CHAPTER 2

WATER SYSTEM DESCRIPTION

City of Bonney Lake Justice and Municipal Center

INTRODUCTION

This chapter presents characteristics of the City of Bonney Lake's (City) existing water system and water service area (WSA) that are important to the planning process. The term "water service area" used in this Water System Plan (WSP) is defined as the area that is served by, or will be served by, the City's existing water distribution system, as adopted by both the Bonney Lake City Council and Pierce County through the coordinated water system planning process. For this WSP, the WSA, the retail service area, and the area of use for water right purposes, are all considered the same. The results of the evaluation and analyses of the existing water system are presented later in **Chapter 7 – *Water System Analysis***.

WATER SERVICE AREA

Ownership

The City's water system (i.e., wells, springs, reservoirs, water mains, etc.) is operated and maintained by the City of Bonney Lake, a municipal corporation. The City is run under the leadership of the Mayor and a seven-member council. The water system is operated and maintained by the City's Public Works Department. The most recent Water Facilities Inventory (WFI) report is included in **Appendix O –** ***Water Facility Inventory Form***, and the system's identification number is 07650H.

History

During the early 1900s, only a few farm homesteads existed within the present WSA. In 1910 and 1911, the Puget Sound Power and Light Company constructed the Lake Tapps project for the purpose of power generation. The Lake Tapps Reservoir was a portion of this project and formed by the construction of several dikes that allowed several small lakes to form into one. The new reservoir not only served the power generation process, but also provided an excellent recreation site. Much of the development of the Bonney Lake area occurred in the years immediately after the Lake Tapps project was completed.

Most of this development occurred on the westerly and southerly shores of the lake and consisted of vacation homes. The development around Lake Tapps has continued to be predominately residential, with very little commercial development and no industrial development. The area is essentially a "bedroom" community for other nearby metropolitan and industrial areas.

In 1947, Ken Simmons purchased approximately 1,000 acres of land near Bonney Lake in order to establish a new community. At that time, residents obtained their water from individual wells and springs. In 1949, Bonney Lake was incorporated, with a population of just over 300, in order to raise revenue bonds for a public water system. The incorporation came as a result of the need for a unified public water system.

Since World War II, the increased population growth in the Seattle-Tacoma area has caused the population of the City to increase significantly.

Geology

The geology of the WSA is the result of two major geologic events: the glaciation of the last glacial epoch, and the Osceola mudflow. During the glacial period, at least two separate and distinct glacial events occurred. These two periods were defined by the advance and recession of major ice fields that carved many valleys and ridges into the terrain. The Osceola mudflow occurred about 4,800 years ago and smoothed the area by filling many of the valleys with mud and silt. The geology is described in more detail in **Chapter 6 –** ***Water Source and Quality***.

Topography

Elevations within the WSA range from approximately 100 feet to 710 feet above mean sea level. However, most of the service area is located on top of the Bonney Lake Plateau, which is defined by the White River on the east and north, the Puyallup River on the west, and Fennel Creek on the south. The plateau is dominated by Lake Tapps, with a normal high water level of 543 feet above mean sea level. Several other small lakes are located throughout the WSA, including Lake Bonney, Debra Jane Lake, Hidden Lake, Bowman Lake, Hille Lake, Kirtley Lake, Crawford Lake, and Church Lake. There are also a number of wetlands and small creeks throughout the service area. The side slopes of the plateau consist of steep grades that range from 25 percent to 50 percent. The terrain on the plateau is undulating with numerous depressions of lakes and former lake beds. Most of the undeveloped areas are heavily forested. The largest transportation corridor within the City's service area is State Route 410, which runs east/west through the southern portion of the plateau.

Climate

The climate of the WSA is typical Puget Sound area weather. Since 1997, rainfall within the City's WSA has been monitored on a monthly basis at two locations: Victor Falls Springs and Grainger Springs. In late 2006, the City added a third station at Tacoma Point. Average annual rainfall at these three stations from 2007 through 2014 was 48.87 inches. Historically, the months of July and August are the driest and have the biggest impact on water demand. For the last 8 years, the average rainfall at these three stations during the summer months of July and August was 0.99 inches per month. The weather data indicates that the last 8 years have been drier than the historical 19-year average of 1.38 inches per month, so the demand factors calculated should be slightly conservative for the last 8 years.

Water Service Area

The City provides water service to most of the Bonney Lake Plateau. The WSA includes the areas generally bounded by:

- The top of the plateau on the west;
- The Pierce/King county line on the north;
- 234th Avenue East on the east; and
- Fennel Creek/ Rhodes Lake Road/112th Street East/Entwhistle area on the south.

The existing WSA encompasses approximately 26 square miles. It is estimated that 4.6 square miles, or 17 percent, of this area is comprised of open water bodies such as Lake Tapps, Debra Jane Lake, Lake Bonney, and Bowman Lake. **Figure 1 – *Water Service Area and Adjacent Systems*** illustrates the location of the City's WSA and adjacent water systems. The service area is approximately four times the size of the City's corporate boundaries. **Table 2-1 – *Water Plan Areas*** lists the relative sizes of the jurisdictional boundaries and major water bodies in the WSA.

Table 2-1
Water Plan Areas

Description	Total Area	
	Acres	Sq. Miles
Water Service Area		
WSA Legal Description	16,712	26.11
Water Bodies	2,936	4.59
Private Water Systems[1]	393	0.61
Bonney Lake WSA (Net)	**13,383**	**20.91**
Boundaries		
Bonney Lake WSA	13,383	20.91
Bonney Lake City Limits (Total)	5,112	7.99
City Limits outside WSA	222	0.35
Bonney Lake PAA[2]	157	0.24
Auburn City Limits[2]	735	1.15
Auburn PAA[2]	138	0.22
Sumner City Limits[2]	142	0.22
Sumner PAA[2]	664	1.04
Pierce County UGA[2]	445	0.70
Water Bodies		
Lake Tapps	2,828	4.42
Debra Jane Lake	20	0.03
Bonney Lake	19	0.03
Hidden Lake	19	0.03
Bowman Lake	14	0.02
64th Street Drainage	11	0.02
Ponderosa Lake	12	0.02
62nd Street Drainage	7	0.01
Hill Lake	6	0.01
Total Water Bodies	**2,936**	**4.59**
Private Water Systems within Bonney Lake's WSA		
Beau View Water	7	0.01
Tapps Island Water	295	0.46
Lake Tapps North Park Water	80	0.13
East End Rod and Gun Club	11	0.02
Total Water System	**393**	**0.61**

Notes:

[1] These systems have individual water service areas that are islands within the City's Water Service Area.

[2] Within the City's Water Service Area.

PAA = Potential Annexation Area

UGA = Urban Growth Area

WATER SERVICE AGREEMENTS

All water purveyors located within a Critical Water Supply Service Area (CWSSA) are required to have a water service area agreement that identifies the external boundary of their water service area. Pierce County was declared a CWSSA on November 8, 1983. As required by the *Pierce County Coordinated Water System Plan*, the City has a Standard Service Area Agreement. In addition, the City has modified its WSA boundaries with Tacoma Public Utilities (TPU) and the City of Auburn to facilitate water service to certain areas. Copies of these water service area agreements and the Standard Service Area Agreement are contained in **Appendix B –** ***Service Area Agreements***. The WSA boundary shown in this WSP is based on various documents and agreements that establish or modify the service area boundaries between adjacent purveyors.

SATELLITE SYSTEM MANAGEMENT

A Satellite System Management Agency (SSMA) is defined as a person or entity that is certified by Washington State Department of Health (DOH) to own or operate more than one public water system without the necessity for a physical connection between such systems. SSMAs were created to stop the proliferation of small water systems, as many of them could not meet federal and state water quality and water system planning regulations. Based on the success of SSMAs, DOH made recommendations to the legislature to include rules for designating entities as qualified SSMAs. In July 1995, Senate Bill 5448 became law; this law governs approval of new water systems and sets forth requirements for SSMAs. The goal of the law is to ensure that the people of this state will receive safe and reliable water supplies in the future from professionally managed or properly operated water systems. SSMAs can provide three different levels of service.

1. Ownership of the satellite system.
2. Operations and management of the satellite system.
3. Contract services only.

The service can be provided to new systems, existing systems that are no longer viable, or existing systems placed into receivership status by DOH.

The City will consider providing satellite system management services to small neighboring water systems and evaluate becoming an SSMA on a case by case basis. Upon agreement between the two systems to have the City provide SSMA services, the City will pursue the necessary steps to become an approved SSMA. These include:

- Submitting a notice of intent to DOH;
- Participating in a pre-submittal meeting with the DOH;
- Submitting an SSMA plan to DOH that meets the plan requirements; and
- Obtaining approval of the plan from DOH.

Currently, there are several small, privately owned water systems within or adjacent to the City’s designated WSA that could be operated by the City. However, the City would prefer to obtain and own these systems outright than to operate them as a SSMA.

EXISTING WATER FACILITIES

This section provides a detailed description of the existing water system and the current operation of the facilities. The analysis of the existing water facilities is presented in **Chapter 7 – W*ater System Analysis***.

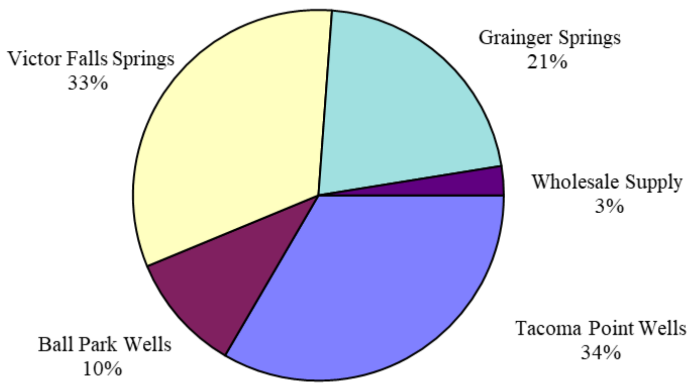
Supply Facilities

There are currently four City-owned water sources that provide drinking water to the City's water system, including two spring sources and two wellfields. Descriptions of Victor Falls Springs, Grainger Springs, Ball Park Well Nos. 1 and 2, and Tacoma Point Well Nos. 2, 4, and 6 are included in this WSP. In addition, the City has a wholesale agreement with TPU. **Table 2-2 – *2018 Annual Production by Source*** and **Chart 2-1 – *2018 Annual Production by Source*** show the relative utilization of each source on an annual basis.

Table 2-2
2018 Annual Production by Source

Source	Annual Production			Percent
	gallons	afy	MGD	
Tacoma Point Wells	436,571,000	1,340	1.20	34%
Ball Park Wells	135,305,000	415	0.37	10%
Victor Falls Springs	423,810,000	1,301	1.16	33%
Grainger Springs	278,308,000	854	0.76	21%
Wholesale Supply	33,102,000	102	0.09	3%
Total	**1,307,096,000**	**4,012**	**3.58**	100%
Total Annual Water Right	**8,006 afy**			**50%**

Chart 2-1
2018 Annual Production by Source



Currently, the City is using approximately half of its annual water rights. **Table 2-3 – *Annual Production vs. Annual Water Rights*** shows the relative utilization of each source on an annual basis versus its water right. For all of the City's sources of supply, including wholesale, the City uses approximately 50 percent of its water rights. The City is currently growing into its allocated wholesale supplies. Looking at only the City's own supplies (non-wholesale), the City is using approximately 79 percent of its annual water rights. In terms of total water demand, 2018 was a relatively average year; therefore, the historical maximum production year of 2009 is used for comparison purposes. Additional water right information is discussed in further detail in **Chapter 6 – *Water Source and Quality***.

Table 2-3
Annual Production vs. Annual Water Rights

Source	Annual Water Right (afy)	Year 2018 (afy)	Percent of Water Right	Year 2009 (Max Year) (afy)	Percent of Water Right
Tacoma Point Wells	2,445	1,340	55%	1,474	60%
Ball Park Wells	985	415	42%	251	26%
Victor Falls Springs	1,771	1,301	73%	1,521	86%
Grainger Springs	77	77	100%	77	100%
Grainger Supplemental	*1,945*	*777*	*40%*	*856*	*44%*
Wholesale Supply (TPU)	2,728	102	4%	143	5%
Total (all sources)	**8,006**	**4,011**	**50%**	**4,322**	**54%**
Total without Wholesale	**5,278**	**3,909**	**74%**	**4,179**	**79%**

Victor Falls Springs

The Victor Falls Springs pump station is located at 11700 Rhodes Lake Road (or on Bissan-Scannel Road east of its intersection with Angeline Road). Flow from this source varies from 540 gallons per minute (gpm) to 1,700 gpm or 0.78 million gallons per day (MGD) to 2.45 MGD. The low flow of 540 gpm (0.78 MGD) was recorded in 1985, and was 80 percent of the previous recorded low flow.

The average low flow in the summer months is approximately 1,010 gpm (1.45 MGD).

Water is collected at three separate spring boxes and flows by gravity through pipes to the Victor Falls pump station's wet well. The water is pumped into the distribution system by one 125 horsepower (hp) pump and one 150 hp pump with 1,000 gpm (1.44 MGD) and 1,200 gpm (1.73 MGD) capacities, respectively. The pumps are throttled so that their combined capacity is not greater than the flow from the springs. Both pumps are short-coupled, vertical turbine pumps that are driven by vertical hollow shaft, part wound, 1,800 revolutions per minute (rpm) motors. The pumps are controlled by the water reservoir levels of the Ponderosa Reservoir, as recorded by the telemetry systems. The pump station has a chlorine disinfection facility, which is located in a separate room with outside access, and a 250 kilowatt (kW) emergency power generator. In 2003, disinfection improvements were made to achieve a chlorine contact time (CT) of 6 at this source. In 2005, the gas chlorination system was replaced with an on-site sodium hypochlorite generation system. In 2012, variable frequency drives (VFDs) were added to the 125 hp pump and 150 hp pump to assist the City in matching flow rates and improve power efficiencies.

In 1995, the City utilized Victor Falls Springs as its major source, with over 56 percent of the City's total annual production, or approximately 1,424 acre-feet per year (afy) (1.27 MGD). This was primarily due to the excellent water quality of this source and its proximity to the system's high demand areas. Over the last 15 years, substantial growth has occurred in the north end of the system and the City has relied on the Tacoma Point Wellfield more often throughout the years. By 2018, Victor Falls Springs was no longer the City's highest utilized source and used only 1,301 afy (1.16 MGD), or 33 percent of the City's total production.

Grainger Springs

The Grainger Springs' facilities are located southwest of the summit of State Route 410 (18100 State Route 410). Flow from this source varies between 650 gpm and 1,300 gpm (0.94 MGD and 1.87 MGD). Like Victor Falls Springs, the minimum flow of this source occurred in 1985. The average low flow in the summer months is approximately 900 gpm (1.30 MGD).

Grainger Springs Treatment Facility

Grainger Springs' water is collected at perforated pipes and manholes along the toe of the hill and flows by gravity through pipes to the Grainger Springs pump station's wet well. The water is

Grainger Springs Pump

pumped into the distribution system by one 75 hp pump and one 150 hp pump with capacities of 500 gpm (0.72 MGD) and 1,000 gpm (1.44 MGD), respectively, and are of the same design as the pumps at Victor Falls Springs. These pumps are also controlled by the water reservoir levels of the Ponderosa Reservoir, as recorded by the telemetry systems. This source includes a complete chlorine disinfection facility and a 150 kW emergency power generator, which are both located up the hill from the pump house in a separate structure. In 2003, chlorine contact time improvements were made to achieve a CT of 6 at this source. In 2005, the gas chlorination system was replaced with an on-site sodium hypochlorite generation system and pH adjustment for corrosion control. In 2012, a VFD was added to the 150 hp pump to assist the City in matching flow rates and improving power efficiencies.

In 1995, the City utilized Grainger Springs as its second largest source, with 24 percent of its annual production, or approximately 602 afy (0.54 MGD). In 2014, although 21 percent of the City's annual production was still from this source, it was the third largest source and production had grown to 854 afy (0.76 MGD). Grainger Springs is still utilized as much as possible by the City due to the excellent water quality and its centralized location in the City's system.

Tacoma Point Wells

Tacoma Point Well No. 2 Building

Tacoma Point Well No. 4 Building

Tacoma Point Well Nos. 2, 4, and 6 are located at 1110 182nd Avenue East. Each well has its own pump house. All three wells share a common chlorine disinfection facility and pH control facility. Well Nos. 2 and 4 have a diesel engine driven, 250 kW generator for backup power that is located in the Tacoma Point Well No. 2 pump house. Tacoma Point Well No. 6 does not have a permanent backup power source. The treatment facility located in the Tacoma Point Well No. 6 building, has a 35 kW generator for backup power to heat the building and run the treatment process in the event of a power failure, and the pump can be powered off of a temporary mobile power generator set. All three wells are controlled by the telemetry systems that measure the levels of the Ponderosa 748 Zone Reservoir. For most of the year, only one of these wells is in use at a time. However, in the summer months during high demand periods, it is sometimes necessary to operate both Tacoma Point Well Nos. 2 and 4 simultaneously; in peak periods Tacoma Point Wells Nos. 2 and 6 are run to reach a maximum production capacity of 2,300 gpm (3.31 MGD).

Tacoma Point Well No. 2 was drilled during the winter of 1985 and 1986. In the spring of 1988, the City constructed the pump house and put the well into service. The first pump for Tacoma Point Well No. 2 was driven by a vertical hollow shaft, part wound, 1,800 rpm motor. Due to a bend in the well casing, the first pump was replaced by a submersible pump in 1991. This pump was recently replaced in 2019 and this 125 hp pump is currently the only submersible pump in the City's water system. The capacity of the submersible pump is approximately 750 gpm (1.08 MGD). The static water level is approximately 246 feet below ground surface.

Tacoma Point Well No. 4 was installed and tested in the spring of 1990. This well is equipped with a 150 hp vertical turbine pump. The well was drilled to a depth of 315 feet and has a capacity of approximately 1,200 gpm (1.73 MGD). The screen interval of Tacoma Point Well No. 4 is 287 to 310 feet below ground level. The static water level was measured at 247.5 feet below ground surface when Tacoma Point Well No. 2 was pumping continuously at 810 gpm (1.17 MGD).

Ball Park Well No. 1

Tacoma Point Well No. 6

Tacoma Point Well No.4

Tacoma Point Well No. 6 was developed in 1999 and treatment was upgraded to include pH control (caustic soda – NaOH) and changed disinfection treatment from a gaseous chlorine system to a liquid bleach system (sodium hypochlorite – NaOCl). In 2013, this system was converted to an on-site generation facility system to match the rest of the City's facilities. The first Tacoma Point Well No. 6 pump was installed and tested in the fall of 1998 and was recently replaced in 2019. This well is equipped with a 200 hp vertical turbine pump (8 stage). The well was drilled to a depth of 315 feet and has a capacity of approximately 1,300 gpm (1.87 MGD). The screen interval of Well No. 6 is 287 to 310 feet below ground level. The static water level was measured at 247.5 feet below ground surface when Tacoma Point Well No. 2 was pumping continuously at 810 gpm (1.17 MGD). In 2012, VFDs were added to Tacoma Point Well Nos. 4 and 6 to assist the City in matching flow rates and improve power efficiencies.

In 1995, the City utilized the Tacoma Point wells as a peaking source. Less than 17 percent of the City's total annual production was from this source, or approximately 425 afy (0.38 MGD). This source is slightly more expensive to operate in comparison to the spring sources due to the depth of the groundwater and the treatment requirements. However, by 2018, annual production for this source increased to 34 percent, or 1,340 afy (1.20 MGD), due to growth in the north end of the water system.

Ball Park Wells

Ball Park Well No. 1 was developed in 1986, and is located just south of the intersection of 192nd Avenue East and 60th Street East (6001 192nd Avenue East). Treatment for this well is provided at the City's Ball Park Treatment Facility located at the Ball Park Well No. 2 site. This well is also controlled by the telemetry systems at the Ponderosa 748 Zone Reservoir.

Ball Park Well No. 1 is 12 inches in diameter and screened between 197 and 205 feet and 214 and 231 feet deep. The static water level is approximately 102 feet below ground level, and

Ball Park Well No. 1 Building

the pump is set at 178 feet below ground level. The well pump is driven by a vertical hollow shaft, part wound, 1,800 rpm motor. The capacity of the 200 hp deep well turbine pump is 1,000 gpm (1.44 MGD). With continuous use, the capacity of the pump is 1,300 gpm (1.87 MGD) at maximum drawdown. The drawdown experienced during normal use is approximately 40 to 50 feet. This pump was rehabilitated in 2017.

Ball Park Well No. 2 was drilled and developed in 2003, and is located on the Emerald Hills Elementary School site, southwest of Ball Park Well No. 1 (19515 South Tapps Drive, Building B). The well is located in the Ball Park Treatment Facility Building and controlled by the telemetry systems at the Ponderosa 748 Zone Reservoir.

Ball Park Well No. 2 is 20 inches in diameter and screened between 214 feet and 234 feet below ground surface. The static water level is approximately 93 feet below ground level, and the pump is set at 203 feet below ground level. The well pump is driven by a vertical hollow shaft, part wound, 1,800 rpm motor. The capacity of the 50 hp deep well turbine pump is 300 gpm (0.43 MGD). With continuous use, the capacity of the well is 200 gpm (0.29 MGD) at maximum drawdown. The drawdown experienced during normal use is approximately 60 feet.

Ball Park Well No. 2 and Treatment Facility

As part of the Ball Park treatment upgrade project in 2003, the pump and motor at Ball Park Well No. 1 were replaced with a new 200 hp motor and VFD drive. In addition, both wells have a diesel engine driven, 350 kW generator for backup power that is located in the treatment building.

In 1995, the City only utilized Ball Park Well No. 1 as a summer peaking source. Less than 3 percent of the City's total annual production was from this source due to the high concentrations of iron and manganese. The degree to which the City relies on this source in the summer varies each year based on weather and water demand conditions. Prior to the construction of the treatment facility, the peak summer usage was in 2003, when low aquifer levels in the Tacoma Point and Ball Park systems, coupled with high demand conditions and the selling of emergency water to both the City of Auburn and the Lake Tapps Water Company, required the City to operate Ball Park Well No. 1 much more. The Ball Park wells made up approximately 16 percent of the City's total summer production that year (21 percent in July), or 227 afy (0.20 MGD). As a result, numerous customer complaints were received by the City about water quality. The City made a commitment to build an iron and manganese treatment (filtration) facility for this source and to buy emergency water from TPU in the summer of 2004 while the facility was being constructed. In 2005, the new pressure filtration facility and on-site sodium hypochlorite generation disinfection system were brought online. In 2018, annual production for this source was 3 percent, or 102 afy (0.09 MGD).

Storage Facilities

The City currently stores water in five water reservoirs: Tacoma Point; Lakeridge; Ponderosa 748; Ponderosa 800; and the Peaking Storage Facility. Four of these are in open pressure zones and provide typical system storage capacity. The four system reservoirs have a total volume of 5.7 million gallons (MG). However, only 3.5 MG of this total is effective, or usable, storage that can be used for normal operational, standby, equalizing, and emergency fire flow demand storage. The remaining 2.2 MG is normally inactive storage and does not have adequate pressure to be used during typical demand conditions. However, during emergency conditions, the City can isolate the Ponderosa 800 Reservoir by operating the Ponderosa 800 Pressure Zone as a closed system. This allows the City to utilize approximately 1.65 MG of additional storage from the Ponderosa 800 Reservoir in the City's 748 Pressure Zone. The fifth reservoir, known as the Peaking Storage Reservoir, has a capacity of 15.0 MG and provides seasonal peaking supply via a booster pump station

Tacoma Point Reservoir

The Tacoma Point Reservoir is located northeasterly of Old Man Thomas Road. The reservoir is a steel standpipe with a diameter of 44 feet. The reservoir has a total volume of approximately 1.1 MG and an effective storage of 0.6 MG. The overflow elevation of the Tacoma Point Reservoir is 738 feet. This reservoir is fitted with an altitude valve and reservoir has not been seismically retrofitted. This reservoir was built in 1972 and has never been repainted.

Tacoma Point Reservoir

Lakeridge Reservoir

The Lakeridge Reservoir is located just south of the intersection of 171st Avenue Court East and Ridgewest Drive. The reservoir is steel, with a diameter of 63 feet and an overflow elevation of 741 feet. The total reservoir volume is approximately 0.8 MG, of which 100 percent is considered effective storage. This reservoir also has an altitude valve. This reservoir was built in 1963, and has been repainted twice; first in 1994, when it was also seismically retrofitted, and again in 2008.

Lakeridge Reservoir

Ponderosa 748 Zone Reservoir (No. 1)

The Ponderosa 748 Reservoir is located south of Wilderness Ridge Division Two, west of the intersection of 202nd Avenue East and 108th Street East. The reservoir is steel, with a diameter of 63 feet and an overflow elevation of 748 feet. The total reservoir volume is approximately 1.0 MG, of which 100 percent is considered effective storage. The reservoir was equipped with an altitude valve in 1988. The telemetry system at the Public Works Department controls the pumps that fill the reservoir. This reservoir was built in 1972, repainted in 1994, and has been seismically retrofitted.

Ponderosa 748 Reservoir

Ponderosa 800 Zone Reservoir (No. 2)

The Ponderosa 800 Reservoir is also located south of Wilderness Ridge Division Two. This steel reservoir is located just south of the Ponderosa 748 Reservoir. This reservoir has a diameter of 64 feet and an overflow elevation of 800 feet. The total volume of the reservoir is approximately 2.8 MG, of which 1.2 MG is considered effective storage. Pressures in the Ponderosa 800 Pressure Zone, or reservoir water levels, are used to control the Ponderosa Booster Pump Station that fills the Ponderosa 800 Reservoir. This reservoir was built in 1998.

Ponderosa 800 Reservoir

Peaking Storage Reservoir

In 2007, the City completed construction of a 15 MG Peaking Storage Facility, located at 21719 96th Street

Peaking Storage Reservoir

East. This prestressed concrete reservoir (American Water Works Association (AWWA) D110) has a diameter of 275 feet and an overflow elevation of 652 feet. The total 15 MG storage volume is available to the City's 748 Pressure Zone via an on-site booster pump station (BPS).

Distribution System

Pipes

The existing distribution system consists of over 205 miles of pipe. Existing water main alignments and sizes are shown in the plan view on **Figure 2 –** ***Existing Water System***. Currently, the distribution system does not extend into the eastern most portion of the WSA. **Table 2-4 –** ***Distribution System Inventory*** presents a summary of the total pipe within the City's distribution and transmission system, and identifies pipe by diameter and material. As this table shows, approximately 50 percent of the City's system is constructed with 8-inch diameter water mains, and over 81 percent of the system consists of ductile iron pipe.

Table 2-4
Distribution System Inventory

Pipe Diameter	Sub-standard Material (feet)				Standard Material (feet)			Total	Percent of System
	Steel	AC	CI	PVC	DI	HDPE	C-900		
2-inch	800	0	0	7,583	0	0	0	8,383	0.8%
4-inch	18,090	14,325	830	0	39,558	0	0	72,803	6.7%
6-inch	20,020	10,794	14,615	0	43,861	0	0	89,290	8.3%
8-inch	40,127	1,053	10,448	0	485,432	0	1,063	538,123	49.8%
10-inch	0	0	5,567	0	28,126	591	0	34,284	3.2%
12-inch	101	0	36,479	0	245,462	0	1,451	283,493	26.2%
14-inch	0	0	0	0	0	746	0	746	0.1%
16-inch	0	0	9,059	0	41,861	0	0	50,920	4.7%
20-inch	0	0	0	0	0	1,524	0	1,524	0.1%
42-inch	320	0	0	0	0	0	0	320	0.0%
48-inch	160	0	0	0	0	0	0	160	0.0%
Total	**79,618**	**26,172**	**76,998**	**7,583**	**884,300**	**2,861**	**2,514**	**1,080,046**	**100%**
Percent of System	7.4%	2.4%	7.1%	0.7%	81.9%	0.3%	0.2%	100%	205 miles

AC = asbesos cement
CI = Cast Iron
PVC = polyvinyl chloride
DI = ductile iron
HDPE = high density polyethylene
C-900 = high strength PVC pipe with gaskets appropriate for water main use

The distribution system in many residential areas consists predominately of 4-inch, 6-inch, and 8-inch diameter mains, with the smaller 2-inch and 4-inch diameter mains located primarily in older developments. Since 1995, the City has reduced the amount of 4-inch and 6-inch diameter mains in the system to approximately 15 percent.

Water mains of 4-inch and 6-inch diameter are common, and in some instances appropriate, for water systems if they are located on a dead end after the last fire hydrant. However, since smaller diameter mains are generally insufficient to provide adequate fire flow, the City will continue to upsize mains where appropriate. **Chapter 9 – *Water System Improvements*** presents distribution improvements to a number of these areas that would increase the fire flow capability and provide looped water mains.

Substandard Materials

Ductile iron (DI), high-density polyethylene (HDPE), and, in some cases, polyvinyl chloride (PVC), are considered the most acceptable types of material for water main construction. Other materials, such as asbestos cement (AC), steel (STL), and cast iron (CI), have been used throughout the years but are considered “substandard” due to relatively low strengths, brittleness, and hazardous material concerns. Health officials are concerned about the concentrations of asbestos in drinking water, and AC pipe is no longer allowed to be manufactured or installed. There is more concern, however, regarding the workmen who have to work with the pipe to make connections or repairs. The City has adopted procedures to protect its workmen who are exposed to this type of pipe. **Table 2-4 – *Distribution System Inventory*** shows that less than 3 percent of the City’s total system is constructed with AC pipe and that less than 8 percent of the system consists of cast iron pipe. Since 1995, the City has reduced the amount of steel pipe in the system to less than 8 percent of the system, as compared to 31 percent 20 years ago.

Isolation Valves

As of 2018, there are approximately 3,139 isolation valves in the City’s system, which is more than three times as many as there were 20 years ago.

Fire Hydrants

In 1995, there were approximately 800 hydrants in the water system. The number of hydrants has more than doubled since then, and it is now estimated that there are 1,754 fire hydrants in the system as of 2018.

Interties

Water system interties are physical connections between two adjacent water systems. Interties are normally separated by a closed isolation valve or control valve. Emergency supply interties provide water from one system to another during emergency situations only. An emergency situation may occur when a water system loses its main source of supply or a major transmission main and is unable to provide a sufficient quantity of water to its customers. Normal supply interties provide water from one system to another during non-emergency situations and are typically supplying water at all times.

The City currently has ten emergency interties and one wholesale intertie with adjacent water systems. The locations of the interties are shown on **Figure 2 – *Existing Water System***. Five interties are located at the south end of the system and connect the City's system with TPU's water system. These five interties are metered and located at Pipe Line Road, Rhode Lake Road, 112th Street East, Connells Prairie Road, and South Prairie Road East. Four of the interties are for emergency use. The Prairie Ridge Booster Pump Station located on Prairie Road East near Pipeline Road and 214th Avenue East, is a permanent wholesale intertie with a capacity of 4 MGD.

The other six interties are located on the north end of the system; four of which are with the City of Auburn near the Lakeland Hill South development. Only one of these interties is metered. The other interties include one with the Winchester Heights Water Company on Edwards Road, and another with the Tapps Island Water Company on 214th Avenue East. An intertie meter for the Tapps Island Water Company was installed in 2008.

The City also has an agreement with the City of Auburn, wherein the City agrees to sell water to Auburn to serve a maximum of two rural residential domestic service connections for lots that abut the Pierce County/King County line.

Pressure Zones

Currently, the City's system consists of three distinct pressure zones, two smaller boosted zones, and ten smaller reduced pressure areas. An existing system hydraulic profile is shown on **Figure 3 – *Existing Hydraulic Profile***. This figure shows the vertical relationship of the pressure zones and demonstrates how the water moves throughout the system. **Table 2-5 – *Water System Pressure Zones*** lists each zone as it is commonly named and its nominal hydraulic elevation. The nominal hydraulic elevation is the overflow elevation of the highest reservoir in the zone, or the overflow elevation that a reservoir would have if there was a reservoir in the zone.

Table 2-5
Water System Pressure Zones

Pressure Zone	Nominal Hydraulic Elevation (feet)	Type
Lakeridge	810	Closed
Ponderosa	800	Open
Pinnacle Estates	795	Closed
Summit	790	Closed
Bonney Lake	748	Open
Sky Island	660	Closed
166th Avenue East	630	Closed
47th Street East	625	Closed
Angeline Valley	620	Closed
Rhodes Lake	565	Closed
Forest Canyon 2	530	Closed
Panorama West 1	465	Closed
Panorama West 2	385	Closed
Panorama West 3	385	Closed
Panorama West 4	310	Closed

Bonney Lake 748 Zone (Open Zone)

The majority of the City's customers (64 percent) are located in the 748 Zone. All sources of supply pump directly to this zone, and three out of four reservoirs are contained in this zone. The performance of this zone is hampered by the fact that all three of the existing reservoirs have different overflow elevations. The Ponderosa 748 Reservoir has the highest overflow elevation, 748 feet above mean sea level, and controls the water system. Due to their lower overflow elevations, neither the Lakeridge Reservoir (overflow of 742 feet) nor the Tacoma Point Reservoir (overflow of 737 feet) experience significant water level fluctuations during normal demand conditions.

Ponderosa 800 Zone (Open Zone)

The Ponderosa 800 Zone is located in the southeast corner of the City's water system and currently serves the Wilderness Ridge, Ponderosa Estates, and Cedar View neighborhoods, as well as the eastern half of the commercial area located along State Route 410. This zone is served by four booster pumps, two fire pumps, and the Ponderosa 800 Reservoir, which are all located at the Ponderosa site. See **Figure 2 – *Existing Water System*** for the extents of the Ponderosa 800 Zone. This zone contains three pressure reducing stations: one is located on 104th Street East in the Spiraea Glen neighborhood; the second is located between the Kelley Glade and Cedar View neighborhoods; and the third is located behind Lowes. All of these valves reduce pressures to serve the adjacent 748 Zone.

Lakeridge 810 Zone (Closed Zone)

The Lakeridge 810 Zone runs along the western middle edge of the City's WSA (basically, north/south along Myers Road north of State Route 410 to just north of Sumner Tapps Highway East along Tapps Drive East). This zone is currently served by three booster pumps located at the Lakeridge site. A second booster pump station was constructed in 2016 and is located at 84th Street East and 184th Avenue East. See **Figure 2 – *Existing Water System*** for the extents of the Lakeridge 810 Zone. This zone contains two pressure reducing valve (PRV) stations to isolated, lower reduced pressure areas: 166th Avenue 625 Zone and 47th Street 625 Zone. Both of these PRVs reduce pressures to serve very small areas along the steep western slopes of the Bonney Lake Plateau. This zone also contains three pressure reducing stations that can provide flows back down to the Bonney Lake 748 Zone. These stations are located at: 1) Sumner Tapps Highway East and South Tapps Drive East; 2) Locust Avenue East and Bonney Lake Boulevard; and 3) South Tapps Drive East and 183rd Avenue East.

Summit 790 Zone (Closed Zone)

The Summit 790 Zone is located just north of the southwest corner of the WSA and serves a small neighborhood located in the Panorama Heights development through a single booster pump station. Water is recirculated as necessary back into the Bonney Lake 748 Zone to help maintain water quality and assist in pump operation during periods of low flow. The booster pump station is only sized for domestic demands, since fire flow demands in this area can be met by the lower Bonney Lake 748 Zone.

Pinnacle Estates 795 Zone (Closed Zone)

The Pinnacle Estates 795 Zone is located in the north end of the water system just east of the main core of the Lakeland Hills South area (City of Auburn). It serves a small neighborhood called Pinnacle Estates through a single booster pump station. Water is recirculated as necessary back into the Bonney Lake 748 Zone to help maintain water quality and assist in pump operation during periods of low flow. The booster pump station is sized for both domestic and fire suppression demands and is served from the main Bonney Lake 748 Pressure Zone.

Sky Island 660 Zone (Closed Zone)

The Sky Island 660 Zone is located on the western side of the Sky Island neighborhood. This zone is served via two pressure reducing stations off of the Bonney Lake 748 Zone.

Angeline Valley 620 Zone (Closed Zone)

The Angeline Valley 620 Zone straddles Angeline Road in the Fennel Creek valley south of State Route 410. This zone is served via three pressure reducing stations off of the Bonney Lake 748 Zone.

Forest Canyon 650 Zone (Closed Zone)

The Forest Canyon 650 Zone is located on the western slopes of the Bonney Lake Plateau along Forest Canyon Drive. This zone is served via a pressure reducing station off of the Bonney Lake 748 Zone.

There are several smaller zones that are located along the western slopes of the WSA that are supplied by higher zones via pressure reducing stations.

Rhodes 565 Zone (Closed Zone)

The Rhodes 565 Zone is located in the southwest corner of the WSA and served via two pressure reducing stations off of the Angeline Valley 620 Zone and a pressure reducing station off of the Sky Island 660 Zone.

Ponderosa Booster Pump Station

Panorama West Zones 1 through 4 (Closed Zones)

Four smaller pressure zones are located in the Panorama West neighborhood. Each zone is served by two pressure reducing stations from higher zones. The four zones have nominal hydraulic grades lines as follows: one at 465 feet, two at 385 feet, and one at 310 feet.

Reduced Pressure Areas (Closed Zones)

There are two localized areas west of the Lakeridge 810 Zone that require reduced pressures. One is located south of the 166th Avenue Court. East pressure reducing station and the other is located west of 166th Avenue East on 47th Street Court. Both of these zones are very small and served with water from the boosted Lakeridge 810 Zone.

Pump Station Facilities

The City currently operates and maintains seven pump stations. Five of these are traditional booster pump stations moving water between zones. One is located at the Ponderosa site and serves the Ponderosa 800 Zone. A second is located at the Lakeridge reservoir site and serves the Lakeridge 810 Zone. A third smaller one is located in the Lakeland Hills South area and serves the Pinnacle Estates 795 Zone. A fourth smaller one is located in the Panorama Heights development and serves the Summit 790 Zone. A fifth one was recently construction to serve the Lakeridge 810 Zone and is located on 84th Street East. Two additional pump stations are supply stations that provide either peaking supply water or wholesale water. The Peaking Storage Facility provides stored supply directly to the Bonney Lake 748 Zone. The Prairie Ridge Facility is the wholesale intertie with TPU and pumps water from Pipeline No. 1 directly to the Ponderosa 800 Zone.

Ponderosa Booster Pumps

Ponderosa Booster Pump Station

This station consists of four domestic demand pumps of 7.5 hp each, located in a concrete masonry unit (CMU) building. In addition, there are two fire flow demand pumps, 40 hp each, located in a separate CMU building with a dedicated emergency power generator. This station was constructed in 1990.

Lakeridge Booster Pumps

This station consists of three pumps, one 20 hp, one 60 hp, and one 150 , located in a CMU building. In addition, there is a dedicated emergency power generator. This station was constructed in 2000.


Lakeridge Booster Pumps


Lakeridge Booster Pump Station

Panorama Heights Booster Pumps

This station consists of a CMU building with four domestic demand pumps; two 0.75 hp pumps and two 5 hp pumps. In addition, there is a dedicated emergency power generator. This station was constructed in 2004.


Panorama Heights Booster Pumps


Panorama Heights Booster Pump Station

Pinnacle Estates Booster Pumps


Pinnacle Estates Booster Pump Station

This station consists of a CMU building with six pumps; two 30 hp, two 10 hp, one 1.5 hp pump, and one 1 hp pump. In addition, there is a dedicated emergency power generator. This station was constructed in 2006.

Peaking Storage Pumps

This station consists of three 100 hp pumps located in a CMU building. This facility has a chlorine disinfection system (on-site generation) to maintain chlorine residuals in the large Peaking Storage Reservoir. In addition, there is a dedicated emergency power generator. This station was constructed in 2008, and provides seasonal supply during peak periods in the summer.


Peaking Storage Booster Pumps


Peaking Storage Booster Pump Station

Prairie Ridge Intertie Pumps

This intertie consists of two 50 hp pumps located in a CMU building. The facility is equipped for the installation of two additional 50 hp pumps and motors in the summer of 2019. In addition, there is a dedicated emergency power generator. This station was constructed in 2012, and serves as the wholesale intertie from the TPU system.


Prairie Ridge Booster Pumps


Prairie Ridge Booster Pump Station

84th Street (Lakeridge 2) Booster Pumps

This station was installed to increase the reliability of the closed Lakeridge 810 Pressure Zone and improve hydraulic capacity in the south end of this pressure zone. This station consists of a CMU building with two pumps; one 25 hp and one 100 hp. This station was constructed in 2016.

84th Street Booster Pump Station

Pressure Reducing Stations

Pressure reducing stations are connections between adjacent pressure zones that allow water to flow from the higher pressure zone to the lower pressure zone by reducing the pressure of the water as it flows through the station, thereby maintaining a safe range of pressures in the lower zone. A pressure reducing station is essentially a below-grade vault (typically concrete) that normally contains two pressure reducing valves, sometimes a pressure relief valve, piping, and other appurtenances. The pressure reducing valve hydraulically varies the flow rate through the valve (up to the flow capacity of the valve) to maintain a constant pressure on the downstream side for water flowing into the lower pressure zone.

Pressure reducing stations can serve multiple purposes. They can function as an active supply facility by maintaining a continuous supply of water into a lower zone that has no other source of supply, such as a well or water reservoir. Pressure reducing stations can also function as standby supply facilities that are normally inactive (no water flowing through them). Standby stations typically trigger operation by a drop in water pressure near the downstream side of the station. A typical application of this function is a pressure reducing station that is only needed to supply additional water to a lower zone during a fire flow situation. The pressure setting of the control valve within the station allows it to remain closed during normal system operation and open only during high demand conditions, like fire flows, to provide the additional supply needed.

Pressure reducing stations are installed between pressure zones. The pressure reducing valves (PRVs) in the pressure reducing stations hydraulically vary the flow rates through the stations to maintain a constant and preset pressure in the downstream or lower level pressure zone. The effect of a PRV on the lower pressure zone is equal to that of a water reservoir with an overflow elevation the same as the pressure setting on the valve (hydraulic grade line). **Table 2-6 – *Pressure Reducing Stations*** summarizes the City's existing PRVs.

Table 2-6
Pressure Reducing Stations

No.	PRV Station	Address	Upper Zone	Lower Zone
1	47th Street East	4626 166th Avenue East	810	625
2	166th Avenue East	5009 166th Avenue East	810	630
3	Creekridge Glen	173rd Avenue Court East & Rhodes Lake Road East	565	465
4	Spiraea Glen	19600 104th Street East	800	748
5	Angeline North (Willow Brook)	107th Street East & Angeline Road East	748	620
6	Panorama Heights	181st Avenue Place East & Panorama Boulevard East	748	620
7	South Tapps Drive	183st Avenue East & South Tapps Drive East	810	748
8	Sumner Tapps	South Tapps Drive East & Sumner Tapps Highway	810	748
9	Cedarview	9117 207th Avenue East	800	748
10	Bonney Lake Boulevard (Locust)	Locust Avenue East & Bonney Lake Boulevard East	810	748
11	Rhodes Lake Road (Whitehorse)	Rhodes Lake Road East & Angeline Road East	620	465
12	Angeline South (Ashton Woods)	Angeline Road East & 113th Street East	748	620
13	Crystal Meadows	106th Street Court East & 165th Avenue East	640	Relief
14	Sky Island 1 (secondary)	98th Street East & Sky Island Drive East	748	660
15	Sky Island 2 (primary)	104th Street East & Sky Island Drive East	748	660
16	Sky Island 3	100th Street East & 176th Avenue East	660	465
17	Copperfield	102th Street East & Angeline Road East	748	620
18	Creekridge II	115th Street East & 171st Avenue East	565	465
19	Forest Canyon 2	166th Avenue East & Forest Canyon Road East	748	530
20	Panorama West 1	17302 111th Street East	565	465
21	Panorama West 2	10704 171st Street East	465	385
22	Panorama West 3	16700 Rhodes Lake Road East	465	385
23	Panorama West 4	17010 West Hill Drive East	385	310
24	Panorama West 5	16803 West Hill Drive East	385	310
25	Panorama Relief	16910 West Hill Drive East	310	Relief
26	Lowes Check Valve	19900 100th Street Court East	800	748
27	The Estates (at Forest Canyon)	16303 24th Street East	530	Relief
28	Angeline Road (not in service)	9815 Angeline Road East	748	620

Pressure Relief Valves

Pressure relief valves are installed to relieve inadvertent high pressures in a water system that may result if some components of the system fail. Such failures include pumps not shutting off when required, pressure reducing valves failing in the open position, and system valves being closed incorrectly. Pressure relief valves can either vent high pressure water to the atmosphere or can redirect water from a higher pressure zone into a lower

Cedar View Pressure Relief Station

pressure zone. The operation of this type of valve is typically triggered by an increase in water pressure past a predetermined setting. The City has pressure relief valves at each of its six pump stations.

Treatment Facilities

Currently, the City's drinking water supplies undergo three forms of water quality treatment: disinfection; pH adjustment; and filtration.

Disinfection

The City operates and maintains chlorination facilities at each of its sources of supply. The City maintains a minimum chlorine residual of 0.2 milligram per liter (mg/L) (or parts per million (ppm)) throughout the system. This is accomplished with a targeted dosing concentration range of between 0.5 mg/L and 0.7 mg/L. In the past, the City utilized gaseous chlorine as its primary method of disinfection. Starting in 2000, with the construction of the Tacoma Point treatment facility, the City began replacing its gas chlorinators with less hazardous methods of chlorination. When the Ball Park Treatment Facility and the Grainger Springs and Victor Falls treatment upgrade projects were completed in the spring of 2005, both the City's spring sources and the Ball Park Wells were converted to on-site hypochlorite generation systems. In addition, a CT of 6 is now maintained at both the Grainger Springs and Victor Falls sources. For approximately 16 years, the Tacoma Point Wells were disinfected via a liquid bleach (sodium hypochlorite – NaOCl) system. In 2013, this system was converted to an on-site generation facility system to match the rest of the City's facilities.

Grainger Springs On-site Chlorine Generator

Tacoma Point Caustic Soda Reservoir

pH Control

Corrosion control studies have indicated that the City's Tacoma Point Wells and Grainger Springs sources are both slightly corrosive. Therefore, the City currently operates and maintains a pH control facility (caustic soda – NaOH) at its Tacoma Point Wellfield. A second pH control facility was constructed at the Grainger Springs source and became operational in 2005.

Ball Park Pressure Tank

Filtration

Water from the Ball Park aquifer has levels of iron and manganese over the current secondary maximum contaminate level (SMCL). Due to the aesthetic problems of using this water on a regular basis, the City has typically run these wells for only a few days per year in the summer to meet peak water demands. However, increased summer demands due to customer growth has required the City to rely on the Ball Park aquifer more and more over the years. This resulted in more customer complaints about odor, taste, and staining. In 2005, the City constructed a pressure filtration facility to treat Ball Park water. This facility utilizes oxidation and filtration with chlorine and pyrolucite for the removal of the iron and manganese, and includes recycling of the backwash water to maximize the amount of water provided to the system.

Grainger Springs Treatment Facility

Telemetry and Control System

Successful operation of any municipal water system requires gathering and using accurate water system information. A telemetry and supervisory control system gathers information and can efficiently control a system by automatically optimizing facility operations. A telemetry and supervisory control system also provides instant alarm notification to operations personnel in the event of equipment failure, operational problem, flood, fire, or other emergency situations.

Successful operation of any municipal water system also requires a comprehensive operation and maintenance program that includes gathering and using accurate water system demand information. A telemetry and supervisory control system gathers information and efficiently controls a system by automatically optimizing facility operations and cataloging system demands. The City recently started updating its supervisory control and data acquisition (SCADA) system to replace the Master Telemetry Unit (MTU) and add dual monitors for the water and sewer systems. Upgrades to the water side of the City's SCADA system will be completed in 2019.

The existing controls for the water system consists of level-sensing devices that are connected directly to the motor starters at each well. Low levels in the Ponderosa 748 Reservoir start the source pumps supplying the water system.

Well Inventory

For historical and tracking purposes, **Table 2-7 – *Well Inventory*** tracks the location and numbering of the large diameter wells drilled by the City. Of the eight wells drilled, five have been put into production, and three are considered dry holes.

Table 2-7
Well Inventory

Location	City Well No.
Ball Park No. 1	1
Tacoma Point No. 2	2
Bachman (dry)	3
Tacoma Point No. 4	4
Safeway (dry)	5
Tacoma Point No. 6	6
Ponderosa (dry)	7
Ball Park No. 2	8

Summary

The City’s facilities are summarized in **Table 2-8 – *Facility Information***.

Table 2-8
Facility Information

Facility	Description	Size	Type	Flow Rate	Installed	Control
Victor Falls Springs						
	Pump 1	125 hp	Vertical Turbine with VFD	1,000 gpm	1983	Ponderosa 748 Reservoir level
	Pump 2	150 hp	Vertical Turbine with VFD	1,200 gpm	1983	Ponderosa 748 Reservoir level
Can run Pump 1 or Pump 2	EG Set	275 kW	Diesel	NA	2005	Power Failure
	Meter 1	8-inch	Water Specialties	gpm	NA	4-20 mA
	Meter 2	8-inch	Water Specialties	gpm	NA	4-20 mA
	Disinfection	12 ppd	On-site Generation	NA	2005	On/off with pumps (flow paced)
Grainger Springs						
	Pump 1	75 hp	Vertical Turbine	500 gpm	1972	Ponderosa 748 Reservoir level
	Pump 2	150 hp	Vertical Turbine with VFD	1,000 gpm	1972	Ponderosa 748 Reservoir level
Can run all pumps	EG Set 1	230 kW	Diesel	NA	2017	Power Failure
	Meter	12-inch	Water Specialties	gpm	NA	4-20 mA
Can run treatment facility	EG Set 2	35 kW	Diesel	NA	2005	Power Failure
	Disinfection	12 ppd	On-site Generation	NA	2005	On/off with pumps (flow paced)
	pH Control	300 gal	50% NaOH (dilute to 20%)	NA	2005	On/off with pumps (flow paced)
Ball Park Wells						
	Well 1	200 hp	Vertical Turbine with VFD	1,300 gpm	2005	Ponderosa 748 Reservoir level
Well 1 only	Meter 1	8-inch	Water Specialties	gpm	NA	4-20 mA and pulse
	Well 2	50 hp	Vertical Turbine	300 gpm	2005	Ponderosa 748 Reservoir level
Well 2 only	Meter 2	6-inch	Water Specialties	gpm	2005	4-20 mA and pulse
Well 1 and Well 2	Meter 3	12-inch	Water Specialties	gpm	2005	4-20 mA and pulse
Wells 1 & 2 and treatment	EG Set	350 kW	Diesel	NA	2005	Power Failure
	Disinfection	50 ppd	On-site Generation	NA	2005	On/off with pumps (flow paced)
	Filtration	26' L, 10' D	Pyrolucite Pressure Filter	1,600 gpm	2005	Packaged control system

Table 2-8
Facility Information (Continued)

Table Continued from Previous Page

Facility	Description	Size	Type	Flow Rate	Installed	Control
Tacoma Point Wells						
	Well 2	125 hp	Submersible	750 gpm	1991	Ponderosa 748 Reservoir level
	Well 4	150 hp	Vertical Turbine with VFD	1,200 gpm	1990	Ponderosa 748 Reservoir level
Wells 2, 4, & 6	Meter 1	12-inch	Water Specialties	gpm	NA	4-20 mA
Can run Well 2 or Well 4	EG Set 1	250 kW	Diesel	NA	2018	Power Failure
	Well 6	150 hp	Vertical Turbine with VFD	1,300 gpm	1999	Ponderosa 748 Reservoir level
Well 6	Meter 2	8-inch	Water Specialties	gpm	1999	4-20 mA
	Disinfection	300 gal	12.5% NaOCl	NA	1999	On/off with pumps (flow paced)
	pH Control	2,500 gal	25% NaOH	NA	1999	On/off with pumps (flow paced)
Can run treatment facility	EG Set 2	35 kW	Diesel	NA	1999	Power Failure
Ponderosa Booster Station						
Domestic	Pump 1	7.5 hp	Centrifugal	250 gpm	1989	Ponderosa 800 Reservoir level & low pressure
Domestic	Pump 2	7.5 hp	Centrifugal	250 gpm	1989	Ponderosa 800 Reservoir level & low pressure
Domestic	Pump 3	7.5 hp	Centrifugal	250 gpm	1989	Ponderosa 800 Reservoir level & low pressure
Domestic	Pump 4	7.5 hp	Centrifugal	250 gpm	1989	Ponderosa 800 Reservoir level & low pressure
	Meter 1	6-inch	Water Specialties	gpm	1989	4-20 mA
Fire Flow	Pump 1	40 hp	Centrifugal	1,250 gpm	1993	Ponderosa 800 Reservoir level & low pressure
Fire Flow	Pump 2	40 hp	Centrifugal	1,250 gpm	1993	Ponderosa 800 Reservoir level & low pressure
	Meter 2	12-inch	Water Specialties	gpm	1993	4-20 mA
Can run all pumps	EG Set	175 kW	Diesel	NA	2019	Power Failure
Lakeridge Booster Station						
	Pump 1	20 hp	Centrifugal with VFD	610 gpm	2000	Low Pressure
	Pump 2	60 hp	Centrifugal with VFD	1,250 gpm	2000	Low Pressure
	Pump 3	150 hp	Centrifugal	2,000 gpm	2000	Low Pressure
	Meter	8-inch	Badger	gpm	2000	4-20 mA
Can run all pumps	EG Set	250 kW	Diesel	NA	2000	Power Failure

Table 2-8
Facility Information (Continued)

Table Continued from Previous Page

Facility	Description	Size	Type	Flow Rate	Installed	Control
Pinnacle Estates Booster Station						
	Pump 1	30 hp	Centrifugal	1,500 gpm	2006	Low Pressure
	Pump 2	30 hp	Centrifugal	1,500 gpm	2006	Low Pressure
	Pump 3	10 hp	Centrifugal with VFD	125 gpm	2006	Low Pressure
	Pump 4	10 hp	Centrifugal with VFD	125 gpm	2006	Low Pressure
	Pump 5	1.5 hp	Centrifugal with VFD	42 gpm	2006	Low Pressure
	Pump 6	1 hp	Centrifugal with VFD	27 gpm	2006	Low Pressure
	Meter	2-inch	Magnetic	gpm	2006	4-20 mA
Can run all pumps	EG Set	80 kW	Diesel	NA	2006	Power Failure
Panorama Heights Booster Station						
Domestic	Pump 1	0.75 hp	Centrifugal with VFD	15 gpm	2004	Low Pressure
Domestic	Pump 2	5 hp	Centrifugal with VFD	60 gpm	2004	Low Pressure
Domestic	Pump 3	0.75 hp	Centrifugal with VFD	15 gpm	2004	Low Pressure
Domestic	Pump 4	5 hp	Centrifugal with VFD	60 gpm	2004	Low Pressure
	Meter	2-inch	Water Specialties	gpm	2004	4-20 mA
Can run all pumps	EG Set	16 kW	Diesel	NA	2004	Power Failure
84th Street Booster Station						
Domestic	Pump 1	25	Centrifugal with VFD	400 gpm	2016	Low Pressure
Domestic	Pump 2	100	Centrifugal with VFD	1,500 gpm	2016	Low Pressure
	Meter	8-inch	Siemens Danfoss Magnetic	gpm	2016	4-20 mA
Peaking Storage Facility						
	Pump 1	100 hp	Vertical Turbine	1,350 gpm	2008	Ponderosa 748 Reservoir level
	Pump 2	100 hp	Vertical Turbine	1,350 gpm	2008	Ponderosa 748 Reservoir level
	Pump 3	100 hp	Vertical Turbine	1,350 gpm	2008	Ponderosa 748 Reservoir level
	Meter	12-inch	Siemens Danfoss Magnetic	gpm	2008	4-20 mA
Can run all pumps	EG Set	250 kW	Diesel	NA	2008	Power Failure

Table 2-8
Facility Information (Continued)

Table Continued from Previous Page

Facility	Description	Size	Type	Flow Rate	Installed	Control
Prairie Ridge Intertie						
	Pump 1	50 hp	Vertical Turbine with VFD	700 gpm	2012	Ponderosa 800 Reservoir level
	Pump 2	50 hp	Vertical Turbine with VFD	700 gpm	2012	Ponderosa 800 Reservoir level
	Meter	12-inch	Siemens Danfoss Magnetic	gpm	2012	4-20 mA
Can run all pumps	EG Set	275 kW	Diesel	NA	2012	Power Failure
Interties						
Tacoma (Prairie Ridge)	Meter	NA	NA	ccf	2012	Wholesale
Tacoma (112th)	Meter	6-inch	Neptune	ccf	1988	Manual
Tacoma (198th)	Meter	6-inch	Rockwell	ccf	1985	Manual
Tacoma (Rhodes)	Meter	4-inch	Water Specialties	ccf	2005	Manual
Tacoma (Connells)	Meter	8-inch	Water Specialties	ccf	2005	Manual
Auburn (Lakeland Hills Way)	No Meter	NA	NA	NA	NA	Manual
Auburn (Evergreen Way)	Meter	8-inch	Neptune	ccf	2003	Manual
Auburn (Evergreen Loop)	No Meter	NA	NA	NA	NA	Manual
Auburn (Olive Avenue)	No Meter	NA	NA	NA	NA	Manual
Winchester Heights	Meter	1.5-inch	Sensus	ccf	NA	Manual
Tapps Island Water	Meter	1.5-inch	Neptune	ccf	NA	Manual
Tanks						
Ponderosa 800	800 overflow	2.8 MG	Steel - 68' diam x 104' ht	NA	1998	Overflow, Ponderosa BPS
Ponderosa 748	748 overflow	1.0 MG	Steel - 63' diam x 43' ht	NA	1972	Overflow, 748 Zone
Lakeridge 748	742 overflow	0.8 MG	Steel - 63' diam x 33' ht	NA	1963	Altitude valve, 748 Zone
Tacoma Point 748	738 overflow	1.1 MG	Steel - 44' diam x 100' ht	NA	1972	Altitude valve, 748 Zone
Peaking Storage Facility	652 overflow	15 MG	Concrete - 275' diam x 33' ht	NA	2007	Overflow, Peaking BPS

ADJACENT WATER SYSTEMS

The City's existing WSA is bordered by the City of Auburn and the Pierce County/King County line on the north. The Muckleshoot Indian Reservation and Valley Water Company's View Royal System border the WSA to the east. TPU's water system borders the WSA to the south and east, and the City of Sumner is located to the west.

Several small water companies are located within the City's adopted WSA. These systems each have their own individual water service areas. They include the Lake Tapps Water Company, Winchester Heights Water Company, Beau View Water Company, Lake Tapps North Park Water, and the East End Lake Tapps Rod and Gun Club. The adjacent systems are shown on **Figure 1 -** ***Water Service Area and Adjacent Systems***.