



# City of Bonney Lake

## WATER SYSTEM PLAN



*DOH Approved May 2020*  
*City Adopted February 2020*



**Final**  
**February 2020**

# ***City of Bonney Lake Water System Plan***

***February 2020***

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# Certification

## City of Bonney Lake *Water System Plan 2020*

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

This plan was approved by the Bonney Lake City Council on \_\_\_\_\_, 2020, approved by the Department of Health on \_\_\_\_\_ 2020. This plan was adopted by the Bonney Lake City Council on \_\_\_\_\_, 2020 via Ordinance \_\_\_\_\_.



  
\_\_\_\_\_  
Geoffrey G. Dillard, P.E.

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# ***EXECUTIVE SUMMARY***



Ascent Gateway – State Route 410

## **PURPOSE OF THE WSP**

The City of Bonney Lake’s (City) water system is a major infrastructure, much of which is invisible to its customers. The water system requires qualified staff to operate and maintain it, and an ongoing capital improvement program to replace old components and meet requirements mandated by federal and state laws. The primary purpose of the City’s Water System Plan (WSP) is to identify and schedule water system improvements that correct existing system deficiencies and ensure a safe and reliable supply of water for current and future customers. This WSP complies with Washington State Department of Health (DOH) regulations under Washington Administrative Code (WAC) 246-290-100, which requires water purveyors to update their water system plans every 10 years.

## ***Executive Summary***

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### **CHANGES SINCE THE LAST WATER SYSTEM PLAN**

The City's last *Water System Plan* was completed in 2009. Many changes have occurred since the last update that affect water system planning for the City.

- The City has secured additional wholesale water supplies to meet future demands.
- The DOH *Water System Design Manual* was last updated in December 2009. However, a draft version is currently available for public comment and was used as a guide for this update. The revisions primarily addressed water demand requirements and water system physical capacity analysis.
- Drinking water regulations are continually evolving to ensure that water purveyors are providing a safe and reliable water supply to their customers. Additional water quality monitoring requirements and revisions to existing regulations, such as the Groundwater Rule, and Stage 1 and 2 Disinfectants/Disinfection Byproducts Rules, have been implemented since the 2009 *Water System Plan* was completed.

### **SUMMARY OF KEY ELEMENTS**

This WSP 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, an overview of the operations and maintenance program, staffing requirements, a schedule of improvements, and a brief financial summary. The WSP also includes several ancillary elements, which include a Water Use Efficiency Program, a Water Quality Monitoring Plan, a Wellhead Protection Plan, and an Emergency Response Plan. A summary of the key issues related to the system is provided in the following sections.

#### **Water Service Area**

By the end of 2018, the City provided water service to approximately 13,574 customer accounts, or an estimated population of 38,797. 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 Bonney Lake Plateau. The City is responsible for providing public water service, utility management, and system development within its WSA. The WSA 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 provide service to all properties within its WSA. For this WSP, the WSA, the City's retail service area, and the area of use for water rights purposes are all considered the same area.

### **Historic Water Usage and Conservation**

The City has experienced a trend of decreasing water demands per equivalent residential unit (ERU) over the last several decades. This trend has been seen statewide and is attributed to water conservation efforts, low flow fixtures, less irrigation-intensive landscaping, smaller yards, tiered water rates, and less distribution system leakage. The City's per capita demand and water system leakage levels are fairly standard for the Puget Sound area. The City's per capita demand in 2018 was approximately 71 gallons per capita per day. This equates to approximately 197 gallons of water per day per household as averaged over one year. In 2018, the average amount of distribution system leakage (DSL) in the City's system was 8.6 percent.

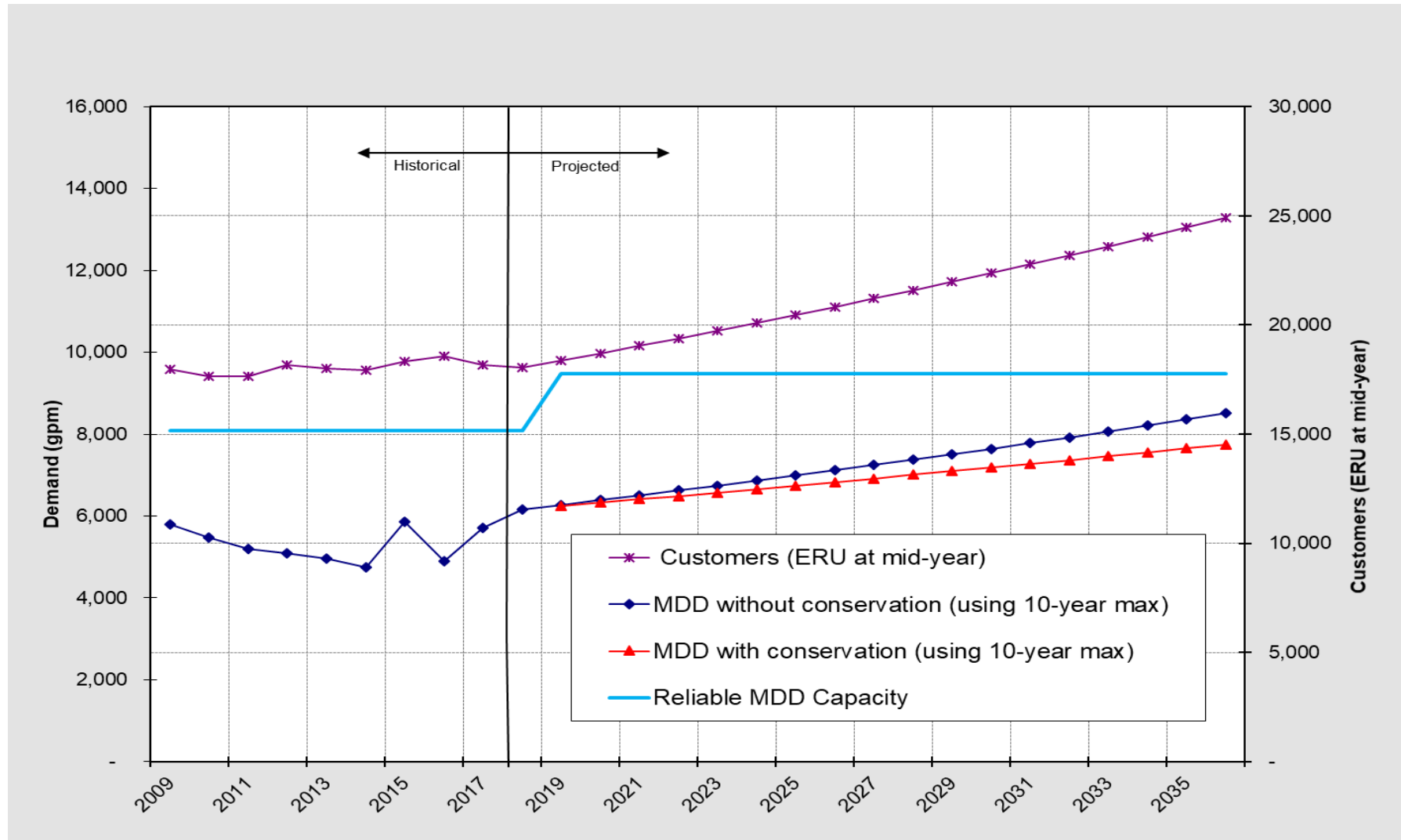
### **Future Water Supply and Demand**

Overall average annual water demand within the City's system is expected to increase approximately 20 percent within the next 10 years, and 43 percent within the next 20 years, based on growth and depending on the amount of future water use reductions from the City's Water Use Efficiency Program.

In 2005, the City entered into a wholesale water agreement to purchase up to 2.0 million gallons per day (MGD) of maximum day demand wholesale water supply from Tacoma Public Utilities (TPU). In 2011, the City entered into a second wholesale water agreement to purchase an additional 2 MGD of maximum day demand water from TPU through the Cascade Water Alliance's TPU allocation. This water will be used to augment both annual and peak water supply capacities for the City. It is now estimated that the City has sufficient water supply from its groundwater wells, springs and wholesale water supply to meet the demand requirements of the system for at least the next 20 years, as shown in **Chart ES-1 – *Water System Capacity***.

The City should evaluate and develop additional supply alternatives and aggressively pursue programs that protect its aquifers. In addition, the City should ensure that all of its sources are able to produce an optimum capacity of consistently high-quality water.

Chart ES-1 – Water System Capacity



## **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 205 miles of water main ranging in size from 2-inch to 16-inch diameter pipes; however, most of the system consists of 8-inch diameter and smaller pipes. Currently, the City's WSA is divided into 15 pressure zones, but developments along the western slopes of the Bonney Lake Plateau will require that at least 6 more pressure zones be established as these areas develop. A map of the City's existing water system is shown on **Figure 2 – Existing Water System**, located at the end of this WSP.

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 cannot provide adequate fire flows. These general areas are shown on the node diagram included in **Appendix J – Hydraulic Model Results**. 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 reservoirs with a total storage capacity of approximately 5.7 million gallons (MG). Based on current pressure zone configurations, these reservoirs 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) with slightly different overflow elevations. It is recommended that the City build additional storage in its higher Lakeridge 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. The existing 15 MG Peaking Storage Reservoir is used to augment supply during peak periods. Therefore, it is not included in the system's storage capacity calculations.

### **Sources of Supply**

The system is supplied by five municipal groundwater wells, two spring sources, and wholesale supplies from TPU. The City's potable water supply comes from several underground aquifers that are replenished from rainwater that falls on the plateau and from Lake Tapps seepage. The optimal production capacity of the City-owned sources of supply is approximately 5,869 gallons per minute (gpm), which is slightly less than the City's total instantaneous withdrawal water right for these sources of 6,254 gpm. However, the City's spring sources experience seasonal fluctuations that are a limiting factor in the system's ability to accommodate additional customers. Therefore, the reliable summer season supply capacity for the City-owned sources is based on their 10-year average low flow, which equals 5,540 gpm.



## ***Executive Summary***

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Additional sources of supply have been added to the City-owned sources to increase the City's overall reliable supply capacity. These include the 4 MGD wholesale supply and the supply from the City's Peaking Storage Facility. The City's total reliable capacity is 9,480 gpm when including these additional supplies

The City will need to develop both additional sources of supply and storage capacity to meet state requirements and accommodate new customers through WSA build-out. The City's existing sources need to be protected from contamination and decreases in capacity due to loss of natural recharge areas.

Currently, the City has the right to pursue additional water supply using interruptible water rights purchased from the Cascade Water Alliance. Further investigation of these rights may lead to a reliable source of supply that can be used by the City to meet future demands. In addition, the City will strive to use its existing water sources efficiently by continuing its current water conservation measures, leaky main replacements, and water rate incentives, and implementing other proposed measures as outlined in the City's Water Use Efficiency Program, which is included in **Appendix C – *Water Use Efficiency Program***.

### **Water Quality**

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 source and slightly low pH at the Tacoma Point and Grainger Springs sources. The drinking water regulations change frequently 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.

In addition, the City should continue to protect its sources from nitrate contamination from septic systems through the monitoring of nitrates in the groundwater and by prohibiting septic systems in the recharge areas of the City's sources. This is an ongoing concern in the Falling Waters Development and Victor Falls Elementary School areas.

### **Operations and Maintenance**

The City's operations and maintenance (O&M) 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 ensure a smooth and safe operation of the water system. The current staff of supervisory personnel and field crew, 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 kept up with the level recommended. In order to properly maintain the system and handle water system expansion in the future, additional staff will be required. The City should plan to add staff to meet the increased requirements from system expansion. This is discussed in more detail in **Chapter 8 – *Operations and Maintenance***.

The City has taken several steps to prepare for emergency situations. An emergency response plan and vulnerability assessment have been developed. The City should continue to assess the vulnerability of its major water system facilities for a number of emergency events.

### **Proposed Water System Improvements and Financing Plan**

Improvements to the water system are necessary to resolve existing system deficiencies and accommodate the increase in water demands from future growth. Improvements identified for the 10-year capital improvement program (2019 through 2028) are estimated to cost approximately \$30.4 million, which results in an average expenditure of approximately \$3 million per year. Improvements in the following 10 years (2029 through 2038) are estimated to cost approximately \$26.5 million, which results in an average expenditure of approximately \$2.7 million per year.

The first 10 years of capital improvements can be funded from a combination of sources that include connection charges, commodity rates, reserves, and other funding sources if available.

### **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 DOH. The results of the evaluation are summarized below.

- The City has sufficient water supply to meet the demands of water customers through 2038.
- Additional storage is needed for system redundancy and 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 distribution system leakage.
- Several areas of the system require the replacement of existing water mains to resolve deficiencies related to low fire flows, aging water main, and substandard water main materials.
- Additional pressure zones, pressure reducing stations, and pressure relief valves are needed to accommodate growth along the west side of the Bonney Lake Plateau.
- Another rate study should be conducted to evaluate the City's future need to fund improvements and an adequate O&M program.



# INTRODUCTION



Peaking Storage Booster Pump Station

## 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, portions of unincorporated Pierce County, and portions of the corporate boundaries of the Cities of Auburn and Sumner. The City's water service area (WSA) also serves parts of the City of Auburn's and City of Sumner's Potential Annexation Areas (PAA), as well as parts of Pierce County's Urban Growth Area (UGA). Water system data on file at the Washington State Department of Health (DOH) for the City's system is shown below in **Table 1-1 – Water System Ownership Information**.

**Table 1-1  
Water System Ownership Information**

<b>Information Type</b>	<b>Description</b>
System Type	Group A - Community - Public Water System
System Name	Bonney Lake Water Department
County	Pierce
DOH System ID Number	07650H
Owner Number	575
Address	P.O. Box 7380, Bonney Lake, WA 98391
Contact	Mr. Dave Cihak, Assistant Superintendent of Public Works - Water
Contact Phone Number	(253) 447-4312

**OVERVIEW OF EXISTING SYSTEM**

At the end of 2018, the City provided service to approximately 13,574 customer connections, or 19,102 equivalent residential units (ERU), within the City’s WSA, which extends beyond the City limits. The City limits comprise an area of approximately 8 square miles, and the WSA is approximately 26 square miles (including water bodies). It is estimated that at the end of 2018, the City served a population of 19,562 within the city limits and a population of 38,797 system-wide. Approximately half of the City’s customers are located within City limits.

Water supply to the system is provided by two wellfields and two spring sources. In addition, wholesale water supply is provided by Tacoma Public Utilities (TPU) via one wholesale intertie and four emergency interties. The City also has six other emergency interties with adjacent purveyors in the north end of the City’s WSA. 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. The City has five storage reservoirs. Four of these are in open pressure zones and provide a system storage capacity of 5.7 million gallons (MG). 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. In addition, the City’s water system has 15 pressure zones with 28 pressure reducing stations, 7 booster pump stations, and approximately 205 miles of water main. A summary of 2018 water system data for the City’s system is shown in **Table 1-2 – Water System Data**.

**Table 1-2  
Water System Data**

<b>Description</b>	<b>1996</b>	<b>2018</b>
Population (estimated at year end)	19,003	38,797
Water Service Area <sup>1</sup>	28 sq mi	26 sq mi
Total Connections (Accounts)	6,673	13,574
Total Customers (ERU at year end)	7,743	18,181
Total Customers (ERU at mid year)	7,322	18,048
Demand per ERU (for year shown)	328 gpd	197 gpd
Demand per ERU used in WSP (10-year max)	329 gpd	213 gpd
Annual Supply	786 MG	1,307 MG
Average Day Demand	1,495 gpm	2,487 gpm
Distribution System Leakage	14.0%	8.6%
Maximum Day Demand/Average Day Demand Factor	2.31	2.31
Peak Hour Demand/Maximum Day Demand Factor	1.38	1.67
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) <sup>2</sup>	NA	1 (1,390 gpm)
Total Water Rights (Qi)	6,314 gpm	9,093 gpm
Total Water Rights (Qa)	5,326 afy	8,054 afy
Number of Booster Pump Stations (Total Capacity)	2 (4,500 gpm)	5 (10,560 gpm)
Peaking Storage Pump Capacity	NA	2,300 gpm
Wholesale Intertie Pump Capacity	NA	1,500 gpm
Number of System Reservoirs (Total Capacity)	3 (2.93 MG)	4 (5.7 MG)
Peaking Storage Reservoir (Storage Capacity)	NA	1 (15.0 MG)
Number of Pressure Zones	6	15
Number of Pressure Reducing Stations	4	28
Total Length of Water Main	122 miles	205 miles
Total Isolation Valves	783	3,139
Total Fire Hydrants	800	1,754
<b>Note:</b>		
<sup>1</sup> The City relinquished approximately 2 square miles of WSA to Tacoma Public Utilities.		
<sup>2</sup> Only two of four potential pumps are currently installed at the Prairie Ridge Booster Pump		

## AUTHORIZATION AND PURPOSE

In January 2019, the City authorized RH2 Engineering, Inc., (RH2) to update its Water System Plan (WSP) to include the most recent data available and as required by state law under WAC 246-290-100. In accordance with Washington Administrative Code (WAC) 246-290-100, water system plans shall be updated and submitted to the DOH every 10 years. The City's previous

## CHAPTER 1

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WSP was prepared in 2007 and approved/adopted in 2009. The purpose of this updated WSP 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 resolve existing system deficiencies and accommodate future needs of the system for at least 20 years into the future.
- To prepare a schedule of improvements to correct deficiencies and maintain the system.
- To evaluate water quality and identify water quality improvements, as necessary.
- To document the City's operations and maintenance program.
- To document water use efficiency, 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.

### SUMMARY OF WSP CONTENTS

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

- The **Executive Summary** provides a brief summary of the key elements of this WSP.
- **Chapter 1** introduces the reader to the City's water system, the objectives of the WSP, and the WSP 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 sources and water quality.
- **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.
- The **Appendices** contain additional information and plans that supplement the main chapters of the WSP.

### DEFINITION OF TERMS

The following terms are used throughout this WSP.

**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 that is made up of both the Capital Facilities Charge and the Meter Service Connection Charge.

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

**Demand:** The quantity of water required from water supply sources over a period of time necessary to meet the needs of domestic, commercial, industrial, and public uses and to provide enough water to supply firefighting, 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;
- **Maximum Day Demand (MDD):** 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 1-hour time period of a given year.

**Equivalent Residential Units (ERUs):** One ERU represents the amount of water used by one typical 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 firefighting, which is usually expressed in terms of 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 a purveyor delivers to any public water system user, measured at the locations identified under WAC 246-290-300, Table 3.

**Meter Service Connection Charge:** This installation charge or hook-up fee is paid by a property owner to reimburse the City for the cost incurred to make the physical connection to the water system. This includes both direct and indirect costs 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, the 748 Zone refers to the City’s pressure zone that has reservoirs 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 divided into the following five components: 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 cost of providing water to new customers and recognizes that the existing water system was largely built and paid for by the existing customers.

**Water Service Area (WSA):** The specific area where the City has the duty to provide water service. The WSA has a recognized boundary by the Pierce County *Coordinated Water System Plan* and includes all areas that receive existing service from the City and areas where future service is planned. For this WSP, the WSA, the retail service area, and the area of use for water right purposes are all considered the same.

## LIST OF ABBREVIATIONS

The abbreviations listed in **Table 1-3 – Abbreviations** are used throughout this WSP.

**Table 1-3**  
**Abbreviations**

<b>Abbreviation</b>	<b>Description</b>
4DMD	4-Day Maximum Demand
AC	Asbestos Cement
AC	Authorized Consumption
ADD	Average Day Demand
afy	acre-feet per year
AMR	Automated Meter Reading
AWWA	American Water Works Association
BLMC	Bonney Lake Municipal Code
bgs	Below Ground Surface
BPS	Booster Pump Station
CCF	Hundred Cubic Feet
CCR	Consumer Confidence Report
CCTF	Corrosion Control Treatment Facility
CDBG	Community Development Block Grant
CFR	Codified Federal Register
CI	Cast Iron
CIP	Capital Improvement Program
CMU	Concrete Masonry Unit
CT	Contact Time
CUGA	Comprehensive Urban Growth Area
CWA	Certificate of Water Availability
CWSSA	Critical Water Supply Service Area
D/DBPR	Disinfectants/Disinfection Byproduct Rule
DBP	Disinfection Byproduct
DI	Ductile Iron
DOH	Department of Health
DSL	Distribution System Leakage
DSL	Digital Subscriber Line
DWSRF	Drinking Water State Revolving Fund
EC+	E-coli Coliform Postive Result
Ecology	Department of Ecology
EPA	Environmental Protection Agency
ERU	Equivalent Residential Unit
ESA	Endangered Species Act
FAZ	Forecast Analysis Zone
fps	feet per second
<i>Continued on Next Page</i>	

**Table 1-3  
Abbreviations (Continued)**

<i>Continued from Previous Page</i>	
<b>Abbreviation</b>	<b>Description</b>
GDR	Groundwater Disinfection Rule
GIS	Geographic Information System
GMA	Growth Management Act
gpcd	gallons per capita per day
gpm	gallons per minute
GUI	Groundwater Under Influence
GWI	Groundwater under the Direct Influence of Surface Water
GWR	Groundwater Rule
HAA	Haloacetic Acids
HDPE	High Density Polyethylene
HGL	Hydraulic Grade Line
ht	height
hp	Horsepower
HWL	High Water Level
IDSE	Initial Distribution System Evaluation
IESWTR	Interim Enhanced Surface Water Treatment Rule
IOC	Inorganic Chemicals
ISO	Insurance Services Office
kW	Kilowatts
LCR	Lead and Copper Rule
LID	Local Improvement District
LNR	Legislative Non-reauthorization
LT2ESWTR	Long Term 2 Enhanced Surface Water Treatment Rule
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDD	Maximum Day Demand
MF	Multi-family
MG	Million Gallons
mg/L	milligrams per liter
MGD	Million Gallons per Day
MPA	Microscopic Particulate Analyses
MPP	Multi-county Planning Policies
MRDL	Maximum Residual Disinfectant Levels
MSDS	Material Safety Data Sheets
MSL	Mean Sea Level
MTU	Master Telemetry Unit
MUTCD	Manual of Uniform Traffic Control Devices
MWL	Minimum Water Level
<i>Continued on Next Page</i>	

**Table 1-3**  
**Abbreviations (Continued)**

<i>Continued from Previous Page</i>	
<b>Abbreviation</b>	<b>Description</b>
NA	Not Available or Not Applicable
NaOCl	Sodium Hypochlorite
NaOH	Sodium Hydroxide
NFPA	National Fire Protection Agency
NGVD	National Geodetic Vertical Datum
NPDWR	National Primary Drinking Water Regulation
NTU	Nephelometric Turbidity Units
O&M	Operations and Maintenance
OFM	Office of Financial Management
OSHA	Occupational Safety & Health Administration
PAA	Potential Annexation Area
PCB	Polychlorinated Biphenyls
PC-CWSP	Pierce County Coordinated Water System Plan
pCi/l	Picocuries per Liter
pH	Potential of Hydrogen (measure of acidity)
PHD	Peak Hour Demand
ppm	parts per million
PRV	Pressure Reducing or Relief Valve
psi	pounds per square inch
PSRC	Puget Sound Regional Council
PVC	Polyvinyl Chloride
PWTF	Public Works Trust Fund
Qa	Annual Withdrawal Water Right
Qi	Instantaneous Water Right
RCW	Revised Code of Washington
rpm	rotations per minute
RTU	Remote Telemetry Unit
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
<i>Continued on Next Page</i>	

**Table 1-3  
Abbreviations (Continued)**

*Continued from Previous Page*

<b>Abbreviation</b>	<b>Description</b>
STL	Steel
SWTR	Surface Water Treatment Rule
TC+	Total Coliform Result
TCR	Total Coliform Rule
TDH	Total Dynamic Head
THM	Trihalomethane
TP	Total Production
TPU	Tacoma Public Utilities
UCMR	Unregulated Contaminant Monitoring Rule
UGA	Urban Growth Area
USGS	United States Geological Survey
VFD	Variable Frequency Drive
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 (Retail Service Area)
WSDCTED	Washington Department of Community Trade and Economic Development