

CHAPTER 1

INTRODUCTION

INTRODUCTION

The Water System Plan (WSP) for the Northshore Utility District (District) has been developed in accordance with the latest revision to Chapter 246-290 of the Washington Administrative Code (WAC), as presented in the Washington State Department of Health (DOH) regulations for Group A Public Water Systems, effective March 30, 2012. A copy of the Northshore Utility District's (District) Water Facilities Inventory Form, DOH Water System Plan Checklist, and DOH submittal form is provided in Appendix A. Correspondence and comments from King County and the neighboring cities regarding the WSP are included in Appendix B.

PURPOSE

The purpose of this WSP is to describe a long-term water planning strategy for the District's water service area. The WSP evaluates the existing system and its ability to meet the anticipated requirements for water source, quality, transmission, storage, and distribution across a 20-year planning horizon in accordance with the Growth Management Act (GMA). Water system improvement projects have been developed to meet the changing demands of regulatory impacts, population growth and development, and infrastructure repair and replacement. The WSP also identifies the costs of the improvement projects and provides a financial plan for funding the projects.

PLAN SUMMARY

This WSP consists of 11 chapters:

- Chapter 1 provides an introduction, plan summary, and historical information about the water system.
- Chapter 2 provides an overview of the current and new regulatory requirements applicable to the District. This chapter includes discussions regarding regulatory requirements, regulatory agencies, system design standards, and water quality standards.
- Chapter 3 provides the planning criteria used in developing the planning strategy for the next 20 years, including growth management, land use planning, intergovernmental coordination, related planning documents,

regional conservation programs, and population trends. This chapter includes a discussion of franchise agreements with adjacent agencies.

- Chapter 4 provides a discussion of the existing water system components, including source of supply, water rights, water treatment, SCADA system, storage, transmission, and distribution.
- Chapter 5 identifies the water use characterization and forecasting, including service connections, water use, and projected water demands for the 20-year planning period.
- Chapter 6 provides the hydraulic analysis for the water system using H₂ONet modeling software. This chapter illustrates how the system responds to various modeling scenarios, including identifying available fire flows and system pressures.
- Chapter 7 analyzes the water system components and their ability to meet the projected demands on the system. This chapter evaluates the potential for water reuse, including sources, uses, and additional facilities needed.
- Chapter 8 provides a discussion of the operations and maintenance programs established by the District.
- Chapter 9 presents a conservation and water use efficiency plan and including goals for reducing water usage and a summary of past conservation efforts. This chapter discusses the potential for water reuse and reclamation.
- Chapter 10 presents the District's capital improvement plan and incorporates the projects discussed in Chapters 6, 7, 8 and 9.
- Chapter 11 presents a review of the current financial status of the District along with a discussion of funding for the identified capital improvement projects.

HISTORY OF THE DISTRICT

Northshore Utility District was originally formed in 1947 as King County Water District No. 79. The District operated only as a water purveyor until 1979 when it merged with the Northeast Lake Washington Sewer District. It then became known as the Northeast Lake Washington Water and Sewer District. In 1992, the name was changed to Northshore Utility District.

The District's first water comprehensive plan was completed in 1949. Four utility local improvement districts (ULID) were formed in 1950 to provide financing for the construction of the public water system. Initial construction was completed using asphalt-dipped and wrapped steel pipe. Once the transmission main along Bothell Way NE was completed in 1952, operation of the District commenced.

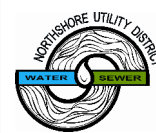
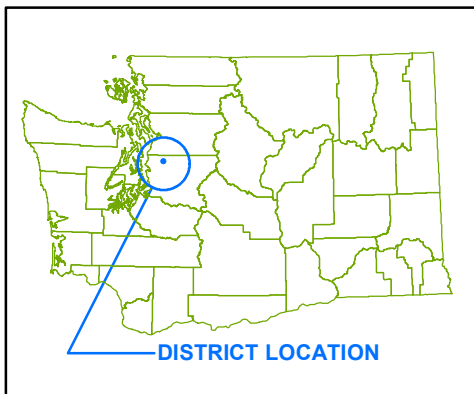
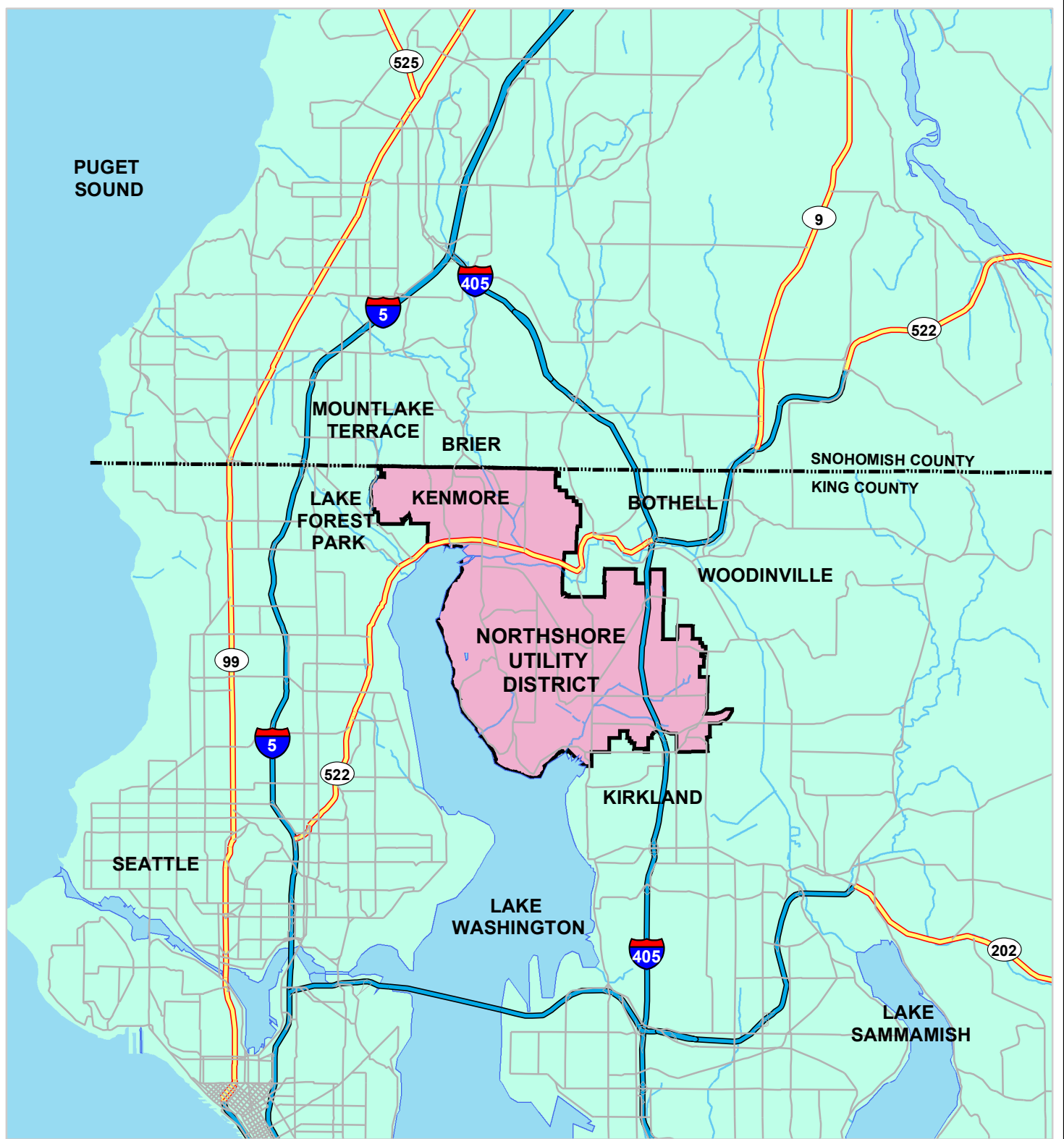
A historical timeline is presented in Table 1-1. The location of the District and its boundaries within Washington State are in Figure 1-1. Figure 1-2 provides a water system base map, including the location of all major facilities.

TABLE 1-1**Historical District Timeline**

Year	Event
1947	Water District No. 79 (WD 79) formed
1949	First Comprehensive Plan developed
1950	Public water system construction financed by four ULIDs
1952	Water main construction completed using asphalt-dipped and wrapped steel pipe
1952	Transmission main on Bothell Way completed from Lake Forest Park
1959	Water main construction completed using asbestos cement (AC) pipe
1962	3.0 MG steel reservoir at Inglemoor, booster station, and supply line constructed
1963	Connection to the Tolt pipeline completed
1967	3.0 MG steel standpipe at Inglemoor constructed
1969	Water main construction completed using polyvinyl chloride (PVC)
1975	24-inch transmission main across Sammamish River to Inglemoor completed
1978	3.0 MG Westhill Standpipe constructed
1979	WD 79 and Northeast Lake Washington Sewer District merged
1981	30-year contract executed with Seattle Public Utilities for the supply of water
1981	3.5 MG steel reservoir completed at Inglemoor Tank Farm
1982	3.0 MG Kingsgate Standpipe completed
1983	4.2 MG steel reservoir completed at Inglemoor Tank Farm
1984	Steel main replacement program begun
1984	Water main construction completed using ductile iron (DI) pipe
1985	Inglemoor Booster Station expanded by 2-100 HP pumps
1987	Lake Forest Park 4.3 MG concrete reservoir completed
1987	Lake Forest Park Booster Station completed
1989	AC main replacement program began
1991	Norway Hill Reservoir 5.0 MG completed
1992	Name changed to Northshore Utility District
1993	Norway Hill Booster Station completed
1998	District office facility completed
2005	Reservoir seismic improvements completed
2005	60-year contract with Seattle Public Utilities executed
2005	Vulnerability Assessment completed
2006	Updated 2006 District Design Standards adopted
2013	Inglemoor Booster Station Upgrade and SEOC
2013	NUD Headquarter Expansion
2013	3.5 MG Reservoir 3 Roof Replacement and Coating
2014	4.2 MG Reservoir 2 Roof Repairs and Recoating
2014	3.0 MG Reservoir 1 Roof Repairs and Recoating

CAPITAL IMPROVEMENTS

Capital improvements are routine and necessary for maintaining a water system. System components need to be upgraded, added, or replaced. Chapter 10 presents the District's



WATER SYSTEM PLAN

**FIGURE 1-1
LOCATION MAP**

Gray & Osborne, Inc.

Capital Improvement Plan for the next 20 years but cannot predict all improvements that will be necessary. Table 1-2 shows the capital improvements completed since the last WSP (2009). Some of these projects were part of the CIP chapter from the last plan while others were improvements due to development or became necessary at a later date.

TABLE 1-2**Capital Improvements Completed**

Year	Project	2009 WSP CIP Number	Year	Project	2009 WSP CIP Number
2008	134/108 WM Replacement	-	2010	147/84 WM Extension	-
2008	134/64 WM Replacement	-	2010	155/79 WM Replacement	-
2008	135/HPD WM Replacement	-	2010	169/112 WM Extension	-
2008	143/92 WM Replacement	-	2010	197/42 WM Extension	-
2008	144/88 WM Replacement	-	2010	Westhill VA Improvements	M-13
2008	68/HPD Water Extension	E-64	2010	Wild Glen WM Revision	-
2008	Kingsgate VA Improvements	M-12	2011	117/84 WM Replacement	-
2009	120/84 WM Replacement	-	2011	132/Juanita WM Replacement	-
2009	138/Juanita WM Replacement	-	2011	156/74 WM Extension	-
2009	140/117 WM Replacement	-	2011	193/49 WM Extension	-
2009	144/119 WM Replacement	-	2011	193/58 WM Extension	-
2009	145/121 WM Replacement	-	2012	133/72 WM Extension	-
2009	153/Juanita WM Replacement	-	2012	149/72 WM Extension	-
2009	165/72 WM Replacement	-	2012	163/90 WM Extension	-
2009	165/Juanita WM Replacement	-	2012	190/57 WM Extension	-
2009	175/89 WM Replacement	-	2012	196/63 WM Extension	-
2009	PRV#10 Modifications	-	2012	198/62 WM Extension	-
2009	PRV#14 Completion	-	2012	202/73 WM Extension	-
2009	PRV#44 Modifications	-	2013	124/116 WM Replacement	-
2009	PRV#6 Replacement	P-1	2013	128/115 WM Replacement	-
2009	SR 522 WM Replacement	R-21/R-22	2013	133/88 WM Replacement	-
2010	116/98 WM Replacement	R-24	2013	168/72 WM Replacement	-
2010	119/73 WM Extension	-	2013	181/61 WM Replacement	-
2010	124/84 WM Replacement	-	2013	NUD HQ Improvements	M-3
2010	129/63 WM Replacement	-	2014	162/81 WM Replacement	-
2010	145/78 WM Replacement	-	2014	Inglemoor Pump House & SEOC	M-6

Note: WM = water main, HQ = headquarters, PRV = pressure reducing valve.

ORGANIZATION

The District is a special purpose district with the authority to operate under Title 57 of the Revised Code of Washington. A five-member board of commissioners that are elected by voters to serve a 6-year term governs the District. The terms are staggered such that elections for each position are held in alternate years. The Board sets the general policies

for the operation of the District. The General Manager is selected by the Board and administers the daily operations of the District.

District staff is organized into six departments: Engineering, Operations, Finance, Information Systems, Human Resources and Fleet/Facilities. These departments are operated by individual Directors that report to the General Manager who reports to the Board of Commissioners. The Engineering Department is responsible for developing and implementing the capital improvement programs and for bringing water and sewer services to areas of new development. It interacts with developers and contractors, reviews design plans, monitors contracts, and inspects constructions. The Finance Department is responsible for utility billing and the financial affairs and functions of the District. The Fleet & Facilities Department is responsible for District vehicle and facility upkeep. This department also maintains vehicles for local agencies that contract with the District for the service. The Human Resources Department is responsible for the development and administration of policies and matters relating to personnel. It is also responsible for purchase/inventory and employee safety. The Information Systems & Technology Department is responsible for the information systems and technological resources for the District. The Operations and Maintenance Department is responsible for the operation and maintenance of the water and sewer systems including all related support services. It is also responsible for emergency response planning and related activity.

The Directors oversee the functions of their respective departments and may be assisted by one or more Supervisors. Many functions like emergency response planning and long-term planning are accomplished through coordinated group efforts.

LIST OF ABBREVIATIONS

AC	Asbestos Cement
ADD	Average Daily Demand
AWWA	American Water Works Association
AWWD	Alderwood Water and Wastewater District
BAT	Backflow Assembly Tester
BPS	Booster Pump Station
CCC	Cross-Connection Control
CCCS	Cross-Connection Control Specialist
CCP	Concrete Cylinder Pipe
CCR	Consumer Confidence Report
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CI	Cast Iron
CWA	Cascade Water Alliance
D/DBP	Disinfection/Disinfection By-products
DI	Ductile Iron
DNS	Determination of Nonsignificance

DOH	Washington State Department of Health
DSL	Distribution System Leakage
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ERU	Equivalent residential unit
ESA	Endangered Species Act
ESWTR	Enhanced Surface Water Treatment Rule
FONSI	Finding of No Significant Impact
GIS	Geographic Information Systems
GMA	Growth Management Act
gpcd	Gallons per capita per day
gpd	Gallons per day
gpm	Gallons per minute
GW	Groundwater under the influence of surface water
GWR	Groundwater Rule
HCP	Habitat Conservation Plan
HPA	Hydraulic Project Approval
ICR	Information Collection Rule
IDSE	Initial Distribution System Evaluation
IOC	Inorganic Chemical
ITP	Incidental Take Permit
KCDNR	King County Department of Natural Resources
LCR	Lead and Copper Rule
MCL	Maximum Contaminant Level
MDD	Maximum Day Demand
MG	Million gallons
mg/L	Micrograms per liter
mg/L	Milligrams per liter
mgd	Million gallons per day
NAS	National Academy of Sciences
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NMFS	National Marine Fisheries Service
PHD	Peak hourly demand
psi	Pounds per square inch
PRV	Pressure reducing valve
PVC	Polyvinyl chloride
PWTF	Public Works Trust Fund
RCW	Revised Code of Washington
RSA	Retail Service Area
RWA	Snohomish River Regional Water Authority
SCADA	Supervisory Control and Data Acquisition
SDWA	Safe Drinking Water Act
SEPA	State Environmental Policy Act

SOC	Synthetic Organic Chemical
SPU	Seattle Public Utilities
SRF	State Revolving Fund
SWTR	Surface Water Treatment Rule
TAZ	Transportation Analysis Zone
TESSL	Tolt Eastside Supply Line
THM	Trihalomethanes
TOC	Total Organic Carbon
TTHM	Total Trihalomethanes
UBC	Uniform Building Code
UGA	Urban Growth Area
ULID	Utility Local Improvement District
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile Organic Chemical
WAC	Washington Administrative Code
WDFW	Washington State Department of Fish and Wildlife
WDM	Water Distribution Manager
WDS	Water Distribution Specialist
WSP	Water System Plan

GLOSSARY OF TERMS

Some important terms used in this Plan are defined as follows:

Average Day Demand (ADD): The total quantity of water use from all sources of supply as measured or estimated over a calendar year divided by 365 days. ADD is typically expressed as gallons per day.

Backflow: The undesirable reversal of flow of water or other substances through a cross-connection into the public water system or consumer's potable water system.

Backflow Assembly Tester (BAT): A person holding a valid BAT certificate issued in accordance with WAC 246-292.

Closed System: Any water system or portion of a water system in which water is transferred to a higher pressure zone closed to the atmosphere, such as when no gravity storage is present.

Comprehensive Monitoring Plan: A schedule that describes both the frequency and appropriate locations for sampling of drinking water contaminants as required by state and federal rules.

Conservation Program: Policies and activities implemented to encourage or cause efficient use of water on a long-term basis. Conservation programs shall include identification of the conservation objectives of the purveyor, evaluation of conservation measures considered, and identification of specific conservation measures identified for implementation.

Contaminant: A substance present in drinking water that may adversely affect the health of the consumer or the aesthetic qualities of the water.

Cross-Connection: Any actual or potential physical connection between a public water system or the consumer's water system and any source of non-potable liquid, solid, or gas that could contaminate the potable water supply by backflow.

Cross-Connection Control Program: The administrative and technical procedures the purveyor implements to protect the public water system from contamination via cross-connections in accordance with WAC 246-290-490.

Cross-Connection Control Specialist: A person holding a valid CCS certificate issued in accordance with WAC 246-290-490.

Dead Storage: The volume of stored water not available to all consumers at the minimum design pressure in accordance with WAC 246-290-230(5) and (6).

Design and Construction Standards: DOH design guidance and other peer reviewed documents generally accepted by the engineering profession as continuing fundamental criteria for design and construction of water facility projects. Design and construction standards are composed of performance and sizing criteria and reference general construction material and methods.

Disinfection: The use of chlorine or other agent or process the DOH approves for killing or inactivating microbiological organisms, including pathogenic and indicator organisms.

Distribution Reservoir: A water storage structure that is integrated with a water system's distribution network to provide for variable system demands, including, but not limited to, daily equalizing storage, standby storage, or fire reserves, or to provide for disinfectant contact time.

Distribution System: All piping components of a public water system that serve to convey water from transmission mains linked to source, storage, and treatment facilities to the consumer, excluding individual services.

Drinking Water State Revolving Fund (DWSRF): The revolving loan program financed by the state and federal governments and managed by the state for the purpose of

assisting water systems to meet their capital needs associated with complying with the federal Safe Drinking Water Act (SDWA).

Emergency: An unforeseen event that causes damage or disrupts normal operations and requires immediate action to protect public health and safety.

Emergency Source: Any source that is approved by DOH for emergency purposes only, is not used for routine or seasonal water demands, is physically disconnected, and is identified in the purveyor's emergency response plan.

Equalizing Storage: The volume of storage needed to supplement supply to consumers when the peak hourly demand exceeds the total source capacity.

Equivalent Residential Unit (ERU): A system specific unit of measurement used to express the amount of water consumed by a typical full-time single-family residence, expressed in gpd.

Financial Viability: The capability of a water system to obtain sufficient funds to construct, operate, maintain, and manage a public water system on a continuing basis, in full compliance with federal, state, and local requirements.

Fire Flow: The maximum rate and duration of water flow needed to suppress a fire in accordance with WAC 246-290-640 or as required under local fire protection authority standards.

Fire Suppression Storage: The volume of stored water available during fire suppression activities to satisfy minimum pressure requirements in accordance with WAC 246-290-230.

Hydraulic Analysis: The study of a water system's distribution main and storage network to determine present or future adequacy for provision of service to consumers within the established design parameters for the system under peak flow conditions, including fire flow.

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

Maximum Contaminant Level Violation: A confirmed measurement above the MCL and for a duration of time, where applicable, as outlined in accordance with WAC 246-290-310.

Maximum Daily Demand (MDD): The highest actual or estimated quantity of water that is, or is expected to be, used over a 24-hour period, excluding unusual events or emergencies. MDD is typically expressed as gallons per day, gpd/ERU or gpm.

Normal Operating Conditions: Those conditions associated with the designed, day-to-day provision of potable drinking water that meets regulatory water quality standards and the routine service expectations of the system's consumers at all times, including meeting fire flow demands. Operation under conditions such as power outages, floods, or unscheduled transmission or distribution disruptions, even if considered in the system design, are considered abnormal.

Operational Storage: The volume of distribution storage associated with source or booster pump normal cycling times under normal operating conditions and is additive to the equalizing and standby storage components, and to fire flow storage if this storage component exists for any given tank.

Peak Hourly Demand (PHD): The maximum rate of water use, excluding fire flow, that can be expected to occur within a defined service area over a continuous 60-minute time period. PHD is typically expressed in gallons per minute (gpm).

Potable: Water suitable for public consumption.

Public Water System: Defined and referenced in accordance with WAC 246-290-020.

Purchased Source: Water a purveyor purchases from a public water system not under the control of the purveyor for distribution to the purveyor's consumers.

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

Reclaimed Water: Effluent derived in any part from sewage from a wastewater treatment system that has been adequately and reliably treated, so that as a result of that treatment, it is suitable for beneficial use or a controlled use that would not otherwise occur, and it is no longer considered wastewater.

Repeat Sampling: A sample collected to confirm the results of a previous analysis.

Service Connection: A connection to a public water system designed to provide potable water to a single-family residence or other residential or nonresidential population.

Source Meter: A meter that measures total output of a water source over specific time periods.

Standby Storage: The volume of stored water available for use during a loss of source capacity, power, or similar short-term emergency.

Surface Water: A body of water open to the atmosphere and subject to surface runoff.

Synthetic Organic Chemical (SOC): A manufactured carbon-based chemical.

Transmission Line: Pipes used to convey water from source, storage, or treatment facilities to points of distribution mains, and from source facilities to treatment or storage facilities. This also can include transmission mains connecting one section of the distribution system to another section of the distribution system as long as this transmission main is clearly defined as such on the plans and no service connections are allowed along the transmission main.

Volatile Organic Chemical (VOC): A manufactured carbon-based chemical that vaporizes quickly at standard pressure and temperature.

Water Right: A permit, claim, or other authorization, on record with or accepted by the Department of Ecology, authorizing the beneficial use of water in accordance with all applicable state laws.

Water Shortage: A situation during which the water supplies of a system cannot meet the normal water demands for the system, including peak periods.

Water Shortage Response Plan: A plan outlining policies and activities to be implemented to reduce water use on a short-term basis during or in anticipation of a water shortage.