City of Bonney Lake Comprehensive Water System Plan

DOH Approved February 2009

City Adopted December 2009

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City of Bonney Lake Comprehensive Water System Plan

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City of Bonney Lake

Comprehensive Water System Plan 2008

Approved and Adopted 2009

This plan was prepared under the direction of the following registered professional engineers.

This plan was approved by the Bonney Lake City Council on May 13, 2008, approved by the Department of Health on February 23, 2009. This plan was adopted by the Bonney Lake City Council on December 22, 2009 via Ordinance 1341.

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City of Bonney Lake
Comprehensive Water System Plan
Table of Contents

EXECUTIVE SUMMARY

CHAPTER 1 – INTRODUCTION

CHAPTER 2 - WATER SYSTEM DESCRIPTION

City of Bonney Lake
Comprehensive Water System Plan
Table of Contents

CHAPTER 3 – LAND USE AND POPULATION

CHAPTER 4 - WATER DEMANDS

CHAPTER 5 - POLICIES AND DESIGN CRITERIA

City of Bonney Lake
Comprehensive Water System Plan
Table of Contents

CHARTS

FIGURES

City of Bonney Lake
Comprehensive Water System Plan
Table of Contents

APPENDICES

EXECUTIVE SUMMARY

PURPOSE OF THE PLAN

Ascent Gateway – State Route 410

The City of Bonney Lake's (City) water system is a major infrastructure, much of which is invisible to the people that receive water from it. The water system requires qualified staff to operate and maintain it, and an ongoing capital improvement program to replace old components to meet the requirements mandated by federal and state laws. The primary purpose of the City of Bonney Lake *Comprehensive Water System Plan* is to identify and schedule water system improvements that correct existing system deficiencies and ensure a safe and reliable supply of water to current and future customers. This Plan complies with Washington State Department of Health (DOH) regulations under WAC 246-290-100, which requires water purveyors to update their water system plans every six years.

CHANGES SINCE THE LAST COMPREHENSIVE WATER SYSTEM PLAN

The City's last *Comprehensive Water System Plan* was completed in 1996. Many changes have occurred since the last update that affect water system planning for Bonney Lake.

- DOH published updated drinking water regulations in April 1999. The revisions primarily address lead and copper monitoring, chemical monitoring, wellhead protection and cross-connection control, all of which affect the City of Bonney Lake.
- DOH published the *Water System Planning Handbook* in April of 1997, which included an extensive list of requirements for water system plans.
- The 1999 listing of Puget Sound's wild Chinook salmon under the Endangered Species Act (ESA).
- The requirement to conduct a vulnerability assessment was established when the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (US H.R.3448) was passed.
- The 2003 Municipal Water Law (2E2SHB 1338) extended water system planning guidelines related to water rights, service area consistency and conservation.

SUMMARY OF KEY ELEMENTS

The *Comprehensive Water System Plan* presents a description of the existing water system and service area, a forecast of future water demands, policies and design criteria for water system operation and improvements, the operations and maintenance program, staffing requirements, a schedule of improvements, and a financial plan to accomplish the improvements. The Plan also includes several ancillary elements, which include a water conservation plan, a water quality monitoring plan, a wellhead protection plan, and an emergency response plan. A summary of the key issues related to these elements is provided in the following sections.

Water Service Area

By the end of 2006, the City provided water service to approximately 11,373 customer accounts, or an estimated population of 32,637 people. The City's water service area (WSA) extends well beyond the City's corporate limits, encompassing approximately 21 square miles (not including water bodies) or most of the Lake Tapps Plateau. The City of Bonney Lake is responsible for providing public water service, utility management and system development within its water service area. The water service area is clearly defined by means of an interlocal agreement between the City and Pierce County as part of the State mandated coordinated water system process. The City needs to be prepared to service all of its customers within its service area and should require a no protest agreement for annexation as a condition of service for all potential customers, regardless if whether or not they are within the City's Urban Growth Area (UGA).

Historic Water Usage and Conservation

The City has experienced a trend of decreasing water demands per equivalent residential unit (ERU) since 1994. This is most likely the result of water conservation practices, including conservation awareness, new buildings and homes with more efficient plumbing and the replacement of old leaky water mains. The City's per capita demand and unaccounted-for water levels are fairly standard for the Puget Sound Area. The City's per capita demand in 2006 was approximately 95 gallons per capita per day. This equates to approximately 278 gallons of water per day per household as averaged over one year. The average amount of unaccounted-for water in the Bonney Lake system was 15 percent from 1994 through 2006. The average for the last ten years is 13 percent with a noticeable drop to 6 percent in 2006. This is assumed to be a result of the City's on-going Leaky Main Replacement Project. The three-year average for the three years (2004-2006) is also 13 percent. The City should continue to pursue its leak detection and leaky water main replacement program and should also continue to pursue the accurate tracking of water used in activities such as water main construction and maintenance.

Future Water Demands and Water Supply

Overall water demand within the City's system is expected to increase approximately 15 to 20 percent within the next 6 years and 45 to 60 percent within the next 20 years, based on growth and depending on the amount of future water use reductions from the City's conservation program.

In the beginning of 2005, Bonney Lake entered into a wholesale water agreement to purchase up to 2 MGD of peak day water from Tacoma Public Utilities (TPU). This water will be used to augment both annual and peak water capacity. It is now estimated that the City has sufficient water supply from its groundwater wells, springs and this wholesale water supply to meet the demand requirements of the system through approximately 2010, as shown in **Chart ES-1** on the following page.

This capacity can be extended even further with the use of the 15-million-gallon peaking storage tank. More effectively utilizing peaking storage can extend the system's capacity to serve through approximately 2017. The City should plan to obtain additional water rights and/or wholesale water supply to meet the projected long-term demands, improve reliability and redundancy within the system, and have adequate water supply during hot, dry summers or if the sources of supply experience a decline in capacity.

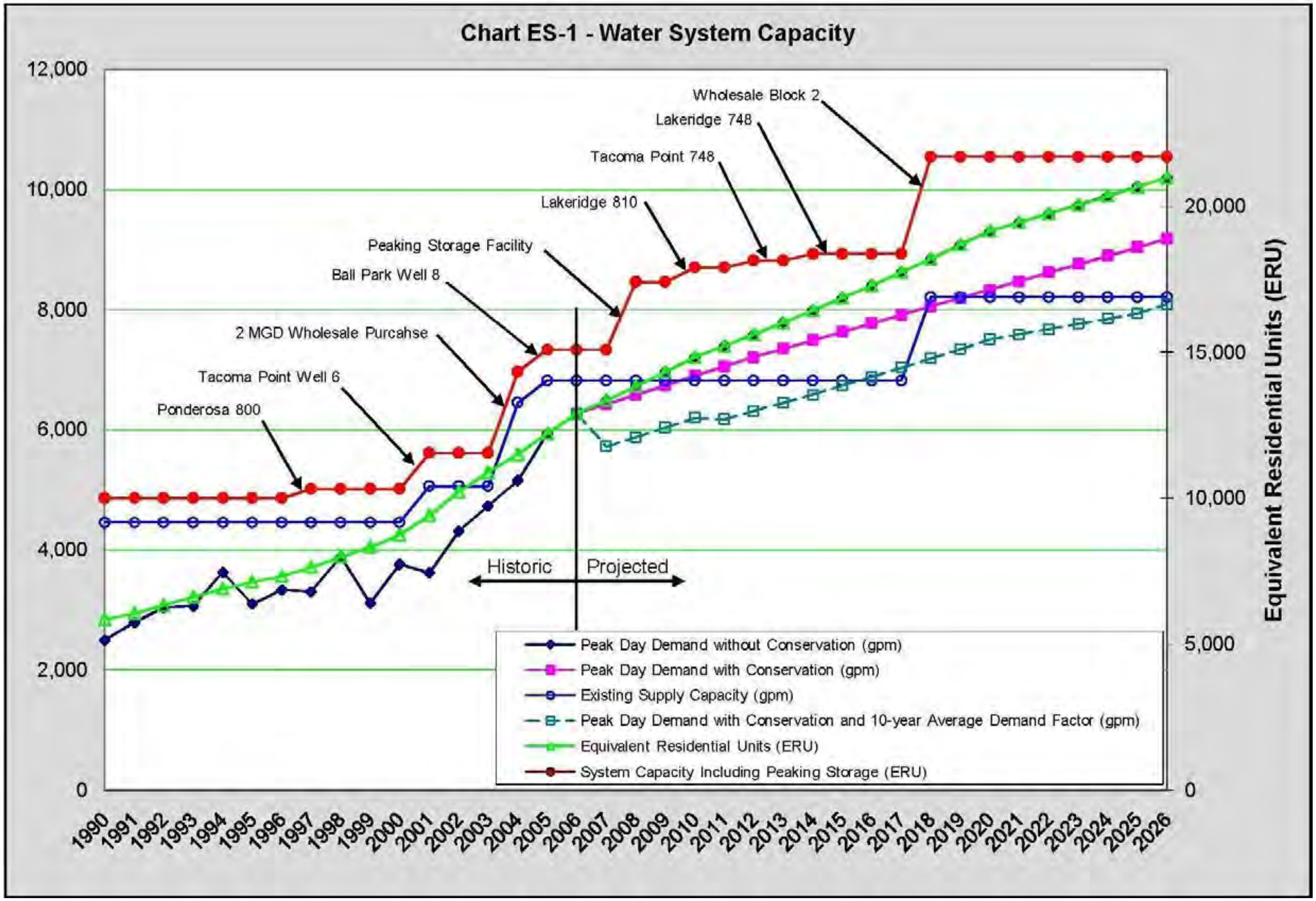


Chart ES-1 - Water System Capacity
Wholesale Block 2
Lakeridge 748
Tacoma Point 748
Lakeridge 810
Peaking Storage Facility
Ball Park Well 8
2 MGD Wholesale Purcahse
Tacoma Point Well 6
Ponderosa 800
Historic
Projected
Peak Day Demand without Conservation (gpm)
Peak Day Demand with Conservation (gpm)
Existing Supply Capacity (gpm)
Peak Day Demand with Conservation and 10-year Average Demand Factor (gpm)
Equivalent Residential Units (ERU)
System Capacity Including Peaking Storage (ERU)
Equivalent Residential Units (ERU)
12,000
10,000
8,000
6,000
4,000
2,000
0
20,000
15,000
10,000
5,000
0
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026

WATER SYSTEM EVALUATION

Distribution System

The water system has been growing steadily since it was formed in 1949. The distribution system is comprised of over 190 miles of water main ranging in size from 2-inch to 16-inch diameter pipe, however, most of the system consists of 8-inch diameter and smaller pipe. Currently, the Bonney Lake water service area is divided into 15 pressure zones, but developments along the western slopes of the Lake Tapps Plateau will require that at least six more pressure zones be established.

While the water distribution system is adequate to provide domestic supply, the hydraulic computer model indicates that there are several areas within the system that can not provide adequate fire flows. These deficiencies are due mainly to inadequate transmission capacity and long dead-end lines. A combination of replacing undersized water mains with larger diameter mains and increasing looping will provide the best approach to correcting system deficiencies.

Storage

Storage is provided by four steel water tanks with a total storage capacity of approximately 5.7 million gallons (MG). Based on current pressure zone configurations these tanks provide approximately 3.5 MG of effective or usable storage to the system. The efficient operation of the storage facilities is adversely impacted by the fact that three of the storage facilities are in the same pressure zone (748 Zone) but have slightly different overflow elevations. It is recommended that the City build additional storage in its higher Lakeridge pressure zones (810 Zone) to improve system efficiency and reliability and correct the overflow elevation discrepancies. In addition, the City will need to provide additional storage facilities as the system continues to expand.

Supply

The system is supplied by five municipal groundwater wells and two spring sources. The City's potable water supply comes from several underground aquifers which are replenished from rainwater that falls on the plateau and from Lake Tapps. The optimal production capacity of the City-owned sources of supply is approximately 6,170 gallons per minute (gpm) which corresponds closely to the City's total instantaneous withdrawal water right of 6,338 gpm. Including the wholesale intertie with the Tacoma Public Utilities, the City's total production capacity is 7,560 gpm and their total water rights are 7,728 gpm. However, the City's spring sources experience seasonal fluctuations which are a limiting factor in the system's ability to accommodate additional customers. For purposes of this Plan and for general planning purposes the 2006 reliable peak season supply capacity is calculated at 6,820 gpm. This is increased to 7,980 gpm once the peaking storage tank is completed. The City should evaluate and develop additional supply alternatives and aggressively pursue programs that protect its aquifers and ensure that all of it sources are able to produce an optimum capacity of consistently high quality water.

The quality of the City's raw water supply has been good and has met or exceeded all drinking water standards, except for slightly higher than allowable levels of manganese at the Ball Park Well. The drinking water regulations are constantly changing and will require additional monitoring and reporting in the future in an effort to ensure safe drinking water for the public. Therefore, it is imperative that the City stays abreast of the regulations to maintain compliance.

The City will need to develop both additional sources of supply and storage capacity in order to meet State requirements and accommodate new customers. Existing sources need to be more effectively protected from contamination and from decreases in capacity due to loss of natural recharge areas.

Operations and Maintenance

The City's operations and maintenance organization is staffed by well-qualified, technically trained personnel. City staff regularly participates in safety and training programs to keep abreast of the latest changes in the water industry and to ensure a smooth and safe operation of the water system. The current staff of supervisory personnel and field crew, in many of which are responsible for the water system and other utilities, have effectively operated the water system in the past. However, in times of rapid growth, general maintenance of the water system has not been kept up with to the level desired. In order to properly maintain the system and handle water system expansion in the future, additional staff will be required. The City plans to add staff to meet the increased requirements from system expansion, as the budget allows.

The City has taken several steps to prepare for emergency situations. An Emergency Response Plan and Vulnerability Assessment were recently developed. The City is assessing the vulnerability of the major water system facilities for a number of emergency events and identifying follow-up procedures to be carried out.

Proposed Water System Improvements and Financing Plan

Improvements to the water system are necessary to resolve existing system deficiencies and to accommodate the increase in water demands from future growth. Improvements identified for the first six years of the capital improvement program (2007 - 2012) are estimated to cost approximately $37,221,700, which results in an average expenditure of approximately $6,200,000 per year. Improvements in the following 14 years (2013 – 2026) are estimated to cost approximately $43,000,000, which results in an average expenditure of approximately $3,000,000 per year.

The financial analysis is intended to illustrate the feasibility of funding the operation and maintenance and capital improvements recommended for the water system for the next six years. The first six years of capital improvements can be funded from a combination of sources that include low interest Public Works Trust Fund (PWTF) loans, connection charges, rates and reserves. The recent rate study indicated that the cost of operating and maintaining the water system and funding the capital improvements over the upcoming six years will require an increase in rates and connection charges.

SUMMARY OF MAJOR RECOMMENDATIONS

The existing water system was evaluated to determine its ability to meet the policies and design criteria of the City and those mandated by the Department of Health. The results of the evaluation are summarized below.

- The City has sufficient water supply to meet the demands of existing water customers.
- Completion of the peaking storage facility will extend the City's summer supply capacity without obtaining additional sources of supply and will extend system capacity to serve through 2017.
- Additional water supply may be needed after 2017 to meet the projected demands of the system based on the forecasted population growth and to improve system reliability during dry hot summers. This is based on demand factors without adjustments for proposed water conservation measures. Proposed conservation could extend system capacity to 2025.
- Additional storage is also needed for system redundancy and for future storage requirements related to growth.
- The City should continue its effort to identify and replace leaking water mains in an effort to increase supply capacity and reduce its unaccounted-for water component.
- Several areas of the system require replacement of existing water main to resolve deficiencies related to low fire flows, aging water main, and undesirable materials.
- Additional pressure zones, pressure reducing stations, and pressure relief valves are needed to accommodate growth along the west side of the Lake Tapps Plateau.
- The existing remote telemetry units are linked to the master telemetry unit with leased telephone lines and should be upgraded to a radio-based or fiber-optic based telemetry system.

CHAPTER 1

INTRODUCTION

Ponderosa 800 Tank Foundation Pour

WATER SYSTEM OWNERSHIP AND MANAGEMENT

The City of Bonney Lake (City) is a municipal corporation that owns and operates a public water system within its corporate boundaries, within portions of unincorporated Pierce County, and within portions of the corporate boundaries of the City of Auburn. Bonney Lake's water service area also serves parts of the City of Auburn's and the City of Sumner's Urban Growth Areas, as well, as parts of Pierce County's Urban Growth Area. Water system data on file at the Department of Health (DOH) for the Bonney Lake system is shown below in **Table 1-1 – *Water System Ownership Information***.

Table 1-1
Water System Ownership Information

Information Type	Description
System Type	Group A - Community - Public Water System
System Names	Bonney Lake Water Department, City
County	Pierce
DOH System ID Numbers	07650H
Owner Number	575
Address	P.O. Box 7380, Bonney Lake, WA 98391
Contact	Mr. Rick Shannon, Assistant Public Works Director
Contact Phone Number	(253) 862-8602

OVERVIEW OF EXISTING SYSTEM

At the end of 2006, the City provided service to approximately 11,373 customer connections, or 13,199 equivalent residential units (ERU), within the City's water service area (WSA), which extends beyond the city limits. The city limits comprise an area of approximately 7.3 square miles and the water service area is approximately 26 square miles (including water bodies). It is estimated that at the end of 2006 the City served a population of 16,090 within the city limits and a population of 32,637 system-wide.

Water supply to the City is provided by two well fields and two spring sources. Both springs are classified as not under the influence of surface water; however, they were found to be in direct hydraulic continuity with surface waters. System storage capacity is provided by four water tanks that have a total capacity of 5.7 million gallons (MG). In addition, the Bonney Lake water system has 15 pressure zones with 21 pressure reducing stations, 4 booster pump stations, and approximately 190 miles of water main. A summary of 2006 water system data for the City's system is shown below in **Table 1-2 – *2006 Water System Data***.

Table 1-2
2006 Water System Data

Description	1996	2006
Population	19,003	32,637
Water Service Area	28 square miles	26 square miles
Total Connections	6,673	11,373
Total Customers (ERU at year-end)	7,743	13,199
Total Customers (ERU at mid-end)	7,322	12,895
Demand per ERU	328 gallons per day	278 gallons per day
Annual Supply	785,600,000 gallons	1,309,915,000 gallons
Average Day Demand	1,495 gpm	2,485 gpm
Unaccounted-for Water	14%	6%
Peak Day/Average Day Demand Factor	2.31	2.23
Peak Hour/Peak Day Demand Factor	1.38	1.99
Number of Pressure Zones	5	15
Number of Wells (Production Capacity)	3 (2,600 gpm)	5 (3,570 gpm)
Number of Springs (Production Capacity)	2 (2,600 gpm)	2 (2,600 gpm)
Number of Wholesale Interties (Production Capacity)	0	1 (1,390 gpm)
Total Water Rights (Qi)	7,704 gpm	7,704 gpm
Total Water Rights (Qa)	6,374 acre*ft	6,374 acre*ft
Number of Pump Stations (Total Capacity)	2 (4,500 gpm)	4 (9,160 gpm)
Number of Reservoirs (Total Capacity)	3 (2.93 MG)	4 (5.7 MG)
Number of Pressure Reducing Stations	3	21
Total Length of Water Main	122 miles	190 miles

AUTHORIZATION AND PURPOSE

In March 2007, the City authorized RH2 Engineering (RH2) to update the *Comprehensive Water System Plan* to include the most recent date available and as required by state law under WAC 246-290-100. In accordance with WAC 246-290-100, the plan shall be updated and submitted to the DOH every six years. The previous *Comprehensive Water System Plan* was prepared for the City in 1996 and approved and adopted in 1997. Another update was prepared in 2004 but was not approved or adopted. The purpose of this updated *Comprehensive Water System Plan* is as follows.

- To evaluate existing water demand data and project future water demands using the most current information available.
- To analyze the existing water system to determine if it meets minimum requirements mandated by DOH and the City's own policies and design criteria.

- To identify water system improvements that resolves existing system deficiencies and accommodates future needs of the system for at least 20 years into the future.
- To prepare a schedule of improvements that meets the goals of the City's financial program.
- To evaluate past water quality and identify water quality improvements, as necessary.
- To document the City's operations and maintenance program.
- To prepare conservation, emergency response, cross connection control, wellhead and watershed protection, and water quality monitoring plans.
- To comply with all other water system plan requirements of DOH.
- Produce a detailed analysis for costs and methods used to develop the allowable system development charge (SDC) amount.

SUMMARY OF PLAN CONTENTS

A brief summary of the content of the chapters in the plan is as follows.

- The **Executive Summary** provides a brief summary of the key elements of this plan.
- **Chapter 1** introduces the reader to the City's water system, the objectives of the plan, and the plan organization.
- **Chapter 2** presents the water service area, describes the existing water system, and identifies the adjacent water purveyors.
- **Chapter 3** presents related plans, land use, and population characteristics.
- **Chapter 4** identifies existing water demands and projected future demands.
- **Chapter 5** presents the City's operational policies and design criteria.
- **Chapter 6** discusses the City's water source and water quality monitoring program.
- **Chapter 7** discusses the water system analyses and existing system deficiencies.
- **Chapter 8** discusses the City's operations and maintenance program.
- **Chapter 9** presents the proposed water system improvements, their estimated costs, and implementation schedule.
- **Chapter 10** summarizes the financial status of the water utility and presents a plan for funding the water system improvements.
- The **Appendices** contain additional information and plans that supplement the main chapters of the plan.

DEFINITION OF TERMS

The following terms are used throughout this plan.

Consumption: The true volume of water used by the water system's customers. The volume is measured at each customer's connection to the distribution system.
Connection Charge: A fee paid by a property owner when connecting to the City's system and is made up of both the Capital Facilities Charge and Meter Service Connection Charge.

Cross-Connection: Any physical connection, actual or potential, between a water system and any source of non-potable substance which, therefore, presents the potential for contaminating the public water system.

Demand: The quantity of water required from a water supply source over a period of time necessary to meet the needs of domestic, commercial, industrial, and public uses and to provide enough water to supply fire fighting, system losses, and miscellaneous water uses. Demands are normally discussed in terms of flow rate, such as million gallons per day (mgd) or gallons per minute (gpm), and are described in terms of a volume of water delivered during a certain time period. Flow rates pertinent to the analysis and design of water systems are:

- **Average Day Demand (ADD)**: The total amount of water delivered to the system in a year divided by the number of days in the year;
- **Peak Day Demand (PDD)**: The maximum amount of water delivered to the system during a 24-hour time period of a given year;
- **Peak Hour Demand (PHD)**: The maximum amount of water delivered to the system, excluding fire flow, during a one hour time period of a given year. A system's peak hour demand usually occurs during the same day as the peak day demand.

Equivalent Residential Units (ERUs): One ERU represents the amount of water used by one single-family residence for a specific water system. The demand of other customer classes can be expressed in terms of ERUs by dividing the demand of each of the other customer classes by the demand represented by one ERU.

Fire Flow: The rate of flow of water required during fire fighting, which is usually expressed in terms of gallons per minute (gpm).

Head: A measure of pressure or force exerted by water. Head is measured in feet and can be converted to pounds per square inch (psi) by dividing feet by 2.31.

Head Loss: Pressure reduction resulting from pipeline wall friction, bends, physical restrictions, or obstructions.

Hydraulic Elevation: The height of a free water surface above a defined datum; the height above the ground to which water in a pressure pipeline would rise in a vertical open-end pipe.

Maximum Contaminant Level (MCL): The maximum permissible level of contaminant in the water that the purveyor delivers to any public water system user, measured at the locations identified under WAC 246-290-300, Table 3.

Meter Service Connection Charge: The installation charge or hook-up fee is a fee paid by a property owner to reimburse the City for the cost incurred to make the physical connection to the water system. This cost includes both direct and indirect cost for installing the service line off of the system's water main to the customer's water meter. The charge also includes the cost of the water meter and meter box.

Potable: Water suitable for human consumption.

Pressure Zone: A portion of the water system that operates from sources at a common hydraulic elevation. For example, 748 Zone refers to the City's pressure zone that has water tanks with an overflow elevation of 748 feet.

Purveyor: An agency, subdivision of the State, municipal corporation, firm, company, mutual or cooperative association, institution, partnership, or persons or other entity owning or operating a public water system. Purveyor also means the authorized agents of such entities.

Supply: Water that is delivered to a water system by one or more supply facilities which may consist of supply stations, booster pump stations, springs, and wells.

Storage: Water that is "stored" in a reservoir to supplement the supply facilities of a system and provide water supply for emergency conditions. Storage is broken down into the following five components which are defined and discussed in more detail in Chapter 7: operational storage, equalizing storage, standby storage, fire flow storage, and dead storage.

System Development Charge (SDC) or Equitable Share of System: A fee paid by a property owner when connecting to the City's water system. This fee pays for the new customer's equitable share of the cost of the existing system. This fee offsets the costs of providing water to new customers and recognizes that the existing water system was largely built and paid for by the existing customers.

Unaccounted-for Water: Water that is measured as going into the distribution system but not metered as going out of the system.

LIST OF ABBREVIATIONS

The abbreviations listed on the following pages in **Table 1-3 –** ***Abbreviations*** are used throughout this plan.

Table 1-3
Abbreviations

Abbreviation	Description
AC	Asbestos Cement
ADD	Average Day Demand
AWWA	American Water Works Association
BLMC	Bonney Lake Municipal Code
BGS	Below Ground Surface
CDBG	Community Development Block Grant
CCTF	Corrosion Control Treatment Facility
CCR	Consumer Confidence Report
CI	Cast Iron
CIP	Capital Improvement Program
City	City of Bonney Lake
CMU	Concrete Masonry Unit
County	Pierce County
CT	Contact Time
CWA	Certificate of Water Availability
CWSSA	Critical Water Supply Service Area
DBP	Disinfection By-Product
D/DBPR	Disinfectants/Disinfection By-Product Rule
DI	Ductile Iron
DOE	Department of Ecology
DOH	Department of Health
DWSRF	Drinking Water State Revolving Fund
EPA	Environmental Protection Agency
ERU	Equivalent Residential Unit
ESA	Endangered Species Act
FAZ	Forecast Analysis Zone
fps	feet per second
GDR	Groundwater Disinfection Rule
GMA	Growth Management Act
gpcd	Gallons per Capita per Day
gpm	gallons per minute
GUI	Groundwater Under Influence

Continued on Next Page

Table 1-3
Abbreviations (Continued)

Continued from Previous Page

GWI	Groundwater under the direct Influence of surface water
GWR	Groundwater Rule
HDPE	High Density Polyethylene
HP	Horsepower
IDSE	Initial Distribution System Evaluation
IESWTR	Interim Enhanced Surface Water Treatment Rule
IOC	Inorganic Chemicals
ISO	Insurance Services Office
LID	Local Improvement District
LT2ESWTR	Long Term 2 Enhanced Surface Water Treatment Rule
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MF	Multi-Family
MG	Million Gallons
mg/l	milligrams per liter
MGD	Microscopic Particulate Analyses
MPA	Million Gallons per Day
MRDL	Material Safety Data Sheets
MSDS	Maximum Residual Disinfectant Levels
MUTCD	Manual of Uniform Traffic Control Devices
NFPA	National Fire Protection Agency
NTU	Nephelometric Turbidity Units
OFM	Office of Financial Management
OSHA	Occupational Safety & Health Administration
O&M	Operations and Maintenance
PCB	Polychlorinated Biphenyls
pCi/l	Picocuries per Liter
PDD	Peak Day Demand
pH	Potential of Hydrogen (measure of acidity)
PHD	Peak Hour Demand
psi	pounds per square inch
PSRC	Puget Sound Regional Council

Continued on Next Page

Table 1-3
Abbreviations (Continued)

Continued from Previous Page

PVC	Polyvinyl Chloride
PWTF	Public Works Trust Fund
RCW	Revised Code of Washington
SCADA	Supervisory Control And Data Acquisition
SDC	System Development Charge
SDWA	Safe Drinking Water Act
SEPA	State Environmental Policy Act
SF	Single-Family
SMCL	Secondary Maximum Contaminate Level
SOC	Synthetic Organic Chemical
SRF	State Revolving Fund
SSMA	Satellite System Management Agency
STL	Steel
SWTR	Surface Water Treatment Rule
TDH	Total Dynamic Head
THM	Trihalomethane
TPU	Tacoma Public Utilities
UGA	Urban Growth Area
USGS	United States Geological Survey
VOC	Volatile Organic Chemical
WAC	Washington Administrative Code
WFI	Water Facilities Inventory
WHPA	Wellhead Protection Area
WISHA	Washington Industrial Safety & Health Act
WSA	Water Service Area

CHAPTER 2

WATER SYSTEM DESCRIPTION

INTRODUCTION

15-Million Gallon Peaking Storage Tank Ribbon Cutting

This chapter presents characteristics of the City of Bonney Lake's (City) existing water system and water service area (WSA) which are important to the planning process. The term "water service area" used in this Plan is defined as the area that is serviced by, or will be serviced by, the City's existing water distribution system, as adopted by both the Bonney Lake Council and Pierce County through the coordinated water system planning process. The results of the evaluation and analyses of the existing water system are presented later in **Chapter 7**.

WATER SERVICE AREA

Ownership

The Bonney Lake water system (wells, springs, storage, water mains, etc.) is operated and maintained by the City of Bonney Lake, a municipal corporation. The City is run under the leadership of a seven member council and the water system is operated and maintained by the City's Public Works Department. The Water Facilities Inventory (WFI) report is included in the appendices and the system identification number is 07650H.

History

During the early 1900s, only a few farm homesteads existed within the present water service area. 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 was formed by the construction of several dikes which 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. The 2006 population within the city limits was approximately 16,090, and the water system served a population of approximately 32,637 residents.

Geology

The geology of the service area 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 which 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 the Water Resources chapter.

Topography

Elevations within the service area range from approximately 100 feet to 710 feet above sea level. However, most of the service area is located on top of the Lake Tapps 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 the Lake Tapps reservoir with a normal high water level of 543 feet above sea level. Several other small lakes are located throughout the service area, including Bonney Lake; Debra Jane Lake; Hidden Lake; Bowman Lake; Hille Lake; Kirtley Lake; Crawford Lake; Prinz Basin; 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 which 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 service area is typical Puget Sound area weather. Rainfall within the City's WSA is monitored on a monthly basis at two locations: Victor Falls Springs and Grainger Springs. Average annual rainfall at these stations from 1997 through 2003 was 42.83 inches and 47.06 inches, respectively. Historically, the period July through September is the driest. For the years 1998 through 2002, average rainfall at these two stations during the summer months of July, August, and September was 0.83 inches per month. In addition, Western Regional Climate Center maintains daily climate data for a station located in Buckley, which is east of Bonney Lake. Their records date back to the year 1931 and show an average annual rainfall of 48.6 inches and an average of 1.81 inches per month for the summer months of July, August, and September. In comparison, for the years 1998 through 2002, average rainfall at this station during the summer months of July, August, and September was 1.06 inches per month, which is slightly higher than the data from the City's stations. For analysis purposes, the years 1998 through 2002 were picked because they corresponded to the recent years for which the City had good telemetry data for the summer months and subsequently demand factors used in this report were calculated. This weather data indicates that the last seven years have been drier than historical so the demand factors calculated should be slightly conservative.

Water Service Area

The City provides water service to most of the Lake Tapps plateau. The water service area 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
- 112th Street East/Buckley Boulevard/Rhodes Lake Road on the south.

The existing service area 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, Bowman Lake, and Prinz Basin. **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 Bonney Lake's corporate boundaries. **Table 2-1 - *Comprehensive Water Plan Areas*** lists the relative sizes of the jurisdictional boundaries and major water bodies in the WSA.

Table 2-1
Comprehensive Water Plan Areas

Description	Total Area Acres	Total Area Sq. Miles
Water Service Area		
WSA Legal Description	16,733	26.15
Water Bodies	2,936	4.59
Private Water Systems[2]	393	0.61
Bonney Lake WSA (Net)	13,404	20.94
Boundaries		
Bonney Lake WSA	13,404	20.94
Bonney Lake City Limits	4,627	7.23
Bonney Lake UGA	157	0.24
Auburn City Limits[1]	756	1.18
Auburn UGA[1]	138	0.22
Sumner City Limits[1]	142	0.22
Sumner UGA[1]	664	1.04
Pierce County UGA[1]	445	0.70
Water Bodies		
Lake Tapps	2,801	4.38
Printz Basin	27	0.04
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 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

[1]Within Bonney Lake's Water Service Area

[2]These systems have individual water service areas that are islands within the Bonney Lake water service 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 of Bonney has a Standard Service Area Agreement. In addition, Bonney Lake has modified its water service area boundaries with Tacoma Public Utilities 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**. The WSA boundary shown in this plan is based on various documents and agreements that established or modify the service area boundaries between adjacent purveyors. With the exception of the common boundary between Bonney Lake and Sumner, the WSA boundary used in this plan agrees with the boundary shown on current Pierce County GIS documents.

SATELLITE SYSTEM MANAGEMENT

A Satellite System Management Agency (SSMA) is defined as a person or entity that is certified by the 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 because 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 approvals of new water systems and sets forth requirements for SSMAs. The goal of the new 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 which are no longer viable, or existing systems placed into receivership status by the 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 the DOH,
- Participating in a pre-submittal meeting with the DOH,
- Submitting a 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 water service area which could be operated by the City. However, the City would prefer to obtain and outright own these systems 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**.

Supply Facilities

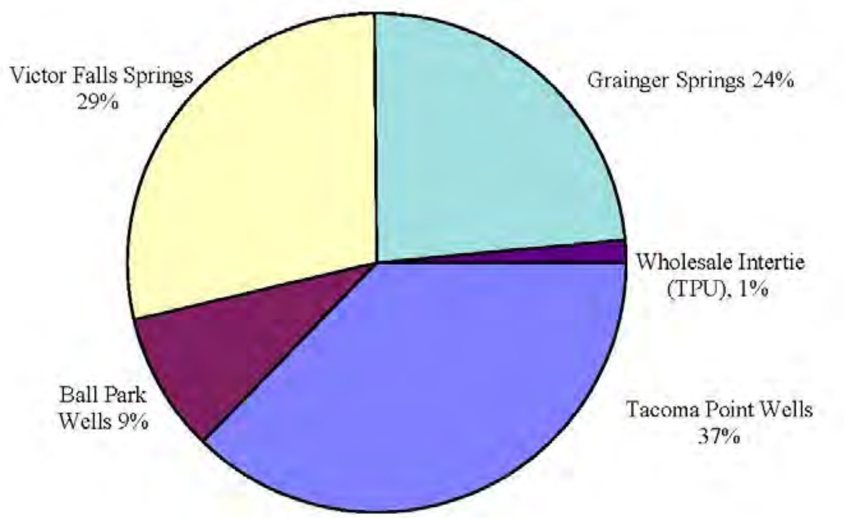
There are currently four water sources that provide drinking water to the Bonney Lake water system including two spring sites and two well fields. Descriptions of Victor Falls Springs; Grainger Springs; Well Nos. 1 and 8 (Ball Park Wells); and Well Nos. 2, 4, and 6 (Tacoma Point Wells) are included below. **Table 2-2 – *2006 Annual Production by Source*** **and Chart 2-1 - *2006 Annual Production by Source*** shows the relative utilization of each source on an annual basis.

Table 2-2
2006 Annual Production by Source

Source	Annual Production			Percent
Tacoma Point Wells	490,060,750 gals	1,504 acre*ft	1.34 MGD	37%
Ball Park Well	118,773,000 gals	365 acre*ft	0.33 MGD	9%
Victor Falls Springs	375,115,000 gals	1,151 acre*ft	1.03 MGD	29%
Grainger Springs	306,699,000 gals	941 acre*ft	0.84 MGD	24%
Wholesale Intertie (TPU)	19,266,984 gals	59 acre*ft	0.05 MGD	1%
Total	*1,309,914,734 gals*	*4,020 acre*ft*	*3.59 MGD*	*100%*

TPU = Tacoma Public Utilities

Chart 2-1
2006 Annual Production by Source



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 to 1,700 gpm (0.78 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 for 1998 through 2006 was 980 gpm (1.41 MGD).


Victor Falls Springs

Water is collected at three separate springs' 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 pump and one 150-horsepower pump with 1,000 gpm and 1,200 gpm (1.44 MGD and 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 a vertical hollow shaft, part wound, and 1,800 revolutions per minute (rpm) motors. The pumps are controlled by the water tank levels of the Ponderosa and Tacoma Point water tanks, as recorded by the telemetry systems. The pump station has complete chlorination (gas) facilities, which are located in a separate room with outside access, and a 250 kilowatt (kW) emergency power generator. In 2003, chlorine contact time 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 1995, the City utilized Victor Falls Springs as its major source. Over 56 percent of the City's total annual production was from this source, or approximately 1,424 acre-feet (1.27 MGD). This was primarily due to the high water quality of this source and to its proximity to the system's high demand areas. Over the last twelve 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 year. Therefore, in 2006 the City no longer utilized Victor Falls Springs as its major source and used only 1,151 acre-feet (1.03 MGD) from this source, or 29 percent of its total production.

Grainger Springs


Grainger Springs Treatment Facility

The Grainger Springs' facilities are located southwest of the summit of State Route 410 (18100 SR410). 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 for 1998 through 2006 was 880 gpm (1.27 MGD).

Grainger Springs' water is collected at perforated pipe 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 pumped into the distribution system by one 75-horsepower pump and one 150-horsepower pump with capacities of 500 gpm and 1,000 gpm (0.72 MGD and 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 tank levels of the Ponderosa and Tacoma Point water tanks, as recorded by the telemetry systems. This pump station includes complete chlorination facilities, which are located in a separate structure, and a 150 kW emergency power generator. 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.


Grainger Springs Pump

As in 1995, the City still utilizes Grainger Springs as its second largest source with 24 percent of its annual production from this source. This is still the case in 2006, although total production capacity has grown from 602 acre-feet (0.54 MGD) in 1995 to 941 acre-feet (0.84 MGD) in 2006, as the water system has grown. Grainger Springs is sill utilized as much as possible by the City due to the high water quality of this source and to its centralized location in the City's system.

Tacoma Point Wells


Tacoma Point Well No. 4 Building


Tacoma Point Well No. 6

Well Nos. 2, 4, and 6 are located at 1110 182nd Avenue East. Each well has its own pump house. Well No. 6 was developed in 1999 and treatment was upgraded to include pH control (caustic soda - NaOH) and change disinfection treatment from a gaseous chlorine system to a liquid bleach system (sodium hypochlorite – NaOCl). All three wells share the common chlorination facilities and pH control facility. Wells 2 and 4 have a diesel engine driven 250 kW generator backup power source which is located in the Well No. 2 pump house. Well 6 does not have a permanent backup power source but the treatment facility (located in the Well 6 building) does have a 35 KW generator back up power system 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 and Tacoma Point water tanks. For most of the year, only one of these wells is in use at a time. However, in the summer months during periods of high demands, it is sometimes necessary to operate both Well Nos. 2 and 4 simultaneously, and in peak periods 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 Building

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 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 125 horsepower pump is currently the only submersible pump in the Bonney Lake water system. The capacity of the submersible pump is approximately 750 gpm (1.08 MGD). The static water level is approximately 246 feet below the ground surface.

Well No. 4 was installed and tested in the spring of 1990. This well is equipped with a 150-horsepower 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 Well No. 4 is from 287 to 310 feet below ground level. The static water level was measured at 247.5 feet below the ground surface when Well No. 2 was pumping continuously at 810 gpm (1.17 MGD).

Tacoma Point Well No.4

Well No. 6 was installed and tested in the fall of 1998. This well is equipped with a 200-horsepower 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 from 287 to 310 feet below ground level. The static water level was measured at 247.5 feet below the ground surface when Well No. 2 was pumping continuously at 810 gpm (1.17 MGD).

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. This source is slightly more expensive to operate in comparison to the spring sources due to the depth of the groundwater and treatment requirements. However, by 2006, annual production for this source increased to 37 percent due to growth in the north end of the water system.

Ball Park Wells

Well No. 1 (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 Ave East). Treatment for this well is provided at the City's new Ball Park Treatment Facility located at the Well No. 8 (Ball Park Well No. 2) site. This Ball Park Well is also controlled by the telemetry systems at the Ponderosa and Tacoma Point water tanks.

Ball Park Well No. 1

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


Ball Park Well No. 1 Building

In 1995, the City only utilized the Ball Park Well as a summer peaking source. Less than three percent of the City's total annual production was from this source, due to the high concentrations of iron and manganese in this source. The degree to which the City relies on this source in the summer various each year based on weather and water demand conditions. In 2006 production from this source for the month of June, July, and August varied between 12 percent and 18 percent with an average of 15 percent. Prior to the new 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 Auburn and Lake Tapps Water Company, required the City to operate the Ball Park well much more than it had in the past. Ball Park made up approximately 16 percent of the City's total summer production that year (21 percent in July). As a result, numerous customers complaints were received by the City about water quality and the City made a commitment to build an iron and manganese treatment (filtration) facility for this source and to buy emergency water from the City of Tacoma Public Utilities in the summer of 2004 while this treatment facility was being constructed. In 2005, the new pressure filtration facility and onsite sodium hypochlorite generation disinfection system were brought online.

Well No. 8 (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 Building and is also controlled by the telemetry systems at the Ponderosa and Tacoma Point water tanks.


Ball Park Well No. 2 and Treatment Facility

Well No. 8 is 20 inches in diameter and is 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-horsepower 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.

As part of the Ball Park treatment upgrade project, the pump and motor at Ball Park Well No. 1 was replaced with a new 200 horsepower motor and VFD drive.

In addition, both wells have a diesel engine driven 350 kW generator backup power source which is located in the treatment building.

Storage Facilities

The City currently stores water in four water tanks: Tacoma Point Water Tank, Lakeridge Water Tank, and Ponderosa Water Tanks Nos. 1 and 2. Combined, they have a total volume of 5.7 million gallons. However, only 3.5 million gallons of this total is effective or usable storage that can be used for normal standby, equalizing and emergency fire flow demand. The remaining 2.2 million gallons is normally inactive storage and does not have adequate pressure to be used. However, during periods of extreme peaks the City is able to isolate the Ponderosa 800 tank by operating the Ponderosa 800 Pressure Zone as a closed system. This allows the City to utilize approximately 1.65 MG of additional storage in the Ponderosa 800 tank in the City's 748 Pressure Zone.

Tacoma Point Water Tank

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

Tacoma Point Water Tank

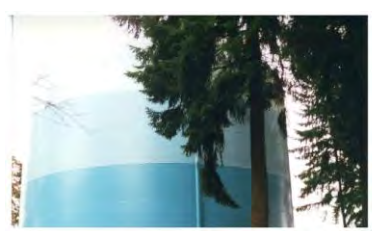
Lakeridge Water Tank

The Lakeridge Tank is located just south of the intersection of 171st Avenue Court East and Ridgewest Drive. The water tank is steel with a diameter of 63 feet and an overflow elevation of 741 feet. The total tank volume is approximately 0.8 million gallons, of which 100 percent is considered as effective storage. This water tank also has an altitude valve. This tank was built in 1963, has been repainted twice, the last time in 1994, and was seismically retrofitted.

Lakeridge Water Tank

Ponderosa Water Tank No. 1

Ponderosa Tank No. 1 is located south of Wilderness Ridge Division Two, west of the intersection of 202nd Avenue East and 108th Street East. The water tank is steel with a diameter of 63 feet and an overflow elevation of 748 feet. The total tank volume is approximately 1.0 million gallons, of which 100 percent is considered as effective storage. The water tank was equipped with an altitude valve in 1988. The telemetry system at City Hall controls the pumps that fill the tank. This tank was built in 1972, was repainted in 1994, and was seismically retrofitted.



Ponderosa Water Tank No. 1

Ponderosa Water Tank No. 2

Ponderosa Water Tank No. 2

Ponderosa Tank No. 2 is also located south of Wilderness Ridge Division Two. This steel tank is located just south of Ponderosa Tank Number 1. This tank has a diameter of 64 feet and an overflow elevation of 800 feet. The total volume of the tank is approximately 2.8 million gallons, of which 1.2 million gallons is considered effective storage. Pressures in the Ponderosa 800 Pressure Zone, or tank water levels, are used to control the Ponderosa Booster Pump Station that fills Ponderosa Tank Number 2. This tank was built in 1998.

Peaking Storage Tank (Construction 2007)

The City has completed the construction of a 15 MG peaking storage facility located at 21719 96th Street East. This prestressed concrete tank has a diameter of 275 feet and an overflow elevation of 652 feet. The total 15 MG storage volume will be available to either the City's 748 or 800 Pressure Zones via an on-site booster pump station.

Distribution System

Pipes

The existing distribution system consists of over 190 miles of pipe. Existing water pipe alignments and sizes are shown in plan view on **Figure 2 - *Existing Water System***. Currently, the distribution system does not extend into the eastern most portion of the water service area. **Table 2-3 - *Distribution System Inventory*** presents a summary of the total pipe within Bonney Lake's distribution and transmission system and identifies pipe by diameter and material. As this table shows, approximately 56 percent of the City's system is constructed with 6-inch and 8-inch diameter water mains and over 77 percent of the system consists of ductile iron pipe.

Table 2-3
Distribution System Inventory

Diameter	Sub-standard Material				Standard Material			Total	Percent
	Steel	AC	CI	PVC	DI	HDPE	C-900		
2-inch	800 ft.	-	-	11,928 ft.	-	-	-	12,728 ft.	1.3%
4-inch	39,478 ft.	14,325 ft.	1,433 ft.	-	38,481 ft.	-	-	93,717 ft.	9.3%
6-inch	26,947 ft.	10,806 ft.	14,974 ft.	-	47,670 ft.	-	-	100,397 ft.	10.0%
8-inch	40,167 ft.	1,053 ft.	10,417 ft.	-	409,476 ft.	-	1,311 ft.	462,424 ft.	46.1%
10-inch	-	-	5,567 ft.	-	28,267 ft.	591 ft.	-	34,425 ft.	3.4%
12-inch	25 ft.	-	36,710 ft.	-	211,416 ft.	-	1,497 ft.	249,648 ft.	24.9%
14-inch	-	-	-	-	-	746 ft.	-	746 ft.	0.1%
16-inch	-	-	9,058 ft.	-	38,014 ft.		-	47,072 ft.	4.7%
20-inch	-	-	-	-	-	1,524 ft.	-	1,524 ft.	0.2%
42-inch	320 ft.	-	-	-	-	-	-	320 ft.	0.0%
48-inch	160 ft.	-	-	-	-	-	-	160 ft.	0.0%
Total	107,897 ft.	26,184 ft.	78,159 ft.	11,928 ft.	773,324 ft.	2,861 ft.	2,808 ft.	1,003,161 ft.	100%
Percent	10.8%	2.6%	7.8%	1.2%	77.1%	0.3%	0.3%	100%	190 miles

The distribution systems in many residential areas consist predominately of 6-inch and 4-inch diameter mains, with 4-inch diameter mains located primarily in the older developments. Since 1995, the City has reduced the amount of 4-inch and 6-inch diameter mains in the system by approximately 13.5 miles or from composing 41 percent to less than 20 percent of the system.

Water mains of the 4-inch and 6-inch diameter mains are common and in some instances appropriate in water system if they are located on 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 6 - *Capital Improvement Plan*** presents distribution improvements to a number of these areas that would increase the fire flow capability by providing looped water mains.

Substandard Materials

Ductile iron (DI) pipe, high-density polyethylene (HDPE) pipe, and, in some cases, polyvinyl chloride (PVC) pipe are considered the most acceptable types of material for construction of water mains. 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 2-3 – *Distribution System Inventory*** shows that less than three percent of the City’s total system is constructed with AC pipe and that less than eight percent of the system consists of cast iron pipe. Since 1995, the City has reduced the amount of steel pipe in the system by approximately 17 miles; now only 10.8 percent of the system is constructed of steel pipe as compared to 30.7 percent twelve years ago.

Isolation Valves

As of 2006, there are approximately 1,645 isolation valves in the City’s system, which is twice as many as there were 12 years ago.

Fire Hydrants

In 1995 there were approximately 800 hydrants in the water system. The number of hydrants has almost doubled since then and it is now estimated that there are over 1,400 fire hydrants in the system.

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 interties with adjacent water systems. The locations of the interties are shown on **Figure 2 – *Existing Water System***. Four interties are located at the south end of the system and connect the City's system with the Tacoma Public Utilities' system. These four interties are metered and are located on Pipe Line Road, Rhode Lake Road, 112th Street East, and Connells Prairie Road. Three of the interties are for emergency use. The one on Connells Prairie is a temporary wholesale supply intertie. This intertie will become an emergency intertie once a permanent wholesale intertie is constructed near Pipeline road and 214th Avenue East.

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 will be installed in 2008.

The City also has an agreement with the City of Auburn wherein Bonney Lake agrees to sell water to Auburn to serve a maximum of two rural residential domestic service connections for lots that abut the Pierce/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 2-4 - *Water System Pressure Zones*** lists each pressure zone as it is commonly named and its nominal hydraulic elevation. The nominal hydraulic elevation is the overflow elevation of the highest water tank in the pressure zone, or the overflow elevation that a water tank would have if there was a water tank in the zone.

Table 2-4
Water System Pressure Zones

Pressure Zone	Nominal Hydraulic Elevation
Lakeridge	810 ft.
Ponderosa	800 ft.
Pinnacles Estates	795 ft.
Summit	790 ft.
Bonney Lake	748 ft.
Sky Island	660 ft.
166th Ave	630 ft.
47th Street	625 ft.
Angeline Valley	620 ft.
Rhodes Lake	565 ft.
Forest Canyon 2	530 ft.
Panorama West 1	465 ft.
Panorama West 2	385 ft.
Panorama West 3	385 ft.
Panorama West 4	310 ft.

Bonney Lake 748 Zone (Open Zone)

The majority of the City's customers (65 percent) are located in the 748 Zone. All sources of supply pump directly to this zone and three out of four water tanks are contained in this zone. The performance of this zone is hampered by the fact that all three of the existing water tanks in this zone have different overflow elevations. The Ponderosa Water Tank has the highest overflow elevation, 748 feet above sea level, and controls the water system. Due to their lower overflow elevations, neither the Lakeridge Tank (overflow of 742 feet) nor the Tacoma Point Tank (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 2.8 MG Ponderosa 800 tank, which are all located at the Ponderosa Tank site. See **Figure 2** for the extents of the Ponderosa 800 Zone. This zone contains two pressure reducing stations; one located on 104th Street East in the

Spiraea Glen neighborhood and another located between the Kelley Glade and Cedar View neighborhoods. Both 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 Bonney Lake water service area (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 served by three booster pumps located at the Lakeridge Tank site. See **Figure 2** for the extents of the Lakeridge 810 Zone. This zone contains two pressure reducing 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 Lake Tapps 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 southwest corner of the water service area 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 Heights 795 Zone (Closed Zone)

The Pinnacle Heights 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 Lake Tapps 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 water service area and 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 water service area and is served via a pressure reducing station off of the Angeline Valley 620 Zone and a pressure reducing station off of the Sky Island 660 Zone.

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, two at 385, and one at 310.

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 Ct. East pressure reducing station and the other is located west of 166th Avenue East on 47th Street Ct. Both of these zones are very small and are served with water from the boosted Lakeridge 810 Zone.

Panorama Heights Booster Pump Station

Pump Station Facilities

The City currently operates and maintains four booster pump stations. One is located at the Ponderosa Tank site and serves the Ponderosa 800 Zone. The second is located at the Lakeridge Tank 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 and a fourth smaller one is located in the Panorama Heights development and serves the Summit 790 Zone.

Ponderosa Booster Pumps

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

Ponderosa Booster Pump Station

Lakeridge Booster Pumps

This station consists of three pumps, one 20–horsepower, one 60–horsepower, and one 150–horsepower, 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 four domestic demand pumps, two ¾-horsepower pumps and two 5-horsepower pumps located in a CMU building. In addition, there is a dedicated emergency power generator. This station was constructed in 2004.

Pinnacle Estates Booster Pumps

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

Pinnacle Estates 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), which 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 of the valve 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 tank. Pressure reducing stations can also function as standby supply facilities that are normally inactive (no water flowing through them). The operation of this type of station is typically triggered 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 to allow water from a higher level pressure zone to flow into the lower level pressure zone at reduced pressures. 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 the same as that of a water tank with an overflow elevation the same as the pressure setting on the valve (hydraulic grade line). **Table 2-5 - *Pressure Reducing Valves*** summarizes the City's existing pressure reducing valves.

Table 2-5
Pressure Reducing Valves

Pressure Reducing Valve	Upper Pressure Zone	Lower Pressure Zone
South Tapps Drive	810 ft.	748 ft.
Sumner Tapps	810 ft.	748 ft.
Bonney Lake Boulevard	810 ft.	748 ft.
166th	810 ft.	630 ft.
47th	810 ft.	625 ft.
Spiraea Glen	800 ft.	748 ft.
Cedar View	800 ft.	748 ft.
Forest Canyon 1	748 ft.	650 ft.
Angeline Road North	748 ft.	620 ft.
Angeline Road South	748 ft.	620 ft.
Panarama Heights	748 ft.	620 ft.
Rhodes Lake Road	620 ft.	465 ft.
Creekridge Glen	565 ft.	465 ft.
Panorama West 1	565 ft.	465 ft.
Panorama West 2	465 ft.	385 ft.
Panorama West 3	465 ft.	385 ft.
Panorama West 4	385 ft.	310 ft.
Panorama West 5	385 ft.	310 ft.
Sky Island 1	748 ft.	660 ft.
Sky Island 2	748 ft.	660 ft.
Sky Island 3	660 ft.	465 ft.

Pressure Relief Valves

Pressure relief valves are installed to relieve inadvertent high pressures in a water system that may result one some component of the system fails. 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 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 booster pump stations.


Cedar View Pressure Relief Station

Treatment Facilities

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

Disinfection


Grainger Springs Onsite Chlorine Generator

The City operates and maintains chlorination facilities at each of its sources of supply. The City maintains an approximate chlorine concentration of 0.2 ppm throughout the system. In the past the City utilized gaseous chlorine as its primary method for disinfection. Staring in 2000, with the construction of the Tacoma Point treatment facility, the City began replacing its gas chlorinators with less hazardous methods of chlorination. The Tacoma Point wells are currently disinfected via a liquid bleach (sodium hypochlorite – NaOCl) system. When the Ball Park treatment facility and the Grainger Springs and Victor Falls treatment projects were completed in the spring of 2005, both the City's spring sources and the Ball Park wells were converted to onsite chlorine generation systems. In addition, a CT (chlorine Contact Time) of 6 is now maintained at both the Grainger Springs and Victor Falls sources.

pH Control


Tacoma Point Caustic Soda Tank

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 Spring source and became operational in 2005.

Filtration


Ball Park Pressure Tank

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 this well only a few days per year in the summer to meet the peak water demand. However, increase summer demands do to growth in the number of customers served by Bonney Lake 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. The City is currently constructing a pressure filtration facility to treat Ball Park water. This facility will utilize oxidation and filtration with chlorine and pyrolucite for removal of the iron and manganese, and includes recycling of the backwash water to maximize the amount of water provided to the system. This project was completed in 2005.

Telemetry and Control System


Grainger Springs Treatment Facility

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, operation problem, flood, fire or other emergency situations.

Successful operation of any municipal water system also requires a comprehensive operation and maintenance program which 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 updated its Supervisory Control and Data Acquisition (SCADA) System to include replacing the Master Telemetry Unit and adding dual monitors for water and sewers.

The existing control system consists of level-sensing devices that are connected directly to the motor starters at each well. Low levels in any of the water tanks start the pumps supplying that water tank.

Summary

The City's facilities are summarized in **Table 2-6** - ***Facility Information***.

Table 2-6
Facility Information

Facility	Description	Size	Type	Flow Rate	Installed	Control
Victor Falls Springs						
	Pump 1	125 HP	Vertical Turbine	1,000 gpm	1983	Pond. & TP Tank Levels
	Pump 2	150 HP	Vertical Turbine	1,200 gpm	1983	Pond. & TP Tank Levels
Pump 1 or Pump 2	EG Set	275 kW	Diesel	NA	2005	Power Failure
	Meter 1	8-inch	Water Specialties	gpm		4-20 mA
	Meter 2	8-inch	Water Specialties	gpm		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	Pond. & TP Tank Levels
	Pump 2	150 HP	Vertical Turbine	1,000 gpm	1972	Pond. & TP Tank Levels
Pump 1 only	EG Set 1	150 kW	Diesel	NA		Power Failure
	Meter	12-inch	Water Specialties	gpm		4-20 mA
for treatment	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	20% NaOH (dilute to 20%)	NA	2005	on/off with pumps (flow paced)
Ball Park Wells						
	Well 1	200 HP	Vertical Turbine	1,300 gpm	2005	Pond. & TP Tank Levels
well 1 only	Meter 1	8-inch	Water Specialties	gpm		4-20 mA and pulse
	Well 8	50 HP	Vertical Turbine	300 gpm	2005	Pond. & TP Tank Levels
well 7 only	Meter 2	6-inch	Water Specialties	gpm	2005	4-20 mA and pulse
well 1 and well 7	Meter 3	12-inch	Water Specialties	gpm	2005	4-20 mA and pulse
well 1 & 7 and treatment bldg.	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 Press. Filter	1,600 gpm	2005	Packaged control system
Tacoma Point Wells						
	Well 2	125 HP	Submersible	750 gpm	1991	Pond. & TP Tank Levels
	Well 4	150 HP	Vertical Turbine	1,200 gpm	1990	Pond. & TP Tank Levels
Wells 2, 4, & 6	Meter 1	12-inch	Water Specialties	gpm		4-20 mA
Well 2 or Well 4	EG Set 1	250 kW	Diesel	NA	1991	Power Failure
	Well 6	150 HP	Vertical Turbine	1,300 gpm	1999	Pond. & TP Tank Levels
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	50% NaOH (dilute to 10%)	NA	1999	on/off with pumps (flow paced)
Treatment bldg.	EG Set 2	35 kW	Diesel	NA	1999	Power Failure
Ponderosa Booster Station						
Domestic	Pump 1	7.5 HP	Centrifugal	250 gpm	1989	Pond Tank Level & low pressure
Domestic	Pump 2	7.5 HP	Centrifugal	250 gpm	1989	Pond Tank Level & low pressure
Domestic	Pump 3	7.5 HP	Centrifugal	250 gpm	1989	Pond Tank Level & low pressure
Domestic	Pump 4	7.5 HP	Centrifugal	250 gpm	1989	Pond Tank 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	Pond Tank Level & low pressure
Fire Flow	Pump 2	40 HP	Centrifugal	1,250 gpm	1993	Pond Tank Level & low pressure
	Meter 2	12-inch	Water Specialties	gpm	1993	4-20 mA
	EG Set	100 kW	Diesel	NA	1993	Power Failure
Lakeridge Booster Station						
	Pump 1	20 HP	VFD	610 gpm	2000	Low Pressure
	Pump 2	60 HP	VFD	1,250 gpm	2000	Low Pressure
	Pump 3	150 HP	VFD	2,000 gpm	2000	Low Pressure
	Meter	8-inch	Badger	gpm	2000	4-20 mA
	EG Set	250 kW	Diesel	NA	2000	Power Failure
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 w/ VFD	125 gpm	2006	Low Pressure
	Pump 4	10 HP	Centrifugal w/ VFD	125 gpm	2006	Low Pressure
	Pump 5	1.5 HP	Centrifugal w/ VFD	42 gpm	2006	Pressure
	Pump 6	1 HP	Centrifugal w/ VFD	27 gpm	2006	Pressure
	Meter	2-inch	Magnetic	gpm	2006	4-20 mA
	EG Set	80 kW	Diesel	NA	2006	Power Failure

Table Continued on Next Page

Table 2-6
Facility Information (Continued)

Table Continued from Previous Page

Facility	Description	Size	Type	Flow Rate	Installed	Control
Panorama Heights Booster Station						
Domestic	Pump 1	3/4 HP	Centrifugal	15 gpm	2004	Low Pressure
Domestic	Pump 2	5 HP	Centrifugal	60 gpm	2004	Low Pressure
Domestic	Pump 3	3/4 HP	Centrifugal	15 gpm	2004	Low Pressure
Domestic	Pump 4	5 HP	Centrifugal	60 gpm	2004	Low Pressure
	Meter	2-inch	Water Specialties	gpm	2004	4-20 mA
	EG Set	16 kW	Diesel	NA	2004	Power Failure
Interties						
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
Auburn	No Meter					Manual
Auburn	Meter	8-inch	Neptune	CCF	2003	Manual
Winchester Heights	Meter	2-inch	Precision	CCF	1998	Manual
Tapps Island Water	No Meter					Manual
Tanks						
Ponderosa 800	800 overflow	2.8 MG	Steel - 68' diam x 104' h		1998	overflow, Ponderosa BPS
Ponderosa 748	748 overflow	1.0 MG	Steel - 63' diam x 43' h		1972	overflow, 748 Zone
Lakeridge 748	742 overflow	0.8 MG	Steel - 63' diam x 33' h		1963	altitude valve, 748 Zone
Tacoma Point 748	738 overflow	1.1 MG	Steel - 44' diam x 100' h		1972	altitude valve, 748 Zone

ADJACENT WATER SYSTEMS

The existing Bonney Lake service area 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 service area to the east. Tacoma Public Utilities (TPU) water system borders the service area to the south and east, and the City of Sumner is located to the west.

Several small water companies are located within Bonney Lake's adopted water service area. These systems each have their own individual water service areas. They include 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***.