Chapter 1 Introduction

1.1 Introduction

The City of Sumner (City) is located in 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. According to the American Community Survey (ACS) Sumner's total population in 2015 was 9,584.

The total area of the City Limits and Urban Growth Area (UGA) is 4,987 acres. The City's current wastewater system service area is approximately 4,090 acres. The City owns, operates, and manages wastewater collection and treatment facilities. The City's wastewater collection facilities include gravity sewers, sewer force mains, and pump stations that convey wastewater to the City's Wastewater Treatment Plant (WWTP). The WWTP is a conventional activated sludge system and provides secondary treatment of municipal wastewater from the Cities of Sumner and Bonney Lake. The WWTP process also includes Modified Ludzack-Ettinger activated sludge treatment process for biological nitrogen removal, anaerobic solids digestion, and effluent ultra-violet (UV) disinfection. Treated wastewater is discharged to the White River. Biosolids meet Class B requirements after digestion, and Class A requirements after drying.

The Puget Sound Regional Council (PSRC) Vision 2040 forecasts that Sumner will grow to a residential population of approximately 14,000 by 2040. The City's sewer service area is expected to grow to approximately 4,330 acres, and will include a small portion of the City of Pacific east of the White River. Approximately 600 acres within the City's UGA, such as the quarry, are not anticipated to be developed and are not included in this area. This Sanitary Sewer Comprehensive Plan (Plan) evaluates future collection and treatment facilities required to accommodate both existing and future wastewater collection and treatment needs.

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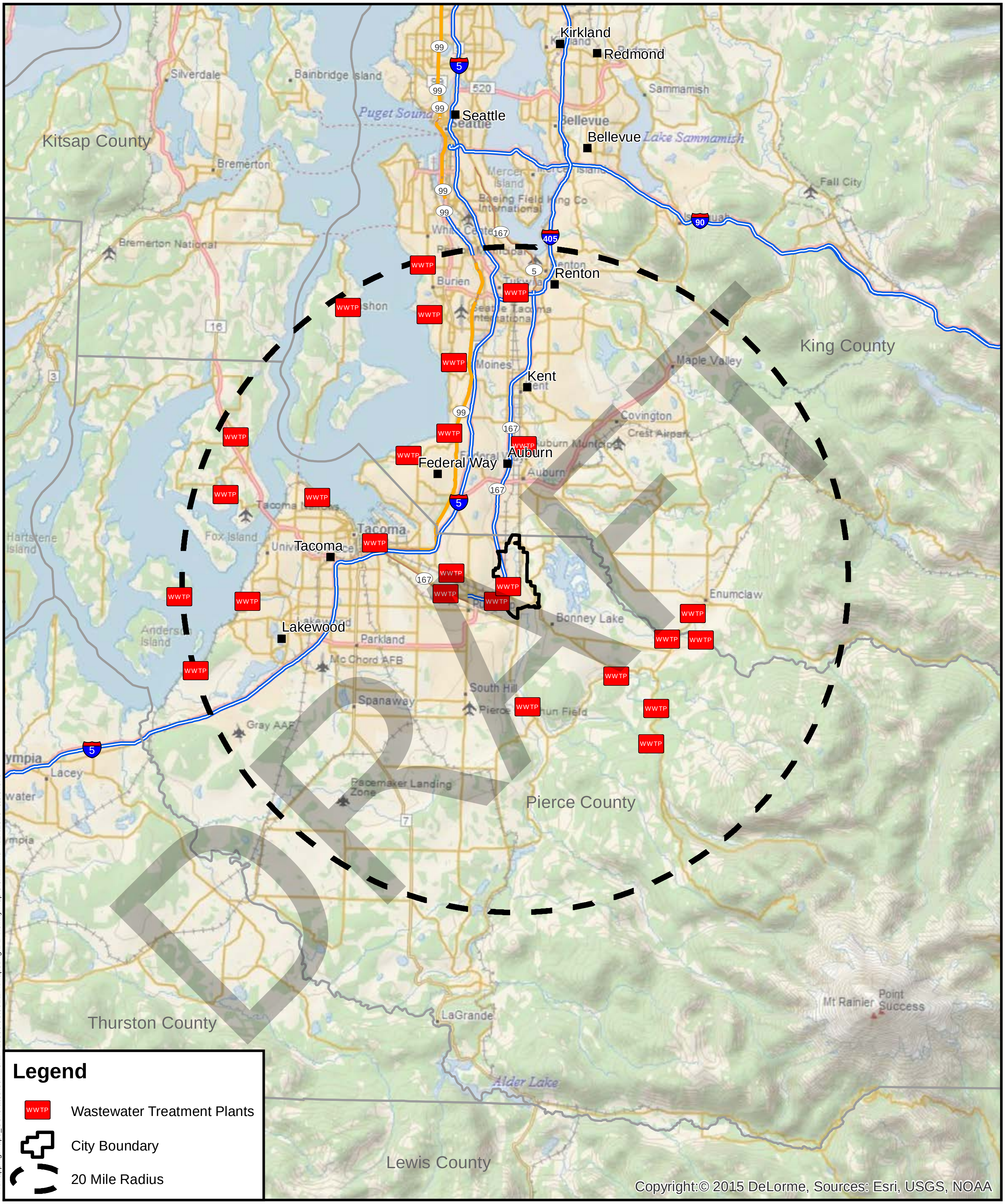

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Vicinity Map

General Sewer Plan Update
City of Sumner

Figure 1-1

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1.2 Purpose and Scope

This Plan is prepared for the City to fulfill the requirements of Chapter 173-240-050 of the Washington Administrative Code (WAC), Chapter 90.48 of the Revised Code of Washington (RCW), and RCW 36.70A (Growth Management Act). The Plan provides the City with a guide for managing and operating the sewer system and coordinating expansions and upgrades to the infrastructure through build-out. The Plan serves as a guide for policy development and decision making processes for the City. The WAC requirements are outlined in Table 1-1. The Plan provides the public and regulatory agencies with information on the City's plans for sewer system extensions.

Table 1-1 Comprehensive Sewer Plan Requirements per WAC 173-240-050

WAC 173-240-050 Reference Paragraph	Description of Requirement	Location in Plan
3a	Purpose and need for proposed plan	Section 1.2
3b	Who owns, operates, and maintains system	Section 1.3
3c	Existing and proposed service boundaries	Chapter 5
3d	Layout map showing boundaries; existing sewer facilities; proposed sewers; topography and elevations; streams, lakes; and other water bodies; water systems	Figure 5-1
3e	Population trends	Chapter 3
3f	Existing domestic and/or industrial wastewater facilities within 20 miles	Figure 1-1
3g	Infiltration and inflow problems	Chapter 6
3h	Treatment systems and adequacy of such treatment	Chapter 8
3i	Identify industrial wastewater sources	Chapter 6
3j	Discussion of water systems	Chapter 2
3k	Discussion of collection alternatives	Chapter 7
3l	Define construction cost and O&M costs	Chapter 10
3m	Compliance with water quality management plan	Chapter 2
3n	SEPA compliance	Appendix A

The Plan is based on projections for a ten-year period to 2028 and a 20-year period to 2038.

The Plan addresses the City's sewer collection system, and the Wastewater Treatment Plant (WWTP) owned by the City and operated jointly with the City of Bonney Lake. The City of Bonney Lake owns and operates a collection and conveyance system which is addressed by Bonney Lake 2017 General Sewer System Plan.

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The existing and future capacities of the sewer system were evaluated based on current and anticipated future wastewater flow rates. Future wastewater flow rates are estimated from existing flow data and population and employment growth projected within the sewer service area by PSRC.

A capital improvement program is provided in Chapter 10 of this plan. The capital improvement program prioritizes system improvements and provides opinions of system improvement probable project costs.

1.3 Ownership and Management

The wastewater collection system is owned by the City and is funded through wastewater rates and general facility charges. The WWTP is owned by the City and is funded through an Interlocal Agreement with the City of Bonney Lake, wastewater rates, and general facility charges. These revenues must provide for future capital improvements and pay for current operating expenses, maintenance of the system, replacement, and/or emergency repairs. Wastewater system management and administration is provided by the City of Sumner's Public Works Department and includes operation, repair, and maintenance of the collection system and WWTP, major improvements and development, engineering design and construction, administrative support, accounting and financial services, and billing and collection. Connections to the City of Sumner's sewer system are billed directly. Bonney Lake contributes capital funds towards WWTP infrastructure improvement projects (based on resulting capacity ownership percentages as agreed upon between the two cities), and also is bulk billed by Sumner for ongoing annual WWTP O&M costs (based on the their metered percentage of total influent flow that was treated).

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Chapter 2 Service Area Characteristics

2.1 Introduction

Sewer service in the City of Sumner (City) is limited to the City's Urban Growth Area (UGA). The overview and description of the City's UGA is presented in this Chapter. The UGA characteristics are essential for assessing the City's current and future wastewater service needs. Service area characteristics described in this chapter include: topography, water resources, geology, critical area, habitat, water supply, land use, and zoning.

2.2 Study Area

The City and surrounding valley is situated in the ancient floodplain of the Puyallup and White Rivers in north central Pierce County. Sumner is located 11 miles southeast of Tacoma and 3 miles northeast of Puyallup. The City limits and UGA boundaries are presented in Figure 2-1.

2.3 Surrounding Vicinity Characteristics

2.3.1 Topography

The City 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 Comprehensive Planning Area is slightly above 550 feet. The City's topography is presented in Figure 2-2.

2.3.2 Water Resources

Water resources in the Sumner area include the Puyallup River, White River, tributaries to these rivers (including Salmon Creek), groundwater, and springs. The White River flows south into the Puyallup River, which flows east to west. The area generally south of Puyallup Street mostly lies above the Puyallup and White River 100-year flood plain as defined by Federal Emergency Management Agency (FEMA), therefore, it is generally not impacted by river flooding. Much of the area north of Puyallup Street between the two railways lies within the 100-year floodplain of the White River. The City's WWTP at the southwestern corner of the City is located within the flood plain at the confluence of the Puyallup and White Rivers and is protected by a flood wall.

The City's WWTP discharges into the White River. Discharge from the WWTP is regulated under the current National Pollutant Discharge Elimination System (NPDES) permit. The NPDES permit is being rewritten by the Department of Ecology (DOE) concurrent with the production of this Plan.

The latest version of DOE's 303(d) Water Quality Assessment list published in 2016 includes a number of waterways in the Sumner vicinity that are classified as impaired. These impaired water bodies are described in Table 2-1.

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Table 2-1 Impaired Water Bodies

Puyallup River	Category 2: Copper, Temperature
White River	Category 2: Dissolved Oxygen Category 4A: Bacteria Category 4C: Instream Flow Category 5: Temperature, pH, Dissolved Oxygen
Salmon Creek	Category 4A: Bacteria
Mill Creek	Category 4A: Bacteria
Tapps Lake Diversion	Category 2: Dissolved Oxygen, Temperature Category 4A: Bacteria

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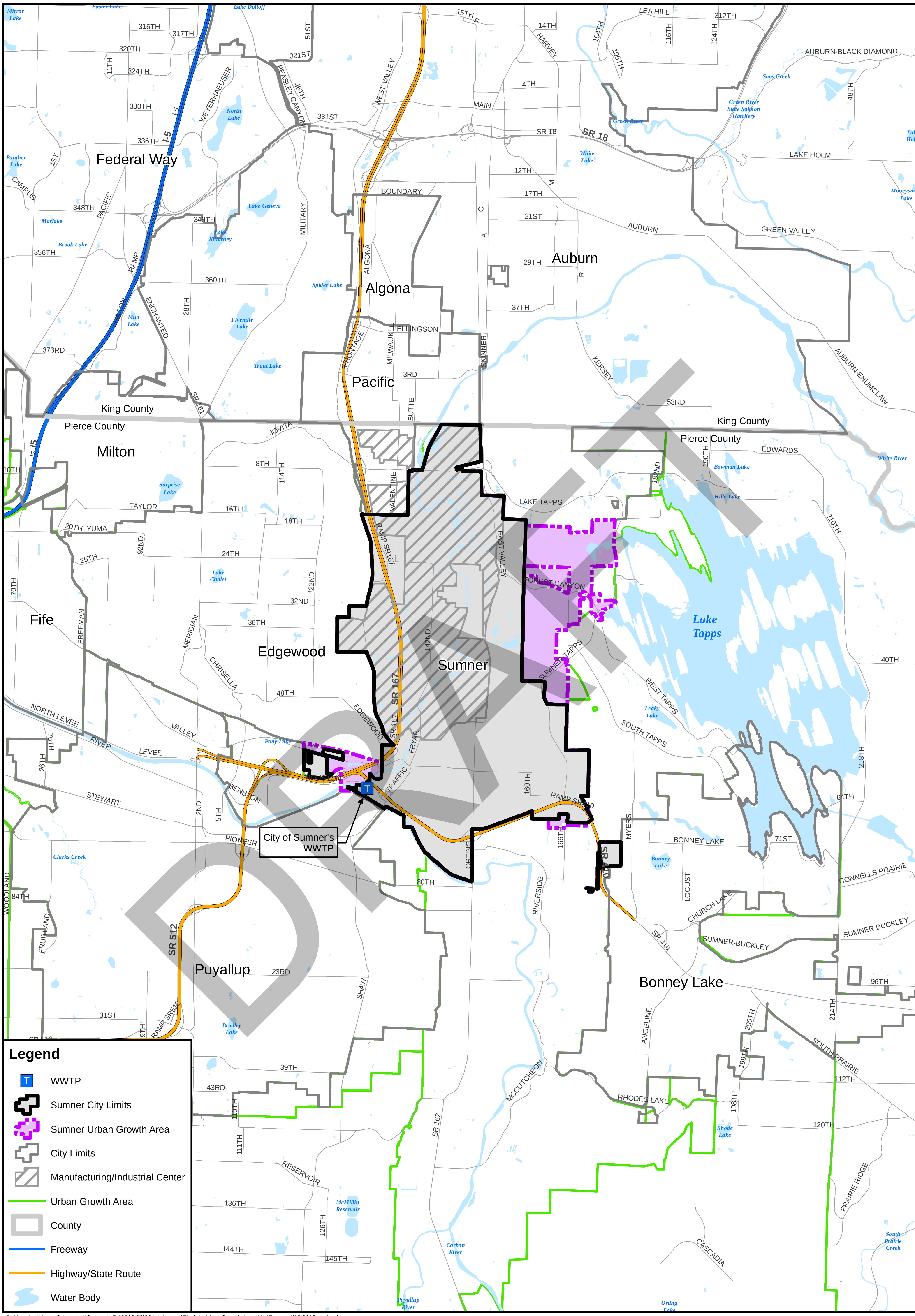

P:\Mapping\Maps_Generated\Sumner\17-10500.00\001\1.4\maps\Fig 2-1 Urban Growth Area 11x17.mxd 4/17/2018 ctolentino

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Urban Growth Area

General Sewer Plan Update
City of Sumner

Figure
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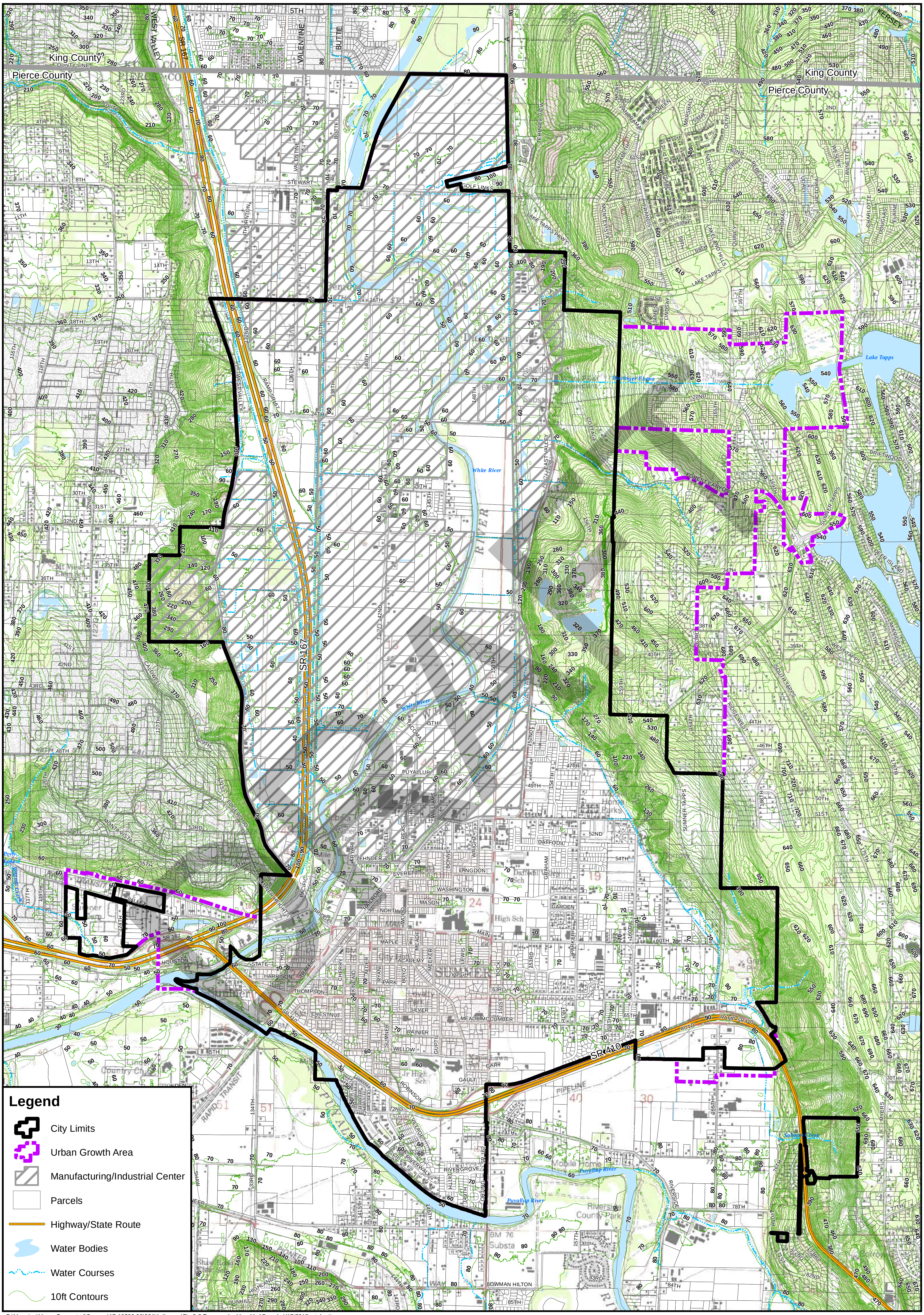

P:\Mapping\Maps_Generated\Sumner\17-10500.00\001\1.4\maps\Fig 2-2 Topography Map 11x17.mxd 4/17/2018 ctolentino

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Topography Map
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City of Sumner

Figure 2-2

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2.3.3 Puget Sound Water Quality Management Plan

The Federal Water Pollution Control Act established the requirement for a Water Quality Management Plan. In response, RCW 90.71 established the need of a Puget Sound Water Quality Management Plan. The stated objectives of this governance are to recover the health of the Puget Sound waters by the year 2020. This Sanitary Sewer Comprehensive Plan is consistent with the intended goals of the Puget Sound Water Quality Management Plan.

2.3.4 Geology

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 about 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.

2.3.1 Critical Areas

Critical areas exist throughout the City that limit development. The critical areas are shown on Figure 2-3. A majority of the critical areas are steep slopes, wetlands, and floodplains.

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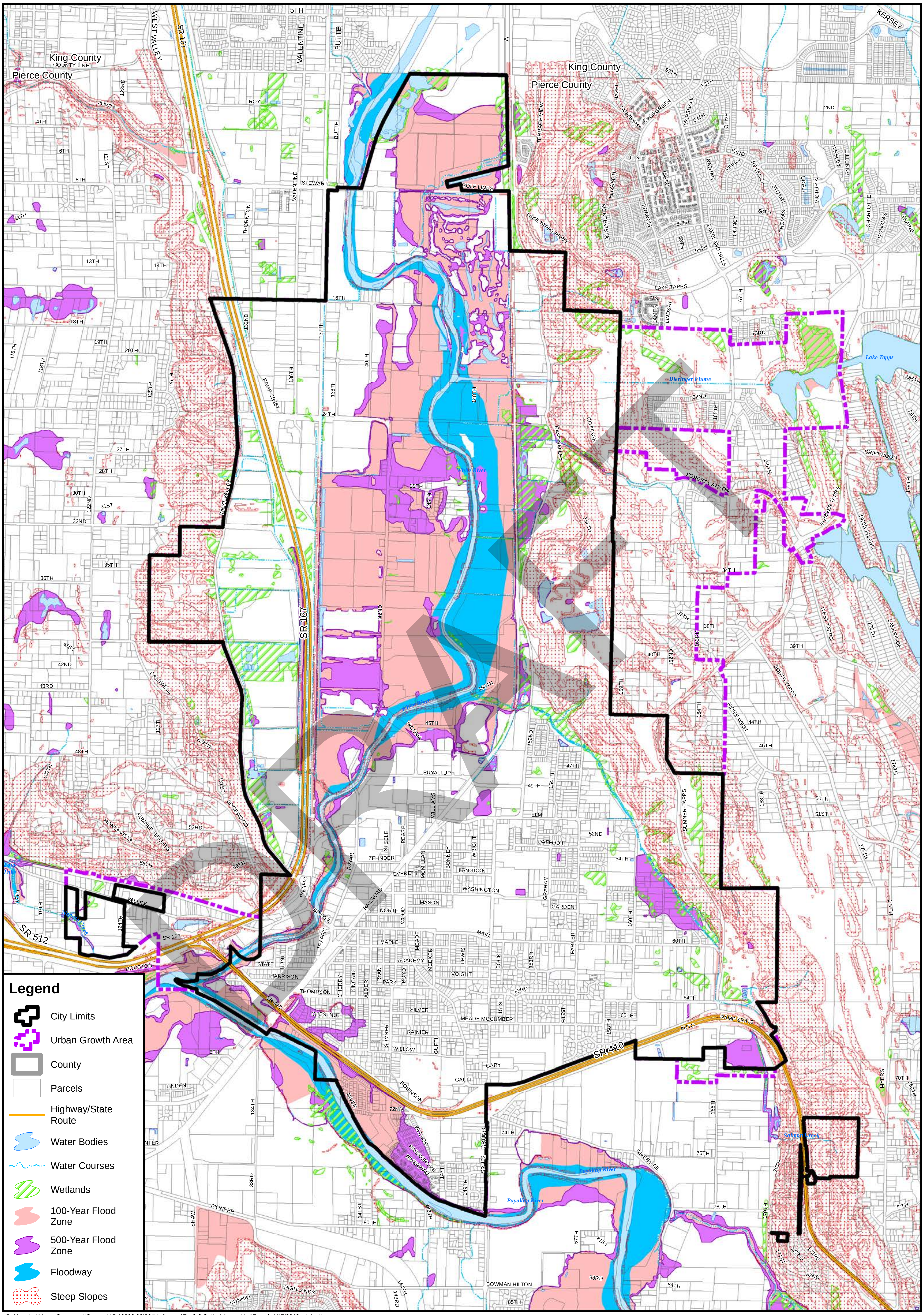

P:\Mapping\Maps_Generated\Sumner\17-10500.00\001\1.4\maps\Fig 2-3 Critical Areas 11x17.mxd 4/17/2018 ctolentino

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Critical Areas
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City of Sumner

Figure
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2.3.2 Endangered Species Habitat

Chinook Salmon, Coho Salmon, Steelhead, and Bull Trout are known to live in the Puyallup and White Rivers. Their State and Federal statuses are summarized in Table 2-2.

Table 2-2 Endangered Species Present

Species	State Status	Federal Status
Chinook Salmon	None	Threatened
Coho Salmon	None	Candidate
Steelhead	None	Threatened
Bull Trout	None	Threatened

There are no reported endangered plants in the area.

2.4 Water Supply System

The City operates a potable water system for the majority of its residents. The City has seven potable water sources, including four springs (County Springs, Sumner Springs, Weber Springs, and Elhi Springs) and four wells (South Well, Central Well, Dieringer Well, and West Well). Raw water is treated in chlorination facilities at each well and spring collection location. The City does not fluoridate their water. The distribution system, including pipes, storage facilities, and treatment facilities are illustrated on Figure 2-4.

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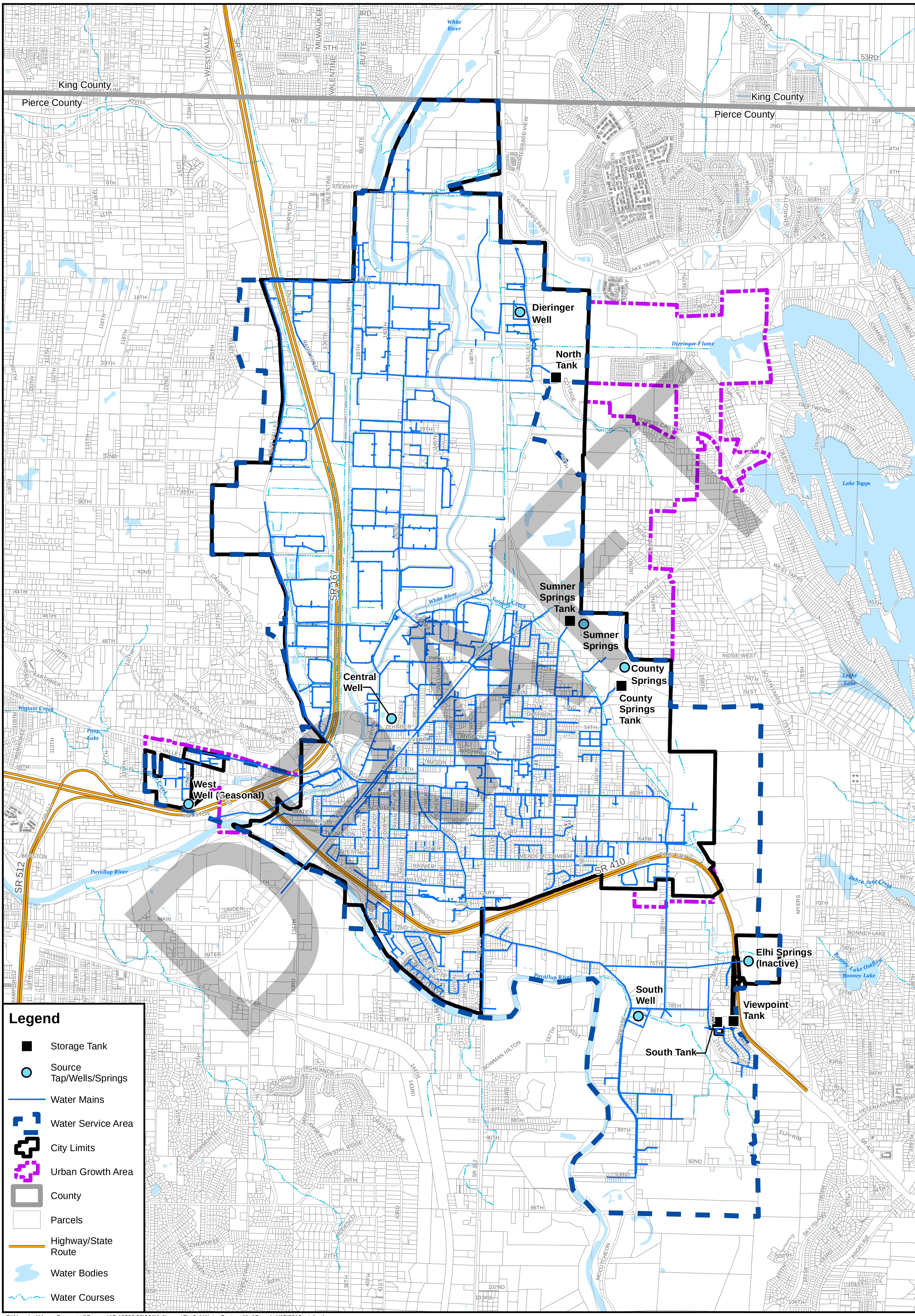

P:\Mapping\Maps_Generated\Sumner\17-10500.00\001\1.4\maps\Fig 2-4 Water System 11x17.mxd 4/17/2018 ctolentino

*City of Sumner Water System Plan 2009 (Parametrix)
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CITY OF SUMNER WASHINGTON

Water System Map

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City of Sumner

Figure
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2.5 Growth Management Act

The State of Washington adopted the Growth Management Act (GMA) to require cities and counties to develop comprehensive plans to manage their population growth in a coordinated and planned manner. Each county and city that plans under the GMA is required to designate an urban growth area (or areas) within which to guide urban growth and development. Urban governmental services, such as sewers, are to be provided within urban growth area (UGA) boundaries. Development of land that is outside of a UGA is intended to be rural in nature with very low density and sufficient acreage to support on-site sewage disposal systems conforming to Department of Health regulations.

The GMA prohibits the provision of urban services outside of the UGA. Per RCW 36.70A.110(4) and WAC 365-196-320(1)(c), the only exception to the prohibitions of sewers outside the UGA recognized under state law is in limited circumstances when necessary to protect basic public health and safety and the environment, and when such services are financially supportable at rural densities and do not permit urban development.

Sewers provided in this case can be satellite systems limited to serving just the qualified and defined parcels, or a sewer extension can be 'tight-lined' to convey wastewater from the qualified and defined parcels into the UGA for connection to an existing sewer system.

2.6 Pierce County Compliance

Under the GMA, the state Office of Financial Management (OFM) develops population projections for the state and each county. Fully planning Growth Management counties and cities are required to work together to determine where that growth should be directed. These population allocations are used in the comprehensive planning process to make sure that individual plans can accommodate their projected level of growth. County and city comprehensive plans must be coordinated. The proposed sewer service area is consistent with the Pierce County's Comprehensive Plan. New sewer services are not being proposed outside of the UGA.

2.7 Zoning

The approximate extent of City zoning within the City Limits and County zoning within the UGA are summarized in Table 2-3 and shown on Figure 2-5. The comprehensive plan map is presented as Figure 2-6. Around forty-seven percent of the land in Sumner is zoned for low to medium density residential development and forty-one percent is zoned for industrial use.

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Table 2-3

City Limits	Acres
LDR-4, Low Density Residential 4000	4.5
LDR-6, Low Density Residential 6000	249
LDR-72, Low Density Residential 7200	65
LDR-85, Low Density Residential 8500	407
LDR-12, Low Density Residential 12000	676
MDR, Medium Density Residential	130
HDR, High Density Residential	104
CBD, Central Business District	23
GC, General Commercial	197
NC, Neighborhood Commercial	32
IC, Interchange Commercial	142
MUD, Mixed Use Development	17
M1, Light Industrial	1,834
M2, Heavy Industrial	138
RP/RPR, Resource Protection	121
UGA	
MSF, Moderate Density Single Family	730
PI, Public Institutional	90
EC, Employment Center	8
NC, Neighborhood Commercial	19
TOTAL	**4,987**

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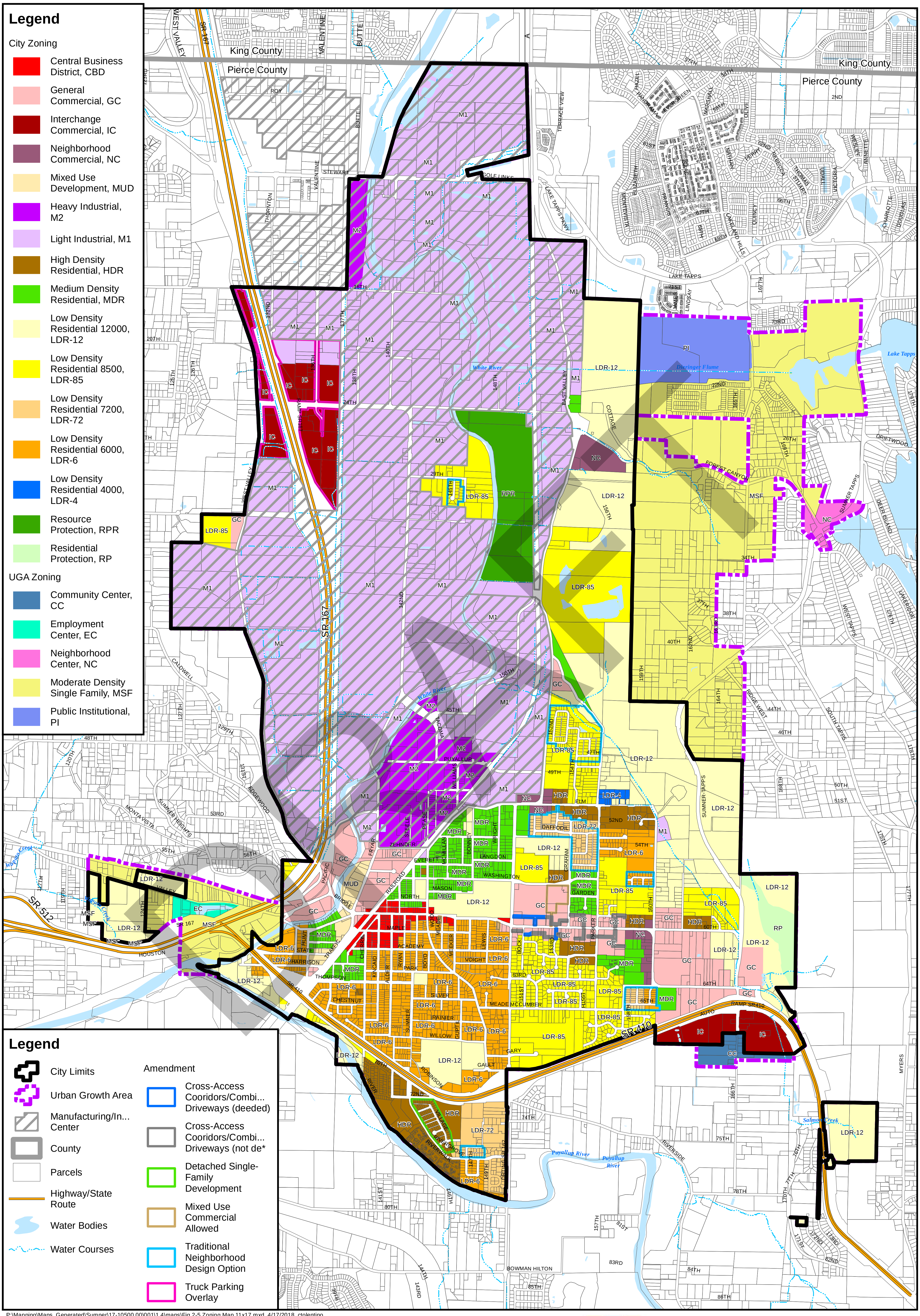

P:\Mapping\Maps_Generated\Sumner\17-10500.00\001\1.4\maps\Fig 2-5 Zoning Map 11x17.mxd 4/17/2018 ctolentino

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Zoning Map
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Figure 2-5

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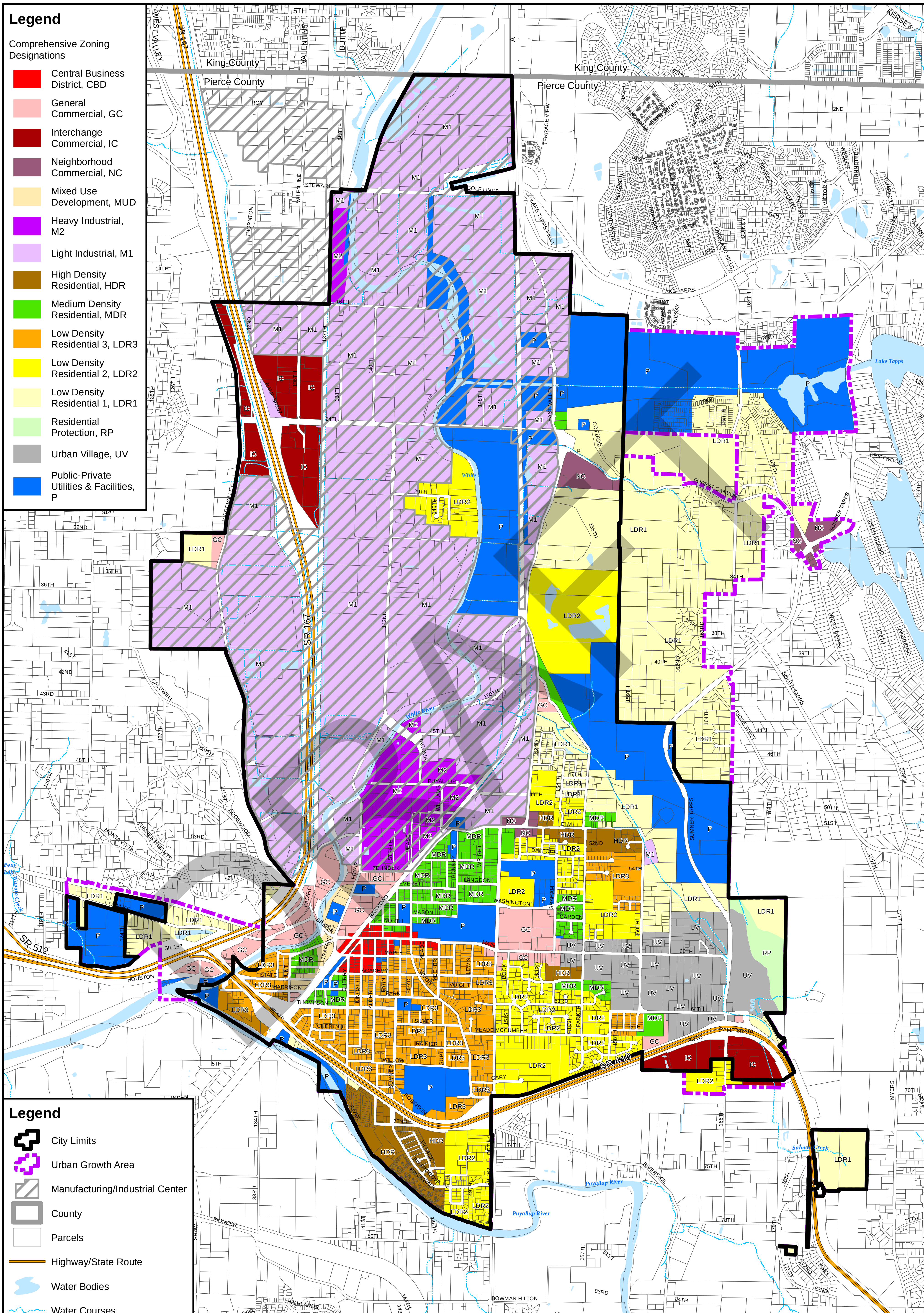

P:\Mapping\Maps_Generated\Sumner\17-10500.00\001\1.4\maps\Fig 2-6 Comprehensive Plan Map 11x17.mxd 4/17/2018 ctolentino

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Comprehensive Plan Map
General Sewer Plan Update
City of Sumner

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Chapter 3 Population

3.1 Introduction

Population and employment estimates for the City of Sumner (City) service area for 2018, 2024, and 2038 are presented in this chapter. Wastewater flows and loadings were separated into population and employment categories and distributed across each of the 19 sewer basins. Years 2024 and 2038 were used for 6- and 20-year CIP planning purposes.

3.2 Existing Population and Employment

The baseline population and employment figures are representative of the most recent year for which data was available. According to the Office of Financial Management (OFM), total population in Sumner's 19 sewer basins was 10,108 in 2016. The Puget Sound Regional Council (PSRC) produces estimates of jobs by city for the four-county central Puget Sound region. The PSRC estimated 14,897 jobs for the City's sanitary sewer service area in 2015.

Population and employment projections were calculated using the OFM small area estimate program (SAEP) and PSRC's Land Use Vision (LUV) projections. The LUV model inputs regional and local policy-based datasets for land use including comprehensive plan designations and zoning to calculate build-out projections in five-year increments. The PSRC LUV model projects regional population and employment growth. These projections were geographically distributed within Sumner's sewer basins using the PSRC UrbanSim model which is a parcel-based land use model. For planning purposes, annual population and employment figures were estimated by applying the average annual growth rates to the baseline figures based on the PSRC 5-year growth projections.

3.2.1 Population

Year 2016 serves as the residential population analysis baseline year. The OFM SAEP estimated 10,108 people in the City's sanitary sewer service area in 2016. The PSRC 5-year incremental projections estimated 10,119 people in the same area in 2015. These figures were reconciled by calculating a blended average annualized growth rate to apply to the PSRC projections. The resulting 2016 baseline total population figure used to project future years is 10,251. This figure is distributed among the basins using the PSRC UrbanSim model and the annualized growth projections to represent full buildout within each basin.

3.2.2 Employment

Year 2015 serves as the baseline year for employment analysis. Baseline employment for each basin uses the PSRC 5-year incremental jobs projections. Employment data from PSRC represents total employment estimates. This includes covered employment from the Quarterly Census of Employment and Wages (QCEW) dataset and incorporates a methodology to estimate private sector and military jobs that are not included in the QCEW data.

The growth rate for each basin is annualized within the five-year timeframes and then used to derive straight line projections per basin for each year.

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3.3 Future Population and Employment

The target years for population and employment forecasts are 2018, 2024 (used for 6-year CIP) and 2038 (used for 20-year CIP).

Population and employment projections for each basin within the service area were provided by the PSRC in 5-year increments from 2015 to 2040. Assuming a constant growth rate, population and employment estimates for target years were interpolated between the 5-year projections. The projected rate of growth for all of the basins in the service area is 1.2% from 2018 to 2038. The Sumner 2015 Comprehensive Plan update projects a 2% growth rate for the City and its urban growth area (UGA). Sumner's sanitary sewer service area covers approximately 75% of the acreage contained within the City and UGA. To compare, 75% of the 2% growth rate used for the City and its UGA is 1.5%. Using a 1.2% rate of growth for the sewer service area is a reasonably close estimate.

Table 3-1 Sewer Basin Population and Employment Projections by Year

Sewer Basin[1]	2018		2024		2038	
	Total Population	Total Employment	Total Population	Total Employment	Total Population	Total Employment
0	994	1,761	1,178	1,965	1,330	2,506
1	402	1,873	420	2,184	472	3,000
2	34	734	34	866	35	1,221
3	330	23	350	23	402	23
4	93	0	98	0	134	0
5	3,727	1,911	4,207	2,086	4,889	2,524
6	1,310	835	1,383	1,019	1,526	1,539
7	1,334	179	1,375	179	1,440	180
8	1,402	266	1,493	266	1,723	270
9	179	18	186	18	194	19
10	171	6,203	179	7,339	189	10,327
11	34	721	34	846	34	1,163
12	3	56	3	67	3	96
13	52	0	76	0	80	0
14	518	203	585	290	626	596
15	9	1,026	28	1,613	38	3,993
16	11	30	12	32	12	34
17	6	0	7	0	7	0
18	11	90	11	124	11	233
Totals	**10,620**	**15,931**	**11,658**	**18,917**	**13,146**	**27,726**

Notes:

1) Sewer basin delineations are described in Chapter 5.

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3.3.1 Population

The PSRC population projections for the City's 19 sewer basins was used to assess the City's sanitary sewer system in this comprehensive plan update. The PSRC projections are consistent with comprehensive planning efforts and anticipated residential development activity. The PSRC projections are based on the City's future land use designations and zoning to approximate a build-out scenario for each basin within the service area. This analysis assumes that all households within the service area will be sewered at the end of the 20-year planning horizon, therefore the 2038 sewered population equals the total population in the service area.

Table 3-2 Estimated Yearly Total Population by Basin

Basin	2010[1]	2011[1]	2012[1]	2013[1]	2014[1]	2015[1]	2015[2]	2015[3]	2016[4]	2017[4]
0	909	907	902	901	898	909	860	884	899	945
1	376	378	382	391	394	401	391	396	402	402
2	39	33	33	34	34	34	21	27	34	34
3	150	150	150	152	154	158	496	327	330	330
4	80	81	81	82	81	82	102	92	93	93
5	3,705	3,711	3,719	3,744	3,743	3,785	3,369	3,577	3,588	3,657
6	1,128	1,129	1,130	1,134	1,134	1,146	1,391	1,268	1,272	1,291
7	1,234	1,235	1,236	1,241	1,258	1,272	1,303	1,287	1,295	1,314
8	1,360	1,361	1,370	1,375	1,372	1,388	1,352	1,370	1,374	1,388
9	196	196	197	199	200	208	92	150	172	175
10	176	176	177	177	184	186	125	155	168	170
11	15	13	13	13	13	13	55	34	34	34
12	5	5	5	5	5	5	0	2	3	3
13	18	18	18	18	18	18	63	40	40	46
14	207	307	364	402	404	406	466	436	512	515
15	12	11	11	11	11	11	2	6	8	8
16	10	10	10	10	10	10	11	10	10	10
17	2	2	2	2	2	2	11	6	6	6
18	12	11	11	11	11	11	9	10	11	11
Totals	**9,634**	**9,734**	**9,811**	**9,902**	**9,926**	**10,045**	**10,119**	**10,077**	**10,251**	**10,433**

Notes:

1) Source: Washington State Office of Financial Management (OFM), Small Area Estimate Program (SAEP)
2) Source: Puget Sound Regional Council (PSRC)
3) Blended Average (OFM/PSRC)
4) 4Blended Average Projection

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3.3.2 Employment

The PSRC employment projections for the City's 19 sewer basins was used as an approximate build-out scenario in this plan update. The PSRC LUV and UrbanSim models forecast total employment using regional employment datasets and distributes jobs to each basin throughout the service area based on the City's land use designations and zoning. These projections are consistent with City's 2015-2035 revisions to the Comprehensive Plan which plans to accommodate an employment capacity growth target of 22,210 jobs within the City and its UGA.

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Chapter 4 Regulations and Policies

4.1 Introduction

The City manages and operates their sewer system in accordance with state, local and federal regulations. The policies and standards described in the Plan provide a framework for the planning, design, operation, and management of the system to maintain the desired level of service to sewer utility customers. These policies are limited to the sewer system and its design and operation.

The City has discretion in setting performance and design criteria and standards for its sewer system, so long as they meet or exceed the minimum standards for public sewers as set forth by the Washington State Department of Ecology (DOE) through Chapters 90.48, 90.52, and 90.54 of the Revised Code of Washington (RCW). The criteria focus on planning, design parameters, and other details that have been developed to establish consistency and to ensure that adequate levels of service are provided throughout the system. The criteria also provide the planning process with measuring tools to identify areas of the existing system that need to be improved to achieve the desired level of customer service.

The City establishes the following goals for sewer service:

- Goal 1: Provide safe, reliable and timely sewer service to its consumers at a fair and reasonable price.
- Goal 2: Provide reliable levels of service and ensure adequate capacity within the sewer system as needed to protect the natural environment.
- Goal 3: Ensure that sewer system infrastructure expansion provides an adequate level of public service to support new development consistent with the City's policies, criteria, and standards. In addition, sewer system expansion should also be consistent with current land use plans and development regulations of the State of Washington, Pierce County, and appropriate local planning agencies.

4.2 Design Standards

All sewer system improvements are designed in accordance with Department of Ecology *Criteria for Sewage Works Design*, the City's *Development Specifications and Standard Details*, and meet or exceed the design standards referenced in WAC 173-240.

4.3 Construction Standards

All sewer system improvements are constructed in accordance with Department of Ecology *Criteria for Sewage Works Design*, the City's *Development Specifications and Standard Details*, and meet or exceed the construction standards referenced in WAC 173-240.

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4.4 Pretreatment

Pretreatment systems may be required to reduce, eliminate or alter the nature of a pollutant's properties prior to discharging to the public sewer collection system. Pretreatment systems include grease traps, interceptors, oil/water separators and other units to treat metals, solvents, fats, oils, grease, excessive BOD or TSS, and other constituents. Pretreatment systems are to be installed in compliance with Section 13.16 of the City's Municipal Code and Section 4.5 of the City's *Development Specifications and Standard Details*. Industrial users are required to complete an industrial user survey and enter into an agreement with the City prior to receiving a permit to connect to the sewer system.

4.5 Developer Sewer System Extensions and Upgrades

Sewer system extensions are allowed to provide sewer service within the City's sewer service area and UGA if the development is consistent with adopted development polices and all sewer utility policies and criteria, including the City's *Development Specifications and Standard Details*.

Developers are required to pay the City to analyze the impacts of the development on the existing sewer system. If the City makes a determination that the development's impact to the existing sewer system requires upgrades, the upgrades shall be made at the cost of the developer.

The City may require the developer to oversize new sewer infrastructure to accommodate future growth. The developer may recoup the additional cost for the oversized infrastructure using latecomers agreements or other mechanisms, including contributions from the City, or discounts to their general facility charges.

4.6 Septic to Sewer Conversion

All homes and businesses within 200 feet of a sewer main that have failing on-site systems and are within the UGA shall connect to that main in compliance with WAC 246-272A-0025.

City Code 13.16.070 states, "The owner of all houses, buildings or properties used for human occupancy, employment, recreation or other purpose, situated within the city and abutting on any street, alley or right-of-way in which there is now located a public sanitary sewer of the city, is required at his expense to install suitable toilet facilities therein and to connect such facilities directly with the proper public sewer in accordance with the provisions of this chapter within 90 days after date of official notice to do so; provided, that the public sewer is within 200 feet of the property line."

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4.7 Grinder and STEP Pump Ownership

The City does not currently own, operate, or maintain grinder pumps, nor do they have budget or staffing to do so.

The City is not planning to assume responsibility for ownership, operations, or maintenance of existing grinder pumps within the City's sewer service area. A revision to this policy would require establishing rights of entry to properties that have a grinder pump, ensuring existing grinder pump systems have been constructed to a standard suitable to the City, the City would need to maintain an inventory of spare parts for maintenance of allowed systems, and control panels and electrical connections would need to be located at locations accessible to City personnel.

The City will review the issue when DOE issues guidance about ownership, operations, and maintenance of grinder pumps.

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Chapter 5 Existing Wastewater Facilities

5.1 Introduction

The City owns and operates a collection system that includes 7.4 miles of force mains ranging from 1.25-inch to 16-inch, and 52.4 miles of gravity sewer ranging in size from 6-inch to 36-inch and is shown in Figure 5-1. Conveyance pipe include asbestos cement (AC), vitrified clay, concrete, polyethylene (PE), polyvinyl chloride (PVC) and ductile iron (DI) pipe.

Wastewater is conveyed to the wastewater treatment plant (WWTP) from the Cities of Sumner and Bonney Lake through two 36-inch gravity sewers. These flows remain separate and are measured for flow quanitity and pollutant loadings for each City at two wet wells at the WWTP. Flows are combined prior to fine screening.

Wastewater is treated at the WWTP via a conventional activated sludge process including fine screens, primary clarifiers, aeration basins, secondary clarifiers, and ultraviolet (UV) disinfection prior to discharge to the White River.

The description of the existing WWTP from the 2016 WWTP Phase III Feasibility Study was referenced as the most accurate and up-to-date information on the state of the existing treatment plant and excerpts from that study are included throughout this chapter.

5.2 Existing and Planned Basins

A basin is the area from which the collection system drains to a specified collection point, which is typically a sewer pump station. Delineation of basins is based on existing sewer service and topography. The City's system is divided into 18 basins which are shown in Figure 5-1.

5.3 Existing Sewer Piping

A listing of gravity sewers, force mains, and septic tank effluent pump (STEP) mains is provided in Tables 5-1, 5-2, and 5-3. Due to the relatively flat topography of Sumner, gravity pipes have generally been constructed at the minimum slope to avoid excessive pipe depths.

Table 5-1 Existing Gravity Sewers

Pipe Diameter (inches)	Length (feet)
6	15,553
8	169,300
10	28,662
12	35,444
14	1,972
15	4,726
16	670
18	2,885
24	7,359
30	6,979

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Table 5-1 Existing Gravity Sewers	
Pipe Diameter (inches)	**Length (feet)**
36	3,025
Total Gravity Sewers	276,576 (52.4 miles)

Table 5-2 Existing Force Mains	
Pipe Diameter (inches)	**Length (feet)**
1.25	195
1.5	465
2	3,698
2.5	18
3	1,707
4	8,130
5	445
6	4,084
8	7,534
10	5,865
16	7,108
Total Force Mains	39,249 (7.4 miles)

Table 5-3 Existing STEP Force Mains	
Pipe Diameter (inches)	**Length (feet)**
4	7,100
6	2,800

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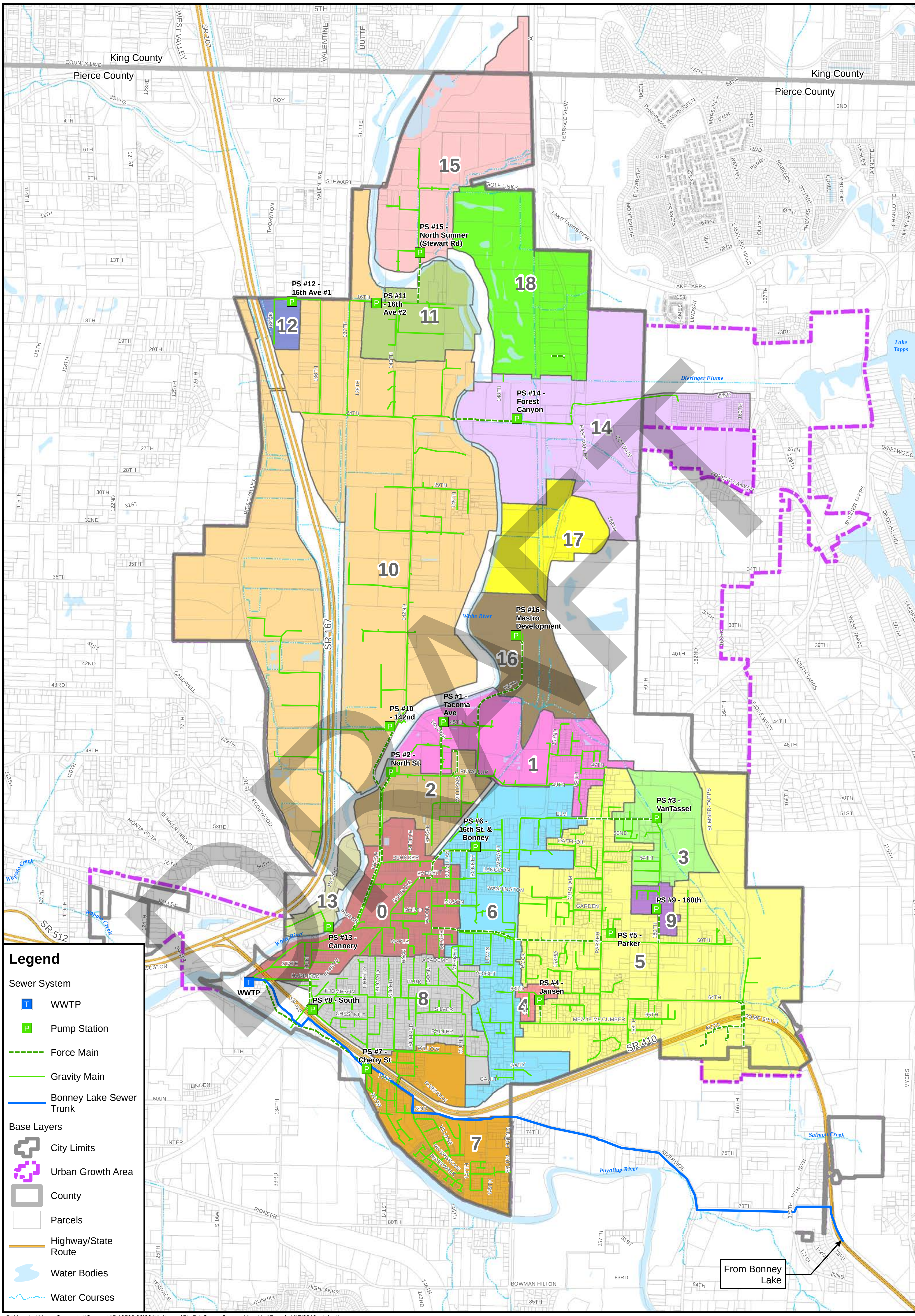

P:\Mapping\Maps_Generated\Sumner\17-10500.00\001\1.4\maps\Fig 5-1 Sewer System Map 11x17.mxd 4/17/2018 ctolentino

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GIS Base: City of Sumner & Pierce County
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Sewer System Map
General Sewer Plan Update
City of Sumner

Figure
5-1

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5.4 Existing Pump Stations

The existing wastewater system includes 16 pump stations. All pump stations are equipped with two pumps (one duty and one standby) with the exception of Pump Station No. 10 (PS-10), which has three pumps. PS-7 has two pumps installed with provisions for the addition of a third. Pump station firm capacity is based on the largest pump out of service. A list of the City's pump stations and associated parameters is provided in Table 5-4. Due to the relatively flat terrain within Sumner, pump stations are needed to convey wastewater from more distant areas or areas with lower elevation within the sewer service area to the WWTP. Pump station locations are shown on Figure 5-1.

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Table 5-4 Pump Station Summary

Pump Station	Station Name	Year Built	Year Rebuilt	Station Type	Pump Manufacturer	Pump Model	Number of Pumps	Single Pump Capacity (gpm)	Total Capacity[1] (gpm)	Pump Total Dynamic Head (ft)	Measured Flow[2] (gpm)	Flow Meter	Motor Horsepower (HP)	Number of Air Vacs	Pig Launch	Bypass Port	On-Site Generator Set (kW)	Force Main Diameter (inch)
PS-1	Tacoma	1982	2009	Submersible / Recessed Impeller	PX	PX3-100-4	2	400	400	56.4	470/510	Yes	15	1	-	Yes	40	6
PS-2	North	1957	1987	Dry/Wet Well	S&L	4B3	2	500	500	62[3]	918/918	No	20	1	-	Yes	40	8
PS-3	Van Tassel	1977	2007	Submersible	ABS	AFP 1041	2	250	250	42.3	200/205	Yes	6.2	2	-	Yes	-	6
PS-4	Jansen	1979	2006	Submersible / Recessed Impeller	KSB		2	130	130		110/109	Yes		0	-	Yes	-	4
PS-5	Parker	1963	2017	Submersible	Hidrostal	EE4S4	2	1,330	1,330	66	1,180/1,140	Yes	37.4	5	Yes	Yes	102	10
PS-6	16th Street	1967	2017	Dry / Wet Well	S&L		2	700	700		700[4]	Yes		1	-	Yes	40	8
PS-7	Cherry Street	1966	2017	Submersible	Hidrostal	E5K-H	2 (3 in future)	1,180	1,180	55	1,230/1,320	Yes	27.8	1	Yes	Yes	51	10
PS-8	South	1966	2017	Submersible	Hidrostal	E5K-S	2	775	775	29	680/700	Yes	9.2	2	Yes	Yes	60	8
PS-9	160th	1966	-	Submersible	ABS		2	130	130		144/164	No		0	-	Yes	-	4
PS-10	142nd	1998	-	Submersible	(2) Fairbanks Morse, (1) Flygt		3	1,500	2,280		1,500/1,500 /1,500	Yes		3		Yes	150	12
PS-11	16th Ave 1	1998	-	Submersible	Flygt		2	100	100		95/110	Yes		0	-	Yes	-	8
PS-12	16th Ave 2	1998	-	Submersible	Flygt		2	100	100		104/117	Yes		0	-	Yes	-	12
PS-13	Cannery	2006	-	Submersible	ABS		2	213	213		240/227	Yes		1	-	Yes	-	4
PS-14	Forest Canyon	2007	-	Submersible	ABS		2	600	600		383/466	Yes		1	-	Yes	40	8
PS-15	North	2010	-	Submersible	ABS	AFP 1049	2	500	500	60.4	470/485	Yes	12.1	1	-	Yes	40	8
PS-16	Mastro	2012	-	Submersible / Recessed Impeller	KSB		2	200	200		175/197	Yes		1	-	Yes	40	4

Notes:
1) Total capacity with largest pump out of service.
2) Measured flow for each pump was measured with either flow meters or draw down tests. The different flow values represent the measured flow for each pump.
3) Total dynamic head determined from pump down test design point. The calculated total dynamic head design point was estimated to be 88 ft.
4) Flows were measured at 430 and 390 gpm with a faulty flow meter. Actual flows are estimated to be 700 gpm.

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5.5 Wastewater Treatment Plant

5.5.1 Overview

The City's WWTP is a conventional activated sludge system that treats wastewater from both the City of Sumner and the City of Bonney Lake. The WWTP is located at 13114 63rd Street East in Sumner, Washington. The WWTP is co-owned by the City of Sumner and City of Bonney Lake through an Intergovernmental Agreement for Wastewater Facilities Management and operated by the City of Sumner's Public Works Department. The WWTP is operated in accordance with the requirements of National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0023353 issued March 24, 2008 and effective May 1, 2008. Modified NPDES permits were since issued on November 16, 2009 and July 18, 2011. The NPDES permit is provided in Appendix B.

The existing WWTP consists primarily of two influent pump stations (one for the City of Sumner influent and one for the City of Bonney Lake influent), two influent Parshall flumes and influent samplers (one each for both influent pump stations), screening, three primary clarifiers, three aeration basins, three secondary clarifiers, a UV disinfection system, effluent flow meter and sampler, effluent pump station, a gravity thickener for thickening primary sludge, a dissolved air flotation thickener (DAFT) for thickening waste activated sludge (WAS), two anaerobic digesters, a centrifuge for sludge dewatering, a sludge dryer and two odor control systems. Recent planning documentation, record drawings, and operational and regulatory information for the existing WWTP, which completed construction of its last expansion project in 2016, are kept by the City engineering and wastewater operations departments.

The existing WWTP is currently designed for a maximum month flow of 6.10 MGD and a peak day flow of 11.66 MGD. The design annual average loadings to the WWTP for 5-day biochemical oxygen demand (BOD_5) and total suspended solids (TSS) are 9,750 lbs/day and 11,500 lbs/day, respectively. The WWTP maximum month BOD_5 and TSS design capacities are 10,900 lbs/day and 12,660 lbs/day, respectively. These design flows and loads are reflective of the recent WWTP upgrade completed in 2016, which are not reflected in the most recent modification of the current NPDES permit that preceded completion of the upgrade. The following sections provide a description of each major unit process within the WWTP.

5.5.2 Headworks

Raw domestic wastewater from the Cities of Sumner and Bonney Lake is conveyed to the headworks through separate 36-inch gravity sewers. The headworks is comprised of two influent pump stations, influent flow metering, samplers, mechanical screens, and a screenings washer/compactor. Wastewater from each of the two Cities is discharged into separate influent pump station wet wells. Each influent pump station contains a wet well with one screw centrifugal submersible jockey pump and three standard centrifugal submersible main pumps having a total capacity (largest unit out of service) of 8.5 MGD.

The influent pump stations lift the influent wastewater approximately 17 feet where it is discharged into influent channels located directly above the pump stations. The influent wastewater from each influent pump station passes through separate 18-inch Parshall flumes prior to being combined just upstream of the screens. A refrigerated composite sampler is located adjacent to each channel, just upstream of the flumes, to monitor the influent water quality from each city. The combined flow is screened through two mechanically cleaned filter screens having an opening size of ¼-inch. These two screens have a combined capacity of

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19.16 MGD. Screened material is discharged into a common sluice trough, which uses non-potable water to transport the screenings to a screenings washer/compactor located on the south side of the headworks structure. After being washed, dewatered, and compacted, screenings are discharged to a dumpster and disposed of in a landfill. A third parallel channel containing a manually cleaned, 3/4-inch bar screen provides additional screening capacity during high flows or maintenance of the mechanical screens.

5.5.3 Primary Clarifiers

The screened wastewater flows from the screen channels through the primary clarifier splitter box to one of three 55-foot diameter primary clarifiers. The primary clarifiers operate in parallel to remove heavier organic and inorganic solids from the screened wastewater. The primary clarifiers are also used to remove grit. The grit first settles by gravity with the other heavier solids in the primary clarifiers. The settled primary sludge is then pumped, as a dilute slurry, to two hydrocyclones where the grit is separated from the other settled solids. The degritted primary sludge is then thickened in a circular gravity thickener, prior to being pumped to the anaerobic digesters. Separated grit is dewatered using a grit classifier and deposited into a dumpster and the grit disposed of in a landfill.

5.5.4 Aeration Basins

Effluent from the primary clarifiers flows by gravity to the aeration basin splitter box, which divides flows between the three aeration basins. The three basins operate in parallel based on basin volume, with Basins 1 and 2 receiving 30 percent of the flow each, while Basin 3 receives 40 percent of the flow due to its larger volume. The aeration basins have a total volume of approximately 3.2 million gallons for a hydraulic retention time (HRT) of 12.6 hours at the design maximum month flow of 6.10 MGD.

Primary effluent is also combined with return activated sludge (RAS) at the splitter box to create the mixed liquor that enters the aeration basins. It is in these basins that the biological removal of both carbonaceous and nitrogenous material begins. Suspended microbial growth in the basins remove both organic pollutants and nutrients, in the form of ammonia and nitrate nitrogen, from the wastewater, which is later removed in the secondary clarifiers. The basins contain selector, anoxic, and aerobic activated sludge zones configured as a Modified Ludzack-Ettinger (MLE) process in which nitrified mixed liquor is recycled from the aerobic zones at the downstream end of the basins to the selector/anoxic zones at the upstream end of the basins for denitrification. Mixed liquor entering each basin first passes through three selector zones designed to promote a rapid uptake of soluble substrate and the development of a floc-forming bacteria with good settling characteristics. Two anoxic and four aerobic zones follow the selector zones.

Aeration and mixing of the selector and oxic zones is accomplished using an air distribution system consisting of coarse and fine bubble diffusers, while the anoxic zones are mixed using submersible mechanical mixers. Four single-stage centrifugal blowers, located in Equipment Building 3, supply air to the diffusers. Blower output is controlled automatically to maintain the dissolved oxygen setpoint concentrations within each individual aerobic zone. Submersible propeller pumps are used to recirculate nitrified mixed liquor from the aerobic zones back to the selector and anoxic zones to achieve denitrification.

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5.5.5 Secondary Clarifiers

Mixed liquor from the aeration basins is conveyed by gravity to the secondary clarifiers. A splitter box divides flows equally between three 70-foot diameter clarifiers. The calculated clarifier overflow rates for the design annual average, maximum month, and peak hourly flows are 370, 530, and 1,720 gallons per day per square foot (gpd/sf), respectively. The clarifiers separate the mixed liquor suspended solids from the effluent flow stream. A scraper mechanism is used to collect solids settled at the bottom of the clarifiers. A scum skimmer attached to the scraper mechanism removes the floatables from the clarifiers and discharges the scum to a sump. The scum pumps transfer the scum to a scum holding vault and then to anaeorobic digesters. Clarified supernatant flows over the effluent weirs to ultraviolet (UV) disinfection system.

5.5.6 Activated Sludge Pumps

The WWTP is equipped with the following activated sludge pumps located below the operations building:

- Five centrifugal RAS pumps (10 HP and 1,200 gpm capacity each)
- Two progressive cavity WAS pumps (5 HP and 101 gpm capacity each)
- Three submersible propeller mixed liquor recycle pumps (8.3 HP and 7,000 gpm capacity each)

The five RAS pumps are used to return the settled solids to the aeration basin splitter box. Sodium hypochlorite is periodically injected into the RAS before it reaches the aeration basin to control filamentous bulking. WAS is drawn off of the RAS discharge manifold and pumped to the DAFT. The thickened WAS is then pumped to the anaerobic digesters. The sludge wasting rate is controlled to maintain the solids retention time (and mixed liquor suspended solids concentration) selected for the activated sludge process control.

5.5.7 UV Disinfection

Clarified effluent from the secondary clarifiers flows by gravity to the low pressure, high intensity UV disinfection system. This system exposes pathogenic organisms remaining in the flow stream to high intensity UV light/radiation, which inactivates them, thereby preventing reproduction. UV disinfection is conducted in two open channels, each containing two banks of UV light emitting lamps. Each bank is comprised of seven parallel modules each containing eight UV lamps for a total of 224 lamps (56 lamps per UV bank). A 216-foot serpentine weir controls the water level in the UV channels. The existing UV disinfection system is capable of passing the design peak hour flow of 19.87 MGD and delivering a design dose of 40 millijoules per square centimeter at the design peak day flow with a minimum UV transmittance of 60 percent.

5.5.8 Effluent Pump Station

Effluent flow is measured using a magnetic flow meter located upstream of the UV system. Under normal conditions, treated effluent flows by gravity to the White River through the effluent pump station and outfall. However, during peak flow or flood events, the effluent must be pumped to a headbox. The higher water elevation in the headbox then allows gravity flow to the White River. The effluent pump station consists of three variable flow, single-stage, vertical turbine mixed-flow pumps and one smaller submersible centrifugal jockey pump. At the design peak White River flood stage of 50.0 feet, these pumps have a total capacity of 14,400 gpm (20.7 mgd).

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5.5.9 Outfall & Receiving Water

The WWTP discharges into the White River at GPS coordinates 47° 12' 00" N, 122° 15' 21" W. The outfall is comprised of a 358-foot long 30-inch diameter polyethylene pipe followed by a 65-foot section of 24-inch ductile iron pipe.

5.5.10 Sludge Thickening

Settled sludge from the primary clarifiers is degritted and then thickened in a circular gravity thickener, prior to being pumped to the anaerobic digesters. The gravity thickener is 33 feet in diameter and has a design hydraulic loading rate of 690 gpd/sf and a design solids loading rate of 9.6 pounds per square foot per day (lbs/sf/day).

WAS pumped from the RAS discharge manifold is conveyed to the DAFT. The DAFT consists of a large steel tank with 300 square feet of flotation area, a recirculation pump, a reaeration pump and two air compressors. The DAFT has a design flow rate of 90 gpm and a design solids loading rate of 36 lbs/sf/day. Thickened WAS is pumped to the anaerobic digesters.

5.5.11 Anaerobic Digestion

The anaerobic digestion system consists of two digesters, one primary and one secondary, each with a working volume of 56,000 cubic feet, along with two digester recirculation pumps, two digester mixing pumps for the primary anaerobic digester, a digester heating system and a linear motion mixer to mix the secondary anaerobic digester. Thickened primary sludge from the gravity thickener, thickened waste activated sludge from the DAFT, and scum from the scum holding vault are all pumped to the primary anaerobic digester.

In the primary anaerobic digester, a portion of the organic content of the sludge and scum is broken down and metabolized by acetogenic and methanogenic bacteria, stabilizing the sludge and reducing the overall mass of sludge for final disposal. Digested sludge from the primary digester overflows by gravity to the secondary digester, which has the same physical characteristics as the primary digester; except that it is not normally heated and is mixed by a linear motion mixer. Some additional volatile solids destruction occurs in the secondary digester, but it primarily serves as a digested sludge holding tank. The secondary anaerobic digester is equipped with a floating cover to allow the water surface to fluctuate, providing greater flexibility in sludge dewatering and drying operations. The digested sludge from this process meets the vector attraction and pathogen reduction requirements for Class B biosolids.

Digested sludge is pumped from the secondary anaerobic digester to the dewatering centrifuge using two progressing cavity pumps, each with a capacity of 78 gpm at 30 psi. The second pump serves as a standby unit, so each pump is capable of meeting the design hydraulic capacity of the dewatering centrifuge. The digester gas in excess of that required to fire the boiler and heat the primary anaerobic digester is flared off in a waste gas burner.

5.5.12 Sludge Dewatering

The digested sludge is dewatered in a decanter centrifuge, prior to being conveyed to the sludge drying system for further treatment. The centrifuge has a hydraulic capacity of 60 gpm and a solids loading capacity of about 1,070 pounds per hour, based on a 3.5 percent solids concentration at the hydraulic capacity. Digested sludge is dewatered in the centrifuge from a solids concentration of approximately 3 percent to in excess of 20 percent. Centrate from the dewatering operation, which is high in ammonia, is stored in the centrate holding tank and returned to the treatment process when influent loads and associated influent nitrogen loading is

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lowest. Dewatered sludge can be conveyed to the sludge drying system or directly to the dewated sludge loading bay.

5.5.13 Sludge Drying

The sludge drying system is a batch system in which dewatered sludge is periodically transferred from the dewatered sludge storage hopper to the sludge dehydration chamber. In the dehydration chamber, the sludge is mixed by a series of rotating disks. Thermal fluid is continuously pumped through these rotating disks and the shell of the dehydration chamber, heating the sludge and evaporating the water contained in the sludge. In this fashion, the sludge is dried to in excess of 90 percent dry solids by weight, thereby significantly reducing the total volume and meeting the time and temperature requirements for Class A biosolids in the process. Five shaftless screw conveyors transport sludge from the centrifuge and the sludge dryer to the truck loading bay: two from the centrifuge, two from the dryer, and one that can be shared by both systems in the loading bay.

5.5.14 Odor Control Systems

There are several areas within the treatment plant that have significant odor potential, which include the influent pump stations, headworks, Grit Handling Building, gravity thickener, centrate storage tank, plant drain pump stations, Equipment Building 2 DAFT Room, thickened sludge storage tank, and sludge drying room. To prevent objectionable odors from leaving the site, the off gases from each of these areas are contained and vented to one of two odor control systems.

The first odor control system consists of parallel biofilters, each containing a five-foot deep bed of shredded root media on top of a concrete air plenum. The shredded root media provides a surface for microorganisms that can oxidize the odor-causing compounds in the off gases to grow. The foul air passes through a heated humidification tower prior to entering the biofilters to provide moisture and temperature conditions that are more optimal for microbial growth. This odor control system treats the foul air from all of the sources listed above with the exception of the Grit Handling Building and gravity thickener. The foul air from these two sources is treated by the second odor control system, which consists of a single granular activated carbon treatment unit.

5.6 Asset Management

The sewer utility assets are cataloged in a geospacial 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 5-5 lists the data management system, attributes, and evaluation measures for several City sewer system assets.

5.7 Sewer 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 personel. The myriad of software and hardware systems utilized by the sewer utility require that the City prioritize the maintenance and security monitoring of these system. It is also vital that City personel understands how each of the

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systems interact. Figure 5-2 illustrates the most prominent software resources currently being deployed along with a rudimentary depiction of how they are networked together.

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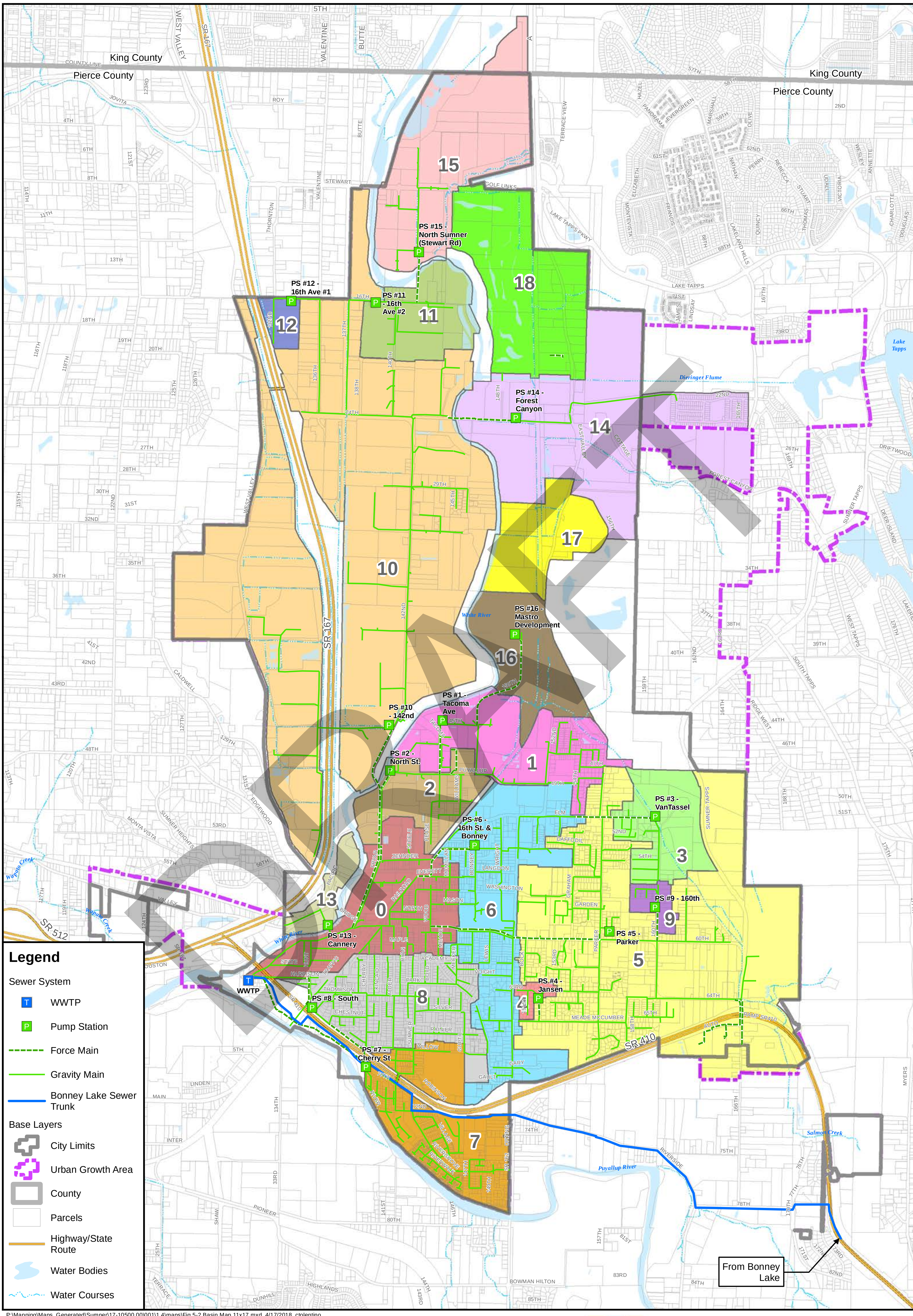

P:\Mapping\Maps_Generated\Sumner\17-10500.00\001\1.4\maps\Fig 5-2 Basin Map 11x17.mxd 4/17/2018 ctolentino

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

Basin Map

General Sewer Plan Update
City of Sumner

Figure 5-2

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Table 5-5 Asset and Data Management Inventory				
Asset	Data Management			Evaluation Measures
	System	Source*	Recorded Attributes	
System Piping and Service Laterals	GIS	E	▪ Physical data	▪ Age, material, location
	Work Order Database	O	▪ Cleaning, repairs, CCTV inspection, smoke testing, cleanout installation	▪ Failure history ▪ Visual inspection of failures or I/I
	System Model	E	▪ Diurnal flow, depth of flow, velocity	▪ Hydraulic capacity adequacy
System Manholes	GIS	E	▪ Physical data	▪ Type, diameter, material, lid
	Work order database	O	▪ Cleaning, repairs, inspection	▪ Visual inspection of failures or I/I
	System Model	E	▪ Depth of flow/surcharge	▪ Hydraulic capacity adequacy
Pump Stations	Engineering database	E	▪ Planning/design/construction documentation	▪ Capacity, design criteria
	SCADA	O	▪ Pump run times and flows, alarming	▪ Communications reliability ▪ Hydraulic capacity adequacy (motor run times, simultaneous dual pump operation)
	Work order database	O	▪ Equipment servicing, inspections, wet well and force main cleaning	▪ Retained operational functionality
WWTP	Engineering database	E	▪ Planning/design/construction documentation	▪ Capacity criteria ▪ Seismic compliance
	Work order database	O	▪ Equipment servicing, inspection, cleaning, lab analysis	▪ Condition assessment
	SCADA/HMI	O	▪ Flows, water quality, biosolids quality, chemical and power use	▪ NPDES compliance ▪ Operational efficiency

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Table 5-5 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

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Chapter 6 Wastewater Flow Characteristics

6.1 Introduction

Wastewater flow data recorded at the City's wastewater treatment plant (WWTP) for 2015 through 2017 were analyzed to determine current wastewater flow characteristics. Population and employment data from Chapter 3 were used to develop the per capita flows that were then used to project future flows.

6.2 Existing Wastewater Flows

The WWTP has two Parshall flume flow meters at the headworks, one measuring flow from the City's collection system, and the other measuring flow from the City of Bonney Lake. The measured flow includes domestic wastewater, industrial wastewater, and infiltration and inflow. The WWTP effluent flow is measured using a magnetic flow meter. Some minor flow attenuation occurs through the treatment process; however, it does not affect daily flow analysis presented herein. Monitoring data is recorded on the daily monitoring reports (DMRs). DMRs for 2015, 2016, and 2017 are summarized in Chapter 8 of this Plan.

Annual average, maximum month, peak day, and peak hour wastewater influent flow characteristics recorded at the WWTP from 2015 through 2017 are summarized in Table 6-1.

Table 6-1 Wastewater Flow Summary

	Flows	2015	2016	2017(1)	Average
Average Annual Flow (mgd)	Sumner	1.05	1.07	-	1.06(2)
	Bonney Lake	1.18	1.20	-	1.19(2)
	WWTP	2.23	2.26	-	2.25(2)
Maximum Month Flow (mgd)	Sumner	1.59	1.43	1.71	1.58
	Bonney Lake	1.91	1.57	1.93	1.80
	WWTP	3.50	2.99	3.66	3.38
Peak Day Flow (mgd)	Sumner	3.67	2.16	2.83	2.89
	Bonney Lake	3.68	2.79	2.86	3.11
	WWTP	7.32	4.42	5.69	5.81
Peak Hour Flow(3) (mgd)	Sumner	-	-	3.60	-
	Bonney Lake	-	-	3.67	-
	WWTP	-	-	7.22	-

Notes:
1) Flows for 2017 are through March.
2) Average annual flows from 2017 were excluded from the table as measured flows were not representative of the entire year.
3) Hourly flows were not available for the peak days occurring in 2015 or 2016.

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6.3 Water Meter Data

Water meter data for the City was analyzed to differentiate between residential and commercial/industrial flows. Water meter data from 2016 was compared to the average annual sewer flow in Table 6-1. Based on this comparison the average daily water demand for 2016 and percent breakdown is shown in Table 6-2.

Table 6-2 Average Annual Water Demand (2016)

Meter Type	Water Demand (mgd)	Percent of Total
Commercial/Industrial(1)	0.37	34%
Residential(2)	0.73	66%
Total	1.10	100%

Notes:
1) Commercial/industrial includes church, City, commercial, hotel/motel, industrial, and school demands.
2) Residential includes single family and multifamily demands.

The total water demand for the City is 1.10 MGD, which is within 5 percent of the City's wastewater average annual flow. Although the water and sewer service areas aren't identical, they are close enough to give an approximate breakdown in flows from residential versus commercial/industrial areas. The percentage of water demand by customer class was used to calculate the unit sewer flows.

6.4 Industrial Wastewater

Many industrial businesses and facilities exist within the Sumner service area. The liquid waste streams that can be generated from these industrial properties include domestic wastewater, process wastewater, and stormwater. Where the flows and pollutant loading from these facility waste streams have the potential to violate state water quality standards for either the local groundwater or surface waters that they are released to, compliance conditions under an industrial permit issued by DOE must be monitored and met. In most cases, this obligates the business to implement either full treatment (if the wastewater discharge to the environment is under the authority of the business) or pretreatment (if the wastewater discharge is being sent to the City's wastewater collection system and WWTP for further treatment before discharge to the environment).

Industrial stormwater permits in place at Sumner businesses include onsite treatment and groundwater discharge, onsite treatment and discharge to the City's stormwater system and Puyallup River outfall, and onsite treatment and direct outfall discharge to the White River. Many industrial facilities separate and solely contribute their domestic wastewater stream to the City's sewer collection system, which is viewed as the equivalent of a domestic service requiring no additional site specific permitting or monitoring.

Under the terms of its WWTP NPDES permit, the City must conduct an annual survey of industrial users that discharge substantial wastewater flows or loads to the sewer collection system. If industrial processes incorporated at the facility result in loadings that might disrupt the treatment processes of the WWTP, or are more than 5 percent of its permitted capacity, an industrial permitting process is initiated. Sumner currently has two industries – Fleischmann's

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Vinegar and Shining Ocean – that include process wastewater in their discharge to the City collection system. Both are regulated under industrial permits, implement pretreatment facilities to maintain discharge compliance to the City, and involve City operations staff in compliance activities. Their minimum, maximum and average permit loading conditions are summarized in Table 6-3. Two additional industries, Pacific Northwest Baking Company and Cold Locker Processing and Storage, were identified in recent annual surveys as being potential significant industrial users that would be subject to the development of industrial permits. With the increased flow and loading capacities of the WWTP that resulted from the completion of plant expansion in 2016, however, the contributions of these industries now fall below a significant threshold (based on current operations).

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Table 6-3 Industrial Users NPDES Discharge Permit Summary

Industrial User	Address	Flow (gpd)		BOD5 (mg/L)		BOD5 (lbs/day)		TSS (mg/l)		TSS (lbs/day)		pH (min/max)
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	
Fleischmanns Vinegar (Outfall 001)	1115 Zehnder St	3,334	12,000	376	1,059	34	106	335	430	32	43	6.0/9.0
Shining Ocean	1115 Zehnder St	45,000	56,000		-	135	169	-	-	45	56	6.0/9.0

Notes:

1) Shining Ocean also has maximum daily permit limits for temperature (100°F) and oil and grease (50 mg/l) and a minimum daily permit limit for dissolved oxygen (1.0 mg/l).

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6.5 Unit Sewer Flow Calculations

The calculation of unit sewer flows in gallons per capita per day (gpcd), coupled with population forecasts outlined in Chapter 3, allows projection of wastewater flows as discussed in this chapter. The existing domestic wastewater flow component of the WWTP influent includes flows from residential, commercial, and industrial sources. An estimate of the unit or per capita flows per day is provided in Table 6-4. Values in Table 6-4 are based on 2016 population and employment estimates to calibrate against measured 2016 flow data. Flows and loads for the industrial dischargers are included in the overall City values for commercial and industrial users. These calculations apply to the City of Sumner's collection system only. It does not include flows or populations from the City of Bonney Lake, which discharges directly to the WWTP.

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Table 6-4 Residential and Commercial Average Annual Unit Flow Calculations for 2016

Average Annual Flow (mgd)	Residential Flow(1) (mgd)	Commercial and Industrial Flow(2) (mgd)	Residential Sewered Population	Employment	Residential per Capita Flow (gpcd)	Commercial and Industrial per Employee Flow (gpcd)
1.06	0.70	0.36	10,251	15,313	68	23

Notes:
1) Residential flow is 66 percent of total average annual flow per Table 6-2.
2) Commercial and Industrial flow is 34 percent of total average annual flow per Table 6-2.

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6.6 Infiltration and Inflow Analysis

Infiltration and inflow (I/I) is the wastewater component consisting of stormwater surface runoff entering the sewer system and infiltration from storm-saturated ground conditions. Inflow is runoff entering the sewer directly, typically from storm sewer connections, basement sump pumps, roof drains, and submerged manholes. Infiltration occurs as groundwater leaks into the sewer system through cracked or broken pipes and manholes or through loose joints and connections. I/I is important in determining the peak day and peak hour flows throughout the system. I/I can vary significantly due to changes in groundwater tables, rainfall intensity, rainfall duration, and rain event peak timing during the day.

Peak calculated I/I rates are presented in Table 6-5.

Table 6-5 Peak Infiltration and Inflow

Parameter	2015	2016	2017
Peak Day Flow (mgd)	3.67	2.16	2.83
Average Annual Flow (mgd)	1.05	1.07	1.07(1)
Peak Day Infiltration and Inflow(2) (mgd)	2.62	1.09	1.76
Sewered Area(3) (acres)	4,089	4,089	4,089
Peak Infiltration and Inflow Rate (gpd/acre)	641	267	430

Notes:

1) Average annual flow for 2017 was not available but is estimated to be the same as 2016.
2) Peak day infiltration and inflow was calculated by subtracting the average annual flow from the peak day flow.
3) Sewered area is the area of all parcels and right-of-way adjacent to a sewer line in 2017. The sewered area for individual years was not available and assumed to be similar.

I/I rates ranged from 267 gpd/acre in 2016 to 641 gpd/acre in 2015. The 2015 rate was used for planning purposes because it was the highest over the analyzed time period.

Assessing the degree of infiltration was based on the EPA publication ‘Infiltration/Inflow – I/I Analysis and Project Certification’ dated May 1985, which was reissued by the Washington Department of Ecology as Ecology Publication No. 97-03. This publication establishes the following thresholds for excessive infiltration and inflow:

- If average dry weather flow during a period of seasonal high groundwater is less than 120 gpcd, infiltration is non-excessive.
- If average wet weather flow is less than 275 gpcd, inflow is non-excessive.

The analysis is presented on Table 6-6. The average dry weather flow during a period of seasonal high groundwater was 116 gpcd. Therefore, infiltration is deemed non-excessive. The average wet weather day flow for days with greater than one inch of rainfall from the 2015 to 2017 period was used. The resulting calculated average wet weather flow was 163 gpcd. The 163 gpcd is below the 275 gpcd threshold for excessive inflow; therefore, the system inflow is deemed non-excessive.

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Table 6-6 EPA/DOE Excessive I/I Criteria

Parameter	Value
Sewered Population	10,251
Average Dry Weather High Groundwater Dates	1/24/2015-1/30/2015
Average Dry Weather High Groundwater Flow (mgd)	1.19(1)
Average Dry Weather High Groundwater Flow (gpcd)	116(1)
Average Wet Weather High Groundwater Flow(2) (mgd)	1.67
Average Wet Weather High Groundwater Flow(2) (gpcd)	163

Notes:
1) EPA's definition of dry weather flows is the average flow on days where no rainfall has occurred during a season of high groundwater.
2) Average wet weather flow is for days with more than one inch of rainfall.

BHC Consultants analyzed I/I rates per basin using flow meter and pump runtime data for dry and wet weather, and documented the results in a Technical Memorandum dated September 11, 2015 and included as Appendix C. The result of the analysis determined that Basins 0, 6, and 8 have the highest rates of I/I in the City. These basins have some of the oldest sewers in the system and are known to have deficiencies that are likely to contribute to higher I/I rates.

Based on this analysis, the City has recently performed smoke testing in Basin 6 to located sources of I/I. The smoke testing report is included as Appendix D.

6.7 Diurnal Curves

Typically, sewer flows are lowest at night and highest during the morning and evening. This distribution of flow throughout the day is described by a diurnal curve. These curves are used by the computer model described in Chapter 7 to simulate flow variations throughout the modeled time period. Two curves are used to vary flow throughout the day: one for the sanitary sewer component, and one for the I/I component.

The sanitary sewer diurnal curve was calculated by normalizing the average annual flow on an hourly basis. A normalized curve is unitless and has an average of 1, and can be multiplied by the daily flow to estimate the flow based on the time of day.

The I/I curve was based on flow data at the WWTP from 3/15/2017, which had a daily flow of 2.83 mgd and a peak hour flow of 3.60 mgd. This day had several days of rainfall preceding it. Flows from 3/14/2017 to 3/16/2017 are shown in Figure 6-1.

The I/I curve was calculated by subtracting the average annual flow from the hourly flow on 3/15/2017, and the results were normalized. The sanitary and I/I diurnal curves are presented as Figure 6-2.

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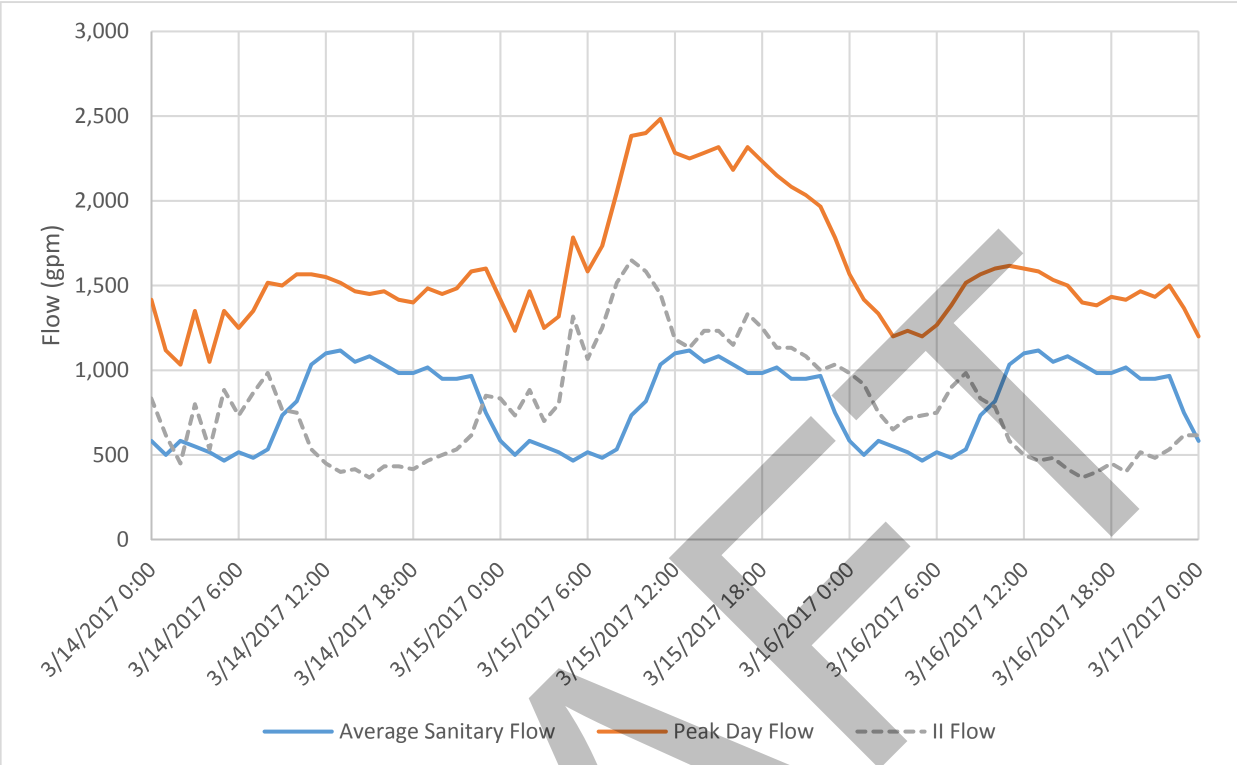

Figure 6-1 3/14-3/16/2017 Flow

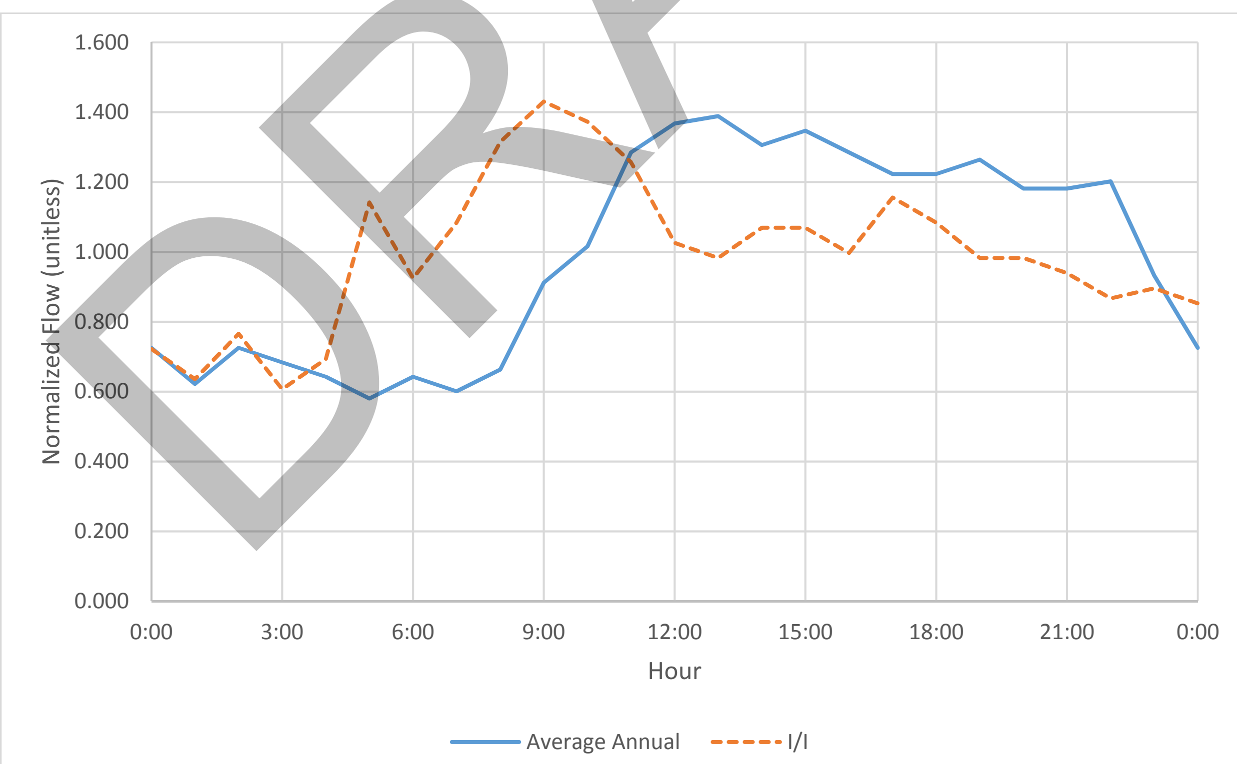

Figure 6-2 Diurnal Curves

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6.8 Peaking Factors

The peaking factors shown in Table 6-7 were calculated based on the measured flow data by dividing the maximum month, peak day, and peak hour flows by the average annual flow. The peaking factors are for the City's collection system and does not include the City of Bonney Lake flows.

The peak day flow occurred on 12/9/2015. Hourly flow data was not available for this date. Peak Hour to Annual Average flow was calculated by using the 2017 Peak Hour to Peak Day factor of 1.27, and multiplying it by the Peak Day to Average Annual factor from 2015 of 3.46.

Table 6-7 WWTP Peaking Factors for Domestic Wastewater

2017 Annual Average Flow	1.06 mgd
Maximum Month Flow (March 2017)	1.71 mgd
Maximum Month to Annual Average	1.61
Peak Day Flow (12/9/2015)	3.67 mgd
Peak Day to Annual Average	3.46
2017 Peak Day Flow (3/15/2017)	2.83 mgd
2017 Peak Hour Flow (3/15/2017)	3.60 mgd
Peak Hour to Peak Day in 2017	1.27[1]
Peak Hour to Annual Average	4.39[1]

Notes:

1) The peak day flow occurred on 12/9/2015. Hourly flow data was not available for this date. Peak Hour to Annual Average flow was calculated by using the 2017 Peak Hour to Peak Day factor of 1.27, and multiplying it by the Peak Day to Average Annual factor from 2015 of 3.46.

The maximum month, peak day, and peak hour factors are related to the served population and typically these peak factors decline as the population increases.

6.9 Summary of Existing Wastewater Flows

For planning purposes, an average annual flow of 1.06 mgd, maximum month flow of 1.71 mgd, peak day flow of 3.67 mgd, and peak hour flow of 4.66 mgd will be used for the City collection system flows. The peak hour flow was calculated by multiplying the peak day flow of 3.67 mgd by the Peak Hour to Peak Day in 2017 of 1.27.

6.10 Projected Wastewater Flows

Wastewater flows were projected to future conditions based on the population projections described in Chapter 3. Unit flows developed above are assumed to remain constant throughout the planning horizon. A summary of unit flows and projected flows for the planning horizon are shown as Table 6-8. A breakdown per basin is included as Appendix E, and is used as the basis to more accurately disperse flows within the collection system model discussed in Chapter 7.

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Table 6-8 Projected Wastewater Flows

Year	Sewered Residential Population	Residential Flow (gpcd)	Employment Population	Employment Flow (gpcd)	Average Annual Flow (mgd)	I/I (gpd/acre)	Sewered Area[1] (acres)	Maximum Month Flow (mgd)	Peak Day Flow (mgd)	Peak Hour Flow[2] (mgd)
2016	10,251	68	15,931	23	1.06	641	4,089	1.59	3.68	4.67
2024	11,658	68	18,917	23	1.23	641	4,254	1.86	3.93	5.00
2038	13,146	68	27,726	23	1.53	641	4,326	2.32	4.32	5.49

Notes:
1) Sewered area is based on sewered parcels in 2016, and increases to the full sewered area of the City and UGA in proportion to the sewered residential population.
2) Peak hour flows in this table were calculated using a peak hour to peak day factor of 1.27.

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Chapter 7 Conveyance System Analysis

7.1 Introduction

Analysis of the City's wastewater conveyance system is a critical component in determining the ability of the existing infrastructure to accommodate future growth. The City's conveyance system was analyzed using a truncated model, simulating only trunk and interceptor gravity mains larger than 8-inches, and all pump stations and force mains. This allows for an accurate representation of the most critical components and most of the City's conveyance system, and the simultaneous analysis of both gravity and pressure systems. The system was analyzed for existing conditions (2016), a 6-year planning horizon (2024), and a 20-year planning horizon (2038).

7.2 Model Software

InfoSWMM 14.5 by Innovyze was the hydraulic modeling software used to model the City sewer system. InfoSWMM is a dynamic hydraulic model that uses the EPA SWMM 5.1.012 computer program for the hydraulic analysis calculations. The model is designed specifically for modeling urban sanitary and combined sewer systems. The current version operates within an ArcGIS (ArcMap) platform.

7.3 Model Development

Model files were imported from the City's GIS database and supplemented or validated through review of record drawings, sewer base maps, and pump station data. Additionally, City operations staff performed a review of the imported model information and provided redlines for observed physical errors that were incorporated.

The City's conveyance system was analyzed using a truncated model, simulating only trunk and interceptor gravity mains, and all pump stations and force mains. The model can be expanded in the future, as needed.

The following information was used in developing the hydraulic model of the existing sewer collection system. Additional detail on the existing sewer system is included in Chapter 5.

7.3.1 Gravity Sewers

Gravity sewer manhole rim and invert elevations were obtained primarily from GIS and sewer base maps maintained by the City. Record drawings were used where available. In the few cases where no data was available, inverts were interpolated from surrounding manholes, establishing consistent upstream and downstream pipe slopes. Rim elevations were estimated based on Pierce County LIDAR data.

7.3.2 Pump Stations

Pump station elevations, wet well dimensions, pump curves, and pump operating points were obtained from the City, based on available information. Pump curves were used to simulate pump operation. Depth to volume relationships of the wet well and pump on/off set points, based on recent system control information, were also added. Modeled pumping rates were compared against measured flow rates when available to ensure model accuracy and that the model outputs were within a range of reasonably expected values.

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7.4 Model Loading

Meaningful modeling results can only be obtained if the quantity of flows and the location where they enter the system in the model reflect actual conditions. Wastewater flow consists of two separate elements: sanitary sewer flow and infiltration and inflow (I/I). Sanitary sewer flow represents the component of conveyance system flows generated from typical municipal uses such as residential, commercial and industrial. It is typically referred to as Average Annual Flow (AAF) in the model (AAF in the collection system usually includes a minor amount of base I/I that is accounted for in the model I/I loading), but is subject to periods that generate higher peak flows. I/I is loaded into the model as an external source of flow. All flow is loaded to model "nodes", which are manholes in gravity systems.

7.4.1 Sanitary Sewer Flows

Existing and projected sanitary sewer flow rates were developed for each basin using the following information:

- Population and employment data and projections (described in Chapter 3)
- Basin areas (described in Chapter 5)
- Existing measured flow rates (described in Chapter 6)
- Unit sewer flows (described in Chapter 6)
- Diurnal curves (described in Chapter 6)

Model loading is assigned on a flow per unit area basis for nodes identified in each basin. The model assigns flow to the nodes, based on the amount of contributing area calculated for each node using the Thiessen polygon method.

7.4.2 Infiltration and Inflow (I/I)

Existing and projected I/I rates were developed on a gallons/acre basis using the following information:

- Basin areas (described in Chapter 5)
- I/I (described in Chapter 6)
- Diurnal curves (described in Chapter 6)
- Sewered areas (described below)
- Flow meter and pump runtime data (described below)

Total I/I for each basin was calculated using the total I/I rates described in Chapter 6, flow meter and pump runtime data, and the approximate area contributing to the sewer system per basin. Model loading is presented in Appendix E. The existing sewered area was derived from the area of parcels and rights-of-way adjacent to existing sewers, and was adjusted based on engineering judgment and knowledge of the sewer system. 2038 sewered area was calculated as the entire basin area. Sewered areas for 2024 were interpolated between existing and build-out sewered areas by calculating the change in sewered area divided by the change in population between existing conditions and 2038 conditions.

Model I/I loading was assigned to nodes based on the Thiessen polygon method, where the ratio of contributing area calculated for each node (nearest node proximity) against the total basin area is generated.

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Determining how I/I is projected into the future as the collection system expands and ages is an important assumptive issue. Based on the King County Regional Infiltration/Inflow Control Program, a widely accepted assumption in Western Washington is to increase the I/I component of sewer flow by 7 percent per decade, up to a maximum of 28 percent. Much of the City's existing sewer collection system was built 40 years ago or more, and has reached the maximum I/I rate. Therefore, a constant I/I rate was assumed for future I/I projections.

7.5 Model Calibration

The model was calibrated using flow meters at the WWTP and at pump stations.

7.5.1 Calibration to Recorded Flow Data

Average Annual Flow Calibration

The first step in calibrating the model was to compare predicted sanitary flows calculated in Chapter 6 to measured average annual flow data at the WWTP. The modeled total daily flow volumes were compared to the metered data at the WWTP. After these flow volumes were verified, diurnal flow patterns were loaded and adjusted so that the variations in simulated flow throughout the day reasonably matched the measured average annual flow conditions. Average Annual Flow calibration is depicted in Figure 7-1.

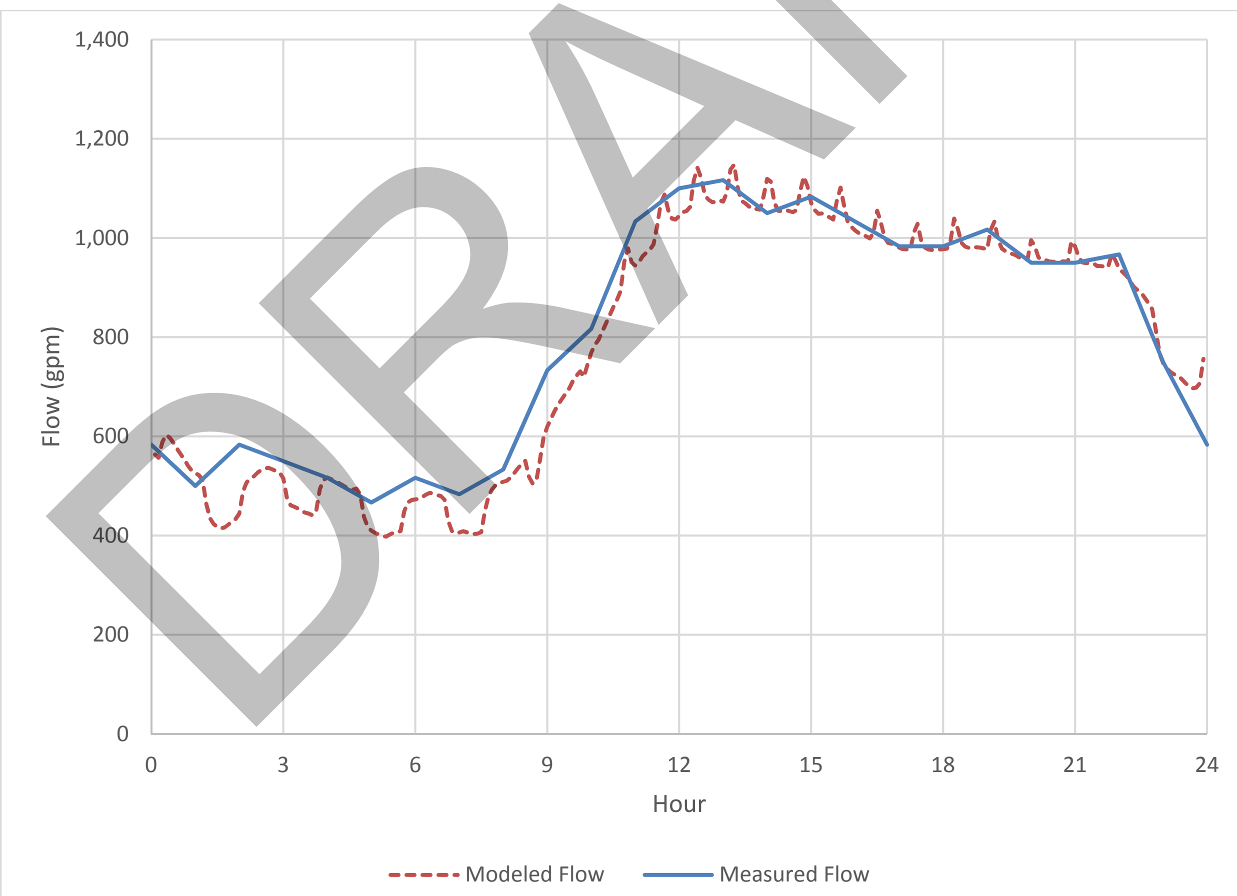

Figure 7-1 Average Annual Flow Calibration

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Peak Day Flow Calibration

Peak day I/I was loaded into the model and simulation results were compared with the peak day flow at the WWTP and the pump stations. The modeled flow volume was compared with the measured flow volume during peak days to ensure model loading reasonably matched the field data. Unit I/I rates were adjusted per basin to get a reasonable match at the pump station meters. I/I rates per basin can be seen in Appendix E.

Peak Hour Flow Calibration

There was not sufficient data available to calibrate peak hour flow. The peak day flow occurred in 2015, for which only total daily flow volumes were available. Therefore, an I/I curve was developed using flow data from 3/15/2017, as described in Section 6.7. This curve was applied to the peak day I/I flow of 2015. Based on the calibration of the average annual flow, peak day flow, and sanitary sewer diurnal curve, this gives a reasonable result. As more data is made available, the peak hour flow calibration may be revisited.

7.5.2 Calibration Results

The model was calibrated to WWTP flow meter data for average annual and peak day influent flow. Average annual flows were calibrated to within 6 percent of the total daily flow and 3 percent of the peak flow. Peak day flows were calibrated to within 1 percent. This is within the accuracy limits of the flow meters used and is acceptable. Calibration results are presented in Table 7-1.

Table 7-1 Calibrated 2016 WWTP Flows (mgd)

Flow	Measured	Modeled	Difference
Average Annual	1.05	1.12	6%
Peak of Average Annual	1.61	1.65	3%
Peak Day	3.67	3.73	2%

7.6 Future Sewer System Expansion

Future sewer system expansion was modeled by adding flow from all future population growth into the existing system model. Sewer extensions were not sized, but as the need arises, the model can be updated to ensure that the new sewer systems are constructed with adequate capacity for future growth.

It is anticipated that most of the future infrastructure into unsewered areas will be constructed by developers. Due to the topography, some new developments may require pump stations.

7.7 Modeling Scenarios

Five scenarios were developed to analyze the City’s wastewater conveyance system utilizing the population and unit flow projections described in Chapters 3 and 6, respectively, and are summarized in Table 7-2. The scenarios are the 2016 average annual flow, 2016 peak day flow, 2024 peak day flow, 2038 peak day flow, and 2038 peak day flow with CIP improvements. Average annual flows for 2024 and 2038 were calculated but were not modeled. Peak hour flows were included within the peak day scenarios.

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Table 7-2 Modeled Wastewater Flows at WWTP (mgd)			
Flow	**2016**	**2024**	**2038**
Average Annual	1.05	1.23	1.53
Peak Day	3.71	3.92	4.43
Peak Hour	5.13	5.57	6.23

7.8 Hydraulic Modeling Analysis

7.8.1 Design Capacity

The design capacity of the gravity mains is considered to be 100 percent depth (1.0 d/D ratio, where d is the flow depth and D is the pipe diameter) during peak hour flow conditions. The maximum design capacity of force mains is exceeded when flow velocities are greater than 8 feet per second. The firm capacity of a lift station is defined as the capacity of the lift station with the largest pump out of service, which is equivalent to a single pump running in a duplex pump station. The lag pump runtime is how long the second pump is running, which indicates the severity of a pump station deficiency. When model simulation results exceed these design capacities in piping or in lift stations, they are identified as deficient and system improvements are identified to resolve them. Modeling results for all scenarios are included in Appendix F.

7.8.2 2016 Peak Day Flow – Results

The existing model results for peak hour flow are shown on Figure 7-2. The gravity sewer capacity deficiencies are summarized in Table 7-3. There are no pump station or force main deficiencies.

Table 7-3 Existing Gravity Sewer Deficiencies							
Map ID	**Location**	**Diam. (in)**	**Length (lf)**	**Upstream Manhole**	**Downstream Manhole**	**Flooding (gallons)**	**Surcharge (d/D)**
1	Fryar Ave between Zehnder Street and Main Street	12	1,600	SMH_C7-2	SMH_C8-35	0	3.5

The pipe described in Table 7-3 surcharges but does not flood. Surcharging occurs when PS-2 turns on. Based on modeling results, VFDs were not sufficient to eliminate the surcharging, but routing the PS-2 force main into the adjacent PS-10 force main eliminated the surcharging and caused no capacity problems.

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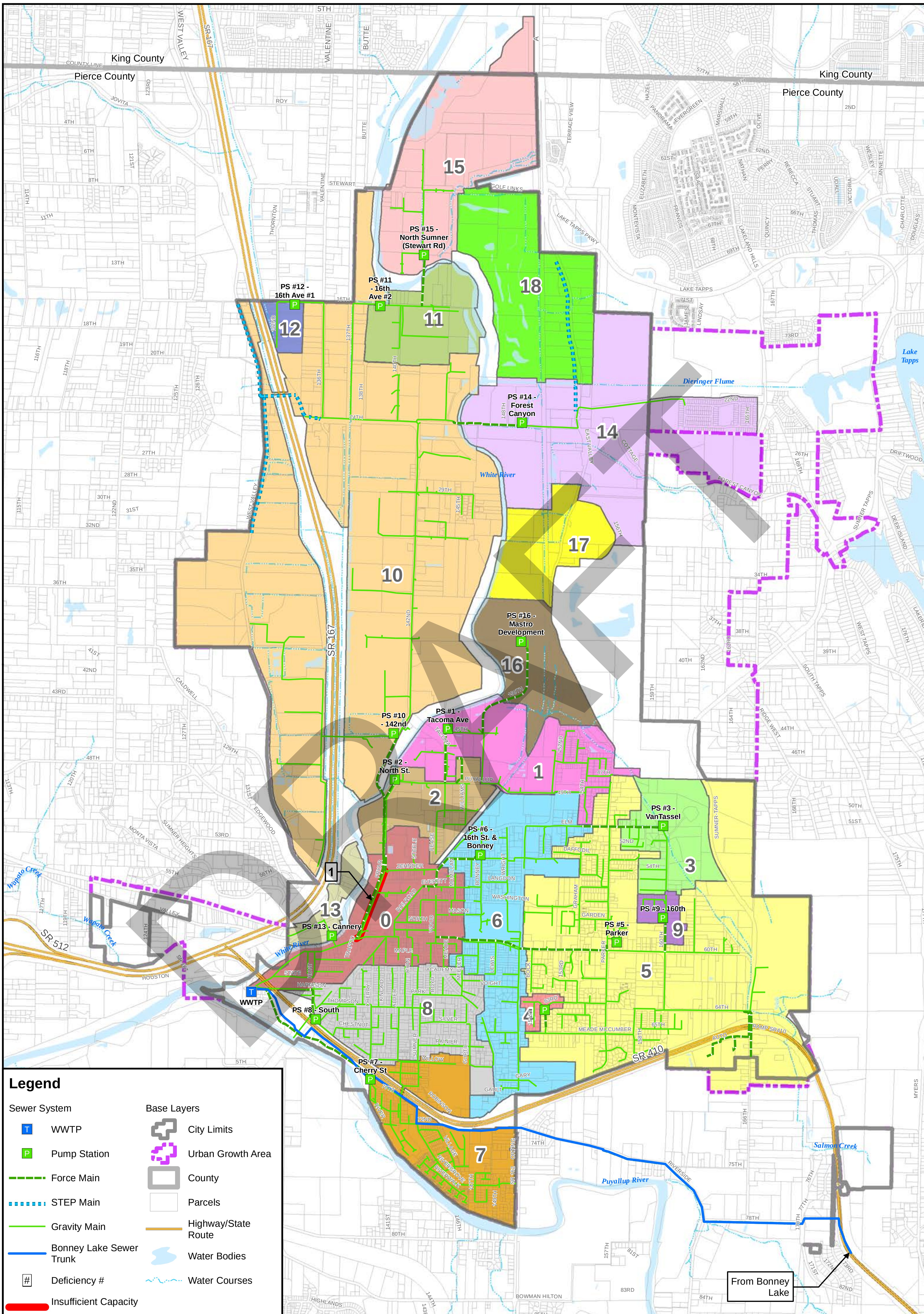

P:\Mapping\Maps_Generated\Sumner\17-10500.00\001\1.4\maps\Fig 7-2 Existing Peak Hour Flow 11x17.mxd 4/17/2018 ctolentino

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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.
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CITY OF SUMNER WASHINGTON

Existing Peak Hour Flow

General Sewer Plan Update
City of Sumner

Figure
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7.8.3 2024 Peak Day Flow – Results

The 2024 model results for peak hour flow are shown on Figure 7-3. The gravity sewer capacity deficiencies are summarized in Table 7-4. There are no pump station or force main deficiencies.

Table 7-4 2024 Gravity Sewer Deficiencies

Map ID	Location	Diam. (in)	Length (lf)	Upstream Manhole	Downstream Manhole	Flooding (gallons)	Surcharge (d/D)
1	Fryar Ave between Zehnder Street and Main Street	12	1,600	SMH_C7-2	SMH_C8-35	0	5.6
2	Valley Ave and Daffodil Street Court E	8	390	SMH_D7-9	SMH_E7-2	0	1.1

The pipes described in Table 7-4 surcharge but do not flood. Surcharging in Fryar Avenue (Map ID 1) occurs when PS-2 turns on. Based on modeling results, VFDs were not sufficient to eliminate the surcharging, but routing the PS-2 force main into the adjacent PS-10 force main eliminated the surcharging and caused no capacity problems.

Surcharging in Valley Avenue (Map ID 2) is minimal and does not warrant a pipe upsizing project in the CIP. Surcharging may be reduced or eliminated with I/I reduction, depending on the efficacy of the I/I reduction in Basin 6.

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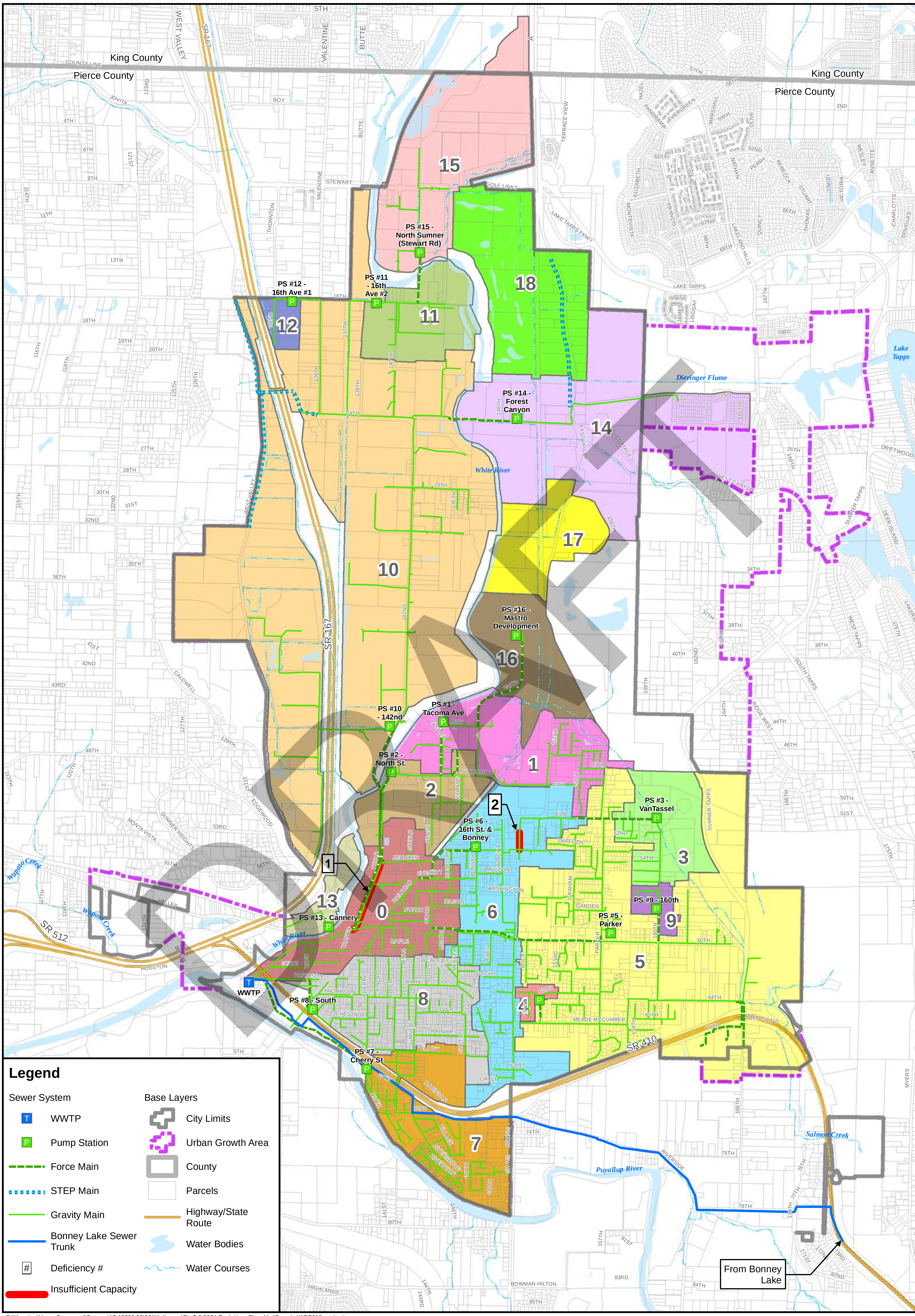

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GIS Base: City of Sumner & Pierce County
Data sources supplied may not reflect current or actual conditions. This map is a geographic representation based on information available. It does not represent survey data. No warranty is made concerning the 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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2024 Peak Hour Flow

General Sewer Plan Update
City of Sumner

Figure
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7.8.4 2038 Peak Day Flow – Results

The 2038 model results for peak hour flow are shown on Figure 7-4. The gravity sewer and pump station capacity deficiencies are summarized in Tables 7-5 and 7-6. There are no force main deficiencies.

Table 7-5 2038 Gravity Sewer Deficiencies

Map ID	Location	Diam. (in)	Length (lf)	Upstream Manhole	Downstream Manhole	Flooding (gallons)	Surcharge (d/D)
1	Fryar Ave between Zehnder Street and Main Street	12	1,600	SMH_C7-2	SMH_C8-35	0	8.7
2	Valley Ave and Daffodil Street Court E	8	960	SMH_E7-2	SMH_D7-12	0	2.0

Table 7-6 2038 Pump Station Deficiencies

Map ID	Pump Stations	Lag Pump Runtime (minutes)	PS Capacity (gpm)	PS Peak Inflow (gpm)	Flooding (gallons)
A	PS-11	400	100	136	0

The pipes described in Table 7-5 surcharge but do not flood. Surcharging in Fryar Avenue (Map ID 1) occurs when PS-2 turns on. Based on modeling results, VFDs were not sufficient to eliminate the surcharging, but routing the PS-2 force main into the adjacent PS-10 force main eliminated the surcharging and caused no capacity problems.

Modeled surcharging in Valley Avenue (Map ID 2) is minimal and does not warrant a pipe upsizing project in the CIP. Surcharging may be reduced or eliminated with I/I reduction, depending on the efficacy of the I/I reduction in Basin 6. If future surcharging is higher than currently projected, upsizing may be necessary.

Both pumps in PS-11 are projected to operate in parallel during 2038 peak hour flow conditions, indicating it will be under capacity. No flooding occurs during these flow conditions.

The City is considering rezoning an area around Traffic Avenue and Maple Street known as the Town Center Area. Growth projections have not been developed for this area yet. An additional model run was performed with approximated flows from this area and the collection system was found to have sufficient capacity. When more accurate growth projections are developed, the model can be updated to verify that there is sufficient collection system capacity.

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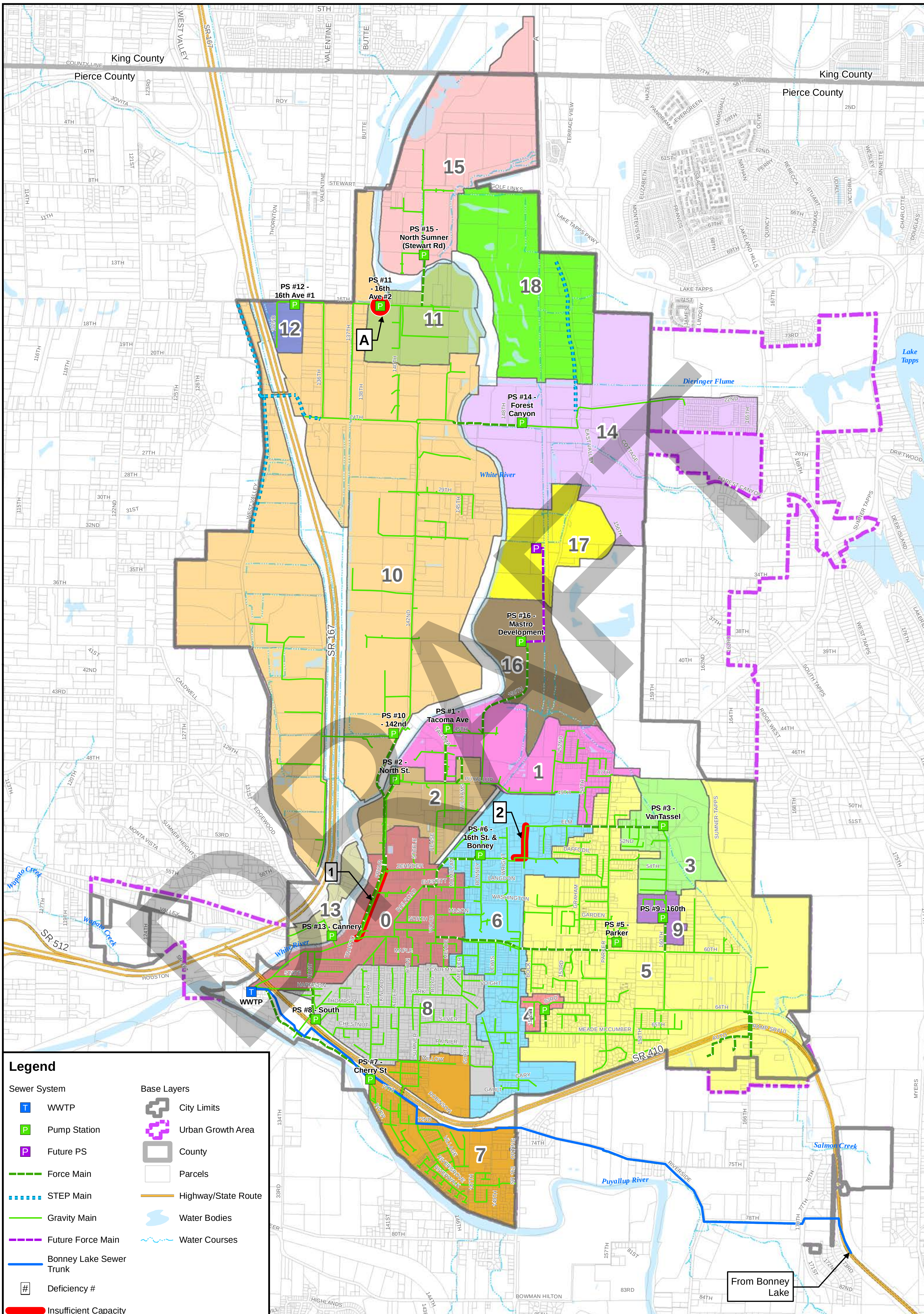

P:\Mapping\Maps_Generated\Sumner\17-10500.00\001\1.4\maps\Fig 7-4 2038 Peak Hour Flow 11x17.mxd 4/17/2018 ctolentino

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

2038 Peak Hour Flow
General Sewer Plan Update
City of Sumner

Figure
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7.9 Pump Station Assessments

Pump station assessments were performed to determine identify capital improvement needs within 6 years. Necessary improvements identified during these assessments and opinions of probable project cost (OPPC) are summarized in Table 7-9. Detailed OPPCs are included in Appendix G.

Table 7-9 Pump Station Deficiencies

Pump Station	Pump Station Deficiencies	Opinion of Probable Project Cost (2017 Dollars)
PS-1 Tacoma	▪ Replace reverse pressure backflow assembly with 1 ½" assembly and 2" supply line. Replace reverse pressure backflow box. ▪ Install bollards around pump station. ▪ Replumb vent to discharge to sewer rather than storm drain. ▪ Remove tree or relocate antenna. ▪ Replace MOSCAD radio with Allen Bradley PLC and Ethernet Radio.	$85,000
PS-2 North	▪ Improve ventilation system in dry well. ▪ Install flow meter. ▪ Stock replacement pump and valves at City shop because they can have long lead times. ▪ Install new engine generator. ▪ Move electrical equipment above grade and revise electrical distribution. ▪ Install connection and controls for new load bank to exercise new engine. ▪ Install safety grate in wet well hatch.	$548,000
PS-3 Van Tassel	▪ Install safety grate in wet well hatch. ▪ Change 230 Volt legacy voltage to 460 Volts. Upgrade control panel and pumps to accommodate this change. ▪ Replace MOSCAD radio with Allen Bradley PLC and Ethernet Radio. ▪ Cut back overgrown trees and shrubs.	$243,000

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Table 7-9 Pump Station Deficiencies

Pump Station	Pump Station Deficiencies	Opinion of Probable Project Cost (2017 Dollars)
PS-4 Jansen	▪ Replace corroded pipes. ▪ Raise antenna to improve connection. ▪ Pot flow meter. ▪ Replace flow tube portion of flow meter. ▪ Install safety grate in wet well hatch. ▪ Replace MOSCAD radio with Allen Bradley PLC and Ethernet Radio.	$115,000
PS-5 Parker	▪ Air release/vacuum relief valves do not function properly and vaults flood. City is currently designing valve and drainage improvements to resolve this issue. This is already budgeted and not included in the OPPC.	-
PS-6 16th Street	▪ City is in process of replacing pumps and valves. ▪ City is in process of demolishing and recoating the wet well and replacing lid. ▪ City has budgeted to replace ATS and panels.	-
PS-7 South	▪ Pump station was recently rehabilitated and needs no additional work.	-
PS-8 Cherry Street	▪ Pump station was recently rehabilitated and needs no additional work.	-
PS-9 160th	▪ Install safety grate in wet well hatch. ▪ Revise control panel to increase VFD ventilation.	$112,000
PS-10 142nd	▪ City has purchased one replacement pump. Replace remaining two submersible pumps. ▪ Replace VFDs when changing pumps. VFD #2 has been scheduled for replacement. ▪ Replace pump rails. ▪ Replace MOSCAD radio with Allen Bradley PLC and Ethernet Radio. ▪ Replace, replumb, and raise air release/vacuum relief valves up to increase orifice size. ▪ Insulate heat trace.	$652,000

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Table 7-9 Pump Station Deficiencies

Pump Station	Pump Station Deficiencies	Opinion of Probable Project Cost (2017 Dollars)
PS-11 16th Avenue 1	▪ Install bypass pumping port and pig launch vault. ▪ Ductile iron hatch lid replacements are currently in design by the City and are not included in OPPC. ▪ Replace MOSCAD radio with Allen Bradley PLC and Ethernet Radio.	$174,000
PS-12 16th Avenue 2	▪ Install safety grate in wet well hatch. ▪ Recoat flow meter and valve vaults. ▪ Replace MOSCAD radio with Allen Bradley PLC and Ethernet Radio.	$77,000
PS-13 Cannery	▪ Replace MOSCAD radio with Allen Bradley PLC and Ethernet Radio. ▪ Install safety grate in wet well hatch.	$51,000
PS-14 Forest Canyon	▪ Replace engine generator. ▪ Replace discharge piping. ▪ Ground flow meter. ▪ Install sunshield on motion sensor. ▪ Replace MOSCAD radio with Allen Bradley PLC and Ethernet Radio.	$265,000
PS-15 North	▪ Replace automatic transfer switch. ▪ Relocate wet well vent. ▪ Replace MOSCAD radio with Allen Bradley PLC and Ethernet Radio.	$54,000
PS-16 Mastro	▪ Replace MOSCAD radio with Allen Bradley PLC and Ethernet Radio.	$39,000
	TOTAL	**$2,415,000**

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Chapter 9 Operations and Maintenance

9.1 Introduction

The primary operational goal of the City's sewer utility is to safely and efficiently convey, treat and remove pollutant loads from customer generated wastewater before returning the treated waste to the environment. The operation and maintenance (O&M) activities performed by the City to ensure performance and reliability of the wastewater collection system and wastewater treatment plant (WWTP) are summarized in this chapter. City personnel maintain approximately 9 miles of force mains, 52 miles of gravity sewers, 15 pump stations, and a secondary WWTP with a 24-inch diameter outfall to the adjacent White River. Chapter 5 provides summarized descriptions of the wastewater facilities operated and maintained by City staff.

This chapter defines the resources needed to continue to implement existing O&M activities, as well as initiate new ones. It is divided into the following sections:

- Organization Structure/Responsibilities.
- System Operation and Control.
- O&M Activities.
- Staffing Assessment.
- O&M Program Recommendations.

For each component of the operations program, current practices are discussed, and recommended changes or improvements are included.

9.2 Organizational Structure/Responsibilities

The City of Sumner Sewer Utility is overseen by the Public Works Department, which is operated and maintained by the Public Works Director. Oversight of the utility is further delegated to three division leaders, with general responsibilities summarized as follows:

- The ***City Engineer***, who manages staff that: maintains infrastructure records and information systems, oversees capital improvement projects through planning, design and construction phases, leads utility-level planning studies and evaluations to support utility budgeting, interfaces with elected officials for utility policy adoption, communicates with regulatory agencies, and assists operations staff in responding to field issues associated with existing infrastructure. The Engineering Department staff works from City Hall.

- The ***Operations Superintendent***, who manages staff and infrastructure associated with several utilities, but is specifically responsible for the inspection and O&M duties of the sewer collection system pipelines and manholes. This can include video inspection, pigging and flushing pipelines, manhole inspection and maintenance, participation in I/I program field activities (smoke testing, service lateral inspection, etc.), responding to and repairing pipeline breaks, and participation in the planning and capital improvement projects specific to the collection system pipes and manholes. Public works infrastructure O&M staff, including sewer collection system specialists, are based out of the Public Works Maintenance Shop, located towards the north end of the City at 4711 142nd Avenue East.

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- The ***Wastewater Superintendent***, who manages staff with specific oversight of the sewer utility's pump stations and WWTP. Duties include monitoring, operation and maintenance of the WWTP facilities, administering and complying with the regulatory requirements under the state's NPDES program (water quality monitoring), biosolids transport and disposal, monitoring, control and maintenance of the City's 15 pump stations, and participation in infrastructure planning and capital improvement projects specific to the pump stations and WWTP. Staff under the Wastewater Superintendent are based out of the WWTP.

Figure 9-1 below shows the City of Sumner departmental organization chart.

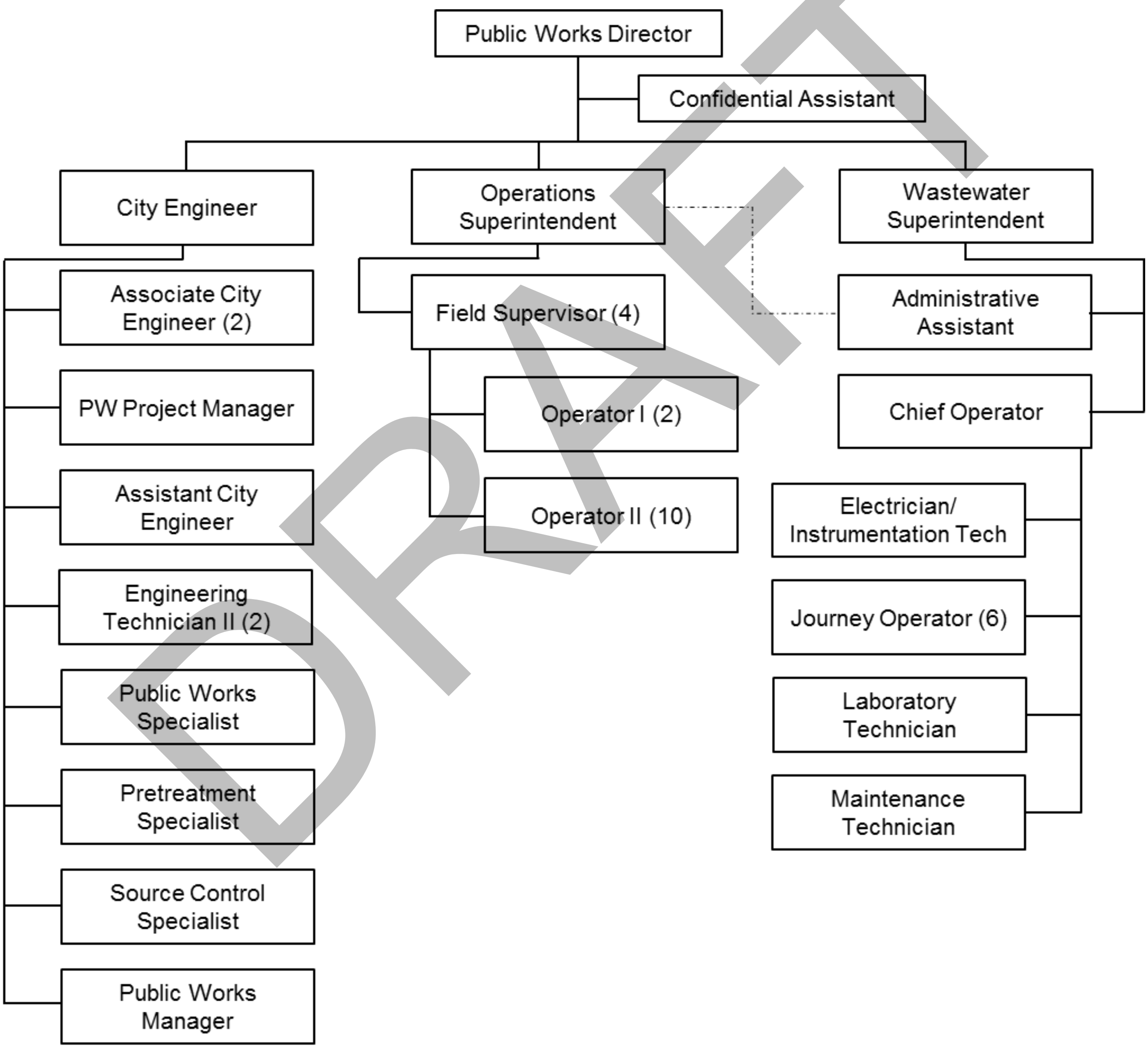

Figure 9-1 City of Sumner Organization Chart

9.2.1 Certification

Under WAC 173-230, DOE requires all state WWTPs to have a certified operator for the protection of the environment. The Sumner WWTP is a Classification III facility, hence the City's lead treatment operators progress to Group III and IV operator certification levels.

Although not required by the state, the City has their sewer collection system operators earn certifications for collection system competence through the Washington Wastewater Collection Personnel Association (WWCPA). In addition, specialty certification is required for safe handling and operation of sewer utility equipment and facilities, such as commercial drivers licenses for transport and disposal of wastewater biosolids. Table 9-1 shows current certifications of the Public Works staff that have sewer utility obligations, including specialty licenses.

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Table 9-1 Staff Certification List – Street/Utilities and WWTP Divisions (2008)

Employee	Title	CCCS	BAT	AC Pipe Handling WISHA	WWC	Confined Space	CPR/FA
Pat Clerget	Operations Superintendent	X		X	III	X	X
Gary Lucas	Field Supervisor			X	II	X	X
Daron Uphaus	Field Supervisor	X		X	III	X	X
John Wells	Field Supervisor			X	II	X	X
Darren Young	Operator II			X	II	X	X
Shaun Piper	Water Field Supervisor	X	X	X	II	X	X
Kevin Babic	Water Operator II	X	X	X	II	X	X
Dave Ellingson	Operator II			X	I	X	X
Lester Reedy	Operator II			X	I	X	X
Casey Stumpt	Operator II			X	I	X	X
Beau LaCrosse	Operator II			X	I	X	X
Monty Brant	Operator II		X	X	II	X	X
Darren Hoberg	Operator II			X	I	X	X
Josh Keller	Operator I			X			X
Kevin Mast	Operator I						
Hunter Hoberg	Operator I						
Brian Akana	Operator I						X
Greg Kongslie	Superintendent WWTP				II		
Anthony Vendetti	Chief Operator						
Ran Vonderau	Senior Operator IV						
Mike Moe	Senior Operator III						
Clay Watkins	Senior Operator III						
Josh Mavin	Senior Operator III						
Danielle Lee	Journeyman Operator						
Matt Ellingson	Journeyman Operator						
Ron Basinger	Lab Analyst IV						
Fred Miller	Maintenance Technician						
Newell La Bolle	Electrician/Instrument Technician						

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Table 10-2 Staff Certification List – Street/Utilities Division (2008) (Continued)

Employee	Pest/Herb License	Flagging Cert	Traffic Signal Tech IMSA	Sign Marking IMSA	CDL A License	ICS 100/700	WWTPO	CESCL	EL-01
Pat Clerget		X			X	X		X	
Gary Lucas		X	II	I	X	X			
Daron Uphaus		X			X	X		X	
John Wells	X	X			X	X		X	
Darren Young		X			X	X		X	
Shaun Piper		X			X	X	I		
Kevin Babic		X	I	II	X	X	I		
Dave Ellingson		X	I	I	X	X			
Lester Reedy		X		II	X	X			
Casey Stumpt		X			X	X		X	
Beau LaCrosse		X			X			X	
Monty Brant	X	X			X	X	I	X	
Darren Hoberg	X	X			X				
Josh Keller		X				X			
Kevin Mast		X							
Hunter Hoberg									
Brian Akana		X							
Greg Kongslie					B		IV		
Anthony Vendetti					B		IV		
Ran Vonderau					X		III		
Mike Moe					B		III		
Clay Watkins					X		III		
Josh Mavin					B		III		
Danielle Lee					X		II		
Matt Ellingson					X		II		
Ron Basinger							IV		
Fred Miller	X						I		
Electrician Newell La Bolle									X

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Source	License	Agency		Source	License	Agency
WTPO I	Water Treatment Plant Operator I	DOE		BAT	Backflow Assembly Tester	DOH
WTPO II	Water Treatment Plant Operator II	DOE		CDL "A"	Commercial Driver's License- Endorsement Class A	DOL
WTPO III	Water Treatment Plant Operator III	DOE		ICS	Incident Command System	DOE
WTPO IV	Water Treatment Plant Operator IV	DOE		EL-01	General Journey Level Electrician	L&I
WWC I	Wastewater Collection I	WWCPA			DOE – Department of Ecology	
WWC II	Wastewater Collection II	WWCPA				
WWC III	Wastewater Collection III	WWCPA			DOL – Washington State Department of Licensing	
					IMSA – International Municipal Signal Association	
CCCS I	Cross Connection Control Specialist I	DOH			L&I – Washington State Department of Labor & Industries	
					WISHA – Washington Industrial Safety and Health Act	
					WWCPA – WA Wastewater Collections Personnel Assoc	

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9.2.2 Operating Permits

Two state regulatory provisions administered by DOE guide the ownership and operation of the City's sewer utility:

- ***NPDES Program (WAC 173-220)****:* Under the Federal Water Pollution Control Act (FWPCA), DOE administers this program and ensures compliance of all waste discharge point sources to receiving water bodies. Under the City's WWTP 6-year permit cycle, daily monitoring reports (DMRs) that summarize water quality data and pollutant loading within the discharge stream are submitted monthly for regulatory review and conformance with imposed limits. Non-conformance requires corrective actions and can result in monetary fines assessed to the utility if not addressed.

- ***WAC 173-240***: Although no formal permitting system exists under this state code, it does mandate DOE approval of all constructed and/or modified wastewater facilities through submittal of an engineering report, design plans and specifications. This requirement includes collection system facilities (manholes, pump stations, sewer pipelines) as well as WWTP facilities. So that sewer utilities do not have to proceed through this sequential approval process for standard collection system infrastructure operational projects (pipeline repair/replacement, pump station upgrades, or new construction), the approval process is waived if the utility has a DOE-approved General Sewer Plan that defines standards to be used for these projects. The City's Sewer Comprehensive Plan meets the requirements of the General Sewer Plan.

9.3 System Operation and Control

As discussed in Section 9.1, the collection system staff under the operations superintendent is limited to duties performed to maintain, repair and replace sewer system piping, manholes and service laterals. Therefore, operation and control of system infrastructure that includes mechanical conveyance, treatment and electrical control related equipment is largely handled by the staff under the wastewater superintendent. Relevant sewer facilities include collection system pump stations and the WWTP.

A Supervisory Control and Data Acquisition (SCADA) system is used to monitor and control equipment to maintain a process or resource in a consistent manner. For the Sumner collection system, SCADA refers to the combination of individual radios and control panels which are installed for Sumner's 16 sewer pump stations, as well as the centralized computer monitoring equipment that receives all remote site information (located at the WWTP). Collection system SCADA functions also provide alarm handling and dissemination to alert operators to imminent or current problems, such as pump failure or wet well high-level alarms. No direct or dedicated telecommunications lines are used to link communications between the pump stations and the WWTP monitoring computer; it is all done through radio wave transmission.

The City is replacing the radio and remote terminal units (RTUs) at their pump stations with Allen-Bradley Programmable Logic Controllers (PLCs) and new Esteem Ethernet radios. The new PLCs provide additional capabilities over the older existing RTUs by enhancing the ability to process logic and communicate historical data to the centralized system. Allen Bradley (a brand owned by Rockwell Automation) equipment is prevalently installed and used by sewer utilities in the Pacific Northwest. Because of the popularity of the PLC, there are many local control panel builders and integrators who support Allen Bradley PLCs.

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In general, the pump station PLCs are used to control pumping operations that transmit collection system flows to the WWTP. As the City continues its upgrade of the SCADA system hardware and software, functional capabilities are being added to optimize operations both locally and remotely that include:

- Pump call on based on wet well high/low levels provided through pressure/level transducers (standard).
- Alarming based on abnormally high or low wet well levels that trip backup float systems (standard).
- Alarming based on unauthorized facility access, including gate, building or vault entrance.
- Alternated lead/lag pump call on status to evenly distribute the motor run hours of individual pump station pumps (standard).
- Flow adjustment for pump stations whose pumps run off VFDs, limiting the number of motor start/stop cycles and allowing energy efficiencies.
- A unique daily pumping cycle sequence that allows the pump station to operate at full capacity and scour sediment that might settle within its force main, due to the lower typical discharge velocities of normal pumping cycles.
- A unique daily pumping cycle sequence that continues to a very low wet well level before calling off pumps, allowing new pump stations (including #6, #7, and #9) that include a self-cleansing "pre-rotation" basin at the base of their wet well to initiate. This self-cleansing cycle controls the residual solids levels that can accrue within the wet well, including fats, oils and grease (FOG), thereby reducing maintenance needs.

The new Esteem radios provide more capabilities as well and as Ethernet supports multiple protocols and provides an upgraded communications link for the current and future projects. The additional capabilities include remote side signal statistics, such as receiver power and signal interference measurements.

The WWTP SCADA framework and control is much more complex, with control sequencing detailed within the reports and construction documentation that was developed as part of the recently completed WWTP expansion project. This documentation is available from the public works engineering department, or on site at the WWTP.

Generally, the equipment that supports individual treatment processes at the WWTP are operated to optimize levels of wastewater treatment and ensure compliance with both liquid stream discharge (to the White River) and solids hauling and disposal (landfill) permit regulations. For the liquid stream process, target oxygen concentrations, as well as solids and hydraulic retention times, are maintained within individual basins to allow biological and physical processes to reduce and remove pollutant loads. Adequate disinfection, defined by the dosing level and transmittance of UV light within the treated wastewater stream, is also provided before river discharge. For the solids processing stream, enclosed tank conditions are set to enable anaerobic digestion and reduction of pathogens, with physical thickening and dewatering equipment used to remove water and reduce the volume and cost of solids hauling.

Most of the liquid and solid stream processes have operational equipment that was supplied as a package from a sole manufacturer. These packages often include their own PLCs to control the unit process. Hence, the WWTP SCADA framework includes several individual PLCs located in different process areas, all hardwired back to a WWTP master controller and computer.

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As part of the City's ongoing SCADA system upgrades, the sewer and the water system will employ different radios, so the two systems are unlikely to interfere with each other. The WWTP, sewer collection system, and water system will each ultimately have a dedicated centralized computer for monitoring and control. The SCADA computer for the Wastewater Treatment Plant is already separated from the collection system for organizational staffing reasons. All three SCADA networks are separate from the City business operations networks. Remote (to the WWTP) access is available to all networks through firewall and remote access servers.

9.4 Operations and Maintenance Activities

The City has both established and evolving sewer collection system O&M programs that include unique functions supplemental to normal facility O&M duties. These continuous programs require sewer utility resource allocation (equipment, labor, contracted services) on an annual basis that must be planned for. A summary of each, along with WWTP duties that are described in more detail within other City documentation, is offered in the ensuing subsections.

9.4.1 Gravity Sewer and Manhole Inspections and Cleaning

Operations staff based at the Public Works Maintenance Shop are assigned to perform ongoing inspection and cleaning duties, which occur concurrently for a section of the collection system on an annual basis. The City owns a CCTV truck and equipment to perform video inspections, as well as jetting equipment to clean pipe and manhole exposed surfaces. The extent of the collection system to be worked on is typically defined and scheduled during dry weather flow months, with a 6-person crew allocated. Table 9-2 provides the maintenance tasks associated with these duties, with annual program objectives adopted by operations staff. The benefits of this program include:

- Removal of solids deposition that can occur with insufficient scouring velocities or system leaks. Solids accrual can lead to reduced collection system capacity, corrosion and odor concerns if pipes and manholes are left uncleaned.
- Removal of FOG from wetted surfaces that can lead to similar issues, particularly capacity reduction. FOG removal can be a more time intensive cleaning effort.
- Identification of structural failures that have occurred or might result from pipe age/condition, corrosion, or root intrusion.
- Identification of mainline or service lateral leaks that promote system I/I.
- Identification of services that might have illicit discharges
- Identification of businesses who are not adequately maintaining FOG removal devices (grease traps, interceptors, and oil/water separators).

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Table 9-2 Collection System Inspection and Cleaning Standards		
Maintenance Task	**Collection System Quantity or Length**	**Annual Objective**
Manholes Inspections and Cleaning	1,066	20 percent of system annually, concurrent with gravity sewer inspections
Gravity Sewer CCTV Inspections and Cleaning	275,000 LF	20 percent of system annually
Problematic Gravity Sewer Regular Cleaning	5,000 LF estimated	Monthly, sometimes weekly, cleaning of sewers particularly susceptible to deposition

9.4.2 Gravity Sewer and Manhole Rehabilitation/Repair

This program typically involves the required follow-up activities that were identified from system cleaning and inspection. The rehabilitation/repair functions performed under the program can be executed using public works resources (labor, equipment and materials), without the involvement of a contractor that might be necessary at a larger scale. A 4-person crew from the Public Works Maintenance Shop are assigned to perform the tasks listed in Table 9-3. Their extent, and degree of response efforts, cannot be accurately planned on an annual basis, but the activities are prioritized based on importance and labor availability.

Table 9-3 Collection System Rehabilitation/Repair Program		
Maintenance Task	**Collection System Quantity or Length**	**Annual Objective**
Repair Manholes	10 (average)	Eliminate I/I source and extend facility life expectancy through grouting. Structural improvements and lining are contracted.
Adjust Manhole Lids	50 (average)	Adjust manhole lids that are no longer flush with surrounding surface (asphalt or other) to prevent safety and future maintenance issues. Annual execution dependent on crew availability.
Gravity Sewer Section Repair	5 (average)	Respond and fix emergency failures to restore system conveyance and eliminate environmental discharge.
Sewer Service Lateral Repair and/or Cleanout Installation	20 (average)	Respond to staff or customer reports and fix utility side facilities. Install cleanouts per City standard on services where none exist.

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9.4.3 I/I Reduction Program

The City is committed to identifying and eliminating sources of I/I that reduce system capacity and add operational costs for conveyance and treatment of unnecessary wastewater flow. The Public Works Department allocates annual budget to continue I/I reduction efforts.

The Operations Superintendent and City Engineer use recent inspections and engineering evaluations to identify collection system drainage basins, or more defined segments, that are suspected sources of significant I/I. From this, continuing annual efforts can be defined and executed.

A recent engineering study compared dry weather and wet weather pump run times for all pump station basins within the collection system. The highest potential I/I basins, as assessed by the largest differential between dry and wet weather pump run times and flows, were identified as Basins 0, 6, and 8. Older portions of the collection system infrastructure are prevalent within these basins, raising the potential not only for I/I to originate within the City-owned infrastructure placed within rights-of-way, but also from failing service laterals and illicit connections (roof and surface water drains) that originate on the private side. This engineering analysis is overlaid with recent infrastructure inspections that provided visual confirmation of I/I sources to determine the most predominant areas of the collection system to be addressed. Recent projects that have spawned from these evaluations include basin-wide smoke testing that was performed for Basin 6 (see Appendix D for report), as well as capital projects SS-R23 and SS-R29, which rehabilitated failing manholes and replaced critical segments of gravity sewer that had prevalent root intrusion.

For the purposes of annual planning, the Operations Superintendent attempts to reserve a 3- or 4-person crew for 2 weeks to participate in or perform smoke testing during dry weather months. Public Works Maintenance Shop staff are also enlisted to provide onsite support for any infrastructure improvements constructed to reduce I/I.

9.4.4 Nuisance Control

Although the efforts required are not large, Public Works Maintenance Shop staff do perform tasks to control potential collection system nuisances. Bait boxes are set and checked within manholes for rat control, and staff investigate odor reports. The City has not had to install any permanent odor control systems within its collection system to date.

9.4.5 Pretreatment Program

The City has adopted an enforceable pretreatment program that is intended to protect the sewer utility from sewer service discharges that have potentially detrimental effects on either the collection system capacity or the ability of the WWTP to effectively treat and discharge effluent with acceptable water quality. In either case, pretreatment compliance is essential to the prevention of unintended pollutant discharge to the environment. A pattern of these occurrences without action can result in steep regulatory fines levied against the City. There are two means of enforcement:

- ***WWTP NPDES Permit**:* Under the terms of the City's discharge permit, compliance with federal pretreatment regulations under 40 CFR Part 403 is required. This includes identifying and facilitating state permitting of potential significant industrial users (SIUs). Sumner conducts an annual survey of existing and potential SIUs, with discharge limits to the collection system established under state permit for all industries that get

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classified as SIUs by the volume of pollutant loading characteristics of their wastewater. Sewer utility staff based out of the WWTP coordinate ongoing monitoring and compliance of SIUs.

- ***City Municipal Code 13.16***: Under this codified section of sewer system ordinances, pretreatment devices are required to be installed and maintained at all food preparation or other services that have the potential to release FOG to the collection system. Currently, approximately 150 grease interceptors, traps, and oil/water separators have been installed by sewer utility customers ranging in profile from restaurants and grocery stores to gas stations and schools. Sewer utility staff based out of the Public Works Maintenance Shop currently enforce these device requirements, but their efforts are currently reactive in nature and limited to communicating with businesses and inspecting devices where collection system FOG has been visually traced.

Due to continued City growth and stringent water quality standards on the White/Puyallup rivers that must be met by WWTP effluent, the City has started the process of creating a more formalized pretreatment program that adopts local pollutant limits by municipal code. Those limits will then be enforced and must be met by all collection system customers, most particularly by SIUs. Some pollutant loading limits will be new and supplemental to parameters currently established at existing permitted industries. The City intends to discuss and consider industry concerns before adoption of the local limits.

Availability of sewer utility staff to fully administer the pretreatment program is already limited. With the adoption of local limits and the increased enforcement duties that will come with them, the City is in the process of hiring a full-time pretreatment program specialist. This position will be supervised by the City Engineer and will include some coordination with WWTP and Public Works Maintenance Shop operations staff that will continue to play a role with compliance. Table 9-4 summarizes the anticipated duties of the pretreatment specialist.

Table 9-4 Pretreatment Program Specialist Job Duties

Task	Quantity	Annual Objective
Enforce SIU Permits	2 current (Shining Ocean, Fleischmann's Vinegar)	▪ Conduct annual SIU surveys ▪ Coordinate effluent monitoring and compliance with WWTP operations staff assistance ▪ Facilitate permit development for new SIUs
Enforce Pretreatment FOG Removal Devices	Approximately 150	▪ Visit all businesses, at a minimum annually, to inspect devices and review maintenance records ▪ Coordinate with Public Works Maintenance Shop operations staff in identifying potentially non-compliant services through collection system inspections
Local Limits Development	N/A	▪ Assist City Engineer and Wastewater Supervisor in development of local limits ordinance ▪ Participate in meetings with local SIUs to discuss and address concerns with proposed with local limits

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Table 9-4 Pretreatment Program Specialist Job Duties

Task	Quantity	Annual Objective
Program Communications	N/A	▪ Provide customer service support to affected customers ▪ Assist in development of program educational materials/mailers for businesses and citizens ▪ Assist City Engineer in providing program reports to City Council

9.4.6 Pump Station Inspection and Maintenance

WWTP operations staff currently monitor each of the City's 15 pump stations on a daily basis, recording the pump hours and checking for alarms. A more thorough maintenance detail is performed monthly, and onsite generator sets are exercised weekly. The monthly maintenance procedures are as follows:

- Wet well inspection
- Manual pump check
- Floats cleaned
- Transducers cleaned
- Vault equipment inspections – flow meter and valve exercising
- Wet well cleaned
- Pump station controls checked
- Generator run time, fuel level, coolant oil level
- Building and grounds cleaned as needed
- Fats, oils, and grease rated
- Inspection, exercising and cleaning of associated force main valving and blowoff assemblies
- Coordination of manufacturer-recommended equipment servicing/calibration

9.4.7 Force Mains

Force mains are inspected by WWTP operations staff on an annual basis and cleaned/flushed upon observed pressure increases or other reported obstructions. Some pump stations are now being programmed with automated daily pumping cycles intended to regularly scour force mains and reduce the need for additional flushing maintenance.

9.4.8 Wastewater Treatment Plant

The WWTP is operated and maintained in accordance with the WWTP O&M Manual, a hardcopy of which is kept at the WWTP. This O&M Manual addresses the WAC 173-240-080 requirements and is written for certified treatment plant operators who are familiar with wastewater treatment and process theory. The O&M Manual includes manufacturers' technical information and O&M Manual for each piece of equipment. The WWTP operators use the O&M Manual in conjunction with the following documents to operate, troubleshoot, and maintain the plant:

- WWTP Record Drawings.

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- Manufacturers' O&M Manuals containing manufacturer recommended procedures, maintenance schedules, and recommended spare parts lists for each piece of equipment.
- The complete set of project data submittals and shop drawings for the all equipment used in the new construction.

The highest staffing priority at the WWTP is providing operational oversight and control of the treatment processes to ensure that NPDES permit limits are met for the effluent discharged to the White River. This oversight typically involves monitoring plant performance through SCADA control software, completing required reporting, coordinating sampling and analysis of raw and treated wastewater for important compliance parameters, and making process adjustments (flow, aeration, mixing, amount of recycled and wasted solids, etc.) to maintain acceptable operations. Due to the time required to provide this critical oversight, a separate staff member (lab analyst) is designated to conduct the required sampling and laboratory analysis. The analyst's duties also include calibration, cleaning and maintenance of the sampling and monitoring equipment within the facility (as well as the laboratory testing equipment), and coordination of samples that must be sent to an outside laboratory for testing of parameters not supported at the WWTP.

Extensive maintenance of facilities is also necessary to promote trouble-free operations at the WWTP. These activities can include draining and cleaning of basins, cleaning and grit removal of headworks, cleaning and maintenance of centrifuge dewatering equipment, performing maintenance on pumps and other mechanical equipment, minor equipment and plumbing repair, management and execution of biosolids dewatering and hauling operations, minor electrical repair and replacement, asset inventory, and general yard work.

For all WWTP employees, additional obligations commonly include construction participation, public education and interface, coordination with consultants, internal/external reporting and training.

9.5 Staffing Assessment

9.5.1 Collection System Staffing

Four departments, including sewer collections, are run out of the Public Works Maintenance Shop. Currently, 17 employees are used to perform the cumulative responsibilities associated with the infrastructure of all departments, which also includes water, streets and stormwater utilities. An internal staffing assessment was recently performed to compare current employee levels against the needs of assigned responsibilities. The summary table for this assessment is included within Appendix H, and shows the potential need of approximately 4 additional staff members to adequately support department functions.

Table 9-5 extracts the sewer collections department portion of this assessment, summarizing the major annual activities scheduled to maintain full ongoing function of the sewer collection system. It indicates a need for more than 3 FTEs to perform the desired annual duties.

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Table 9-5 Sewer Collections Department Staffing Needs

Tasks	Work Description of Tasks Public Works Shops Workload	Personnel Requirements in FTEs
SEWER DEPARTMENT		
Clean 20% of sewer system *	This takes a six person crew including TV video for 1.5 months	0.72
Smoke test for I & I *	This will use a 3-person crew for 2 weeks	0.12
Regular cleaning	There are some poor sections needing either wkly, monthly or qtrly	0.20
Repair sections	This takes a 4-person crew each section	0.36
Grout leaky manholes*	Probably work on 5 to 10 manholes with 4-person crew	0.20
Adjust manhole lids *	This uses a 4-person crew	0.24
Inspections	New, old, complaints	0.10
Side sewers	Installing cleanouts & complaints	0.30
Grease Traps	Policing F.O.G. producers	0.40
Baiting Manholes	Bait manholes for rat control	0.05
Management & Administration	Public Works Shops managerial and administrative staff	0.50
	TOTAL FOR SEWER DEPARTMENT	**3.19**
*** Items that get partially/not done due to staffing constraints**		

As a means of benchmarking this assessment, a survey of current staffing levels at other local sewer utilities of similar profile to Sumner is given in Table 9-6. This comparison is general in nature, as the assigned responsibilities of other sewer utility staff can vary significantly from those assigned to Sumner's operations staff. As examples, the City of Puyallup only targets cleaning and video inspections of 6 to 7 percent of their collection system annually (below standard industry recommendation of 20 percent), and some other utilities outsource their video inspections when they are performed.

Table 9-6 Sewer Utility Staffing Comparison per Total Mile of Pipe

Agency		Total Current Staff (FTEs)	Total Length of Pipe (miles)	Mile of Pipe per FTE
City of Sumner		**3.2 needed**	**52**	**16**
City of Bonney Lake		6	89	15
City of Port Orchard		3.5	70	20
City of Puyallup		3.7	195	53
City of Enumclaw		2	47	24
City of Kent		9	200	22
City of Auburn		9	200	22
		Average Miles of Pipe Per FTE (excluding Sumner)		**26**

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Based on these results, the projected staffing level needed to perform Sumner sewer collection system duties is slightly higher than current staffing levels allocated for other local sewer utilities. However, for the utilities included in Table 9-6 that have recently performed staffing assessments as part of a comprehensive system plan, most have reported the need for additional collection system labor in order to fully perform their expected duties. It is concluded that the projected labor needed from Public Works Maintenance Shop staff is appropriate and justified for the assigned responsibilities.

9.5.2 WWTP Staffing

As part of the WWTP expansion completed in 2016, a staffing study was done to assess the needed labor associated with performing appropriate operation and maintenance of the expanded plant facilities and the 15 collection system pump stations. The study is also included within Appendix I, and relies on recommended labor effort developed and published by a vast consortium of northeast wastewater utilities, the New England Interstate Water Pollution Control Commission. This consortium used data from a large database of WWTPs to predictively estimate required labor for a variety of standard wastewater treatment process types and flow capacity ranges.

The staffing study concluded that 10 FTEs would be needed to adequately perform necessary assignments at the WWTP, with an additional 2.5 FTEs necessary to cover other defined duties, such as performing pump station O&M and providing services associated with pretreatment. Currently, Sumner has 10 FTEs at the WWTP, and is in the process of hiring an eleventh (electrician/instrument technician). The City is also in the process of hiring a pretreatment program specialist to work under the supervision of the City Engineer. This specialist's job responsibilities will be solely focused on pretreatment program development and compliance, which is intended to reduce the needed efforts currently demanded of WWTP staff on the program. With these hires, it may be concluded that WWTP staffing levels will be sufficient. The Wastewater Superintendent will need to continue to assess staff workload to determine if this proves to be the case.

9.6 Recommended Operation and Maintenance Improvements

The City has been proactive in taking steps to solve the most critical sewer infrastructure issues and has implemented preventative ongoing annual activities that promote longevity of service according to industry-accepted guidelines. Overall staffing levels, with anticipated hires, appear to be appropriate to execute utility duties associated with existing infrastructure. Therefore, no further labor increase beyond anticipated levels is recommended. Potential future system expansion, added regulatory compliance, or increased maintenance associated with aging infrastructure could all result in increased labor requirements that necessitate reevaluation of staffing levels.

The most important improvements to continue to fund will be associated with the replacement of obsolescent equipment that supports the execution of O&M programs. As examples, the City recently purchased a new CCTV truck and equipment to support collection system inspections, has budgeted for purchase of two new dump trucks to support biosolids hauling and disposal, and continues to allocate annual budget towards overhaul and upgrade of the City's SCADA system telemetry and control equipment. Continued budgetary appropriations for these purchases is evaluated on a biennial cycle; current significant needs are identified as separate line items within the CIP detailed in Chapter 10.

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Chapter 10 Capital Improvements Program

10.1 Introduction

This chapter provides a compilation of specific projects, improvements, and programs the City should implement, providing the tools necessary for long range project planning and budgeting. These projects are derived primarily from the system analysis, pump station site visits, review of infrastructure age, and discussions with the City's operations and engineering staff. Other non-project recommendations can be found throughout the preceding chapters. Each project is accompanied by a planning level opinion of probable project cost (OPPC). The City should review the CIP periodically to adjust for changes in the priority of each project, its cost, and scope.

Wastewater collection and WWTP improvement projects are divided into the following five categories:

- **Capacity:** Improvements classified as insufficient in capacity are determined based on whether or not the infrastructure can effectively convey the incoming flow. Gravity sewer pipes are considered to have insufficient capacity when the flow through the pipe is 100 percent or more of the pipe flowing full (d/D > 1.0). Force mains are considered to have insufficient capacity when the velocities exceed 8 feet per second. Pump stations are considered to have insufficient capacity when inflow exceeds the flow produced by the pump station with the largest pump out of service. As described in Chapter 7, the conveyance system was evaluated using existing flows and flows projected for 2024 and 2038. The evaluations determined system deficiencies when subjected to these existing and future flow conditions. Following identification of system deficiencies, the computer model was used to evaluate and select system improvements to alleviate the system deficiencies.

- **Operations & Maintenance (O&M):** O&M projects will replace facilities identified by the City O&M staff as having unacceptably high maintenance requirements, both in terms of frequency and in level of effort. These projects may be needed to simplify system operation, ease O&M efforts and reduce O&M costs, consolidate and/or eliminate redundant facilities, reduce or eliminate non-critical O&M concerns, or to meet ongoing sewer system management needs.

- **Obsolescence:** Improvements classified as obsolete are based on the age and condition of the infrastructure. Mechanical and electrical equipment is expected to have a typical usable life of 25 years. Structures are expected to have a typical usable life of 50 years. Pipes are expected to have a typical usable life of 100 years.

- **General:** General improvement projects are those identified by City staff for various reasons that do not fall within any of the remaining four categories.

  Redundancy: Improvements classified as insufficient in firm capacity of equipment for treatment or conveyance.

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- **Developer:** Projects identified as developer dependent are needed to serve new developments but are not needed to provide continuation of service to existing customers.

Projects are also identified as either "Replacement", "Upgrade", or "Expansion" or a combination of the three. This gives a quick indication of the driving need for the project and the appropriate funding source.

- Replacement: These projects are generally intended to replace like infrastructure with like, they are typically the result of obsolete equipment that has exhausted its useful life or creates excessively high maintenance.
- Upgrade: These projects are normally targeted at reducing maintenance or improving operations, this may include new equipment or a replacement of equipment that is still functional but has not been optimized.
- Expansion: These projects can include new equipment or a replacement of equipment but their driving force is to provide additional capacity for future growth.

When possible, system improvement projects should be coordinated with other utilities to minimize disruption and reduce associated costs such as road and surface restoration. Due to the number of projects scheduled in the 6-year CIP the City should periodically evaluate its progress in completing those projects and determine if current project engineer staffing levels are adequate to complete those projects efficiently.

10.2 Capital Improvement Program

10.2.1 6-Year CIP (2018-2024)

The projects recommended for the 6-year Capital Improvement Program (CIP) are illustrated on Figure 10-1 and described in Table 10-1. Developer improvements are expected to be privately funded by developers and are not listed in this section.

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Table 10-1 6-Year CIP (2018-2024)

CIP No.	Project	Type	Replacement	Upgrade	Expansion	Eligible for Connection Fee	Project Description
C-1	PS-2 (North) Force Main Modifications	Capacity			☑	☑	▪ Connect the PS-2 force main to the PS-10 force main to alleviate gravity sewer surcharging along Fryar Avenue identified in Chapter 7. ▪ Improve PS-10 air release/vacuum release valve operation, and reroute discharge to either a sewer or a vault that can be pumped out when filled.
C-2	PS-2 (North) Improvements	Obsolescence	☑	☑			▪ Improve ventilation system in dry well. ▪ Install flow meter. ▪ Stock replacement pump and valves at City shop because they can have long lead times. ▪ Install new engine generator. ▪ Move electrical equipment above grade and revise electrical distribution. ▪ Install connection and controls for new load bank to exercise new engine. ▪ Install safety grate in wet well hatch.
C-3	PS-10 (142nd) Improvements	Obsolescence	☑	☑			▪ City has purchased one replacement pump. Replace remaining two submersible pumps. ▪ Replace VFDs when changing pumps. One VFD has been purchased and scheduled for replacement. ▪ Replace pump rails. ▪ Replace MOSCAD radio with Allen Bradley PLC and Ethernet Radio. ▪ Insulate heat trace.

C-4	Pump Station Improvements	Obsolescence	☑	☑			▪ Replace obsolete equipment identified in Section 7.9 at the following pump stations:
							  ▪ PS-1
							  ▪ PS-3
							  ▪ PS-4
							  ▪ PS-9
							  ▪ PS-11
							  ▪ PS-12
							  ▪ PS-13
							  ▪ PS-14
							  ▪ PS-15
							  ▪ PS-16

C-5	PS-8 (South) AC Force Main Replacement	Obsolescence	☑	☑			▪ Replace asbestos concrete force main. A new bridge is being built within the next several years, and the portion of the force main near the bridge should be completed prior to bridge construction.
C-6	I/I Reduction and Rehabilitation	Obsolescence	☑				▪ Reduce I/I through a variety of means such as slip lining, cured-in-place pipe (CIPP), pipe replacement, manhole lining, and other methods.
C-7	Centrifuge Replacement	Capacity, Redundancy	☑	☑	☑		▪ Replace the centrifuge at the WWTP to provide redundancy and to increase the capacity so it only needs to operate when WWTP staff are on site.
C-8	WWTP O&M	Obsolescence	☑				▪ General WWTP improvements, including but not limited to roof replacements, painting, replacement of mechanical equipment, and replacement of electrical, instrumentation, and controls equipment.

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Table 10-1 6-Year CIP (2018-2024)

CIP No.	Project	Type	Replacement	Upgrade	Expansion	Eligible for Connection Fee	Project Description
C-9	Solids Hauling Dump Trucks	Obsolescence	☑				▪ Purchase two new solids hauling dump trucks.
C-10	Portable Screw Sucker Pump	General		☑			▪ Purchase a portable screw sucker pump.
C-11	Emergency Pipe Replacement	Obsolescence	☑				▪ Replace and repair broken pipes as needed.
C-12	Pretreatment Program Implementation	General		☑			▪ Consultant to implement a pretreatment program to establish local limits.

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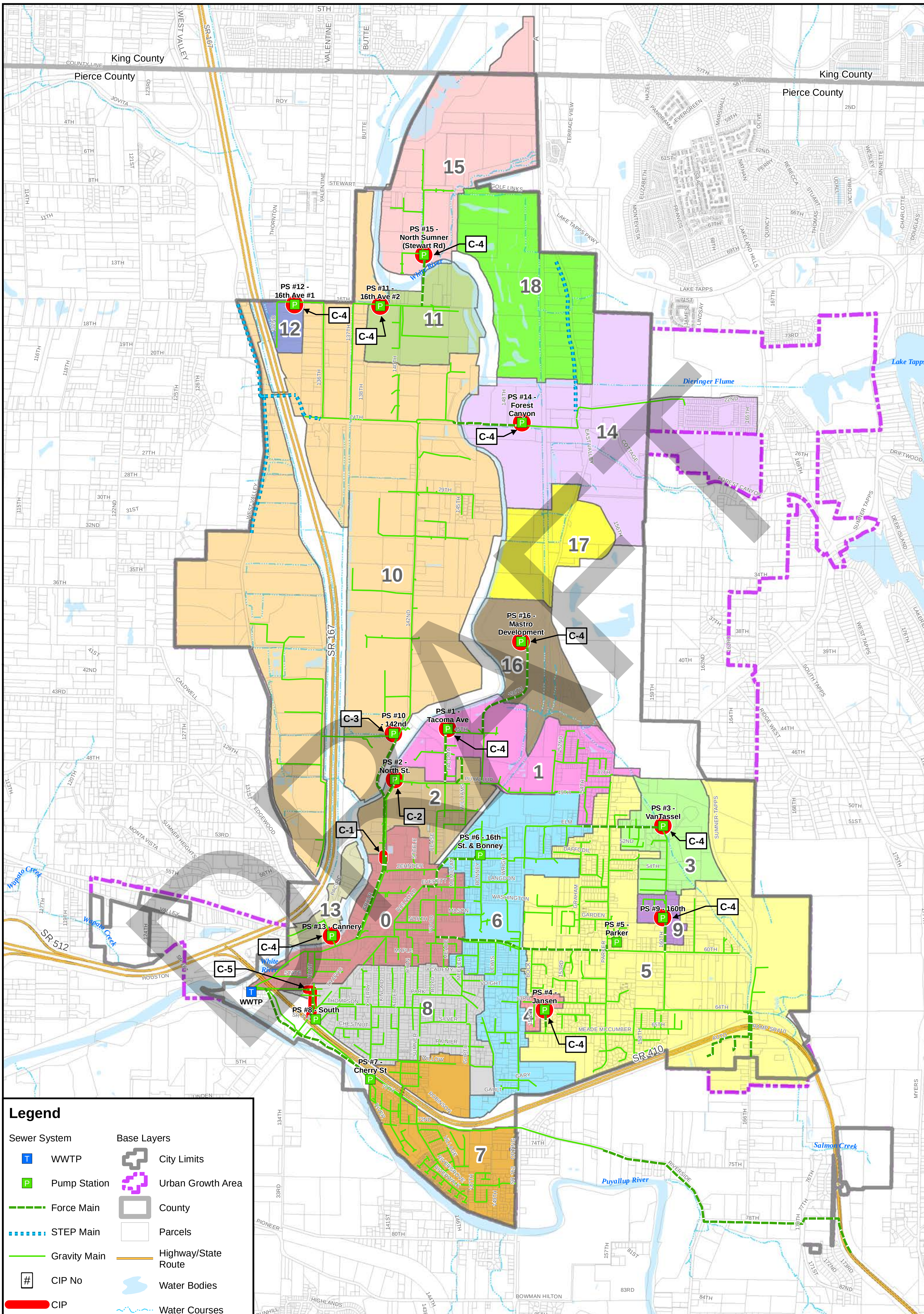

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GIS Base: City of Sumner & Pierce County
Data sources supplied may not reflect current or actual conditions. This map is a geographic representation based on information available. It does not represent survey data. No warranty is made concerning the accuracy, currency, or completeness of data depicted on this map.
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CITY OF SUMNER WASHINGTON

6-Year CIP
General Sewer Plan Update
City of Sumner

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10.2.2 6-year CIP Project Descriptions

CIP C-1 – PS-2 (North) Force Main Modifications

This project will reroute the 8-inch PS-2 force main into the adjacent 12-inch PS-10 force main to eliminate surcharging in the gravity sewer downstream of PS-2. This project will also improve PS-10 air release/vacuum release valve operation, and reroute discharge to either a gravity sewer or a vault that can be pumped out when filled.

CIP C-2 – PS-2 (North) Improvements

PS-2 was built in 1957 and rehabilitated in 1987. A pump station assessment was performed to identify capital improvement needs within 6 years. This project will include the following improvements: installation of a flow meter and new engine generator, improvements to the ventilation system in the dry well, stocking of replacement pumps and valves, relocating electrical equipment above grade, revising electrical distribution, installing connection and controls for new load bank to exercise new engine, and installing safety grate in wet well hatch.

CIP C-3 – PS-10 (142^{nd}) Improvements

PS-10 was built in 1998. A pump station assessment was performed to identify capital improvement needs within 6 years. This project will include replacement of the existing MOSCAD radio with an Allen Bradley PLC and an Ethernet Radio, replacement of two of the three pumps, pump rails, and VFDs, and insulating the heat trace. The City recently purchased one replacement pump and VFD which are scheduled for replacement.

CIP C-4 – Pump Station Improvements

A pump station assessment was performed to identify capital improvement needs within 6 years. Pump stations 1, 3, 4, 9, 11, 12, 13, 14, 15, and 16 require minor improvements. Common improvements include replacement of existing MOSCAD radios with Allen Bradley PLCs and Ethernet Radios, installation of safety grate in wet well hatch, and improvements to electrical equipment. A detailed list of these improvements is included in Chapter 7.

CIP C-5 – PS-8 (South) AC Force Main Replacement

This project will replace 910 feet of 8-inch asbestos cement force main with a new 8-inch force main downstream of PS-8. The force main is the last remaining AC force main in the sewer system. Pipe replacement is required due to the age and material of the pipe. The installation method will be evaluated during the design phase and may include open trench or trenchless installation. The OPPC is estimated based on installation of 100 feet through jack and bore construction under the railroad right-of-way and 810 feet through open trench construction.

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CIP C-6 – I/I Reduction and Rehabilitation

This general budget item provides a funding source to repair and replace problematic or deteriorated areas. This allows maintenance crews to monitor the condition of the City's collection system and make recommendations for repairs or replacement as warranted. This proactive approach will keep I/I rates low and preserves the overall functionality of the collection system. A variety of means may be used including slip lining, cured-in-place pipe (CIPP), pipe replacement, manhole lining, and other methods. I/I reduction and rehabilitation may occur throughout the City, and will likely focus on Basin 6, also known as the Siebenthaler Basin.

CIP C-7 – Centrifuge Replacement

This project will replace and increase the capacity of the centrifuge at the WWTP. This additional capacity will allow for all dewatering to occur during regular hours when staff is on site. It will also add redundancy to the process.

CIP C-8 – WWTP O&M

This general budget item provides a funding source for WWTP improvements, including but not limited to roof replacements, painting, replacement of mechanical equipment, and replacement of electrical, instrumentation, and control equipment.

CIP C-9 – Solids Hauling Dump Trucks

This project will purchase two new solids hauling dump trucks to replace the existing trucks.

CIP C-10 – Portable Screw Sucker Pump

This project will purchase a portable screw sucker pump for use at the pump stations when pumps need to be taken out of service for maintenance.

CIP C-11 – Emergency Pipe Replacement

This general budget item provides a funding source to replace and repair broken pipes as needed.

CIP C-12 – Pretreatment Program Implementation

This project will fund a consultant to implement a pretreatment program to establish local limits.

10.2.3 20-Year CIP (2024-2038)

The projects recommended for the 20-year CIP are illustrated on Figure 10-2 and described in Table 10-2. Developer improvements are expected to be privately funded by developers and are not listed in this section.

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Table 10-2 20-Year CIP (2024-2038)

CIP No.	Project	Type	Replacement	Upgrade	Expansion	Eligible for Connection Fee	Project Description
C-101	PS-9 (160th) Abandonment	Obsolescence	☑				▪ Abandon and demolish pump station. ▪ Install 800 feet of 8-inch PVC gravity sewer pipe to reroute flows to PS 5.
C-102	PS-11 (16th Ave 1) Replacement	Obsolescence	☑		☑		▪ Replace pumps and mechanical equipment. ▪ Replace and upgrade electrical and control equipment. ▪ Increase pump station capacity from 100 gpm to 130 gpm.
C-103	PS-12 (16th Ave 2) Replacement	Obsolescence	☑				▪ Replace pumps and mechanical equipment. ▪ Replace and upgrade electrical and control equipment. ▪ Maintain existing firm capacity of 100 gpm.
C-104	PS-4 (Jansen) Replacement	Obsolescence	☑				▪ Replace pumps and mechanical equipment. ▪ Replace and upgrade electrical and control equipment. ▪ Maintain existing firm capacity of 130 gpm.
C-105	PS-13 (Cannery) Replacement	Obsolescence	☑				▪ Replace pumps and mechanical equipment. ▪ Replace and upgrade electrical and control equipment. ▪ Maintain existing firm capacity of 213 gpm.
C-106	PS-3 (Van Tassel) Replacement	Obsolescence	☑				▪ Replace pumps and mechanical equipment. ▪ Replace and upgrade electrical and control equipment. ▪ Maintain existing firm capacity of 250 gpm.
C-107	PS-14 (Forest Canyon) Replacement	Obsolescence	☑				▪ Replace pumps and mechanical equipment. ▪ Replace and upgrade electrical and control equipment. ▪ Maintain existing firm capacity of 600 gpm.
C-108	PS-1 (Tacoma) Replacement	Obsolescence	☑				▪ Replace pumps and mechanical equipment. ▪ Replace and upgrade electrical and control equipment. ▪ Maintain existing firm capacity of 400 gpm.
C-109	PS-15 (North) Replacement	Obsolescence	☑				▪ Replace pumps and mechanical equipment. ▪ Replace and upgrade electrical and control equipment. ▪ Maintain existing firm capacity of 500 gpm.
C-110	PS-16 (Mastro) Replacement	Obsolescence	☑				▪ Replace pumps and mechanical equipment. ▪ Replace and upgrade electrical and control equipment. ▪ Maintain existing firm capacity of 200 gpm.

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Table 10-2 20-Year CIP (2024-2038)							
CIP No.	**Project**	**Type**	**Replacement**	**Upgrade**	**Expansion**	**Eligible for Connection Fee**	**Project Description**
C-111	PS-2 (North) Replacement	Obsolescence	☑				▪ Replace pumps and mechanical equipment. ▪ Replace and upgrade electrical and control equipment. ▪ Replace wet well. ▪ Maintain existing firm capacity of 500 gpm.
C-112	PS-10 (142nd) Replacement	Obsolescence	☑				▪ Replace mechanical equipment. ▪ Replace and upgrade electrical and control equipment. ▪ Maintain existing firm capacity of 2,280 gpm.
C-113	I/I Reduction and Rehabilitation	Obsolescence	☑				▪ Reduce I/I through a variety of means such as slip lining, cured-in-place pipe (CIPP), pipe replacement, manhole lining, and other methods.
C-114	WWTP O&M	Obsolescence	☑				▪ General WWTP improvements, including but not limited to roof replacements, painting, replacement of mechanical equipment, and replacement of electrical, instrumentation, and controls equipment.
C-115	Emergency Pipe Replacement	Obsolescence	☑				▪ Replace and repair broken pipes as needed.

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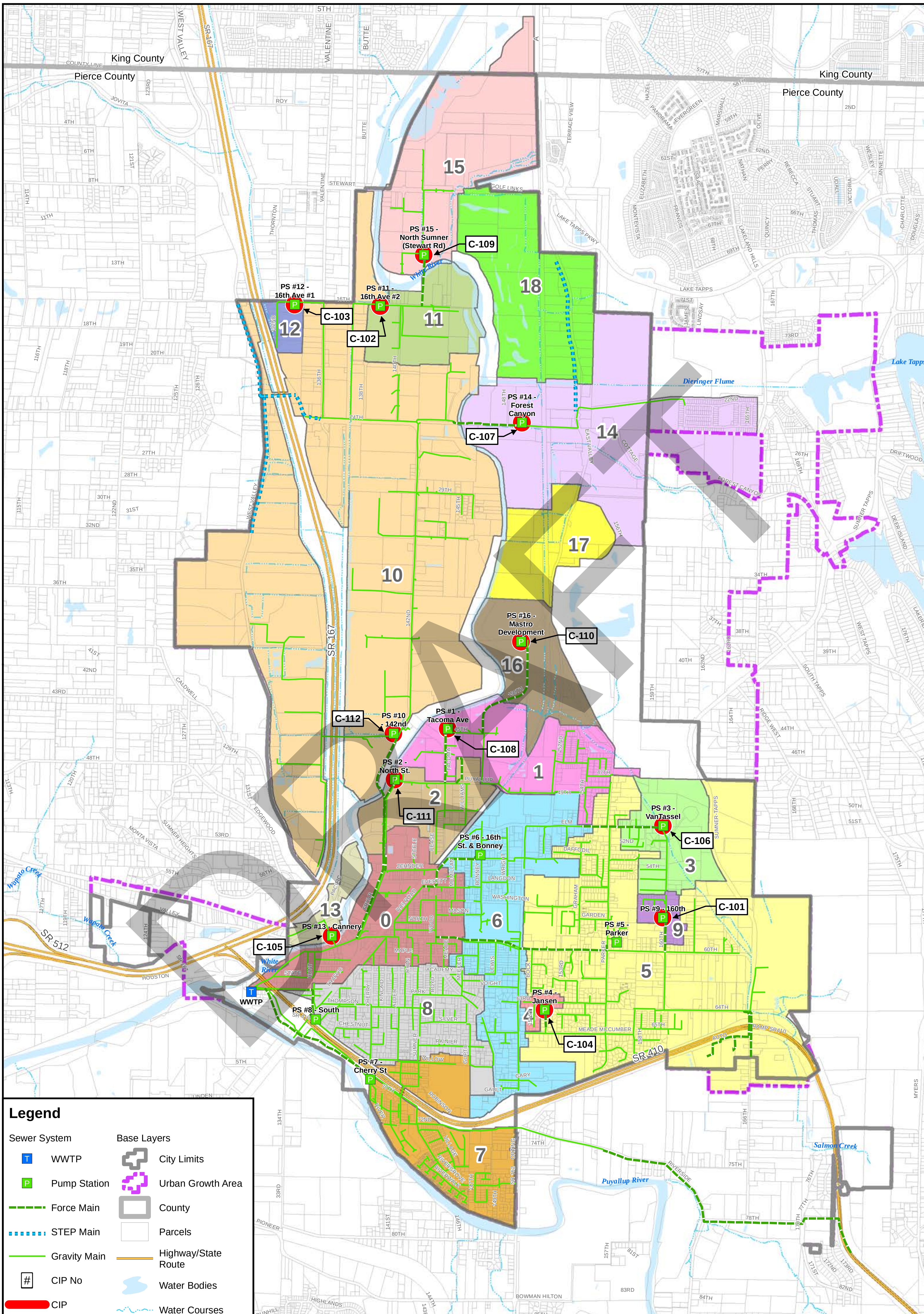

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GIS Base: City of Sumner & Pierce County
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20-Year CIP
General Sewer Plan Update
City of Sumner

Figure
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10.2.4 20-year CIP Project Descriptions

CIP C-101 – PS-9 (160th) Abandonment

PS-9 was built in 1966 and was originally intended for temporary use only. This station will be abandoned and demolished in the 20-year planning horizon. Flows currently routed to this station will be rerouted to PS-5.

CIP C-102 – PS-11 (16th Ave 1) Replacement

PS-11 was built in 1998 and will exceed the typical 25-year life expectancy of electrical and mechanical equipment within the 20-year planning horizon. It is recommended that funds be budgeted for the rehabilitation/replacement of pumps, mechanical equipment, and electrical equipment. Improvements recommended for the 6-year CIP have not been included in the 20-year CIP. The firm capacity of the pump station will be increased to approximately 130 gpm.

CIP C-103 – PS-12 (16th Ave 2) Replacement

PS-12 was built in 1998 and will exceed the typical 25-year life expectancy of electrical and mechanical equipment within the 20-year planning horizon. It is recommended that funds be budgeted for the rehabilitation/replacement of pumps, mechanical equipment, and electrical equipment. Improvements recommended for the 6-year CIP have not been included in the 20-year CIP. The firm capacity of the pump station will be approximately 100 gpm.

CIP C-104 – PS-4 (Jansen) Replacement

PS-4 was built in 1979 and rehabilitated in 2006. This station will exceed the typical 25-year life expectancy of electrical and mechanical equipment within the 20-year planning horizon. It is recommended that funds be budgeted for the rehabilitation/replacement of pumps, mechanical equipment, and electrical equipment. Improvements recommended for the 6-year CIP have not been included in the 20-year CIP. The firm capacity of the pump station will be approximately 130 gpm.

CIP C-105 – PS-13 (Cannery) Replacement

PS-13 was built in 2006 and will exceed the typical 25-year life expectancy of electrical and mechanical equipment within the 20-year planning horizon. It is recommended that funds be budgeted for the rehabilitation/replacement of pumps, mechanical equipment, and electrical equipment. Improvements recommended for the 6-year CIP have not been included in the 20-year CIP. The firm capacity of the pump station will be approximately 215 gpm.

CIP C-106 – PS-3 (Van Tassel) Replacement

PS-3 was built in 1977 and rehabilitated in 2007. This station will exceed the typical 25-year life expectancy of electrical and mechanical equipment within the 20-year planning horizon. It is recommended that funds be budgeted for the rehabilitation/replacement of pumps, mechanical equipment, and electrical equipment. Improvements recommended for the 6-year CIP have not been included in the 20-year CIP. The firm capacity of the pump station will be approximately 250 gpm.

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CIP C-107 – PS-14 (Forest Canyon) Replacement

PS-14 was built in 2007 and will exceed the typical 25-year life expectancy of electrical and mechanical equipment within the 20-year planning horizon. It is recommended that funds be budgeted for the rehabilitation/replacement of pumps, mechanical equipment, and electrical equipment. Improvements recommended for the 6-year CIP have not been included in the 20-year CIP. The firm capacity of the pump station will be approximately 600 gpm.

CIP C-108 – PS-1 (Tacoma) Replacement

PS-1 was built in 1982 and rehabilitated in 2009. This station will exceed the typical 25-year life expectancy of electrical and mechanical equipment within the 20-year planning horizon. It is recommended that funds be budgeted for the rehabilitation/replacement of pumps, mechanical equipment, and electrical equipment. Improvements recommended for the 6-year CIP have not been included in the 20-year CIP. The firm capacity of the pump station will be approximately 400 gpm.

CIP C-109 – PS-15 (North) Replacement

PS-15 was built in 2010 and will exceed the typical 25-year life expectancy of electrical and mechanical equipment within the 20-year planning horizon. It is recommended that funds be budgeted for the rehabilitation/replacement of pumps, mechanical equipment, and electrical equipment. Improvements recommended for the 6-year CIP have not been included in the 20-year CIP. The firm capacity of the pump station will be approximately 500 gpm.

CIP C-110 – PS-16 (Mastro) Replacement

PS-16 was built in 2012 will exceed the typical 25-year life expectancy of electrical and mechanical equipment within the 20-year planning horizon. It is recommended that funds be budgeted for the rehabilitation/replacement of pumps, mechanical equipment, and electrical equipment. Improvements recommended for the 6-year CIP have not been included in the 20-year CIP. The firm capacity of the pump station will be approximately 200 gpm.

CIP C-111 – PS-2 (North) Replacement

PS-2 was built in 1957 and rehabilitated in 1982. This station will exceed the typical 25-year life expectancy of electrical and mechanical equipment and the 50-year life expectancy of structural facilities within the 20-year planning horizon. It is recommended that funds be budgeted for the rehabilitation/replacement of pumps, mechanical equipment, and electrical equipment. Improvements recommended for the 6-year CIP have not been included in the 20-year CIP. The firm capacity of the pump station will be approximately 500 gpm.

CIP C-112 – PS-10 (142nd) Replacement

PS-10 was built in 1998 and will exceed the typical 25-year life expectancy of electrical and mechanical equipment within the 20-year planning horizon. It is recommended that funds be budgeted for the rehabilitation/replacement of mechanical equipment and electrical equipment. Improvements recommended for the 6-year CIP have not been included in the 20-year CIP. The firm capacity of the pump station will be approximately 2,280 gpm.

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CIP C-113 – I/I Reduction and Rehabilitation

This general budget item provides a funding source to repair and replace problematic or deteriorated areas. This allows maintenance crews to monitor the condition of the City's collection system and make recommendations for repairs or replacement as warranted. This proactive approach will keep I/I rates low and preserves the overall functionality of the collection system. A variety of means may be used including slip lining, cured-in-place pipe (CIPP), pipe replacement, manhole lining, and other methods. I/I reduction and rehabilitation may occur throughout the City.

CIP C-114 – WWTP O&M

This general budget item provides a funding source for WWTP improvements, including but not limited to roof replacements, painting, replacement of mechanical equipment, and replacement of electrical, instrumentation, and control equipment.

CIP C-115 – Emergency Pipe Replacement

This general budget item provides a funding source to replace and repair broken pipes as needed.

10.2.5 Sewer Extensions into Undeveloped Basins

New sewer extensions will be needed to serve new developments expected in unsewered areas of the City as shown on Figure 10-3. Specific plans for the sewer extensions have not been prepared and will be the responsibility of the developer. Some of the developments shown will require local pump stations. The downstream existing pump stations have adequate capacity to handle the projected additional flows.

Major land developers will prepare site-specific plans for street layouts, residential lot distribution, commercial parcels, sensitive area delineations, required setbacks with buffers, and other land use intentions for approval by the permitting authorities. These land use decisions, and the timing of when specific parcels are developed will influence the sewer collection facilities within these basins. These sewer extensions will be funded and built by developers and are not expected to require significant financial investment by the City.

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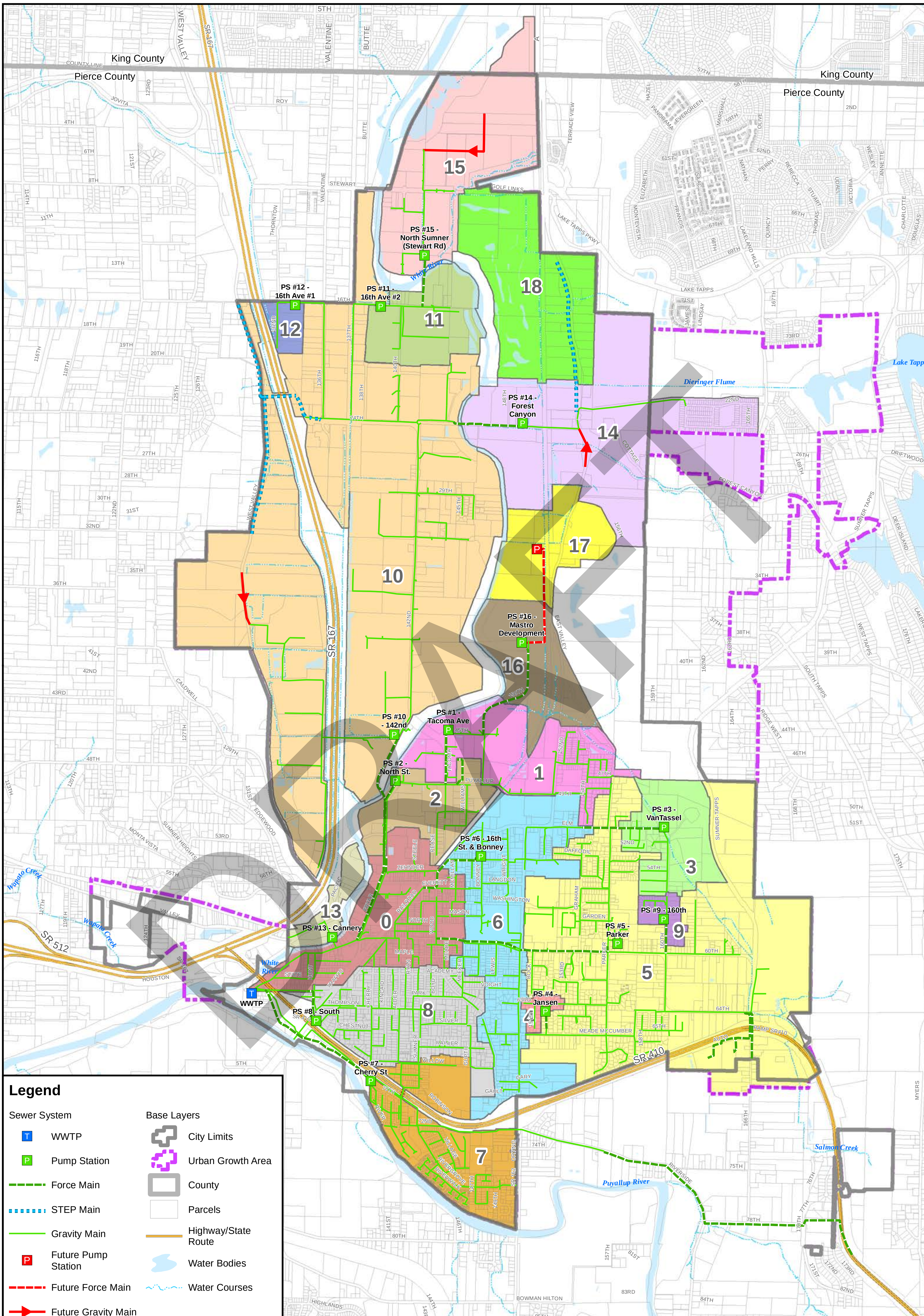

P:\Mapping\Maps_Generated\Sumner\17-10500.00\003\3.6\maps\Fig 10-3 Future Sewer Extensions 11x17.mxd 4/17/2018 ctolentino

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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

Future Sewer Extensions
General Sewer Plan Update
City of Sumner

Figure
10-3

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10.3 Opinions of Probable Project Cost

Opinions of probable project costs (OPPC) for the 6-year and 20-year CIP are listed in Tables 10-3 and 10-4, respectively. These projects have been defined to a preliminary planning level with approximate dimensions. All projects will require further definition and design refinement as part of the design process. The OPPC for each improvement are provided in Appendix G. Each OPPC includes 9.3% Washington State sales tax (WSST), 35% construction contingency, 5% for planning, and 15% for engineering services during construction (including inspection and observation services). Additionally, based on project complexity, a varying percentage was applied for engineering design and permitting services. Construction costs were estimated from bid results for similar projects in the Puget Sound area and RS Means cost data for 2017. Costs associated with financing, easements, right-of-way, or property acquisition are not included, unless specifically noted. Actual costs can and will differ from the opinions of probable costs. Volatility in the bidding climate, the number of contractors bidding on a project, and their approach to bidding and completing the work will all impact actual project costs.

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Table 10-3 Opinion of Probable Project Costs, 6-Year CIP (2018-2024)

CIP No.	Project	Replacement	Upgrade	Expansion	Opinion of Probable Project Cost	2018	2019	2020	2021	2022	2023
C-1	PS-2 Force Main Modifications			☑	$90,000[1]	$90,000	-	-	-	-	-
C-2	PS-2 Improvements	☑	☑		$548,000[1]	$548,000	-	-	-	-	-
C-3	PS-10 Improvements	☑	☑		$652,000[1]	-	$652,000	-	-	-	-
C-4	Pump Station Improvements	☑	☑		$1,215,000[1]	$202,500	$202,500	$202,500	$202,500	$202,500	$202,500
C-5	PS-8 AC Force Main Replacement	☑	☑		$540,000[1]	-	-	$540,000	-	-	-
C-6	I/I Reduction and Rehabilitation	☑			$600,000[2]	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
C-7	Centrifuge Replacement	☑			$1,200,000[2]	-	-	-	$1,200,000	-	-
C-8	WWTP O&M	☑			$1,200,000[2]	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
C-9	Solids Hauling Dump Trucks	☑			$500,000[2]	-	-	-	-	-	$500,000
C-10	Portable Screw Sucker Pump	☑			$65,000[2]	$65,000	-	-	-	-	-
C-11	Emergency Pipe Replacement	☑			$600,000[2]	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
C-12	Pretreatment Program Implementation				$200,000[2]	-	-	$200,000	-	-	-
Total Opinion of Probable Project Cost					**$7,410,000**	**$1,305,500**	**$1,254,500**	**$1,342,500**	**$1,802,500**	**$602,500**	**$1,102,500**

1. Opinion of probable project cost developed by BHC Consultants and included in Appendix G.
2. Opinion of probable project cost provided by the City.

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Table 10-4 Opinion of Probable Project Costs, 20-Year CIP (2024-2038)

CIP No.	Project	Replacement	Upgrade	Expansion	Opinion of Probable Project Cost
C-101	PS-9 (160th) Abandonment	☑			$560,000
C-102	PS-11 (16th Ave 1) Replacement	☑		☑	$820,000
C-103	PS-12 (16th Ave 2) Replacement	☑			$800,000
C-104	PS-4 (Jansen) Replacement	☑			$830,000
C-105	PS-13 (Cannery) Replacement	☑			$910,000
C-106	PS-3 (Van Tassel) Replacement	☑			$1,000,000
C-107	PS-14 (Forest Canyon) Replacement	☑			$800,000
C-108	PS-1 (Tacoma) Replacement	☑			$1,000,000
C-109	PS-15 (North) Replacement	☑			$990,000
C-110	PS-16 (Mastro) Replacement	☑			$1,000,000
C-111	PS-2 (North) Replacement	☑			$1,610,000
C-112	PS-10 (142nd) Replacement	☑			$1,830,000
C-113	I/I Reduction and Rehabilitation	☑			$1,400,000
C-114	WWTP O&M	☑			$2,800,000
C-115	Emergency Pipe Replacement	☑			$1,400,000
Total Opinion of Probable Project Cost					**$17,750,000**

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