City of Sumner

General Water Plan Update

August 2020

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ACKNOWLEDGEMENTS

The General Water Plan Update was developed under the direct supervision of Chris Kelsey, P.E. of BHC Consultants, LLC.

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List of Abbreviations

AC	Asbestos Concrete
ac-ft	Acre-Foot
ADD	Average Daily Demand
AG	Approved Air Gap
ATS	Automatic Transfer Switch
AVB	Atmospheric Vacuum Breaker
AWWA	American Water Works Association
BATs	Backflow Assembly Testers
BPS	Booster Pump Station
CBD	Central Business District
CCCS	Cross Connection Control Specialist
ccf	Charge per Hundred Cubic Feet
CCR	Consumer Confidence Report
CCCS	Cross Connection Control Specialist
CERB	Community Economic Revitalization Board
CIP	Capital Improvement Plan
City	City of Sumner
CTI	City Transfer Incorporated
CUGA	Comprehensive Urban Growth Area
CWSP	Coordinated Water System Plan
D/DBPR	Disinfectants and Disinfection By-Products Rules
DCDA	Double-Check Detector Backflow Prevention Assembly
DCVA	Double Check Valve Assembly
DOE	Washington State Department of Ecology
DOH	Washington State Department of Health
DS	Dead Storage
DSL	Distribution System Leakage
DWSRF	Drinking Water State Revolving Fund
EC	Employment Center
EPA	Environmental Protection Agency
ERUs	Equivalent Residential Units
ES	Equalizing Storage
FEMA	Federal Emergency Management Agency
FSS	Fire Suppression Storage
ft	Foot/Feet
GC	General Commercial
gpd	Gallons per Day
gpcd	Gallons per Capita Day
gpm	Gallons per Minute

GWI	Groundwater Under the Influence of Surface Water
GWR	Groundwater Rule
HDR	High Density Residential
IC	Interchange Commercial
ICS	Incident Command System
IDSE	Initial Distribution System Evaluation
IESWTR	Interim Enhanced Surface Water Treatment Rule
IGEA	Investment-Grade Efficiency Audit
in	Inch(es)
LCR	Lead and Copper Rule
LTGO	Limited-Tax General Obligation
LUV	Land Use Vision
MCL	Maximum Contaminant Limits
MCLG	Maximum Contaminant Level Goals
MDD	Maximum Daily Demand
mg	Million Gallons
mgd	Million Gallons per Day
MIC	Manufacturing/Industrial Center
MHI	Median Household Income
MRDL	Maximum Residual Disinfectant Level
MRDLG	Maximum Residual Disinfectant Level Goal
MUD	Mixed Use Development
MWL	Municipal Water Law
NC	Neighborhood Commercial
NDWAC	National Drinking Water Advisory Council
NFPA	National Fire Protection Association
O&M	Operations and Maintenance
OCPI	Overriding Considerations of Public Interest
OPCC	Opinion of Probable Construction Cost
OPPC	Opinion of Probable Project Cost
OS	Operational Storage
PFAs	Per- and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctyl Sulfonate
PHD	Peak Hour Demand
PI	Public Institutional
psi	Pound-force per Square Inch
PSRC	Puget Sound Regional Council
ppt	Parts per Trillion
PVB	Pressure Vacuum Breaker
PWTF	Public Works Trust Fund

RCW	Revised Code of Washington
RLDWA	Reduction of Lead in Drinking Water Act
RPBA	Reduced Pressure Principal Backflow-Prevention Assembly
RPDA	Reduced-Pressure Principal Detector Backflow Prevention Assembly
RP/RPR	Resource Protection
rpm	Revolutions per Minute
RTCR	Revised Total Coliform Rule
SB	Standby Storage
SACDA	Supervisory Control and Data Acquisition
SDC	System Development Charges
SDWA	Safe Drinking Water Act
SMC	Sumner Municipal Code
SWTR	Surface Water Treatment Rule
TCR	Total Coliform Rule
TNTC	Too Numerous To Count
TPCBH	Tacoma Pierce County Board of Health
TPCHD	Tacoma Pierce County Health Department
UCMR3	Unregulated Contaminant Monitoring Rule
UGA	Urban Growth Area
USGS	United States Geological Survey
VFD	Variable Frequency Drives
VOC	Volatile Organic Content
WAC	Washington Administrative Code
WAWARN	Water/Wastewater Agency Response Network
WDMs	Water Distribution Managers
WDS	Water Distribution Specialist
WISHA	Washington Industrial Safety and Health Act
WLCAP	Water Loss Control Action Plan
WPA	Works Project Administration
WRIA	Water Resource Inventory Area
WSDM	Water System Design Manual
WSP	Water System Plan
WSRP	Water Shortage Response Plan
WUE	Water Use Efficiency
WTPO	Wastewater Treatment Plant Operator
WWTP	Wastewater Treatment Plant

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ES Executive Summary

The 2018 Sumner Water System Plan has been developed in compliance with the requirements set forth by the Washington State Department of Health (DOH), including the applicable Washington Administrative Code (WAC) 246-290 Sections and the Municipal Water Law of 2003. This summary is intended to provide a brief description of the key elements discussed in the Plan.

ES.1 Service Area

The Sumner water utility service area is situated in the Puyallup/White River basin and is adjoined by the water service areas of the City of Bonney Lake, Mountain View-Edgewood, the City of Puyallup, Valley Water District, the City of Auburn, Tacoma Water, and the City of Pacific. The Sumner water system has interties with both the Pacific and Puyallup water systems. These interties are for use during emergencies only and do not provide additional water for daily demands. The future Sumner water service area, which is discussed in Section 1.2, is consistent with the Pierce County Coordinated Water System Plan and is located entirely within the Urban Growth Area Boundary established by Pierce County.

ES.2 Water System Inventory

Sumner's water system infrastructure consists of approximately 90 miles of transmission mains ranging from 2-inch diameter to 18-inch diameter. The City currently has the rights to utilize up to eight potable water sources, including four springs (Sumner Springs, County Springs, Weber Springs, and Elhi Springs) and four wells (South Well, Central Well, Dieringer Well, and West Well). The physical capacities of the City's potable water sources are presented as Table ES-1.

Table ES-1
Sumner Potable Water Sources

DOH ID Number	Source Name	Source Type	Source Capacity (mgd)	Water Right (mgd)
SO 1	Sumner Springs	Free-Flowing Spring	1.15[1]	4.04
SO 2	Weber Springs	Free-Flowing Spring	Flow and water rights are combined with Sumner Springs and County Springs.	
SO 3	Elhi Springs	Free-Flowing Spring	0.13[2]	0.52
SO 4	County Springs	Free-Flowing Spring	0.79[1]	1.15
SO 5[4]	West Well	Artesian Well	0.36[3]	0.36
SO 6	South Well	Artesian Well	1.01[3]	1.44[5]
SO 7	Dieringer Well	Artesian Well	0.36[3]	0.14
SO-CW	Central Well	Artesian Well	1.51[3]	0.43/1.51[6]

Notes:
1) Source capacity based on historic station meter readings.
2) Source capacity based on City records; Elhi Springs is typically not being utilized.
3) Source capacity based on well pump capacity.
4) The West Well is currently utilized primarily for irrigation.
5) Source pumping capacity is less than the City's Water Rights.
6) The City obtained a Temporary Water Right to use the Central Well as an additional point of withdrawal for the South and West Well water rights. Combined instantaneous withdrawal from the Central, South, and West Wells is not to exceed 1.8 mgd.

The City's water system currently has a physical source capacity of approximately 5.31 mgd and a storage capacity of approximately 5.40 million gallons.

ES.3 Demand Projections

Water demand projections were developed based on historic water usage per resident and employee and the projected population growth within the water service area during the 6-year, 10-year, and 20-year planning periods. Population growth within the City's water service area is projected to increase based on information provided by the Puget Sound Regional Council (PSRC) as described in Section 3.2 of this Plan.

Using water consumption records from 2014 to 2017, the City's single family residential usage rate was estimated to be 189.6 gpd resulting in a total of 8,774 existing Equivalent Residential Units (ERUs). Consumption records from 2015 to 2017 indicate per capita usage rates of 72.73 gpd/resident and 25.28 gpd/employee for the City's main water system. These values were used to develop the City's water demand projections, provided as Table ES-2. Meeting water use efficiency goals are assumed within this table, though Chapter 3 also projects demands without reducing system losses.

Table ES-2
Water Demand Projections

Year	Residential Population	Employees	Irrigation[1] (gpd)	Unclassified Consumption[2] (gpd)	DSL[3] (gpd)	ADD (mgd)	MDD (mgd)
2015	9,584	14,303	238,999	36,134	263,214	1.69	3.32
2016	10,805	15,745	254,450	23,226	328,254	1.72	3.02
2017	10,925	17,332	227,172	22,740	196,780	1.70	3.29
2018	11,044	16,563	229,443	26,334	268,299	1.77	3.36
2024	11,793	17,792	258,390	29,657	188,608	1.81	3.52
2028	12,321	18,150	268,882	32,102	183,988	1.87	3.64
2038	13,343	19,269	268,882	38,522	196,102	1.99	3.89

Notes:
1) Assuming irrigation growth per year reduces from 2 percent per year between 2018 and 2024, to 1 percent per year between 2025 and 2028, to 0 percent per year beyond 2029.
2) Assuming a 2 percent per year Unclassified Consumption Growth Rate.
3) Assumes DSL reduces from the current 3-year average of 15 percent to the WLCAP goal of 10 percent by 2025.

The Sumner water system has a current operational source capacity of approximately 3.59 mgd, defined in Chapter 5 as operational Scenario A. Based on water demand projections, the instantaneous capacity of the existing City sources may be insufficient to meet the projected maximum day demand by the year 2028 if the City does not receive approval of the additional water rights for the Central Well to allow for the increased source capacity of 1.01 mgd of operational Scenario B.

ES.4 Water Resources

The Sumner potable water sources have a combined instantaneous water right of approximately 7.94 mgd, including rights for Weber Springs No. 1 and No. 2 and including a combined 1.8 mgd for the Central, South, and West Wells as allowed under the current temporary water right.

ES.5 Water Quality

The City's sources produce very high-quality water and conformance with water quality rules and regulations is generally not an issue. Water quality regulations recently implemented, or currently under development, that will likely be applicable to the City of Sumner are summarized as follows:

- Lead and Copper Rule: The EPA proposed changes to the existing Safe Drinking Water Act (SDWA) regulations. These changes include modifying the definition of lead free plumbing products to conform to the statute enacted by Congress that prohibits a lead content level above 0.25%, as well as labeling requirements that allow users of these products to identify plumbing devises that meet the new "lead free" definition. Manufacturers also must certify that they are meeting these new requirements. If these changes are enacted, modifications to the City's Development Standards may be required for new construction.
- Perchlorate: The EPA has determined that perchlorate meets the SDWA criteria for regulation as a contaminant; the rulemaking process is in the peer review period for establishing a MCLG for perchlorate. When established, the City will be required to include perchlorate into their source water testing.
- Per- and Polyfluoroalkyl Substances (PFAs): The Washington State Board of Health began a rulemaking process for PFAs regulation in late 2017, which is expected to be a two-year process. If and when PFAs regulation is promulgated, the City will be required to test their source water and treat to below established MCLs. The City should actively be surveying local industry and fire department activities to identify and implement appropriate means of source control.

ES.6 Capital Improvement Plan (CIP)

The CIP presented in this plan includes approximately $24.4 million in capital improvements (2018 dollars) over the next 10 years tied to the City's distribution system, sources of supply and storage facilities, and operations and maintenance of the water system. Capital improvements in each of these categories are classified as either existing infrastructure deficiencies or as improvements needed to accommodate projected growth. The CIP is presented in the plan as Table 8-1 and provides a comprehensive capital improvement list, including opinions of probable construction cost (OPCCs) and implementation schedule.

ES.7 Financial Review

The water utility fund revenues expected during the 10-year planning period were estimated based on the City's actual budget for 2019-2020. The biennial revenues were increased by 1.0 percent annually to account for City water customer base growth and expenses were increased annually by 3.0 percent for inflation. Based on the existing and projected financial data, it appears that the existing monthly fees and system development charges (SDC) will be insufficient to cover both the existing expenditures and the future expenditures proposed in the Capital Improvement Plan. Future fund revenues will continue to be increased through a combination of monthly fee/SDC increases and low interest loans.

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Chapter 1 Service Area

1.1 Location and Boundaries

The City of Sumner (City) is located within north Pierce County approximately 10 miles east of the City of Tacoma (see Figure 1-1). The City was settled in 1853, platted in 1883, and incorporated in 1891. The City is bounded by the City of Puyallup to the southwest, the City of Edgewood to the west, the City of Pacific to the north, the City of Auburn to the northeast, and rural, suburban, and agricultural areas of unincorporated Pierce County to the east and south. The City lays generally north east of the confluence of the White and Puyallup Rivers, with an industrial area located north west of the White River. The City contains residential, industrial, and commercial areas.

The Sumner Retail Water Service Area is situated in the Puyallup/White River basin which also includes the water service areas for the Cities of Bonney Lake, Edgewood, Puyallup, Auburn, and Pacific, as well as Tacoma Water, the Mountain View/Edgewood Water Company, and the Valley Water District. Figure 1-2 illustrates the proposed Sumner Retail Water Service Area with adjacent water purveyors service area boundaries.

The Sumner Retail Water Service Area covers approximately 4,804 acres inside the City limits and 1,543 acres outside the City limits. This is consistent with the Pierce County Coordinated Water System Plan. The City identifies the area south of SR-410 and east of SR-162 as a joint planning area with Pierce County, although the area is not included in Sumner's future service area.

The Sumner water utility service area and existing water distribution infrastructure is shown in Figure 1-3.

1.2 Adjacent Water Purveyors

East of the Sumner water service area, the City of Bonney Lake supplies water to approximately 13,253 (2014) accounts with a total service area of approximately 26 square miles. According to the Draft City of Bonney Lake Water System Plan (2016), the City of Bonney Lake's water service area was estimated to have 16,879 Equivalent Residential Units (ERUs) in year 2014. There are no interties with Sumner due to the difference in pressure zones and separation by steep hillside. An area near the northern limits of the Sumner water service area is served by Bonney Lake, as allowed per the Lakeland Hills Development Water Service Agreement. An intertie could be made in this area due to close proximity of the systems, but no formal action has been taken. This area is currently served by Sumner Sewer.

West of Sumner's service area, the Mountain View-Edgewood Water Company supplies approximately 3,100 (2017) services. Land use in the Mountain View-Edgewood Water Company is primarily residential and agricultural. Mountain View-Edgewood Water Company maintains 2.2 million gallons (mg) of reservoir storage (2013). There are no interties between the City of Sumner system and the Mountain View-Edgewood system. However, a signed service area agreement contains provisions for a possible future emergency intertie. This agreement is provided in Appendix A. Sumner provides water service to several parcels located within the City of Edgewood where it is geographically infeasible for Mountain View-Edgewood to provide service.

Southwest of the City's service area, the City of Puyallup supplies water to approximately 36,000 people within the City and its Urban Growth Area (UGA) (2015). There are two interties between the City of Sumner and the City of Puyallup water systems. The first intertie is west of the Great Northern Pacific Railroad on Main Street in Sumner, and the second intertie is at the intersection of North and Railroad Streets. The water main on which the interties are located conveys water from the Puyallup Salmon Springs, which are at a lower elevation than the Sumner sources. Therefore, under normal conditions, water can only flow out of the Sumner system.

South of the Sumner service area, the Valley Water District supplies water to approximately 754 services in an area of approximately 2,673 acres. There are no interties with Sumner. However, interties with Sumner could occur at two locations. The first location is just south of the Puyallup River Bridge on Valley Avenue. The second location is across the Puyallup River Bridge on Annis Bowman Road. Both interties could provide a beneficial emergency supply for either system for which service area agreements will need to be negotiated.

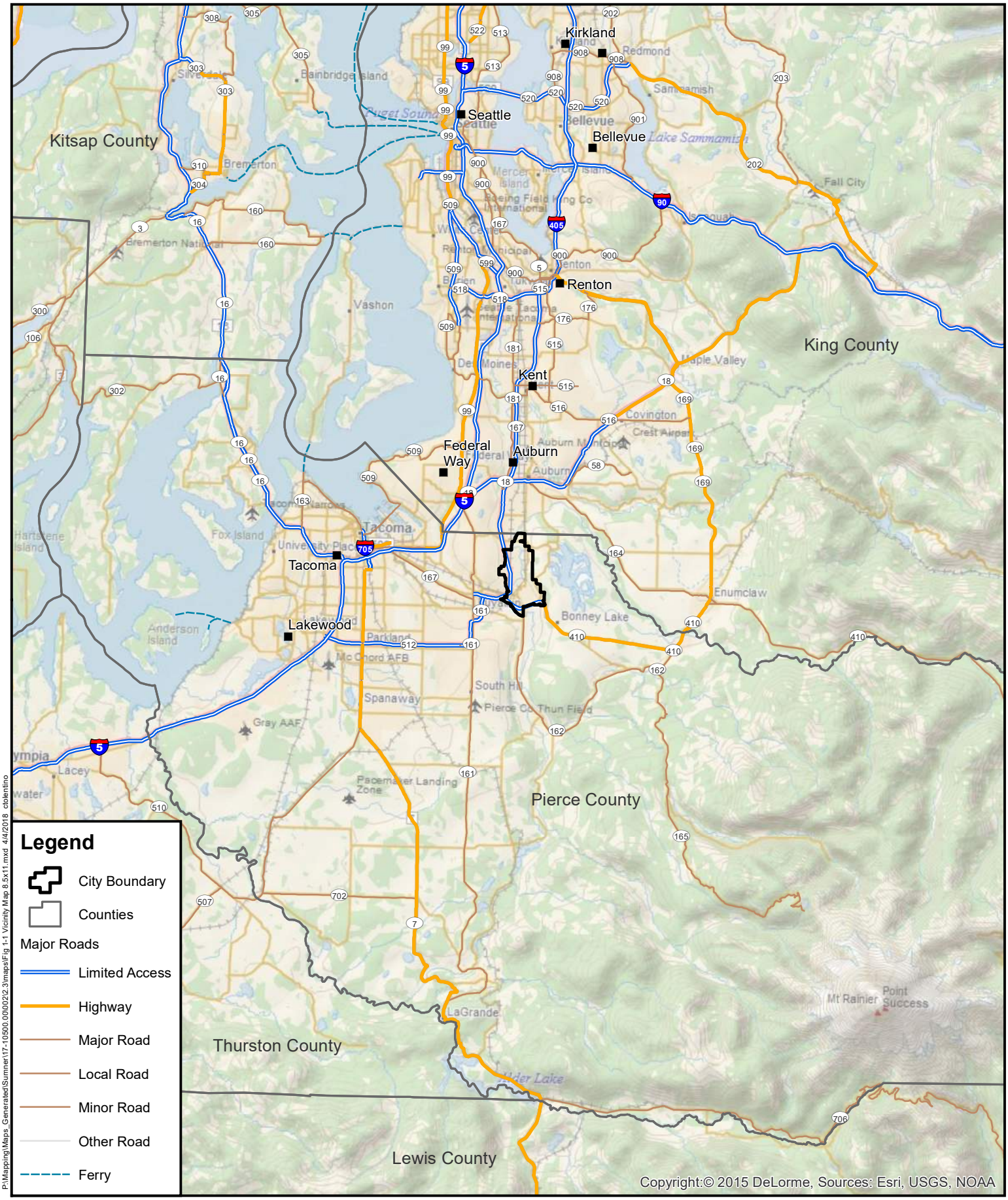
Also to the south, Tacoma Water serves an area of approximately 75,000 acres adjacent to the City's service area. Currently, there are no interties with Tacoma Water.

The City of Pacific water service area borders Sumner's service area to the north. Due to the acquisition of the Fowler Mutual Water Company and the Webstone Water District, there are currently two interties between Sumner and Pacific. The first intertie is located at 16th Street East and 136th Avenue East, and the second intertie is located on 8th Street East at the boundary between Sumner/Pacific City limits. A capital improvement project added an extension of the water infrastructure under the White River via a directional drill; therefore, eliminating the need to "wheel" water through Pacific's water system to a few isolated services north of 8th Street East / Stewart Road.

The City of Sumner took over the spring supply, water rights, and water customers for the Fowler Mutual Water Company, which are located in northwest Sumner. Additionally, in coordination with the City of Pacific, the City of Sumner assumed customers and infrastructure of the Webstone Water District, which used to border the Sumner water service boundary on the northwest. The cities have entered into a Memorandum of Agreement, with the City of Sumner acquiring the Webstone service area outside of Pacific City limits. A copy of this agreement is located in Appendix A.

The City of Auburn abuts the Sumner service area on the northeast. Potential interties could occur along East Valley Highway at the Auburn/Sumner City limits.

The Log Cabin System is located between East Valley Highway and the eastern border of the Sumner City limits. This water system is identified as a Group A water system by the Department of Health (DOH). Currently there are no interties with Sumner.



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GIS Data: City of Sumner & Pierce County.
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CITY OF SUMNER WASHINGTON

Vicinity Map

Water Comprehensive Plan
City of Sumner

Figure
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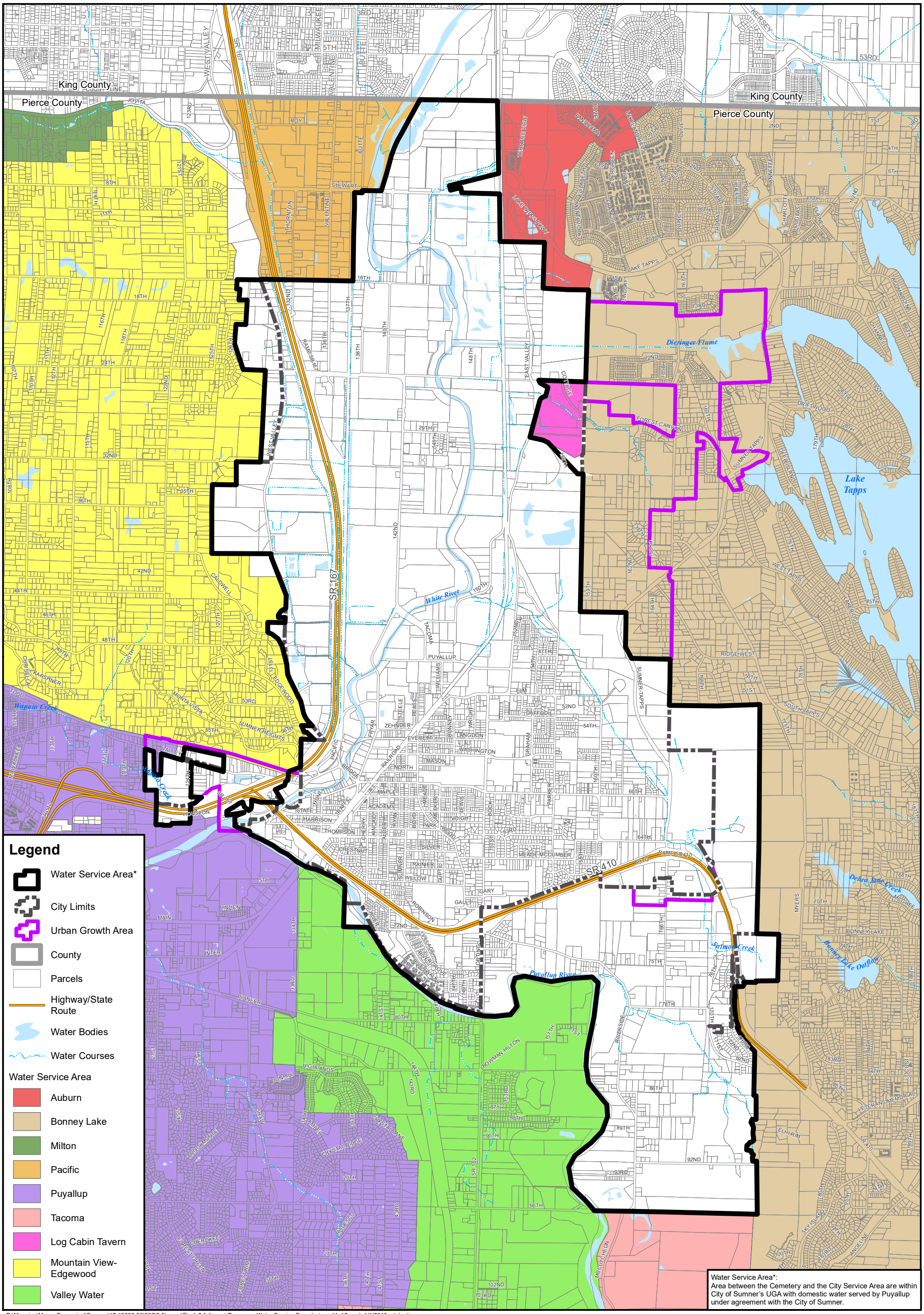

P:\Mapping\Maps_Generated\Sumner\17-10500.00\002\2.3\maps\Fig 1-2 Adjacent Purveyors Water Service Boundaries - 11x17.mxd 4/4/2018 ctolentino

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GIS Base: City of Sumner & Pierce County
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CITY OF SUMNER WASHINGTON

Adjacent Purveyors Water Service Area Boundaries

Water Comprehensive Plan
City of Sumner

Figure
1-2

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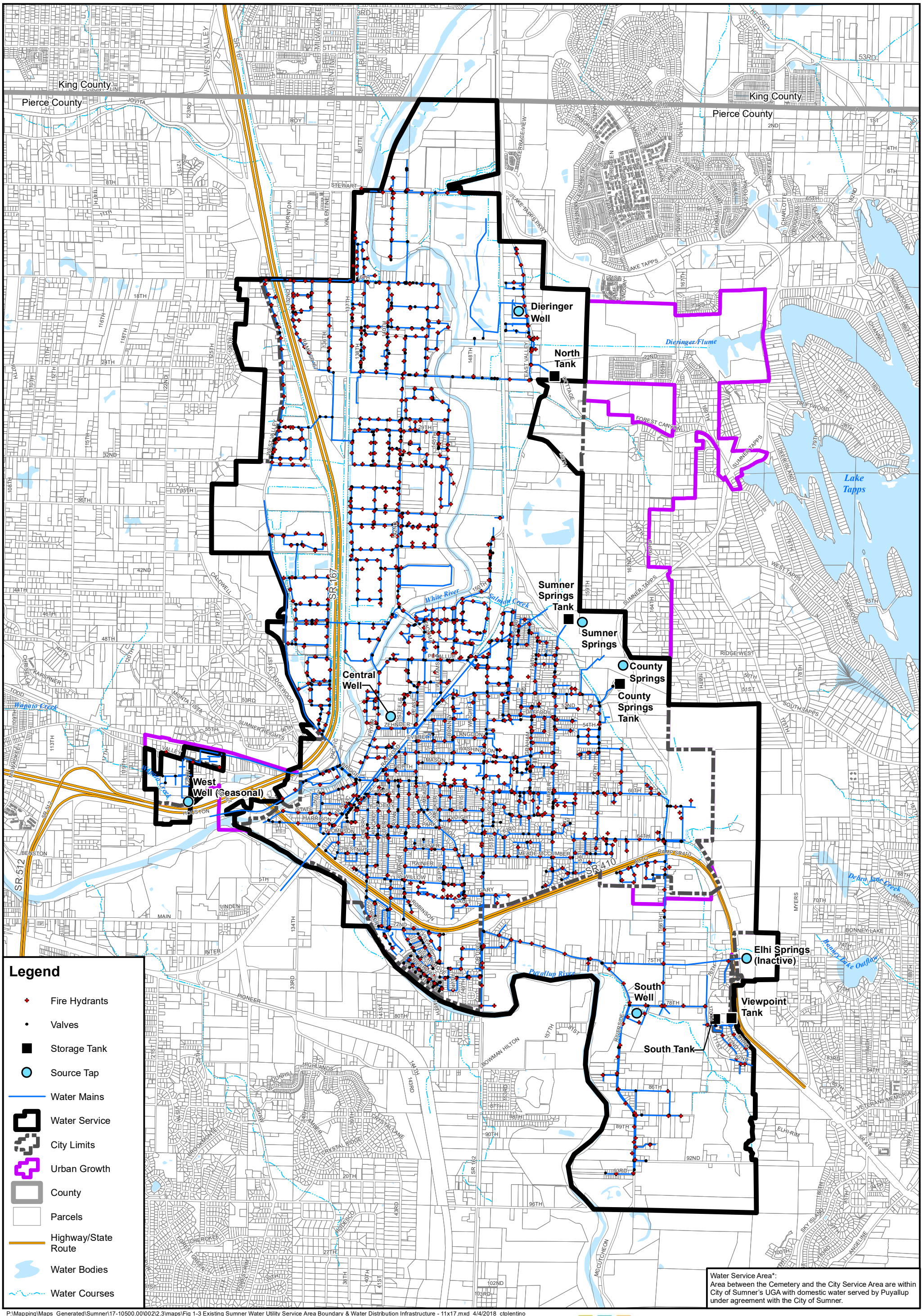

P:\Mapping\Maps_Generated\Sumner\17-10500.00\002\2.3\maps\Fig 1-3 Existing Sumner Water Utility Service Area Boundary & Water Distribution Infrastructure - 11x17.mxd 4/4/2018 ctolentino

GIS Base: City of Sumner & Pierce County
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Existing Sumner Water Utility Service Area Boundary & Water Distribution Infrastructure

Water Comprehensive Plan
City of Sumner

Figure 1-3

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1.3 Service Area Characteristics

1.3.1 Climate

The climate in the Sumner area is typical for the eastern side of Puget Sound, with temperature and weather patterns moderated by the Pacific Ocean and Olympic Mountains. Mild winters with highs in the upper 40s and lows in the mid-30s (Fahrenheit) are typical. Temperatures below freezing rarely occur for periods of more than a few days. The valley is usually frost-free from March 11 to November 18.

Average annual precipitation in Sumner is approximately 42 inches. Most precipitation falls as steady rain; snow is rare. Storms in the Sumner area last an average of 20 hours, with a rainfall intensity of 0.024 inches per hour creating 0.48 inches of precipitation. The average interval between storms is about 100 hours.

1.3.2 Topography

The City of Sumner lies in a broad valley with slopes ranging from 0 to 5 percent. The shallow slopes break abruptly at the east and west sides of the valley, where hills extend from the valley floor with slopes ranging from 20 to 70 percent. Hillsides are primarily undeveloped and forested, although some of the forest is cleared for gravel mining. The elevation of the valley ranges from 40 to 90 feet above sea level. The highest point in the Water Service Area is slightly above 295 feet.

1.3.3 Soil Conditions

Two geologic depositional processes are responsible for soil characteristics in the planning area. Most of the soil in the valley is comprised of alluvial deposits from the White and Puyallup Rivers. Mudflows from past Mount Rainier eruptions account for a smaller portion of the soils. The hillsides are mostly glacial till deposited during the retreat of the last ice age 12,000 years ago.

Infiltration capacities of the valley soils vary based on the amount of fine silts and clays in the top layers. Overall, the soils in the valley infiltrate poorly, particularly in the northern half of the study area. Hillside soils infiltrate readily and erode very easily due to their sand content and location on steep slopes.

1.3.4 Land Use

The City of Sumner has transitioned from what was once largely an agricultural-based community to a mixed community of commerce, industry, and agriculture with various types and densities of housing. Sumner has a strong employment base with a higher concentration of manufacturing jobs per capita than Pierce County overall. On February 25, 2016, the Puget Sound Regional Council (PSRC) conditionally approved a joint application from the cities of Sumner and Pacific to designate 2,100 acres for a regional manufacturing/industrial center (MIC). Most of this land is within Sumner's service area boundary. The City of Pacific's portion of the industrial center is adjacent to the City to the north. The MIC anticipates an employment population of 20,000 jobs by 2040. Other notable land use changes that have occurred since the 2009 update to this plan include Urban Growth Area (UGA) boundary amendments that expanded Sumner's UGA to the south by approximately 188-acres and reduced the UGA by about 250-acres on east hill around the Sumner-Tapps Highway E.

Sumner's population density is greatest within the City limits; however, there are some large neighborhoods in unincorporated areas east and south of the City. Just to the north of the City center are some light industrial complexes, such as Golden State Foods Industrial Bakery, Shining Ocean, Western Wood Preserving and distribution warehouses for REI, Costco, and Amazon.

Except for the few large neighborhoods east and south of the City, most of the land outside City limits is rural with agriculture, single family homes concentrated along main roads, storage lots, hobby farms, turf farms, trucking, and other businesses requiring large storage yards. A portion of the City of Pacific's industrial center is adjacent to the northern extents of the City. Hillside residences are generally confined to the tops and bases of the hills where the land is more suitable for development.

The Alderton-McMillin Neighborhood is located south of Sumner, between Puyallup and Bonney Lake. The Pierce County Comprehensive Plan adopted a Plan for this neighborhood in 2007 to maintain a rural environment through large lot zone classifications.

1.3.5 Land Use, Zoning, and Service Area

The Pierce County Comprehensive Plan, first adopted in 1994, established two types of boundaries; the Comprehensive Urban Growth Boundary (CUGA) and Urban Growth Areas (UGAs) also referred to as Urban Service Areas (USAs). UGAs are areas proposed by cities where urban growth and urban services will occur. They are anticipated to change over time as cities grow. The City of Sumner UGA was established in 1997 in cooperation with Pierce County and the surrounding cities

The Land Use Element of the City of Sumner Comprehensive Plan was developed in accordance with the Growth Management Act to address land use within the City. The Sumner Land Use chapter conforms to countywide planning policies and the PSRC Vision 2040 Plan. Comprehensive Plans are the roadmap for future development. The Land Use Element map designates future land use categories to determine appropriate zoning districts.

Around forty-seven percent of land within City limits and UGA is zoned for low to medium density residential development. A large block of land, approximately 1,834 acres, representing about forty-four percent of Sumner's developable land has been designated for the regional manufacturing/industrial center (MIC). It is zoned for light industrial uses. Zoning districts for the remaining land based on the City and Pierce County zoning (within Sumner's UGA) are:

- High Density Residential (HDR) 104-acres
- Central Business District (CBD) 23-acres
- General Commercial (GC) 197-acres
- Neighborhood Commercial (NC) 51-acres
- Interchange Commercial (IC) 9-acres
- Mixed Use Development (MUD) 17-acres
- Heavy Industrial 38-acres
- Resource Protection (RP/RPR) 21-acres
- Public Institutional (PI) 9-acres
- Employment Center (EC) 8-acres

Figure 1-4 shows the Comprehensive Plan Map. Many of the existing agricultural uses in the north end of the City were recently converted to light industrial/commercial uses. Figure 1-5 shows the Zoning Map.

Almost all of Sumner City limits is within the Retail Water Service Area, with the exception of a 14-acre parcel along the E. Valley Highway in the vicinity of Forest Canyon Road E that is served by a Log Cabin, a Group A system. Current use on the parcel is a pub and eatery. A portion of the Sumner water service area is located within unincorporated Pierce County. The County's zoning within these areas include Moderate Density Single Family, Community Center, and Employment Center (Urban); Rural 10 (Rural); and Agricultural Resource Lands (Natural Resource). Additionally, a portion of Sumner's Retail Water Service area is located within the City of Edgewood's municipal boundaries. The City of Edgewood has zoned this area for single-family residential. This information is illustrated in Figure 1-6.

1.4 Future Service Area

The City of Sumner future Retail Water Service Area is generally bounded on the east and west by the steep hillside terrain, on the north by the City of Pacific, and partially on the south by the Puyallup River and 96th Street E. Appendix A contains copies of the City's Service Area Agreements, including a letter detailing recent negotiations with the City of Pacific for Sumner to provide water and sewer utility service to the Mosby Brothers Farm, Inc. parcels located in the City of Pacific (interlocal service agreement now executed). Sumner also serves a small section of parcels within the City of Edgewood. Similarly, due to geographical and infrastructure convenience, areas within the southwest and eastern portions of Sumner's UGA are served by Puyallup and Bonney Lake, respectively.

The City of Sumner future Retail Water Service Area is consistent with the Pierce County Coordinated Water System Plan (CWSP). The City's Growth Management Act Boundaries are defined by the City's Comprehensive Plan. Figure 1-7 shows the location of the proposed Sumner Retail Water Service Area.

The Retail Service Area, as required by the State's Public Water System Coordination Act and Municipal Water Law, designates an area within which the City has a "duty to serve" existing and potential future customers. The determination of the extents of this area must be made through an evaluation of four threshold factors:

- ***Adequate capacity***, as determined through the limiting factor of water rights and existing supply and storage facilities. Chapter 5 evaluates the supply, storage, and transmission facilities, defining deficiencies to be addressed in maintaining adequate system capacity for this document's planning horizon.
- ***Consistency*** with other adopted plans and regulations within the coordinated area. The designated Retail Service Area is consistent with surrounding jurisdictions and water utilities. Consistency statements from Pierce County and adjacent utilities are included in Appendix O.
- ***Water Rights adequacy***, as determined through a self-assessment, is included in Appendix G. Planned water rights changes to support adequacy for this document's planning horizon are discussed in Chapter 5.

- ***Timely and reasonable*** service, which establishes policy guidelines for the review of a service application, as well as an appeals process available to applicants who are denied service. In general, the City defines *timely service* in alignment with the CWSP guideline of a 120-day period (from the date of filing) to reach agreement with an applicant for provision of water. The timing of actual service installation can be dependent on whether a water main already exists within the adjacent right-of-way to the property, or if the owner must consider installing a City-approved water main extension at their expense. *Reasonable service* is defined as water that can be supplied in a manner consistent with the conditions of City service policies. Section 13.24 of Sumner Municipal Code (SMC) has been recently updated to provide further detail of the appeals process for water service applications that have been denied, including submittal of a Notice of Appeal to the City's Public Works Director and an appeal hearing held before the City's designated hearing examiner thereafter.

Future growth is expected to follow a pattern similar to other river basin communities in Western Washington, with agricultural lands being developed for commercial, residential, and industrial purposes.

Figure 1-5 and Figure 1-6 show maximum build-out land use based on the City's 2017 zoning map, Pierce County zoning designations, and zoning designations for the City of Edgewood. An industrial land-use class has been added in addition to the land-use categories from the previous land-use map. The City has been provisionally certified for a regional Manufacturing Industrial Center (MIC) that is anticipated to facilitate 20,000 jobs by 2040 (see Figure 1-8).

Concurrent with the production of this plan, the City is undertaking the development of a Town Center Plan that, if adopted, could allow for approximately 6,000 residential units in the area around the Sound Transit Train station.

1.5 Related Plans

1.5.1 City of Sumner 2009 Water System Plan

This plan established a capital improvement program (CIP) based on expected growth in the Sumner service area and water system development needs. Some recommendations from this plan have been carried out, but the majority remain to be completed. Where implementation was deferred, recommendations will be updated as appropriate and carried forward in this plan to feed into the City's CIP process.

Legend

Comprehensive Zoning Designations

- Central Business District, CBD
- General Commercial, GC
- Interchange Commercial, IC
- Neighborhood Commercial, NC
- Mixed Use Development, MUD
- Heavy Industrial, M2
- Light Industrial, M1
- High Density Residential, HDR
- Medium Density Residential, MDR
- Low Density Residential 3, LDR3
- Low Density Residential 2, LDR2
- Low Density Residential 1, LDR1
- Residential Protection, RP
- Urban Village, UV
- Public-Private Utilities & Facilities, P

Legend

- City Limits
- Urban Growth Area
- County
- Parcels
- Highway/State Route
- Water Bodies
- Water Courses

P:\Mapping\Maps_Generated\Sumner\17-10500.00\002\2.3\maps\Fig 1-4 Comprehensive Plan Map - 11x17.mxd 4/4/2018 ctolentino

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GIS Base: City of Sumner & Pierce 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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CITY OF SUMNER WASHINGTON

Comprehensive Plan Map

Water Comprehensive Plan
City of Sumner

Figure **1-4**

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City Zoning

- Central Business District, CBD
- General Commercial, GC
- Interchange Commercial, IC
- Neighborhood Commercial, NC
- Mixed Use Development, MUD
- Heavy Industrial, M2
- Light Industrial, M1
- High Density Residential, HDR
- Medium Density Residential, MDR
- Low Density Residential 12000, LDR-12
- Low Density Residential 8500, LDR-85
- Low Density Residential 7200, LDR-72
- Low Density Residential 6000, LDR-6
- Low Density Residential 4000, LDR-4
- Resource Protection, RPR
- Residential Protection, RP

UGA Zoning

- Community Center, CC
- Employment Center, EC
- Neighborhood Center, NC
- Moderate Density Single Family, MSF
- Public Institutional, PI

Legend

- City Limits
- Urban Growth Area
- County
- Parcels
- Highway/State Route
- Water Bodies
- Water Courses

P:\Mapping\Maps_Generated\Sumner\17-10500.00\002\2.3\maps\Fig 1-5 Zoning Map - 11x17.mxd 4/4/2018 ctolentino

GIS Base: City of Sumner & Pierce County
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Zoning Map

Water Comprehensive Plan
City of Sumner

Figure 1-5

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Pierce County Zoning

- Employment Center EC
- Community Employment CE
- Public Institutional PI
- Major Urban Centers MUC
- Activity Center AC
- Community Center CC
- Urban Village UV
- Neighborhood Center NC
- Mixed Use District MUD
- Residential/Office-Civic ROC
- High Density Residential District HRD
- Moderate- High Density Residential MHR
- High Density Single Family HSF
- Moderate Density Single Family MSF
- Single Family SF
- Residential Resource RR
- Master Planned Communities MPC
- Employment Based Planned Community EBPC
- Rural Industrial Center RIC
- Rural Neighborhood Center RNC
- Rural Separator Rsep
- Rural 10 R10
- Rural 5 R5
- Rural Farm RF
- Park & Recreation PR
- Agricultural Resource Land ARL

Edgewood

City Zoning

- Single Family-2
- Single Family-3
- Single Family-5
- Mxed Residential-1
- Mixed Residential-2
- Mixed Use Residential
- Commercial
- Town Center
- Business Park
- Public
- Industrial

Legend

- Water Service Area*
- City Limits
- Urban Growth Area
- County
- Highway/State Route
- Water Bodies
- Water Courses

P:\Mapping\Maps_Generated\Sumner\17-10500.00\002\2.3\maps\Fig 1-6 Pierce County and City of Edgewood Zoning - 11x17.mxd 4/4/2018 ctolentino

GIS Base: City of Sumner & Pierce County
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CITY OF SUMNER WASHINGTON

Pierce County and City of Edgewood Zoning

Water Comprehensive Plan
City of Sumner

Figure 1-6

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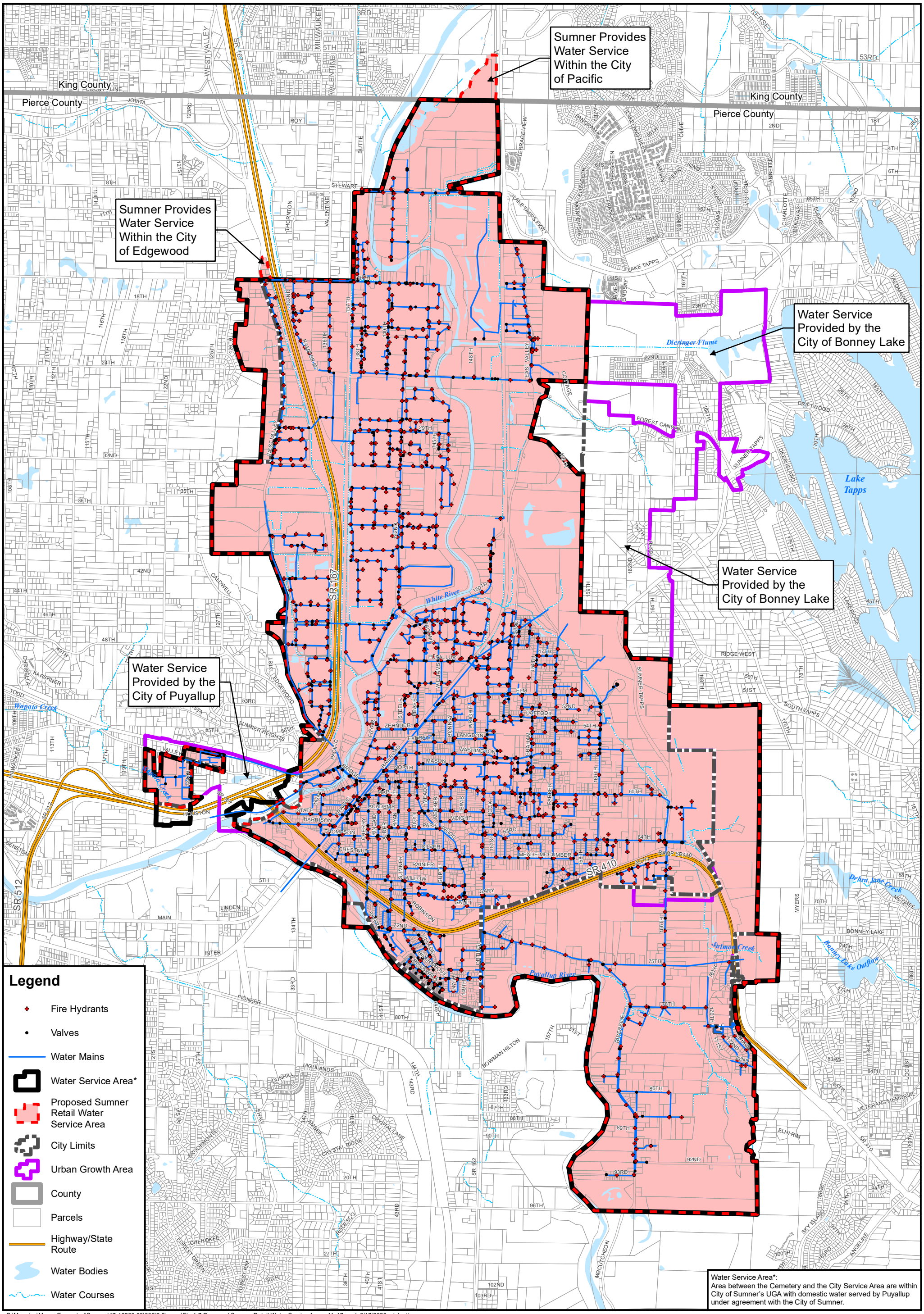

P:\Mapping\Maps_Generated\Sumner\17-10500.00\002\2.3\maps\Fig 1-7 Proposed Sumner Retail Water Service Area - 11x17.mxd 6/17/2020 ctolentino

BHC CONSULTANTS

GIS Base: City of Sumner & Pierce County
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CITY OF SUMNER WASHINGTON

Proposed Sumner Retail Water Service Area

Water Comprehensive Plan
City of Sumner

Figure 1-7

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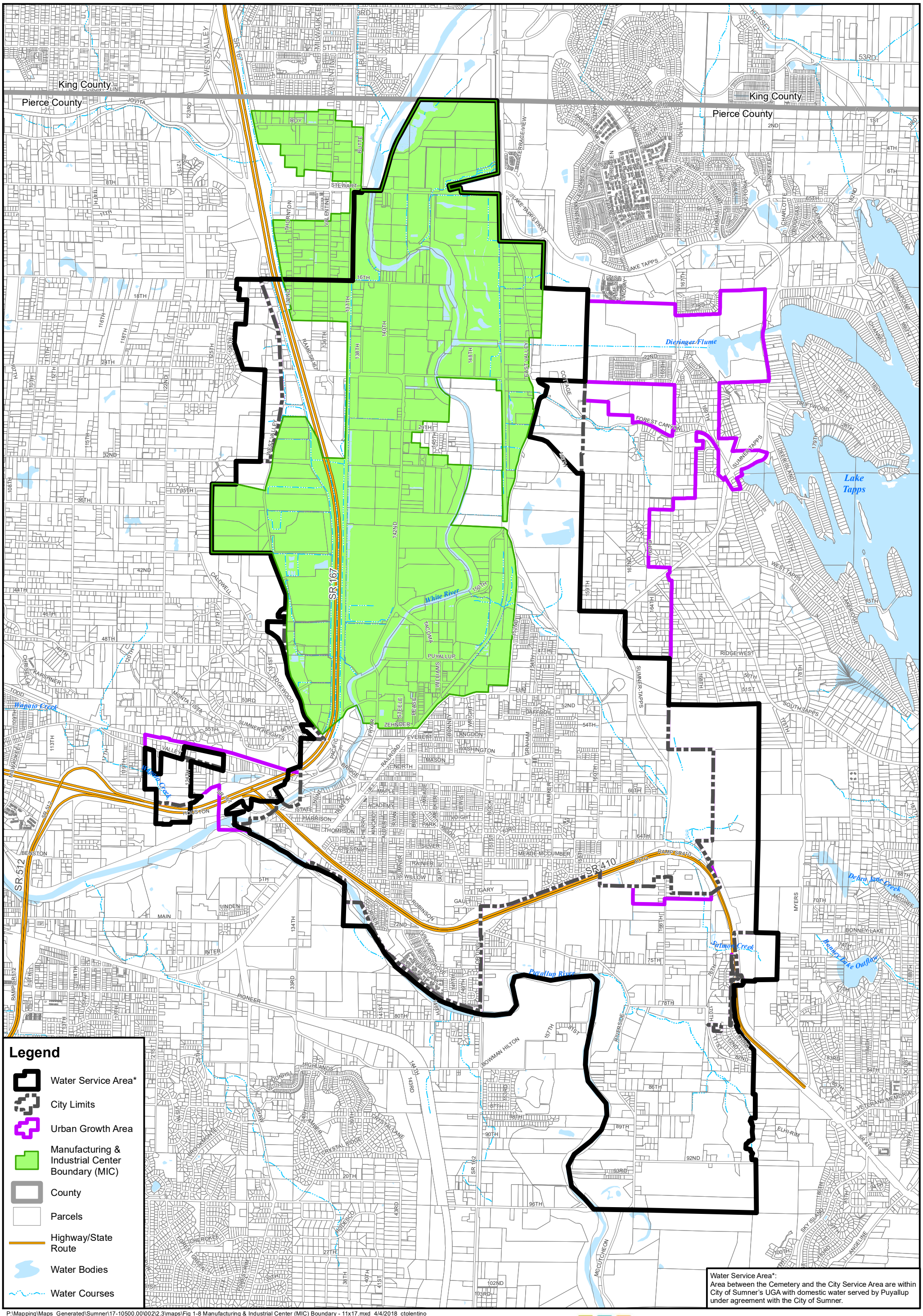

P:\Mapping\Maps_Generated\Sumner\17-10500.00\002\2.3\maps\Fig 1-8 Manufacturing & Industrial Center (MIC) Boundary - 11x17.mxd 4/4/2018 ctolentino

GIS Base: City of Sumner & Pierce 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.
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CITY OF SUMNER WASHINGTON

Manufacturing & Industrial Center (MIC) Boundary

Water Comprehensive Plan
City of Sumner

Figure 1-8

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1.5.1 Pierce County Coordinated Water System Plan (CWSP) and Regional Supplement, 2001

This plan was developed to present a unified approach to water resource development in Pierce County. The Sumner Water System Plan follows the recommendations of the Pierce County Coordinated Water System Plan (CWSP) and is in agreement with CWSP policies. Concurrence with the CWSP will be discussed where appropriate in the text of the Sumner Water System Plan.

1.5.2 City of Tacoma Water System Plan and Intertie

The Tacoma Water System Plan document presents an implementation plan for the City of Tacoma. Of particular importance to Sumner are Tacoma's plans for new transmission piping and the potential for an intertie between the two utilities. Concurrence with the Tacoma Water System Plan will be discussed where appropriate in the text of the Sumner Water System Plan.

1.5.3 City of Puyallup Water System Plan

This plan presents the overall planning effort for the City of Puyallup and should be used to determine the potential for cooperative interties between the two utilities and resolution of service area conflicts.

1.5.4 Washington State Department of Ecology Instream Resources Protection Program (WAC 173-510)

This WAC lists the minimum required instream flows and levels for perennial rivers, streams, and lakes in the Puyallup River Basin, Water Resource Inventory Area (WRIA) 10. Of interest to Sumner are restrictions placed on Salmon Creek and the White River and the resultant impacts on the availability of acquiring additional water rights. WAC 173-510 is discussed in Chapter 5 under "Water Rights."

1.5.5 City of Pacific Water System Plan, September 2008

The City of Pacific Water System is located north of Sumner with an estimated 1,622 connections and the City encompasses an area of 1,587 acres. The City of Pacific's potable water infrastructure is connected to Sumner's water system with two separate interties.

1.5.6 Webstone Water System Plan, 1995

The City of Pacific assumed the Webstone Water District in 2002. Following assumption of the district, Sumner entered into a Memorandum of Agreement with the City of Pacific to acquire the Webstone service area outside of Pacific City limits.

Per the 1995 Webstone Water District Comprehensive Plan, the district maintained approximately 170 connections located within Sumner and Pacific City limits. The district had no sources or storage facilities and depended entirely on Sumner and Pacific for daily and emergency demands.

1.5.7 Pierce County Comprehensive Plan Update, 2015

This plan was developed in response to the requirements of the Washington State Growth Management Act. The City of Sumner provides water service to unincorporated Pierce County. Compliance with policies outlined in the Pierce County Comprehensive Plan and applicable Pierce County codes is required when providing water service within Unincorporated Pierce County limits.

1.5.8 City of Edgewood Comprehensive Plan, 2015

The City of Edgewood created a Comprehensive Plan to establish clear intent and policy base to develop and interpret City regulations. The City of Sumner supplies water service to portions of incorporated City of Edgewood. Compliance with the City of Edgewood Comprehensive Plan, policies, and applicable City ordinances is required when providing service within Edgewood City limits.

Chapter 2 Service Area Policies

This chapter establishes procedures and policies that affect growth of the Sumner Water System. Conditions of service are given, and all new facilities shall be in accordance with City of Sumner Municipal Code Chapters 13.24, 13.28, 13.30, and 13.40, City of Sumner Development Specifications and Standard Details, and the *Pierce County Coordinated Water System Plan* (2001). The Sumner Municipal Code and Development Specifications will govern over the Pierce County Coordinated Water System Plan (CWSP). SMC Chapter 13.24 is related to general water system regulations, Chapters 13.28 and 13.30 are related to water infrastructure extensions and new water main installation requirements, and Chapter 13.40 is related to reimbursement agreements for infrastructure installation. This City Water System Plan and some provisions within the SMC chapters have been modified to remain consistent with updates to Municipal Water Law (MWL) legislation passed by Washington State. Applicable Sumner Municipal Code Chapters are provided in Appendix B.

Under the terms of Sumner Ordinance No. 2015-50, a franchise agreement with Pierce County was executed to permit the City to own, operate, maintain, and construct water system appurtenances within County rights-of-way that fall within the City's retail service area, subject to the terms, standards, and approval of Pierce County Public Works and Utilities.

There have been several changes in the Washington State Department of Health (DOH) requirements since the City Ordinance and CWSP were amended in 2017 and 2001, respectively. Recommended changes to these documents are identified below:

- The SMC should have a section added explicitly prohibiting the private use of fire hydrants by anyone not authorized by the director or a member of the fire or public works department.
- Chapter 3 of the Sumner Development Specifications should include a section titled "Storage", inclusive of a requirement that reads "Sizing of storage facilities shall be adequate to provide for equalizing storage, standby storage, and fire storage."

In addition, an evaluation of the following subjects and a determination of whether to incorporate them in the ordinance should be made:

- Satellite System Management: The Sumner service area is surrounded by other purveyors. In the future, there may be areas that could be more easily and cost effectively served through a satellite-system procedure rather than connecting the new area to the existing system. These requirements should be established prior to a satellite system approaching the City.

Sections 2.1.1, 2.1.2, and 2.1.3 below list the provisions of City of Sumner Municipal Code Chapters 13.24, 13.28, 13.30, and 13.40 and the *Pierce County Coordinated Water System Plan* to aid prospective customers in identifying requirements and conditions of service.

2.1 General Provisions

2.1.1 General Design Standards

Except as otherwise superseded in these standards, water system design, installation, modification, and operation are subject to the *Group A Public Water Supplies*, Washington State Department of Health, WAC 246-290.

2.1.2 General Material Specifications and Construction Standards

Except as provided in approved plans and specifications or in these minimum standards, selection of materials and construction of water system facilities in Sumner shall conform to the following, in order of hierarchy:

- Standard Specifications and Details Manual (City of Sumner, latest edition).
- Standard Specifications for Road, Bridge, and Municipal Construction (Washington State Department of Transportation/APWA latest edition).
- Standards of the American Water Works Association (AWWA).
- National Fire Protection Association Standards (NFPA).
- Manufacturer materials and equipment specifications and recommendations.

The City Engineer will make the final determination of all applicable standards. Copies of the City of Sumner ordinances applicable to the water system are contained in Appendix B. Water utility infrastructure construction specifications are contained in the *City of Sumner Development Specifications and Standard Details* document.

2.1.3 Fire Flow Requirements

Utility-based minimum fire flows by land use class with required duration are specified in the following Table 2-1:

Table 2-1
Utility-Based Minimum Fire Flows by Land-Use Class

Land-Use Class	Minimum Rate (gpm)	Minimum Duration (hours)
Medium- and Low-Density Residential	1,000	2
High-Density Residential and Commercial	1,500	2
Industrial	3,500	3
Existing High Fire Flow Buildings	4,500	4

Land-use-based fire flow requirements are based on the governing local ordinance and guidance by the East Pierce Fire and Rescue Fire Marshal. The developer is responsible for making up any deficiency for fire flow requirements. Additional facilities and capacity for flow may be provided by the utility at the developer's expense to meet site requirements. Fire-resistant construction, sprinklers, and other fire protection measures may be used to reduce site-specific fire flow requirements

Chapter 3 Historic and Projected Water Demand

3.1 Introduction

The objective of this chapter is to develop future population and land use projections for water-demands within the City of Sumner's Retail Water Service Area.

3.2 Historical and Projected Population

Population in the City of Sumner has increased from 2,816 residents in 1950 to an estimated 9,584 residents in 2015, according to the US Census American Community Survey 5-year estimates, 2006-2010. This represents the City's residential population.

Table 3-1 shows historic populations for Sumner and the average annual growth rates.

Table 3-1
City of Sumner Population

Year	City Population	Population Change per Decade	Annual Population Growth (%)
1950	2,816	–	–
1960	3,155	339	1.2
1970	4,325	1,170	3.7
1980	4,936	611	1.4
1990	6,459	1,523	3.1
2000	8,504	2,045	3.2
2010	9,451	947	1.1

In 2015, the population of Sumner was estimated at 9,584. The population has grown at an average annual rate of 1.9 percent since 1990. The Puget Sound Regional Council (PSRC) reports that population in the four-county Puget Sound region is growing in every county. The population change in Pierce County from 2014-2015 is 1.1 percent compared to the four-county region at 1.6 percent.

The City's 2015 Comprehensive Plan projected 15,964 residents and 22,108 employees within the City and its UGA by 2035.

The PSRC provides population and employment projections based on the PSRC Land Use Vision and UrbanSim model. PSRC maintains and develops the LUV and UrbanSim to project policy-based growth based on regional growth strategies, adopted local growth targets, and the City's Comprehensive Plan land use and zoning. Table 3-2 displays residential population and employment projections for the City of Sumner's proposed Retail Water Service Area through the year 2038. Residential population and employment assumptions for the City's Retail Water Service Area apply the PSRC LUV/UrbanSim projections.

Table 3-2 City of Sumner Retail Water Service Area Residential Population and Employment Projections

Year	Population	Annual Population Growth (%)	Employment	Annual Job Growth (%)
2018	11,044	--	16,563	
2024	11,793	1.1	17,712	1.2
2028	12,321	1.1	18,064	0.5
2038	13,343	0.8	19,096	0.6
2068	16,946	0.8	23,057	0.6
2068(H)	20,681		26,777	

For purposes of long range planning necessarily associated with planning for water rights acquisitions, population and employment projections have been extended to a 50 year horizon using the rates of growth derived from the PSRC population and employment projections. Due to the uncertainty associated with making long range forecasts, a high growth value was derived by assuming 75 years of growth at current rates could occur within the 50-year period. This high growth value is represented as 2068(H) in Chapter 3 tables. Additional information on build out growth projections is provided in Appendix C.

3.3 Historical Water Consumption

3.3.1 Service Meters

Service meters have been installed on most customer water connections in the Sumner water system. At the time this plan is being produced, there are still two industrial sites at which the City is working to get meters installed.

Customers are divided into nine separate classes: residential (with subclasses for single family residential and multifamily residential), commercial, schools, industrial, church, City services, hotels, irrigation, and unclassified. The multifamily category includes both duplexes and apartments.

The overall category of “Residential” is defined as the sum of the use from the single family and multifamily residential accounts. “Non-Residential” is defined as the sum of the accounts for commercial, schools, industrial, churches, City services and motels. “Irrigation” and “unclassified” are kept as their own categories. Table 3-3 lists the annual billed water use for the Residential, Non-Residential, Irrigation, and Unclassified Consumption customer classes, as well as the calculated Distribution System Leakage (DSL) between 2015 and 2017. DSL is further explained in Section 3.4. Seasonal fluctuations for these classifications are included.

Seasonal variations by customer class are calculated from meter data that is recorded on a bi-monthly basis. The seasons are classified as November to May and June to October, which approximate the dry and the wet seasons in the area. The four-month span from June to October accounts for an average of 54% of the annual water usage during the years 2015 to 2017, indicating an increase in domestic water use associated irrigation. Within the two seasons, irrigation usage sees a 13.4% increase during the dry season. Single-family residential usage sees an average increase in water usage of 16 million gallons; however, the percentage relative to the total water used during each season remains nearly constant around

36%. Conversely, those customer classifications with negligible irrigation needs tended to decrease in total percentage of system use during the dry season, though their average demand patterns remained relatively constant.

Figure 3-1 shows the annual average water use of each customer class and usage type as a percentage of the total water delivered to the system (metered and un-metered). This figure also includes the system's DSL percentage.

The historical annual source production, graphically shown in Figure 3-2, was observed to increase between 2015 and 2016. This could be attributed to the hotter than usual temperatures.

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Table 3-3
Annual Use Record Summary 2015-2017

Year	Uncategorized Commercial	Single Family Residential	Commercial/ City	Schools	Industrial	Multi-Dwellings	Church	Hotel/Motel	Irrigation	Unclassified Consumption[1]	DSL	Total Annual Use
	(mg/year)	(mg/year)	(mg/year)	(mg/year)	(mg/year)	(mg/year)	(mg/year)	(mg/year)	(mg/year)	(mg/year)	(mg/year)	(mg/Year)
2015	0.86	187.2	88.1	7.2	37.3	85.9	4.1	4.8	91.4	13.2	64.8	584.7
2016	0.09	175.1	89.1	7.0	33.5	88.3	2.7	4.6	97.8	8.5	113.4	620.1
2017	0.05	199.5	101.8	6.7	40.8	92.9	2.7	4.5	87.3	8.3	65.4	610.0
Avg ('15-'17)	**0.3**	**187.3**	**93.0**	**7.0**	**37.2**	**89.0**	**3.2**	**4.6**	**92.2**	**10.0**	**81.2**	**604.9**
Avg ('15-'17) Nov - May	--[2]	36.4%	21.6%	1.4%	8.4%	20.4%	0.7%	1.1%	10.2%	--[2]	--[2]	100%
Avg ('15-'17) Jun - Oct	--[2]	36.5%	16.0%	1.4%	6.4%	14.7%	0.6%	0.8%	23.6%	--[2]	--[2]	100%

Notes:
1) Unclassified consumption is an estimate of water used that does not fit within another category. It is typically water taken from hydrants for construction and maintenance uses.
2) Seasonal variations came directly from the meter reader data, in which Uncategorized Commercial, Unclassified Consumption, and DSL are not recorded on a bi-monthly basis.

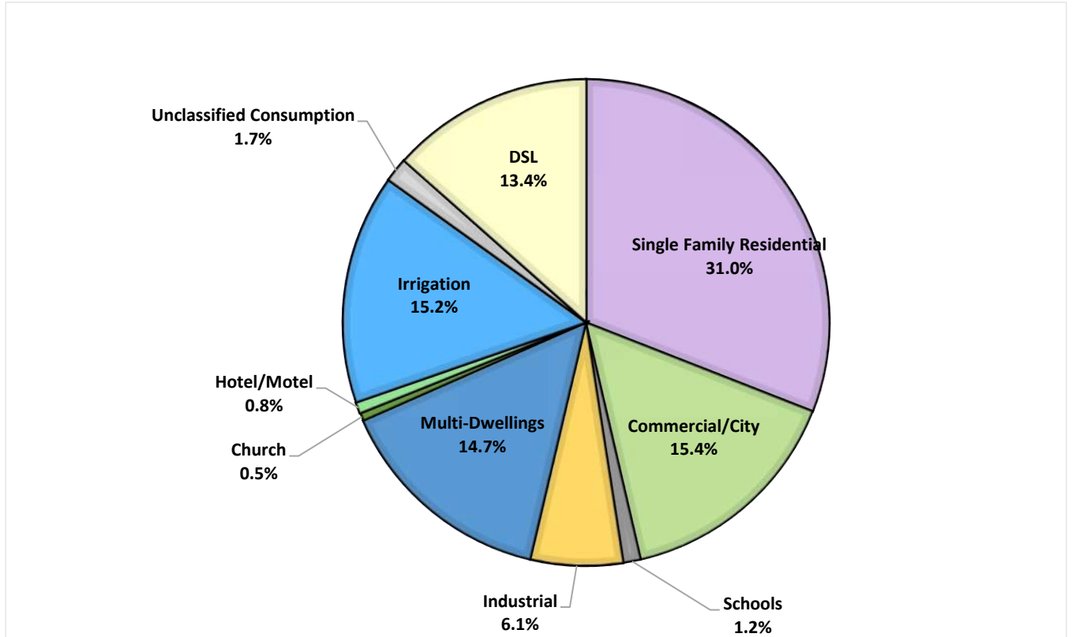

Figure 3-1 2015 to 2017 Average Water Use by Category

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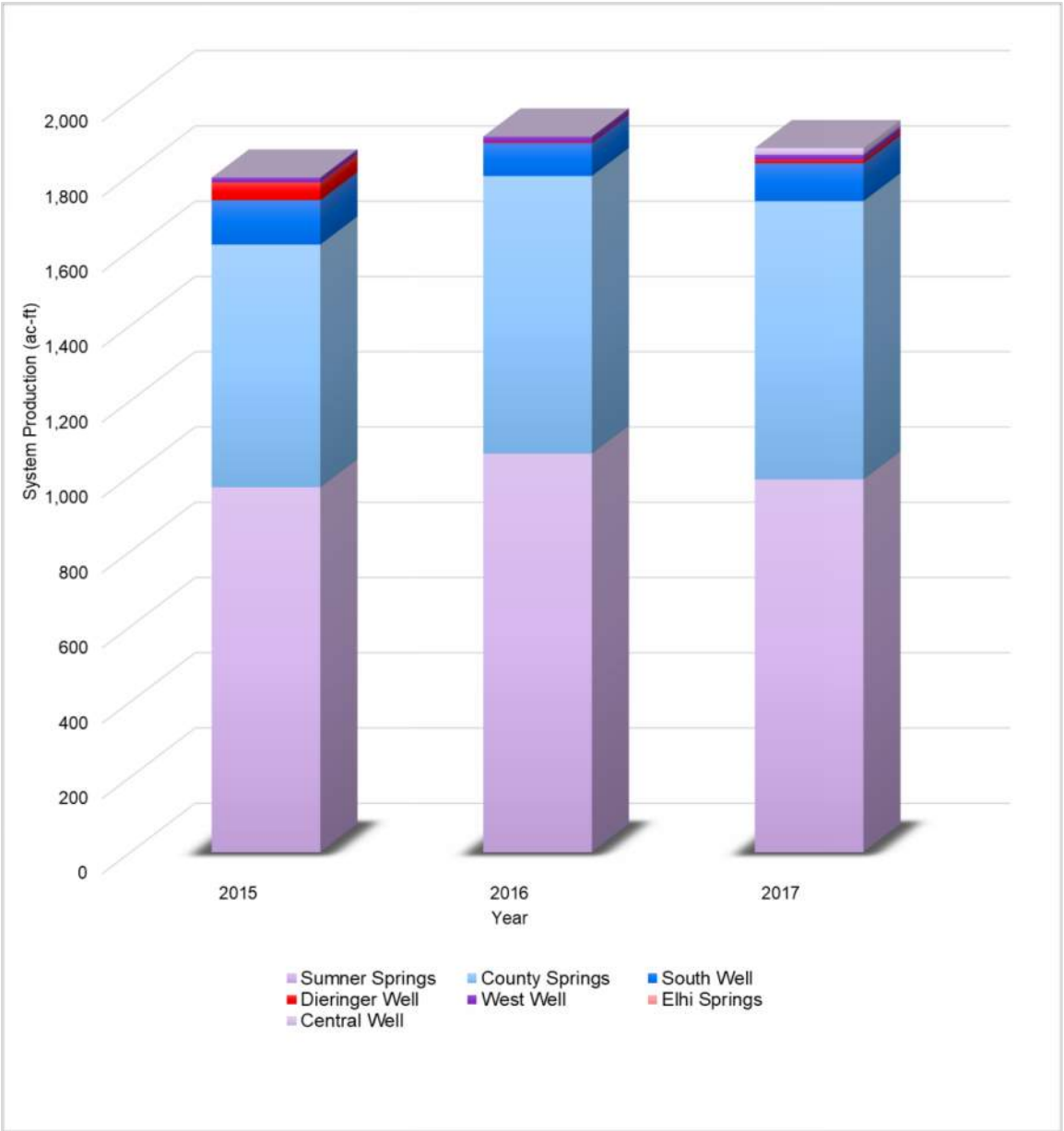

Figure 3-2 Annual Source Production to the System (2015 to 2017)

3.3.1 Master Meters

In addition to service meters at most customer connections, the City of Sumner has a number of "master" flow meters located where source flow enters the distribution system. Annual source production to the water system is shown in Table 3-4.

Table 3-4
Annual Source Production to the System

Year	Sumner Springs (ac-ft)	County Springs (ac-ft)	South Well (ac-ft)	Dieringer Well (ac-ft)	West Well (ac-ft)	Elhi Springs (ac-ft)	Central Well (ac-ft)	Total (ac-ft)
2015	971	645	118	47	13	0	NA	1,794
2016	1,060	738	87	3	15	>0	NA	1,903
2017	991	739	101	9	14	0	18	1,872
Average ('15-'17)	**1,007**	**707**	**102**	**20**	**14**	**>0**	**18**	**1,856**

3.3.1 Station Meters

Station meters are located at metering vaults upstream of the storage tanks at Sumner and County Springs. Station meters utilize weir flow with head measured with transducers to record total spring flow (spring production) and spring bypass (bypass). The difference in these measured parameters is the spring flow to the system (system demand).

Spring Production - Bypass = System Demand

Instantaneous system demand flow readings from the station meters do not accurately reflect instantaneous system demands, as the reservoirs fill and empty regularly. System flow values from the station meters are considered less accurate than the system flow values derived from master meters.

3.3.2 Top Water Users

The City's top water users are included in Table 3-5. The annual average day demand for each user is shown. The largest single user of water in the system is Shining Ocean TWC, Inc.

Table 3-5
City of Sumner - Year 2016 Top 10 Water Users

Rank	Customer	2016 ADD (gpd)
1	Shining Ocean TWC, Inc.	30,193
2	City of Sumner	27,133
3	Summerville Estates	21,768
4	Rainier Manor Homeowners	19,534
5	GRE River Grove LLC	18,313
6	Prologis LP	17,936
7	Sumner School District 320	17,125
8	YMCA of Pierce & Kitsap Counties	15,953
9	Costco	15,667
10	City of Sumner - STP	14,157

3.4 Authorized Consumption and Distribution System Leakage (DSL)

Table 3-6 and Table 3-7 are comparisons of the most recent three years of annual source production to the system data from master meters and demand data from service meters for the City's main system and for the Sumner Viewpoint pressure zone, respectively. The City finds benefit in evaluating the water use patterns of the Viewpoint area against the averages of the rest of the system. For Sumner Viewpoint, the most recent three years of data is 2014 to 2016. The difference between production and demand provides the amount of Distribution System Leakage (DSL) in the system. Metered/Authorized consumption includes billed usage, hydrant flow meters (typically water taken from hydrants for maintenance and construction uses), flushing, residual analyzers, and flushing dead end mains. DSL can be attributed to leaks, main breaks, unmetered connections or uses, and possible miscalibration of meters used to collect information.

Table 3-6 Source Production to the System Versus System Demand				
Year	**Production (MG)**	**Billed and Authorized Consumption (MG)**	**DSL (MG)**	**DSL**
2015	585	519	66	11.3%
2016	620	507	113	19.1%
2017	610	545	65	11.5%

Table 3-7 Source Production to Sumner Viewpoint Versus System Demand				
Year	**Production (MG)**	**Billed and Authorized Consumption (MG)**	**DSL (MG)**	**DSL**
2014	5.60	3.78	1.82	33%
2015	6.36	5.50	0.86	14%
2016	7.31	5.96	1.35	18%

Table 3-6 and Figure 3-3 show that the percent of DSL in the system has been decreasing for the most part, though it has leveled off in the last three years. The DSL for the main portion of the system has decreased since 2010 from 31.8 percent to 11.5 percent demonstrating that Sumner's Water Loss Control Plan is working. Long periods of record are desirable to increase the expected accuracy of the DSL. Short periods of overlapping data have error associated due to different schedules of reading the meters. This analysis is highly dependent on the accuracy of both source and service meters.

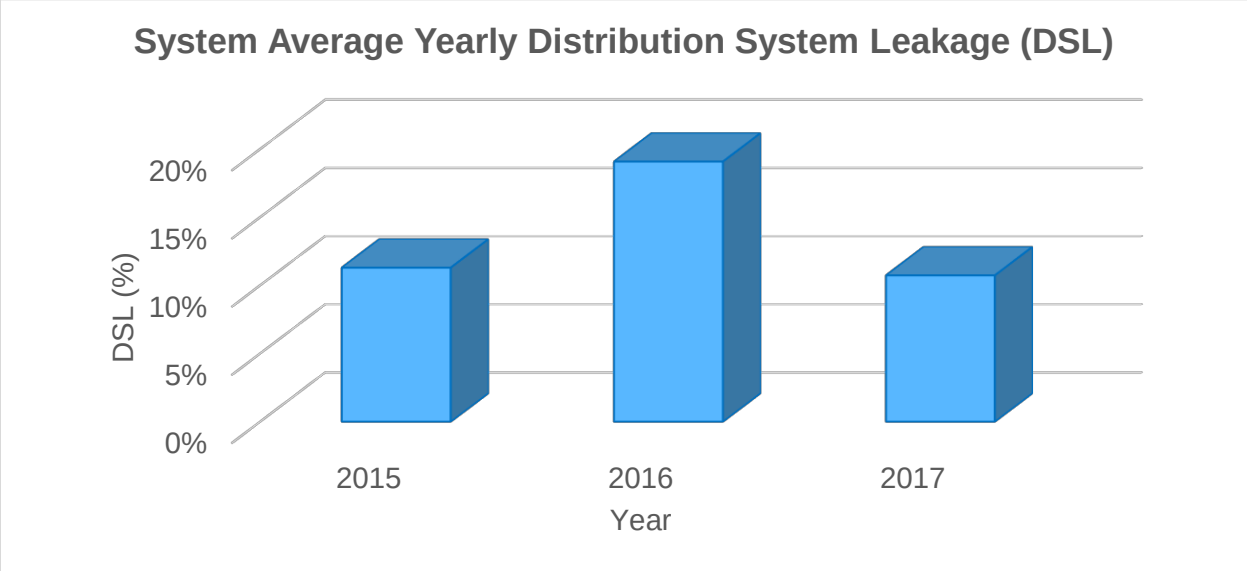

Figure 3-3 Main System Average Yearly Distribution System Leakage (DSL)

3.4.1 Water Loss Control Action Plan (WLCAP)

The City's three-year DSL average (from 2015 to 2017) of 14.7 percent in the overall system is above the DSL threshold of 10 percent designated by DOH's Water Use Efficiency Program, and therefore, requires the City to implement a Water Loss Control Action Plan (WLCAP). The plan, initially established in 2008, was updated in 2017.

The City updated their Water Use Efficiency Plan in April 2017 (Appendix D). This plan advocates implementation of demand side and supply side actions to help meet the single goal of reducing the City's three-year running average DSL to 10 percent or less by 2025. Demand side actions include eliminating unmetered connections and preventing unauthorized water withdrawal from fire hydrants. Supply side actions include improvements to instrumentation and telemetry for added accuracy in water production calculations and water main replacements for eliminating distribution system leaks.

Components of the 2017 WLCAP include:

- An implementation schedule for the control methods to be implemented.
- A budget that demonstrates how the control methods will be funded.
- Technical and economic concerns which may affect the City's ability to implement a program or comply with the standard including past efforts and investments to minimize leakage.
- Address the data accuracy and data collection methods used to determine distribution system leakage.

In May 2017, the following additional actions were proposed to the City Council:

- Develop and implement a program approved by the Fire Marshall to identify and eliminate unauthorized withdraw of water from fire hydrants.
- Work with property owners to install metering devices at commercial properties that do not currently meter City water entering the premises.
- Provide customers with information on how to conserve water, efficient irrigation techniques, and the benefits of low use fixtures and appliances.

These actions will be ongoing and continue until (and likely after) the City reaches an allowable DSL average based on a 3-year period. Specific actions that are in process or have been recently completed include:

- Consistent communication with the owner of two commercial properties believed to be connected to, and beneficially using, City water without metering or adequate backflow prevention devices. The most recent communication came from the City attorney's office, placing a near-term deadline for a corrective program to be put in place that resolves these issues. The City is waiting for a satisfactory response from the owner and, if none is forthcoming, will perform its own field procedures to make sure the properties are disconnected. These properties are potentially a large user of water for industrial process purposes and could represent a substantial portion of DSL reported by the City.
- Replacement of water mains felt most likely to be a source of actual system leakage as the highest priority of the City's annual main replacement program. A construction project to replace an old AC main beneath the BNSF railroad where wet surface conditions had been observed was recently completed.

- Continued investigation by operations staff into the illicit use of City water through fire hydrant connection. The City has recently revised SMC 13.24 to specifically state the monetary penalties that this unauthorized use is subject to.
- Investment in the calibration, SCADA recording equipment, and calculation of source water production metering facilities at the City's springs sources.

3.5 Equivalent Residential Units

Equivalent residential units (ERUs) are defined as the amount of water consumed by a typical single-family residence.

The water use per ERU was determined by taking the average daily use per single family residential connection using meter reading data and factoring out accounts with meter reads for part of the year, or no recorded consumption. The accounts with the top 0.5% of total annual consumption were also removed from the analysis as this higher usage pattern appeared indicative of non-single-family usage patterns.

The analysis was done using a four-year data set covering the years 2014 to 2017. The average single family residential rate for the four years was 189.6 gpd. A memorandum provided by the City summarizing the calculations for the average single family residential consumption rate is provided as Appendix E.
A comparison with the average single family residential usage reported by the City of Pacific to be between 152 to 167 ERUs is in line with the consumption rate calculated for the City of Sumner given the similar geological features between the two cities.

Bonney Lake reported an ERU of 218 gpd (2014) in their 2016 Water System Plan. Although this is significantly higher than Sumner's overall rate, recalculating the ERU rate for the single-family residences within the Sumner Viewpoint area yields an ERU rate of 320.6 gpd. Given the topography being more similar to Bonney Lake's service area the higher ERU rate is considered reasonable.

A summary of the City's existing water system ERUs by category is provided as Table 3-8. These ERUs are calculated based on the same four-year period of data from 2014 to 2017.

Table 3-8
City of Sumner Total ERUs (2014 to 2017)

Service Classification	Annual ADD (gpd)	Total ERUs
Single-Family Residential	504,797	2,665
Sumner Viewpoint[1]	17,599	44
Multi-Family Residential	238,977	1,263
Non-Residential	390,946	2,064
Irrigation	231,414	1,224
Un-Classified	26,334	139
DSL	258,570	1,376
	Calculated System ERUs	8,775

Notes:
1) Sumner Viewpoint annual ADD and total ERUs shown were calculated from the available data from 2014 to 2016.

3.6 Per Capita Residential Usage Rate

The per capita residential water usage is calculated by dividing the combined metered use from the residential (single family plus multifamily) ERUs by the residential population in the Retail Water Service Area boundary for each of years 2015 through 2017. The resulting average per capita residential water usage for the three years is 72.73 gpd/resident. This was used for residential demand projections. An average population rate of 2.64 capita per ERU can be calculated using a similar methodology.

3.7 Per Employee Usage Rate

The per employee water usage is calculated by dividing the combined metered use from the non-residential ERUs by the employment population in the Retail Water Service Area boundary for each of years 2015 through 2017. The resulting average per employee water usage for the three years is 25.28 gpd/employee. An average employee rate of 7.61 employees per ERU can be calculated using a similar methodology.

3.8 Projected Water Demand

3.8.1 Average Daily Demand

Projected water demands are calculated based on the per capita usage rates of the residential and employment population. Irrigation, Un-classified, and DSL are kept separate from the per capita calculations and escalated or decreased over time at a rate agreed on by the City.

A system-demand increase based on the population projections presented in Section 3.2 was used to estimate future water demands. The projected water demands through the year 2038 planning period are included in Table 3-9 and 3-10 (representing demands with and without WUE goals being met) for the City's main system. Similarly, water demand projections for Sumner Viewpoint are provided in Table 3-11 and 3-12. A final row with a City-generated year 2068 projection is added for the purposes of evaluating the City's sources of supply and long-term water rights needs (see Chapter 5), as modifications to the latter are currently being negotiated.

Table 3-9
Water Demand Projections with Water Use Efficiency

Year	Residential[1] (gpd)	Employment[1] (gpd)	Irrigation[2] (gpd)	Unclassified Consumption[3] (gpd)	DSL[4] (gpd)	Total Annual Use (ADD) (mgd)
2018	**803,251**	**418,670**	**229,443**	**26,334**	**268,299**	**1.75**
2019	812,086	423,694	234,032	26,861	255,869	1.75
2020	821,019	428,779	238,713	27,398	243,365	1.76
2021	830,050	433,924	243,487	27,946	230,781	1.77
2022	839,181	439,131	248,357	28,505	218,113	1.77
2023	848,412	444,401	253,324	29,075	205,358	1.78
2024	**857,745**	**449,733**	**258,390**	**29,657**	**188,608**	**1.78**
2025	867,180	451,982	260,974	30,250	178,932	1.79
2026	876,719	454,242	263,584	30,855	180,600	1.81
2027	886,363	456,513	266,220	31,472	182,285	1.82
2028	**896,113**	**458,796**	**268,882**	**32,102**	**183,988**	**1.84**
2038	**970,438**	**487,079**	**268,882**	**38,522**	**196,102**	**1.96**
2068[5]	**1,232,491**	**582,826**	**268,882**	**61,635**	**238,426**	**2.38**
2068(H)	**1,504,133**	**676,912**	**271,192**	**116,446**	**285,409**	**2.85**

Notes:
1) Assuming demand increases proportional to population projections.
2) Assuming growth per year reduces from 2 percent per year between 2018 and 2024, to 1 percent per year between 2025 and 2028, to 0 percent per year between 2029 and 2038.
3) Assuming a 2 percent per year Unclassified Consumption Growth Rate.
4) Assumes DSL reduces from the current 3-year average of 15 percent to the WLCAP goal of 10 percent by 2025.
5) The total annual use (ADD) projection for 2068 generally assumes maintenance of a 10 percent DSL, 2 percent unclassified consumption, and constant residential and employment growth rates from 2038 of 1.1 and 0.8 percent, respectively.

Table 3-10
Water Demand Projections Without Water Use Efficiency

Year	Residential[1] (gpd)	Employment[1] (gpd)	Irrigation[2] (gpd)	Unclassified Consumption[3] (gpd)	DSL[4] (gpd)	Total Annual Use (ADD) (mgd)
2018	**803,251**	**418,670**	**229,443**	**26,334**	**268,299**	**1.75**
2019	812,086	423,694	234,032	26,861	269,305	1.75
2020	821,019	428,779	238,713	27,398	270,339	1.76
2021	830,050	433,924	243,487	27,946	271,402	1.77
2022	839,181	439,131	248,357	28,505	272,493	1.77
2023	848,412	444,401	253,324	29,075	273,612	1.78
2024	**857,745**	**449,733**	**258,390**	**29,657**	274,159	**1.78**
2025	867,180	451,982	260,974	30,250	274,956	1.79
2026	876,719	454,242	263,584	30,855	277,519	1.81
2027	886,363	456,513	266,220	31,472	280,109	1.82
2028	**896,113**	**458,796**	**268,882**	**32,102**	282,726	**1.84**
2038	**970,438**	**487,079**	**268,882**	**38,522**	301,341	**1.96**
2068[5]	**1,232,491**	**582,826**	**268,882**	**61,635**	366,378	**2.38**
2068(H)	**1,504,133**	**676,912**	**271,192**	**116,446**	438,575	**2.85**

Notes:
1) Assuming demand increases proportional to population projections.
2) Assuming growth per year reduces from 2 percent per year between 2018 and 2024, to 1 percent per year between 2025 and 2028, to 0 percent per year between 2029 and 2038.
3) Assuming a 2 percent per year Unclassified Consumption Growth Rate.
4) Assumes current DSL 3-year average of 15 percent remains constant.
5) The total annual use (ADD) projection for 2068 generally assumes maintenance of a 10 percent DSL, 2 percent unclassified consumption, and constant residential and employment growth rates from 2038 of 1.1 and 0.8 percent, respectively.

Table 3-11
Sumner Viewpoint Water Demand Projections with Water Use Efficiency

Year	Residential[1] (gpd)	DSL[2] (gpd)	Total Annual Use (ADD) (gpd)
2018	**22,262**	**5,565**	**27,827**
2019	22,438	5,320	27,759
2020	22,616	5,077	27,693
2021	22,796	4,835	27,631
2022	22,977	4,595	27,572
2023	23,159	4,357	27,516
2024	**23,322**	**4,116**	**27,437**
2025	23,852	3,802	27,654
2026	24,394	3,485	27,879
2027	24,948	3,162	28,111
2028	**25,442**	**2,827**	**28,269**
2038	**29,682**	**3,298**	**32,980**
2068[3]	**48,736**	**5,415**	**54,151**

Notes:
1) Assuming demand increases proportional to population projections.
2) Assumes DSL reduces to the WLCAP goal of 10 percent by 2025.
3) The total annual use (ADD) projection for 2068 generally assumes maintenance of a 10 percent DSL and a constant residential growth rate from 2038 of 1.67 percent.

Table 3-12
Sumner Viewpoint Water Demand Projections Without Water Use Efficiency

Year	Residential[1] (gpd)	DSL[2] (gpd)	Total Annual Use (ADD) (gpd)
2018	**22,262**	**5,565**	**27,827**
2019	22,438	5,551	27,989
2020	22,616	5,538	28,154
2021	22,796	5,526	28,322
2022	22,977	5,514	28,491
2023	23,159	5,503	28,662
2024	23,322	5,487	28,809
2025	23,852	5,530	29,382
2026	24,394	5,575	29,969
2027	24,948	5,622	30,570
2028	25,442	5,653	31,095
2038	29,682	6,596	36,278
2068[3]	48,736	10,829	59,565

Notes:
1) Assuming demand increases proportional to population projections.
2) Assumes current DSL 3-year average of 15 percent remains constant.
3) The total annual use (ADD) projection for 2068 generally assumes maintenance of a 10 percent DSL and a constant residential growth rate from 2038 of 1.67 percent.

3.8.2 Maximum Daily Demand

Maximum daily demand utilizes a peaking factor that is the ratio of maximum daily production to the average daily production. DOH has a minimum peaking factor of 2.0 to be used in evaluating water systems. Maximum day demands were measured from the master meters from 2010 to 2015. Due to lack of available maximum day demand data for 2016 and 2017, the most recent three-year average maximum day demand peaking factor was taken from 2013 through 2015 and is equal to 2.05. This exceeds the DOH required minimum factor of 2.0. Table 3-9 includes the maximum daily production for the year compared with the annual average-day demand for the year. A peaking factor of 2.05 as shown in Table 3-13 was used for future maximum-day-demand estimates.

Irrigation is included in the calculation for maximum-to-average peaking factor but has a different pattern as there are several months with much lower flows. Peak day irrigation usage could be 3.5 to 4.0 times the annual average due to its concentrated use during warmer months.

The amount of DSL was not included in the peaking factor since the DSL is not expected to increase at the max day demand. The annual average DSL was instead added to the total max day demand.

Table 3-13 Historical Maximum-Day Demands				
Year	**Total Maximum Day Production (mgd)**	**Maximum Daily Production Minus DSL (mgd)**	**Average Daily Production (mgd)**	**Maximum-to-Average Factor**
2010	3.07	2.54	1.14	2.24
2011	3.42	3.14	1.14	2.76
2012	2.55	2.37	1.19	1.99
2013	2.82	2.52	1.23	2.04
2014	2.83	2.57	1.30	1.98
2015	3.28	3.02	1.41	2.14
Average Maximum-to-Average Factor ('13 - '15):				**2.05**

3.8.3 Off-Peak Average and Maximum Daily Demand

The City currently has a temporary water right that allows for different instantaneous groundwater supply rates during the peak (July, August, and September) and off-peak months. An estimate of the maximum demand during the off-peak months is necessary to ensure the City can meet projected demands utilizing the water available during the off-peak months.

Daily City production records for all sources were totaled, trended and evaluated for off-peak months from 2015 through 2017 to establish an existing off-peak 2018 ADD of 1,000 gpm (1.44 mgd). Although the daily trends show very small percentages of deviation from these numbers, a peaking factor of 1.5 is assumed to establish off-peak MDD that allows for unanticipated system demands that might arise from main breaks, extended flushing operations, or other abnormal uses. Future projections will retain the same existing average annual to off-peak average percentage and the 1.5 peaking factor. The off-peak MDD projections that are needed to assess source of supply water rights are included in Table 3-14.

3.8.4 Peak Hourly Demand

Due to unavailable meter data that would indicate maximum instantaneous water use, the DOH *Water System Design Manual* (*WSDM*) suggests using the following equation to calculate the peak hour demand (PHD).

PHD = *MDD/1,440 x [(C)(N) + 225] + 18*

Where: ***PHD*** = *Peak Hour Demand (gpm)*
MDD = *Maximum daily demand (gpd/ERU)*
C = *Coefficient associated with the number of ERUs (1.6)*
N = *Number of ERUs*

Table 3-14 summarizes the projected system demands from year 2017 through year 2037. The table includes the average-day-demand, maximum-daily-demand, off-peak season maximum-daily-demand, and peak-hour-demand calculations.

Table 3-14
Projected Max Day Demand and Peak Hour Demand with DSL

Year	ADD (mgd)	MDD (mgd)	Off-Peak MDD (mgd)	PHD (gpm)
2018	1.77	3.36	2.16	3,764
2024	1.81	3.52	2.21	3,979
2028	1.87	3.64	2.27	4,111
2038	1.99	3.89	2.43	4,389
2068	2.44	4.76	2.97	5,382
2068(H)	2.85	5.97	3.47	6,729

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Chapter 4 Water System Description

This chapter includes a brief history of the Sumner water system that provides a historical perspective to past improvements and provides insight into the logical progression of future improvements. Following that, there is a discussion on the components of the water system and a summary of relevant physical features, including sources, storage, and transmission. The relationship among the system components is provided, and the effectiveness and condition of the facilities are addressed where lacking.

4.1 History of the Water System

In 1883, George H. Ryan recorded a deed to the timbered hills approximately ½ mile northeast of the present City. Ryan built a sawmill and constructed a gravity water supply system. The water supply at Ryan's Mill was conveyed to the town through logs approximately 15 inches in diameter and 15 feet long with a 2.5-inch hole bored through the length of each log.

On December 24, 1889, the Sumner Light and Water Company was incorporated and assumed management of Ryan's Sumner Lumber Company water system. Ryan later became the Town's first mayor in 1892. In 1893, the water system was sold to A. Brier Wood. The town government wanted to purchase the water system but was unable to finance the purchase as a public utility. It was not until 1905 that the town voted to purchase the water system with a bond issue of $7,000.

The first drinking water ordinance was passed February 1907, which provided for the creation of a water department, appointment of a superintendent, and fixed water rates.

Soon, the Town began to industrialize. Lake Tapps was created by enlarging five lakes on the plateau east of Sumner. Puget Power and Light installed a power generation station. Fleischmann's Yeast, Northern Board and Paper Company, and several other large manufacturing companies established facilities in the northern factory district.

By 1920, the wooden-stave, turn-of-the-century water system was inadequate. In May of 1921, the Town authorized a bond issue of $45,000 to rebuild the system, again using wood-stave pipe.

In July 1928, newly elected officials took office. This event marked a great change in policy and operations of the water department. The new mayor, Frank B. Weick, was a civil engineer from Tacoma who resided in Sumner. Mayor Weick made a very emphatic address to the new town council urging the discontinuation of using water department funds to keep the tax levy down. He proposed instead to use the revenues to provide a better water distribution system as well as fire protection to the factory district, which was outside the corporate limits at that time. Mayor Weick proposed to gradually replace the wooden water mains with longer-life pipes.

The Town council gave the mayor its support, and 2,760 linear feet of pipe was laid in 1929 in the factory district with fire hydrants spaced to conform to the recommendations of the underwriters. The factory district was incorporated into the Town limits, and several months later Sumner qualified to become a City.

The schedule for replacement of wooden water mains began in 1930 and was faithfully maintained throughout the Depression years. By the time of maturity of the last bonds (1941) from the 1920 issue, the last of the wooden mains were replaced by cast iron or asbestos cement pipe. Over the years the system has been expanded further, including expansion north along 142nd Avenue East with a 14-inch diameter ductile iron main, a system developed to serve the eastern residential portions of the City and the REI complex near 45th Street East. Additional expansion included construction of a 2.0 MG reservoir in the north end of Sumner east of the East Valley Highway, and 12-inch-diameter to 16-inch-diameter ductile iron extensions north on West Valley Highway and East Valley Highway.

Weber and Ritter, Inc. was a private water system that was developed to the south of Sumner. Weber and Ritter first acquired the County and Elhi Springs before the City of Sumner purchased Weber, County, and Elhi Springs in 1968.

The City of Sumner acquired all Fowler Mutual Water Company assets, water service area, and water customers on July 2, 2001 through a Water Service Agreement. A copy of this agreement is provided as Appendix A.

On September 4, 2001, the City of Sumner adopted Resolution No. 1045, supporting the City of Pacific's assumption of the Webstone Water District and the transfer of the portion of Webstone Water District's service area within Sumner's UGA to the City of Sumner. The City of Pacific adopted Ordinance No. 1518 on March 4, 2002 authorizing the City of Pacific to begin dissolution of the Webstone Water District and to assume ownership of said district, including all assets, service area, and responsibilities. The Webstone Water District has been completely absorbed by the City of Pacific and City of Sumner systems.

4.2 Past Spring and Watershed Improvements

In 1889, the spring headworks of the Sumner Light and Water Company consisted of 17.8 acres of forested hillside northeast of the City. In 1934, Sumner purchased another 30 acres. At that time, the headworks of the Puyallup Springs were located to the north. To the south, four or five private water systems were developed (Weber and Ritter, County, etc.). The headworks were fenced in 1937.

In 1938 and 1939, the federal Works Project Administration (WPA) drove tunnels into the hillside to intercept a greater portion of the four largest springs of the Sumner system. These tunnels extended from 50 to 120 feet, and interception facilities with large culverts carried the spring water to a head house. From the head house, a 14-inch water main leads to the City. Prior to the WPA work on the springs, the flow was approximately 2.0 million gallons per day (MGD). After completion of the improvements, the flow weir at the head house showed approximately 3.0 MGD. From the time of the WPA improvements until 1980, the springs required few changes.

Passage of the Safe Drinking Water Act in 1974 precipitated efforts by the City to protect and improve their water supply sources. Water system plans in 1975, 1980, and 1985 identified a need to capture a greater portion of the springs and improve their sanitary condition. The 1985 Water System Plan made the following recommendations (Parametrix 1985):

- Chlorination at Sumner and County Springs.
- Watershed fencing for protection from vandalism and unlawful entry.

- Repair of spring taps and collection boxes to collect a greater portion of the spring flow and protect surface runoff from entering the collection works.
- Predesign engineering report detailing needed improvements.

A predesign engineering report addressing the fourth bullet, titled "Water Supply Improvements, Spring Protection and Chlorination", was completed the following year (Parametrix 1986). This report identified in greater detail needed improvements to Sumner, Weber, and County Springs. No improvements were outlined for Elhi Springs in the predesign engineering report.

All recommendations in the predesign report were completed by 1989, although watershed fencing was limited to access points and those areas adjacent to roads and highways. Source improvements for each system were as follows:

- Sumner Springs:
  - Chlorination facilities added.
  - New flow metering system added.
  - Broken pipes slip lined and repaired.
  - Surface drainage improved.
  - Watertight access doors placed on all collection/tap boxes.
- Weber Springs No. 1:
  - New spring tap with Hypalon liner provided.
  - System tied into Sumner Springs.
- Weber Springs No. 2:
  - Existing holding tank abandoned.
  - Existing pipes abandoned.
  - Spring taps improved.
  - Surface drainage improved.
  - Watertight access doors placed on all collection/tap boxes.
  - New spring tap with Hypalon liner provided.
  - System tied into County Springs.
- County Springs:
  - Chlorination facilities added.
  - 68,000-gallon chlorine contact tank installed.
  - New flow metering system added.
  - Broken pipes slip lined and repaired.
  - Surface drainage improved.
  - Watertight access doors placed on all collection/tap boxes.
  - New spring tap with Hypalon liner provided.
- Entire Sumner/Weber/County Spring System:
  - Fenced along Sumner-Tapps Highway and at access points along the valley.
  - Gates installed at all vehicle access points.

In 2018 the City of Sumner implemented security improvements in the Sumner, Weber, and County Spring watersheds that included installing security fencing around the spring tap. The City of Sumner completed source improvements at Elhi Springs in 2003. Source improvements included:

- Chlorination facilities added, including continuous chlorine residual monitoring equipment and instrumentation/control.

- Chlorine contact tanks added.
- Booster pump added to raise the hydraulic grade line of the Elhi Springs to match the rest of the Sumner potable water sources.
- Abandonment of the water storage reservoir and repurposing the structure to serve as a building pad for the chlorination and (proposed) fluoridation facilities.

Elhi Springs is currently not utilized in routine operations due to the difficulty in providing adequate chlorine contact time between the source and the first service.

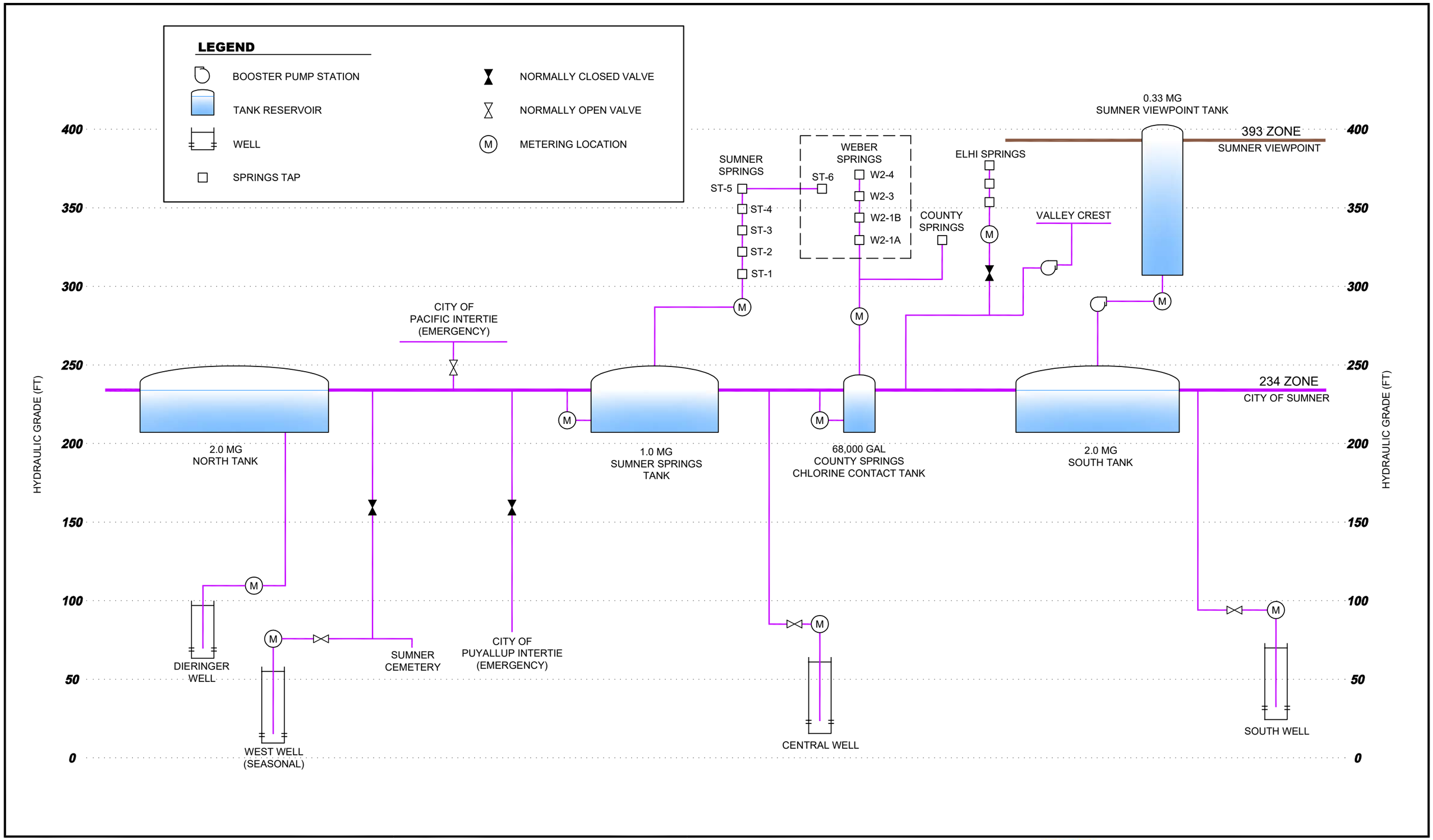
4.3 Water System Overview

The location of major water system facilities is shown in Figure 1-3. The hydraulic profile for the City of Sumner's Water System is provided as Figure 4-1. The system currently consists of a primary pressure zone with a hydraulic grade line of approximately elevation 234 and a second pressure zone supporting the Sumner Viewpoint development at approximately elevation 393. Table 4-1 lists the capacity of water supply sources in the Sumner water system.

Table 4-1
Sumner Potable Water Source Capacities

DOH ID Number	Source Name	Source Type	Source Capacity (mgd)	Maximum Instantaneous Water Right Q_i(mgd)
SO 1	Sumner Springs	Free-Flowing Spring	1.37[1]	4.04
SO 2	Weber Springs	Free-Flowing Spring	Flow is combined with Sumner Springs and County Springs.	0.29
SO 3	Elhi Springs	Free-Flowing Spring	0.13[2]	0.52
SO 4	County Springs	Free-Flowing Spring	0.94[1]	1.15
SO 5[4]	West Well	Artesian Well	0.36[3]	0.36
SO 6	South Well	Artesian Well	1.01[3]	1.44[5]
SO 7	Dieringer Well	Artesian Well	0.36[3]	0.13
SO-CW	Central Well	Artesian Well	1.51[3]	0.43/1.51[6]

Notes:
1) Source capacity based on historic station meter readings.
2) Source capacity based on City records; Elhi Springs is typically not being utilized.
3) Source capacity based on well pump capacity.
4) The West Well is currently utilized primarily for irrigation.
5) Source pumping capacity is less than the City's Water Rights.
6) The City obtained a temporary Water Right to use the Central Well as an additional point of withdrawal for the South and West Well water rights. Combined instantaneous withdrawal from the Central, South, and West Wells is not to exceed 1.8 mgd.



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Hydraulic Profile

Sumner Water System Plan

Figure

4-1

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Construction of the Sumner Viewpoint development created a separate pressure zone within the Sumner water system at approximately elevation 393. This development is located outside of Sumner City limits, but within the Retail Water Service Area off SR 410. The development includes a booster station at the South Tank site that pulls potable water from the South Tank supply line and pumps it to a 330,000-gallon reservoir located at the Sumner Viewpoint site. This establishes an approximate hydraulic grade line of 393 feet. The pump station and reservoir were sized to accommodate a maximum build-out of 120 ERUs in the Sumner Viewpoint development. Analysis of supply, storage and pump station design requirements within Chapter 5 confirm the adequate sizing of these facilities.

The City supplies water to a water distribution system owned and maintained by the Valley Crest Maintenance Association. This Maintenance Association serves 14 properties located on 171st Avenue Court East. This system has a booster pump station operated and maintained by the association. The approximate hydraulic grade line of the system is unknown.

Each of the Valley Crest properties has a meter installed at the service line to the property and the City bills the residents at each property for the water consumed in accordance with the City's published utility rates.

4.4 Distribution Network

The distribution system consists of approximately 1,017 sections of pipe ranging in size from 2-inch diameter to 18-inch diameter. The approximately 90 miles of pipe also vary in age and material. Detailed maps of the distribution network are maintained and updated by the City. These water system maps show pipe diameters, pipe materials, locations of hydrants, valves, and abandoned pipes, and give the year of installation for most pipes. The approximate length and percentage of each pipe size in the distribution network is listed in Table 4-2.

Table 4-2
Distribution Network Inventory (August 2017)

Pipe Sizes (inches)	Length (feet)	Percentage
2	6,706	1.4
3	2,739	0.6
4	6,198	1.3
6	104,199	22.0
8	165,270	34.8
10	6,889	1.5
12	160,116	33.7
14	11,338	2.4
16	6,246	1.3
18	4,903	1.0
Total	**474,603**	**100.0**

4.5 Spring Collection Works

4.5.1 Sumner Springs

The current Sumner Springs collection works are shown on Figure 4-2, Figure 4-3, and Figure 4-4. There are five spring taps. The spring taps feed into collection boxes, which pass the flow on to the downstream collection box through a common header pipe. All tap boxes may be manually bypassed in the event a single spring tap becomes contaminated or otherwise undesirable. From the header pipe, the spring flow passes into a metering vault where the flow is split between wastage to Salmon Creek and water for distribution. An access road, which turns into a footpath, parallels the spring taps. Surface water is collected and diverted away from the spring taps via perforated pipes and culverts. In general, the Sumner Springs collection works appear to be in good condition. Section 5.8, "Minimum Sanitary Control Area Survey," will discuss Sumner Springs in further detail. Operational information for Sumner Springs is discussed in Chapter 10, "Operations Program."

4.5.2 Weber Springs

The current Weber Springs collection works are shown on Figure 4-5 and Figure 4-6. Figure 4-5 shows Weber Springs No. 1, which feeds into spring tap ST-6 of the Sumner Springs system. Figure 4-6 shows Weber Springs Taps W2-1A, W2-1B, W2-3 and W2-4, which feed into the metering vault of the County Springs system. There is one spring tap at Weber Springs No. 1 and four spring taps at Weber Springs No. 2. For the purpose of this document, the Weber Springs is not evaluated as a separate source but is considered to be part of Sumner and County Springs. As with Sumner Springs, the spring taps feed into collection boxes, which pass the flow downstream to the next collection box through a common header pipe. All tap boxes may be manually bypassed in the event a single spring tap becomes contaminated or otherwise undesirable. Surface water is collected and diverted away from the spring taps via perforated pipes and culverts. The abandoned holding tank from the old Weber system is shown on Figure 4-5. An access road parallels the spring taps. In general, the Weber Springs collection works appear to be in good condition. Section 5.8, "Minimum Sanitary Control Area Survey," will discuss Weber Springs in further detail. Operational information for the springs is discussed in Chapter 10, "Operations Program."

4.5.3 County Springs

The current County Springs collection works are shown on Figure 4-7. One spring tap flows into the metering vault, where it merges with the flow from Weber Springs No. 2. The metering vault may be manually bypassed in the event of contamination of Weber Springs No. 2 or County Springs. Spring flow from the metering vault is split between wastage to Salmon Creek and water for distribution. An access road leads to the spring tap from the south. Surface water is collected and diverted away from the spring tap via perforated pipes, culverts, and walls. In general, the County Springs collection works appear to be in good condition. Additional information on County Springs is included in Section 5.6, "Minimum Sanitary Control Area Survey." Operational information for the springs is discussed in Chapter 10, "Operations Program."

4.5.4 Elhi Springs

Elhi Springs collection works are shown on Figure 4-8. Elhi Springs was upgraded in 2000 to 2001, and again in 2003. The following improvements were made:

- Greater spring flow collection with the addition of three spring taps and collection vaults.
- Conversion of settling tank to a spring overflow collection and diversion facility.
- Better channelization of surface water to prevent surface water entering collection works.
- Installation of a metering vault.
- Replacement and addition of piping to transport spring flows to the holding tank.
- Removal of old collection station.
- Installation of a chlorination facility including continuous chlorination residual monitoring and instrumentation/control.
- Installation of chlorine contact tanks.
- Installation of a booster pump to increase the hydraulic grade line of Elhi Springs to match the remainder of the potable water sources.
- Abandonment of the water storage reservoir and repurposing the structure to serve as a building pad for the chlorination equipment and booster pump.

Elhi Springs requires a high dosage of chlorine in order to provide adequate CT time before the first service connection. This high chlorine dosage presents an undesirable outcome at the first service. For this reason, field staff typically do not utilize Elhi Springs unless required to meet system demands.

4.6 Wells

4.6.1 South Well

The South Well was constructed in 1975 to a depth of 304 feet. The well has a 16-inch diameter casing with a stainless steel screen installed from 304 feet to 280 feet. The South Well is currently utilized as a permanent domestic source and is equipped with a three-stage vertical turbine well pump. The well is operated at a pumping rate of 700 gpm to minimize sand production. The Well is controlled automatically to turn on when the water level in the South Tank drops below an operator selected elevation.

4.6.2 West Well

The West Well was constructed in 1975 to a depth of 285 feet. The well has a 10-inch diameter casing with a 10-foot screen length. This well is equipped with a four-stage vertical-turbine pump with an approximate 250 gpm capacity. The West Well has previously been used to meet peak demands during drier months, but it is currently used primarily for irrigating the Sumner Cemetery landscaping. Operation of system valves allow the West Well to be connected to the system to meet seasonal demands when necessary.

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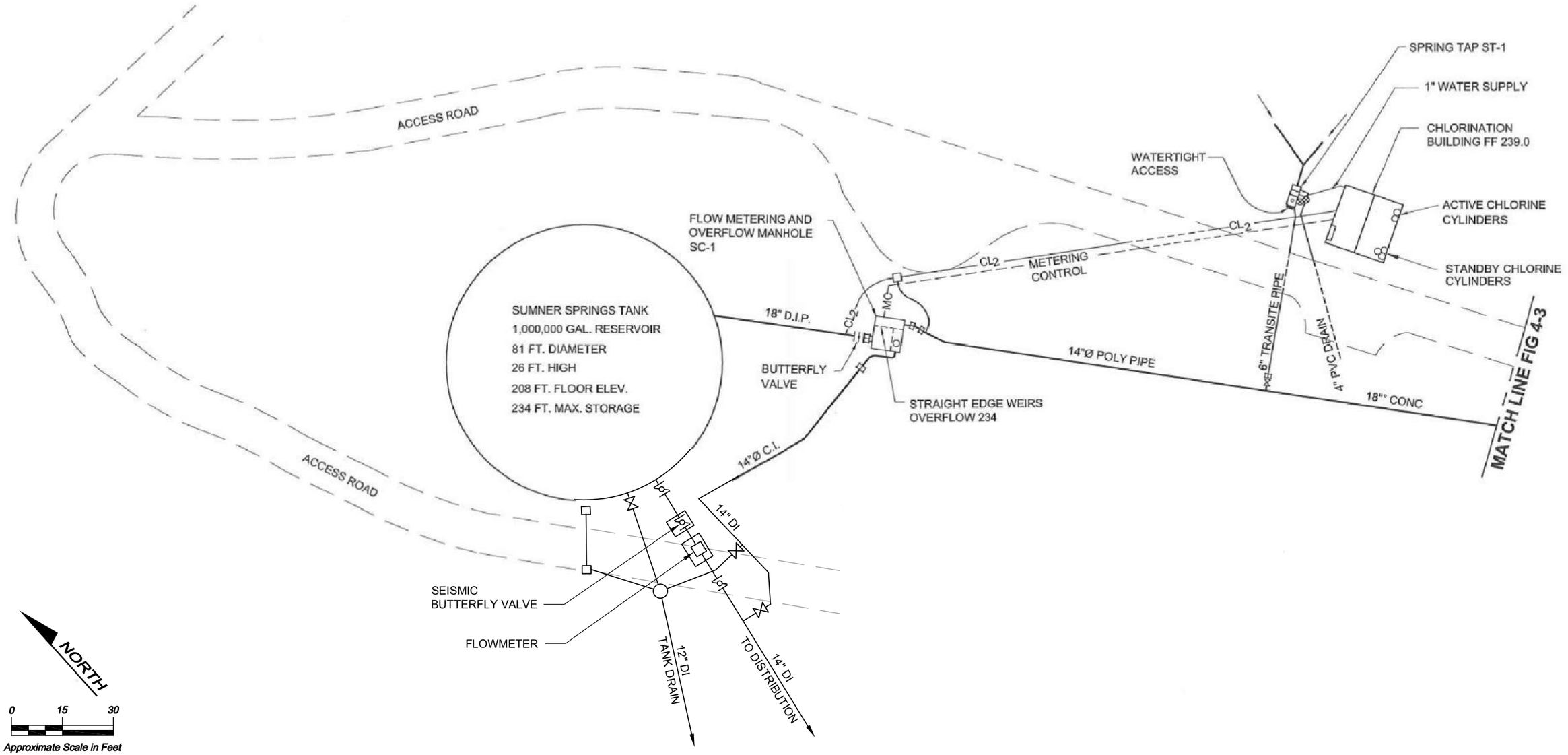

Source: Parametrix, May 2010

Sumner Springs

Sumner Water System Plan

Figure **4-2**

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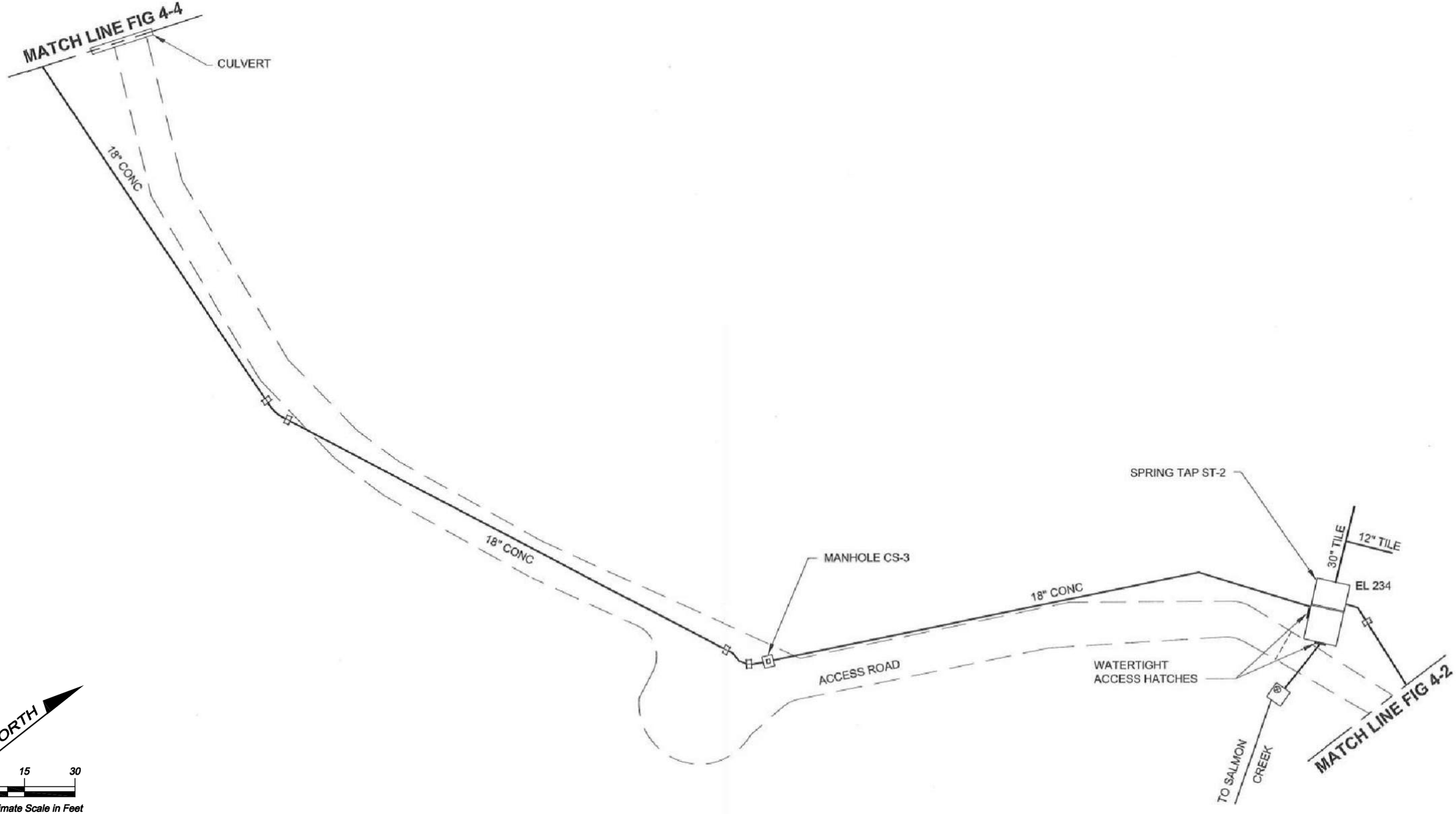

Source: Parametrix, May 2010

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Sumner Springs

Sumner Water System Plan

Figure **4-3**

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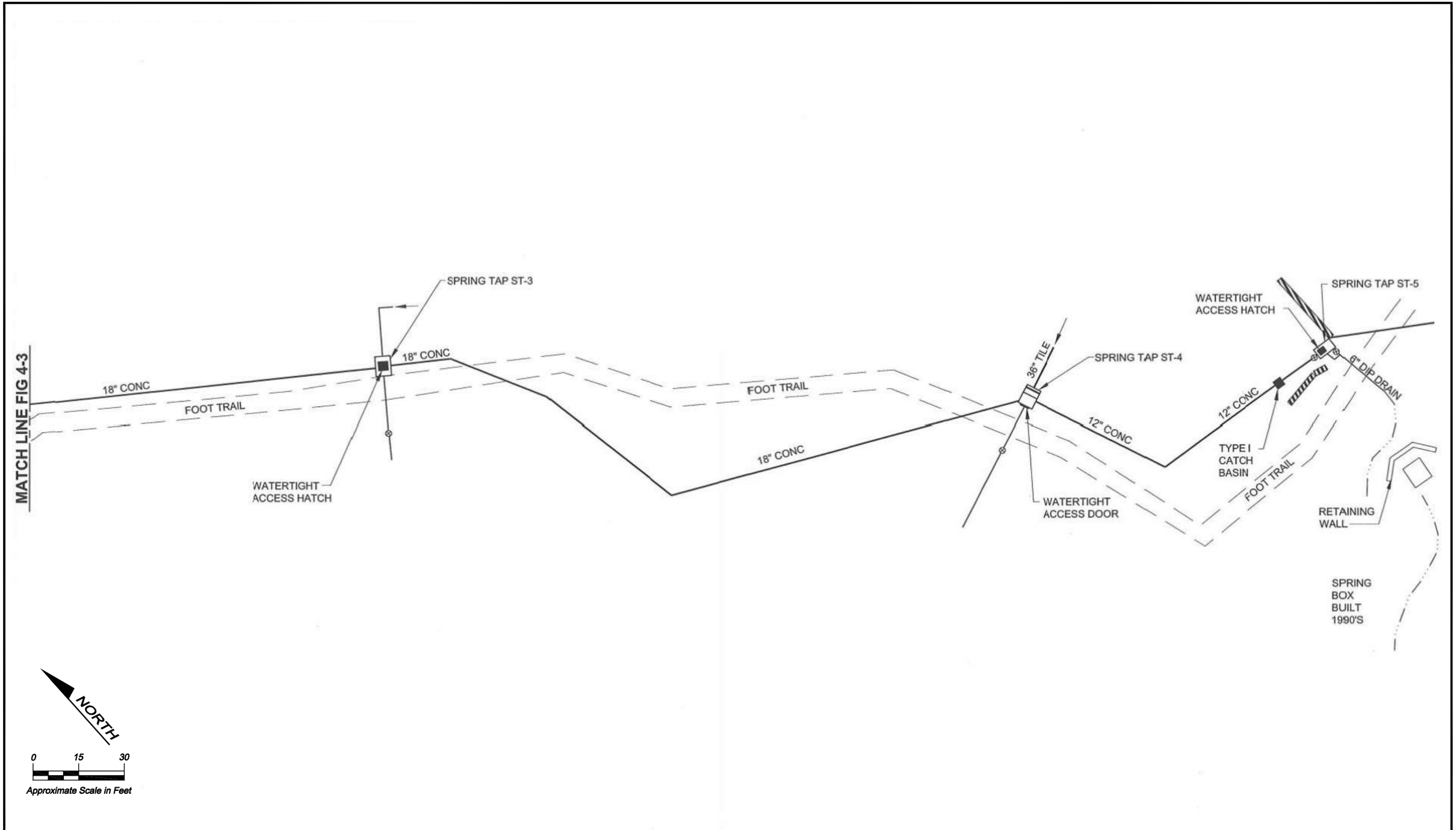

Source: Parametrix, May 2010

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Sumner Springs

Sumner Water System Plan

Figure **4-4**

Path: S:\Cad\Sumner\17-10500 Water System Plan\ Filename: F17-10500.00_Fig 4-4 Plot date: Apr 04, 2018-01:33:54pm CAD User: psimon.
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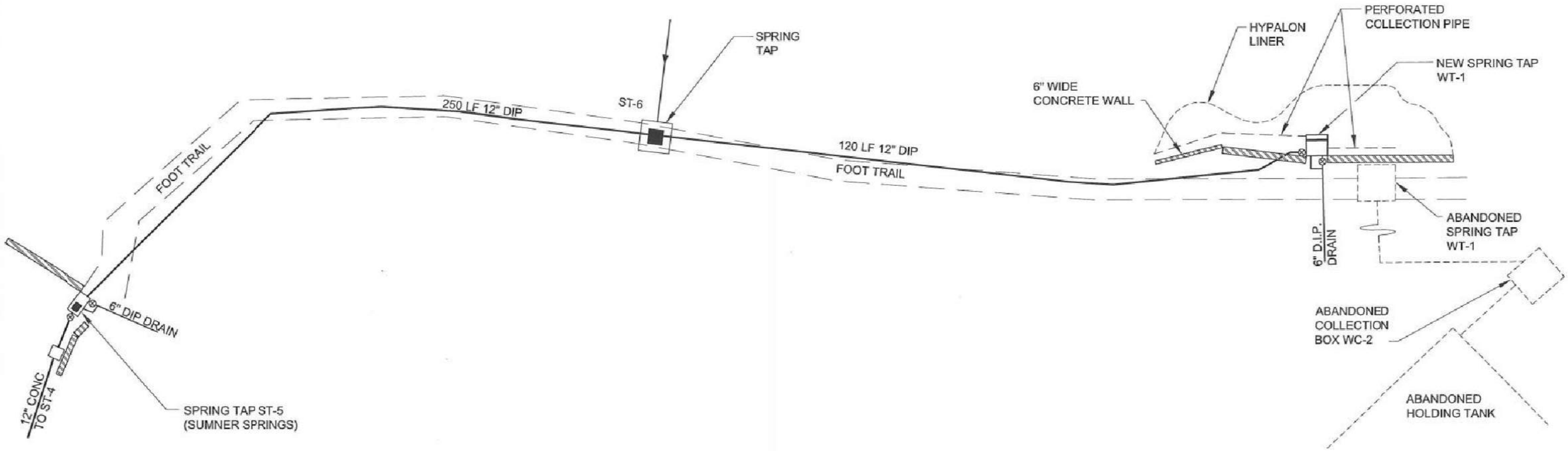

Source: Parametrix, May 2010

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CITY OF SUMNER WASHINGTON

Weber Springs No. 1

Sumner Water System Plan

Figure **4-5**

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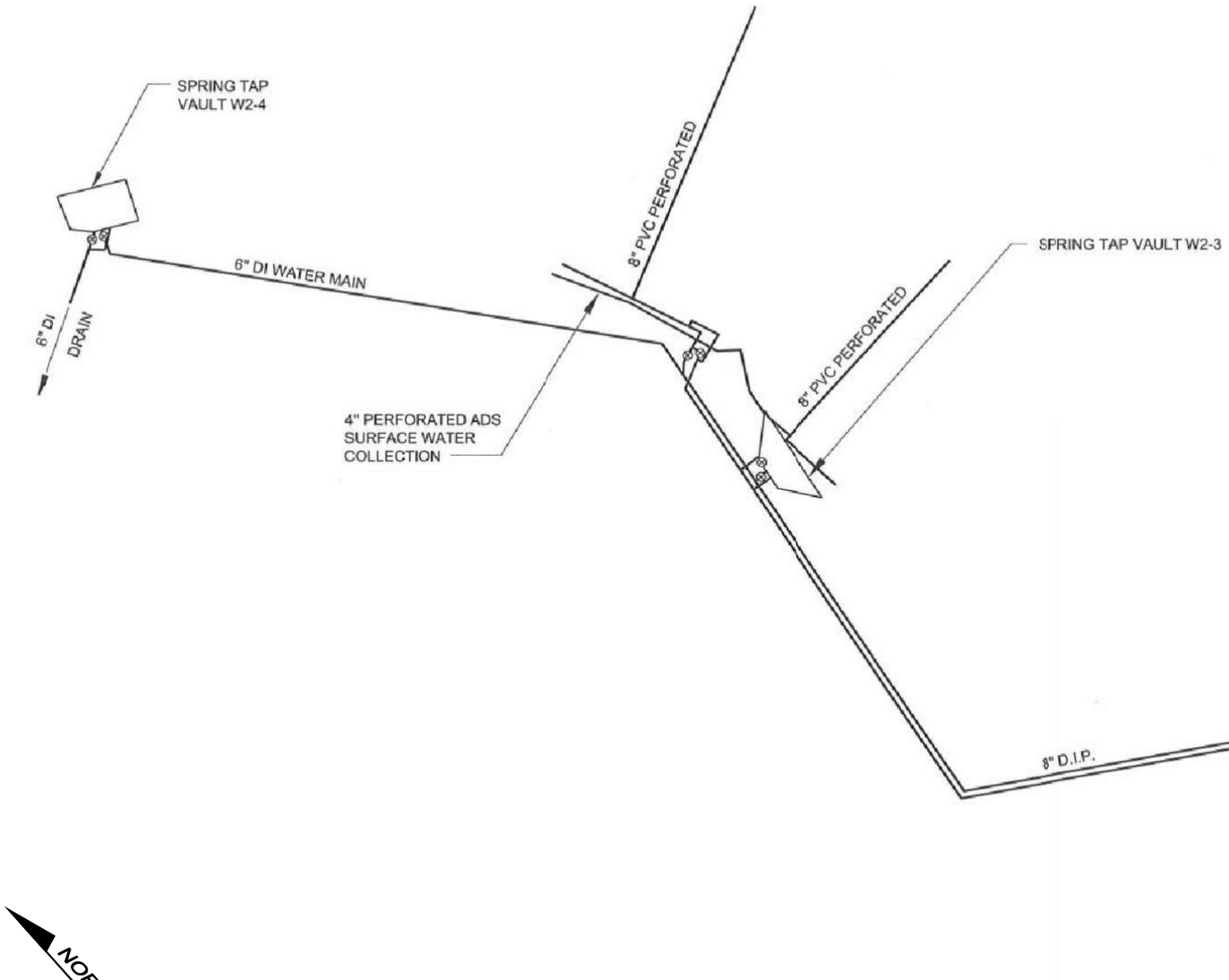

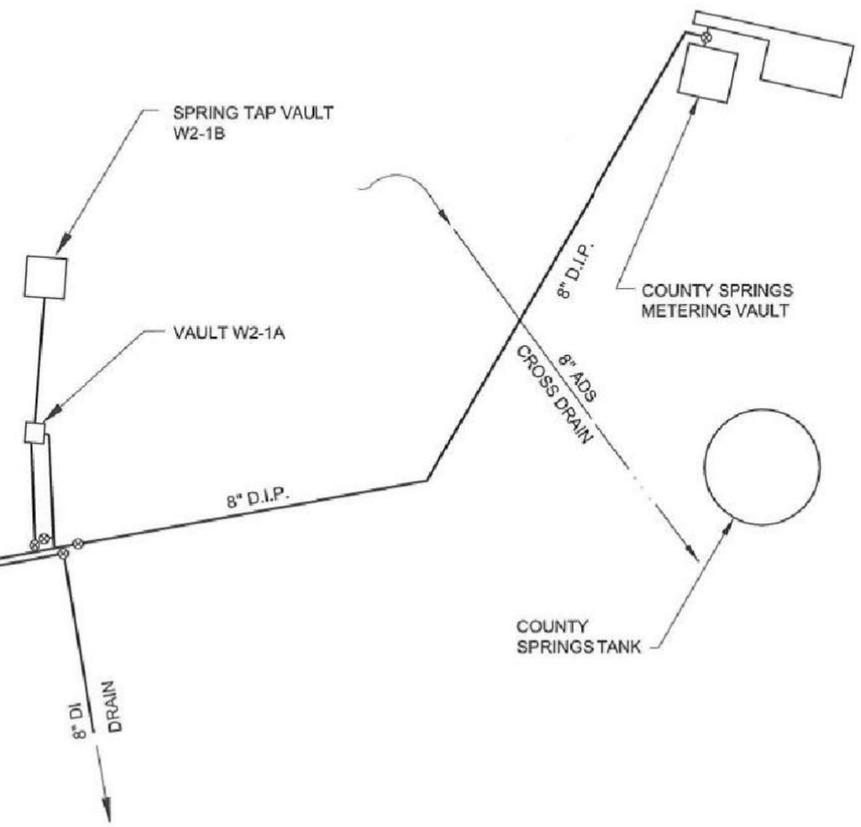

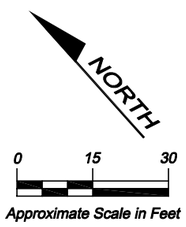

Source: Parametrix, May 2010

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CITY OF SUMNER WASHINGTON

Weber Springs No. 2

Sumner Water System Plan

Figure **4-6**

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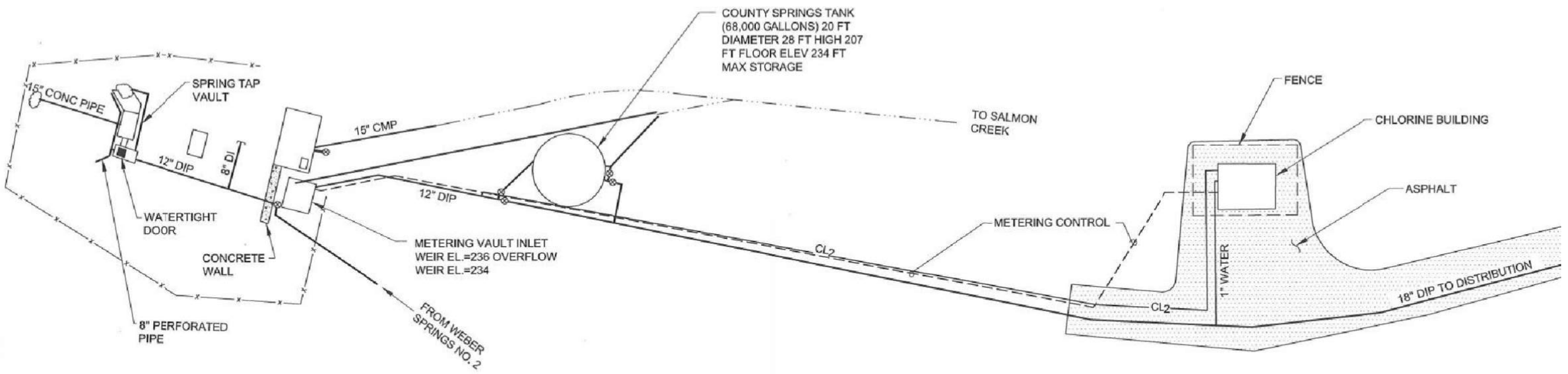

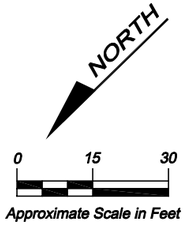

Source: Parametrix, May 2010

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CITY OF SUMNER WASHINGTON

County Springs

Sumner Water System Plan

Figure **4-7**

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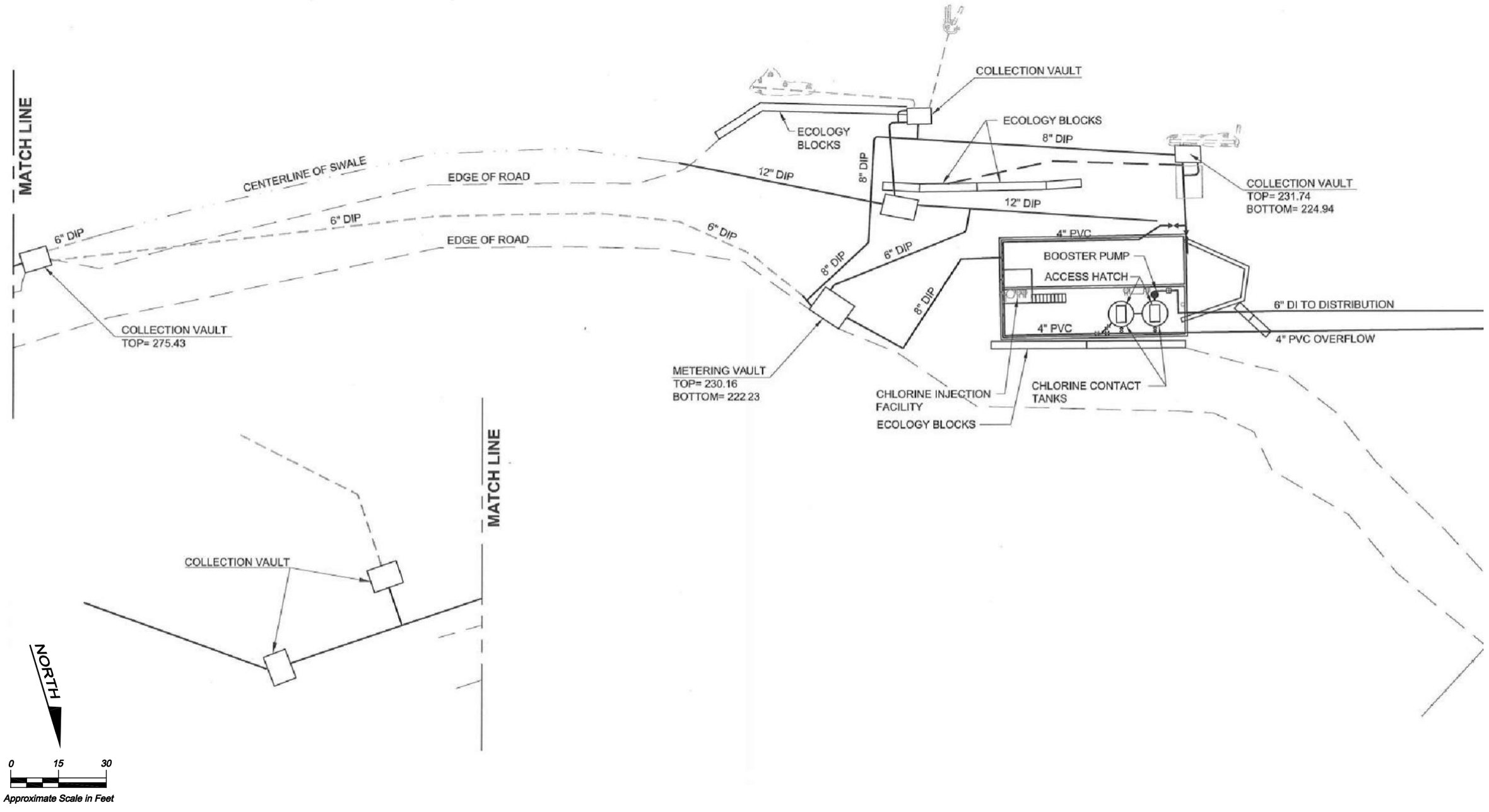

Source: Parametrix, May 2010

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CITY OF SUMNER WASHINGTON

Elhi Springs

Sumner Water System Plan

Figure **4-8**

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4.6.3 Dieringer Well

The Dieringer Well was constructed in 1954 to a depth of 408 feet. The well was constructed with 12 inch-diameter casing from 0 feet to 240 feet and 10-inch casing from 240 feet to 408 feet. Per the well log, the 12-inch casing was perforated from 215 feet to 238 feet, and the 10-inch casing was perforated from 245 feet to 386 feet. The Dieringer Well was initially constructed to service the Dieringer School and was later utilized by Peterson Brothers. The City of Sumner acquired the well and associated water rights and began using the source in 1998. Final acquisition of the Dieringer Well was completed in December 2003. In 2004, well improvements were completed to allow the City of Sumner to fully utilize the Dieringer Well as a permanent potable water source. Video investigation conducted during the well rehabilitation revealed that the actual casing perforations were not as extensive as indicated on the initial well log. Subsequently, the existing well casing was re-perforated between 258 feet and 305 feet, gravel backfill material was installed from 315 feet to 400 feet, and a 6-inch stainless steel screen was installed from 210 feet and 310 feet. Filter pack material was installed from 200 feet to 315 feet. This well is equipped with a seven-stage vertical-turbine pump with a capacity of approximately 250 gpm. The Dieringer Well control is automated such that the well turns on when the level in the North Tank drops below an operator selected, preset elevation. Water Rights granted for this well limit use to 95 gpm and 6.25 acre-feet per year.

4.6.4 Central Well

Construction of the Central Well was completed in 2008 to a depth of 407 feet. The well was constructed with 20-inch diameter casing set down to 304 feet and a 16-inch diameter casing set down to 407 feet. There are two 12-inch diameter well screens from 402 to 417.5 feet deep and 429.5 to 460.5 feet deep. A 12-inch diameter pressure relief screen was installed from 397 to 402 feet deep. A 12-inch diameter riser extends from the pressure relief screen within the internal well casing up to 343 feet below the existing ground surface. The well is equipped with a 6-stage vertical-turbine pump with a capacity of approximately 1,050 gpm. Water withdrawn from the Central Well is chlorinated on site and flows through greensand/pyrolusite pressure filters to remove manganese and granular activated carbon filters to remove organic taste and odor precursors before distribution.

The Central Well has been granted a temporary authorization by the Department of Ecology (DOE) to withdraw 1,050 gpm during the months of July, August, and September; average withdrawal from October through June is not to exceed 110.9 gpm. Under the temporary water right granted by the DOE, the well is also required to be used during these non-peak demand months in order to increase the diversion rate at the Springs sources. This provides mitigation for impacts to the White River from the dry weather pumping. Combined instantaneous withdrawal from the Central, South, and West Wells cannot exceed 1,250 gpm under this authorization. The City uses the Central Well as a primary point of withdrawal throughout the year.

The City has an application for permanent water rights submitted to the DOE (application G2-30524A) for withdrawal of 1,580 acre-feet per year at an instantaneous rate of 2,250 gpm from the Central Well.

4.6.5 Well Information

Table 4-3 lists system well information. Operation of wells is discussed further in Chapter 10, “Operations Program.”

Table 4-3
Well Information

Name (type)	Capacity (gpm)	Pump Head[1] (ft)	Speed (rpm)	Horsepower (hp)	Casing Depth (ft)	Casing Diameter (in)	Bowl Depth (ft)	Screen Length (ft)	Static Water Surface
South Well	700	155	1,760	50	304	16	100	26	Minus 5 ft
West Well	250	170	1,760	30	285	10	50	10	Minus 7 ft
Dieringer Well	250	264	3,450	30	408	12/10	165	90	Plus 9 ft
Central Well	1,050	252	1,785	100	407	20/16	100	15.5/31	Plus 6 to 8 ft

Notes:
1) At capacity.

4.7 Chlorination Facilities

4.7.1 Sumner Springs, County Springs, and South Well

Structural and mechanical relationships between the Sumner and County Springs chlorination facilities and spring collection works are shown on Figure 4-4 and Figure 4-7, respectively.

Each of these chlorination buildings, for the Sumner and County Spring sources, contain five chlorine cylinders (two online, three standby or empty), two chlorinators, two injectors, two injector pumps, residual analyzers, metering control equipment and charts, leak detection equipment, alarm facilities, and ventilation equipment. In general, both chlorination facilities are in very good condition and contain adequate safety equipment and controls.

South Well contains one chlorine cylinder, chlorinator, injector, injector pump, residual analyzer, metering control equipment and charts, leak detection equipment, alarm facilities, and ventilation equipment. In general, the chlorination facility is in fair condition and contains adequate safety equipment and controls.

Chlorine dose is based on flow-rate telemetry information from the metering vaults. The chlorine gas is metered in proportion to flow into distribution, injected into solution, and fed to the transmission lines feeding Sumner and County Springs Tanks, respectively. The South Well is connected to the distribution system. Operation of the chlorination facilities is discussed in Chapter 10, “Operations Program.”

Chapter 8 describes some planned improvements to the South Well, which will increase the chlorine contact time and improve the building and facilities on-site.

4.7.2 Dieringer Well, West Well, and Elhi Springs

The chlorine injection assemblies at the Dieringer, West Well, and Elhi Springs consist of a single drum of 12.5 percent sodium hypochlorite with a solenoid diaphragm dosing pump. The discharge side of the pump is equipped with an atmospheric vacuum breaker to prevent siphoning, a back-pressure check valve to keep positive pressure against the dosing pump, and an injection assembly with an integral ball check to prevent siphon and backwash. The suction side of the pump is equipped with a foot valve to keep the suction line primed and a graduated cylinder to allow pump calibration. The Dieringer Well and Elhi Springs chlorination systems are installed with continual chlorine residual analyzers.

4.7.3 Central Well

The chlorine injection assembly at the Central Well consists of an on-site sodium hypochlorite generation system that uses a prepared salt solution to generate a low strength 0.8 percent sodium hypochlorite liquid disinfectant. Similar metering pumps and suction/discharge side valving are used to pump the disinfectant solution into the treatment process stream, with a higher feed rate required to achieve the target disinfection residual levels (because of the lower solution strength). Pre-filtration chlorination is also performed at this site to assure that breakpoint chlorination is achieved within the treatment facilities for potential control of ammonia levels. Operations staff must periodically add bulk dry salt to the solution tank in order to continually generate the sodium hypochlorite solution, as well as periodically clean and maintain the electrolytic cells used to generate the disinfectant solution. As with the other sources, a chlorine residual analyzer is used to establish an appropriate solution injection rate to meet the ammonia oxidation needs and maintain the target disinfectant residual within the distribution system.

4.7.4 Chlorine Contact Time Product

WAC Section 246-290-451 states that groundwater sources required to disinfect shall provide a minimum CT Product of 6.0 at or prior to the first customer. CT (C x T) Product is defined as the combination of free chlorine residual (C) in mg/L and the contact time (T) in minutes. The initial CT is then corrected for the baffling configuration by applying a Baffling Factor. For pipes, the Baffling Factor is 1.0. A summary of CT Product for each source at flows equaling physical source capacity and instantaneous water right is depicted in Table 4-4. CT Product Calculations are contained in Appendix F.

The City of Sumner target chlorine residual within the conveyance and distribution system is 0.45 mg/L free chlorine. As shown above, a majority of the sources currently being operated are able to provide a minimum CT of 6 while dosing to maintain a free chlorine residual of 0.45 mg/L. The exceptions are Elhi Spring and the South Well, both of which are sources typically used during the dry summer months. The City currently does not withdraw from Elhi Springs because it is difficult to meet the CT requirements without a high residual at the first service connection.

Table 4-4
Source CT Product

Source Name (type)	CT @ Source Capacity	Notes
Sumner Springs	50.4 (mg/L)(min) @ 0.45 mg/L Cl Residual	Source Capacity = 951 gpm; Instantaneous Water Right = 2,805+ gpm
Elhi Springs	6.0 (mg/L)(min) @ 1.42 mg/L Cl Residual	Source Capacity = 92 gpm; Instantaneous Water Right = 360 gpm
County Springs	13.9 (mg/L)(min) @ 0.45 mg/L Cl Residual	Source Capacity = 650 gpm; Instantaneous Water Right = 800+ gpm
West Well	13.2 (mg/L)(min) @ 0.45 mg/L Cl Residual	Source Capacity = 250 gpm; Instantaneous Water Right = 250 gpm
South Well	6.0 (mg/L)(min) @ 0.49 mg/L Cl Residual	Source Capacity = 700 gpm; Instantaneous Water Right = 1,000 gpm
Dieringer Well[1]	91.8 (mg/L)(min) @ 0.3 mg/L Cl Residual	Source Capacity = 250 gpm; Instantaneous Water Right = 95 gpm
Central Well	28.2 (mg/L)(min) @ 0.45 mg/L Cl Residual	Source Capacity = 1,050 gpm; Instantaneous Water Right = 1,050 gpm

Notes:
1) CT @ Source Instant Water Right: 24.9 (mg/L)(min) @ 0.3 mg/L Cl Residual

4.8 Fluoridation Facilities

On October 22, 2002, the Tacoma Pierce County Board of Health (TPCBH) adopted Resolution 2002 3366A 2, which required all Pierce County water systems serving a population of 5,000 or greater to initiate a fluoridation program. A Pierce County Superior Court confirmed TPCBH's authority to order fluoridation of public and private water systems on February 19, 2003. The City of Sumner entered into a Fluoridation Program Grant Agreement with the Tacoma Pierce County Health Department (TPCHD) on April 10, 2003. This agreement stated that the City of Sumner would implement a fluoridation program with construction completed no later than November 30, 2003 and start up completed no later than December 31, 2003. In return, the TPCBH would partially reimburse the City of Sumner for engineering, construction, and start-up costs associated with developing and implementing the fluoridation program.

The City of Sumner developed the construction documents and Project Report for the fluoridation program and received TPCHD approval on December 29, 2003. Construction of the fluoridation facilities at each of the Sumner potable water sources began soon after TPCHD approved the project report and construction documents.

On May 13, 2004, the Washington State Supreme Court reversed the earlier Superior Court ruling, deciding that the TPCHB cannot mandate implementation of fluoride programs for public and private water purveyors. The basis of the reverse ruling was that the resolution conflicts with RCW 57.08.012, which gives water districts the power to control the content of their water systems and, with that power, the authority to fluoridate their water.

In light of the Supreme Court ruling, and to satisfy complaints and concerns associated with fluoridation expressed by citizens of Sumner, the City of Sumner scheduled a Public Hearing on July 19, 2004, to measure public opinion. Citizens attending the meeting were overwhelmingly against implementing a fluoridation program in the City of Sumner. As a result, on August 2, 2004, the Sumner City Council ruled that fluoridation would not be implemented in the City of Sumner.

4.9 Storage

The City of Sumner currently operates five storage tanks in the water system. Table 4-5 summarizes system storage facility information.

Sumner and County Springs Tanks are gravity fed by Sumner and County Springs, respectively. All storage tanks in the main pressure zone are at the same hydraulic grade. The South Tank and North Tank water surface elevations float up and down with the system hydraulic grade. The South Tank is equipped with a PAX Water Mixer to provide circulation and prevent thermal stratification. There is a seismic isolation valve installed on the Sumner Springs Tank outlet to the distribution system. Figures 4-4 and 4-7 show the orientation of Sumner and County Springs Tanks with the spring collection and chlorination facilities.

The fifth tank, located in the Sumner Viewpoint development, is fed by a pump house located adjacent to the South Tank and operates at a higher hydraulic grade than the rest of the system.

Figure 4-1 shows the elevation of the tanks with respect to the rest of the system. All tanks are in good condition. Operation of the tanks is discussed in Chapter 10, "Operations Program."

Table 4-5
Storage Information

Name	Function(s)	Total Volume	Working Volume[1]	Dimensions (diameter)	Height (ft)	Overflow Elevation (ft)	Floor Elevation (ft)	Condition
Sumner Springs Tank	Storage, Chlorine Contact	1.0 MG	1.0 MG	81 feet	26.00	234.00	208.0	Good
County Springs Tank	Primarily Chlorine Contact	0.068 MG	0.066 MG	20 feet	28.00	234.00	207.0	Good
South Tank	Storage	2.0 MG	2.0 MG	104 feet	32.00	234.00	202.0	Good
North Tank	Storage	2.0 MG	2.0 MG	120 feet	24.23	234.23	210.0	Good
Sumner Viewpoint	Storage, higher pressure zone	0.33 MG	0.194 MG	26 feet	85.00	392.00	310.0	Good

Notes:
1) To overflow elevation.

4.10 Meters

Service meters were installed at all customer connections starting in 1975, and installation continued through the early 1980s. System meters include two station meters and six master meters. Master meters are located at the distribution system connection points for Sumner Springs, County Springs, and Elhi Springs. Master meters are also located at all four wells. Station meters, nicknamed "system meters," are located in the metering vaults upstream of Sumner and County Springs storage tanks. Table 4-6 lists system meter information. Meters are further discussed in Chapter 10, "Operations Program."

Table 4-6
System Meter Information

Meter	Type	Size	Flow Measurement
Sumner Springs Station	Ultrasonic	Weir	Spring Flow, Bypass Flow, Total System Flow (calculated)
Sumner Springs Master	Magnetic	8-Inch	Flow from Sumner Springs Tank into Distribution System
County Springs Station	Ultrasonic	Weir	Spring Flow, Bypass Flow, Total System Flow (calculated)
County Springs Master	Magnetic	8-Inch	Flow from County Springs Tank into Distribution System
Elhi Springs Master	In-Line Turbine	2-Inch	Flow from Elhi Springs into Distribution System
South Well Master	In-Line Turbine	10-Inch	Flow from South Well into Distribution System
West Well Master	In-Line Turbine	10-Inch	Flow from West Well into Distribution System
Dieringer Well Master	In-Line Turbine	4-Inch	Flow from Dieringer Well to North Tank
Central Well Master	Magnetic	8-Inch	Flow from Central Well into Distribution System
Sumner Viewpoint			Flow to the Sumner Viewpoint Pressure Zone

4.11 Valves

The system contains hundreds of isolation valves that have been assigned a number on the City's water system maps. There are two air-release valves, several pressure-reducing valves (within the Sumner Viewpoint development on individual services and one 8-inch pressure reducing valve at the Sumner Viewpoint booster pump that connects the Sumner Viewpoint tank to the South Tank for emergency use only). Valves are exercised on a regular basis.

4.12 Hydrants

The system contains approximately 1,052 hydrants. All hydrants have been assigned a number on the City's water system maps.

4.13 Emergency Backup Power Systems

Emergency power hookups are available at Sumner Springs, County Springs, Elhi Springs, South Well, Dieringer Well, West Well, and Central Well facilities. The South, Dieringer, and West Wells do not have permanent emergency power sources. The booster pump station between the South Tank and the Sumner Viewpoint Tank contains an emergency power hookup, but the City has never utilized this connection due to the specialty nature of the connection.

4.14 Interties

The Sumner water system interties with the Puyallup water system. The valves remain closed except in emergencies. Figure 4-1 shows the location (schematically) of the Puyallup intertie. The portion of the Sumner water system previously owned by Webstone connects the Sumner and Pacific water systems with two interties normally closed. Existing and potential interties are discussed in further detail in Section 1.2, “Adjacent Water Purveyors.”

4.15 Telemetry and Controls

The City’s tanks and sources are all connected to the monitoring and control system at the City Shops building via a radio telemetry system.

In 2017, the water telemetry system was modified to make it independent from the radio telemetry system used to monitor the sanitary sewer collection system. The system operates using radios on a wireless monitoring network that report to a central system utilizing Wonderware software and WIN911 for alarm monitoring and reporting.

4.16 Asset Management

The water utility assets are cataloged in a geospatial database maintained by a GIS Specialist in the City’s public works department. Asset inventories and condition assessments are continuously updated based on input from field staff. New facilities are incorporated into the database from record drawings compiled as part of the City’s project acceptance process. Table 4-7 lists the data management system, attributes, and evaluation measures for several City water system assets.

4.17 Water Utility Computing Systems

The City of Sumner’s adopted vision statement of “setting the standard of excellence for a progressive small city” has led to the implementation of many computer software platforms that allow the City to manage the assets entrusted to it, automate the functionality of the City services, and increase the efficiency of City personnel. The myriad of software and hardware systems utilized by the water utility require that the City prioritize the maintenance and security monitoring of these system. It is also vital that City personnel are understanding of how each of the systems interact. Figure 4-9 illustrates the most prominent software resources currently being deployed along with a rudimentary depiction of how they are networked together.

Table 4-7
Asset and Data Management Inventory

Asset	Data Management			Evaluation Measures
	System	Source*	Recorded Attributes	
System Piping	GIS	E	▪ Physical data	▪ Age, material
	Work Order Database	O	▪ Flushing, leak detection, repairs	▪ Failure history ▪ Water quality history
	System Model	E	▪ Pressures, flows, velocities	▪ Hydraulic capacity adequacy
System valves	GIS	E	▪ Physical data	▪ Age
	Work order database	O	▪ Exercising program	▪ Full open/close capability
System hydrants	GIS	E	▪ Physical data	▪ Adequacy of port configuration for water utility/fire department
	Work order database	O, F	▪ Flushing program	▪ Retained functionality ▪ Fire flow capacity
	System model	E	▪ Water availability	▪ Fire flow adequacy
Source of supply facilities	Engineering database	E	▪ Planning/design/construction documentation	▪ Capacity, water quality criteria
	SCADA	O	▪ Pumping, treatment, water quality	▪ Communications reliability ▪ Production capability ▪ Regulatory compliance
	Work order database	O	▪ Equipment servicing	▪ Retained operational functionality
Storage facilities	Engineering database	E	▪ Planning/design/construction documentation	▪ Capacity criteria ▪ Seismic compliance
	Work order database	O	▪ Inspection, cleaning, coating	▪ Condition assessment
	SCADA	O	▪ Temperature, water quality	▪ Degree of stratification ▪ Chlorine demand

Table 4-7
Asset and Data Management Inventory

Asset	Data Management			Evaluation Measures
	System	Source*	Recorded Attributes	
Vehicles and equipment	Engineering and operations databases	E, O	▪ Maintenance records, inspections	▪ Retained functionality ▪ Operation need ▪ Code compliance
Staffing	Engineering and operations databases	E, O	▪ Responsibilities ▪ Projected workload ▪ Training, licensing, certifications	▪ Needed FTE assessment ▪ License, certification requirements ▪ Performance reviews and goal setting

Notes:
E =- Engineering
O = Operations
F = Fire Department

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City of Sumner's Public Works Software Systems Map

Version 3.3, Printed 6/19/2020

Utility Rate Model
Excel Spreadsheet
FCS W, SS, SD Rate Models
Capital Improvements
Utility Rates

Backflow Device Tracking
TOKAY
Device Inventory
Annual Notices

Tree Management
ARBOR PRO
Tree Inventory

GIS Dept

Record Drawing
\CDPW\Address File
Property Records
Project As-built Archives

Pavement Management
PAVER
Road Condition Ratings

Staff Map Viewer
GOOGLE EARTH
Utility Asset Viewer

Field GIS Data Collection
TRIMBLE TERRASYNC
Data Collection
Postprocessing

Asset Mapping
ERSI ARCGIS
Utility Assets
Parcel Data
Sensitive Areas
Zoning

Web Accessible Maps
GIS Online
GoogleEarth
Public Map Viewer

Computer Aided Drafting
AUTOCAD
Standard Details
Office Cubical Layouts
Civil Design

Connect GIS
Spatial Data
Hosting

Sewer Inspections
GraniteNet
Sewer Inspection Video
Feature Cataloging

Consultant Software

Water System Modelling
INFOWATER
Hydraulic Modelling
Fireflow Estimates

Sewer System Modelling
INFOSWMM
Hydraulic Modelling

Meter Reading
SpringBrook

Keys & Access
Sybis CyberLock

Community Engagement
Bang The Table

Maintenance
(WWTP & Collections)
AssetEssentials
Service History
Work Orders

Development Services

Utility Permitting
EnerGov
Permit Tracking

Plan Review
BLUEBEAM / ADOBE ACROBAT
Plan comments

Pretreatment Agreements
Tracking Log
Inspection Scheduling

Water Operations

Wi-Fi Network
SumnerWa.GOV
Device Connection

Text/Email

DSL

WatchGuard

Alarm Notification
TopView

Supervisory Data Acquisition
WONDERWARE INTOUCH

Data Storage
WONDERWARE HISTORIAN

Remote Desktop
RADMIN VIEWER

TopView
Mobile App

AB Radio
(Serial 450MHz)

North Tank
Derringer Well
Sumner Springs
County Springs
South Well
Viewpoint Tank
Viewpoint PS
South Tank
Central Well
Central Well Security Alarm
Elhi Springs

Sewer Collections

I&I Analysis
Excel Spreadsheet

Kelly H??

POTS

VOIP Phone App

Collections Server
Windows Server 16
Alarm: WIN911
SCADA: Intouch
Data: Historian
Remote Desktop: RADMIN

Remote Desktop
RADMIN VIEWER

Milltronics Pump Control/
Moscad Radio
PS02 - Puyallup
PS06 - Siebenthaller

MOSCAD
(Serial
450 MHz)

MOSCAD Control & Radio
PS04 - Jansen
PS14 - Forest Canyon
PS15 - North
PS16 - Mastro

Esteem
(Ethernet
450 MHz)

AB Compact Logics Control w/ Esteem Radio
PS01 - Tacoma
PS03 – Van Tassel
PS05 - Parker
PS07 - Cherry
PS08 - Mt. Circle
PS10 - 142nd Shops
PS11 - 16th East
PS12-16TH West
PS13 - Old Cannery

Operator Tablets

Wi-Fi Network
SumnerWa.GOV
Device Connection

Cable

WatchGuard

Lab Operations
Hach WIMS
Lab Records and Certification

Remote Desktop
RADMIN VIEWER

WWTP Operations

VOIP Phone App

POTS

WWTP0 (Server Rm)
Win 10
Alarm: WIN911
SCADA: Wonderware Intouch
Data: Historian
Remote Desktop: RADMIN

WWTP1 (Greg's Office)
Win 10

WWTP2 (Solids Handling)
Win 10

WWTP3 (Maint Room)
Win 10

Fiber Network

EB2
EB3
EB2 DAF
SCB
SHB
UV
Centrifuge
Dryer

Aeration Basin Control
Turblex Blower #1
Turblex Blower #2
Turblex Blower #3
Aerzen Blower
Influent Screen

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Chapter 5 Water Resources

This chapter provides information on the City's water resources, including an evaluation of the adequacy of current source and storage and projected requirements for new source and storage based on future water demands. Additionally, water rights, an updated Water Use Efficiency (WUE) program, water reclamation, and source sanitary control programs are summarized.

5.1 Source Evaluation

Since the 2009 WSP, the City of Sumner has spent considerable effort to develop an additional well source, the Central Well. With recent peak demand seasons progressively taxing the production capabilities of Sumner's sources of supply; the Central Well currently provides an additional point of withdrawal for existing groundwater rights shared by the South and West Wells. Operation of the Central Well allows Sumner to achieve needed instantaneous production levels allowable under the existing rights. The Central Well is anticipated to ultimately expand system production capabilities to meet future demands upon the approval of a pending application for additional water rights.

Based on groundwater modeling and evaluation of the potential impacts to rivers within the Puyallup basin from withdrawals that include these three wells, Sumner received a temporary approval from the Department of Ecology (DOE) in June 2017 to utilize the Central Well as a primary groundwater source of supply during the summer peak demand season. The combined average and instantaneous withdrawals of the South, Central, and West sources under the temporary approval are still restricted to the existing rights granted for the South and West Wells, and the Central Well use must adhere to an agreed upon use pattern during off-peak months. DOE's June 23, 2017 letter approving a temporary water right for the Central, with conditions, is attached in Appendix G.

Existing and future source capacities are presented in Table 5-1. WAC 246-290-222 requires that source capacity is sufficient to provide water equal to or exceeding the MDD, which is calculated in Chapter 3 and summarized as Table 5-2. Existing source capabilities are evaluated based on the authorized production rates of the South, Central, and West wells during peak demand season under the DOE temporary approval, in addition to Dieringer Well and springs source capacities. Due to the curtailed use of the South, Central, and West wells under the temporary approval, existing source capacity during off-peak months (October through June) is also compared with the ADD anticipated during these periods of the year.

This chapter will evaluate the capacity of the system under the following four scenarios:

- Scenario A: Current capacity of the existing sources operating within the water rights presently allocated to the City.
- Scenario B: Current capacity of the existing sources operating within the existing water rights with the addition of water rights for the Central Well.
- Scenario C: Existing sources and water rights as identified in Scenario B with the addition of the full buildout of the Central Well to the ultimate instantaneous production rate.
- Scenario D: All existing sources expanded to fully utilize existing water rights and the requested water rights for the Central Well.

Table 5-1
Instantaneous Source Analysis

Source	Scenario A		Scenario B	Scenario C	Scenario D
	Existing Capacity Legally Available (Peak Season)	**Existing Capacity Legally Available (Off-Peak Season)**	**Existing Capacity with Applied for Water Rights**	**Existing Capacity with Applied for Water Rights and Central Well Buildout**	**Full Utilization of Existing and Applied for Water Rights**
Sumner Springs Capacity (mgd)	1.37	1.37	1.37	1.37	4.01
County Springs Capacity (mgd)	0.94	0.94	0.94	0.94	1.15
Elhi Springs Capacity (mgd)	~~0.13~~	~~0.13~~	~~0.13~~	~~0.13~~	0.52
Weber Springs (mgd)	Weber Springs' Flows are incorporated into the Sumner and County Springs Capacities				0.29
South Well Capacity (mgd)	0.00	1.01	1.01	1.01	1.44
Dieringer Well Capacity (mgd)	0.14	0.14	0.36	0.36	0.36
West Well Capacity (mgd)	0.00	0.00	0.36	0.36	0.36
Central Well Capacity (mgd)	1.51	0.16	1.51	3.02	3.02
Total Source Capacity (mgd)	**3.96**	**3.62**	**5.55**	**7.06**	**11.15**

For the Scenarios B, C and D, it is assumed that the City will gain approval of a pending water rights application to increase the cumulative instantaneous withdrawal from the South, Central, and West Wells from 1,250 gpm (1.8 mgd) to 2,250 gpm (3.24 mgd), and to increase the total annual quantity of water rights from 2,882.25 acre-feet/year to 4,462.25 acre-feet/year.

City intent for these sources in the future is to increase use of the Central Well to its designed ultimate production and treatment capacity of 3.02 mgd, use the South Well as needed up to allowable instantaneous withdrawal rights, and reserve the West Well for the supply of irrigation water at the City Cemetary.

In Scenario A, the South Well production rate is discounted to reflect operation only when the Central Well is not in use.

The total source capacities shown for each scenario in Table 5-1 are different than the total operational capacity of the City's sources. The operational capacities will be used for the source of supply analyses in this Chapter; assumptions are summarized as follows:

- Use of the Ehli Springs is discounted due to the water quality issues which cause them to typically be off-line under normal operating circumstances.
- Under peak Scenario A, the City will operate the Central Well at capacity in order to not exceed the combined 1.8 mgd allowed between the West, Central, and South Wells during peak months under the temporary water authorization (see Appendix G).
- Under off-peak Scenario B, the City will operate the Central Well at capacity as needed, but limit its use to not exceed the 0.47 mgd allowed between the West, Central, and South Wells during off-peak months under the temporary water authorization (see Appendix G). The 0.16 mgd instantaneous capacity of the Central Well in Scenario B is the additional capacity available from the Central Well derived from this operational pattern.

Table 5-2
Source Capacity Analysis by Scenario

Year	Projected MDD (mgd)	Projected Off-Peak MDD (mgd)	Projected Residential and Commercial ERU's[2]	Source Capacity Surplus (Deficiency) by Scenario (mgd)				
				A (Peak)	A (Off-Peak)	B	C	D
				3.96	**3.62**	**5.55**	**7.06**	**11.15**
2018	3.36	2.16	6,353	0.60	1.46	2.19	3.70	7.79
2024	3.52	2.21	6,798	0.44	1.41	2.03	3.54	7.63
2028	3.64	2.27	7,045	0.32	1.35	1.91	3.42	7.51
2038	3.89	2.43	7,578	0.07	1.17	1.66	3.17	7.26
2068H[1]	5.97		11,340	-2.01		-0.42	1.09	5.18

Notes:
1) 2068H MDD projection developed by the City and used for ongoing water rights negotiations with local agencies.
2) Residential and commercial ERU's were calculated by dividing the projected population for each planning year as shown in Chapter 3 by the population per ERU value of 2.75 residents per ERU and 7.69 employees per ERU, respectively. These values are 3-year averages from 2015 to 2017.

Subtracting instantaneous source capacity from projected MDD yields source surplus/deficiency for each planning year. The current source capacity provides an approximate surplus of 0.60 mgd during 2018 MDD conditions, but would result in a negligible excess capactiy at the 20-year planning horizon in year 2038.

The source deficiency shown at the 50-year planning horizon, a common milestone to consider when negotiating and attempting to secure sufficient long-term source water rights, provides justification for Sumner's additional water requests under Scenarios B and C.

In addition to meeting WAC requirements of supplying MDD, Chapter 5 of the DOH *WSDM* provides reliability recommendations for sources of supply in a water system that might result in a more dependable and adequate water supply, includes meeting the following criteria:

- Sources can replenish depleted fire suppression storage within 72 hours while supplying MDD.
- Source capacity is capable of meeting MDD within 18-hour period.
- Sources can provide ADD with largest source out of service.

The City's sources are evaluated under these criteria in Table 5-3 through Table 5-5.

Table 5-3
Source Analysis
Replenish FSS in 72 Hours with MDD

Scenario	A (Peak)	A (Off-Peak)	B	C	D
Total Operational Supply (mgd)	3.96	3.62	5.55	7.06	11.15
FSS Replenish Demand(1) (mgd)	0.36	0.36	0.36	0.36	0.36
Allowable MDD(2) (mgd)	3.60	3.26	5.19	6.70	10.79
Planning Year that the allowable MDD would be exceeded	<2018	≈2050	≈2050	>2068	>2068
Projected Residential and Employment ERU's at Planning Year	6,104	8,416	8,416	13,519	13,519

Notes:
1) FSS replenish demand calculated using largest required fire flow of 4,500 gpm for 4 hours, or 1,080,000 gallons divided by 3 days (72 hours).
2) Allowable MDD is equal to the total operational supply capacity minus the FSS replenish demand.

Table 5-4
Source Analysis
Meet MDD with 18 Hours of Pumping

Scenario	A (Peak)	A (Off-Peak)	B	C	D
Total Operational Supply with 18 Hours of Pumping (mgd)[1]	4.01[2]	3.29[2]	4.74	5.87	9.57
Allowable MDD (mgd)	4.01	3.29	4.74	5.87	9.57
Planning Year that the Allowable MDD would be Exceeded	2027	2050	>2068	>2068	>2068
Projected Residential and Employment ERU's at Planning Year	6,798	6,798	13,519	13,519	13,519

Notes:
1) Assumes all pumped well sources operate for 18 hours, springs sources maintain 24 hour production due to gravity feed to the system.
2) The South and West Wells are assumed to be operational for the 6 hours per day that the Central Well is not operational.

Table 5-5
Source Analysis
Meet ADD with Largest Source Offline

	Scenario A – Peak	Scenario B – Off Peak	Scenario B	Scenario C	Scenario D
Supply Without Largest Source (mgd)	3.46[1]	2.25	4.04	4.04	7.14
Allowable ADD (mgd)	3.46	2.25	4.04	4.04	7.14
Projected Planning Year that the MDD is exceeded.	>2068	>2068	>2068	>2068	>2068
Estimated Residential and Employement ERU's at Projected Planning Year	13,316	13,316	13,316	13,316	13,316

Notes:
1) Assumes the Central Well is out of service, but the South and West Wells would be operated at their production capacities of 700 and 250 gpm.

With the addition of the full source capacity of the Central Well under Scenario B, the City's sources meet the DOH reliability recommendations for the 20-year planning period. Until that point, evaluation of reliability criteria suggests that the City would have difficulty replenishing storage volume associated with an occurrence of the highest rated fire during summer MDD conditions.

Failure to obtain the increased water withdrawl rights from the City's wells of 2,250 gpm results in a current source of supply deficiency of 0.66 mgd (458 gpm) additional water supply to resolve through 2038.

If the increase in water rights from the groundwater wells becomes impossible, a combination of improvements to interties and the springs sources will become necessary to meet the demands of the 20-year planning horizon.

5.2 Storage Evaluation

According to the DOH *WSDM*, the following five components shall be considered in sizing required storage volume for a public water system:

- Operational storage (OS);
- Equalizing storage (ES);
- Standby storage (SB);
- Fire suppression storage (FSS); and
- Dead storage (DS), if any.

The tank located in the Sumner Viewpoint development is fed by a pump house located at the South Tank and operates at a higher hydraulic grade than the rest of the system. Because this tank functions on a higher grade line and serves the Sumner Viewpoint development (which includes a relatively small number of residential connections), its volume is not included in the total storage capacity calculations of the main system. A separate storage analysis was done for the Sumner Viewpoint pressure zone.

5.2.1 Operational Storage (OS)

Per the 2009 *WSDM*:

"OS is the volume of the reservoir devoted to supplying the water system while, under normal operating conditions, the sources of supply are in "off" status (WAC 246-290-010). This volume will vary according to two main factors:

1. The sensitivity of the water level sensors controlling the source pumps.
2. The configuration of the tank designed to provide the volume required to prevent excessive cycling (starting and stopping) of the pump motor(s).

OS is in addition to the other storage components. When the reservoir is full, OS provides a safety factor beyond that provided by the ES, SB, and FSS."

The City of Sumner Water System utilizes spring sources that in normal operation have constant bypass. This means that the reservoirs are constantly being filled to overflow. When the reservoir is full, the excess flow is diverted to the spring bypass; therefore, the City of Sumner's main pressure zone tanks do not have measurable operational storage (OS) requirements. The Viewpoint BPS supply to the Viewpoint tank is called on when the water level drops four feet below full. Therefore, the Viewpoint tank has an OS equivalent to four feet of tank depth.

5.2.2 Equalizing Storage (ES)

Equalizing storage (ES) is used to help meet demand requirements during peak hours of the day. Peak hours often demand water at a rate faster than the source can provide, so equalizing storage is called upon to make up the difference during those hours. Later, the source can catch up and replenish this storage when demand is low. The total water produced by the source during a day should equal total demand for that day. ES acts as a buffer and helps balance the demand on the source.

When figuring the necessary ES for a water system, several factors must be considered: peak system demand, diurnal variations in the system demand, the production rate of the source facility, and how the production facility operates (i.e., continuous production or production during daily shifts). ES must provide adequate volume to meet the periodic hourly peak demands and allow the supply facility a reasonable amount of time to supply total daily demand.

A recommended equation for determining equalizing storage, as provided by DOH, is as follows:

ES = ***(PHD - Qs)*(150 min.)**, *but in no case less than zero*

Where:

ES	=	*Equalizing storage component, in gallons*
PHD	=	*Peak hourly demand, in gpm, as defined earlier*
Qs	=	*Sum of all installed and active supply source capacities except emergency supply, in gpm.*

5.2.3 Standby Storage (SB)

Standby storage (SB) refers to an emergency or reserve storage supply. The DOH Sizing Guidelines for SB are based upon the maximum-day demand, the duration of a possible emergency, the supply capacity to the system, and the number of connections in the water system. This supply of water shall be available to all connections with a minimum pressure of 20 psi.

The recommended equation for determining standby storage is as follows:

$$SB_{TSS} = (2\ days)(ADD)(N) - tm\ (Qs - QL)$$

Where:

SB_{TSS}	=	*Total standby storage for a single source water system, in gallons*
ADD	=	*Average day demand for the design year, in gpd/ERU*
N	=	*Number of ERUs*
Qs	=	*Sum of all installed continuously available source of supply capacities, except emergency sources, in gpm.*
QL	=	*The largest capacity source available to the system, in gpm.*
tm	=	*Time that remaining sources are pumped on the day when the largest source is not available, in minutes (generally assumed to be 1,440 minutes).*

SB is used to provide water service during an emergency occurring somewhere within the water system. Such an emergency could be a pump going out, an interruption in the water supply, fire flow, a critical valve or pipeline going out of service somewhere in the distribution system, etc.

DOH also recommends that standby storage should not be less than 200 gpd/ERU. This value will be used to calculate a separate standby storage volume that will be included in the storage analyses in Table 5-6 and Table 5-7.

5.2.4 Fire Suppression Storage (FSS)

Per the 2009 *WSDM*:

"The local fire protection authority or county fire marshal determines a fire flow requirement for water systems. This fire suppression storage (FSS) level depends on the maximum flow rate and duration. Water systems must build and maintain facilities, including storage reservoirs, capable of meeting fire flow requirements while maintaining 20 psi pressure throughout the distribution system (WAC 246-290-221(5)).

Water systems in areas governed under the Public Water System Coordination Act of 1977 (chapter 70.116 RCW), must meet the minimum flow rates and durations for residential, commercial, and industrial developments specified in the Water System Coordination Act (see Section 10.1) (WAC 246-293-640). The local fire protection authority, county fire marshal, or a locally adopted coordinated water system plan, may specify greater FSS requirements."

Table 5-6
Sumner 234 and 392 Zone Storage Analysis

	Existing Scenario A (Peak Season)	2038 Scenario A (Peak Season)	2068H Scenario B
Average Day Demand (mgd)	1.719	1.994	2.85
Max Day Demand (mgd)	3.011	3.887	5.97
Peak Hour Demand (gpm)	3,764	4,389	6,729
Operational Storage (MG)	0.016	0.016	0.016
Equalizing Storage (MG) (1)	0.125	0.261	0.530
Fire Suppression Storage (MG)	1.200	1.080	1.080
Standby Storage (MG) (1)	1.246	0.112	0.112
Standby Storage (MG) (2)	1.444	2.108	3.404
Dead Storage (MG)	0.136	0.136	0.136
Total Required Storage (MG) (3)	**1.721**	**2.520**	**4.086**
Total Available Storage (MG)	**5.068**	**5.068**	**5.068**
(Deficit) or Surplus Storage (MG)	**3.347**	**2.548**	**0.982**

Notes:
1) Calculated standby storage using Equation 9-3 from the 2009 *WSDM*. The capacity of sources of supply were assumed to increase in 2024 for equalizing and storage calculations, consistent with receiving additional groundwater rights.
2) Calculated standby storage using DOH recommended value of 200 gal/ERU.
3) Fire Suppression Storage and Standby Storage assumed to be nested for all years. The largest value resulting from the two calculated methodologies was used for the Standby Storage component.

Table 5-7
Sumner Viewpoint 392 Zone Storage Analysis

	Existing Storage Scenario A (Peak Season)	392 Storage Limits
Average Day Demand (mgd)	0.020	0.086
Max Day Demand (mgd)	0.035	0.242
Peak Hour Demand (gpm)	101	
Operational Storage (MG)	0.016	0.016
Equalizing Storage (MG) [(1)]	0.000	0.000
Fire Suppression Storage (MG)	0.120	~~0.120~~[(4)]
Standby Storage (MG) [(1)]	~~0.037~~[(4)]	0.172
Standby Storage (MG) [(2)]	~~0.010~~[(4)]	~~0.090~~[(4)]
Dead Storage (MG)	0.136	0.136
Total Required Storage (MG) [(3)]	**0.272**	**0.324**
Total Available Storage (MG)	**0.330**	**0.330**
(Deficit) or Surplus Storage (MG)	**0.058**	**0.006**

Notes:
1) Calculated standby storage using Equation 9-3 from the 2009 *WSDM*. The capacity of sources of supply were assumed to increase in 2024 for equalizing and storage calculations, consistent with receiving additional groundwater rights.
2) Calculated standby storage using DOH recommended value of 200 gal/ERU.
3) Fire Suppression Storage and Standby Storage assumed to be nested for all years. The largest value resulting from the two calculated methodologies was used for the Standby Storage component.
4) Only the largest requirement in rows labeled Fire Suppression Storage (MG), Standby Storage (MG) [(1)], and Standby Storage (MG) [(2)] are included in the Total Required Storage.

The following equation expresses the required FSS:

$$FSS = (FF)(t_m)$$

Where:

FF = *Required fire flow rate, expressed in gpm, as specified by the fire protection authority or the Coordination Act, whichever is greater*

t_m = *Duration of FF rate, expressed in minutes, as specified by fire protection authority or the Coordination Act, whichever is greater*

The SB or the FSS storage components, whichever volume is smaller, can be excluded from the total storage requirement of a water system per WAC 246-290-235(4) provided that such practice is not prohibited by:

1. A locally developed and adopted Coordinated System Plan
2. Local ordinance
3. The local fire protection authority or County Fire Marshal

This prevents unused water stagnating in oversized tanks. Calculations for FSS are shown below. The FSS is based on the largest required fire flow rate and duration within each pressure zone of the City's service area.

Sumner:

FSS = (4,500 gpm)*(4 hours)*(60 min/hr)
FSS = 1.08 Million Gallons

Sumner Viewpoint:

FSS = (1,000 gpm)*(2 hour)*(60 min/hr)
FSS = 0.12 Million Gallons

5.2.5 Dead Storage (DS)

Per the 2009 *WSDM*:

"Dead storage (DS) is the volume of stored water not available to all consumers at the minimum design pressure (WAC 246-290-230(5) and (6)). The reservoir- and water system-capacity analysis should clearly identify the DS volume."

DS (effective only to provide adequate pressure) is the volume of stored water not available to all consumers at the minimum system design pressure. DS volume is excluded from the volumes provided to meet operational, equalizing, and fire suppression storage requirements.

The City of Sumner's main pressure zone is served at a hydraulic grade line of 234 feet. The minimum system pressures within the system are normally at 50 psi. The height of the reservoirs varies, but is approximately 25 feet. A pressure drop of 11 psi (25 feet) results in minimum system pressure of 38 psi, which is above the minimum allowed pressure. Therefore, a majority of the system does not include dead storage.

The highest service elevation in the second pressure zone, served exclusively by the Sumner Viewpoint tank, is at approximately 298 feet. A hydraulic grade line of 344 feet is required to provide 20 psi residual pressure during a fire flow scenario at this service; this results in approximately 34.2 feet or 136,000 gallons of dead storage.

5.2.6 Storage Summary

The City's excess reservoir capacity serves as storage for peak-hour demands. Based on the required storage calculations, the City had an existing excess storage capacity of 3.509 million gallons and will have an estimated excess of 2.96 million gallons in year 2038, assuming that no improvements are made to existing sources and no additional sources are acquired to improve instantaneous system capacity.

A summary of the storage analysis for the City's main system and the Viewpoint pressure zone is provided as Table 5-6and Table 5-7. The calculations generally show that Sumner has adequate capacity in each of its pressure zones with existing storage facilities for the planning period of this document.

It was estimated that the Viewpoint pressure zone has an existing excess of 0.058 million gallons of storage. All water supplied to the 392 zone is from storage contained in the 234 zone, equalizing and operational storage volumes are calculated based on the

instantaneous capacity of the booster pump station. Impacts from instantaneous source capacities are accounted for in the 234 zone storage calculations.

The number of ERU's served in the 392 zone could increase by approximately 350% (from 87 ERU's in 2016 to 310 ERU's) before the Standby Storage would exceed the Fire Supression Storage and thereby reduce the estimated existing excess storage capacity in this zone.

The DOH *WSDM* also provides the following recommendations for distribution storage reliability:

- More than one gravity storage tank exists and can be isolated without interruption to service.
- Storage can meet standby capacity of at least two times the ADD while ensuring that fire suppression service will be available at 20 psi minimum residual pressure.
- A minimum of 200 gpd per residential connection of standby volume is provided.
- An alarm system notifies operators of overflows or when storage drops below equalizing storage volume.

The Sumner water system has more than one gravity storage tank, and all can be isolated without interruption to service. Alarm systems are installed at each reservoir and notify operators of overflow scenarios or when equalizing storage is depleted. The remaining criteria are evaluated and summarized as Table 5-8 through Table 5-11. Sumner has adequate storage capacity to meet all criteria for the 20-year planning horizon. The storage components within the City's tanks are illustrated in Figure 5-1 and Figure 5-2.

Table 5-8
234 Zone Storage Analysis – Provide FSS plus Two Times ADD

	Existing Scenario A (Peak Season)	2038 Scenario A (Peak Season)	2068H Scenario B
Two Times ADD (MG)	3.438	3.988	5.700
FSS (MG)	1.080	1.080	1.080
Total Recommended Storage (MG)	4.518	5.068	6.780
Total Available Storage (MG)	5.068	5.068	5.068
(Deficit) or Surplus Storage (MG)	0.550	0.000	-1.712

Table 5-9
392 Zone Storage Analysis – Provide FSS plus Two Times ADD

	Existing	392 Storage Limits
Two Times ADD (MG)	0.040	0.172
FSS (MG)	0.120	0.120
Total Recommended Storage (MG)	0.160	0.292
Total Available Storage (MG)	0.330	0.330
(Deficit) or Surplus Storage (MG)	0.170	0.038

Table 5-10
234 Zone Storage Analysis – Provide 200 gpd/ERU of SB

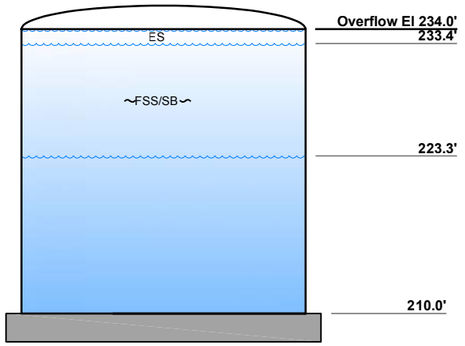
	Existing Scenario A (Peak Season)	2038 Scenario A (Peak Season)	2068H Scenario B
ERUs	8,687	10,539	17,019
Total Required SB (MG)	1.737	2.108	3.404
Total Available SB[(1)] (MG)	3.727	3.712	3.442
(Deficit) or Surplus Storage (MG)	1.990	1.604	0.038

Notes:
1) Available SB volume is calculated as the total available storage minus operational, equalizing, fire and dead storage components. Nesting of fire and standby allows additional surplus.

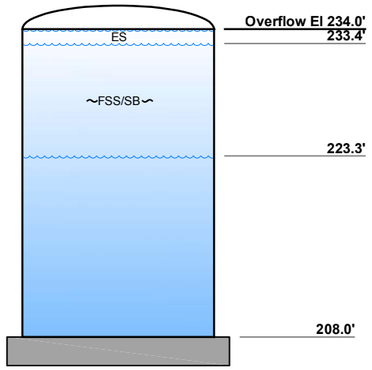
Table 5-11
392 Zone Storage Analysis – Provide 200 gpd/ERU of SB

	ERUs	Total Required SB (MG)	Total Available SB[(1)] (MG)	(Deficit) or Surplus Storage (MG)
Existing	88	0.022	0.105	0.084
392 Storage Limits	450	0.172	0.178	0.006

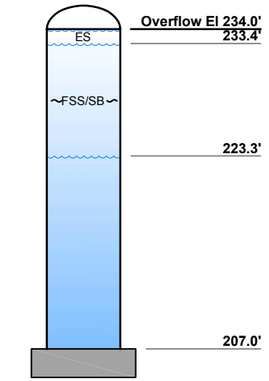
Notes:
1) Available SB volume is calculated as the total available stroage minus operational, equalizing, fire and dead storage components. Nesting of fire and standby allows additional surplus.



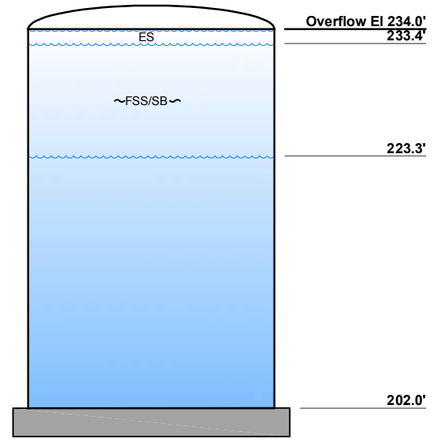
NORTH TANK
2.0 MG



SPRINGS TANK
1.0 MG



COUNTY TANK
0.068 MG



SOUTH TANK
2.0 MG

NOTES:

1. THERE IS NO OPERATING STORAGE SINCE THE TANKS ARE SUPPLIED BY SPRINGS AND ARE CONSTANTLY FILLED TO OVERFLOW.

LEGEND

OS = Operational Storage
ES = Equalizing Storage
FSS = Fire Suppression Storage
SB = Standby Storage

Sumner 234 Zone Water Storage Facilities

Sumner Water System Plan

Figure **5-1**

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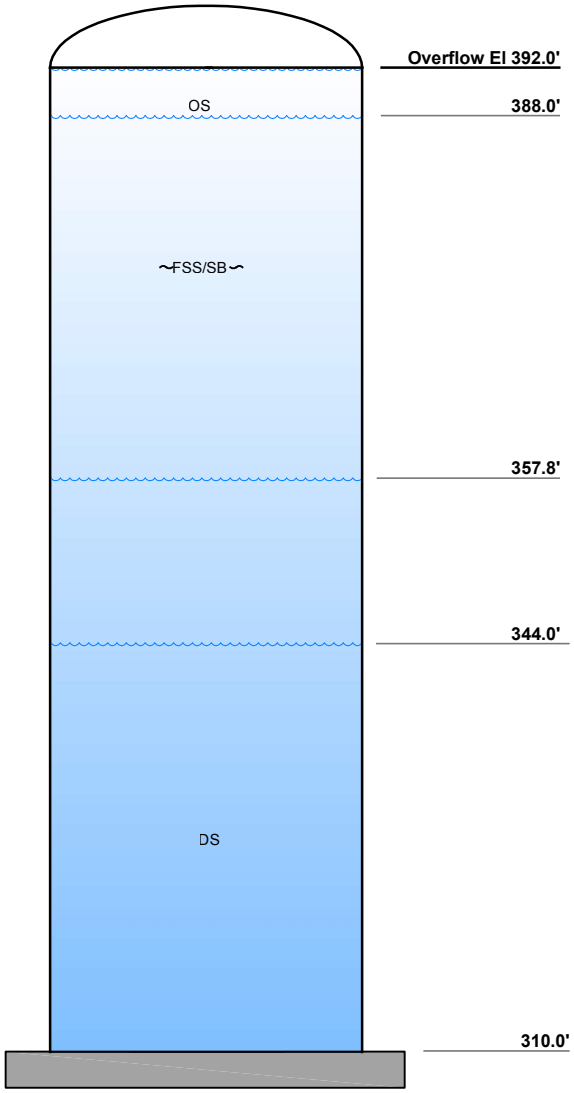

VIEWPOINT TANK
0.33 MG

NOTES:

1. THERE IS NO EQUALIZING STORAGE SINCE THE SUPPLY RATE TO THE TANK IS GREATER THAN THE PEAK HOUR DEMAND IN THE PRESSURE ZONE.

LEGEND

OS = Operational Storage
ES = Equalizing Storage
FSS = Fire Suppression Storage
SB = Standby Storage
DS = Dead Storage

BHC CONSULTANTS

CITY OF SUMNER WASHINGTON

Sumner 392 Zone
Water Storage Facilities
Sumner Water System Plan

Figure
5-2

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5.3 Booster Pump Station Evaluation

The DOH *WSDM* also includes required criteria for a booster pump station that pumps to an open system (one that has storage and a free water surface level). These criteria are summarized as follows and evaluated in Table 5-12 and Table 5-13:

- BPS meets the MDD for the pressure zone.
- BPS meets the ADD for the pressure zone with the largest pump out of service.

Table 5-12
Viewpoint BPS Analysis – Meet MDD

	Existing	2038	At Zone Stoage Limits (see Table 5-7)
Viewpoint MDD (gpm)	29.7	49.3	168.1
BPS Supply (gpm)	700.0	700.0	700.0
(Deficit) or Surplus Supply (gpm)	670.3	650.7	531.9

Table 5-13
Viewpoint BPS Analysis – Meet ADD Without Largest Pump

	Existing	2038	At Zone Stoage Limits (see Table 5-7)
Viewpoint ADD (gpm)	13.9	22.9	59.7
BPS Supply Without Largest Pump (gpm)	700.0	700.0	700.0
(Deficit) or Surplus Supply (gpm)	686.1	677.1	640.3

The Viewpoint BPS has two pumps that operate in a lead-lag pattern to supply the Viewpoint tank, but are redundant due to their capacity. There is not a deficit in the BPS capacity through 2038. Additionally, the *WSDM* recommends the following criteria are met for BPS reliability:

- Multiple pumps installed with capacity to provide MDD of the service area with largest pump out of service.
- At least 20 psi is provided at the intake of the pumps under PHD or fire flow plus MDD conditions.
- An automatic shut-off is in place for when the intake pressure drops below 10 psi.
- Power connections are available to two independent primary public power sources or there is a provision for in-place auxiliary power.

The Viewpoint BPS is located at an elevation of approximately 202 feet and is supplied by the South tank and main pressure zone with a hydraulic gradient of 234 feet. Thus, there is not typically 20 psi provided at the intake of the pumps. Intake pressure is monitored, and automatic shutoff is provided. There is an existing backup generator plug on site and the power must be manually transferred to the backup source. A new automatic transfer switch, control panel, and onsite backup generator are included in the recommended improvements for the BPS as summarized in Table 5-14.

The Valley Crest Booster Pump Station maintained by the Valley Crest Maintenance Association was not assessed in this report since it is maintained independently from the utility.

5.4 Field Condition Assessments

Site walkthroughs and condition assessments with City engineering and operations staff were performed at each of the well, springs, and reservoir sites in August 2017. Recommended improvements for each facility are summarized as Table 5-14. Additional discussion of the recommended improvements for each facility is provided in Chapter 8.

Table 5-14
Recommended Improvements per Facility

Facility	Recommended Improvements
North Tank	▪ Replace interior ladder in tank ▪ Install PAX mixing system for added water quality while Dieringer Well is off ▪ Install emergency generator ▪ Recalibrate existing Cla-Val on tank supply pipe to operate as a shutoff valve for flow spikes
Springs Tank	▪ Recoat exterior of tank
County Tank	▪ Recoat exterior of tank
South Tank	▪ Complete seismic retrofit of tank ▪ Install seismic valve on combined inlet/outlet pipe of tank as part of seismic retrofit project ▪ Repaint tank exterior as part of seismic retrofit project
Viewpoint Tank	▪ Install detention pond downstream of tank drain ▪ Install seismic valve on tank outlet pipe
Dieringer Well	▪ Install ball check valve on treatment supply ▪ Install intake and outtake louvers on existing building ▪ Install surge protectors for radio jumper line
South Well	▪ New well building including replacement of radio and controls and building structure; existing mechanical and chemical addition items to remain ▪ Modify or replace existing metering vault for required pipe lengths upstream and downstream of magnetic flowmeter ▪ Install VFD to allow for throttled supply rate ▪ Include flexible fitting in discharge piping between the wellhouse and meter vault
West Well	▪ Conduct flushing and water quality testing ▪ Replace supply pipe and fittings in well house
Central Well	▪ None
Sumner Springs	▪ Install chain-link fence around perimeter of complex ▪ Install vent on weir vault to eliminate siphoning from the Springs Tank
County Springs	▪ Install permanent generator ▪ Replace existing building gutters
Viewpoint Booster Pump Station	▪ Purchase and store spare pump; includes cost for a VFD ▪ Install new automatic transfer switch and control panel ▪ Purchase and Install backup power generator.

5.5 Water Rights Evaluation

This section provides an overview of water resources laws and regulations that relate to the City's present and future water supplies. The section was developed for the 2009 WSP and is largely repeated here, except where updates are briefly described.

5.5.1 Water Rights Laws

Rights to use water in Washington State are established under water rights laws and regulations administered by the Washington State Department of Ecology (DOE). Water rights in the state of Washington are only allowed through the following legal sources:

- Surface water code (Chapter 90.03 RCW).
- Groundwater code (Chapter 90.44 RCW).
- Pre-Code Claims based on one of the following common law or statutory doctrines:
  - Prior Appropriation; Riparian Rights.
  - Federal Trust (Winters Doctrine) Water Rights.
  - Federal Treaty Rights.

The City's water rights derive from the surface and groundwater codes and pre-code prior appropriation claims, which are discussed briefly below.

Prior Appropriation

Washington statutes and case law recognize the common law prior appropriation doctrine as a means of creating a water right based on the principal of "first in time; first in right." Initially, anyone desiring to appropriate public water for beneficial use had to post a notice at the proposed point of diversion and record a copy of that notice with the local county auditor. Construction of the diversion facilities and putting the water to beneficial use, with due diligence, perfected the right in the amount of the beneficial use. Until such rights are confirmed by a court's general adjudication of water rights, these rights are generally referred to as "claims to vested right." In order to preserve the validity of a pre-code water right claim, the claim had to be filed and registered with DOE or its predecessor water rights agency, the Department of Water Resources, during the period from July 1, 1969, through June 30, 1974, pursuant to the water right claim registration requirements of Chapter 90.14 RCW. An additional claims filing period was authorized by the legislature for September 1, 1997, to June 30, 1998, pursuant to RCW 90.14.068. Two of the City's water sources, County Springs and Elhi Springs, have associated pre-1917 "vested rights." The City filed claims for these rights in 1998 to protect the rights from relinquishment.

Surface Water Code (Chapter 90.03 RCW)

Laws were enacted in 1917 that recognized and protected pre-existing rights, provided a process for establishing rights to surface waters after that date, and set up a three-step procedure for acquiring water rights. The procedure includes:

- Application: A filing must be submitted to the state (now DOE) requesting permission to appropriate water for beneficial use. Following a process of publication of legal notice, evaluation of protest (if any), field examination, and consulting other agencies, DOE either approves, approves with modification, or rejects the application. To approve an application, DOE must find:
  - The proposal is a "Beneficial Use" as defined in the Code.

  - Water is available for appropriation in the amount requested.
  - The proposed use will not impair existing rights.
  - The proposed use will not be detrimental to the public interest, having due regard to the highest feasible development of the use of the waters belonging to the public.
- Permit: Assuming approval of the application, a permit is issued. The permit is authorization to proceed with construction of facilities and use of water consistent with the time schedule and other provisions of the permit.
- Certificate: Once a project is completed and water fully utilized, the Certificate of Water Right is issued. This document is recorded with the local county auditor and in DOE records. The right embodied in a certificate is perpetual and not subject to renewal.

Once a right is established in either of the above three categories, it is fixed in:

- Source.
- Priority.
- Quantity.
- Purpose of use.
- Period of use.
- Point of diversion.
- Place of use.

There is provision in the laws to change the purpose of use, place of use, and point of diversion/withdrawal. However, to make such changes, an application must be filed with DOE and a Certificate of Change granted.

Groundwater Code (Chapter 90.44 RCW)

Laws were enacted in 1945, which extended the provisions of the 1917 Surface Water Code to the appropriation and use of groundwater. There were, however, two key differences: First, withdrawals of less than 5,000 gpd were exempt from the permit requirement. Second, a 5 year period was allowed for "declaring" rights to groundwater existing prior to 1945. An application/certificate process was provided during this period. The application essentially constituted a claim of right, which, if verified by the state, was confirmed by issuing a "declaration" certificate.

The application/permit/certificate process discussed above for surface water is essentially the same for groundwater. There is, however, an additional criterion DOE must consider in acting on new applications for groundwater permit. RCW 90.44.070 provides in part that "No permit shall be granted for the development or withdrawal of public groundwaters beyond the capacity of the underground bed or formation in the given basin, district, or locality to yield such water within reasonable or feasible pumping lift in case of pumping developments, or within a reasonable or feasible reduction of pressure in the case of artesian developments…"

5.5.2 Primary and Supplemental Water Rights

Some terminology used in water rights documents, such as "supplemental," has created confusion and led to conflicting interpretations of water right quantities. DOE issued program policy POL-1040 in 2006 in order to clarify terms used in water right documents and the

relationship between certain water rights. As a result of POL-1040, DOE no longer uses the term "supplemental" and clarifies that most water rights using that term are "non additive" according to the definition and example set forth below. The City currently has one water right that is identified as being partially "supplemental." Future rights may be designated as "non-additive." Therefore, for general background understanding, an explanation and example of "non-additive" rights from POL-1040 is copied as follows:

> **Scenario 2**
> Staff is reviewing the Town of Turnip's first Comprehensive Water System Plan. The Town has two water rights. Water Right G3-11111 issued in 1960 for 300 gpm and 448 ac-ft from the Town Well No. 1. In 1980, the Town received a second water right, G3-22222 for Well No. 2 for 500 gpm and 627 ac-ft from the Town Well No. 2. Certificate G3-22222C describes these quantities as supplemental to existing rights.
>
> Staff reviews the complete water right record to determine the correct terms to use. The ROE for G3-11111 describes the intent of the project as serving a population 500 people by 1980 at 800 gallons per capita day (gpcd). The ROE for G3 22222 was written in 1979 and describes 350 people living in the Town in 1979 using approximately 314 ac-ft, and the Town is planning for 700 people by the year 2000. The ROE for G3-22222 indicates that a total of 500 gpm and 627 ac-ft are needed to serve the 2000-year projection.
>
> Based on the review of the record in this case, staff concludes that the Town's water rights should be interpreted as follows.

Water Right	Source	GPM (Qi)		Ac-Ft/Year (Qa)		Comment
		Additive	Non-Additive	Additive	Non-Additive	
G3-11111	Well 1	300		448		
G3-22222	Well 2	200	300	179	448	Alternate to G3-22222
Total:		**500**		**627**		

> *The Town of Turnip is authorized to produce 500 gpm and 627 acre-feet per year from these alternate water rights. Well 1, however, contains lower Qi and Qa limitations under G3-11111 than Well 2 does under G3-22222. The system could file a change application on G3-22222 to add well 1 if additional source flexibility on Well 1 were desired (e.g. pumping Well 1 at 500 gpm instead of 300 gpm), and provided the statutory tests for change are met." [emphasis original]*

Using this example, the City of Sumner's South Well water right, Certificate G2-23281C, would be interpreted as "additive" for 542 acre-feet and "non-additive" for 258 acre-feet because of language in the documents that states, "In no instance shall the total annual quantity withdrawn/diverted under all existing and/or claimed rights exceed 2,450 acre-feet for municipal supply." The 2,450 acre-foot limitation was based on the South Well application's population projection of 12,500 and a per capita demand of 175 gallons daily. The City then had rights totaling 1,908 acre-feet, so the first 542 acre-feet of Certificate G2-23281C is additive, and the balance of the 800 acre-foot allocation is non-additive. This is reflected in Table 5-15 (page 5-25). Non-additive quantities are listed separately as "NA" and not included in the total annual quantity.

5.5.3 Instream Flow Laws and Stream Closures

The maintenance and protection of certain specified flows in rivers and streams has been provided, for the most part, by three statutes:

- RCW 75.20.050, which established the policy "that a flow of water sufficient to support game fish and food fish populations be maintained at all times in the streams of the state…" The policy was carried out by conditioning permits or rejecting applications for new water rights based on recommendations from the Directors of Fisheries or Game (now Wildlife).
- Minimum Water Flows and Levels Act (Chapter 90.22 RCW).
- Water Resources Act (Chapter 90.54).

The last two statutes establish a state policy that sufficient flows are to be retained in perennial rivers and streams to protect fish, game, wildlife, and other resources and values. Chapter 90.22 RCW refers to "minimum flows" and Chapter 90.54 RCW to "base flows." DOE has established "minimum instream flows" through the process of adoption of state regulations. Once minimum instream flows are established, all new permits using or impacting the same source are issued subject to these flows, and are generally referred to as "interruptible." As a matter of law, a new appropriation cannot be exercised when instream flows are not being met, in the absence of an approved mitigation plan. Water rights established prior to establishment of instream flows are not affected.

When DOE determines that a stream has no available capacity for additional consumptive appropriations of water, it can "close" the stream, or segment thereof, to further appropriation. Stream closures in the Puyallup-White watershed were listed in the regulation described below. An application for a new groundwater appropriation in continuity with a closed stream must be denied if it would have any effect on the flow of the stream, unless that flow is mitigated.

5.5.4 Puyallup Watershed Regulations

Chapter 173-510 WAC is the comprehensive regulation establishing instream flows and stream closures for the Puyallup River Basin, Water Resource Inventory Area (WRIA) 10.

The purpose of this regulation is to retain perennial rivers, streams, and lakes in the Puyallup River Basin with instream flows and levels necessary to provide protection for wildlife, fish, scenic-aesthetic, environmental values, recreation, navigation, and to preserve high water quality standards (WAC 173 510-020). This rule established instream flow levels for the Puyallup River and the Carbon River, and listed stream closures for several streams including all tributaries of the Unnamed Stream (Strawberry Creek) and Salmon Creek, and the tributary to White River near NE 1/4 SE 1/4, Section 13, T20N, R4E. All Sumner's source springs are tributary to these streams.

The regulation affects new groundwater development, as well as changes to existing water rights in the vicinity of regulated or closed streams. WAC 173-510-050 reads in part, "In future permitting actions relating to groundwater withdrawals, particularly from shallow aquifers, a determination shall be made as to whether the proposed withdrawal will have a direct and measurable impact on stream flows in streams for which closures and instream flows have been adopted…" The courts have held that DOE can use new technology, including computer models, when evaluating the effect of a new or changed water right on stream flow. However, DOE has not officially interpreted how "direct and measurable effect" applies with the use of groundwater modelss, and currently takes the position that "any effect" on instream flows requires mitigation or denial of groundwater applications. If DOE finds that a new appropriation would affect the flow of a closed stream or impair a regulated instream flow, the application must be rejected unless there are adequate mitigation conditions to protect the instream flows or prevent effects to closed streams.

In a 2015 decision of the Washington Supreme Court, *Foster v. Dept. of Ecology and City of Yelm*, the Court found that DOE had no statutory authority to allow out-of-kind mitigation for "legal impacts" to instream flow water rights and interpreted the "overriding considerations of public interest" (OCPI) statute as applying only to temporary water uses. As a result, the issuance of new municipal water rights and water right changes often depends on finding year-round water rights available to purchase for mitigation in all areas of a basin that are potentially impacted by a groundwater withdrawal. Expensive storage and engineered aquifer recharge options may be needed to offset small flow impacts that may not otherwise impede the environmental functions of regulated streams, instead of allowing habitat or aquatic function mitigation for impacts to fish habitat and other aquatic values.

5.5.5 City of Sumner Water Rights

The water rights of the City of Sumner have been reviewed by water rights attorney Thomas M. Pors. Water rights certificates and claims are provided in Appendix G, along with a copy of the recently completed Water Right Self-Assessment Form in DOH format. A summary of this review is shown in Table 5-15 (page 5-25).

The City's water usage appears to be within total annual authorization under existing rights of 5,511 gpm and 2,882.25 acre-feet per year for public water supply purposes.

In September 2005, the City of Sumner filed an application to change its Dieringer School District water right from domestic supply to municipal, and to change the place of use to include the City's entire water service area. DOE investigated the history of beneficial use of this water right, and concluded that only 90 gallons per minute and 6.25 acre-feet of the right had been put to beneficial use and was eligible to be changed. The application was approved on April 12, 2006. The reduced water right quantities are reflected in Table 5-15 (page 5-25).

In October 2009 the City filed application G2-30534 to increase the allowable instantaneous withdrawal rate and average annual withdrawal volume from the City's previously permitted water rights. This application is still under DOE review, which includes ongoing analysis of potential impacts to the Puyallup Basin's surface waters through the use of a regional groundwater flow model that is being developed by the U.S. Geological Survey. The City has acquired several mitigation assets in anticipation of forming a mitigation plan for this application to offset impacts to instream flows.

In January 2018, the state enacted Engrossed Substitute Senate Bill 6091 (ESSB 6091) addressing Water Availability. ESSB 6091 created a joint legislative task force on water resource mitigation to develop and recommend a mitigation sequencing process and scoring system to address water appropriations. That bill also granted DOE the authority to issue permit decisions for up to five water resource mitigation pilot projects utilizing a mitigation sequence contained in the text of the bill. Sumner meets the criteria for one of the pilot projects and anticipates having its central well application considered under the mitigation sequence contained in ESSB 6091.

5.5.6 City of Sumner Temporary Water Rights

The City of Sumner submitted five applications for change of its existing water rights to the Department of Ecology in late May 2004. The intent of these change applications was to add new and existing City wells to several of the other existing water rights in order to allow more security and operational flexibility, especially in the event of a catastrophic loss of one or more water sources.

Three of the applications for the City's existing surface water rights were withdrawn after DOE adopted a new procedural policy requiring "direct and substantial continuity" between a surface water source and aquifer as a prerequisite for any surface to groundwater change application (POL-2010, adopted February 15, 2007). The City later amended the remaining change applications to add the Central Well to the South Well and West Well water rights.

Due to complications from changing legal standards and disputes regarding groundwater modelling, the City tabled consideration of the change applications until the USGS regional groundwater model is completed, and accepted a temporary water right for the Central Well until application G2-30534 is approved for permanent additional water rights. The June 23, 2017 letter is provided in Appendix G. The temporary water right allows the City to withdraw 1050 gpm from the Central Well during the peak season and 110.9 gpm during the non-peak season, with mitigation requirements described in the letter.

A tabulation of the City's current water rights is presented as Table 5-15.

Table 5-15
City of Sumner Water Rights Tabulation

Certificate Name	Current Name	Point of Diversion[a]	Water Right Certificate No.	Instantaneous Maximum[d]			Annual AF[c,d]	Comments
				gpm	cfs[b]	mgd		
Well	Dieringer Well	20N05E-07	2151-A	95	0.21	0.14	6.25	This water right was changed to municipal supply purposes pursuant to an application that was approved in the April 12, 2006, Report of Examination. (See Appendix G).
Salmon Springs	Sumner Springs	20N05E-18P and Q	7838	2,244	5.0	3.23	1,008	These two water rights relate to the combined spring area development referred to as “Sumner Springs.”
Salmon Springs	Sumner Springs		S2-21979C	561	1.25	0.81	900	
Well	South Well	20N05E-30R	G2-23281C	1,000	2.23	1.44	542 258 (NA)	Report of Examination identified projected need for “Area served by City of Sumner” to be 2,450 acre-feet per year for municipal supply by the year 1995. Therefore, 258 acre-feet of the authorized 800 acre-feet per year is non-additive to existing rights and is not included in totals.
Well	Central Well	20N04E-24	CG2-21980 and CG2-23281	1,050 (NA)	2.34 (NA)	1.51 (NA)	560.7 (NA)	This is a temporary water right until approval of application G2-30534 for the Central Well. Values shown for instantaneous maximum and annual production are in accordance with the temporary water right’s proposed pumping regime.
Well	West Well	20N04E-23P	G2-21980C	250	0.56	0.36	100	This right was issued for irrigation of 50 acres (Sumner Cemetery) and has a period of use from May 1 to October 1 of each year, but is eligible for use throughout the city water system. [e]
Crystal Springs	Weber Springs No. 1	20N05E-19B	2266	112	0.25	0.16	181	These two certificates were issued to Weber and Ritter, Inc., and the place of use is described as the Van Tassell Garden Tracts; E 1/2 of NW 1/4; E 1/2 of SW 1/4 of Section 19, T20N, R.5E.W.M. An annual quantity was not identified on either right and is assumed to be based on continuous usage at the maximum instantaneous quantity. The annual quantity is considered “additive” and is included in the total because the service area and connections in the Weber and Ritter system were not considered in DOE’s review of future water right demand in the ROE for G2-23281C.
Unnamed Springs	Weber Springs No. 2	20N05E-19B	2267	90	0.20	0.13	145	These two certificates were issued to Weber and Ritter, Inc., and the place of use is described as the Van Tassell Garden Tracts; E 1/2 of NW 1/4; E 1/2 of SW 1/4 of Section 19, T20N, R.5E.W.M. An annual quantity was not identified on either right. The annual quantity is considered “additive” and is included in the total because the service area and connections in the Weber and Ritter system were not considered in DOE’s review of future water right demand in the ROE for G2-23281C.

Table 5-15
City of Sumner Water Rights Tabulation

Certificate Name	Current Name	Point of Diversion[a]	Water Right Certificate No.	Instantaneous Maximum[d]			Annual AF[c,d]	Comments
				gpm	cfs[b]	mgd		
Elhi Springs	Elhi Springs	20N05E-29L	S2-300571CL	360	0.80	0.52	100(NA)	Water Right Claim. The annual quantity of these claims is not included in the total because of language in DOE's ROE for the South Well water right, which limited the City's total annual quantity to 2,450 acre-feet "including claims to vested rights."
County Springs	County Springs	20N05E-19B	S2-300572CL	799	1.78	1.15	675(NA)	Water Right Claim. The annual quantity of these claims is not included in the total because of language in DOE's ROE for the South Well water right, which limited the City's total annual quantity to 2,450 acre-feet "including claims to vested rights."
			Totals	**5,511**	**12.28**	**7.94**	**2,882.25**	

Notes:

a. The location of the point of diversion is given by township, range, section, and 40-acre tract (e.g., NW 1/4 SW 1/4) within the section. For example, in the location, 20N05E-30R, the part preceding the hyphen indicates Township 20 North, Range 5 East Willamette Meridian. The number following the hyphen indicates the section (30) and the letter (R) gives the 40-acre tract within the section as shown in the schematic on the right

D	C	B	A
E	F	G	H
M	L	K	J
N	P	Q	R

(e.g., R is the SE 1/4 of the SE 1/4 of section.)

b. cfs = cubic feet per second.
c. AF = acre-feet.
d. Total instantaneous maximum shown includes a combined 1,250 gpm for the Central, West, and South Wells as allowed under the current temporary water right. Current operational constraints may limit total instantaneous maximum shown. An (NA) following acre-feet/year means the right is non-additive to prior existing right to that extent; therefore, the quantity is not included in the annual AF total.
e. This water right meets the definition of "municipal water supply purposes" in RCW 90.03.015(4), and is eligible for use as a municipal supply throughout the Sumner water service area.

5.6 Water Use Efficiency (WUE) Program

The Municipal Water Law was passed in the 2003 legislative session. It requires municipal water suppliers to more efficiently use their water supplies. The WUE rules required by the municipal water law are being implemented by DOH and DOE. The water use efficiency rules establish:

- Planning requirements for WUE programs for municipal water suppliers.
- A distribution system leakage (DSL) standard.
- Requirements and processes for water use efficiency goal setting.
- Requirements for water use efficiency annual performance reporting.

Sumner first developed WUE goals and measures in 2008. These initial WUE program elements were focused on the reduction of single family residential use through public education and retrofit opportunities, as well as the commencement of efforts to identify and correct sources of unaccounted for use.

The goals and measures were replaced with the adoption of a complete WUE program included within the City's WSP update in 2009. The program's goals expanded desired average residential and ERU demand reduction, as well as adopted the state DSL standard of achieving a 3-year running average below 10 percent. Several discretionary and required WUE measures, including enhanced billing history information, introduction of conservation rate structures, and comprehensive supply and demand side metering, were added to maintain compliance with state requirements. Sumner has been submitting annual performance reports to DOH since the 2009 WUE program was adopted.

Concurrent with the development of this plan, the City has recently updated its WUE program to both assess the effectiveness of measures implemented to date, as well as establish a new WUE goal and associated measures through the required public process. These efforts were formalized through a series of City Council utility committee and general public meetings. The new WUE program was adopted by City Council on May 1, 2017, and is included in its entirety as Appendix D. Highlights of plan include:

- Adoption of a singular goal to meet the 3-year running average DSL standard of 10 percent or less by 2025.
- Continuance of the discretionary and required WUE measures that were adopted with the 2009 plan, as they have largely resulted in reduced and efficient customer use that has fulfilled past goals on a cost-effective basis.
- A water loss control action plan (WLCAP) that details demand side actions to eliminate potential unauthorized connections associated with two commercial/industrial properties and to reduce unauthorized withdrawals from City fire hydrants.
- WLCAP supply side actions that include upgrades to the City's instrumentation and telemetry system (which ultimately is used to quantify water production totals) and funding of a water main replacement program that will target suspected leaking mains. The suspected mains have been identified through continuing leak detection surveys performed for the City.

The contents of this 2017 WUE program serve to meet the recently updated third addition of the DOH Water Use Efficiency Guidebook, published in January 2017.

5.7 Water Reclamation

Per RCW 90.46.120, public water systems serving 1,000 or more connections must evaluate opportunities for reclaimed water "when it is available or proposed for use under a water supply or wastewater plan".

Expansion and improvements to the Sumner wastewater treatment plant (WWTP) were recently completed to provide capacity for the City of Sumner through a projected year 2043. A further facility expansion to accommodate growth within the City of Bonney Lake, which also discharges the entirety of its sewer collection system to this location for treatment, is likely to occur. Master planning for the WWTP continues to include provisional space to allow construction of a future effluent filtration process that would serve as the first step in enabling the production of reclaimed water. This construction would need to be accompanied by a UV disinfection system upgrade to produce the highest quality of reclaimed water defined by the state (Class A), which coincides with the largest range of potential permissible beneficial uses. WWTP planning documents have discussed an initial reclaimed water production capacity of 1.5 mgd and an ultimate potential capacity of 3.0 mgd.

There are no near-term plans to proceed with WWTP upgrades to produce reclaimed water, which would offset potable water demand used for purposes such as irrigation, industrial process water, or local WWTP maintenance. When comparing the cost to construct the additional WWTP facilities and an associated conveyance system to potential end users, the potential water resource and revenue benefits remain low from an invested cost/benefit perspective. However, a summary description of a few previously identified potential uses is offered in the ensuing paragraphs.

The 50 acre cemetery site has a water right for 100 acre-feet of annual consumption for irrigation of the cemetery property. The West Well presently primarily serves the cemetery. This water right could be better used for general municipal use. With the construction of approximately 9,300 feet of 4-inch force main from the WWTP to the cemetery, the cemetery may be irrigated with reclaimed water. The development of directional boring has made this a potentially feasible scenario. A 4-inch high-density polyethylene line may be bored under the rivers and SR 167 in a fairly direct line to the cemetery.

An identified potential use for reclaimed water identified in the 2009 WSP was the City golf course on the east side of the White (Stuck) River south of Stewart Road. The golf course is no longer operational and there are plans for redevelopment of the property to light industry, similar to surrounding businesses, by private owners. Although there may be several opportunities to consider reclaimed water use by the City's current industrial businesses located in this north end area (including those that historically have been the largest water consumers), industrial process water can often have other water quality requirements not typically met through treatment to Class A standards. A conveyance system in excess of two miles, through some of the City's busiest and most utility-laden rights-of-way, would also be required to reach the industries closest to the WWTP.

Potential reclaimed water uses in proximity to the WWTP, which would minimize the costs associated with conveyance, might include in-plant uses such as washdown and supplemental chemical system supply water. Adjacent City-owned property to the southeast of the WWTP might also offer field, park and right-of-way median irrigation opportunities.

The reclaimed water projects described above have not been studied in any further detail than described. It is unlikely that reclaimed water will be available to the City before the next WSP update is performed, at which time it could be reconsidered.

5.8 Minimum Sanitary Control Area Survey

Per WAC 246-290-135, a minimum sanitary control area, defined as 200 feet and 100 feet radiuses for springs and well sources, respectively, must be maintained to prevent introduction of potential contamination sources. Land activity within these areas is legally restricted by the City, who must have a protection program and conduct periodic evaluation activities. A sanitary survey was conducted by DOH with Sumner water operations staff in the summer of 2016 to observe source control. A copy of the Water System Sanitary Survey Report is included in Appendix H.

5.8.1 Sumner, Weber, and County Springs

Collection, transmission, treatment, and storage works at the Sumner, Weber, and County Springs are in good condition and protect the spring sources from normal routes of exposure to contamination. Facility features implemented to help prevent contamination include:

- Waterproofing of lids on all tap boxes and diversion box lids.
- Routing surface drainage around collection works.
- Filter fabric installation near spring taps.
- Slip lining leaking pipes.
- The recent DOH sanitary survey report noted the need to add fine mesh screen to vent piping on spring boxes and site reservoirs. The City has since addressed this by placing mesh screens around the vents of the tanks and spring vault vents.

Poor drainage and development uphill of the springs poses a potential problem of increased volumes of runoff, which could potentially aggravate the occurrences of mass wasting and slope failures above the spring taps. Surface water diversion will help reduce this potential, but some bank stabilization may also be needed. If uphill conditions are observed to degrade, the City will consider a geologic investigation to determine slope stability near the Sumner, Weber, and County Springs, and that appropriate measures be taken to reduce the likelihood of bank failure.

5.8.2 Elhi Springs

Elhi Springs was last upgraded in 2003, during which the existing holding tank was converted into a treatment building with an entryway and stairs installed on the east side of the tank to allow access. A chlorine-injection system, including chlorine contact chambers and a chlorine-residual monitor, was installed in the retrofitted holding tank. The existing collection facilities are in good condition, but the source is seldom used for potable water production because of the high chlorine dosage needed to meet disinfection requirements before reaching the first customer. When used, customer complaints typically occur.

As noted in the recent DOH sanitary survey report, a surge pipe vent in the old reservoir building lacked screening. The City has since addressed this by installing a screen on the surge pipe vent.

5.8.3 South Well

The pump and pump house for the South Well are in fair condition, due to the general deterioration with age of building facilities and signs of corrosion appearing on interior equipment. The pump base is encased in concrete within the pump house. The pump house is surrounded by a chain-link fence. The wellhead is above the 100 year floodplain of the Puyallup River. In general, the immediate vicinity of the well is protected.

No comments were noted for this facility in the recent DOH sanitary survey report, but potential sources of contamination remain within the minimum sanitary control area that should be monitored:

- A large creek (Van Ogles Creek) flows south of the well. Van Ogles Creek is believed to be subject to high suspended-solids loadings from surrounding farms. A variety of agricultural pollutants may be present.
- Riverside Road to the north is subject to truck traffic carrying a variety of cargoes.
- Potential use of chemical fertilizers and insecticides in the field to the east.

Outside of the sanitary control area within 100 yards of the well, the following potential sources of pollution remain:

- Livestock facilities and grazing activities in proximity to Van Ogles Creek.
- Knutson farm packaging facility.

These potential polluting activities must be monitored and could affect the risk classification of the well under the Groundwater Disinfection Rule and Wellhead Protection Program.

5.8.4 Dieringer Well

This well is located on the Peterson Brothers property (a local contractor), the perimeter of which is fenced and gated to prevent illegal entry. The pump and pump house are in good condition.

The DOH approved a Sanitary Control Area variance for the Dieringer Well in 1998, allowing the control-area radius to be reduced from 100 feet to 42 feet. Potentially contaminating activities observed within the required sanitary control radius include:

- Parking lot.
- Equipment and vehicle operation.

The Dieringer Well is a deep well that, based on aquifer testing and available hydrogeological information, draws from a deep confined aquifer. Therefore, it seems unlikely that activities resulting in surface water or shallow aquifer contamination within the 42-foot sanitary control-radius area would adversely affect water quality within the well.

The recent DOH sanitary survey report noted the need to add a required raw water sample tap at the well. However, the Dieringer wellhead facility currently allows the City to sample raw water before chlorination.

5.8.5 West Well

The pump and pump house for the West Well are in fair condition, due to the general deterioration with age of building facilities. The west well is currently used exclusively for irrigation of the cemetery. Operations staff has manually closed valves from this source to prevent normal contribution of the well to the potable water distribution system, primarily due to increasing water quality concerns and customer complaints received when it is allowed to circulate. No fencing is provided around the pump house. A variety of potentially contaminating activities exist within the minimum sanitary-control radius of the West Well. These include:

- Hobby farms with horses.
- Vehicle maintenance shop.
- Parking lot.
- Storage of chemicals.

The recent DOH sanitary survey report noted the need to add a required raw water sample tap at the well. However, the West wellhead facility currently allows the City to sample raw water before chlorination.

5.8.6 Central Well

The Central Well pump and pump house are in new condition. No potentially contaminating activities were observed within the minimum sanitary-control radius during the recent DOH sanitary survey. A Wellhead Protection Program completed as part of the Central Well design and construction project identified 1- and 10-year time of travel (TOT) delineations, and educational letters sent to appropriate residential and commercial customers are included in Appendix J.

5.9 Watershed Survey

5.9.1 Protected City of Sumner Watersheds

The City of Sumner owns and exercises control over two protected watersheds. The northern watershed encompasses the Sumner, Weber, and County Springs. The southern watershed encompasses Elhi Springs. Both watersheds are steeply sloped; heavily forested with fir, cedar, and deciduous trees; and are relatively undisturbed.

Access to the watersheds is controlled by locked gates. The Parker Road entrance to the northern watershed allows vehicular access to the Sumner Springs tank and chlorination facility. The Van Tassel Road entrance to thecentral watershed allows access to the County Springs tank and chlorination facility. A forest trail of varying width connects the Sumner Springs tank and County Springs tank allowing foot traffic to pass by all spring taps in the Sumner, Weber, and County Springs systems. The other access to the northern watershed off Sumner-Tapps Highway is rarely used. There is only one entrance from Highway 410 to the southern watershed and Elhi Springs.

The northern and southern watersheds are protected with fences that run along the western side of Sumner-Tapps Highway and the northern side of SR 410, respectively. The entire perimeter of the watersheds is not fenced, however, all source production facilities have been independently fenced off in entirety. The City has plans to add entry alarming to all structures in the near future, with video surveillance also provided to critical facilities where it is feasible.

5.9.2 Unprotected Tributary Drainage Areas

Surface runoff from upstream drainage areas can migrate to the protected portions of the watershed via overland flow. The northern tributary drainage area is more than twice as large as the protected area of the watershed. The southern tributary drainage area is less than half the size of the protected area of the watershed. The tributary drainage areas have experienced residential development. The abundance of new houses and subdivisions in the northern tributary drainage area indicates most development is recent. The southern drainage area has seen similar types of residential development, although it has been on a smaller scale.

5.9.3 Groundwater

A 1965 geologic report speculates that the sources of groundwater for the Sumner Springs system are precipitation on the upland east of the springs and possibly from Lake Tapps. The springs flow out from a geologic contact where a permeable gravel layer overlies a less permeable layer of older glacial drift. The permeable gravel layer is itself overlain by another layer of younger glacial drift. The younger glacial drift is thin in some places, and surface drainage could penetrate to the water-bearing gravel layer from which the springs flow. The absence of visible surface channels in the younger glacial drift is evidence that much of the runoff may be subsurface flow.

5.9.4 Potential Sources of Groundwater Contamination

Based on the geology of the area around the springs, it can be speculated that surface-water infiltration from the area between Lake Tapps, Bonney Lake, and the springs could contribute to replenishment and recharge of the spring aquifer. Outside of the tributary drainage areas, runoff would first have to penetrate the upper layer of glacial drift and travel as groundwater to enter the spring aquifer. Filtering through the soil and traveling the distance to the springs would likely remove Giardia, viruses, particulates, and colloidal particles from the groundwater. Therefore, these contaminants are not of primary concern outside the tributary drainage areas. However, dissolved substances such as oils, solvents, fertilizers, pesticides, and other contaminants can travel with the groundwater to the springs. Since most development above the springs is residential, large quantities of hazardous chemicals are unlikely to enter the aquifer that feeds the springs. Nevertheless, the City will carefully monitor development and activities above the spring sources outside the watershed.

5.9.5 Potential Sources of Surface Water Contamination

Runoff from the tributary drainage areas may not have the benefit of filtration. Surface water is a potential avenue of contamination if it reaches the spring collection areas.

The City of Sumner can reduce the potential for water supply contamination from surface runoff by maintaining the Sumner, County, Weber, and Elhi Springs, and exercising control of the tributary drainage areas above the protected watersheds. Exercising control could involve annexing these portions of the watershed into the city, interlocal agreements with Pierce County on types and magnitude of development, or funding projects in these areas to divert and contain runoff. On-site sewage systems should be monitored to ensure adequate function. Development in these areas should be restricted to single- or double-family rural housing. Unwarranted activities include livestock tending, farming, medium-to-large hobby farms, industry, gravel-mining operations, large parking lots, and nonfunctional on-site sewage disposal.

5.10 Source Water Protection

The Safe Drinking Water Act requires that public water system wells be protected from potential sources of contamination. DOH has complied with this requirement by establishing a Wellhead Protection Program. A Wellhead Protection Program has been completed for all current sources, including the recently constructed Central Well. See Appendix J for the Wellhead Protection Program and information. Appendix J also includes data for the susceptibility assessment, the protection area information, an inventory of containment sources, and samples of letters distributed to businesses that may impact water quality. A contingency plan for replacement of water sources has not been formally developed. The City of Sumner will be forced to locate additional sources of water in the event that the existing sources are contaminated. Documentation for spill response planning is included in Chapter 10, "Operations Program."

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