrier pipe with the skids located not more than two feet from each end of the pipe joints. The skids shall be adequate in number to hold the pipe to grade, and not less than two skids shall be installed on each section of pipe. Provide skids within 6 inches of each end of the casing.

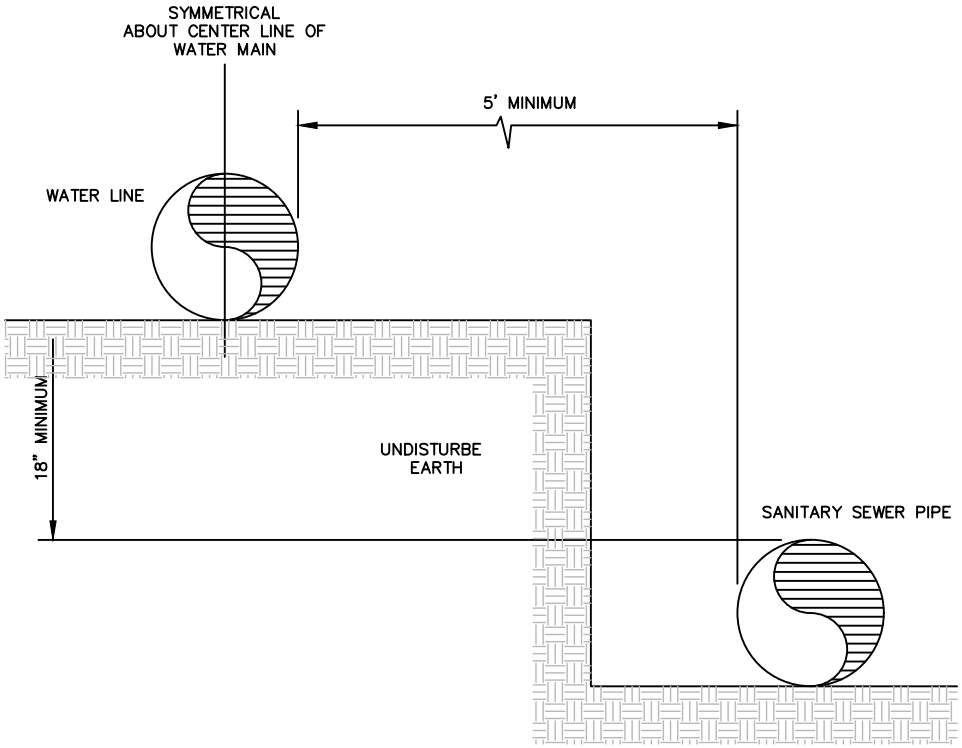
    c. After installation and testing of the carrier piping, carefully fill the remaining space in the casing with pneumatically placed sand unless directed by the City Engineer to leave the casing unfilled. Take care to avoid floating the carrier pipe.

    d. Install casing end seals and secure in place with stainless steel bands. Make seals watertight.



UTILITY SEPARATION SECTION C1-2

REQUIRED SEPARATION BETWEEN WATER LINES AND SANITARY SEWERS
PARALLEL CONSTRUCTION



UTILITY SEPARATION SECTION C1-3

REQUIRED SEPARATION BETWEEN WATER LINES AND SANITARY SEWERS
UNUSUAL CONDITIONS PARALLEL CONSTRUCTION

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Port ORCHARD

RESTORATION, TAPS, AND BLOCKING A

SEPARATION STANDARDS

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DATE	1/30/2019
SCALE	NTS
DRAWING NUMBER	800-B

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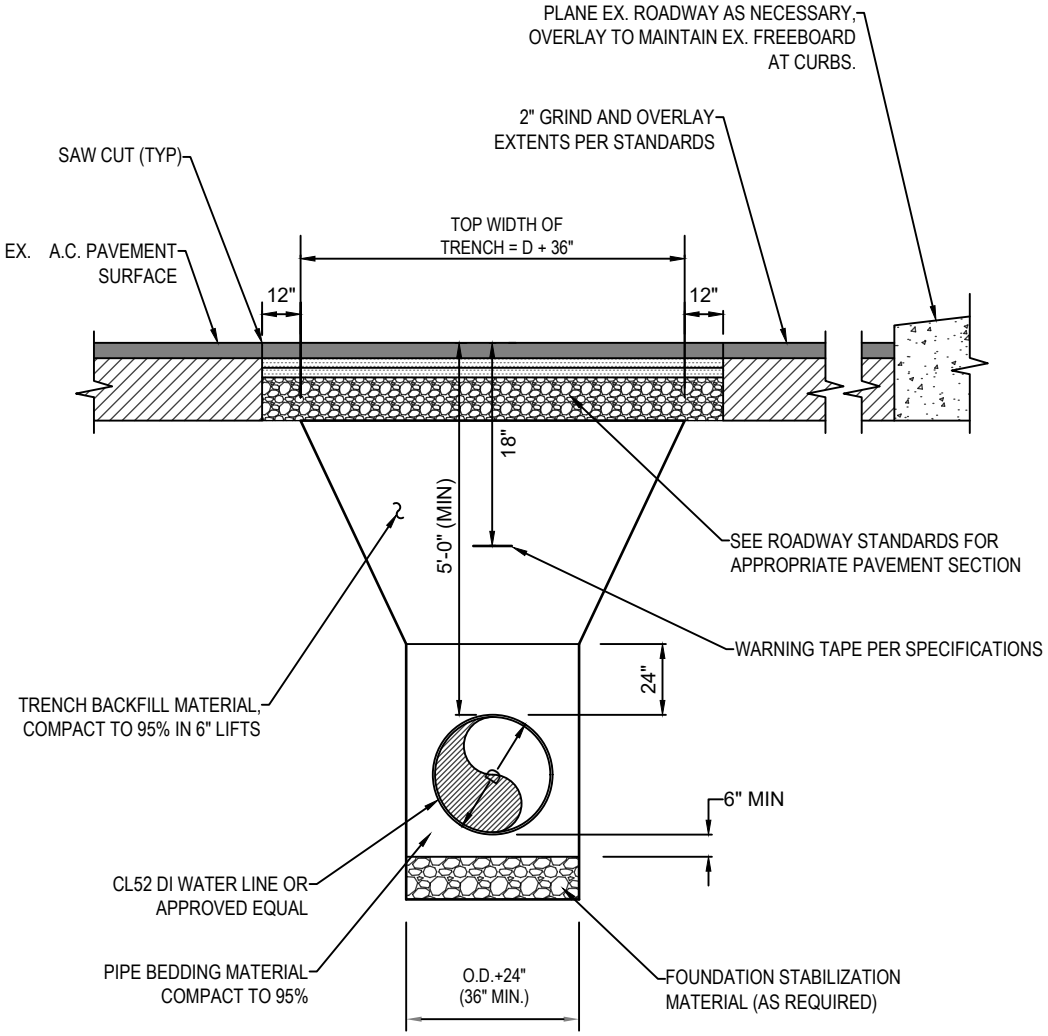

NOTES:

1) BED THE ENTIRE WIDTH OF THE TRENCH PAVEMENT
2) RESTORATION SHALL BE PER THE APPROPRIATE SECTION IN CHAPTER 6 (PAVEMENT SURFACING).
3) INSTALL TRACER WIRE PER SPECIFICATIONS

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RESTORATION, TAPS, AND BLOCKING B

WATER MAIN TRENCH

DRAWN BY	IDS
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DRAWING NUMBER	801

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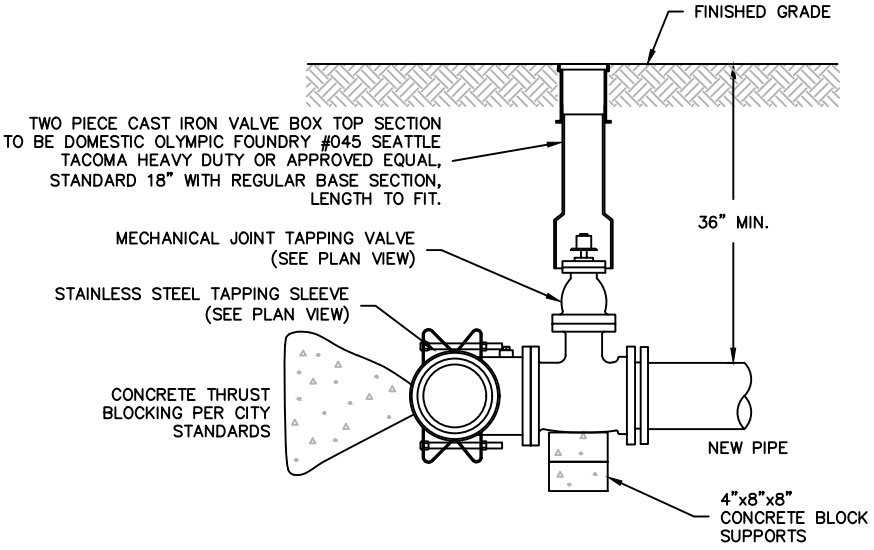
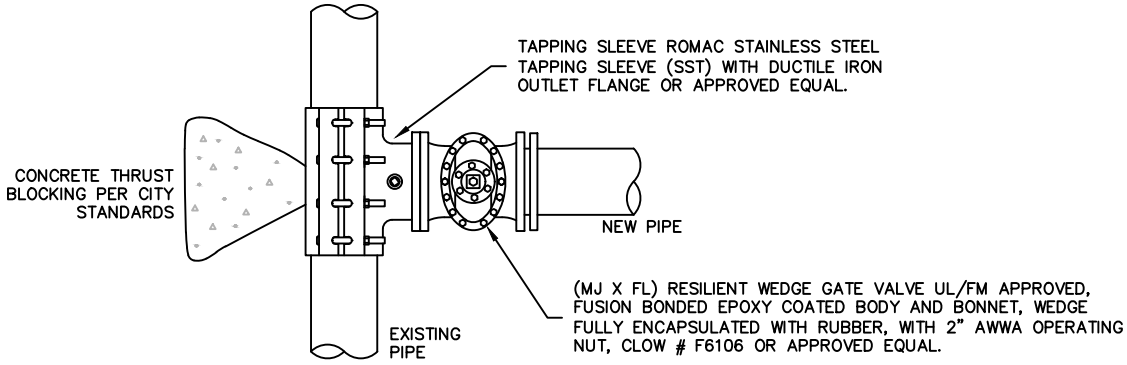


ELEVATION



PLAN

NOTES:

1. PRIOR TO BORING:
   A. TAPPING SLEEVE AND VALVE SHALL BE PRESSURE TESTED AT 200 PSI FOR A PERIOD OF 15 MINUTES. PRESSURE LOSS DURING TESTING SHALL NOT EXCEED 5 PSI.
   B. TAPPING SLEEVE AND VALVE SHALL BE STERILIZED PER SPECIFICATIONS
2. PRIOR TO FINAL CONNECTION OF TAPPING VALVE TO NEW PIPING, THE NEW PIPING SHALL BE PRESSURE TESTED AND STERILIZED PER SPECIFICATIONS

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RESTORATION, TAPS, AND BLOCKING C

WET TAP

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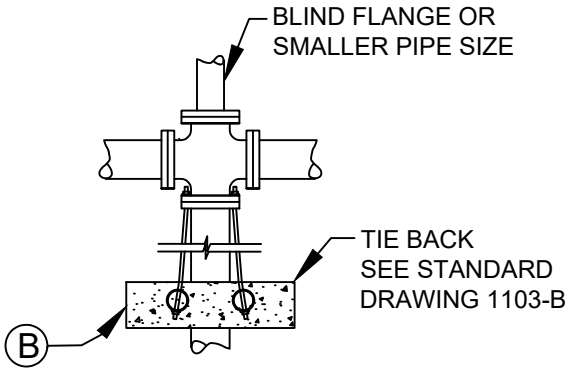
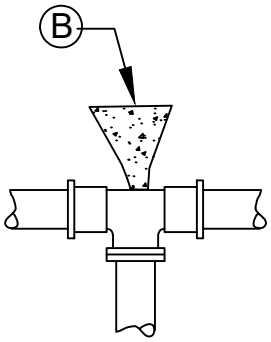


CROSS



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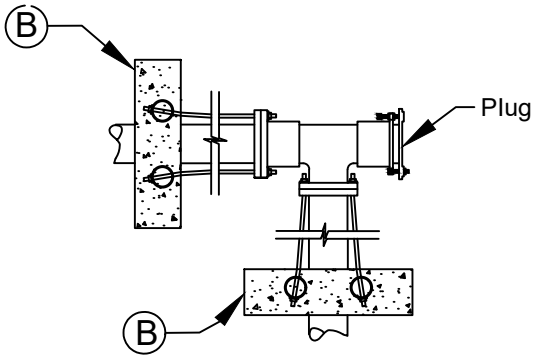

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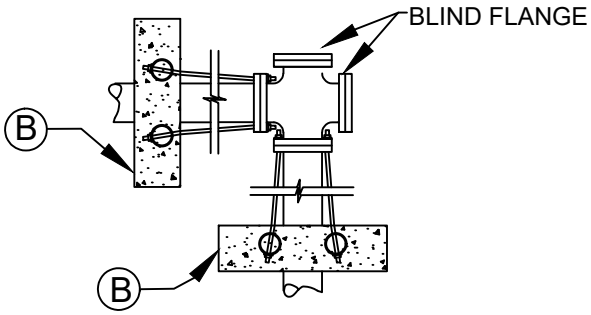
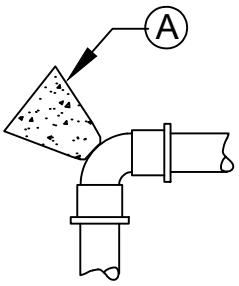
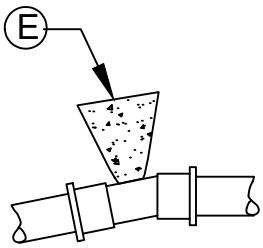


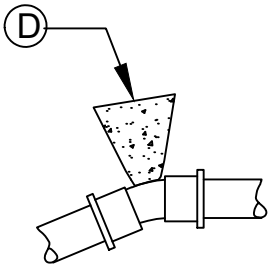
CAPPED CROSS



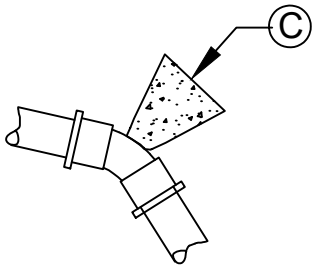
90° BEND



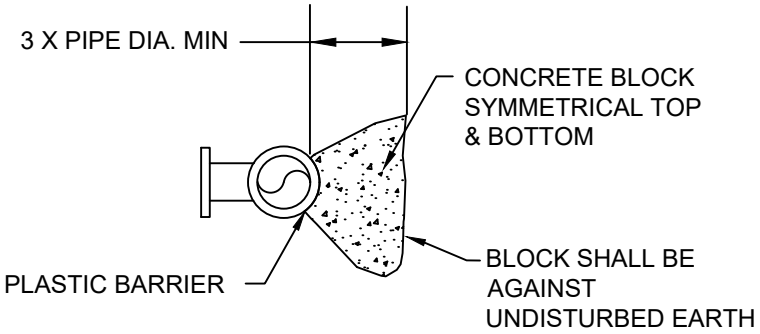
11 1/4° BEND



22 1/2° BEND



45° BEND



TYPICAL CROSS-SECTION

TABLE A - THRUST BLOCK

PIPE SIZE	Ⓐ SQ. FT.	Ⓑ SQ. FT.	Ⓒ SQ. FT.	Ⓓ SQ. FT.	Ⓔ SQ. FT.
4"	3	2	2	1	1
6"	6	5	4	2	1
8"	11	8	6	3	2
12"	22	16	12	6	3
16"	38	27	21	10	6
18"	48	34	26	14	7
24"	84	59	45	23	13

MIN. BEARING AREA AGAINST UNDISTURBED SOIL

SEE DRAWING 1103-B FOR ADDITIONAL NOTES

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RESTORATION, TAPS, AND BLOCKING

THRUST BLOCKING AND TIE BACKS

DRAWN BY	IDS
DATE	1/15/2019
SCALE	NTS
DRAWING NUMBER	803-A

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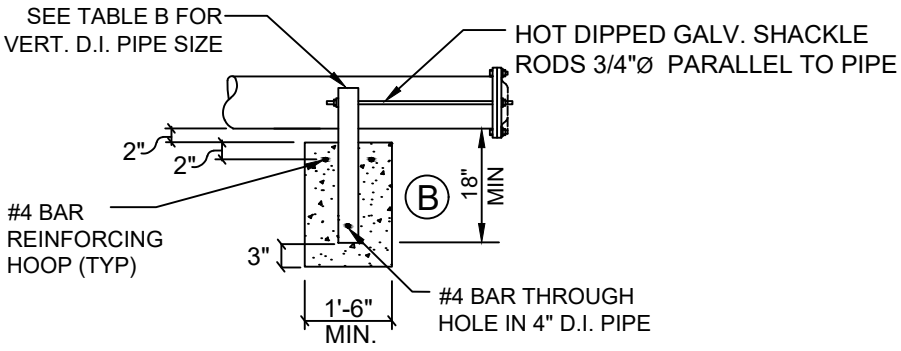

TIE BACK BLOCK DETAIL

TABLE B - TIE BACK

WATER MAIN PIPE	AMOUNT OF 3/4" GALV. SHACKLE RODS	SIZE OF VERT. PIPE IN CONC.	AMOUNT OF #4 REINFORCING BAR HOOPS
4"	2	4"	1
6"	2	4"	1
8"	2	4"	1
12"	4	4"	2
16"	6	6"	3
18"	6	6"	3
24"	6	6"	3

NOTES:

1. BEARING AREA OF CONCRETE THRUST BLOCK IS BASED ON 225 PSI PRESSURE AND SAFE SOIL BEARING LOAD OF 2000 PSF.
2. THE SAFE SOIL BEARING LOAD SHALL BE ADJUSTED TO MEASURED SOIL BEARING LOADS IN THE FIELD.
3. AREAS MUST BE ADJUSTED FOR OTHER PIPE SIZES, PRESSURES AND SOIL CONDITIONS.
4. CONCRETE BLOCKING SHALL BE CAST IN PLACE AND HAVE A MINIMUM OF 1/4 SQUARE FOOT BEARING AGAINST THE FITTING.
5. THE BLOCK SHALL BEAR AGAINST THE FITTINGS ONLY AND SHALL BE CLEAR OF JOINTS TO PERMIT TAKING UP AND DISMANTLING OF JOINT
6. THE CONTRACTOR SHALL INSTALL BLOCKING ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATING PRESSURE UNDER ALL CONDITIONS OF SERVICE.
7. USE 2" THICK STYROFOAM TO FORM THE CONCRETE BLOCKING. PLASTIC SHALL BE INSTALLED BETWEEN ALL CONCRETE BLOCKING AND FITTINGS.

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RESTORATION, TAPS, AND BLOCKING

THRUST BLOCKING AND TIE BACKS

DRAWN BY	IDS
DATE	1/15/2019
SCALE	NTS
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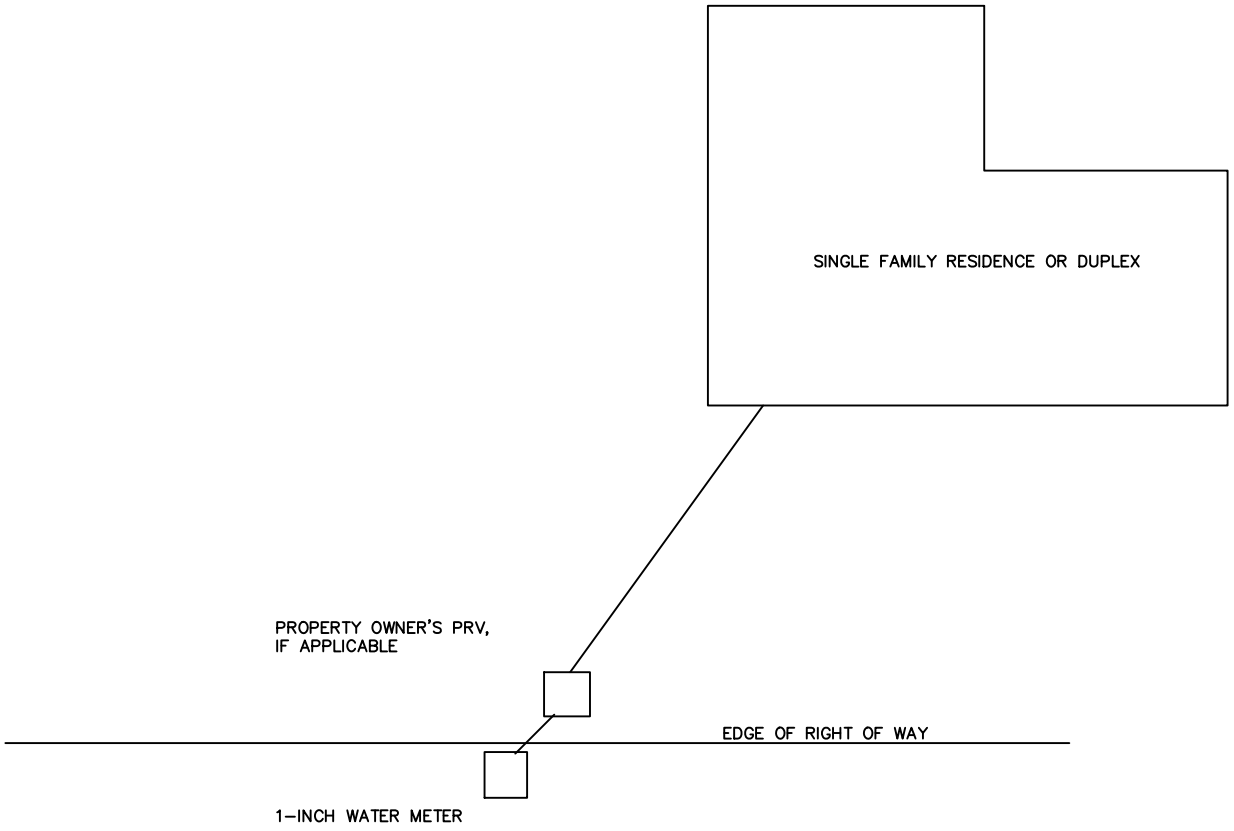

NOTES:

IF A RESIDENTIAL FIRE SPRINKLER SYSTEM IS USED:

1. THE WATER METER WILL BE AT LEAST A 1–INCH METER
2. THE SPRINKLER SYSTEM WILL BE PRIVATELY OWNED AND MAINTAINED.
3. THE SPRIKLER SYSTEM WILL BE CONNECTED TO THE OWNER'S SERVICE LINE AND WILL BE A FLOW–THROUGH SYSTEM.

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Port ORCHARD

FIRE SUPPRESSION A

RESIDENTIAL FIRE SPRINKLER METERING

DRAWN BY	IDS
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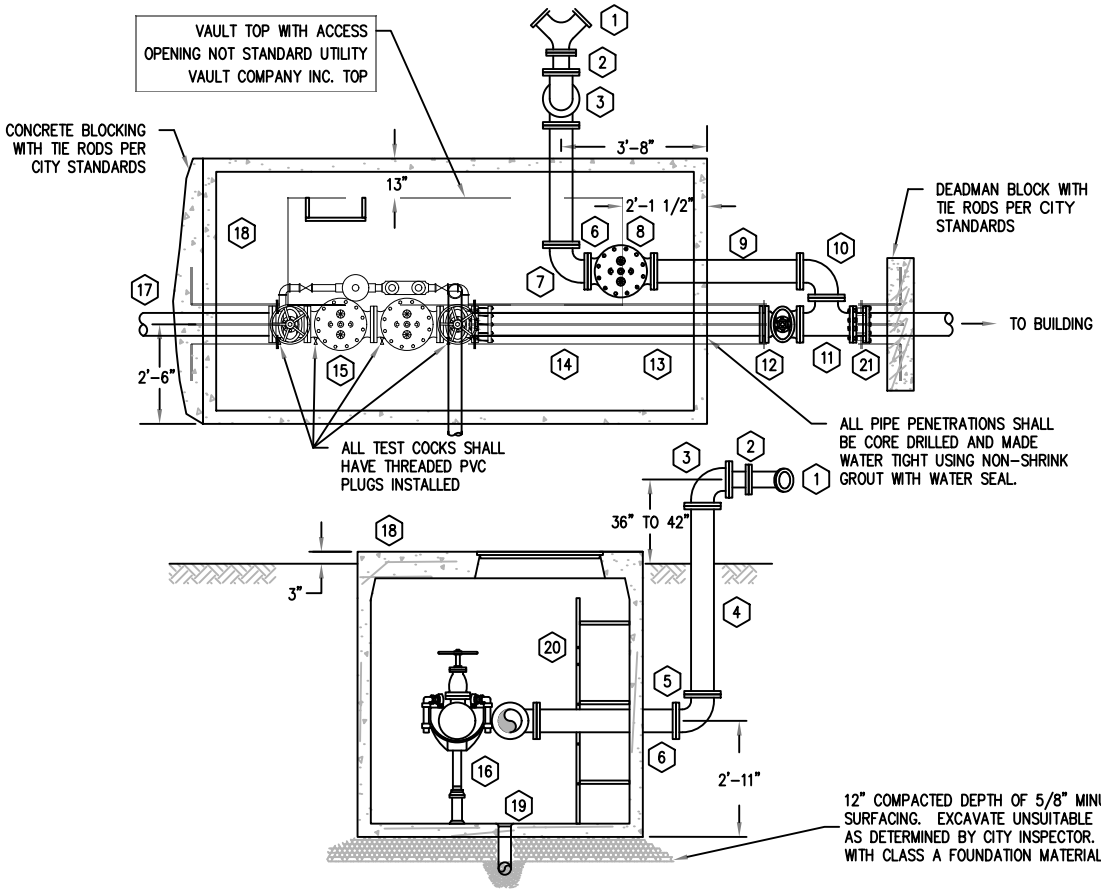

LEGEND

1. 4"x2 1/2" FIRE DEPARTMENT DOUBLE CONNECTION FOR STAND PIPE WITH BREAKABLE CAST IRON HOSE CAPS.
2. 4" ADAPTER (FLxSCREWED)
3. 4" OR 6" 90° BEND (FL)
4. 4" OR 6" PIPE (FLxFL), LENGTH TO FIT
5. 4" OR 6" 90° BEND (FL)
6. 4" OR 6" PIPE (FLxFL), 3'-0" LONG
7. 4" OR 6" 90° BEND (FL)
8. 4" OR 6" SWING TYPE GRAVITY OPERATED CHECK VALVE(FL)
9. 4" OR 6" PIPE (FLxFL), 3'-8" LONG
10. 4" ASSEMBLY: 4" SHORT RADIUS 90° BEND (FL), 6"AND 8" ASSEMBLY: 6" SHORT RADIUS 90° BEND (FL), 10" ASSEMBLY: 8"x6" REDUCING 90° BEND (FL)
11. 4" ASSEMBLY, 4" TEE (FL)
    6" ASSEMBLY, 6" TEE (FL)
    8" ASSEMBLY, 8"x8"x6" TEE (FL)
    10" ASSEMBLY, 10"x10"x8" TEE (FL)
12. 4", 6", 8", OR 10" RESILIENT WEDGE GATE VALVE (FLxMJ) WITH INDICATOR POST. INDICATOR POST VALVE SAME SIZE AS DOUBLE CHECK VALVE.
13. 4", 6", 8", OR 10" DI CLASS 52 NIPPLE PIPE, CEMENT LINED, LENGTH TO FIT, WITH TIE RODS PER CITY STANDARD.
14. 4", 6", 8", OR 10" FLANGED COUPLING ADAPTER
15. DETECTOR DOUBLE CHECK VALVE ASSEMBLY. EACH ASSEMBLY SHALL INCLUDE TWO RESILIENT WEDGE GATE VALVES AND TEST COCKS, BY- PASS ASSEMBLY, AND BE APPROVED CROSS-CONNECTION CONTROL ASSEMBLIES PER THE LATEST D.O.H. APPROVED LIST.
16. ADJUSTABLE PIPE SUPPORT UNDER CHECK VALVES STANDON MOD. #S92 OR APPROVED EQUAL (THREE REQUIRED).
17. 4", 6", 8", OR 10" (FLxPE) PIPE WITH COLLAR 18" FROM PLAIN END (PE):
    4" - 5'-6" LONG 6" - 4'-6" LONG
    8" - 3'-6" LONG 10" - 3'-0" LONG
18. PRECAST CONCRETE VAULT WITH LOCKING STEEL COVERS. COVER EQUAL TO LW PRODUCTS COMPANY TYPE "HD." UTILITY VAULT CO. #612-LA OR APPROVED EQUAL.
19. 6" MIN. DRAIN WITH SCREEN TO DAYLIGHT OR STORM DRAIN SYSTEM. PROVIDE RODENT PROOF SCREEN AT DAYLIGHT.
20. FREE STANDING GALVANIZED STEEL LADDER ATTACH TO FLOOR AND VAULT WALL.
21. 4", 6", 8", OR 10" FLANGED COUPLING ADAPTER

Est. 1890

Port ORCHARD

FIRE SUPPRESSION B

FIRE SERVICE CONNECTION - EXTERNAL DDCV/PIV/FDC

DRAWN BY	IDS
DATE	1/30/2019
SCALE	NTS
DRAWING NUMBER	821

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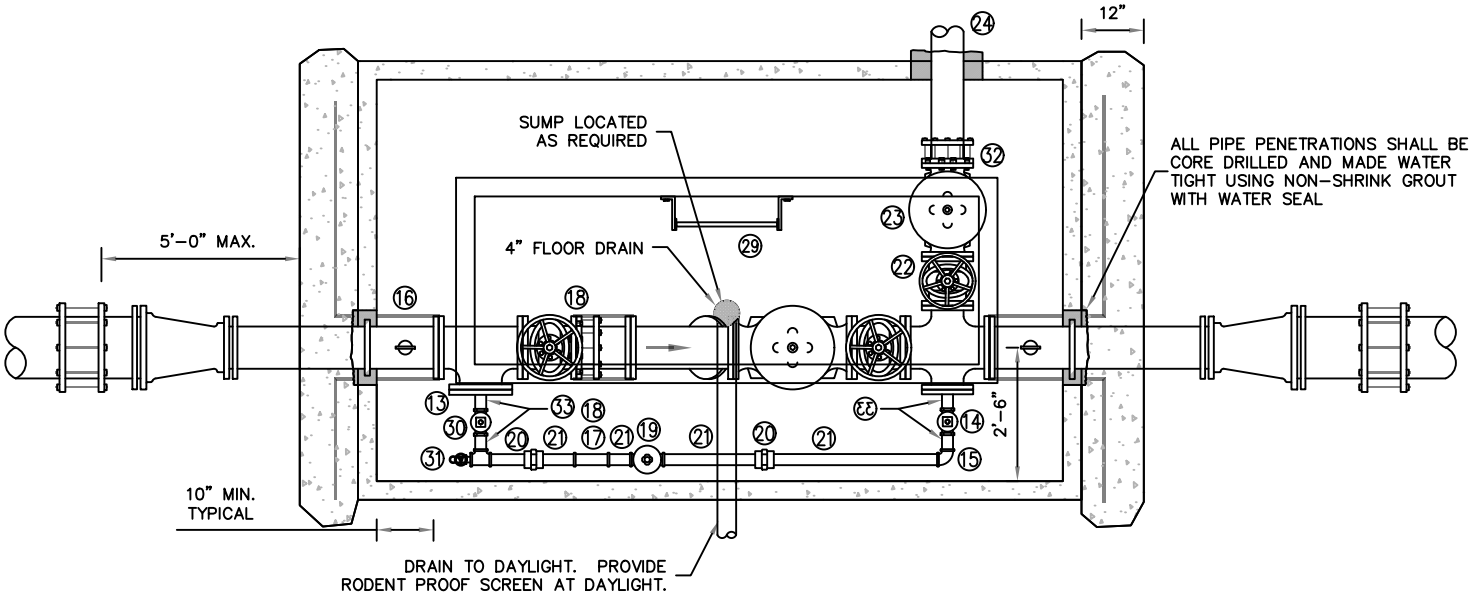

PLAN

SIZING TABLE					
Main Line	Main PRV	Bypass Line	Pressure Relief	Utility Vault	Locking Steel Covers
*12"	8"	3"	Sized	712-LA	LW PRODUCTS TYPE "HD"
10"	8"	3"	for	712-LA	LW PRODUCTS TYPE "HD"
8"	6"	2"	each	612-LA	LW PRODUCTS TYPE "HD"
6"	4"	2"	Project	5106-LA	LW PRODUCTS TYPE "HD"

* Size shown in this figure.

NOTES
1. PAINT INTERIOR WALLS WITH TWO COATS OYSTER WHITE, FACTORY APPLIED.
2. SUBMIT FOR APPROVAL ALL SUPPLIER CUT SHEETS ON ALL MATERIALS TO BE USED.
3. TWO COATS VAN DEX WATERPROOFING OR APPROVED EQUAL TO BE APPLIED ON OUTSIDE SURFACES OF VAULT.
4. ALL BRASS OR COPPER GALVANIZED CONNECTIONS SHALL HAVE DIELECTRIC BUSHINGS.

① 12" CAST IRON COUPLING ROCKWELL 431 WITH LONG LENGTH SLEEVE OR APPROVED EQUAL.
② 12" DI PIPE, LENGTH TO FIT.
③ 12" TO 8" DI REDUCER (MJxMJ).
④ 8" DI SPOOL WITH COLLAR (PExFL), LENGTH TO FIT.
⑤ 8" DI TEE (FL x FL x FL).
⑥ ADJUSTABLE PIPE SUPPORT STANDON MODEL S92 OR APPROVED EQUAL.
⑦ 8" RESILIENT SEAT GATE VALVE (FLxFL) WITH HAND WHEEL.
⑧ 8" FLANGE COUPLING ADAPTER ROCKWELL 913 WITH ANCHOR STUDS OR APPROVED EQUAL.
⑨ 8" STRAINER (FLxFL) MUESSCO NO. 751 OR APPROVED EQUAL.
⑩ 2" BRONZE CORPORATION STOP (IPTxFIPT) FORD FB 1700-7 OR APPROVED EQUAL.
⑪ 8" PRESSURE REDUCING VALVE (FLxFL), CLA-VAL 90G-01ABCS OR APPROVED EQUAL WITH TEST COCKS, COPPER TUBING TRIM, EPOXY LINING, AND VALVE POSITION INDICATOR.
⑫ 8" TO 6" BRANCH REDUCING CROSS (FLxFLxFLxFL).
⑬ 8" DI BLIND FLANGE WITH 3" IPS TAP (TYPICAL).
⑭ 3" R.S. GATE VALVE WITH HAND WHEEL (SxS).
⑮ 3" BRASS 90° BEND (SxS).
⑯ PRESSURE GAUGE (0 TO 200 PSI) WITH BALL VALVE AND BRASS FITTINGS. TAP PIPE FOR CONNECTION, CENTER BETWEEN FLANGE AND VAULT WALL.
⑰ 3" STRAINER (FLxFL) WITH 1/8" PERFORATIONS BRASS SCREEN MUESSCO NO. 751 OR APPROVED EQAUL. TWO 3" BLIND FLANGES WITH 3" FIPT THREAD.
⑱ 3/4" BRONZE CORPORATION STOP (IPTxFIPT) FORD FB1700-3 OR APPROVED EQUAL.
⑲ 3" PRESSURE REDUCING VALVE (SxS), CLA-VAL 90G-01ABS WITH TEST COCKS AND VALVE POSITION INDICATOR OR APPROVED EQUAL.
⑳ 3" BRASS UNION.
㉑ 3" BRASS THREADED PIPE, LENGTH TO FIT (TYPICAL).
㉒ RESILIENT SEAT GATE VALVE (FLxFL) WITH HAND WHEEL (CITY TO SIZE FOR EACH PROJECT).
㉓ PRESSURE RELIEF VALVE (FL) CLA-VAL 50G-01 WITH TEST COCKS AND VALVE POSITION INDICATOR OR APPROVED EQUAL. (CITY TO SIZE FOR EACH PROJECT).
㉔ DI PIPE. (CITY TO SIZE FOR EACH PROJECT).
㉕ 8" DI SPOOL (FLxPE) APPROX. 9" LONG.
㉖ PRECAST UTILITY VAULT - SEE SIZING TABLE OR APPROVED EQUAL. ALL JOINTS TO BE INSTALLED USING NON-SHRINK GROUT AND TESTED TO ACHIEVE WATER TIGHTNESS.
㉗ 4" FLOOR DRAIN WITH SCREEN AND 4" SCHEDULE 40 PVC PIPE.
㉘ 4" SCHEDULE 40 PVC 45° BEND (2 each).
㉙ FREE STANDING GALVANIZED STEEL LADDER ATTACH TO FLOOR AND SIDE OF HATCH.
㉚ 3" BRASS TEE (SxS) WITH 3" x 3/4" BUSHING. AND 3/4" BALL VALVE.
㉛ HOSE BIB WITH VACUUM BREAKER.
㉜ FLANGE COUPLING ADAPTER (SIZE PER DISCHARGE PIPING).
㉝ 3" BRASS THREADED PIPE, 3" LONG.

Est. 1890
Port ORCHARD

PRESSURE REDUCTION A

PRESSURE REDUCING STATION (PLAN)

DRAWN BY	IDS
DATE	1/30/2019
SCALE	NTS
DRAWING NUMBER	840A

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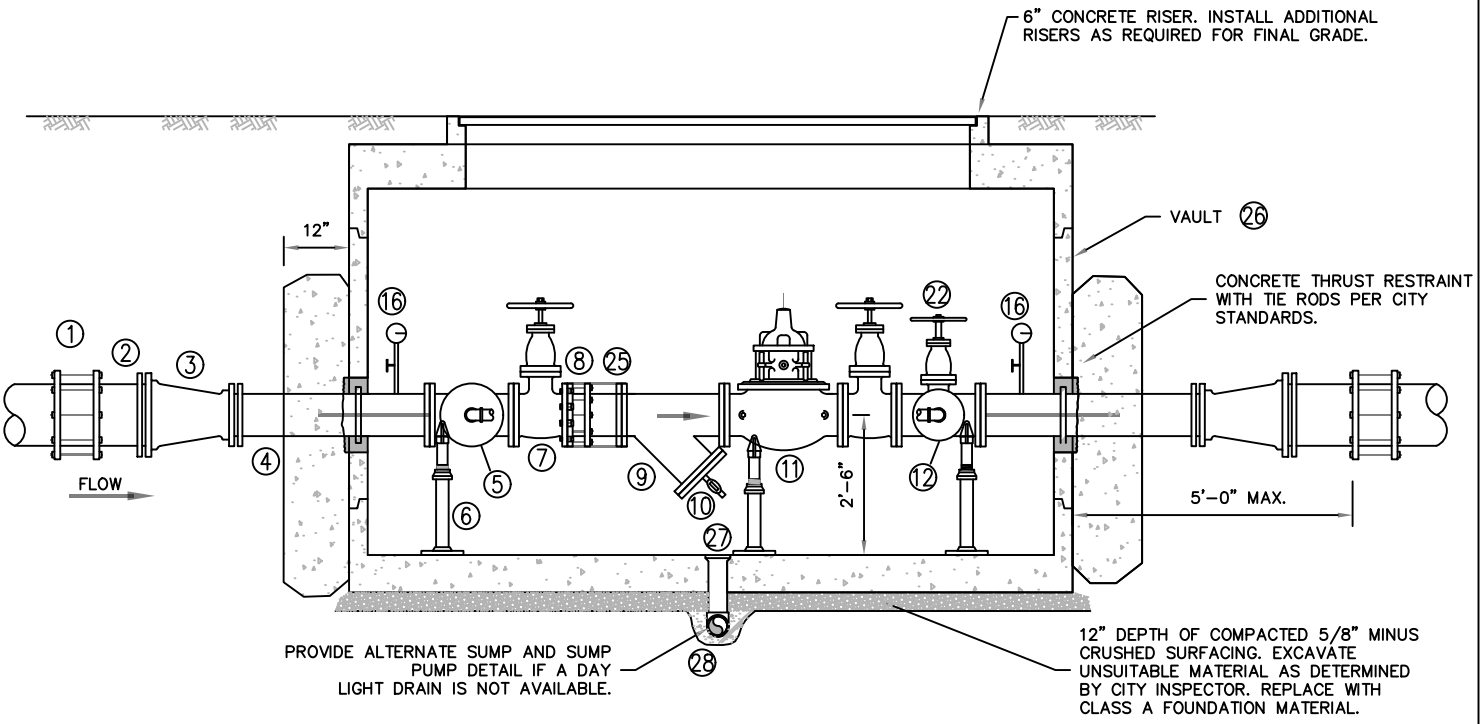
BALL VALVES SHALL BE TWO PIECE BRASS RED-WHITE BALL VALVE #5044F OR APPROVED EQUAL.



ELEVATION

1. 12" CAST IRON COUPLING ROCKWELL 431 WITH LONG LENGTH SLEEVE OR APPROVED EQUAL.
2. 12" DI PIPE, LENGTH TO FIT.
3. 12" TO 8" DI REDUCER (MJxMJ).
4. 8" DI SPOOL WITH COLLAR (PExFL), LENGTH TO FIT.
5. 8" DI TEE (FL x FL x FL).
6. ADJUSTABLE PIPE SUPPORT STANDON MODEL S92 OR APPROVED EQUAL.
7. 8" RESILIENT SEAT GATE VALVE (FLxFL) WITH HAND WHEEL.
8. 8" FLANGE COUPLING ADAPTER ROCKWELL 913 WITH ANCHOR STUDS OR APPROVED EQUAL.
9. 8" STRAINER (FLxFL) MUESSCO NO. 751 OR APPROVED EQUAL.
10. 2" BRONZE CORPORATION STOP (IPTxFIPT) FORD FB 1700-7 OR APPROVED EQUAL.
11. 8" PRESSURE REDUCING VALVE (FLxFL), CLA-VAL 90G-01ABCS OR APPROVED EQUAL WITH TEST COCKS, COPPER TUBING TRIM, EPOXY LINING, AND VALVE POSITION INDICATOR.
12. 8" TO 6" BRANCH REDUCING CROSS (FLxFLxFLxFL).
13. 8" DI BLIND FLANGE WITH 3" IPS TAP (TYPICAL).
14. 3" R.S. GATE VALVE WITH HAND WHEEL (SxS).
15. 3" BRASS 90° BEND (SxS).
16. PRESSURE GAUGE (0 TO 200 PSI) WITH BALL VALVE AND BRASS FITTINGS. TAP PIPE FOR CONNECTION, CENTER BETWEEN FLANGE AND VAULT WALL.
17. 3" STRAINER (FLxFL) WITH 1/8" PERFORATIONS BRASS SCREEN MUESSCO NO. 751 OR APPROVED EQUAL, TWO 3" BLIND FLANGES WITH 3" FIPT THREAD.
18. 3/4" BRONZE CORPORATION STOP (IPTxFIPT) FORD FB1700-3 OR APPROVED EQUAL.
19. 3" PRESSURE REDUCING VALVE (SxS), CLA-VAL 90G-01ABS WITH TEST COCKS AND VALVE POSITION INDICATOR OR APPROVED EQUAL.
20. 3" BRASS UNION.
21. 3" BRASS THREADED PIPE, LENGTH TO FIT (TYPICAL).
22. RESILIENT SEAT GATE VALVE (FLxFL) WITH HAND WHEEL (CITY TO SIZE FOR EACH PROJECT).
23. PRESSURE RELIEF VALVE (FL) CLA-VAL 50G-01 WITH TEST COCKS AND VALVE POSITION INDICATOR OR APPROVED EQUAL. (CITY TO SIZE FOR EACH PROJECT).
24. DI PIPE. (CITY TO SIZE FOR EACH PROJECT).
25. 8" DI SPOOL (FLxPE) APPROX. 9" LONG.
26. PRECAST UTILITY VAULT - SEE SIZING TABLE, OR APPROVED EQUAL. ALL JOINTS TO BE INSTALLED USING NON-SHRINK GROUT AND TESTED TO ACHIEVE WATER TIGHTNESS.
27. 4" FLOOR DRAIN WITH SCREEN AND 4" SCHEDULE 40 PVC PIPE.
28. 4" SCHEDULE 40 PVC 45° BEND (2 each).
29. FREE STANDING GALVANIZED STEEL LADDER ATTACH TO FLOOR AND SIDE OF HATCH.
30. 3" BRASS TEE (SxS) WITH 3" x 3/4" BUSHING. AND 3/4" BALL VALVE.
31. HOSE BIB WITH VACUUM BREAKER.
32. FLANGE COUPLING ADAPTER (SIZE PER DISCHARGE PIPING).
33. 3" BRASS THREADED PIPE, 3" LONG.

Est. 1890 Port ORCHARD

PRESSURE REDUCTION A

PRESSURE REDUCING STATION (ELEVATION)

DRAWN BY	IDS
DATE	1/30/2019
SCALE	NTS
DRAWING NUMBER	840B

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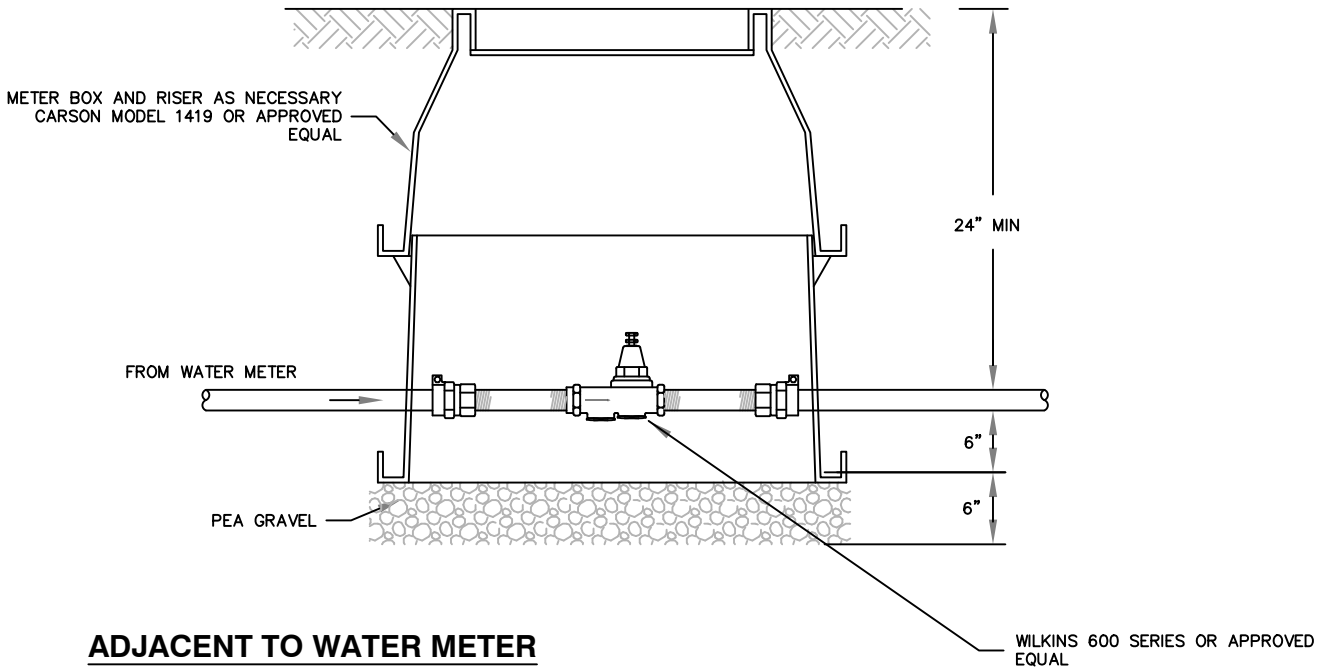

ADJACENT TO WATER METER

INSTALLATION

THE PRESSURE REDUCING VALVE SHALL BE LOCATED ON THE CUSTOMER'S PROPERTY "DOWNSTREAM" OF THE METER BOX. THE FUNCTION OF A PRESSURE REDUCING VALVE IS TO REDUCE HIGH-WATER PRESSURES IN THE SERVICE CONNECTION TO AN ACCEPTABLE RANGE OF 50 TO 75 PSI. INSTALLATION OF A PRESSURE REDUCING VALVE IS REQUIRED WHERE THE SERVICE CONNECTION PRESSURE EXCEEDS 80 PSI IN ACCORDANCE TO THE UNIFORM PLUMBING CODE.

THE CUSTOMER IS RESPONSIBLE FOR INSTALLATION AND MAINTENANCE

Est. 1890

Port ORCHARD

PRESSURE REDUCTION B

SERVICE PRESSURE REDUCING VALVE

DRAWN BY	IDS
DATE	1/31/2019
SCALE	NTS
DRAWING NUMBER	841

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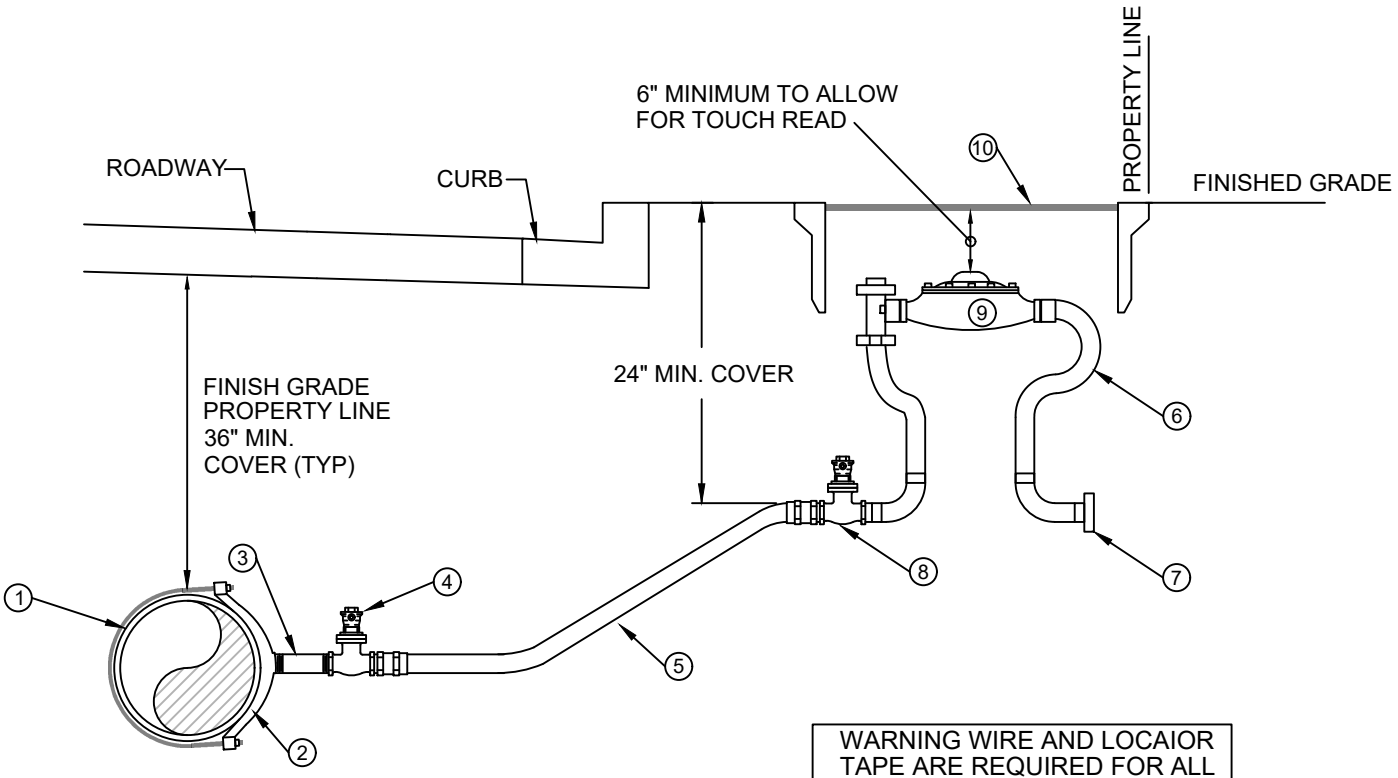

NOTES:

1. EXISTING WATER MAIN
2. 1" (IP THREAD) SINGLE STRAP SADDLE ROMAC STYLE 101S OR APPROVED EQUAL
3. 1" BRASS NIPPLE, 3" LONG
4. CORP. STOP, FORD FB1100 OR APPROVED EQUAL
5. 1" POLYETHYLENE PIPE, MAINTAIN 36" COVER FROM WATER MAIN TO WITHIN 48" OF METER BOX
6. 1" METER SETTER MUELLER 1434 OR APPROVED EQUAL HORIZONTAL IN, HORIZONTAL OUT. M.I.P. THREAD ENDS.
7. SCHEDULE 40 1" PVC THREADED PLUG. REMOVED WHEN CONNECTION MADE TO CUSTOMER LINE
8. BRASS CURB STOP, FORD B41-444-NL OR EQUAL.
9. WATER METER - TO BE SUPPLIED BY THE CITY
10. METER BOX SHALL BE SIGMA RAVEN HDPE METER BOX MODEL 1324-SW. PROVIDE HDPE LID WITH TOUCH READ AND METER READER LID. PLACE BACK OF METER BOX FLUSH WITH PROPERTY LINE.

Est. 1890

Port ORCHARD

SERVICES A

5/8, 3/4, OR 1-INCH WATER SERVICE

DRAWN BY	IDS
DATE	1/22/2019
SCALE	NTS
DRAWING NUMBER	860

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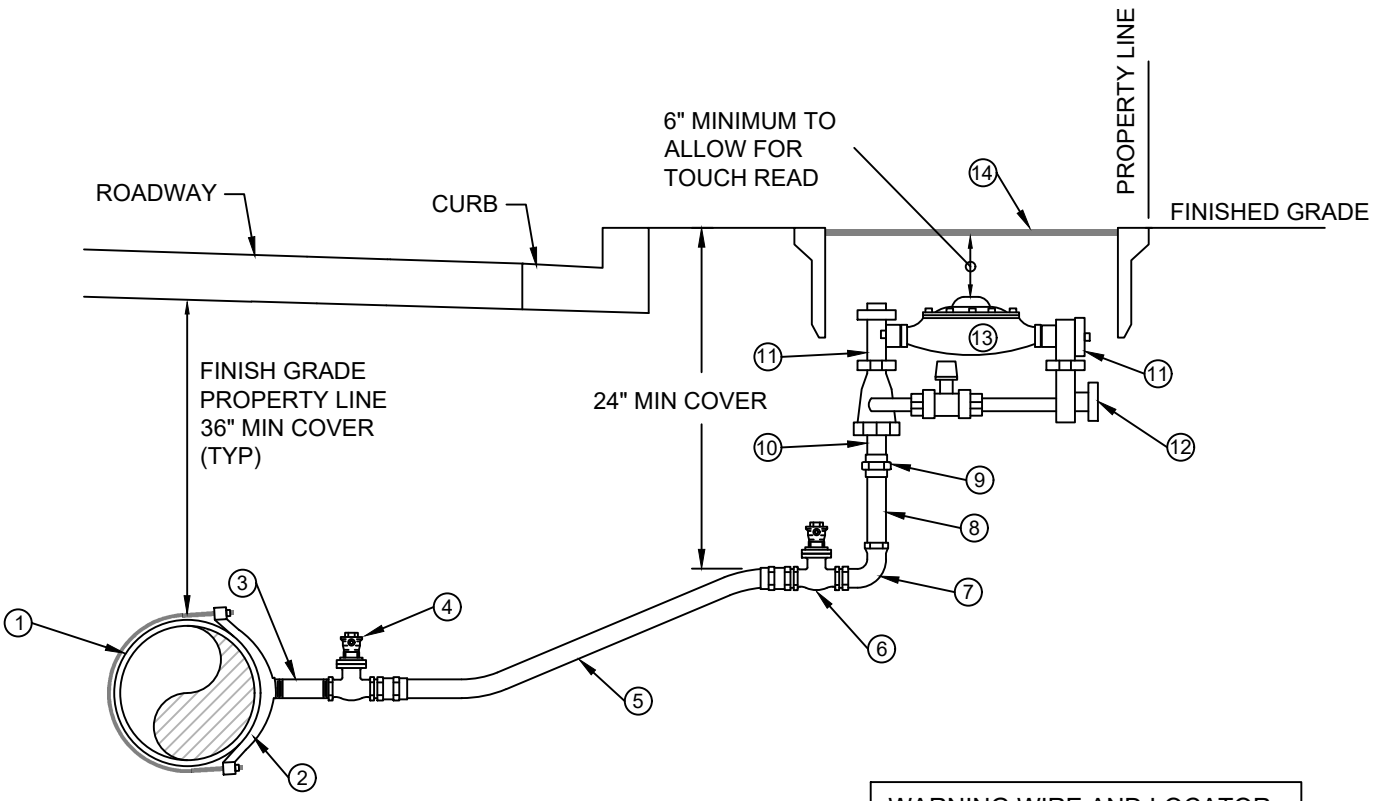

WARNING WIRE AND LOCATOR TAPE ARE REQUIRED FOR ALL SERVICES AND MAINS

NOTES:

1. EXISTING WATER MAIN
2. 2" (IP THREAD) DOUBLE STRAP SADDLE ROMAC STYLE 202S OR APPROVED EQUAL
3. 2" BRASS NIPPLE, 3" LONG
4. CORP. STOP, FORD FB1100 OR APPROVED EQUAL
5. 2" POLYETHYLENE PIPE, MAINTAIN 36" COVER FROM WATER MAIN TO WITHIN 48" OF METER BOX
6. 2" BRASS CURB STOP, FORD B41-777-NL OR EQUAL
7. 2" BRASS STREET ELL
8. 2" BRASS NIPPLE, 6" LONG
9. 2" BRASS UNION
10. 2" BRASS NIPPLE, 3" LONG
11. 2" METER SETTER WITH HIGH BYPASS MUELLER SERIES 1429 OR APPROVED EQUAL. VERTICAL IN, HORIZONTAL. OUT. FLANGED BALL VALVE WITH LOCK WINGS, CHECK VALVE AND BY-PASS.
12. SCHEDULE 40 2" PVC THREADED PLUG. REMOVED WHEN CONNECTION MADE TO CUSTOMER LINE
13. WATER METER - TO BE SUPPLIED BY THE CITY
14. METER BOX SHALL BE SIGMA RAVEN HDPE METER BOX MODEL 1730-SW. PROVIDE HDPE LID WITH TOUCH READ AND METER READER LID. PLACE BACK OF METER BOX FLUSH WITH PROPERTY LINE.

Est. 1890 Port ORCHARD

SERVICES B

1-1/2 OR 2-INCH WATER SERVICE

DRAWN BY	IDS
DATE	1/22/2019
SCALE	NTS
DRAWING NUMBER	861

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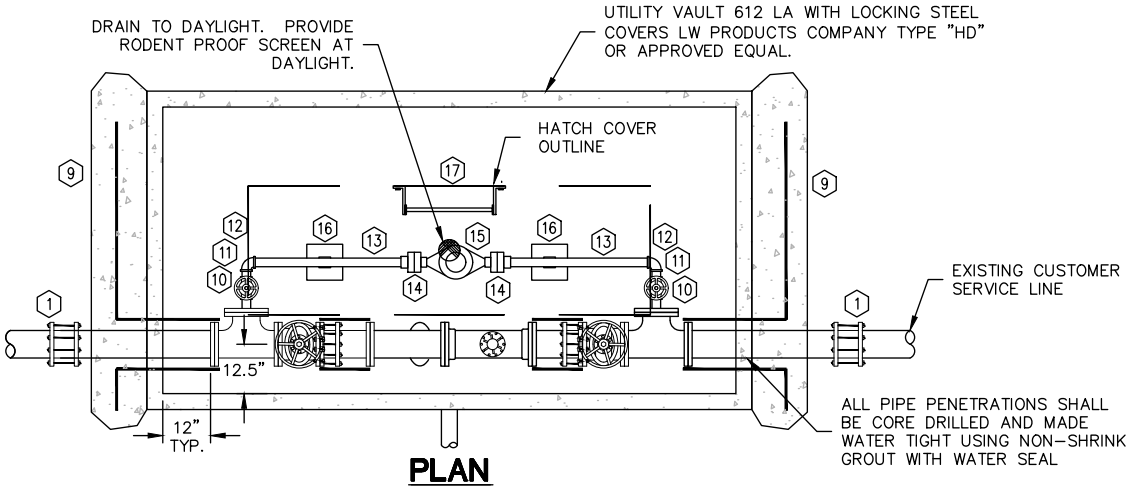

PLAN

1. LONG BODY SLEEVE
2. DI SPOOL (FLxPE), 3'-0" LONG
3. DI TEE (FLxFLxFL) WITH BLIND FLANGE WITH 2" IPT TAP
4. RESILIENT SEAT GATE VALVE (FLxFL) WITH HAND WHEEL
5. FCA
6. 6" DI SPOOL (FLxPE), 0'-9" LONG
   4" DI SPOOL (FLxPE), 1'-6" LONG
   3" DI SPOOL (FLxPE), 1'-11" LONG
7. STRAINER (FLxFL)
8. COMPOUND METER W/TOUCH READ (FLxFL), CITY TO PROVIDE
9. CONCRETE THRUST RESTRAINT WITH TIE RODS PER CITY STANDARDS
10. 2" THREADED BRASS NIPPLES (3" LONG)
11. 2" RESILIENT SEAT GATE VALVE THREADED WITH HAND WHEEL
12. 2" BRASS ST ELL
13. 2" THREADED BRASS PIPE, LENGTH TO FIT
14. 2" FLANGE METER COUPLINGS
15. 2" BYPASS METER W/TOUCH READ, CITY TO PROVIDE
16. ADJUSTABLE PIPE SUPPORT STANDON #S92 OR APPROVED EQUAL
17. FREE STANDING GALVANIZED STEEL LADDER, ATTACH TO FLOOR AND SIDE OF HATCH.
18. 4" FLOOR DRAIN W/ SCREEN
    4" SCHEDULE 40 PVC PIPE

Est. 1890

Port ORCHARD

SERVICES D

3, 4, AND 6-INCH COMPOUND METER SERVICE - PLAN

DRAWN BY	IDS
DATE	1/30/2019
SCALE	NTS
DRAWING NUMBER	863A

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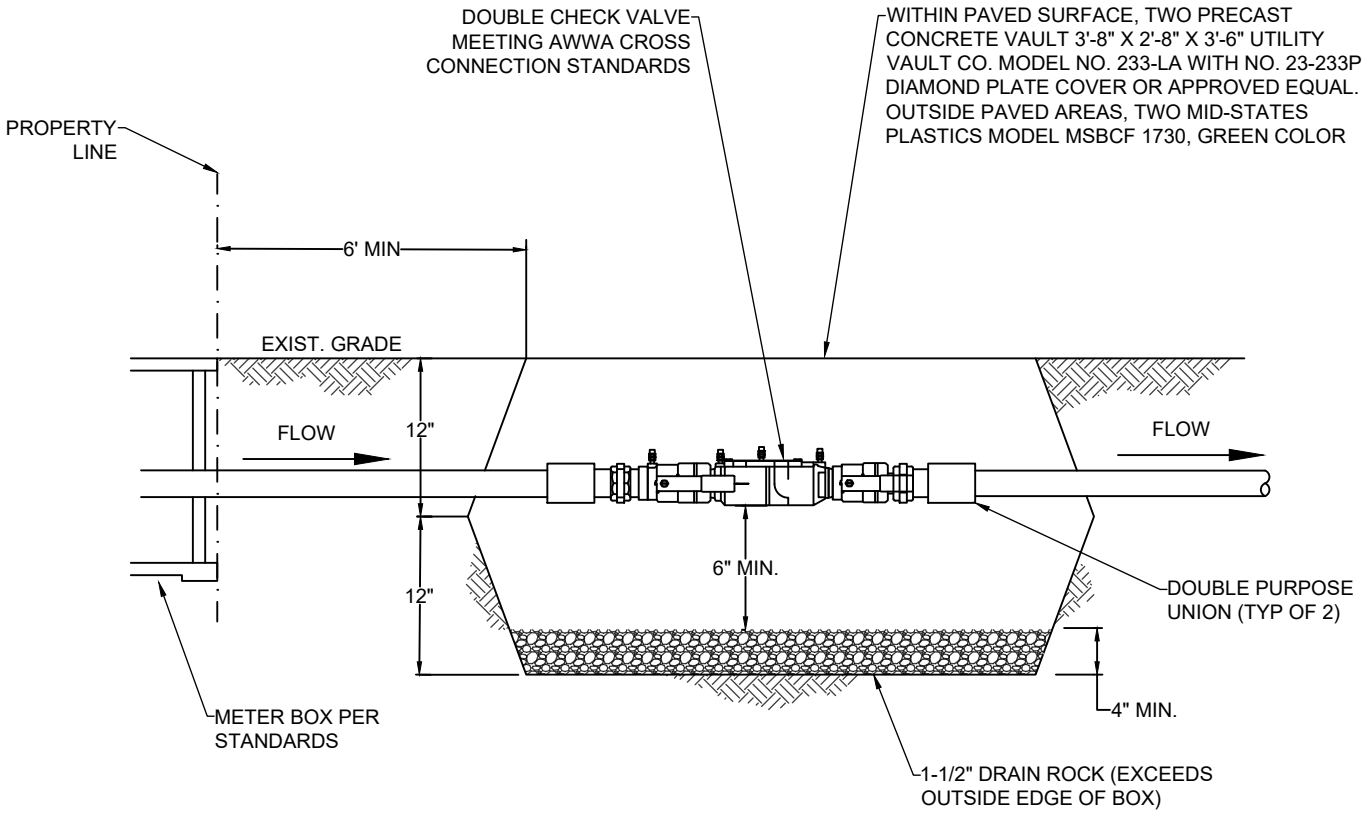

Est. 1890

Port ORCHARD

SERVICES E

DOUBLE CHECK BACKFLOW ASSEMBLY (BELOW GROUND)

DRAWN BY	IDS
DATE	1/23/2019
SCALE	NTS
DRAWING NUMBER	864

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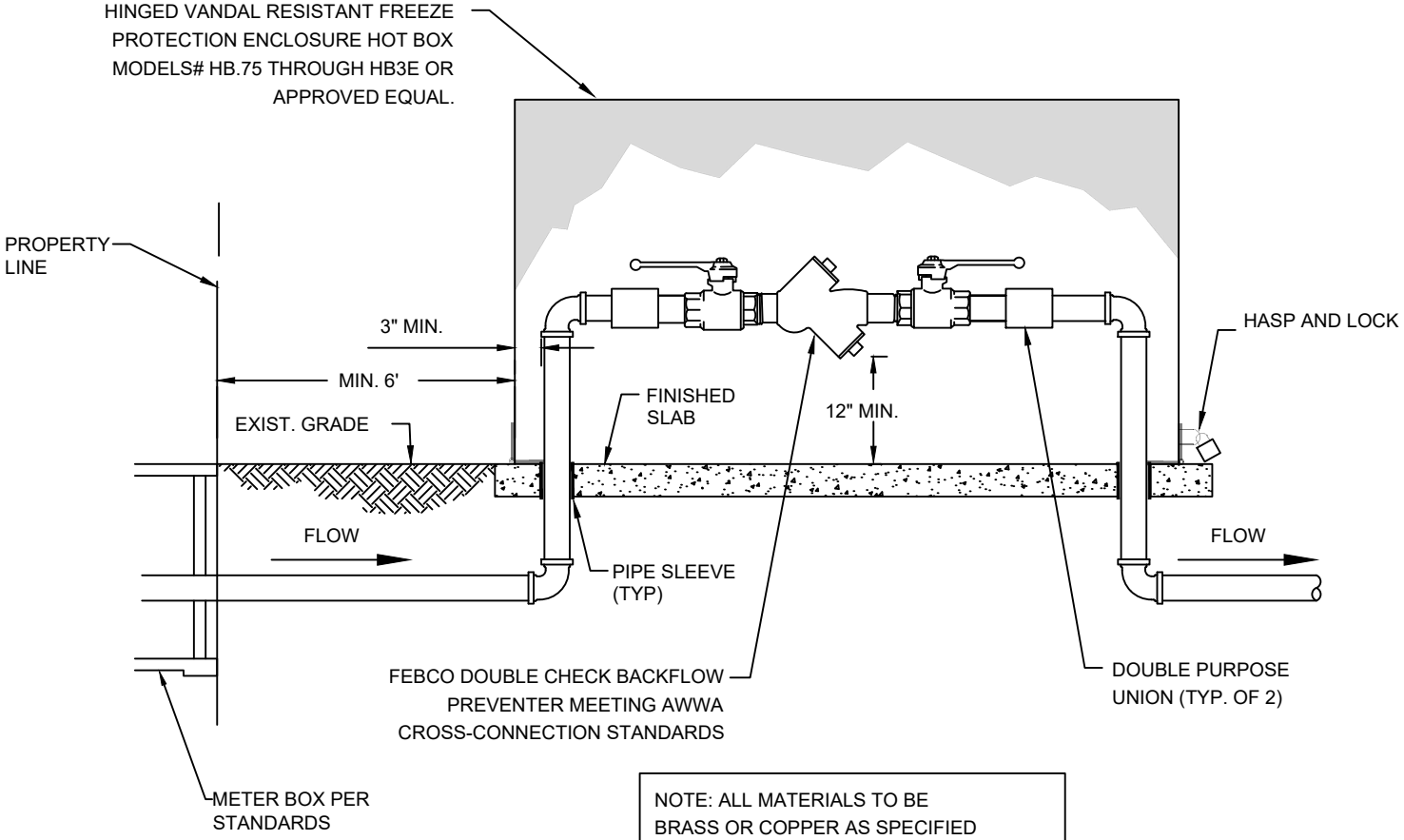

NOTE: ALL MATERIALS TO BE BRASS OR COPPER AS SPECIFIED BY CITY.

Est. 1890

Port ORCHARD

SERVICES F

DOUBLE CHECK BACKFLOW ASSEMBLY (ABOVE GROUND)

DRAWN BY	IDS
DATE	1/23/2019
SCALE	NTS
DRAWING NUMBER	865

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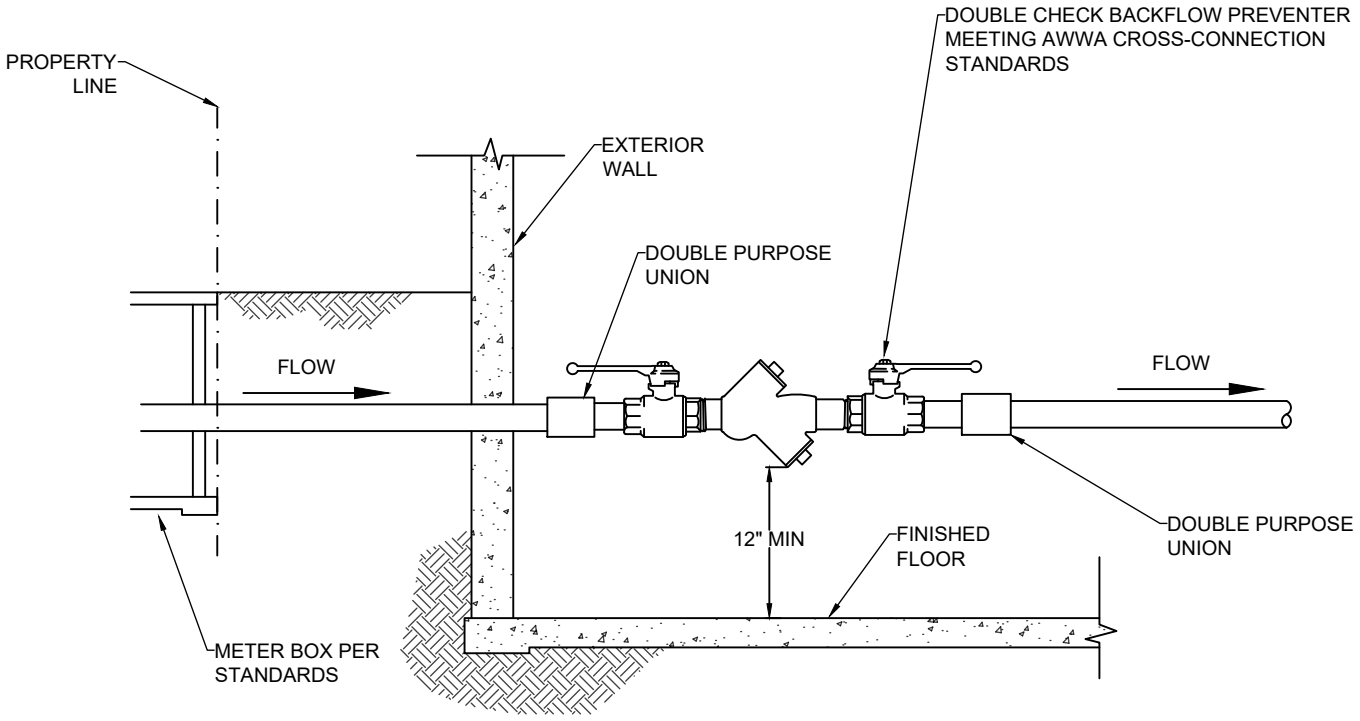

Est. 1890

Port ORCHARD

SERVICES G

DOUBLE CHECK BACKFLOW ASSEMBLY (IN BASEMENT)

DRAWN BY	IDS
DATE	1/23/2019
SCALE	NTS
DRAWING NUMBER	866

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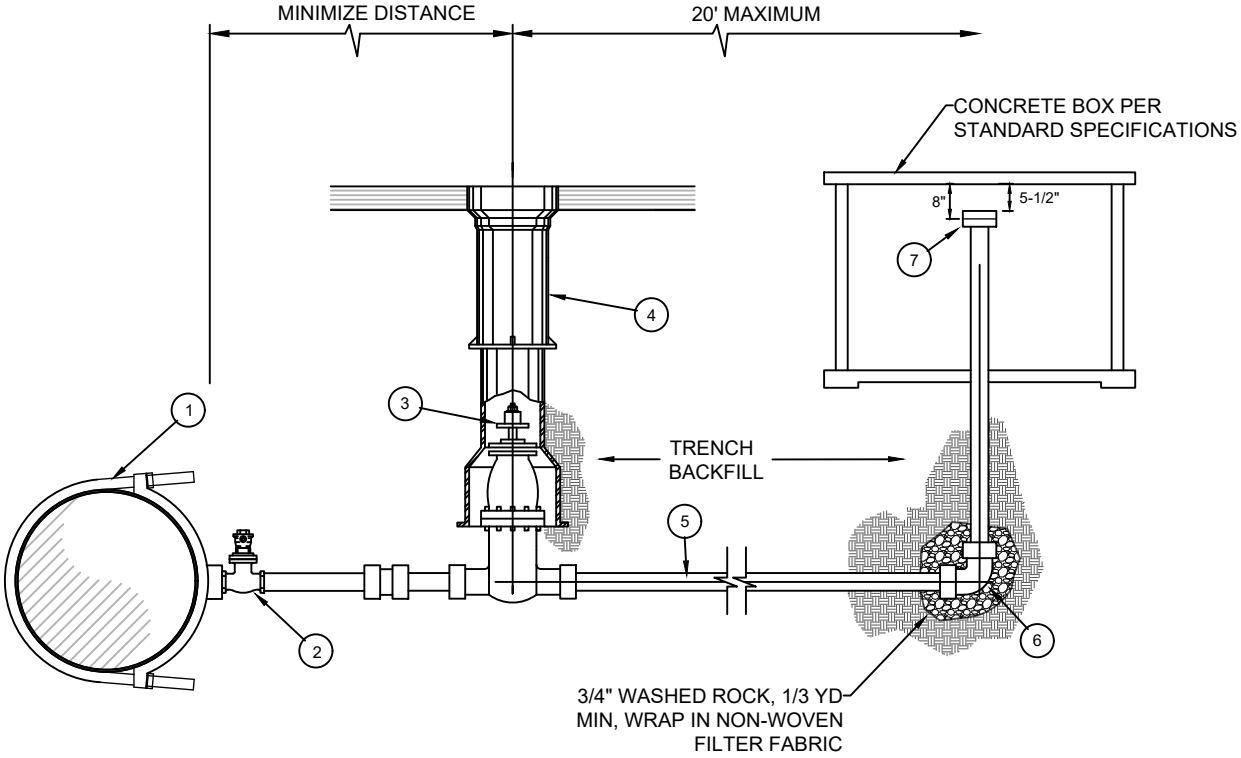

NO.	ITEM
1	2" DOUBLE STRAP SADDLE, ROMAC 202 OR APPROVED EQUAL
2	2" CORP. STOP, FORD FB1100 OR APPROVED EQUAL
3	2" GATE VALVE, THREADED, NON-RISING STEM WITH SQUARE NUT
4	VALVE BOX
5	2" GALVANIZED IRON PIPE
6	2"-90° GALVANIZED IRON ELBOW W/ 1/8" DRAIN HOLE
7	2" GALVANIZED IRON COUPLING (FIPxFIP) W/ PVC PLUG

Est. 1890

Port ORCHARD

SYSTEM APPURTENANCES A

2" BLOW OFF ASSEMBLY

DRAWN BY	IDS
DATE	1/23/2019
SCALE	NTS
DRAWING NUMBER	880

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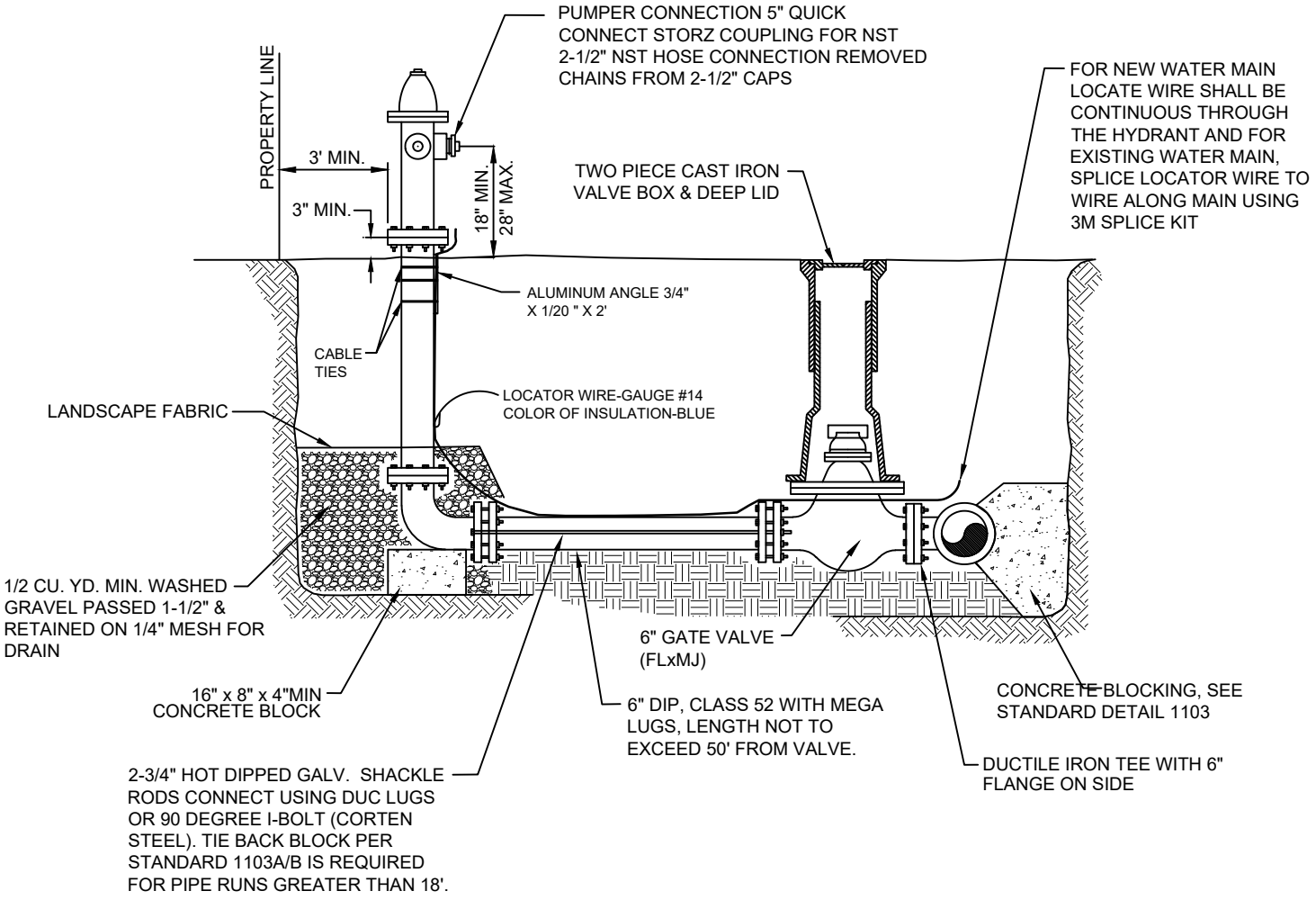

NOTES:

1. MAIN VALVE OPENING SHALL BE 5-1/4" IN DIAMETER EQUAL TO M&H 929. 6" MECHANICAL JOINT INLET. 1-1/2" PENTAGON OPERATING NUT. THE CITY WILL PAINT THE HYDRANT.
2. LOCATOR WIRE TO BE PROTECTED WITH ANGLE ALUMINUM (3/4" X 1/20" X 2' LONG) STRAP TO THE HYDRANT BURY WITH CABLE TIES (36" LENGTH, 175 LB TENSILE, COLOR BLACK, MANUFACTURED BY 3M). LOCATION SHALL BE BELOW THE LOWER FLANGE OF THE HYDRANT BELOW THE PUMPER PORT. LOCATE WIRE SHALL HAVE 6" SLACK FOR CONNECTING TO LOCATING DEVICE.
3. IF THE PIPE BETWEEN THE VALVE AND THE HYDRANT IS MORE ONE FULL STICK OF DUCTILE IRON PIPE, THEN A TIE BACK THRUST SHALL BE INSTALLED AND FIELD-LOK GASKETS AND MEGA LUGS SHALL BE USED.

Est. 1890

Port ORCHARD

SYSTEM APPURTENANCES B

FIRE HYDRANT ASSEMBLY

DRAWN BY	IDS
DATE	1/23/2019
SCALE	NTS
DRAWING NUMBER	881

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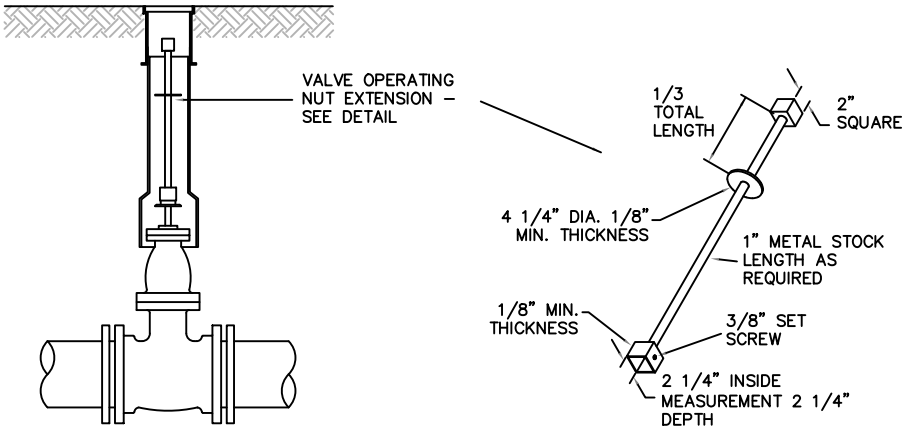
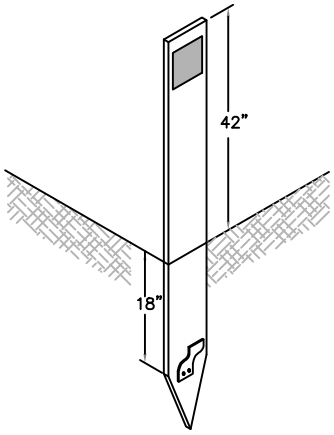


EXTENSIONS ARE REQUIRED WHEN THE VALVE NUT IS MORE THAN THREE (3) FEET BELOW FINISHED GRADE. EXTENSIONS ARE TO BE A MINIMUM OF ONE (1) FOOT LONG, ONLY ONE EXTENSION PER VALVE. ALL EXTENSIONS ARE TO MADE OF STEEL SIZED AS NOTED, AND PAINTED WITH TWO COATS OF CARBON ELASTIC (ATCO NO. 2221) OR APPROVED EQUAL.

VALVE OPERATING NUT EXTENSION



VALVE MARKER POST

PROVIDE A VALVE MARKER POST FOR EACH VALVE. THE FIBERGLASS VALVE MARKER POST SHALL BE BLUE IN COLOR, 4" WIDE (FLAT), 72" LONG AND FURNISHED WITH A 2"x2" HIGH-INTENSITY WHITE REFLECTOR (250 CANDLEPOWER) AND A FLEXIBLE ANCHOR BARB.

THE VALVE MARKER POST SHALL BE A CARSONITE CURV-FLEX MARKER OR APPROVED EQUAL.

THE POST SHALL BE SITUATED IN A SAFE, REASONABLY CONSPICUOUS LOCATION, AND AT A RIGHT ANGLE TO THE ROADWAY FROM THE VALVE.

THE DISTANCE FROM THE MARKER TO THE VALVE SHALL BE WRITTEN ON THE BACK OF THE MARKER IN 1-1/2" HIGH BLACK LETTERS.

VALVE MARKER

Est. 1890

Port ORCHARD

SYSTEM APPURTENANCES C

VALVE MARKER AND VALVE EXTENSION

DRAWN BY	IDS
DATE	1/30/2019
SCALE	NTS
DRAWING NUMBER	882

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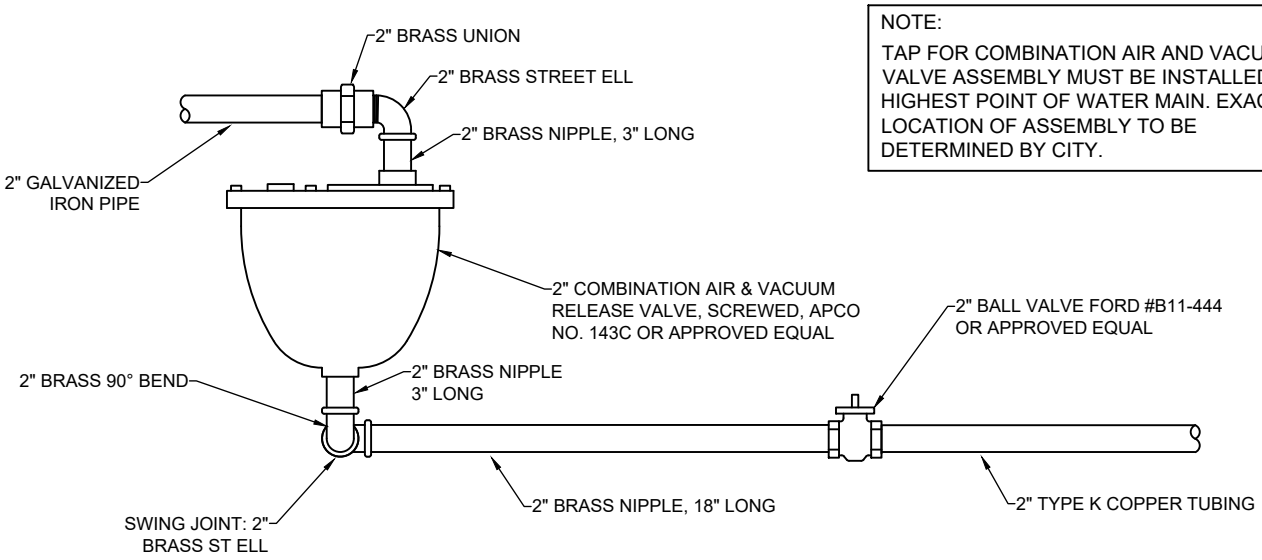
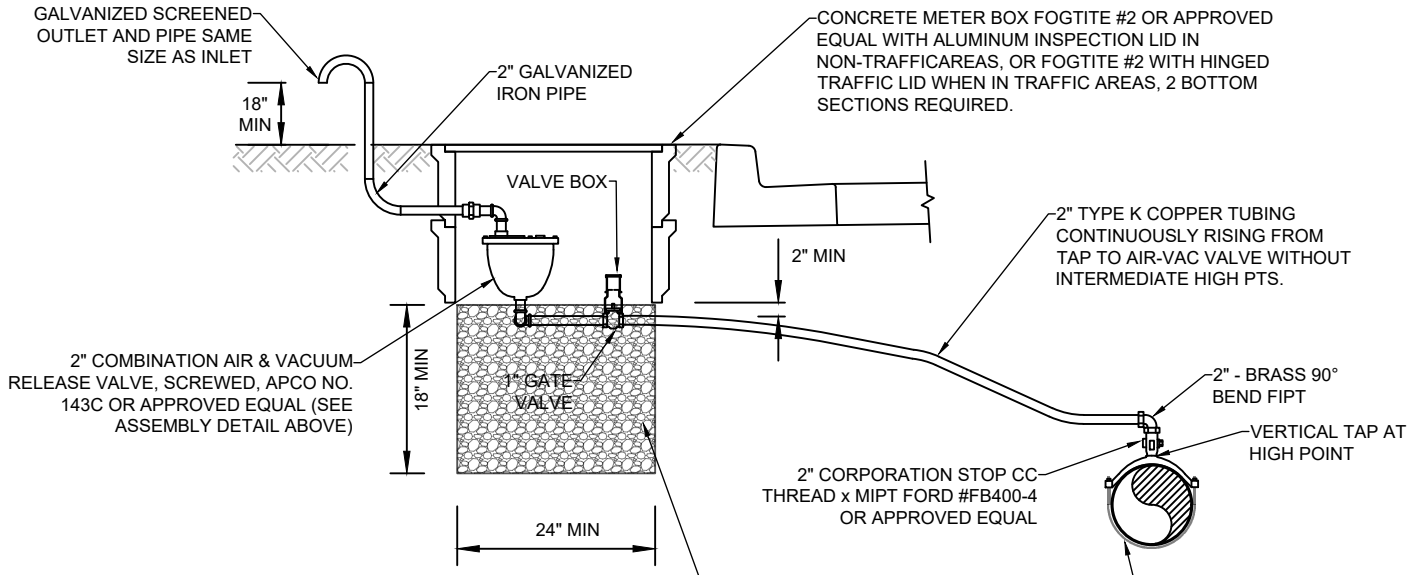
NOTE:
TAP FOR COMBINATION AIR AND VACUUM VALVE ASSEMBLY MUST BE INSTALLED AT HIGHEST POINT OF WATER MAIN. EXACT LOCATION OF ASSEMBLY TO BE DETERMINED BY CITY.



VALVE ASSEMBLY DETAIL



NOTE:
ALL FITTINGS SHALL BE BRASS.
ALL PIPE SHALL BE COPPER, UNLESS OTHERWISE SHOWN.

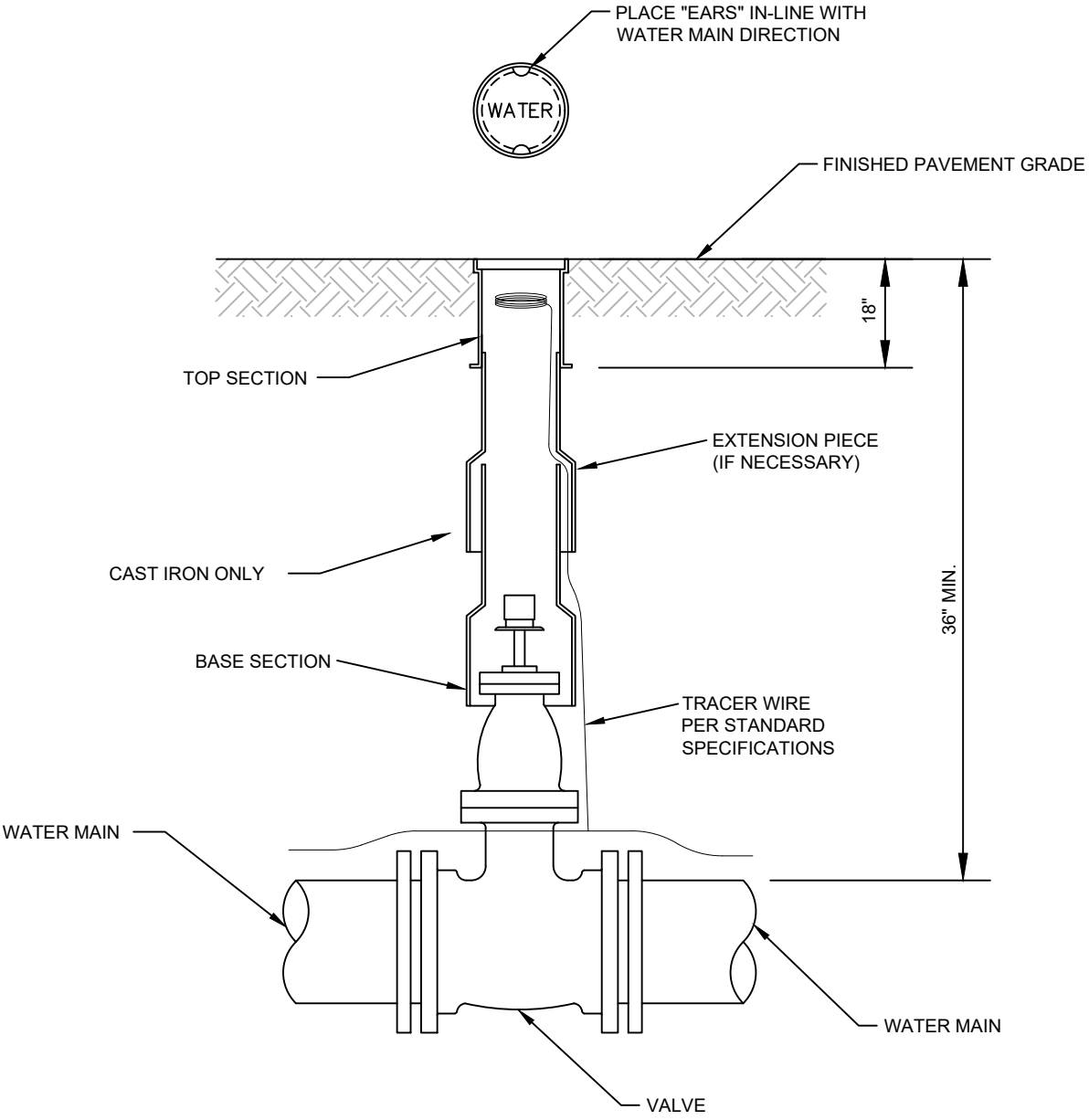
Est. 1890
Port ORCHARD

SYSTEM APPURTENANCES D

AIR-VAC ASSEMBLY

DRAWN BY	IDS
DATE	1/23/2019
SCALE	NTS
DRAWING NUMBER	883

U:\ENGINEERING\DEVELOPMENT GUIDELINES\2018 UPDATE_STANDARD DETAILS\NEW STANDARDS\CAD FILES\883



Est. 1890

Port ORCHARD

SYSTEM APPURTENANCES

VALVE BOX

DRAWN BY	IDS
DATE	1/23/2019
SCALE	NTS
DRAWING NUMBER	884

U:\ENGINEERING\DEVELOPMENT GUIDELINES\2018 UPDATE_STANDARD DETAILS\NEW STANDARDS\CAD FILES\884

Appendix H

Water Facility Inventory

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: 06/21/2021
Printed: 7/15/2021
WFI Printed For: On-Demand
Submission Reason: Other

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
40529 X	MCCORMICK WOODS	KITSAP	A	Comm

6. PRIMARY CONTACT NAME & MAILING ADDRESS	7. OWNER NAME & MAILING ADDRESS
JACKI BROWN [UTILITY MANAGER] 216 PROSPECT ST PORT ORCHARD, WA 98366	PORT ORCHARD, CITY OF JACKI BROWN 216 PROSPECT ST PORT ORCHARD, WA 98366 UTILITY MANAGER
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) 876-4991 x129		Owner Daytime Phone: (360) 876-4991 x129	
Primary Contact Mobile/Cell Phone: (360) 535-2477		Owner Mobile/Cell Phone: (360) 535-2477	
Primary Contact Evening Phone: (xxx)-xxx-xxxx		Owner Evening Phone: (xxx)-xxx-xxxx	
Fax:	E-mail: xxxxxxxxxxxxxxxxxxx	Fax:	E-mail: xxxxxxxxxxxxxxxxxxx

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
- [ ] Day Care
- [x] Food Service/Food Permit
- [ ] 1,000 or more person event for 2 or more days per year
- [ ] Hospital/Clinic
- [ ] Industrial
- [ ] Licensed Residential Facility
- [ ] Lodging
- [x] Recreational / RV Park
- [x] Residential
- [ ] 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)

1,670,000

- 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
40529 X	MCCORMICK WOODS	KITSAP	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
S01	WELL #1 NO TAG WW				X							X			Y	X						229	175	NE NW	09	23N	01E
S02	WELL #2 NO TAG WW				X									X	Y	X						168	350	NE NW	09	23N	01E
S03	WELL #3 NO TAG WW				X							X			Y	X						171	325	NE NW	09	23N	01E
S04	WF (SO1, 2, & 3) Disinfec. Required			X								X			Y		X					168	915	NE NW	09	23N	01E
S05	08200R / Bremerton-Pump Station 2A	08200 R										X			Y	X							350			00N	00E
S06	Pre-Active 02/11/2014 S06 Well #4 A		X									X			N	X						813	750	NE NW	09	23N	01E

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
40529 X	MCCORMICK WOODS	KITSAP	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?)		1033	Unspecified
A. Full Time Single Family Residences (Occupied 180 days or more per year)	1033		
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	0		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	0		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	0	0	
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	11	11	
28. TOTAL SERVICE CONNECTIONS		1044	

29. FULL-TIME RESIDENTIAL POPULATION

A. How many residents are served by this system 180 or more days per year? 2610

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?	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
B. How many days per month is water accessible to the public?	30	30	30	30	30	30	30	30	30	30	30	30

32. REGULAR NON-RESIDENTIAL USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, or businesses connected to your water system, how many students, daycare children and/or employees are present each month that are NOT alrealy included in the residential population?	50	50	50	50	50	50	50	50	50	50	50	50
B. How many days per month are they present?	30	30	30	30	30	30	30	30	30	30	30	30

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	3	3	3	3	3	3	3	3	3	3	3	3

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

35. Reason for Submitting WFI:

☐ Update - Change ☐ Update - No Change ☐ Inactivate ☐ Re-Activate ☐ Name Change ☐ New System ☐ Other _____

36. I certify that the information stated on this WFI form is correct to the best of my knowledge.

SIGNATURE: _____ **DATE:** _____

PRINT NAME: _____ **TITLE:** _____

Intentionally left blank

WS ID	WS Name
40529	MCCORMICK WOODS

Total WFI Printed: 1

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

Water Facilities Inventory (WFI)

Report Create Date:	7/15/2021		
Water System Id(s):	40529		
Print Data on Distribution Page:	ALL		
Print Copies For:	DOH Copy		
Water System Name:	ALL		
County:	-- Any --		
Region:	ALL		
Group:	ALL		
Type:	ALL		
Permit Renewal Quarter:	ALL		
Water System Is New:	ALL		
Water System Status:	ALL		
Water Status Date From:	ALL	**To**	ALL
Water System Update Date	ALL	**To**	ALL
Owner Number:	ALL		
SMA Number:	ALL		
SMA Name:	ALL		
Active Connection Count From:	ALL	**To:**	ALL
Approved Connection Count	ALL	**To:**	ALL
Full-Time Population From:	ALL	**To:**	ALL
Water System Expanding	ALL		
Source Type:	ALL		
Source Use:	ALL		
WFI Printed For:	On-Demand		

WATER FACILITIES INVENTORY (WFI) FORM

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

ONE FORM PER SYSTEM

Quarter: 1
Updated: 01/15/2021

Printed: 7/15/2021
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
68900 V	PORT ORCHARD WATER DEPT	KITSAP	A	Comm

6. PRIMARY CONTACT NAME & MAILING ADDRESS

JACKI BROWN [UTILITY MANAGER]
216 PROSPECT ST
PORT ORCHARD, WA 98366

7. OWNER NAME & MAILING ADDRESS

PORT ORCHARD, CITY OF
JACKI BROWN
216 PROSPECT ST
PORT ORCHARD, WA 98366

UTILITY MANAGER

STREET ADDRESS IF DIFFERENT FROM ABOVE

ATTN
ADDRESS
CITY STATE ZIP

STREET ADDRESS IF DIFFERENT FROM ABOVE

ATTN
ADDRESS
CITY STATE ZIP

9. 24 HOUR PRIMARY CONTACT INFORMATION

Primary Contact Daytime Phone: (360) 876-4991 x129
Primary Contact Mobile/Cell Phone: (360) 535-2477
Primary Contact Evening Phone: (xxx)-xxx-xxxx
Fax:
E-mail: xxxxxxxxxxxxxxxxxxx

10. OWNER CONTACT INFORMATION

Owner Daytime Phone: (360) 876-4991 x129
Owner Mobile/Cell Phone: (360) 535-2477
Owner Evening Phone: (xxx)-xxx-xxxx
Fax:
E-mail: xxxxxxxxxxxxxxxxxxx

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
- [x] Hospital/Clinic
- [x] Industrial
- [ ] Licensed Residential Facility
- [x] Lodging
- [ ] 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)

4,300,000

- 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
68900 V	PORT ORCHARD WATER DEPT	KITSAP	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
S01	WELL #6 No Tag		X									X			Y		X		X			806	250	NW SW	25	24N	01E
S02	WELL #7 No Tag		X									X			Y		X		X			769	750	NW SE	26	24N	01E
S04	08200/Bremerton	08200 R											X		Y	X							1000			00N	00E
S05	WELL #8		X									X			Y		X		X			429	450	NW SW	02	23N	01E
S06	InAct 08/06/2009 WELL #5 No Tag		X											X	Y		X		X			500	100	NW SE	26	24N	01E
S07	InAct 12/31/2018 WELL #4 No Tag		X									X			Y		X		X			381	50	NW SE	26	26N	01E
S08	Well #9 AGP499		X									X			Y		X	X	X		X	478	500	NE SW	35	24N	01E
S09	02600/West Sound Utility	02600 W												X	Y	X							1000			00N	00E

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
68900 V	PORT ORCHARD WATER DEPT	KITSAP	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?)		3600	Unspecified
A. Full Time Single Family Residences (Occupied 180 days or more per year)	2082		
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	215		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	1518		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	0	0	
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	428	428	
28. TOTAL SERVICE CONNECTIONS		4028	

29. FULL-TIME RESIDENTIAL POPULATION

A. How many residents are served by this system 180 or more days per year? 9428

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?	9500	9500	9500	9500	9500	9500	9500	9500	9500	9500	9500	9500
B. How many days per month is water accessible to the public?	30	30	30	30	30	30	30	30	30	30	30	30

32. REGULAR NON-RESIDENTIAL USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, or businesses connected to your water system, how many students, daycare children and/or employees are present each month that are NOT alrealy included in the residential population?	4493	4493	4493	4493	4493	500	500	500	4493	4493	4493	4493
B. How many days per month are they present?	30	30	30	30	30	30	30	30	30	30	30	30

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	15	15	15	15	15	10	10	10	15	15	15	15

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

35. Reason for Submitting WFI:

☐ Update - Change ☐ Update - No Change ☐ Inactivate ☐ Re-Activate ☐ Name Change ☐ New System ☐ Other _____

36. I certify that the information stated on this WFI form is correct to the best of my knowledge.

SIGNATURE: _____ **DATE:** _____

PRINT NAME: _____ **TITLE:** _____

Intentionally left blank

WS ID	WS Name
68900	PORT ORCHARD WATER DEPT

Total WFI Printed: 1

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

Water Facilities Inventory (WFI)

Report Create Date:	7/15/2021		
Water System Id(s):	68900		
Print Data on Distribution Page:	ALL		
Print Copies For:	DOH Copy		
Water System Name:	ALL		
County:	-- Any --		
Region:	ALL		
Group:	ALL		
Type:	ALL		
Permit Renewal Quarter:	ALL		
Water System Is New:	ALL		
Water System Status:	ALL		
Water Status Date From:	ALL	**To**	ALL
Water System Update Date	ALL	**To**	ALL
Owner Number:	ALL		
SMA Number:	ALL		
SMA Name:	ALL		
Active Connection Count From:	ALL	**To:**	ALL
Approved Connection Count	ALL	**To:**	ALL
Full-Time Population From:	ALL	**To:**	ALL
Water System Expanding	ALL		
Source Type:	ALL		
Source Use:	ALL		
WFI Printed For:	On-Demand		

Appendix I

Wellhead Protection Plan

City of Port Orchard
Wellhead Protection Plan

Prepared by:

Beau J. Schilz
Project Planner
PACE Engineers, Inc.

Susan Boyd
Vice President
PACE Engineers, Inc.

Martin Penhallegon
President
PACE Engineers, Inc.

With Assistance From:

City of Port Orchard Staff

ROBINSON NOBLE SALTBUSH INC.

Douglas C. Dow, L.HG.
Senior Hydrogeologist
Robinson Noble, Inc.

Mike Piechowski, L.HG.
Senior Hydrogeologist
Robinson Noble, Inc.

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Table of Contents

Appendices

Appendix A: City of Port Orchard Wells 9, 10, and 11 Summary and Wellhead Protection Report *(December 2011, Robinson Noble, Inc)*

Appendix B: Department of Ecology Report of Examination, Well 4
Department of Ecology Report of Examination, Well 5
Department of Ecology Report of Examination, Well 10

Appendix C: Well Susceptibility Assessment Survey Forms (Wells 4, 6, 7, 8, 9, 10, 11)

Appendix D: Environmental Data Resources, Inc. Reports on Potential Contaminant Sources

City of Port Orchard
Wellhead Protection Plan

The City of Port Orchard has developed this Wellhead Protection Plan (WHPP) to identify and protect the groundwater resources it utilizes to supply potable drinking water to its customers. This WHPP is divided into six areas of interest:

1) Overview and Purpose
2) Wellhead Protection Area Definition
3) Susceptibility Assessment
4) Protection Strategies
5) Implementation Tasks
6) Spill Response

1. OVERVIEW

Port Orchard owns and operates 11 wells located on a total of seven locations throughout the City. Of these wells, nine are currently (2012) operational, two wells (Wells 2 and 5) are no longer in service, and another two wells (Wells 1 and 3) will be abandoned upon Well 11 becoming fully operational. Wells 10 and 11 are scheduled to begin production before the end of 2012.

The City's wells produce a combined 387 million gallons per year (estimated, 2011), enough to meet the entire City's existing annual demands. The City maintains two separate public water systems, referred to as the City system and the McCormick Woods system. Although there are plans to connect the two systems over the long term, they currently (2012) operate as separate water systems and maintain unique DOH and EPA water system identification numbers. Wells 4, 5, 6, 7, 8, 9, and 10 are designed serve the City system and Wells 1, 2, 3, and 11 serve the McCormick Woods system. .

This WHPP meets the requirements of the federal Safe Drinking Water Act and conforms to the wellhead protection measures established under Washington Administrative Code (WAC) 246-290-135 and by the State Department of Health (DOH). It conforms to the guidance provided in the *Wellhead Protection Program Guidance Document* (DOH Pub. 331-018) and provides a roadmap for Port Orchard to protect its wells and customers from pollutants and contaminants that may enter the aquifers from known sources. This Plan updates and supersedes all previous versions of Port Orchard's WHPPs, including the WHPP developed for the McCormick Woods system prior to the City's annexation of the area. This Plan includes new groundwater sources that have been constructed and are ready to be put to beneficial use upon WHPP approval.

1.1. Purpose

The goal of a WHPP is to prevent the contamination of ground water sources used by public water systems. The program developed in this WHPP identifies potential contaminant sources and provides management techniques for the protection of Port Orchard's water supplies within designated zones of contribution and the established Wellhead Protection Areas (WHPAs). The purpose of wellhead protection is to protect public health for residents and businesses served by the City. In creating this plan, the City will not only prevent contamination of vital potable water sources for City residents and customers, it will minimize the potential costs associated with clean-up should the source water become contaminated. The cost of contamination

typically includes the investigation of sites, installing treatment facilities, and/or locating new water sources.

2. WELLHEAD PROTECTION AREA

The Wellhead Protection Area (WHPA) is defined as the surface and subsurface area surrounding a groundwater well supplying public water through which potential contaminants are likely to pass and eventually reach the well. The process for delineating the WHPA is described in the following paragraphs.

2.1. WHPA Determination

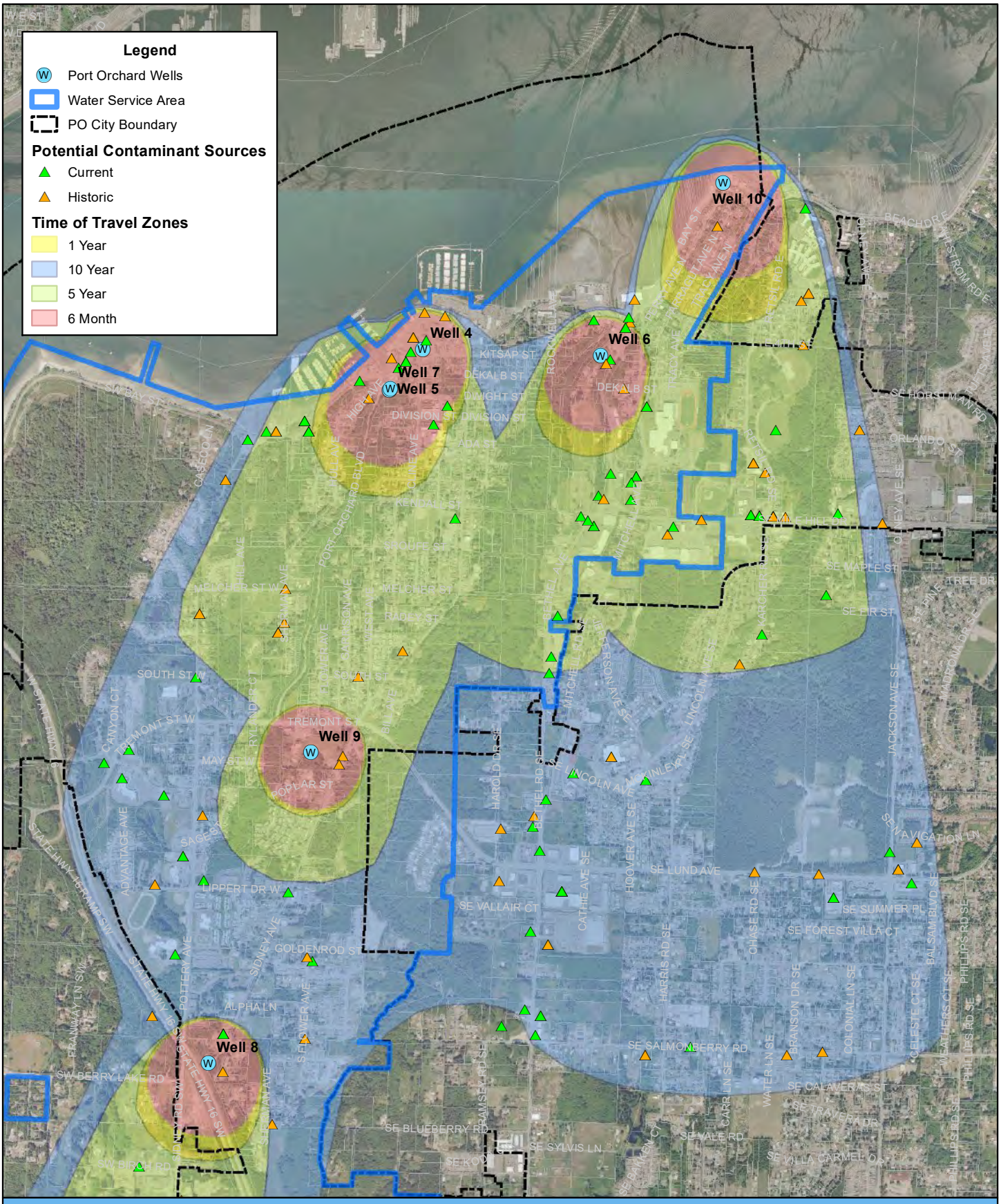
Delineation of the WHPAs is based on hydrogeologic conceptual modeling that considers topography, soil type, measured recharge rates and other data collected and interpreted by hydrogeologists at Robinson Noble, Inc. This area is known as the well's capture zone, or zone of contribution. This area of contribution is defined by delineating 6-month, 1-year, 5-year, and 10-year travel times around a well head. Data are usually insufficient to completely and accurately define the exact size and shape of the capture zones. For this reason, a series of approximation methods are used to delineate the WHPAs. These methods, in order of increasing complexity, include:

- Calculated Fixed Radius
- Analytical Models
- Hydrogeologic Mapping
- Numerical Flow/Transport Models

Sufficient hydrogeologic data are available from City's existing and three new wells to allow combined use of Hydrogeological mapping and Analytical Models for calculating the WHPAs for this plan. Based on these modeling efforts, the WHPAs have been delineated according to four travel-time periods as established by DOH. These travel-time areas, also often referred to as zones of contribution or capture zones, are established according to the length of time it takes for water to reach the wellhead after it percolates into the ground. It represents the length of time that Port Orchard would have to prepare for a potential compromise of water quality that may occur when known contaminants have entered the watershed.

The City currently draws water supply from three underground aquifers referred to in this report as the Shallow Aquifer (Shallow), the Sea Level Aquifer (SLA), and the Deep Artesian Aquifer (DAA). The Shallow Aquifer is located in the North Lake area where the McCormick Woods system operates, and the aquifer can be found at elevations between 100 and 300 feet below the surface. The ground surface elevation of the wellhead site for Wells 1, 2, 3, and 11 is approximately 420 feet. The Sea Level Aquifer is a confined, flowing-artesian aquifer comprised of gravelly sand at elevations between 200-400 feet below sea level near Sinclair Inlet. The Deep Artesian Aquifer is the deepest, providing underground freshwater at a depth of greater than 450 feet below sea level. A complete description of the aquifers in the Port Orchard area is provided in the *Wells 9, 10, and 11 Summary and Wellhead Protection Report* (December, 2011) provided in Appendix A. Additional information on aquifers is provided in the Well Reports of Examination for Wells 5 and 10 included in Appendix B.

The travel time capture zones have been calculated and are displayed in Figures 1 through 3. Figures 1 and 2 show the 6-month, 1 year, 5 year, and 10 year time of travel capture zones for the City system wells, and Figure 3 shows the capture zones for the McCormick Woods system wells. Several of the City system wells share time of travel capture zones, as indicated in Figures 1 and 2. Likewise, the McCormick Woods system wells contain shared area within their respective 10-year time of travel capture zones. These figures indicate that the WHPA extends beyond City's designated retail water service area and corporate boundary.



WELLHEAD PROTECTION PLAN FIGURE 1

City of Port Orchard WHPA

TRAVEL-TIME CAPTURE ZONES
Port Orchard Wells 4, 5, 6, and 7

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Feet

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Note: These layers represent themes requiring further planning and design. They are conceptual and under no circumstances should be construed as final plans for specific sites or areas.

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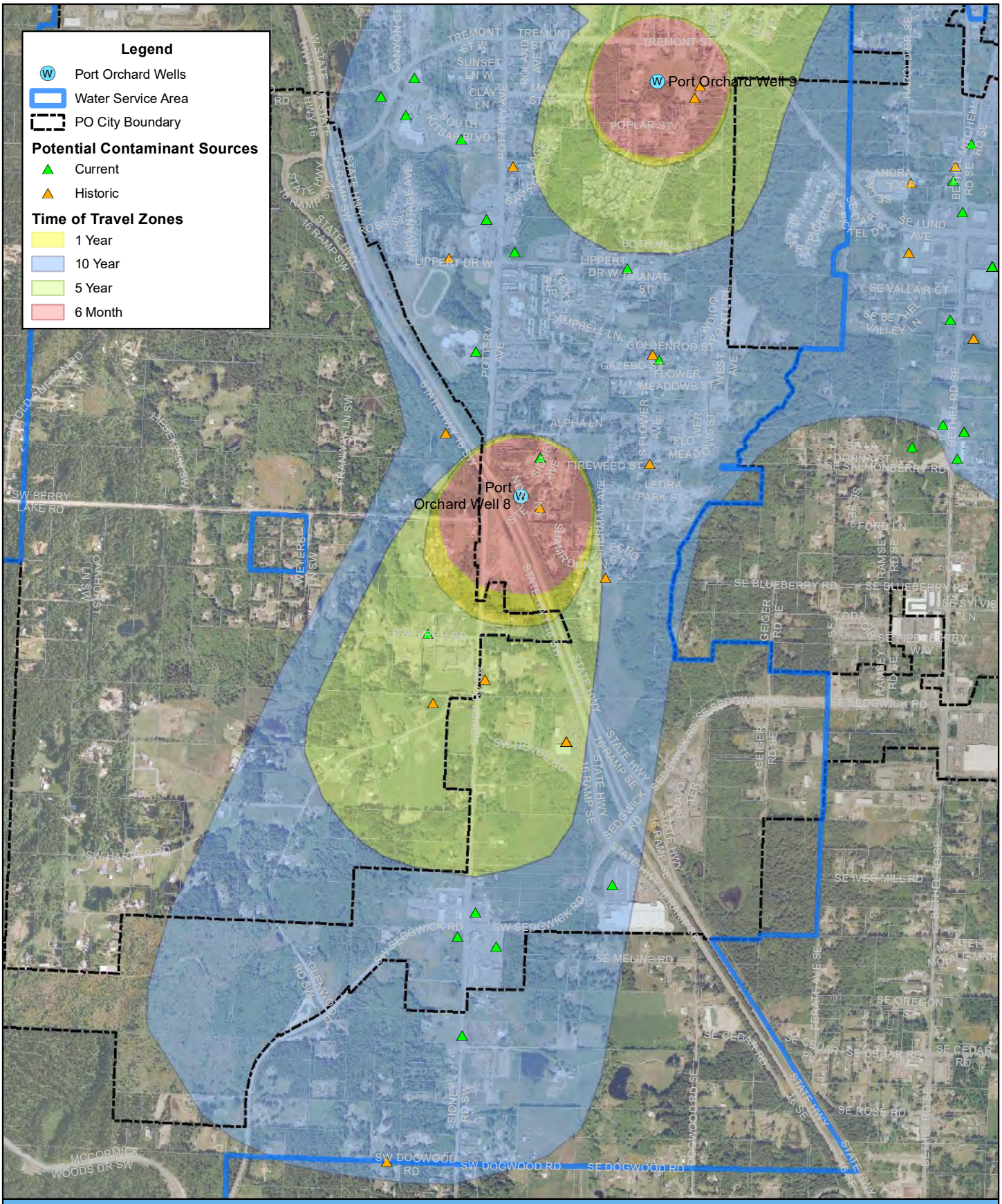

WELLHEAD PROTECTION PLAN FIGURE 2

City of Port Orchard WHPA

TRAVEL-TIME CAPTURE ZONES
Port Orchard Wells 8 and 9

Note: These layers represent themes requiring further planning and design. They are conceptual and under no circumstances should be construed as final plans for specific sites or areas.

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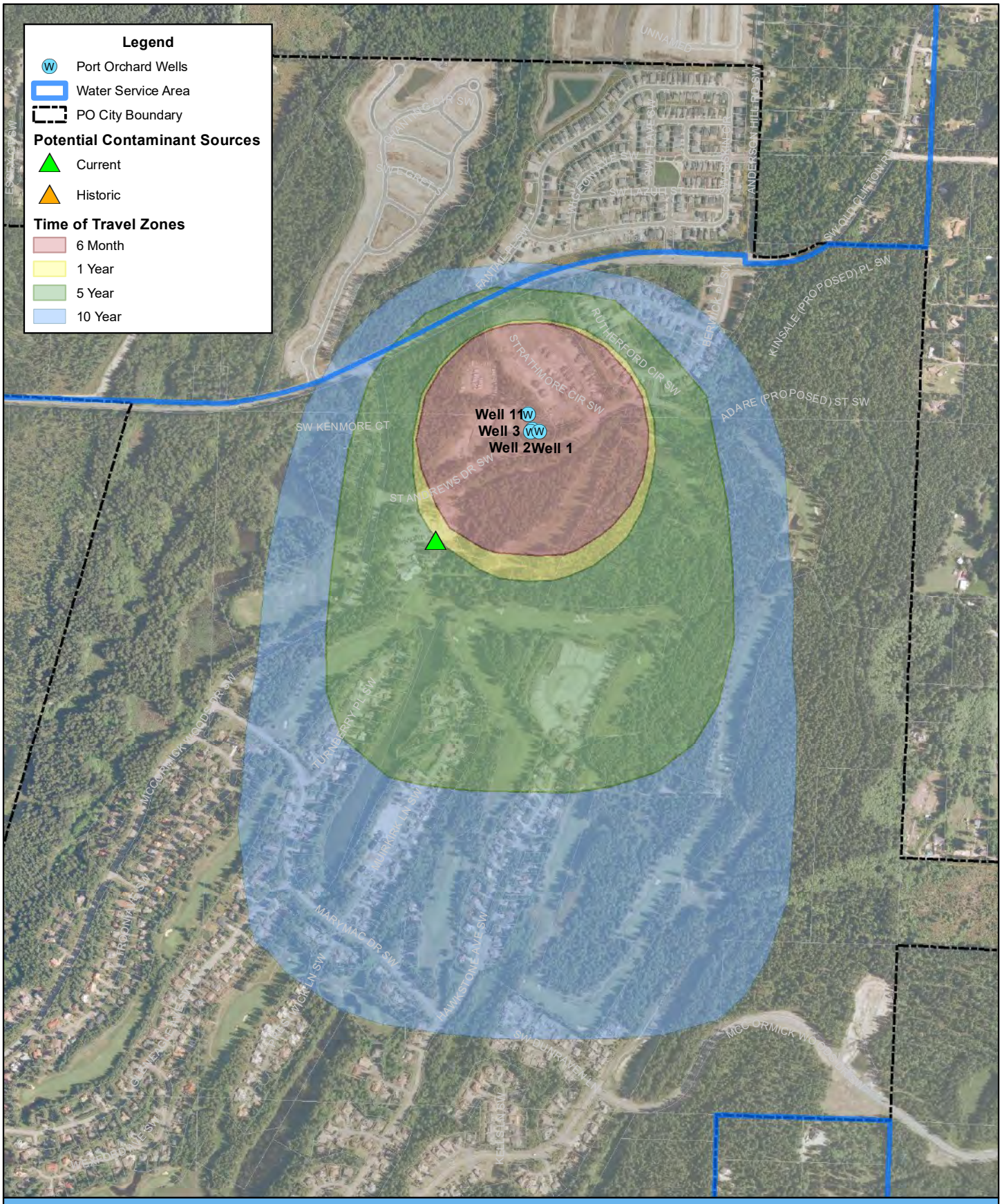

WELLHEAD PROTECTION PLAN FIGURE 3

City of Port Orchard WHPA

TRAVEL-TIME CAPTURE ZONES
McCormick Woods System Wells 1, 2, 3, and 11

Note: These layers represent themes requiring further planning and design. They are conceptual and under no circumstances should be construed as final plans for specific sites or areas.

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This Wellhead Protection Plan identifies historic and current land uses and potential sources of contaminants within the defined WHPA, which encompasses all time of travel capture zones for all active and inactive wells. The locations of potential contaminant sources are shown in proximity to the delineated WHPA in Figures 1-3.

The following paragraphs provide an overview of the geographic, land use, and water resource characteristics for Port Orchard's water system and WHPA.

2.2. Geography and Land Use

The City is located on Kitsap Peninsula on the south side of Sinclair Inlet of the Puget Sound across from the City of Bremerton. The City limits boundary is approximately 8.68 square miles, and the City's designated retail water service area serves approximately 90% of the City limits, or approximately 10,400 of its residents. Two small areas in the eastern part of the City are served by West Sound Utility District, which provides water service to residents east of the City limits. The two City water systems also serve businesses and government agencies that employ approximately 4,500 people. Zoning acreage in the water service area consists of primarily single family residential (53.4%), followed by commercial (14.6%), parks and open space (9.7%), multi-family residential (8.9%), community property such as government and institutional (6.7%), industrial (3.5%), and mixed use (3.2%).

The WHPA is similar to the water service area's makeup in that it is comprised predominantly of single family residential areas. Table 2-1 shows the existing land uses found within the WHPA by acreage. Land use is correlated, but not always 100% consistent with current zoning.

Table 2-1: WHPA Land Use

Land Use Category	Acreage	Percent
Single Family Residential	4,039	61.6%
Multi-family Residential	425	6.5%
Commercial	977	14.9%
Government / Institutional	320	4.9%
Industrial	167	2.6%
Mixed Use	153	2.3%
Parks and Open Space	473	7.2%
Total	*6,554*	

Source: City of Port Orchard and Kitsap County GIS, Jan. 2011.

Table 2-2 shows the land use within the six month and 1-year time of travel zones, which are considered the most critical areas for protection of groundwater resources and the City's drinking water supply. Port Orchard has developed zoning ordinances that prohibit certain types of land uses and development within the designated Wellhead Protection Area. More information about these ordinances in provided in Section 4 of this Plan.

Table 2-2: WHPA Land Use within 1-year Zone

Land Use Category	Acreage	Percent
Single Family Residential	261	54.9%
Multi-family Residential	29	6.1%
Commercial	98	20.6%
Government / Institutional	34	7.2%
Mixed Use	10	2.1%
Parks and Open Space	43	9.1%
Total	*476*	

Source: City of Port Orchard and Kitsap County GIS, Jan. 2011.

2.3. Topography and Geology

As previously discussed, the City of Port Orchard is situated along the south shore of Sinclair Inlet of the Puget Sound. The City and service area generally slope downward to the north and east. Elevations in the service area range from 320 feet in the southern portion of the City system to sea level along the shores of Sinclair Inlet. The general character of the topography in the area is that of small hills, ravines and other minor land forms.

The topography of the area necessitates four pressure zones: the High, Intermediate and Low zones that serve the City system and two pressure zones in McCormick Woods system. The geology of the area is dominated by ancient glacial deposits, including coarse and fine sands, gray silty sands, and gravel. Additional information about the hydrogeologic makeup of the WHPA is provided in Well Reports of Examination provided in Appendix B.

2.4. City Water Resources

Port Orchard's groundwater wells have historically provided adequate supply for the entire City and McCormick Woods systems. As previously discussed, these systems do not serve 100% of the City's residents due to an interlocal agreement with neighboring West Sound Utility District to serve approximately 380 acres of land within the City limits. Port Orchard maintains emergency interties with West Sound Utility System and the City of Bremerton with agreements in place to purchase water in the event of their wells becoming unavailable for production. The City is constructing new wells was to maximize use of the groundwater wells by increasing their yield and fully utilizing the City's ten water rights. The City maintains a long term goal of providing high quality potable water to its customers at the lowest possible cost of treatment and delivery. With the introduction of wells 10 and 11, the City will perfect its water rights and maximize the use of their resources.

Tables 2-2 and 2-3 show all eleven wells owned by the City, including the recently (2012) constructed Wells 10 and 11. Production at Well 5 was halted and transferred to Well 4, and water rights associated with Wells 1, 2 and 3 will be transferred to Well 11 upon DOH approval and start-up of the newly constructed well.

Table 2-2: Port Orchard's Active Wells – City System

Well No.	Associated Water Rights	Maximum Instantaneous Withdrawal (Qi) (gpm)	Maximum Annual Withdrawal (Qa) (acre ft)	Estimated Elevation (ft)	Diameter (in)	Depth (feet)	Aquifer	Design Capacity (GPM)
4	G1-26728P	50	80	17	Artesian	0	SLA	50
5	*G1-000911CL*	*51.3*	*82.8*	*16*	*10*	*240*	*Shallow*	*40*
6	G1-04166C Cert. 3334A	350	560	48	10	806	DAA	250
7	G1-24586C	750	1,210	16	10	804	DAA	725
8	*G1-25019C*	*500*	*560*	*262*	*12*	*577*	*DAA*	*350*
9	G1-25019C	500	560	230	12	632	DAA	450
10[3]	G1-26119P	500	806	14	10	1074	DAA	500 - 1,500[3]

Notes: 1 – Well 5 has been decommissioned and point of withdrawal has been transferred to Well 4.
2 – Well 8 serves as a back-up well and additional point of withdrawal for Well 9's Water Right (G1-25019C).
3 – Well 10 could provide up to 1,500 gpm if water rights are transferred.
Wells in rows highlighted grey are not in active use.

Table 2-3: McCormick Woods System Wells

Well No.	Associated Water Rights	Maximum Instantaneous Withdrawal (Qi) (gpm)	Maximum Annual Withdrawal (Qa) (acre ft)	Estimated Elevation (ft)	Diameter (in)	Depth (feet)	Aquifer	Design Capacity (GPM)
1	*G1-24437P*	*600*	*450*	*420*	*12*	*281*	*Shallow*	*175*
2	*G1-24437P*	*600*	*450*	*420*	*12*	*210*	*Shallow*	*350*
3	*G1-24437P*	*600*	*450*	*420*	*12*	*183*	*Shallow*	*350*
11	G1-26454P G1-24437P	750[3]	692[3]	420	TBD	953	DAA	TBD

Notes: 1 – Wells 1, 2, and 3 will be decommissioned when Well 11 is brought online in 2012.
2 – Well 4b was transferred to McCormick Woods Partners and is not a part of the City's well resources inventory.
3 – Well 11 will serve as additional point of withdrawal for Wells 1, 2, and 3. Total Annual Withdrawal amount will be 692 acre ft/yr. and maximum instantaneous withdrawal is 750 gpm.
Wells in rows highlighted grey are not in active use.

Overall production from Port Orchard's wells has historically yielded lower quantities than the total quantity the City is permitted to withdraw. In total, the City has nine active water rights between the two systems it operates, and these water rights allow for a maximum instantaneous withdrawal amount of 2,951 gpm and annual volume withdrawal of 3,348 acre-feet. The construction of Wells 10 and 11 will allow for full utilization

of the City's water rights for the City and McCormick Woods systems, respectively, and will allow the City to continue to provide high quality potable water for its residents and businesses.

2.4.1. Historic Well Development

The City of Port Orchard has constructed 12 planned wells since 1955, located at a total of eight locations. These wells have drawn from one of three underground aquifers located at various depths (shallow, intermediate, and deep aquifers). Table 2-2 shows the aquifer that each well withdraws water from. Wells 5 and 8 were pumping water from the shallow aquifer, but have since been abandoned due to higher maintenance requirements and declining yields. The construction of Well 11 will serve as an additional point of withdrawal for the water right associated with Wells 1, 2, and 3 in the McCormick Woods system. Of the 12 wells, eight are actively supplying water for customers and one has been converted to a monitoring well. Well 10 will provide up to 1,500 gpm of instantaneous withdrawal from the deep (Qg5) aquifer.

3. SUSCEPTIBILITY ASSESSMENT

Development of this Wellhead Protection Plan has included a susceptibility assessment that includes collecting and inventorying of existing and potential hazardous sites within the WHPA zones of contribution. The susceptibility assessment provides the basis for the development of an appropriate management program for protecting groundwater resources. An inventory of potential hazardous sites located within the established WHPA has been developed collectively for both the Port Orchard and McCormick systems. Combining the WHPAs for both water systems, this Plan identifies potential contaminants within a combined, or Composite WHPA. These sites are important to determining a wellhead protection strategy and management program that will help minimize potential threats to their wells. Potential and existing impacts are discussed in this section.

Additionally, the susceptibility of each public water source to contaminants has been determined. The characteristics of the wells as constructed (or to be constructed) are captured in the Well Susceptibility Survey Forms, which are included in Appendix C. A well susceptibility form for Well 5 could not be located to be included in this Plan, but the well is currently inactive and Well 4 is now serving as an additional point of withdrawal for the water rights associated with Well 5.

3.1. Groundwater Potential Impacts

A key element of Port Orchard's Wellhead Protection Plan is education of customers and staff on the principles of watershed stewardship. The following paragraphs describe various ways that pollutants may enter the ground and impact the quality of wells within the City and McCormick water systems. An analysis of the threat opposed by each of these potential contaminants is provided in Section 3.2.

3.1.1. Discharge onto the Ground Surface

Discharge of contaminants often occurs on the surface of the ground when products or waste materials are spilled or placed onto the ground surface. With the help of rainfall infiltration, the materials percolate into the subsurface and, if in sufficient volume, eventually reach the water table and migrate through the aquifer. Often times pollutants discharged to ground surfaces will occur when waste materials are deposited into landfills or illegal dumping areas; when waste is stored in liquid form in retention ponds; and when chemicals such as pesticides and fertilizers are applied to the ground for agricultural, or landscaping purposes, especially high intensity landscaping such as parks and golf courses.

3.1.2. Direct Discharge to the subsurface

Discharge into the subsurface is more direct means than ground surface discharges because the contaminants are located closer to the water table and have no chance of being carried away during storm events. Subsurface discharge often bypasses the upper layers of soil, which can provide an added layer of absorption and where chemicals can be better dispersed as it percolates into the ground. Subsurface discharge occurs from septic tanks and dry wells.

3.1.3. Abandoned Wells

Ground water monitoring and water production wells can also be a source of contamination. Washington State has standards (WAC 173-160) for construction and abandonment of wells. Because of these standards, newly constructed or recently decommissioned wells pose little risk for contamination of the aquifer. However, improperly constructed or abandoned wells can act as direct conduits for contaminant transport to the aquifer or as conduits between shallow and deep aquifers. These types of wells are likely to have been installed prior to 1988, and pollutants can be easily transported between the ground surface and aquifer zones if they are poorly sealed during decommission.

3.1.4. Stormwater Runoff

Rainfall onto the ground either induces infiltration into the subsurface or induces runoff. The quality of the water that infiltrates or runs off is dependent on type of land use development, the potential presence of contaminants, the intensity of a storm, topographical features, and the pervious qualities of the surface. Surface water runoff poses a particular threat because as it runs over the ground surface it picks up and dissolves potential contaminants that may eventually be discharged to ground water via infiltration from stormwater ditches, ponds, swales, or catchment basins.

The potential contaminants of concern in infiltrated water or runoff are diverse and reflect the land use activities in the area. Improved roadways, parking areas and residential development can contribute heavy metals and petroleum hydrocarbons, rooted primarily from automobiles. Industrial and commercial areas can discharge the same contaminants as automobiles in addition to a wide variety of organic pollutants.

Open spaces, which can be found throughout the WHPA, pose a different risk when considering contaminants present in storm water runoff. Instead of metals and petroleum hydrocarbons, runoff in these areas consists primarily of high silt content and nutrients. Runoff is influenced greatly by the condition of vegetative cover, slope of land surface, and any nutrients that may be applied. A majority of runoff will originate from paved roadways, residential areas, open spaces where vegetative cover has been removed and in areas of bedrock outcroppings.

3.2. Existing Contaminant Sites

Contaminant sites have been identified to assess how chemicals and other pollutants may enter the ground through the various methods of infiltration as described in Section 3.1. Table 3-1 provides a brief summary of land uses that may be found within a delineated WHPA, and shows the type and volume of chemical usage that can impact the quality of groundwater resources. This information is provided to assist the City in evaluating the potential impact of existing land uses and for consideration of the potential impacts of future development proposals on groundwater resources.

Table 3-1: Quantities and Types of Chemicals Used, Stored, or Transferred by Land Uses

Land Use Activity	Typical Chemicals Used	Typical Quantity Used
Industrial Activities: Chemical manufacturing; electronics; petroleum refining and storage; metal treating; food processing; wood and pulp processing; textile manufacturing; warehousing	Metals and a variety of synthetic organic compounds including petroleum based hydrocarbons. solvents, degreasers, and pesticide	Large Amounts
Commercial Activities: Gas stations; furniture strippers; drum cleaning; bus barns	Petroleum products; other synthetic organic compounds[1]	Large Amounts
Commercial Activities: Dry cleaners; junkyards; auto repair and body shops; pest controllers; photographic processing; machine shops; auto parts stores; lawn and garden/farm stores; hardware stores: medical facilities	Metals; nutrients; fertilizers; pesticides; petroleum products; other synthetic organic compounds[1]	Moderate Amounts
Agricultural Activities: High intensity agriculture operations (fruits and vegetables); concentrated animal operations (feedlots, dairies, poultry)	Nitrates and other nutrients; fertilizers; pesticides	Moderate Amounts
Residential Activities Urban housing; high density using septic systems, urban gardening	Nitrates and other nutrients; fertilizers; pesticides; petroleum products; other synthetic organic compounds[1]	Moderate Amounts
Commercial Activities: Grocery stores: department stores: office buildings; laundromats; food service; shoe repair; barber and beauty shops	Petroleum products; other synthetic organic compounds[1]	Low Amounts
Agricultural Activities: Low chemical use agriculture (forage crops)	Nitrates	Low Amounts
Residential Activities Moderate and low density, septic systems, urban gardening	Nitrates and other nutrients; fertilizers; pesticides; and petroleum products; other synthetic organic compounds[1]	Low Amounts

Notes: 1 - Synthetic organic compounds include volatile, semi-volatile and non-volatile compounds. In general they include: degreasers; plasticizers: petroleum based hydrocarbons and by-products; other industrial chemicals; and pesticides (herbicides, fungicides, rodenticides, and insecticides).

Source: Table adapted from the United States Environmental Protection Agency's *Guide for Conducting Contaminant Source Inventories for Public Drinking Water Supplies. EPA 570/9-91-014.*

As noted previously, a critical component of this Plan is to identify the types of land uses that exist in Port Orchard's WHPA and maintain an inventory a list of potential contaminant sources within the WHPA. This inventory provides the City with a basis upon which a protection program can be built and implemented. A records check prepared by independent environmental data consultant Environmental Data Resources, Inc. (EDR) shows that within a calculated fixed radius ranging from 1 mile (Well 8, McCormick Woods wells) to 1.75 miles (all other wells), there were 163 records found in 123 unique locations within the 10-year time of travel

zone that are known or have been known to contain potential contaminants or environmental hazards.

After searching 33 databases and eliminating duplicates from the more than 300 records discovered, 163 potential contaminant sources were spatially mapped according to the four time-of-travel capture zones (6-month, 1-year, 5-year, and 10-year) they were located in, based on longitude and latitude coordinates. In many cases the longitude and latitude coordinates needed to be matched to the nearest appropriate parcel, and some records were field verified.

Table 3-2 shows the number of sites within the Composite WHPA found in the environmental data records check according to the databases examined, and Table 3-3 shows the types of land use associated with those record locations. This data is used to rank potential hazardous locations within the WHPA. A full list of current and historic hazardous sites is kept on file at the City's Public Works Department.

Table 3-2: Environmental Records Check Results, Contaminant Sites within the WHPA

Status	Database	6 Month	1 Year	5 Year	10 Year	Total
Current	Brownfields Sites				1	1
	Emergency Response Notification System			1	1	2
	Facility Index System / Facility Registry System	1		7	4	12
	Federal Hazardous Waste Site - Non-Generators				1	1
	FIFRA/ TSCA[1] Tracking System				1	1
	Financial Assurance Information Listing			1	2	3
	List of Sites Contaminated by Clandestine Drug Labs			2		2
	State Sites of Interest	7	2	13	25	47
	Sites With Institutional Controls			1		1
	Solid Waste Facility Database		1			1
	State Equivalent of RCRA[2] Hazardous Waste Sites			1		1
	State Equivalent of Superfund Site (No Further Action)			2		2
	Underground Injection Wells Listing	1				1
	Underground Storage Tank			1	2	3
	Voluntary Cleanup Action Site			1	1	2
	Voluntary Cleanup Program Site	1				1
	Visual Survey[3]	1				1
Current Site Total		*11*	*3*	*30*	*38*	*82*
Historic	Facility Index System / Facility Registry System	1		2	1	4
	Federal Hazardous Waste Site - Non-Generators			1		1
	FIFRA/ TSCA[1] Tracking System				3	3
	List of Sites Contaminated by Clandestine Drug Labs	2		4	3	9
	Permit for Discharge to Stormwater Systems			3	1	4
	Reported Spills	3	1	10	15	29
	State Sites of Interest	3		12	4	19
	State Equivalent of Superfund Site (No Further Action)				1	1
	Underground Injection Wells Listing			1		1
	US Historic Clandestine Drug Labs	1		1	1	3
	Voluntary Cleanup Action Site	2		3		5
	Voluntary Cleanup Program Site			1		1
	Integrated Compliance Information System	1				1
Historic Site Total		*13*	*1*	*38*	*29*	*81*
Grand Total		**24**	**4**	**68**	**67**	**163**

Notes: Table Data Source: Environmental Data Resources, Inc. Reports *(Executive Summaries in Appendix D)*

1 – FIFRA = Federal Insecticide, Fungicide, and Rodenticide Act, TSCA = Toxic Substance Control Act

2 – RCRA = Resource Conservation and Recovery Act

3 – Visual Survey of the WHPA conducted by PACE Engineers and found a business not found in EDR Records Check.

Table 3-3: Land Use assigned to Environmental Records Check

Status	Land Use	Contaminant Threat Level	6 Month	1 Year	5 Year	10 Year	Total
Current	Business Professional	Low to Moderate				1	1
	Commercial	Moderate to High	8		21	23	52
	Community Facilities	Low	1	3	2	4	10
	Residential, High Density	Low			4		4
	Residential, Low Density	Low	2		3	10	15
Current Site Total			*11*	*3*	*30*	*38*	*82*
Historic	Business Professional	Low to Moderate				1	1
	Commercial	Moderate to High	3		20	10	33
	Community Facilities	Low			3		3
	Employment - Industrial/Office	Moderate to High			1	1	2
	Mixed Use District	Moderate	4			1	5
	Parks and Open Space	Low	1				1
	Residential, High Density	Low	1		1	1	3
	Residential, Low Density	Low	4	1	13	13	31
	Residential, Medium Density	Low				2	2
Historic Site Total			*13*	*1*	*38*	*29*	*81*
Grand Total			**24**	**4**	**68**	**67**	**163**

Source: Environmental Data Resources, Inc. Reports *(Executive Summaries in Appendix D)*

The 123 contaminant sites vary by type and some pose a greater threat to underground water resources than others. Approximately half of the documented contaminant sources are considered historic records, which means the owner or land use when the hazardous record was documented has since changed. Several historic sources could not be matched with current land parcel address records, but their approximate latitude and longitude coordinates is included in the full EDR report on file at the City's Public Works Department. The 82 existing records represent records associated with existing businesses or owners. Many of the existing threats are businesses or residential properties that are known to contain hazardous materials or contaminant sources. A brief description of the types of harmful sites identified in Port Orchard's WHPA is provided in the following paragraphs. Copies of the Executive Summaries for the environmental reports prepared by Environmental Data Resources, Inc. (EDR) are provided in Appendix D.

In addition to known records of potential contaminant sources, the City provides sewer service to approximately 90% of the estimated 11,000 residents within its City boundary. Assuming a household size of approximately 2.4 persons, this means there are an estimated 450 residential properties within the City that with functional on-site sewage disposal, or septic, systems. The threat of contaminants entering the aquifer from failing or improper use of septic systems is low, but the City has developed a strategy for notifying and educating both City and County residents about ways they can help maintain a healthy septic system, in addition to steps they can take to help protect the City's valuable underground water resources.

3.2.1. CERCLA Sites

The Federal "Superfund" legislation formed by 1980's Comprehensive Environmental Response,

Comprehensive and Liability Act (CERCLA) was created to assure that the nation's most contaminated sites were cleaned up. Major provisions of CERCLA include:

- Facility owners/operators are required to identify and report sites where hazardous substances were deposited in the past, and are required to report current releases of substances.
- EPA regulations that outline investigation and remedial action process for identified sites. (40 CFR part 300)
- EPA is authorized to investigate and inspect sites, and use information gathered during that process to rank site and determine their priority. Sites that are highly ranked are placed on the National Priorities List.
- EPA can use federal dollars to clean up highly contaminated sites, and can sue to recover dollars from the people who are responsible for the contamination.

CERCLA sites are categorized according to their status and inventoried in the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS). The database also indicates whether a particular site is considered on the Federal National Priority List (NPL), which is a list of sites that the Superfund program has identified as the most critical areas in need of clean up.

The environmental records check showed no CERCLA sites located within Port Orchard's WHPA.

3.2.2. Model Toxics Control Act (MTCA)

By the middle of the 1980's, the State had more than 500 CERCLA sites listed. In response to the need, Washington began a state clean-up effort. These efforts were largely funded by general tax revenue, and because of the limited funding only a few sites were targeted. The state legislature subsequently provided "State Superfund" legislation, which was followed in 1988 by the Model Toxic Controls Act (MTCA). Washington Administrative Code (WAC) 173-340 contains state policies resulting from the MTCA and establishes a State Hazardous Site List (HSL), which is the State equivalent of the Federal National Priority List. The State HSL is a list established, ranked according to public health risk, and published semi-annually by the Department of Ecology (DOE). It may or may not also contain sites found in the Federal CERCLIS.

The primary differences between the Superfund and MTCA programs are as follows:

- MTCA includes provisions to encourage responsible parties to perform voluntary cleanup.
- MTCA provides specified cleanup standards for hundreds of contaminants in the air, soil, surface water and ground water. Petroleum products are included in these standards.
- MTCA encourages public input into the clean-up process at many points, unlike the Superfund, which allows for public participation once a remedy is selected.

DOE maintains a database of sites called the Confirmed and Suspected Contaminated Sites List (CSCSL), and sites on the HSL are included in this database. The environmental records check performed for this Wellhead Plan showed 4 CSCSL Sites are located within Port Orchard's Composite WHPA, and 1 site is listed on the State HSL.

3.2.3. Underground Storage Tanks (UST)

Underground storage tanks typically contain motor fuels or heating oil, but may also contain solvents or other compounds. Old or improperly installed and maintained tanks frequently leak. The most common causes of leaks are structural failure, corrosion, improper fittings, improper installation and natural

phenomena.

Owners of all tanks as defined by Chapter 173-360 of the WAC must apply for and obtain an annual permit in order to operate the tank. However state and federal regulations do not cover all underground storage tanks. Exceptions are:

- Farm or residential UST systems of 1,100 gallons or less capacity used for storing motor fuel for non-commercial purposes.
- UST systems used for storing heating oil for consumptive use on the premises, except for systems with a capacity of more than 1,100 gallons, which have a reporting requirement.
- UST with a capacity of 10,000 gallons or less are exempted from environmental review under SEPA.

The first two exceptions are subject to local regulatory authority under the International Fire Code (IFC) and WAC 51-54-3400. Installation of new, and removal of, abandoned home heating oil tanks is regulated by the Kitsap County Fire Marshal's office, local fire districts and cities under the IFC. The IFC requires that the tanks which have been unused longer than one year be properly closed in a manner approved be the appropriate fire official.

The environmental records check showed 3 USTs are located within Port Orchard's Composite WHPA. Details on the sites are provided in the EDR reports included in Appendix D.

3.2.4. Leaking Underground Storage Tanks (LUST)

Leaking underground storage tanks are handled by a separate regulatory approach. The EPA has funded a program for states to implement clean-up programs. For the state approach, DOE's program involves regulation development, reporting requirements and cleanup standards. DOE currently addresses leaking tanks through oversight of voluntary clean up action by tank owners or through enforcement actions under MTCA.

The environmental records check showed no LUSTs located within Port Orchard's Composite WHPA. Details on the sites are provided in the EDR reports included in Appendix D.

3.2.5. On-Site Septic Systems

Potential contaminants from septic tanks and drainfields include pathogenic organisms, toxic substances, and nitrogen compounds. Regulatory jurisdiction over on-site sewage disposal systems depends on the type of waste and the size of system. DOE regulates Industrial disposal and large domestic on-site septic systems (14,500 gallons per day or more). Both industrial and domestic systems must now comply with the state's groundwater standards. DOH regulates systems with flows between 3,500 and 14,499 gallons per day. Kitsap Public Health District has jurisdiction over systems less than 3,500 gallons per day.

The purpose of the state regulations for on-site sewerage is to minimize the potential for public exposure to wastewater, and to minimize adverse impacts on public health from septic system discharges into the ground and to surface waters.

3.2.6. Hazardous Materials/Hazardous Waste Sites

Commercial use of chemicals can present significant risk to ground water. While there is always the possibility of a chemical release to the environment when using or handling chemicals, significant releases

of liquids occur in one of two ways; through accidental releases or spills, and through improper disposal.

Hazardous Material Storage

The storage of hazardous materials is regulated under the Superfund Amendments and Reauthorization Act of 1986 (SARA). This law, in addition to providing the extension and needed changes to CERCLA, contains Title III, which provides for emergency response and encourages greater citizen participation in making decisions on how sites should be cleaned up.

As required by law, facilities handling hazardous materials must report quantities, which are stored on site. The purpose of these reports is to notify the community, in particular emergency responders, of the types and amounts of chemicals on hand. Reportable quantities vary from chemical to chemical, and go as low as one pound. In addition, facilities must annually report any releases of these chemicals into the environment.

Hazardous Material Transportation

Regulation of the transporting of hazardous materials is provided by the U.S. Department of Transportation. Regulations are focused in three areas: labeling, placards and shipping. The DOT has specific requirements for labeling hazardous materials. Vehicles carrying these materials must be placarded with the appropriate signage.

Hazardous Waste

The Federal Resource Conservation and Recovery Act (RCRA) of 1976 (40 CFR 260) regulates hazardous materials waste. RCRA has been termed the "cradle to grave" legislation, as it requires tracking of hazardous waste from the time of creation to its ultimate disposal. Sites that have been identified on the RCRA list must track and report on hazardous materials that are produced, used, or disposed of on site.

Washington was one of the first states to pass legislation and create regulations comprehensive enough to warrant partial authorization by EPA to administer portions of the Resource Conservation and Recovery Act. Under WAC 173-303, waste materials thought to be hazardous must be designated through a process of determining characteristics of the material.

The environmental records check showed 2 RCRA sites within Port Orchard's Composite WHPA, but they are classified as Non-Generators, and are therefore not generating waste. Both sites are located outside of the 6-month and 1-year capture zones. Additional details on the sites are provided in the EDR reports included in Appendix D.

3.2.7. Pesticides and Fertilizers

The use of pesticides is regulated under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), originally adopted in 1947 and updated and amended several times over the next several decades. In Washington, Pesticide and Fertilizer controls have been delegated to the state Department of Agriculture. The DOA is responsible for pesticide registration, quality control sampling, and testing and licensing of applicators. Washington has its own statutory control under the Washington Pesticide Control Act (RCW 15.58) and the Pesticide Application Act (RCW 17.21). Pesticide and fertilizer use within Port Orchard's WHPA is limited to golf courses and public parks and sports fields. There are no agricultural land uses occurring within the WHPA, but there are 16 sites (4 are historic) identified within the 10-year capture

zone that were found in the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) / Toxic Substance Control Act (TSCA) Tracking System database.

3.2.8. Stormwater

Stormwater is not only a source of groundwater recharge, but is also a potential source of contamination. The federal government regulates Stormwater discharges under Section 402 (National Pollutant Discharge Elimination System or NPDES) of the Clean Water Act. The intent is to minimize the concentrations of point source and non-point source polluters. Contaminants may be discharged directly to surface waters directly from industrial sites, wastewater treatment plants, construction sites, and other locations. Other pollutants are discharged during storm events, which can carry contaminants to surface water resources through stormwater infrastructure maintained by private land owners and municipal systems. The following basic components of the NPDES program include:

- Administering permits required for stormwater discharges associated with industrial activities.
- Requiring facilities to implement a stormwater pollution prevention plan (SWPP) and utilize best management practices (BMP) to control the quality of stormwater discharges. The SWPP summarizes BMPs, reporting requirements, inspection and maintenance requirements, and establishes a team at each site where responsible for implementation of the plan.
- The federal program also requires that construction sites that disturb more than 5 acres to apply for a general stormwater permit.

DOE has jurisdiction over the stormwater program in the state. Its program goes farther than the federal program, as it requires that permit holders monitor stormwater quality at the point of discharge to surface or groundwater. The City of Port Orchard maintains its NPDES Phase II Municipal Stormwater Permit under supervision from the Department of Ecology. The City maintains development standards and policies that improve the collection and treatment of stormwater contaminants prior to discharge to surface or underground water resources. Chapter 15.30 of the Port Orchard Municipal Code regulates Illicit Discharge Detection and Elimination within the City.

4. MANAGEMENT STRATEGIES

In order to accomplish the protection of the Composite WHPA for the City and McCormick Woods water systems in an orderly and cost-effective manner, the following wellhead protection management strategies have been developed. These strategies are separated into the following categories:

1) Long-Term Management and Cooperation
2) Land Use Strategies
3) Regulatory Strategies
4) Planning Strategies
5) Data Managements Strategies
6) Education Strategies

4.1. Long-Term Management and Cooperation

This Wellhead Protection Program is designed to be a continuing management activity, adapted and evolving as needed to meet future changes in hazardous materials and substance lists, City philosophies, and/or changes in the physical or geochemical conditions of the aquifer system. As such, management strategies and practices provide a general direction, but will periodically need refinement to fit specific conditions, future

activities and regulations, or changes in current regulations that may affect the WHPA.

4.1.1. Land management Activities

The City encourages owners or agencies responsible for large parcels and developments to use and monitor best management practices for control, reduction and restriction of potential contaminants within the WHPA. This is accomplished through the land use permitting processes currently in place. Low impact development standards and other engineering methods of retaining and treating stormwater onsite prior to recharge into the ground shall be encouraged where practical. In December 2007, the City adopted Title 16.80 of the municipal code to include Low Impact Development guidelines in the City's adopted Storm Water Design Manual.

4.2. Regulatory Land Use Strategies

As indicated in Figure 1, the WHPA for Port Orchard's wells is primarily within the City limits, but also contains land parcels located within unincorporated Kitsap County. The City maintains a cooperative relationship with Kitsap County, and has full authority over land use policies and zoning within its incorporated area. Coordination of new development and building permits with Kitsap County where appropriate will ensure consistency between City and County land use policies within the WHPA.

4.2.1. Designated Critical Aquifer Recharge and Wellhead Protection Areas

Chapter 18.12.020 of the Port Orchard Municipal Code, with authority under WAC 365-190-080, establishes regulations for designated and protecting the City's Critical Aquifer Recharge Areas (CARA). The designation of the Wellhead Protection Zones (the WHPA designated in this Plan) as a CARA prohibits certain types of land development within the City's WHPA. Table 18.12.030 in the Municipal Code lists the various types of land uses that are not permitted within the WHPA.

The City's municipal code makes a distinction concerning allowable land uses between the time of travel capture zones provided in this Plan. The 6-month and 1-year capture zones are automatically considered CARAs. The 5-year capture time of travel zones are included as CARAs only if the public well is drawing water from an aquifer that is at or above sea level and is overlain with permeable soils. None of the City's wells in active use (2012) are currently withdrawing water from the Shallow or Sea Level Aquifers, and plans for future wells (Wells 10 and 11) are designated for withdrawal from the Deep Artesian Aquifer. The WHPAs established in this Plan will ensure long term sustainability and quality of the groundwater wells.

4.3. Planning Strategies

Present day planning and coordination will achieve a substantial degree of future protection for the WHPA. It is important to remain cognizant of stormwater infrastructure and development to ensure harmful chemicals and contaminants are minimized and/or treated prior to groundwater recharge taking place.

4.3.1. Stormwater Management

The impact of stormwater discharge on water quality and quantity has been researched and evaluated within the City. The City partners with Kitsap County to ensure the adequacy of existing and future stormwater facilities, including routing, retention and detention facilities, are maintained. The storm system is continually evaluated and designed to allow for the optimum recharge of stormwater to groundwater systems while adequately protecting the water quality of the aquifers. The City is

responsible for stormwater runoff on its wellhead sites, and ensures runoff from impervious surfaces on the well site infiltrates into the ground. With the exception of Well 4, impervious surfaces at the well sites are limited to rooftops of small sheds housing well controls. Well 4 is located in the parking lot at City Hall and is completely surrounded by impervious surface. Well 4 is no longer used as a drinking water supply and the artesian nature of the well provides some protection from direct contamination at the wellhead.

4.3.2. Emergency Response

The City has procedures in place emergencies that may occur within the WHPA and has established communication protocols with first-responders. The City's Water System Emergency Response procedures are incorporated into the confidential City-wide emergency response plan on file at City Hall.

4.3.3. Petroleum Pipeline

Documentation of the location of petroleum pipelines and establishing emergency response plans for pipeline failure is to be accomplished as part of the City's overall emergency response plan. Port Orchard relies partially on the DOE and Kitsap County for being notified of petroleum pipeline deficiencies, breaks or failures.

4.4. Data Management Strategies

One of the principle goals of the WHPP is the development of a data collection network and analysis capable of providing the City with advance warning of contamination to the water supply.

4.4.1. Groundwater Monitoring

Port Orchard actively participates in the collection and analysis of regional and local groundwater information. Cooperation with other agencies seeking to monitor groundwater resources within the region will alert the City to potential groundwater quality problems. Kitsap County is currently undergoing a County-wide assessment of hydrogeological modeling to determine how the various aquifers in the County are connected to existing public and private wells. The City will continue to work with Kitsap County on the USGS Kitsap Peninsula Groundwater Model project and expects to have additional information on how public and private wells are impacting the underground aquifers in the area.

4.4.2. Herbicide and Pesticide Survey

The City inventories businesses and land uses that may use or store herbicides and pesticides on site and encourages owners and managers to use alternative management practices that will better protect groundwater quality and/or minimize the likelihood of a spill.

4.4.3. Underground Storage Tank Inventory

Kitsap County maintains an inventory of commercial properties that contain Underground Storage Tanks (USTs). Residential heating oil USTs may also be present and are inventoried as the County is made aware of their existence. A complete list of residential USTs within the City is not currently available or known at this time.

4.5. Education Strategies

Education of the public concerning groundwater protection is a critical portion of the WHPP. Through proper education, the degree and potential for future contamination can be greatly reduced.

4.5.1. WHPP Education Programs

The WHPP education program is targeted for distribution of information regarding septic tank maintenance, fuel oil storage tank maintenance and abandonment, residential use of herbicides, pesticides, fertilizers, and other hazardous material use, storage and disposal. The target audience includes land owners and managers within the WHPA. Information analyzed from an environmental records check was compared with current land use records provided by Kitsap County's property assessor's office. For current landowners, businesses, and residents, an outreach education program will ensure proper care of contaminants and spill response procedures are followed. A sample letter prepared for notifying and educating business owners and residents is provided in the following pages.

Sample Letter for Business Owners within the WHPA:

<<Date>>
<<Address Block>>

Dear <<Business Owner>>:

We are writing to let you know that your business is located within City of Port Orchard's Wellhead Protection Area (WHPA). The City has recently completed a Wellhead Protection Plan in accordance with the requirements of the Washington State Department of Health. The Plan has been prepared as a means of protecting the community drinking water supply from contamination and ensure the long term viability of our water resources is preserved.

A primary goal of the City's watershed protection planning is to raise public awareness regarding the potential human activities that can impact underground aquifer water quality. Although the aquifers are considered well protected and secure, there are certain activities which could result in contamination of the source.

To assist in protection of the watershed, the City has identified specific areas where special precautions are warranted, and have completed an inventory of potentially hazardous activities based on business types and land use designations. A WHPA has been established for City wells and is shown on the attached map. Businesses such as yours that are located within the established WHPA shown on the map are being notified as required by Washington State law. The purpose of this letter is to inform you that the nature of your business indicates that activities you may be engaged in or materials you may have stored on site could present a threat to the drinking water supply for City customers if proper care and disposal procedures are not followed. Hazardous materials spilled onto the ground in this area could eventually reach the City's water supply. Some specific sources of contamination which you should be aware of are:

- *Accidental spilling of fuel, oil or other chemical products.*
- *Improper use of septic systems (i.e. paints, cleaners, and/or solvents in the septic system).*
- *Septic tank failure, or lack of proper septic tank maintenance (i.e. periodic pumping).*
- *Draining of motor oil, gasoline, antifreeze or other similar materials on the ground or into the stormwater system.*
- *Leaking fuel or chemical storage tanks and/or distribution lines.*
- *Improper or excessive use or disposal of fertilizers, pesticides, and herbicides*

We encourage you to learn more about how you can do your part to help us protect our valuable water resources by visiting our website at http://www.cityofportorchard.us/municipality/departments/public-works*. Please be aware that the City of Port Orchard maintains a rigorous water quality testing program to ensure the highest quality drinking water is delivered to you at an affordable rate. On behalf of the City, we appreciate your assistance in the long term health and sustainability of our underground aquifers. Please contact the City at (360) 876-4991 if you have questions regarding the Wellhead Protection Plan.*

Sincerely,

Mark Dorsey, PE
City Water System Manager and Public Works Director

Sample Letter for Residents within the WHPA:

<<Date>>
<<Address Block>>

Dear <<Resident>>:

The City of Port Orchard has recently completed a Wellhead Protection Plan in accordance with the requirements of the Washington State Department of Health. The Plan has been prepared as a means of protecting the community drinking water supply from contamination and ensure the long term viability of our water resources is preserved.

A primary goal of the City's watershed protection planning is to raise public awareness regarding the potential human activities that can impact underground aquifer water quality. Although the aquifers are considered well protected and secure, there are certain activities which could result in contamination of the source.

To assist in protection of the watershed, the City's consultants have identified specific areas where special precautions are warranted. A Wellhead Protection Area (WHPA) has been established for City wells and is shown on the attached map. The purpose of this letter is to inform you about how hazardous materials spilled onto the ground could eventually reach the underground aquifers that provide you and other City customers with potable drinking water. Please be aware of and take appropriate action to prevent the following activities on your property:

- *Accidental spilling of fuel, oil or other chemical products.*
- *Improper use of septic systems (i.e. paints, cleaners, and/or solvents in the septic system).*
- *Septic tank failure, or lack of proper septic tank maintenance (i.e. periodic pumping).*
- *Draining of motor oil, gasoline, antifreeze or other similar materials on the ground or into the stormwater system.*
- *Leaking fuel or chemical storage tanks and/or distribution lines.*
- *Improper or excessive use or disposal of fertilizers, pesticides, and herbicides*

We encourage you to learn more about how you can do your part to help us protect our valuable water resources by visiting our website at http://www.cityofportorchard.us/municipality/departments/public-works*. Please be aware that the City of Port Orchard maintains a rigorous water quality testing program to ensure the highest quality drinking water is delivered to you at an affordable rate. On behalf of the City, we appreciate your assistance in maintaining the long term health and sustainability of our underground aquifers. Please contact the City at (360) 876-4991 if you have questions regarding the Wellhead Protection Plan.*

Sincerely,

Mark Dorsey, PE
City Water System Manager and Public Works Director

5. PROGRAM IMPLEMENTATION

The previous section outlined strategies to help with the sustainable management of Port Orchard's Wellhead Protection Area (WHPA). In order to accomplish long term protection, the following specific tasks need to be considered for full implementation. Port Orchard staff will periodically evaluate various program implementation tasks such as the ones provided in the following subsections. Tasks are categorized into communication and education measures, coordination with other agencies, advocacy, security measures, and data collection and maintenance.

5.1. Coordination with Other Agencies

The following tasks will ensure ongoing coordination with regulatory agencies:

- ☐ Establish formal communication with first responders.
- ☐ Communicate the extent and critical nature of the Composite WHPA to Kitsap County Department of Community Development (DCD).
- ☐ Work with responsible agencies to assess the adequacy of stormwater systems.
- ☐ Coordinate and promote the evaluation of stormwater detention, retention and routing priorities.
- ☐ Assure that hydrogeological impact of surface development is adequately evaluated during the 'SEPA process.
- ☐ Promote Kitsap County's Solid and Hazardous Waste Management Program regarding household hazardous materials use, storage and disposal.
- ☐ Support the current and ongoing efforts of the USGS Kitsap Peninsula Groundwater Model project to further define, characterize and protect the sustainability of the County's underground aquifers

5.2. Advocacy

The following tasks are related to advocating for regulatory development and enforcement:

- ☐ Encourage development and use of best management practices where practical.
- ☐ Seek to have the DOE prioritize the investigation of contaminated sites within the WHPA.
- ☐ Coordinate environmental education projects with appropriate County agencies to focus efforts on the WHPA.
- ☐ Encourage County, State and private landowners to utilize vegetation management practices to protect water quality.
- ☐ Support the implementation of state laws and regulations regarding septic tank system inspection and maintenance.

5.3. Security Measures

The following tasks are related to securing and protecting the underground aquifers:

- ☐ Consider seeking designation of the WHPA as a special protection area, and/or work with land use authorities to ensure WHPA area is included in Critical Area Ordinances and factored into development/permitting decisions.
- ☐ Install "Wellhead Protection Area" signs at appropriate WHPA boundaries.
- ☐ Install fencing and a security system on the well site to prevent public intrusion.

5.4. Data Collection and Maintenance

The following tasks are related to collecting and maintaining data that may prove useful for evaluating protective measures:

- ☐ Review water quality data generated under general NPDES stormwater permit.
- ☐ Participate in regional groundwater data development and management program.
- ☐ Document the type and amount of herbicide and pesticide application.
- ☐ Conduct groundwater monitoring for analysis of herbicide, pesticide and nitrate.
- ☐ Develop data on the number and size of exempt underground tanks within the one-year time of travel zone for the next potential contaminant inventory.

5.5. Communication and Education Measures

The following tasks are related to communication and outreach to the community within and passing through the WHPA:

- ☐ Communicate the location of the WHPA; explain the basic WHP philosophy and address specific concerns with the residents and businesses.
- ☐ Provide education to businesses and residents about how to report a spill.
- ☐ Residents not connected to the sewer system should be sent information concerning aquifer contamination, household hazardous waste recycling and disposal information, as well as cautioning on the use and storage of hazardous materials.
- ☐ Residents that own and maintain septic systems should be notified regarding septic tank maintenance as well as hazardous materials use storage and disposal.
- ☐ Educate landowners on how to minimize the use of fertilizer, pesticides, and herbicides.
- ☐ Participate in public education programs to notify the public concerning the impact of septic systems, proper septic tank maintenance and proper hazardous waste disposal.
- ☐ Wellhead protection posters should be posted at various public locations.

6. SPILL RESPONSE

The purpose of this section is to outline and evaluate response procedures for spill events with the Composite WHPA. Spill events can be large or small, and can exist of highly toxic or inert materials. Events can occur under conditions, and in locations where the spill is easily contained and clean-up time is plentiful, or they can occur where surface water, waterways or ground water are under immediate threat. This range of possibilities has prompted a spill response system, which is nationwide in scope and can involve federal agencies, yet is designed to handle the more common small-scale spills. As the ability of the City to affect procedures and protocols of the national and state response system is limited, this effort is focused on local response capabilities and needs in response to localized and/or small spills.

6.1. Local Response

Local operational response to hazardous material spills is the responsibility of local fire departments or districts. Spill response for this area is handled by South Kitsap Fire and Rescue (SKFR), which maintains protocols for hazardous material response. SKFR's role as first responder is to control the scene and call for

assistance. This may involve attempts to slow or stop spills or leaks, if this can be done within the training and capabilities of the responder.

Spill response planning has taken place in Kitsap County and the state for many years and organizations involved in the storage and transportation of hazardous materials are required to develop contingency plans. The Washington State Patrol is the designated Incident Command agency for all incidents occurring on state highways.

6.2. State Response

The role of the DOE is described in detail in the remainder of this section. This agency often provides an important function in spill management and cleanup. They are not generally considered a "first response" agency, but because of their regional offices and their environmental protection responsibilities, they often are quickly on-scene and provide cleanup or containment advice and services through contractors.

The DOE is developing the State Master Oil and Hazardous Substance Spill Contingency Plan. This document when completed will provide spill responders and key agency staff with the information and procedural guidelines necessary to effectively respond to spills. These procedures will include such times as enforcement protocols and laboratory support procedures.

The following are spill response plans and types of plans in effect in Washington which cover inland (non-marine) areas such as wellhead protection areas and aquifer recharge areas:

- National Oil and Hazardous Substance pollution and Contingency Plan (NCP) - prepared by EPA
- Oil and Hazardous substance Pollution Contingency Plan for Federal Region 10 – prepared by EPA Region 10
- Washington Statewide Master Oil and Hazardous Substance Spill Contingency Plan – currently being prepared by the DOE
- Washington State Emergency Response Plan – prepared by Department of Community, Trade, and Economic Development

6.3. Spill Response Organizations

Ecology Spill Response Team (ESRT)

The Ecology Spill Response Team is made up of regional DOE office personnel. The team is responsible for determining the source, cause and responsible party, as well as initiating appropriate enforcement action. Additional responsibilities include ensuring containment, cleanup, and disposal are adequately carried out. The team coordinates actions with federal, state and local agencies.

Local Response Team (LRT)

The Local Response Team consists of state and local government agencies, industry personnel, academic organizations and other private interests that may assist the on-scene commander in pollution response and planning. The composition and level of participation is dependent upon the area involved, the hazard posed and the type of assistance required. Normally the LRT consists of the state environmental response agency and clean-up contractors.

Technical Assistance Team (TAT)

The Technical Assistance Team is a contractor used by the EPA Region 10 office to provide technical oversight at spills and uncontrolled hazardous waste sites. Requests for the TAT are made via the EPA.

Natural Resource Damage Assessment Team (NRDA)

The State Natural Resource Damage Assessment Team consists of representatives from the DOE, the Department of Natural Resources, the Department of Fish and Wildlife, the parks and Recreation Commission, Department of Community Trade and Economic Development and the Department of Health. In the event of a major pollution event, which damages natural resources, this committee's mission is to organize personnel, materials and equipment necessary to conduct reconnaissance evaluations and initiate detailed assessments of natural resource damages.

EPA Environmental Response Team (ERT)

The Environmental Response Team was established to advise the on-scene coordinator and Regional Response Team on environmental issues surrounding spill containment, cleanup, and damage assessment. ERT personnel have expertise in areas such as treatment technology, biology, chemistry, hydrology, geology and engineering.

Regional Response Team (RRT)

The Regional Response Team consists of representatives from selected federal and state agencies and performs functions similar to those performed nationally by the NRT. Essentially the RRT is the regional body responsible for planning and preparedness before an oil spill occurs, and provides advice to the on-scene coordinator following such incidents.

National Response Team (NRT)

The NRT consists of representatives from various federal agencies. It serves as the national body for planning and preparedness actions prior to a spill and as an emergency advisory center when a spill occurs.

6.4. Roles and Responsibilities

Spill response in Washington State involves the active participation of a significant number of agencies, organizations and private individuals. For spill response procedures to be effectively executed, each party must be fully aware of their specific roles and responsibilities. Additionally, there must be an understanding of the roles of other parties involved in the response activities as well as effective coordination, communication and cooperation among responding agencies, organizations and individuals.

6.4.1. Responsible Party

The primary responsibility for assessing, responding to and containing a spill or discharge falls upon the individual, agency and/or company responsible for the spill incident. The responsible party, whether there is an approved contingency plan or not is responsible for containment and cleanup of the spill, disposal of containment debris, restoration of the environment and the payment of damages. State and federal law specifically require that the removal of a discharge of oil or hazardous substance should be immediate.
Environmental Protection Agency (EPA)

The EPA has primary responsibility for spills that occur on inland waters not under United States Coast Guard jurisdiction, and all land spills. As directed by the NCP, the EPA is pre-designated as on-scene

coordinator for spills occurring under its jurisdiction.

6.4.2. Washington State Department of Ecology

The DOE is the lead agency for environmental pollution within the state. As such, is has pre-designated the state on-scene coordinator and the incident commander for any spills occurring in state jurisdiction. In the event of a spill occurring on a state highway, the DOE coordinates with the State Patrol, which assumes responsibility as incident commander and the DOE acts as the lead agency responsible for clean-up.

6.4.3. Washington State Patrol

The State Patrol acts as the designated Incident Command agency for incidents on interstate and state highways, and other roads and jurisdictions as delegated. When a spill occurs, the DOE joins the Unified Command and acts as the lead agency for clean-up response.

6.4.4. Washington State Emergency Management Division

The following are responsibilities of the Washington State Emergency Management Division:

- Develop and maintain State Comprehensive Emergency Plan
- Maintain 24-hour capability to receive notification of incidents and request assistance and initial notification to local, state federal response agencies.
- Activate EOC as needed to coordinate state resource identification and acquisition in support of DOE's response.
- Provide PIO support to Incident Command.
- Maintain and update list of NRDA team members submitted by participating agencies.
- Maintain and update notification list of local, state and federal agencies involved in emergency response.
- Coordinate procurement of state resources for use by on-scene commander or as requested by local EMD or other designated local response agency or state response agency.
- Participate in the NRDA team.

6.4.5. Washington State Department of Fish and Wildlife (DFW)

The DFW is a state agency with trustee responsibilities for wildlife, game fish, food fish, non-game fish, shellfish and their associated habitats. The agency is also responsible for state facilities (hatcheries, properties, launch ramps and related facilities) and assorted equipment. Of special concern are high-volume habitats that may be used as nursery grounds for fish or wildlife. DFW is a participant on the NRDA team.

6.4.6. Washington State Department of Health (DOH)

The DOH has the responsibility for beach closures for human health and safety purposes, public health concerns from contaminated food supply (e.g. shellfish) and general health related matters for the safety of the public. In addition DOH is to render all appropriate laboratory support and services to the on-scene commander. DOH is a participant in the NRDA team.

6.4.7. Washington State Department of Transportation (DOT)

The Dot may provide traffic control, equipment and personnel for non-hazardous clean-up activities on state and interstate highways. The DOT may provide and mobilize equipment necessary in a major spill

incident.

6.4.8. Local Responders

Local emergency response organizations such as local police, county police and local fire districts have a key role to play in most spill situations. The first responders for a majority of spills are these local entities. They provide for immediate protection of health, property and the environment. It is this group of responders who determine the need for additional assistance and mobilization of additional resources.

6.4.9. Local Emergency Planning Committee (LEPC)

Local governments have the duty to be prepared for disasters of all types. Kitsap County's Department of Emergency Management is charged with establishing the Local Emergency Planning Committee to facilitate planning efforts.

The LEPC has the responsibility to create local emergency response plans. Title III of the Superfund Amendments and Re-authorization Act of 1986 contain the general requirements for local response plans. When there is a threat to life and property, local agencies, generally fire and police can be activated to provide emergency services. These services may include: fire and explosion control, investigation and documentation, perimeter control, evacuation, traffic control and initial containment and/or removal of materials depending upon the nature of the incident.

6.5. Incident Response Management

6.5.1. Notification Requirements and Local Response Relationships

By Washington State law the responsible party is required to notify the National Response Team and Kitsap County's Department of Emergency Management. The responsible party is also encouraged to contact the DOE. In most spill response situations, the initial call is to a local emergency response agency such as police or fire. First responders provide for the initial on scene control and manage the event under the Incident Command system. The use of a "911" call will activate the initial local response.

PHONE NUMBERS

Washington State Emergency Management	(800) 258-5990
Kitsap County Dept. of Emergency Management	(360) 307-5870
Washington State Dept. of Ecology (24 hour spill response)	(360) 407-6300
South Kitsap Fire and Rescue (non-emergency)	(360) 871-2411
City of Port Orchard Public Works	(360) 876-4991
City of Port Orchard Police Department (non-emergency)	(360) 876-1700
EPA-Seattle	(206) 553-1263
National Response Center	(800) 424-8802

6.6. Incident Command System (ICS)

The state spill response is organized and managed under an Incident Command System (ICS). The ICS is a functional component of a larger program, the National Interagency Incident Management System (NIIMS), which was developed years ago for the interagency management of large forest fires. The ICS, although less complex than the NIIMS, is designed to manage all oil and hazardous substance spill response efforts.

Specifically the system will operate in the following scenarios: 1) Single jurisdiction/single agency, 2) single jurisdiction/multi agency and 3) multi jurisdiction/multi agency.

The ICS concept is built upon teamwork, coordination and cooperation between all entities involved, or potentially involved in a spill response. Teamwork is encouraged throughout all phases of incident management including the preparedness for, mitigation of, response to and recovery from a spill of any type or size. The DOE has taken steps to ensure effective teamwork, coordination and participation in the ICS by appropriate state and local agencies occurs.

6.6.1. Unified Command

The Unified Command Structure is a consistent, systematic means of organizing a variety of agencies, having jurisdictional responsibilities surrounding an incident, into one concerted effort. The concept offers uniform and trackable procedures that enable all emergency response agencies to perform their roles effectively and in unison. A Unified Command is intended to be located as close as possible to the site of the spill as practicable, without interfering in the actual spill response activities.

The ICS will operate using a Unified Command Structure involving representatives of the DOE, federal government, industry, and in some circumstances local government. A Unified Command Structure is called for when the spill is multi-jurisdictional in nature, e.g. when public safety and welfare, as well as environmental damage are imminent.

Under this structure the three key on-site coordinators, federal, state and industry will share decision-making authority in the command post and consult with each other regarding spill response and cleanup management issues. Participation in ICS does not mean that agencies that have roles and responsibilities set by federal and state statues are relinquishing or surrendering their authority. Emergency situations may however require some actions to be taken outside of the normal permitting process.

6.6.2. Organization and Staffing

The ICS is organized around four functional areas: command, planning, logistics and administration. The flexibility to expand or contract this organization as situations dictate is designed without the need to conduct major organizational changes or a cumbersome transition into a different operational system during a spill response. For example, in a minor incident a single person may serve as the incident commander and perform all functions. In a major incident the command may consist of federal and state representatives, the responsible party, the on-scene coordinator, a staff and a group of sections and functional units.

It is important for those parties and agencies participating in ICS to understand that the key to its effectiveness is the acknowledgement that the Incident Commander (IC) is in command of an incident during its emergency phase and the On-Scene-Coordinator (OSC) is the person in charge of spill or release management and cleanup, and the section chiefs and functional unit leaders are in charge of their units or sections. As a rule sections should have a single individual in charge that has authority to make decisions and to give orders. Section chiefs should be selected based on experience and qualifications, not rank or seniority within their relative agency or organization.

6.7. Spill Response Action Plan

A Spill Response Action Plan has been developed for Port Orchard as part of this WHPP. The Action Plan outlines the procedures to be followed by various designated staff in the event a spill of contaminants occurs. It applies to both accidental and deliberate chemical spills. Chemicals today are routinely transported and can harm humans directly or indirectly by contaminating air and water resources. Contamination and spills can come from motor vehicles, trains, airplanes, boats or fixed containers, and can occur at any time without warning. The contaminant could be introduced at any point within the system, including raw water, treatment facilities, distribution system including water mains, finished water storage, and pump stations.

Port Orchard Spill Response Action Plan

Action Item	*Notes*
A. Initiation and Notification:	
1. Initiate this Action Plan (AP) if there is confirmed evidence that a spill has occurred near/in the vicinity of the water system: ▪ The preponderance of the evidence confirms that a chemical spill has occurred. ▪ Notified by operating or maintenance that a spill has occurred near water facilities ▪ There is information from public health officials and law enforcement agencies have been notified that a chemical spill has occurred. ▪ Specific information on the spill contaminant can be used in conjunction with other available information to narrow down the number/s of spill contaminant candidates.	*It may take several days to collect sufficient evidence to confirm a contamination incident, and the required time will depend on the type of information used for confirmation (some microbial analytical procedures may take several days).*
2. Notify Public Works Director or designated alternate immediately upon discovery of confirmed evidence of contamination (if not already notified).	*The individual who first becomes aware of the confirmed evidence should contact the Public Works Director (PWD) immediately by whatever means of communication may be available.*
3. Initiate full ERP activation.	*The PWD will decide whether to initiate the ERP on a partial or full basis. The PWD will also decide when and to what extent to activate the EOC.*
4. Initiate full activation of Emergency Operations Center (EOC).	
5. Engage other organization as needed (drinking water primacy agency, public health agency, response agencies, and law enforcement).	*Notification phone numbers can be obtained from the Organization Contact List. The PWD should make the notifications to the outside agencies.*
6. Perform internal and external notifications according to ERP.	
Equipment Identified:	*This equipment is available to assist in the execution of this AP.*

Equipment	Location

Port Orchard Spill Response Action Plan

Action Item	*Notes*
B. Assess the Problem: 1. Confirm the identity of the contaminant. 2. Confirm the time that the spill occurred and the size of the spill. 3. Perform a full characterization of the contaminated area, including contaminant properties, contaminant concentration profiles, and characteristics of the impacted area. 4. Evaluate the likely direction and extent of future movement of the contaminant within the area. 5. Evaluate all available information about the contamination incident. 6. Immediately implement the plan when the spill threatens human health or the environment.	*Effective implementation of response actions depends on positive identification of the contaminant and knowledge of contaminant properties, including public health protection strategies and selection of treatment technologies.* *If information from site characterization activities indicates that the contaminant impacts water quality in a certain manner (i.e., consumes free chlorine or imparts a certain odor to the water), the contaminant specific information may facilitate tentative identification of a contaminant and determine the analytical approach that should be used to positively identify the specific contaminant. Sources of contaminant information include:* *http://www.bt.cdc.gov/agent/agentlistchem.asp* *http://www.cdc.gov/atsdr/index.html* *http://www.waterisac.org/* *EPA Water Contaminant Information Tool (WCIT)*
C. Isolate and Fix the Problem: 1. Immediately keep the spill from entering sewer or storm drains, spreading off-site or affecting human health. Limit personal injury. **Stop, contain and clean up the chemical spill if**: a. The spilled chemical and its hazardous properties have been identified. b. The spill is small and easily contained. c. Responder is aware of the chemicals' hazardous properties. **If a spill or release cannot be controlled or injuries have occurred:** 1. Summon help or alert others of the release. 2. Evacuate immediate area and provide care to the injured – Call 911. 3. If potential fire or explosion hazards exist initiate evacuation procedures and Call 911. 4. Respond defensively to any uncontrolled spills: a. Use appropriate personal protective equipment when responding to any spill. b. Attempt to shut off the source of the release (if safe to do so). c. Eliminate sources of ignition (if safe to do so).	*The spill area can be estimated using hydraulic modes, consumer complaints, public health agency reports, water quality data, or other available information. The estimate may define additional locations where site characterization should be performed.*

Port Orchard Spill Response Action Plan

Action Item	*Notes*
d. Protect drains by use of adsorbent, booms or drain covers (if safe to do so). 5. Notify onsite emergency contact(s). 6. Notify other trained staff and or [emergency response contractor] to assist with the spill response and cleanup activities. 7. Coordinate response activities with local emergency personnel (South Kitsap Fire and Rescue). 8. Be prepared to provide information to fire department, EMT, hospital or physician. 9. Notify appropriate agency if a release has entered the environment.	
D. Spill Cleanup and Disposal: In the event of a hazardous substance are to be cleaned up properly the following must be performed: 1. Determine if the hazardous substance spill is a designated Washington State Dangerous Waste. 2. The designated onsite emergency contact, with the assistance of a waste disposal vendor approved by the City and other resources will determine the wastes status prior to disposal.	
E. Reporting a Release If a hazardous substance spill has been released to soil, surface water, drains or air the following notifications (within 24-hours) must be performed: ▪ Fire Department (any release that poses an immediate threat to human health, property or the environment). ▪ Department of Ecology (any release; notification within 24 hours). ▪ Health Department (any release). ▪ Puget Sound Clean Air Agency (release to air only). ▪ National Response Center (release of oil or fuel to surface water, or a release of a chemical with an established Reportable Quantity – RQ).	*Contact information will be attached to this Response Plan. When reporting a release prepare the following information (use spill report form):* ▪ *Your name and telephone number from where you're are calling* ▪ *Exact address of the release or threatened release* ▪ *Date, time, cause and type of incident (fire, air release, spill, etc.)* ▪ *Material and quantity of the release, to the extent known* ▪ *Current condition of the facility'* ▪ *Extent of injuries, if any* *Possible hazards to the public health and/or environment outside of the facility*

Port Orchard Spill Response Action Plan	
Action Item	***Notes***
F. Inventory Hazardous Substances: List the hazardous materials onsite and the following pertinent information: 1. Hazardous substance 2. Manufacturer 3. Quantity/unit of issue 4. Storage location	
G. Spill and Incident Report Forms: Attach Spill and Incident Report Forms to the document.	*The PWD should file an internal report for the City's records, and also provide information as requested to outside agencies.*

Notes:

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ROBINSON NOBLE

Technical Memorandum
City of Port Orchard
Wells 9, 10, and 11
Summary and Wellhead Protection Report
December 2011

Date: December 21, 2011

To: PACE Engineers
City of Port Orchard

From: Michael F. Piechowski, LHG

Subject: Wells 9, 10, and 11 Summary and Wellhead Protection Report

Attachments: Water Well Reports

Local Hydrogeology

The City of Port Orchard (City) is located on the south side of Sinclair Inlet in Kitsap County, Washington. The City's Wells 4, 6, 7, 8, 9, and 10 are located on the eastern side of Highway 16, within the Blackjack Creek drainage. The City's Well 11 and the McCormick Woods wells are located to the southwest of the City nearer Anderson Creek. Water Supply Bulletin No. 18 (WSB-18), *Water Resources and Geology of the Kitsap Peninsula and Certain Adjacent Islands* (1965), shows several streams, including Annapolis, Blackjack, and Anderson creeks, that derive base flow from springs emanating from a shallow aquifer (Upland Aquifer) that discharges to several drainages between 200 and 300 feet elevation at the north and west sides of the southern upland.

There are three principal aquifer systems in the area: the Shallow Aquifer, the Sea Level Aquifer, and the Deep Artesian Aquifer system. The Shallow Aquifer is found at elevations above 100 feet and is shown in well logs to be between 50 and 150 feet thick. It appears to consist of sand-and-gravel-filled valleys connected by sheets of sand and gravel. It is utilized by most domestic wells and the production wells for the Sunnyslope and McCormick Woods water systems. This is the aquifer that supplies McCormick Woods Wells 1, 2, and 3 and provides base flow to the many small streams running north into Sinclair Inlet and northwest into the Gorst Creek watershed. At Well 11, it was logged between 212 and 267 feet below ground surface (bgs).

Table 1. Selected Well Data for Port Orchard

Name	Depth (feet)	Elevations			Production Rate (gpm)	Aquifer & Thickness (feet)
		Wellhead (feet)	Static Water Level (feet)	Completion Interval (feet)		
Port Orchard						
Well 9	638	230	107	-245 to -402	500	DAA (157)
Well 10	1,074	14	48.46	- 855 to -1,055	1300	DAA(200)
Well 11	539	420	240	-78 to -119 *	na	SLA (40')
Well 11	950	420	217	-394 to -534	750	DAA (140)

* Observed water-bearing zone, well not completed in this zone.
SLA– Sea Level Aquifer
DAA – Deep artesian aquifer

The **Sea Level Aquifer** (SLA) is found between about 50 to 250 feet below sea level. Layers of gray clay and gray silt separate the Shallow Aquifer from the Sea Level Aquifer. Gray sand is logged at the depth of the Sea Level Aquifer in Well 10. However, it was silty, tight, and did not show any indication of water production capability. At Well 11, the Sea Level Aquifer is found between 78 and 119 feet below sea level and consists of tight, gray silty sand with wood chips.

The **Deep Artesian Aquifer System** (DAA) appears to have several layers in the Port Orchard area as shown by the completion elevations of wells listed in Table 1. Well 9 appears to be in an upper layer of the DAA with a completion elevation between 245 and 402 feet below sea level. The DAA at Well 10 was found from 855 to 1055 feet below sea level. The DAA at Well 11 is below a lower confining unit of gray silt and clay that is 258 feet thick from 119 to 377 feet below sea level. The Well 11 aquifer is found between 394 and 534 feet below sea level. There are production wells completed at the elevation of Well 10 owned by Westsound Utilities. There is also a 2,000-foot deep well located at the U.S. Navy's Bremerton shipyard on the north side of Sinclair Inlet suggesting the Deep Aquifer does exist under Sinclair Inlet to the north. The City's wells are all completed in the DAA.

Both the SLA and DAA exhibit confined aquifer characteristics and are impacted by barometric pressure changes. However, only the DAA is influenced by tide.

Well 9 Summary[1]

Well 9 was constructed as an additional point of withdrawal under the City's Well 8 water right certificate, G1-25019C. It is located in the City's Van Zee Park at the southwest corner of Sidney Avenue and Tremont Street. The 12-inch well was drilled in 2002 by Holt Drilling, Inc. to a depth of 638 feet (408 feet below sea level) and is completed in a fine sand aquifer between 455 and 629 feet below ground surface (bgs). This aquifer is part of the DAA.

After pumping for 24 hours at a rate of 480 gallons per minute (gpm), the drawdown in Well 9 was 79 feet below a static water level of 124 feet, indicating a specific capacity of 6 gpm per foot of drawdown (gpm/ft). The pumping water level did not stabilize within the 24-hour test period, but rather settled into a steady log-linear rate of drawdown, as is typical of a water well under pumping. The average transmissivity for the DAA at this location is approximately 8,000 gallons per day per foot of aquifer width (gpd/ft).

[1] Robinson & Noble, Inc., 2002, *Well 9 Construction and Testing Report, City of Port Orchard* as published for the City of Port Orchard

Laboratory analyses indicate all measured water quality parameters, except manganese, are in compliance with Washington State Department of Health requirements for potable water. The manganese test result exceeds the MCL of 0.05 mg/L with a value of 0.059 mg/L. Manganese is a secondary contaminant and is not a hazard to human health. The water has a slight odor of hydrogen sulfide and a temperature of 47 degrees Fahrenheit.

Well 9 is rated for continuous production at 500 gpm.

Well 10 Summary[2]

Well 10 was drilled in 2005 and 2006, by Boart Longyear, Inc., to a depth of 1,102 feet. Well 10 is located at 1778 Bay Street, across the street from Mitchell Point. Drilling of Well 10 identified a gray, coarse sand and gravel aquifer between 748 and 1,085 feet bgs. The well is completed with 200 feet of stainless-steel well screen placed between 869 and 1,068 feet bgs in the most productive part of the DAA at this location. The static water level elevation is about 34 feet above ground surface. Ground surface elevation is about 14 feet. The confined aquifer responds to barometric and tidal changes.

Well 10 was tested at a pumping rate of 1,223 gpm for 24 hours, resulting in 77 feet of drawdown and a specific capacity of 15.9 gpm/ft of drawdown. Aquifer transmissivity, calculated from the pumping rate and change in slope of the drawdown and recovery curves from the 24-hour test, averages 34,000 gpd/ft at Well 10.

Water quality from Well 10 is very good, and all parameters tested meet drinking water standards. The water has a slight hydrogen sulfide odor and a temperature of 53 degrees Fahrenheit.

Well 10 is rated at a continuous free-flow of 500 gpm and is capable of increased production if a pump is installed.

Well 11 Summary[3]

The City's Well 11 is located on the upland south of Sinclair Inlet and west of the City in the McCormick Woods development. The southern upland is characterized by gently rolling hills at elevations between 300 and 450 feet. Ground surface elevation at the well site is about 420 feet. Well 11 was drilled to a depth of 1,080 feet by Charon Drilling. Work started in 2009 and was completed in early 2011

Drilling of Well 11 identified a gray, coarse sand and gravel aquifer between 797 and 956 feet bgs. The well is completed with 140 feet of stainless-steel well screen placed between 813 and 953 feet bgs in the most productive part of the DAA at this location. The static water level elevation is about 217 feet. The confined aquifer responds to barometric and possibly tidal change in Sinclair Inlet.

Well 11 was tested at a pumping rate of 1,000 gpm for 21.5 hours, resulting in 133 feet of drawdown and a specific capacity of 7.5 gpm/ft of drawdown. Aquifer transmissivity, as calculated from the pumping rate and change in slope of the drawdown and recovery curves from the 24-hour test, ranges from 6,600 to 11,000 gpd/ft.

Water quality is very good, and all parameters tested meet drinking water standards. The water is sand free, has a noticeable hydrogen sulfide odor, and a temperature of 48 degrees Fahrenheit.

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[2] Robinson, Noble & Saltbush, Inc., 2006, *City of Port Orchard Well 10 Construction and Testing Report* as published for the City of Port Orchard

[3] Robinson Noble, Inc., 2011, *City of Port Orchard Well 11 Construction and Testing Report* as published for the City of Port Orchard

Well 11 is rated at a continuous pumping rate of 750 gpm.

Modeling Summary

Wellhead protection areas were delineated for each of the City's wells by using an analytical model set up specifically for each well. Modeling used data gathered during well drilling and testing as well as the information used in previous wellhead protection area delineations[4,5]. Calculations of the time-of-travel (TOT) zones were completed in AquiferWin32 3. As an analytical model, computation relies on several basic inputs: aquifer gradient, aquifer hydraulic conductivity, aquifer thickness, and pumping rate.

Gradient influences shape and direction of the capture zone. With a planar gradient, the width and length of a capture zone partially results from the steepness or shallowness of the gradient slope and the direction of a capture zone is due to the direction of the gradient. Steeper gradients make capture zones narrower while shallower gradients make capture zones wider. A zero gradient (flat surface) would create circular capture zones. As applied to the DAA, the model uses a planar gradient as a starting point for each well, though the direction angle and slope were adjusted as appropriate.

Hydraulic conductivity influences the size of the capture zone. Width increases as hydraulic conductivity decreases, because drawdown increases. While in reality hydraulic conductivity is variable in most aquifers, in the model it was set to be homogeneous and isotropic. This is a limitation of this particular modeling code.

Thickness has a similar influence, as a thicker aquifer will transmit more water than a thinner aquifer if both have the same hydraulic conductivity. As aquifer thickness increases, the capture zone width decreases. Similar to hydraulic conductivity, the aquifer thickness is constant for the entire modeled domain. As applied to the DAA, the model uses the measured aquifer thickness and hydraulic conductivity specific to each well location.

Pumping rate also heavily influences the capture zone width (by increasing the drawdown), but only alters the length for relatively short pumping periods, such as the six-month and one-year TOT zones. As applied to the DAA model used, pumping rates were determined through an analysis of the water right for each well. For the six-month capture zones, the instantaneous withdrawal amounts (Qi) were used. For the other capture zones, the annual withdrawal limits (Qa) were used to determine modeled production rates.

Data used for each of the modeled wells is included in the following table. For modeling, all length units and measurements were converted to meters to facilitate integration into GIS. All time units were expressed in days. Due to the differences in aquifer parameters and model characteristics at each well, only one well was pumped at a time. Each well was modeled with four sets of runs to account for uncertainties in aquifer parameters as well as the differences in short-term and long-term production rates.

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[4] AGI Technologies, 1997, *City of Port Orchard Wellhead Protection Investigation* as published for the City of Port Orchard, Washington

[5] Camp, Dresser & McKee, 2000, *City of Port Orchard McCormick Woods Wellhead Protection Program* as published for the City of Port Orchard

Table 2. Port Orchard Well Data Used in 2011 Wellhead Protection Area Models

Well No.	Well Diameter (m)	Aquifer Thickness (m)	Hydraulic Conductivity (m/d)	Short Term Production Rate (m^3/day)	Long Term Production Rate (m^3/day)	Gradient	Gradient Direction (degrees clockwise from east)
4	0.203	32.31	6.92	273	273	0.008	75
6	0.254	45.72	8.15	1,908	763	0.008	75
7	0.305	45.72	8.15	4,088	3,271	0.008	75
8	0.305	24.38	7.13	1,363	632	0.008	75
9	0.203	53.03	1.87	2,726	1,265	0.008	75
10	0.254	60.96	6.93	2,726	2,726	0.015	90
11	0.203	48.77	1.68	4,088	2,338	0.016	90

The differences between each of the model runs completed for each well are described below.

Run one

- Hydraulic conductivity set at half the value in Table 2
- Production rate set at six-month rate
- Gradient set at the Table 2 value
- Time of travel set at six months

Run two

- Hydraulic conductivity set at half the value in Table 2
- Production rate set at long-term rate
- Gradient set at the Table 2 value
- Time of travel set at 1, 5, and 10 years

Run three

- Hydraulic conductivity set at twice the value in Table 2
- Production rate set at long-term rate
- Gradient set at the Table 2 value plus 5 degrees
- Time of travel set at 6 months and 1, 5, and 10 years

Run four

- Hydraulic conductivity set at twice the value in Table 2
- Production rate set at long-term rate
- Gradient set at the Table 2 value minus 5 degrees
- Time of travel set at 6 months and 1, 5, and 10 years

Once each model run calculated drawdown, a set of modeled particles around each well were traced backward in time by the modeling software to determine the time-of-travel zones. Particle traces were traced at four specific time intervals: 6 months and 1, 5, and 10 years. When complete, the particle traces generated were exported and combined using GIS to delineate the wellhead protection areas (WHPA). Each WHPA represents the composite of the four sets of particle traces, which together determine the proper width and breadth of the wellhead protection areas.

and any attachments to it, is for the exclusive use of the City of Port Orchard and PACE Engineers. Unless specifically stated in the document, no warranty, expressed or implied, is made.

Appendix J

Cross Connection Control Program

City of Port Orchard Municipal Code

Chapter 13.04
WATER AND SEWERS

13.04.100 Cross connections.
The installation or maintenance of any cross connection which would endanger the water supply of the city of Port Orchard is prohibited. Such cross connections are declared to be a public health hazard and shall be abated.

The control or elimination of cross connections shall be in accordance with WAC 246-290-490. The policies, procedures and criteria for determining appropriate levels of protection shall be in accordance with the Accepted Procedure and Practice in Cross Connection Control Manual – Pacific Northwest Section – American Water Works Association, Fourth Edition, or any superseding edition.

It shall be the responsibility of the city to protect the potable water system from contamination or pollution due to cross connections. Water service to any premises shall be contingent upon the customer providing cross connection control in a manner approved by the city engineer. Backflow prevention assemblies required to be installed shall be a model approved by the Kitsap County health department.

The city engineer, or his designated representative with proper identification, shall have free access at reasonable hours of the day to all parts of the premises or within the building to which the water is supplied. Water service may be refused or terminated to any premises for failure to allow necessary inspections. (Ord. 027-11 § 8; Ord. 1897 § 12, 2003; Ord. 1799 § 12, 2000).